SECTION III

SANITARY SEWER COLLECTION SYSTEM & APPURTENANCES

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A. GENERAL

All development under the jurisdiction of the Village of Northbrook shall include provisions for the construction of or connection to sanitary sewerage facilities. At a minimum, proposed sanitary sewer construction shall include a system of sewers between a connection to an existing sewer system at an approved location and the boundary line of each individual parcel of property within or adjacent to the development. Where more than one building is located or planned on one parcel of property, the proposed initial phase of construction shall include all sanitary sewer construction and appurtenances within the parcel.

The design of all sanitary sewerage facilities shall meet the technical requirements of these Standards and the requirements of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC).

B. SERVICE AREAS

The design plans submitted to the Village Engineer for approval shall include a map of the Ultimate Service Area. The Ultimate Service Area shall include the entire area proposed to be ultimately served by all or a portion of the proposed sanitary sewer.

By decision of the Village, the Ultimate Service Area may be required to be extended beyond the limits of any development. The additional expense for such extension of the Ultimate Service Area beyond the limits of the development may result in provisions to recover such incremental cost through a recapture ordinance.

Adequate details shall be shown on the Ultimate Service Area map relative to future sewer sizes, elevations and topography to establish the adequacy of construction plans submitted for approval to serve possible future extensions beyond the Ultimate Service Area.

C. PUBLIC EASEMENTS AND UTILITIES

All public sewer 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 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 CONNECTIONS

The location of proposed connections to the existing sanitary sewer system shall be approved by the Village Engineer with due regard to the available capacity of the entire system. The developer shall be responsible for providing a sewer capacity report to the Village Engineer for review and approval. The available capacity of receiving sewers shall be determined by the developer by comparing the theoretical capacity of the receiving sewer to the design flow calculated as the sum of the following factors:

- Monitored flow baseline
- Wet weather groundwater infiltration
- Rain dependent infiltration and inflow
- Proposed development peak flow

E. BASIC DESIGN STANDARDS

Sewer mains shall be designed in accordance with these standards and the “Watershed Management Ordinance”. The more stringent requirements contained in these standards shall apply. Sewer mains

shall be of adequate size to serve the entire development proposed and, except as otherwise approved by the Village Engineer, shall be installed in the street right-of-way, or in an easement adjacent thereto. Sewer mains shall not be installed within 10-feet of a building.

Before commencing the sewer layout, the developer shall confer with the Village Engineer to determine the required size and grades for any trunk sewers traversing the subdivision to complement the Village system capacity to existing MWRDGC interceptor facilities together with the estimated additional flow created by the development to such facilities.

Sanitary sewers shall be extended to the boundary of the development along public rights-of-way and at other locations indicated by the Village Engineer.

Every effort shall be made to avoid lift stations in the engineering design.

1. Design Flows and Slopes

   Average design flow for a sanitary sewer facility shall be 100 gallons per capita per day (gpcpd). Maximum design flow for sanitary sewer lines shall be determined by MWRDGC design criteria, provided, however, that the maximum design flow for sewer laterals need not exceed 400 gpcpd and the maximum design flow for collecting sewer mains and trunks shall not be less than 250 gpcpd. The design engineer is to provide detailed design calculations for approval.

   The design of flows, slopes, and sewerage facilities shall be in accordance with the "Watershed Management Ordinance".

2. Sewer Size and Design Hydraulics

   (a) Minimum sanitary sewer main size shall be 8-inches internal diameter.

   (b) Minimum building sanitary service sewer size shall be a 4-inch internal diameter.

   (c) Sewer size changes - Sanitary sewers of different diameters shall join only at manholes. The invert elevations shall be adjusted to maintain a uniform energy gradient by matching the 0.8 depth points of different diameters.

3. Alignment

   Sewers shall be laid straight in both horizontal and vertical planes between manholes, unless otherwise approved by the Village Engineer.

4. Manholes

   Manholes shall be precast concrete, waterproof to prevent infiltration, and constructed in accordance with the Village's Standard Detail.

   Manholes shall be installed not more than 400 feet apart for sewers 15 inches in diameter or less, and 500 feet apart for sewers 18 to 30 inches in diameter, at the end of each line, and all changes in grade, size, alignment, and material.

   A 1/10th of a foot difference in invert elevations should be used when a change of direction of flow is necessary within the manhole. In no case shall the invert of a pipe discharge more than 24 inches above the invert. When connecting into an existing manhole the existing structure shall be rehabilitated as necessary to eliminate all sources of infiltration.

   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.

5. Drop Manholes

An exterior drop pipe shall be provided for a sewer entering a manhole whenever the elevation is 24 inches or more above the manhole invert. The minimum diameter of the drop pipe shall conform to the requirements of the Illinois Recommended Standards for Sewage Works and shall not be less than 8 inches diameter. If a smaller drop is desired, design calculations and configurations shall be submitted for review and approval by the Village Engineer.

6. Inspection Manholes

Inspection manholes shall conform to the requirements of the MWRDGC.

7. Sewer Depth

For sewer depths less than 4 feet, thickness Class 55 ductile iron cement lined pipe shall be used.

