UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR EXTENDING WATER DISTRIBUTION SYSTEMS

SECTION 2

DESIGN STANDARDS
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2.00 GENERAL STATEMENT

The water facilities design shall include planning to meet present and future demands, population projections, per capita consumption, area population densities, and fire requirements. These factors must then be considered to size the mains from the various sources of supply to every point in the system. Other design elements are: soil corrosiveness considerations, the water main pressure requirements, water main location with reference to property lines and other utilities, sizing of service lines, location and size of valves, fire hydrants, special valves, and booster pumps. All water system designs shall be prepared by, or under the direction of, a professional engineer registered in the State of New York.

2.01 WATER DISTRIBUTION SYSTEM PRESSURE

2.01.01 In areas where a static pressure in excess of 70 psi may occur under any demand condition, individual pressure reducing valves are required to be installed and maintained by the Owner or Developer in accordance with the applicable plumbing code. The Developer’s Engineer will identify on the water plans the services requiring individual pressure reducing valves.

2.01.02 Design parameters for the minimum water pressure in the water main, or service connection during various flow conditions, are as follows:

A. Each building will have 35 pounds per square inch (psi) at the meter with 15 gpm (or the calculated maximum domestic flow for the building, whichever is greater) flowing in the service, and domestic demand on the system of 5 gallons per minute (gpm) at all lots.

B. All points in the system shall maintain 20 psi under fire flow demand.

C. Main is adequately sized to supply both the section proposed and the overall future project (i.e. all phases of a subdivision or water district).

D. Proposed order of construction will maintain an adequate supply for all uses throughout each completed section.

2.01.03 “Low Pressure Water Service” is defined as a service which will have water pressure between twenty (20) and thirty-five (35) psi under any conditions of demand, except fire flows. If the property may be served by extending a main from an adjacent pressure zone, a low pressure water service will generally not be permitted. Such service must be approved in advance by the Authority.
approved by the Authority, occupants with a low pressure water service may be required to sign a low pressure acknowledgement.

2.02 WATER DISTRIBUTION MAIN SIZES

2.02.01 General Requirements

A. All water mains shall be sized based on flow demands and pressure requirements.

B. The minimum water main size to be installed in the Authority’s system shall be eight (8) inches in diameter unless otherwise approved.

C. Departures from the minimum requirements will be considered only in special circumstances. Water mains in short dead-end cul-de-sacs may be six (6) inches in diameter if that size water main meets the development’s water demand requirements. Any departure from minimum requirements identified above shall be justified by a network hydraulic analysis.

2.02.02 Size-Fire Protection

A. Fire protection is to be provided. System design shall be such that fire flows and facilities are in accordance with requirements of the Fire Department having jurisdiction and the “Fire Suppression Rating Schedule” as published by Insurance Services Office (ISO). All systems must be designed with a minimum residual pressure on the customer’s side of the meter and/or backflow device of twenty (20) psi during fire flow conditions.

B. Required fire flows will be identified on the Project Data Sheet (Appendix D).

C. A maximum water velocity of twenty (20) fps will be utilized when designing for fire flows and/or other emergency conditions.

D. Fire suppression sprinkler systems shall be designed per the fire codes of the fire Department having jurisdiction. In no case will the design be based on a water pressure greater than ten(10) psi below the available static pressure at the water main. The design must also take into consideration the pressure loss(es) associated with the service, meter, backflow assembly, etc.
2.03 NETWORK HYDRAULIC ANALYSIS

2.03.01 Design

The Developer’s Engineer should request the source hydraulic grade line (HGL) from the Authority prior to the initial design. The Authority will need the following information at the time of the request:

A. Location, type of development, and the number of units within the development.
B. Anticipated fire flow requirements.
C. Location where the proposed water distribution system is proposed to tie into the existing system.

2.03.02 Submittal of a Network Hydraulic Analysis for Review and Approval

The network hydraulic analysis may be submitted with the project design for review. However, for larger projects, such as a major subdivision, etc., obtaining network hydraulic analysis approval prior to water plan submission is recommended. The Developer’s Engineer is encouraged to contact the Authority for guidance.

