

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

VERTICAL DRAIN

(No.)
CODE 630

DEFINITION

A well, pipe, pit, or bore in porous, underground strata into which drainage water can be discharged.

PURPOSES

Provide an outlet for drainage water from a surface or subsurface drainage system, protect an existing outlet from erosion or improve water quality.

CONDITIONS WHERE PRACTICES APPLY

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 natural "sinkholes" are the vertical drain and erosion control or treatment of surface runoff is a concern.

This practice is applicable only in locations where a determination has been made that it is not contrary to state laws or regulations, and that it will not cause pollution of underground waters.

This practice is not applicable where development of the vertical drain will cause existing wetlands to be drained.

This practice does not apply where discharge from any animal confinement operation, private or municipal dump or landfill, or any other concentrated pollutant source may reach the drain.

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.

The minimum diameter of shallow uncased wells shall be 6 inches and of deep cased wells, 4 inches.

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

Well casings shall be of adequate strength and longevity to serve planned needs.

CONSIDERATIONS

Significant diversions into underground storage areas may have an effect on the peak discharge rate from a watershed. Planners should consider this, and take steps to mitigate any potential negative effects this may have on riparian habitat downstream from the structure.

Significant additions to subsurface water sources may raise local water tables or cause undesirable surface discharges down gradient from the vertical drain.

Sinkholes may be backfilled with a graded filter, as per SCS-IL-209L, and to grade with site soils. Filter gradations shall be based on the crevice/sinkhole opening and shall meet the requirements of standard drawing SCS-IL-209 or 210. For crevice/sinkhole openings greater than 12 inches, filter design shall be as per SCS Design procedures.

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.</p>

Inlets installed in sinkholes shall be located directly over a visible crevice or sinkhole entrance. Rock or concrete may be used to bridge any gap at the entrance and to support the drain at the base. Openings in the inlet shall extend to the surface.

Surface inlets shall be designed to store the 24-hour, 10-year runoff for a minimum of 24 hours, where cropland is in the ponded area; or 48 hours, where no cropland exists in the ponded area. Inlets shall include a trash-rack. Inlet capacity may be determined from tables in standard drawing SCS-IL-210.

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.

VERTICAL DRAIN - SPECIFICATIONS

- A. Site Preparation. All undesirable materials located in the existing drain or sinkhole should be removed. All potential pollutants or sources of hazardous waste shall be safely disposed of as per state and local regulations.
- B. Excavations. Carefully excavate overburden from fractured rock in sinkholes in order to expose the crevice/opening. Excavations shall extend, laterally, 2-feet from the crevice/opening. Excavation shall be laid back to 1:1 slopes or flatter or shoring used when excavation is in earth and workmen are to be allowed in the excavation.
- C. Installation. Collapse and/or remove weak rock exposed near the crevice/opening of sinkholes. Place the inlet directly over the largest part of the opening, cover all other openings with filter fabric and place the drain over the largest part of the opening, cover all other openings with filter fabric, cut forms to fit around the inlet and place concrete to form an inlet base. Do not

place backfill over concrete sooner than 24 hours after placement.

- D. Backfill. Filter Placement - For inlet backfill, where base rock is used at the inlet base, a layer of IDOT CA-7 or CA-11 gravel shall be placed 1 foot deep over the base rock prior to placing soil material. For instances where graded filters are used without an inlet, graded filters shall be placed with the largest rock at the bottom of the sinkhole. The average size of the base layer shall be equal to or greater than the maximum crevice opening. Rock gradations and installation shall be as per drawing SCS-IL-209 or 210. Use the coarsest soil on site to cover the graded filter to ground level. Crown the backfill 5-10 percent of the total excavation depth for settlement. The appearance of the completed fill should be smooth and the surface free of any objects larger than 6-inches in any dimension.
 - E. Vegetative Treatment. The surface of the filled sinkhole and all other disturbed areas shall be prepared and seeded as per CRITICAL AREA PLANTING, SCS-IL-342.
 - F. Materials. Drain Inlets - Inlets for vertical drains shall meet requirements of tables 5 through 7, SCS-IL-378 Ponds. For those tables, the depth from filled surface of sinkhole to bas of inlet shall be considered "fill over pipe". Concrete shall be a minimum 3000 lb. mix.
- Filter Drain - Rock for filter drains shall meet the requirements for IDOT riprap and course aggregate.
- G. Safety. All operations shall be performed in a workmanlike manner and proper safety precautions shall be observed. Heavy equipment shall not be operated adjacent to sinkholes unless an attendant is present on the ground to assist the operator in assessing site stability.

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.