

**NATURAL RESOURCES CONSERVATION SERVICE  
MISSOURI CONSTRUCTION SPECIFICATION**

**VERTICAL DRAIN  
(SINKHOLE OUTLET)  
CODE 630**

**GENERAL**

Construction operations shall be carried out in a manner and sequence such that erosion and air and water pollution are minimized and held within legal limits.

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.

**MATERIALS**

Materials required and fabrication details shall be specified on the drawings.

The concrete design mix shall have a minimum 28 day compressive strength of 3000 psi with a maximum water content of 7 gallons per bag of cement and a minimum of 5.5 bags of cement per cubic yard of concrete. The proportions of the aggregates shall be such as to produce a concrete mixture that will work readily into the corners and angles and around the pipe, but will not segregate or produce free water during placement and consolidation.

**SITE PREPARATION**

The crevice opening of the sinkhole shall be entirely exposed and all trees, logs, stumps, roots, brush, boulders, sod, rubbish or other debris. All materials cleared from the site that are not suitable for fill material shall be burned, buried or removed from the site in compliance with any applicable laws or regulations.

The soil material around the sinkhole shall be excavated to provide adequate room for pipe, filter and concrete placement and to accommodate the necessary operation of equipment. All excavated slopes shall be sloped to 2:1 or flatter unless otherwise shown on the drawings. Bench excavated slopes as necessary for safe operation of equipment.

**PIPE AND CONCRETE INSTALLATION**

All pipes, filters and concrete shall be installed as shown on the construction drawings.

The crevice and rock where concrete is to be placed shall be cleaned of all soil material and loose rock. The pipe shall then be placed over the largest part of the exposed crevice. Once the pipe is in place and braced to prevent movement, the forms for concrete placement can be installed around the pipe. The forms and concrete shall cover the entire exposed crevice. Any crevice larger than 1 inch shall be covered by a form before concrete is placed. Forms shall be positioned so that concrete cannot flow into the crevice. Concrete shall be placed on moist firm earth, rock or forms free of water, ice or snow.

Backfilling shall not begin until concrete has set sufficiently to support the soil load. The surface of the concrete shall be kept continuously moist for 3 days unless covered with moist soil.

**BACKFILL**

Selected backfill material of friable clayey soil material shall be place around the pipe at approximately the same rate on all sides to prevent unequal pressures. Fill material shall be free of detrimental amounts of sod, roots, frozen soil, stone over 6 inches in diameter and other objectionable material. To the extent it is usable, excavated materials are to be used in the backfill. Foundation areas shall be kept free of standing water during backfill placement. All borrow areas shall be graded and left so they are free draining of surface water and shall be seeded if required on the drawings.

Backfill shall be placed in 6 inch thick horizontal layers with each lift being compacted by tracking of rubber tired equipment or by manually directed power compactors. If compaction is obtained by manual means only, then the layer thickness shall not exceed 4 inches.

Caution is to be used when compacting backfill around the pipe to prevent damage or movement. Equipment shall not be operated over any structure until there is sufficient backfill depth to prevent damage.

**FILTER STRIP**

A vegetative filter strip shall be installed per the attached seeding specifications (JS-AGRON-25) and to the dimensions as shown on the drawings.

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

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

**VERTICAL DRAIN  
(SINKHOLE OUTLET)  
CODE 630**

**OPERATION AND MAINTENANCE**

The pipe inlet should be inspected after each major rainfall and any debris found blocking the inlet shall be removed. Trash racks or grating shall be maintained in working order.

The vegetative filters, sediment basins and other filters associated with the vertical drain shall be maintained as per the Operation and Maintenance requirements for each of the respective practice standards.

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