The network hydraulic analysis submittal should include the following items:

A. The data input sheets, as well as the analysis results.
B. Information on the development (e.g., type of development, number of acres, number of units, fire flow requirements, etc.).
C. Data sheet outlining all assumptions (e.g., method used to assign demands to corresponding nodes and source HGL’s used).
D. Map identifying pipe and node numbers and their locations.
E. Fire hydrant locations.
F. The name and version of software used for the analysis.
G. Elevations of junction nodes.
H. Staging or phasing of development.
I. Service data and sizing results.
J. Appropriate off-site demand.
2.03.03 Miscellaneous

A. The roughness factors to be used in the analysis should be as follows:
   - C = 70 for all unlined cast iron pipe
   - C = 100 for all other existing pipe
   - C = 110 for proposed pipe

B. When identifying the fire flow available in a network hydraulic analysis, use the hydrant located at the development’s weakest point (typically the highest point in the development and/or last hydrant on dead-end main).

C. The elevations used in the network hydraulic analysis should preferably be based on a project grading plan or the anticipated final elevation. If the final grading plan deviates significantly from the elevations used in the analysis, a revised analysis will be required.

D. All calculations shall be certified by a New York State Licensed Professional Engineer.

2.04 WATER MAIN LOCATION

2.04.01 Main extensions should be located within a dedicated right-of-way. If a dedicated right-of-way is not available, the main may be located elsewhere upon Authority approval and upon the granting of an easement to the Authority. The easement shall be thirty (30) feet, or greater in width to accommodate large diameter pipe or accommodate other utilities in the same easement. Water lines shall be designed to be a minimum of ten (10) feet from the property line or easement edge or as specified by the Authority for the entire water main length.

2.04.02 Mains will be located a minimum of six (6) feet from the edge of pavement and from the right-of-way edge.

2.04.03 Dead-end mains shall be minimized by looping mains whenever practical.

2.04.04 Mains installed in a cul-de-sac shall run the full street length ending with a hydrant at the end of the cul-de-sac, unless they are looped.

2.05 WATER SERVICES

2.05.01 Water mains must be installed along the frontage length of at least one property line of the property to a point where the service line can be installed perpendicular to the building to be served.
2.05.02 Only those subdivision lots which are to receive water service from the proposed subdivision water main shall be included in the MEA or PWME.

2.05.03 Subdivision lots which will receive water service off an existing water main will be excepted from the MEA or PWME. These lots will be noted on the approved plans as “MCWA Exception Lots”. Application for service for these lots shall be made by the Developer separately.

2.05.04 In general, no advance taps will be approved or accepted. Developer may seek approval for advance services on a case by case basis, and only in single-family, residential subdivisions. The Developer or Engineer shall show the location of all advance taps on the plans. Developer shall install only those advance taps which are shown on the Approved Plans.

2.05.05 In the event that an installed advance tap is not needed, the Developer shall pay all costs associated with the abandonment of it. Abandonment shall only be performed by the Authority.

2.05.06 Developer shall pay all fees for each approved advance tap at the time of execution of the MEA or PWME.

2.06 VALVES

2.06.01 Valve Location

Sufficient valves shall be provided on water mains to minimize inconvenience and sanitary hazards during repairs. Valves shall be generally located as follows:

A. At intervals to isolate no more than two (2) fire hydrants at any time.
B. At minimum intervals of five hundred (500) feet in industrial or commercially zoned areas.
C. In residential areas to isolate a maximum of twenty (20) services, or no more than approximately every 1000 feet.
D. At intersections of two or more mains.
E. A maximum of five (5) valves will be required to isolate any location.
F. As required for proper operation and maintenance of the system.
G. Valves shall not be located in street gutters or in driveways.
H. A valve is required at the end of all temporarily dead-end mains.
I. If the Developer proposes to utilize an existing valve to pressure test new mains, Developer shall pay the Authority to replace the valve in the event that it leaks during the pressure test.
J. The Authority may require additional valves depending upon the project design.

2.06.02 Special Valves

A. Air relief or air vacuum relief valves may be required on pipeline high points and changes in grade, depending on the main size and terrain.
B. Pressure reducing valves (PRV) will be required where it is necessary to reduce pressure to a maximum value.
C. Blow-offs are required on all permanent dead-end pipe runs and at locations designated by the Engineer during plan review. Blow-offs shall be installed in accordance with the Standard Details.

2.07 HYDRANTS

2.07.01 Hydrant Locations

Hydrants shall be provided on water mains. Hydrants shall be generally located as follows:

A. At property lines.
B. Three (3) feet (minimum) from pavement, sidewalks or driveways.
C. As required by the Authority at high points and low points for air-release and blow-off purposes.
D. A minimum spacing of 500 feet in residential areas and 300 feet in industrial areas. In rural or sparsely developed areas, the Authority reserves the right to increase this minimum spacing.
E. At the end of all dead-end mains.

