APPENDIX A - SURFACE OUTLET AND BAFFLE SEDIMENT BASINS AND MULTIPURPOSE BASINS

This Appendix contains requirements for the design, materials, equipment, and construction of temporary Surface Outlet and Baffle Sediment Basins and Multipurpose Basins in conformity with the Plans, Specifications, and SCDOT Standard Drawings and as directed by the RCE.

Section A.1 Description

Section A.2 Site Assessment

Section A.3 Materials

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- Section A.4.1 General Design Requirements

Section A.5 SCDOT Design Aids for Surface Outlet and Baffle Sediment Basins

- Section A.5.1 Riser and Spillway Design

Section A.6 Multipurpose Basin Design

Section A.7 Construction

- Section A.7.1 Installation Requirements

A.1 Description

Provide a Surface Outlet and Baffle Sediment Basin to remove sediment from construction site runoff at locations shown on the Plans or as directed by the RCE. See SCDOT Standard Drawings for Surface Outlet and Baffle Sediment Basin Detail Sheets 815-305-01, 815-305-02, 815-305-03, 815-305-04, 815-305-05, 815-305-06, and 815-305-07. A Surface Outlet and Baffle Sediment Basin is a basin where sediment-laden runoff is temporarily detained, allowing sediment to settle out before the runoff is discharged. The purpose of a Surface Outlet and Baffle Sediment Basin is to collect and store sediment from disturbed areas cleared or graded during construction. To maximize effectiveness, locate Surface Outlet and Baffle Sediment Basins at the lowest points or near the edge of a watershed catchment.

Traditional Sediment Basin designs typically use a perforated riser or staged riser with a low flow orifice for dewatering. Surface Outlet and Baffle Sediment Basins **do not** use perforated risers. These Basins require dewatering from the water surface where the density of total suspended solids is at a minimum in the water column. A Surface Outlet and Baffle Sediment Basin implements three spillway devices:

1. A Primary Riser Spillway consisting of a solid circular concrete monolithic base or extended base riser with no staged discharges or low flow orifices connected to an Outlet Barrel Pipe. Stormwater enters the Primary Riser spillway by overtopping the structure and through a Floating Skimmer.

2. A Floating Skimmer attached to the bottom of the Primary Riser dewatering the runoff volume below the top elevation of the Primary Riser. The Floating Skimmer dewaters the volume below the Primary Riser within 48 hours.

3. A stabilized Emergency Spillway that safely passes the 100-year, 24-hour storm event.

A Surface Outlet and Baffle Sediment Basin includes Baffles across the width of the Basin to spread flow across the entire width of the Basin, reducing the potential for turbid flow and short circuiting.

A.2 Site Assessment

Select Surface Outlet and Baffle Sediment Basin locations during a site evaluation, or by reviewing a detailed topographic map. Note natural watershed catchments and select Surface Outlet and Baffle Sediment Basin locations so runoff from land disturbing activities can easily be diverted into the Surface Outlet and Baffle Sediment Basin. Install Surface Outlet and Baffle Sediment Basins before land disturbance activities begin.

Consider construction phasing when selecting locations for Surface Outlet and Baffle Sediment Basins. Select a location that allows the Surface Outlet and Baffle Sediment Basin to remain in service as long as possible before final stabilization is achieved. Select locations that are accessible for periodic sediment removal and other necessary maintenance. Plan locations for sediment disposal as part of the Surface Outlet and Baffle Sediment Basin site selection. Identify sediment disposal locations on the Plans or as directed by the RCE.

A.3 Materials

Use materials listed in Table A.1 for Surface Outlet and Baffle Sediment Basin construction. Information concerning the references in the tables is found in the SCDOT *2007 Standard Specifications for Highway Construction* book, or most recent edition, along with the SCDOT Supplemental Technical Specifications.

