

## **University of Missouri Extension**

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# **Design Criteria For Debris Basins**

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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)

<b>Watershed condition</b>	<b>Watershed drainage area</b>	<b>Sediment storage capacity</b>
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.

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### **Related MU Extension publications**

- G1510, Design Criteria for Canopy and Hood Inlet Spillways  
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- 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  
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