SECTION II

WATER DISTRIBUTION SYSTEM AND APPURTENANCES

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A. GENERAL

All development under the jurisdiction of the Village of Northbrook shall include provisions for construction of water distribution and service facilities complete with valves, fire hydrants, and other appurtenances designed in accordance with the standards herein. Where more than one building is located or planned on one parcel of property, or where fire protection is required, the proposed initial phase of construction shall include all water main construction and appurtenances.

The design of all water distribution system improvements proposed for construction as independent projects under the control of the Village shall meet these technical requirements and the requirements of the Illinois Environmental Protection Agency (IEPA).

B. ENVIRONMENTAL PROTECTION AGENCY

Water main design and construction shall in all respects be in accordance with the regulations of the IEPA Division of Public Water Supplies. An IEPA Public Water Supply Construction Permit shall be obtained prior to construction commencing.

C. PUBLIC EASEMENTS AND UTILITIES

All public water main extensions shall be located within publicly dedicated rights-of-way or easements. If located within an easement, the easement shall be centered on the pipe and appurtenances and extend 10 feet to either side.

To protect existing utilities all underground utility work shall be performed in accordance with the Illinois Underground Utility Facilities Damage Prevention Act and JULIE Excavator Handbook.

D. SYSTEM EXTENSION

Extensions to the water distribution system shall form a complete network and be compatible with the existing water system network. Mains shall be extended to the property lines along public rights-of-way and at any location indicated by the Village Engineer. As required by the Village Engineer, the developer shall have the proposed water main improvements added to the Village's water system model to verify the capacity of the existing system to support the new development.

Transmission mains within or adjacent to a development shall be sized and located as directed by the Village Engineer. Distribution mains shall form a grid, be sized, looped, and spaced as required for water quality and fire flows, and shall have a minimum diameter of 8-inches. Dead legs shall not be allowed.

The proposed system extension shall be arranged so that the isolation of any section of main will require closure of no more than 3 valves and minimize the interruption of service.

E. MAIN OVERSIZING

When the construction of a transmission main is deemed necessary by the Village Engineer, the additional incremental construction cost to oversize the water main in the same location may be accommodated by a recapture agreement or borne by the Village if so accepted and authorized by the Board of Trustees.

F. FIRE PROTECTION

1. Anticipated Fire Flow Loadings

If required by the Village Engineer or Fire Chief, the design engineer shall show, in a separate report to both the Village's Engineering Department and the Fire Prevention Bureau, that at various locations, selected by the Village Engineer, the proposed water main system will supply the required fire flows in excess of domestic consumption demands. A "C" factor of 140 may be used for new water main and the "C" factor shall be reduced by 5 for each decade of age. A minimum fire flow requirement of 1200 GPM, 20 psi, residual gallons per minute should be used for single-family residential fire flow calculations. The Fire Department jointly with the Engineering Department shall determine the minimum required fire flows for other proposed developments.

2. Private Booster Pumps for Fire Protection

No pump shall be installed without specific approval of the Fire Prevention Bureau. The Standards of the National Fire Protection Association have been adopted by reference in the Village Building and Fire Prevention Code. Proper backflow prevention devices are required in accordance with the Illinois Plumbing Code.

G. INSTALLATION REQUIREMENTS

All water main pipe shall be protected in accordance with IEPA requirements. There shall be a minimum 12-inch vertical separation from all non-sewer utilities.

H. MATERIAL SPECIFICATIONS AND DETAILS

1. Water Main Pipe

Pipe shall be furnished in nominal 18-to-20-foot laying lengths as supplied by the manufacturer. Each pipe shall have the manufacturer's mark and year in which the pipe was manufactured in addition to the current AWWA, thickness class, pressure class, diameter, and listing standards.

Pipe shall be specified for a working pressure of 150 psi. Higher pressure or thickness classes of pipe may be required when installed outside of the right-of-way, in rear or side yards, in casings, and as otherwise specified by the Village Engineer.

Ductile Iron Pipe
Ductile iron water main pipe shall be minimum thickness Class 52, cement lined, bituminous coated and comply with AWWA C151. Pipe shall be encased in an 8-mil thick polyethylene encasement installed in accordance with the manufacturer's instructions. Polyethylene encasement shall be secured to the pipe main with plastic tie straps.

Polyvinyl Chloride Pipe
Polyvinyl chloride water main pipe shall have a minimum DR18 pressure rating and comply with AWWA C900.

Tracer Wire
Tracer wire shall be installed with all water main and shall be a minimum #12 AWG single strand copper or copper clad conductor with blue colored 30 mil minimum thickness HDPE insulation or as approved by the Engineer. Tracer wire shall be placed alongside the pipe between the 3 o'clock and 6 o'clock position, and fastened at

minimum of 5 foot intervals within the limits of the initial backfill. Tracer wire shall extend through all valves and fittings and shall be brought up to grade inside all valve vaults and with fire hydrants.

Tracer wire shall not be looped and underground splices shall be performed using locking connectors or lugs specifically designed for direct bury applications.

Tracer wire termination or access boxes shall be installed as required by the Village Engineer.

