

SUBDRAINS AND FOOTING DRAIN COLLECTORS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Subdrains
- B. Subdrain Cleanouts and Outlets
- C. Footing Drain Collectors
- D. Storm Sewer Service and Connections

1.02 DESCRIPTION OF WORK

- A. Construct subdrains, subdrain cleanouts and outlets, and footing drain collectors.
- B. Construct storm sewer service and connections.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT**A. Subdrains:**

1. **Measurement:** Each type and size of pipe installed will be measured in linear feet from end of pipe to end of pipe along the centerline of pipe, exclusive of outlets. Lengths of elbows and tees will be included in length of pipe measured.
2. **Payment:** Payment will be made at the unit price of each type and size of pipe.
3. **Includes:** Unit price includes, but is not limited to, trench excavation, furnishing and placing bedding and backfill material, engineering fabric (when specified), connectors, and elbows and tees.

1.08 MEASUREMENT AND PAYMENT (Continued)**B. Footing Drain Collectors:**

1. **Measurement:** Each type and size of pipe will be measured in linear feet along centerline of pipe from end of pipe to end of pipe.
2. **Payment:** Payment will be made at the unit price for each type and size of pipe.
3. **Includes:** Unit price includes, but is not limited to, trench excavation, pipe, wyes, tap, fittings, and furnishing and placing bedding and backfill material.

C. Subdrain or Footing Drain Cleanouts:

1. **Measurement:** Each type and size of subdrain or footing drain cleanout will be counted.
2. **Payment:** Payment for each cleanout will be made at the unit price for each type and size of subdrain or footing drain cleanout.

D. Subdrain or Footing Drain Outlets and Connections:

1. **Measurement:** Each type and size of outlet or connection to a structure will be counted.
2. **Payment:** Payment for each outlet or connection to a structure will be made at the unit price for each type and size installed.
3. **Includes:** Unit price includes, but is not limited to, pipe, non-shrink grout, coupling bands, and rodent guards for pipes 6 inches or smaller.

E. Storm Sewer Service Stub: The storm sewer service stub is the portion of the storm sewer service from the footing drain collector or storm sewer to a point 10 feet outside of the right-of-way or as specified in the contract documents.

1. **Measurement:** Each type and size of pipe will be measured in linear feet along centerline of pipe from the centerline of storm sewer or footing drain collector to 10 feet outside of the right-of-way.
2. **Payment:** Payment will be made at the unit price per linear foot for each type and size of storm sewer service stub.
3. **Includes:** Unit price includes, but is not limited to, trench excavation, furnishing bedding material, placing bedding and backfill material, tap, fittings, and plugs.

PART 2 - PRODUCTS**2.01 FOOTING DRAIN COLLECTORS****A. Polyvinyl Chloride Pipe and Fittings (Solid Wall PVC):**

1. Comply with ASTM D 3034, minimum thickness SDR 35, 46 psi minimum pipe stiffness.
2. Use PVC plastic conforming to ASTM D 1784, Cell Classification 12454.
3. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.

B. Corrugated Polyvinyl Chloride Pipe and Fittings (Corrugated PVC):

1. Use corrugated exterior, smooth interior, PVC.
2. Comply with ASTM F 949, minimum pipe stiffness, 46 psi.
3. Use PVC plastic complying with ASTM D 1784, Cell Classification 12454.
4. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.

C. High Density Polyethylene Pipe and Fittings (HDPE):

1. AASHTO M 252 or M 294, Type S corrugated exterior and smooth interior.
2. Integral bell and spigot joints with O-ring rubber gasket meeting ASTM F 477.

D. Reinforced Concrete Pipe (RCP): Comply with Section 4020, 2.01.**2.02 TYPE 1 SUBDRAINS (LONGITUDINAL SUBDRAIN)****A. Polyvinyl Chloride Pipe and Fittings (Solid Wall PVC):**

1. Comply with Section 4040, 2.01, A.
2. Slot subdrain pipe according to ASTM F 949 or perforate with four rows of 1/4 inch to 3/8 inch diameter holes along the bottom of the pipe.

