Review of Large Site
SESC Plan Performance Criteria

February 12, 2015

Brian Lafaille
RIDEM RIPDES Stormwater Program
Soil Erosion and Sediment Control Performance Criteria

1. Avoid and Protect Sensitive Areas and Natural Features
2. Minimize Area of Disturbance
3. Minimize the Disturbance of Steep Slopes
4. Preserve Topsoil
5. Stabilize Soils
6. Protect Storm Drain Inlets
7. Protect Storm Drain Outlets
8. Establish Temporary Controls for the Protection of Post-Construction Stormwater Treatment Practices
9. Establish Perimeter Controls and Sediment Barriers
10. Divert or Manage Run-on from Up-gradient Areas
11. Properly Design Construction Stormwater Conveyance Channels
12. Retain Sediment Onsite
13. Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
14. Construction Activity Pollution Prevention Control Measures
15. Control Measure Installation, Inspections, Maintenance, and Corrective Actions
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Performance Criteria No. 10
Divert or Manage Run-on from Up-gradient Areas

Source: USEPA-833-R-06-004 May 2007
Foundry Parking Lots Construction Project

Source: RIDEM – RIDEP Permitting Program
Foundry Parking Lots Construction Project
Foundry Parking Lots Construction Project

Source: RIDEM – RIPDES Permitting Program
RIDOT I-95 Viaduct Project

Source: RIDEM – RIPDES Permitting Program
RIDOT I-95 Viaduct Project
RIDOT I-95 Viaduct Project
RIDOT I-95 Viaduct Project
Diversion Installed – Problem Alleviated

Source: RIDEM – RIPDES Permitting Program
Diversion Installed – Pipe Slope Drain
Diversion Installed – Pipe Slope Drain

Source: RIDEM – RIPDES Permitting Program
Diversion Installed – Pipe Slope Drain

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Diversion Installed – Pipe Slope Drain

Source: RIDEM – RIPDES Permitting Program
Diversion Installed – Pipe Slope Drain
Performance Criteria No. 11
Properly Design Constructed Stormwater Conveyance Channels
Example: Temporary Diversion Swale
• Temporary Conveyance Channels must be designed to handle the 10 Year, 24 Hour Type III Design Storm.

• SESC Site Plans must contain details and specifications demonstrating this design requirement has been satisfied.

Example: Temporary Diversion Swale
Performance Criteria No. 12
Retain Sediment Onsite
Retain Sediment Onsite: 
Common Drainage Locations 
Serving <1 Acre of Disturbance

A combination of phasing, stabilization, and conveyances that provide run-off control will be sufficient.

**Note:** In some cases, additional control measures may be required where site conditions warrant or a specific requirement exists in State regulations or Local ordinance. Refer to Performance Criteria No. 13 for additional information.
Retain Sediment Onsite: Temporary Sediment Traps

Sediment Traps are Mandatory for Common Drainage Locations Where 1-5 Acres of Land Will Be Disturbed

Note: If period of disturbance will be greater than six (6) months, a sediment basin would be required.
Example: Temporary Sediment Trap
Example: Temporary Sediment Trap
Example: Temporary Sediment Trap
Example: Temporary Sediment Trap
Example: Temporary Sediment Trap
Example: Temporary Sediment Trap

SEDIMENT TRAP DIMENSIONS

<table>
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<tr>
<th>SEDIMENT TRAP #</th>
<th>BOTTOM ELEV.</th>
<th>CLEANOUT MARK ELEV.</th>
<th>WET POOL ELEV.</th>
<th>WET CREST ELEV.</th>
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LONGITUDINAL CROSS SECTION

NOT TO SCALE

TEMPORARY SEDIMENT TRAP DETAIL

NOT TO SCALE
Retain Sediment Onsite: Temporary Sediment Basins

- Required for Common Drainage Locations Where >5 Acres of Land Will Be Disturbed

- Designs Must Utilize Surface Outlets When Discharging From Temporary Sediment Basins to Maximize Sediment Removal

Example: Temporary Sediment Basin
Example: Temporary Sediment Basin
Example: Temporary Sediment Basin
Example: Temporary Sediment Basin

