

**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 watercourses to form a sediment trap and water detention basin.

**PURPOSE**

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

**CONDITIONS WHERE PRACTICE APPLIES**

This standard applies to planning, designing, and constructing water and sediment control basins. It does not apply to diversions (362), grade stabilization structures (410), or sediment basins (350). This practice applies to sites where:

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

**CRITERIA**

**General**

Water and sediment control basins can be part of the treatment needed to protect the soil resource base. In addition, practices such as terraces, contouring, a 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 extend beyond the detention basing or level embankment, terraces shall be designed. The resource management system must reduce soil loss in the interval above and below the basin to prevent excessive maintenance and operation problems.

**Design**

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 shall be set to prevent watercourse or gully erosion. The drainage of each basin shall be limited so duration of flooding, infiltration, or seepage does not damage crops or create other problems.

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.

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 farmability without excessive shoulder points or sharp curves. Field boundaries and row length should also be considered when determining basin location and row direction.

Cross section. Embankment slopes shall not be steeper than two horizontal to one vertical. The effective top width and height shall be at least as wide as shown in the following.

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

Fill height (ft)	Effective top width (ft)
0 - 5	3
5 - 10	6
10 - 15	8

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 ft measured from the natural ground at the centerline of the embankment. Slopes may be vegetated or may be flattened to permit cropping.

**Capacity.** The basin shall be large enough to control the runoff during 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 the runoff from a storm of a frequency consistent with the potential hazard. The basin also shall have the capacity to store the anticipated 10-year sediment accumulation, unless provisions are made for periodic sediment removal from the basin to maintain the design capacity.

The basins shall have the ends closed to the elevation needed for the design capacity. A maximum of 1 ft. (0.31 m) 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 must not contribute runoff to a lower basin in series that does not have an emergency spillway.

**Outlets.** Water and sediment control basins shall have underground outlets or soil infiltration outlets that meet the requirements for terraces (600) and underground outlets.

**Vegetation.** Slopes and distributed areas that are not to be farmed shall be established to suitable erosion-resistant vegetation. Environmental quantity and quantity and wildlife food and habitat shall be considered in selecting the species of vegetation. If soil or climatic conditions preclude the use of vegetative cover and protection is needed, organic or gravel mulch may be used. Seedbed preparation, fertilizing, seeding, and

mulching shall be in accordance with the technical guides.

## CONSIDERATIONS

### Water quantity

- Effect on the water budget, especially on volumes and rates of runoff, infiltration, and evaporation.
- Ability to increase deep percolation below the root zone and, where possible, ground water recharge.
- Potential for a change in rates of plant growth and transpiration because of changes in the amount of soil water storage.
- Effects on the trapping or distribution of snow.

### Water quality

- Potential to trap sediment and sediment-attached substances carried by runoff.
- Potential change in the flow of dissolved substances such as nitrates or pesticides into downstream watercourses.
- Potential movement of dissolved substances to ground water.
- Effects on downstream water temperature.
- Effects on the visual quality of downstream water resources.

## OPERATION AND MAINTENANCE

A maintenance job sheet or maintenance plan shall be provided for each resource management 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 inspection of inlets for clogging and embankment failure after each large storm. Failures should be corrected as soon as possible to prevent major damages.

The sediment and design capacity shall be maintained by cleaning the basin or by raising the embankment height. Excavated material spread on the cropland shall be placed to maintain fertility and enhance topography. 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 gullyng of the embankment. Trees and woody cover generally create problems on 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.

#### **REFERENCE**

NRCS Conservation Practice Standards:  
Critical Area Planting, Code 342  
Terrace, Code 600  
Underground Outlet, Code 620

**Natural Resources Conservation Service  
Construction Specification**

**WATER AND SEDIMENT CONTROL BASIN**

**1. SCOPE**

Work shall consist of constructing the water and sediment control basin embankment, inlet channels, and outlet(s), to the lines and grades as shown on the drawings or as staked in the field. The location of the water and sediment control basin shall be as shown on furnished drawings or as staked in the field.

**2. SITE PREPARATION**

All fencerows, brush, debris, and tall standing vegetation shall be removed from the area occupied by the embankment and the area from which the earthen construction material will be taken. All brush, logs, stumps, or other debris removed must be disposed of by burning, burying, or removal from field area. Gullies located under the embankment shall have the sides sloped to a 1 vertical to 2 horizontal prior to backfill.

**3. MATERIAL**

Materials for earthfill shall be obtained from excavation in designated borrow areas and shall be free of objectionable materials such as brush, roots, and rock particles that endanger the performance of the embankment. Borrow areas are generally located on a knoll or adjacent ridge where borrow will enhance the field layout and farmability. Topsoil should be stockpiled and spread over excavated borrow areas to facilitate revegetation.

**4. PLACEMENT OF EARTHFILL**

All fills shall be full-bodied, with cross section conforming to that specified at all stations. Top of the constructed embankment shall not be lower at any point than the design elevation with required freeboard plus the specified overbuild for settlement.

The specified embankment overbuild for settlement shall be:

- a. 5 percent of the designed fill height for scrapers, pans, and similar equipment or
- b. 10 percent of the designed fill height for bulldozers and similar equipment.

All survey rod readings taken to determine embankment dimensions shall be taken in a footprint that has had a person's full weight applied. Construction equipment shall be routed over the fill to provide compaction such that no bridging results. The embankment top, side slopes, end closures, channel, and other excavated areas shall be finished to a smoothness so the surface can be readily traveled upon by farm type equipment.

Final construction shall be considered satisfactory when:

- a. Fill elevations are at or within 0.5 foot above design height plus settlement.
- b. Excavation elevations are within  $\pm 0.2$  foot of design grade and have a positive slope toward the outlet.
- c. Fill slopes are no steeper than 2.0:1. Fill slopes of 6.0:1 or flatter will be used if slopes are to be cropped.

**5. UNDERGROUND CONDUIT**

Underground conduits, when used, shall be located under the embankment and have adequate compaction of the conduit trench and embankment material. Mechanical compacting, water packing, sloping conduit trench walls, and use of very moist soil are methods of achieving adequate compaction. Conduit installation before terrace embankment construction is recommended. Materials used for the inlet and conduit shall be suitable for the

purpose intended and meet the requirements of Subsurface Drains (606).

Underground conduit installation shall be considered satisfactory when the pipe is within  $\pm 0.3$  foot of design grade and has a positive slope toward the outlet. A 2-foot minimum cover over top of pipe is recommended. An animal guard on the outlet of each pipe will be installed.

## **6. MEASUREMENT**

Measurement shall be of the embankment fill volume. The amount of earthfill or excavation, as appropriate, shall be the design yardage computed from the natural ground line to the neat line as specified.

Volume of earthfill or excavation shall be computed to the nearest cubic yard.

Measurement for vegetative planting area shall cover all disturbed areas (embankment, channel, borrow, disposal) that are not to be cultivated. Areas shall be measured to the nearest 0.1-acre.

Measurement of underground conduit shall be the field laying length from the inlet end to the outlet end. No separate accounting of appurtenances (band, tee, ell, etc.) shall be made. The length of each pipe size used shall be identified.