B. Corrugated Polyvinyl Chloride Pipe and Fittings (Corrugated PVC):

1. Comply with Section 4040, 2.01, B.
2. Slot subdrain pipe according to ASTM F 949.

C. High Density Polyethylene Pipe and Fittings (HDPE):

1. Comply with Section 4040, 2.01, C.
2. Slot or perforate according to AASHTO M 252, Type SP.

2.02 TYPE 1 SUBDRAINS (LONGITUDINAL SUBDRAIN) (Continued)**D. Corrugated Polyethylene Tubing and Fittings (Corrugated PE):**

1. Comply with AASHTO M 252, Type C, corrugated interior and exterior.
2. Use only fittings supplied or recommended by pipe manufacturer for soil tight service.
3. Slot or perforate according to AASHTO M 252, Type CP.

2.03 TYPE 2 SUBDRAINS (COMBINATION SUBDRAIN/FOOTING DRAIN COLLECTOR)

- A. Use materials complying with Section 4040, 2.01.
- B. Perforate all pipe per the following requirements:
 1. Solid Wall PVC Pipe: Comply with ASTM F 949 or perforate with four rows of 1/4 inch to 3/8 inch diameter holes along the bottom of the pipe.
 2. Corrugated PVC Pipe: Comply with ASTM F 949.
 3. HDPE Pipe: Comply with AASHTO M 252 or M 294, Type CP or Type SP.

2.04 POROUS BACKFILL MATERIAL

- A. **Crushed Stone or Processed Gravel:** Comply with Iowa DOT Article 4109.02, Gradation No. 29 in the Aggregate Gradation Table and the quality requirements of Iowa DOT Section 4131.
- B. **Pea Gravel:** Comply with Iowa DOT Article 4109.02, Gradation No. 20 or No. 21 in the Aggregate Gradation Table and the quality requirements of Iowa DOT Section 4131.

2.05 SUBDRAIN OUTLETS**A. Corrugated Metal Pipe (CMP):**

1. Comply with AASHTO M 36, Type 1.
2. Zinc coating complying with AASHTO M 218.
3. Use a corrugated steel circular section with annular or helical corrugation.
4. Minimum thickness of 0.052 inch.

B. Corrugated HDPE:

1. Comply with Section 4040, 2.01.
2. Pipe to be double-walled.

C. PVC: Comply with Section 4040, 2.01.**D. Coupling Bands:** Match annular or helical corrugations on coupling bands to pipe ends.**E. Rodent Guard:** Mild steel meeting ASTM A 36 with hot-dip galvanized coating applied following welding and fabrication. Comply with Iowa DOT Materials I.M. 443.01 and Figure 4040.233. Required for 4 inch or 6 inch subdrains.

2.06 SUBDRAIN OR FOOTING DRAIN CLEANOUTS**A. Type A-1 or A-2 Cleanouts:**

1. Use solid wall PVC riser pipe and fittings of the same diameter (maximum 8 inch) as the adjacent subdrain or footing drain pipe. Comply with Figure 4040.232.
2. Use a light duty (HS-20 loading) cast iron casting for Type A-1 cleanouts. When a PVC cap is used on top of the cleanout, drive a 1 foot length of reinforcing steel into the ground immediately adjacent to the cleanout to allow future location.

B. Type B Cleanouts: Comply with Figure 4040.232. Use 24 inch diameter riser for subdrain 8 inches or smaller. Use 30 inch diameter riser for 10 inch and 12 inch subdrains.

1. **Reinforced Concrete:** Use Class III RCP complying with Section 4020, 2.01.
2. **Polyvinyl Chloride:**
 - a. Comply with ASTM D 1784, Cell Classification 12454 for PVC plastic.
 - b. Conform to ASTM D 3212 for joints.
 - c. Comply with ASTM F 477 for flexible elastomeric.
3. **Concrete:** Comply with Section 6010 for structural concrete for base and invert shaping.
4. **Castings:** Use a light duty (HS-20 loading) cast iron casting complying with Section 6010, 2.10 or a ductile iron casting meeting ASTM A 536.

