

SECTION I

(Sub-Section 3)

Water Systems Design Standards

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WATER SYSTEMS DESIGN STANDARDS SUB-SECTION 3

3.1 GENERAL

The following standards cover the design, review of plans and specifications, installations, inspection, testing, and acceptance of water distribution systems, water main extensions and all appurtenant items which are to be owned and maintained by Citrus county.

All improvements and modifications made to the Citrus County Water System shall be done in accordance with plans approved by the Utilities Division (UD). Material and workmanship shall conform to the standards that appear herein.

3.2 PLANS PREPARATION

All water distribution systems, water main extensions and all appurtenant items shall be designed in accordance with the applicable regulations of the County and the standards established herein.

For systems within the Citrus County service area, Citrus County shall own and maintain all portions of the water system within the public right-of-way up to and including the water meter.

No water distribution system or water main extension or any portion thereof, which is to become the property and sole responsibility of Citrus County, will be designed or constructed outside of any public right-of-way and/or easement which may be designated for said purpose.

The water distribution system and/or water main extension shall be designed and constructed in accordance with the requirements specified in Section 3.4.

3.3 DESIGN AND CONSTRUCTION STANDARDS

3.3.1 DESIGN CRITERIA

The provisions of this section set forth the general requirements for design and installation of potable water distribution systems and facilities. The Project Engineer shall comply with current requirements of the AWWA, and governmental agencies having jurisdiction, in addition to the criteria contained herein.

3.3.2 FLOW CRITERIA

3.3.2.1 Domestic Flow Demand: Flow demands for design shall be calculated based on full or projected ultimate development. The average daily flow (ADF) shall be based on 125 gallons per day (GPD) per capita, with 2.5 persons per single-family residence and 2.5 persons per multi-family residences. Irrigation demands will be estimated by the procedure outlined in AWWA Manual M22 Latest edition and will be in addition to the calculated ADF.

Flow demands for commercial and special development shall be based upon the type of establishment, including irrigation requirements, with calculations submitted to the UD for approval prior to design. The Developers Engineer shall refer to AWWA M-22 to calculate demands for commercial development. Developers Engineer shall include irrigation and fire requirements in addition to the domestic use when calculating total demand for the development.

3.3.2.2 Fire Flow: Fire flow shall, as a minimum, be 500 gpm above estimated peak demand and shall, at full discharge flow, have a minimum residual pressure of 20 psi. The Citrus County Fire Prevention Chief, using the criteria contained in N.F.P.A. Code, Volume 1231, Section B-4-1, may determine and require additional fire flow to meet these code requirements in determining whether the system is acceptable to Citrus County.

3.3.2.3 Line Sizes: Line sizes shall be based upon peak hour, maximum day demand plus fire flow and irrigation demand conditions with minimum residual pressures as specified in AWWA Manual M32 Latest Edition or appropriate section of The Florida Administrative Code (FAC).

- 3.3.2.4 Well Capacity: Wells shall be designed to provide a capacity of maximum day demand with the additional consideration that combined with storage, the entire system must be capable of producing flows of maximum day demand plus fire flows or maximum hour flows, whichever is greater for a 4-hour period.

3.4 PROTECTION OF WATER SUPPLY

3.4.1 GENERAL:

There shall be no physical connection between a public or private potable water supply and a sewer or appurtenance which would permit the passage of any sewage or polluted water supply into the potable supply.

3.4.2 PARALLEL INSTALLATION

All new and relocated water mains shall be located at least six feet (preferably ten feet) horizontally from all gravity or pressure type sanitary sewers, wastewater force mains or reclaim water mains. If the bottom of a potable water main is located 6 inches minimum above the top of a gravity type sewer main, the horizontal distance can be reduced to 3 feet minimum. Also, all new and relocated water mains shall be located at least three feet horizontally from all storm sewers, stormwater force mains, reclaimed water lines carrying reclaimed water for nurseries and vacuum-type sanitary sewers.

The horizontal distance between a potable water main and an onsite sewage treatment and disposal system shall be ten feet minimum.

All distances are measured from outside pipe edge to outside pipe edge.

3.4.3 CROSSINGS

Water mains crossing sanitary or storm water sewer shall be laid to provide a minimum vertical distance of 12 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossing, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water

And sewer pipes may be required. The developer will use 20 feet minimum DIP centered on the point of crossing.

3.4.4 CROSS-CONNECTION CONTROL

Backflow prevention devices shall be installed on all commercial and industrial connections and in all lines where the potential exists which would allow water from any other source to enter the public water supply system in accordance with AWWA M-14, Latest Edition or appropriate sections of the Florida Administrative Code (FAC). Any installed backflow prevention device shall be tested in accordance with the requirements of this document. Copies of satisfactory test results shall be supplied to the County UD prior to placing the system into service.

