

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

WATER AND SEDIMENT CONTROL BASIN

(No.)

CODE 638

DEFINITION

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

SCOPE

This standard applies to planning, designing, and constructing water and sediment control basins. It does not apply to diversions, grade stabilization structures, or sediment basins.

PURPOSE

To reduce watercourse and gully erosion, trap sediment, reduce and manage onsite and downstream runoff, improve downstream water quality, and improve farmability of sloping land.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where:

1. The topography is generally irregular.
2. Watercourse and gully erosion are a problem.
3. Sheet and rill erosion levels are reduced in the watershed to minimize operation and maintenance requirements.
4. Runoff and sediment damage land and improvements.
5. Soil and site conditions are suitable.
6. Adequate outlets are available or can be provided.
7. The basins are part of a planned conservation system.

DESIGN CRITERIA

General

Water and sediment control basins can be part of the treatment needed to protect the soil resource base. In addition, other practices such as terraces, contouring, conservation cropping system, conservation tillage, and crop residue management shall also be used to control erosion.

Water and sediment control basins shall not be used in place of terraces. When a ridge and channel extends beyond the detention basin or level embankment, the system shall be designed as a terrace.

The planned conservation management system should reduce sheet and rill erosion in the watershed to minimize operation and maintenance requirements.

Spacing

Water and sediment control basins shall generally be spaced at terrace intervals. The grade of the watercourse between basins shall be considered and the spacing set to prevent watercourse or gully erosion.

The drainage of each basin shall be limited so that the duration of flooding, infiltration, or seepage does not damage crops or create other problems. The maximum drawdown time for cropland shall be 24 hours and 48 hours for pastureland.

The system of basins and row arrangements shall be parallel when possible and spaced to accommodate farm machinery widths. Consideration shall be given to embankment slope lengths, top width, and inlet location when determining spacing.

Water and sediment control basins can be used as a part of a terrace system to control small watersheds. They are intended to be utilized in the watershed and not at the outlet of a watercourse. Reference Standard 410, Grade Stabilization Structures or Standard 350, Sediment Basins for this purpose. The uncontrolled drainage area to each basin should not exceed 30 acres (12.1 ha).

Alignment

The embankment orientation and row direction shall be approximately perpendicular to the land slope to permit contouring as near as possible. The arrangement should permit farming without excessive short point rows or sharp curves. Field boundaries and row lengths should also be considered when determining basin location and row direction.

Cross Section

Embankments may consist of a broadbase (both slopes are farmable), narrow base (both slopes are vegetated) or steep backslope (front slopes are farmable backslopes are vegetated) configuration. Embankment slopes shall not be steeper than 2:1. Farmable slopes shall not be steep than 5:1. The (3.0m), the combined side slopes shall not be less than 5:1. The minimum top width of the dam is shown in the table below.

Fill Height		Top Width	
ft	(m)	ft	(m)
0-5	(0-1.5)	3	(1)
5.1-10	(1.5-3.0)	6	(1.8)
10.1-15	(3.0-4.6)	8	(2.4)

The constructed height of the embankment shall be at least 5 percent greater than the designed height to allow for settlement. The maximum settled height shall be 15 feet (4.6 m), measured from the natural ground at the centerline of the embankment to the top of the dam.

