18. Pipeline Valves.

a. General.

1) Allowable valves on water pipelines; Double Disc or Resilient Seated (Wedge) Gate Valves which are in accordance with the Specifications and requirements stated in this section.

b. Valve Locations.

1) Valves on Tees. Locate valves as close as possible to all branch connections off the mainline pipeline, except when the valve is located within or adjacent to roadways. At an intersection of roadways, locate valve on the projection of the roadway right of way line. When valves are located near the connection to the main pipeline and the branch connection is only extended a short distance, restrain the valve to the mainline pipeline, see Standard Detail B/2.1 and Part Three, Section 27 (Thrust Restraint Design for Buried Piping).

2) Valves on Fire Hydrants. Locate the valve next to the tee on all fire hydrant leads and restrain all joints on fire hydrant lead, see Part One, Section 24 (Fire Hydrants).

3) Valve next to Reducers. If a valve is required in the vicinity of or in close proximity to a reducer, locate the valve on the smaller diameter pipe. See the design requirements for restraining reducers in Part Three, Section 27 (Thrust Restraint Design for Buried Piping).

4) Valves larger than 14-inch in diameter. These larger size valves are designed for installation in valve vaults, see requirements under Horizontal Gate Valve Vault Design for Pipelines Larger Than 16-inch diameter, in this section. The design of these vaults and valves will require valve restraint in the closed position, see requirements in Part Three, Section 27 (Thrust Restraint Design for Buried Piping).

5) Double Valves. Two (2) valves are generally used when connecting 12-inch diameter and smaller pipelines to 42-inch diameter and larger mainline pipelines. Provide two (2) valves at the connection.

6) Water House Connections 3-inch through 12-inch diameter. Locate valves on the branch connection to the mainline pipeline, see Standard Detail W/5.12.

7) Division Valves. Provide division valves when directed by WSSC to divide and interconnect two different pressure zones. Label the valve as a "Division Valve" and indicate the size. Also, indicate if the valve is designed to be closed or open, show the pressure zone boundary lines and indicate the pressure on each side of the boundary.

8) Valves for Looped Water Distribution Systems. For water mains that are looped between streets, design valves at both ends, before entering and leaving each street onto private property.

9) Valves for Future Extensions. Valves may be needed when a pipeline ends with a plug/cap and it is possible that the pipeline will be extended in the future.

   a) Locate a valve near the end of the pipeline so that no more than ten (10) more domestic services will need to be shut down during the future extension and restrain the valve.

c. Special Requirements.

1) When a mainline valve is closed on a pipeline that is 16-inch and larger diameter, a low or high point may be created at the closed valve. If this condition occurs on the pipeline, provide a blowoff or air valve.

d. Valve Size.

1) Table "6" indicates the valve size required for each pipeline diameter.

TABLE "6"
Valve Sizes

Diameter Pipeline	Valve Size
14-inch and smaller	Same size as pipeline
16-inch	14-inch valve with 16"x14" Reducers
Greater than 16-inch to 54-inch	Same size as pipeline
Larger than 54-inch	Consult with WSSC for valve size

e. Valve Spacing.

1) Table "7" indicates the maximum distance allowed between valves on a pipeline.

TABLE "7"
Spacing of Valves

Diameter Valves	Maximum Spacing of Valves
6-inch	every 800 feet
8-inch to 12-inch (Multi-Family Residential Use)	every 800 feet
8-inch to 12-inch (Single Family Residential Use)	every 1000 feet
8-inch to 12-inch (Other)	every 1200 feet
14-inch (on 16-inch pipeline with WHC)	every 1200 feet
14-inch (on 16-inch pipeline with no WHC)	every 1,500 to 2000 feet
20-inch	every 2,000 to 2,500 feet
24-inch to 48-inch	every 2,500 feet
larger than 48-inch	as directed by WSSC

f. Restraining of Valves.

1) For valve thrust restraint design, see Part Three, Section 27 (Thrust Restraint Design for Buried Piping).

g. Plan Design Information.

1) Show the valves on the plan view, and indicate the distance from all existing adjacent valves. Provide the associated valve numbers necessary for shutdown. Request the existing valve numbers from the WSSC.

2) Valve stem extensions are required when the top of the valve's operating nut exceeds four (4) feet of cover. Provide the following note on the drawings: "Provide valve extension stem, See WSSC Standard Detail W/2.2".

h. Profile Design Information.

