

# PLUMBING AND TRENCHING FOR HOME OWNERS

The intent of this handout, is to familiarize the home owner or plumbing installer, with some of the basic theory of household plumbing, along with the Washington State and Uniform Plumbing Code requirements. This handout covers only a small part of the requirements for household plumbing, and is subject to possible misunderstanding or confusion. Please feel free to have the plumbing inspector check your plumbing and/or venting prior to gluing fittings. It may save you a lot of time and money.



**This handout is based on RCW 19.27, known as the "Washington State Residential Code". The handout includes portions of the International Residential Code (IRC), and may include portions of other codes adopted by statute, publications, as well as Klickitat County Ordinance and policies. Any portion of this document presuming to give authority to violate, ignore or cancel the provisions of codes adopted by Klickitat County shall not be valid.**

If your property is located in the National Scenic Area, the Columbia River Gorge Commission requires you to comply with all National Scenic Area regulations. They can be contacted at (509) 493-3323.

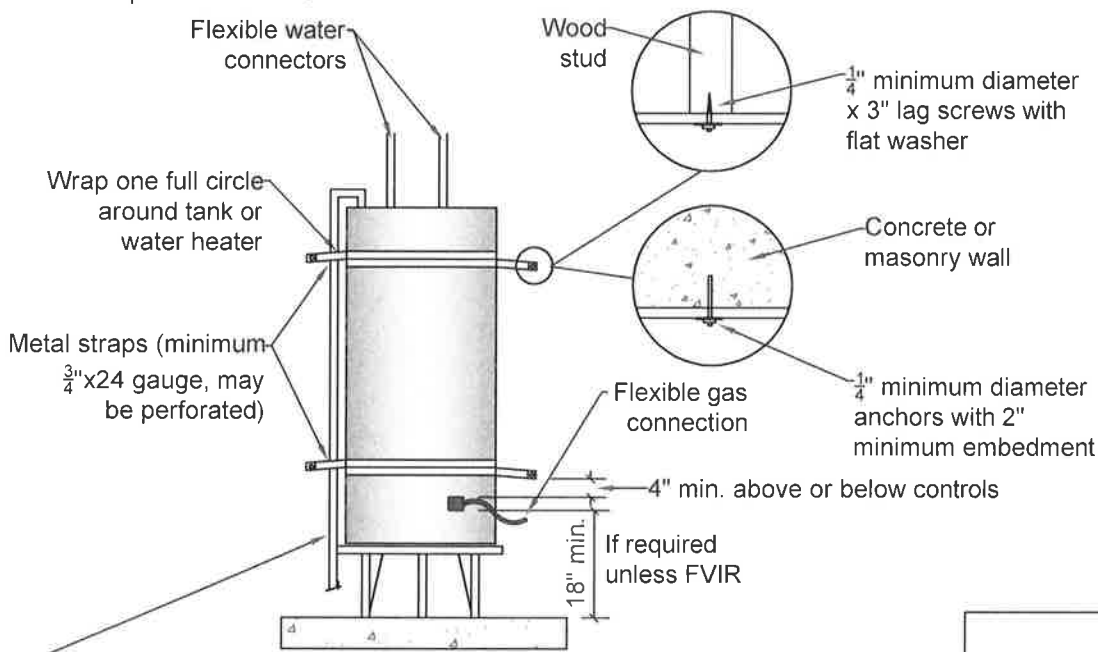
# SIZING AND PROTECTION OF WATER HEATERS

## 2018 Uniform Plumbing Code

**507.2** Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. Strapping shall be at points within the upper one-third and lower one-third of its vertical dimensions. At the lower point, a distance of not less than 4 inches shall be maintained from the controls with the strapping.

**507.13 Installation in Garages.** Appliances in residential garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that all burners, burner-ignition devices and ignition sources are located not less than 18 inches above the floor **unless listed as flammable vapor ignition resistant (FVIR)**.

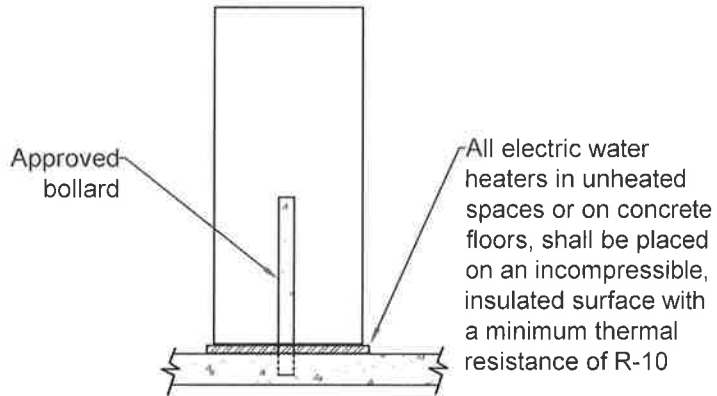
**507.13.1 Physical Damage.** Appliances installed in garages, warehouses, or other areas subject to mechanical damage shall be guarded against such damage by being installed behind protective barriers or by being elevated or located out of normal path of vehicles.



**505.2 Safety Devices.** All storage-type water heaters deriving heat from fuels or types of energy other than gas, shall be provided with, in addition to the primary temperature controls, an over-temperature safety protection device constructed, listed, and installed in accordance with nationally recognized applicable standards for such devices and a combination temperature and pressure relief valve.



**608.5** The discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following: 1) Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down. 2) Materials shall be rated at not less than the operating temperature of the system and approved for such use. 3) Discharge pipe shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2' and not less than 6" above the ground and pointing downwards. 4) Discharge in such a manner that does not cause personal injury or structural damage. 5) No part of such discharge pipe shall be trapped or subject to freezing. 6) The terminal end of the pipe shall not be threaded. 7) Discharge from a relief valve into a water heater pan shall be prohibited. **Exception:** Where no drainage was provided, replacement heating equipment shall only be required to provide a drain pointing downward from the relief valve to extend between 2' and 6" from the floor. No additional floor drain need be provided.



**Sizing**  
Table 501.1(2)<sup>1,3</sup>

Number of Bathrooms	1 - 1.5	1 - 1.5	1 - 1.5	2 - 2.5	2 - 2.5	2 - 2.5	2 - 2.5	3 - 3.5	3 - 3.5	3 - 3.5	3 - 3.5
Number of Bedrooms	1	2	3	2	3	4	5	3	4	5	6
First Hour Rating <sup>2</sup> , Gallons	38	49	49	49	62	62	74	62	74	74	74

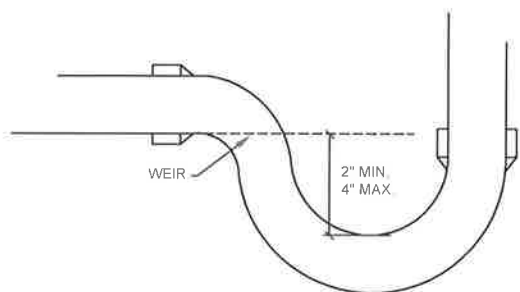
Notes:

1. The first hour rating is found on the "Energy Guide" label.
2. Non-storage and solar water heaters shall be sized to meet the appropriate first hour rating as shown in the table, and shall be capable of delivering hot water at the maximum system demand flow, as calculated in Section 610.0 or Appendix A, as applicable.
3. For replacement water heaters, see Section 102.4

