

Section V

WATER DISTRIBUTION SYSTEM

DESIGN GUIDELINES

A. GENERAL

1. The following water system design guidelines are based on Federal, State and local health requirements and the Hilton Head No. 1 Public Service District's engineering design criteria.
2. Design criteria not indicated herein shall comply with "Ten States Standards" where applicable.
3. All installations are to meet the bacteriological and chemical quality standards of the South Carolina Department of Health and Environmental Control (SCDHEC).
4. These design guidelines are applicable to all developments including but not limited to residential, commercial and industrial developments, subdivisions, commercial and industrial developments, subdivisions and/or parks requiring water service from the Hilton Head No.1 Public Service District.

B. SYSTEM DESIGN CRITERIA

1. Design data and design calculations shall include the following:
 - a. Maximum Instantaneous Flow. Refer to Ameen's Table XXI.
 - b. Number and type of proposed connections.
 - c. Fire flow requirements – Shall equal $500 + 1/5$ of the maximum instantaneous flows.
 - d. Fire flow test results, conducted in the past 12 months, at a location near the proposed connection to the existing system. The results shall include the static and residual pressures when a known flow, time and date of test, existing pipe size, type of pipe, and the elevation and distance between test

point and connection. Known flow must be in excess of the demand for the extension.

- e. Design head loss calculations, including elevation changes shall show 25 psi minimum residual when either instantaneous demand occurs or when the flushing flow in excess of peak hourly flow occurs, whichever is greater.
2. No line extension shall be made of an existing line when the existing line does not meet the minimum pressure and flow requirements.
3. Minimum size water mains for providing fire protection (fire hydrants) shall be 6 inches in diameter. Larger size mains shall be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum required residual pressure.
4. Line extensions of an existing line must not be made when the existing line does not meet the minimum pressure and flow requirements specified in section R.61-58.4.D.(4)(a).
5. Dead ends shall be minimized by looping of all water mains, whenever practical.
6. Avoid dead-end lines, if possible. Check lines less than 200 feet to ensure that they have sufficient flow to avoid stagnant water in the lines in addition to maintaining a chlorine residual. Should have plans to extend these types of lines within a year.
7. The lengths of small dead end lines (**service lines only**) shall not exceed:
 - a. 1 inch diameter - 150 feet.
 - b. 1.25 inch diameter - 200 feet.
 - c. 1.5 inch diameter - 300 feet.
 - d. 2 inch diameter - 1,500 feet.
8. Provide for a readily accessible means of flushing all water mains at a minimum velocity of 2.5 fps. To a degree, service lines may be used to flush a line. For example, where you have a dead-end line running down a cul-de-sac serving 2 homes.
10. Blow-offs required where changing pipe size, unless engineer can demonstrate that there is adequate pressure to flush the lines. Plans should specify size of blow-off. Dead end lines shall be provided with a fire hydrant if flow and

pressure are sufficient, or with a post hydrant or blow-off valve in a box for flushing purposes, except for lines:

- a. 1.5 inches in diameter and less will not require blow-offs but will require a service connection.
 - b. 200 feet or less in length will not require blow-offs, unless specifically required by the Department.
11. Blow-offs sized to provide a minimum velocity of 2.5 fps in the line & maintain a residual pressure of 25 psi.
 12. Post-type hydrants are acceptable for flushing on lines 4 inches in diameter and can be used on 3 inch diameter lines where the design flow is increased to 100 gpm in excess of the peak hourly flow. Standard fire hydrants required on lines 6 inch in diameter and greater.
 13. Lines 10 inches in diameter and larger require flows in excess of 500 gpm to achieve a 2.5 fps scouring velocity. This requires a standard fire hydrant or other approved blow-off, for flushing designed to provide at least 500 gpm in excess of peak hourly flow and a minimum residual pressure of 20 psi.
 14. No flushing device shall be directly connected to any sewer.
 15. Sufficient valves shall be provided on water mains so that customer inconvenience and sanitary hazards will be minimized during repairs.
 16. Valves required at all intersections and on loops.
 17. Where standard 4 to 6 inch diameter hydrants are proposed, the design flow shall not be less than 500 gpm over and above peak hourly flow. Standard hydrants shall not be placed on systems using only hydropneumatic storage, unless standby power is provided and the pumping capacity from wells or ground storage exceeds the fire flow demand with the largest well or pump out of service. Standard hydrants shall not be connected to lines not designed to carry fire flows.
 18. Where post-type hydrants are proposed, they must meet the flow requirements for blowoffs. Post hydrants shall not be used on water lines smaller than 3 inches in diameter.
 19. Use DIP with mechanical joints for any lines being installed in rock.

