
APPENDIX F

SCDOT SEEDING SPECIFICATION

SEEDING

SCDOT Designation: SC-M-810-2(04/11)

1.0 Seeding

This Supplemental Specification replaces section 810, *Seeding*, in the *South Carolina Department of Transportation (SCDOT) Standard Specifications for Highway Construction, 2007 Edition*. This supplemental specification replaces Supplemental Technical Specification SC-M-810.

1.1 Description

This work consists of permanent cover, permanent grassing for small projects, temporary cover, liming and fertilizing (when specified), and applying mulch on all areas shown on the Plans or where directed by the Resident Construction Engineer (RCE) in accordance with these Specifications. The Contractor coordinates seeding with the construction of fill and cut slopes. In order to limit the area of erodible material, the RCE may require that partially completed slopes be brought to the required slope and the Contractor perform permanent or temporary cover operations at that time.

Small Projects are defined as projects which do not require coverage under the NPDES Construction General Permit SCR100000. In addition projects consisting of improving shoulders with a width of less than six feet due to backfill from resurfacing or upgrading deficient shoulders are also exempt from NPDES requirements and are classified as Small Projects.

1.2 Materials

1.2.1 General

The Contractor shall, at the time of delivery, furnish the RCE invoices and or documentation of all materials received in order to determine the application rate of materials.

1.2.2 Seed

Use seed that conforms to all state laws and all requirements and regulations of the South Carolina Department of Agriculture (SCDA). Seeds containing species designated by the State Crop Pest Commission as a plant pest (i.e., noxious weeds) are not permitted. Use seed that is individually packaged or bagged and tagged. Each tag must clearly state:

- Net weight
- Botanical name
- Common name
- Variety
- Grower name
- Grower lot number
- Percent purity
- Percent germination
- Percent other crop seed
- Percent inert matter
- Percent weed seed (if weed seed is present, provide a list of species by botanical name)
- Origin

When mixtures of different types of seed are called for in the seeding schedule the Contractor may use pre-blended mixtures that are individually packaged or bagged and tagged with the tag specifying the botanical and common name of each species contained in the blend, and the percentages of each species.

When pre-blended seed mixtures are not used, each species shall be weighed and mixed in the proper proportions on-site in the presence of the RCE or a member of the RCE's staff.

SCDOT reserves the right to test, reject, or approve all seed before seeding.

1.2.2.1 Seeding Schedule

Unless otherwise provided, select seed from Table 1, Perennials, and Table 2, Annuals, for the UpperState and the LowerState as applicable to the project. The LowerState consists of all counties east of and including Aiken, Lexington, Richland, Kershaw, and ChesterfieldCounties. The UpperState consists of all counties west of the LowerState, i.e. all the remaining counties (see Figure 1).

If the seed listed in the tables is not available, the Contractor may select the most practicable alternative seed available as a substitute. The Contractor must submit data to the RCE showing that the substitute seed is appropriate for the specific application.

Select a minimum of two (2) seed types from Table 1 for all permanent cover and permanent grassing for small projects based on the specific application and the availability of the seed. A minimum of one (1) of the seed types selected must be a turf-type species. The Contractor must also add a minimum of one (1) acceptable annual nurse crop species from Table 2 at the rate shown in Table 2, or a mix of two (2) or more annual nurse crops species from Table 2 with one species applied at a minimum rate of approximately 75% of the rate shown in Table 2 and the other species applied at a rate that does not exceed approximately 50% of the rate shown in Table 2.

When the seeding schedule utilizes more than two (2) perennial seed types from Table 1, apply the primary turf type species at the rate shown in Table 1 and the Contractor may apply the additional perennial seeds at a rate less than the rate shown in Table 1.

The exceptions for selecting a minimum of two (2) permanent cover species from Table 1 are:

- Medians: Use a minimum of one (1) turf-type species from Table 1 and one (1) acceptable annual nurse crop from Table 2 for medians in the UpperState and LowerState.
- Shoulders in LowerState: Use a minimum of one (1) turf-type species from Table 1 and the Contractor may add an acceptable annual nurse crop from Table 2 for Shoulder work in the LowerState.

Select a minimum of one (1) seed type from Table 2 for all temporary cover by seeding based on the specific application and the availability of the seed.

If the Common Name of the seed listed in Table 1 or Table 2 is not available, use seed with the listed Botanical Name.

1.2.2.2 Seeding Plan

Prepare and submit a seeding plan to the RCE utilizing the seeding schedule for all temporary cover by seeding and permanent cover applications. The RCE will approve all seeding plans before temporary cover by seeding and permanent cover applications are initiated.

