Greenville County Contractor and CEPSCI Training
Construction BMPs and SCDHEC Audit Results

March 6, 2018
9:00 am – 11:00 am
Acknowledgements and Introductions

- Judy Wortkoetter, PE, Greenville County Engineer
- Josh Fisher, Greenville County Chief Inspector
- Jacob Burkey, PE, Woolpert Inc.
Presentation Agenda

• 2016 Construction BMP Audit
  – Audit Process
  – BMP Observations
• Updated Specs and Details
• 2017 SCDHEC Audit
  – General Comments
  – Specific BMPs
2016 Greenville County Construction BMP Audit
Greenville County is required by its NPDES Permit to develop and implement a Construction Site Program to reduce erosion and sedimentation.

Construction BMP Audits performed every 4-6 years to assess and improve the Program.

- Internal audit process, not a regulatory compliance audit
Audit Process

Site Selection:

• 72 potential active projects available
  – Classification
    ▪ Single Family, Multi Family, Commercial, Industrial, Institutional
  – Size (Disturbed Area)
    ▪ <1 ac, 1-10 ac, 10-25 ac, 25+ ac
  – BMPs present on site
  – Geographical location
  – Stages of construction
• 32 representative sites were randomly selected
Data Collection:

- February of 2016
- Two team members walked entirety of each site
- Panasonic Toughbook computer with GPS and digital camera
- Data gathered about each site in general and each BMP on site
- Data fields were the same as previous audits when possible
  - Consistency
  - Comparison
- New fields created for new BMPs as necessary
Audit Process

Data Collection:

- General site data
- BMP specific data
  - 753 BMPs total
  - 24 BMPs/site average
- Most common BMPs:
  - Silt Fence
  - Construction Entrance
  - Rock Ditch Check
  - Storm Drain Inlet Protection
  - Seeding/Stabilization
  - Sediment Basin
    - Floating Skimmer
    - Porous Baffles

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Individual BMP Data Collection:

- Specific data collected varied as appropriate for each BMP.
- General criteria:
  - Installation
    - Is the BMP installed correctly per Greenville County specs?
    - Specific critical dimensions were recorded and scored.
  - Maintenance
    - Is sediment accumulation acceptable?
    - Has BMP been maintained properly?
  - Function
    - Has the BMP been damaged or failed?
    - Is the BMP functioning to protect water quality?
Individual BMP Scoring:

- Example: Rock Ditch Check

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Total Points: 8

Individual Rock Ditch Check Score

$$= \frac{\text{Total Points}}{8} = \text{___} \%$$
Database and Scoring

Individual BMP Scoring:

- Example: Silt Fence

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Total Points: 13

Individual Silt Fence Score

\[
\text{Score} = \frac{\_\_}{13} = \_\_ \%
\]
Results: Overall Individual BMP Scores

- **Overall Individual BMP Score**
  - Average score for each type of BMP across entire Audit
  - BMPs from all sites combined
- **753 Total BMPs with overall average score of 70%**
Results: Overall Individual BMP Scores

Overall BMP Score: Average score for each type of BMP audited
Results and Recommendations:
The Good, The Bad, and The Ugly

The Good:
• Correct application, installation, and maintenance
• Functioning to protect water quality

The Bad:
• Incorrect application, installation, or maintenance
• Potential for off-site impacts

The Ugly:
• Serious problems with application, installation, or maintenance
• Failure of BMP or off-site impacts
Results and Recommendations:

The Good

SC-01 Surface Outlet and Baffle Sediment Basin
Results and Recommendations:

The Good

SC-02 Sediment Trap
Results and Recommendations:
The Good

EC-06 Riprap Aggregate
Results and Recommendations:

The Good

EC-03 Seeding/Stabilization
Results and Recommendations:

The Good

EC-03 Seeding/Stabilization
Results and Recommendations:
The Good

EC-04 Rolled Erosion Control Products
Results and Recommendations:

The Good

EC-04 Rolled Erosion Control Products
Results and Recommendations:

The Bad

EC-04 Rolled Erosion Control Products
Results and Recommendations:

The Good

SC-10 Floating Skimmer
Results and Recommendations:

The Good

SC-10 Floating Skimmer
Results and Recommendations:

The Bad

SC-10 Floating Skimmer
Results and Recommendations:

The Ugly

SC-10 Floating Skimmer
Results and Recommendations: The Ugly

SC-10 Floating Skimmer
Results and Recommendations:
The Good

SC-11 Porous Baffles
Results and Recommendations:

The Good

SC-11 Porous Baffles
Results and Recommendations:

The Bad

SC-11 Porous Baffles
Results and Recommendations:

The Bad

SC-11 Porous Baffles
Results and Recommendations: The Ugly

SC-11 Porous Baffles
Results and Recommendations:
The Ugly

SC-11 Porous Baffles
Results and Recommendations:

The Good

SC-07A Type A Inlet Protection – Filter Fabric
Results and Recommendations:

The Bad

SC-07A Type A Inlet Protection – Filter Fabric
Results and Recommendations:

