Water and Sediment Control Basin (WASCOB) (No.) 638

DEFINITION

An earth embankment or a combination ridge and channel constructed across the slope of minor watercourses to form a sediment trap and water detention basin *with a stable outlet*.

PURPOSE

This practice may be applied as part of a *resource management* system for one or more of the following purposes:

- To reduce watercourse and gully erosion
- To trap sediment
- To reduce and manage onsite and downstream runoff

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 damages land and works of improvements.
5. Adequate outlets can be provided.

Do not use this standard in place of terraces. Where the ridge and/or channel extends beyond the detention basin or level embankment, use NRCS conservation practice standards for Terrace (600) or Diversion (362), as appropriate.

CRITERIA

General Criteria Applicable to All Purposes

WASCOBs shall be planned, designed, and installed to meet all federal, state, local and tribal laws and regulations.

Install WASCOBs as part of a conservation system that adequately addresses resource concerns both above and below the basin. Where land ownership or physical conditions preclude treatment of the upper portion of a slope, a WASCOB may be used to separate this area from, and permit treatment of the lower slope.

Location. *Locate WASCOBs to control erosion in drainage ways. Basins may be installed singly or in series as part of system. Adjust the location to fit the topography, maximize storage and accommodate farm equipment and farming operations.*

Spacing. The spacing shall be set to prevent watercourse or gully erosion between the WASCOBs. The maximum spacing for WASCOBs used for erosion control shall be determined by one of the following methods:

1.) V.I. = xs + y
2.) H.I. = (xs + y)(100/s)

Where:

V.I. = Vertical Interval in Feet
H.I. = Horizontal Interval in Feet
x = 0.8 north of Pentwater-Tawas City line
x = 0.7 south of Pentwater-Tawas City line
s = land slope, percent
y = a variable with values from 1.0 to 4.0
Values of y are influenced by soil erodibility, cropping system, and crop management practices.
y = 1.0 for erodible soils with tillage systems that provide little or no residue cover during periods of intense rainfall.
y = 4.0 for erosion-resistant soils with tillage systems that provide a large amount of residue cover (1.5 tons/acre straw equivalent) on the surface.
y = 2.5 where one of the above factors is favorable and the other is unfavorable.

Other y values between 1.0 and 4.0 may be used according to the estimated quality of the factors.

Spacing may be increased up to 20% to provide better alignment or location, or to adjust for farm machinery. In no case shall the maximum horizontal spacing exceed that shown in Table 1 for the conditions shown. The minimum horizontal spacing shall be 90 feet.

Adjust spacing or include other measures needed to prevent erosion in the watercourse between basins.

The system of basins and row arrangements shall be parallel where possible, and spaced to accommodate farm machinery widths and crop row spacing. Spacing design must consider embankment slope lengths, top width, and surface inlet location.

Table 1. – Maximum horizontal spacing for WASCOBS

Slope, percent	Spacing, feet (35<R<175) R = Rainfall Factor	Spacing, feet (with Contour Stripcropping)
0 to 2	500	N/A
>2 to 6	400	N/A
>6 to 9	300	N/A
>9 to 16	250	N/A
>12	200	150

Alignment. The embankment orientation and row direction shall be approximately perpendicular to the land slope to permit contouring to the greatest extent possible. Embankment end closure sections suitable to farm and not parallel to the main dike section may be used. The arrangement should permit farmability without excessive point rows or sharp curves.

Earth embankment. Minimum top widths are given in Table 2. Construct embankments at least 5% greater than design height to allow for settlement. Measured from natural ground at the centerline of the embankment, the maximum settled height of the embankment must be 15 feet or less.

Table 2. Minimum Top Width of Embankments

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

Design embankment slopes no steeper than 2 horizontal to 1 vertical. The sum of the horizontal components of the upstream and downstream slopes of the embankment must be 5 or greater. *Design all slopes to be farmed no steeper than those on which farm equipment can be operated safely.* Slopes to be cropped should be 8H:1V or flatter.

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 *if conditions warrant,* seepage control. Refer to NRCS conservation practice standards for Pond (378) for criteria for foundation cutoff and seepage control.

Capacity. As a minimum, design WASCOBs with sufficient capacity to control the runoff from a 10-year frequency, 24-hour duration storm using a combination of flood storage and discharge through the outlet. Where basins are used for flood control or to protect other works of improvement, if warranted, use larger design storms appropriate to the risk.