FIGURE 1: UPPER AND LOWER STATE MAP

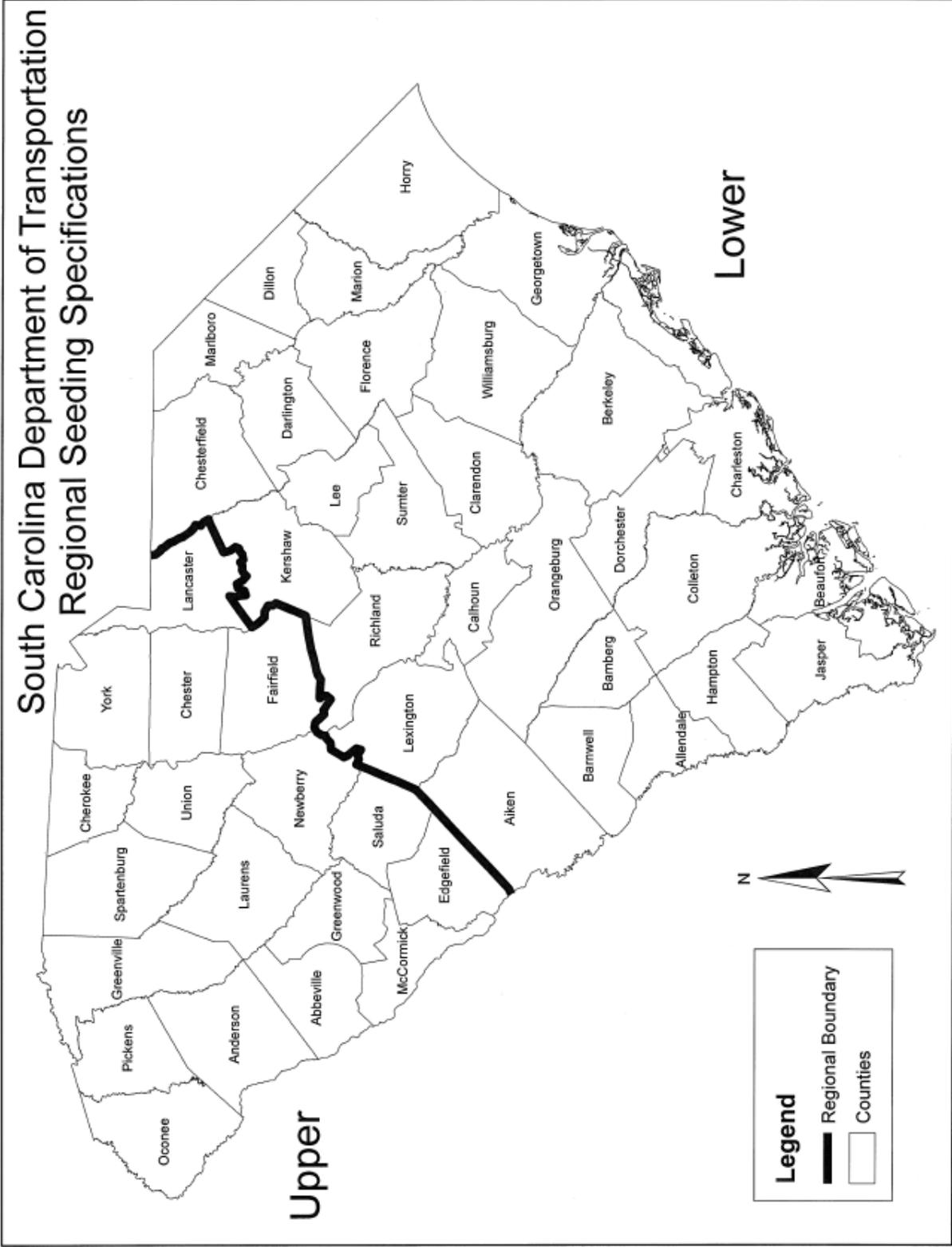


TABLE 1: PERRENIALS * Months shaded in gray represent applicable planting dates.

COMMON NAME ⁵	BOTANICAL NAME	APPROVED SITE(S)	PLANTING RATE (lbs/acre)	PLANTING LOCATION	Planting Dates*																						
					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC											
TURF-TYPE GRASSES (SELECT ONE)																											
Bahiagrass ¹	Paspalum notatum	Slopes	30	Upper State Lower State																							
Common Bermudagrass ² (hulled = hull absent)	Cynodondactylon	Shoulders, Slopes, or Medians	25	Upper State Lower State																							
Common Bermudagrass ² (unhulled = hull present)	Cynodondactylon	Shoulders, Slopes, or Medians	30	Upper State Lower State																							
Carpet Grass	Axonopus affinis	Shoulders, Slopes or Medians	15	Upper State Lower State																							
Tall Fescue	Festuca arundinacea	Shoulders, Slopes, or Medians	50	Upper State Lower State																							
Centipede grass	Eremochloa ophiuroides	Shoulders, Medians	10	Upper State Lower State																							
GRASSES																											
Weeping Lovegrass	Erograstis curvula	Slopes	5	Upper State Lower State																							
Indiangrass	Sorghastrum nutans	Slopes	10	Upper State Lower State																							
Little Bluestem	Andropogon scoparius	Slopes	10	Upper State Lower State																							
Coastal Panicgrass	Panicum amarum	Slopes	20	Upper State Lower State																							
Switchgrass	Panicum virgatum	Slopes	10	Upper State Lower State																							
Perennial Rye Grass ³	Lolium perenne	Shoulders, Slopes, or Medians	15	Upper State Lower State																							
Virginia Wild Rye	Elymus virginicus	Shoulders, Slopes, or Medians	6	Upper State Lower State																							
LEGUMES⁴																											
White Clover	Trifolium repens	Shoulders, Slopes	5	Upper State Lower State																							
Sericea Lespedeza (Scarified seed)	Lespedeza cuneta	Slopes	50	Upper State Lower State																							
Sericea Lespedeza (Unscarified seed)	Lespedeza cuneta	Slopes	80	Upper State Lower State																							

¹Bahiagrass: Bahiagrass may be used as an optional turf-type permanent cover at the discretion of the RCE. * Months shaded in gray represent applicable planting dates.

²Common Bermudagrass: Do not use Giant Bermudagrass (NK-37).

³Perennial Rye Grass: Do not use Annual Italian Rye Grass (Lolium multiflorum).

⁴Only use pre-inoculated legumes or use an appropriate inoculant with the seed at planting.

⁵If the Common Name of the seed listed in Table 1 is not available, use seed with the listed Botanical Name.

1.2.3 Lime

1.2.3.1 Agricultural Granular Lime

Use solid agricultural granular lime for all permanent cover applications that is agricultural grade, standard ground limestone conforming to the current *Rules, Regulations, and Standards of the Fertilizer Board of Control*. These rules, regulations, and standards are promulgated and issued by the Fertilizer Board of Control at Clemson University in accordance with Section 16 of the *South Carolina Liming Materials Act*. Ensure that each bag has affixed in a conspicuous manner a tag or label, or in the case of bulk sales, a delivery slip showing brand or trade name, calcium carbonate equivalent, percent by weight passing prescribed U. S. Standard Sieves, and other pertinent information to identify lime as being agricultural grade, standard ground limestone.

1.2.3.2 Fast Acting Lime

Use fast acting liquid forms and/or dry forms of lime for all temporary cover by seeding and permanent cover applications that meet all of the requirements of agricultural grade granular lime specified herein, except percent by weight passing U.S. Standard Sieves.

1.2.4 Fertilizer and Biological Growth Stimulants

1.2.4.1 Granular Fertilizer

Use granular fertilizer for all permanent cover applications that complies with state fertilizer laws. In a mixed fertilizer such as 10-10-10, the first number represents the percent of nitrogen required, the second number represents the percent of available phosphoric acid required, and the third number represents the percent of water soluble potash required in the fertilizer. **Use fertilizer that incorporates a minimum of 50% water insoluble (slow release) nitrogen.** Use fertilizer that has a package slip clearly stating the percentage of nitrogen, water insoluble nitrogen, percentage of phosphoric acid, and percentage of potash along with the weight (pounds) of nitrogen, weight (pounds) of phosphoric acid, and weight (pounds) of potash. Animal by-product or municipal waste fertilizers are not acceptable under this Specification.

1.2.4.2 Biological Growth Stimulants

Provide biological growth stimulants for all permanent cover and temporary cover by seeding applications. Use biological growth stimulants that provide an immediate seedbed adjustment to help stimulate seed germination, improve the availability of nutrients to the grass, increase the number and depth of root development, and generate robust plant growth which is more tolerant of changes in environmental conditions.

Use biological growth stimulants that:

- Provide natural plant hormones, auxins and cytokinins that encourage nutrient uptake, nitrogen metabolism, and carbohydrates storage.
- Improve fertilizer utilization in the soil by increasing the enzymatic and microbial nutrient conversion activity.
- Improve photosynthetic production resulting in greater root mass and improved disease resistance.
- Contains endo-mycorrhizae to improve nutrient and water uptake by the plant.