8. Lift Stations

(a) Whenever possible, sanitary sewerage gravity facilities shall be designed to avoid the necessity of providing lift stations.

(b) Lift station and force main designs shall be submitted for review and approval by the Village Engineer prior to submission to the MWRDGC. Lift stations shall be submersible with dual pumps.

(c) A natural gas standby generator shall be provided for each lift station. Generator shall have a block heater and an automatic transfer switch with automatic exercise capability. Generator shall have an all-weather enclosure and be sized to power the entire station including pumps, controls, alarms, emergency lighting and other appurtenances.

(d) Lift station shall be equipped with a telemetry system and connected to the Village's existing monitoring and control system as approved by the Village Engineer.

(e) Force mains shall be constructed of polyvinyl chloride pipe conforming to AWWA C900 with a DR18 pressure rating or as approved by the Village Engineer.

9. Pipe Bedding and Initial Backfill

Bedding and Initial Backfill shall consist of CA-11 crushed aggregate or washed stone.

The pipe shall be laid so that it will be uniformly supported and the entire length of the pipe barrel will have full bearing. No blocking of any kind shall be used to adjust the pipe to grade except when concrete embedment is used. Bedding shall be required for all sanitary sewer.

10. Separation of Sewer/Water Mains

Water main pipe shall be protected in accordance with IEPA requirements.

F. MATERIAL SPECIFICATIONS

All sanitary sewer system elements shall conform to the "Watershed Management Ordinance" and "Standard Specifications for Water and Sewer Construction in Illinois".

1. Sewer Main Pipe

Polyvinyl chloride (PVC) SDR 26, ASTM 3034 with joints conforming to ASTM D3212. Where water main quality pipe is required, it shall conform to the requirements of Section II.

2. Cured in Place Pipe Liner

(a) The installation of cured in place pipe (CIPP) liner may be permitted by the Village Engineer to rehabilitate existing sewer mains or services. CIPP shall be designed and installed in accordance with the "NASSCO Specification Guidelines" for CIPP Installation and as approved by the Village Engineer.

(b) Where water quality pipe is required for protection of potable water systems CIPP shall be designed and installed in accordance with AWWA C623 and as approved by the Village Engineer.

3. Castings

(a) Manhole frame and cover - Neenah No. R-1713 (pavement) and R-1772 (lawn).

(b) Concealed pickholes with gasketed cover embossed "SANITARY SEWER".

(c) To prevent entry of overland flow, when designated by the Village Engineer, use a watertight frame and bolted lid, Neenah No. R-1916 Series, embossed "SANITARY SEWER".

G. INSTALLATION REQUIREMENTS

1. MWRDGC and IEPA

Sewer system construction shall in all respects be in accordance with the regulations of the MWRDGC and the IEPA. No construction shall commence until copies of the approved permits are on file with the Village Engineer.

2. Sewer Service Stub Locations

The contractor shall keep a "field record" of all sewer services or stub locations by measurement to the nearest downstream manhole. Such records shall be delivered to the Village Engineer prior to scheduling testing and acceptance of the sewer construction.

Sanitary service stub location shall be field marked with a painted "red" 4" x 4" hardwood timber installed vertically.

3. 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.

4. Pipe Laying

The laying of pipe in finished trenches shall be accomplished using a laser beam system to establish proper line and grade. The sewer line shall start at the outlet end with the spigot ends pointing in the direction of flow and shall proceed upstream with pipes abutting true to line and grade. The ends of the pipes shall be carefully cleaned before the pipes are lowered into the trenches. As each length of pipe is laid, the mouth of the pipe shall be properly protected to prevent the entrance of earth or bedding material. The pipe shall be fitted and matched so that when laid in the work they will form a sewer with a smooth, uniform invert.

All jointing material shall be used in accordance with the recommendations of the manufacturer. Each pipe shall be pushed or pulled as tightly as possible to the section in place to insure tight joints.

Sewer pipe shall not be dropped or thrown from the site delivery vehicle. All pipe shall be lowered into the trench with suitable apparatus for that purpose.

5. Inspection

All sewer pipe installations and connections must be inspected by the Village. No backfilling or closing of a sewer pipe trench shall occur until specific permission to do so has been given by the Village Engineer. Upon approval, backfilling or closing of trenches shall be completed immediately.

6. Sewer Connections

(a) Connection of new sewers to existing sewers, shall be made as directed by the Village Engineer. Such connections shall be made within a manhole, connection via bell and spigot, or using a shielded, non-shear coupling.

(b) When connections are made to sewers, special care must be taken that no part of the work is built under water. A flume or dam shall be installed and bypass pumping maintained, if necessary, to keep the new work dry until completed and cementitious material has properly cured.

(c) Junctions, service stubs or extensions of main sewer line for future sewer connections shall be plugged at the ends, or otherwise sealed off in a manner approved by the Village Engineer.

