
ARTICLE 7: REQUIREMENTS FOR SEWER CONSTRUCTION

Introduction

For the protection of existing and future infrastructure, and in the **interest** of public health, all **qualified sewer construction** in **Cook County** is subject to regulation requiring formal approvals and permitting. Regulating sewer projects promotes minimum design and construction standards, provides a data repository of underground sewer infrastructure, and minimizes the risk to existing public and private infrastructure by requiring research, preparation, and coordination prior to a contractor beginning work.

GENERAL SEWER CONSTRUCTION REQUIREMENTS (§700)

Approximately 125 agencies (**municipalities**, sanitary **districts**, townships, and one utility company) are tributary to the **District's** collection system of interceptor sewers. These agencies are relieved of the responsibility to own and operate a **sewage** treatment plant and benefit from the economy of scale of large, regional **sewage** treatment plants. Older **municipalities** are built upon a **combined sewer** system that conveys domestic **sewage**, **industrial wastes**, and **stormwater runoff** to the **District** collection system. **Municipalities** constructed after 1945 are generally on a **separate sewer** system where one pipe conveys domestic **sewage** and **industrial wastes** with a separate pipe for the collection of **stormwater runoff**. The **District** maintains a **Combined Sewer Atlas** to show what areas it considers to be on a **combined sewer** system and what areas considered to be on a **separate sewer** system.

The **District** has the right to annex property within **Cook County** into the **District** Corporate limits. This is done by an Act of the State Legislature. The **District** also has the right to enter into Sewer Service Agreements with **municipalities** that are within **Cook County** and the **District's** corporate limits and also lie in an adjoining county such as Lake, DuPage, or Will Counties. Areas that are annexed after July 9, 1998 must pay a **Connection Impact Fee** to the **District** for the area to be served.

The **District** follows the design standards for public sewer systems as regulated by Title 35 of the State of Illinois Administrative Code, Subtitle C, Part 370. While the **District** does not regulate plumbing of **buildings** it may ask for plumbing plans to determine where waste flows are originating from and how they are routed through the **building**.

<p>Note: All bold terms contained in this document are defined terms in the WMO. Refer to Appendix A of the WMO or the TGM for the definition of each bold term.</p>

QUALIFIED SEWER CONSTRUCTION (§701)

The **District** collects, treats, and disposes of **sewage** from approximately 95% of the land area of **Cook County**. The suburbs of Chicago Heights, University Park, Park Forest, and the majority of Homewood are tributary to the Thorn Creek Basin Sanitary District (TCBSD); construction and replacement of **sanitary** or **combined sewers** in those communities should be coordinated through TCBSD. Contact information is available on-line at the following website: www.thorncreek.dst.il.us. The far northwest portion of **Cook County** (Barrington and the areas immediately east of it) is also not in the corporate limits of the **District** and **sanitary sewer** construction would be regulated by the appropriate local agency. Most of this area is currently on septic and is not tributary to a **sewage** treatment plant. However, a **Watershed Management Permit** is still needed for **development** in these areas of **Cook County**, even when they are not located within the corporate boundaries of the MWRD or are not tributary to its treatment plants (WMO §200.1) Service laterals for **single-family homes** and multi-family homes less than 3 units within the corporate limits are not regulated by the WMO.

Construction or modification of **storm sewers** in a **combined sewer area** and construction of **storm sewers** in a **separate sewer area** that discharge to a **District** facility are considered **qualified sewer construction** and require a **Watershed Management Permit**. Refer to the **qualified sewer construction** flowchart provided as Figure 7.1 for additional guidance. A permit from the **District** is also required for **development** that impacts **District** property; a flowchart that navigates applicants through **District** impacts is provided as Figure 7.2.

A **Watershed Management Permit** is required for cured-in-place pipe (CIPP) lining of public sewer systems. CIPP lining of private sewer systems is considered **non-qualified sewer construction**. Routine **maintenance** performed on an existing sewer system, public or private, such as grouting, jetting, cleaning, and root cutting is not regulated by the WMO.

QUALIFIED SEWER CONSTRUCTION REQUIREMENTS (§702)

Qualified sewer construction is considered all public and private new sewers and new sewer connections, exterior to the **building envelope**, including sewer repair and sewer replacement. Any construction that is considered **qualified sewer construction** will require a **Watershed Management Permit**. The following summarize the **District's** requirements for **qualified sewer construction**:

A. Single-Family Home

A **service sewer**, also referred to as a lateral, that serves a **single-family home** or two-unit **building** to connect to the public sewer system does not require a **Watershed Management**

Permit from the **District**. However, it does require a **Watershed Management Permit** if the public sewer must be extended to serve that property.

B. Residential Subdivision

A **residential subdivision** of **single-family homes** or townhomes or **multi-family residential** units requires a **Watershed Management Permit**.

C. Multi-Family Residential Sewer

A **development** that consists of a single **building** or **structure** that has more than two individual dwelling units requires a **Watershed Management Permit**.