Table A.1: Surface Outlet and Baffle Sediment Basin Construction Materials and Associated SCDOT Specifications

Material	Specification
Corrugated Aluminum Pipe	AASHTO M 196 & *SCDOT Supplemental Technical Specification for Pipes SC-M-714*
Reinforced Concrete Pipe	AASHTO M 170 *& SCDOT Supplemental Technical Specification for Pipe SC-M-714*
Class 3000 Concrete	**Section 701**
Riprap Class B	**Section 804**
Type 2 Non-Woven Geotextile Under Riprap	**Section 804**
FA-10 Fine Aggregate	**Section 701**
Dam Core Materials	AASHTO Classifications A-2-6, A-2-7, A-6, A-7
Woven Wire Fence, Type 1without barbed wire, with gate	**Section 806**
Chain Link Fence for Multipurpose Basins, with gate	**Section 806**
Floating Skimmer	*SCDOT Supplemental Technical Specification for Floating Skimmers SC-M-815-14 or latest revision.*
Porous Baffles	*SCDOT Supplemental Technical Specification for Porous Baffles SC-M-815-16 or latest revision*
Seeding	*SCDOT Supplemental Technical Specification for Seeding SC-M-810-2 or latest revision.*
RECPs	*SCDOT Supplemental Technical Specification for RECP SC-M-815-9 or latest revision*

A.4 Design Requirements

The Surface Outlet and Baffle Sediment Basin is designed to dewater at a controlled rate, which helps ensure maximum trapping efficiency by allowing a greater settling time for sediment, and the release of the cleanest water from the top of the water column. Flow through the Primary Rise Structure is a function of the Surface Outlet and Baffle Sediment Basin.

A.4.1 General Design Requirements

The design criteria is determined using the charts or graphs on SCDOT Standard Drawings 815-305-03, 815-305-04 and 815-305-05 includes basin size, runoff storage volume, sediment storage volume, and Primary Riser Spillway and Outlet Barrel Pipe configuration. The design requirements outlined in this Specification ensure a minimum of 80% trapping efficiency of total suspended solids (TSS). The General Design Requirements are:

- Drainage Area: 10 acres or more draining to one location require a Surface Outlet and Baffle Sediment Basin.
- 80 percent design removal efficiency goal for TSS.
- Optimum Basin length to width ratio is 2L:1W.
- Basin bottom has a 0.5% slope.
- Floating Skimmer with a dewatering time of 48 hours.
- Anti-vortex device / trash rack required for Primary Riser.
- Minimum of three (3) Baffles four (4) feet in height installed in the Basin in the Upper State.
- Minimum of one (1) Baffle four (4) feet in height installed in the Basin in the Lower State.
- At least one row of Baffles placed between the Primary Riser structure and all pipes or channels discharging to the Basin.
- Perform temporary stabilization by seeding and install Temporary Erosion Control Blankets on exposed basin side slopes.

Design Temporary Surface Outlet and Baffle Sediment Basin using one of two strategies:

1. SCDOT Design Aids using the SCDOT specific charts and graphs for drainage areas ranging from five (5) to twenty-five (25) acres as listed in the SCDOT Standard Drawings 815-305-01 through 815-305-07.
2. In accordance to the requirements in standards for Stormwater Management and Sediment Reduction Act 72-425 using South Carolina Design Aids, Sedimot, SEDCAD4, Pond Pack, SEDPRO and other computer models that utilize eroded particle size distributions and calculates a corresponding 80% trapping efficiency for TSS.