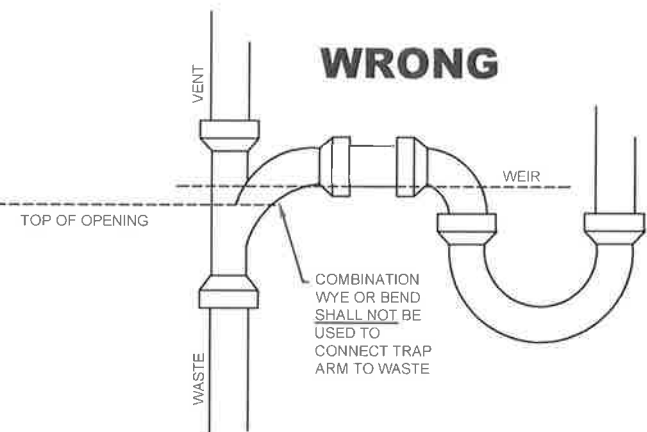
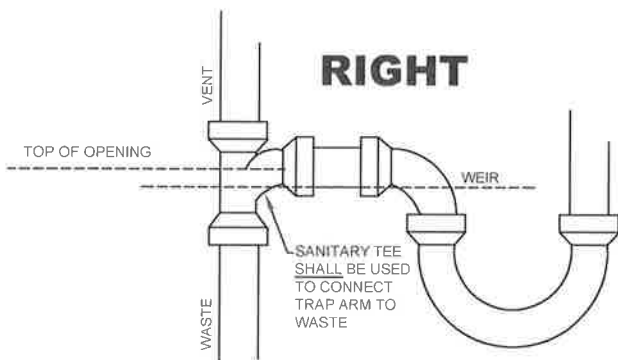
# P-TRAPS

All piping shall be protected in an approved manner.

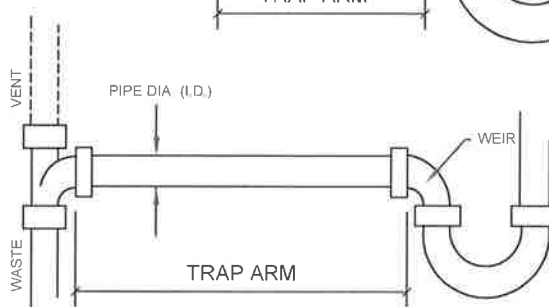
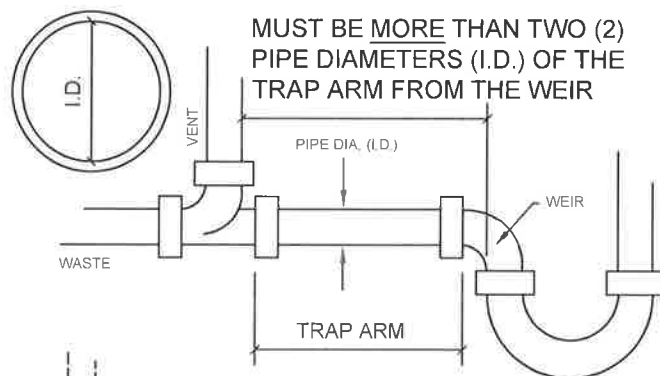
**NOTE:** No form of trap that depends for its seal upon the action of movable parts shall be used.



The weir of a p-trap must be below the top of the opening in the fitting that connects it to its vent.



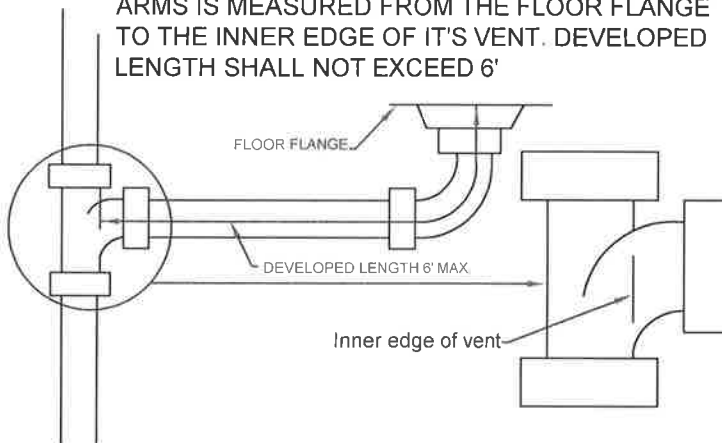
**NOTE:** Floor drains or similar traps directly connected to the drainage system and subject to infrequent use shall be protected with a trap seal primer.