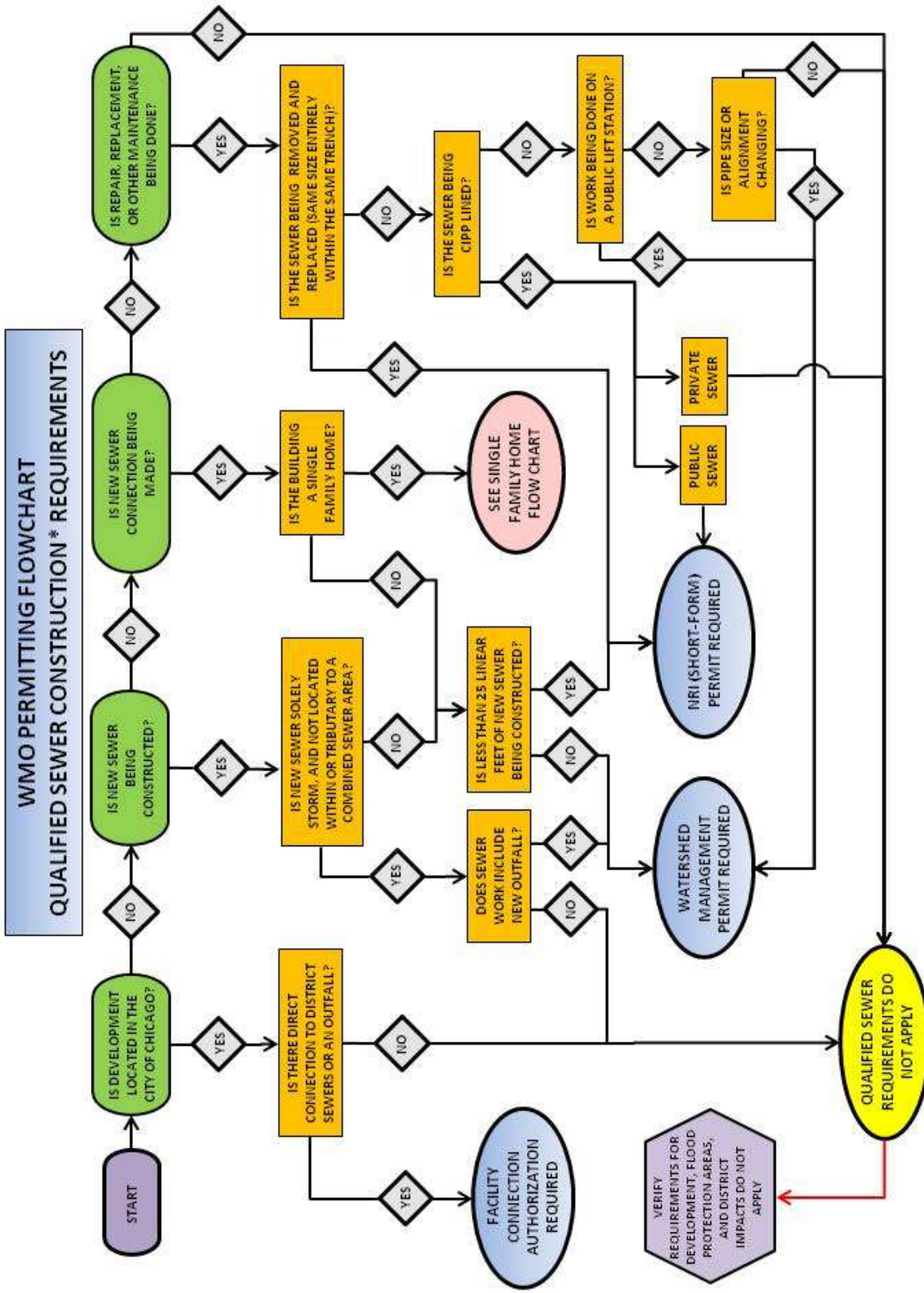
D. Non-Residential Service Sewer

Commercial, recreational, and industrial properties must apply for and receive a **Watershed Management Permit** before they can be constructed and discharge into the public sewer system. All such properties will require an inspection manhole that isolates the **sewage** being discharged from the **building** before it leaves the private property. The inspection manhole should be located at least 5 feet from the perimeter of the **building** and not be in a driveway or traveled area. A manhole into which a force main discharges cannot be considered an inspection manhole.

E. Public Lift Station/Force Main

The following items are required for a proposed lift station:

- Schedule E – Lift Station (Schedule E is only required for publicly owned lift stations serving multiple service areas; an original PE Seal and signature is required on the Schedule E form).
- Details of Construction;
- Service Area Map;
- Hydraulic design calculations;
- Present and future population equivalents (PE);
- Pump System Curves, Characteristic Curves, Operation Point;
- Wet Well Capacity and Detention Time calculations (detention should be between 10 and 30 minutes);
- Buoyancy Calculations for the lift station;
- Lift stations are to be located a minimum of 25 feet horizontally from any water main; and
- New lift stations shall not be located within the **regulatory floodplain** or have access openings and vents below the **Flood Protection Elevation (FPE)**.



* See definition of qualified sewer construction in Appendix A of the WMO.

