

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**VERTICAL DRAIN**

(No.)

**CODE 630**

**DEFINITION**

A well, pipe, or pit in porous, underground strata into which drainage water can be discharged without contaminating groundwater resources.

**PURPOSE**

Provide an outlet for drainage water from a surface or subsurface drainage system.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice is applicable in locations where the underlying strata can receive, transmit or store the design drainage flow, and other drainage outlets are not available and cannot be provided at a reasonable cost. This practice is also applicable where a natural "sinkhole" acts as the vertical drain, and erosion control or treatment of surface runoff is needed.

This practice is applicable only in locations where a determination has been made that it

- Conforms to local, State, Tribal, or Federal laws or regulations
- Will not contaminate groundwater resources
- Will not affect in-stream habitat by reducing surface water flows.

This practice is limited to rural areas and can only be used when (1) to dispose of stormwater runoff occurring within the same topographic watershed, (2) the introduction of contaminants is kept to a minimum, and (3) only very shallow karst systems are involved. Very shallow karst systems are those where the sinkhole outlets in the same or adjacent watershed and the total depth from the restored ground surface to the receiving strata entrance is 20 feet or less.

This practice is limited to the shallow karst systems found in Ste. Genevieve, Cape Girardeau and Perry Counties.

A vertical drain shall not be installed where it would destroy important woody wildlife cover and where the present watercourse has little or no erosion. When encountered, wetlands will be treated in accordance with current NRCS wetlands policy. Refer to NRCS booklet "Wetland Types in Missouri," or Fish and Wildlife Circular 39 for classification.

**CRITERIA**

The number, size, and location of vertical drains shall be adequate to discharge the design drainage flow into the underlying stratum or strata, and shall be based on a field determination of the depth, permeability, porosity, thickness, and extent of the strata. Sinkholes will not be blocked in order to divert flow into adjacent topographic drainage areas.

The minimum pipe diameter installed in sinkholes with surface watershed areas of 10 acres or less shall be 12 inches, and for watershed areas between 10 and 20 acres shall be 18 inches. For watershed areas greater than 20 acres the pipe shall be designed to drain the 10 year – 24 hour frequency runoff for the watershed in 24 hours or less, but shall not be less than 18 inches. The pipe shall be smooth steel pipe with a minimum wall thickness of 3/16 inch. The pipe inlet shall have a trash rack or grating installed that has openings that do not exceed more than ½ the pipe diameter in any dimension.

The elevation of the pipe inlet shall allow a minimum of 0.5 feet of water to stage above the inlet. Pipe inlet may extend above ground level but must have side inlet holes to allow drainage to ground level.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service or download the standard from the electronic Field Office Technical Guide for Missouri.

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A suitable filter system, desilting basin or other means necessary for removing sediment and other contaminants from the water shall be provided before it enters the vertical drain.

Where significant amounts of surface water are planned to be diverted underground, the aggregate effect on stream flows must be determined, and steps taken to mitigate or avoid any potential negative effects on in-stream and riparian habitat.

### **CONSIDERATIONS**

Significant additions to subsurface water sources may raise local water tables or cause undesirable surface discharges down-gradient from the vertical drain. When a sinkhole is the vertical drain, investigate the surrounding area for evidence that the sinkhole is discharging to the surface or is causing surface discharge in adjacent sinkholes. Do not treat sinkholes using this standard that have evidence of significant discharges.

Consider alternatives to installation of a vertical drain in a sinkhole that would control the erosion to an acceptable level while meeting the land use needs of the landowner. Such alternatives may include but are not limited to filter strips, conservation cover or use exclusion.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for installing vertical drains shall be in keeping with this standard, and shall describe the requirements for properly installing the practice to achieve its intended purpose.

### **OPERATION AND MAINTENANCE**

The inlets to vertical drains shall be inspected periodically to insure that they are not plugged or damaged. Vegetative filters, sediment basins, and other filters shall be maintained as per Operation and Maintenance requirements for each of the respective practice standards.