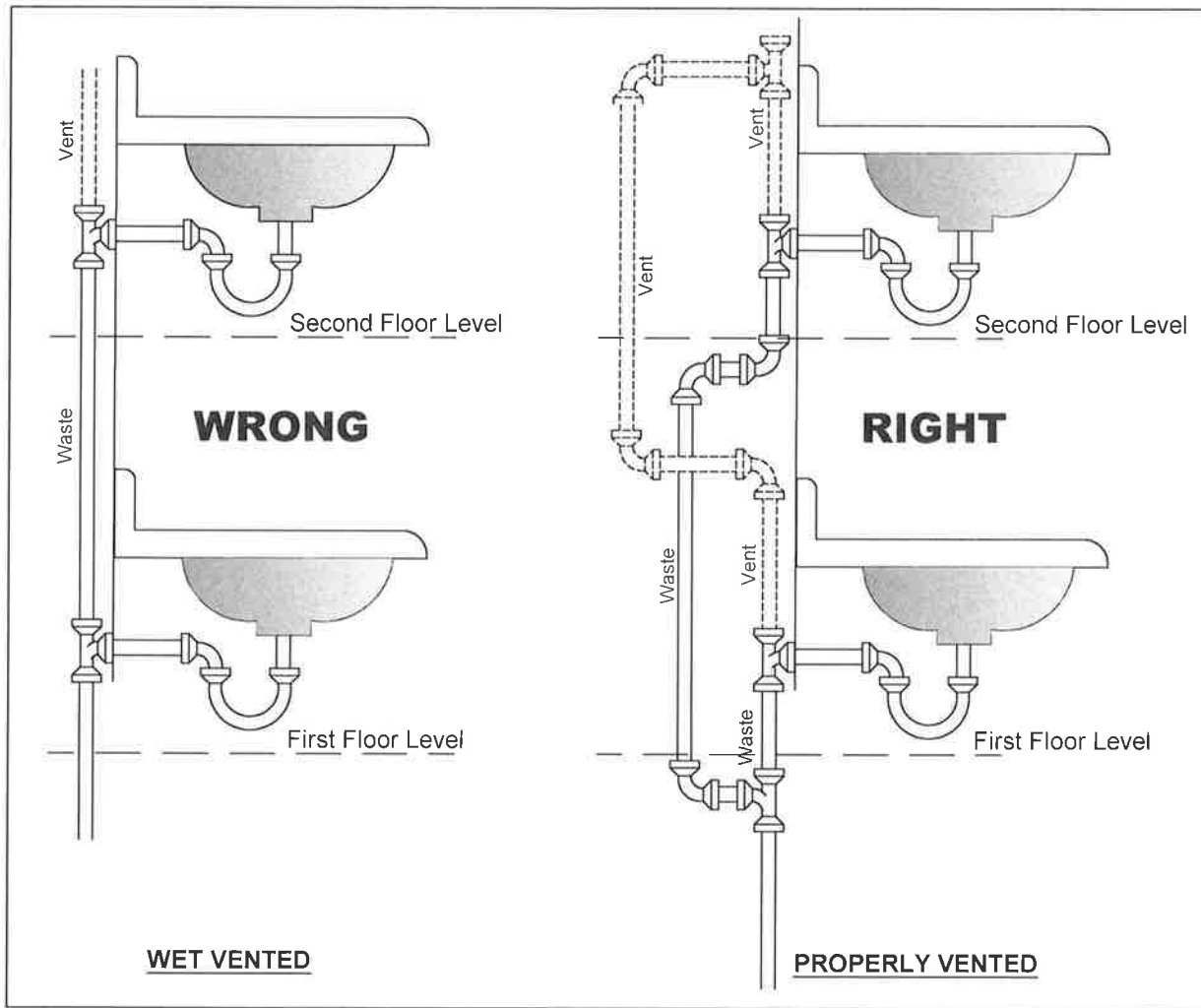


## HORIZONTAL LENGTH OF TRAP ARMS (Except for water closets and similar fixtures)\*

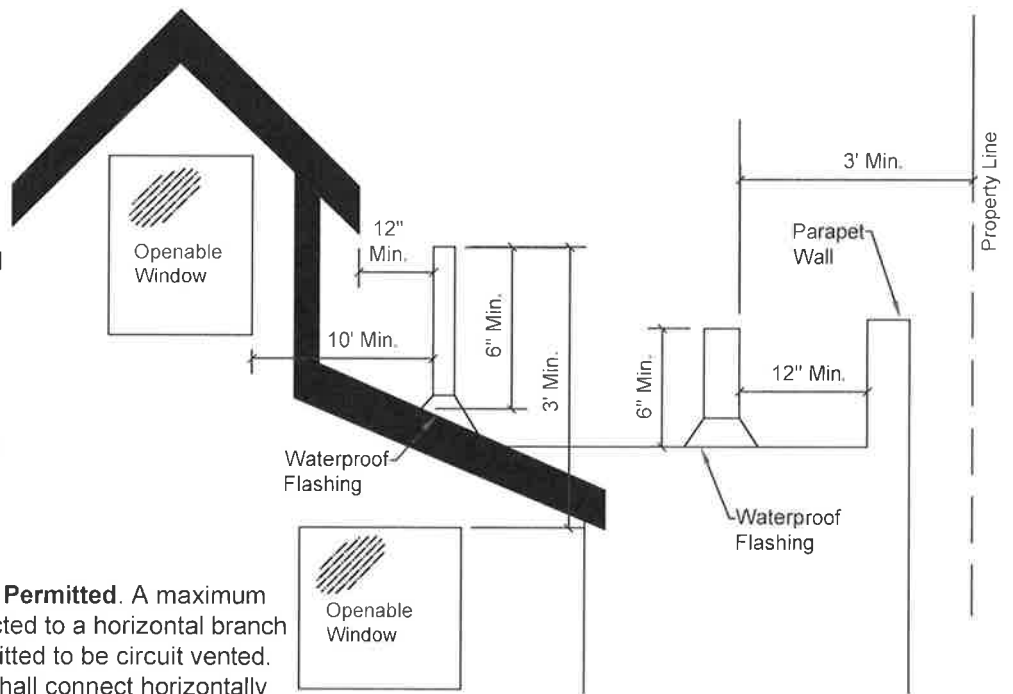
Trap Arm Pipe Size (I.D.)	Distance Trap to Vent	
	Max.	Min.
1 1/4"	2'-6"	2 1/2"
1 1/2"	3'-6"	3"
2"	5'	4"
3"	6'	6"
4"	10'	8"
>4"	10'	2x diameter

\* THE LENGTH OF WATER CLOSET (TOILET) TRAP ARMS IS MEASURED FROM THE FLOOR FLANGE TO THE INNER EDGE OF IT'S VENT. DEVELOPED LENGTH SHALL NOT EXCEED 6'

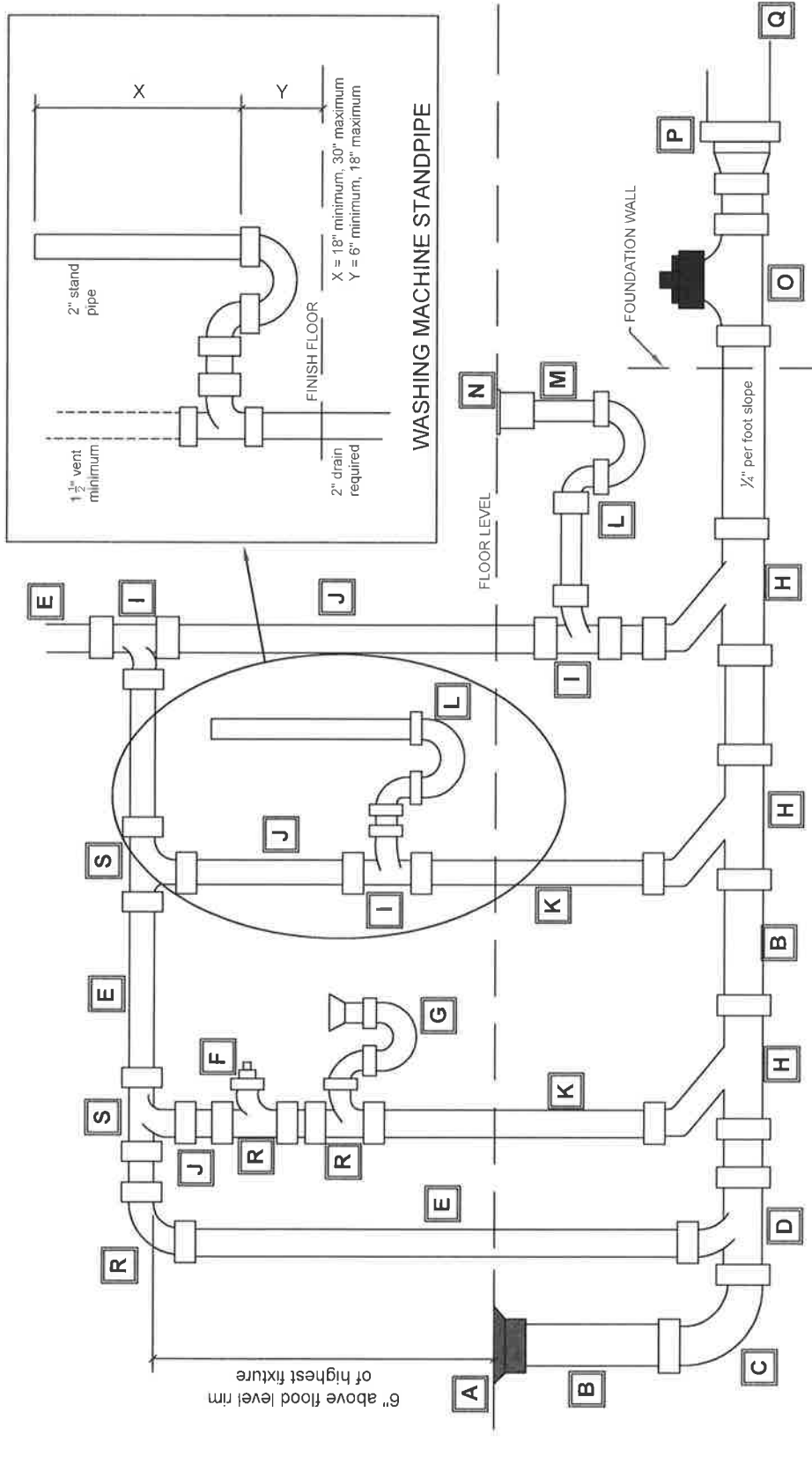




Each vent pipe or stack shall extend through its flashing and shall terminate vertically not less than 6" above the roof nor less than 1' from a vertical surface. ABS and PVC piping exposed to sunlight shall be protected by water based synthetic latex paint. Each vent shall terminate not less than 10' from, or not less than 3' above, an openable window, door, opening, air intake, or vent shaft, or not less than 3' in every direction from a lot line, alley and street excepted.



