Sediment Control Practices	SMP-04 Temporary Sediment/Detention Basin

Symbol

DB

Description

Typically temporary sediment/detention basins require the construction of an embankment across the drainage path in order to create a pond to trap sediment and inhibit the potential of downstream flooding. Sediment basins are usually designed by a professionally licensed engineer.

Application

- For disturbed areas between 5 to 10 acres. Areas greater than 10 acres will require a design by a licensed professional engineer.
- Collect and store sediment from areas that have been cleared in preparation for construction.
- Used in areas where sediment-laden runoff may enter waterways.
- Suitable for almost all construction projects.

Design

- The sediment control basin should be designed by a professional engineer licensed in Kentucky using SEDCAD, or another suitable computer program.
- It is recommended that the dams be located in a natural drainageway in a deep construction that has a wide area upstream for ponding detained stormwater.
- The intent of this BMP is to trap sediment before it leaves the construction area.
- Construction phase performance goal is to reduce the total suspended solids by 80 percent for the 10-year, 24-hour storm, or provide a detention time of 24-48 hours for a 10-year 24-hour wet weather event.
- Provide a minimum storage capacity of 3600 cf per acre of bare soil. The maximum capacity for the impoundment must not exceed 10 acre-feet. If more impoundment capacity is needed, install basins in a series or site them to intercept tributary drainage areas.

Design (cont'd)

- The ratio of basin flow length to flow width is 2:1.
- Do not locate dams where a failure would result in severe property damage or danger to human life.
- Sediment basins should be designed or modified to drain down slowly for 2-4 days after a storm event. Modify the outlet if necessary to achieve the maximum detention time.
- Minimum drainage area is 5 acres; the maximum drainage area is 120 acres.
- Basin flow length should be at least two times the flow width; the longer, the better. Baffles constructed of filter fabric and metal posts can be used inside the basin to create a longer (e.g., serpentine) flow path between inlet(s) and the outlet.
- Basins that drain more than 10 acres can be designed as retention (rather than detention) basins (i.e. wet ponds). Design outlet to drain top of the pool farthest away from muddy inflows. Incorporating a sediment collection forebay is recommended to aid in maintenance.
- There are three components to the successful design of a sediment basin:
    - Embankment
    - Principal Spillway
    - Emergency Spillway

Embankment Recommendations

- Dam height should not exceed 20 feet.
- Slopes of the embankments for a Class 1 basin shall not be steeper than 3:1 on the upstream side, and not steeper than 5:1 on the downstream side of the basin, in order to allow the area to be safely mowed and maintained. (See SMP-05-01).
- Slopes on either side of the embankment of Class 2 or 3 basins shall not be steeper than 3:1 for, in order to allow the area to be safely mowed and maintained. (See SMP-05-01).
- Provide for a minimum of 1-foot of freeboard for a 100-year 6-hour wet weather event to the top of the embankment.
- The minimum width at the top of the embankment is 12-inches.
- Stabilize the slope with vegetation or rip rap.
- Antiseep collars around discharge pipe are required

Principal Spillway Requirements

- Provide a subsurface drain, a solid riser pipe, or both, with sufficient dewatering holes to allow sufficient detention time. Risers with one-half inch holes every 3 to 6 inches apart are recommended.
- No large holes or slots should appear in the lower two thirds of the riser. Risers with large openings can be modified as described below or wrapped with filter fabric to cover lower openings during the construction period.

Design (cont'd)

- During construction, risers should be modified with an inlet protection dike, pile of stone at the riser base, or other structure to provide longer ponding times (e.g., 1-2 days) for small flow events.
- The outlet pipe diameter shall be a minimum of 12-inches.
- Operational design goal is to reduce the peak flow to predevelopment levels for the 2-year and 10-year, 24-hour storms.
- Trash rack and anti-vortex device on the riser pipe are required.
- Prepare a stabilized apron for the outlet pipe.
- Provide a minimum of one foot of freeboard between the top of the riser pipe and the crest of the spillway.