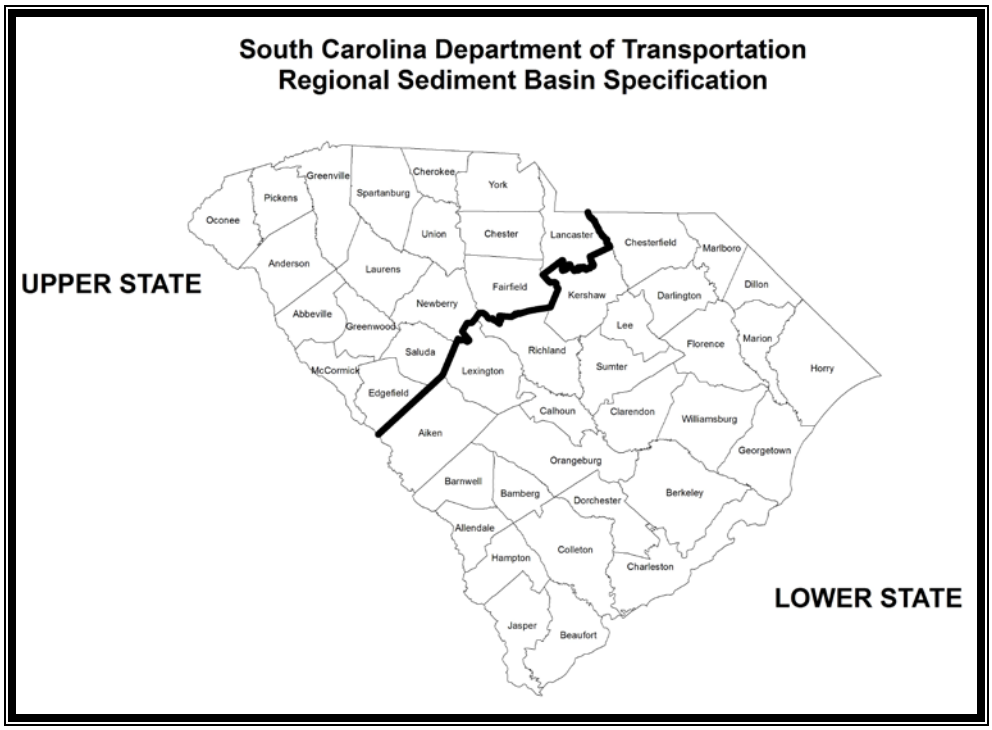

Figure A-1. Upper and Lower State Map

A.5 SCDOT Design Aids for Surface Outlet and Baffle Sediment Basins

The required runoff and sediment storage volume is dependent on the Project site location. Use Figure A-1 above or SCDOT Standard Drawings 815-305-03 to determine if the Project Site location is classified as Upper State or Lower State.

Determine the required Basin Volume by using one of 4 strategies:

1. Use the Charts on SCDOT Standard Drawings 815-305-03, 815-305-04 and 815-305-05 to select the Basin top and bottom Length and Width.

    - For the Lower State, use the Charts on SCDOT Standard Drawing 815-305-03 to select the Basin top and bottom Length and Width based on the five Basin drainage area classifications (5, 10, 15, 20, and 25 acres). Area classifications used to select the Basin bottom Length and Width must be greater than the actual construction site Basin drainage area.

    - For the Upper State, use the Charts on SCDOT Standard Drawings 815-305-04 and 815-305-05 to select the Basin top and bottom Length and Width based on the percent disturbance of the watershed drainage area (0% - 10%, 10% - 25%, 25% - 75%, 75% - 100%) and the five Basin drainage area classifications (5, 10, 15, 20, and 25 acres). Area classifications used to select the Basin bottom Length and Width must be greater than the actual construction site Basin drainage area.

2. Use the Graphs on SCDOT Standard Drawings 815-305-03, 815-305-04 and 815-305-05 to determine the total required Basin Volume below the top elevation of the Primary Riser.

    - For the Lower State, Use Graph A-1 on SCDOT Standard Drawing 815-305-03 to determine the total required Basin Volume below the top elevation of the Primary Riser.

    - For the Upper State, Use Graphs B-1, C-1, D-1 and E-1 on SCDOT Standard Drawings 815-305-04 and 815-305-05 based on the percent disturbance of the watershed drainage area (0% - 10%, 10% - 25%, 25% - 75%, 75% - 100%) to determine the total required Basin Volume below the top elevation of the Primary Riser.

3. If the drainage area is greater than 25 Acres in the Lower State, calculate the total Basin Volume at the top elevation of the Primary Riser by:

    - 550 cubic feet per drainage acre of runoff volume and 450 cubic feet per drainage acre sediment storage volume for the Basin.

    - Basin Volume at the top elevation of the Primary Riser = [(550 cubic feet of runoff volume per acre) * (#drainage area in acres)] + [(450 cubic feet sediment storage volume per acre) * (# drainage area in acres)]

4. If the drainage area is greater than 25 Acres in the Upper State:

- Design Surface Outlet and Baffle Sediment Basins in accordance to the requirements in standards for Stormwater Management and Sediment Reduction Act 72-425 using South Carolina Design Aids, Sedimot, SEDCAD4, Pond Pack, SEDPRO and other computer models that utilize eroded particle size distributions and calculates a corresponding 80% trapping efficiency for TSS.

- Design the Primary Riser according to Section A.5.1 and of this document.

- Include an appropriate Floating Skimmer as specified in SCDOT Supplemental Technical Specification for Floating Skimmers (SC-M-815-14) or latest revision in the design.

- Include Baffles as specified in SCDOT Supplemental Technical Specification for Porous Baffles (SC-M-815-16) or latest revision for Porous Baffle requirements in the design.