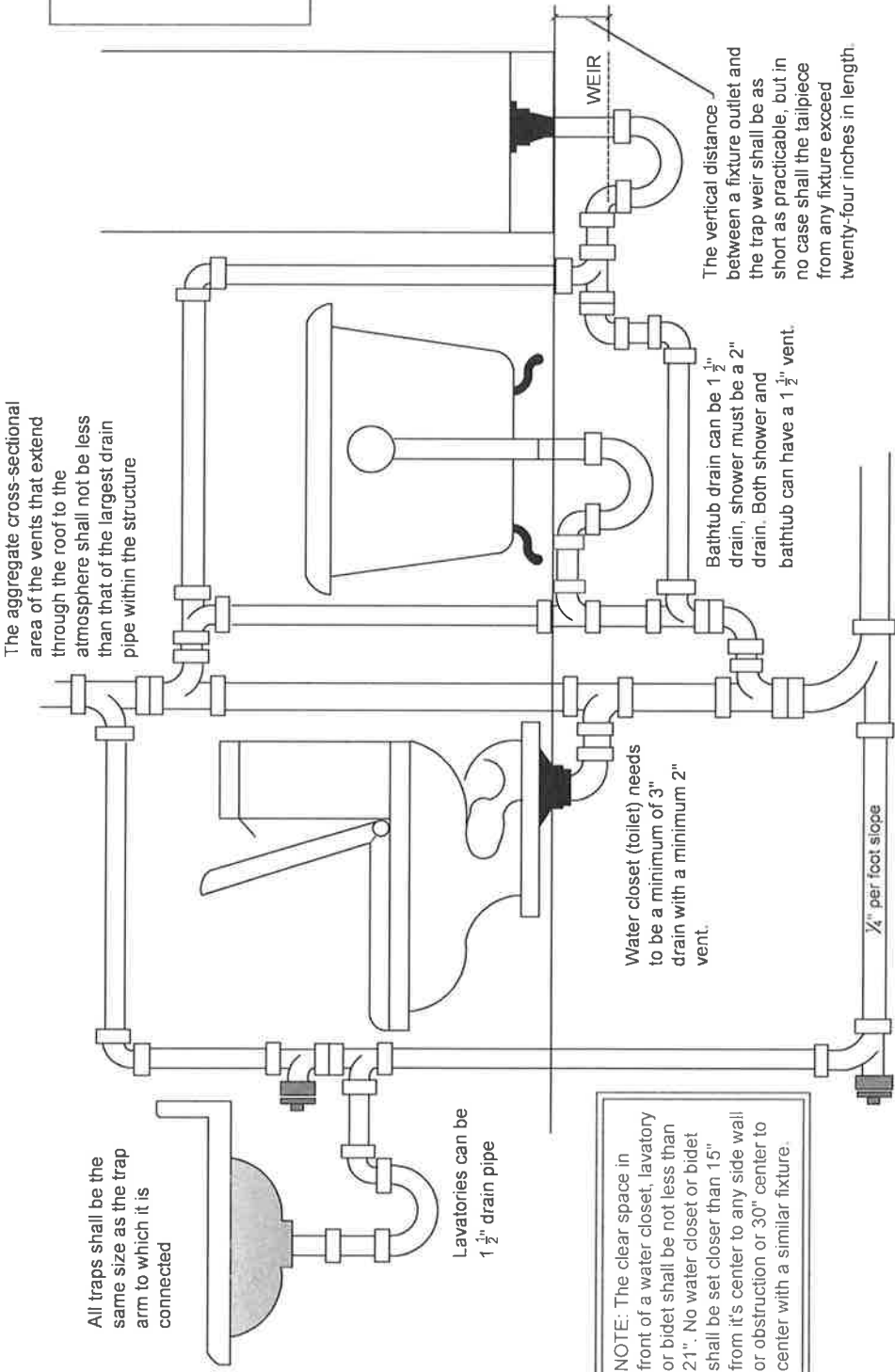
**911.1 Circuit Vent Permitted.** A maximum of 8 fixtures connected to a horizontal branch drain shall be permitted to be circuit vented. Each fixture drain shall connect horizontally to the horizontal branch being circuit vented. The horizontal branch drain shall be classified as a vent from the most downstream fixture drain connection to the most upstream fixture drain connection to the horizontal branch.



The aggregate cross-sectional area of the vents that extend through the roof to the atmosphere shall not be less than that of the largest drain pipe within the structure.

- A. 3" closet flange (toilet)
- B. 3" drain
- C. 3" bend
- D. 3" x 3" x 2" san-T
- E. 2" vent
- F. 1 1/2" cleanout
- G. 1 1/2" P-trap
- H. 3" x 3" x 2" combination wye and 1/8 bend
- I. 2" san-T
- J. 1 1/2" vent
- K. 2" drain for kitchen sinks, 1 1/2" drain for lavatory
- L. 2" P-trap for showers & laundry, 1 1/2" P-traps for bath tubs & sinks
- M. 2" drain
- N. 2" shower drain with strainer
- O. 3" two way clean-out tee
- P. 3" to 4" adapter (if needed)
- Q. 3" or 4" drain line to sewer or septic tank
- R. 1 1/2" san-T
- S. 2" x 2" x 1 1/2" san-T

NOTE: Different suppliers use different names for their parts.



**312.6 Freeze Protection.** No water, soil, or waste pipe shall be installed or permitted outside of a building, in attics, crawl spaces, or in an exterior wall unless, where necessary, adequate provision is made to protect such pipe from freezing. All hot and cold water pipes installed outside the conditioned space shall be insulated to a minimum R-3.

Piping, fixtures and appliances shall be properly supported and installed per manufacturer's installation instructions.

**604.14 Plastic Pipe Termination.** Plastic water service piping may terminate within a building, provided the connection to the potable water distribution system shall be made as is practical to the point of entry and shall be accessible. Barbed insert fittings with hose clamps are prohibited as a transition fitting within the building.