Emergency Spillway Requirements

- Emergency spillway shall be designed to pass a 100-year 6-hour wet weather event, to the top of the embankment.
- Crest elevation at least one foot above the tip of the riser pipe.
- Rock used for the emergency spillway must be KYTC No. 2 or larger, depending on flow volumes and spillway slope.
- Emergency spillway energy dissipator must be extended at least 4 feet beyond the toe of the dam.

Construction Specifications

- Construct the basin by excavating or building an embankment dike before any clearing or grading work begins.
- Areas under the embankment and any structural works must be cleared, grubbed and stripped of any vegetation and rootmat as shown on the erosion and sediment control plan.
- To facilitate cleanout and restoration, the basin area must be cleared, grubbed and stripped of any vegetation.
- A cut-off trench must be excavated along the centerline of the earth fill embankments. The minimum depth must be 2 feet. The cut-off trench must extend up both abutments to the riser crest elevation.
- Fill material for the embankment must be clean, low-permeability, mineral soil free of roots, woody vegetation, oversized stones, rocks, or other objectionable material.
- Fill material must be placed in 6 inch lifts, continuous layers over the entire length of the fill. Compacting must be obtained by routing the hauling equipment over the fill so that the entire surface of each layer of the fill is traversed by at least one wheel or tread track of the equipment or by the use of a compactor. Each layer must be compacted to 95 percent of maximum density and +/– 2 percent of optimum moisture content.

Design (cont'd)

- The embankment should be constructed to an elevation of 10 percent higher than the design height to allow for settlement if compacting is achieved with hauling equipment. If compactors are used for compacting, the overbuild may be reduced to not less than 5 percent.
- The principle spillway riser must be securely attached to the discharge pipe by welding all around. All connections must be watertight.
- The pipe and riser must be placed on a firm, smooth soil foundation. The connection between the riser and the riser base must be watertight. Pervious materials such as sand, gravel, or crushed stone must not be used as backfill around the pipe or antiseep collars.
- The fill material around the pipe spillway must be placed in 4-inch layers and compacted under the shoulders and around the pipe to at least the same density as the adjacent embankment. A minimum of 2 feet of compacted backfill must be placed over the pipe spillway before crossing it with construction equipment.
- Risers might require a rock berm or other flow restrictor during the construction phase to ensure that muddy flows are detained sufficiently to promote settling of sediment.
- Steel base plates must have at least 2.5 feet of compacted earth, stone, or gravel over them to prevent flotation.
- An emergency spillway is required, and must not be installed in fill. Appropriate overflow channel lining and energy dissipator must be constructed.
- Baffles, if used, must be constructed of 4 inch by 4 inch posts and of 4 foot by 8 foot half-inch exterior plywood. The posts must be set at least 3 feet into the ground, no farther apart than 8 feet center to center, and must reach a height 6 inches below the riser crest elevation. Silt fencing with metal posts can also be used if flow velocities in the basin are low and ponding heights during the 2-year, 24-hour storm will not exceed 5 feet.
- The embankment, emergency spillway, incoming channels, and other site features must be stabilized with vegetation and mulched or blanketed immediately following construction.
- Construction operations must be carried out in such a manner that erosion and water pollution will be minimized.
- Local and state requirements must be met concerning fencing and signs warning the public of hazards of soft sediment and floodwater.

Maintenance

- Inspect weekly as well as before and after wet weather events greater than one-half inch.
- If incoming flows are exiting the basin quickly because of large holes in the outlet, modify the lower portion of the riser with a stone berm, filter fabric, or other flow restrictor that retains incoming flows for at least 12-24 hours.
- Repair all damages to and within the basin due to construction by the end of the work day.
- Maintain all aspects of the basin (outlet area, outlet structures, etc.).
- Remove sediment when storage is 1/2 full.
- Ensure that all sediment removed from the basin will not erode from the site. The sediment must not be deposited downstream from the embankment or in or adjacent to a stream or floodplain.
- When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposit must be leveled or otherwise disposed of according to the approved erosion and sediment control plan.
- If the sediment basin is designed to function as a permanent stormwater treatment pond, the basin and riser will be configured to that mode upon stabilization of the upland drainage area. Temporary flow restrictors on risers and other construction phase modifications must be removed.
- Basin failure should not affect loss in life, property, roads, or utilities.