Provide biological growth stimulants that contain compounds such as

- humic acid (humates)

- cold water processed seaweed extract
- cytokinins
- gibberellins
- auxins (growth hormones)
- endo-mycorrhizae.

Provide biological growth stimulants that:

- Contain plant growth hormones which act as a stimulant to improve vegetative growth and intake of micro nutrients and can reduce damage from disease and insect infestation.
- Contain humic acid and/or other components that increases biological activity in the soil to improve stress tolerance/drought resistance, reduces sodium uptake in sandy soils, provides more phosphorus availability, and increases cation exchange capacity resulting in earlier germination and better root establishment.

Animal by-products or municipal waste products are not acceptable biological growth stimulants under this specification. Liquid fertilizers are not acceptable as biological growth stimulants under this specification.

Provide biological growth stimulants composed of non-toxic materials.

Provide Biological Growth Stimulants that have no germination or growth inhibiting factors and do not form a water-resistant crust that can inhibit plant growth. Furnish biological growth stimulants where all components are pre-packaged by the manufacturer to assure material performance and compliance with the minimum requirements in Table 3.

Table 3: Minimum Biological Growth Stimulant Requirements

BGS Property	Test Method ¹	Required Value
Physical		
Humate/Humic Acid		1% minimum
Acute Toxicity	ASTM 7101 EPA 2021.0-1	Non Toxic
Performance		
Seed Germination	ASTM D7322 ²	200% minimum
Plant Height	ASTM D7322 ²	200% minimum
Plant Mass	ASTM D7322 ²	110% minimum

¹ Alternative Test Methods from independent 3rd party testing facilities will be accepted until January 31, 2012.

² ASTM test methods developed for Rolled Erosion Control Products (RECPs) that have been modified for comparison to control between 14 and 21 days.

Provide biological growth stimulants from a manufacturer listed on the most recent edition of the *SCDOT Qualified Product List 74* and provide documentation of testing at an approved independent laboratory demonstrating performance based on enhanced plant germination.

1.2.5 Mulch

Mulch is required for all permanent cover and temporary cover applications except for shoulder work and resurfacing projects that have a disturbed width less than six (6) feet and seeding is compacted using a culti-packer or light roller. Compaction is not necessary if seeds are planted by mechanical seed drills that perform a compaction procedure. Only use mulch that is certified weed free. Mulch is used for temporary cover by mulch applications. Wood chip mulch is not acceptable for seeding applications.

1.2.5.1 Straw or Hay Mulch with Tackifier

Use straw or hay mulch material that consists of certified weed free straw or hay. Use straw that consists of stalks of wheat, rye, barley, oats, or other approved straw. Use hay that consists of Timothy, Peavine, Alfalfa, Coastal Bermuda, or other grasses from approved sources. Use materials that are reasonably dry and reasonably free from mature seed-bearing stalks, roots, or bulblets of Johnson grass, Nutgrass, Sandburg, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed, and Cocklebur. Comply with all state and federal domestic plant quarantine regulations. Straw mulch is not to be used in urban areas or in areas adjacent to sidewalks, guardrails, curbs, curb and gutters, or concrete medians.

Do not use straw or hay mulch with tackifiers for temporary cover by mulch applications on slopes steeper than 4H:1V.

Anchor straw mulch material using one of the following tacking agents:

1.2.5.1.1 Organic or Chemical Tackifier

Use an organic or chemical tackifier that consists of guar gum, plantago, polysaccharides, polymer synthetic resin, polypectate, liquid latex, or other material that will give similar adhesive properties as asphalt emulsion when sprayed on straw mulches. Organic or chemical tackifiers require approval by the RCE.

1.2.5.1.2 Hydraulic Straw Tackifiers

Use hydraulic straw tackifiers that meet the requirements of this Specification. Apply hydraulic erosion control products at the manufacturer's recommended rate for straw binding.

1.2.5.1.3 Emulsified Asphalt

Use Emulsified Asphalt that meets the requirements of Subsection **407.2.4**. Dilute Emulsified Asphalt at the manufacturing plant with water, if necessary, to provide a homogenous and satisfactory material for spraying.

1.2.5.2 Hydraulic Erosion Control Products(HECPs)

Refer to *SCDOT Supplemental Specification for HECP (SC-M-815-11) or latest revision* for HECP description, materials, and construction requirements.

1.2.5.3 Compost Mulch

Refer to *SCDOT Supplemental Specification for Compost(SC-M-815-3)or latest revision* for Compost Mulch description, materials, and construction requirements.

1.2.5.4 Temporary Erosion Control Blankets (ECBs)

Refer to *SCDOT Supplemental Specification for Rolled Erosion Control Products (RECP) (SC-M-815-9) or latest revision* for Temporary Erosion Control Blanket (ECB) description, materials, and construction requirements.

1.2.5.5 Turf Reinforcement Matting (TRMs)

Refer to *SCDOT Supplemental Specification for Rolled Erosion Control Products (RECP)(SC-M-815-9) or latest revision* for Turf Reinforcement Matting (TRM) description, materials, and construction requirements.

1.2.5.6 Slope Interruption Devices

The maximum allowable continuous slope length for all straw and hay mulch, HECP, compost mulch, and ECB applications is 50 feet. Slope interruption devices or TRMs are required for continuous slope length longer than 50 feet. Refer to *SCDOT Supplemental Specification for Inlet Structure Filters Type F – Non Weighted (SC-M-815-8) or latest revision* for slope interruption device description, materials, and construction requirements.

1.3 Construction Requirements

1.3.1 Seeding Dates and Rates of Application

Perform seeding work during the periods and at the rates specified in the seeding tables of this Specification. Do not use temporary cover by seeding, permanent cover, and permanent grassing for small projects when the ground is frozen and/or when the 10-day forecasted low temperature remains below 35 degrees Fahrenheit. Do not use temporary cover by seeding, permanent cover, and permanent grassing for small projects when the ground is excessively wet. Do not conduct seeding work when the ground is excessively dry (periods of drought) unless watering is specified in the Contract or directed by the DCE. During periods of adverse conditions, use temporary stabilization by mulch according to this Specification.

1.3.2 Seedbed Preparation

Ensure that the areas to be seeded are uniform and conform to the finished grade and cross-section shown on the Plans or as otherwise directed by the RCE. Perform minor shaping and evening of uneven and rough areas outside of graded sections as directed by the RCE in order to provide for more effective erosion control and for ease of subsequent mowing operations.

Loosen the seedbed (including cut slopes) to a minimum depth of three (3) inches before compost, agricultural lime, fertilizer, mulch, or seed is applied. An acceptable method of preparing the seedbed on slopes is vertically tracking the seedbed up and down the slope with proper equipment.

