

**Sanitary Drainage and Venting**

**Sanitary Drainage Pipes**

**Soil Pipe (Soil Stack)**

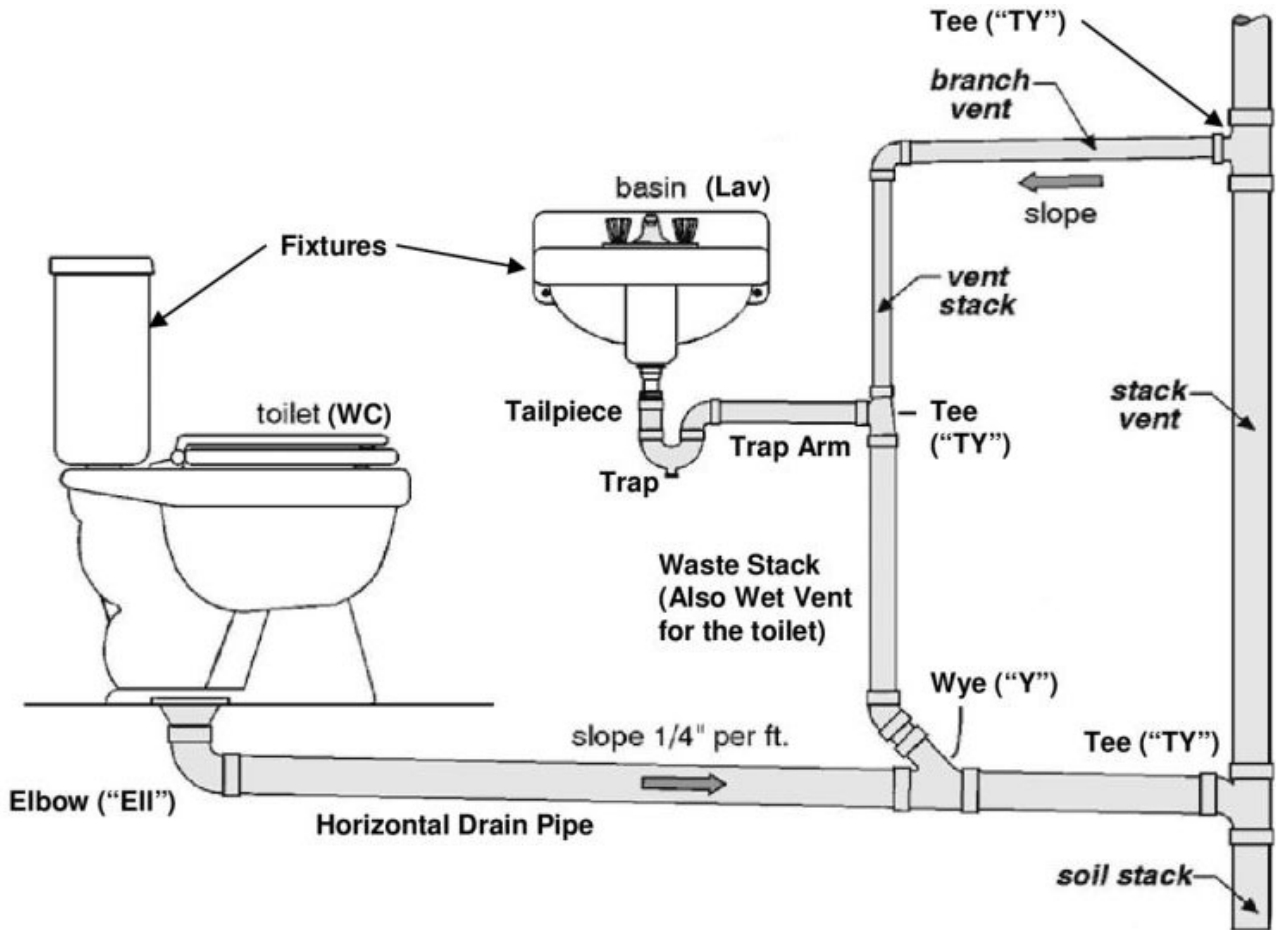
A soil pipe is designed to carry soiled water from the toilet, urinal or bidet to the sewer.

**Waste Pipe (Waste Stack)**

A waste pipe carries water from your sinks, shower, washing machine or bath.

