WATER AGENCIES' STANDARDS

Design Guidelines for Water and Sewer Facilities

SECTION 5.3
LINE VALVES

5.3.1 PURPOSE

The purpose of this section is to provide guidelines for the type, spacing and location of line valves on water pipeline projects.

5.3.2 STANDARD TERMS AND DEFINITIONS

Wherever technical terms or pronouns occur in these guidelines or in related documents, the intent and meaning shall be interpreted as described in Standard Terms and Definitions.

The following terms and definitions as found in this section shall have the following meaning:

DU: Dwelling Unit

5.3.3 GENERAL

It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document. The Engineer of Work may not deviate from the criteria presented in this section without prior written approval of the Agency's Engineer.

5.3.4 GUIDELINES

A. In general, line valves are installed in distribution and transmission pipelines to isolate and depressurize pipeline segments for repairs, modifications, inspections or maintenance.

B. Isolation of water lines during repairs, modifications, inspection or maintenance causes a temporary loss of water service within the affected area. Locations of line valves shall be based on the following considerations:

1. Limiting the number of customers that will be out of service,
2. Limiting the number of fire hydrants out of service,
3. Limiting the time it takes to drain a pipe segment,
4. Limiting the number of customers impacted by future system modifications,
5. Limiting future construction within major streets or intersections,
6. Conformance to State of California Codes and Regulations
7. Avoiding excessive number of valves thus reducing initial capital cost, exercising and maintenance of valves, and replacement costs.

C. Valves shall be placed on all branches of crosses and tees unless otherwise directed by the Agency's Engineer. Valves may be placed at each street intersection on the main prior to the branch and on each branch if the system is looped in a fashion that allows isolation of each reach of pipe segment.

D. In high-density residential (ten (10) + DU's per acre) areas and commercial areas, the valve placement is not to exceed one city block up to a maximum of one thousand feet (1,000').

E. In medium density residential (five (5) ± DU's per acre) areas, the valve placement is not to exceed one quarter (¼) mile or seventy (70) DU's out of service.

F. In low-density residential (two (2) ± DU's per acre) or rural areas (one (1) DU per acre), the valve placement is not to exceed one quarter (¼) mile or thirty (30) DU's out of service,

G. Line valves shall be incorporated into the design to ensure that no more than two (2) fire hydrants are out of service when a line valve is closed. Fire hydrants shall be spaced in accordance with Section 5.4.

H. Valves are placed on fire hydrants and private fire service laterals, air/vacuum valves, three inch (3) and larger service connections and blow-offs in accordance with the WAS Standard Drawings.

I. Line valves may be located between each fire hydrant and/or side connection in commercial areas as required by the Agency's Engineer.

J. The maximum spacing between valves on distribution lines twelve inch (12") or less shall be one-quarter (¼) mile. The maximum spacing between valves on transmission lines sixteen inch (16") or larger shall be one half (½) mile.

K. For maintenance purposes the line valve spacing may be reduced to accommodate the location of blowoff, air release, and air/vacuum valves. Typically blowoff, air re release, and air/vacuum valves should be placed at no greater spacing than that which allows the pipe to be drained in the time specified in Section 5.6.

L. Where future water main extensions are anticipated, valves shall be located on the branch line at the tee or cross and blind flanged only as directed by the Agency's Engineer.

M. The maximum spacing for line valves on distribution lines is governed by the one thousand three hundred twenty foot (1,320') maximum distance recommended by the California Code of Regulations (CCR), Title 21, Public Works.

N. Selection of valves and appurtenances to be used with the installation of valves shall be in accordance with WAS Standard Specification 15100 and 15102 and the Approved Materials List.

O. Concrete support blocks are required for all valves, and shall be installed in accordance with the requirements shown in the WAS Standard Drawings. Concrete support blocks are not intended to provide thrust restraint when valves are operated. In locations where valves are not adjacent to pipe fittings or are otherwise not provided with thrust restraint when valves are operated, thrust blocks are required instead of support blocks. The Engineer of work shall design thrust blocks in accordance with Section 5.2.

5.3.5 MISCELLANEOUS VALVE INFORMATION

A. Motor operated valves will be used in locations where valves are operated and installed in a vault or on inlet/outlets of reservoirs as required by the Agency's Engineer. Locations shall be approved by the Agency's Engineer during the sixty percent (60%) submittal plan review.

B. Installation: Valves and gate wells shall be installed at locations shown on the approved plans in accordance with the applicable sections of the WAS Standard Specification and Standard Drawings.

C. Only resilient-seated gate valves (twelve inch (12") or less) and butterfly valves (sixteen inch (16") or larger) are allowed in accordance with the Approved Materials List. The Agency's Engineer may require the use of plug valves or ball valves in high-pressure locations and other locations.

D. Valves rated for higher pressures are available (i.e. two hundred fifty (250) psi class), but are not covered by the AWWA Standards. In these situations, valve specifications must be individually prepared to meet the requirements of each project.

E. Vaults should have a hole cored in the lid above the valve actuator nut to allow for an extension and portable motor operator to be used to operate the valve above ground without entering a confined space.

5.3.6 NOTATIONS ON PLANS

Valves shall be shown in the plan view portion of the sheet(s) only and include, but not limited to, the following information.

A. Standard symbols, stationing and plan callout notes shall be in accordance with Section 1.1. Note: butterfly valves shall be shown with the valve operator located to the curb line side of the water main.

B. Valves shall be shown with the following information:

- Stationing of the valve.
- Size of valve.
- Refer to Figure 1 below.

