

## SECTION VII

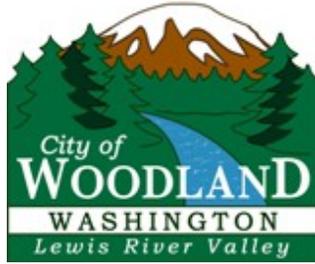
## SECTION VII - DESIGN AND CONSTRUCTION STANDARDS

Standard construction specifications for the distribution system are identified in the City policy document *Woodland Construction Standards* provided in this chapter (referred to herein as the City Standards). In general, the City Standards provide sizing criteria, detailed material specifications and criteria for installation of water mains and appurtenances. Administrative procedures for main extensions and main replacement are discussed in Section I.

Standard detail drawings have been developed to allow for uniform installation of water mains, service meters, valves, thrust blocks and appurtenances. The standard details are provided in Appendix G.

DOH will review the City Standards concurrently with this Water System Plan (WSP). Upon approval of the City Standards by DOH, the City may replace piping and extend distribution mains without further review by DOH if the replacement or extension is consistent with the City Standards and the WSP. As a condition of the approval, the City must keep accurate records of distribution extensions and replacement projects. The records that must be kept include record drawings and engineering certifications. Typically, most distribution extensions should be designed by a professional engineer and in all cases approved by the Public Works Director prior to construction.

It should be noted that the City Standards only provide detailed guidelines for distribution mains and related appurtenances. Proposed improvements such as a pump station, source improvements, or storage tanks must be reviewed by DOH on a case-by-case basis.



## **CITY OF WOODLAND WATER SYSTEM STANDARDS AND SPECIFICATIONS**

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### **I. INTRODUCTION**

The City of Woodland Water System Standards and Specifications are minimum base level performance, design, and construction standards used to maintain uniformity of design within the water utility.

The standards herein contained shall not supersede any other legally constituted standards that are more stringent than these standards.

### **II. DESIGN CONSIDERATIONS**

#### **A. Pipe Sizing**

The minimum main size shall be established by hydraulic analysis using the appropriate land use designation to develop both domestic and fire flow requirements. The minimum main size shall be 8" in diameter.

#### **B. Flow Requirements**

##### **(1) Required Minimum Fire Flow**

Table 1 presents the minimum fire flow requirements applicable to the various development classifications. Additional flow above these minimums may be required by the local fire protection authority for commercial or industrial complexes or large structures with exposure hazards. The developer is required to meet any specific commercial or industrial site requirements.

##### **(2) Water Pressure**

Water systems shall be hydraulically designed to provide a maximum pressure range of 35-100 psi with desired range of 40-90 psi. A minimum residual pressure of 30 psi under maximum instantaneous design flow is required. A 20 psi residual pressure shall be maintained throughout the

system under combined fire flow and peak demand conditions at the meter or property line.

<b>TABLE 1 REQUIRED MINIMUM FIRE FLOW</b>	
Land Use Classifications	Minimum Fire Flow Requirements (*)
Low Density Residential	1000 gpm
High Density Residential	1500 gpm (**)
Commercial	1500 gpm
Industrial	2000 gpm (**)
<p>(*) Minimum fire flow requirements are in addition to maximum instantaneous domestic demand.</p> <p>(**) Commercial and industrial buildings may be subject to higher flow requirements when evaluated on an individual basis by the local fire protection authority.</p>	

(3) Storage

Minimum fire storage volumes shall be sized to be compatible with fire flow requirements of the Department of Health or the local fire protection authority, whichever is more stringent, in addition to standby storage and equalizing storage requirements.

(4) Hydrant Maintenance

Public fire hydrants shall be installed in compliance with these minimum standards and located within publicly owned easements and rights-of-way. The City shall be responsible for mechanical maintenance.

(5) Variance from Standard

The local fire protection authority (LFPA) may require or allow, and shall approve, any variance in required fire flow and/or other requirements in consideration of factors not encompassed within this standard (e.g., large commercial complexes, large structures with exposure hazards, consideration of automatic sprinkler protection, etc.).

(6) Other Standards

The LFPA in conjunction with the water utility, using the Insurance Services Office's grading schedule for municipal fire protection as a guide, may establish or require additional standards or specifications as required for water supply criteria not specifically set forth herein.

C. Valving

Valving shall be installed on all legs of all crosses and tees unless otherwise required. In addition, unvalved lengths of pipe should not exceed 500 feet in school, commercial, or multi-family areas, and 800 feet in residential areas, where customers are being served.

D. Fire Hydrants

Fire hydrants shall be connected to an 8" minimum diameter main. A minimum 6" diameter lateral pipe is required for connecting to hydrants located 50 feet or less from the main line and a minimum 8" diameter lateral pipe is required where hydrants are located more than 50 feet from an 8" or larger main.

Fire hydrant location shall be determined by the appropriate local fire authority. In general, hydrants shall be predicated on the location of street intersections wherever possible, and located to minimize the hazard of damage by traffic. They shall have an average normal spacing of 600 feet within residential areas measured along the street frontage. In no case shall hydrants be placed farther than 700 feet apart and no building shall be more than 350 feet from the nearest hydrant. In commercial or industrial areas, the maximum hydrant spacing shall be 300 feet.

