Water

Section **4**

General.

Plans for the existing water system are maintained in digital and printed form by the City. Copies may be obtained from the Utility Division of the Public Works Department.

Future expansion of the water system is planned by the City and maintained in the "Comprehensive Plan Update, Water System", available from the Planning Department.

Every subdivision, including long plats and short plats, and all other land use developments, shall be provided with a complete water system connected to the existing City system, conforming to the Comprehensive Water Plan.

All design, materials, and work (methods) shall conform to the following list. *All design, materials, and methods not specifically referenced in these City standards and specifications shall comply with applicable sections of ASTM, AWWA, and APWA/WSDOT Standard Specifications.* In the case of differences among the standards and specifications, the most restrictive standards shall apply unless directed otherwise by the Public Works Director. The Public Works Director retains the authority to modify, revise, or deviate from the approved plans at his discretion. Approval of the plans does not warrant the accuracy of the plans.

a. The latest edition of the City of Poulsbo Construction Standards and Specifications adopted by the City of Poulsbo, and subsequent revisions;
b. The latest edition of "Standard Specifications for Road, Bridge, and Municipal Construction" and "Standard Plans For Road, Bridge and Municipal Construction" prepared by the Washington State Chapter American Public Works Association (APWA) and the Washington State Department of Transportation (WSDOT), and subsequent revisions;

A. Planning Criteria

1. Design and construction of water mains shall provide for the extension of mains across property frontages and within the site to adjacent properties, when appropriate, for the ultimate development of tributary areas, as determined by the Public Works Director. All water systems shall be publicly owned up to, and through, the water meter. For fire mains, the City shall own up to and including the Post Indicator Valve. All water mains and fire hydrants

shall be located in public right-of-way or easements granted to the City of Poulsbo.

B. General Design and Drawing Standards

Design.

1. Water system extensions shall be designed to be compatible with the applicable pressure zone.

2. Provide temporary 2" blow off assemblies for testing and disinfection of new water mains (where hydrants are not available).

3. Cap end of existing water lines to be abandoned with MJ cap and concrete blocking.

4. Systems shall be designed to promote and maintain water quality standards. New system extensions may require additional looping connections to interconnect mains.

5. All street ends with the possibility for extension must have utilities stubbed out of the paved area a minimum of six feet or as directed by the City Engineer.

Drawings

1. The drawings shall conform to the requirements listed in Section 1 of these standards and specifications under Drafting Requirements.

2. Each fitting/valve shall have attachment type listed (e.g. FL, MJ, FLxMJ, etc.)

3. Dimension existing and new main locations from right-of-way line, property line and/or centerline.

C. Mains

1. Minimum pipe size:
   a. 8" minimum when serving fire hydrants.
   b. 6" minimum may be used in localized conditions where fire hydrants are served by looped lines, subject to approval by the Public Works Director.
   c. 4" minimum shall be used beyond hydrants to serve water to end of cul-de-sac when no future extension is required.

2. 14-gauge locator wire shall be buried along the entire length of the pipe and shall be stripped and connected to a bolt on each gate valve, and be brought to the surface at each meter, gate valve, blow-off, and air vacuum valve. The wire at valve boxes shall be brought up the outside of the valve box and inserted through a hole drilled six (6) inches below the top of the

box. The inserted portion of the wire shall be formed into a six (6) inch diameter loop. All splices in the locator wire shall be made using split bolt connectors or with a double nut connection at a fitting.

3. Mains which could be extended in the future shall be terminated with an in-line valve and blow-off assembly.

D. Valves & Appurtenances

1. The maximum distance between valves on mains is 300 feet. Additional valves may be required at shorter distances for area isolation.

2. Provide a valve at both ends of an easement.

3. Valves shall be placed at all legs of water main intersections unless otherwise indicated by the Public Works Director.

4. Air/vacuum relief valves shall be installed at local high points of water mains.

5. Blow-off assemblies shall be installed at local low points in water main to allow for removal of sediments.

6. Blocking of valves, appurtenances, and fittings shall be per the standard details. The engineer of record shall determine if special blocking designs are necessary (e.g. due to soil conditions, conflicting utilities, etc.).

