

SECTION 2
WATER DESIGN AND CONSTRUCTION REQUIREMENTS

		Page
2-1	DESIGN REQUIREMENTS	
	2-1.01 Introduction	2-3
	2-1.02 Distribution System Extensions to Support Development	2-3
	2-1.03 Connection to Existing System	2-3
	2-1.04 Water Main Locations; Easements	2-4
	2-1.05 System Reliability; Looping	2-4
	2-1.06 Water Pipe Materials and Size	2-5
	2-1.07 Depth of Cover	2-6
	2-1.08 Coordination with Other Utilities; Water Main Profiles	2-6
	2-1.09 Air Release, Vacuum Release and Blow-off Valves	2-6
	2-1.10 Isolation Valves	2-6
	2-1.11 Thrust Blocks and Restrained Joints	2-7
	2-1.12 Deflection at Pipe Joints	2-8
	2-1.13 Cross-connection Control	2-8
	2-1.14 Water Demand vs. Meter Size	2-8
	2-1.15 WSDOT/Railroad Crossings	2-8
	2-1.16 Fire Hydrant Spacing Requirements	2-9
	2-1.17 Resources	2-10
2-2	CONSTRUCTION REQUIREMENTS	
	2-2.01 General	2-11
	2-2.02 Ductile Iron Pipe	2-11
	2-2.03 Ductile Iron Fittings	2-11
	2-2.04 Restrained Push-On Joints	2-11
	2-2.05 Restrained Mechanical Joint	2-12
	2-2.06 Valves	2-12
	2-2.07 Valve Boxes	2-13
	2-2.08 Standard Air Release Valves	2-13
	2-2.09 Standard Blowoff Assemblies	2-13
	2-2.10 Tapping Sleeves	2-13
	2-2.11 Tapping Valves	2-13
	2-2.12 Standard Fire Hydrant Assembly	2-14
	2-2.13 Trench Excavation, Bedding and Backfill	2-14
	2-2.14 Compaction of Backfill	2-15
	2-2.15 Cutting and Plugging Existing Pipe	2-15
	2-2.16 Water Services	2-16
	2-2.17 Relocating Existing Water Services	2-16
	2-2.18 Abandoning Water Services	2-16
	2-2.19 Hydrostatic Testing	2-16
	2-2.20 Disinfecting Water Mains	2-16
	2-2.21 Connection to Existing System	2-16

2-3 WATER STANDARD PLAN DETAIL SHEETS
W-1 to W-29

2-17

SECTION 2 WATER DESIGN AND CONSTRUCTION REQUIREMENTS

2-1.01 Introduction

The City of Vancouver Water Utility provides drinking water to areas within the City limits and outside the City limits as designated by the 2011 Coordinated Water System plan. This entire area is considered the “City of Vancouver Water System Boundary”. The goal of the Water System Planning and Design Section is to provide technical management, comprehensive planning, and sound engineering to expand and maintain a safe, reliable and sustainable water supply, distribution, and storage system for high-quality customer service and fire protection.

The Water System Planning and Design section provides engineering, standards, and conducts reviews to support a water supply and distribution system that is safe, reliable, durable, and maintainable. Privately-funded water mains proposed to be connected to the City’s system are reviewed for compliance with City standards and to ensure that water mains can continue to be extended to new users in a logical and cost-effective manner.

The following requirements are intended to be used as guidance during the design stages of new developments needing connection to the City of Vancouver water system. The Requirements do not replace professional engineering design or specific project reviews. City staff, including Fire Department officials, may impose different requirements based on site-specific reviews.

These requirements are intended to supplement but not duplicate the construction and installation details in Section 2-2 and Water Standard Plan Details W-1 to W-29.

2-1.02 Distribution System Extensions to Support Development

Developing properties must extend utility lines to the site, across the property frontage, and through the property, to allow connection and provide for future extensions for the development of adjacent parcels. Additional offsite work may be required to provide a looped water main for water quality, fire protection, or system redundancy purposes. Any existing water main that is substandard in size or material shall be replaced. Proposed water line sizes and alignments must be designed in accordance with the latest Water System Comprehensive Plan, or other appropriate master plans, as determined by the City staff for overall system development and network extension (City of Vancouver Resolution M-2492). To obtain a written statement of the preliminary utility requirements for a specific site, a Preliminary Information Request (PIR) may be submitted. PIR forms are available from the City’s Development Review Services Engineering Counter located at City Hall, 415 W 6th Street, 360-487-7800.