Remove stones larger than two and one-half (2½) inches in any dimension, large clods, roots, or other debris brought to the surface.

Use compost as directed by the RCE for shoulders and slopes if good seedbed material is not located on site.

1.3.3 Soil Amendments

1.3.3.1 Compost

For seedbeds that have little or no topsoil, and are determined to be deficient from the results of the soil analysis, furnish, place, and mix certified weed free compost to a minimum depth of 3 inches into the seedbed in order to ensure a good stand of grass. Refer to *SCDOT Compost Specification (SC-M-815-3) or latest revision* for description, materials, and construction requirements.

As directed by the RCE, provide compost when seedbeds are excessively nutrient deficient to the extent of requiring costly fertilizer additions and or have excessively low pH values (lower than 5.0) to the extent of requiring costly lime additions.

1.3.3.2 Select Material

For seedbeds that have little or no topsoil, are determined to be deficient from the results of the soil analysis, furnish, place, and mix select material to a minimum depth of 3 inches into the seedbed in order to ensure a good stand of grass.

As directed by the RCE, provide select material for seedbeds that are excessively nutrient depleted to the extent of requiring costly fertilizer additions and or have excessively low pH values (5.0 or lower) to the extent of requiring costly lime additions

Select material consists of a friable material containing grass roots and is comparatively porous, capable of growing grass, and stable in nature. When compacted, select material will resist erosion and be capable of supporting vehicles when relatively wet.

1.3.4 Soil Analysis

A soil analysis is not required for permanent grassing on Small Projects and temporary cover by seeding. A soil analysis is required prior to all permanent cover applications. A soil analysis is required on all representative soil types for the specified vegetation species prior to agricultural granular lime and granular fertilizer applications. The RCE determines where distinguishable representative soil types are located on the project site. Representative soil types include existing predominate soils on the project site, cut slopes, fill material, and areas of exposed subsoil.

Collect one (1) soil sample for each distinguishable representative soil type. One (1) sample consists of mixing ten (10) sub-samples taken uniformly over each distinguishable representative soil type. Soil samples should be taken from stockpiles where the material will be the top six (6) inches of the seedbed. Take each sub-sample within the top four (4) to six (6) inches of the soil surface.

Submit a separate soil sample for each representative soil type to a SCDOT certified soil testing laboratory.

The soil analysis determines the need and rate of lime and fertilizer applications. At a minimum, a standard soil test includes pH, buffer pH, extractable phosphorus, potassium, lime requirements and recommendations, calculations for CEC (cation exchange capacity), and fertilizer requirements and recommendations.

1.3.5 Applying Lime

1.3.5.1 Agricultural Granular Lime

A soil analysis is required prior to agricultural granular lime applications. The soil analysis determines the need and rate of granular lime application for a given application area. Based on the results of the soil analysis, furnish granular lime to provide a long term pH adjustment. Following advance preparation and placing of soil amendments when called for in the Contract or directed by the RCE, uniformly spread lime over the designated areas. Thoroughly mix agricultural granular lime with the soil to a depth of approximately two (2) inches. Mixing is not required when spreading lime with hydraulic methods.

Adequately scarify all slopes subject to slides and inaccessible to power equipment. Lime may be applied by approved mechanical spreaders or by hydraulic methods as a mixture of lime and seed.

Apply all agricultural granular lime at a rate that is within $\pm 10\%$ of the weight recommendation of the soil analysis.

Agricultural granular lime is not required for temporary cover by seeding applications unless a soil analysis is requested by the RCE and indicates a pH below 5.0.

1.3.5.2 Fast Acting Lime

Fast acting liquid and dry lime provides an immediate pH adjustment. Use fast acting liquid or fast acting dry forms of lime for all temporary cover by seeding and permanent cover by seeding applications. Apply fast acting liquid lime at a rate of 5 gallons per acre or per the manufacturer's recommendations. Apply fast acting dry lime at a rate of 100 pounds per acre or per the manufacturer's recommendations.

1.3.6 Applying Fertilizer and Biological Growth Stimulants

1.3.6.1 Agricultural Granular Fertilizer

A soil analysis is required prior to agricultural granular fertilizer applications. The soil analysis determines the need and rate of fertilizer applications for the specific vegetation species. Following advance preparation and placing of soil amendments when called for in the Contract or directed by the RCE, uniformly spread fertilizer over the designated areas.

Adequately scarify all slopes subject to slides and inaccessible to power equipment. Fertilizer may be applied by approved mechanical spreaders or by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied with combination seed and fertilizer drills, no further incorporation is necessary. Apply the fertilizer and seed together when hydraulic methods of seeding are used.

Apply all fertilizer at a rate that is within $\pm 10\%$ of the weight recommendation of the soil analysis. Apply fertilizer that is within ± 2 percentage points of the recommendation of the soil analysis.

The required application of nitrogen includes a minimum of 50% water insoluble (slow release) nitrogen under this Specification.

When a fertilizer blend meeting the soil analysis requirements is not readily available, the Contractor may combine fertilizers of different compositions to meet the soil analysis composition requirements. Apply the fertilizer at a rate to achieve the amount of nitrogen, phosphoric acid, and potash that would have been accomplished by utilizing the fertilizer specified by the soil analysis.

In all cases, under the guidelines of this Specification, apply nitrogen and phosphorus at a rate that does not exceed the soil analysis recommendation while keeping the actual nitrogen and phosphorus rate as close to the soil analysis recommended rate to the maximum extent practicable.

Payment is made for the number of pounds of fertilizer applied as required by the soil analysis. Use a separate payment for each of the three fertilizer components (nitrogen, phosphoric acid, and potash).

1.3.6.2 Biological Growth Stimulants

Use biological growth stimulants for all permanent cover and temporary cover by seeding applications. Apply biological growth stimulants strictly at the manufacturer's recommended rates. Ensure that all biological growth stimulant applications strictly follow the manufacturer's recommendations to avoid damage or burning of the seedbed. Use approved hydraulic methods to apply biological growth stimulants.

Deliver materials and products sealed in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures, and construction operations.

Degradation of biological growth stimulants can be expected to occur as a result of mechanical degradation, chemical degradation, biological hydrolysis, sunlight, salt, and temperature. Where necessary, reapply biological growth stimulants in accordance with the manufacturer's instructions. Reapplication is not required unless biological growth stimulant treated soils are disturbed or turbidity or water quality shows the need for an additional application. If biological growth stimulant treated soils are left undisturbed, the necessity of reapplication will be determined by the RCE. The Department will not pay for the reapplication of biological growth stimulants within 45 days of the initial application unless the reapplication is approved by the RCE.

1.3.7 Temporary Cover

Perform temporary cover by mulch or temporary cover by seeding within seven (7) days when a site will not be worked for 21 days up to a maximum of 60 days. If the site will not be worked for a period longer than 60 days, then temporary cover by seeding is required.

