

CHAPTER 5 - WATER

5.00 General Approval Requirements

- A. See Chapter 1 for general construction requirements, including the requirements for extension to limits of property, surety bond, and utility review.
- B. Water mains shall be extended to the limits of the property being served for service to adjacent parcels where directed by the City.

5.01 Planning Criteria

- A. Ensure adjacent properties can be provided water service (extend to extreme of property with adequate capacity and pressure).
- B. Demand projections:
 - X Unit demand, Average daily demand (ADD):
 - Single family - 130 gallons per capita per day (GPCD)
 - Multi-family - 80 GPCD
 - Commercial - 15 gallons per day per 200 square feet of floor area
 - X Peaking factors:
 - Single family maximum day demand (MDD) = $ADD \times 2.4$
 - Multi-family MDD = $ADD \times 1.6$
 - Commercial MDD = $ADD \times 2.0$
- C. System parameters
 - X Water velocity in mains - velocities shall not exceed 10 feet per second during highest demand and fireflow.
 - X Distribution system pressures (measured at building elevation):

- Desirable - Minimum 30 PSI
- Maximum 90 PSI

* Pressure reducing valves are required on all services when water pressure exceeds 80 PSI. Pressure reducing valves shall be installed on main lines rather than individual services unless otherwise directed by the City.

X Reservoir replenishment - facilities (i.e. transmission mains, pump stations) shall be sized to enable storage facilities to be refilled within 3 days after an emergency or major fire.

D. Fireflow requirements shall be as determined by Skamania County Fire Marshal.

X Determination of available fireflow shall be computed using a computer simulated model acceptable to the City with a base demand equal to the maximum daily demand.

X Minimum system pressure during fireflow analysis shall be 20 psi at the hydrant and throughout the water system.

5.02 General Design Standards

A. Final drawings shall be provided to the City on mylar and on a diskette with AutoCad compatibility for as-builts and permanent records. See Chapter 1 for detailed requirements.

B. Blocking - Reference standard details

X At vertical bends, pipe shall be restrained a minimum of 36 feet (2 joints) from each side of bend. Reduced size concrete blocks shall be installed at bends per standard detail.

X Check if special blocking designs are necessary (e.g. poor soil, conflicting utility, etc.).

X Show all blocking on plans and profiles.

C. Check with City Public Works Department to determine how surrounding development will affect design:

X Serve to extreme of property if adjacent property has potential for future development.

- X System may require additional looping (i.e. eliminate dead end lines).
- X Where dead end lines cannot practically be avoided as determined by the City, a permanent blowoff capable of providing a 2.5 fps flushing velocity shall be provided along with provisions as needed for disposal of flushing water.

- D. To assure compatibility with existing system, check with City to determine hydraulic gradients.

- E. Check with local jurisdiction for necessary permitting requirements.

- F. Provide temporary 2" blow off assemblies for testing and disinfection of new watermains (where hydrants are not available). Place blow-off at high end of line, where possible.

- G. Cap end of existing water lines to be abandoned as follows:
 - X Asbestos cement lines: use end cap coupling and thrust blocking.
 - X Cast or ductile iron lines: Use M.J. cap or plug and thrust blocking.

- H. Minimum watermain size
 - X 8" minimum when serving fire hydrants.
 - X 6" minimum may be used in localized conditions where fire hydrants are served by looped lines, subject to City approval.
 - X 2" minimum shall be used to serve water to end of cul-de-sac when no future extension is required.

5.03 Valving

- A. 500' maximum distance between valves on distribution mains.

- B. Provide valve at both ends of an easement.

- C. Valves shall be placed at all legs of watermain intersections, unless otherwise indicated by the City.

- D. Additional valving may be required for area isolation.

- E. Air/vacuum relief-valves shall be installed at local high points in watermain.

- F. Blow-off assemblies shall be installed at local low points in watermain to allow for

removal of sediments.

- G. Valves 12 inches and smaller shall be gate valves.
- H. Valves 14 inches and greater shall be butterfly valves.

5.04 Fire Hydrants

- A. The number and locations of fire hydrants, fire flow requirements and fire sprinkler components will be determined by the City or Skamania County Fire Marshal's office. Following are general requirements for fire hydrant locations: (These criteria are subject to change. For the most current information, contact the Fire Marshal's office.)

1. **Commercial Buildings:** Fire hydrants shall be located so that no part of a commercial building is more than 250 feet from a fire hydrant measured along a route accessible to fire department vehicles. When a fire department connection (FDC) is installed in conjunction with an automatic sprinkler system, it is required to have a fire hydrant located within 70 feet of the FDC.
2. **Non-Commercial Buildings** Unless otherwise approved by the Fire Marshal, a fire hydrant shall be placed at each street intersection, or at spacing not exceeding 700'.