3.5 FIRE HYDRANT LOCATION AND FLOW

3.5.1 RESIDENTIAL AREAS

Hydrants shall be spaced such that the radius of protection will be not more than 500 feet and, in addition, for a distance from the furthest lot no greater than 500 feet along the center line of public right-of-ways. Each hydrant will be required to deliver a minimum of 500 gallons per minute (gpm).

3.5.2 COMMERCIAL AND APARTMENT AREAS FOUR STORIES OR LESS

Fire hydrants will be placed 500 feet along the right-of-way with a minimum of 250 feet to the last unit. A minimum of flow of either 500 gpm each from two fire hydrants at the same time will be required or 1000 gpm from one hydrant.

3.5.3 COMMERCIAL AND APARTMENTS OVER FOUR STORIES

Fire hydrants will be placed 500 feet along the right-of-way with a minimum of 250 feet to the last unit. A minimum flow of 1000 gpm from each of two fire hydrants at the same time will be required.

3.5.4 LIGHT MANUFACTURING AND LIGHT INDUSTRY

Fire hydrants will be placed 300 feet along the right-of-way with a minimum of 150 feet to the last lot. A minimum flow of 500 gpm from each of two fire hydrants at the same time will be required or 1000 gpm from one fire hydrant.

3.5.5 HEAVY MANUFACTURING AND HEAVY INDUSTRY

Fire hydrants will be placed 300 feet along the right-of-way with a minimum of 150 feet to the last lot. A minimum flow of 1000 gpm from each of two fire hydrants at the same time will be required.

In no case shall mains feeding fire hydrants and fire hydrant branches be less than six inches in diameter. Each branch will individually have a gate valve. Fire lines shall also be valved at the right-of-way line.

Hydrants will be located within one foot of the property line on lot lines, and the pump discharge will face the nearest roadway unless plans approved by the UD show details of location other than the above.

Hydrants shall be no closer than 4 feet from the back of valley gutter (Miami curb) and 2-1/2 feet from the back of upright curb in urban sections. For rural sections, FDOT Index 700 Clear Zone Criteria shall be met.

3.6 SYSTEM DESIGN

3.6.1 GENERAL

The water distribution systems shall be designed to conform to two Design Cases as noted below. Design Case No. 1 includes the Estimated Peak and Irrigation Demands and Design Case No. 2 includes Estimated Peak, Irrigation and Fire Flow Demands. Design flows and computerized Cybernet or equal input and output files shall be submitted to the UD for review. System Design Calculations shall document the basis for all information used to assure conformance to the two Design Cases.

Design Case No. 1:

The normal working pressure in the distribution system should be approximately 60 to 80 psi. The pressure anywhere in the system shall not fall below 35 psig when furnishing Estimated Peak and Irrigation Demands with a resulting minimum of 20 psig at the service meter. The minimum system pressure of 35 psig shall be maintained in the pipeline that provides flow to each of the customer services.

The Estimated Peak shall be calculated as follows:

No. of Services x 312.5 gpd/service x 3.5 peak factor.

Irrigation Flows shall be based on AWWA Publication M22 and have been found to be approximately 15 gpm per residential lot. However, due to restrictions imposed by the Southwest Florida Waste Management District (SWFWMD), homeowners are not allowed to irrigate every day. Based on the SWFWMD regulations, it should be assumed that, at most, only half the lots would be irrigating on any given day. Therefore, approximately 7.5 gpm per residential lot should be used in the design calculations. Irrigation Demand will not be calculated where irrigation water is provided from a separate non-potable water source not associated with the County's Potable Water System.

Design Case No. 2:

The pressure anywhere in the system shall not fall below 20 psig when furnishing Estimated Peak, Irrigation and Fire Flow Demands. The Estimated Peak and Irrigation Flow Demands shall be calculated as noted in Design Case No. 1. To analyze the Fire Flow, the system should be modeled with fires at critical locations. A critical location is usually the point farthest from the water plant or at the highest elevation.

Fire Flow shall be based on the chart located on page 17 of Appendix D of the Citrus County Land Development Code. For example, for Estimated Peak Flows of up to 100 gpm, the Minimum Required Fire Flow would be 500 gpm. For the network analysis of proposed distribution systems that have a required Fire Flow in excess of 500 gpm, Fire Flow shall be drawn from multiple hydrants distributed throughout the proposed system. The Citrus County Fire Prevention Chief may determine and require additional Fire Flow as noted in Sub-Section 3.3.2.2.

The above Design Cases show the method of developments required for residential Projects. However, these Design Cases shall be modified as required for different flow demands for commercial and special development projects. These different flow demands shall be developed as noted in Sub-Section 3.3.2.1.