2.07 ENGINEERING FABRIC

Use fabric complying with Iowa DOT Article 4196.01.

2.08 STORM SEWER SERVICE STUBS

Use materials complying with Section 4040, 2.01.

PART 3 - EXECUTION**3.01 SUBDRAINS**

- A. Install Type 1 or Type 2 subdrain where specified in the contract documents. Comply with Figure 4040.231.
 - 1. Excavate trench and provide pipe bedding and backfill as shown on the figures. Install engineering fabric if specified in the contract documents.
 - 2. Begin subdrain installation at the outlet and continue upgrade.
 - 3. Lay subdrain pipe to the proper line and grade. Place pipe with the perforations down.
 - 4. If concrete pipe is specified for Type 2 subdrains, wrap exterior of each joint with engineering fabric and do not use joint sealant.
 - 5. Place porous backfill material over installed pipe in layers no more than 6 inches thick. Thoroughly tamp each layer with mechanical tampers.
 - 6. Restore pavement subbase material, shoulder material, or ground above subdrain trench as applicable.
- B. Provide cleanouts where specified in the contract documents. Comply with Figure 4040.232.
- C. Provide outlets where specified in the contract documents.
 - 1. Comply with Figure 4040.233 for outlets to structures.
 - 2. Install a rodent guard on all subdrain outlet pipes 6 inches and smaller.

3.02 FOOTING DRAIN COLLECTORS

- A. Install footing drain collectors according to Section 3010.
- B. If specified, install engineering fabric.
- C. Provide cleanouts and connections where specified in the contract documents.
 - 1. Connect footing drain sewer collectors to storm sewer manhole or intake.
 - 2. Provide fabricated or preformed wye or tee service fitting for each platted lot or building.
- D. Provide manholes, where specified, according to Section 6010.

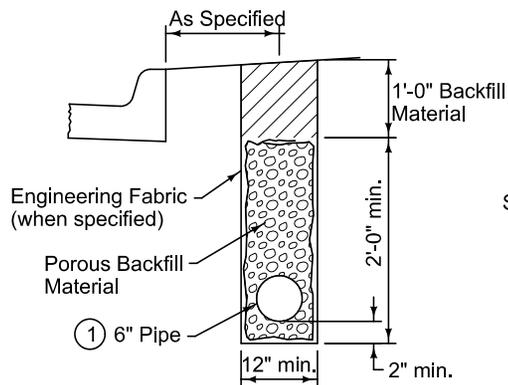
3.03 FOOTING DRAIN SERVICE STUBS

- A. Provide footing drain service stubs at locations specified in the contract documents.
- B. Install wye or tee for each service connection.
 - 1. For new storm sewer and footing drain collector construction, except RCP sewers, install wye or tee fittings according to the manufacturer's requirements.
 - 2. For existing storm sewers, existing footing drain collectors, and all RCP sewers, saw or drill a neat hole in main and install preformed saddle wyes or tees according to the manufacturer's requirements.

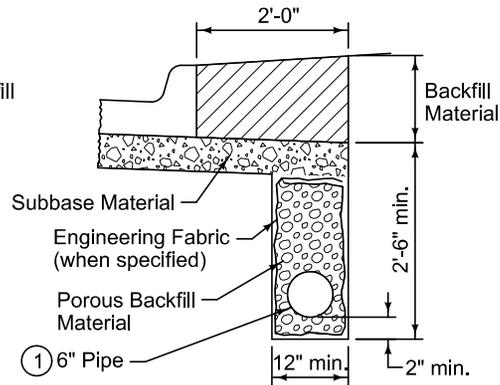
3.03 FOOTING DRAIN SERVICE STUBS (Continued)

- C. Install footing drain service stub to a location 10 feet beyond the right-of-way line or as specified in the contract documents.
 - 1. For undeveloped properties, place a watertight stopper or plug in the end of the storm sewer service.
 - 2. For reconnection of existing service pipe to new sewer service pipe, use a manufactured flexible connection.

