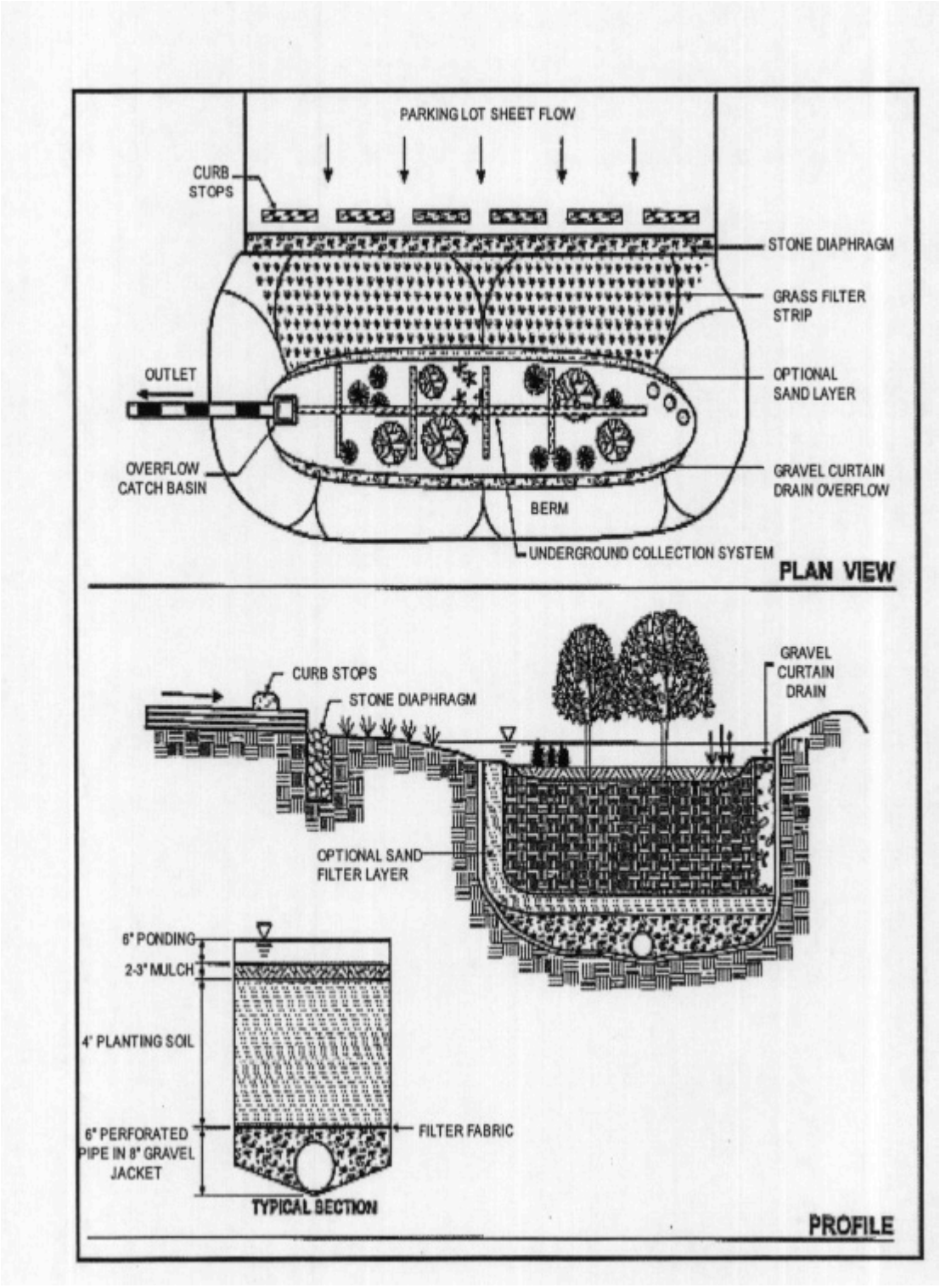

Schematic of a Typical On-Line Bioretention Area
(Source: Claytor and Schueler, 1996)

WATER QUALITY SWALES

QUICK REFERENCE

Description: Vegetated open channels that are explicitly designed and constructed to capture and treat storm water run-off within dry cells formed by check dams or other means.

Site Feasibility: Drainage Area: Maximum 5 acres

Residential Subdivision Use: Yes

High Density/Ultra-Urban: No

Design Criteria: Pretreatment forebay required.

Longitudinal slopes must be less than 4%.

Maximum side slopes 2:1 with 4:1 preferred.

Advantages: Combines storm water treatment with run-off conveyance system.

Relatively inexpensive to install.

Reduces run-off velocities.

Aesthetic qualities.

Disadvantages: Cannot be used on steep slopes.

Large area requirement - not feasible for high-density areas.

Maintenance: Maintain grass height of 4 to 6 inches.