Figure 1
Plan Callouts for Line Valves

5.3.7 DESIGN NOTES

A. Gate Valves: The decision to limit gate valves to a maximum size of twelve inch (12") is based on the standard depth of cover criteria of forty-two inches (42"). Gate valves over twelve inches (12") in size have such a tall bonnet that the operating nut is too close to finish grade. An auxiliary reason is the number of turns required to close a gate valve larger than twelve inch (12").

B. Butterfly Valves: Pipeline design criteria limits flow velocity to ten (10) feet per second (fps). Class 150A valves are designed for eight (8) fps, Class 150B valves are designed for sixteen (16) fps, therefore only Class 150B butterfly valves are allowed.

C. Holes cored in the valve vault lids will allow the use of portable motor operators and reduce the need for entry into a confined space. Confined space rules significantly increase the cost of accessing vaults and therefore are avoided by designing for operation without entry by operations personnel.

5.3.8 REFERENCE

Reference shall be made to the latest edition of the following publications unless otherwise called for. The following list of publications, as directly referenced within the body of this document, has been provided for the users convenience. It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document.

1. Water Agencies' Standards (WAS):

    a. Design Guidelines:

        1. Section 1.1, Drafting Guidelines
        2. Section 5.5, Air Valves
        3. Section 5.6, Blowoffs

    b. Standard Specifications

        1. Section 15000, General Piping System and Appurtenances
        2. Section 15100, Resilient Wedge Gate Valves
        3. Section 15102, Butterfly Valves

    c. Standard Drawings

        1. WV-01, Gate Well Installation

    d. Approved Materials List for Water Facilities

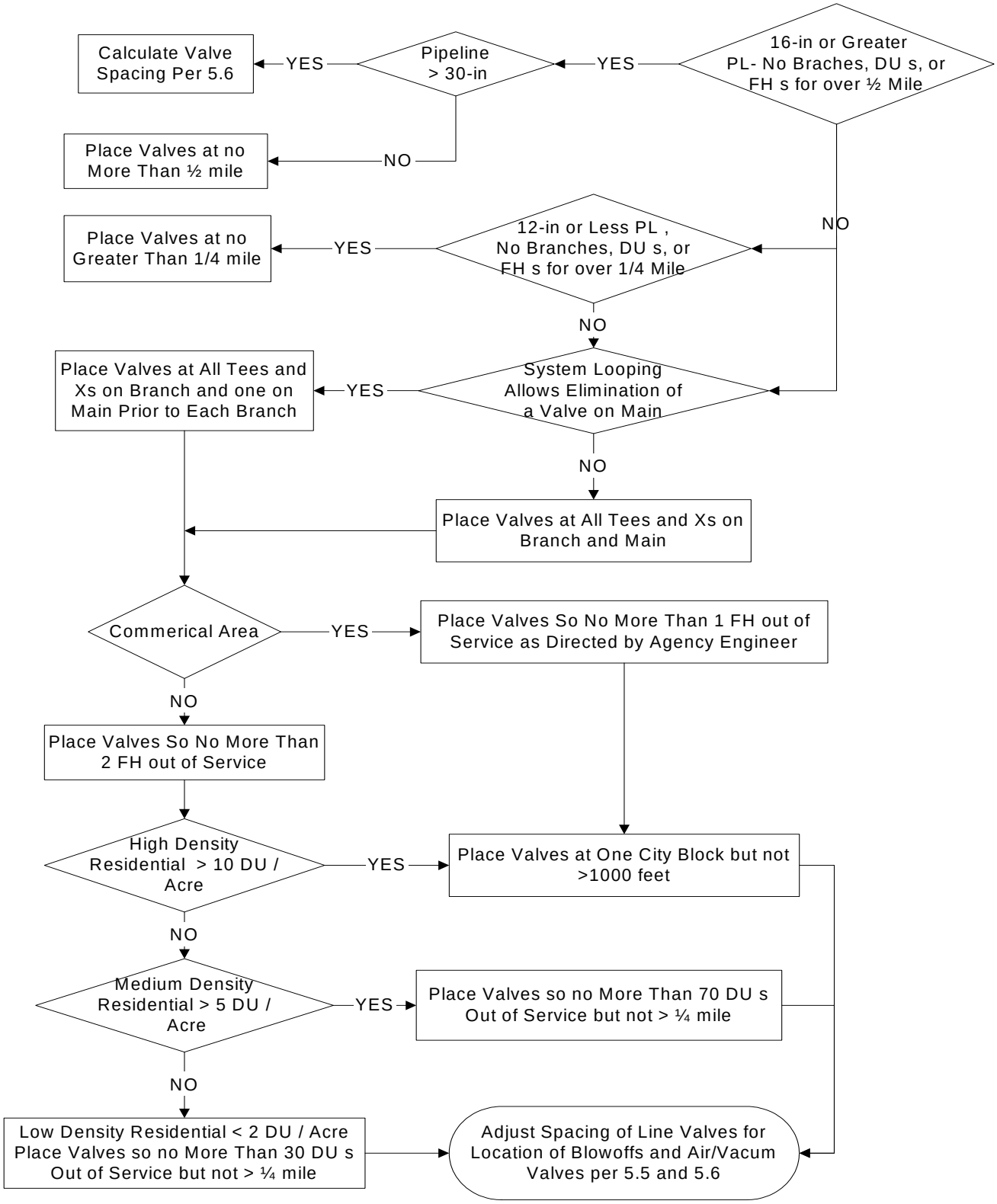
2. American Water Works Association (AWWA):

    a. C504, Rubber Seated Butterfly Valves
    b. C509, Resilient Seated Gate Valves

3. California Code of Regulations (CCR):

    a. Title 21,

LINE VALVE SPACING AND LOCATION FLOWCHART



END OF SECTION