All new tracer wire installations shall be tested by the developer at the developer's expense using low frequency line locating equipment. Testing shall be observed by the Village Engineer who shall be the final authority for approval. Testing shall be performed prior to public improvement acceptance. Continuity testing in lieu of actual line locating shall not be accepted.

Fittings
All underground fittings and related fittings/hardware shall be ductile iron and connected to water main pipe by means of mechanical joints with Grade 304 stainless steel fasteners. All fittings shall be encased in high-density cross-laminated polyethylene encasement.

All fittings shall meet current AWWA C110.

2. Pipe Joints

Sections of water main pipe shall be connected by means of slip joints, consisting of bells extruded with the pipe which have interior angular recesses conforming with the shape and dimensions of a rubber sealing gasket, the interior dimension of which is such that it will admit the insertion of the spigot end of the joining pipe in such manner as to compress the gasket tightly between the bell of the pipe and the inserted spigot, thus securing the gasket and sealing the joint.

The lubricant used in conjunction with slip joints shall be NSF approved and as recommended by the pipe or fitting manufacturer.

Mechanical joint pipe shall meet the above requirements. Fasteners shall be Grade 304 stainless steel.

3. Restrained Joints

The unbalanced forces at pipe bends, tees, etc., shall be restrained by transmitting those forces of the pipe wall by means of concrete thrust blocks, mechanically restrained joint restraining glands, a tie rod system, field locking gaskets, or a combination of these systems to stabilize the pipe. Mechanical systems shall consist of Grade 304 stainless fasteners and shall include polyethylene encasement. Mechanically restrained joint systems shall be approved by the Village Engineer.

4. Thrust Blocks

Thrust blocks, mechanical joint restraints, or combinations of these systems are required at all valves, hydrants, tees and bends. Engineering drawings shall indicate the location of each concrete thrust block to be installed. Where undisturbed earth is not available or not

likely to be available to back up pressure type concrete thrust blocks, the design engineer shall specify tie rods or mechanically restrained joints with or without anchor type concrete thrust blocks.

Thrust blocks shall be precast concrete block or poured in place Class SI concrete as approved by the Village Engineer.

5. Fire Hydrants

Fire hydrants with auxiliary valves shall be the break flange type and the make and model shall conform to the current Standard Detail W-1.

Spacing:

Fire hydrants shall be installed so that residential property will not be further than one hundred and 150 feet from a fire hydrant. Fire hydrants shall be provided so as to provide the required fire flows to structures as described in the "Fire Suppression Rating Schedule". Where water transmission lines or offsite water lines are installed on private property, the first private hydrant must be installed at no more than a 500 foot interval distance from the street hydrant and at 300 foot intervals thereafter to the most remote point of the building. Commercial areas require a fire hydrant within 100 feet of a building's Fire Department Connection.

Installation Specifications:

(1) The hydrants shall be installed to meet the requirements as indicated on the Standard Detail.

(2) Fire hydrants shall be typically installed not further than 7 feet nor less than 4 feet from the back of curb. Parking lots shall be designed to provide not less than 15 feet of hydrant clearance on one side of the hydrant on which a steamer or hose connection is located to permit access.

6. Valves

Valves shall be located on water mains to effectively isolate the sections from the system with minimal disruption should a shutdown be required. Valves shall be spaced such that not more than 1,200 feet of main will be shut off at any given time. The Village Engineer may require closer spacing of valves.

Valves 12 inches and smaller shall be iron body, resilient seat gate valves, and conform to AWWA C509. Valves over 12-inch diameter shall be iron body, rubber seat, butterfly valve, Class 150B, conforming to AWWA C504.

All valves shall open counterclockwise and flange ends shall conform to AWWA C111.

Pressure testing against existing water main valves will not be permitted. Developer shall remove and replace existing valves prior to testing new main to ensure protection of the water supply.

7. Valve Vaults

Valve vaults shall be watertight and provided for each valve and shall be precast reinforced concrete circular barrel and cone sections (ASTM C478) with mastic watertight joints. The exterior of all valve vaults shall be treated with waterproofing materials.

Water Valve or Tap Size	Minimum Valve Vault Diameter
Less than 10-inch	48-inch
10-inch or 12-inch	60-inch
14-inch or 16-inch	72-inch
Greater than 16-inch	84-inch
Pressure Tap on 8-Inch	60-inch
Pressure Tap on 10-inch or 12-inch	72-inch
Pressure Tap on 14-inch or 16-inch	84-inch
Pressure Tap over 16-inch	96-inch

A minimum of 2 inches of precast adjusting rings shall be installed on every structure. No more than 3 adjusting rings with an 8-inch maximum height adjustment shall be allowed. Two butyl rubber sealant strips shall be installed between adjusting rings, the structure, and the casting.

8. Castings

Manhole frame and solid cover shall be Neenah No. R-1772 in non-pavement areas and Neenah R-1713 in paved areas. Covers shall have concealed pick holes and embossed "WATER".

9. Air Release Valves

Air release valves shall be placed on the water main at high points as deemed necessary by the design engineer or the Village Engineer to serve as air vents preventing air locking of the water main. Air release valves shall be of the APCO Body Style 200A or an approved equivalent. Valve vaults for air release valves shall be sized according to Pressure Tap sizing.

