

SECTION III

SANITARY SEWER COLLECTION SYSTEM & APPURTENANCES

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A. GENERAL

Regardless of size, all developments within the corporate limits or under the control of the Village 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 construction shall include all sanitary sewer construction and appurtenances within the parcel.

The design of all sanitary sewerage facilities shall also meet the technical requirements of these Standards and the other local sanitary districts and the Illinois EPA.

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 (See Section II-D, Water Distribution System and Appurtenances - page II-3)

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.

E. BASIC DESIGN STANDARDS

Sewer mains shall be designed in accordance with the Manual of Procedures for the Administration of the MWRDGC Sewer Permit Ordinance, the Standard Specifications for Water and Sewer Main Construction in Illinois and the Recommended Standards for Sewage Works. The more stringent requirements contained in the cited documents 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 ten (10) feet of a building. The minimum sewer main size shall be an eight (8) inch internal diameter. Manholes shall be installed not more than 400 feet apart for sewers fifteen (15) inches in diameter or less, and 500 feet apart for sewers eighteen (18) inches to thirty (30) inches in diameter, at the end of each line, and all changes in grade, size, alignment, and material.

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 so as to complement the Village system capacity to existing MWRDGC interceptor facilities together with the estimated additional flow created by the subdivision or development to such facilities. Construction changes required to accommodate said incremental increase shall be submitted as part of the engineering plans. 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 gpcpd (gallons per capita per day). 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 Manual of Procedures for the Administration of the MWRDGC Sewer Permit Ordinance, latest edition.

2. Sewer Size and Design Hydraulics

- (a) Minimum sanitary sewer size shall be an eight (8) inch internal diameter.
- (b) Minimum building sanitary service sewer size shall be a four (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 and constructed in accordance with the Standard Detail in the Appendix.

A one-tenth (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 six (6) inches above the poured concrete bench. When tying into existing manhole, all existing leaks must be sealed.

5. Drop Manholes

An exterior drop pipe shall be provided for a sewer entering a manhole whenever the elevation is 12 inches or more above the manhole invert. The minimum diameter of a drop manhole shall be 48 inches. The minimum diameter of the drop pipe shall not be smaller than the diameter of the entering sewer by more than two nominal diameters (e.g. for 12", 15" and 18" entering sewer, the drop shall be 8", 10" and 12" respectively), provided that the minimum diameter of the drop pipe shall not be less than 8". If a smaller drop is desired, design calculations and configurations shall be submitted for review and approval by the Village Engineer.

6. Inspection Manholes

An inspection manhole having a minimum diameter of 48" is required for all commercial and industrial buildings. Such inspection manhole shall be constructed on the building service sewer before it connects to the sewer main, and shall not be located within the building excavations disturbed earth or closer than five (5) feet to the building. There shall be no flow into the inspection manhole except flow from the building or buildings for which the inspection manhole is intended. Only one (1) exterior manhole shall be permitted unless otherwise approved by the Village Engineer. Manholes constructed on a public sewer, or on sewers receiving other flows, are not considered inspection manholes.

7. Sewer Depth

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

8. Lift Stations

- (a) Whenever possible, sanitary sewerage gravity facilities shall be designed so as 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. Station shall be submersible with a natural gas standby generator. Generator shall have a block heater and an automatic transfer switch and automatic exercise capability. Generator shall have an all weather enclosure. Station shall have a minimum of two pumps. The station shall also be equipped with a telemetry system as directed by the Village Engineer and Director of Public Works.
- (c) Lift stations type shall be as approved by the Director of Public Works and Village Engineer.
- (d) A stand-by internal combustion power source shall be provided for each lift station.
- (e) Force mains shall be designed and constructed of cement lined, ductile iron pipe (Class 55) with heavy duty (8 mil) polyethylene wrap, and stainless steel nuts and bolts (as specified in Section II. I. 1 (c)).

- (f) A compatible telemetered alarm and communication system shall be installed and connected to the Village's existing alarm panel.
- (g) Sanitary sewer pipe shall be SDR 26 PVC unless ductile iron is deemed necessary by the Village Engineer (i.e. water main crossings).