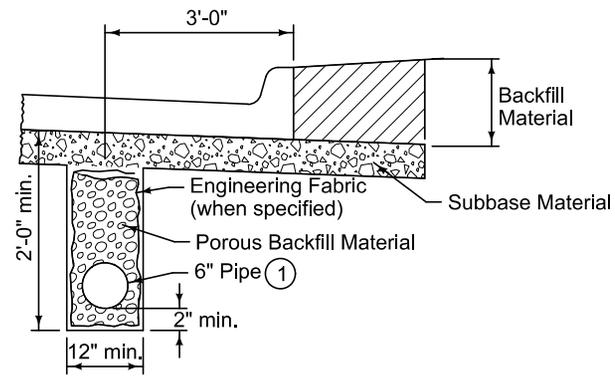
END OF SECTION



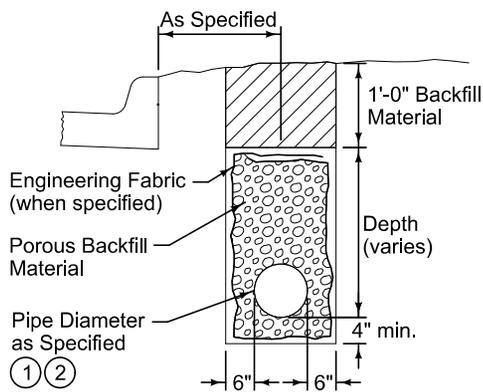
CASE A
TYPE 1



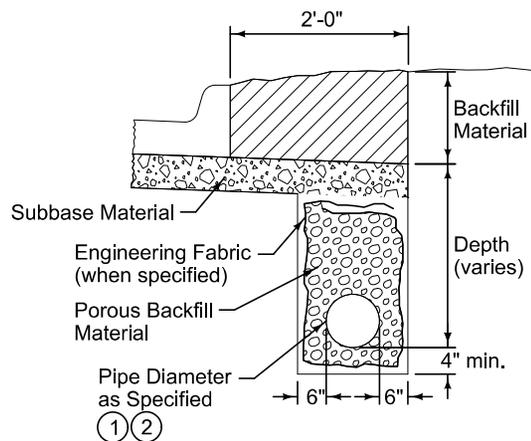
CASE B
TYPE 1



CASE C
TYPE 1



CASE D
TYPE 2

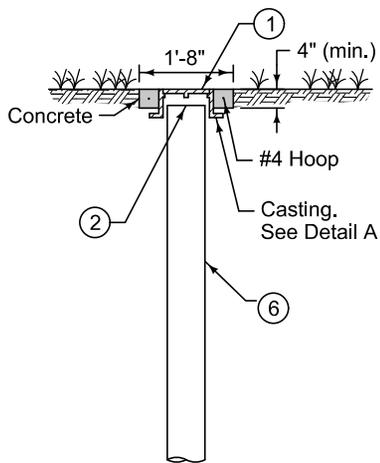


CASE E
TYPE 2

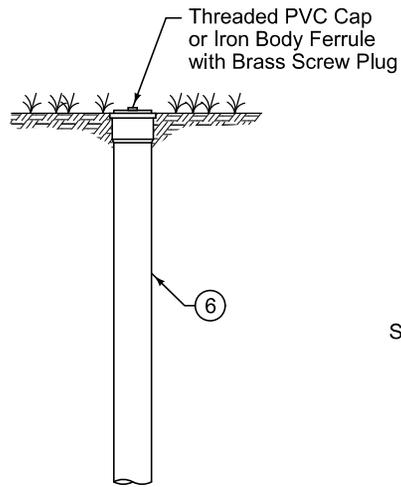
Type 1 installation is for longitudinal subdrain only. Type 2 installation is for combination subdrain/footing drain collectors.