2.08 BACKFLOW

Any expansion to the Authority’s distribution system shall protect the public potable water supply from contamination or pollution. Containment shall be achieved by the use of a Department of Health approved backflow device which isolates, within the customer’s internal distribution system(s) or the customer’s private water system(s), such contaminants or pollutants which could backflow into the public water system.

No water service connection to any premises shall be approved, installed, or maintained by the Authority unless the water supply is protected as required by State laws, Department of Health regulations, and Authority standards. Water service to any premises shall not be activated by the Authority if the Authority
determines the water service requires a backflow device and any of the following conditions prevail:

A. The backflow assembly is not installed or has been removed after installation.
B. The backflow assembly has been by-passed.
C. The backflow assembly is in any way altered.
D. An unprotected cross-connection exists on the premises.

2.08.01 When required, the Developer or Owner shall submit an Engineer’s Report, plans and application for Backflow Device Approval.

2.08.02 The required backflow prevention assembly type shall be determined by facility use.

2.08.03 Any backflow prevention assembly required herein shall be a model and size approved by the Authority. The term “Approved Backflow Prevention Assembly” shall mean an assembly and configuration meeting the Authority’s specifications.

2.08.04 When backflow prevention assemblies are required, their installation design shall take into consideration pressure loss across the device and maintenance requirements for critical services. Parallel assembly use should be considered to prevent service disruption during scheduled maintenance.

2.09 SUBMITTALS AND REVIEW

2.09.01 General Requirements

All plans submitted to the Authority for review must be accompanied by the following:

A. A completed Project Data Sheet (sample shown in Appendix D).
B. One copy of an overall master plan showing the area to be developed (total build-out of the project) and any other adjoining proposed developments.
C. Hydraulic or system analysis for flow and pressure in the form prescribed by the Authority.
D. Vicinity map showing adjacent area and the relationship between proposed facilities and existing facilities.
E. A written statement detailing the completion of the environmental assessment process under the State Environmental Quality Review Act.
F. Thrust block calculations signed and sealed by the Developer’s Engineer for the water main. The safety factor, design pressure, soil type, source of soil determination and soil bearing strength must be clearly stated.

G. Calculations determining the minimum length of pipe required between the end of the main and the last (upstream) valve such that when the valve is closed, and the pressure released from the main, and the thrust block removed from the end of the main, the main and valve will not move. These restrained joint calculations are only required when the proposed water main will be a temporary dead-end main that will be extended at a future date.

2.09.02 Water Plan Drawing Submittal Requirements

The following are the requirements for drawings submitted to the Authority:

A. General Plan Requirements
   1. Project name
   2. Developer’s name, address and phone number.
   3. Engineer’s name, address and phone number.
   4. Engineer’s P.E. stamp with signature (required on final drawing and required calculations.)
   5. Legend
   6. North arrow(s)
   7. Scale(s) (horizontal and vertical)
   8. Signature block for Authority approval
   9. Horizontal scale shall be between 1” = 10’ and 1” =50’.
   10. All new mains shall be drawn true to scale with no break lines
   11. Benchmark data and identification of a tie between existing or proposed survey monuments and the submitted easement documents

B. Utility Plan
   1. Plans shall indicate all water details up to, and for, the property to be served.
   2. Street names and right-of-way dimensions
   3. Rights-of-way and easement lines (all easement lines to include bearings); may also be shown on the subdivision (plat) plan.
   4. Show all existing mains, laterals, valves, hydrants, etc. Locate all existing and proposed obstructions,
such as utility vaults, catch basins, traffic islands, etc.

5. Show all proposed mains, stubs, valves, bends, reducers, hydrants, etc., dimensioned from existing stationary markers (street light, sign, hydrant, etc.) and surveyed controls (street intersections, centerlines, property lines, etc.)

6. Show proposed services with curb boxes on the ROW or easement line.

7. Show the adjacent area and the relationship between the new facilities and the existing facilities, (i.e. surface grading, etc.)

8. Show driveway, sidewalk, curb, gutter and structure footprint locations.

9. Standard Notes and Details as required by these Standards

10. Curve data on deflected water mains

C. Subdivision (Plat) Plan
1. Rights-of-way and easement lines (all easement lines to include bearings); may also be shown on the utility plan.

