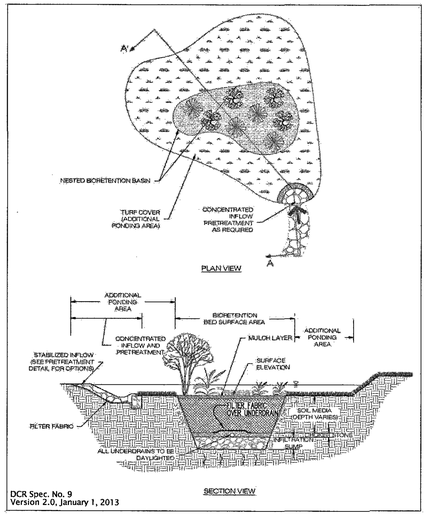

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FIGURE 9.5 TYPICAL DETAIL OF BIORETENTION WITH PONDING

Table 9.7. Bioretention Material Specifications

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: • 80% - 90% sand • 10%-20% soil fines • 3%-5% organic matter	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Available P between L+ and M per DCR 2005 Nutrient Management Criteria.	The media should be certified by the supplier.
Mulch Layer	Use aged, shredded hardwood bark mulch or stable coarse compost.	Lay a 2 to 3 inch layer on the surface of the filter bed.
Alternative Surface Cover	Use river stone or pea gravel, coir and jute matting, or turf cover.	Lay a 2 to 3 inch layer of to suppress weed growth.
Top Soil For Turf Cover	Loamy sand or sandy loam texture, with less than 5% clay content, pH corrected to between 6 and 7, and an organic matter content of at least 2%.	3 inch surface depth.
Geotextile/Liner	Use a non-woven geotextile fabric with a flow rate of > 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent)	Apply only to the sides and directly above the underdrain. For hotspots and certain karst sites only, use an appropriate liner on bottom.
Choking Layer	Lay a 2 to 4 inch layer of sand over a 2 inch washed gravel), which is laid over the underdrain stone.	layer of choker stone (typically #8 or #89
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	12 inches for the underdrain; 12 to 18 inches for the stone storage layer, if needed
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe (or equivalent corrugated HDPE for micro-bioretention), with 3/8-inch perforations at 6 inches on center; position each underdrain on a 1% or 2% slope located nor more than 20 feet from the next pipe.	Lay the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface with vented caps at the Ts and Ys.
Plant Materials	Plant one tree per 250 square feet (15 feet on-center, minimum 1 inch caliper). Shrubs a minimum of 30 inches high planted a minimum of 10 feet on-center. Plant ground cover plugs at 12 to 18 inches on-center; Plant container-grown plants at 18 to 24 inches on-center, depending on the initial plant size and how large it will grow.	Establish plant materials as specified in the landscaping plan and the recommended plant list. In general, plant spacing must be sufficient to ensure the plant material achieves 80% cover in the proposed planting areas within a 3-year period. If seed mixes are used, they should be from a qualified supplier, should be appropriate for stormwater basin applications, and should consist of native species (unless the seeding is to establish maintained turf).

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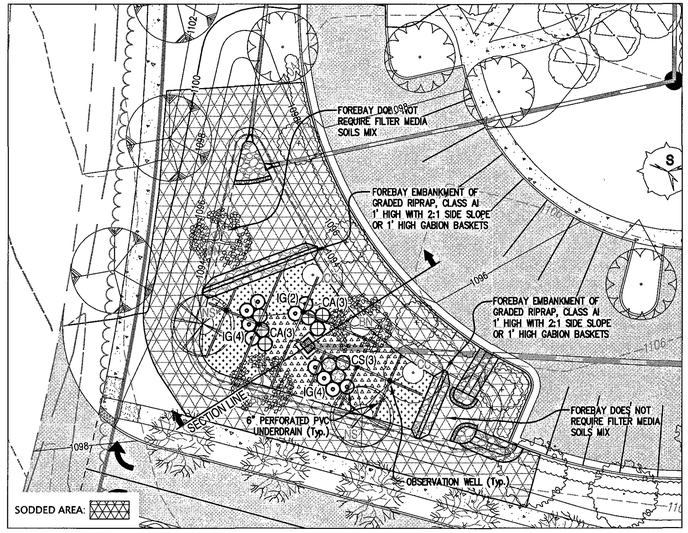
TABLE 9.7 BIORETENTION MATERIAL SPECIFICATIONS