Inspection Checklist

- ☐ Structure has appropriate outlet design.
- ☐ Stabilized outlet prevents erosion.
- ☐ Sediment accumulation does not exceed 1/2 depth of basin.
- ☐ Outlet is free of trash and deleterious materials that will clog the pipe and restrict flow.
- ☐ Trash rack and anti-vortex device on riser is free of debris and other deleterious materials that will clog and restrict flow.

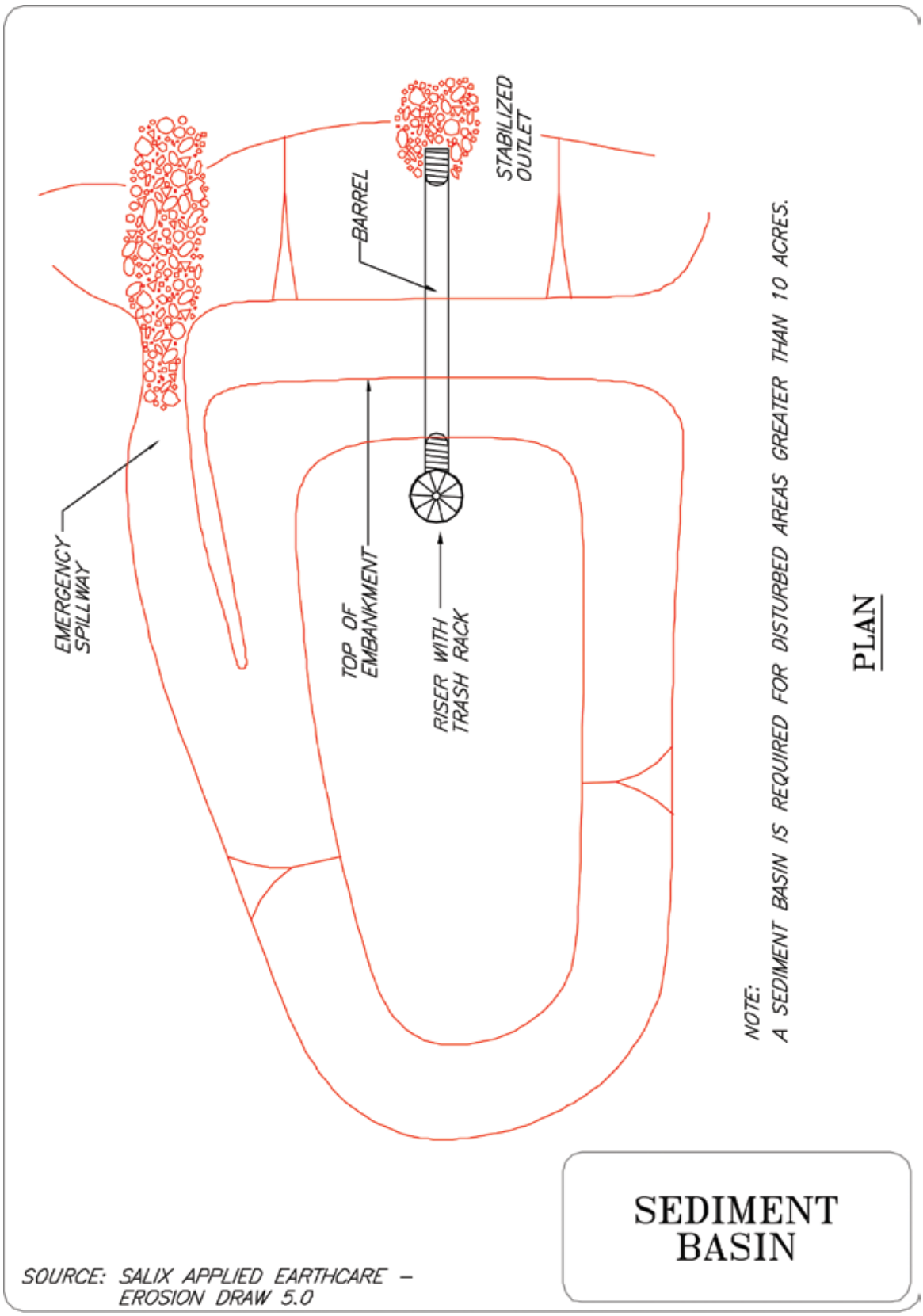

Figure SMP04-1. Sediment Basin Schematic

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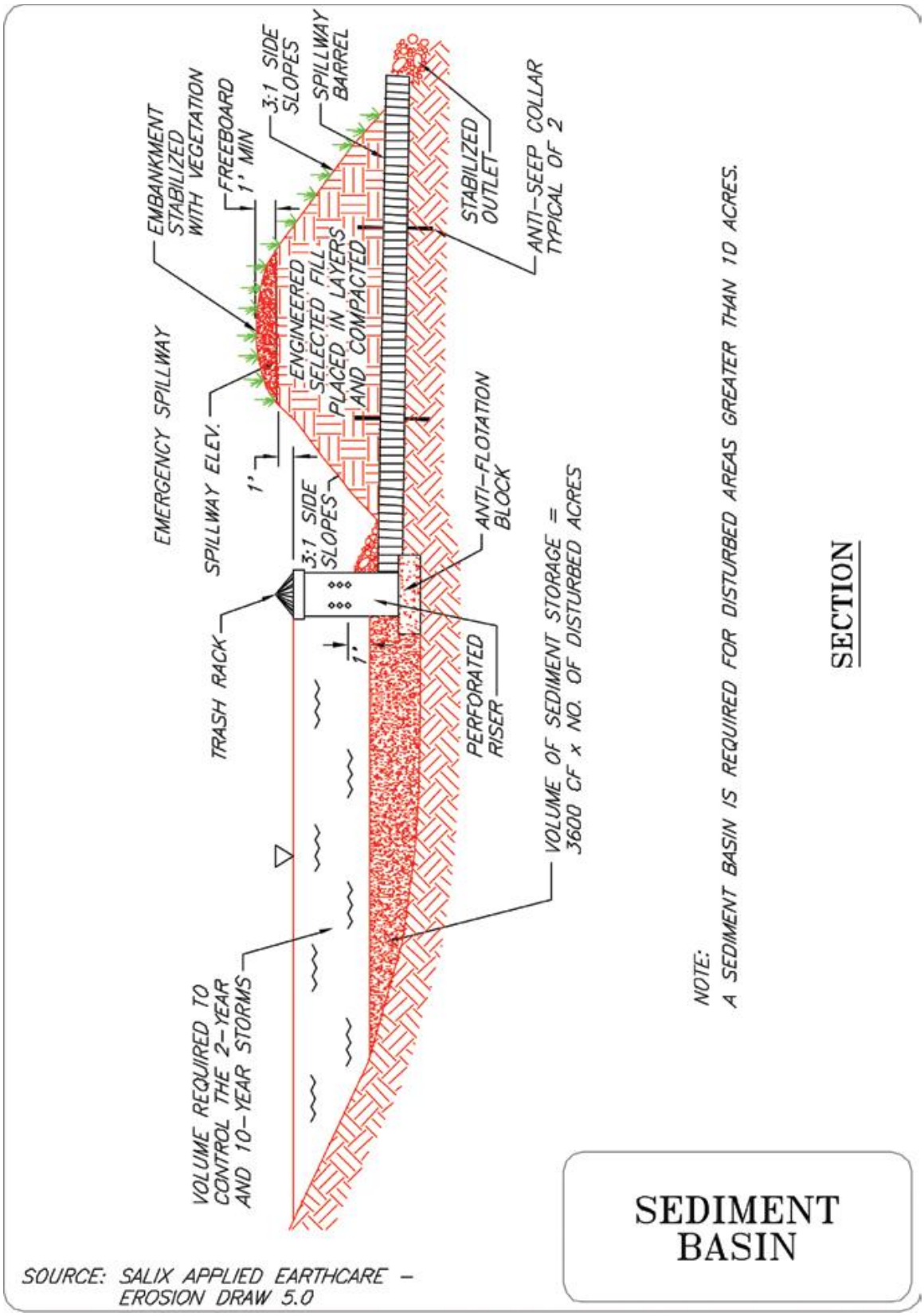

Figure SMP04-2. Sediment Basin Cross Sectional View'

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