The Bad

SC-07A Type A Inlet Protection – Filter Fabric
Results and Recommendations:
The Ugly

SC-07A Type A Inlet Protection – Filter Fabric
Results and Recommendations:

Example of Good

SC-07A Type A Inlet Filter – Sediment Tube
Results and Recommendations:

The Bad

SC-07A Type A Inlet Filter – Sediment Tube
Results and Recommendations:
The Ugly

SC-07A Type A Inlet Filter – Sediment Tube
Results and Recommendations:

The Good

EC-01 Surface Roughening
Results and Recommendations:

The Bad

EC-01 Surface Roughening
Results and Recommendations:

The Good

SC-03 Silt Fence
Results and Recommendations:
The Bad

SC-03 Silt Fence
Results and Recommendations:

The Bad

SC-03 Silt Fence
Results and Recommendations:

The Ugly

SC-03 Silt Fence
Results and Recommendations:

The Ugly

SC-03 Silt Fence
Results and Recommendations:
The Good

SC-06 Construction Entrance
Results and Recommendations:

The Bad

SC-06 Construction Entrance
Results and Recommendations:

The Bad

SC-06 Construction Entrance
Results and Recommendations:

The Ugly

SC-06 Construction Entrance
Results and Recommendations:

The Good

SC-04 Rock Ditch Check
Results and Recommendations:

The Bad

SC-04 Rock Ditch Check
Results and Recommendations:

The Bad

SC-04 Rock Ditch Check
Results and Recommendations: The Ugly

SC-04 Rock Ditch Check
Results and Recommendations:
The Good

SC-05 Sediment Tube Ditch Check
Results and Recommendations:

The Bad

SC-05 Sediment Tube Ditch Check
Results and Recommendations:

The Ugly

SC-05 Sediment Tube Ditch Check
Conclusions

• EPSC practices have generally improved over time since the first audit in 2001.
• There is room for improvement:
  – Porous Baffles and Floating Skimmers in Ponds
  – Inlet Protection
  – Ditch Checks
    • Rock
    • Sediment Tube
  – Construction Entrances
  – Silt Fence
• Update specifications and details
• Provide training
BMP Audit Questions?
Updated BMP Specifications and Details
### Specification/Detail Updates

- Does this page look familiar?

#### Appendix F / Erosion Prevention Specifications and Details

<table>
<thead>
<tr>
<th>Specification Number</th>
<th>BMP Type</th>
<th>Standard Specification</th>
<th>Detail (pdf)</th>
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### Specification/Detail Updates

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<td>SC-12</td>
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<td>Concrete Washout</td>
<td>pdf</td>
<td>pdf</td>
<td>dxf</td>
</tr>
</tbody>
</table>
Specification/Detail Updates

• Greenville County Design Manual contains specs and details for **30 Erosion Prevention and Sediment Control BMPs for use during construction**.

• 6 BMPs received updates after the BMP Audit
  – EC-04 Rolled Erosion Control Products (RECPs)
  – EC-10 Slope Interruption Devices (SIDs)
  – SC-03 Silt Fence
  – SC-06 Construction Entrance
  – SC-07 Storm Drain Inlet Protection
  – SC-11 Porous Baffles

• To be released with updated [2018 Design Manual](#) as [Appendix E](#)
EC-04 Rolled Erosion Control Products (RECPs)

- Observed problems with installation on slopes
- Renamed Detail Drawing for clarity
  - EC-04B: RECP – Slope Installation
EC-10 Slope Interruption Devices (SIDs)

- Observed need for clarification
- Spec and detail updated
- Only non-weighted tubes anchored with wood posts should be used as SIDs
- Should be used with HECP or ECB when slope length ≥ 50 feet
  - Or shorter slope lengths at discretion of Engineer
SC-03 Silt Fence

- No major changes to dimensions or materials
- As a reminder...
• Observed double row silt fence frequently in field
• Spec and detail updated to provide guidance of 3 to 5 foot spacing
SC-06 Construction Entrance

- Observed problems with installation and maintenance
  - Sometimes incorrect stone being used
    - Too small or mix of too small with correct stone
  - Old specification:

  Provide a stabilized construction entrance composed of the following materials:

  - Class 2 non-woven geotextile fabric and
  - Aggregate stone with the gradation in the following table:

<table>
<thead>
<tr>
<th>Nominal Size (Sieves with Square Openings)</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 in.</td>
<td>100</td>
</tr>
<tr>
<td>1 1/2 in.</td>
<td>35 to 100</td>
</tr>
<tr>
<td>3/4 in.</td>
<td>0 to 15</td>
</tr>
</tbody>
</table>
SC-06 Construction Entrance

- Updated Spec/Detail:
  - Use AASHTO No. 1, 2, 24, or 3 stone
  - Minimum dimensions
    - 100 ft long
    - 24 ft wide
  - May use pre-fabricated alternatives with County approval
Examples of pre-fabricated construction entrances
SC-07 Storm Drain Inlet Protection

