

**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 constructed across the slope of minor watercourses to form a sediment trap and water detention basin with a stable outlet.

**PURPOSE**

This practice may be applied as part of a resource management system for one or more of the following purposes:

- To reduce watercourse and gully erosion
- To trap sediment
- To reduce and manage onsite and downstream runoff

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to sites where:

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

Do not use this standard in place of terraces. Where the ridge and/or channel extends beyond the detention basin or level embankment, use Conservation Practice Standard (600), Terrace or (362) Diversion as appropriate.

**CRITERIA**

**General Criteria Applicable To All Purposes**

Install Water and Sediment Control Basins as part of a conservation system that adequately addresses resource concerns both above and below the basin. 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.

**Utilities and Permits.** The landowner shall be responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

The landowner shall obtain all necessary permissions from regulatory agencies, including the Illinois Department of Agriculture, US Army Corps of Engineers, US Environmental Protection Agency, Illinois Environmental Protection Agency and Illinois Department of Natural Resources – Office of Water Resources, or document that no permits are required.

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

**Location.** Locate Water and Sediment Control Basins to control erosion in drainage ways. Basins may be installed singly or in series as part of system. Adjust the location to fit the topography, maximize storage and accommodate farm equipment and farming operations.

**Earth Embankment.** Water and sediment control basin cross sections shall be as defined for Conservation Practice Standard 600 - Terrace, except that effective top widths shall be as shown in Table 1. Construct embankments at least 5% greater than design height to allow for settlement. Measured from natural ground at centerline of the embankment, the maximum settled height of the embankment must be 15 feet or less.

Table 1. Minimum Top Width of Embankments

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

Design embankment slopes no steeper than 2 horizontal to 1 vertical. The sum of the horizontal components of the upstream and downstream slopes of the embankment must be 5 or greater. Design all slopes to be farmed no steeper than those on which farm equipment can be operated safely.

**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 if conditions warrant, seepage control. Refer to Conservation Practice Standard (378), Pond for criteria for foundation cutoff and seepage control.

**Capacity.** As a minimum, design Water and Sediment Control Basins with sufficient capacity to control the runoff from a 10-year frequency, 24-hour duration storm using a combination of flood storage and discharge through the outlet. Where basins are used for flood control or to protect other works of improvement, if warranted, use larger design storms appropriate to the risk.

In addition to the above storage, Water and Sediment Control Basins must have the capacity to store at least the anticipated 10-year sediment accumulation, or periodic sediment removal is required in the Operation and Maintenance Plan to maintain the required capacity.

**Outlets.** A Water and Sediment Control Basin must have an adequate outlet. The outlet must convey runoff water to a point where it will not

cause damage. Outlets can be underground outlets, pipe drop structures, soil infiltration, stabilized channels or a combination of outlet types.

If the basin is cropped, design the outlet so that the flow release time does not exceed the inundation tolerance of the planned crops. If sediment retention is a primary design goal, adjust the release rate according to sediment particle size so that sediment is retained in the basin. Refer to Conservation Practice Standard (620), Underground Outlet for design criteria for underground outlets.

Outlets can include auxiliary spillways above the primary storage to handle large storm flows. If an auxiliary spillway is used, add freeboard to the design height of the embankment to provide for the safe operation of the spillway. The freeboard shall be at least 0.5 ft. above the design flow depth through the auxiliary spillway. Auxiliary spillways must not contribute runoff to lower Water and Sediment Control Basins unless the lower basins are designed to handle the runoff. Refer to Conservation Practice Standard (378), Pond for criteria to design auxiliary spillways.

**Topsoil.** Where necessary to restore or maintain productivity, spread topsoil over areas disturbed by construction. Topsoil can be salvaged and stockpiled from the site of the Water and Sediment Control Basin prior to construction.

**Vegetation.** After construction of the Water and Sediment Control Basin, revegetate disturbed areas that will not be cropped as soon as possible. In non-cropland settings other erosion protection such as gravel or organic mulches can also be used.