Intermediate hydrants are required when the distances to any part of non--commercial buildings exceeds 500 feet measured along a route accessible to fire department vehicles.

- B. Fire hydrants shall not be connected to mains less than 8 inches, or 6 inches in diameter where the length of dead end 6-inch main is less than 50 feet.
- C. Dead end fireline/hydrant run over 50' in length must be 8" (terminate with tee, plug and hydrant assembly).
- D. Hydrant shall be located minimum 50' from any building.
- E. As per the UFC, fire hydrants shall be located to allow a 36-inch clear space surrounding the hydrant. For example, street lights, sign posts, protective posts, or retaining walls shall be no closer than 36" from the nearest portion of a hydrant. There shall also be no obstructions directly in line with any of the ports of the hydrant.
- F. Piping between fire sprinkler vaults and protected building shall not be shown on water

design.

- G. Guard posts are to be used only in parking lots when no curbs are present or in exposed areas in parking lots.
- H. Fire hydrants shall have Storz fittings.

5.05 Pipe Class / Protection / Cover

- A. Ductile iron pipe class designation:

Class 52 - Roadways and easements

Class 53 - Crossing under rockery or retaining wall less than 3' in height

Class 52 - With steel casing - when crossing under rockeries and retaining walls that are over 3' high. Casing to extend beyond footings or rockery face a minimum of 5' and extend beyond the back of rockery or wall equal to the height of the wall or rockery or a minimum of 5'.

- B. Watermain depth of cover:

3' minimum from final grade

6' maximum from final grade

- C. Building setback requirements:

X 5' minimum from covered parking to watermain.

X 10' minimum from building (and retaining walls) to watermain.

X 20' minimum easement shall be provided between buildings.

X When passing between single family residential buildings which are 25' apart or less, class 53 ductile iron pipe shall be used to a point 5' beyond the limits of building.

X When passing between commercial or multifamily buildings which are 25' apart or less, the waterline shall be encased in steel pipe. The casing shall be wrapped with polyethylene as per City standards. The line shall be encased to a point 5' beyond the limits of the building .

- D. All ductile iron pipe and adjacent fittings shall be encased in 8-mil polyethylene per AWWA C-105 where directed by the City.

5.06 Clearances / Other Utilities

- A. Water services and sewer stubs shall have at least 5' horizontal separation.
- B. Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Avoid crossing at highly acute angles (smallest angle measure between utilities should be between 45 and 90 degrees).
- C. At points where thrust blocking is required, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5' .

D. Horizontal clearances from watermain:

Cable TV	5'
Gas	5'
Power	5'
Storm	5'
Sanitary	10'
Telephone	5'

E. Vertical clearances from watermain:

Cable TV	1'
Gas	1'
Power	1'
Storm	1'
Sanitary	2'
Telephone	1'

- F. Where watermain crosses above or below sanitary sewer, one full length of water pipe shall be used with the pipes centered for maximum joint separation.
- G. Send letter and preliminary plan to existing utilities to inform them of new construction. Request as-built information and incorporate into plans. At minimum the following

utilities should be contacted:

Cable television
Natural gas
Power
Telephone

H. Draft plans shall be sent to the above listed utilities to allow coordination of projects.

5.07 Slopes

- A. Vertical bends shall be used when joint deflection would exceed 5 degrees.
- B. Pipe joints shall be restrained where slopes are 20% or greater. Joint restraint on slopes shall be megalug restrainer for mechanical joint fittings and tie rod/retainer clamp assemblies for DI push on joints, or other methods from approved materials list. Anchor blocks shall be used in conjunction with joint restraint where slopes are 25% or greater.

5.08 Connections to Existing System

- A. When tapping water mains use stainless steel or full-bodied cast iron Mueller type tapping tee.
- B. Connections to existing mains 8-inch and larger shall be via a wet tap unless otherwise approved by the City. The wet tap shall be a minimum of one pipe size smaller than the existing main.
- C. Connections to existing mains smaller than 8" shall be by cutting in a tee, unless otherwise approved by the City.
- D. Size on size tapping tees are not allowed.

5.09 Easements

- A. Show easements off roadways and identify width.
- B. Show easements on developer's property. If easement is defined as a constant width on each side of watermain, then show a segment of the easement and label as typical (typ).

- C. All easements shall be a minimum of 15' in width, unless otherwise approved or required by the City.