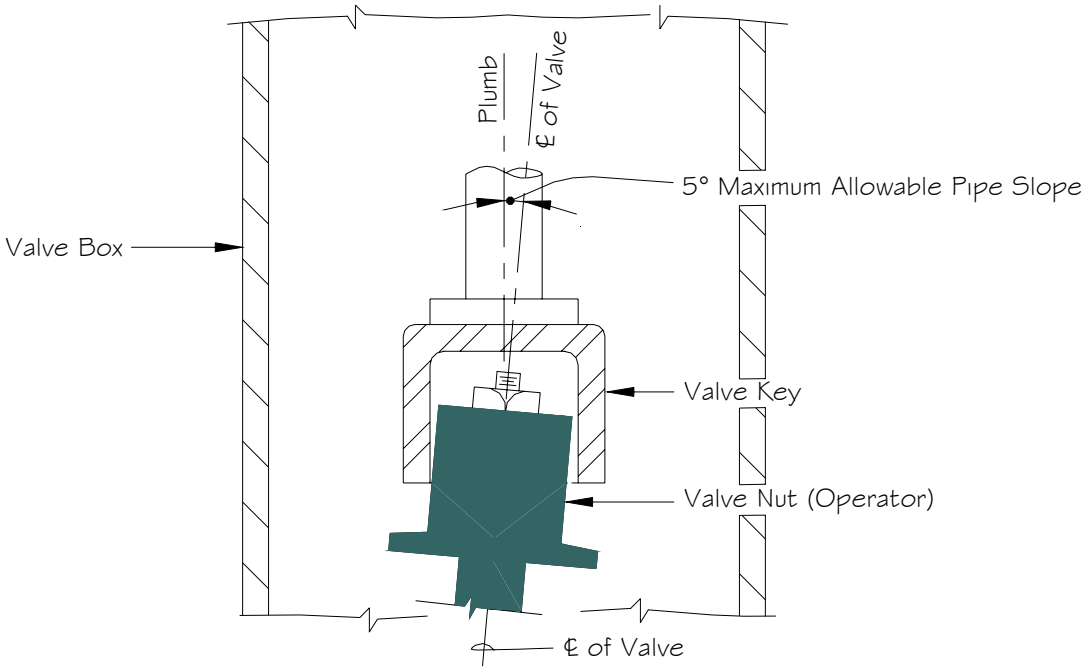
1) Provide a minimum of two (2) feet of cover over the valve operating nut or four (4) feet of cover over the pipeline, whichever is greater.

2) Design the pipeline at the valve, with almost no vertical slope with the following exceptions:

a) The maximum allowable pipe slope at the valve is three (3°) degrees (5.24%).

b) Valves 14-inch diameter and smaller: Where the depth of the pipeline does not require the valve to have a valve extension stem added, the maximum allowable pipe slope is five (5°) degrees (8.75%), see Sketch "I".

c) When the valve is located on a pipeline that is not level (on a slope), check the pipe slope and depth of the valve to verify that the buried valves are operable.



SKETCH " I "

Maximum Pipe Slope for Valves

i. Type of Valves (Double Disc Gate Valves and Resilient Seated (Wedge) Gate Valve)

1) Double Disc Gate Valves.

(a) Vertical Double Disc Gate Valves.

(1) Double disc gate valves 14-inch and smaller shall be vertical valves with mechanical joint ends for direct buried service and flanged ends for non-direct buried service.

(2) Vertical valves for pipelines 16-inch and larger require WSSC approval. Locate the valve in a valve vault (see Standard Detail W/2.6) for 20-inch valves. Provide for flanged ends on the valve. Larger vertical valves in vaults will require special design details to be shown on the drawings and if the design requires the use of 16-inch and larger vertical valves, provide Special Provisions to Specifications.

(3) Valves must have a standard operating nut. If hand-wheel operations are required, provide Special Provisions to Specifications.

(4) If the design requires a change to the above requirements for vertical valves, submit the appropriate changes.

(5) Design Requirements.

(a) Mechanical joint or flanged vertical valves, 14-inch and smaller, Class 125. These valves are designed to withstand and operate up to a non-shock working pressure of two hundred (200) psi. For design purposes, use ninety (90%) percent of two hundred (200) psi or one hundred eighty (180) psi working pressure. For requirements of Class 125 valves, see Specifications. If the valve requires flange ends, use ANSI B16.1, Class 125.

(b) Mechanical joint or flanged vertical valves 14-inch and smaller, Class 250. When the non-shock working pressure exceeds one hundred eighty (180) psi, provide Class 250 valves. For requirements of Class 250 double disc gate valves, see Specifications. If the valve requires flanged ends, use ANSI B16.1, Class 250, flat face. See requirements under Part One, Section 3 (Pipe and Fitting Joints) and Section 7 (Allowable Fittings) for information on connecting ANSI B16.1 Class 250 flanged pipe and fittings.

b) Horizontal Double Disc Gate Valves.