20. Water services and plumbing must conform to relevant local plumbing codes or the National Plumbing Code.
21. Individual home booster pumps are not allowed to meet the 25 psi minimum pressure at the service connection.
22. Water Loading Stations - To prevent contamination of the public water supply, the following criteria must be met:
 - a. Air Gap - A device must be installed on the fill line to provide an air break and prevent a submerged discharge line.
 - b. Hose Length - The fill hose and cross connection control device must be constructed so that when hanging freely it will terminate at least 2 feet above the ground surface.
 - c. Fill line terminus - The discharge end of the fill line must be unthreaded and constructed to prevent the attachment of additional hose, piping or other appurtenances.
23. Distribution main size: minimum 6" diameter.
24. Arrange mains so they are looped and interconnected at intersections.
25. Comply with all application requirements of the SCDHEC, the Town of Hilton Head and Hilton Head Fire Marshall.
26. Hazen and Williams design coefficient:
 - a. PVC: C=140
 - b. Ductile iron pipe: C=120
27. Air relief valves shall not be allowed. Hydrants shall be placed at high points in water systems as required to expel air when necessary.
28. Chambers, pits or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer.

C. HILTON HEAD PUBLIC SERVICE DISTRICT NO. 1 MASTER PLAN

1. Design system to comply and be compatible with the District's Water System Master Plan.

D. FIRE HYDRANTS

1. Comply with the Town of Hilton Head Fire Code.
2. Fire hydrant spacing:
 - a. Low density residential, less than 5 units per acre: 1,000 feet or at each intersection.
 - b. High density residential, single family homes, more than 5 units per acre: 600 feet.
 - c. High density residential, apartments, condominiums, etc.: 500 feet.
 - d. Commercial and isolated industrial: 500 feet.
3. Fire hydrant leads to be a minimum of 6" diameter with an isolation valve.

E. SIZING OF LINES

1. Pipe size 6" and larger:
 - a) Size piping based on either 1/5 the instantaneous maximum flow plus fire flow or maximum instantaneous demand, whichever is greater.
2. Pipe size 4" and smaller:
 - a) Size piping based on either 1/5 of maximum instantaneous demand plus blow off flow to meet flushing requirements or maximum instantaneous demand whichever is greater.
3. The maximum instantaneous demand is to be calculated using the **Community Water System Source Book** by Joseph S. Amen, as a reference.
4. Design for flushing velocity per SCDHEC regulations.

5. Minimum design residual pressure: 20 psi.
6. The Developer's Design Engineer is to determine available static and residual pressures at the delivery point for the water to a new development. The data is to be obtained under the direction of an engineer who is registered in the State of South Carolina.

F. VALVES AS INDICATED BELOW

1. Provide three (3) valves for a tee intersection.
2. Provide four (4) valves for a cross intersection.
3. Maximum valve spacing: 1000 feet.

G. INDUSTRIAL OR SPECIAL DESIGN CONDITIONS

1. Design of water systems for industrial or other systems not covered under this section shall be approved on a special case basis only. Special requests need to be made to the Hilton Head No. 1 Public Service District.

H. DEAD ENDS

1. Minimize dead ends by looping of all mains.
2. Where dead ends occur provide a fire hydrant on lines 6".
3. Do not connect any flushing device to any sanitary sewer.

I. SEPARATION OF WATER MAINS AND SEWERS

1. Where possible, locate water line at least ten (10) feet away, horizontally, from sewer pipes.
2. Should ten (10) foot separation not be practical, then the water main may be located closer provided:
 - a. It is laid in a separate trench.

- b. It is laid in the same trench with the water main located at one side of a bench of undistributed earth.
 - c. In either of the above cases, crown elevation of the sewer shall be at least 18" below invert elevation of water line.
3. Where water lines cross over sewers, maintain 18" minimum clearance between crown of sewer and invert of water lines.

J. THRUST BLOCK DESIGN

- 1. Maximum soil pressure: 2000 lbs/sq ft.
- 2. Minimum water pressure: 150 psi.

K. COVER

- 1. Provide suitable cover on all distribution mains. Minimal cover depth as follows:
 - a. Less than 8" diameter: 30".
 - b. 10" and 12" diameter: 36".
 - c. 14" diameter and larger: 48".
 - d. All piping located within the right-of-way of the South Carolina Department of Transportation shall have a cover as indicated above or 36" below the elevation of the road, whichever is greater.
 - e. Special conditions other than those listed above may be approved if requested in writing from the Hilton Head No. 1 Public Service District.

L. DUCTILE IRON PIPE LOCATIONS

- 1. Use ductile iron pipe where water line:
 - a. 12" or larger.
 - b. Crosses beneath sewers.

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- c. Crosses beneath storm drainage pipe with less than three (3) feet of clearance.
- d. Crosses above a storm drainage or other pipe with less than two (2) feet of clearance.
- e. Crosses creeks, rivers and other water bodies.
- f. Installed in casing.
- g. Cover is less than minimum prescribed in Part K above.