**DWV Terminology**

The **Drain, Waste, and Venting (DWV) System** provides for the collection of sanitary soil (solid particles) and waste (fluids) within a building, and the discharge of those products outside the building to a municipal sewer system or to a septic system.



**2016 California Plumbing Code  
Chapter 7 Sanitary Drainage**

**Drainage Fixture Unit (DFU)**

Measure of the probable discharge of wastewater and waterborne waste into the drainage system.

1 drainage fixture unit (DFU) = 7 ½ gallons per min (gpm)

**TABLE 702.1  
DRAINAGE FIXTURE UNIT VALUES (DFU)**

PLUMBING APPLIANCES, APPURTENANCES, OR FIXTURES	MINIMUM SIZE TRAP AND TRAP ARM <sup>7</sup> (inches)	PRIVATE	PUBLIC	ASSEMBLY <sup>8</sup>
Bathtub or Combination Bath/Shower	1½	2.0	2.0	—
Bidet	1¼	1.0	—	—
Bidet	1½	2.0	—	—
Clothes Washer, domestic, standpipe <sup>5</sup>	2	3.0	3.0	3.0
Dental Unit, cuspidor	1¼	—	1.0	1.0
Dishwasher, domestic, with independent drain <sup>2</sup>	1½	2.0	2.0	2.0
Drinking Fountain or Water Cooler	1¼	0.5	0.5	1.0
Food Waste Disposer, commercial	2	—	3.0	3.0
Floor Drain, emergency	2	—	0.0	0.0
Floor Drain (for additional sizes see Section 702.0)	2	2.0	2.0	2.0
Shower, single-head trap	2	2.0	2.0	2.0
Multi-head, each additional	2	1.0	1.0	1.0
Lavatory	1¼	1.0	1.0	1.0
Lavatories in sets	1½	2.0	2.0	2.0
Washfountain	1½	—	2.0	2.0
Washfountain	2	—	3.0	3.0
Mobilehome or Manufactured Home, trap <sup>9</sup>	3	6.0	—	—
Receptor, indirect waste <sup>1,3</sup>	1½	—	See footnote <sup>1,3</sup>	
Receptor, indirect waste <sup>1,4</sup>	2	—	See footnote <sup>1,4</sup>	
Receptor, indirect waste <sup>1</sup>	3	—	See footnote <sup>1</sup>	
Sinks	—	—	—	—
Bar	1½	1.0	—	—
Bar <sup>2</sup>	1½	—	2.0	2.0
Clinical	3	—	6.0	6.0
Commercial with food waste <sup>2</sup>	1½	—	3.0	3.0
Exam Room	1½	—	1.0	—
Special Purpose <sup>2</sup>	1½	2.0	3.0	3.0
Special Purpose	2	3.0	4.0	4.0
Special Purpose	3	—	6.0	6.0
Kitchen, domestic <sup>2</sup> (with or without food waste disposer, dishwasher, or both)	1½	2.0	2.0	—
Laundry <sup>2</sup> (with or without discharge from a clothes washer)	1½	2.0	2.0	2.0
Service or Mop Basin	2	—	3.0	3.0
Service or Mop Basin	3	—	3.0	3.0
Service, flushing rim	3	—	6.0	6.0
Wash, each set of faucets	—	—	2.0	2.0
Urinal, integral trap 1.0 GPF <sup>2</sup>	2	2.0	2.0	5.0
Urinal, integral trap greater than 1.0 GPF	2	2.0	2.0	6.0
Urinal, exposed trap <sup>2</sup>	1½	2.0	2.0	5.0
Water Closet, 1.6 GPF Gravity Tank <sup>6</sup>	3	3.0	4.0	6.0
Water Closet, 1.6 GPF Flushometer Tank <sup>6</sup>	3	3.0	4.0	6.0
Water Closet, 1.6 GPF Flushometer Valve <sup>6</sup>	3	3.0	4.0	6.0
Water Closet, greater than 1.6 GPF Gravity Tank <sup>6</sup>	3	4.0	6.0	8.0
Water Closet, greater than 1.6 GPF Flushometer Valve <sup>6</sup>	3	4.0	6.0	8.0

