

## ARTICLE IV - STORM SEWER SYSTEMS

### SECTION A - STORM SEWERS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. This section describes the materials and installation required for storm sewer piping systems.
- B. This section is to be used only when non-watertight joints will be allowed. Hydrostatic or air testing will not be required for storm sewers unless excessive leakage is suspected.
- C. This specification covers the following types of materials for storm sewers:
  - 1. Reinforced Concrete Pipe and Fittings
  - 2. Polyvinyl Chloride Pipe (PVC)
  - 3. Corrugated Metal Pipe
  - 4. Perforated Underdrain Pipe

##### 1.02 PIPE IDENTIFICATION

- A. Each length of pipe shall bear the name of the manufacturer, location of the plant, and the date of manufacture. Each length shall likewise be marked to designate the class or strength of the pipe. The marking shall be made on the exterior or interior of the pipe barrel near the end and shall be plainly visible.

#### PART 2 - PRODUCTS

##### 2.01 REINFORCED CONCRETE PIPE AND FITTINGS

- A. All concrete pipe shall conform to ASTM C76, "Reinforced Concrete Culvert Storm Drain and Sewer Pipe".
- B. All concrete pipe shall be Class III, wall B unless otherwise approved by the City.
- C. All reinforced concrete pipe joints shall be spigot groove type joint with O-ring gasket conforming the ASTM C443 "Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets".

- D. Precast reinforced concrete end sections shall be in accordance with the cited specifications to the extent which they comply. End sections shall be sized to match the pipe.

## 2.02 POLYVINYL CHLORIDE PIPE (PVC)

### A. PVC Pipe 4" through 15" in diameter.

- 1. All PVC Pipe 4" through 15" in diameter shall conform to ASTM D1784, "Rigid Poly (Vinyl Chloride) and Chlorinated Poly (Vinyl Chloride) Compounds" and either:
  - a. ASTM F794, "Poly (Vinyl Chloride) (PVC) Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter",
  - b. ASTM F949, "Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings", or
  - c. ASTM D3034, "Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings".
- 2. PVC sewer pipe shall be SDR 35 with cell classification of 12454-B or 12354-C.
- 3. Pipe joints shall be push-on type conforming with ASTM D3212 "Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals".

### B. PVC pipe 18" through 48" in diameter.

- 1. All PVC pipe 18" through 48" in diameter shall conform to ASTM D1784, "Rigid Poly (Vinyl Chloride) and Chlorinated Poly (Vinyl Chloride) Compounds" and either:
  - a. ASTM F794, "Poly (Vinyl Chloride) (PVC) Ribbed Gravity Sewer Pipe and Fittings based on Controlled inside Diameter",
  - b. ASTM F949, "Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings", or
  - c. ASTM F679, "Poly Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings", for sizes 18" to 27" only.
- 2. Pipe shall be made from PVC compounds with a minimum cell classification of 12364A.
- 3. Pipe joints shall be push-on type conforming with ASTM D-3212.

- C. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe.

#### 2.03 CORRUGATED METAL PIPE (CMP)

- A. Corrugated Metal Pipe shall be aluminum-zinc-coated steel manufactured in accordance with ASTM A806 "Aluminum-Zinc-Coated Steel Sheet (by Hot-Dip Process) for Storm Sewer/Drainage Pipe".
- B. When required by the Drawings, bituminous coating for corrugated steel pipe shall meet the requirements of ASTM A849 "Post-Coated (Bituminous) Corrugated Steel Sewer and Drainage Pipe".
- C. End sections for CMP sewers or culverts shall be of the same material as the pipe. End sections and coupling bands shall be suitable for the pipe size specified. Band couplers shall have corrugations that mesh with the corrugations of the pipe.
- D. Fittings such as stub-tee connections or saddles shall be shop fabricated.

#### 2.04 PERFORATED UNDERDRAIN PIPE:

- A. Perforated underdrain pipe shall corrugated polyethylene tubing manufactured in accordance with ASTM F405 or ASTM F667 (10" to 15" only).
- B. Underdrain piping shall be bedded with gravel or selected bedding material as shown and required by the details included herein.

### PART 3 - EXECUTION

#### 3.01 GENERAL CONSTRUCTION REQUIREMENTS:

- A. Before installing piping, the Contractor shall carefully verify location depth type of joint needed and size of pipe to which connection is proposed. Contractor shall assure that the lines can be run as contemplated without interfering with footings, walls, other piping, fixtures, etc.
- B. All lengths of pipe shall be dimensioned accurately to measurements established at the site and shall be worked into place without springing or forcing. Cut sections of pipe shall be reamed to remove all burrs.

