


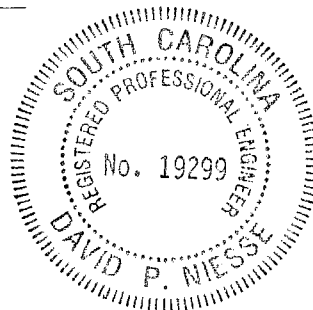
# MOUNT PLEASANT WATERWORKS



## WATER DISTRIBUTION SYSTEM DESIGN STANDARDS

May 2009

  
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May 14, 2009

MR. DAVID P. NIESSE, PE  
MOUNT PLEASANT WATERWORKS  
1619 RIFLE RANGE ROAD  
P.O. BOX 330  
MOUNT PLEASANT SC 29465-0330

RE: STANDARD SPECIFICATIONS FOR WATER SYSTEMS  
MOUNT PLEASANT WATERWORKS

Dear Mr. Niesse:

This office has reviewed the water system specifications submitted to this office on 05/13/2009 for consideration of becoming approved Standard Specifications that we maintain on file. Based on our review, this letter may serve as your approval of these Standard Specifications. The water system standard specifications approval reference number is SS-002074 with an approval date of May 14, 2009.

Please be advised that these Standard Specifications are only approved for water supply distribution lines and related appurtenances as outlined in your submittal. Water storage tanks and water booster pump systems are not included.

For further submittals of projects, please indicate on the application for permit to construct that your specifications have been approved as Standard Specifications and that no additional copies will be necessary.

If you have any questions, please call me at 803-898-3396.

Sincerely,

Alan Coffey  
Construction Permitting Section  
Water Facilities Permitting Division  
Bureau of Water

## **2 – WATER DISTRIBUTION DESIGN CRITERIA**

### **SERIES 2000 – WATER DISTRIBUTION**

#### **2005 – Design Pressures**

All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The minimum pressure in all water mains under conditions of maximum instantaneous demand shall be twenty-five (25) pounds per square inch at the customer's tap. Twenty (20) pounds per square inch at any tap is acceptable when fire flows or flushing flows are provided in excess of maximum peak hourly flow. The normal working pressure in the distribution system shall be approximately 60 psi.

#### **2010 – Pipe Size, Depth and Material**

The minimum size of water mains for providing fire protection and serving fire hydrants shall be 8-inch diameter (6-inch on dead ends). Larger size mains will be required as necessary to allow the withdrawal of the required flow while maintaining the minimum residual pressure previously specified. MPW shall have final determination of water main sizing. Water lines servicing buildings with fire protection sprinkler systems shall be sized to provide adequate pressure for the system per manufacturer's recommendations.

All water service taps shall be a minimum of one size smaller than the water main being tapped unless the water main being tapped is a part of a looped water distribution system. In these cases the water service tap can be the same size as the main being tapped but cannot be larger. MPW reserves the right to stipulate the maximum size tap available off of any water main regardless of the main size and configuration, if it is deemed in MPW's best interest to do so.

No line extensions shall be made to an existing line when the existing line does not meet the minimum pressure and flow requirements stated above.

Depth of cover shall be as follows (regardless of backfill):

- a. For all pipe material installed by open cut, the depth of cover shall be a minimum of three (3) feet and a maximum of five (5) feet below finished grade.
- b. If, to avoid conflicts with storm drains or other utilities, it is necessary to reduce the depth of cover to less than three (3) feet, ductile iron pipe shall be used for the affected length of pipe, and an additional length of DIP installed before and after the length of reduced-cover pipe. The transition to DIP shall be made with DIP MJ sleeves or bends. All planned transitions to DIP shall be clearly shown on the approved drawings.
- c. Minimum acceptable depth of cover when installing DIP shall be eighteen (18) inches.
- d. Water lines shall not be installed until finished grade is completed and certified by a professional land surveyor. Installation of the water line shall not be permitted until the certification is submitted and approved by an MPW inspector.
- e. If conflicts exist with a drainage system which cannot be corrected using the depths listed above, the Design Engineer shall submit a proposed design for a conflict box along with the preliminary drawing submittal. In general, an acceptable conflict box design provides a steel casing through which the DIP water main will be run. The approval of a conflict box design by MPW does not insure approval by other review agencies (specifically Charleston County, the SCDOT, or the Town of Mount Pleasant).