Refer to Conservation Practice Standard (342), Critical Area Planting for criteria on seed selection, seedbed preparation, fertilizing and seeding.

## CONSIDERATIONS

Water and Sediment Control Basins can be spaced at intervals down a slope, similar to terraces, in order to control erosion. Refer to Conservation Practice Standard (600), Terraces for methods to determine spacing. Additional conservation measures may be needed in the water course between basins to prevent erosion.

When choosing the location of a Water and Sediment Control Basin be sure to consider the extent of ponding that will occur from the basin. If the basin will cause water to pond near or across property lines both land owners should agree in writing on the elevation and expected duration of ponding.

The soil survey can be a valuable resource when planning and designing water and sediment control basins. The soil survey can identify potential problems such as the presence of limiting layers to plant growth in the soil profile. Field investigations can then identify problem areas to avoid such as shallow bedrock or dense, acid or saline layers that will adversely affect plant growth if construction brings them into the root zone.

Sediment retention within the basin can be enhanced by using flow deflectors, inlet and outlet selection, and by increasing the length to width ratio of the basin.

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.

Underground outlets from Water and Sediment Control Basins can provide a direct conduit to receiving waters for contaminated runoff from crop land. To reduce the impact of this runoff, Water and Sediment Control Basins should be installed as part of a conservation system that includes such practices as grassed waterways, contouring, a conservation cropping system, conservation tillage, nutrient and pest management, crop residue management and filter areas to reduce or mitigate contaminated runoff.

Seasonal water sources can be very important for migratory waterfowl and other wildlife. Partially blocking the outlet of a basin during non-cropping times of the year will allow water to pond in the basin to provide water for wildlife. Refer to Conservation Practice Standard (646) Shallow Water Development and Management for information on managing seasonal water sources for wildlife.

The construction of a Water and Sediment Control Basin can disturb large areas and potentially affect cultural resources. Be sure to follow state cultural resource protection policies before construction begins.

The construction of Water and Sediment Control Basins can introduce steep and potentially dangerous slopes into crop fields. When designing Water and Sediment Control Basins that will be farmed, choose flat slopes that will be safe for operating farm equipment. Where steep slopes are unavoidable, make sure that the farmer is aware of the location of the basin and the potential danger.

## PLANS AND SPECIFICATIONS

Prepare plans and specifications for Water and Sediment Control Basins that describe the requirements for applying the practice according to this standard. As a minimum, the plans and specifications shall include:

- A plan view of the layout of the Water and Sediment Control Basin system.
- Typical cross sections of the basin(s).
- Profile(s) of the basin(s).
- Details of the outlet system.
- For underground outlets, details of the inlet and profile(s) of the underground outlet.
- Seeding requirements, if needed.
- Construction specifications that describe in writing site-specific installation requirements of the Water and Sediment Control Basin system.

## OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for the operator. The minimum requirements to be addressed in the operation and maintenance plan are:

- Periodic inspections, especially immediately following significant runoff events.
- Prompt repair or replacement of damaged components.
- Maintenance of basin ridge height and outlet elevations.

- Removal of sediment that has accumulated in the basin to maintain capacity and grade.
- Regular cleaning of inlets for underground outlets. Repair or replacement of inlets damaged by farm equipment. Removal of sediment around inlets to ensure that the inlet remains the lowest spot in the basin.
- Where vegetation is specified, provide regular mowing and control of trees and brush. Vegetative disturbance should be scheduled to avoid the peak nesting season.
- Notification of hazards about steep slopes on the basin.

## **REFERENCES**

USDA, NRCS. National Engineering Handbook, Part 650 Engineering Field Handbook, Chapters 6, 8, 14.

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION  
WATER AND SEDIMENT CONTROL BASIN**

**Scope**

The work shall consist of constructing the basin channel and ridge, and excavating, filling and shaping as required by the construction plans.

**Location**

The location of the water and sediment control basin shall be as shown on the construction plans or as staked in the field.

**Site Preparation**

All dead furrows, ditches, and gullies shall be filled prior to or as a part of construction. Old terraces, fencerows, brush, and tall standing vegetation shall be removed from the area occupied by the terrace ridge and the area from which the earthen construction material will be taken.