For SI units: 1 inch = 25 mm

**Notes:**

- <sup>1</sup> Indirect waste receptors shall be sized based on the total drainage capacity of the fixtures that drain therein to, in accordance with Table 702.2(2).
- <sup>2</sup> Provide a 2 inch (50 mm) minimum drain.
- <sup>3</sup> For refrigerators, coffee urns, water stations, and similar low demands.
- <sup>4</sup> For commercial sinks, dishwashers, and similar moderate or heavy demands.
- <sup>5</sup> Buildings having a clothes-washing area with clothes washers in a battery of three or more clothes washers shall be rated at 6 fixture units each for purposes of sizing common horizontal and vertical drainage piping.
- <sup>6</sup> Water closets shall be computed as 6 fixture units where determining septic tank sizes based on Appendix H of this code.
- <sup>7</sup> Trap sizes shall not be increased to the point where the fixture discharge is capable of being inadequate to maintain their self-scouring properties.
- <sup>8</sup> Assembly [Public Use (see Table 422.1)].
- <sup>9</sup> For drainage fixture unit values related to lots within mobilehome parks in all parts of the State of California, see California Code of Regulations, Title 25, Division 1, Chapter 2, Article 5, Section 1268. For drainage fixture unit values related to lots within special occupancy parks in all parts of the State of California, see California Code of Regulations, Title 25, Division 1, Chapter 2.2, Article 5, Section 2268.

**TABLE 702.2(1)  
MAXIMUM DRAINAGE FIXTURE UNITS FOR A  
TRAP AND TRAP ARM\***

SIZE OF TRAP AND TRAP ARM (inches)	DRAINAGE FIXTURE UNIT VALUES (DFU)
1¼	1 unit
1½	3 units
2	4 units
3	6 units
4	8 units

For SI Units: 1 inch = 25 mm

\* **Exception:** On self-service laundries.

**TABLE 702.2(2)  
DISCHARGE CAPACITY IN GALLONS PER MINUTE FOR  
INTERMITTENT FLOW ONLY\***

GPM	FIXTURE UNITS
Up to 7½	Equals 1 Fixture Unit
Greater than 7½ to 15	Equals 2 Fixture Units
Greater than 15 to 30	Equals 4 Fixture Units
Greater than 30 to 50	Equals 6 Fixture Units

For SI units: 1 gallon per minute = 0.06 L/s

\* Discharge capacity exceeding 50 gallons per minute (3.15 L/s) shall be determined by the Authority Having Jurisdiction.

### **703.0 Size of Drainage Piping.**

**703.1 Minimum Size.** The minimum sizes of vertical, horizontal, or both drainage piping shall be determined from the total of fixture units connected thereto, and additionally, in the case of vertical drainage pipes, in accordance with their length.

**703.2 Maximum Number of Fixture Units.** Table 703.2 shows the maximum number of fixture units allowed on a vertical or horizontal drainage pipe, building drain, or building sewer of a given size; the maximum number of fixture units allowed on a branch interval of a given size; and the maximum length (in feet and meters) of a vertical drainage pipe of a given size.

