

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

SEDIMENT BASIN

(No.)

CODE 350

DEFINITION

A basin constructed to collect and store debris or sediment.

PURPOSE

- Preserve the capacity of reservoirs, wetlands, ditches, canals, diversion, waterways, and streams.
- Prevent undesirable deposition on bottom lands and developed areas.
- Trap sediment originating from construction sites or other disturbed areas.
- Reduce or abate pollution by providing basins for deposition and storage of silt, sand, gravel, stone, agricultural waste solids, and other detritus.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where physical conditions or land ownership preclude treatment of a sediment source by the installation of erosion-control measures to keep soil and other material in place or where a sediment basin offers the most practical solution to the problem.

CRITERIA

Sediment basin design and construction shall comply with all applicable federal, state, and local laws and regulations.

The capacity of the sediment basin shall equal the volume of sediment expected to be trapped at the site during the planned useful life of the basin or the improvements it is designed to protect. If it is determined that periodic removal of sediment will be practicable, the capacity may be proportionately reduced.

The design of dams, spillways, and drainage facilities shall be according to South Dakota (SD) Natural Resources Conservation Service (NRCS) Conservation Practice Standard (CPS) Pond (378), CPS Grade Stabilization Structure (410) or according to the requirements in NRCS TR-60 (Earth Dams and Reservoirs), as appropriate for the class and kind of structure being considered.

Temporary basins having drainage areas of five acres or less and a total embankment height of five feet or less may be designed according to SD NRCS CPS Water and Sediment Control Basin (638).

All disturbed areas shall be treated as soon as possible after construction ends to control erosion and prevent excess sediment from leaving the site.

Provisions shall be made for dewatering sediment pools if necessary for sediment removal, safety, and vector control.

Fencing and other safety measures shall be installed as necessary to protect the public.

Due consideration shall be given to good visual resource management.

Additional Criteria For Sediment Basins Included in Animal Waste Management Systems

Structures designed under this standard may be used to separate agricultural waste solids from liquids as a component of an agricultural waste management system (AWMS).

Sediment basin embankments, foundations, and fabricated structures (concrete, metal, wood) must meet structural requirements outlined in the CPS Waste Storage Facility (313).

Liquids and solids removed or discharged from the sediment basin must be delivered to a waste storage facility, waste treatment lagoon, or other appropriate component of the AWMS. Solids removed from the sediment basin and land applied must be land applied in accordance with the SD NRCS CPS Nutrient Management (590).

Design Storage Volume

Specific design storage volume criteria, which includes both solids and liquid storage is listed below. The minimum elevation of the top of the settled embankment shall be one foot above the elevation within the sediment basin that contains the entire design storage volume.

Sediment basins must be designed to allow for sediment removal using available equipment. Sediment basins that are a component of a AWMS must provide the minimum solids capacity as determined by the following:

$$\text{Volume of Solids} = \frac{(0.5\text{ft}^3)(\text{No. 1000lb Animals})(\text{Confinement Days})}{\text{No. of Feedlot Cleanings per year}} \times (\text{S.F.})$$

S.F. = Slope Factor: 3% or less = 0.25
3% to 6% = 0.50
6% to 10% = 0.75
over 10% = 1.00

Sediment basin drainage structures (screen with 1 inch maximum opening size, perforated riser, slatted wall, v-notch weir etc.,) or filtered pumping systems must be provided to remove liquids from sediment basins within 72 hours or less of runoff events.

The NRCS Curve Number (CN) method must be used in computing runoff from feedlot surfaces and other contributing runoff areas. The soil cover complex number (runoff CN) used in computing runoff from feedlot surfaces shall not be lower than 97 for paved lots and 90 for unpaved lots.

The required design storm event for animal feeding operations that commenced construction (or had significant expansion) after February 12, 2003, that require permitting through SD Department of Environment and Natural Resources (DENR), and that involve waste from swine, poultry, or veal shall be the 100-year frequency, 24-hour duration storm event. Systems that do not meet the above criteria shall use the 25-year frequency, 24-hour duration storm event.

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The required design storage volume must be one of the following:

1. The entire runoff volume from the design storm event with the design solids volume contained in the sediment basin.
2. Flood routing the design storm event through the sediment basin with the design solids volume contained in the sediment basin. The maximum liquid elevation during the flood routing is considered the top of the design storage volume.

Storage capacity for sediment basins used for other purposes will follow the storage criteria as described in the sections below for either vegetative treatment areas (VTA) or temporary sediment basins.

Additional Criteria for Sediment Basins for Vegetated Treatment Areas

Structures designed under this standard may be used to separate solids prior to application of runoff to a VTA.

