

**NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATIONS**

IA-620 UNDERGROUND OUTLETS

1. SCOPE

This work shall consist of installation of underground outlets in accordance with an approved plan and design.

2. MATERIALS

Materials for underground outlets shall meet the requirements as shown in the plans and specifications. They shall be field inspected for any deficiencies such as thin spots or cracking prior to installation.

Conduit

The following reference specifications pertain to products currently acceptable for use as underground outlets:

Plastic

Corrugated Polyethylene (PE) Tubing and Fittings (3-6 inch).....	ASTM F 405
Large Diameter Corrugated Polyethylene (PE) Tubing and Fittings (8-24 inch).....	ASTM F 667
Corrugated Poly(Vinyl Chloride) (PVC) Tubing and Compatible Fittings (4-12 inch).....	ASTM F 800
Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings (4-36 inch)	ASTM F 949
Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings	ASTM D 2729
Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings	ASTM D 3034
Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).....	ASTM D 2241
Polyethylene Plastics Pipe and Fittings Materials	ASTM D 3350

Clay

Clay Drain Tile	ASTM C 4
Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated	ASTM C 700
Vitrified Clay Pipe, test methods	ASTM C 301

Concrete

Concrete Drain Tile (4-36 inch).....	ASTM C 412
Concrete Pipe for Irrigation or Drainage	ASTM C 118
Concrete Pipe, Manhole Sections, or Tile (test methods)	ASTM C 497
Concrete Sewer, Storm Drain and Culvert Pipe	ASTM C 14
Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.....	ASTM C 76
Perforated Concrete Pipe	ASTM C 444
Portland Cement	ASTM C 150

Other

Styrene-Rubber (SR) Plastic Drain Pipe and Fitting	ASTM D 2852
Corrugated Aluminum Pipe for Sewers and Drains.....	ASTM B 745
Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.....	ASTM A 760

Inlet

The inlet shall be fabricated and installed as shown on the plans. Inlets must be of durable material, structurally sound, and resistant to damage by rodents or other animals. Inlets shall be of rigid material, which does not require supplemental support to remain in a vertical position. Materials, which meet these requirements, include the following:

1. Corrugated metal pipe, galvanized or aluminum, 16 gauge,
2. Smooth steel pipe, with 3/16 inch minimum wall thickness,
3. Smooth plastic pipe, polyvinyl chloride (PVC), with an SDR of 43 or less,
4. High-density polyethylene pipe (PE). Round pipe shall have an SDR of 43 or less. Square intakes shall have minimum wall thickness as shown in the following table:

<u>Nominal Size</u>	<u>Minimum Thickness</u>
6 inch	0.16 inch
8 inch	0.21 inch
10 inch	0.26 inch
12 inch	0.31 inch

All plastic and polyethylene inlets shall include an ultra-violet stabilizer to protect from solar degradation.

Perforations in the inlet shall be smooth and free of burrs. Unless otherwise specified, the above ground portion of the inlet shall have holes evenly spaced around the perimeter of the inlet in accordance with the following table:

<u>Inlet Size</u>	<u>Minimum Number of 1" Diameter Holes per Foot of Inlet</u>
4 inch	20
5 inch	24
6 inch	30
8 inch	40
10 inch	50
12 inch	60

If slots or round holes other than 1 inch in diameter are provided, the total cross sectional area of the openings per foot shall be equivalent to that provided by 1 inch diameter round holes meeting the above criteria.

The below ground portion of the inlet may be perforated with holes 5/16 of an inch in diameter or less to provide drainage around the inlet.

Appurtenances (i.e. tees and elbows) for polyvinyl chloride (PVC) inlets shall be schedule 40 or heavier.

Additional subsurface drainage tubing or tile may be used in conjunction with the surface inlet to improve access and farmability around the inlet. These underground extensions (when used) shall have a minimum length of 10 feet.

The inlet shall be offset from the main conduit except as noted below. A minimum of 8 feet of non-perforated conduit shall be installed between the inlet and the main conduit. The minimum diameter of the offset line shall be 3 inches. When conduit capacity is based on orifice flow from the inlet, such inlets shall be fabricated so that an orifice can easily be installed.