**Emergency Spillway Detail**

- **Installation Notes:**
  1. **Note 1:** SMALL THE ANTI-SEEP AND ATTACH THE BORDERS TO THE EDGES TO FORM A SQUARE. (USE THE BORDERS AND NAILS PROVIDED.)
  2. **Note 2:** CUT A ROUND HOLE IN THE CENTER OF THE RUBBER THAT IS SMALLER THAN THE PIPE SIZE. (Approx. 20% SMALLER.) THIS WILL ALLOW THE RUBBER TO STRETCH OVER THE PIPE WHEN THE ANTI-SEEP IS INSTALLED ON THE PIPE. THIS SHOULD PROVIDE A NEARLY WATERPROOF SEAL BETWEEN THE PIPE AND THE ANTI-SEEP.
  3. **Note 3:** SLIP THE PIPE THROUGH THE ANTI-SEEP, INSERT THE SEAL BETWEEN THE PIPE AND THE ANTI-SEEP, CAREFULLY BACKFILL AND COMPACT WITH SUITABLE SOIL.

**Anti-Seep Collar**

- **Low Flow Outlet**

**Detention Pond Typical Cross Section**

- **Description:**
  - **Top of Pond Elevation:** 62.00
  - **Top of Pond Elevation:** 65.50
  - **Bottom of Pond Elevation:** 56.00
  - **Bottom of Pond Elevation:** 39.00
  - **100 Year Storm Elevation:** 61.00
  - **25 Year Storm Elevation:** 59.15
  - **10 Year Storm Elevation:** 57.79
  - **1 Year Storm Elevation:** 39.96
  - **Seasonal High Grit Elevation:** 54.58
  - **Soil Evaluation:** TH 05 TH 018

**Outlet Structure**

- **Gravel Borrow Anti-Flotation Device**

**Pond F With Outlet Control Structure**

- **Pond F Without Outlet Control Structure**

**Low Flow (CP) Outlet**

- **Low Flow Riser Detail**

**Internal Orifice Schedule**

- **Location:**
  - **Invert Diameter:**
    - Pond E: 56.00, 1.75"
    - Pond F: 39.00, 2.125"
Example: Surface Outlet
Performance Criteria No. 13
Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
Goal: Minimize Impacts In the Vicinity of All Points of Discharge:

- Channel Erosion/Scouring means controlling velocities
- Natural Streambank Erosion means controlling smaller storms
- Flooding (ex. Overbank, Drainage System)
The Combination of All Other Performance Criteria Will Be Adequate In the Majority of Cases

- Construction Sequencing/Phasing
- Minimize Area of Disturbance
- Stabilize Soils
- Establish Perimeter Controls and Sediment Barriers
- Divert of Manage Run-on from Upgradient Areas
- Retain Sediment Onsite
  - <1 Acre of Disturbance - No Trap or Basin Required
  - 1-5 Acres of Disturbance - Sediment Trap
  - >5 Acres of Disturbance - Sediment Basin
Example No. 1
Overbank Flooding Concerns
Example No. 2
Flooding of Downstream Collection System
Pre-Development Analysis

Design Storms

Two Design Points

The hydrologic analysis was performed using HydroCAD software for a 24-hour, Type III rainfall event for Washington County (1-year: 2.8 inches, 10-year: 4.9 inches, 100-year: 8.5 inches). Two (2) Design Points were analyzed:

- Design Point 1: RVW Closed Drainage System to Hall Creek
- Design Point 2: CPR Closed Drainage System to Mill Creek

PRE-DEVELOPMENT ANALYSIS

Under pre-development conditions, the Site was divided into three (3) sub-watersheds contributing to the two (2) Design Points, where peak discharge rates and volumes were evaluated for the 10-year and 100-year storm events. (See Appendix F for “Pre-development Drainage Area Plan” and Appendix C for HydroCAD calculations):

- Sub-watershed “MC-3A” is comprised of 12.8 acres of pasture/grass and some pavement. Runoff from this area flows northeasterly into the closed drainage system in Roma Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southeasterly direction to an outfall at Hall Creek.
- Sub-watershed “MC-3B” (Post-2004) is comprised of 3.6 acres of pasture/grass and some pavement. Runoff from this area flows northeasterly into the closed drainage system in Roma Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southeasterly direction to an outfall at Hall Creek.
- Sub-watershed “MC-2B-2” (Post-2004) is comprised of 9.5 acres of Phase I roof, Pond 3, and landscape areas adjacent to Pond 3. Pond 3 contains an outlet control structure (OCS) along the western banks of the basin. The OCS controls peak runoff out of Pond 3 via a 12-inch pipe from the OCS to the closed drainage system in Commerce Park Road (Design Point 2), where it is conveyed in a southeasterly direction to Mill Creek.