**703.3 Sizing per Appendix C.** For alternate method of sizing drainage piping, see Appendix C.

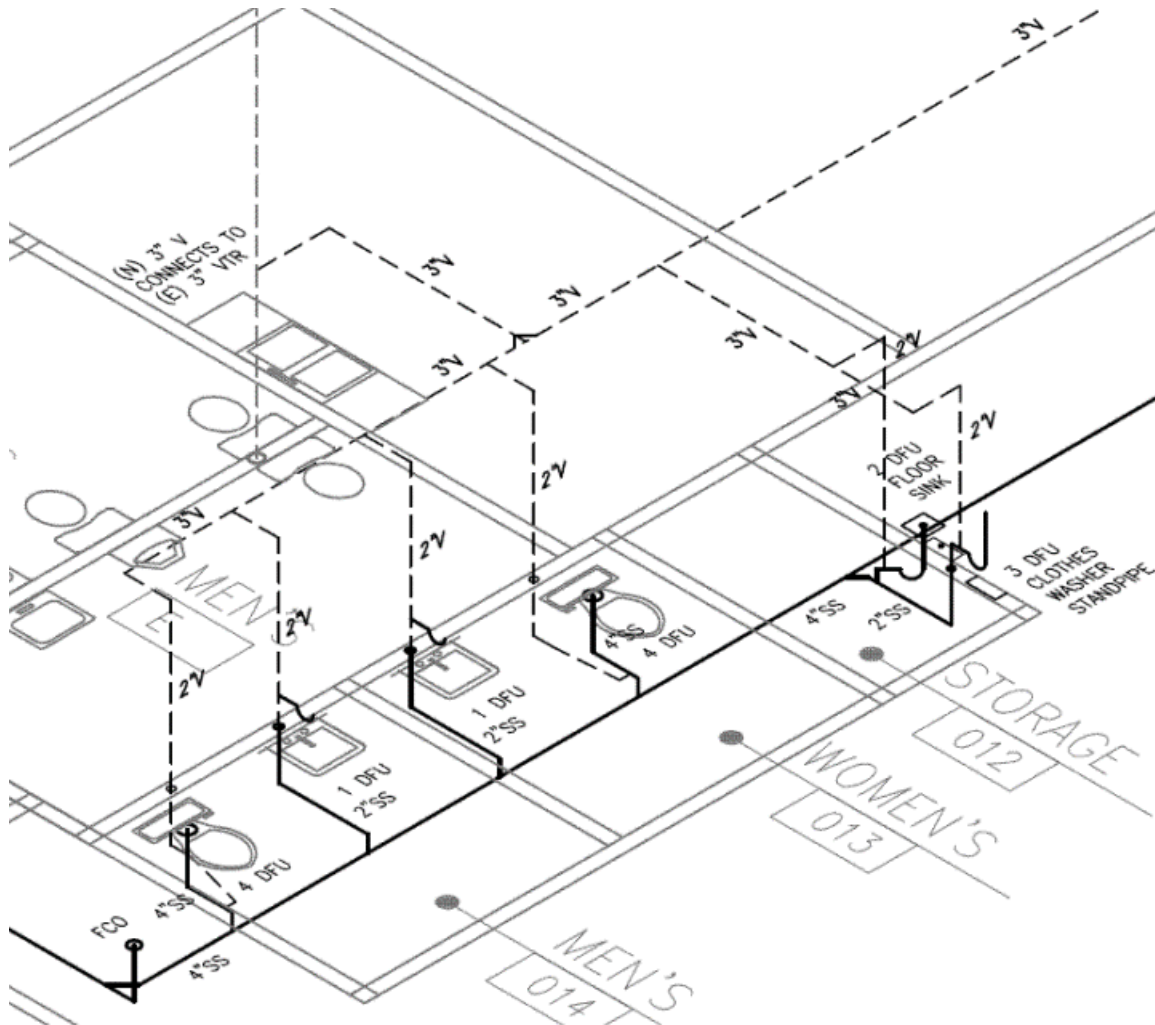
**TABLE 703.2  
MAXIMUM UNIT LOADING AND MAXIMUM LENGTH OF DRAINAGE AND VENT PIPING**