Remove sediment from forebay and channel

GENERAL

Description

Water quality swales are conveyance channels engineered to capture and treat the WQ_v for a drainage area. They differ from normal drainage channels or swales through the incorporation of

specific features that remove storm water pollutants by filtration through an engineered media. Water quality swales are not the same as filter strips, which are limited application structural controls and not considered acceptable for meeting the TSS removal requirements independently. Water quality swales are designed to include a forebay in addition to a filter bed of prepared soil that overlays an underdrain system. The swales are sized to allow the entire WQ_v to be filtered and discharged or infiltrated through the bottom of the swale. Limited longitudinal slopes, in conjunction with berms and/or check dams installed perpendicular to the flow path, force the flow to be slow and shallow allowing for particulates to settle and limiting erosion. Run-off is collected by a perforated pipe and discharged to an appropriate outlet.

A separation distance of 2 feet is required between the bottom of the water quality swale and the elevation of the seasonally high water table.

DESIGN CRITERIA

The following criteria are minimum standards for the design of a water quality swale, which is acceptable for storm water quality treatment only and does not provide detention storage. Flow from run-off in excess of the WQ_v must be diverted or the water quality swale adequately designed to safely pass higher flows to prevent erosion of the swale.

1. The maximum drainage area tributary to a water quality swale is 5 acres.

2. Peak flows are limited to 10 cfs and run-off velocities are limited to 2.5 fps.

3. The maximum ponding time in the water quality swale is 48 hours.

4. The swale shall have a maximum ponding time of 48 hours. Soil media shall have an infiltration rate of at least 1 foot per day (f_c > 0.5 inches per hour), with 1.5 feet per day maximum. Infiltration of the WQ_v will only be allowed when proven by geotechnical evaluation that underlying soils have an infiltration rate of 0.5 inches per hour (typically hydrologic group A soils). Infiltration will not be allowed in wellhead protection areas.

5. Water quality swale geometry:

a. The surface area of the water quality swale should be approximately 10% to 20% of the tributary impervious.

b. The elevation difference (head) generally needed from inflow to outflow is 3 to 5 feet.

c. The longitudinal slope of the swale shall be a maximum of 4%, with 1% to 2% preferred.

d. Side slopes of the swale shall be no greater than 3:1. Swales shall be parabolic or trapezoidal in shape to maximize vegetative areas and to provide ease of maintenance.

e. The maximum design flow depth shall be 12 inches. The depth of the WQ_v at the downstream end of the swale should not exceed 18 inches.

f. A minimum bottom channel width of 2 feet is required to ensure adequate filtration.

g. The bed of the swale shall have a minimum permeable soil layer 30 inches in depth.

h. The swale must have a minimum length of 100 feet.

6. Pretreatment:

a. All water quality swales shall include a sediment forebay that consists of a separate cell, formed by an acceptable barrier. See A.1. - Storm Water Ponds for design criteria for a forebay.

b. Run-off can also enter along the sides of the channel as sheet flow through a grass filter strip containing a pea gravel flow spreader trench (diaphragm) along the entrance to the filter strip. Slopes to the diaphragm shall not exceed 6% for the last 20 feet prior to entering the spreader.

7. The underdrain collection system shall consist of a 4- to 6-inch perforated PVC pipe (Schedule 40 or greater in strength) in an 8-inch gravel layer (clean washed aggregate 0.5 to 2-inches in diameter). A permeable filter fabric is required between the gravel layer and the planting soil bed. A clean out must be provided and the underdrain pipe must discharge to an appropriate facility.

8. Compaction during construction must be minimized at both the base of the water quality swale and for the backfill materials. Use of equipment causing excessive compaction will result in reduced infiltration rates contributing to failure of the system and is not acceptable. Do not use heavy equipment within the bioretention basin.

9. An overflow structure and nonerosive overflow channel must be provided to safely pass flows from the water quality swale that exceeds the system storage capacity to a stabilized downstream area or watercourse.

10. Proper grass species and plants should be specified for the water quality swale.

11. Water quality swales must be constructed within an easement either platted or legally described and recorded as a perpetual storm water drainage easement. The easement shall extend a minimum of 30 feet horizontally outside of the water quality swale limits and provide a minimum 10-foot wide access easement. A copy of the easement should be included in the BMP operations and maintenance manual.

12. The water quality swale shall not be constructed until all contributing drainage area has been stabilized. The swale shall not be used as a sediment control measure during active construction.

MAINTENANCE AND INSPECTION CHECKLIST

Regular inspection and maintenance is critical to the effective operation of water quality swales. The following inspection checklist, to be completed at periods indicated, is provided for the BMP owner and should be retained as a record by the owner for a period of five (5) years from the approval date of the Storm Water Pollution Prevention Plan. Evidence of inspection and maintenance shall be provided to the Town of Edgewood upon request.

Project Name/Site Location:

Owner Name: _____ Phone:

Owner Address:

Date: _____ Inspector: