

SECTION 300

WATER SYSTEM REQUIREMENTS

The general design and construction requirements for the City of Puyallup shall be those contained in the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the "Standard Specifications"), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction (hereinafter referred to as the "City Standards").

301 Water System Design Criteria

301.1 Water Mains

1. All new water main lines shall be installed to the size as indicated in the City's Comprehensive Plan. The minimum water pipe size shall be 8-inch diameter. The only exception is a dead-end line with no possibility of being expanded in the future and beyond the last fire hydrant, shall be 4-inch diameter.
2. Pipe for water mains shall be ductile iron conforming to Section 7-09 of the Standard Specifications and shall be thickness Special Class 52 or greater. Joints shall be Tyton or approved equal. Pipe shall be cement lined in accordance with A.S.A Specification A21.4-1964.
3. Connections to existing water mains typically shall be wet taps through a tapping tee and tapping valve and shall be made by a city approved contractor. The tapping sleeve shall be Romac SST all stainless steel tapping sleeve or approved equal. A two-piece epoxy coated or ductile iron tapping sleeve may be used on ductile iron pipe, when the tap is smaller than the water main size i.e. 6-inch tap on 8-inch pipe. The City shall approve the time and location for these connections.
4. Where water mains are to be extended to serve a particular property, the water lines shall be extended along the entire frontage of the property to be served. Looped connections may be required to maintain continuity in the system.
5. Water mains shall have a minimum cover of 36 inches from paved final grade in improved right-of-way and improved easements, and 48 inches of cover in unimproved right-of-way and unimproved easements.
6. All water mains and appurtenances shall be hydrostatically tested at 200 psi in accordance with Standard Specification 7-09.3(23). Pressure testing shall not be performed until satisfactory bacteriological (Coliform and Iron Bacteria) purity samples have been received, except when new water mains are installed independently from the water system piping.
7. Two-inch blow-off assemblies are required on dead-end water lines, except where fire hydrants are installed at the dead end. The blow-off assembly shall be installed in accordance with City Standard Detail 03.06.01.
8. Minimum distance between sewer and water lines shall be 10 feet horizontally and 18 inches vertically measured from outside edge of pipe to outside edge of pipe.
9. Air relief valves are required at high points in water lines. Air relief valves shall be installed in accordance with City Standard Detail 03.07.01.

10. Water valves shall be installed along the water line at a maximum spacing of 400 feet and at the intersection of lateral lines. Water valves shall be located in clusters when possible and shall be located so that each leg of the main line system can be isolated separately.
11. Easements shall be a minimum of 40 feet in width for water lines. The water main shall be a minimum of 10 feet away from building foundations and/or roof lines. No structures or woody landscape plants shall be allowed within easements. The easement may be fenced, as long as it has a minimum 10 foot wide access gate with a key provided to the City.
12. No woody landscape plants shall be planted within 10 feet of any water structure (e.g. valves, air reliefs, sample stations, blow-off assemblies, etc.).
13. Detectable marking tape shall be installed on all new water main including water service lines. The tape shall be placed approximately 1.5 feet (18 inches) above the top of pipe and shall extend its full length. Detectable marking tape shall be blue in color and meet the material requirements specified in Standard Specification 9-15.18.

301.2 Fire Hydrants

1. Fire hydrants shall be installed at a maximum lateral spacing of 1000 feet along streets in single family residential zones and 330 feet in all other zones, or as directed by the Fire Code Official.
2. On-site hydrants shall be a maximum of 150 feet from the farthest point of the building(s) and a minimum of 50 feet from building(s) or structures, or as directed by the Fire Code Official.
3. Fire hydrant feed lines shall be installed at right angles to the supply main.
4. Fire hydrant leads over 20 feet in length from the water main to the hydrant are required to be sized using an engineered hydraulic fire flow model. Any hydrant leads over 50 feet in length from the water main to the hydrant shall be no less than 8 inches in diameter.
5. The fire hydrant assembly shall be installed in accordance with City Standard Detail 03.05.01.
6. Easements, when required, shall be a minimum of 5 feet each side of any fire hydrant.
7. A minimum 3-foot radius unobstructed clear zone (work area) shall be provided around all fire hydrants. Only ground level landscaping (grass, mulch, bark, etc.) is allowed within this clear zone.
8. No woody landscape plants shall be planted within 10 feet of any fire hydrant. Overreaching branches of trees adjacent to fire hydrants shall have a maintained vertical clearance of 7 feet above finished grade of the hydrant.
9. Fire hydrant assemblies shall have a maintained minimum sight distance from roadway of 50 feet in each direction of travel.

301.3 Water Service Connections

1. For single family residential construction in new subdivisions, the contractor shall furnish and install all materials for the service connection, including the meter setter, except that the City shall furnish and install the meter and the automated meter reading transmitter at the time of occupancy of the residence. The Contractor shall furnish and install the meter and automated meter reading transmitter for any tract.
2. For commercial and multi-family construction, the meter and the automated meter reading transmitter shall be furnished and installed by the contractor.
3. Installation of water service connections shall be in accordance with City Standard Details 03.03.01-1, 03.03.01-2, 03.03.02, 03.03.03, and 03.03.04.
4. Where possible, adjacent lots may use dual water services installed in accordance with City Standard Detail 03.03.01-1 and 03.03.01-2.
5. No woody landscape plants shall be planted within 10 feet of any water meter.
6. A minimum sized 1” water meter and a minimum sized 1” water service shall be installed for domestic water services that supply residential fire sprinkler protection systems as granted under the authority of Puyallup Municipal Code Chapter 14.02.200 FIRE PROTECTION.
7. Water meter boxes shall be located in the public right-of-way and are prohibited within any hard surface. If a private development requires an existing water service to be relocated, the property owner and/or developer shall relocate the water service at their own expense. The new water meter location shall be reviewed and approved by the City Engineer, or designee. Meter boxes may be offset up to two feet from the original location. If a meter box must be relocated more than 2 feet from the original location, the service lateral shall be removed and a new service installed in accordance with the standards herein.

302 Water Quality Requirements

302.1 Irrigation Systems

1. A minimum of a double check valve assembly (DCVA) is required on the irrigation water supply service, three (3) feet downstream of the water meter, prior to any branch connections for all commercial projects. If chemical injection is used in the irrigation system, the protection needs to be upgraded to a reduced pressure backflow assembly (RPBA).
2. Irrigation systems on residential water services shall be protected by a minimum of a DCVA. The irrigation branch connection shall be located three (3) feet downstream of the water service meter. The DCVA shall be placed just after the irrigation tee connection on private property.
3. The DCVA shall be installed in accordance with City Standard Detail 03.04.01. The RPBA shall be installed in accordance with City Standard Detail 03.04.02 and 03.04.03.
4. Upon approval of the installation by the city inspector, the DCVA/RPBA shall be tested by a Washington State certified backflow assembly tester, and the test report results shall be submitted to the City prior to occupancy of the building and annually thereafter. Test results shall be sent to: City of Puyallup, Water Quality Operations, 1100 39th Ave SE, Puyallup, WA 98374.

302.2 Commercial and Industrial Uses

1. A double check valve assembly (DCVA) is required on the domestic water supply service to any commercial or industrial building. Exceptions for businesses that fall under WAC 246-290-490 Table 9 facilities. A Table 9 water supply service needs to be upgraded to a reduced pressure backflow assembly (RPBA). Final determination of the proper backflow assembly to be determined by the City Water Division.
2. Duplexes, Tri-plexes, and 4-plexes are not considered commercial buildings for the purposes of water quality, and do not require backflow protection at the service connection. Multi-family buildings (i.e. apartment complexes) are considered commercial buildings and require a minimum of a DCVA. Exceptions for multi-family buildings that fall under WAC 246-290-490 Table 9 facilities. A Table 9 water supply service needs to be upgraded to a reduced pressure backflow assembly (RPBA). Final determination of the proper backflow assembly to be determined by the City Water Division.
3. The placement of the DCVA/RPBA shall be three (3) feet downstream of the water meter, prior to any branch connection. The DCVA shall be installed in accordance with City Standard Detail 03.04.01. The RPBA shall be installed in accordance with City Standard Detail 03.04.02 and 03.04.03.
4. Upon approval of the installation by the city inspector, the DCVA/RPBA shall be tested by a Washington State certified backflow assembly tester, and the test report results shall be submitted to the City prior to occupancy of the building and annually thereafter. Test results shall be sent to: City of Puyallup, Water Quality Operations, 1100 39th Ave SE, Puyallup, WA 98374.