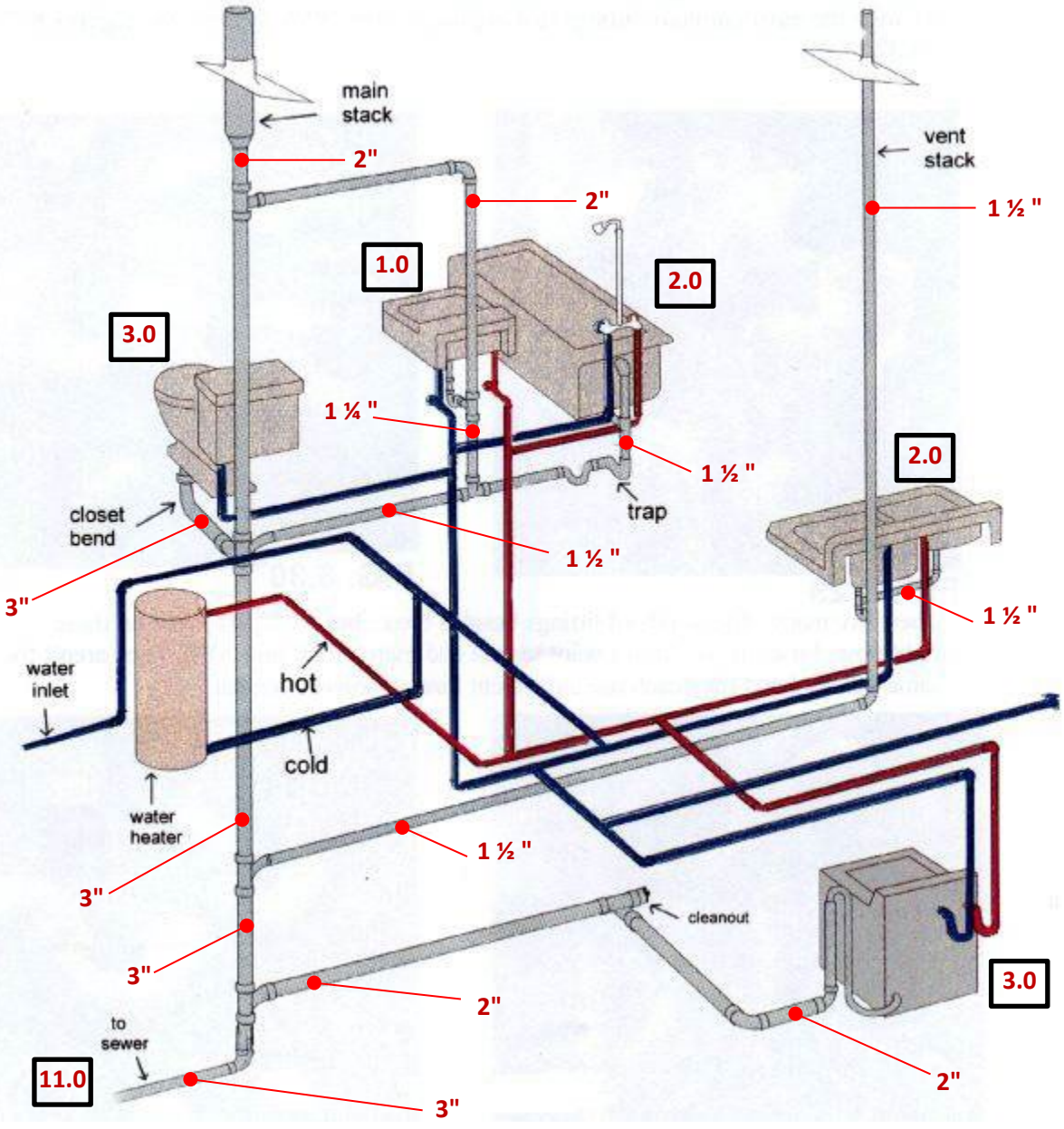
SIZE OF PIPE (inches)	1¼	1½	2	3	4	5	6	8	10	12
<b>Maximum Units</b>										
Drainage Piping <sup>1</sup>										
Vertical	1	2 <sup>2</sup>	16 <sup>3</sup>	48 <sup>4</sup>	256	600	1380	3600	5600	8400
Horizontal	1	1	8 <sup>3</sup>	35 <sup>4</sup>	216 <sup>5</sup>	428 <sup>5</sup>	720 <sup>5</sup>	2640 <sup>5</sup>	4680 <sup>5</sup>	8200 <sup>5</sup>
<b>Maximum Length</b>										
Drainage Piping										
Vertical, (feet)	45	65	85	212	300	390	510	750	—	—
Horizontal (unlimited)										
<b>Vent Piping</b>										
Horizontal and Vertical <sup>6</sup>										
Maximum Units	1	8 <sup>3</sup>	24	84	256	600	1380	3600	—	—
Maximum Lengths, (feet)	45	60	120	212	300	390	510	750	—	—

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

**Notes:**

- <sup>1</sup> Excluding trap arm.
- <sup>2</sup> Except sinks, urinals, and dishwashers – exceeding 1 fixture unit.
- <sup>3</sup> Except six-unit traps or water closets.
- <sup>4</sup> Only four water closets or six-unit traps allowed on a vertical pipe or stack; and not to exceed three water closets or six-unit traps on a horizontal branch or drain.
- <sup>5</sup> Based on ¼ inch per foot (20.8 mm/m) slope. For ⅛ of an inch per foot (10.4 mm/m) slope, multiply horizontal fixture units by a factor of 0.8.
- <sup>6</sup> The diameter of an individual vent shall be not less than 1¼ inches (32 mm) nor less than one-half the diameter of the drain to which it is connected. Fixture unit load values for drainage and vent piping shall be computed from Table 702.1 and Table 702.2(2). Not to exceed one-third of the total permitted length of a vent shall be permitted to be installed in a horizontal position. Where vents are increased one pipe size for their entire length, the maximum length limitations specified in this table do not apply. This table is in accordance with the requirements of Section 901.3.