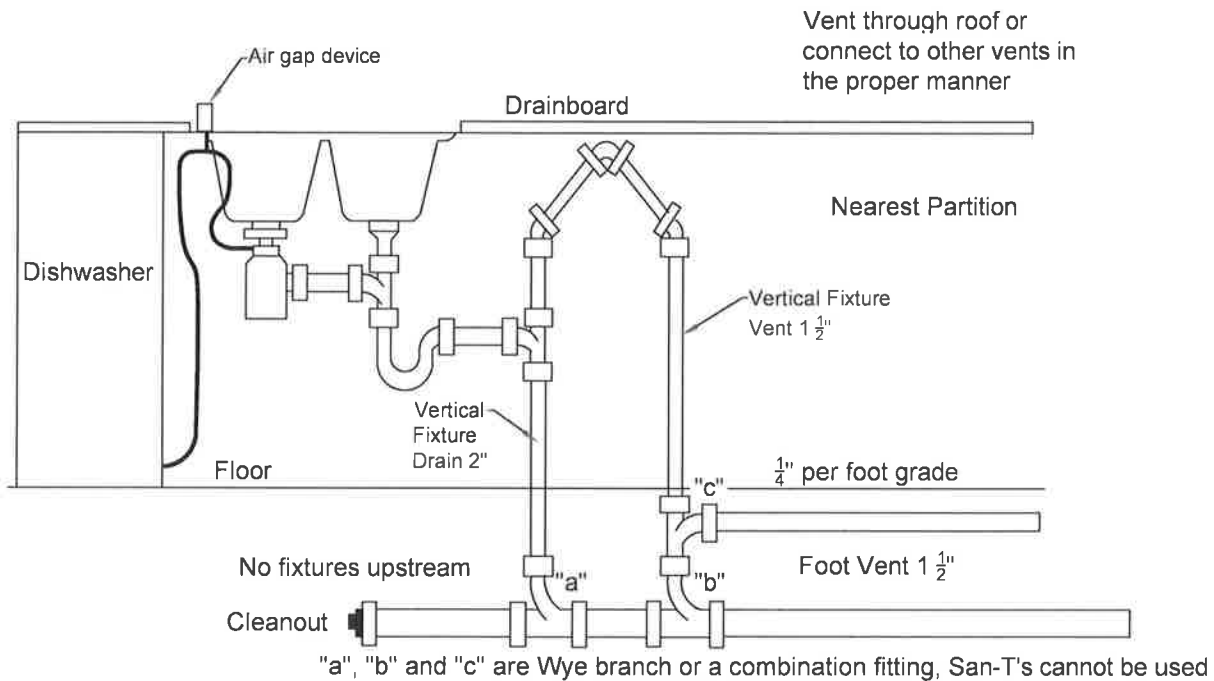
**606.5 Control Valve.** A control valve shall be installed immediately ahead of each water-supplied appliance and immediately ahead of each slip joint or appliance supply.

**NOTE:** The clear space in front of a water closet, lavatory or bidet shall be not less than 21". No water closet or bidet shall be set closer than 15" from its center to any side wall or obstruction or 30" center to center with a similar fixture.

**407.2 Water Consumption.** The maximum water use allowed in gallons per minute (gpm) for any of the following faucets and replacement aerators is the following:

Lavatory faucets.....	.2 gpm
Kitchen faucets.....	2.2 gpm
Replacement aerators.....	2.2 gpm

**411.2 Water Consumption.** Water closets shall have a maximum consumption not to exceed 1.6 gallons of water per flush in accordance with ASME A112.19.2/CSA B45.1. No water closet that operates on a continuous flow or continuous flush basis shall be permitted.



### SPECIAL VENTING FOR ISLAND FIXTURES

**909.1 General.** Traps for island sinks and similar equipment shall be roughed-in above the floor and shall be permitted to be vented by extending the vent as high as possible, but not less than the drainboard height and then returning it downward and connecting it to the horizontal sink drain immediately downstream from the vertical fixture drain. The return vent shall be connected to the horizontal drain through a wye-branch fitting and shall, in addition, be provided with a foot vent taken off the vertical vent by means of a wye branch immediately below the floor and extending to the nearest partition and then through the roof to the open air, or shall be permitted to be connected to other vents at a point not less than 6" above the flood-level rim of the fixtures served. Drainage fittings shall be used on the vent below the floor level, and a slope of not less than  $\frac{1}{4}$ " per foot back to the drain shall be maintained. The return bend used under the drainboard shall be a one-piece fitting or an assembly of a 45 degree, a 90 degree, and a 45 degree elbow in the order named. Pipe sizing shall be as elsewhere required in this code. The island sink drain, upstream of the returned vent, shall serve no other fixtures. An accessible cleanout shall be installed in the vertical portion of the foot vent.

### DOMESTIC DISHWASHING MACHINE

**414.3 Drainage Connection.** Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.3 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste disposer. Commercial dishwashing machines shall discharge indirectly through an air break or indirect connection. The indirect discharge for commercial dishwashing machines shall be in accordance with Section 807.1, and the direct discharge shall be in accordance with Section 704.3.

**807.3 Domestic Dishwashing Machine.** No domestic dishwashing machine shall be directly connected to a drainage system or food waste disposer without the use of an approved dishwasher air gap fitting on the discharge side of the dishwashing machine. Listed air gaps shall be installed with the flood-level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher.



## WATER SUPPLY

### **Water Distribution (within the building)**

1. Water pipe and fittings shall be of brass, copper, cast iron, galvanized malleable iron, galvanized wrought iron, galvanized steel, or other approved materials. CPVC and PB water pipe and tubing may be used for hot and cold water distribution systems within a building. All materials used in the water supply system, except valves and similar devices shall be of a like material, except where otherwise approved by the Administrative Authority.
2. **Do not use PVC water pipe for water supply inside the structure.** Supply piping shall convert to the proper approved piping before entering any part of the building. Plastic water service piping may terminate within a building, provided the connection to the potable water distribution system shall be made as near as is practical to the point of entry and shall be accessible. Barbed insert fittings with hose clamps are prohibited as a transition fitting within the building. (604.14)
3. Piping and tubing which has previously been used for any purpose other than for potable water systems shall not be used.

### **Valves**

1. **A fullway valve controlling all outlets** shall be installed on the **discharge side of each water meter and on each unmetered water supply.** (The valve on the meter will not fulfill this requirement).
2. A fullway valve shall be installed on the cold water supply pipe to each water heater at or near the water heater and shall be accessible.
3. A control valve shall be installed immediately ahead of each water supplied appliance and immediately ahead of each slip joint or appliance supply. Parallel water distribution systems shall provide a control valve either immediately ahead of each fixture being supplied or installed at the manifold, and shall be identified with the fixture being supplied. Where parallel water distribution system manifolds are located in attics, crawl spaces, or other locations not readily accessible, a separate shutoff valve shall be required immediately ahead of each individual fixture or appliance served.

### **Backflow Prevention**

Potable water outlets with hose attachments, other than water heater drains, boiler drains, and clothes washer connections, shall be protected by a non-removable hose-bibb-type vacuum breaker, or by an atmospheric vacuum breaker, installed not less than six inches above the highest point of usage located on the discharge side of the last valve. In climates where freezing temperatures occur, a listed self-draining frost-proof hose bibb with an integral backflow preventer or vacuum breaker shall be used.

### **Unions**

1. Unions shall be installed in the water supply piping within twelve (12) inches of regulating equipment, water heating, conditioning tanks, and similar equipment which may require service by removal or replacement in a manner which will facilitate its ready removal.