Figure 7.1. Qualified Sewer Construction Flowchart

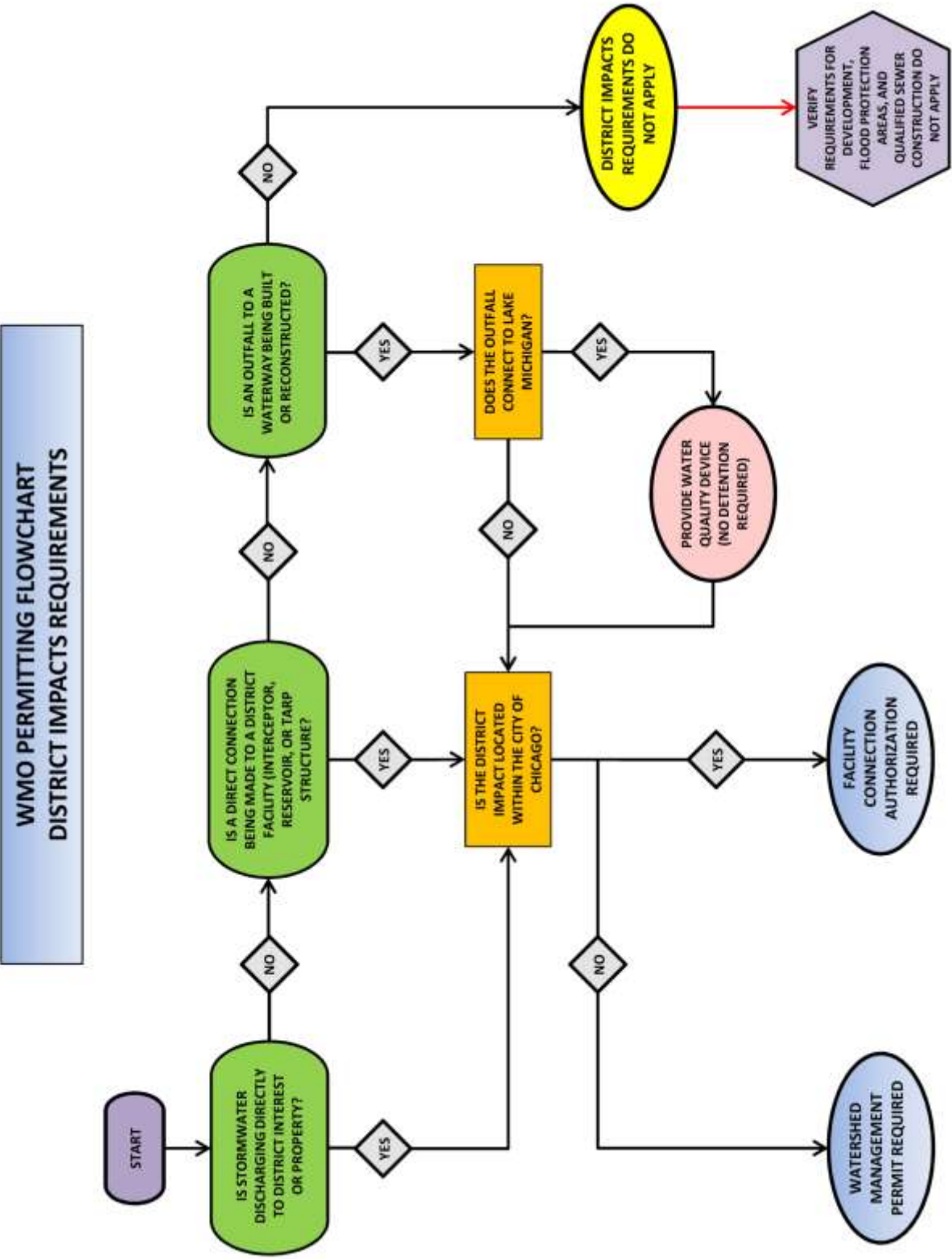


Figure 7.2. District Impacts Flowchart

The following items are required for a proposed force main:

- A plan and profile drawing are required identifying high and low points and point of discharge;
- For a public force main the minimum diameter is four inches or a pipe size that provides a self scouring velocity of 2 feet per second;
- Thrust blocks are required for open cut installations;
- Air relief valves are required on the high points;
- Blow off valves are recommended on the low points;
- Submit calculations addressing items 2, 4, 5, 6 of Schedule E;
- Submit service area map with present and future population equivalents (PE); and
- Submit pump curves and systems curves.

The lift station shall be designed and operated so that only one pump is in operation at a time. The second pump should have the capacity for the service area, and will serve as a backup to be placed in operation only when the first pump is not in operation. Simultaneous operation of both pumps is prohibited. If the pump station has three or more pumps, multiple pumps may operate simultaneously; however, the maximum discharge rate may not be exceeded at any time.

PLC control logic electrical schematic diagrams must be submitted as part of the plan set. The control logic must demonstrate that the pumps cannot be operated simultaneously.

In addition, the applicant must also:

- Verify the size of the force main is not less than 4 inches for public systems;
- Provide wet well size calculations;
- Verify the detention/retention time in the wet well is calculated and provided between 10 and 30 minutes. The cycle time of the pumps should not be more than six times per hour;
- Verify that air relief valves are provided on the high points of the force main;
- Include information or calculations for future growth (PE and pump curves);
- Identify Pump Horsepower and Impeller type and which system curve is applicable;
- Verify that the operating head is not too close to the shutoff head.

If an existing lift station is being replaced, any increase in the pump capacity must be justified, such as by service population increase (and a map showing this must be provided to support this). The **District** does not allow increased pump capacity to accommodate excessive Infiltration and Inflow (I&I) conveyed by **sanitary sewers** upstream of the Lift Station. In addition, force main to force main connections are discouraged.

For private lift stations, the engineer must provide the force main profile and Special Conditions will be attached to the permit. A private lift station serves a sole property even if that property is publicly owned. A separate inspection manhole shall be provided upstream of the wet well for any **non-residential** facilities tributary to the private lift station.

For **stormwater** lift stations, check downstream conditions that may limit or constrict flow such as culverts under a roadway.

F. District Interceptor, TARP and other Direct Connections to District Facilities

- Procure applicable **District record drawings**, design standards, and specifications relevant to the proposed connection.
- Provide a map of the service area for the proposed sewer.
- Provide a detail of the connection to the **District** facility including size, pipe material, details of **District structure**, and proposed **structure**.
- Provide an auxiliary manhole upstream of the proposed connection.
- Before construction commences, provide calculations prepared and sealed by a Structural Engineer licensed in the State of Illinois for excavation support systems that may be required.
- Provide a bypass pumping plan, if required.

G. Outfall Connection

For proposed **outfall** connections, the following must be provided:

- Provide a map of the service area for the proposed **outfall**.
- Provide a natural or mechanical flow-through device (see Lake Michigan Outfall Water Quality Structure Typical Detail).
- Provide a headwall for the **outfall**, a precast flared end Section may be provided for **outfalls** that are 15 inches or less in diameter such as **IDOT Standard 542301**. For larger **outfalls**, a cast in place headwall must be provided – such as **IDOT Standard 542101** – or be part of the permanent dock wall.
- Energy dissipation by the use of a level spreader or rip-rap placement must be provided when discharging at a grade.
- Details of the energy dissipation system must be provided.
- Consider if a backflow prevention device is required when the receiving **waterway** is at **flood** stage. Backflow preventers are required for stormwater detention systems in separate sewer areas with flood control projects and also in combined sewer areas where an open detention pond is proposed.
- Provide WMO Schedule O (see §608 of the WMO for **outfall** requirements).

- Should the **outfall** pierce an existing dock wall, such as a driven sheet pile wall, a detail of the wall penetration must be prepared and sealed by a Structural Engineer licensed in the State of Illinois.
- A Special Condition requiring the **owner** of the **outfall** to obtain a **National Pollutant Discharge Elimination System (NPDES)** permit from the **IEPA** is attached to the permit.

H. Treatment and Pretreatment Facilities (such as Treatment Plants and Oxidation Ponds)

Provide technical data on the operation of the facilities including criteria and calculations, such as the following:

- Process Flow Schematics.
- Provide Schedule G (or **IEPA** Schedule J).
- Provide a flow meter to measure water into the facility.
- Provide a sampling chamber or inspection access where samples of the effluent can be taken.
- Provide a surety bond for the **maintenance** and operation of the facility.

I. Septic Systems

The **District** does not regulate the design, construction, or **maintenance** of septic systems for **sewage** disposal serving a home or **building**. When allowed, the local authority would be the permitting agency for such an installation. In unincorporated **Cook County**, the County's Department of Public Health would regulate and permit such an installation. Septic systems cannot discharge their effluent to a sewer tributary to the **District's** interceptor sewer system.