Only the top inlet in a terrace system may be placed directly on the main conduit. If the top most inlet in a terrace system is placed directly on the main conduit, the conduit shall be non-perforated from the inlet to the toe of the terrace back slope.

Outlet

A continuous section of non-perforated conduit at least 20 feet long shall be used at the outlet. Two-thirds of the outlet pipe shall be buried in the ditch bank, and the cantilever section must extend to the toe of the ditch side slope or the side slope shall be protected from erosion.

Acceptable materials for use at the outlet include the following:

1. Corrugated metal pipe, galvanized or aluminum, 16 gauge;
2. Smooth steel pipe, with 3/16 inch minimum wall thickness;
3. Smooth plastic pipe, polyvinyl chloride (PVC), with a SDR of 26 or less or schedule 40 or heavier; or
4. Dual wall corrugated polyethylene (PE) pipe.

All plastic and polyethylene pipe outlets shall include an ultra-violet stabilizer. PVC and PE pipe outlets shall not be used where burning vegetation on the outlet ditch bank is likely to create a fire hazard.

The outlet shall be equipped with a flap-gate type rodent guard.

3. TRENCH EXCAVATION

Trench excavation shall be sufficient to provide required cover after other construction is completed. Refer to Practice Standard 620 for minimum pipe cover based on type of material and pipe diameters.

The trench bottom shall be smooth and free of exposed rock. If rock is encountered in the trench bottom, over-excavate the trench and place at least 2 inches of compacted earth or sand bedding in the trench to bring it up to the conduit grade. The bottom of the trench shall be grooved in the center for proper conduit bedding. The groove shall be semi-circular or trapezoidal and shaped to fit the conduit. A 90 degree "V"-notch may be used for conduit 8 inches or less in diameter.

Maximum trench width shall be the conduit diameter plus 24 inches measured at the flow line. Minimum trench width shall be the conduit diameter plus 6 inches except when the trench is shaped to fit the conduit additional width is not required.

4. INSTALLATION

The underground outlet system shall be installed to the line and grade shown in the plans or as staked in the field. Conduit lines shall be installed and properly backfilled prior to placement of any other earthfill over the lines. A filter fabric wrap (sock) or equivalent shall be used if migration of soil particles around conduit is anticipated.

Conduit lines shall be joined with standard factory couplers, if applicable, to produce a continuous system. Internal couplers may be used if they do not cause excessive flow restrictions. Conduit ends shall be protected during installation.

All appurtenant structures, including trash and rodent guards, shall be installed promptly and provisions shall be made for protecting them during installation. All conduit ends except the outlet and inlets with screens shall be capped with standard factory end caps or concrete. When corrugated plastic tubing is used, no more than 5% stretch will be allowed.

Orifice plates, when specified, shall have smooth edges and fit tightly.

5. TRENCH BACKFILL

Conduits shall be bedded and backfilled throughout the base width of the basin embankment or terrace ridge. Friable soil material shall be placed in 6 inch layers and hand tamped to a depth of approximately 12 inches above the conduit. The sides of the remaining trench shall be sloped no steeper than 3 horizontal to 1 vertical and backfill placed in 6 inch layers and machine compacted.

Water packing may be used as an alternative to mechanical compaction. If the conduit is non-perforated, it shall be filled with water during the water packing procedure. The initial backfill, before wetting, shall be of sufficient depth to ensure complete coverage of the pipe after consolidation has taken place. Water packing is accomplished by adding water in such quantity as to thoroughly saturate the initial backfill without inundation. The wetted fill shall be allowed to dry until firm before final backfill is begun.

The remaining conduit shall be backfilled with selected bedding material containing no hard objects larger than 1½ inches in diameter to a minimum depth of 6 inches over the pipe. The tubing shall be held in place mechanically while select backfill material is placed around and over the pipe. This is to ensure that the proper conduit grade is maintained. All backfill material shall be placed so that deflection or displacement of the conduit will not occur. Large stones, frozen material and large dry clods are not allowed in the backfill material.

6. FINISH

Work areas shall be smoothed and left in a workmanlike manner. Vegetation or other protective cover shall be established as specified.

7. SPECIAL SPECIFICATIONS