• Added clarification on materials as applicable
  – **Never use** straw bales, pine bales, leaf mulch, or grass clippings
• Observed failure due to inadequate posts
• Posts and post spacing for Type A (Filter Fabric) and Type B (Wire and Stone)
  – Steel T-posts only

![Diagram of Storm Drain Inlet Protection]

**POST SPACING DETAIL**
(MAXIMUM 2-FOOT SPACING)
SC-07 Storm Drain Inlet Protection

- Observed failure due to inadequate posts
- Posts and post spacing for Type A (Sediment Tube)
  - Steel T-posts or wood posts minimum ¾” x ¾”
SC-11 Porous Baffles

- Observed Porous Baffles in field that are a double layer of material folded over a wire
  - Good idea!
- Updated Spec/Detail to:
  - Show installation of double layer Porous Baffle
  - Spec materials to be used as a double layer Porous Baffle

SINGLE LAYER: IF NEEDED ADD SUPPORT WIRE TO PREVENT SAGGING
DOUBLE LAYER: SUPPORT WIRE REQUIRED

ENSURE POST IS LOCATED AT START OF SIDESLOPES

4-FT (MAX)

5 FT MIN POST HEIGHT VARES

USE 12” ANCHORS (STAKES, PINS, STAPLES) SPACED AT 1” INTERVALS TO SECURE POROUS BAFFLE TO BASIN BOTTOM OR TRENCH & BACKFILL.

CROSS SECTION VIEW
SC-11 Porous Baffles

• Observed Porous Baffles in field that are a double layer of material folded over a wire
  – Good idea!
• Updated Spec/Detail to:
  – Show installation of double layer Porous Baffle
  – Spec materials to be used as a double layer Porous Baffle
SC-11 Porous Baffles

- Material with greater open space can be used as Porous Baffle in a double layer.

### Table 2: Minimum Coconut / Excelsior Blanket Porous Baffle Material Performance Requirements

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Test Method</th>
<th>Required Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Penetration (% openings)</td>
<td>ASTM D 6567 or Equivalent</td>
<td>10% Min, 35% Max</td>
</tr>
<tr>
<td>Tensile Strength¹ (machine direction)</td>
<td>ASTM D 6818 ASTM D 4595</td>
<td>145 lb/ft Min</td>
</tr>
</tbody>
</table>

### Table 3: Minimum Coconut / Excelsior Blanket Porous Baffle Material Performance Requirements for Use as a Double Layer

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Test Method</th>
<th>Required Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Penetration (% openings)</td>
<td>ASTM D 6567 or Equivalent</td>
<td>30% Min, 60% Max</td>
</tr>
<tr>
<td>Tensile Strength¹ (machine direction)</td>
<td>ASTM D 6818 ASTM D 4595</td>
<td>145 lb/ft Min</td>
</tr>
</tbody>
</table>
SC-11 Porous Baffles

- Material with greater open space can be used as Porous Baffle in a double layer.

21% Open Space = Use as Single Layer Baffle

54% Open Space = Use as Double Layer Baffle
SC-11 Porous Baffles

- Reminder: Silt Fence should **NEVER** be used as a Porous Baffle.
BMP Update Questions?
2017 SCDHEC Stormwater Program Audit
DHEC Audit: CEPSCI Inspections/Inspectors

- Approved plans and CEPSCI inspections must be **readily available** for review by EPA, SCDHEC, and local Municipality/permitting agency.
  - Ideally on-site
  - At minimum, an indication on-site of where to access off-site
DHEC has requested that if the County determines any CEPSCI certified inspectors are not doing their jobs, they should be reported to DHEC and that DHEC may consider revoking their certification.
DHEC Audit: General Comments

• Port-o-john/portable toilet must be available and properly located on ground level away from stormwater inlets (and ponds!)
• Trash and fuels/oils must be properly handled and disposed of
• Stream buffers should remain undisturbed
DHEC Audit: Specific BMPs

• Construction Entrances
  – Geotextile is required under rock
  – Must be properly sized and maintained for the duration of project
DHEC Audit: Specific BMPs

• Silt Fence
  – Must be properly installed and maintained for the duration of project
DHEC Audit: Specific BMPs

• Sediment Ponds/Traps
  – Must have a clearly marked cleanout stake
  – Baffles are required
  – Floating skimmers must have a rock pad to prevent being stuck in mud
DHEC Audit: Specific BMPs

- How is this pond doing?
  - Cleanout stake?
  - Baffles?
  - Floating skimmer?
  - What else?
DHEC Audit: Specific BMPs

• Concrete Washout
  – Proper washout area is required
DHEC Audit: Specific BMPs

- Temporary and Permanent Vegetation
  - Applied at proper rate
  - Soil must be properly prepared
DHEC Audit: Specific BMPs

• Temporary and Permanent Vegetation
  – Applied at proper rate
  – Soil must be properly prepared
DHEC Audit: Specific BMPs

- Temporary and Permanent Vegetation
  - Protect your vegetation!
DHEC Audit Questions?