

Building & Inspecting the BMP

Region 2000 Planning District Commission

Lynchburg, VA

December 13, 20013



BUILDING & INSPECTING THE BMP

AGENDA

BMP Construction

BMP Inspection

BMP As-Built



COMMONWEALTH OF VIRGINIA



Virginia Stormwater Management Handbook

Second Edition
2011

PART 1 & PART 2 & PART 3

DEQ

Virginia Department of Conservation and Recreation
Division of Stormwater Management
203 Governor Street, Suite 206
Richmond, VA 23219-2094
Phone: (804) 786-2064

BMP CONSTRUCTION

Relevant guidance in the VA SWM handbook:

Chapter 8:

Appendix 8-A Example BMP Design Checklists

DEQ Stormwater Design Specifications (Version 2.0; 2013)

Section 8: Construction



BMP CONSTRUCTION

Sequence of Construction

- 1st Step = ? Understand the ESC implications.



BMP CONSTRUCTION

Sequence of Construction

- 2nd Step = ? Pre-Construction Meeting



BMP CONSTRUCTION

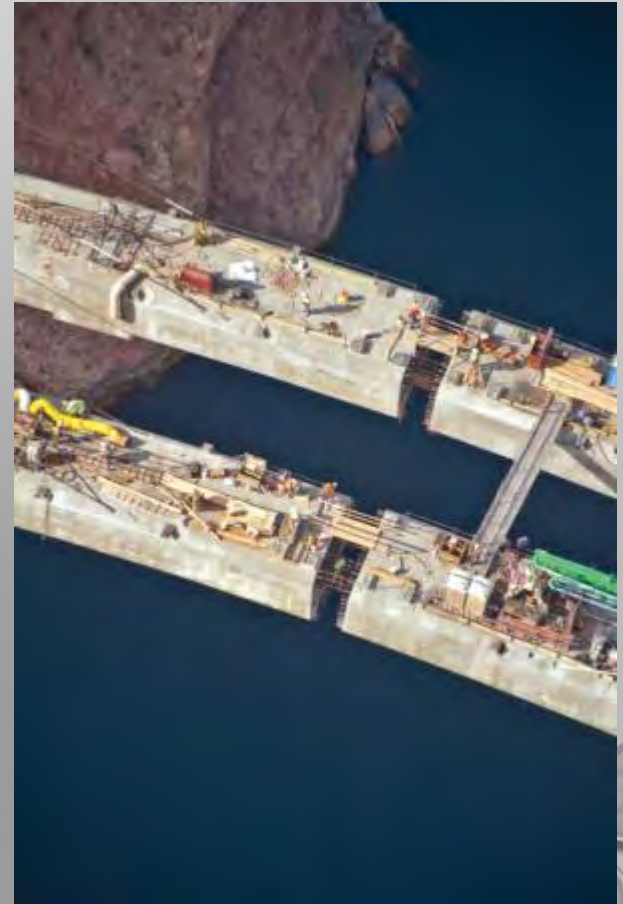
Sequence of Construction

- 3rd Step = ? Installation of Erosion Controls



BMP CONSTRUCTION

- Construction Issues



CONSTRUCTION ISSUES

- ESC timing
- Deviations from design plans
- Discrepancies in water quality treatment volume
- Grading problems
- Filter media problems
 - Contractor error? or
 - Contractor ignorance?

CONSTRUCTION ISSUES

- Contractor Error?
- Contractor Ignorance?
- Plan Deficiency?
- Unavoidable?

Does it matter??



BMP CONSTRUCTION - INSPECTIONS

9VAC25-870-114. Inspections.

A. The VSMP authority shall inspect the land-disturbing activity during construction for:

- 1. Compliance with the approved ESC plan;**
- 2. Compliance with the approved SWM plan;**
3. Development, updating, and implementation of a PP Plan; and
4. Development and implementation of any additional control measures necessary to address a TMDL.

BMP CONSTRUCTION - INSPECTIONS

2. Compliance with the approved SWM plan

Construction Inspection Checklist (Bioretention)

- ☒ Pre-Construction Meeting **VSMP Authority**

Excavation

- ☒ Certification of Excavation Inspection **VSMP Authority or
Cert. Eng of Record**

Filter Layer, Underdrain, and Stone Reservoir Placement

- ☒ Certification of Filter Layer and Underdrain
Placement Inspection **VSMP Authority or
Cert. Eng of Record**

Soil Media Placement

- ☒ Certification of Soil Media Placement Inspection **VSMP Authority or
Cert. Eng of Record**

Pretreatment and Plant Installation

- ☒ Final Construction Inspection **VSMP Authority**
- ☒ Acceptance of BMP **VSMP Authority**

BMP CONSTRUCTION - INSPECTIONS

§ 62.1-44.15:30.B. Personnel of VSMP authorities reviewing plans or conducting inspections pursuant to this chapter shall hold a **certificate of competence** as provided in subsection A. Professionals registered in the Commonwealth pursuant to Article 1 (§ 54.1-400 et seq.) of Chapter 4 of Title 54.1 shall be deemed to have met the provisions of this section for the purposes of renewals.