7. Valves at the end of mains shall be both blocked and tied back.

E. Fire Hydrants

1. Fire hydrants shall be located not more than 600 feet apart in single family residential areas. Additional hydrants may be required by the Fire Marshall when any building is in excess of 300 feet from a hydrant or when accessibility is determined to be limited. Fire hydrant distance to a building is measured by the lay of the fire hose.

2. For all building occupancies except single family and single story duplexes, hydrant spacing shall be at 300-foot intervals. Additional hydrants are required when the building to be protected is in excess of 150 feet from a hydrant or when determined to be necessary by the Fire Marshall.

3. Fire mains/hydrant runs over 50 feet in length must be 8" diameter.

4. Hydrants shall be located a minimum of 50 feet from any commercial building.

5. A valve shall be installed at the mainline tee.

6. The Fire Marshall or Public Works Director may require existing hydrants to be upgraded or replaced with new hydrants.

7. Three (3) feet minimum clearance shall be provided around hydrants in service. Guard posts may be required.

8. Fire hydrant assemblies shall be installed per the standard detail.

F. Fire Flow and Fire Protection Systems

Fire flow requirements shall be determined by the Fire Marshall. Fire protection sprinkler systems, including backflow prevention as required by the current WAC (Washington Administrative Code), are reviewed and approved by the Fire Marshall in association with the required Building Permit. For uses other than single-family applications, an FDC (Fire Department Connection) shall not be placed on the building but shall be constructed no closer than 10 feet nor farther than 100 feet from the building, unless required or approved otherwise by the Fire Marshall. The civil plans shall show the FDC, PIV (Post Indicator Valve) and DDCV (Double Detector Check Valve) in conformance with the standard detail.

G. Pipe Class / Cover / Protection

1. All water mains shall be Class 52 ductile iron pipe.

2. Water main depth of cover shall be 3 feet minimum and 6 feet maximum from final grade.

3. In certain applications, the Public Works Director may require the ductile iron pipe and adjacent fittings to be encased in 8-mil polyethylene per AWWA C-105.

H. Separation and Clearances with Other Utilities

1. <u>Water Services and Building Water Services</u>.
   a. A “water service” (or “lateral” or “service line”) is considered to be that portion of a water line that will be constructed between a water main and the property line or easement line of a residence or other building to which water is being provided.
   b. A “building water service” is considered to be that portion of a water line that will be constructed from the meter to the residence or building to which water is being provided.
   c. Water services and side sewers shall have at least 5 feet horizontal separation.

2. Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Water mains and sewers should be separated as far as is reasonable is both the horizontal and vertical direction, with sewer mains always lower than water mains. Avoid crossing at highly acute angles (smallest angle measure between utilities should be between 45 and 90 degrees). Refer to Section 3(F), Sanitary Sewer, for specific requirements.

3. At points where thrust blocking is required, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5 feet.

4. Horizontal and vertical clearances from water mains shall be:

Utility	Horizontal (ft)	Vertical (ft)
Cable	5	1
Gas	5	1
Power	5	1
Telephone	5	1
Storm	5	1
Sewer	10	1.5

I. Bends

Vertical bends shall be used when joint deflection exceeds the manufacturer's recommendations.

J. Slopes

Pipe joints shall be restrained where slopes are 20% or greater. Joint restraint on slopes shall be Megalug™, or equal, restrainer for mechanical joints and restraint joints for ductile iron push-on joints. Anchor blocks shall be used in conjunction with joint restraint where slopes are 25% or greater. Refer to the standard detail.

K. Tee Connections to the Existing System

1. Tee connections to existing mains shall be via a wet tap unless approved otherwise by the Public Works Director.

2. Wet taps shall be made by a qualified tapping service. Notice shall be given to the City inspector 24 hours in advance of the scheduled tap.

L. Services

1. Irrigation services may be tapped off the domestic service but require separate backflow prevention. Sewer billing is based on water

consumption. If metering is desired in order to reduce the sewer billing, a separate irrigation service tap and connection fee is required. Deduct meters are not allowed.