- f. For water mains installed by trenchless methods (Horizontal Directional Drill), the depth of cover requirements listed in a) above shall apply, unless a deeper installation is required at a road crossing by SCDOT. An exception to this requirement may be made if the water main is a main transmission main for which there are no plans for future taps or extensions.

Material selection for water mains is as follows:

- a. Six (6) inch to twelve (12) inch: C-900 or C-905 PVC
- b. Fourteen (14) inches or larger: Ductile iron
- c. MPW retains the right to require ductile iron for any pipe to be installed in commercial areas and within primary and secondary road right-of-ways.

## **2015 – Fire Protection**

Systems design shall be such that fire flows and facilities are in accordance with the requirements of MPW, Mount Pleasant Fire Department (MPFD) and the State Insurance Services Office (ISO). Water lines serving fire hydrants shall be six (6") inches minimum. Larger size mains will be required as necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in Section 2005. Systems shall be designed to provide for fire flow demands that are 1,000 gpm or greater.

## **2020 – Fire Hydrants**

Hydrants shall be provided at each street intersection and at intermediate points between intersections as recommended by the State Insurance Services Office (ISO) and local fire departments having jurisdiction. Fire hydrants shall be located in accordance with MPFD requirements which states within 300 feet of any structure (as accessible by MPFD fire trucks) or within 150 feet if any structure containing a sprinkler system. Otherwise, hydrants spacing shall be reviewed by MPW and shall never exceed a spacing of 1000 feet.

For standard six (6) inch diameter hydrants, the design flow shall not be less than 1000 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. Hydrants shall not be connected to lines not designed to carry fire flow.

The hydrant lead shall be a minimum of six (6) inches in diameter. A hydrant control valve shall be installed in all hydrant leads.

No privately owned fire hydrants will be permitted.

For hydrant drains, a gravel pocket or dry well shall be provided unless the natural soils will provide adequate drainage. Hydrant drains shall not be connected to or located within ten (10) feet of sanitary sewers.

## **2025 – Looping**

Dead ends shall be minimized by looping all mains whenever possible to provide increased reliability of service and reduced headloss. All lines serving fifteen (15) residents or more shall be looped unless



approved otherwise by MPW, or in a cul-de-sac. A line that dead ends on a cul-de-sac shall end with a fire hydrant.

Looping and valve locations shall be such that an interruption of service due to a water main break will put no more than 800 feet of main or more than two fire hydrants out of service while maintaining adequate flows and pressure in the remaining portion of the system.

Where dead-end mains occur they shall be provided with a fire hydrant if flow and pressure are sufficient or with a blow-off for flushing purposes. Flushing devices shall be sized to provide flows, which will give a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be directly connected to any wastewater or stormwater (sewer) line.

Temporary dead end main lines, which will be extended at a later date, shall have an in-line valve installed and an additional ten (10) feet of pipe for every inch of pipe diameter, and a cap on the end. For example, the termination of an eight (8) inch main shall consist of an eight (8) inch valve and eighty (80) additional feet of pipe, with a cap on the end.

### **2030 – Valves, Air Release Valves and Chambers**

Sufficient isolation valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than 500-foot intervals in commercial areas and at not more than one block or 800-foot intervals in other areas. In line valves shall be located at each fire hydrant. MPW shall have final determination on the number and location of valves. All mainline tees shall have three (3) valves.

Mains shall be designed to minimize high points. At high points in water mains where air can accumulate, provision shall be made to remove the air by means of an air release valve. Automatic air release valves shall not be used in situations where flooding of the manhole or chamber may occur. Air valves shall be selected based on the size of the water main. Air valves shall be detailed on the design drawings and approved by MPW.

Chambers, pits or manholes containing valves, blow-offs, or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or wastewater line. Such chambers or pits shall be drained to the surface of the ground, where they are not subject to flooding, or to absorption pits underground.