302.3 Fire Service Connections

1. A double detector check valve assembly (DDCVA) complete with 3/4-inch bypass DCVA and 5/8-inch Sensus SR-II water meter reading in cubic feet is required on the fire service line to any building which is equipped with a fire sprinkler system.
2. The DDCVA shall be located inside the building or in a vault at or near the property line and shall be installed in accordance with City Standard Detail 03.10.01-1 and 03.10.01-2.
3. Upon approval of the installation by the city inspector, the DDCVA and the DCVA shall be tested by a Washington State certified backflow assembly tester, and the test report results shall be submitted to the City prior to occupancy of the building and annually thereafter. Test results shall be sent to: City of Puyallup, Water Quality Operations, 1100 39th Ave SE, Puyallup, WA 98374.
4. The domestic water service shall not be connected directly to a fire system service line, but rather shall be a separate connection to the main line.
5. The fire department connection shall be located within 15 feet of a fire hydrant but not less than 10 feet. Additionally, if the project is utilizing a fire booster pump, the fire department connection (FDC) must connect to the sprinkler system on the discharge side of the pump in accordance with NFPA regulations.
6. A ball drip valve is required on the Fire Department Connection (FDC) line when the FDC is lower in elevation than the Double Detector Check Valve Assembly.
7. Any fire system that is required will be designed (from water main through DDCVA to top of riser in building) by a state certified level III designer or state licensed professional civil engineer.

302.4 Additional Water Quality Requirements

1. Brass or dielectric unions shall be installed immediately downstream of all backflow assemblies 2-inch and smaller.

303 Water System Plan Requirements

The following items shall be shown on the plans:

- Plan and profile in accordance with Section 2.0
- Water pipe including location, length, material, slope, depth, and size
- Detail all new connections to the existing water system
- Identify any possible utility conflicts
- Stationing and reference points
- Valves, meters, and fittings, including size and location
- Fire hydrant protection for hydrant outside City right-of-way if hydrant is not protected by street curb and gutter
- Blow-offs at dead ends (2-inch minimum)
- Air and vacuum relief valve at high points
- Pressure reducing valves
- Concrete blocking
- An all-weather maintenance access, including typical cross section of said access road
- Service sizes and locations
- Meter sizes and locations
- Minimum one (1) service per lot
- Proper reference and layout for saw cutting and patching existing streets
- Fire sprinkler system location from public water line to building showing gate valve at main line connection
- Existing and/or abandoned wells
- Provide plan and elevation detail drawings of the fire line riser where it enters the building. The detail drawing shall include call-outs containing dimensions and clearances, and type of riser joint restraint. The details shall be in compliance with NFPA 24.

304 Water System Plan Notes

The following notes shall also be shown on the plans.

WATER SYSTEM NOTES:

1. All work in City right-of-way requires a permit from the City of Puyallup. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting at the Development Services Center to be attended by all contractors that will perform work shown on the engineering plans, representatives from all applicable Utility Companies, the project owner and appropriate City staff. Contact Engineering Services to schedule the meeting (253) 841-5568. The contractor is responsible to have their own approved set of plans at the meeting.
2. 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 sanitary sewer service.
3. All materials and workmanship shall conform to the Standard Specifications for Road, Bridge, and Municipal Construction (hereinafter referred to as the “Standard Specifications”), Washington State Department of Transportation and American Public Works Association, Washington State Chapter, latest edition, unless superseded or amended by the City of Puyallup City Standards for Public Works Engineering and Construction (hereinafter referred to as the “City Standards”), or as directed by Fruitland Mutual Water Company (FMWC), Valley Water (VW), or Tacoma City Water (TCW) is the purveyor.
4. A copy of these approved plans and applicable city developer specifications and details shall be on site during construction.
5. Any revisions made to these plans must be reviewed and approved by the developer's engineer, the Engineering Services Staff, and the FMWC, VW or TCW when served by that purveyor, prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.
6. The contractor shall have all utilities verified on the ground prior to any construction. Call (811) at least two working days in advance. The owner and his/her engineer shall be contacted immediately if a conflict exists.
7. Any structure and/or obstruction which requires removal or relocation relating to this project shall be done so at the developer's expense.
8. Bacteriological (Coliform and Iron Bacteria) test samples will be taken by the City (or FMWC, VW or TCW when served by that purveyor) and paid for by the contractor, except for Capital Improvement Projects (CIP) which shall be paid for by the City.
9. Water mains shall have a minimum cover of 36 inches from paved final grade in improved right-of-way and improved easements, and a minimum of 48 inches in unimproved right-of-way and unimproved easements.