Do not use temporary cover by seeding when the ground is frozen and/or when the 10-day forecasted low temperature remains below 35 degrees Fahrenheit.

Scarify all temporary cover areas before fill is placed on top of the temporary cover area.

1.3.7.1 Temporary Cover by Mulch

Use an appropriate mulch as listed in this Specification. Apply the mulch with a minimum continuous soil coverage of 95% that is maintained across the entire application area.

Temporary cover by mulch may be used on isolated problem areas or where it is not feasible or practicable to bring an area to final slope and grade. Finish the surface so that permanent cover can be performed without subsequent serious disturbance by additional grading.

1.3.7.2 Temporary Cover by Seeding

Following the preparation of the seedbed according to this Specification, sow seed prior to a rainfall event that compacts the seedbed. Using the seed specified in the seeding tables in Section 1.2, the Contractor will determine all rates of application necessary to produce the required results and follow the application procedures as specified herein. Uniformly sow seed at the rate specified by the use of approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or any other type of equipment that produces a uniform seed application.

After sowing temporary seed, apply an appropriate mulch as listed in this Specification prior to a rainfall event that compacts the seedbed. On small areas inaccessible to machinery, the seed may be covered by hand rakes or other methods satisfactory to the RCE. When required by the RCE, add fertilizer and lime as directed by a soil analysis.

Temporary cover by seeding may be used in isolated problem areas or where it is not feasible or practicable to bring an area to final slope and grade. Finish the surface so that permanent cover can be performed without subsequent serious disturbance by additional grading.

1.3.8 Acceptance of Temporary Cover

Before acceptance of temporary cover, the Contractor will be required to produce temporary cover sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent cover is to commence.

If the temporary cover is disturbed by the prime, grading, or other contractor before acceptable temporary cover is established, the temporary cover will be re-established at no cost to the SCDOT.

The Contractor will be required to produce a satisfactory stand of temporary cover meeting the requirements of this Specification regardless of the time of the year the work is performed.

1.3.9 Permanent Cover

Perform permanent cover with seeding within 21 days of when the site was last worked. Following the application of fertilizer and preparation of seedbed according to this Specification, perform permanent cover within 5 working days and/or prior to a rainfall event that compacts the prepared seedbed. Using the seed specified in the seeding tables in section 1.2, the Contractor will create a seeding plan and determine

all rates of application necessary to produce the required stand of grass and follow the application procedures as specified herein. Uniformly sow seed at the rate specified by the use of approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or any other type of equipment that produces a uniform seed application.

After sowing permanent seed, apply an appropriate mulch as listed in this Specification within 5 working days and/or prior to a rainfall event that compacts the prepared seedbed. On small areas inaccessible to machinery, the seed may be covered by hand rakes or other methods satisfactory to the RCE. Add fertilizer and lime as directed by a soil analysis.

1.3.10 Mulch

Apply mulch according to Table 4.

TABLE 4: MULCH

Mulch ¹	Applicable Slopes ²	Minimum Application Rate (lbs/acre -dry) ³	Min Slope Height (ft)
Straw or Hay with Tackifier	≤ 4:1	2,000	N/A
HECP Type 1 - Tracer under RECP	Per RECP	1000	N/A
HECP Type 1	≤ 4:1	2,000	N/A
HECP Type 2	4:1 < S ≤ 3:1	2,500	N/A
HECP Type 3	3:1 < S ≤ 2:1	3,000	N/A
HECP Type 4	2:1 < S ≤ 1:1	3,500	N/A
	>1:1	4,000 (temp cover only) ⁴	
Compost Mulch	≤ 2:1	200 CY/acre	N/A
When site constraints exceed the acceptable application for mulch, use Rolled Erosion Control Products (RECPs); Erosion Control Blankets (ECB) or Turf Reinforcement Matting (TRM)			
Temporary ECB or Type 1 TRM	≤ 2:1	N/A	5
Type 2 TRM	≤ 1.5:1	N/A	5
Type 3 TRM	≤ 1:1	N/A	5

1 A higher level of mulch may be applied than that specified on the Plans, Specifications, and other terms of the Contract. In this situation, the higher level mulch is to be applied at the specified mulch rate for the actual slope conditions of the site in accordance with the mulch tables. Payment will be made for the mulch specified not the higher level mulch.

2 The maximum allowable continuous slope length for all mulch and ECB applications is 50 feet. Slope interruption devices or TRMs are required for continuous slope length longer than 50 feet.

3 Strictly comply with the manufacturer's mixing recommendations and installation instructions for the actual slope steepness and the actual continuous slope length of the application.

4 HECP Type 4 may be used for permanent cover applications on slopes 1:1 or greater at a minimum rate of 4,500 pounds per acre as directed by the RCE only when proper TRM installation is not practicable due to site constraints.

1.3.10.1 Straw or Hay Mulch with Tackifier

Uniformly apply straw or hay mulch material at the rate of 2000 pounds per acre. Straw mulch may be spread either by hand, by appropriate mechanical spreaders, or by blowers. Apply straw mulch to allow sunlight penetration, air circulation, partial shading of the ground, and conservation of soil moisture. Secure newly laid straw mulch with an approved tackifier. Replace all straw mulch displaced during the tackifier application process.

1.3.10.1.1 Organic or Chemical Tackifier

These tackifiers consist of guar gum, plantago, polysaccharides, polymer synthetic resin, polypectate, liquid latex, or other material that will give adhesive properties when sprayed on straw mulches. Applications should be heavier at edges, in valleys, and at crests of banks and other areas where the straw mulch may be moved by wind or water. All other areas must have a uniform application of the tackifier. Use tacking agents approved by the RCE, and apply them at the manufacturer's recommended rate.

1.3.10.1.2 Hydraulic Straw Tackifiers

Apply hydraulic tackifiers at the manufacturer's recommended rate for straw binding.

1.3.10.1.3 Emulsified Asphalt

Dilute Emulsified Asphalt at the manufacturing plant with an equal amount of water and uniformly apply it over the straw mulch material as a film. Apply the film at approximately 0.20 gallon of dilution per square yard to sufficiently bond together the straw mulch and prevent wind erosion without creating a heavy coating of asphalt material.

Emulsified Asphalt is not applicable for use in urban areas or along sidewalks, curb and gutters, bridges, and water bodies.

1.3.10.2 Hydraulic Erosion Control Product(HECPs)

Refer to *SCDOT Supplemental Specification for HECPs (SC-M-815-11)* or latest revision for HECP construction requirements.

1.3.10.3 Compost

Refer to *SCDOT Supplemental Specification for Compost(SC-M-815-3)* or latest revision for construction requirements.

1.3.10.4 Temporary Erosion Control Blankets (ECBs)

Refer to *SCDOT Supplemental Specification for Rolled Erosion Control Products (RECP) (SC-M-815-9)* or latest revision for Erosion Control Blanket (ECB) construction requirements. For permanent cover applications using hydraulic methods for seed application, apply seed with HECP Type 1 as a tracer at a minimum rate of 1000 pounds/acre prior to RECP installation. Payment for the application of HECP Type 1 as a tracer is a separate bid item.

1.3.10.5 Turf Reinforcement Matting (TRMs)

Refer to *SCDOT Supplemental Specification for Rolled Erosion Control Products (RECP)(SC-M-815-9)* or latest revision for Turf Reinforcement Matting (TRM) construction requirements. For permanent cover applications, when using hydraulic methods for seed application, apply seed with HECP Type 1 as a tracer at a minimum rate of 1000 pounds/acre prior to RECP installation. Payment for the application of HECP Type 1 as a tracer is a separate bid item.

1.3.10.6 Slope Interruption Devices

Refer to *SCDOT Supplemental Specification for Inlet Structure Filters Type F – Non Weighted (SC-M-815-8) or latest revision* for slope interruption device description, materials, and construction requirements.

1.3.11 Permanent Grassing for Small Projects

Select seed in accordance with Section 1.2 of this specification. Using the seed specified in the seeding tables, the Contractor will create a seeding plan and determine all rates of application necessary to produce the required stand of grass and follow the application procedures as specified herein.

Select nutrients based on experience and past success. Soil samples, watering and any other section of this seeding specification can be used to obtain better results but are not required. If granular fertilizer and lime are used, sow seed within 24 hours following the application and preparation of the seedbed. Uniformly sow seed at the rate specified by the use of approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or any other type of equipment that produces a uniform seed and nutrient application.

Permanent grassing for small projects does not require the application of mulch when the width of the seeding application is less than six (6) feet and seeding is compacted using a culti-packer or light roller. Compaction is not necessary if seeds are planted by mechanical seed drills that perform a compaction procedure. Track slopes inaccessible to compaction equipment prior to seeding. Stabilize slopes that cannot be tracked with the appropriate mulch.

1.3.12 Acceptance of Permanent Cover and Permanent Grassing for Small Projects

Before acceptance of permanent cover or permanent grassing for small projects, a uniform perennial vegetative cover with a density of 70% of each square yard of the seeded area is required by the Contractor. A well developed root system must be established to sufficiently survive dry periods and winter weather and be capable of reestablishment in the spring.

1.3.13 Protection of Structures

Cover any parts of bridges, culverts, guardrails, signs, sidewalks, curb and gutters, catch basins, pipe ends, and other structures as necessary to prevent discoloration before spraying organic or chemical tackifiers.

1.3.14 Selective Watering for Vegetation

Note: Selective Watering for Vegetation is to be used to establish a bid price per gallon of water in the event that the District Construction Engineer (DCE) determines that watering is necessary. Selective Watering for Vegetation is not intended to be used for all projects or an entire project site.

Selective Watering for vegetation consists of selectively applying water to seeded areas that are slow to develop or deficient in adequate density. Use Selective Watering to enhance germination and enhance root growth in poor growth areas.

When directed by the DCE use the following guidelines in areas where germination has not occurred within 21 days after seeding:

- Keep the soil moist but not excessively wet until the seed germinates.
- Water a minimum of three (3) days a week for two (2) weeks preferably watering two (2) or three (3) times a day in small quantities.
- Use fine spray and low pressure to avoid soil wash and to prevent uncovering buried seeds.
- When applicable, water during early morning hours or early evening hours.
- Do not water when rain is forecasted for the area.

When directed by the DCE, use the following guidelines in areas where adequate density is a problem after emergence:

- Apply one (1) inch of water per irrigation event. (Note: 1-acre-inch = 27,154 gallons. This is the volume of water necessary to cover one (1) acre one (1) inch deep.)
- During summer, water two (2) to three (3) days per week.
- During winter, water once every ten (10) to fourteen (14) days.
- If rainfall occurs, suspend watering according to rainfall amount.

Closely monitor the deficient areas to ensure germination and density of cover. Further analysis of the soil, application of soil amendments, or re-seeding may be necessary if the problem area persists.

1.3.15 Mowing

Mowing consists of mowing areas seeded or sodded under the Contract or other areas as necessary to provide adequate sight areas and to maintain the project in a satisfactory manner. Mowing will be performed by the Contractor where directed by the RCE and such mowing will commence within three (3) business days following verbal notification by the RCE. Failure of the Contractor to comply with the above may be grounds for stopping work on the project or withholding payment of the monthly construction estimate.

Mow shoulders and medians when vegetation reaches a height of approximately eighteen (18) to twenty four (24) inches. Use mowing equipment equipped with safety devices designed to prevent injury or property damage caused by flying debris propelled from under the mowing equipment. Keep all mowing equipment in good operating condition and keep the equipment maintained to provide a clean, sharp cut of vegetation at all times. If the RCE determines the equipment is defective to the point that the quality of work or safety is affected, immediately repair or replace the equipment.

Ensure that mowing results in a uniform vegetation height of four (4) to six (6) inches, unless otherwise directed by the RCE. Mow as closely as possible to all fixed objects exercising care not to damage trees, plants, shrubs, signs, delineators, or other appurtenances which are a part of the facility. Hand trimming around such objects may be required of the Contractor.

Remove litter and debris prior to beginning mowing operations. Immediately remove and properly dispose of all litter and debris resulting from mowing operations. Mowed grass is not normally removed unless it becomes a hazard as determined by the RCE.

Do not perform mowing when, in the opinion of the RCE, soil and weather conditions are such that rutting or other damage to the project may occur. The three-business-day period may be extended by the RCE until the soil and weather conditions become suitable for mowing on the project.

1.3.16 Inspection and Maintenance

Perform all maintenance necessary to keep permanent cover, permanent grassing for small projects, temporary cover by seeding, and temporary cover by mulch areas in a satisfactory condition until the work is finally accepted. This includes mowing, repairing areas of erosion and washes, and applying additional seed, fertilizer, and mulch to areas where a satisfactory stand of grass has not been achieved. Water seeded areas as directed by the DCE. The Contractor is not responsible for permanent cover, permanent grassing for small projects, temporary cover by seeding, and temporary cover by mulch areas damaged by insects, animals, or extreme rainfall events. An extreme rainfall event is defined as being a 25-year storm event or greater based on the inches of rain received per time interval (30-min, 1-hr, 3-hr, 6-hr, 24-hr etc.) for the particular location as determined from the current NOAA precipitation tables.

1.4 Measurement

Permanent Cover, Permanent Grassing for Small Projects and Temporary Cover - The quantity of permanent cover, permanent grassing for small projects, and temporary cover is the ground surface area with acceptable vegetation or stand of cover and is measured by the one-acre (acre) unit, complete and accepted.

