

**NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATIONS**

SUBSURFACE DRAIN

1. Scope

The work shall consist of all construction operations and furnishing all materials for the installation of the subsurface drain as required and outlined on the construction plans.

2. Location

The location of the subsurface drain and all related appurtenant structures shall be as shown on the construction plans or as staked in the field.

3. Installation

Inspecting and handling materials. Material for subsurface drains shall be carefully inspected before the drains are installed. Plastic pipe and tubing shall be protected from hazard causing deformation or warping. Plastic pipe and tubing with physical imperfections shall not be installed. A damaged section shall be removed and a suitable joint made connecting the replaced and retained sections. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements.

Placement. All subsurface drains shall be laid to the lines and grades and covered with approved blinding, envelope, or filter material to a depth of not less than 3 inches. If an impervious sheet is used over the drain, at least 3 inches of blinding material must cover the sheet. No reversals in grade of the conduit shall be permitted.

If the conduit is to be laid in a rock trench or if rock is exposed at the bottom of the trench, the rock shall be removed below grade so that the trench can be backfilled, compacted, and bedded. When completed, the conduit shall not be less than 2 inches from rock.

Joints between drain tile shall not exceed 1/8 inch except in sandy soils where the closest possible fit must be obtained and in organic soil where some of the more fibrous types make it desirable to slightly increase the space between tile.

Earth backfill material shall be placed in the trench in a manner to ensure that the conduit does not become displaced and so that the filter and bedding material, after backfilling, meet the requirements of the plans and specifications.

If a filter is required, all openings in the subsurface drain shall be protected by the filter, or the bottom and sides of the conduit shall be protected by the filter and the top of the conduit. In addition, part of the side filter material is to be covered by a sheet of impervious plastic not less than 6 mils thick. If a filter is needed, no part of the conduit containing openings shall be left exposed.

If sand-gravel filter material is used, it shall be a mixture of sand and gravel within the gradation required by the base material in the trench. The trench shall be overexcavated 3 inches and backfilled to grade with filter material. After the conduit is placed on the filter material, additional filter material shall be placed over the conduit to fill the trench to a depth of 3 inches over the conduit. A plastic sheet and friable soil may be used as the backfill over the subsurface drain if specified.

Laying corrugated plastic tubing. Tubing with physical imperfections shall not be installed. Care shall be taken to prevent excessive impact or pull on the tubing during installation. The allowable stretch shall not exceed 5 percent of the normal length. When the temperature exceeds 90 degrees Fahrenheit, the tubing shall be allowed to cool in the trench to the soil temperature before backfilling.

Site cleanup. Any scraps or excess material brought to the work site shall be removed. Excess excavated soil and scalped material shall be spread over the work area to fill ruts from machine travel and to blend the surface with the surrounding field. The finished surface shall be smooth enough for travel by farm-type equipment.

General. The installing contractor shall certify that the installation complies with the requirements of these specifications and name the source of materials used.

4. Materials

Materials shown on the drawings or otherwise specified to be used in the installation of the inlet, main conduit, outlet, and appurtenant items shall meet the requirements stated herein.

- Smooth wall polyvinyl chloride (PVC) pipe shall be free from defects and be labeled to indicate the type and grade of pipe. The minimum ratio of the outside pipe diameter to the wall thickness--standard dimension ratio (SDR)--shall be that which is shown on the plans. The minimum cover over the top of the pipe shall be that which is shown on the plans.

Joints at fittings and pipe sections shall be gasketed and watertight.

- Corrugated PVC pipe with smooth interior walls fused to the outer wall shall be free from defects and be labeled to indicate the type and grade of pipe. The PVC material shall be simultaneously extruded to form the 2 walls. The minimum cover over the top of the pipe shall be 2 feet.

Joints at fittings and pipe sections shall be gasketed and watertight.

- Smooth wall iron or steel pipe shall be free from pits and flaky rust and be at least 3/16 inch thick. Connections shall be gasketed "Dresser"-type couplings, gasketed flanges, or screw-type couplings. Minimum fill over the top of the pipe shall be 2 feet.
- Corrugated iron or steel pipe shall be galvanized or aluminized, at least 16 gauge in thickness, and have helical or annular corrugations. Connections shall be gasketed flanges or gasketed connecting bands (either 1- or 2-piece) that are standard with the manufacturer. Minimum fill over the top of the pipe shall be 2 feet.
- Corrugated aluminum pipe shall be at least 16 gauge in thickness. Aluminum pipe shall not be used in soils having a pH greater than 9 or less than 4. Connections shall be gasketed flanges or gasketed connecting bands (either 1- or 2-piece) that are standard with the manufacturer. Minimum fill over the top of the pipe shall be 2 feet.
- Corrugated plastic tubing may be polyethylene (PE) or PVC. The joints at each fitting shall be double-wrapped with polyethylene tape at least 6 mils thick and 2 inches wide. Minimum fill over the top of the pipe shall be 2 feet.

Drainage conduit perforations. If perforations are needed in smooth wall conduits, they shall be in compliance with ASTM D 2729 (2 rows of holes ½ inch in diameter on 5-inch centers, and the rows shall be parallel to the axis of the pipe and 120 degrees apart).

Perforations in corrugated plastic tubing shall be either circular perforations or slots about equally spaced along the length and circumference of the tubing in not less than 3 rows. Circular perforations shall not exceed 3/16 inch in diameter. Slots shall not be more than 1/8 inch wide and 1¼ inches long for 3- and 5-inch diameter tubing, 1½ inches for 6- and 8-inch diameter tubing, or 1¾ inches for 10-, 12-, and 15-inch diameter tubing. The slots shall be located in the middle of the valley so that there is a shoulder on each side of the slot. Slots and circular perforations shall be cleanly cut. Slot lengths for 15-inch corrugated plastic tubing should not exceed 1¾ inches. The water inlet area shall be at least 1 in²/foot of tubing length.

Round perforations greater than 5/16 inch in diameter but equal to or less than ¾ inch shall be permitted on mineral soils if special requirements on blinding, envelopes, or filters are used.

5. Measurement

The quantity of installed drainage conduit and filter or envelope material will be determined from measured ground surfaces. Measurement will be to the nearest foot for the conduit. Computations for the filter or envelope material shall be to the nearest cubic yard.

6. Construction Details