9. Pipe Bedding

Bedding shall consist of CA-11 crushed aggregate or washed stone, 1/4" to 3/4" in size.

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 construction and shall be of a minimum thickness equal to 1/4th of the outside diameter of the sewer pipe but shall not be less than four inches (4").

10. Separation of Sewer/Water Mains

Where a sewer main, lateral or building service sewer is within ten feet (10') of a water main, the water main must be at least eighteen inches (18") above the sewer. Where this is not possible, the sewer shall be constructed of ductile iron pipe or approved water main type material for a minimum distance of 10 feet on each side of the water main crossing. Reference is made to the "Technical Policy Statements" of the IEPA, Title 35, Part 653, Section 119.

F. MATERIAL SPECIFICATIONS

All sanitary sewer system elements shall conform to the specifications of the Manual of Procedures for the Administration of the MWRDGC Sewer Permit Ordinance, latest edition.

Pipe

- (a) PVC SDR 26, ASTM 3034 with joints conforming to ASTM 3212.

Castings

- (a) Manhole frame and cover - Neenah No. R-1712 (pavement) and R-1772-C (lawn), with self sealing lid, embossed "SANITARY SEWER".
- (b) Manhole steps - Neenah No. R-1981-I.
- (c) Concealed pickholes with gasket cover.
- (d) To prevent entry of overland flow, when designated by the Village Engineer, use a watertight frame and self sealing lid, with 1" closed pickhole, Neenah No. R1916 Series or East Jordon 1050 EXHD, embossed "SANITARY SEWER".

G. INSTALLATION REQUIREMENTS

1. MWRDGC/IEPA

Sewer system construction shall in all respects be in accordance with the regulations of the Metropolitan Water Reclamation District of Greater Chicago and Standard Specifications for Water and Sewer Main Construction in Illinois, latest edition. 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/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.

3. Pipe Sleeves for Jacking, Augering or Tunneling

(a) Steel sleeves shall be 3/8 inch thick of the diameter specified, with a continuous, circular 1/2 inch bead weld and shall meet the requirements of ASTM A-120.

(b) The annular void in the casing shall be bulkheaded watertight and filled with blown in pea gravel to prevent the pipe from floating, then bulkheaded watertight.

4. Sheeting and Bracing

Sheeting and bracing may be placed in the trench.

Sheeting and/or bracing shall be progressively removed as the backfill is placed in such a manner as to prevent the caving-in of the sides of the trench or excavation and to prevent damage to the work.

Sheeting which is placed shall not be removed until the backfill has been placed and thoroughly compacted. While being pulled, all vacancies left by the sheeting shall be carefully filled with sand free from silt, rammed into place, puddled or otherwise firmly compacted.

The contractor is responsible for the construction techniques, procedures and compliance with O.S.H.A. standards to insure a safe and proper installation.

5. 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 toward the inlet end 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 must be lowered into the trench with suitable apparatus for that purpose.

6. Sewer Connections

General:

The following is provided to reemphasize Village requirements for the connection of the individual sanitary sewer service.

- (a) All sewer pipe installations must be inspected by the Village. This means that no backfilling or closing of a sewer pipe trench can be accomplished until specific permission to do so has been given by authorized personnel representing the Village. Upon approval, backfilling or closing of trenches will be completed immediately.
- (b) Connection of new sewers to existing sewers, when encountered in construction, shall be made as ordered by the Village Engineer . Such connections shall be made within a manhole, except for individual house and drain connections. A band-seal coupling shall be used for connection of dissimilar materials.
- (c) 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 must be installed and bypass pumping maintained if necessary, to keep the new work dry until completed and concrete or mortar has properly cured.
- (d) Junctions, service stubs or extension 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.

