

MAP CODE
RBSN

RETENTION BASIN

USE

Environment
Pollution Prevention
Siltation
Stormwater

What ➤ A pond to hold stormwater and filter out sediment.

Purpose ➤ To retain stormwater runoff and to remove the majority of the sediment within the stormwater, by settling.
➤ Not a settling pond for wash plant water.



Source: Center for Sustainable Design, Mississippi State University, 1999

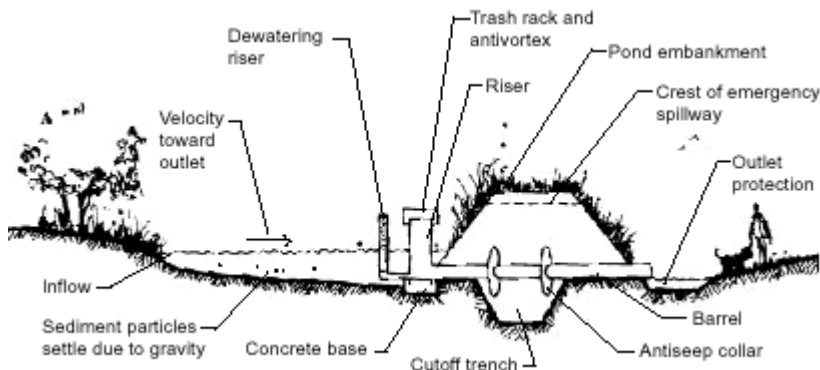
Where **YES:** In a low area or natural drainage way. Basins should be located where stormwater naturally flows or collects.
NO: Should not be constructed on streams or where failure can endanger fish habitat, human safety or property.

Materials, Equipment & Costs ➤ Earth, riprap, pipe, collars, seed for stabilization of disturbed soil.
➤ Backhoe, labour.
➤ \$ Variable depending upon size and design.

Plans & Specs • Sediment basins are at best only 70-80 percent effective in trapping sediment which flows into them. Therefore, they should be used with other erosion control practices such as temporary seeding, mulching, diversion dikes, etc., to reduce the amount of sediment before it gets to the basin.

Plans & Spec's cont'd

- The basin should be located to intercept the largest possible amount of runoff from the site. The best locations are generally low areas and natural drainage ways.
- Drainage into the basin can be improved by diversion dikes and ditches.
- Retention basins can be made with a number of designs, including:
 1. Simple dugout
 2. Embankment pond
- Contact the local Mines Branch Regional office for specific [Health, Safety & Reclamation Code](#) requirements and the local office of the [Ministry of Sustainable Resource Management](#) for environmental regulations related to larger retention basins.
- There are a number of formulae for calculating the optimum size for stormwater retention basins, but they are beyond the scope of this handbook. Operators can obtain technical advice on these calculations from the above agencies.
- A common approach is to construct a number of ponds in series, with the first to take out the coarsest material, and subsequent ponds to capture progressively finer suspended solids. A series of ponds allows one or more ponds to operate while another is being cleaned.
- A suggested maximum drainage area for a single basin is 10 hectares, unless designed by a professional engineer.
- The design capacity of the basin should be at about 50 cubic metres per hectare of drainage area. . The capacity of the basin may be roughly estimated as $40\% \times \text{Height} \times \text{Surface area}$, with the height measured from the bottom of the basin to the crest of the spillway.
- The sediment cleanout level should be $1/3$ of a metre below the crest of the spillway.
- The length of the flow path that the water travels should be three to five times the width of the pond. This path length can be accomplished with baffles.
- Drainage options for the basin include armoured spillways, stand pipes and infiltration.



Source: Center for Sustainable Design, Mississippi State University, 1999

Installation

- Only general retention basin design and construction practice instructions will be offered here.
- Site Preparation
Clear, grub and remove the topsoil from the area. Compact the area if it has been built up with fill.
- Embankment
Construct the embankment with clean mineral soil: free of roots, woody vegetation, oversized stones, rocks or other objectionable material. Areas on which mineral soil is to be placed should be previously scarified. The mineral soil should contain sufficient moisture to be formed into a ball by hand without crumbling. If water can be squeezed out of the ball, it is too wet for proper compaction. Place the mineral soil in 1.5-2.0 metres continuous layers over the entire length of the embankment. Compaction can be achieved by driving haul equipment over the mineral soil, so that the entire surface of the fill is traversed by at least one wheel or tread of the equipment. The embankment should be constructed to an elevation 10 percent higher than the design height to allow for settlement.
- Stand Pipe
The riser of the standpipe can be perforated plastic pipes, T-intersections or screened.
- Spillway
The spillway should not be routed over unprotected mineral soil. Design elevations, widths, entrance and exit channel slopes and armouring are critical to the successful operation of a spillway.
- Vegetative Stabilization
The embankment and spillway of the retention basin should be stabilized with temporary vegetation within 15 days of completion of the basin.
- Erosion and Sediment Control
The construction of the retention basin should be carried out in a manner that minimizes erosion and siltation of stormwater.

Maintenance

- Clean out the retention basin before it becomes more than 1/3 full of sediment.

Additional Considerations

- Due to the plastic nature of retention basin sludge, the area of the pond may have restricted land uses after aggregate operations have ceased. If any construction is planned for the area, complete removal of all sludge may be necessary. Alternative uses could be parks, designated gardens or local green spaces.

Sources

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