10.12 Wet Detention Basin

10.12.1 Introduction

A wet detention basin is very similar to a dry detention basin in that it detains stormwater, but it is different in that it retains a permanent pool during dry weather. Wet detention basins are usually more expensive to construct and maintain than dry detention basins and usually serve large watersheds.

10.12.2 Regulatory Considerations

See Section 10.11.2.

10.12.3 Sizing Requirements

Stormwater Quality For quality purposes, the permanent pool must be at least equal to the WQV for the watershed. See Section 10.11.3 for WQV calculation. The theory behind this is that incoming runoff displaces old stormwater from the basin and the new runoff is detained until it is displaced by more runoff from the next storm. A permanent pool equal to the WQV should then provide an adequate detention time for the stormwater. Watershed size, soil conditions and groundwater elevation must be evaluated to ensure the capability of the site to support a permanent wet basin. To enhance pollutant and sediment removal, several other considerations may be taken into account, including a sediment forebay.

The shape of the basin can significantly affect the pollutant-removal efficiency. The length-to-width ratio should be at least 3:1. Figure 10-28 shows basin configurations that may be used to increase the length-to-width ratio and allow for maximum flow path length. Basin depth should be between 1.5 and 3.0 m (5 and 10 ft); less could allow insect breeding and wind resuspension of settled particles, and more could lead to thermal stratification in the basin and anaerobic conditions in the deep water. A wedge-shaped basin, wider at the outlet, can also improve pollutant removal (Figure 10-29).

Stormwater Quantity For quantity purposes, the wet detention basin is designed similarly to the dry detention basin. The basin should be designed to reduce the peak flow from the 2, 10, and 25 year storms (considered individually) and be able to pass a 100-year storm safely.

10.12.4 Outlets

Outlet requirements for wet detention basins are the same as those for dry detention basins, therefore see Section 10.11.4 for outlet design.

10.12.5 Sediment Forebay

A sediment forebay is recommended for all wet detention basins. The purpose of the forebay is to provide pretreatment by settling out coarse sediment particles, which will enhance treatment performance, reduce maintenance, and increase the longevity of a stormwater basin. A forebay is a separate cell within the basin formed by a barrier such as an earthen berm, concrete weir, or gabion baskets.

- The forebay should be sized to contain at least 10% of the WQV and be of an adequate depth to prevent resuspension of collected sediments during the design storm, often being four to six feet deep. The goal of the forebay is to at least remove particles consistent with the size of medium sand. The forebay storage volume may be used to fulfill the total WQV requirement of this system. The forebay must also include additional sediment storage volume that may not be used for WQV calculations. Sediment storage volume is calculated by the Universal Soil Loss Equation in the *Connecticut Guidelines for Soil Erosion and Sediment Control.*
- The outlet from the forebay should be designed in a manner to prevent erosion of the embankment and primary pool. This outlet can be configured in a number of ways including a culvert, weir, or spillway channel. The outlet should be designed to convey the same design flow proposed to enter the basin. The outlet invert must be elevated in a manner such that 10% of the WQV can be stored below it in addition to the required sediment volume.
- The forebay should have a minimum length to width ratio of 2:1 and a preferred length to width ratio of 3:1.
- Direct access for appropriate maintenance equipment should be provided to the forebay and may include a ramp to the bottom if equipment cannot reach all points within the forebay from the top. The forebay can be lined with a concrete pad to allow easy removal of sediment and to minimize the possibility of excavating subsurface soils or undercutting embankments during routine maintenance.
- A fixed vertical sediment depth marker should be installed in the forebay to measure sediment deposition.
- A barrier, such as an earthen berm, gabions, check dam, or a concrete weir may be used to separate the forebay from the permanent pool. This barrier should be armored as necessary to prevent erosion of the embankment if it overtops. This armoring could consist of materials such as riprap, pavers, or geosynthetics designed to resist slope erosion. If a channel is used to convey flows from the forebay to the basin, the side slopes of the channel must be armored as well.
- Additional pretreatment can be provided in the forebay by raising the embankment to provide some detention of incoming flows.

10.12.6 Embankment Cross Sections

See Section 10.11.5.

