Single Family Residential
Stormwater Management Plan

BIORETENTION WITH UNDERDRAIN

Definition:

Bioretention is an excavated pit filled with a filter bed of planting media (mixture of soil, sand and organic matter) that provides temporary storage and treatment of runoff from rooftops and driveways. Bioretention discharges through an underdrain.

Constraints:

- Bioretention facilities should not be used in areas where their operation may create a risk for basement flooding, interfere with septic sewage disposal systems, or cause downslope seepage problems
- Bioretention should be used in lieu of a dry well or rain garden if the infiltration rate of the soil is less than 0.27 inches per hour
- Drainage area to each bioretention shall not exceed 2,000 sf

Design Guidance:

- Bioretention must be installed in accordance with the attached detail
- Bioretention must be installed on the contour
- Bioretention should not intercept water table or bedrock
- Bioretention shall be located at least 30 feet from water supply wells and 25 feet from septic systems

Installation:

- The bottom of the bioretention excavation shall be level and scarified prior to backfilling
- Collection pipes from downspouts shall be 4"-6" PVC installed at min. slope of 1%
- Bioretention shall not be constructed until surrounding site is completely stabilized
- Inflow points must be protected from erosion and flow distributed evenly throughout the surface of the bioretention
- Planting media and mulch must conform to Table 1 specifications
- Plantings should include a diverse mixture of species – see Table 2 for commonly used species

- Herbaceous species plantings to have 2 ft. spacing - shrubs shall be spaced according to nursery recommendations
- Overflow from larger storm events must have a stable outfall which does not cause downstream flooding issues
- Underdrain must have cap at downstream end with 0.5" drawdown orifice

Construction Inspections:

A minimum of three (3) inspections must be made during construction as follows:

- During excavation to subgrade
- During placement of backfill and appurtenant piping, including downspout conveyance
- Upon completion of final grading and stabilization

Failure to provide for inspection by Allegany Soil Conservation District, Maryland Registered Professional Engineer or adequate photographs to verify all construction details shall be cause to withhold issuance of Occupancy Permit. If occupancy is requested during a season that is not favorable for planting, a bond in the amount of $1,000 may be required to ensure completion in the next planting season.

Maintenance:

After installation, bioretention and associated conveyances will be delineated on the site sketch with an easement. The sketch and this Stormwater Management Plan must be attached to the executed Operation & Maintenance Agreement, which must be recorded in the land records of Allegany County prior to issuance of Occupancy Permit. The bioretention is subject to maintenance inspection by Allegany County on a periodic basis.

If water ponds for more than 48 hours or if more than 1" of sediment has accumulated, the top few inches of filter media shall be excavated and replaced. Mulch should be replaced once every two years.

Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

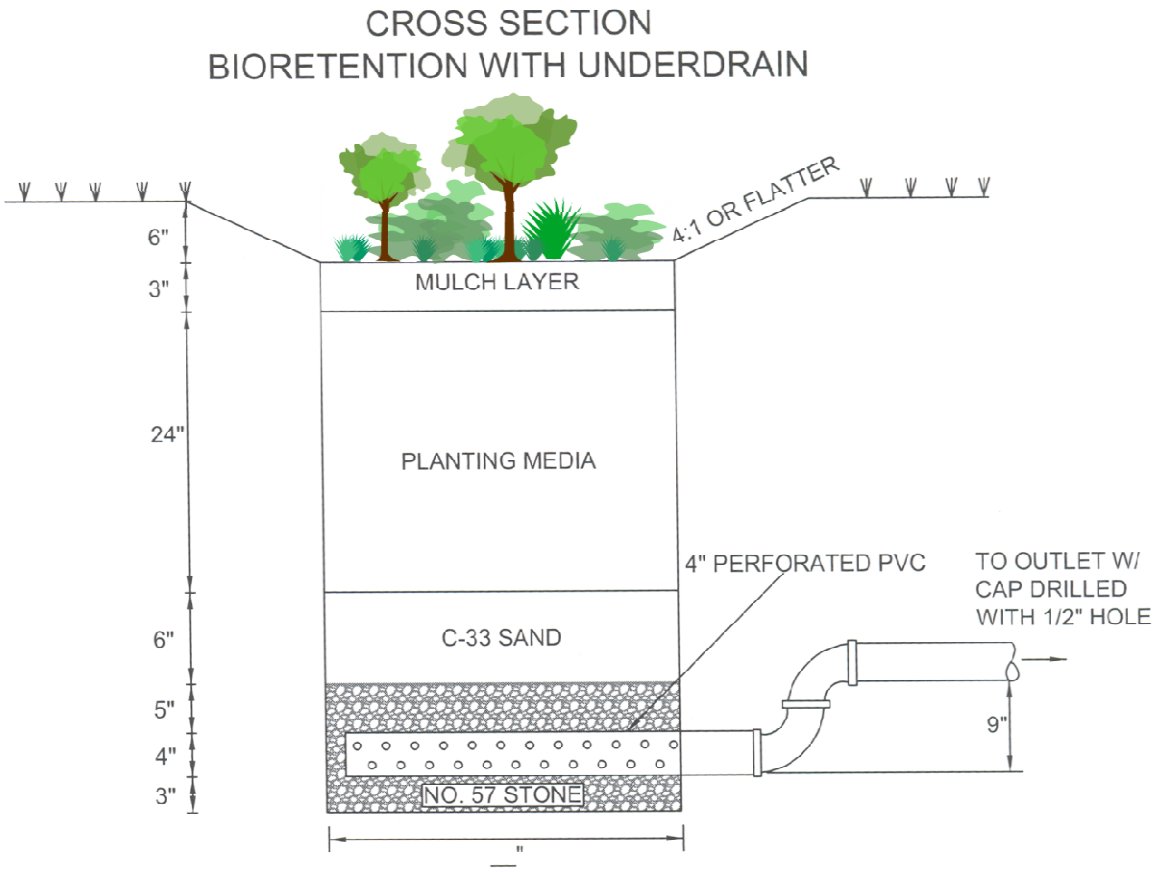
Table 1: Construction Specifications for Bioretention*

Material	Specification	Size	Notes
Planting Soil	Loamy sand (60-65%) & compost (35-40%) OR sandy loam (30%), coarse sand (30%) & compost (40%)	n/a	USDA soil types loamy sand or sandy loam; clay content < 5%
Mulch	Shredded hardwood		Aged 6 months, min. no pine or wood chips
Gravel underdrain	AASHTO M-43 or MSHA Section 901	AASHTO No. 8 or MSHA No. 7Aggregate (3/4 " to 1/8")	
Underdrain piping	F 758, Type PS 28 or AASHTO M-278	4" to 6" rigid schedule 40 PVC or SDR35	Slotted or perforated pipe; 3/8" perf. @ 6" on center, 4 holes per row, min. 3" gravel above and below pipe

Table 2: Commonly Used Species for Bioretention*

Herbaceous Species	Shrubs
Andropogon virginicus Broomsedge	*Aesculus pariviflora* Bottlebrush Buckeye
Eupatorium perpurea Joe Pye Weed	*Cephalanthus occidentalis* Buttonbush
Scirpus pungens Three Square Bulrush	*Hamemelis virginiana* Witch Hazel
Iris versicolor Blue Flag	*Vaccinium corymbosum* Highbush Blueberry
Lobelia cardinalis Cardinal Flower	*Ilex glabra* Inkberry
Panicum virgatum Switchgrass	*Ilex verticillata* Winterberry
Dichanthelium scoparium Broom Panic Grass	*Viburnum dentatum* Arrowwood
Rudbeckia laciniata Tall Coneflower	*Lindera benzoin* Spicebush
Scirpus cyperinus Woolgrass	*Myrica pennsylvanica* Bayberry
Vernonia noveboracensis New York Ironweed	
Rudbeckia hirta Black-eyed Susan	

**Source: 2000 Maryland Stormwater Design Manual, Appendix A and Appendix B.4*


CROSS SECTION
BIORETENTION WITH UNDERDRAIN
4:1 OR FLATTER
6"
3"
MULCH LAYER
24"
PLANTING MEDIA
4" PERFORATED PVC
TO OUTLET W/
CAP DRILLED
WITH 1/2" HOLE
6"
C-33 SAND
5"
4"
3"
9"
NO. 57 STONE
"
L =___
W =___
SURFACE AREA =___
NUMBER OF PLANTS =___
N.T.S.