University of Missouri Extension

G1528, Reviewed October 1993

Design Criteria For Debris Basins

James Steichen
Department of Agricultural Engineering

A debris basin provides storage for silt, sand, gravel, or other debris moving from adjacent lands. The debris causes damage when it moves with runoff water from its source on land adjacent to a landowner's farm and deposits as sediment in ponds, waterways, diversions, bottomland fields or other developed areas. The landowner has no means of controlling the movement of the debris at its source on land adjacent to his or her farm and therefore must develop the debris basin on his or her own land to control the sediment before it causes damage.

Description

The debris basin consists of an earth dam or other barrier constructed across a drainageway or other suitable location for collecting sediment. The dam is provided with properly designed spillways to dispose of excess runoff water at safe velocities that will not damage the dam or other improvements.

The sediment basin is a small pool of water through which the runoff from the adjacent land must flow. As the silt-laden runoff flows through the pool, it slows down and loses its capacity to carry the larger silt particles, which drop out into the pool.

Capacity of debris basin

The capacity of the basin should be not less than the volume of sediment expected to be deposited in the pool during the planned useful life of the proposed improvements it is designed to protect. The capacity may be reduced where it is determined that periodic removal of the debris will be practical. In most cases, the basin should have a capacity to contain an estimated 10-year sediment yield from the watershed area. In no case should the capacity be less than a two-year yield. For cultivated land, the Universal Soil Loss Equation may be used in determining the soil loss. Use the following guidelines and Table 1 for determining the sediment yield from drainage areas of 100 acres or less.

Table 1
Sediment storage capacity for debris basin having drainage area of 100 acres or less (based on 10-year sediment storage capacity)

Watershed condition	Watershed drainage area	Sediment storage capacity
A	5 acres	0.6 acre feet
A	10 acres	1.0 acre feet
A	20 acres	1.6 acre feet
A	30 acres	2.1 acre feet
A	40 acres	2.6 acre feet

A	50 acres	3.0 acre feet
A	60 acres	3.4 acre feet
A	70 acres	3.7 acre feet
A	80 acres	4.1 acre feet
A	90 acres	4.4 acre feet
A	100 acres	4.8 acre feet
B	5 acres	0.4 acre feet
B	10 acres	0.6 acre feet
B	20 acres	1.0 acre feet
B	30 acres	1.3 acre feet
B	40 acres	1.6 acre feet
B	50 acres	1.9 acre feet
B	60 acres	2.1 acre feet
B	70 acres	2.3 acre feet
B	80 acres	2.6 acre feet
B	90 acres	2.8 acre feet
B	100 acres	3.0 acre feet
C	5 acres	0.2 acre feet
C	10 acres	0.3 acre feet
C	20 acres	0.4 acre feet
C	30 acres	0.5 acre feet
C	40 acres	0.6 acre feet
C	50 acres	0.7 acre feet
C	60 acres	0.8 acre feet
C	70 acres	0.9 acre feet
C	80 acres	1.0 acre feet
C	90 acres	1.1 acre feet
C	100 acres	1.2 acre feet

Condition A (high sediment yield)
Area may be similar to one of the following:

- Continuous row crop farmed with the field boundary
- Very little vegetative cover and with considerable active gully erosion.

Condition B (medium sediment yield)
Area may be similar to one of the following:

- Half of the area meets Condition A and the remaining half is in permanent vegetative cover or small grain
- Continuous cropland farmed on the contour
- Rotation cropland with small grain and meadow
- Non-cropland area with very little vegetative cover and no active gully erosion
- Good permanent vegetative cover with very active gully erosion

Condition C (low sediment yield)
Area is in permanent vegetative cover with minor gully erosion.

This publication was prepared jointly by state and field staffs of the College of Agriculture, MU, and Natural Resources Conservation Service. Original authors were Otto Griessel, NRCS (retired), and R.P. Beasley, MU (deceased).

G1528, reviewed October 1993

Related MU Extension publications

- G1510, Design Criteria for Canopy and Hood Inlet Spillways
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1510
- G1514, Design Criteria for Formless Concrete Flumes
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1514
- G1518, Estimating Peak Rates of Runoff From Small Watersheds
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1518
- G1520, Discharge Capacity Tables for Canopy, Hood, Morning Glory and Drop Inlet Spillways
  http://extension.missouri.edu/publications/DisplayPub.aspx?P=G1520

Order publications online at http://extension.missouri.edu/explore/shop/ or call toll-free 800-292-0969.

UNIVERSITY OF MISSOURI Extension

■ Issued in furtherance of the Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Director, Cooperative Extension, University of Missouri, Columbia, MO 65211
■ an equal opportunity/ADA institution ■ 573-882-7216 ■ extension.missouri.edu