### **2035 – Backflow Prevention and Metering**

Any extension to the MPW water system must be constructed in a manner that eliminates the possibility of back-flow of water from the non-approved system into the active MPW system and provides the ability to meter water use. To achieve this, either one of the following methods shall be used (refer to Construction Detail W-04):

- a. The new section of water main shall be installed with an “air gap” of three (3) feet between the new pipe and the existing stub out or wet tap. The new main shall have a temporary threaded cap with appropriate fittings installed at the end of the new pipe that is closest to the proposed connection point of the existing system. All temporary connections must be inspected and approved by an MPW inspector before being put in use. All water entering the new main shall flow through an MPW-approved back-flow preventer and meter connected to a fire hydrant or



other source of water on the approved MPW system. The final connection to the MPW system shall not be completed until a SCDHEC Permit to Operate has been issued for the new section. Final connection will consist of the installation of a spool piece and MJ sleeve(s) supplied and installed by the Contractor. In the case where there are multiple connection points to the MPW system within a project, an air-gap shall be provided at each location.

- b. At the beginning of construction, a temporary backflow preventer and meter (both approved by MPW) shall be supplied and installed by the Contractor in-line between the tapping valve, or stub-out, and the water extension. The backflow preventer shall be tested and certified by a SCDHEC licensed tester and the test results provided to MPW prior to being placed into operation. The Engineer shall determine the size backflow preventer required that achieves a 2.0 feet/sec. scouring velocity during flushing for a given size of pipe. Once the SCDHEC Permit to Operate has been issued for the new section, the backflow assembly shall be removed by the Contractor and replaced with a spool piece and MJ sleeves(s). Any other connection points to the MPW system shall be provided with the air gap described in section a. above. All temporary backflow installations shall be inspected and approved by a MPW inspector before being placed into operation.

Regardless of which method is used, a representative of the MPW Engineering Department prior to back-filling the excavation shall inspect the final connection.

In the case of a water project that has multiple connection points with the MPW system, the MPW Engineering Department will determine the optimum location for a single water-supply connection. Final tie-in to all other connection points shall only be made after the Permit to Operate is issued.

Permanent backflow preventer, installed as part of a service extension, shall be in accordance with MPW "Cross-Connection Control Program Guidelines".

Preferred sized residential meter is 5/8". Any residential meters greater than 5/8" shall be reviewed and approved by the MPW Water Department.

## **2040 – Cross Connection Control**

For all non-residential installations, a Cross-Connection Questionnaire must be completed and returned to MPW. MPW will provide evaluation and/or inspection of plans in order to determine the type of backflow preventer, if any, that will be required. Reduced pressure backflow prevention devices shall be required for any service where toxic materials are used or where positive protection for the public water supply is required. Typical applications include hospitals, medical and dental laboratories, mortuaries, industrial plants, dry cleaners, irrigation systems, or as determined by MPW. Any water supply project involving the use of a reduced pressure backflow preventer or double check valve assembly will not be given final approval for operation until the backflow prevention devices have been tested by a SCDHEC certified tester and test results submitted to MPW.

No piping systems which by-pass an installed backflow preventer shall be allowed under any circumstances.

High hazard category cross-connections shall require an air gap separation or an approved reduced pressure back-flow preventer.



Reduced pressure principal back-flow prevention assemblies may not be installed in any location subject to possible flooding. This includes pits or vaults, which are not provided with a gravity drain to the ground's surface that is capable of exceeding the discharge rate of the relief valve. Generally, if installed in a pit, the drain line shall be two (2x) times the size of the line entering the back-flow prevention device. The drain cannot empty into any type of ditch, storm drain, or sewer, which could flood water back into the pit.

All piping up to the inlet of the back-flow prevention device must be suitable for potable water. The pipe must be AWWA or NSF approved. Black steel pipe cannot be used on the inlet side of the device.

Backflow preventers must be on the SCDHEC list of approved backflow prevention devices, and shall be installed in a manner approved by MPW and in accordance with local plumbing codes and all applicable requirements of the SCDHEC State Primary Drinking Water Regulations.

For residential protection, the Water Department will also install a Residential Dual Check Valve for the customer. The customer shall be aware that the installations of a residential dual check valve results in a potentially closed plumbing system within the residence. As such, the owner may need to provide for thermal expansion within their closed system, i.e., pressure relief valves and/or the installation of thermal expansion devices.

For further information on the testing and installation requirements of backflow preventers, refer to MPW's "Cross-Connection Control Program Guidelines".

## 2045 – Separation Requirements

**Parallel Installation:** Water mains shall be laid at least 10 feet horizontally from any existing or proposed wastewater line. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten-foot separation, the reviewing authority may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a wastewater line, provided that the water line is laid in a separate trench or on an undisturbed earth shelf located on one side of the wastewater line at such an elevation that the bottom of the water main is at least eighteen (18) inches above the top of the wastewater line.