Sanitary Sewer Service:

- (a) All service pipe shall be a minimum of four (4) inches in diameter, of ductile iron, extra heavy cast iron or PVC SDR26 and laid at a minimum slope of 1%.
- (b) The following precautions are to be taken during installation of the house service (from house to sewer stub at front property line):
 - (1) No run of pipe should exceed 100 feet without providing a suitable clean-out. This clean-out should not be less than four (4) inches in inside diameter.
 - (2) Clean-outs should be provided whenever the sewer makes a turn in excess of 45 degrees. Clean-out openings should terminate at grade and be suitably protected against damage. Clean-outs to be cast iron with brass covers.
 - (3) Connection to the existing cast iron house sewer shall be made using a Standard #C594-66T band seal (Fernco or approved equal) coupling.

- (4) In the event that a clean-out has not been provided inside the building (that portion of sewer under the building), one should be placed on the sewer service line outside and adjacent to the building.
 - (5) Pipe bedding shall consist of crushed CA-11 stone 1/4 to 3/4 inches in size (ASTM C-67) to a minimum depth of four (4) inches or per pipe manufactures requirements.
 - (6) No clean outs are to placed within the public right-of-way or easement.
- (c) All abandoned septic tanks must have all contents removed. Such removal must be verified by the Village. The empty tank must then be removed or holes punched in bottom and filled with sand or similar granular material. This phase of the connection requirements will be inspected as well as the installation of the house sanitary sewer line.
 - (d) No storm water drainage from roof drains, footing tiles or outside drains, etc., can ever be directed to the sanitary sewer. Any such combination of drainage existing or at a future date is prohibited.
 - (e) Individual sanitary sewer service shall generally enter the sewer main or lateral by way of an existing wye. In the event no such wye exists, the connection to the sewer main or lateral shall be made by one of the methods indicated below. If another method is desired, a detail shall be submitted for review and approval by the Village Engineer before the connection is made. Indiscriminate breaking of the sewer main pipe is prohibited
 - (1) Installation of a manhole.
 - (2) Circular saw-cut of sewer main by proper tools ("Shewer-Tap" machine or similar), and proper installation of hub wye saddle, in accordance with manufacturer's recommendations.
 - (3) Using pipe cutter, neatly and accurately cutting desired length of pipe for insertion of proper fitting. Use of "Band-Seal" couplings, or similar couplings, and shear rings and clamps to fasten the inserted fitting and hold it firmly in place. Follow manufacturer's recommendations for the installation.

7. Wyes and Plugs

(a) Wyes

Wyes, for existing or future lateral connection, shall be inserted in the sewer as specified on approved construction plans. Wyes shall be constructed so as 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 injury to the wye or tee.

8. Building Sewer Service

Building sewer service is defined as a sewer pipe receiving flow from a single building and connecting to a sewer main or lateral, constructed on private property, except for a street crossing. The maximum length of a building service sewer shall preferably be 120 feet and shall not exceed 150 feet. If such length is exceeded, an intermediate manhole shall be provided. A manhole shall also be installed every 150 feet.

Minimum design standards, and other requirements hereof, governing materials, joints, infiltration, workmanship and maintenance for sewer mains and laterals shall also apply to building service sewers. Horizontal and vertical alignment of the service sewer shall be uniform and shall follow a straight alignment. There shall be no dips in the grade or fall in the line. Turns or bends required for the riser, if necessary to connect to the sewer wye or tee, shall be made with standard bends.

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

9. Backfilling

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

All sewer pipe, when laid, shall have a minimum four (4) inch stone bedding and have the space between the pipe bottom and sides of the trench above the pipe foundation completely packed with (CA-11) 1/4" to 3/4" crushed aggregate. Then, approved backfill shall be carefully placed, thoroughly tamped with a mechanical tamper. The backfilling shall be accomplished evenly on both sides of the pipe. Care shall be taken that no rock, frozen material or other debris are placed in direct contact with the pipe. Water jetting of the individual trenches is required.

All voids existing between the outside of the pipe and the limits of an auger/tunnel excavation or lining shall be filled with silica sand or pea gravel, free of silt, thoroughly rammed or blown into place, or with cement grout composed of one (1) part Portland Cement, three (3) parts of fine aggregate and five (5) parts of coarse aggregate thoroughly packed into place.