Table 10-6 Summary Of Considerations For A Wet Basin

Quality	Permanent pool volume is equal to the WQV
Quantity	Control 2, 10 and 25- year peak flows
Shape	3:1 length-to-width ratio; wedge shaped (wider at outlet); permanent pool depth from 1.5 - 3.0 m (5 - 10 ft); perimeter ledges
Maintenance	Inspect once a year, preferably during wet weather; mow as required; remove sediment every 5-10 years or as required
Safety	Fence around basin; provide shallow (0.5 m (1.5 ft) deep) safety ledge around basin; post signs
Other considerations	Side slopes provide easy maintenance access (1V:4H); perimeter vegetation; sediment forebay; provide valve to drain basin for maintenance
Pollutant removal	Moderate to high

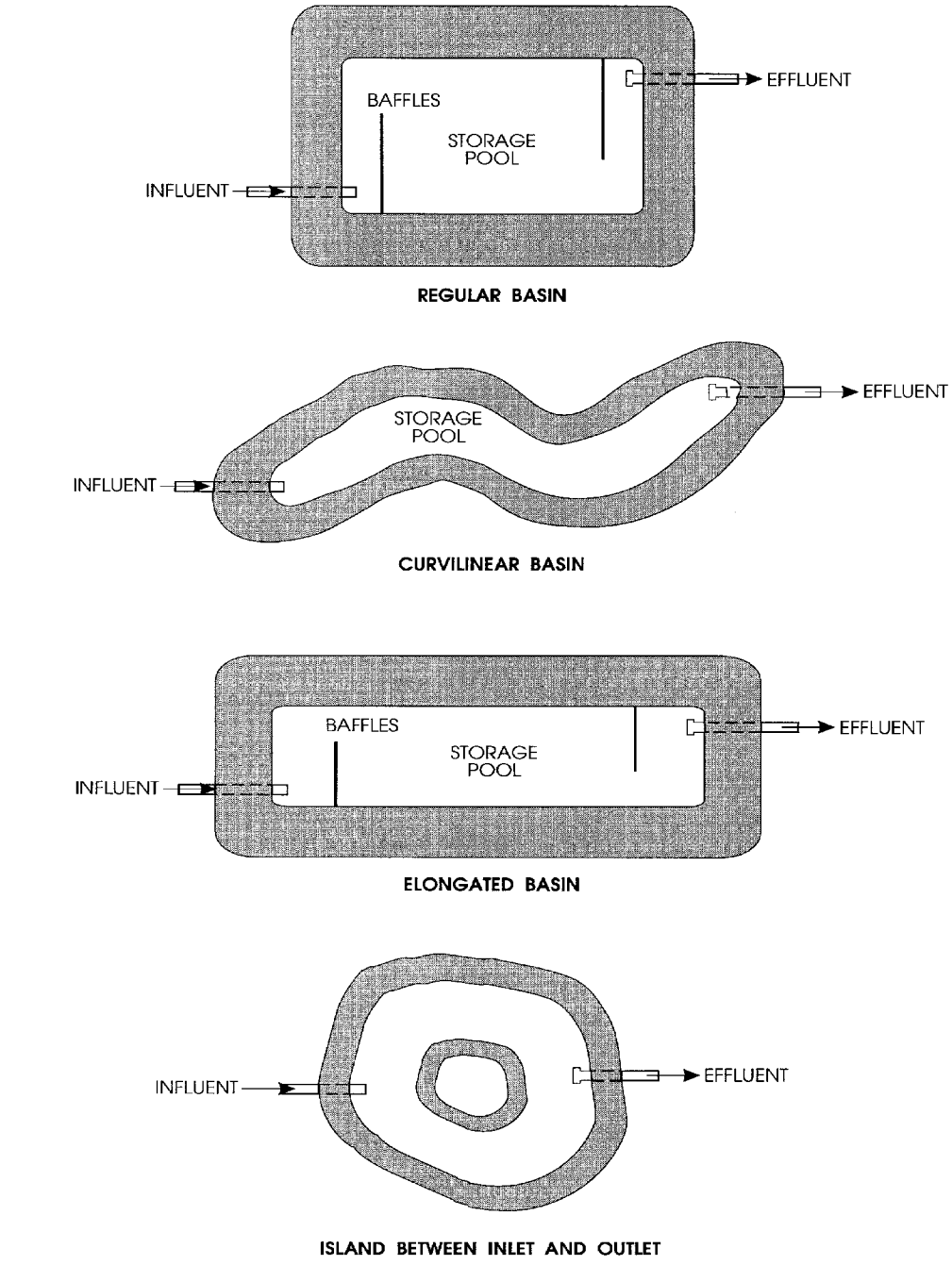

Figure 10-28 Methods Of Increasing The Length-to-Width Ratio (after Schueler, 1987)