Sediment basin embankments, foundations, and fabricated structures (concrete, metal, wood) must meet the structural requirements outlined in the CPS Waste Storage Facility (313).

Liquids discharged from the sediment basin must be delivered to a VTA. Solids removed from the sediment basin and land applied must be land applied in accordance with the SD NRCS CPS Nutrient Management (590).

Controlled outflow from the sediment basin with the use of shut-off valves, pumps, etc. to the VTA is encouraged, but not required. Application of liquids from the sediment basin to the VTA should be done as soon as possible. During periods of wet conditions or dormant vegetation within the VTA, storage of liquids for more than 72 hours may be necessary to properly manage the timing of application of liquids to the VTA.

Design Storage Volume

The criteria for the design storage volume for a sediment basin with outflow to a VTA shall have the same design storage volume as a sediment basin as part of an AWMS, except

that the required design storage volume must be one of the following:

1. For sediment basins that have controlled outflow to the VTA with the use of shut-off valves, pumps, etc., the design liquid volume is the entire runoff volume from the design storm event with the design solids volume contained in the sediment basin.
2. For sediment basins that have uncontrolled outflow to the VTA, the design storage volume can either be the entire runoff volume from the design storm event with the design solids volume contained in the sediment basin or flood routing the design storm event through the sediment basin with the design solids volume contained in the sediment basin. If using the flood routing method, the maximum liquid elevation during the flood routing is considered the top of the design storage volume.

Storage capacity for sediment basins used for other purposes will follow the storage criteria as described in the sections for either AWMS or temporary sediment basins.

Additional Criteria for Temporary Sediment Basins

Temporary sediment basins are used at construction and other sites where the basin will be used for periods of 2 years or less, the drainage area is 10 acres or less, and where failure of the embankment (if any) would not cause loss of life or damage to high value property.

Temporary sediment basins must provide at least 3,600 cubic feet of sediment storage for each acre of sediment contributing drainage area. These sediment basins must be cleaned when effective sediment storage drops below 0.2 drainage area inches.

Minimum effective top widths are given in Table 1. Maximum design height of the embankment must be 15 feet or less measured from natural ground at centerline of the embankment.

Table 1. Minimum Embankment Top Width

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

Portions of embankments designed to impound more than three foot depth of water must include foundation treatment and seepage control as required by the CPS Pond (378).

Where water will be impounded adjacent to the embankment to a depth exceeding 3 feet, the embankment must not be overtopped by runoff from a 10-year frequency, 24-hour duration storm.

At the end of the period of need for the structure, the structure should be removed and the area graded and seeded as appropriate.

Storage capacity for sediment basins used for other purposes will follow the storage criteria as described in the sections for either AWMSs or VTAs.

CONSIDERATIONS

Large sediment basins may have an effect on the peak discharge rate from a watershed. Planners should consider this, and take steps to mitigate any potential negative effects this may have on riparian habitat downstream from the structure.

Visual aesthetics may be a concern, especially in urban or suburban areas. To address these concerns, the basin could be designed to blend with the surrounding topography, or plantings could be proposed to screen the view from surrounding homes or buildings.

The nesting success and survival rate of ground-nesting species will increase if mowing is delayed until after the nesting season during operation and maintenance operations.

Using native species for revegetation will increase habitat diversity.

Considerations for Waste Management

Where possible, the sediment basin surface area should be at least five percent of the size of the sediment contributing area for effective removal of light weight sediment from liquids. Sediment basin bottoms should be relatively flat with positive slope toward the sediment basin outlet where possible, to facilitate sediment removal.

All known outlet structure designs for agricultural waste settling basins can become plugged or frozen and should be designed for easy cleaning.

Consider sediment basins that have concrete bottoms with curbs or walls (for machine buckets to push against while loading) which will allow sediment removal in less than ideal weather.

Consider exclusion of livestock from the sediment basin to reduce the chance of damage to the embankments and outlet/drainage structures.

If earth basins are used, consider including two basins so one can dry out for cleaning while the other is being used to settle solids.

Sediment basins for agricultural waste require continuing management and maintenance. They should have solids removed frequently to function properly.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment basins shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Provisions for controlling erosion and reducing sediment loss will be included. Specify rates of seed, mulch, and fertilizer, appropriate planting dates, and method(s) of establishment.

OPERATION AND MAINTENANCE

An Operation and Maintenance Plan shall be prepared for use by the owner/operator. The plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly.

For AWMSs, the plan must include the design schedule of required sediment basin sediment removal operations, and lot cleanings.

The sediment basin will be inspected after major storms for damage that may affect its function and performance. Any damage will be promptly repaired.

Mow as need to maintain adequate vegetative cover and to prevent the establishment of undesirable species.