2-1.03 Connection to Existing System

All new water mains must connect to an existing public water main. This can be accomplished by cutting the existing main and inserting a tee or cross, by tapping an existing main, or by removing a cap or plug on an existing main and connecting to the

end of the main. Connection to an existing main may be done only after disinfection, testing, and approval by City staff of the new main. An exception to this is to use a pre-sterilized, closed, approved valve to connect to the new main before any water is allowed to flow.

2-1.04 Water Main Locations; Easements

Water mains shall generally be in public rights of way, except where needed to serve onsite fire hydrants, buildings on private roads, and adjacent properties.

The standard location for water mains is on the north or east side of street centerline, 6 feet from the curb, on the street side of the curb. Other locations to avoid existing utilities and proposed utility crossings may be approved.

Public water facilities that are not in the public right-of-way must be in an easement dedicated to the City of Vancouver. The easement is intended to allow access for maintenance by City staff, and to prevent any structure or tree from interfering with the facility or hindering access to it. The easement shall be of a standard form, provided at the City's Community and Economic Development Department Engineering Counter located at City Hall, 415 W 6th Street, 360-487-7804.

Water facilities that require easements on private property include water mains, fire hydrants, water services to the water meter, and water meters. The easement boundary should generally be near the downstream side of a water meter, or 7.5 feet past the fire hydrant. Water meter easements shall be a minimum of 10' wide.

Water easements shall be 15 feet wide or greater. Shared utility easements with water and one other utility such as sanitary sewer or storm water shall generally be a minimum of 20 feet wide. Shared utility easements with water and two other utilities such as sanitary sewer and storm water shall generally be a minimum of 25 feet wide. Wider easements may be required depending on the depth and size of the utilities or if there are public water mains within 10 feet of a property line. Spite strips and any separations intended to deny access to the water main by adjoining properties shall not be allowed. Easements shall have no structures on them and shall be paved or covered with approved landscaping (not to include trees). Easements for private roads shall include the entire roadway and all water meters. The easement shall be described as such.

2-1.05 System Reliability; Looping

Looped water mains are desirable for fire flow, system reliability during maintenance, and for water quality. Dead ends shall be avoided, except as needed to provide for future service, and for cul-de-sacs and fire hydrants. Water main loops shall be completed wherever possible. An extension to provide for future looping may be required, even if such extension is not required to serve adjacent properties. Dead-end extensions shall be provided with a standard blowoff assembly, or with a temporary blowoff assembly; see Water Standard Detail Sheets.

2-1.06 Water Pipe Materials and Size

The water meter size shall be determined by the water customer or their designee. Water services shall be sized as required by water demand and on-site fire protection service flow. Services 1 and 2 inches in diameter shall be either Municipex PEX-A (or approved equal) with tracing wire or Type “K” copper. Services for water meters 3 inches or larger shall be a minimum of 4 inches and be Class 52 zinc coated ductile iron pipe. No 2-1/2 or 3 inch pipe shall be allowed.

Water mains shall be constructed of externally zinc coated ductile iron pipe; Class 52 for 12 inch diameter and smaller mains, Pressure Class 350 for 14 inch diameter and larger mains, and per the City of Vancouver Water Standard Detail Sheets.

All ductile iron fittings shall be mechanical joint (MJ) fittings with certain exceptions. A flanged (FLG) connection is required between the mainline branch and a gate valve on; a fire hydrant lead, a fire protection service, a tapping assembly, and on all 4 inch and larger diameter service leads per the Standard Details which makes particular MJ x FLG fittings necessary. There will be no FLG x FLG fittings allowed.

New water mains that are provided for future extensions will be sized consistent with the City of Vancouver Water System Comprehensive Plan, as interpreted by City staff. For locations not covered by the Comprehensive Plan, City staff will determine the necessary size during the development review process. For preliminary planning, size the new main according to the existing grid, or 8 inches diameter, whichever is larger.

Mains of a size larger than indicated above may be required based on fire flow needs and the water system pressure at a particular location.