In addition to the above storage, WASCOBs must have the capacity to store at least the anticipated 10-year sediment accumulation, or periodic sediment removal is required in the *Operation and Maintenance Plan* to maintain the required capacity.

Outlets. A WASCOB must have an adequate outlet. The outlet must convey runoff water to a point where it will not cause damage. Outlets can be underground outlets, pipe drop structures, soil infiltration, stabilized channels or a combination of outlet types. The outlet shall conform to the appropriate NRCS conservation practice standard.

If the basin is cropped, design the outlet so that the flow release time does not exceed the inundation tolerance of the planned crops. *If sediment retention is a primary design goal, adjust the release rate according to sediment particle size so that sediment is retained in the basin.*

Outlets can include auxiliary spillways above the primary storage to handle large storm flows. If an auxiliary spillway is used, add freeboard to the design height of the embankment to provide for the safe operation of the spillway. *The freeboard shall*

be at least 0.5 ft. above the design flow depth through the auxiliary spillway. Auxiliary spillways must not contribute runoff to lower WASCOBs unless they are designed to handle the runoff. *Refer to NRCS conservation practice standard for Pond (378) for criteria to design auxiliary spillways.*

Topsoil. Where necessary to restore or maintain productivity, spread topsoil over areas disturbed by construction. Topsoil can be salvaged and stockpiled from the site of the WASCOB prior to construction.

Vegetation. After construction of the WASCOB, revegetate disturbed areas that will not be cropped as soon as possible. In non-cropland settings other erosion protection such as gravel or organic mulches can also be used.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food and habitat needs. Use vegetation adapted to the site that will accomplish the desired purpose. Preference shall be given to native species in order to reduce the introduction of invasive plant species; provide management of existing invasive species; and minimize the economic, ecological and human health impacts that invasive species may cause. If native plant materials are not adaptable or proven effective for the planned use, then non-native species may be used. Refer to the FOTG Section II, Invasive Plant Species, for plant materials identified as invasive species. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with NRCS conservation practice standards for Critical Area Planting (342) and Mulching (484).

CONSIDERATIONS

Consider the potential effects of installation and operation of WASCOBs on the cultural, archeological, historic and economic resources.

Underground outlets from WASCOBs can provide a direct conduit to receiving waters for contaminated runoff from crop land. To reduce the impact of this runoff, WASCOBs should be installed as part of a conservation system that includes such practices as grassed waterways, contouring, a conservation cropping system, conservation tillage, *nutrient* and *pest management*, crop residue management *and filter areas to reduce or mitigate contaminated runoff.*

Consider the extent of ponding that will occur from the basin. If the basin will cause water to pond near or across property lines both land owners should agree in writing on the elevation and expected duration of ponding.

Field investigations can identify problem areas to avoid such as shallow bedrock or dense layers that will adversely affect plant growth if construction brings them into the root zone.

Sediment retention within the basin can be enhanced by using flow deflectors, inlet and outlet selection, and by increasing the length to width ratio of the basin.

Field boundaries and row lengths should be considered in planning basin location and row direction.

Seasonal water sources can be very important for migratory waterfowl and other wildlife. Partially blocking the outlet of a basin during non-cropping times of the year will allow water to pond in the basin to provide water for wildlife. Refer to NRCS conservation practice standard Shallow Water Development and Management for Wildlife (646) for information on managing seasonal water sources for wildlife.

The construction of WASCOBs can introduce steep and potentially dangerous slopes into crop fields. When designing WASCOBs that will be farmed, choose flat slopes that will be safe for operating farm equipment. Where steep slopes are unavoidable, make sure that the farmer is aware of the location of the basin and the potential danger.

Excavations for fill material should be made in a manner that enhances the topography, basin storage capacity and suitability of the area for farming when possible.

PLANS AND SPECIFICATIONS

Plans and specifications for installing WASCOBs must conform to requirements of this standard and

must describe requirements for applying the practice and achieving its intended purpose.

Support data documentation requirements are as follows:

- Inventory and evaluation records
  - Assistance notes or special report
- Survey notes, where applicable
  - Design survey
  - Construction layout survey
  - Construction check survey
- Design records
  - Physical data, functional requirements and site constraints, where applicable
  - Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:
  - Location map
  - "Designed by" and "Checked by" names or initials
  - Approval signature
  - Job class designation
  - Initials from preconstruction conference
  - As-built notes
- Construction inspection records
  - Assistance notes or separate inspection records
  - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be developed for this practice. The O&M plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.