8 ▪ WATER DISTRIBUTION FACILITIES

8.01 *Design Basis*

This Chapter provides minimum standards for the design and construction of water mains and appurtenances. All water main extensions of the City of Belmont water system shall meet the requirements of the North Carolina Administrative Code, Title 15A, Subchapter 18C - Rules Governing Public Water Systems, with the following modifications and additions. These requirements apply to water system extensions that will be donated to the City for maintenance and to privately owned and operated extensions connected to the City's system.

8.02 *Information Required*

a. Plans and specifications for water system extensions shall be submitted to the City of Belmont for review and approval prior to submittal to NCDENR – Public Water Supply Section (PWSS) for Authorization to Construct approval. Included in the submittal to the City shall be calculations for the average and maximum daily water demands expected in the proposed extension and the projected maximum daily landscape irrigation demand and maximum flow rate.

b. For donated projects, the PWSS permit application and pertinent documents shall indicate the City of Belmont as the owner. Privately owned water main extensions will require an Ability to Serve letter from the City. The City will not sign the permit application or provide the Ability to Serve letter until all review comments on the plans and calculations have be addressed to the City's satisfaction. The Developer is responsible for all permit fees.

c. An Engineering Report shall be submitted to the City verifying the system capacity to provide fire flows within the service area of the water main extension. System hydraulic calculations are required. Upon request, the City will perform flow tests on existing fire hydrants to provide data regarding the capacity of the City's system to serve the proposed extension service area. Hydrant flow tests are performed for a fee and are to be requested through the Director of Public Works.

d. Recorded easement documents must be provided for improvements that are off-site of the development and which are located on private property. These easements must be recorded at the Gaston County Register of Deeds prior to approval of the plans.

8.03 *Minimum Pipe Sizes*

a. The minimum water main pipe size is 8 inch diameter except that dead-end lines terminating in cul-de-sacs and which are less than 500 feet in length may be 2 inch diameter. A blow-off assembly is required at the terminus of the 2 inch main.

b. Any water line which has the reasonable potential of being extended in the future shall be sized to accommodate the future tributary area demands and required pressures for potable water usage and fire flows. These water mains shall be extended to the development boundary and in no case shall these pipes be less than 8 inch in diameter. The main must be terminated with a fire hydrant.

8.04 *Distribution System Design*

a. Water mains shall be provided in the public right of way fronting all lots and parcels.

b. Water mains shall be looped where feasible. If necessary to complete a loop and avoid dead-end lines, water mains shall be placed in 30-foot wide dedicated easements connecting between two street rights of way. The maximum length of a dead-end water line shall be 1,000 feet.

c. Water mains shall be located under the street pavement between the street centerline and the curb.

d. Water mains in easements across rear and side yards are not permitted without City approval.

e. The installation of 10 inch diameter and larger water mains in easements will not be permitted unless no other alternative exist and written approval is obtained from the City.

f. Easement areas shall be graded flat with little or no cross slope.

g. The City will not replace walks or driveway pavements within easements when they must be removed for water main repairs.

h. Water mains that are 12 inch and larger shall be provided with air release valves in vaults at high points

8.05 *Phased Construction*

a. Developers are encouraged to phase the construction of water systems in order to limit the length of water lines that are operational, but have no customers.

b. The design of the water system must account for potential water quality issues associated with water age and stagnation.

c. System design and phasing shall promote circulation within the system.

d. For systems serving more than 50 dwelling units, the design professional shall provide a written plan for the operation of the proposed water main extension during the build out

period which includes:

(1) Periodic water main flushing requirements. This must include a system map with the location of flushing fire hydrants, the amount of flushing time required per hydrant, and an estimate of water volume to be used in flushing the lines.

(2) Isolation of portions of the system. Dead-end water lines and mains with little expected circulation shall be valve off from the active portion of the proposed water system.

a. PWSS Authorization to Construct permit applications shall designate phases and indicate the phase limits on the plans and in the application. Engineer's certification and PWSS Final Approvals to operate the improvements must be on a phase by phase basis.

8.06 *Fire Protection*

a. Fire hydrants shall be provided every 500 feet as measured along the centerline of the right of way. The location and accessibility are subject to the review and approval of the Belmont Fire Department.

b. Fire hydrants shall be located in the right of way at the common line between two parcels or lots. The distance between hydrants shall be reduced to meet this requirement.