In certain cases, the City may require a water main that is larger than needed by the development alone. If this oversize main is 12 inches or more in diameter, the City may participate in the cost difference between the larger main required, and the size of the main needed for the development alone. However, decisions by the courts may mean that the developer must pay prevailing wages to qualify for this cost participation. To initiate a review of this possible participation, the developer needs to submit a request for City participation to Community Economic Development Engineering, 415 W 6th Street, 360-487-7804.

Dead end mains 50 feet or shorter to serve only a fire hydrant shall be a minimum of 6 inches in diameter. Dead end runs longer than 50 feet to serve a fire hydrant shall be a minimum 8 inches in diameter.

Dead end mains to the end of a residential cul-de-sac where the water main cannot be extended in the future shall be minimum 8 inches in diameter to the last hydrant and 4 inches in diameter past the last hydrant to the end. The diameter reduction is to minimize the amount of potentially stagnant water in the end of a main.

All development projects with 3 or more services where the combined public and private service length individually exceeds 100 feet, shall install a 4” minimum diameter public

ductile iron main to serve the project. The water main shall be extended to the nearest property line of the most remotely served parcel of the project.

2-1.07 Depth of Cover

The minimum pipe cover is 3 feet for water mains smaller than 12 inches and 4 feet for water mains 12 inches and larger. The cover shall not exceed 6 feet unless greater depth is required to avoid other utilities, or where special circumstances arise and greater cover is approved by the City. A water services is to be installed at the depth shown on the Standard Detail.

2-1.08 Coordination with Other Utilities; Water Main Profiles

Parallel runs of water and sanitary sewer main shall be separated by 10 feet, edge to closest edge. If 10 feet separation is impossible, separations of between 5 feet and 10 feet may be approved, based on City staff review and on the guidance in Washington Department of Ecology, Water Quality Program, “Criteria for Sewage Works Design”. Sewer mains should cross under water mains and be separated by 18 inches vertically. Where sewer mains cross over water mains, there shall be minimum 18 inches of vertical separation and the sewer mains shall be constructed of ductile iron pipe or other approved material, and the sewer main joints shall be located as far as possible from the water main. Oblique crossings (close to parallel) shall be avoided.

The water main shall be located more than 5 feet from other non-sanitary-sewer utility pipes, measured center-to-center. An edge-to-edge separation of 3 feet may be allowed where no reasonable alternative exists, if approved by the City of Vancouver staff. Water mains must be deflected vertically, or vertical bends must be used, as necessary, to provide 6 inch minimum crossing clearance with other utilities (18 inches minimum crossing clearance where water mains cross below sewer mains).

To facilitate coordination with other utilities and City staff review of proposed water facilities, water main profile drawings must be included for all mains 12 inches or larger in diameter. Profile drawings should show all crossings with other utilities.

2-1.09 Air Release, Vacuum Release and Blow-Off Valves

A combination air release valve (see Water Standard Plan W-9) shall be installed at designated high points on mains 10 inches and larger. The release valve may not be required if a fire hydrant is close to the high point.

Standard blowoff assemblies (see Water Standard Plan W-15) shall be installed at the end of dead-end mains 4 inches and larger. The blowoff may not be required if a fire hydrant is close to the end of the main.

2-1.10 Isolation Valves

Isolation valves must be installed to facilitate new connections to the system, and to provide for the isolation of pipe segments during maintenance. Generally, two isolation valves per tee, and three isolation valves per cross are required. At least one isolation

valve per 1000 feet of main run must be installed. Live taps may be allowed at the City of Vancouver's discretion.

Where tees or crosses are installed to provide for both new and future connections, isolation valves should be located so as to minimize loss of service when the future connection is made.

2-1.11 Thrust Blocks and Restrained Joints

Thrust blocks are only allowed at "live taps" and where connections are made to the end of an existing main. Bends, valves, and all reducers 4 inches or larger, shall be supported from separation by restrained joints. Restrained joints must be Megalug or approved equal. Tie rods may not be used for buried water mains. Where restrained joints are used, there must be no unrestrained joints within a sufficient distance from the fitting to provide the necessary earth support and frictional resistance. This distance must be calculated by accepted engineering methods, such as the calculative methods provided by the Ductile Iron Pipe Research Association (DIPRA) or EBAA Iron Inc. (see Resources). Minimum DIPRA design criteria shall be laying condition of "type 3", soil designation of "coh-gran", pressure of 200 psi and safety factor of 1.5. Minimum EBAA criteria shall be "3" trench type, "CL" soil type, 200 psi test pressure and 2:1 safety factor. The pipe length variable of the "Run" on TEE's shall be 1' in both DIPRA and EBAA calculators.