10. Sampling Tap

Copper testing whips and minimum 3/4 inch lead free bronze corporation cocks shall be installed in all water main valve vaults.

11. Water Service Line

The water service line and connection shall be in accordance with the Water Service Detail. The minimum size for a residential water service shall be a minimum of 1-1/2 inch in diameter.

I. CONSTRUCTION REQUIREMENTS

1. Pipe Installation

Pipe shall be installed in accordance with "Standard Specifications for Water and Sewer Main Construction in Illinois", the applicable AWWA standards, and the requirements of the Village Engineer.

2. Backfill

Excavation in existing pavement shall be backfilled to the pavement base layer with controlled low strength material unless otherwise approved by the Village Engineer.

Water main constructed via open cut within 3 feet of existing pavement or across proposed pavement shall be backfilled with approved granular backfill, thoroughly compacted in 8-inch lifts in place.

3. Water Services Less Than 4 Inches Diameter

The required minimum 1-1/2 inch diameter Type K copper line shall be laid in a trench at a minimum depth of 5-1/2 feet.

Excavation in existing pavement shall be backfilled to the pavement base layer with controlled low strength material unless otherwise approved by the Village Engineer.

Sewers constructed via open cut within 3 feet of existing pavement or across proposed pavement shall be backfilled with approved granular backfill, thoroughly compacted in 8-inch lifts in place.

The water service line for each property shall be laid from the buffalo box (B-Box) into the building, through a water meter and then into the plumbing system of the building. All plumbing shall conform, at a minimum, to the Illinois Plumbing Code (77 Ill. Adm. Code 890).

The location of the B-Box shall be sawcut in the curb as a “W” and the location field marked with a painted “blue” 4 x 4 hardwood timber installed vertically.

The B-Box shall be located in the center of the lot frontage and located in the street right-of-way or street easement.

No meter will be placed into service until an inspection of the existing building's plumbing system has been made by Village personnel to insure positive and permanent disconnection of previous well water supply and adequate flushing and disinfection. There shall be no cross connection of the municipal and individual well water supplies in the building's plumbing. Continued use of a well water supply is permitted for non-domestic benefit (sprinkling and irrigation, etc.) only if the potable Village water supply is completely physically disconnected from the non-Village supply.

An approved backflow prevention device shall be installed wherever, in the Director of Development's opinion, such installation is necessary in order to comply with the Illinois Plumbing Code (77 Ill. Adm. Code 890). All backflow prevention devices or methods required shall conform to the Illinois Plumbing Code.

The water meter must be installed within the building at a location which ensures protection from freezing, allows convenient access for repair, replacement, periodic reading, and is as close to the supply line entrance as possible.

4. Connections to Existing Mains

All connections to the Village water distribution system shall be made under full water service pressure unless otherwise approved by the Village Engineer.

5. Pipe Cutting

The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the existing pipe and so as to leave a smooth end at right angles to the axis of the pipe.

6. Steel Casing Pipe for Auger Boring or Tunneling

Circular steel casing pipe for auger boring or tunneling shall conform to the approved and permitted plans. Stainless steel casing spacers and rubber end seals are required on all installations. Record drawings are required for casing location and elevation.

J. WATER MAIN TESTING

All water main and service line 4-inches and greater shall be tested according to the Standard Specifications for Water and Sewer Main Construction in Illinois or as approved by the IEPA. The contractor shall notify the Engineering Department at least 48 hours in advance to arrange for observation of the testing, disinfection, and sampling.

K. WATER METERS

It will be the responsibility of the general contractor to contact Public Works for an appointment to install Village water meters. Installation of water meters must occur prior to final inspection and occupancy approval by the Development Department.

In general, cold water displacement meters, manufactured in accord with AWWA Standard C700 shall be used for domestic and lower usage commercial buildings. For larger users, compound meters meeting AWWA Standard C702 shall be used. Compound meters shall be single register.

L. WATER SERVICE DISCONNECTION

Disconnection of the water service from the water main shall be completed prior to demolition or elimination of a building or property that has existing water service supplied to it from the Village.

Water services with tapping saddles 2-inches and smaller shall be shut off at the corporation stop and have a brass cap installed on the stop. Direct taps or deteriorated tapping saddles shall be removed completely and a stainless-steel repair clamp shall be installed over the tap location to seal the main. This operation shall be performed under pressure to ensure the integrity of the public water supply.

Water services larger than 2-inches shall be removed by removing the tee or valve from the main and replacing with new pipe and restraint joint pipe couplings as necessary to reestablish the integrity of the pipe main.

M. RECORD DRAWINGS

Prior to acceptance of the water distribution systems, Record Drawings must be delivered to the Village in electronic and hard copy formats as approved by the Village Engineer. The Record Drawings shall indicate the location of all valves and B-Boxes, and size, location, and depth of all water lines, and shall be certified as to accuracy by an Illinois licensed Professional Engineer or Illinois licensed Professional Land Surveyor. See As-Built Checklist for required format of As-Built submittals.

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