When disconnection from a septic system and sanitary service connection is made, the existing septic system must be abandoned by pumping out any residual sludge, completely filling the abandoned septic tanks with granular material such as **IDOT** FA 2 or CA 6, and plugging the ends with grout. Alternatively, the septic system could be completely removed. If the existing tank is left in place, the bottom slab should be punctured to allow water to drain out, and the ends plugged with grout. Connections and piping to the new **sanitary sewer** system must be made upstream of the septic tank and must be watertight.

J. Sewer Construction in Floodplain

Provide watertight, bolt down covers on **sanitary** or **combined sewer** manholes that may be inundated during a **flood** condition. This would be considered any area that is less than two feet above the **Base Flood Elevation**, **Flood Protection Elevation**, or the detention system's High Water Level. The **Flood Protection Elevation (FPE)** is defined as the **Base Flood Elevation** plus two feet of freeboard.

FACILITY CONNECTION AUTHORIZATION (§703)

Within the City of Chicago, a **Facility Connection Authorization (FCA)** must be prepared for connections made directly or indirectly to **District** facilities. The **FCA** is signed by an authorized representative of the Department of Water Management. Projects that cross **District** property to reach a **waterway** require an easement from the Law Department's Real Estate Section. The technical details would be the same as listed under subsection **F. District Interceptor, Tarp and other Direct Connections**.

THE SEWER CONSTRUCTION PROCESS

Starting the Project

First, identify where the project is located and which public sewer the **sewage** will discharge to. The **municipality** that owns the public sewer is the "**permittee**." The property **owner** whose **building** or facility is discharging the **sewage** is the "**co-permittee**." There are situations where the **sewage** discharges directly to a **District** interceptor sewer, generally known as a "**Sole Permittee**." There are locations where **sewage** and/or **stormwater** flow through more than one **municipality's** sewer before it reaches the **District** interceptor or the receiving stream. In such cases an additional Page 7 and Page 8 are required indicating that the **municipality** is aware and agrees to the project and certifies that their sewer system has adequate capacity. Information about existing **Sewerage System Permits** that may be helpful can be obtained by forwarding an email to the head of the Local Sewer System Section and requesting that a search of the permit data base for a given location be conducted. If a large number of permits are involved, the applicant will be asked to go the Stickney Field Office and review the permits to determine what is relevant to the project.

Identify if the project is in a **combined sewer area** or a **separate sewer area**. The **District** maintains an atlas that defines the areas considered to have been developed on a **combined sewer** system. Some older **municipalities** have done partial separation by **building storm sewers** for roadway drainage, but those **municipalities** are still considered to be on a **combined sewer** system.

Identify whether the project is residential, commercial, institutional, or industrial. The amount of **sewage** to be generated from the project is calculated by using the chart in the State of **Illinois Recommended Standards for Sewage Works** (Title 35 Part 370), Appendices A and B. It is assumed that, on average, a **person** needs 100 gallons of water per day to bathe, cook, flush the toilet and clean. It is also assumed that whatever water goes into a home or business comes out to the public sewer.

A Population Equivalent (PE) Calculation is required for any **building** connection or public sewer extension. The PE calculation may be written on Schedule C (Page 7) or it can be attached as a worksheet or shown on a drawing. Any time the PE calculation is not written on Schedule C (Page 7), a note should be written below the “PE** __” that indicates where the PE calculation is located (i.e. “See Attachment or See Sheet C1.1”).

Design Flow. Average design flow for **sanitary sewers** shall be 100 gpcpd. Maximum design flow for **sanitary sewer** lines shall be determined by one of the equations indicated below; provided, however, that the maximum design flow for sewer laterals need not exceed 400 gpcpd and the maximum design flow for sewer mains and trunks shall not be less than 250 gpcpd.

Equation 1:
$$Q = \frac{500}{\sqrt{P}}$$

Equation 2:
$$Q = 100 \left(1 + \frac{14}{4 + \sqrt{P}} \right)$$

Where,

Q = Maximum design flow, gallons per capita per day (gpcpd)

P = Population in thousands

The **sanitary sewer** is designed to flow under gravity to the public sewer with adequate slope to maintain a self-scouring velocity of 2 feet per second and with adequate earth cover, not less than 36 inches, to prevent freezing during the winter months.

Table 7-1. Minimum and Maximum Pipe Slopes by Size

Sewer Diameter <i>Inches</i>	Minimum Slope <i>Percent</i>	Maximum Slope <i>Percent</i>
6	1.0	33.0
8	0.40	22.0
10	0.28	15.0
12	0.22	11.0
15	0.15	8.3
16	0.14	7.8
18	0.12	6.5
21	0.10	5.1
24	0.08	4.2

Under special conditions, if detailed justifiable reasons are given, slopes slightly less than those required for the 2 feet per second velocity when flowing full may be permitted. Such decreased slopes will only be considered where the depth of flow will be 30% of the diameter or greater for design average flow. Whenever such decreased slope are selected, the design engineer must furnish with his report his computations of the depth of flow in such pipes at minimum, design average, and design peak rates of flow. It must be recognized that decreased slopes may cause additional sewer **maintenance** expense and special linings or materials should be considered for corrosion protection. A letter from both the **permittee** and **co-permittee** acknowledging the increased **maintenance** due to the decreased slope shall be provided to the **District**.

Design of the Sewer System

The sewer system is laid out in the most efficient alignment possible keeping in mind the presence of other utilities such as potable water, natural gas, **storm sewers**, and electrical and telecommunications cables. The design of the sewer system is laid out concurrently with the grading plan to minimize any cut and fill earthwork the project may require and to ensure adequate earth cover over the **sanitary sewer**. Occasionally there are situations where an outlying **building** or public restroom for a park may be more efficiently served by constructing a grinder pump and a small 2-inch diameter HDPE force main that outlets to the public sewer system than constructing a gravity sewer.