10. Pipe for water mains shall be ductile iron conforming to Section 7-09 of the Standard Specifications, Class 52 with tyton or approved equal joints. Pipe shall be cement lined in accordance with A.S.A. Specification A 21.4-1964.
11. Connections to existing water mains typically shall be wet taps through a tapping tee and tapping valve and shall be made by a city approved contractor. The tapping sleeve shall be Romac SST all stainless steel tapping sleeve or approved equal. A two-piece epoxy coated or ductile iron tapping sleeve may be used on ductile iron pipe, when the tap is smaller than the water main size i.e. 6-inch tap on 8-inch pipe. The City (or FMWC, VW or TCW when served by that purveyor) shall approve the time and location for these connections.
12. All water mains and appurtenances shall be hydrostatically tested at 200 psi in accordance with Standard Specification 7-09.3(23). Pressure testing shall not be performed until satisfactory purity samples have been received, except when new water mains are installed independently from the water system piping.
13. Fire hydrants shall be installed in accordance with City Standard Detail 03.05.01 and as directed by the City of Puyallup Fire Code Official.
14. Valve marker posts shall be installed where valve boxes are hidden from view or in unpaved areas. The installation shall be in accordance with City Standard Detail 03.01.02.
15. Resilient seated wedge gate valves shall be used for 10-inch mains and smaller. Butterfly valves shall be used for mains greater than 10 inches.
16. Pipe fitting for water mains shall be ductile iron and shall be mechanical joint conforming to AWWA Specification C111-72.
17. Water main pipe and service connections shall be a minimum of 10 feet away from building foundations and/or roof lines.
18. Where a water main crosses the Northwest Gas pipeline, the water line shall be cased with PVC pipe a minimum of 10 feet beyond each side of the gas line easement. Contact Williams Northwest Pipeline before the crossing is made.
19. Trenching, bedding, and backfill for water mains shall be installed in accordance with City Standard Detail 06.01.01.
20. All commercial and industrial developments, irrigation systems, and multi-family water service connections shall be protected by a double check valve assembly or a reduced pressure backflow assembly as directed by the City (or FMWC, VW or TCW when served by that purveyor) conforming to City Standard Details 03.04.01, 03.04.02, and 03.04.03.
21. Any lead joint fitting disturbed during construction shall be replaced with a mechanical joint fitting at the contractor's expense.
22. Hydraulic fire flow modeling shall be required for formal plats within or to be annexed into the City of Puyallup's water service area. The developer shall be responsible to apply for a hydraulic model permit prior to plat review. The hydraulic modeling criteria is based on the projected water demand while maintaining a minimum system pressure of 20 pounds per square inch (PSI) and a maximum velocity of 10 feet per second.

23. When using a fire hydrant for non-firefighting purposes, a city hydrant meter must be used. Coordinate the acquisition of the hydrant meter with the City's Utility Billing Division at Puyallup City Hall. A city approved backflow protection assembly shall be installed by the person requesting use of a fire hydrant. The assembly shall be accompanied by a current backflow assembly test report. The test report shall be available at the site for the duration of the hydrant use.
24. Should a break occur on any City water main, the Contractor shall follow the City's adopted "Water Main Break Procedure" issued to them at the Pre-Construction Meeting and notify those connected to the system in the impacted area as outlined in the Procedure.
25. Water Main Repairs (References: AWWA C651-14 and WSDOT Standard Specification Section 7-09)

(Note: A planned water main repair shall be approved by the City Inspector and/or Water Division Supervisor prior to commencing work.)

- a. Repair without depressurization – Small leaks shall be repaired using repair bands while maintaining positive pressure in the water main. Valves surrounding the leak will be partially shut by the City Water Department to reduce the flow and pressure to the area. Blowoffs and hydrants in the reduced pressure area may be opened as needed to further reduce the pressure. The water main trench shall be over-excavated to allow water in the trench to be pumped out and maintained below the level of the water main. The repair shall be completed with the water main pressure remaining positive. After the repair is made, the system shall be fully pressurized and a visual leak inspection will be completed. The water main in the affected area shall be flushed to achieve three pipe volumes pulled from the pipe (distance measured from valve opened for flushing to the exit hydrant or blowoff).
- b. Repair/cut-in with depressurization – Trench shall be over excavated and dewatered below the water main. Flush water from pipe from each direction until it runs clear. Immediately prior to installation of a new pipe section for repair or cut in tee, all new fittings and pipe spools shall be swabbed with a five percent (5%) chlorine solution (minimum). The interior of the existing pipe shall be swabbed with a five percent (5%) chlorine solution at least 6 feet in each direction from exposed cut ends. The water main in the affected area shall be flushed to achieve three pipe volumes pulled from the pipe (distance measured from the valve opened for flushing to the exit hydrant or blowoff). Customers shall be notified after the water main is flushed and repairs have been completed, as outlined in the "Water Main Break Procedure."