8.07 *Pipe Materials*

a. Laying Conditions – Pipe material and strength class shall be determined based on laying conditions and trench bedding preparation.

b. Minimum pipe materials and strength class are:

(1) 14 inch and larger – Cement lined ductile iron pipe (DIP), AWWA C151, minimum Pressure Class 250.

(2) 10 inch and 12 inch – Cement lined DIP, AWWA C151, Pressure Class 350,

(3) 8 inch and 6 inch – Cement lined DIP, AWWA C151, Pressure Class 350, or polyvinyl chloride (PVC) pipe, AWWA C900, DR 14.

(4) 2 inch - PVC pipe, ASTM D2241, Class 200, SDR13.5 - NSF certified.

c. Pipe joints for all size pipes shall be "push on" or mechanical joint. At pipe bends, tees and other locations where pipe restraint is necessary, mechanically restrained joints are

required in lieu of concrete thrust blocking. The length of restrained joint pipe required at fittings shall be indicated on the plans. Concrete thrush blocking may be required under certain conditions and shall be specifically indicated on the plans.

d. A 14-guage solid copper tracer wire shall be laid on top of all PVC pipe to aid in locating the pipe for maintenance purposes. The wire shall be secured to the pipe with duct tape near every bell and at the center of each pipe joint. The wire shall be fastened securely to a cast iron fitting at each system valve and fire hydrant, and to copper service lines as directed by the City.

e. Minimum depth of bury for all water mains regardless of pipe material is 36 inches.

8.08 *Pipes in Steel Casing Pipes*

a. Casing pipes are required in some circumstances to avoid open cut installation of water mains. These situations are generally governed by the NCDOT and railway companies. The installation shall meet all requirements of these agencies.

b. Spider supports and spacers are required to adequately support the water main pipe within the casing pipe.

c. Appropriate casing pipe end seals are required.

d. Detail plans are required for review by the City.

8.09 *Valves*

a. 16 inch and larger – Butterfly valves, direct bury, for horizontal installation and operator shaft vertical, open left, mechanical joint ends, AWWA C504.

b. 12 inch to 6 inch - Gate valves, direct bury, non-rising stem, resilient wedge, open left, mechanical joint ends, AWWA C509.

c. 2 inch - Gate valves, double disk, open left, AWWA C509 with mechanical joint ends.

d. Valves shall be restrained to nearest fitting.

e. An adjustable height cast iron valve box and lid shall be provided. The word “WATER” shall be cast into the lid. A concrete ring (collar) shall be provided around valve box if the valve is located outside of paved areas. All valve box lids shall be painted blue.

f. The location of all valves, including hydrant cut off valves shall be indicated by a “V” stamped or chiseled into the curb at a point closest to the valve. The “V” shall be painted blue.

8.10 *Air Release Valves and Vaults*

a. Air release valves shall be provided at high points of 12 inch and larger water mains.

b. Air release valves shall be automatic operation, sized per manufacturer's recommendation, and furnished with back flushing attachments.

c. All valves shall open left.

d. The minimum depth of bury for water mains must be increased to allow adequate vertical clearance for the valve and valve vault manhole.

e. Valve vault shall be precast concrete with manhole cover and steps.

f. Manhole frames and covers shall be US Foundry 669 or as approved with "WATER" cast into cover.

g. Vent pipes shall be installed so that the above grade portion is near the right of way line.

8.11 *Fire Hydrants*

a. Dry barrel with break-away safety traffic flange, two 2-1/2 inch nozzles, one 4-1/2 inch pumper nozzle with 5 inch Storz pumper nozzle connection, open left. Nozzle threads shall be Belmont standard.

b. All fire hydrants must be installed with an isolation valve and minimum one foot sleeve from valve to fire hydrant.

c. Hydrants shall be installed with grade ring no more that 2 inches above finished ground elevation. If necessary, barrel extension kits shall be used to raise the hydrant.

d. The only accepted hydrant manufacturer and model is American-Darling, 4-1/2 inch Mark 73-5 with 5 inch Storz pumper nozzle connection.

e. Fire hydrants shall be painted chrome yellow per Belmont standard. Privately owned and maintained fire hydrants shall be painted red.