3.6.2 MINIMUM LINE SIZE

The minimum distribution main size shall not be less than 6 inches serving a fire hydrant. For cul-de-sacs, without a fire hydrant, 4" water main shall be allowed as long as a minimum residential pressure of 20 PSI can be maintained downstream of nearest hydrant.

3.6.3 DEPTH OF COVER

Cover as measured from finish grade to top of the pipeline shall be no less than 36 inches or unless otherwise approved by the UD.

3.7 VALVE LOCATION

Valves with roadway boxes shall be provided for all branch connections, loop ends, fire hydrant stubs or other locations, as required to facilitate operation of the distribution system. Valves shall be placed so that the maximum allowable length of water main required to be shut down for repair work shall not be more than 500 feet in commercial, industrial or non-residential districts or 1,000 feet in other areas. Wherever practical, valves shall be located outside of paved roadway, or as directed by the UD.

3.8 AIR VENTING AND BLOW-OFFS

Where the water main profile is such that air pockets or entrapment could result in flow blockage, methods for air release shall be provided. Air venting capabilities shall be provided for distribution mains by appropriately placing service connections, fire hydrants or flushing hydrants. Air release valves shall be provided at critical points on transmission mains. A blow-off shall be installed on all dead-end mains.

3.9 INSTALLATION

3.9.1 GENERAL

Installation of all lines, hydrants, service connections and facilities shall be in accordance with the provisions of this document. This also includes installation of force mains and reclaimed water mains.

3.9.2 CONNECTION TO EXISTING WATER MAINS

The contractor shall make the tap under UD supervision and shall pressure test the tapping sleeve and valve installation under supervision of the UD inspector. The contractor shall be responsible for properly back-filling the work area pit after the work is completed. The contractor shall be responsible for scheduling and coordinating the work for each tap. Minimum 48 hours notice shall be given to the UD prior to beginning work.

The contractor shall make the connection while the line is in service by a tapping sleeve or tapping saddle as appropriate. The tapping of the main shall be done using standard tapping techniques as approved by the Utilities Department. The water mains shall be tapped in such a manner that the operation of the main in service is not disturbed and so that the potable-water supply is not contaminated. Prior to making the tap, the contractor shall assemble all materials, tools, equipment, labor and supervision necessary to make the connection.

All connections to existing mains shall be made under the direct supervision of the Citrus County Utilities Department. Valves on existing mains shall be operated by Utilities personnel or under direct UD supervision. Tapping sleeves and valve shall be pressure tested prior to tapping.

If service must be cut off to existing customers, the Citrus County Utility Department must have three- (3) days' notice to make the necessary preparations. In this event, the contractor shall be ready to proceed with as much material pre-assembled as possible at the site to minimize the length of service interruption. The Citrus County UD will postpone a cutoff if the contractor is not ready to proceed on schedule. Such connections may be made at night to minimize effects. No customer shall be without service for more than six (6) hours.

3.10 HYDROSTATIC AND LEAKAGE TEST

Water mains shall be tested as a whole or in sections between valves. The mains shall be tested in accordance with Section 4, Hydrostatic testing, AWWA C600 Latest Edition under an average hydrostatic pressure of not less than 150 pounds per square inch for a minimum of 2 hours. All valves shall be tested for secure closure. The maximum length of pipe to be tested shall not exceed 1500 linear feet. (See Section VII, Art. 3.6.2.4 for maximum allowable leakage).

All pumps, gauges and measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation, shall be approved by the UD Inspector. All water for testing and flushing shall be potable water provided by the Contractor, at no cost to the County, from a source approved by the UD. The quantity used, which shall be compared to the allowable quantity, shall be measured by pumping from a calibrated container, and approved by the County UD Inspector. Minimum 48-hour notice shall be given to the UD prior to beginning the test.

All restraint sections of the buried main shall be completely back-filled before such sections are tested.

When leakage occurs in excess of the specified amount, defective pipe, pipe joints or other appurtenances shall be located and repaired at the expense of the contractor. If the defective portions cannot be located, the contractor, at his own expense, shall remove and reconstruct as much of the original work as necessary to obtain a water main within the allowable leakage limits upon re-testing.

All valves, fire hydrants services (to the curb stop) and appurtenances shall be hydrostatically and simultaneously tested and sterilized with the line in which they are installed.

All pressure and leakage testing shall be done in the presence of the UD Inspector and the Engineer of Record or his designated representative. Copies of all test results shall be supplied to the County UD along with the as-built plans.

3.11 REQUIREMENTS FOR DISINFECTION AND BACTERIOLOGICAL TESTING

After completion of pressure testing as described in Section 3.10, the contractor shall disinfect all pipes and fittings installed in the system and receive approvals and clearances prior to placing the system in service. The disinfecting shall be accomplished in accordance with the applicable provisions of current AWWA Standard C 651, "Disinfecting Water Mains," and all appropriate approval agencies. After disinfecting, the system shall be thoroughly flushed until water samples show chlorine content equal to or less than the existing system.

