

NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE STANDARD

WATER AND SEDIMENT CONTROL BASIN (NUMBER)

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 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 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 **and other conservation practices**. Where a ridge and/or channel extend beyond the detention basin or level embankment, **Field Office Technical Guide (FOTG), Section IV – Practice standards and Specifications for Terrace (Code 600), or Diversion (Code 362)** must be applied as appropriate.

CRITERIA

General Criteria Applicable To All Purposes

This practice applies to structures that have a settled fill height of 15 feet or less, and based on a 10-year, 24-hour storm runoff. The structure shall have a storage times height of less than 10-acre feet. Larger structures shall be designed using requirements of Field Office Technical Guide (FOTG), Section IV – Practice Standards and Specifications for Pond (Code 378).

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 may 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.

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

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

NOTE: This type of font (**AaBbCcDdEe 123..**) indicates NRCS National Standards.
This type of font (**AaBbCcDdEe 123..**) indicates Montana Supplement.

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 **Field Office Technical Guide (FOTG), Section IV – Practice standard and Specification for Terrace (600)**]. Adjust spacing or include other measures needed to prevent erosion in the watercourse between 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 flowing water 3 feet deep or less, 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.

Earth Embankment. Minimum effective top widths are given in Table 1. Constructed embankment height must be at least 5% 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	3
5 - 10	6
10 –15	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 **Field Office Technical Guide (FOTG), Section IV – Practice standard and Specification for Pond (Code 378)**.

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. **A maximum of 1.0 foot of freeboard may be added to the design height to provide for an emergency spillway around one or both ends of the basin.**

Unless provisions are made for periodic cleaning the basins must have capacity to store at least the anticipated 10-year sediment accumulation.

Basin ends must be closed to an elevation that will contain design capacity. 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.

Outlets. Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to **Field Office Technical Guide (FOTG), Section IV – Practice standards and Specifications for Pond (Code 378)**, **Grassed Waterway (Code 412)**, **Diversion (Code 362)** or **Underground Outlet (Code 620)** 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.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food and habitat needs. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with **Field Office Technical Guide (FOTG), Section IV – Practice standards and Specifications for Critical Area Planting (Code 342)** and **Mulching (Code 484)**.

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.

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.

The detention time for basins should be a minimum of four hours and a maximum of 48 hours.

Detention time shall be based on local site conditions.

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 must 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.

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

Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned.

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.

As required by the landowner to control noxious weeds and undesired vegetation, all construction equipment used in the installation of this practice shall be pre-washed and cleaned prior to mobilization to construction site.

Permits: One or more of various State and/or Local permits will likely be required.

Consult the web site:

http://dnrc.mt.gov/permits/stream_permitting/guide.asp for a list of permits required for various types of construction activities in Montana.

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. **Each inlet and outlet shall be kept clean and free of sediment deposits. Pipe ends, which are damaged by farm machinery, must be replaced or repaired immediately.**

Within the maintenance plan, a program shall be established to maintain vegetation cover while controlling noxious weeds or other undesired vegetation.