Fixture	# of Fix.	Minimum Trap Size and Trap Arm (inches)	DFU	
			EACH	THIS JOB
BT	1	1 1/2	2.0	2.0
LAV	1	1 1/4	1.0	1.0
WC FT	1	3.0	3.0	3.0
KS	1	1 1/2	2.0	2.0
CW	1	2	3.0	3.0
TOTALS				11.0

**901.0 General.**

**901.1 Applicability.** This chapter shall govern the materials, design, and installation of plumbing vent systems.

**901.2 Vents Required.** Each plumbing fixture trap, except as otherwise provided in this code, shall be protected against siphonage and backpressure, and air circulation shall be ensured throughout all parts of the drainage system by means of vent pipes installed in accordance with the requirements of this chapter and as otherwise required by this code.

**901.3 Trap Seal Protection.** The vent system shall be designed to prevent a trap seal from being exposed to a pressure differential that exceeds 1 inch water column (0.24 kPa) on the outlet side of the trap.

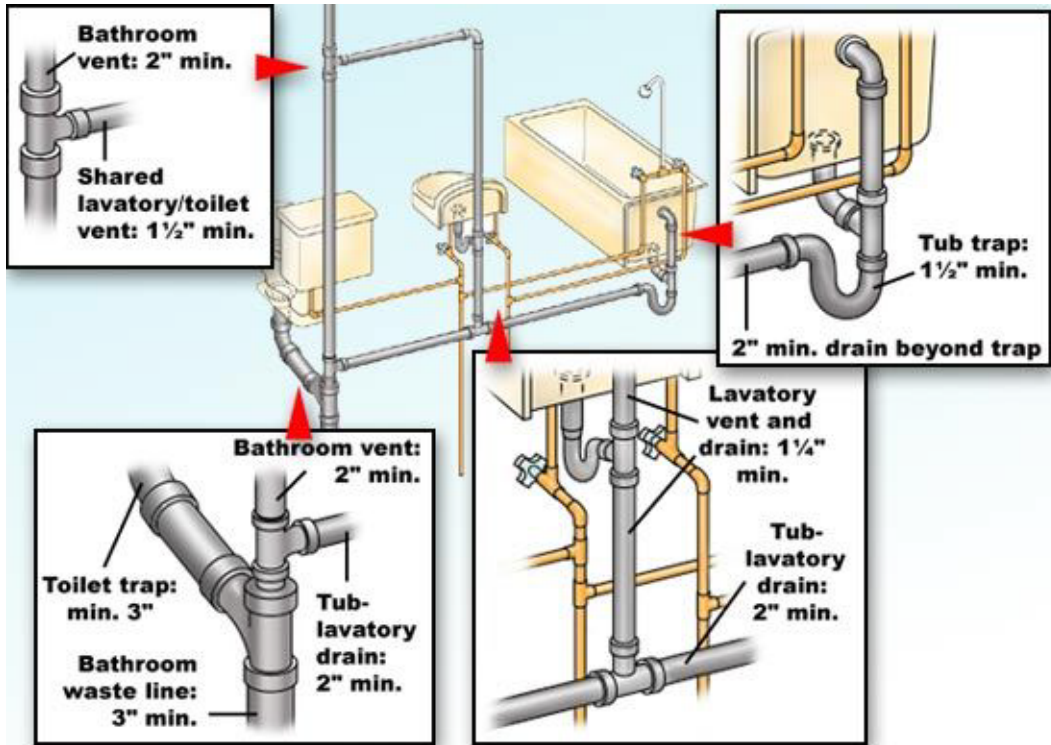
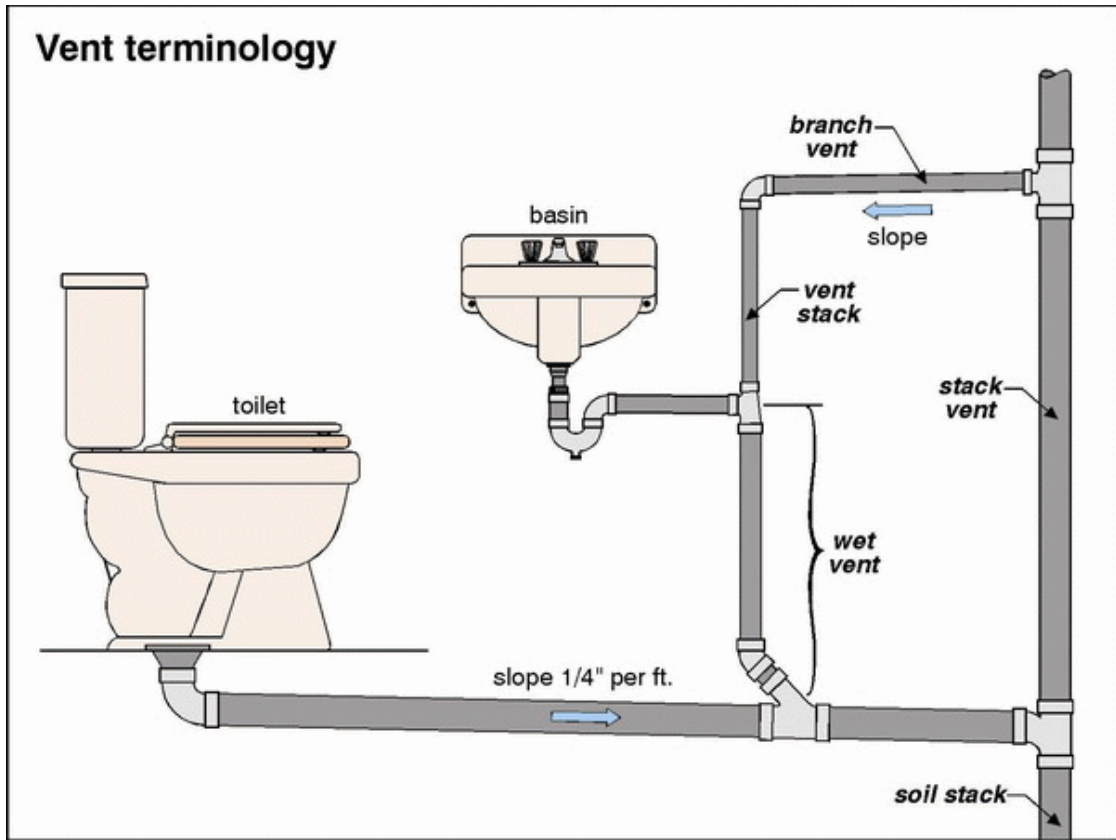
**904.0 Size of Vents.**