Lime - The quantity of agricultural granular lime is the weight applied and is measured by the pound (lb), complete and accepted. Weights are determined by approved scales or by guaranteed weight of sacks shown on the manufacturer's tag. Furnish invoices or documentation of the materials received on the project to the RCE.

Fertilizer - The quantity of fertilizer is the weight applied and is measured by the pound (lb), complete and accepted. Quantities are measured for each of the three fertilizer components (nitrogen, phosphoric acid, and potash). Weights are determined by approved scales or by guaranteed weight of sacks shown on the manufacturer's tag. Furnish invoices or documentation of the materials received on the project to the RCE.

Mulch - The quantity of mulch is the ground surface area covered and is measured by the one-acre (acre) unit, complete and accepted. Furnish invoices of the materials received on the project to the RCE.

Selective Watering for Vegetation - The quantity of selective watering for vegetation is the amount of water applied as directed by the DCE and is measured in gallons (gal). This is measured by actual gallons utilized from a water tank equipped with a water meter, or by utilizing a measuring stick and volume tables for the tank, or the number of gallons applied by a pump based on the pump rating and the actual time the pump is operated.

Mowing - The quantity of mowing is the area of ground surface area mowed at the direction of the RCE and is measured by the one-acre (acre) unit, complete and accepted. Separate measurements will be made and added to the quantity for payment each time the area is mowed.

Compost - The quantity of compost is the volume of compost placed on the sites directed by the RCE and is measured by the cubic yard (CY), complete and accepted. The quantity of compost is the actual number of cubic yards measured and placed on site.

Select Material - The quantity of select material is the volume of select material placed on the site as directed by the RCE and is measured by the cubic yard (CY), complete and accepted. The quantity of select material is the actual number of cubic yards measured and placed on site. The Contractor may elect to base the quantity measured on the loose volume at the point of delivery by scaling and counting the loads, with a deduction of 35% made for shrinkage.

1.5 Payment

Payment for the accepted quantity for each pay item, measured in accordance with this Specification, is determined using the Contract unit bid price for the applicable pay item. The payment includes all direct and indirect costs and expenses necessary to complete the work. If the RCE determines that the Contractor implements all of the requirements of this Specification and a satisfactory stand of permanent cover or temporary cover meeting the requirements of the Specification is not established, the Contractor will receive payment for the permanent cover or temporary cover required for re-application.

Permanent Cover - Payment for permanent cover is full compensation for furnishing all materials (excluding agricultural granular lime, granular fertilizer, mulch, compost, select material, and watering for vegetation) and includes all other materials, seed, fast acting lime, biological growth stimulants, labor, soil samples and analysis, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. Payment is up to 90% of the Contract unit price for permanent cover items until a satisfactory stand of grass meeting the requirements of this Specification is established.

Permanent Grassing for Small Projects - Payment for permanent grassing for small projects is full compensation for furnishing all materials including seed, agricultural granular lime, fast acting lime, granular fertilizer, biological growth stimulants, mulch, compost, select material, water, labor, equipment, tools, supplies, transportation, all other materials, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. Payment is up to 90% of the Contract unit price for permanent grassing for small projects until a satisfactory stand of grass meeting the requirements of this Specification is established.

Temporary Cover –

Payment for temporary cover by mulch is full compensation for furnishing all materials (excluding mulch) and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. Payment is 100% upon approval of acceptable application of mulch.

Payment for temporary cover by seeding is full compensation for furnishing all materials (excluding mulch, compost, select material, and watering for vegetation) and includes all other materials, seed, fast acting lime, biological growth stimulants, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. Payment is up to 90% of the Contract unit price for temporary cover until a satisfactory stand of grass meeting the requirements of this Specification is established.

Agricultural Lime - Payment for agricultural granular lime is full compensation for furnishing and applying lime as specified or directed and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Granular Fertilizer - Payment for granular fertilizer is made for each of the three fertilizer components (nitrogen, phosphoric acid, and potash). Payment for granular fertilizer is full compensation for furnishing and applying fertilizer as specified or directed and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Mulch - Payment for mulch is full compensation for furnishing and applying mulch, as specified or directed, and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. If applicable, the installation must be accepted and certified by the manufacturer's representative or RCE prior to payment. When a higher level of mulch is applied than that specified on the Plans, Specifications, and other terms of the Contract, payment is for the mulch specified.

Selective Watering for Vegetation - Payment for selective watering for vegetation is full compensation for furnishing and applying water as specified or directed by the DCE and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Mowing - Payment for mowing is full compensation for mowing vegetation to an acceptable height in areas specified or directed and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract. No adjustments in unit price will be made in case of overruns or under runs of this item.

Compost - Payment for compost is full compensation for furnishing and placing compost as directed by the RCE and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Select Material - Payment for select material is full compensation for furnishing and placing select materials directed by the RCE and includes all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Payment for each item includes all direct and indirect costs and expenses required to complete the work. Payment will be made under a bid item number per Table 5.

TABLE 5: BID ITEM NUMBER

Bid Item Number	Description	Units
8100100	Permanent Cover	ACRE
8100101	Permanent Grassing for Small Projects	ACRE
8100200	Temporary Cover	ACRE
8101100	Select Material	CY
8101105	Compost	CY
8101110	Straw or Hay Mulch with Tackifier	ACRE
8104005	Fertilizer (Nitrogen)	LB
8104010	Fertilizer (Phosphoric Acid)	LB
8104015	Fertilizer (Potash)	LB
8105005	Agricultural Granular Lime	LB
8109050	Selective Watering	GAL
8109901	Mowing	ACRE
8151101	Turf Reinforcement Matting (TRM) Type 1	MSY
8151102	Turf Reinforcement Matting (TRM) Type 2	MSY
8151103	Turf Reinforcement Matting (TRM) Type 3	MSY
8151110	Temporary Erosion Control Blanket (ECB)	MSY
8151201	Hydraulic Erosion Control Product (HECP) Type 1	ACRE
8151209	Hydraulic Erosion Control Product (HECP) Type 1 as Tracer under RECP	ACRE
8151202	Hydraulic Erosion Control Product (HECP) Type 2	ACRE
8151203	Hydraulic Erosion Control Product (HECP) Type 2	ACRE
8151204	Hydraulic Erosion Control Product (HECP) Type 4	ACRE
8152006	Inlet Structure Filter Type F - Non-Weighted (Slope Interruption Devices)	LF