### **Inspections**

1. No water supply system or portion thereof shall be covered or concealed until it first has been tested, inspected and approved by the inspector.

### **Testing**

1. Upon completion of the entire hot and cold water supply system, it shall be tested and proven tight under a water pressure not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable water source. Fifty (50) psi air pressure may be substituted for the water test in the supply piping using an approved air gauge. In either method of testing, the piping shall withstand the test without leaking for a period of not less than fifteen (15) minutes. The test shall be verified by the inspector. Radiant heating piping shall be tested at 100 psi.

### **609.1 Cover depth**

Building supply yard piping shall be not less than twelve (12) inches below the average local frost depth (18" in Klickitat County) (30" minimum). The cover shall be not less than twelve (12) inches below finish grade.



## SANITARY DRAINAGE

### Drainage Piping

Materials for drainage piping shall be in accordance with one of the referenced standards in Table 701.2 except that:

1. No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6" above ground.
2. ABS and PVC DWV piping installations shall be installed in accordance with applicable standards in Table 1701.1.
3. No vitrified clay pipe or fittings shall be used above ground or where pressurized by a pump or ejector. They shall be kept not less than 12" below ground.
4. Copper tube for drainage and vent piping shall have a weight of not less than that of copper drainage tube type DWV.
5. Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6" above ground.
6. Cast-iron soil pipe and fittings shall be listed and tested in accordance with standards referenced in Table 1701.1. Such pipe and fittings shall be marked with country of origin and identification of the original manufacturer in addition to markings required by referenced standards.

### Inspections

No Drain Waste and Vent system shall be covered or concealed until it first has been tested, inspected and approved by the inspector.

### Testing

Upon completion of the entire Drain Waste and Vent system, it shall be tested and proven tight by filling with water. Vent pipes shall be tested with 10' of head. The piping shall withstand the test without leaking for a period of not less than 15 minutes.

### Cover Depth

Drainage piping shall not be less than 1' below the surface of the ground.

### Location of Cleanouts

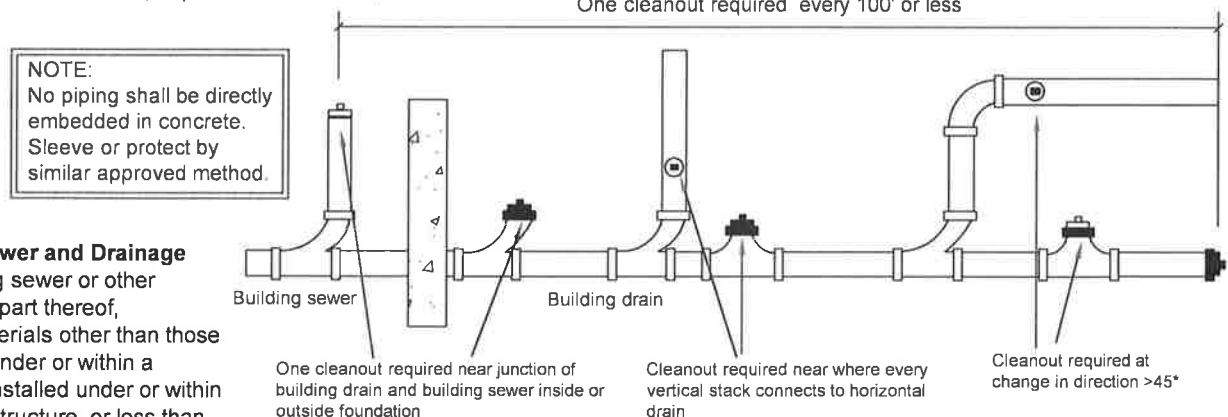
Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping that is more than 100' in total developed length, shall be provided with a cleanout for each 100', or fraction thereof, in length of such piping. An additional cleanout shall be provided in a drainage line for each aggregate horizontal change of direction exceeding 135 degrees.

### Exceptions:

1. Cleanouts shall be permitted to be omitted on a horizontal drain line less than 5' in length unless such line is serving sinks or urinals.
2. Cleanouts shall be permitted to be omitted on a horizontal drainage pipe installed on a slope of 72 degrees or less from the vertical angle.
3. Except for the building drain, its horizontal branches, and urinals, a cleanout shall not be required on a pipe or piping that is above the floor level of the lowest floor of the building.
4. An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and the building sewer or installed outside of a building at the lower end of a building drain and extended to grade, shall be permitted to be substituted for an upper terminal cleanout.

### Clearance at Cleanouts

Each cleanout in piping 2" or less in size shall be so installed that there is a clearance of not less than 12" in front of the cleanout. Cleanouts in piping exceeding 2" shall have a clearance of not less than 18" in front of the cleanout. Cleanouts in under-floor piping shall be extended to or above the finished floor or shall be extended outside the building where there is less than 18" vertical overall, allowing for obstructions such as ducts, beams and piping, and 30" of horizontal clearance from the means of access to such cleanout. No under-floor cleanout shall be located exceeding 20' from an access door, trap door or crawl hole.



**312.3 Building Sewer and Drainage Piping.** No building sewer or other drainage piping or part thereof, constructed of materials other than those approved for use under or within a building, shall be installed under or within 2' of a building or structure, or less than 1' below the surface of the ground.

# PLUMBING & TRENCHING REQUIREMENTS

**105.1 General.** Plumbing systems for which a permit is required by this code (Uniform Plumbing Code) shall be inspected by the authority having jurisdiction. No plumbing system or portion thereof shall be covered, concealed, or put into use until inspected and approved as prescribed by this code. Neither the authority having jurisdiction nor the jurisdiction shall be liable for expense entailed in the removal or replacement of material required to permit inspection. Plumbing systems regulated by this code shall not be connected to water, the energy fuel supply, or the sewer system until authorized by the authority having jurisdiction. Klickitat County Building Department will not inspect for other jurisdictions.

**105.2 Required Inspections.** New plumbing work and such portions of existing systems as affected by new work, or changes, shall be inspected by the authority having jurisdiction to ensure compliance with the requirements of this code and to ensure that the installation and construction of the plumbing system is in accordance with approved plans. The authority having jurisdiction shall make the following inspections and other such inspections as necessary. The permittee or the permittee's authorized agent shall be responsible for the scheduling of such inspections as follows:

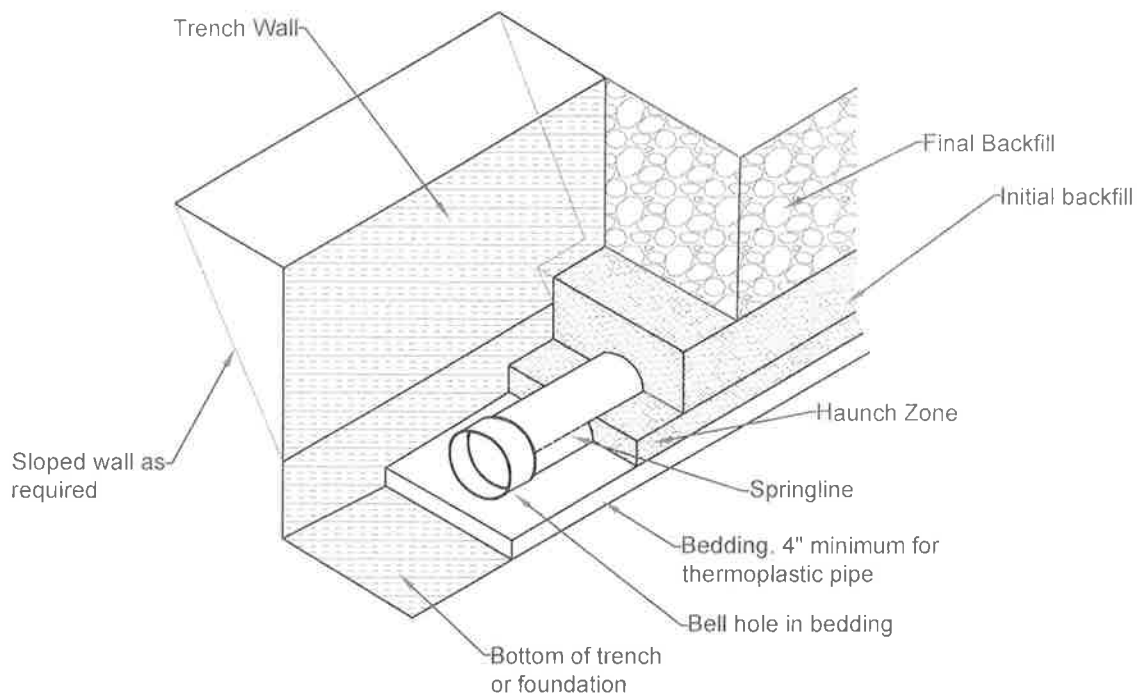
1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.
2. Rough-in inspection shall be made prior to the installation of wall or ceiling members.
3. Final inspection shall be made upon completion of the installation.

**314.1 Trenches.** Trenches deeper than the footing of a building or structure, and paralleling the same, shall be located not less than 45° from the bottom exterior edge of the footing, or as approved by this code.

**314.3 Open Trenches.** Excavations required to be made for the installation of a building drainage system or part thereof, within the walls of a building, shall be open trench work and shall be kept open until the piping has been inspected, tested, and accepted.

**314.4 Excavations.** Excavations shall be completely backfilled as soon after inspection as practicable. Precaution shall be taken to ensure compactness of backfill around piping without damage to such piping. Trenches shall be backfilled in thin layers to 12" above the top of the piping with clean earth, which shall not contain stones, boulders, cinderfill, frozen earth, construction debris, or other materials that will damage or break the piping or cause corrosive action. Mechanical devices such as bulldozers, graders, etc., shall be permitted to then be used to complete backfill to grade. Fill shall be properly compacted. Precautions shall be taken to ensure permanent stability for pipe laid in filled or made ground. Underground thermoplastic pipe and fittings for sewers and other gravity flow applications shall be installed in accordance with this code and section 314.4.1.

**314.4.1 Installation of Thermoplastic Pipe and Fittings.** Trench width for thermoplastic sewer pipe shall be not less than 1.25 times the outside diameter of the piping plus 12" or the outside diameter of the piping plus not less than 16". Thermoplastic piping shall be bedded in not less than 4" of granular fill supporting the piping. The backfill for thermoplastic piping shall be compacted along the sides of the piping in 6" layers and continue not less than 12" above the piping. Compaction shall be not less than 85% standard proctor density.



# PLUMBING & TRENCHING REQUIREMENTS

**609.1 Installation.** Water piping shall be adequately supported. Piping shall be installed in an approved manner for the material being used. Provisions shall be made for expansion in hot-water piping. Piping, equipment, appurtenances, and devices shall be installed in a workmanlike manner in accordance with the provisions and intent of the code. Building supply yard piping shall be not less than 12" below the average local frost depth (18"). (minimum 30" below grade) The cover shall be not less than 12" below finish grade.

**609.2 Trenches.** Water pipes shall not be run or laid in the same trench as building sewer or drainage piping constructed of clay or materials that are not approved for use within a building unless both of the following conditions are met:

1. The bottom of the water pipe shall be not less than 12" above the top of the sewer drain line.
2. The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a clear horizontal distance of not less than 12" from the sewer or drain line.

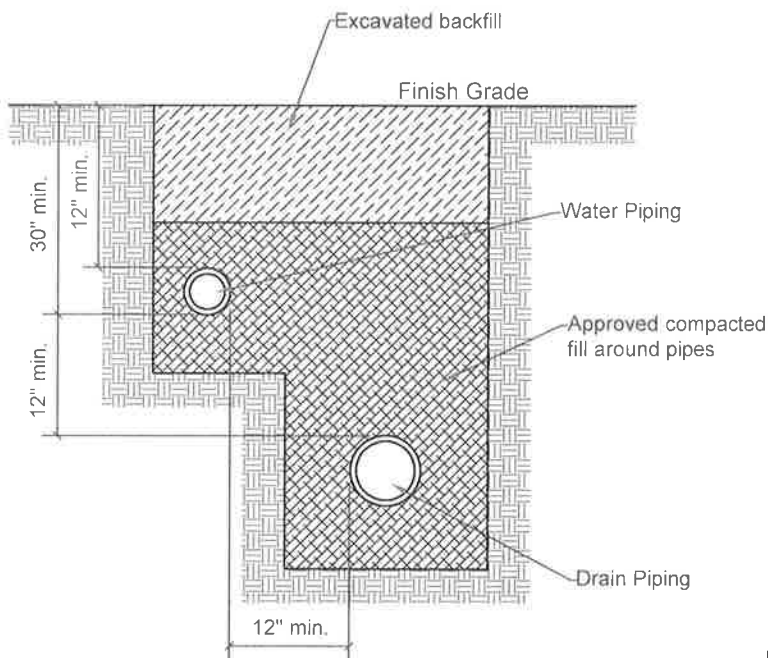
Water pipes crossing sewer or drainage piping constructed of clay or materials that are not approved for use within a building shall be laid not less than 12" above the sewer or drain pipe.

**609.4 Testing.** Upon completion of a section or of the entire hot and cold water supply system, the system shall be tested with air or water. The potable water test pressure shall be greater than or equal to the working pressure under which the system is to be used. The air pressure shall be a minimum of 50 psi. Plastic pipe shall not be tested with air. The piping system shall withstand the test pressure without showing evidence of leakage for a period of not less than 15 minutes.

**Exception:** PEX, PP or PE-RT tube shall be permitted to be tested with air where permitted by the manufacturer's instructions.

## Hydronic Piping

Hydronic piping systems shall be tested hydrostatically at a pressure of one and one-half times the maximum system design pressure, but not less than 100 psi. The duration shall be not less than 15 minutes and not more than 20 minutes. Openings through concrete or masonry building elements shall be sleeved. The potable water system shall be protected from backflow in accordance with the provisions of the Uniform Plumbing Code. A hydronic piping system shall not be in direct contact with any building material that causes the piping material to degrade or corrode. Piping shall be installed so that piping, connections and equipment shall not be subject to excessive strains or stresses. Provisions shall be made to compensate for expansion, contraction, shrinkage and structural settlement. Piping system shall be installed per manufacturer's installation instructions. Hydronic heating in slabs (radiant heat), shall have R-10 insulation under the entire slab.



### QUICK REFERENCE

#### Plumbing

Minimum 30" below grade. Test at 50 psi air test for a minimum of 15 minutes, or fill with potable water.