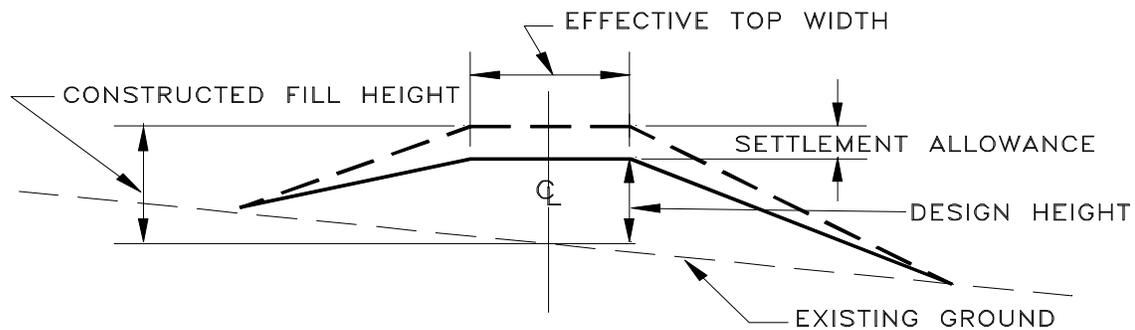


Figure 1. Typical Cross - Section

Capacity

The capacity of the basin shall be large enough to control the runoff from a 10-year, 24-hour frequency storm without overtopping. The capacity of basins designed to provide flood protection or to function with other structures may be larger and shall be adequate to control a storm of a frequency consistent with the potential hazard.

The basin capacity shall be increased to provide storage for the anticipated 10-year sediment accumulation, unless provisions are made for periodic sediment removal from the basin to maintain the design capacity and the landowner agrees to this provision in the operation and maintenance plan.

End Closures

End enclosures may be necessary to obtain the design capacity. A maximum 0.5-ft (0.15m) of freeboard may be added to the design height to provide for an emergency spillway around one or both ends of the basin. The emergency spillway should not outlet to a lower basin in series that does not have an emergency spillway.

Outlets

Water and sediment control basins shall have underground outlets that meet the requirements for Standard 620, Underground Outlets.

Vegetation

Slopes and disturbed areas that are not to be farmed shall be established to suitable erosion resistant vegetation. Environmental quality and wildlife food and habitats shall be considered in selecting the species of vegetation. Seedbed preparation plus seeding, fertilizing and mulching rates shall comply with Standard 342, Critical Area Planting.

Maintenance

A maintenance plan shall be provided for each planned conservation system and practice. The maintenance plans for the water and sediment control basin shall include maintenance requirements for the embankment, design capacity, vegetative cover, and the outlet. Maintenance should include provisions for inspection of inlets, outlets and embankments after each storm event. Any damage to the basin should be corrected as soon as possible to prevent major damages.

The sediment and design capacity shall be maintained at intervals specified in the O&M plan by cleaning the basin or, where practical, by raising the embankment height. Excavated material spread on the cropland shall be placed to enhance topography and maintain fertility. Fill material, for increasing the embankment height, shall be obtained in a manner that enhances topography and maintains productivity of the cropland. The vegetation shall be maintained to prevent sheet and rill erosion or gulying of the embankment. Trees and woody cover generally create problems or embankments and should be controlled.

Plans and Specifications

Plans and specifications for installing water and sediment control basins shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

NATURAL RESOURCES CONSERVATION SERVICE
ENGINEERING STANDARD

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Earth Embankment

Water and sediment control basins shall be constructed as designed, staked and/or flagged in the field. Fill material shall be free of sod, roots, organics and stones larger than six (6) inches (0.15 m) or other objectionable material. Fill shall be placed in approximately horizontal lifts no greater than six (6) inches (0.15 m) prior to compaction. Each lift shall be compacted using excavating equipment or equivalent. At least two (2) passes of compaction equipment, covering each lift, shall be required. Fill material shall have a moisture content that will allow a ball of soil to hold together when squeezed by hand. The fill material shall not be frozen or placed on a frozen foundation.

Borrow Area

If cuts expose unfavorable subsoil in the borrow, the topsoil shall be stockpiled and replaced. Cuts and fills should be made in a manner that enhances the topography. Excessive cuts, to secure borrow to build the basin ridge through depressions, should be avoided. Borrow, when taken from adjacent ridges, should level the field and improve farmability.

Underground Outlets

If underground outlets are located under embankments, provisions shall be made to prevent piping, which may include hand tamping or installing the outlet the previous construction season to allow for settlement. The materials used for the inlet and underground outlet shall be as specified in the design. Backfill material within 6 inches (0.15 m) of the pipe shall be free of clods and stones greater than 3 inches (7.6 cm) to avoid crushing.

General

Construction operations shall ensure that erosion, air, and water pollution is minimized. Any changes in the plans or specification shall be approved by the local NRCS office. The landowner or his/her designated representative is responsible for obtaining approval for any changes.