26. New Water Main Installation:

- a. Each new water main section shall be delivered, stacked and stored onsite with ends plugged. The plugs shall remain in the pipe until each particular section is installed. National Sanitation Foundation (NSF) approved sixty-five percent (65%) calcium hypochlorite shall be added to the upstream end of each pipe section, and at each hydrant tee in the amount given in the table below (or per approved manufacturer specifications). The minimum amount of calcium hypochlorite added should be sufficient to achieve a 50 mg/L concentration within the impacted area.

65% Calcium Hypochlorite Addition per Pipe Section

Pipe Diameter (Inches)	Pipe Volume per 18 feet (gal)	5-gram tablets per pipe section	Hypochlorite Granules		Maximum Fill Rate (gpm)
			Ounces per 500 feet	Teaspoons per 18 feet	
4	35	1	1.7	0.2	40
6	53	1	3.8	0.4	90
8	70	2	6.7	0.7	150
12	106	4	15.1	1.4	350
16	141	6	27	2.5	600

- b. New water mains shall be filled using an approved backflow prevention assembly. The water main shall be filled from the lower elevation end so that as the water main is filled, the chlorine is contacted, dissolved and spread relatively uniform through the length of the new water main. The fill rate shall be minimized so that the velocity of the water is less than 1 ft/sec (see table above). Successful pressure test and bacteriological tests shall be completed and provided to the City prior to any new water main connection to the existing water system.
- c. The chlorinated water will be allowed to remain in contact with the new water main system for 24 to 72 hours. After 24 hours, water may be added to the water main for the purposes of pressure testing. The water in the main used for pressure testing must remain in the water main until pressure test is completed. If necessary, liquid chlorine shall be injected into the water main with fill water to maintain a concentration in the water main above 50 mg/L. Under no circumstance shall “super” chlorinated water be allowed to sit within a new water main for more than 5 days.
- d. Pressure testing includes testing against new valves and hydrants. Each valve shall be tested by closing each in turn and reducing the pressure beyond the valve. The pressure on the back side of the valve should not be eliminated. Care must be taken that, during this process, positive pressure remains throughout the system being tested at all times. All hydrant foot valves shall be open during pressure testing so that the pressure test is against the hydrant valve. Pressure testing will not be allowed against any existing valves.
- e. After successful pressure testing, the water main shall be thoroughly flushed to remove all “super” chlorinated water from the new water main. Flushing of new or extended water mains shall be conducted per WSDOT Specification 7-09.3(24)A with a minimum velocity developed within the pipe while flushing of 2.5 feet per second (fps). All flushed water shall be dechlorinated prior to disposal. The Contractor shall be responsible for disposal of all chlorinated water flushed from mains. **The City shall approve the disposal method prior to implementation in the field.** The Contractor shall utilize on-site disposal methods, if available. Disposal of flush water to the sanitary sewer system shall not be allowed without written permission from the Water Pollution Control Plant (WPCP) Supervisor. Any planned discharge to a stormwater system shall be dechlorinated to a concentration of 0.1 ppm or less, pH adjusted (if necessary) to be between 6.5 and 8.5, and volumetrically and velocity controlled to prevent any resuspension of sediments. The City will require independent testing throughout the water discharge process to ensure compliance of these standards are met.

- f. Samples for bacteriological analysis shall be collected after flushing and again 24 hours after the first set of samples.
- g. All closure/final connection fittings shall be sprayed clean and then swabbed with a five percent (5%) chlorine solution immediately prior to installation per AWWA Standard C651. Additional samples for bacteriological analysis shall be collected from the immediate vicinity of the new or replaced water main and analyzed after the final connections are made. If necessary, additional flushing shall be conducted and additional samples shall be collected until satisfactory results are obtained.