9VAC25-870-114.C The **VSMP authority may utilize** the inspection reports of the owner of a SW facility as part of an inspection program established in subsection B (**inspections after completion of land disturbing activities**) if the inspection is conducted by a person who is licensed as a licensed as a professional engineer, architect, landscape architect, or land surveyor;

BMP CONSTRUCTION - INSPECTIONS

- Inspection at critical stages of construction;
- The frequency of inspections will vary with the BMP Type;
- All inspections will be **NEEDED IMMEDIATELY!**



BMP CONSTRUCTION - INSPECTIONS

VSMP Authority Program Manual

Establish provisions for SW inspection program:

1. Compliance with approved SW plan in accordance with BMP inspection checklist



TYPICAL INSPECTIONS (BIORETENTION)

#1



TYPICAL INSPECTIONS (BIORETENTION)

#2



TYPICAL INSPECTIONS (BIORETENTION)

#3

(optional)



TYPICAL INSPECTIONS (BIORETENTION)

#3

(optional)



TYPICAL INSPECTIONS (BIORETENTION)

#4



TYPICAL INSPECTIONS (BIORETENTION)

#5



TYPICAL INSPECTIONS (BIORETENTION)

#6



TYPICAL INSPECTIONS (BIORETENTION)

#7



TYPICAL INSPECTIONS (BIORETENTION)

#8



CONSTRUCTION ISSUES

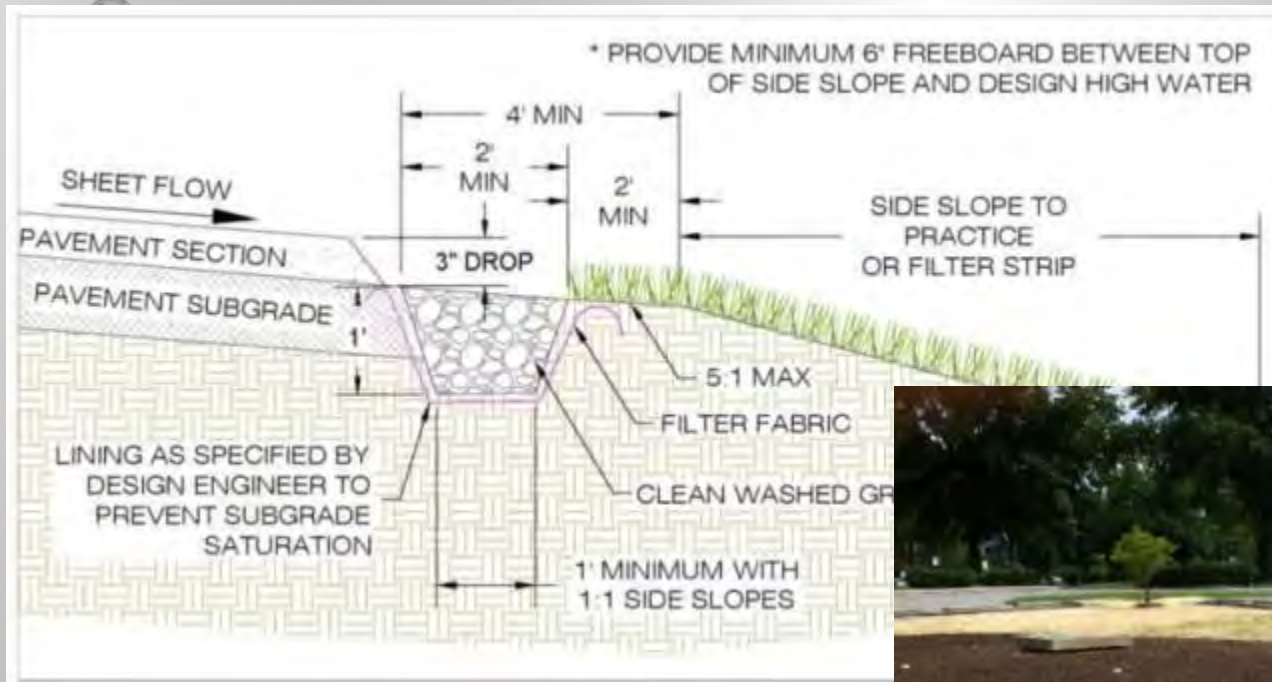
ESC TIMING



One bad storm can ruin the project!

CONSTRUCTION ISSUES

DEVIATION FROM DESIGN PLANS



May not seem like a big deal! But





CONSTRUCTION ISSUES

DISCREPANCIES IN STORAGE VOLUME OR GRADING



- Confirm inlet and outlet elevations;
- Confirmation adjacent grades;

Subtle changes in grading, paving and drainage can really screw up an otherwise fine design!

CONSTRUCTION ISSUES

FILTER MEDIA PROBLEMS



- Compacted soil media?
- Bad soil media?
- Both?

Operate machinery from the side – to avoid compaction, and other maladies



Virginia Lee Burton

CONSTRUCTION ISSUES

FILTER MEDIA PROBLEMS

Soil Mix:

- On-Site mix
- Vendor Supplied
- Either way – get it certified



CONSTRUCTION ISSUES

FILTER MEDIA PROBLEMS

Soil Mix:

- **Section 6.9:** Bioretention Material Specification

- **Certification:**

Meets the material specifications of DEQ
Stormwater Design Specification No. 9 (Version
2.0, 2013)



OTHER BMPS

PERMEABLE PAVEMENT

- Critical inspections
- Qualified Personnel
- Contractor Certification





OTHER BMPS

GRASS CHANNELS

- ESC timing
- Stabilization prior to activation



OTHER BMPs FILTER STRIPS

- ESC timing
- Stabilization prior to activation



Images courtesy of NC State Bio & Ag Engineering

OTHER BMPS INFILTRATION

Geotechnical Investigation:

DEQ Stormwater Design Specifications (Version 2.0; 2013: No. 8 Infiltration; Appendix 8-A: Infiltration and Soil Testing



FINAL BMP INSPECTION AND ACCEPTANCE

- ✓ Final Construction Inspection
- ✓ As-Built (Record Drawing)
- ✓ Acceptance of BMP



Hand over the keys to the new homeowner!

Photo courtesy of Horsley Witten Group

BMP CONSTRUCTION - INSPECTIONS

VSMP Authority Program Manual (continued):

Establish provisions for SW inspection program

2. Frequency for PP compliance inspections



BMP INSPECTIONS: POST-CONSTRUCTION



NEED TO SHARPLY REDUCE THE TIME FOR MOST ROUTINE INSPECTIONS

- Use rapid visual indicators
- Dump the long checklists
- Pass the good facilities quickly and move on
- Flag the bad or failing practices for a more intensive investigation

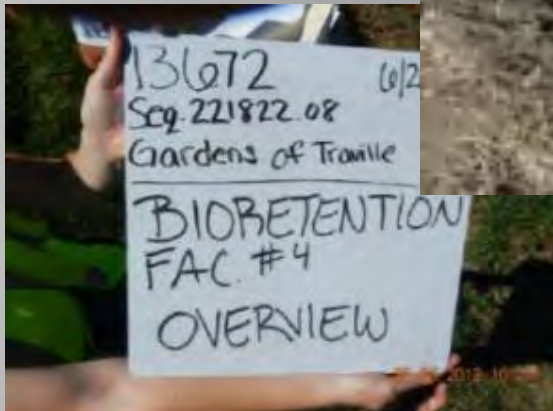
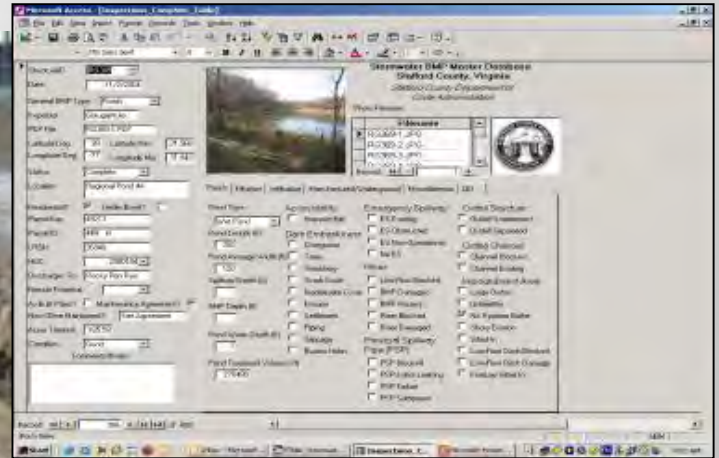


TRIAGE APPROACH FOR STORMWATER INSPECTION

- Limit the use of expensive engineer time for the limited inspections where they are really needed



INTEGRATE TECHNOLOGY THROUGHOUT EACH STEP OF THE INSPECTION PROCESS



QUESTIONS?