All joints, valves and fittings 12 inch and greater, and all installations within designated high liquefaction zones shall be mechanically restrained.

Isolation valves for fire hydrants shall be located or restrained such that the hydrant can be removed for maintenance without the closed valve being displaced due to water pressure. This is normally achieved by a flange (FLG) by mechanical joint (MJ) valve being bolted to an MJ x FLG branch tee in the street main, per the Water Standard Detail Sheets. Where the hydrant isolation valve is not at a tee, additional restrained joints upstream from the valve may be required.

Underground flanged joints are only allowed for restraining valves installed for "Live Taps", fire hydrants, fire protection services and water meters 3" and larger. They cannot be used elsewhere, because of the difficulty of achieving the precise alignment needed for flanged joints, during field repair.

All joints on fire hydrant mains including the tee are to be mechanically restrained. Thrust blocks for hydrants shall not be allowed.

Two adjacent MJ fittings, or a valve and adjacent MJ fitting, may be joined with a Foster adapter or similar approved product.

2-1.12 Deflection at Pipe Joints

Water main pipe joints can be deflected to achieve a non-linear alignment, provided the deflection at each joint does not exceed the maximum deflection recommended by the pipe manufacturer. The deflection angle or bend radius shall be stated on the civil plans.

2-1.13 Cross-connection Control

The prevention of non-potable water or any deleterious substance from entering the distribution system is extremely important to public safety. The City of Vancouver recognizes the Washington State Department of Health regulations (WAC Chapter 246-290-490) with regard to the protection of the public via minimum requirements for design, construction, operation, and maintenance of public water supplies. All developers or applicants constructing public water mains or facilities should be familiar with, and comply with, these requirements. These referenced regulations and standards are a minimum, and the City specifically reserves the right to require additional safety features and items as may be deemed appropriate by the City. The Standard Backflow Prevention Details (see Water Standard Plans W-21 to W-29) and the City of Vancouver's Cross-Connection Control Procedures Manual provides guidance as to the location and installation standards, when backflow prevention assemblies are required. Premise isolation by a reduced pressure backflow assembly (RPBA) approved by the City is required for all customers with access to auxiliary water supplies connected to a piping system, whether or not an interconnection exists between the auxiliary supply and the city water system. For other information or interpretation, contact the Water Quality Group of the Operations Services Division, Public Works, City of Vancouver, 360-487-8276.

2-1.14 Water Demand vs. Meter Size

For water services that require more flow than available through a standard 5/8 inch x 3/4 inch residential meter, the water meter size requested should be sized to serve the expected peak and continuous demands. Guidance for the safe maximum operating capacity and the recommended rate for continuous operation can be found in the American Water Works Association Standards, C-700 through C-710. General guidance can be found in the American Water Works Association Manual of Water Supply Practices, "Sizing Water Service Lines and Meters," M22.

The minimum diameter for a new service pipe is 1 inch. The service pipe shall be reduced at the meter as necessary.

2-1.15 WSDOT/Railroad Crossings

The developer shall obtain and make full payment for any permits required from WSDOT/railroad prior to constructing a water main under any highway or railroad tracks. The permit should be on behalf of the City of Vancouver. All requirements of the permit shall be met prior to acceptance of any construction. Requirements usually include boring with a steel casing for installation of the main.

2-1.16 Fire Hydrant Spacing Requirements

All fire hydrant spacing shall, at a minimum, meet the City of Vancouver VMC 16.04.160 spacing standards. More stringent standards may be required by other agencies within the City of Vancouver water service area.

2-1.17 Resources

American Water Works Association Standards, covering many aspects of water supply, treatment, and distribution.

City of Vancouver, Vancouver Municipal Code section 14.04 “Water And Sewer Use—Regulations And Charges”, available from Vancouver’s website:
www.cityofvancouver.us.