Sewers constructed in open cut across any existing or proposed (where locations are known) pavements, driveways and sidewalks, and all trenches where the inner edge of the trench is closer than two (2) feet to the edge of such improvements, shall be backfilled with approved granular gravel backfill, thoroughly flushed and jetted or tamped in nine (9) inch lifts in place.

H. INSPECTION AND TESTING

1. Cleaning

All sewers and appurtenances shall be cleaned prior to inspection and tested as required by these Standards.

2. Visual Inspection

(a) All sewer and appurtenances shall be laid with the use of a laser and visually inspected by representatives of the developer during and following construction.

(b) Sewers designed to be straight between manholes will be tested for straightness by flashing a light from manhole to manhole, lamping or by other suitable means.

3. T. V. Inspection - Internal Televising Inspection of Pipe

(a) 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. Video tapes (VHS) and a written report of all television inspections 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 type and format of the video tape shall be approved by the Village Engineer. The tape shall be high quality and resolution, and the attached report shall indicate all sags, connections, leaks and defects.

(b) Fees and costs connected with such inspections including retelevising shall be at the expense of the developer or owner.

(c) All dips, cracks, leaks, improperly sealed joints, and departures from approved grades and alignment detected by such inspections shall be repaired by the developer or owner.

(d) 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 retested and further inspection made as deemed necessary by the Village Engineer.

4. Infiltration Testing

(a) It is the intent of these Standards to obtain a sanitary sewer system with a minimum amount of infiltration. The maximum allowable infiltration shall not exceed one hundred (100) gallons per inch of diameter of sewer per mile per twenty-four (24) hour day at any time for any section of the system. The manhole and sewer joints shall be tight and any joint with visible leakage or leakage in excess of that specified above, shall be repaired at the developer's expense.

- (b) The repair must be of a permanent nature and of a quality equal to the initial work which was constructed in conformance with the applicable specifications.
- (c) Immediately after backfilling, the entire length of the sewer trench, including stubs, shall be inundated to normal ground water level or eighteen (18) inches above the top of sewer pipe, whichever is higher. Permission for using metered hydrant water must be obtained from the Public Works Department. At that time infiltration tests will be made to determine compliance with the allowable infiltration criteria. To measure the amount of infiltration, the contractor shall furnish, install, and maintain a V-notch crested weir in a metal frame tightly secured at the lower end of each sewer test section as directed by the Village Engineer. The Village Engineer will check the infiltration by measuring the flow over such weirs. When infiltration is demonstrated to be within the allowable limits, the contractor shall remove such weirs only after the MWRDGC has approved the sewer line.

5. Exfiltration Testing

If during the construction of the sewer system, the Village Engineer shall determine that it is impractical to obtain a proper infiltration test or that an alternate test is preferable, then a test for watertightness shall be made by bulkheading the sewer at the manhole at the lower end of the section under test and filling the sewer trench with water to eighteen (18) inches above the top of the sewer in the manhole at the upper end of the section. Leakage will then be the measured amount of water added to maintain the above described level at a maximum allowable exfiltration rate of one hundred (100) gallons per inch of diameter of sewer per mile per twenty-four (24) hour day at any time for any section of the system.

6. Air Testing

In lieu of infiltration or exfiltration testing, the Village Engineer may permit or require air testing in accordance with ASTM C828.

7. Completion of Work

When the work is completed, all surplus material, earth, rubbish, etc., shall be removed from the construction area by the developer or contractor and that portion of the surface of each street disturbed by construction shall be left in as good a condition as it was before commencement of the work. The sanitary sewer work accepted by the Village shall be guaranteed for one (1) year as to items of materials and workmanship. The Village Engineer may require the sanitary sewer to be retelevised after one (1) year, prior to final acceptance.

8. Record Drawings

Prior to acceptance of the sewer, record drawings shall be submitted to the Village. The record drawings shall indicate all manhole and individual service locations, length, slope, and material of all sewers, and shall be certified as to accuracy by an Illinois Registered Professional Engineer or registered surveyor.