#### DWW

Minimum 12" below grade. Test at 5 psi (for non-plastic piping) for a minimum of 15 minutes. Water test shall have 10' of head on vent pipe.

#### Hydronic tubing

Install per manufacturer's instructions for system being used. Test at 100 psi for a minimum of 15 minutes, not to exceed 20 minutes duration.

Unless specified otherwise by Washington State department of Labor and Industries or Klickitat PUD, minimum separation to electrical in the same trench shall be no less than 12".

# PLUMBING & TRENCHING REQUIREMENTS

**701.2 Drainage Piping.** Materials for drainage piping shall be in accordance with one of the referenced standards in Table 701.2 except that:

1. No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6" above ground.
2. ABS and PVC DWV piping installations shall be installed in accordance with applicable standards in Table 1701.1, (Available upon request). Except for individual single family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of 25 and a maximum smoke developed index of 50, when tested in accordance with ASTM E-84 and UL 723.
3. No vitrified clay pipe or fittings shall be used above ground or where pressurized by a pump or ejector. They shall be kept not less than 12" below ground.
4. Copper tube for drainage and vent piping shall have a weight of not less than that of copper drainage tube type DWV.
5. Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches above ground.
6. Cast-iron soil pipe and fittings shall be listed and tested in accordance with standards referenced in Table 1701.1, (Available upon request) Such pipe and fittings shall be marked with country of origin and identification of the original manufacturer in addition to markings required by referenced standards.

**701.4 Location.** Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping that is more than 100 feet in total developed length, shall be provided with a cleanout for each 100 feet, or fraction thereof, in length of such piping. An additional cleanout shall be provided in a drainage line for each aggregate horizontal change of direction exceeding 135°.

## Exceptions:

1. Cleanouts shall be permitted to be omitted on a horizontal drain line less than 5 feet in length unless such line is serving sinks or urinals.
2. Cleanouts shall be permitted to be omitted on a horizontal drainage pipe installed on a slope of 72° or less from the vertical angle (one-fifth bend).
3. Except for the building drain, its horizontal branches, and urinals, a cleanout shall not be required on a pipe or piping that is above the floor level of the lowest floor of the building.
4. An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and the building sewer or installed outside of a building at the lower end of a building drain and extended to grade, shall be permitted to be substituted for an upper terminal cleanout.

**701.9 Clearance.** Each cleanout in piping 2" or less shall be so installed that there is a clearance of not less than 12" in front of the cleanout. Cleanouts in piping exceeding 2" shall have a clearance of not less than 18" in front of the cleanout. Cleanouts in under-floor piping shall be extended to or above the finished floor or shall be extended outside the building where there is less than 18" vertical overall, allowing for obstructions such as ducts, beams, and piping, and 30" of horizontal clearance from the means of access to such cleanout. No under-floor cleanout shall be located exceeding 20' from an access door, trap door, or crawl hole.

**712 Testing.** The piping of the plumbing, drainage, and venting systems shall be tested with water or air except that plastic pipe shall not be tested with air. The water test shall be applied to the drainage and vent systems either in its entirety or in sections. Where the test is applied to the entire system, openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. Where the system is tested in sections, each opening shall be tightly plugged, except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 10 foot head of water. The water shall be kept in the system, or in the portion under test, for not less than 15 minutes before inspection starts. The system shall then be tight at all points. The air test shall be made by attaching an air compressor testing apparatus to a suitable opening, and after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 5 psi or sufficient to balance a column of mercury 10" in height. The pressure shall be held without introduction of additional air for a period of not less than 15 minutes.

**718.2 Support.** Building sewer piping shall be laid on a firm bed throughout its entire length, and such piping laid in made or filled-in ground shall be laid on a bed of approved materials and shall be properly supported.

**718.3 Protection from Damage.** No building sewer or other drainage piping or part thereof, which is constructed of materials other than those approved for use under or within a building, shall be installed under or within 2 feet of a building or structure, or part thereof, nor less than 1 foot below the surface of the ground. The provisions of this subsection include structures such as porches and steps, whether covered or uncovered; breezeways; roofed porte cocheres; roofed patios; carports; covered walks; covered driveways; and similar structures or appurtenances.

**SANITARY DRAINAGE**

**TABLE 701.2  
MATERIALS FOR DRAIN, WASTE, VENT PIPE AND FITTINGS**

MATERIAL	UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS	ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS	BUILDING SEWER PIPE AND FITTINGS	REFERENCED STANDARD(S) PIPE	REFERENCED STANDARD(S) FITTINGS
ABS (Schedule 40)	X	X	X	ASTM D2661, ASTM D2680*	ASTM D2661, ASTM D2680*
Cast-Iron	X	X	X	ASTM A74, ASTM A888, CISPI 301	ASME B16.12, ASTM A74, ASTM A888, CISPI 301
Co-Extruded ABS (Schedule 40)	X	X	X	ASTM F628	ASTM D2661, ASTM D2680*
Co-Extruded Composite (Schedule 40)	X	X	X	ASTM F1488	ASTM D2661, ASTM D2665, ASTM F794*, ASTM F1866
Co-Extruded PVC (Schedule 40)	X	X	X	ASTM F891, ASTM F1760	ASTM D2665, ASTM F794*, ASTM F1336*, ASTM F1866
Copper and Copper Alloys (Type DWV)	X	X	X	ASTM B43, ASTM B75, ASTM B251, ASTM B302, ASTM B306	ASME B16.23, ASME B16.29
Galvanized Malleable Iron	—	X	—	—	ASME B16.3
Galvanized Steel	—	X	—	ASTM A53	—
Polyethylene	—	—	X	ASTM F714, ASTM F894	—
PVC (Schedule 40)	X	X	X	ASTM D1785, ASTM D2665, ASTM F794*	ASTM D2665, ASTM F794*, ASTM F1866
PVC (Sewer and Drain)	—	—	X	ASTM D2729	ASTM D2729
PVC PSM	—	—	X	ASTM D3034	ASTM D3034
Stainless Steel 304	—	X	—	ASME A112.3.1	ASME A112.3.1
Stainless Steel 316L	X	X	X	ASME A112.3.1	ASME A112.3.1
Vitrified Clay (Extra strength)	—	—	X	ASTM C700	ASTM C700

\* For building sewer applications.

# PLUMBING & TRENCHING REQUIREMENTS

**719.1 Cleanout Locations.** Cleanouts shall be placed inside the building near the connection between the building drain and the building sewer or installed outside the building at the lower end of the building drain and extended to grade. Additional building sewer cleanouts shall be installed at intervals not to exceed 100 feet in straight runs and for each aggregate horizontal change in direction exceeding 135°.

**719.2 No Additional Cleanouts.** Where a building sewer or branch thereof does not exceed 10 feet in length and is a straight-line projection from a building drain that is provided with a cleanout, no cleanout will be required at its point of connection to the building drain.

**719.4 Cleaning.** Each cleanout shall be installed so that it opens to allow cleaning in the direction of flow of the soil or waste or at right angles thereto, and except in the case of wye branch and end-of-line cleanouts, shall be installed vertically above the flow line of the pipe.

**719.5 Access.** Cleanouts installed under concrete or asphalt paving shall be made accessible by yard boxes or by extending flush with paving with approved materials and shall be adequately protected.