3.12 WATER SERVICE LINES AND TAPS

Direct service taps without service saddles are not permitted. Service saddles shall be required for all service taps. Space taps a minimum of 18 inches apart and a minimum of 18 inches from a bell, pipe joint or fitting. Consecutive taps shall be off set 45 degrees from the crown of the pipe. Service line tubing shall be polyethylene PE 3408 material conforming to AWWA C901, SDR 9. Tubing shall be installed in a continuous length with no in-line fittings. Tubing sleeves shall be 3 inch PVC schedule 40. The minimum size for double services shall be 1 ½ inch tubing and 1 inch for single services. Tapping saddles shall be wide stainless steel strap with epoxy coating and stainless steel nuts and bolts. All water meter setters and brass shall conform to materials currently used by the UD. (See Approved Materials List, Section II). All services over 50 feet in length shall be 1 ½ inch minimum. Services shall not exceed 100 feet from the main to the meter unless otherwise pre-approved by the UD. All service lines shall be installed in accordance with standard details provided herein.

3.13 METER INSTALLATION

Construction plans shall include a typical meter installation (but not the meter) for each size meter to be installed as shown by standard detail provided herein. Meters will be installed by the UD at the time service is required at the stub-out. Each unit within a residential building (i.e., duplex, triplex, etc.) shall have a separate meter, unless prior approval is received by the UD. The proper sizing of service lines is the responsibility of the design engineer. Meters will be available in the following sizes: 5/8, 1, 1 ½, 2-inch and larger standard sized as necessary. Meter boxes for 2 inch and smaller meters are standard. Industrial/Office/Commercial type developments may require above grade type meter installations as determined by the UD. The UD may request historical data for meter sizing. The UD assumes no responsibility for undersized meters and problems associated with under-sizing. Meters shall not be placed in areas that can be fenced, such as backyards.

Meter boxes shall be kept out of pedestrian walkways and driveway areas. For shopping centers, the developers engineer should give special consideration to meter layout to satisfy these requirements.

3.14 BACKFLOW PREVENTION DEVICES

It is the intent of this section to establish design criteria and minimum standards to safeguard against potential cross connection and backsiphonage by the installation of appropriate backflow prevention devices and assemblies to protect the health, safety and welfare of the water-consuming public and maintain the integrity of the County's potable water system.

As required by and in accordance with F.A.C. 62-555 all connections, permanent or temporary, to Citrus County Utilities public water systems shall be protected against potential backflow, backsiphonage or cross connection by the installation of a Utility Division approved backflow prevention device. All facilities other than single family residences including, but not limited to commercial or industrial enterprises, schools, office buildings, mobile homes parks, multi-family residences or irrigation systems shall install a reduced pressure zone type backflow assembly. All water services to wastewater lift stations shall also be fitted with reduced pressure zone type backflow assemblies and appurtenances as may be shown by standard detail provided herein. All fire lines shall be fitted with double detector check type backflow prevention assemblies.

Backflow prevention device assemblies shall be provided with all necessary parts and accessories for a complete operable installation. Assemblies shall be the latest approved products of manufacturer regularly engaged in the production of equipment of this type. All assemblies shall be as approved by the Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California, and fully compliant with the intent of the recommendations contained in AWWA Manual M14. All assemblies shall be permanently labeled with the following information:

- A. Type of Assembly (Reduced Pressure, Double check Valve, etc.)
- B. Name or Trademark
- C. Size
- D. Model Number
- E. Direction of Flow (shown by an arrow)
- F. Unit Serial Number
- G. Rated Working Water Pressure (RWWP)
- H. Rated Working Water Temperature (RWWT)

Type and size of assemblies shall be indicated on the drawings.

Backflow prevention device ownership and maintenance responsibilities shall be the customer's responsibility. The Owner shall document yearly that the backflow prevention device has been tested annually by a qualified technician. A copy of valid technician certification must be attached to the test results and submitted to the UD as required by the appropriate Florida Administrative Code.

3.15 SYSTEM PRESSURES

The design engineer shall not assume a pressure greater than 35 psi at the meter or detector check valve without confirmation from the UD. The design engineer, if possible, should field verify the available pressures prior to finalizing the design. The UD will work with the design engineer to ascertain available system pressures at or near the connection point when requested. The UD does not guarantee or warrant any pressure or flow above what the system can furnish. The UD reserves the right to limit water usage for irrigation in the event of drought, or a requirement by FDEP or South West Florida Water management District (SWFWMD).

3.16 DEDICATED FIRE LINES

All fire lines shall have a reduced pressure principal backflow preventor with a 5/8-inch bypass meter (to detect low flows) within the right-of-way or dedicated easement. No exceptions shall be made regardless of sprinkler system type, configuration, Inc.