8.12 *Connections to Existing System*

a. Water main connections to existing City mains shall be made under pressure. The pressure tap shall be made in the presence of City personnel. City may require that tap be made during off-peak water demand periods, including evening and night hours. Pressure taps shall be made using a 304 stainless steel tapping sleeve and gate valve.

b. Temporary jumper is required between the City system and newly constructed water mains. It shall consist of 4 inch ductile iron piping with handwheel operated valve, double check backflow device, and 4 inch meter. The jumper shall be in place during testing and disinfection of new water mains and cannot be removed until Authority to Operate has been received from PWSS for the new system.

8.13 *Water Services*

a. Each lot or parcel shall have a separate water service consisting of tap and corporation stop at the main, double band water service tapping saddle, 1 inch (minimum size) Type K copper tubing – ASTM B88 (within public right of way or easement), terminating the copper tubing with a curb stop valve at proper depth and at the right of way line. When a structure is constructed on the lot or parcel, the builder must provide meter, locate and expose the curb stop and install the meter yoke, meter, and meter box.

b. Multi-meter service assemblies may be used for buildings containing up to four individual dwelling units such as duplexes and “pinwheels”. Each dwelling unit must have a separate 5/8 inch water meter. The water service line between the water main and the multi-meter manifold shall be 1-1/2 inch for two units and 2 inch for three or four units. The water service line shall be Type K copper tubing – ASTM B88. All fittings must be brass of the appropriate size. Double band water service tapping saddles shall be used at the main.

c. Meters shall be Hersey of the model standard adopted by the City (5/8 inch to 2 inch) with manual read registers reading in US gallons. Larger meters shall be Hersey of the model standard adopted by the City. After initiation of an Automatic Meter Reading program by the City, meters must be provided with a Muller System Mi.Node meter interface unit.

d. Separate water meters are required for all landscape irrigation systems. After July 1, 2009, irrigation systems costing more than $2,500 must be installed by a State licensed irrigation contractor.

e. Services for building fire suppression systems (sprinklers) shall be metered. The meter must be capable of measuring the full flow of the fire line.

f. Meter setters (riser) shall include angle ball valve with padlock wings and dual check valve.

g. All fittings and materials are subject to City approval.

h. Water service lines shall be located near the center of the subdivision lot frontage with meter boxes located on the building side of the sidewalk.

i. Meters shall not be located in sidewalks, driveways or other pavements. The location of the water meter shall be indicated by a “W” stamped or chiseled into the curb at a point closest to the meter. The “W” shall be painted blue.

j. Water service meter boxes shall not be installed until final grade has been established for the lot/meter area and shall be protected with orange fencing after installed. The fencing shall be maintained by the Developer until the building is permanently occupied.

k. Developer is to provide water meter and install the water service line, water main tap, fittings, meter setter, and meter box.

l. All non-residential meters, and all meters 1-1/2 inch or larger, shall also be provided by the Developer.

8.14 *Backflow Prevention*

a. Backflow prevention is regulated through the City’s *Cross Connection Control Ordinance*. This ordinance governs the design, installation, and maintenance requirements. An annual inspection and testing of backflow devices is mandatory.

b. The designer must indicate on the plans, the organization that will be responsible for the maintenance of the backflow devices and for the annual testing. It is anticipated that this will be the property owner, rental agent, homeowner association, or others.

c. Backflow prevention devices are subject to City approval. The City maintains a list of acceptable backflow prevention devices on its website at:

http://www.cityofbelmont.org/Water-SewerDepartmentOrdinances.aspx.

d. Potable water services shall be protected with approved double check valve integral to the meter setter assembly.

e. Water services for fire protection, irrigation systems, and non-domestic water uses shall include a suitable backflow prevention device including but not limited to double check valves, reduce pressure backflow valves, etc.

f. Backflow prevention devices that are installed above grade in a “Hot Box” enclosure, shall not be located in the front building setback area established in the Land Development Code. Landscaping around the enclosure shall be provided and indicated on the landscaping plan sheet.

g. Backflow prevention devices may be installed within buildings if an adequate drainage system is included. An air gap is required between the device discharge and the drainage system components.

8.15 *Operation of Existing Valves*

a. Only City personnel may operate existing system valves and fire hydrant valves.

8.16 *Temporary Water Service*

a. Builders are required to establish a water account for temporary water service as each house or structure is constructed.

b. The Public Works Department will establish minimum standards for temporary water service connections and backflow prevention.