**Perpendicular Crossings:** Water mains crossing wastewater lines shall be laid to provide a minimum vertical distance of eighteen (18) inches from the outside of the wastewater line. This shall be the case where the water main is either above or below the wastewater line. At crossings, one full length of ductile iron water pipe shall be located so both joints will be as far from the wastewater line as possible. Special structural support for the water and wastewater pipes may be required. Where a water pipe is laid under a storm drain there must be a minimum of eighteen (18) inches of clearance. A twenty (20) foot joint of DIP shall be centered under the storm water line. In cases where eighteen (18) inches of clearance is not obtainable, MPW and SCDHEC may approve special provisions such as concrete encasement or casing.

**Special Conditions:** MPW must specifically approve any variance in separation when it is impossible to obtain the specified distances above. To be considered, an alternative design shall, as a minimum, comply with part R.61-58.4 (D)(12)(c) of the SCDHEC State Primary Drinking Water Regulations. Any alternative design shall:

- a. Maximize the distance between the water main and sewer line and the joints of each.
- b. Use materials that meet the requirements of R.61-58.4 (D)(1) of the SCDHEC State Primary Drinking Water Regulations.



- c. Allow enough distance to make repairs to one of the lines without damaging the other.

**Force Mains:** There shall be at least a ten (10) feet horizontal separation between water mains and wastewater force mains. There shall be an eighteen (18) inch vertical separation at crossings.

**Wastewater and Storm Drainage System Interference:** No water main shall pass through or come in contact with any part of a wastewater manhole, storm drainage pipe or structure.

**Drain Fields and Spray Fields:** Potable water lines shall not be laid less than 25-feet horizontally from any portion of a wastewater field or spray field.

**Surface Water Crossings:** Surface water crossings, whether over or under water, present special problems. MPW shall be consulted before plans are prepared. The following guidelines shall be used as a minimum:

- a. Underwater crossings shall include a minimum of two (2) feet of cover. Only fused pipe joints will be allowed for underwater crossings.
- b. Above water crossings, when crossing fifteen (15) feet in width, the pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair or replacement.
- c. When crossing through watercourses, which are greater than fifteen (15) feet in width, the following shall be provided:
  - The pipe material and joints must be designed appropriately. Provide DIP with mechanical joints.
  - Valves shall be located so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding.
  - A blow-off shall be provided on the side opposite the supply service sized in accordance with R.61-58.4 (D)(7) of the SCDHEC State Primary Drinking Water Regulations.
  - Blow-offs shall not be directed toward creeks or other water bodies without proper precaution being taken to dechlorinate prior to discharge.

## 2050 – Water Line Locations

Utility lines specified shall designate whether in easements (subdivision or commercial property) or designate the right-of-way (SCDOT primary or secondary road). When possible, all water lines shall be located in dedicated road right-of-ways and on the opposite side of the road from the wastewater line. Water lines shall not be installed under asphalt or sidewalks when in road right-of-ways. Water lines installed in areas where future road expansion is a possibility shall be in a dedicated utility easement. Water services which will serve a single residential lot shall branch off the main using a polyethylene tubing service a minimum of one (1) in diameter. Water services which will serve two (2) adjacent residential lots shall branch off the main using a polyethylene tubing service one and one-half (1-½) inches in diameter. For water services larger than one and one-half (1-½) inches, and for multiple-meter applications, refer to the applicable construction detail. All water services shall be extended to within a foot of the property line. Locate water service laterals at the opposite side of the property from the wastewater service laterals. Water lines will not be approved on the back property line or sidelines unless exclusive easement and access is granted and it is determined by MPW staff to be in the best interest of



MPW to accept said exclusive easement. Water lines shall not be located in surface water or wetlands, unless approved by OCRM, US Army Corps of Engineers, and MPW.

## **2055 – Pipe and Valve Identification and Testing**

All potable PVC and DI water mains shall be color coded blue.

All water mains that are installed by the open-trench method, regardless of piping material, shall also include the installation of an electronically or magnetically detectable tape. The tape shall be designed to last as long as the pipe it is installed over, even in adverse soils.

All water main installations, regardless of piping material, shall include the installation of a tracer wire. Prior to final acceptance the tracer wire's proper function shall be verified.

Where concrete curb is installed, the location of all valves and water service laterals shall be marked on the curb.