

**NATURAL RESOURCES CONSERVATION SERVICE  
MISSOURI CONSTRUCTION SPECIFICATION**

**SUBSURFACE DRAIN**

**CODE 606**

**GENERAL**

Construction operations shall be carried out in such a manner and sequence such that erosion and air and water pollution will be minimized and held within legal limits. Work shall comply with all required permits. A land disturbance permit from the Missouri Department of Natural Resources may be needed if the disturbed area is greater than one (1) acre in size.

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used. The contractor shall be assured that all state laws concerning buried utilities are met prior to beginning work.

Construction shall be according to the requirements as specified for the job, in the plans and specifications.

All conduits shall be laid to line and grade in such a way that the side walls are continuously and uniformly supported with suitable bedding material. Such material shall be properly placed and compacted to provide lateral restraint against deflection and to protect the conduit against collapse during backfilling.

**SITE PREPARATION**

All trees, stumps, roots, brush, weeds, and other objectionable material in the work area shall be removed from the site and disposed of without degrading the environment or visual resources.

**MATERIALS**

The following specifications pertain to products currently acceptable for use as subsurface drains. These specifications are also to be applied in determining the quality of materials referenced by other standards:

<b>Type</b>	<b>Specification</b>
<b>Plastic</b>	
Corrugated polyethylene (PE) tubing and fittings 3-6 inches	ASTM F405
Corrugated polyethylene (PE) tubing and fittings 8-24 inches	ASTM F667
Polyvinyl chloride (PVC) corrugated sewer pipe with a smooth interior and fittings 4-8 inches	ASTM F949
Polyvinyl chloride (PVC) sewer pipe and fittings	ASTM D2729, ASTM D3034 type PSM or PSP
<b>Metal</b>	
Pipe, corrugated (aluminum alloy)	ASTM B745
Pipe, corrugated (iron or steel, zinc coated)	ASTM A760, A762, or A885

### **CONDUIT PERFORATIONS SPECIAL REQUIREMENTS**

Where perforated conduit is required, the water inlet area shall be at least 1 square inch per foot of conduit length. Round perforations shall not exceed 3/16-inches in diameter except where filters, envelopes, or other protection is provided or for organic soils, where a maximum hole diameter of 1/2-inches may be used. Slotted perforations shall not exceed 1/8-inches in width.

### **INSTALLATION**

All materials shall be inspected and handled properly prior to installation. 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 retained sections. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements.

### **TRENCHING**

Trench widths must be adequate for proper installation of the conduit, allow proper joining of sections, and allow proper placement of filter, envelope, or blinding materials. The trench bottom shall be constructed to proper grade before placement of the conduit.

Where rock is encountered the trench will be overexcavated a minimum of 6 inches and refilled to the proper grade with a suitable bedding material.

Provisions for safety during trenching operations shall be in compliance with the applicable safety and health regulations for construction - Occupational Safety and Health Administration (OSHA) regulations.

### **PLOW INSTALLATION**

Plow installation has been satisfactorily used in many situations. Special care needs to be exercised relative to grade control and bedding conditions.

### **BEDDING**

The trench bottom shall be smooth and free of clods and loose or exposed rock. Where a gravel envelope is not specified, the bottom of the trench shall be shaped to conform to the pipe. The groove may be semi-circular, trapezoidal, or a 90 degree "V"-shape (90 degree "V" suitable for 3-8 inches only) and shall be of such dimensions that the bottom quarter of the pipe is below the contact points of the groove.

In unstable soils a firm foundation shall be provided by overexcavation and backfilling with processed stone or gravel, suitably graded so as to act as a mat into which unstable soil will not penetrate.

### **FILTERS AND ENVELOPES**

If a sand-gravel filter is specified, it shall be clean, hard, durable material and of the gradation specified.

When sand-gravel envelopes are used they will be of clean, hard, durable material with less than 5 percent passing the No. 200 sieve, not more than 30 percent passing the No. 60 sieve, and with a maximum size of 1-1/2 inch.

**PLACEMENT**

Conduit will be placed in such a way that maximum stretch does not exceed 5 percent.

Fittings shall be installed in accordance with instructions furnished by the manufacturer. Couplers are recommended at all joints and fittings, at all changes in direction (where the centerline radius is less than three times the tubing diameter), at changes in diameter, and at junction(s) with another line.

Caps are needed at the ends of lines. All fittings shall be compatible with the tubing materials. Where certain fittings are not available, handcut holes are acceptable provided care is taken when making the connection not to create a means of obstructing flow, catching debris, or allowing soil to enter the line. Place selected bedding material, containing no hard object larger than 1-1/2 inches in diameter in the trench to a minimum depth of 6 inches over the conduit. The conduit will be held in place mechanically until secured by blinding.

**BACKFILLING**

Place backfill material so that displacement or deflection of the conduit will not occur. This is preferably on an angle, so the material flows down the front slope. Avoid large stones, frozen material, and dry clods that cause concentrated point loads on the tubing. The trench should be backfilled as soon as practical. When installing the tubing on a hot day, backfilling should be delayed until tubing temperature cools to the soil temperature.

**CERTIFICATION**

The installing contractor shall certify that the installation complies with the requirements of these specifications. The contractor shall provide the name(s) of the material source(s).

**Additional Details:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PAGE LEFT BLANK ON PURPOSE**

**NATURAL RESOURCES CONSERVATION SERVICE  
MISSOURI OPERATION AND MAINTENANCE**

**SUBSURFACE DRAIN**

**CODE 606**

**OPERATION AND MAINTENANCE ACTIVITIES**

A maintenance program shall be established by the landowner/user to maintain the functional capacity of the subsurface drain. Items to consider are:

- Keep inlets, trash guards, collection boxes, and structures clean and free of materials that can reduce the flow.
- Repair all broken or crushed lines to insure proper functioning of the drain.
- Repair or replace broken or damaged inlets, breathers, or vents damaged by livestock or machinery.
- Periodically inspect outlet conduit and animal guards for proper functioning.

**Additional Details:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_