City of Vancouver Standard Water Line Details (Water Standard Plans W-1 to W-19) and the Backflow Prevention Details (Water Standard Plans W-21 to W-29) are available online at: <https://www.cityofvancouver.us/publicworks/page/general-requirement-standards-details-water-sanitary-sewer-stormwater>

Ductile Iron Pipe Research Association (DIPRA), Birmingham, Alabama, “Installation Guide for Ductile Iron Pipe,” Chapter 5, Restraining Thrusts, and DIPRA computer program, “Thrust Restraint for Ductile Iron Pipe.” www.dipra.org

EBAA Iron Inc. (EBAA), Eastland, Texas “Restraint Length Calculator v7.1.2”
www.ebaa.com

Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers, Recommended Standards for Water Works (also known as 10-State Standards), latest version.

Washington Department of Ecology, Water Quality Program, Publication #98-37 WQ, “Criteria for Sewage Works Design,” section C1-9.1 “Required Separation Between Water Lines and Sanitary Sewers.”

Washington State Department of Health, Environmental Health Programs, Division of Drinking Water, “Water System Design Manual”, DOH #331-123, Revision 2019, available on the web at www.doh.wa.gov/ehp/dw/publications/331-123.pdf

Washington State Department of Transportation, with Washington Chapter of the American Public Works Association, Standard Specifications for Road, Bridge, and Municipal Construction, M41-10, latest version adopted by the City of Vancouver Water System Planning and Design section.

2-2 CONSTRUCTION REQUIREMENTS

2-2.01 General

Materials and construction methods shall be in conformance with the most current version of the "STANDARD SPECIFICATIONS for ROAD, BRIDGE & MUNICIPAL CONSTRUCTION" as prepared by Washington State Department of Transportation and the Washington State Chapter of the APWA, and as amended by the City of Vancouver Amendments to the most recent edition of the *Standard Specifications* for Road, Bridge, and Municipal Construction except as noted herein. All references to American Water Works Association (AWWA) specifications shall mean their latest revision. Operation of, or connection to existing city water facilities shall only be performed under the observation of authorized city personnel. As of January 4, 2014 all newly installed fittings and appurtenances in contact with water shall be in compliance with the revised section 1417 of the EPA safe water drinking act and certified lead free using NSF 372 standards.

2-2.02 Ductile Iron Pipe

All water main pipe furnished shall be new zinc coated ductile iron (ZDI) pipe conforming to the requirements of AWWA C151 and shall be manufactured within the United States. The zinc coating shall conform to ISO 8179-1. Pipe sizes 12 inch and smaller shall be Class 52 and pipe 14 inch and larger shall be Pressure Class 350, unless otherwise noted on the plans. All pipe shall be furnished in 18 to 20 foot lengths and shall be cement lined per AWWA C104. All rubber gasket joints for ductile iron shall conform to the requirements of AWWA C111.

2-2.03 Ductile Iron Fittings

All fittings shall conform to the requirements of AWWA C110 or C153. Fittings shall be of the size, type, and type of joint as called for on the plans. Zinc coating of fittings shall not be required. All MJ and MJ x FLG fittings shall be 350 psi minimum. Flanged fittings shall be 250 psi minimum. All fittings shall be ductile iron unless approved by the City. All ductile iron fittings shall be cement lined. All compact fittings shall be DI, cement lined, and have a pressure rating of 350 psi. All rubber gasket joints for ductile iron fittings shall conform to the requirements of AWWA C111. All vertical elbow installations shall be engineered and calculations submitted with plans to the City's Engineering Division for approval. Bolts for buried flanged fittings shall be galvanized or zinc-cadmium plated and coated with 2 coats of bitumastic after installation. Bolts for mechanical joints shall be NSS Corten steel.

2-2.04 Restrained Push-on Joints

Allowable joint restraint systems for push-on pipe shall be per the pipe manufacturer's recommendation and as follows:

- U.S. Pipe's Field-Lok 350 Gaskets, or
- TR Flex by U.S. Pipe, or
- American Fast-Grip gasket, or
- Snap-Lok by Griffin Pipe, or

- Flex-Ring by American, or
- McWane Ductile Sure Stop Gaskets, or
- An approved equal.

Restrained pipe joints shall be extended after they are assembled to minimize further take-up and shall be installed per the manufacturer's recommendations.

2-2.05 Restrained Mechanical Joint

Allowable joint restraint systems for mechanical joints are as follows:

- Megalug by EBAA Iron, or
- Stargrip Series 3000 by Star Pipe Products, or
- Sigma One-Lok, or
- TUFGRIP Series 1000 by Tyler Union, or
- An approved equal.

