

**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.

embankment, Natural Resources Conservation Service (NRCS) Field Office Technical Guide (FOTG) Standards (600) Terrace or (362) Diversion must be applied as appropriate.

**CRITERIA**

**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.

**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 must 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.

**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

The uncontrolled drainage area to a single basin shall not exceed 30 acres.

**Laws and Regulations.** This practice shall conform to all federal, state, and local laws, rules 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 must generally be spaced at terrace intervals (see NRCS FOTG Standard (600) Terrace). Adjust spacing or include other measures needed to prevent erosion in the watercourse between basins. The drainage of each basin shall be limited so duration of ponding,

**Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the electronic Field Office Technical Guide for your state.**

infiltration, or seepage does not damage crops or create other problems.

The system of basins and row arrangements must be parallel 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.

Runoff shall not be ponded on the neighboring property without written permission of all landowners involved in the project.

**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 a maximum of 2:1 in either slope. Slopes may be vegetated or flattened to permit cropping.

All constructed slopes steeper than 5:1 shall be vegetated.

**Earth Embankment.** Minimum effective top widths are given in Table 1. Constructed embankment height must be at least 10% greater than design height to allow for settlement. 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 – 5.0	3
5.1 – 10.0	6
10.1 – 15.0	8

**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 NRCS FOTG Standard (378) Pond.

**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.

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.

Basin ends must be closed to an elevation that will contain design capacity. A minimum of one foot of 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 from the additional runoff or provide for an emergency spillway.

**Channel Grades.** When the storage section of the basin is extended as a ridge and channel (non-storage), the channel grades and velocities shall comply with those shown for NRCS FOTG Standard (600) Terrace.

**Outlets.** Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to NRCS FOTG Standards (378) Pond, (412) Grassed Waterway, (362) Diversion, (600) Terrace, or (620) Underground Outlet 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.

Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with NRCS FOTG Standards (342) Critical Area Planting and (484) Mulching.

**Safety.** Basins with steep backslopes can be very hazardous. Machinery shall be kept away from steep backslopes. All cut slopes and fills that are to be farmed must be no steeper than that on which farm equipment can operate safely. All hazards must be brought to the attention of the landowner/user. Chemicals used shall be used according to the label.

**CONSIDERATIONS**

Water and sediment control basins should be part of a resource management plan including but are not limited to 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.

Effects on streams and wetlands should be considered. Mitigation may be required where water is diverted or degraded for downstream uses.

This practice can be used to develop/enhance seasonally ponded areas for migratory waterfowl.

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

Slopes may be flattened to permit cropping.

When runoff will be ponded on a neighboring property, consider recording a legal document outlining or identifying ponded area(s).

Additional height may be considered to be added to prevent storms in excess of the design storm frequency from overtopping the middle of the dam. This should be considered in situations where overtopping the middle would have some likelihood of breaching such as short, high fills, steep backslopes, and large drainage areas.

Effects on water quantity and quality should be considered. This practice may reduce the volume and rate of discharge by using underground outlets. With underground outlets infiltration through the catchment area will increase and runoff will be decreased. Deep percolation and ground water recharge may occur when conditions permit. Consider the effects basins may have on the discharge to the watershed.

Consider using grass buffers around each riser to help reduce sediment, nutrient, and pesticide contamination of the runoff.

Consideration should be given to Nutrient, Pest, Animal Waste Management planning, and residue management to the soils tolerable soil loss limits (T).

Consider constructing side slopes 3 to 1 or flatter when mowing of vegetation is part of maintenance or weed control.

Where underground outlets are located under a basin ridge, mechanical compaction or water packing should be used. Installation and backfill of conduit trenches should be made in advance of other fill placement to allow adequate settlement.

## 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.

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

Other items that could be in the O&M plan are:

- Place excavated material on the cropland 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.
- Maintain vegetation on steep back slope embankments to prevent sheet and rill erosion or gullyng.
- Control all trees, woody cover and noxious weeds from the embankment areas by hand, mechanical or chemical means. Only use chemicals recommended for this purpose.
- Repair all broken or damaged inlets and underground outlets as soon as physically possible.

- Maintain effective conservation treatment of the contributing watershed to prevent excessive siltation and the resulting loss of capacity in the basin.