For fill heights of 6 feet and greater, the foundation area of the ridge will be thoroughly scarified to a minimum depth of 4 inches before placement of the fill material and before moisture is added, if necessary, so that the first layer of fill material can be bonded to the foundation.

**Material**

Earth fill material shall be free from frozen particles, roots, sod, brush, and other objectionable materials that might endanger the performance of the basin. The fill material shall have no rock particles larger than 3 inches in diameter.

The moisture content of the earth fill material shall be sufficient to permit satisfactory compaction. The moisture content can generally be considered as satisfactory if the fill material can be molded into a round ball between the hands without readily separating or squeezing out free water.

For broadbase ridges, required fill material shall come from the channel unless otherwise specified. For grassed back and narrow base ridges, fill material shall come from the downhill side of the ridge, except for cuts that are required to construct the channel to the specified grade and cross section.

**Placement of Earthfill**

All ridges shall be constructed to the planned alignment, grade and cross-section shown on the

plans, with the specified overfill for settlement and the channel graded to drain reasonably well. Any ditch or depression at the bottom of the back slope shall be filled and smoothed so that drainage will be away from the ridge. All fill cross sections shall conform to that specified for all stations. The ridge shall be compacted by routing the hauling and spreading equipment over the fill material in such a manner that the entire surface of the completed ridge will be traversed by not less than one tread/track of equipment. The channel, side slopes, ridge, cut areas, and fill areas shall be finished to a smoothness so the surface can be readily traveled upon by farm-type equipment.

When topsoil salvaging is specified, areas to receive topsoil shall be brought to within 4 inches of final grade, or as specified on the construction plans. Topsoil shall be evenly placed and spread over specified area to bring it to final grade.

**Outlets**

Underground tile outlets are to be installed at locations shown on the drawings or as staked in the field. Provisions must be made to prevent piping if underground conduits are located under ridges. Mechanical compaction, water packing, trench sidewall sloping, and installation and backfill of conduit trenches early enough to allow adequate settlement are methods that can be used. Refer to Construction Specifications 620, Underground Outlet, for detailed installation requirements.

**Vegetation**

A protective cover of vegetation shall be established on steep back slope and narrow-based terraces when specified in the design plans. Refer to Construction Specification 342, Critical Area Seeding, for detailed seeding requirements.

**Utilities**

The landowner shall be responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

**NATURAL RESOURCES CONSERVATION SERVICE**  
**ILLINOIS OPERATION AND MAINTENANCE**  
**WATER AND SEDIMENT CONTROL BASIN**

**An operation and maintenance plan shall be developed and established by the producer to keep the water and sediment control basin system functioning as intended:**

- Inspect after significant storm events and at least annually to identify repair and maintenance needs. Promptly repair or replace damaged components.
- Avoid damage to riser inlets by farm equipment. Mark risers so they are visible to prevent damage by equipment.
- Water and sediment control basin (WASCOB) ridges, especially those with steep backslopes, are potentially hazardous. All farming and maintenance operations should be executed with caution to reduce the chance of damage to machinery and injury to the operator.
- Remove accumulated sediment in the channel periodically and place on the ridge. Repair any erosion that occurs in channel. Make sure that the inlet is located at the lowest spot in the basin.
- Check frequently for burrowing animals. When found, remove the burrowing animals, replace embankment materials and reseed.
- Remove debris and trash accumulated around riser inlets that might impair water flow. Clear debris from orifice plate in riser, if applicable.
- Repair any settlement or piping along drain tubing promptly.
- Remove trash from the outlet and maintain animal guard.
- Regularly mow and fertilize desired vegetation. Time the first mowing for after nesting birds have hatched (about August 15). Remove excess top growth. Remove risers when burning warm season grasses.
- Control tree and bush growth by hand cutting, mowing, or chemicals. Avoid damaging grass with herbicide sprays.
- Maintain proper width, depth and shape of vegetated emergency spillways. Fill and seed any rills that occur.

**Additional Details:**

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