The minimum working pressure rating of restrained joint systems shall be 350 psi.

Restrained mechanical joints shall be extended after they are assembled to minimize further take-up and installed per the manufacturer's recommendations.

Thrust blocks are only allowed at "live taps" and where connections are made to the end of an existing main. See "Design Requirements" section 2-1.11 regarding the number of joints adjacent to a fitting that must be restrained. Tie rods for joint restraint shall not be allowed.

2-2.06 Valves

Resilient-seated gate valves may be used for valve installations of 10 inch and smaller and shall be used on all fire hydrant and fire protection service. Resilient-seated gate valves shall conform to AWWA C509 or C515 and shall be epoxy coated on the inside. Butterfly valves shall be used for all valve installations of 12 inch and larger. Butterfly valves shall conform to AWWA C504 and shall be Class 150-B with short body. Butterfly valves shall be required to have a minimum of 28 turns to move fully open to fully closed. The operator shall be mounted directly on the valve with no exposed or external couplings. Units shall be fully gasketed and grease packed. Valves shall be installed with the operator on the side of the pipe nearest the road centerline. All valves shall be furnished with an underground manual (AWWA 2 inch square) operating opening with a counterclockwise rotation. Install the operator nut such that the depth from finish grade to the operator nut is 18 to 36 inches. Valve stem extensions, if required, shall be of the polyfiber type. For branching mains, valves are to be installed directly to the tee or cross using a bolt through MJ Foster ® adapter (restrained joint), a short (18-24 inch) length of pipe with mechanical restraints on each end, or an approved equal; with the exception of a valve serving a fire hydrant run which requires a flanged connection directly to the tee on the mainline.

2-2.07 Valve Boxes

Valve boxes shall be Fort Vancouver Pattern No. 910, cast iron or approved equal. For arterial traffic applications, use East Jordon #3639A2 solid extra deep valve box. Valve box extensions shall be one piece and constructed of 6-inch ASTM D 3034 SDR 35 PVC pipe. Valve boxes shall be set in pavement or a concrete pad (18" diameter or 18" square, 4" thick).

2-2.08 Standard Air Release Valves

Combination Air Release Valves are to be furnished as called for in the plans. Valves shall be of the size indicated and shall be suitable for a working pressure of 150 psi. All Air Release Valves shall be installed at the crest of pipe runs. Combination valves shall be ARI D-040-C or approved equal.

2-2.09 Standard Blowoff Assemblies

Standard blowoff assemblies are to be extended from the end of water mains.

2-2.10 Tapping Sleeves

Tapping sleeves shall meet ANSI/AWWA C223 specifications. Tapping sleeves shall be rated at 150 psi working pressure with ANSI/AWWA C207 Class D 150 pound flanges or equivalent stainless steel pattern. All sleeves shall be designated by the manufacturer as suitable for the service proposed. All fabricated steel tapping sleeves shall have fusion-applied epoxy coating. All stainless steel tapping sleeves shall have stainless steel nuts and bolts. All bolts for the sleeve body shall be the drop-in type, not welded. All nuts and bolts shall be stainless steel (with nuts or bolts treated to prevent galling) or high-strength, low alloy steel bolts with the steel meeting ANSI/AWWA C111/A21.11 specifications. After a tap is made, all exposed areas of the pipe and sleeve shall be coated with either bitumastic coating or Brown primer and Trenton #1 wax or approved equal. Tapping sleeve gaskets shall be NSF approved for potable water. Sleeves shall be tested, on the pipe, at 200 psi for 15 minutes with no pressure drop prior to making the tap. All sleeves shall have a test outlet and plug. Concrete blocking for tapping sleeves shall be the same as required for an equal size tee. Sleeves furnished for ductile iron pipe taps, reduced outlet taps on steel pipe or reduced outlet taps on cast iron pipe larger than 12 inches, shall be fabricated steel with outlet gasket. (JCM 412, Dresser style 610, Smith-Blair 622, Romac FTS420, Ford FTSC or approved equal). For reduced outlet taps on steel, JCM 422 is also approved. Size on size taps are only allowed on ductile iron mains. Tapping sleeves furnished for taps on cast iron 12 inches and smaller, or taps on asbestos cement, shall be stainless steel with full circumferential gasket: Romac SST III, JCM432, Smith-Blair 664/5, Dresser 630, Ford FTSS or approved equal. Tapping sleeves for pipes not listed above must be approved by the City.

