

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
WATER AND SEDIMENT CONTROL BASIN**

(number)

CODE 638

DEFINITION

An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.

PURPOSES

A water and sediment control basin may be established to:

- Improve farmability of sloping land
- Reduce watercourse and gully erosion
- Trap sediment
- Reduce and manage onsite and downstream runoff
- Improve downstream water quality

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where:

1. The topography is generally irregular.
2. Watercourse or gully erosion is a problem.
3. Sheet and rill erosion is controlled by other conservation practices.
4. Runoff and sediment damage land and improvements.
5. Soil and site conditions are suitable.
6. Adequate outlets can be provided.

Water and sediment control basins shall not be used in place of terraces. Where a ridge and/or channel extend beyond the detention basin or level embankment, standards for Terrace (600) or Diversion (362) must be applied as appropriate.

This practice standard does not apply where Conservation Practice Standard (410) Grade Stabilization Structure or Conservation Practice Standard (350) Sediment Basin is appropriate. **Maximum drainage area for a water- and sediment-control basin is 20 acres.**

This practice is not applicable to watercourses where its installation would destroy important woody wildlife cover and the present watercourse is not seriously eroding. Such situations are usually recognizable by a meandering condition, steep side slopes which are stabilized by woody plants and herbaceous vegetation and the watercourse is without rapidly advancing overfalls.

CRITERIA

General Criteria Applicable To All Purposes

The resource management system must reduce soil loss in the interval above and below the basin to prevent excessive maintenance and operation problems.

Where land ownership or physical conditions preclude treatment of the upper portion of a slope, a water and sediment control basin may be used to separate this area from, and permit treatment of the lower slope.

The design must limit inundation, infiltration, and seepage to prevent crop damage and/or other problems.

This practice may adversely affect cultural resources. Planning, installation and maintenance must comply with GM 420, Part 401.

Laws and Regulations. This practice must conform to all federal, state, and local laws

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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and regulations. Laws and regulations of particular concern include those involving water rights, dam construction, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Spacing. Water and sediment control basins shall generally be spaced at terrace intervals (see standard for Terrace (600)). Adjust spacing or include other measures needed to prevent erosion in the watercourse between basins.

The drainage area of each basin shall be limited so duration of flooding, infiltration, or seepage does not cause excessive damage to crops or create other problems.

The system of basins and row arrangements shall be approximately perpendicular to the land lope to permit farming on the contour, be parallel when possible and spaced to accommodate farm machinery where needed to fit row crop spacing.

Spacing design must consider embankment slope lengths, top width, and outlet location.

Cross section. For portions of the basin controlling only flowing water 3 feet or less deep, embankment slopes must be two horizontal to one vertical, or flatter. For all other portions of the basin, the sum of the upstream and downstream slopes must be 5:1 or flatter with neither slope steeper than 2:1. Slopes may be vegetated or flattened to permit cropping.

Embankments may consist of a broad-base configuration in which both the slopes and the top are suitable for farming or of a configuration in which one slope or both is steep and vegetated.

Earth Embankment. Minimum effective top widths are given in Table 1. The maximum settled height of the embankment must be 15 feet or less measured from natural ground at centerline of the embankment.

Table 1.
Minimum Top Width of Embankments

Fill Height (feet)	Effective Top Width (feet)
0 – 5	3
5 - 10	6
10 –15	8

The design height of the basin embankment shall be increased by the amount needed to insure that after settlement the height of the embankment equals or exceeds the design height. The actual percent increase selected by designer shall be based on (1) soil mechanics test results, (2) history of embankments in the surrounding area, and (3) the type of compaction designated. The following minimum shall be met:

- 5 percent increase where fill material is placed in 9-inch layers and compacted by heavy hauling equipment or liquid filled tamping roller. (Sheepsfoot or wedgefoot drum rollers are considered tamping rollers.)
- 5 to 10 percent increase where fill construction and compaction is by bulldozer or light hauling equipment, i.e., unloaded scrapers. Individual layers shall be 5 inches in thickness or less.

Foundation cutoff and seepage control. Portions of basin ridges designed to impound more than a 3-foot depth of water must include foundation cutoff and seepage control as required by the standard for Pond (378).

Capacity. Basins must have capacity to prevent overtopping by runoff from a 10-year frequency, 24-hour duration storm. Larger design storms may be used where needed for flood control or other purposes.

Where settled fill height is 8 feet or more and total storage is 2 acre-feet or more, then Conservation Practice (410) Grade Stabilization Structure principal and auxiliary spillway design criteria shall be met.

In addition to the above storage, basins must have capacity to store at least the anticipated 10-year sediment accumulation, or periodic

sediment removal must be provided to maintain the required capacity.

Procedures for computing sediment volume from cropland and pastureland are shown in Missouri supplement to the NRCS, National Engineering Handbook (NEH), Part 650, Engineering Field Handbook (EFH), Chapter 8 - Terraces. For drainage areas over 5 acres, for strip mined land, and for other disturbed areas, use procedures in Missouri supplement to EFH, Chapter 10 - Gully Treatment to compute sediment capacity.

Basin ends must be closed to an elevation that will contain design capacity. A maximum 1 foot freeboard may be added to design height to provide for safe operation of auxiliary spillways. Auxiliary spillways must not contribute runoff to a lower basin (or pond) except where the lower basin (or pond) is designed to control the flow.

Outlets. Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to standards for Grade Stabilization Structure (410), Grassed Waterway (412), Diversion (362) or Underground Outlet (620) as appropriate.

Topsoil. Where necessary to restore or maintain productivity, topsoil must be stockpiled and spread over disturbed areas.

Vegetation. Disturbed areas that are not cropped must be established to appropriate vegetation or otherwise protected from erosion using organic or gravel mulch or other measures.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food and habitat needs. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with standards for Critical Area Planting (342) and Mulching (484).

CONSIDERATIONS

Water and sediment control basins should be part of a resource management plan including such practices as terraces, grassed waterways, contouring, a conservation

cropping system, conservation tillage, and crop residue management.

Where possible, the basin should be configured to enhance sediment deposition. This can be accomplished by using flow deflectors, inlet and outlet selection, and by adjusting the length to width ratio.

For cropped fields, embankment orientation and crop row direction should be approximately perpendicular to the land slope to support contour farming. The design should support farmability by limiting short point rows or sharp curves. Field boundaries and row lengths should also be considered in planning basin location and row direction

Where possible, the design should enhance habitat for native and endangered species or habitat for migratory birds. Effects on downstream water quality and temperature may be critical for some species.

Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment and water control basins must conform to requirements of this standard and must describe requirements for applying the practice and achieving its intended purpose.

OPERATION AND MAINTENANCE

A site specific O&M plan must be prepared for and reviewed with the landowner or operator. The plan shall contain guidance to maintain the embankment, design capacity, vegetative cover and outlet.

All plans shall include a provision that after each large storm, basins must be inspected and needed maintenance performed. When sediment storage is full, accumulated sediment must be removed or the basin must be redesigned and modified to restore capacity. Excavated material spread on the cropland or pastureland shall be placed to maintain fertility and enhance topography.

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Vegetation shall be maintained and trees and brush controlled.

Where designs include underground outlets, O&M plans should include checking for clogging and/or pipe damage.

Failures should be corrected as soon as possible to prevent major damages.