ITEM 556

PIPE UNDERDRAINS

556.1. Description. Install pipe underdrains.

556.2. Materials.

A. Pipe. Furnish the types and sizes of pipe specified on the plans. Use only one type of pipe for any underdrain system on the project. Use perforated pipe in areas to be drained, and use non-perforated pipe between the perforated pipe and the outfall.

1. **Type 1.** Corrugated steel pipe conforming to any type specified in AASHTO M 36, fabricated from corrugated galvanized sheet.
2. **Type 2.** Corrugated aluminum pipe conforming to AASHTO M 196, Type I or IA, fabricated from corrugated sheet.
3. **Type 3.** Bituminous-coated corrugated steel pipe conforming to the requirements of Type 1 and uniformly coated inside and out with a minimum thickness of 0.05 in. with a bituminous material meeting the requirements of Table 1 when tested in accordance with Tex-522-C.

Table 1
Requirements of Bituminous Material

Test	Requirements
Solubility, % by wt. in trichloroethylene	99.5 min.
Brittleness	Pass
Flow, in.	0.25 max

4. **Type 4.** Bituminous-coated corrugated aluminum pipe conforming to the requirement of Type 2 and uniformly coated inside and out with a minimum thickness of 0.05 in. with a bituminous material meeting the requirements of Table 1 when tested in accordance with Tex-522-C.
5. **Type 5.** Acrylonitrile-butadiene-styrene pipe conforming to ASTM D 2751, SDR-35. Perforations must meet the requirements of AASHTO M 278.
6. **Type 6.** Corrugated polyethylene plastic tubing conforming to ASTM M 252.
7. **Type 7.** Corrugated polyvinyl chloride (PVC) pipe conforming to ASTM F 949.
8. **Type 8.** Smooth-wall PVC pipe conforming to AASHTO M 278, Class PS 46.
9. **Type 9.** As shown on the plans.

B. Filter Material. Furnish hard, durable, and clean sand, gravel, crushed stone, or crushed shell, unless otherwise shown on the plans, free of clay balls or other organic or deleterious matter as determined by Tex-413-A, that meets the gradation by percent weight specified in Table 2. Do not furnish crushed limestone unless shown on the plans. Use only one type of filter material for any underdrain system on a project.

Table 2
Percent Retained On Sieve (Tex-401-A)

Sieve Size	Type A	Type B	Type C	Type D
1-1/2"	–	–	0–10	
3/4"	–	0–10	20–40	
3/8"	–	15–35	–	–
No. 4	0–10	35–55	40–60	0–5
No. 8				0–20
No.16				15–50
No. 20	35–65[1]	35–65[1]	35–65[1]	
No. 30				40–75
No. 50	75–100[1]	75–100[1]	75–100[1]	70–90
No. 100				90–100

1. Of the portion finer than No. 4 sieve.

Loss by decantation as determined by Tex-406-A must not exceed 1% of the material retained on a No. 4 sieve or 4% of the material passing a No. 4 sieve. Use Type B or Type C filter material around the underdrains unless otherwise shown on the plans. Do not place Type A or Type D filter material within 6 in. of perforations.

C. Filter Fabric. Meet DMS-6200, "Filter Fabric," Type 1.

D. Riprap. When required, provide concrete riprap in accordance with Item 432, "Riprap."

556.3. Construction. Begin excavation of the trench at the outfall and proceed toward its upper end, following the lines and grades shown on the plans or as directed by the Engineer. Hold the minimum horizontal limits of excavation for filter material to the dimensions shown in Table 3 or as shown on the plans.

Table 3
Minimum Horizontal Limits of Excavation for Filler Material

Depth of Trench (ft.)	Distance Outside Neat Lines of Pipe Underdrains (ft.)
0 to 6	1.00
Over 6 to 10	1.50
Over 10 to 15	2.00
Over 15	2.50

In areas to be drained, place filter fabric in the bottom and sides of the trench before placing pipe or filter material, as shown in Figure 1. Provide enough width of fabric to overlap on top of the filter material. Center perforated pipe in the excavated ditch with the perforations below the horizontal axis. Join the pipe with appropriate couplers if required. Join plastic pipe in accordance with the manufacturer's recommendations. Do not use tarpaper strips. Before placing filter material, obtain the Engineer's approval of pipe placement.

Place filter material at least 12 in. above the bottom of the pipe or as shown on the plans. Do not allow filter material to displace the pipe.

After placing pipe and filter material, lap filter fabric over the top of the filter material according to the manufacturer's recommendation or as shown on the plans.

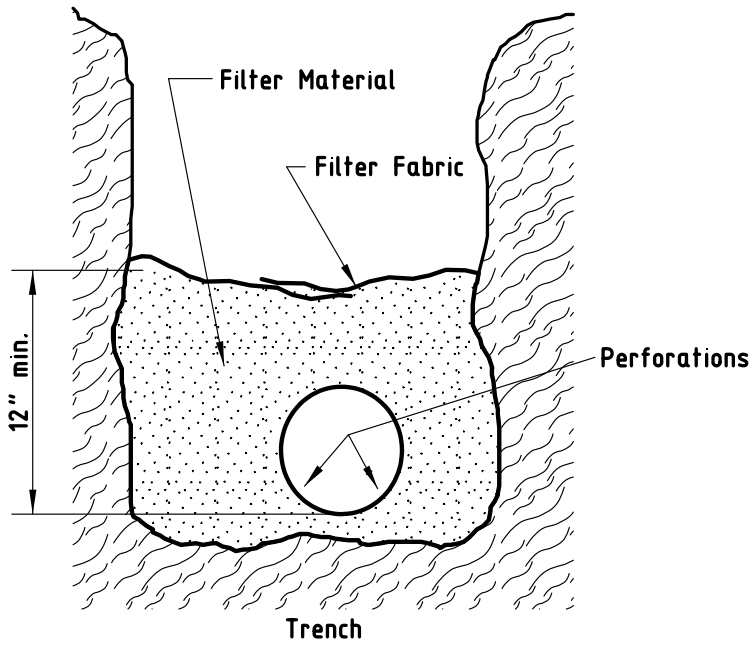

Figure 1
Installation process.

Install non-perforated pipe sections between the perforated pipe and the outfall. The sections of non-perforated pipe do not require filter fabric or filter material.

Place approved plugs in the upper ends of all pipe. Cover exposed outfall ends with 1/2-in. galvanized hardware cloth as directed by the Engineer. When required, provide Class B concrete riprap in accordance with Item 432, “Riprap,” and details shown on the plans. Place the riprap to the contour and grade of the embankment slope. Cut the pipe to the slope of the riprap.

Backfill the remainder of the trench with suitable material in layers not to exceed 6 in.

556.4. Measurement. This Item will be measured by the foot along the top of the pipe and will include the length of elbows, Y’s, T’s, and other branches.

556.5. Payment. The work performed and material furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Pipe Underdrains” of the pipe type and size specified. This price is full compensation for pipe, couplers, plugs, screens, filter material, filter fabric, riprap, excavation, backfill, equipment, labor, materials, tools, and incidentals.

Protection methods for excavations deeper than 5 ft. will be measured and paid for in accordance with Item 402, “Trench Excavation Protection.”