

**YELM ENGINEERING SPECIFICATIONS AND STANDARD
DETAILS**

CHAPTER 4 WATER

Table of Contents

CHAPTER 4.00 WATER 2

 4.00.010 GENERAL2

 4.00.020 DESIGN STANDARDS2

GENERAL NOTES (WATER MAIN INSTALLATION) 2

PROCESS TO OBTAIN WATER SERVICE 5

 4.00.030 MAIN LINE.....6

 4.00.040 CONNECTION TO EXISTING WATER MAIN7

 4.00.050 SERVICE INTERRUPTION7

 4.00.060 HYDRANTS7

 4.00.070 VALVES9

 4.00.080 CASING10

 4.00.090 AIR AND VACUUM RELEASE VALVE10

 4.00.100 BLOWOFF ASSEMBLY10

 4.00.110 BACKFLOW PREVENTION.....10

 4.00.120 SERVICE CONNECTION11

 4.00.130 MARKING SERVICE LINES ON CURBS.....11

 4.00.140 WATER MAIN/SANITARY SEWER CROSSINGS.....12

 4.00.150 IRRIGATION13

 4.00.160 STAKING14

 4.00.170 TRENCH EXCAVATION.....14

 4.00.180 THRUST BLOCKING15

 4.00.190 BACKFILLING15

 4.00.200 STREET PATCHING AND RESTORATION15

 4.00.210 HYDROSTATIC TESTS16

 4.00.220 STERILIZATION AND FLUSHING16

 4.00.230 FENCING AT WATER METERS.....16

 4.00.240 LANDSCAPING, WATER METERS AND FIRE HYDRANTS16

LIST OF DRAWINGS - WATER 18

CHAPTER 4.00 WATER

4.00.010 General

Any extension of the Yelm Water System must be approved by the Director of Public Works and, all extensions must conform to DOH and the Coordinated Water System Plan, City of Yelm Water System Plan, and South East Thurston Fire Authority requirements.

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

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

Issuance of building permits for new construction of single family subdivisions shall not occur until final Public Works approval is given. For commercial projects, building permits may be issued upon completion and acceptance of the required fire protection facilities. A performance bond, in accordance with Section 1.00.050 YDS, will be required for the remaining Public Works improvements. Certificate of occupancy will not be issued until final Public Works approval is given for all improvements.

4.00.020 Design Standards

The design of any water extension/connection shall conform to City Standards and any applicable standards as set forth herein and in Section 1.00.010 YDS.

The layout of extensions shall provide for the future continuation and/or "looping" of the existing system as determined by the City. In addition, main extensions shall be extended as required in Section 1.00.095 YDS.

The General Notes on the following page shall be included on any plans dealing with water system design.

GENERAL NOTES (WATER MAIN INSTALLATION)

- A. All workmanship and material shall be in accordance with City of Yelm standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction.
- B. All work in City right-of-way requires a permit from the City of Yelm. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting to be attended by all major contractors,

representatives of involved utilities, and the City of Yelm. The Contractor is responsible to have a set of approved plans at the meeting.

C. Water mains shall meet the following specifications:

1. Polyvinyl Chloride (PVC) Pipe (under 4 inches): Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and have minimum wall thickness equal to or less than the Standard Dimension Ratio (SDR) of 21, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)B.
2. Polyvinyl Chloride (PVC) Pipe (4 through 12 inches): Shall meet the requirements of AWWA C900, Class 150 wall thickness equal to or greater than the SDR of 18, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)A.
3. Polyvinyl Chloride (PVC) Pipe (14 through 20 inches): Shall meet the requirements of AWWA C905 wall thickness equal to or greater than the SDR of 18.
4. Ductile Iron Pipe (DIP): DIP shall conform to AWWA C151 Class 50 or greater, and shall be 1/16-inch cement lined and sealed in accordance with ANSI/AWWA C104/A21.4-90, and meet the requirements of WSDOT Standard Specifications Section 9-30.2.(1). Six-inch fire hydrant spools shall be Class 52.

D. Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-rings seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500. Existing valves to be operated by City employees only.

E. Hydrants shall be M & H Reliant Style 929, Mueller Centurion, or Clow Medallion or AVK. Hydrants shall be bagged until system is approved.

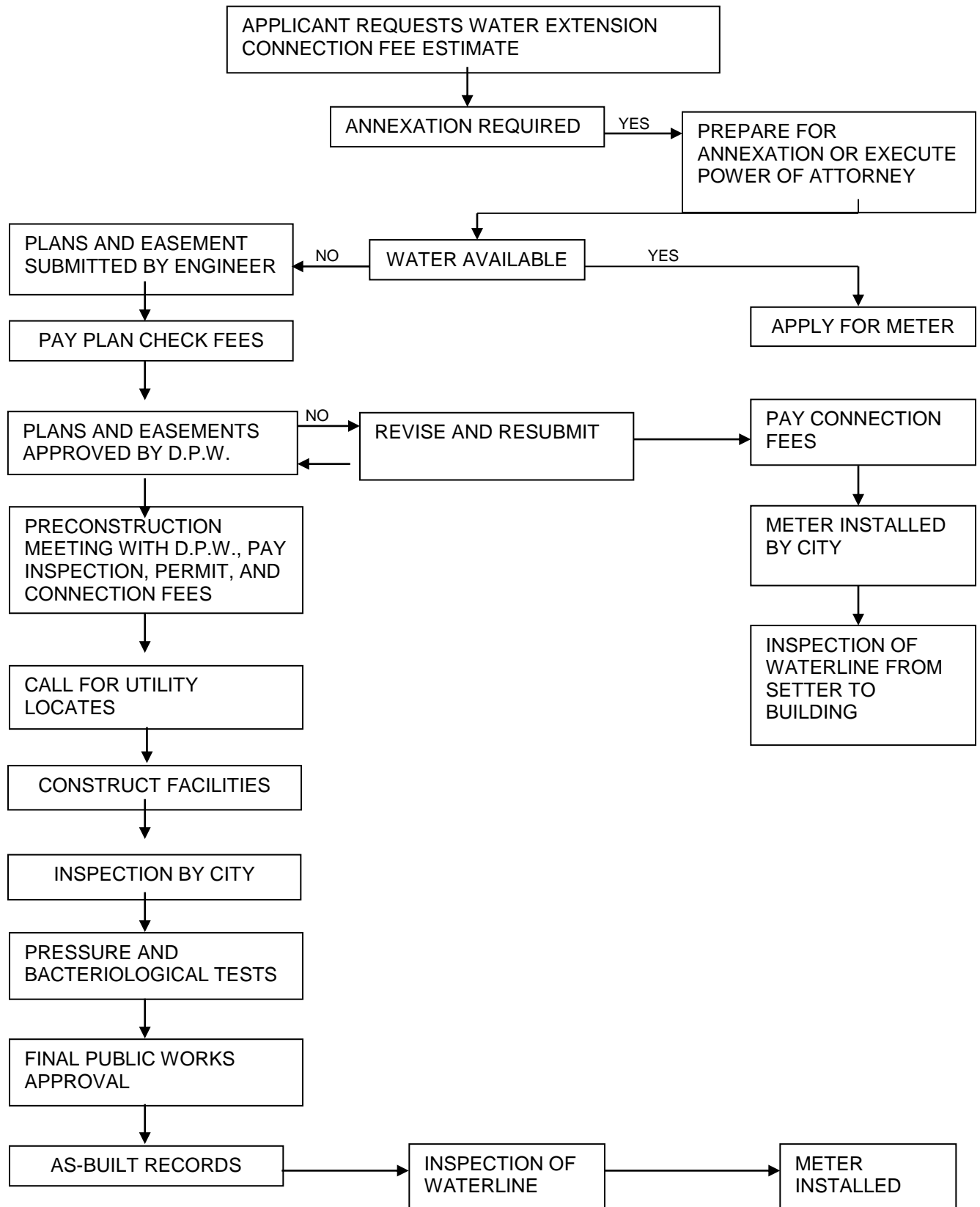
F. All lines shall be chlorinated and tested in conformance with the above referenced specification (Note 1).

G. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water 2-inch-wide minimum, which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge heavy duty direct bury coated copper wire (PAIGE "UF" single conductor or equal), wrapped around the pipe, brought up and tied off at valve body. All wire connections shall use wire nuts and a DBR Splice Kit, manufactured by 3-M or approved

equal. All locator wire for service pipe shall be connected to the locator wire on the water main.

- H. Provide traffic control plan(s) as required in accordance with MUTCD.
- I. All water mains shall be staked for grades and alignment by an engineering or surveying firm capable of performing such work.
- J. All service line locations shall be marked on the face of the curb with an embossed "W" 1/4 inch into concrete.
- K. Call Underground Locate at 1-800-424-5555 a minimum of 48 hours prior to any excavations.
- L. The City will be given 72 hours' notice prior to scheduling a shutdown. Where connections require "field verification", connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.
- M. At any connection to an existing line where a new valve is not installed, the existing valve must be pressure tested to City standards prior to connection. If an existing valve fails to pass the test, the contractor shall make the necessary provisions to test the new line prior to connection to the existing system or install a new valve.
- N. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list" prepared by the City's Inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the water system and provision of water service.
- O. A copy of these approved plans and applicable city developer specifications and details shall be onsite during construction.
- P. Any revisions made to these plans must be reviewed by the developer's engineer and the City of Yelm prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.

PROCESS TO OBTAIN WATER SERVICE



4.00.030 Main Line

- A. Water mains shall be sized to provide adequate domestic plus fire flow at the required residual pressure. Fire flow requirements will be determined by South East Thurston Fire Authority, however, the quantity of water required will in no case be less than 750 GPM at 20 psi residual pressure.

The minimum water main size shall be 6 inches diameter as long as fire flow requirements can be met. Larger size mains are required in specific areas outlined in the Coordinated Water System Plan. Nothing shall preclude the City from requiring the installation of a larger sized main in areas not addressed in the Coordinated Water System Plan if the City determines a larger size is needed to meet fire protection requirements or for future service.

- B. All pipe for water mains shall have flexible gasketed joints and shall comply with one of the following types:

Water mains shall meet the following specifications:

1. Polyvinyl Chloride (PVC) Pipe (under 4 inches): Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and have minimum wall thickness equal to or less than the Standard Dimension Ratio (SDR) of 21, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)B.
 2. Polyvinyl Chloride (PVC) Pipe (4 through 12 inches): Shall meet the requirements of AWWA C900, Class 150 wall thickness equal to or less than the SDR of 18, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)A.
 3. Polyvinyl Chloride (PVC) Pipe (14 through 20 inches): Shall meet the requirements of AWWA C905 wall thickness equal to or greater than the SDR of 18.
 4. Ductile Iron Pipe (DIP): DIP shall conform to AWWA C151 Class 50 or greater, and shall be 1/6-inch cement lined and sealed in accordance with ANSI/AWWA C104/A21.4-90, and meet the requirements of WSDOT Standard Specifications Section 9-30.2.(1). Six-inch fire hydrant spools shall be Class 52.
- C. All fittings for ductile iron pipe or PVC pipe shall be ductile iron compact fittings conforming to AWWA C 153 or Class 250 gray iron conforming to AWWA C 110 and C 111. All shall be cement mortar lined conforming to AWWA C 104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain

ends. All fittings shall be connected by flanges or mechanical joints.