Basin Volumes calculated using Methods 2 or 3 represent the Basin Volume between the Top of the Primary Riser and the Basin bottom. Basin stage area relationships and Basin top and bottom Length and Width must be calculated separately when using Methods 2 or 3.

When using Methods 1, 2 or 3, use the tables on SCDOT Standard Drawings 815-305-03, 815-305-04 and 815-305-05 to select Basin specific requirements (Primary Riser Diameter, Outlet Barrel Pipe Diameter, Emergency Spillway Bottom Width, and Floating Skimmer dewatering rate) corresponding to one of the five drainage area classifications (5, 10, 15, 20, 25 acres). Area classifications used to select the Basin requirements must be greater than the actual construction site Basin drainage area.

Freeboard is the Vertical distance between the top elevation of the Primary Riser and the top elevation of the Sediment Basin Dam.

A.5.1 Riser and Spillway Design

The Primary Riser consists of a solid concrete riser with a monolithic base or extended base with no low flow orifice or staged orifice/weir discharges. Runoff only enters the Primary Riser structure by overtopping and through the Floating Skimmer.

Design the 10-year, 24-hour storm event peak stage in the Basin at an elevation of approximately six (6) inches above the top elevation of the Primary Riser.

Design the Primary Riser and Outlet Pipe Barrel to operate in weir flow control and transition to pipe/barrel flow control. Orifice flow of the Primary Riser structure is not allowed for the 10-year, 24-hour storm event.

Design the Emergency Spillway to safely pass the peak runoff from the 100-year, 24-hour storm event storm with a minimum of one (1) foot of freeboard between the 100-year peak water surface elevation and the top of the Emergency Spillway. Design the Emergency Spillway as a run-around conveyance that is constructed on existing ground and not over the Basin Dam/Embankment.

Show all Basin dimensions and slopes on the Plans.

A.6 Multipurpose Basin Design

Permanent Multipurpose Basin storage volumes, dimensions, and riser configurations are designed to meet the permanent post-construction requirements for the specific basin.

Two spillway configurations are required for Permanent Multipurpose Basins that are used for both during construction sediment control and post-construction water quantity or water quality control.

The first configuration is the Temporary Surface Outlet and Baffle Sediment Basin Primary Riser Spillway consisting of a solid concrete riser with no staged discharges. Runoff only enters the Primary Riser structure by overtopping and through the Floating Skimmer.

The second configuration is the **Permanent** Basin Riser spillway designed to reduce post-development peak flow rates to pre-development peak flow rates for the 2-year and 10-year, 24-hour storm events where applicable or designed for post-construction water quality control.

Post-construction staged orifices, low flow orifices, or staged weirs are securely covered or sealed during the construction phase.

Uncover post-construction staged orifices, low flow orifices, or staged weirs after the construction phase is complete.

Floating Skimmers and Baffles may be removed when the construction phase ends.

Clean the Temporary Surface Outlet and Baffle Sediment Basin of deposited sediment and re-grade the Basin to meet the Permanent Basin contours if necessary when the construction phase ends.

Refer to *SCDOT Supplemental Technical Specification for Pipe (SC-M-714)* or latest revision for allowable permanent Outlet Barrel Pipe materials.

Make any necessary modifications to the Emergency Spillway after the construction phase has ended.

A Temporary Surface Outlet and Baffle Sediment Basin that is converted to a Permanent post-construction basin will be retained and maintained after completion of the project.

When the construction phase has ended, remove Woven Wire Fence-Type 1 and install Security Fence per SCDOT Specification Section 806.

A.7 Construction

Construct the Surface Outlet and Baffle Sediment Basin in accordance with these Specifications and the SCDOT Standard Drawings 815-305-01 - 815-305-07 along with the most current edition of the "SCDOT Standard Specifications for Highway Construction", unless otherwise indicated on the Plans and in the Special Provisions or directed by the RCE.

A.7.1 Installation Requirements

Installation includes constructing the sediment basin; installing the Primary Riser Structure; installing Riser Outlet Barrel Pipe; installing Baffles; furnishing, installing, and cleanout of Floating Skimmers; providing and placing Riprap pad on the bottom of the basin underneath the Floating Skimmer; providing and placing an Emergency Spillway and liner; disposing of excess materials; removing Baffles, emergency spillway liner, and Floating Skimmer; backfilling basin area with suitable material; and providing proper drainage when basin area is abandoned.