2. Tax Account Numbers for on-site and adjoining properties.

D. Profiles
1. Profiles are to be provided for all mains being installed.

2. Identify all other utilities, existing and proposed (i.e. gas, sewer, etc.). Locate all existing or proposed obstructions such as utility vaults, catch basins, traffic islands, etc.

3. Road bore crossings require casing length, restrained joint pipe length, and depth of all existing and proposed utilities.

4. Standard Notes and Details as required by these Standards.

E. Additional Plans Submittals (as required by the Authority)
1. Grading plan
2. Landscaping plan
3. Erosion control plan
2.09.03 Easement Submittals

When easements are to be granted to the Authority, prior to signing the Final Plans, the Developer shall supply the following to the Authority:

A. Owner’s exact name and address.
B. If the Owner is not an individual, also provide the name and title of the person who will be executing the easement document.
C. Name and address that the easement should be sent to for execution arrangements (e.g. attorney, engineer, or owner.)
D. Copy of the most current deeds for all properties through which the easements run.
E. Certify ownership to the Authority; either in a letter or other suitable form. A title company or an attorney can do this work. In the body of the letter include the following for each deed:
   - Liber and page numbers
   - Recording date
   - Tax account numbers
   - Property addresses
F. Tax maps highlighting each parcel involved and the approximate locations of the easements.
G. Anchor the point of beginning to the intersection of two dedicated roads or a filed map.
H. Easement descriptions, Microsoft Word format, on disk or send by email to tom.peaslee@mcwa\.com.

Once all of the above has been provided, reviewed and approved, the Water Authority will prepare the easement document and send it to the appropriate recipient to arrange for execution. Once the easement document has been returned to the Water Authority properly executed so that it can be recorded at the County Clerk’s Office, the easement will be considered granted.

2.09.04 Approval Requirements

A. Preliminary Plan Review

Preliminary plan approval must be obtained after submitting the water plans for plan check, and making all the required changes as requested by the Authority. The project fees, applications, and agreements are not required at this time. Final project approval must be obtained before construction is initiated.
B. Resubmittals

In the event the drawings or other information change with respect to the water main installation, the Developer shall resubmit two sets of revised plans and information to the Authority for review and approval.

C. Final Approval

1. All easements required must be granted to the Authority prior to Final Approval.
2. All plans submitted to the Authority must be signed and have the stamp of an Engineer who is registered within the State of New York.
3. The Developer’s Engineer must submit the original mylar plans for Authority approval. The minimum review period for final plan check of the final mylar plans submittal is one week.
4. This approval is for the water system only and does not include backflow review. Backflow review and approval requires a separate application, which must also be approved by the Department of Health.

2.09.05 Expiration Date

Construction must commence within one (1) year of the approval date shown on the plans, and must be diligently pursued to completion or the project may be subject to cancellation and must then be resubmitted for review and approval in accordance with the Authority’s Service Rules. If construction has not started within this period, the approval shall be void, and the Developer shall be required to resubmit the necessary plans and information for approval by the Authority.

2.10 CORROSIVE SOILS

2.10.01 Testing

The Developer or his Engineer must submit certified results of the Ductile Iron Pipe Research Association’s (DIPRA) Ten Point Soil Test prior to commencing construction. Testing shall be conducted by a qualified soil testing laboratory, and the results shall be submitted to the Water Authority on the report form included in Appendix E. Test samples shall be:

1. Taken along the route of the proposed water main,
2. Taken at a maximum spacing of 500 feet with a minimum of one test in developments less than 500 feet long,
3. Taken in all wetlands, fill areas and railroad beds (existing or abandoned) that the water main route crosses or occupies,
4. Taken at the elevation of the top of the proposed water main, and
5. Referenced on the report by station number.

The Developer’s Engineer shall certify that the samples tested are from the site referenced on the form and were taken along the pipe route at the appropriate depth. The certification may be done on the form or in a separate letter from the Developer’s Engineer.

2.10.02 Polywrap Installation

Upon submission of a satisfactory soil testing report, the Engineer will make the determination as to whether or not a main will require polyethylene encasement, and the limits of such encasement. Water mains installed in soils with DIPRA Point Totals of 10 or greater shall be wrapped in polyethylene. Polyethylene encasement shall be installed in accordance with the Water Authority’s Materials and Performance Specifications.

The Developer may choose to wrap the entire main in polyethylene in lieu of soils testing. In this case, a note stating this shall be placed on the plans.