POST-DEVELOPMENT ANALYSIS

Under post-development conditions, the Site was divided into eight (8) sub-watersheds contributing to the two (2) previously-described Design Points, where peak discharge rates and volumes were evaluated for the 10-year and 100-year storm events. Four (4) of these sub-watersheds are conveyed to Pond 4 prior to entering Pond 3 and three (3) of these sub-watersheds are conveyed directly to Pond 3. (See Appendix F for “Post-development Drainage Area Plan” and Appendix C for HydroCAD calculations).

To Pond 4:
- Sub-watershed “PR-4A” is comprised of 4.6 acres of truck loading and trailer parking and some grass that is conveyed via closed drainage piping to a sediment forebay and bioretention area in Pond 4 then to Pond 3 through a box culvert.
- Sub-watershed “PR-4B” is the 4.4 acre proposed building roof that is conveyed via closed drainage piping to a sediment forebay in Pond 4 then conveyed to Pond 3 through a box culvert.

Designer identifies points of discharge and evaluates potential for impacts
Post-Development Analysis

5. HYDROLOGIC ANALYSIS

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- Sub-watershed “HC-34” is comprised of 12.0± acres of pasture/grass and some pavement. Runoff from this area flows overland northeasterly into the closed drainage system in Romano Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southerly direction to an outfall at Hall Creek.
- Sub-watershed “HC-38” (Pre-2004) is comprised of 3.6± acres of pasture/grass and some pavement. Runoff from this area flows overland northeasterly into the closed drainage system in Romano Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southerly direction to an outfall at Hall Creek.
- Sub-watershed “MC-2B-2” (Pre-2004) is comprised of 9.5± acres of Phase I roof, Pond 3, and landscape areas adjacent to Pond 3. Pond 3 contains an outlet control structure (OCS) along the western banks of the basin. The OCS controls peak runoff out of Pond 3 with a 12-inch pipe from the OCS to the closed drainage system in Commerce Park Road (Design Point 2), where it is conveyed in a southerly direction to Mill Creek.

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Closed Collection System and Conveyances at capacity, history of flooding in area
Post-Development Analysis

Peak Rates are managed for the 10 yr and 100 yr storms

Table 1: Hydrologic Analysis Summary (See additional details in Appendix C)

<table>
<thead>
<tr>
<th>Design Point</th>
<th>Description</th>
<th>DESIGN STORM</th>
<th>Peak Flow (cfs)</th>
<th>Volume (Ac-ft)</th>
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<td></td>
<td>EX PR EX PR</td>
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<tr>
<td></td>
<td></td>
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<td>2</td>
<td>Commerce Park Road Mill Creek</td>
<td>10-YEAR</td>
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<td>100-YEAR</td>
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</table>

The analysis shows that post-development peak discharge rates are significantly less than pre-development peak discharge rates to Romano Vineyard Way and Design Point 1. Peak-development peak discharge rates are roughly equivalent to pre-development peak discharge rates to Commerce Park Road and Design Point 2. These results are conservative, as they negate any infiltration that might occur in the recession portions of the basins or the basin sidewalls.
Control Velocities and Volumes

1.2 Nature and Sequence of Construction Activity

- The Project is estimated to commence in November 2013 (or upon receipt of all necessary permits) with the placement of perimeter erosion and sedimentation controls around the active construction area, followed by minor clearing and grubbing within the limit of disturbance. Anticipated erosion controls at the onset of construction include a construction entrance, placement of silt fence along all down-gradient slopes within the subject property, silt sack sediment traps in existing catch basins in the vicinity of the project, and hay bales at the existing inlets and outlets to Pond 3.

- If construction activities are temporarily halted for more than 14 days, the disturbed areas will be stabilized with temporary seed.

- Earthwork associated with building pad preparation and truck loading and trailer parking is anticipated immediately following placement of erosion controls. Installation of the stormwater management system will be coordinated with these earthwork activities to ensure that stormwater quality and quantity is managed throughout construction activities. Temporary sediment basins and phased construction within Pond 3 are required to achieve these goals.