- D. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water 2-inch-wide minimum, which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge heavy duty direct bury coated copper wire (PAIGE "UF" single conductor or equal), wrapped around the pipe, brought up and tied off at valve body. All wire connections shall use wire nuts and epoxy DBY water connection kit.
- E. The minimum cover for all water mains from top of pipe to finish grade shall be 42 inches unless otherwise approved.
- F. No trees shall be planted closer than 5 feet to the water main.

4.00.040 Connection To Existing Water Main

The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains. See drawing number 4-10.

It shall be the Contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make the connections to the existing mains. All fittings shall be approved by the Water Department prior to installation.

4.00.050 Service Interruption

The contractor shall give the City a minimum of 72 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

4.00.060 Hydrants

- A. The lead from the service main to the fire hydrant shall be ductile iron cement mortar lined Class 52 no less than 6 inches in diameter. MJ joint shall be restrained with wedge action retainer glands, MegaLug 1006 of approved equal.

- B. Fire Hydrants, shall have two, 2-1/2 inch outlets and one 4-1/2 inch pumper port outlet. All outlet ports shall be National Standard thread. The valve opening shall be no less than 5-1/4 inch diameter with a 5-inch "Storz" coupling and blind flange cap installed on the steamer port. The hydrant shall have a positive and automatic barrel drain and shall be of the "traffic safety" or break-away style; i.e., when accidentally broken off, water will not flow.

All hydrants shall be center-stem compression design, valve shall open against pressure.

Hydrants shall be M & H Reliant Style 929 or Mueller Centurion, or Clow Medallion or American AVK Series 2780. All hydrants shall be bagged until system is approved.

- C. The Department of Public Works and South East Thurston Fire Authority work together to insure that adequate hydrant spacing and installation are achieved.

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

1. At least one hydrant shall be installed at all intersections.
 2. Hydrant spacing of 330 feet shall be required in all areas except single family and duplex residential areas.
 3. Hydrant spacing of 660 feet shall be required for single family and duplex residential areas.
 4. Hydrants located in cul-de-sac or dead end areas either by design, topographic or manmade feature which prohibit straight line distance measurement, shall be located to serve no more than 120,000 square feet, and be served by an 8-inch-minimum main.
 5. When any portion of a proposed building is in excess of 150 feet from a water supply on a public street, there shall be provided, when required by the fire chief, on-site hydrants and mains capable of supplying the required fire flow. Such hydrants shall be located as may be required by the South East Thurston Fire Authority and easements for such hydrants shall be granted to the City.
- D. Fire hydrants shall be set as shown in drawing number 4-7.
- E. For requirement regarding use, size and location of a fire department connection (FDC) and/or post indicator valve contact

South East Thurston Fire Authority. Location of FDC shall be shown on water plans.

- F. Where needed, the Department of Public Works or South East Thurston Fire Authority will require hydrants to be protected by two or more posts, each eight inches in diameter by five feet in height made of either reinforced concrete or steel. Post shall be painted to match hydrant color.
- G. Fire hydrants must be installed, tested, and accepted prior to the
- H. Fire Hydrants must have 3 foot of clearance around them.
- I. Hydrant locks are required to be installed as part of the City's water conservation and accountability program. Hydrant locks and adapters are purchased from the City.

4.00.070 Valves

Where possible, valves shall be located at tee's or crosses, and be flanged by mechanical joints.

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

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. Generally, there shall be two valves on each tee and three valves on each cross. Specific requirements for valve spacing will be made at the plan review stage.

- A. Gate Valves, 6 inch to 12 inch. The design, materials and workmanship of all gate valves shall conform to AWWA C509-80 latest revision. Gates valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500.

Gate valves shall be used on all 2 to 12-inch lines.

- B. Butterfly Valves. Butterfly valves shall conform to AWWA C504, Class 150B, with cast iron short body and O-ring stem seals. Butterfly valves shall be Mueller, Linseal III, M & H, Pratt Ground hog, or Allis Chalmers.