7. Sanitary Sewer Service

(a) All service pipe through a foundation wall and within 10 feet of the building shall be ductile iron. Transitions in pipe material shall be performed using a shielded, non-shear coupling. Pipe material beyond 10 feet from the foundation may be ductile iron, extra heavy cast iron or SDR26 PVC laid at a minimum slope of 1% to provide for self-cleaning velocity. A cleanout shall be installed at the 10-foot pipe transition.

(b) The following restrictions apply to services between the structure and the connection with the sewer stub on private property:

(1) No run of pipe shall exceed 100 feet without providing a suitable cleanout. This cleanout should not be less than 4 inches in inside diameter.

(2) Cleanouts should be provided whenever the sewer makes a turn exceeding 45 degrees. Cleanout openings should terminate at grade and be suitably protected against damage. Cleanouts shall be cast iron with brass covers in pavement and may be PVC in non-pavement areas.

(3) If a cleanout has not been provided inside the building one shall be installed on the sewer service line outside and adjacent to the building.

(4) Pipe bedding and initial backfill shall consist of CA-11 crushed aggregate or washed stone.

(5) No cleanouts are to be placed within the public right-of-way or easement.

(6) The minimum depth at the foundation wall shall be 3 feet.

(c) All sewer services in the public right-of-way shall be installed by auguring up to the point of connection at the sewer main. Open cut or trenching installation within public road pavement is not permitted unless approved by the Village Engineer.

(d) All abandoned septic tanks shall have all contents removed. The empty tank shall then be removed, or holes shall be punched in the bottom and filled with sand or similar granular material. Inspection and approval of this work is required prior to final approval by the Village Engineer.

(e) No storm water drainage from roof drains, footing tiles or outside drains, etc., shall be directed to the sanitary sewer.

(f) Individual sanitary sewer service shall enter the sewer main by way of an existing wye. In the event no such wye exists, the connection to the sewer service shall conform to the Village's Standard Detail.

8. Wyes and Plugs

(a) Wyes

Wyes for existing or future lateral connections shall be inserted in the sewer as specified on approved construction plans. Wyes shall be constructed to be an integral part of the main sewer pipe. The wye bell shall be placed midway between the top of the pipe and the horizontal center line of the pipe at an angle of approximately 45 degrees to 60 degrees, with the upstream face of the pipe.

(b) Plugs

Wyes not immediately utilized at the time of the sewer construction shall be plugged in such a manner as to be watertight and to facilitate future removal without damage to the fitting.

9. Backfilling

The developer shall not backfill sewers above the top of pipe until the sewer elevations, gradient, alignment, and pipe joints have been inspected and approved by the Village Engineer.

Upon approval of the sewer pipe installation, granular initial backfill shall be carefully placed and mechanically compacted as required per MWRDGC standards. Suitable trench backfill shall then be placed and mechanically compacted.

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.

H. INSPECTION AND TESTING

1. Costs

All inspection, testing, repair, and retesting costs shall be the responsibility of the developer.

2. Cleaning

All sewers and appurtenances shall be cleaned prior to inspection and testing as required by the IEPA and MWRDGC.

3. Defect Repairs

(a) All dips, cracks, leaks, improperly sealed joints, and departures from approved grades and alignment detected by such inspections shall be repaired by the developer at their expense.

(b) All defects and corrective work required as the result of such inspection shall be performed by the developer without delay. Upon completion thereof, the sewer shall be reinspected and tested as deemed necessary by the Village Engineer.

4. CCTV Inspection - Internal Televising Inspection of Pipe

Upon completion of construction but prior to initiation of the maintenance guarantee period, or as deemed necessary during the construction of the sanitary sewer, an internal inspection of the sewer shall be performed. CCTV footage and a written report of all CCTV inspections conforming to NASSCO standards shall be provided to the Village prior to connecting individual services and prior to the initial acceptance required by these Standards. The form of the report and format of the video footage shall be approved by the Village Engineer. The video shall be high quality and resolution, and the report shall explicitly identify all sags, connections, leaks, and defects.

5. Leakage Testing

Air testing new sewer shall be performed in accordance with the “Standard Specifications for Water and Sewer Construction in Illinois” or as approved by the Village Engineer.

6. Deflection Testing

Deflection testing of new flexible sewer shall be performed in accordance with the “Standard Specifications for Water and Sewer Construction in Illinois” or as approved by the Village Engineer.

7. Manhole Testing

Negative pressure testing of new sewer manholes shall be performed in accordance with the “Standard Specifications for Water and Sewer Construction in Illinois” or as approved by the Village Engineer.

I. SEWER SERVICE DISCONNECTION

Disconnection of a sanitary sewer lateral shall be done at the sanitary sewer main. The lateral pipe shall be disconnected and removed from the main. The wye fitting shall be sealed with a rubber friction plug installed as close to the main line pipe as possible and the remaining part of the fitting shall be sealed with hydraulic cement.

J. RECORD DRAWINGS

Prior to acceptance of the Sanitary Sewer systems, Record Drawings shall be submitted to the Village in electronic and hard copy formats as approved by the Village Engineer. The record drawings shall indicate all manhole and individual service locations, elevations, length, slope, and material of all sewers, 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 formal of As-Built submittals.