Service Sewer

A **service sewer**, also known as a lateral, is defined as a sewer pipe receiving flow from a single **building**, connecting to a sewer main, and constructed on private property, except for street crossings. The maximum length of a **service sewer** shall not exceed 400 feet or 150 feet if access to a sewer cleaning truck is not available. If the length is exceeded, an intermediate manhole shall be built. Cleanouts may be used only for special conditions and shall not be substituted for manholes nor installed at the end of laterals greater than 150 feet in length. Two consecutive cleanouts in series are not allowed. When the **service sewer** connects to a sewer lateral of a size not larger than the size of the **service sewer**, a manhole shall be built at the point of connection. The minimum slope for a 6-inch diameter service line shall be one percent (1%).

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

In those instances where the **service sewer** is partially constructed from the sewer lateral or main to a point other than the **building** to be served, the pipe shall be tightly plugged using a manufactured plug. The plug shall be pre-wired by the manufacturer so that it can be firmly secured in place.

Combined Sewer Areas

In areas designated as **combined sewer areas** on the **District Combined Sewer Atlas**, the following requirements shall apply:

- a. *Separation.* Complete separation of **storm** and **sanitary sewers** shall be provided within the property lines.
- b. *Down Spouts.* All down-spouts or roof drains shall discharge onto the ground or be connected to the **storm** or **combined sewer**. No down spouts or roof drains shall be connected to the **sanitary sewers**.
- c. *Footing Drains.* Footing drains shall be connected to sump pumps, and discharge shall be made into **storm sewers, combined sewers** or drainage ditches. No footing drains or drainage tile shall be connected to the **sanitary sewer**. After December 31, 1970 all **new construction** shall conform to the requirements of this paragraph. No permit application will be accepted, nor any permits issued after December 31, 1970 to any **municipality** or local government unless said **municipality** or local government shall have adopted an ordinance reflecting the requirements of this paragraph and a copy of said ordinance shall have been filed with the **District**, or that the **permittee** and/or **co-permittee** shall agree to comply with the requirements of this article.
- d. *Floor Drains.* Floor drains in **basements** shall be connected to sump pumps and discharged to the sanitary or **combined sewers**.
- e. *Sump Pumps.* Sump pumps installed to receive and discharge **groundwater** or other **stormwater** shall be connected to the **storm** or **combined sewers** or discharge into a drainage ditch. Sump pumps installed to receive and discharge floor drain flow or other sanitary **sewage** shall be connected to the **sanitary** or **combined sewers**. A sump pump shall be used for one function only, either the discharge of **stormwater** or the discharge of sanitary **sewage**.
- f. *Stormwater Detention.* A backflow preventer is required for all detention basins tributary to **combined sewers**. Required backflow preventers shall be inspected and exercised annually by the property owner to ensure proper operation, and any necessary maintenance shall be performed to ensure functionality. In the event of a sewer surcharge into an open detention basin tributary to **combined sewers**, the **permittee** shall ensure that clean up and wash out of sewage takes place within 48 hours of **the storm event**.

Separate Sewer Areas

In areas served by **separate sewer** systems, the following requirements shall apply:

- a. *Down Spouts.* All down-spouts or roof drains shall discharge onto the ground or be connected to **storm sewer**. No down-spouts or roof drains shall be connected to the **sanitary sewers**.
- b. *Footing Drains.* Footing drains shall be connected to sump pumps, and discharge shall be made into **storm sewers** or drainage ditches. No footing drains or drainage tile shall be connected to the **sanitary sewer**. After December 31, 1970, all **new construction** shall conform to the requirements of this paragraph. No permit application will be accepted, nor any permits issued after December 31, 1970, to any **municipality** or local government unless said **municipality** or local government shall have adopted an ordinance reflecting the requirements of this paragraph and a copy of said ordinance shall have been filed with the **District**, or that the **permittee** and/or **co-permittee** shall agree to comply with the requirements of this article.
- c. *Floor Drains.* Floor drains in **basements** shall be connected to sump pumps and discharged to the **sanitary sewers**.
- d. *Sump Pumps.* Sump pumps installed to receive and discharge **groundwater** or other **stormwater** shall be connected to the **storm sewer** or discharge into a drainage ditch. Sump pumps installed to receive and discharge floor drain flow or other sanitary **sewage** shall be connected to the **sanitary sewers**. A sump pump shall be used for one function only, either the discharge of **stormwater** or the discharge of sanitary **sewage**.
- e. *Completion of **Storm Sewer** System.* The construction of the proposed **storm sewer** system shall be completed before the **sanitary sewer** system is put in service. When compliance with this requirement may cause an undue hardship to the **permittee**, the **permittee** shall notify the **District** and the **District** may waive this requirement if the conditions so warrant.
- f. *Window Well and Area-Way Drains.* No window well or area-way drains shall be connected to the **sanitary sewer**.

Storm Sewers

Storm sewers are usually shallower and on a flatter slope than **sanitary** or **combined sewers**. The **storm sewer** is sized for a particular **storm event** (typically a 10-year **storm event**) and conveys **stormwater** to an outlet. The outlet is usually a **waterway** but there are cases where **stormwater** outlets to a **District** facility. The 100-year **storm event** is usually designed to flow over pavement and ground to a receiving **waterway**. It is important that there shall not be any **structures** in the path of the 100-year storm. An important aspect of **storm sewer** design is the spacing of inlets so the **stormwater** can actually be collected into the **storm sewer** during the rain event. Many **municipalities** have a standard frame and grate that they use based upon their past experience

and the need to maintain inventory for repairs and **maintenance**. Any analysis of the **storm sewer** system inlets should be done with the standard grate that the **municipality** will specify.

Overhead Plumbing

All new **buildings** with **basements**, floors, rooms, or occupancy areas below ground level at the **building site** and served by a public or private sewer system, shall have overhead plumbing. No permit application will be accepted, nor any permits issued to any **municipality** or local government unless said **municipality** or local government shall have adopted an ordinance requiring overhead plumbing, and a copy of said ordinance shall have been filed with the **District**, or that the **permittee** and/or **co-permittee** shall agree to comply with the requirements of this section. A project that is a Sole **Permittee** will have to provide Schedule J, Overhead Plumbing.