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

- C. Valve Box. All valves shall have a standard Inland Foundry, 910 or equal water valve box set to grade with a 6 inch ASTM SDR 21 PVC riser from valve to within 4 to 6 inches of valve box top. If valves are not set in paved area, a 3 foot by 3 foot by 4 inch concrete pad

shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. See drawing number 4-11.

- D. Valve marker Post. Valve marker posts shall be 4 inch x 4 inch reinforced concrete or schedule 40 steel posts 5 feet long stamped with "W" and distance to valve. Post shall be painted with 1 base coat and 2 coats white oil base enamel. See drawing number 4-12.

4.00.080 Casing

Steel casing shall be designed to a minimum of H2O loading. Pipe spacers shall be Cascade style CC5 with 8 inch runners as available from Cascade Waterworks. Casing pipe and spacers shall be sized for pipe being installed. Install minimum of three spacers per section of pipe.

4.00.090 Air and Vacuum Release Valve

Combination air and vacuum release valves (ARV) shall be 2" combination air release valve, or approved equal. Installation shall be as shown on drawing number 4-8.

The installation shall be set at the high point of the line when required. Where possible, pipes are to be graded to prevent the need for an air release valve. Air release valves may not be required when services are in the vicinity.

4.00.100 Blowoff Assembly

If a fire hydrant is not located at the end of a dead end main, a blowoff assembly shall be required. On water mains which will be extended in the future, the valve which operates the blowoff assembly shall be the same size as the main and provided with a concrete thrust block. The pressure rating for blowoff assemblies shall be 200 psi. Installation shall be as shown on drawing number 4-9.

4.00.110 Backflow Prevention

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

The installation of all backflow devices is required to protect the existing water system and users from possible contamination.

Public Works shall get the certificate for testing of any backflow prevention device before releasing the certificate of occupancy on any building. Test may be performed by any person certified by the

Washington State Board of Health. A list of approved testers may be obtained from Washington Environmental Training Resource Center (WETRC) located in Auburn, Washington.

South East Thurston Fire Authority will test the fire line and obtain the certificate for underground piping. In any situation, South East Thurston Fire Authority No. 2 will not test their portion of underground until Public Works has tested and approved their main up to the fire line.

4.00.120 Service Connection

- A. All service connections relating to new development shall be installed by the developer at the time of mainline construction. After the lines have been constructed, tested and approved the owner may apply for a water meter. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after system is inspected and final approval is given.
- B. When water is desired to a parcel fronting an existing main but not served by an existing setter, an application must be made to the City. Upon approval of the application and payment of all applicable fees, the City will tap the main, and install the meter, box, and setter.
- C. Service lines shall be one inch high density polyethylene pipe, minimum pressure class 200 psi DR7, Phillips Drisco 5100 Ultra-Line, or Westflex. No glued joints will be accepted. Service lines shall be installed 90 degrees off the main. Tracer tape and wire wrapped around the pipe shall be installed on all service lines.
- D. Service saddle shall be all ductile iron body with stainless steel straps and shall be Romac style 202S, Rockwell 313 or approved equal. All clamps shall have rubber gasket and iron pipe threaded outlets.
- E. Corporation stop shall be all bronze, lead free, and shall be Ford type FB1101 or approved equal with iron pipe threads conforming to AWWA C 800. Stainless steel inserts shall be used with pack joints and polyethylene pipe.
- F. Master meters will not be allowed for service to more than one per building. An approved backflow prevention system must be installed in conjunction with any master meter. Deviations to this may be granted by the Director of Public Works.

4.00.130 Marking Service Lines on Curbs

The location of all service lines shall be marked on the face or top of the cement concrete curb with a "W" 1/4 inch into concrete.