2-2.11 Tapping Valves

Tapping valves shall have the same construction as specified for gate valves. The inlet end of valve shall be flanged and outlet end shall be a mechanical joint. Tapping valves shall be supported by an 8 inch x 8 inch concrete block prior to making the tap. Tapping sleeves and valves shall be used only when specifically called for in the plans.

2-2.12 Standard Fire Hydrant Assembly

All fire hydrants shall conform to AWWA standard specifications (C-502) for fire hydrants. All fire hydrants shall be of the latest design that the manufacturer is producing. All hydrants shall be 3 port with (2) 2-1/2 inch hose nozzles with national standard fire hose coupling screw thread, 7-1/2 threads per inch, and one 4-1/2 inch steamer nozzle with Storz quick connect fitting or equal.

Quick connect coupling: Aluminum alloy hydrant adapters shall be 5 inch and secured to steamer nozzle if adapter is threaded on steamer nozzle. Each unit shall have 1/4 inch #20 thread stainless steel set screws for permanently securing adapters to hydrant. Each unit will have a blind cap with plastic coated aircraft cable attaching it to the hydrant steamer post. Facing on the adapter shall be metal and not rubber gasketed to avert sticking during freezing weather conditions. The blind cap shall fit the adapter tight enough so that it cannot be removed without a spanner wrench.

All hydrant nozzle caps must be installed with gaskets. All hydrants shall have 'O' ring seals on the operating stem, and all working parts shall be of bronze and all 'O' ring surfaces shall be rust-free material. The compression hydrant operating threads shall be lubricated and shall be 'O' ring sealed from water, moisture and foreign matter. The operating nut shall be 1-1/2" pentagon. The center of the lowest port shall be minimum 17 inches from the ground bury mark. All fire hydrants shall be placed no closer than 5 feet from all trees and 3 feet from all shrubs and utility structures. Bollards shall not be installed as fire hydrant protection.

All hydrants shall be constructed with mechanical joint connections and provisions shall be made to automatically drain the barrel in order to protect the unit from freezing. The barrel shall be a minimum seven (7) inches I.D. and of such length as to be suitable for installation with connections to piping. Minimum barrel length shall be 28-1/4 inches. All working parts shall be removable through the top of the hydrant without the necessity of digging.

All hydrants shall have the interior and exterior prepared and coated or painted per AWWA standard C502. The exterior of the barrel shall be factory painted with safety yellow. The Storz adapter shall not be painted. Each joint on a fire hydrant lead from the tee to the assembly shall be restrained without the use of thrust blocks.

2-2.13 Trench Excavation, Bedding and Backfill

The existing road surface shall be cut in a neat line by saw cutting prior to removal. Trench backfill shall be according to the backfill section, shown on the plans and/or the utility permit. All excess material not used for trench backfill shall be removed and disposed of by the contractor. Placement of backfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced.

During construction, the contractor shall stockpile the excavated trench materials so as to do the least damage to adjacent lawns, gardens, shrubbery, trees or fences, regardless of

the ownership of these areas. All excavated materials shall be removed from these areas, and these surfaces shall be left in a condition equivalent to, or better than their original condition and free from all rocks, gravel, boulders or other foreign material.

Replace topsoil areas as specified. All existing drainage ditches and culverts shall be reopened and graded, and original drainage restored. All damaged irrigation, house drainage pipe, drain tiles, sewer laterals and culverts shall be repaired or replaced. All clearing, grubbing, and stripping shall be performed in advance of excavation operations.

All weeds, roots, trash, debris and similar objectionable materials shall be removed from excavation areas. All asphalt rubble, rocks, trash, or debris shall be hauled away. Asphalt pavement shall be neatly saw-cut at designated limits and shall be removed and hauled away.

2-2.14 Compaction of Backfill

The inspector may conduct periodic testing of backfill compaction, using a nuclear densometer, at intervals of his choosing. The contractor shall provide safe trench conditions at all times for testing at any depth. Compaction control tests to determine optimum moisture content and maximum density shall be by the following methods:

1. For non-granular materials - Method of test for compaction control of non-granular materials (ASHTO T99).
2. For granular materials - Method of test for compaction of granular materials (WSDOT Test Method No. 606).
3. Field moisture and density of backfill material shall be determined by the Nuclear Moisture/Density Gauge.