Manholes, Drop Manholes

An exterior drop pipe must be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert, as provided in the State of Illinois Title 35, Part 370. The minimum diameter of any manhole shall be 48 inches. A rubber boot conforming to ASTM C-923, shall be provided for all connections between **sanitary sewers** and manholes, for all connections between **combined sewers** and manholes, and for all connections between **storm sewers** and **storm sewer structures** that are tributary to the **District's** collection system. The diameter of the drop pipe shall preferably be larger than, or of the same diameter as, the entering sewer. 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 pipe is desired, design calculations and configurations shall be submitted for review and approval. The drop pipe shall be encased in concrete. The flow channel through manholes shall be made to conform in shape and slope to that of the sewers. A bench shall be provided which shall have a minimum slope of two (2) inches per foot. A drop manhole is required when a **storm sewer** discharges to a **combined sewer** and the change in elevation is 24 inches or more.

Protection of Water Mains

Water mains shall be protected in accordance with the requirements of the State of **Illinois Recommended Standards for Sewage Works** (Title 35 Part 370). Where a water main crosses above a sewer main lateral or **building** service, a minimum vertical separation of 18" shall be provided between the top of the lower pipe and the bottom of the upper pipe. Where the 18" vertical separation is not provided or where the sewer crosses above the water main, the sewer shall be designed and constructed of pipe equal to water pipe such as AWWA C900 or ASTM D-

3139/D-2241 or shall be encased in a steel casing pipe for a minimum distance of 10 feet on each side of the water main. Water mains must be located at least 25 feet from a sanitary lift station.

The **District** does regulate the use of pipe materials for sewers .The table below summarizes the most commonly used pipe materials and their ASTM, ANSI, and AWWA specification. The **District** will consider other pipe materials than those shown below but that material must be proposed to the **District** in writing and given written approval before the **Watershed Management Permit** can be approved.

All sewers tributary to the **District's** facilities are to have a gasketed joint to ensure water tightness. A solvent weld (commonly called a glued) joint is not acceptable to the **District**. If such a joint is provided, it must be encased in a concrete collar. Fused joints for directionally drilled HDPE pipe are acceptable.

Table 7-2. Pipe and Joint Materials

Material	Pipe Specification	Joint Specification
Vitrified Clay Pipe	ASTM C-700	ASTM C-425
Reinforced Concrete Sewer Pipe	ASTM C-76	ASTM C-443
Cast Iron Soil Pipe	ASTM A-74	ASTM C-564
Ductile Iron Pipe	ANSI A21.51	ANSI A21.11
Polyvinyl Chloride (PVC) Pipe 6-inch to 15-inch Diameter SDR 26 18-inch to 27-inch Diameter F/dy=46	ASTM D-3034 ASTM F-679	ASTM D-3212 ASTM D-3212
High Density Polyethylene (HDPE)	ASTM D-3350 ASTM D-3035	ASTM D-3261, F-2620 (Heat Fusion) ASTM D-3212, F-477 (Gasketed)
Water Main Quality PVC 4-inch to 36-inch 4-inch to 12-inch 14-inch to 48-inch	ASTM D-2241 AWWA C900 AWWA C905	ASTM D-2672 OR ASTM D-3139 ASTM D-3212 ASTM D-3212

Workmanship

As a minimum requirement all sewer pipes shall be laid in accordance with the applicable ASTM specification. The specifications for the construction of any sewers within the **District** shall not be less stringent than the latest version of the "Standard Specifications for Water and Sewer Main Construction in Illinois," adopted by a joint committee of the Illinois Society of **Professional**

Engineers, Consulting Engineers Council of Illinois, Illinois Municipal League, and The Associated General Contractors of Illinois. A copy of said specifications is obtainable from the organizations mentioned.

Directionally Bored Sewers

When the proposed sewer is to be constructed by the means of a directional bore, the sewer pipe must have restrained joints, the completed sewer shall have a minimum slope as specified in the table above plus 1% additional slope or greater, and the finished installation must be televised in the presence of the **District** inspector. Before the proposed directional bore sewer is connected to the public sewer system, it shall be air pressure tested, flooded, then drained by gravity and followed by televising for compliance with MWRD requirements covering pipe and joint material. If it fails to meet current requirements, the sewer shall be replaced.

Green Infrastructure

Underdrains in **combined sewer areas** that are tributary to the **District's** collection system must have a fabric filter cloth or sock. The underdrains must be at least 3.5 feet above the seasonal high **groundwater** elevation, which is established through soil borings performed on the **development site**.

Appurtenances

If the project is not solely residential there may be appurtenances that need to be provided. A restaurant or facility that prepares food will usually require a grease interceptor or basin.

An automobile dealership will have a vehicle service area that requires an oil water separator or triple trap to capture spilled oil and a vehicle wash area that will have a grit separator or mud basin to capture grit that is washed off vehicles. Discharge from a grit separator shall not flow through the oil water separator.

A commercial laundromat and apartment complexes with laundry rooms will require a lint trap to collect fibers that are present in the wastewater.

Swimming pools and spas have certain requirements about where backwash must discharge to and where the pool drain may discharge to.

Industrial facilities may have neutralization basins or pH adjustment processes to treat the wastewater before it is discharged into the public sewer.

The design engineer is encouraged to consult with the **District** in a pre-permit meeting to clarify any questions that he or she may have in connection with the permit requirements and to insure adequacy and conformance of the drawings to the intent of the WMO. In all cases which involve

the design of treatment or pre-treatment facilities, direct connection to the **District** interceptors or facilities, and any project involving **industrial waste**, the design engineer should confer with the **District** prior to the preparation of the final plans. The transmittal letter submitting the plans must bear reference to prior consultations, if any.