4.00.140 Water Main/Sanitary Sewer Crossings

The Contractor shall maintain a minimum of 18 inches of vertical separation between sanitary sewers and water mains. The minimum cover for water main of 42 inches may be reduced to 24 inches upon approval by the City to provide for as much vertical separation as possible.

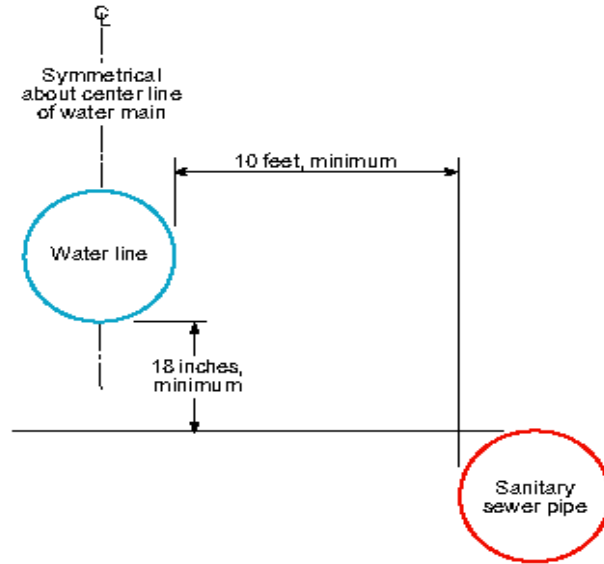
The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or sewer service in pipe or concrete. No concrete shall be installed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

Taken from: "Criteria for Sewage Works Design"

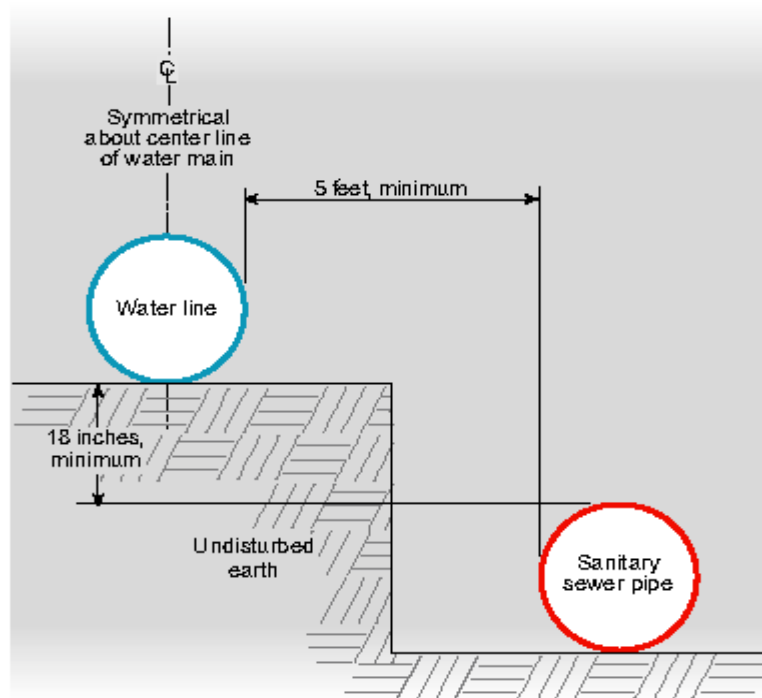
By: "State of Washington Department of Ecology, December 1998.

Situations not addressed below shall follow the criteria as outlined in the most current edition of the above mentioned document.

WATER MAIN STANDARD PIPE MATERIAL			
	AWWA (ASTM) Standard		
Type of Pipe	PIPE	JOINT	FITTINGS
Ductile Iron - Class 50	C151 & C104	C111	C110 & C153
Polyvinyl-Chloride - Class 150	C900	D3139 & 477	C110 & FC153
Concrete Cylinder	C303		



Required Separation Between Water Lines and Sanitary Sewers, Parallel Construction



Required Separation Between Water Lines and Sanitary Sewers, Unusual Conditions Parallel Construction

4.00.150 Irrigation

All irrigation systems shall be installed with an approved backflow prevention assembly approved by the Department of Health.