The contractor shall fill all open trenches at the completion of each day's work. Open trenches shall not be allowed overnight. Trenches filled but not compacted shall be re-excavated the following working day and compacted according to these specifications.

2-2.15 Cutting and Plugging Existing Pipe

Where shown on the plans, the contractor shall cut and plug the existing main. The existing main, which is to be abandoned, shall have a concrete plug poured around and in the end of the pipe for a distance of two pipe diameters. The part of the main which is to remain shall have a new metal plug or cap installed on the existing pipe, cross, or tee, or shall be connected to the new fitting or pipe with thrust restraint. All valve boxes on mains which are abandoned (cut and plugged) shall be removed and the holes shall be patched to match finished surface.

Cutting of all pipe and specifically asbestos cement pipe shall conform to the latest rules and regulations of the Department of Labor and Industries.

2-2.16 Water Services

Water services to be installed by the contractor are to be inspected by the city. Call (360-487-7780) 48 hours in advance. Water meter boxes shall be placed in landscaped areas no closer than 5 feet from all trees and 3 feet from all shrubs and utility structures.

The minimum water service size to be installed shall be 1 inch diameter and constructed of materials as specified in section 2-1.06 of this document. Single family services shall be centered along the property frontage.

2-2.17 Relocating Existing Water Services

If an existing water meter/service is to be relocated a distance less than 10 feet, the existing service may be used. When the distance is 10 feet or greater, a new water service must be installed at the new location.

2-2.18 Abandoning Water Service

If an existing meter is to be taken out of service, when the main is not being abandoned, the service shall be abandoned by turning off the corporation stop at the main, followed by cutting and plugging the service just after the corporation stop, and removing the meter set (yoke).

2-2.19 Hydrostatic Testing

All sizes of pipe shall be tested hydrostatically at 200 psi. for 15 minutes with no pressure drop. A passing bacteriological test result must be received prior to conducting pressure testing.

2-2.20 Disinfecting Water Mains

Disinfection and bacteriological testing of water mains shall conform to the requirements of AWWA C651.

Following chlorination, treated water shall be flushed from the water main until the replacement water chlorine residual does not exceed the City of Vancouver water supply residual throughout the length of the new main. The contractor shall be responsible for the proper chlorine neutralization prior to disposal.

2-2.21 Connection to Existing System

Pipelines that have not been disinfected may be connected to the existing distribution system with a disinfected pre-tested closed inline valve and only at points approved by the Engineer. The contractor shall supply documentation from the valve supplier certifying that the valve has been pre-tested.

2-3 WATER STANDARD PLAN DETAIL SHEETS

Standard Plan Numbers and Description

W-1	Standard 1" Water Service
W-2	Standard 2" Water Service
W-3	Standard 3" Water Meter & Larger Service Installation
W-4	Standard Domestic Meter Locations
W-5	Standard Deduct Meter Locations
W-6	Standard Fire Protection Backflow Locations
W-7	Meter Service Transfer & Replacement
W-8	Compound Meter Reduction
W-9	Combination Air Release Valve
W-10	Standard Fire Hydrant Assembly
W-11	Hydrant Retaining Wall Detail
W-12	Standard Valve Box & Cover
W-13	Water Pipe Trench Bedding & Backfill
W-14	Standard Blowoff Assemblies
W-15	Oversize Blowoff Assembly
W-16	Standard Thrust Block
W-17	Water & Sewer Spacing
W-18	Pipe & Casing Detail
W-19	Standard Polyethylene Pipe Wrap
W-20	Blank Sheet – Reserved For Future Details
W-21	Standard Double Check Valve Assembly 2" & Smaller
W-22	Standard DCVA/DCDA 2½" & Larger
W-23	Standard Reduced Pressure Principle Backflow Assembly 2" & Smaller
W-24	Standard RPBA/RPDA 2½" & Larger
W-25	Standard Pressure Vacuum Breaker Assembly 2" & Smaller
W-26	Approved Air Gap
W-27	Blank Sheet – Reserved For Future Details
W-28	Blank Sheet – Reserved For Future Details
W-29	General Backflow Notes