- C. Utmost care shall be exercised in transporting and handling all pipe, fittings, valves, etc., in order to avoid shock and damage to pipe and coatings. Lifting shall be by joist or skids when hand lifting is not feasible. Dropping of the pipe will not be permitted. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground. Damaged or defective pipe and appurtenances shall be replaced.
- D. The pipe shall be thoroughly cleaned before being laid and kept clean during construction.
- E. The Contractor shall cut all pipe and drill all holes that may be necessary.
- F. Pipe trenching and backfill shall be performed in accordance with Article I - Section C.

## **SECTION B - INLETS AND CATCH BASINS**

### **PART 1 - GENERAL**

- 1.01 **DESCRIPTION:** The work of this section shall include the manufacturing and installation of precast concrete storm sewer inlets and catch basins as detailed and specified herein.
- 1.02 **DELIVERY, STORAGE AND HANDLING:** Precast concrete structures shall be delivered to the site complete and in structurally sound condition. The Contractor shall take proper care in moving the structures to prevent cracking, breaking or otherwise damaging the structure.

### **PART 2 - PRODUCTS**

- 2.01 **GENERAL:** All precast concrete structures to be used on the project shall be structurally sound and free of defects. Any spalled concrete or voids shall be properly repaired using equivalent strength grout and properly cured before placement. Structures showing excessive cracking of damage should be rejected and shall be replaced at the discretion of the City.
- 2.02 **CONCRETE STRENGTH:** All concrete used in the production of precast inlets and catch basins shall have a minimum compressive strength of 4,000 psi at 28 days.
- 2.03 **INLETS AND CATCH BASINS:**
  - A. All precast inlets and catch basins shall be manufactured in accordance with ASTM C478 and the Indiana Department of Transportation (IDOT) "Standard Specifications".

- B. Reinforced concrete pipe used as inlets or catch basins shall meet the requirements for concrete storm sewer pipe specified in Section A, paragraph 2.01 above.
- C. Where practical, inlets and catch basins shall be of standard size and dimensions as identified by the IDOT standards.

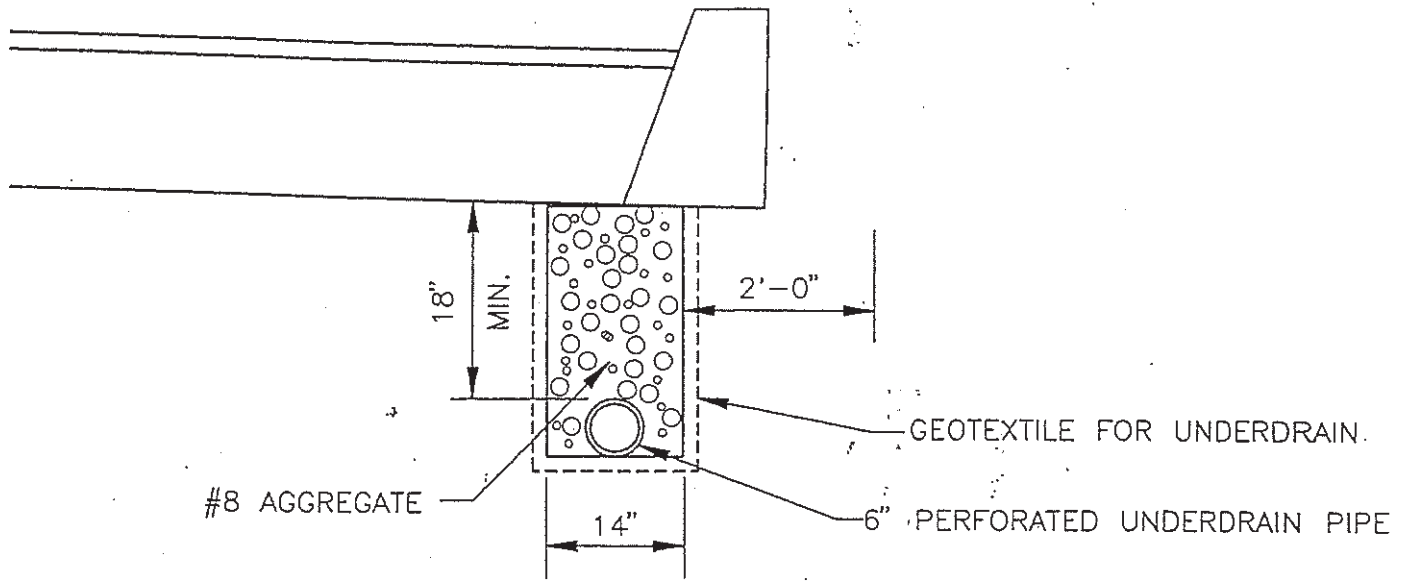
#### 2.04 CASTINGS:

- A. Castings for inlets and catch basin shall be made of either gray or ductile iron. Metal used in the manufacture of castings shall conform to ASTM A48 Class 35B for gray iron or ASTM A536 Grade 65-45-12 for ductile iron.
- B. Castings shall be of uniform quality, free from blowholes, shrinkage, distortion or other defects.
- C. Castings placed in roadways, drives, or other locations subject to vehicular traffic shall be heavy duty type, suitable for the applicable loadings.
- D. Castings shall be as manufactured by Neenah Foundry Company, East Jordan Iron Works or equal.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

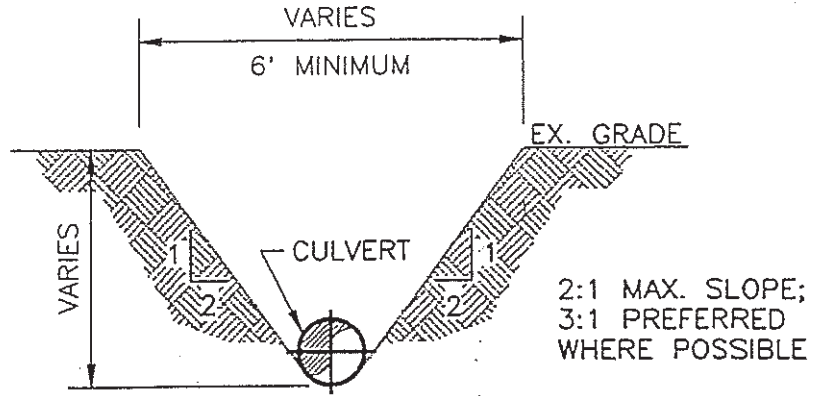
- A. Storm sewer inlets and catch basins shall be of the size and type shown on the plans and as detailed herein. Structures shall be installed level and true to grade.
- B. Excavation and backfill for inlets and catch basins shall be in accordance with Article I, Section B. All structures shall be placed on a leveling surface consisting of a minimum of 4" of stone or "B" borrow.
- C. Where structures are placed in pavement areas or areas which may be paved in the future, the height of the casting shall be determined by the depth of pavement.
- D. Inlet and outlet pipes shall extend through the structure walls a sufficient distance to allow for connections to the storm sewer system. Pipes shall be flush with the interior wall face and mortared into place so as to prevent leakage around their outlet surfaces.



NOTE: UNDERDRAINS SHALL BE INSTALLED UNDER BOTH SIDES OF PAVEMENT.

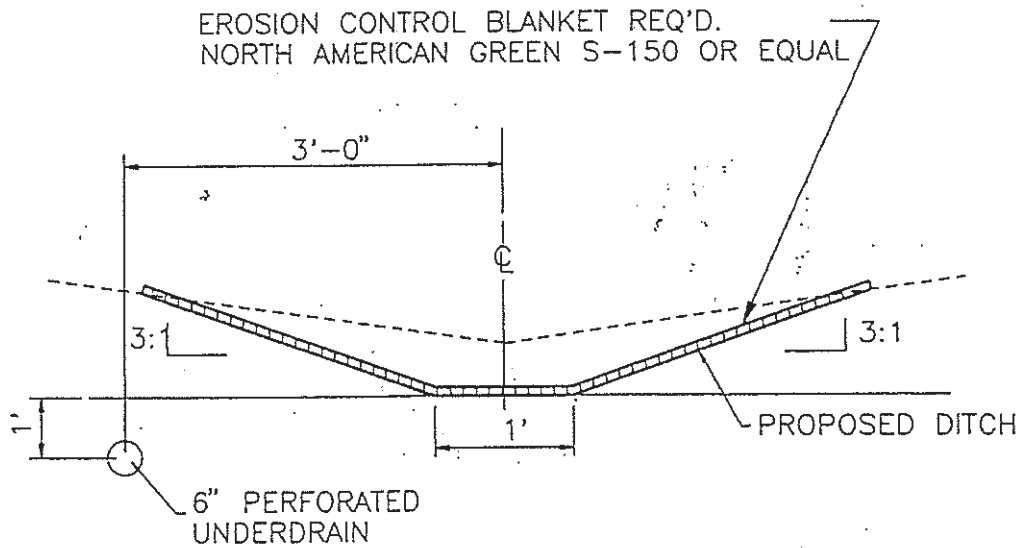
## UNDERDRAIN BEDDING DETAILS

City of Madison  
Figure IV-1



NOTE: MULCHED SEEDING REQUIRED ON SLOPES & OTHER DISTURBED AREAS

V-DITCH DETAIL



FLAT BOTTOM DITCH DETAIL

DRAINAGE DITCH DETAILS