

NATURAL RESOURCES CONSERVATION SERVICE
VIRGINIA 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.

PURPOSES

A water and sediment control basin may be established to:

- Improve the 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 are controlled by other conservation practices.
4. Runoff and sediment damage land and improvements.

5. Soil and site conditions are suitable for installation.
6. Adequate outlets are available or can be provided.

CRITERIA

GENERAL CRITERIA

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, Virginia Conservation Practice Standards *Terrace (Code 600)* or *Diversion (Code 362)* must be applied as appropriate.

The resource management system must reduce soil loss in the interval above and below the basin to prevent excessive maintenance and operations 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 basin shall be designed so that flooding, infiltration and seepage do not damage crops or create other problems.

This practice must conform to all federal, state and local laws and regulations, especially those involving water rights, dam construction, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

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

SPACING

Water and sediment control basins must generally be spaced at terrace intervals found in the Virginia Conservation Practice Standard *Terrace (Code 600)*. However, spacing may be adjusted to fit site conditions. The grade of the watercourse between basins shall be considered, and the spacing set to prevent watercourse or gully erosion between the basins.

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.

CROSS SECTION

For portions of the basin controlling only water flowing at a depth of 3 feet or less, embankment slopes must be 2 horizontal to 1 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 on either slope. Slopes may be vegetated or flattened to permit cropping.

The constructed embankment height must be at least 5 percent greater than the design height to allow for settlement. The settled height must be 15 feet or less measured from natural ground at the centerline of the embankment.

Minimum effective top widths are shown below:

<u>Fill Height (feet)</u>	<u>Effective Top Width (feet)</u>
0-5	3
5-10	6
10-15	8

FOUNDATION CUTOFF

Where the fill height is greater than 4 feet, a cutoff trench shall be provided. The cutoff trench shall be excavated to a minimum depth of 4 feet below the existing ground level or to bedrock, whichever is less. The bottom width of the cutoff trench shall be wide enough to accommodate excavation, backfill and compaction operations and shall not be less than 4 feet. The side slopes shall be 1:1 or flatter. The most impervious material available shall be used as backfill in the cutoff trench.

CAPACITY

The basin shall be large enough to store the runoff from a 10-year frequency 24-hour duration storm plus the anticipated 10-year sediment accumulation 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 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 basin shall have the ends closed to the elevation needed for design capacity. A maximum of 1 foot of freeboard may be added to the design height to provide for an auxiliary spillway around one or both ends of the basin. When such an auxiliary spillway is used, it must not contribute runoff to a lower basin in series not similarly provided with an auxiliary spillway.

OUTLETS

Water and sediment control basins must have spillways, underground outlets, or soil infiltration outlets that conform to Virginia Conservation Practice Standards *Pond (Code 378)*, *Grassed Waterway (Code 412)*, *Diversion (Code 362)* or *Underground Outlet (Code 620)* as appropriate.

VEGETATION

Slopes and disturbed areas that are not to be farmed shall be established to suitable erosion-resistant vegetation as soon as practical after construction. Environmental quality and wildlife food and habitat shall be considered in selecting the species of vegetation. If soil or climate 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 Virginia Conservation Practice Standards *Critical Area Planting (Code 342)* and *Mulching (Code 484)*. Where it is necessary, topsoil may be

stockpiled and spread over disturbed areas to facilitate restoration of productivity.

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.

Consider effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation and groundwater recharge. Consider effects on the volume of downstream flow on the environmental, social and economic conditions.

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. Selection of pond width should consider the types of equipment available for sediment removal from the basin as well as equipment required for initial construction.

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. Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned. Field boundaries and row lengths should also be considered in planning basin location and row direction.

This practice can be used to develop 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.

Consider effects on erosion, movement of sediment, pathogens, and soluble and sediment-attached substances that could be carried by runoff.

Effects on the water table downstream and the results of changes of vegetative growth should be evaluated.

Consider the use of pipe outlets at sites with long duration small flows and on basins with highly erosive soils. Keep velocities at spillways or outlets as low as possible to avoid resuspension of sediments. Consider wide shallow spillways to reduce water velocities.

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

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.

Plans and specifications shall be prepared to show site specifics. The drawings and specifications shall show location, cross sections of excavations and embankments, applicable piping and spillway details, applicable seeding requirements and any special requirements for spoil disposal.

OPERATION AND MAINTENANCE

A site specific Operation and Maintenance 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.

REFERENCES

1. NRCS Engineering Field Handbook, Part 650, Chapters 6, 10 and 11.
2. Virginia Erosion and Sediment Control Handbook.
3. NRCS General Manual 420, Part 401.

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Approved Practice Narrative

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638 D1 Water and Sediment Control
Basin: A water and sediment control basin shall be installed to reduce the peak rate of flow downslope and the content of the sediment in the flow.

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