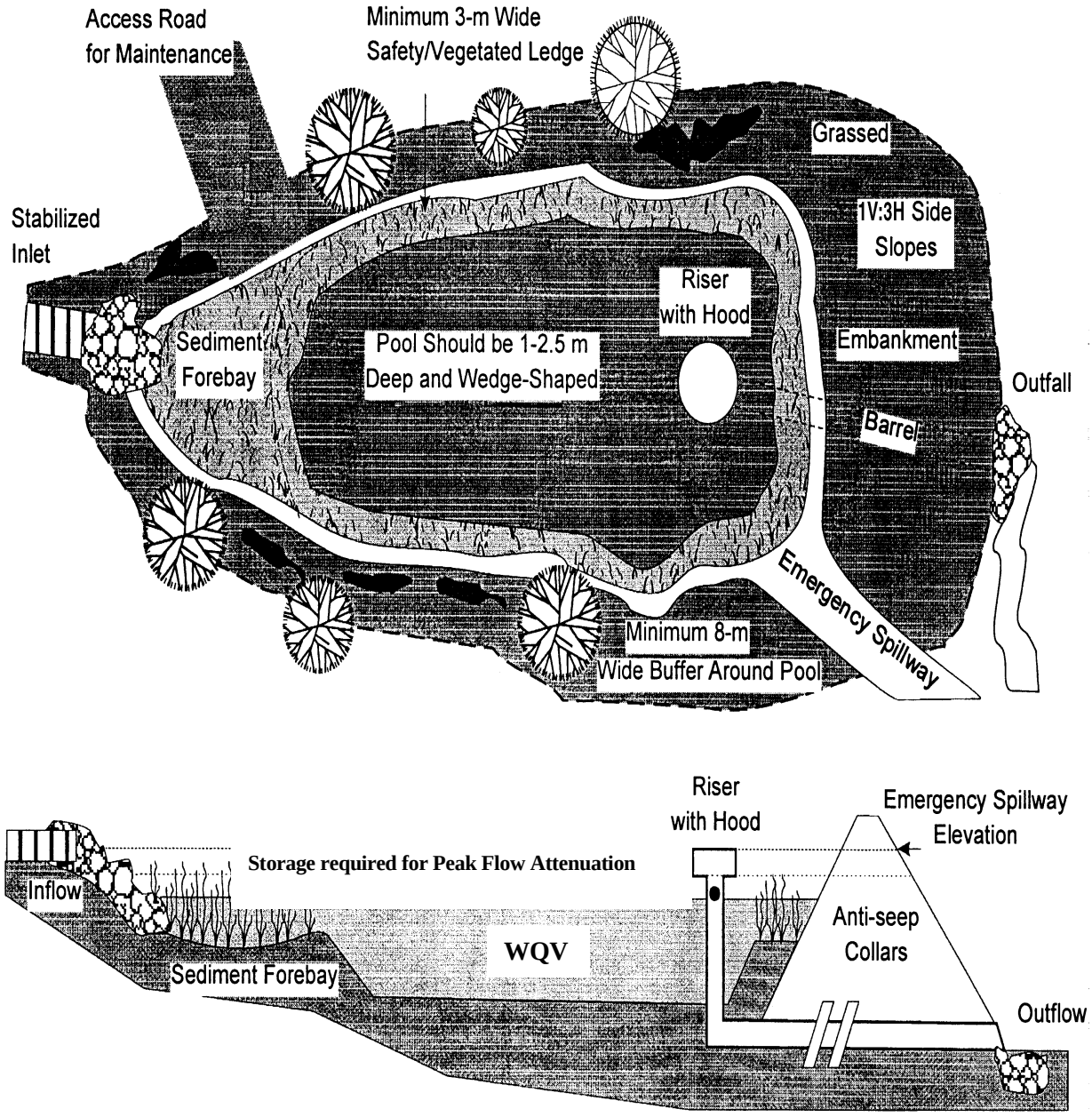

Figure 10-29 Wet Basin