

CHAPTER 17: STORM SEWER STANDARDS

17.00 Introduction

17.01 Administration

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The purpose of this chapter is to provide guidance for the design and construction of storm sewer systems throughout the city and within the 1-1/2 mile extra territorial jurisdiction (ETJ).

17.01 ADMINISTRATION

All storm sewer projects in the City or within the 1-1/2 mile ETJ shall be designed and constructed in compliance with these standards, shall comply with the Erosion Control Standard of Chapter 22, and shall require the submittal of storm sewer plans and calculations with the construction plans for approval by the City Engineer.

17.02 STANDARDS

- A. Referenced Standards:** Specific technical aspects of all storm sewers shall be designed in accordance with this chapter, all other chapters within this manual, and in accordance with, but not limited to, the current versions of the following design standards:
1. IDOT Manual of Policies and Procedures
 2. IDOT Design Manual
 3. IDOT Drainage Manual
 4. IDOT Standard Specifications for Road and Bridge Construction
 5. Standard Specifications for Water & Sewer Main Construction in Illinois
- B. General Storm Sewer Design Standards:** Storm sewer systems are required in all new subdivisions. All lots shall be provided with an approved outlet by a direct connection available to either a storm sewer or a sump pump collection line. The outlet location shall be designed to accommodate the natural drainage of the lot served. Sump pump collection lines shall conform to the design standards found in this chapter.
1. *General Requirements:*
 - a. In non-paved areas, the minimum cover from the top of the pipe to the finished grade shall be 2 ft.
 - b. In paved areas, minimum cover from the bottom of the pavement to the top of the pipe shall be 1 ft. Minimum cover for stabilized subgrade may be reduced to 6 in.
 - c. No curved alignments shall be allowed. Manholes or inlets shall be provided at all changes in direction.
 - d. Minimum separation between utilities shall conform to Chapter 15 of this Manual.
 - e. All easements shall conform to Chapter 15 of this Manual.
 - f. Minimum public storm sewer (excluding underdrains) size shall be 12-in. diameter.

- d. Inflow and outflow pipes shall be constructed with end sections or headwalls.

C. Casting / Frame and Grates:

1. *Heavy Duty Castings:* Storm inlet and manhole castings located in the right-of-way and in areas subject to vehicular traffic shall be heavy duty and meet or exceed the specifications provided below. The following applications are referenced by Neenah Foundation Catalog Number, 12th edition. Similar casting provided by another manufacturer may be acceptable and are subject to approval by the City Engineer.

Casting Location	Neenah Casting ¹ Number	IDOT Standard
Barrier Curb ²	R-3278-A	Type 3, 604006
Driveway or Sidewalk Conflict	R-3508-A2	Type 10, 604046
Barrier Curb, High Runoff Volume ²	R-3278-AL	Type 3, 604011
Backyard or Area Drains	R-4340-B	Type 8, 604036
Ditch Grates	R-4341-A	
Storm Manholes/Inlets	R-1712-C	Type 1, 604001

¹ Or an approved equivalent.

² Provide open curb box

2. *Pavement Castings:* Castings located within a paved area shall be set in a full bed of mortar and sealed completely around the outside with concrete.
3. *Yard / Parkway Castings:* Castings located outside a paved area shall be set in a full bed of mastic and shall be constructed with an external chimney seal.
4. *Constructed Elevation:* Castings located in unpaved areas that are designed to accept storm water flows shall be constructed with the top of the casting 1 in. below the adjacent ground surface. All other castings located in unpaved areas that are not designed to accept storm water flows shall be constructed with the top of the casting 1 in. above the adjacent ground surface. The frame and grate will be constructed to the plan elevation in accordance with Standard Specification for Road and Bridge Construction. A maximum of 8 in. of adjusting rings shall be allowed.

- D. Major System Design:** The Major System is that system that is designed to accommodate storm water flows in excess of the 10-year design frequency. This system may include swales, pavements, detention basins, overflows, large diameter pipes, channels and ditches within or adjacent to the development. See Chapters 19, 20, and 23 of this Manual for the design of the Major System components.

E. Manholes:

1. All manholes shall conform to IDOT standards for a Type A manhole.
2. Manholes shall be installed at the end of each storm sewer line, at all changes in grade or alignment, at all storm sewer intersections, and at distances not to

exceed 400 ft. Greater spacing may be permitted in storm sewers larger than 48 in. diameter.

3. Minimum drop between influent and effluent pipes in a manhole, if there is no change in pipe diameter, shall be 0.1 ft. and the desirable maximum drop shall be 24 in.
4. When the influent and effluent pipes differ in diameter, no hydraulic losses should be allowed. In manholes where pipe sizes change, the hydraulic grade lines shall be matched by setting the larger effluent pipe invert at $0.8(d_{\text{eff}} - d_{\text{inf}})$ below the influent pipe invert. An example of calculating the drop across a manhole with a 24 in. outlet (effluent) and a 12 in. inlet (influent) is calculated by the following method:

Outlet pipe diameter (in feet) – inlet pipe diameter (in feet) = elevation difference in feet (2.0 ft.-1.0 ft.=1.0 ft.). Then the elevation difference times 0.8 (1.0 ft. x 0.8 = 0.8 ft.).

The outlet pipe invert is lowered a minimum of 0.8 ft. below the inlet pipe invert.

5. No steps shall be allowed in manholes.
6. Connections to Existing Manholes - New connections made to any existing manhole shall be angled in the direction of flow, and shall be accomplished by core drilling through the wall of the manhole and installing an appropriately sized connector boot, such as *KOR n SEAL®* by NPC Inc., or approved equal.

F. Inlets:

1. All inlets shall conform to IDOT standards for Type A and B inlets. Concrete inverts shall be required for all inlets.
2. Sufficient inlets for local streets shall be provided at all low points and at a maximum spacing of 600 ft. on a continuance pavement grade. Inlet capacity shall be designed in accordance with the IDOT Design Manual. Maximum water depth at all low points shall not exceed 6 in. before discharging into the Major System.
3. Inlet locations for collectors and arterial streets shall be designed in accordance with the IDOT Design Manual. The maximum encroachment of storm water on collector and arterial streets shall be 10 ft. (measured from the back of curb). Maximum water depth at all low points shall not exceed 6 in. before discharging into the Major System. The strictest interpretation of the encroachment limit shall apply.
4. Because of the possibility in sag locations of debris clogging the grates / inlets on collector and arterial streets, as per the IDOT Drainage Manual, a clear opening or perimeter at least twice that required by the capacity equations shall be used.

G. Endsections:

1. All end sections shall be provided with protective grates.
2. All end sections shall be permanently protected from erosion by use of grouted riprap, revetment mat or other methods as approved by the City Engineer.

- H. **Headwalls:** All headwalls shall be designed and constructed in accordance with IDOT standards.

- I. **Storm Sewer Pump Station:**
(RESERVED)