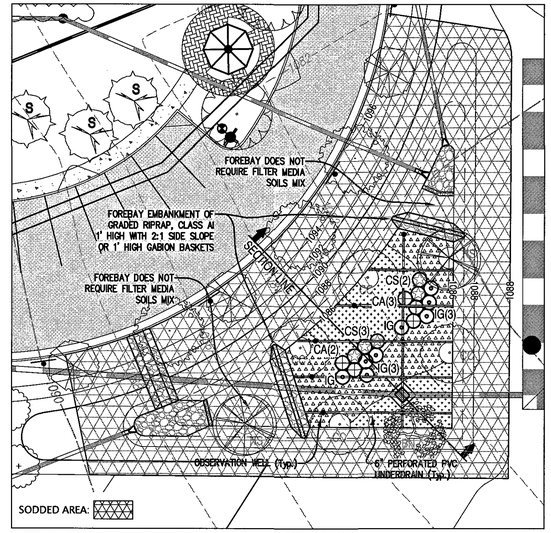


BIORETENTION TREES NOTE: ALL PROPOSED TREES SHOWN ON THIS DETAIL ARE FOR REFERENCE ONLY AND ARE ACCOUNTED FOR ON THE LANDSCAPING PLAN, SHEET 10, THIS SET.

INSET SCALE:1"=20'

"RG1" BIORETENTION PLANTING DETAIL

BIORETENTION LEVEL 2 DESIGN
"RG1" CONTRIBUTING DRAINAGE AREA: 2.30 AC
REQUIRED TREATMENT VOLUME: 5,136 CF
REQUIRED PRE-TREATMENT CELL VOLUME: 770 CF — DESIGN CELLS VOLUME: 830 CF
MINIMUM BMP SURFACE AREA: 1,766 SF — DESIGN SURFACE AREA: 1,774 SF
DESIGN MEDIA DEPTHS: 4.0' PLANTING MEDIA, 3.0' GRAVEL, 1' PONDING DEPTH
DESIGN PLANTING TEMPLATE: TREE, SHRUB AND HERBACEOUS PLANTS



BIORETENTION TREES NOTE: ALL PROPOSED TREES SHOWN ON THIS DETAIL ARE FOR REFERENCE ONLY AND ARE ACCOUNTED FOR ON THE LANDSCAPING PLAN, SHEET 10, THIS SET.

INSET SCALE:1"=20'

"RG2" BIORETENTION PLANTING DETAIL

BIORETENTION LEVEL 2 DESIGN
"RG2" CONTRIBUTING DRAINAGE AREA: 2.00 AC
REQUIRED TREATMENT VOLUME: 4,864 CF
REQUIRED PRE-TREATMENT CELL VOLUME: 730 CF — DESIGN CELL VOLUME: 768 CF
MINIMUM BMP SURFACE AREA: 1,897 SF — DESIGN SURFACE AREA: 2,014 SF
DESIGN MEDIA DEPTHS: 4.0' PLANTING MEDIA, 2.0' GRAVEL, 1' PONDING DEPTH
DESIGN PLANTING TEMPLATE: TREE, SHRUB AND HERBACEOUS PLANTS