2. Individual pressure reducing valves are required on the customer side of service lines (after water meter box) when service pressures exceed 80 psi. The plans shall identify lots/buildings where individual pressure reducing valves are required.

3. All service lines between the main and the meter shall have 14-gauge locator wire placed along the top of the pipe for the entire length of the pipe.

4. Service taps shall be a minimum of 18 inches from the nearest edge of any fitting and a minimum of 12 inches from any other service tap.

M. Backflow Prevention

All commercial buildings shall have a Washington State approved double check valve assembly installed on the domestic water service and irrigation service. The check valve shall be located within eighteen (18) inches of the downstream side of the water meter. The device must be tested by a City-approved state-certified Backflow Assembly Tester (BAT) upon installation. Provide a copy of the test report to the Public Works Department and the Building Department. Assemblies installed outside of buildings shall be enclosed in an appropriate box or vault. In traffic areas, the box must be traffic rated. In non-traffic areas the box may be plastic.

N. Materials and Methods

1. General
   a. All materials and methods not specifically referenced in this manual shall comply with the applicable sections of the most currently adopted editions of the ASTM, AWWA, APWA, and APWA/WSDOT Standard Specifications. When there are differences between the specifications, the Public Works Director shall determine which shall apply.
   b. Where reference is made to other specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein.
   c. When specific manufacturers or models of various materials are listed, no substitutions will be allowed without prior approval by the Public Works Director.

2. Gate Valves
   a. All gate valves shall be epoxy-lined ductile iron, with a resilient seat, and conform to AWWA C515.

b. No butterfly valves are allowed unless approved by the Public Works Director.
c. In those installations where the operating nut is five (5) feet or more below the finished grade, the contractor shall extend the operating nut to not more than three (3) feet below the finished grade. Extensions are to be a minimum of 1 foot with only one extension per valve.
d. When a main is extended, the City does not guarantee the water tightness of existing valves at the connection point.

3. Tapping Valves and Tees
   a. Wet taps larger than 2 inches shall be made using an American Flow Control™ Series 2800 ductile iron tapping sleeve or Romac™, stainless steel tapping sleeve. The minimum length shall be 20 inches.
   b. Sleeves for size-on-size taps shall have a minimum length of 30 inches.
   c. Stainless steel tapping sleeves shall have a full circle seal.
   d. All tees and valves shall be water tested before tapping.

4. Service Taps
   a. Services shall be tapped before the main is disinfected and pressure tested.
   b. All taps shall utilize a tapping saddle. Direct taps are not allowed.

5. Fire Hydrants
   a. All fire hydrants shall be one of the following five types:
      i. M & H 929
      ii. Mueller Centurion
      iii. Waterous 5-1/4 Pacer
      iv. Clow F2500
      v. AVK Series 2780
   b. Hydrants shall be equipped with two (2) 2-1/2" hose nozzles, National Standard threads, with caps, chains, and one (1) pumper nozzle, City of Seattle threads, and a 5" Stortz 1/4 turn quick coupling fitting with a set screw, cap, and chain.
   c. The shoe connection shall be six -inch mechanical joint with lugs. The operating nut is one and one-quarter inch (1-1/4") pentagonal. Hydrants shall be as shown in the approved materials list, with no exceptions unless approved by the Public Works Director. All hydrants shall be of the "Traffic Model" type with approved break-away features and brass to brass sub-seat.
   d. Fire hydrants shall be painted with two (2) coats of Ace™ Safety Red paint for exterior metal. Hydrants shall be properly cleaned and prepared for repainting. Spray paint is not allowed.

6. Check Valves

a. Check valves shall be for 150 psi working pressure, unless otherwise specified. Valve shall have adjustable tension lever and spring to provide non-slamming action under all conditions unless otherwise specified.
b. For irrigation, a double check valve assembly (DCVA) shall be installed within 18" of the downstream side of the water meter. The device must be tested by a City-approved state-certified Backflow Assembly Tester (BAT) upon installation. Provide a copy of the test report to the Public Works Department and the Building Department. Assemblies installed outside of buildings shall be enclosed in an appropriate box or vault. In traffic areas, the box must be traffic rated. In non-traffic areas the box may be plastic.

7. Air and Vacuum Release Valve
   a. Combination air valves shall be of the single housing style that combines the operating features of both an Air/Vacuum and Air Release Valve.
   b. The air/vacuum portion shall automatically exhaust large quantities of air during the filling of the pipeline and automatically allow air to re-enter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, power outage, pipeline break, etc.
   c. The air release portion shall automatically release small pockets of air from the pipeline while the pipeline is in operation and under pressure.
   d. The combination air valve shall have 1" NPT inlet and outlet connections and a maximum working pressure of 300 psi.
   e. The valve body and cover shall be cast iron with stainless steel float. All combination air valves placed below ground level shall be vented to prevent cross connection potential.

8. Pressure Reducing Station
   a. Unless otherwise shown on the construction plans, a standard pressure reducing station shall have a 6" pressure reducing valve with flanged ends and a bypass with a 2" pressure reducing valve with threaded ends.
   b. Strainers shall be installed on the inlet side of each pressure reducing valve with a bronze ball valve or resilient seat gate valve with a hand wheel operator sized to correspond with the strainer blow-off outlet size. A 1-1/2" pressure relieve valve with threaded ends shall be installed on the discharge side of the 2" pressure reducing valve line and vented to atmosphere as shown on the plans.

9. Pressure Reducing Valve (PRV Station)
   The pressure reducing valve shall maintain a constant downstream pressure regardless of varying inlet pressure. The valve shall be a hydraulically operated diaphragm-actuated, globe valve. The pilot control

shall be a direct-acting, adjustable, spring loaded, 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.

10. Pressure Relief Valve (PRV Stations)
    The pressure relief valve shall maintain constant upstream pressure by passing or relieving excess pressure, and shall maintain close pressure limits without causing surges. The main valve shall be hydraulically operated, diaphragm-actuated, globe valve. The pilot control shall be a direct acting, adjustable, spring-loaded, diaphragm valve, designed to permit flow when controlling pressure exceeds spring setting. The pilot control system shall operate such that as excess line pressure is dissipated, the main valve shall gradually close to a positive, drip-tight seating.

11. Diaphragm-Actuated Valves
    All diaphragm-actuated valves shall contain a resilient, synthetic rubber disc, having a rectangular cross-section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single removal seat insert. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing valve from the line.

12. Strainers (PRV Stations)
    Strainers shall be ductile iron-bodied "Y" type equal in size to corresponding pressure reducing valve. Strainer shall feature bolted cover machined to hold screen securely in place and tapped F.I.P.T. for blow-off outlet. Screen shall be constructed from perforated stainless steel. Wire mesh screens will not be allowed. Main-line strainer shall have flanged-ends and bypass strainer shall have threaded ends.

13. Vaults (PRV Stations)
    The vault shall be equal to Utility Vault Company Model 687-LA with full size dual hatch cover. Vault exterior shall be coated with coal tar enamel or equal and shall be equipped with a ladder access.

14. Corporation Stop
    a. Corporation stops shall be brass in accordance with AWWA Standard C800 with iron pipe size inlet and outlet.

b. Corporation stops for 1" tap shall be either the plug-type or ball valve type. Corporation stops for 1 1/2" and 2" tap shall be ball valve type.
c. For poly pipe, the corporation stop shall be with AWWA iron pipe (IP) inlet by iron pipe (IP) outlet. All joints with poly pipe shall be made utilizing stainless steel inserts along with couplings and adapters.

15. Reduced Pressure Backflow Assembly
All reduced pressure backflow assemblies shall be the one listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State Department of Health. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

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

17. Double Check Valve Assembly (DCVA)
All double check valve assemblies shall be the one listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by the Washington State Department of Health. The assembly shall include a tightly closing resilient seated shut-off valve on each side of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

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

19. Backflow Device Resilient Seated Shut-Off Valves
Each valve shall be marked with model number with designation of resilient seat; such as "RS" or "R", which must be cast, molded, or affixed onto the body or bonnet of the valve. All ferrous bodied valves shall be coated with a minimum of 4 mills. of epoxy or equivalent polymerized coating. Two-inch or

smaller R.P.B.A.'s and D.C.V.A.'s shall use ball valves, and all 2-1/2" or larger R.P.B.A.'s and D.C.V.A.'s shall use resilient seated gate valves for domestic supply and resilient seated O.S. and Y. valves for fire lines.

20. Concrete marker posts

Concrete marker posts shall be painted with two coats of safety blue paint and shall be set for all valves except auxiliary hydrant valves. Valve markers shall be installed only in unimproved or unpaved areas at a location to be determined at the time of construction by the Public Works Director.

21. Connection to Existing Water Mains

a. All connections to the existing system and all testing of the new line must be with the authorization of, and in the presence of, the authorized representative of the City. Opening and closing of valves and use of water from the City's system will be done only by the City.
b. Connections may be made to existing pipes under pressure with a tapping machine by determining the size and type of pipe and installing tapping tee to fit completely with tapping gate valve. Tapping tees shall be installed as shown on the Standard Details and wet tap shall be by the City subject to application. Where cut-ins are permitted to be made in existing pipes, the work shall be conducted as such a time as in such a manner as to minimize the interruption of service. Cut-in time must be approved by the City. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shutting-off of water in the existing main. Once the water has been cut off, the work shall be prosecuted vigorously and shall not be halted until the line is restored to service.
c. Unless specifically provided for elsewhere in these standards, the Contractor shall have the responsibility of giving at least forty-eight (48) hours notice to the City and affected water customers of intention to disrupt service.

22. Hydrostatic Tests

a. When a new main is connected to an existing main prior to pressure testing, pressure testing shall not occur until the new main has been satisfactorily sterilized.
b. Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 200 psi for 15 minutes at the high point in the line and any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. No air will be allowed in the lines. The mains shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected. The Contractor shall provide all necessary equipment and shall perform all work connected to the test. Tests shall be made after all valved connections

have been made. At unvalved connection points, a temporary plug (or 2" blow-off assembly on lines without hydrants) shall be installed at the end of the new main. This shall include concrete blocking necessary to withstand pressures encountered during the hydrostatic test.

c. Once the new line is successfully tested and disinfected, the plug (blow-off) shall be removed and the connection to the existing main completed. Insofar as it is practical, tests shall be made with pipe joints, fittings and valves exposed for inspection. Allowable loss in the test will be determined by the inspector. 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 inspector witness the test.

d. Testing shall include water service lines up to the meter setter connection.

23. Sterilization and Flushing of Water Mains

a. Sterilization of water mains shall be accomplished by the Contractor in accordance with the requirements of the State Health Department and in a manner satisfactory to the Engineer. The section to be sterilized shall be thoroughly flushed at maximum flow established by the Public Works Director prior to chlorination. Flushing shall occur between 10 pm and 4 am unless approved otherwise by the Public Works Director. Sections will ordinarily be sterilized between adjacent valves unless, in the opinion of the Public Works Director, a longer section may be satisfactorily handled. When the new main is connected to the existing main prior to pressure testing, sterilization shall be completed and satisfactory prior to pressure testing.

b. Chlorine shall be applied by solution feed at one end of the section with a valve or hydrant at the opposite end open sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 60 ppm chlorine. Hydrants along the chlorinated section shall be open during application until the presence of chlorine has definitely been detected in each hydrant run. When a chlorine concentration of not less than 50 ppm has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and then remain undisturbed for 24 hours before water samples are taken for bacteria testing and approval from the local health agency.

c. As an alternative, the Contractor may use granulated chlorine. Granulated chlorine (dry calcium hypochlorite at 65% - 70% chlorine) shall be placed in the pipe to yield a dosage of not less than 50 ppm. The number of ounces of 65% test calcium hypochlorite required for a 20-foot length of pipe equals .008431d, in which "d" is the diameter in inches. When a chlorine concentration of not less than 50 ppm has

been established throughout the line, including the hydrants, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and then remain undisturbed for 24 hours before water samples are taken for bacteria testing and approval from the local health agency. Flushing shall occur between 10 pm and 4 am unless approved otherwise by the Public Works Director. The Contractor shall exercise special care in flushing to avoid damage to surrounding property and to maintain water quality.

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