



Developing a Standard & Specification for Biosoil Media: A Delaware Perspective

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Background



- Conservation Design Manual released in 1997
- Goals
 - Maximize recharge
 - Minimize runoff
 - Reduced reliance on structural SWM

Bioretention



- Hydrologic Cycle
- Mimic Natural Hydrologic Cycle = Quantity Mgt.



Biological Processes in Plant/Soil Complex = Quality Mgt.



Bioretention – “Past”

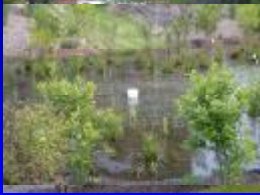


- Original guidelines from PG County, MD
 - Sizing criteria
 - Materials
 - Plant selection

Many Successful Installations



Some Not-So-Successful Installations!



- Day 1 – No Problem
- Day 4 – Problem?
- Day 10 – PROBLEM!

“Anecdotal Forensics”



- Approx. 25% failure rate – Unacceptable
- 4 Issues Identified
 - Design
 - Construction
 - Materials
 - Maintenance

Material Issues



Bioretention – “Present”



- “Green Technology”
 - Bioswales
 - Filter strips
 - Terraces
 - Riparian Buffers
 - **Bioretention**

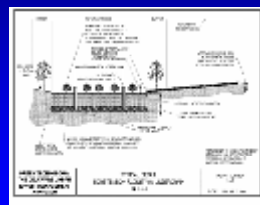
Standards & Specifications



- Design guidelines
- Typical detail
- Material specifications
- Plant lists
- Construction methods
- Maintenance guidelines

Material Specifications

Bio Soil Media



- Equal parts by volume
 - Triple-shredded hardwood mulch
 - Sphagnum peat
 - Concrete sand
- Drum mixed batch
- DNREC approved supplier

Mulch Specifications



- Free of dirt & debris
- Triple shredded hardwood
- Single shredded may be used as top dressing

Peat Moss Specifications



- Virgin sphagnum peat moss
- Typically must be imported from Canada

Sand Specifications



- ASTM C-33 concrete sand
- Clean, washed
- Fineness modulus of 2.75 or greater

Mixing Specifications



- Batch mixed
- Use of appropriate mixing equipment
- Trommel screen

What about QA/QC?

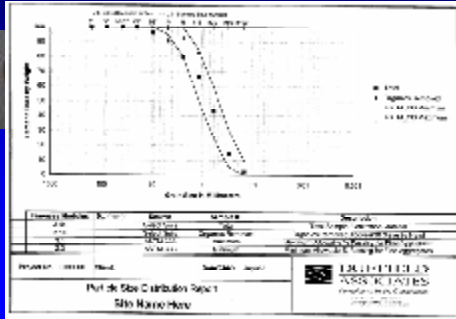


Bio soil Media Conformance Testing Protocol Step 1 – Visual Inspection



- Typically two 5 gal. samples
- Visually checked to see if sample generally consists of equal parts sand, peat moss & triple-shredded hardwood mulch

Bio Soil Media Conformance Testing Protocol Step 2 – Sieve Analysis



Bio Soil Media Conformance Testing Protocol Step 3 – Hydraulic Conductivity



- ASTM D 5856 – “Constant Head” Method
- Sample + geotextile + aggregate placed in accordance with DNREC detail
- Measure time required to filtrate 1 liter water through sample (4X)
- Avg. rate $\geq 5"/hr$

<http://www.swc.dnrec.delaware.gov/SedimentStormwater.htm>