- As each bioretention area is completed, silt fence will be installed around the perimeter of each immediately after completion of construction to protect them from sediment transport from construction runoff and compaction from construction equipment.

- Paving of parking and loading areas and access drives and placement of loam, seed, and landscaping is expected to be completed by June 2014. The construction of the building itself is not anticipated at this time or in the near future.

- Phase II - **DURING EARTHWORK**

  Describe phase:
  Immediately following the placement of the erosion controls, minor clearing and grubbing within the proposed limit of disturbance is anticipated, as most of this area was already cleared during previous permitting of the site. Construction will commence with the installation of the utilities infrastructure and the re-grading of Pond 3. A binder course in pavement areas is anticipated to be completed during this phase.

  The Contractor shall employ a phased approach to re-grading Pond 3 and re-installing/locating its outlet control structure, as existing roof runoff directed to Pond 3 must continue throughout construction. Phasing may include temporary sediment basins near Pond 3, sheeting or other methodologies for isolating the construction work zone from the active stormwater system, and erosion control devices (gabions, stone check dams, or haybales) to prevent sediments from exiting Pond 3 during construction.
Control Velocities and Volumes

2.12 Retain Sediment On-Site and Control Dewatering Practices

Sediment traps, basins, and barriers are used to retain sediment on the site to protect streams, lakes, drainage systems, and adjacent property. These devices are used at the outlets of channels, diversions, and other runoff conveyance measures to allow sediment-filled water to pool and sediment to settle. These measures are often used as the last line of defense to stop sediment from leaving the site.

A sediment trap or basin shall be installed, and maintained, as depicted on the approved plan set and in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended).

The dewatering of non-contaminated non-stormwater (i.e. groundwater) or accumulated precipitation discharge of sediment-laden water into storm drains, streams, lakes or wetlands prior to sediment removal is prohibited. A sediment trap or basin shall be installed, and maintained, as depicted on the approved plan set and in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended).

The dewatering of contaminated non-stormwater cannot be discharged without obtaining a Rhode Island Department of Environmental Management RIPDES discharge permit to do so. If dewatering of contaminated water is anticipated at the site, appropriate permits must be obtained in advance.

- Sediment trap(s) may be installed in Pond 3 to retain sediment during construction. Because Pond 3 must remain operational throughout construction and the contractor will need to modify Pond 3 in phases, no single location for these sediment traps can be identified on the plan set, but rather, it is left to the discretion of the contractor. A sediment trap detail is provided in the plan set and designed in accordance with the RI Soil Erosion and Sedimentation Control Handbook.

- Visible floating solids or foam shall not be discharged.

- Velocity dissipation devices shall be used at all points where dewatering water is discharged.
Control Velocities and Volumes

2.6 Control Stormwater Flowing Onto and Through the Project

Structural BMPs are used to divert flows from exposed soils, retain or detain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site.

BMPs shall be installed as depicted on the approved plan set and in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) or the RI Department of Transportation Standard Specifications for Road and Bridge Construction.

- Structural practices, such as temporary sediment basins and diversion dikes are anticipated to be required during construction to modify Pond 3, because roof drain connections into Pond 3 (installed in 2004) will continue to discharge runoff into Pond 3 throughout construction. Pond 3 changes include excavation of two feet of material and widening to increase storage capacity and accommodate the anticipated increase in the 100-year storm event.
What Must the Design Professional Demonstrate?

- Clearly Identify All Discharge Locations
- Determine Whether or Not Conditions Warrant Temporary Detention Measures to Protect Receiving Waters and Downstream Conveyances in the Vicinity of Discharge Locations.

For areas > 5 acres the Department may require engineering analysis of design storms and controls.
The Design Professional is Responsible for Evaluating the Need for Additional Controls.
Next Steps

- Further Training Sessions Planned
  - Design Professionals
  - Municipalities
  - RIDOT
  - Contractors
Next Steps

- Update Toolbox
  - Internal SESC Plan Review Checklist
  - Appendix A Checklist Revision
  - RI Model SESC Plan
  - RI Stormwater Management Guidance for Individual Single-Family Residential Lot Development
Questions?