5.10 Services

- A. Locate water services and indicate size. Sizes shall be determined by the City.
- B. On offices, multi-family developments and plats with planter areas provide irrigation services.
- C. Irrigation shall be by separate water main connection and service. No deduct meters.
- D. Static service pressures at ground floor elevation shall be determined at all lots/buildings to ensure compliance with system pressure standards.
- E. Plan shall identify lots/buildings where builder/owner should install individual pressure reducing valves. Individual service PRVs are required on customer side of service lines (after water meter box) when service pressures exceed 80 psi inside City limits or 100 psi in the County.

5.11 Backflow Prevention

Private fire protection systems, irrigation and special domestic services, because of the varying degrees of hazard, shall comply with minimum backflow requirements as outlined in the following charts on pages 5-10 and 5-11.

Some of the concerns with these systems are:

- A. The growth of offensive micro-organisms which can create taste and odor problems.
- B. The leaching of heavy metals such as zinc, cadmium, iron, or lead into the water.
- C. The addition of corrosion inhibitors or antifreeze compounds to protect the piping system.
- D. A loss of pressure on the public water supply main or an increase in pressure on the users' system which would reverse the water flow into the public supply.

Installation shall comply with the City of Stevenson requirements and regulations as

approved by the State of Washington, Department Health.

All private fire systems such as double check valve assemblies from the mainline control gate valve shall be owned and maintained by the property owner.

All backflow preventers shall be installed in vaults outside of building as close as possible to supplying main.

Fire systems in existing buildings being revised or upgraded shall comply with current regulations.

Special "health hazard" facilities (facilities named in cross-connection control W.A.C. 248-54-285) such as:

Hospitals, morgues, wastewater plants, metal plating facilities, laboratories, and food beverage plants, usually contain water connections that could backflow hazardous materials into the potable water supply. Therefore, these types of facilities are required backflow preventions as noted on the chart on page 5-11.

Private Firelines and Fire Sprinkler System Chart

	Double Check Valve Assembly	Double Check Valve Assembly with Detector	Reduced Pressure Backflow Assembly	Reduced Pressure Backflow Assembly with Detector
1. Fire system - (without chemical addition) 3" & larger See standard detail		X		
2. Fire system - (without chemical addition) 3/4" to 2-1/2" See standard detail	X			
3. Private fire system with hydrants See standard detail		X		
4. Fire system - (with chemical addition) 3" & larger See standard detail				X
5. Fire system - (with chemical addition) 3/4" to 2 1/2" See standard detail				X

* All backflow prevention assemblies require test and inspection at the time of installation and annual test thereafter.

Irrigation and Domestic Service Backflow Protection Chart

	Double Check Valve Assembly	Reduced Pressure Backflow Assembly	Double Check Valve Assembly and by-Pass
1. Irrigation system - (without chemical injection) See standard detail	X		
2. Irrigation systems - (with chemical injection) See standard detail		X	
3. Tall buildings - over 30 feet above ground level <u>or</u> with in-line booster pump interrupted service permissible See standard detail	X		
4. Tall building - over 30 feet above ground level <u>or</u> with in-line booster pump uninterrupted service required See standard detail			X
5. Facilities with health hazards, i.e., hospitals, laboratories, sewage lift stations, car washes etc.** See standard detail		X	

* All backflow prevention assemblies require an initial test and inspection, as well as an annual test, thereafter.

** If service is uninterruptable, then bypass with RPBD is required.

Note: All new or improved water installations will need to check with City for proper and approved backflow device.

5.12 Satellite (Remote) Water Systems

- A. Applicability. It is the City's policy to require all customers to be served by direct extension of water mains from the City's water system. Where satellite (remote) water systems are authorized by the City, they shall be designed per these standards.

- B. Well and Well Pump
 - 1. Two wells required, each of equal size, depth, and with equal equipment.
 - 2. 8-inch minimum diameter casing.
 - 3. Stainless steel screen.
 - 4. 480 Volt 3-phase well pump.

- C. Well Pump Building
 - 1. Each well located in a well pump building having a minimum of 5-foot clear distance between well and building walls with access provided for future well maintenance.
 - 2. One of the pump buildings to have an emergency generator with automatic starter, and two days of fuel supply at full load.
 - 3. Removable roof on building.
 - 4. Architectural features as follows:
 - a. Coated metal roof.
 - b. Split-face CMU walls.
 - c. Two metal doors with panic hardware.
 - d. Separate room for emergency generator.
 - e. A thermostat operated heater.
 - f. Automatic ventilation.
 - 5. Controls to include radio or phone telemetry.
 - 6. Water treatment as necessary to meet all drinking water standards and chlorine disinfection.

D. Distribution System

1. Ductile iron pipe with design and construction per City's standards.