8.17 *Contractor Qualifications*

a. Any contractor that will install water distribution improvements must have a valid North Carolina General Contractor License for utility construction.

b. Contractor shall present proof of licensure prior to the preconstruction meeting.

c. If any of the development improvements will be constructed within public rights of ways, the contractor shall provide evidence of adequate insurance coverage to protect the general public. This provision applies to rights of ways that may have been dedicated within the development through the Final Plat process where improvements were bonded by the Developer.

8.18 *Testing Procedures*

a. All water mains shall be pressure tested and disinfected in the presence of City personnel.

b. Testing procedures are contained in Appendix B of this Manual.

8.19 *Re-Activation of Water Mains*

a. Water mains which have been constructed, but were de-activated for a period of 6 months or more because of water quality concerns and slow development build out, are subject to the following upon re-activation:

(1) The design professional must submit a written re-activation plan. It must be signed and sealed by the Developer's design professional of record.

(2) The design professional and City Inspector must jointly inspect all valves, fire hydrants and service lines and meters boxes.

(3) The water main must be thoroughly flushed using unidirectional flushing techniques. Design professional shall perform hydraulic modeling to determine the optimum sequence of flushing to clean the lines and avoid contamination of the active water system.

(4) The lines must be pressure tested and disinfected.

(5) The design professional must witness and record all data and test results regarding flushing, pressure testing, and system disinfection in a summary report.

8.20 *Acceptance for Maintenance*

a. The City may accept water mains upon activation providing all tests are successfully passed, providing the first customer account has been established, and providing record drawings have been submitted. Activation for acceptance purposes is defined as the point in time when the first service connection is placed into service.

b. The City may elect to accept water lines on a block by block basis as the first customer account per block is established.

c. Record drawings for water mains shall be full sized paper copy and in digital formats. The required digital formats include <u>both</u> AutoCAD and Adobe PDF formats. Digital files shall be provided on CD labeled with name of development, date of record drawings, name of contractor, and name of design professional.

d. The acceptance requirements and procedures are contained in Appendix E of this Manual.

e. Upon acceptance, the Developer shall provide one year written warranty on the workmanship, materials and installation of the water system. Warranty shall also cover trench settlement caused by backfill consolidation.

8.21 *Notification of Impact Fees*

a. The City of Belmont has adopted impact fees for water main extensions falling in the areas defined for each impact fee zone. The fees are based on land use and number of defined units.

8.22 *Abandonment of Water Services*

a. When existing buildings are demolished for the purpose of clearing the parcel(s), any change of use, or for the redevelopment of the parcel(s), the water services must be terminated in accordance with the following requirements:

(1) Contractor retained by developer/property owner for completing the abandonment of the service must be licensed by the State of North Carolina for utility construction. The City of Belmont can perform the abandonment if requested and upon the payment of the fees established by the City Council. Abandonments to be completed by City staff must be scheduled through the City Public Works Department.

(2) Contractor shall notify the City Public Works Department for verification of the service line location. Contractor shall contact NC One Call for the location of underground utilities before any excavation is started.

(3) Abandonment of the water service shall include exposing the tap at the water main and closing the corporation stop, physical disconnection of the service line at the corporation stop, and the removal of the meter and meter box. All salvaged materials shall be delivered to the City Public Works Department.

(4) Water service piping shall be removed from the right of way if it can be accomplished without pavement removal. It this is not possible, contractor shall notify the City.

(5) Curb markings on curbs indicating the former location of the meter shall be obliterated.

b. Upon completion of the abandonment, contractor shall notify the City Billing Department so that the service account may be cleared.

c. The abandonment of water services must be completed within 30 calendar days of the demolition of a building. Contractor/developer/property owner are required to obtain a Demolition/Grading Permit from the City of Belmont before any work on site may be completed.

d. The abandonment of water services for single family structures on existing subdivided lots may only be completed by City personnel. The fee for Water Service Termination shall be paid prior to the City issuing a Demolition/Grading Permit. If a Zoning Permit for a new single family structure is obtained within one year of the date of the abandonment of the service, the City will install a new 1 inch water service at no cost when the structure is constructed. If the Zoning Permit is obtained later than one year after the original abandonment date, the owner must pay the Water Tap Fee and Meter Set. All other fees associated with establishing a water service account shall be the responsibility of the owner. Water Service Termination fees for voluntarily demolished single family structures in violation of the City of Belmont Minimum Housing Standards Code of Ordinances, will be waived.