- ① Place perforations down for all installations.
- ② When concrete pipe is specified, wrap pipe joints with engineering fabric. Do not apply joint sealant. Comply with Figure 4020.211

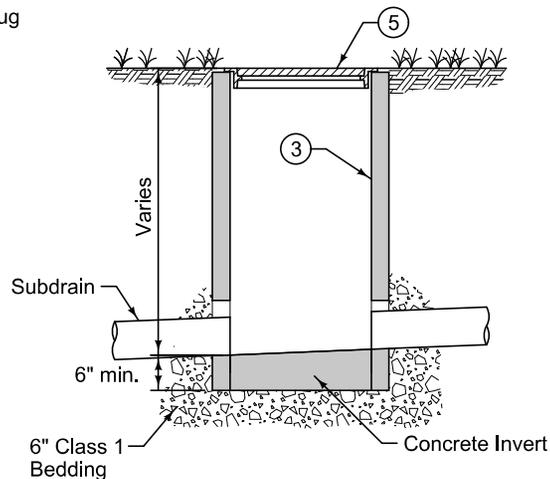
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SUBDRAINS		



TYPE A-1 CLEANOUT

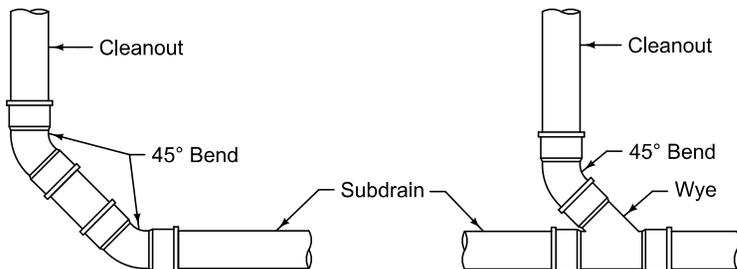


TYPE A-2 CLEANOUT
(Non-traffic areas only)

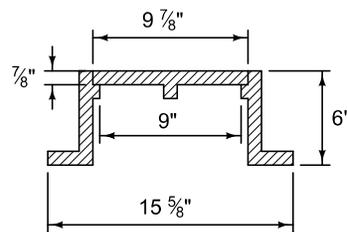


TYPE B CLEANOUT
(Non-traffic areas only)

- ① Light duty casting. Label lid with "Storm" or "Storm C.O."
- ② Do not allow casting to bear on top of riser pipe; provide 2 inch clearance, minimum.
- ③ A manufactured cleanout may be used in lieu of a Type B cleanout, if approved by the Engineer.
- ④ Design is intended for use in conjunction with 8 inch PVC riser pipe. Other sized caps may be used with smaller pipe, as approved by the Engineer.
- ⑤ Provide Type G casting, as required to fit pipe size.
- ⑥ PVC riser pipe; match diameter of subdrain (8 inches maximum).



TYPE A CLEANOUT CONNECTIONS

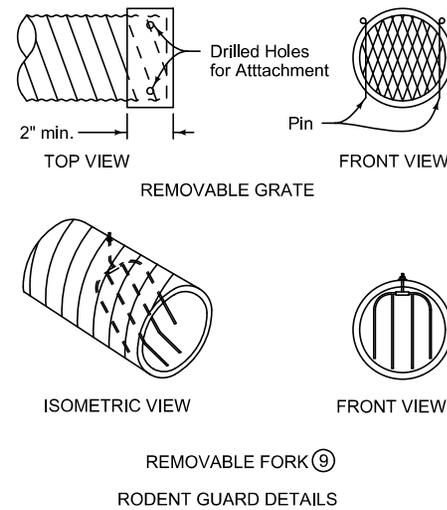
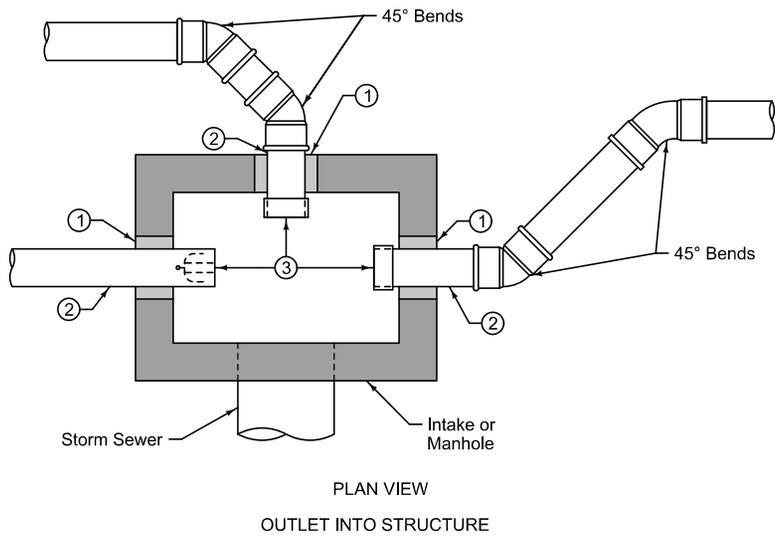