(1) Gate valves 16-inch and larger shall be flanged horizontal valves and designed for installation in valve vaults.

(2) Valves 8-inch and smaller which are installed horizontally in a vault, shall be designed so that the valve has a bevel gear and a right angle gear box, see Specifications. Typically, this type of horizontal design is for the installation of an air valve in a vault.

(3) If the design requires a change to the above requirements for horizontal valves, submit the appropriate changes.

(4) Design Requirements.

(a) Valves 16-inch and larger, Class 125. These valves are designed to withstand and operate up to a non-shock working pressure of one hundred fifty (150) psi. For design purposes, use ninety (90%) percent of one hundred fifty (150) psi or one hundred thirty five (135) psi working pressure. For requirements of Class 125 valves, see Specifications. If the valves require flange ends, use ANSI B16.1, Class 125.

(b) Valves 16" and larger, Class 250. When the non-shock working pressure exceeds one hundred thirty five (135) psi, provide Class 250 gate valves. For requirements of Class 250 double disc gate valves, see Specifications. If the valve requires flanged ends, use ANSI B16.1, Class 250, flat face. See requirements under Part One, Section 3 (Pipe and Fitting

Joints) and Section 7 (Allowable Fittings) for information on connecting ANSI B16.1, Class 250 flanged pipe and fittings.

2) Resilient Seated (Wedge) Gate Valve (RSGV)

a) When using valves with mechanical joint, flanged or push-on ends, 36-inch and smaller, see the Specifications. Exceptions can be requested from WSSC, by submitting design requirements and Special Provisions to Specifications.

b) Valve Design Requirements. Design valves for a minimum total pressure (operating plus surge pressure), of two hundred fifty (250) psi. When total pressure exceeds two hundred fifty (250) psi, use Class 250 Double Disc Gate Valve.

j. Horizontal Gate Valve Vault Design for Pipelines Larger Than 16-inch Diameter.

1) Pipelines Valves 16-inch and larger shall be flanged and designed for installation in valve vaults. For pipelines 36-inch diameter and smaller, see Standard Details W/2.4 and W/2.4a. Valves 42-inch and larger, required submittal of vault design for approval.

2) For sizing valves on pipelines, see Valve Size, in this section.

3) When designing a TS&V and TA&V with a 16-inch and larger valve, the tapping sleeve or tapping assembly is to be housed in the vault. With approval from WSSC, larger sizes of Resilient Seated Gate Valves (tapping valves) may be used for buried service. Submit design requirements and Special Provisions to Specifications; see requirements under Resilient Seated Gate Valves in this section.

4) When reducing the pipeline at the valve, the profile must be examined to see if the reducer will create a high point. If so, use an eccentric reducer, designing the straight side of the eccentric reducer to match the top of the pipe elevations on both sides of the pipeline.

5) Include in the vault piping, a mechanical coupling or mechanical joint solid sleeve for the removal of the valve, pipe and fittings within the vault. Mechanical couplings require special pipe restraints, (see Standard Detail B/3.0) or mechanical joint solid sleeves, either a "short or long" type of solid sleeve, see WSSC Standard Details W/2.4 and W/2.6. Mechanical joint solid sleeves require the joints to be restrained using wedge action retainer glands, see Standard Detail B/2.7.

6) All pipe connections to vaults shall have a watertight seal. Provide a rubber annular hydrostatic sealing device in accordance with the Specifications and Standard Details.

7) The size of the vault can be determined by the dimensions of each valve, pipe and fitting that is required in the vault. Larger size valves that are not covered by standard details must be designed on a case by case basis. Submit vault piping design for approval, use Standard Details W/2.4 and W/2.6 as a guide.

8) Design the vaults for valves 16-inch and larger as poured in place concrete vaults and give the option to the contractor to provide pre-cast concrete vaults.

9) On profile, determine the invert of the pipeline using the design depth shown on the details for the valve vaults.

10) For additional structure design requirements, see Part One, Section 17 (Design of Structures).

11) Valve extension stems will be required on all valves in vaults if the valve stem operator nut is four (4) feet or more below the existing or finished grade. When extension stems are required, refer to Standard Detail W/2.2 on the drawings.

12) Design thrust restraint for the valve in the closed position, see requirements in Part Three, Section 27 (Thrust Restraint Design for Buried Piping).

13) Coordinate with the WSSC when valves on the project may need to be pre-purchased. WSSC will only pre-purchase valves if construction time for the pipeline is not sufficient for valve delivery when valves are ordered by the contractor. Furnish all the necessary information to WSSC for pre-purchasing of the valves.