**904.1 Size.** The size of vent piping shall be determined from its length and the total number of fixture units connected thereto, in accordance with Table 703.2. The diameter of an individual vent shall be not less than 1¼ inches (32 mm) nor less than one-half the diameter of the drain to which it is connected. In addition, the drainage piping of each building and each connection to a public sewer or a private sewage disposal system shall be vented by means of one or more vent pipes, the aggregate cross-sectional area of which shall be not less than that of the largest required building sewer, as determined from Table 703.2. Vent pipes from fixtures located upstream from pumps, ejectors, backwater valves, or other devices that obstruct the free flow of air and other gases between the building sewer and the outside atmosphere shall not be used for meeting the cross-sectional area venting requirements of this section.

**Exception:** Where connected to a common building sewer, the drainage piping of two or more buildings located on the same lot and under one ownership shall be permitted to be vented by means of piping sized in accordance with Table 703.2, provided the aggregate cross-sectional area of vents is not less than that of the largest required common building sewer.

**904.2 Length.** Not more than one-third of the total permitted length, in accordance with Table 703.2, of a minimum-sized vent shall be installed in a horizontal position.

# Vent terminology



» 911.0 Circuit Venting.

» 911.1 Circuit Vent Permitted. A maximum of eight 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.

» 911.1.1 Multiple Circuit-Vented Branches. Circuit-vented horizontal branch drains are permitted to be connected together. Each group of a maximum of eight fixtures shall be considered a separate circuit vent and shall be in accordance with the requirements of this section.

» 911.2 Vent Size and Connection. The circuit vent shall be not less than 2 inches (50 mm) in diameter and the connection shall be located between the two most upstream fixture drains. The vent shall connect to the horizontal branch on the vertical. The circuit vent pipe shall not receive the discharge of a soil or waste.

» 911.3 Slope and Size of Horizontal Branch. The slope of the vent section of the horizontal branch drain shall be not more than 1 inch per foot (83.3 mm/m). The entire length of the vented section of the horizontal branch drain shall be sized for the total drainage discharge to the branch.