Specific Requirements By Building Type

The following requirements are specific to certain types of **development**:

- a. *Commercial & Recreational*. Check for whether an inspection manhole has been provided. Inspection manholes cannot be located in the roadway or in a driveway. The flow into the inspection manhole has to be gravity flow not from a force main. The inspection manhole should serve just one property. Verify that when an inspection manhole is provided on the property, approximately 5 feet from the **building**, only sanitary **sewage** flows through the manhole. Do not route **stormwater** through the inspection manhole, only **sewage**.
- b. *Food preparation*. If the grease trap is inside, a detail is not required. If it is outside, a detail is required and must provide cleanouts for **maintenance** both upstream and downstream of the grease trap. Dishwasher discharges must bypass the grease trap.
- c. *Auto service*. Inside/outside, a triple basin is required (provide detail if outside).
- d. *Auto wash*. Inside/outside, a grit trap (mud basin) is required (provide detail if outside).
Note: If the project includes a triple basin and a grit trap (mud basin), verify that the discharge from the grit trap (mud basin) bypasses the triple basin.
- e. *Drainage from Multi-Story Parking Garages With Open Wall Areas*. Floor drains for multi-story parking garages that have open exterior walls where 50% or more of the floor to ceiling space is open must connect to the **storm sewer** system. All stories with less than 50% open exterior wall area must connect to the **sanitary sewer** system and shall have a triple basin before connection to the receiving system. In all cases, if the top story of the garage is open to the sky, that area must be connected to the separate **storm sewer** system within the property, even if the remainder of the **building** is connected to the **sanitary sewer** system as mentioned above.
- f. *Laundry facilities*. Lint trap for laundromats, commercial laundries, and apartment complexes with laundry rooms.
- g. *Swimming Pools*. For indoor swimming pools: filter backwash, deck drains, and main drain must discharge to the **sanitary sewer** system. No filter media shall be discharged into the sewers. If receiving **sanitary sewer** system has insufficient capacity for the main drain discharge, the main drain discharge may be routed to a **storm sewer**. Detailed plumbing plans must be submitted clearly showing the route of the flow of water from the above mentioned pool facilities to their point of discharge to a public sewer system. For outdoor pools: deck drains and main drains connect to the **storm sewer** system. Filter backwash pit discharges to a **sanitary sewer**. Outdoor pools shall be drained into the **storm sewer**

system. A note must be included on the plans that the pool will not be drained earlier than 24 hours following a rainfall.

Coordination with other District Ordinances

The design engineer must comply with the requirements of the **District's Sewage and Waste Control Ordinance**, Environmental Remediation Wastewater Ordinance and any other ordinances that may apply.

The design engineer will identify if the potential exists for **industrial wastes** to be discharged from the **building**. Should **industrial wastes** be produced (food processing, manufacturing, reclaiming of wastes, etc.) the appropriate Schedules F and G must be completed and provided with the **Watershed Management Permit** application. Schedule F is provided when the waste stream from the project is contaminated to the point that pretreatment or a Discharge Authorization from the Monitoring and Research Department (M&R) is required. The discharge of condensate from cooling towers does not require a Schedule F. If treatment or pretreatment facilities, such as neutralizing basins or metal precipitation are part of the project Schedule G must be provided as part of the **Watershed Management Permit** application.

Landfill Leachate and Groundwater. The discharge of landfill leachate (liquids that have percolated through landfill disposal wastes) and **groundwater** into a **sanitary** or **combined sewer** system will require a Discharge Authorization or a Special Discharge Authorization issued by the **District's** Director of Monitoring and Research or his designee, pursuant to the Environmental Remediation Wastewater Ordinance or the **Sewage and Waste Control Ordinance**.

Chemical Toilet Wastes. A permit from the Monitoring and Research Department must be granted. See Chemical Toilet Wastes Disposal Ordinance.

Coordination of **IEPA** Permits: Two (2) signed copies of the **Watershed Management Permit** may be accepted by the **IEPA** in lieu of certification of item 7 of **IEPA** WPC-PS-1.

Submittal of the Watershed Management Permit

Once the design is completed, the **Watershed Management Permit** application is submitted to the **District** for review. An initial Review Letter (RL #1) is generated and sent to the design engineer who responds to the RL #1 in writing. Any remaining deficiencies are summarized in a second Review Letter and sent to the designer who responds to RL #2 in writing. The cycle continues until all the comments are resolved and the **District** issues the **Watershed Management Permit**.

Filling out the **Watershed Management Permit** forms:

- On Schedule B, indicate the sewer length all the way to the face of the **building**. Indicate on Schedule B whether the sewer is a **storm sewer**, **sanitary sewer**, or **combined sewer**. **Combined sewers** are allowed only in a **combined sewer area**. **Storm sewers** and/or underdrains that are not tributary to the **District** interceptor sewer do not have to be shown, unless the **storm sewers** are proposed in a **combined sewer area** and are tributary to a **waterway**, in which case the **storm sewers** must be listed with a note stating that “**storm sewers** are tributary to sewer system that discharges to a **waterway**.”
- If an underground detention vault or pipe system are proposed and are tributary to an MWRD interceptor or to **TARP**, the vault/pipe system should be shown in the table, which would be the length of the detention vault or the overall length of the pipe system.
- Indicate the type of sewer pipe and joints by ASTM standard, this must also be shown on the plan sheets. Sewer size and length of run that are to be lined by CIPP or other methods should be indicated but no inspection fee is to be charged. If **storm sewers** to a **waterway** are to be constructed in a **combined sewer area**, indicate so on Schedule B.
- Schools, public roadways, fire stations, police stations, or parks are considered publicly financed projects. A convention center or athletic facility that generates revenue for the public entity may not be fee exempt.
- Provide a future service area map and provide corresponding PE calculations for a sewer intended to serve future areas.

Designers should cross reference this information with the plans to:

- Check the length, slope, diameter, and material with respect to the sewers proposed on the plans and the total length indicated on the Fee Payment Voucher form.
- Verify separation of **sanitary** and **storm sewers** before the property line in a **combined sewer area**. As tracing the route, the offsite sewer size should not decrease (onsite, **storm sewers** may be used for detention systems).
- Verify that wye connections are made from a smaller pipe to a larger pipe (i.e. a six-inch pipe wyes into an eight-inch pipe). Wye connections cannot be made with the same size pipe; provide a manhole or cleanout instead. Alternate cleanouts with manholes (two cleanouts in a row are not allowed).

Plans. Two copies of the plans no larger in size than 24" x 36" shall be submitted with the permit application. All plans shall show a "North" arrow, and shall be oriented so that the "North" arrow points upward or to the right hand side of the drawing. When the set of drawings submitted contains five or more sheets, an index shall be provided on the title sheet of the set, if any, or on the overall plan. Each sheet shall be designated by a proper title. The index sheet shall bear a date and shall show the name of the project and the name, address, email, and telephone number of the design engineer. When the set of plans contains less than five sheets, and no index is provided, each sheet shall be identified independently and shall show the name of the project, the date, the sheet title, and the name, address, and telephone number of the design engineer. The plans must contain the MWRD General Notes shown below and a routing map of the sewers and how they are tributary to the **District** facility. The plans shall be signed and sealed with original signatures and seals by a licensed **Professional Engineer** in the State of Illinois. If a plan index sheet is provided, that sheet must be signed and sealed.