Irrigation sprinklers shall be situated so as to not wet any public street or sidewalk.

4.00.160 Staking

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

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

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

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

4.00.170 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public Right-of-Way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits. Temporary erosion control measures shall be installed and approved by the City Inspector prior to any excavations.
- B. Trenches shall be excavated to the line and depth designated by the Engineer to provide a minimum of 42 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below water main grade. Where materials are removed from below water main grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted Section 4.00.190 YDS.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

4.00.180 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be commercial Class 3000 psi poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See drawing number 4-13 and 4-14 for thrust block locations and calculations.

4.00.190 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. All trenches shall be backfilled during non-working hours unless otherwise approved by the City. Selected backfill material shall be sorted or screened so that the maximum aggregate is 4 inches and placed and compacted around and under the water mains by hand tools to a height of 6 inches above the top of the water main. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside traveled area. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. See Standard Drawing No. 4-15 for backfill and bedding materials.

4.00.200 Street Patching and Restoration

See Chapter 2 for requirements regarding street patching and trench restoration.

4.00.210 Hydrostatic Tests

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 200 psi for 15 minutes, and any leaks or imperfections developing under said pressure shall be remedied by the contractor. No main shall be hydrostatically tested until the lines are flushed of chlorine. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made and the roadway section is constructed to subgrade. This is to include any and all connections as shown on the plan. The contractor 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 to witness the test.

See Section 4.00.110 for testing responsibilities for backflow prevention devices.

4.00.220 Sterilization and Flushing

Sterilization of water mains shall be accomplished by the contractor in accordance with the requirements of the Washington State Department of Health and in a manner satisfactory to the City. At no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, drainage ways, and any and all other waters where fish or other natural water life can be expected.

When a chlorine concentration has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken by the contractor at least 24 hours after flushing and disinfecting for approval by the local health agency. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the contractor until satisfactory results are obtained. The sample can only be taken on Mondays, Tuesdays, and Wednesdays until noon. Testing and sampling shall take place after all underground utilities are installed and compaction of the roadway section is complete.

4.00.230 Fencing at Water Meters

Water meters shall not be fenced in yard. Fencing shall be placed around meters to allow access from the City right-of-way or easements.

4.00.240 Landscaping, Water Meters and Fire Hydrants

No trees or shrubs shall be planted within 5 feet of any water meter or fire hydrant. Improvement or landscaping of any sort shall not be constructed which will impede easy access or maintenance to water meters and fire hydrants.

LIST OF DRAWINGS - WATER

<u>Title</u>	<u>Drawing</u>
5/8" Single Meter Service	4 - 1
5/8" Dual Meter Service	4 - 2
1 1/2" to 2" Meter Service	4 - 3
Double Detector Check Valve	4 - 4
2" Blowoff Assembly	4 - 4.1
Water Vault Details	4 - 4.2
Double Detector Check Valve Notes.	4 - 4.3
Fire Department Connection.	4 - 4.4
3" - 4" - 6" Water Meter.	4 - 5
Typical Meter Placement.....	4 - 6
Fire Hydrant.....	4 - 7
2" Air and Vacuum Release Valve.	4 - 8
2" Blowoff Assembly.	4 - 9
Connection to Existing Main	4 - 10
Standard Valve Box	4 - 11
Valve Marker Post & Hydrant Bollard Detail.....	4 - 12
Standard Blocking Detail	4 - 13
Thrust Loads.....	4 - 14
Typical Water Main Trench & Bedding.....	4 - 15
Double Check Valve Assembly 2" and Smaller	4 - 16
Reduced Pressure Backflow Assembly for 2" or Smaller	4 - 17
Reduced Pressure Backflow Assembly for 3" and Greater.....	4 - 18