DETAIL A ① ④
(Dimensions are nominal)

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	SHEET 1 of 1		

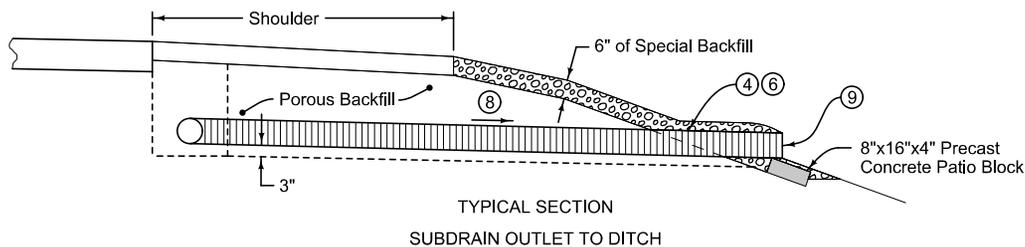
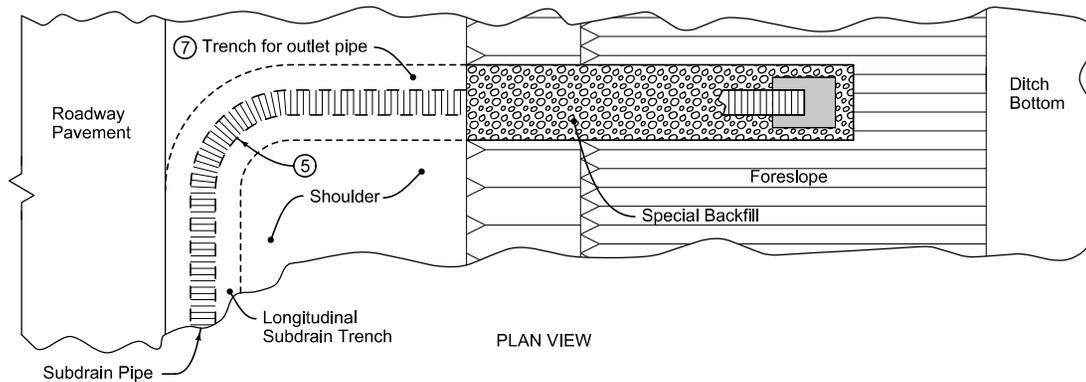
SUDAS Standard Specifications

SUBDRAIN CLEANOUTS



Transverse and backslope subdrains require only single outlets. Install double outlet pipes on all longitudinal subdrain systems, except at the beginning and end of the system. At these locations, install a single outlet pipe.

- ① Fill annular space with non-shrink grout.
- ② Outlets through intake walls to be CMP; corrugated, double-walled HDPE; or PVC.
- ③ Extend outlet pipe into structure as required to install removable rodent guard.
- ④ Construct subdrain outlet to ditch with the same type and size of pipe as used for the subdrain.
- ⑤ Provide a minimum 1 foot radius for all bends or use two 45° fittings
- ⑥ If a CMP outlet is specified in the contract documents, construct the final 10 to 12 feet of the subdrain outlet to ditch with CMP 2 inches larger than the subdrain pipe. Connect pipes with a manufactured coupler or concrete collar.
- ⑦ Provide a minimum trench width of 12 inches for a single outlet and 24 inches for a double outlet.
- ⑧ Provide a 6 inch minimum drop in elevation between longitudinal subdrain and outlet.
- ⑨ Use only fork type rodent guard for subdrain outlet to ditch.



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SUBDRAIN OUTLETS	