MWRD General Notes (Sanitary Sewer)

1. The contractor shall take measures to prevent any polluted water, such as ground and surface water, from entering the existing sanitary sewers.
2. A water-tight plug shall be installed in the downstream sewer pipe at the point of sewer connection prior to commencing any sewer construction. The plug shall remain in place until removal is authorized by the municipality and/or MWRD after the sewers have been tested and accepted.
3. Discharging any unpolluted water into the sanitary sewer system for the purpose of sewer flushing of lines for the deflection test shall be prohibited without prior approval from the municipality or MWRD.
4. All sanitary sewer construction shall be in accordance with the *Standard Specifications for Water and Sewer Main Construction in Illinois* (latest edition).
5. All floor drains shall discharge to the sanitary sewer system.
6. All downspouts and footing drains shall discharge to the storm sewer system.

7. All sanitary sewer pipe materials and joints (and storm sewer pipe materials and joints in a combined sewer area) shall conform to the following:

<u>Pipe material</u>	<u>Pipe Specifications</u>	<u>Joint Specifications</u>
Vitrified Clay Pipe	ASTM C-700	ASTM C-425
Reinforced Concrete Sewer Pipe	ASTM C-76	ASTM C-443
Cast Iron Soil Pipe	ASTM A-74	ASTM C-564
Ductile Iron Pipe	ANSI A21.51	ANSI A21.11
Polyvinyl Chloride (PVC) Pipe		
6-inch to 15-inch Diameter SDR 26	ASTM D-3034	ASTM D-3212
18-inch to 27-inch Diameter F/dy=46	ASTM F-679	ASTM D-3212
High Density Polyethylene (HDPE)	ASTM D-3350 ASTM D-3035	ASTM D-3261 or F-2620 (Heat Fusion) ASTM D-3212, F-477 (Gasketed)
Water Main Quality PVC		
4-inch to 36-inch	ASTM D-2241	ASTM D-2672 or ASTM D-3139
4-inch to 12-inch	AWWA C900	ASTM D-3212
14-inch to 48-inch	AWWA C905	ASTM D-3212

8. All sanitary sewer construction (and storm sewer construction in combined sewer areas), requires stone bedding with stone ¼" to 1" in size, with minimum bedding thickness equal to ¼ the outside diameter of the sewer pipe, but not less than four (4) inches nor more than eight (8) inches. Material shall be CA-11 or CA-13 and shall be extended at least 12" above the top of the pipe when using PVC.
9. "Band seal" or similar non-shear flexible-type couplings shall be used in the connection of sewer pipes of dissimilar materials.
10. All manholes shall be provided with bolted, watertight covers. Sanitary lids shall be constructed with a concealed pickhole and watertight gasket with the word "SANITARY" cast into the lid.
11. When connecting to an existing sewer main by other than an existing wye, tee or an existing manhole, one of the following methods shall be used:
- A circular saw-cut of sewer main by proper tools ("shower-tap" machine or similar) and proper installation of hubwye saddle or hub-tee saddle.

- Remove an entire section of the pipe (breaking only the top of one bell) and replace with a wye or tee branch section.
 - With pipe cutter, neatly and accurately cut out desired length of pipe for insertion of proper fitting, using “band seal” or similar couplings to hold it firmly in place.
12. Whenever a sanitary/combined sewer crosses under a watermain, the minimum vertical distance from the top of the sewer to the bottom of the watermain shall be 18 inches. Furthermore, a minimum horizontal distance of 10 feet between sanitary/combined sewers and watermains shall be maintained unless: the sewer is laid in a separate trench, keeping a minimum 18” vertical separation; or the sewer is laid in the same trench with the watermain located at the opposite side on a bench of undisturbed earth, keeping a minimum 18” vertical separation. If either the vertical or horizontal distances described above cannot be maintained, or the sewer crosses above the watermain, the sewer shall be constructed to watermain standards.
 13. All existing septic systems shall be abandoned. Abandoned tanks shall be filled with granular material or removed.
 14. All sanitary manholes, (and storm manholes in combined sewer areas), shall have a minimum inside diameter of 48 inches, and shall be cast in place or pre-cast reinforced concrete.
 15. All sanitary manholes, (and storm manholes in combined sewer areas), shall have precast “rubber boots” that conform to ASTM C-923 for all pipe connections. Precast sections shall consist of modified groove tongue and rubber gasket type joints.
 16. All abandoned sanitary sewers shall be plugged at both ends with at least 2 feet long non-shrink concrete or mortar plug.
 17. Except for foundation/footing drains provided to protect buildings or perforated pipes associated with volume control practices, drain tiles/field tiles/underdrains/perforated pipes are not allowed to be connected to or tributary to combined sewers, sanitary sewers, or storm sewers tributary to combined sewers in combined sewer areas. Construction of new facilities of this type is prohibited; and all existing drain tiles and perforated pipes encountered within the project area shall be plugged or removed, and shall not be connected to combined sewers, sanitary sewers, or storm sewers tributary to combined sewers.
 18. A backflow preventer is required for all detention basins tributary to combined sewers. Required backflow preventers shall be inspected and exercised annually by the property owner to ensure proper operation, and any necessary maintenances shall be performed to ensure functionality. In the event of a sewer surcharge into an open detention basin tributary to combined sewers, the permittee shall ensure that clean up and wash out of sewage takes place within 48 hours of the storm event.

Specifications. When specifications are prepared for the project separate from the plan sheets, submit one (1) copy of the specifications covering or relating to the sewer work, upon request. The specifications shall indicate the name of the project, and the name and address of the design engineer and shall contain a table of contents. The specifications table of content page shall be signed and sealed with original signatures and seals by a licensed Professional Engineer in the State of Illinois.

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Metcalf & Eddy. 1972. Wastewater Engineering: Collection, Treatment, Disposal.

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Standard Specifications for Water & Sewer Construction in Illinois

State of Illinois Administrative Code: *Title 35: Environmental Protection, Subtitle C: Water Pollution Chapter II: Environmental protection Agency Part 370: Illinois Recommended Standards for Sewage Works*.

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