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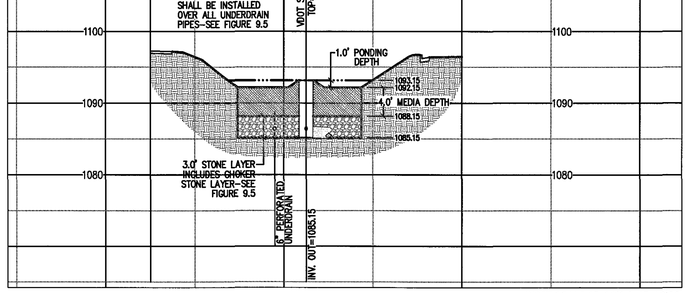
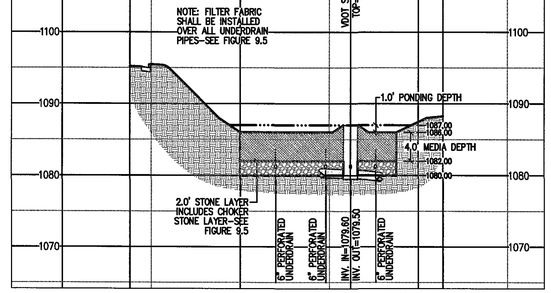
FIGURE 9-B.2 TYPICAL BIORETENTION BASIN BERM



INSET SCALE:1"=20'(H), 1"=10'(V)

"RG1" BIORETENTION SECTION



INSET SCALE:1"=20'(H), 1"=10'(V)

"RG2" BIORETENTION SECTION

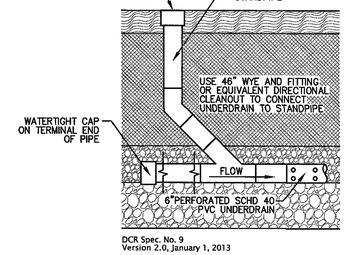


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FIGURE 9-B.1 P.V.C. CLEANOUT DETAIL

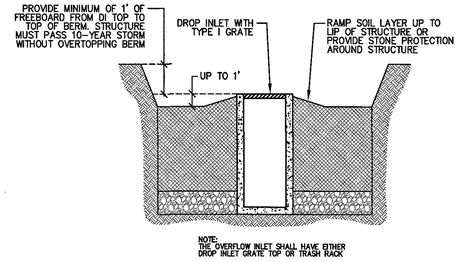

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FIGURE 9.13 TYPICAL DETAIL BIORETENTION OVERFLOW INLET

BIORETENTION LANDSCAPE MATERIALS

SYMBOL & KEY	SCIENTIFIC NAME	COMMON NAME	SIZE (MIN.)	CONTAINER	QUANTITY
SHRUBS / GRASSES / GROUNDCOVER					
	*Agrostis alba**	REDTOP	PLUG	–	975
CA	*Clethra alnifolia 'September Beauty'**	'SEPTEMBER BEAUTY' SPICEBUSH	18"	#3	11
CS	*Cornus sericea**	REDOSIER DOGWOOD	18"	#3	8
	*Deschampsia caespitosa**	TUFTED HAIRGRASS	PLUG	–	950
IG	*Ilex glabra 'Nigra'**	'NIGRA' INKBERRY	18"	#3	18

* INDICATES NATIVE PLANT SPECIES

THE QUANTITIES LISTED IN THIS TABLE MATCH THE QUANTITIES SHOWN ON THE PLAN. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT OF ANY DISCREPANCY OR QUESTION.

BIORETENTION TREES NOTE: ALL PROPOSED TREES SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY, AND ARE ACCOUNTED FOR ON THE LANDSCAPING PLAN, SHEET 10, THIS SET.

BIORETENTION SOD PLANTING:

SOD SHALL BE INSTALLED AROUND THE PERIMETER AND WITHIN THE FOREBAY AREA OF EACH BIORETENTION AREA, AS SHOWN ON THE PLAN. SOD SHALL BE PLACED SO AS TO BE IMMEDIATELY ADJACENT TO THE AREAS RECEIVING HERBACIOUS GRASS/GROUNDCOVER PLUGS, STONE LEVEL SPREADING STRUCTURES AND AREAS OF OUTLET PROTECTION RIPRAP.

VA DCR STORMWATER DESIGN SPECIFICATION NO. 9 **BIORETENTION**
Version 2.0 - January 1, 2013

8.2 Bioretention Installation

The following is a typical construction sequence to properly install a bioretention basin. The installation of a bioretention basin will include intermediate inspections at critical stages of construction with inspector sign-off that the particular elements of the bioretention are constructed according the approved plans and specifications. As an alternative, if allowed by the VSMP Authority, the contractor may rely on the engineer of record or other qualified individual to conduct the intermediate inspections and certifications of compliance. The construction sequence for micro-bioretention is more simplified. These steps may be modified to reflect different bioretention applications or expected site conditions:

Step 1. Construction of the bioretention area may only begin after the entire contributing drainage area has been stabilized with vegetation. It may be necessary to block certain curb or other inlets while the bioretention area is being constructed. The proposed site should be checked for existing utilities prior to any excavation.

Step 2. The designer and the installer should have a preconstruction meeting, checking the boundaries of the contributing drainage area and the actual inlet elevations to ensure they conform to original design. Since other contractors may be responsible for constructing portions of the site, it is quite common to find subtle differences in site grading, drainage and paving elevations that can produce hydraulically important differences for the proposed bioretention area. The designer should clearly communicate, in writing, any project changes determined during the preconstruction meeting to the installer and the plan review/inspection authority.

Step 3. Temporary E&S controls are needed during construction of the bioretention area to divert stormwater away from the bioretention area until it is completed. Special protection measures such as erosion control fabrics may be needed to protect vulnerable side slopes from erosion during the construction process.

Step 4. Any pre-treatment cells should be excavated first and then sealed to trap sediments.

Step 5. Excavators or backhoes should work from the sides to excavate the bioretention area to its appropriate design depth and dimensions. Excavating equipment should have scoops with adequate reach so they do not have to sit inside the footprint of the bioretention area. Contractors should use a cell construction approach in larger bioretention basins, whereby the basin is split into 500 to 1,000 sq. ft. temporary cells with a 10-15 foot earth bridge in between, so that cells can be excavated from the side.

Step 6. It may be necessary to rip the bottom soils to a depth of 6 to 12 inches to promote greater infiltration.

Step 7. Place geotextile fabric on the sides of the bioretention area with a 6-inch overlap on the sides. If a stone storage layer will be used, place the appropriate depth of #57 stone on the bottom, install the perforated underdrain pipe, pack #57 stone to 3 inches above the underdrain pipe, and add approximately 3 inches of choker stone/pea gravel as a filter between the underdrain and the soil media layer. If no stone storage layer is used, start with 6 inches of #57 stone on the bottom, and proceed with the layering as described above.

Step 8. Obtain soil the media from a qualified vendor, and store it on an adjacent impervious area or plastic sheeting. After verifying that the media meets the specifications, apply the media in 12-inch lifts until the desired top elevation of the bioretention area is achieved. Wait a few days to check for settlement, and add additional media, as needed, to achieve the design elevation.

Step 9. Prepare planting holes for any trees and shrubs, install the vegetation, and water accordingly. Install any temporary irrigation.

Step 10. Place the surface cover in both cells (mulch, river stone or turf), depending on the design. If coir or jute matting will be used in lieu of mulch, the matting will need to be installed prior to planting (Step 9), and holes or slits will have to be cut in the matting to install the plants.

Step 11. Install the plant materials as shown in the landscaping plan, and water them during weeks of no rain for the first two months.

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9/12/17
LANDSCAPE ARCHITECT

BIORETENTION FACILITY CONSTRUCTION DETAILS

COMPREHENSIVE DEVELOPMENT PLAN
FOR
JEFFERSON HILLS ASSISTED LIVING
PREPARED FOR
NEW MILLENNIUM SENIOR LIVING COMMUNITIES
SITUATED ALONG OGDEN ROAD, SW
CITY of ROANOKE, VIRGINIA

REVISIONS		
NO.	DATE	DESCRIPTION
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DATE: September 12, 2017
SCALE: 1" = 30'(H), 1" = 10'(V)
COMMISSION NO: 15-079
SHEET 11 OF 16

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