E. Facility Placement

All piping, pumping, source, storage and other facilities shall be located on public rights-of-way or dedicated utility easements. Utility easements must be a minimum of 20 feet in width and piping shall be installed no closer than 5 feet from the easement's edge. Exceptions to this minimum easement may be approved by the operating water utility. Unrestricted access shall be provided to all public water system lines utilities.

F. Pipe Cover

A 3-foot minimum cover is required from the finished or existing ground surface; whichever is greater, to the top of the pipe for all installed transmission and distribution mains. The minimum cover for service piping shall be 24-inches to the top of piping outside of traveled areas.

G. Air and Air-Vacuum Relief Valves

Air or combined air-vacuum relief valves shall be situated at designated points of high elevation throughout the system.

H. Blow-off Valves

A blowoff assembly shall be installed on all permanent dead-end runs and at designated points of low elevation within the distribution system. The blowoff assembly shall be installed in the utility right-of-way. In no case shall the location be such that there is a possibility of back-siphonage into the distribution system.

I. Separation Distances

Transmission and distribution water piping shall be separated at least ten feet horizontally from on-site waste disposal piping, drainfields, sewage collection piping or sewer force mains. All parallel and crossing installations of water and sewer lines shall be installed in accordance with provisions in the current version of the DOH Water System Design Manual.

J. Auxiliary Power

Unless directed otherwise by the utility, all source and booster pumping facilities shall be equipped with auxiliary power pigtail outlets and at least manual transfer switching devices.

K. Flow Measurement

All service lines shall be installed so that each residential, commercial, and industrial structure will have a separate metered service for domestic water received from the utility. If approved by the designated utility, domestic water consumption may be measured by a master meter for service to a complex under single ownership and where water utility line subdivision is impractical. Service lines providing fire flow may be required to be equipped with fire detection check or other appropriate metering devices, as directed by the designated utility.

L. Cross Connection Control

Where the possibility of contamination of the supply exists, water services shall be equipped with appropriate cross connection control devices in accordance with WAC 246-290. The City cross-connection control program shall determine the need, size, kind, and location of the device.

III. Material Specifications

A. Introduction

All pipe, valves, meters, hydrants, fittings and special material shall be new, undamaged and designated for use in potable water systems. Potability shall be established through verification of compliance with NSF Standards 60 and 61, in accordance with WAC 246-290-220. Material used on water projects shall comply with each project's detailed plans and specifications. In general, all materials and specifications shall be in conformance with the Standard Specifications for Road, Bridge, and Municipal Construction, WSDOT and APWA, and the specification of the American Water Works Association, except as modified herein.

B. Pipe, Joints and Fittings

1. General

All pipe sizes, as shown on the drawings, and as specified herein, are in reference to "nominal" diameter, unless otherwise indicated. One type of pipe shall be used throughout the entire project except as necessary to

match existing pipe or as otherwise specified. Where location of or replacement of existing piping is necessary during construction, materials used shall be subject to the approval of the City.

2. Ductile Iron Pipe (DI)

Ductile iron pipe shall conform to the requirements of AWWA C151 specifications. Pipe thickness shall be of Class 50, or greater if required in accordance with the criteria specified in AWWA C150.

Ductile Iron Pipe shall be cement lined and sealed in accordance with AWWA C104. In addition, all pipe shall have push-on rubber gasket joints and be furnished in 10 to 20 foot lengths unless design conditions dictate otherwise.

3. Polyvinyl Chloride (PVC)

8- inch through 12-inch PVC pipe shall be AWWA C900, Class 150.

PVC Pipe larger than 12-inches shall meet the requirements of AWWA C905 with a minimum DR of 26.

All pipe shall be furnished in 18 to 20 foot lengths unless design conditions dictate otherwise and assembled with a non-toxic lubricant.

4. Polyethylene Pipe (PE)

All polyethylene pipe shall be rated for a working pressure of at least 160 psi. This pipe shall comply with ASTM D-2239 and D-1248. The pipe shall be appropriately marked to designate the nominal pipe size, type of plastic material, pipe dimension ratio or pressure rating and ASTM or AWWA designation code. The pipe shall bear the National Sanitation Foundation seal signifying its use for potable water. The pipe from the main to the meter shall be copper tubesize (CTS) and connected with standard brass or bronze fittings by the use of pack joint with stainless steel insert stiffeners. Pack joints shall be equipped with a split clamp locking device. The pipe shall be installed with locating devices as approved by the City.

5. Copper Pipe

All copper service pipe shall be rated in accordance with ASTM Designation B88, Type K soft copper tubing.

6. Fittings

All fittings shall be of the size, type, and type of joint as specified on the plans, by the designated utility, or by the pipe manufacturer.

## C. Valves

### 1. Gate Valves

Resilient seated gate valves shall be manufactured and tested in accordance with AWWA C515 specifications. They shall be equipped with mechanical joints or flange ends of Class 125 in accordance with ANSI B16-1.

Gate valves, 3" and larger, shall be iron body, bronze-mounted, double disc, and "O"-ring stem seal. Gate valves smaller than 3" shall be 125 psi, non-stem rising, wedge disc, all brass or bronze valves with screwed, soldered, or flanged ends compatible with the connecting pipe. All valves shall open counterclockwise and, unless otherwise specified, shall be non-rising stem type equipped with standard AWWA 2-inch square stem operating nuts.

### 2. Butterfly Valves

Butterfly valves shall meet or exceed all AWWA C504 specifications and shall be Class 150-B with short body which are suitable for direct bury. When they are installed they shall have a position indicator, which clearly shows position of the disc. All valves shall be equipped with an underground manual operator with AWWA 2-inch square operating nut and shall open with a counterclockwise rotation.

### 3. Check Valves

Check valves, 3" or larger, shall be iron body, iron disc, bronze-mounted, swing type, clearway, quiet closing, lever and spring valves with flanged ends. All valves shall comply with AWWA C508 specifications.

Check valves, 2-1/2" or smaller, shall be bronze body, bronze mounted, swing type with flanged or threaded ends depending upon installation.

### 4. Air and Air-Vacuum Relief Valves

Air and air-vacuum relief valves shall have cast iron bodies and covers and stainless steel floats. Float guides, bushings, and lever pins shall be stainless steel or bronze. Valves shall be designed for operating service to 150 pounds per square inch (psi).

### 5. Pressure Reducing Valve

This valve shall maintain a constant downstream pressure regardless of varying inlet pressure. It shall be hydraulically operated, pilot-controlled diaphragm-type globe or angle valve. The main valve shall have a single removable seat and a resilient disc. The stem shall be guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. No external packing glands are permitted, and there shall be no pistons operating the main valve or any pilot controls.

The pilot control shall be a direct-acting, adjustable, springloaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice. All valves shall be equipped with mechanical joints of flanged ends.

6. Valve Boxes

All valve boxes shall be cast iron, 2-piece, equipped with suitable extension for at least a 36" trench depth. The top section and lid will be designed for installation in traffic areas. Lid is to be labeled "W" with lid tabs pointing in the direction of the water main.

7. Fire Hydrants

Fire hydrants shall conform to AWWA Standard C502 for post-type, dry-barrel, self-draining hydrants suitable for at least a 36" depth. Each hydrant shall be equipped with a 6" inlet, a minimum valve opening of 5 1/4", two 2-1/2" hose connections, and one 4-1/2" pumper port. All ports shall have national standard threads, and the 4-1/2" pumper port shall be national standard threads. All valves and caps shall open counterclockwise and have 1-1/2" flat point pentagon operation and cap nuts. Hydrants shall be break-away traffic models. Fire hydrant valves shall comply with Section III.C.1 or 2. and shall be provided with a valve box as specified herein. Fire hydrants shall be fitted with a storz adaptor on the steamer port.

8. Cross Connection Control Devices

All cross connection control devices will be specified by the City cross connection control program based on the degree of potential hazard. Such devices will comply with models approved by the Department of Health in accordance with WAC 246-290.

IV. Construction Standards

A. General

Installation of water systems shall conform at a minimum to the Standard Specifications for Road, Bridge, and Municipal Construction, WSDOT and APWA and the specifications of the American Water Works Association, standard C600, and according to the recommendations of the manufacturer of the material or equipment concerned. Prior to construction, a service connection must be applied for and approved by the City. All requirements of the service connection approval shall become part of these specifications.

B. Fire Hydrant Installation

Hydrant installation shall conform to AWWA Standard C600 provisions. Fire Hydrants shall stand plumb and be set to the finish grade. The center of the

lowest outlet of the hydrant shall be no less than 18" above finished grade. In addition, all hydrants shall be installed with a minimum of a 36" unobstructed radius around the hydrant. Hydrants shall be aligned so that pumper ports face toward the road or most probable route of access, if roads are not available, as determined by the appropriate local fire protection authority.

D. Locate Wire

All piping and services shall be installed with UL listed, type UF, 14-gauge, solid copper wire coated (blue) the entire length, taped to the top of the pipe to prevent movement during backfilling and laid loose enough to prevent stretching and damage before being brought up and tied off at the valve box in such a way that the wire is easily accessible from the ground surface. Two (2) feet of slack will be provided to allow for connection to the locator.

C. Hydrostatic Pressure Test

A hydrostatic and pressure leakage test will be conducted on all newly constructed water mains, fire lines, fire hydrant leads and stub-outs in accordance with WSDOT/APWA Standard Specifications, Section 7-09, and AWWA C-600 specifications, unless specified otherwise by the City.

D. Disinfection and Bacteriological Testing

All water mains shall be flushed and disinfected in accordance with AWWA Standard C651. All reservoirs shall be flushed and disinfected in accordance with AWWA Standard C652. Treatment Plants and wells will be disinfected in accordance with AWWA Standard C653 and C654.