*MSY= One Thousand Square Yards

APPENDIX G

BMP USAGE GUIDANCE

EROSION PREVENTION BMP SUGGESTED USES

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Erosion Prevention Measures	X	X	X	X	X	X	X
Surface Roughening	X		X				
Bench Terracing	X		X				
Temporary Seeding	X		X		X	X	X
Mulching	X				X	X	
Erosion Control Blankets and Turf Reinforcement Mats	X	X	X			X	
Final Stabilization	X		X		X		X
Permanent Seeding and Planting of Grasses	X		X		X		X
Permanent Ground Cover Plants	X		X				X
Sodding	X		X		X		X
Riprap or Aggregate	X	X	X				
Outlet Protection		X		X			X
Dust Control					X	X	X
Polyacrylamide (PAMs)	X		X	X	X	X	X

TEMPORARY SEDIMENT CONTROL BMP SUGGESTED USES

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Temporary Sediment Control Structures	X	X	X	X	X	X	X
Storage Volumes and Maintenance Schedules		X		X			X
Temporary Sediment Basin		X	X	X			X
Multipurpose Basin		X	X	.X			X
Temporary Sediment Trap		X	X				X
Silt Fence	X	X					X
Rock Ditch Check			X				X
Stabilized Construction Entrance					X		X
Storm Drain Inlet Protection		X		X			X
Vegetated Filter Strips		X					X
Rock Sediment Dike		X	X				X

RUNOFF CONTROL AND CONVEYANCE BMP SUGGESTED USES

BMP	Slope Protection	Waterway Protection	Surface Protection	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Pipe Slope Drains	X		X				
Temporary Stream Crossing		X	X				X
Runoff Conveyance Measures	X					X	X
Construction De-watering		X		X	X	X	
Level Spreader			X		X		X
Subsurface Drains			X		X		

STRUCTURAL STORMWATER QUALITY BMP SUGGESTED USES

BMP	Land Requirement	Single Family	Multi Family	Low Density Commercial	High Density Commercial	Low Density Industrial	High Density Industrial
Wet Storm Water Ponds	MODERATE - HIGH	X	X	X	X	X	X
Wet Extended Pond	MODERATE - HIGH	X	X	X	X	X	X
Micropool Extended Pond	MODERATE - HIGH	X	X	X		X	
Shallow Wetland	MODERATE - HIGH	X	X	X		X	
Extended Detention Shallow Wetland	MODERATE - HIGH	X	X	X		X	
Pond/Wetland System	MODERATE - HIGH	X	X	X		X	
Pocket Wetland	MODERATE	X	X		X		X
Bioretention Areas	MODERATE	X	X	X	X	X	X
Sand Filtration Facilities	LOW			X	X	X	X
Infiltration Trenches	MODERATE	X	X	X	X	X	X
Enhanced Dry Swales	HIGH	X	X	X		X	
Pre-Fabricated Control Devices	LOW		X	X	X	X	X

STRUCTURAL STORMWATER QUALITY BMP CHARACTERISTICS

BMP	Maintenance Burden	Costs	Aesthetically Pleasing	Provide Habitat	Drainage Area (Acres)	Soils
Wet Storm Water Pond	LOW	LOW	X	X	10 MIN 25 PREFERRED	HSG A SOILS MAY REQUIRE POND LINER
Wet Extended Pond with Aquatic Bench	LOW	LOW	X	X	10 MIN 25 PREFERRED	HSG B SOILS MAY REQUIRE INFILTRATION TESTING
Micropool Extended Pond	MODERATE	LOW	X	X	10 MIN	
Shallow Wetland	MODERATE	MODERATE	X	X	20 MIN	
Extended Detention Shallow Wetland	MODERATE	MODERATE	X	X	20 MIN	HSG A AND B SOILS MAY REQUIRE LINER
Pond/Wetland System	MODERATE	MODERATE	X	X	20 MIN	
Pocket Wetland	HIGH	MODERATE	X	X	5 MIN	
Bioretention Areas	LOW	MODERATE	X	X	5 MAX	CLAY OR SILTY SOILS MAY REQUIRE PRETREATMENT
Sand Filtration Facilities	HIGH	HIGH			5 MAX 2 PREFERRED	
Infiltration Trenches	HIGH	HIGH			5 MAX	INFILTRATION RATE > 0.5 IN/HR
Enhanced Dry Swales	LOW	MODERATE			5 MAX	PERMEABLE SOIL
Pre-Fabricated Control Devices	HIGH	HIGH	X (HIDDEN)		VARIABLES	NO REQUIREMENT

STRUCTURAL STORMWATER QUALITY BMP SUGGESTED USES

BMP	Water Quality	Channel Protection	Flood Protection	TSS Removal	Nutrient Removal	Metal Removal	Bacterial Removal
Wet Stormwater Pond	X	X	X	HIGH	MODERATE	MODERATE	MODERATE
Wet Extended Pond with Aquatic Bench	X	X	X	HIGH	HIGH	MODERATE	MODERATE
Micropool Extended Pond	X	X	X	HIGH	MODERATE	MODERATE	NO DATA
Shallow Wetland	X	X	X	HIGH	HIGH	MODERATE	HIGH
Extended Detention Shallow Wetland	X	X	X	HIGH	HIGH	MODERATE	HIGH
Pond/Wetland System	X	X	X	HIGH	HIGH	MODERATE	HIGH
Pocket Wetland	X	X		HIGH	HIGH	MODERATE	HIGH
Bioretention Areas	X			HIGH	MODERATE	MODERATE	NO DATA
Sand Filtration Facilities	X			HIGH	MODERATE	MODERATE	MODERATE
Infiltration Trenches	X			HIGH	MODERATE	HIGH	HIGH
Enhanced Dry Swales	X			HIGH	MODERATE	MODERATE	LOW
Pre-Fabricated Control Devices	X			HIGH	LOW-HIGH	LOW-HIGH	LOW-HIGH

APPENDIX H

Contractor Certification Form



CONTRACTOR CERTIFICATION FORM
For Coverage(s) Under South Carolina
NPDES General Permit For
Stormwater Discharges From Construction Activities SCR100000

(Maintain As Part of On-Site SWPPP)

Date: _____

A. Project Information

1. NPDES Coverage No.: SCR _____ State Permit (Tracking) No.: _____
2. Project/Site Name (As Approved by Department): _____
3. Owner/Operator Name: _____

B. Contractor Information

1. Name: _____ Title/Position: _____
Mailing Address: _____ City: _____ State: _____ Zip: _____
Company Name (As Applicable): _____
Phone: _____ Email Address: _____
2. Describe Construction-Related Responsibilities & Activities (Home construction, site grading, utility line installation, etc.):

C. Contractor Certification Statements & Agreement: *(Read the Contractor Certification statements below (in entirety) and provide date and signature of agreement below).* See Section 122.22 of S.C. Reg. 61-9 for signatory authority requirements. **DO NOT SIGN IN BLACK INK!**

"I certify by my signature below that I or I (on behalf of my company and its contractors and agents), as the case may be,

- (a) Understand, accept, and will adhere to the provisions of the Stormwater Pollution Prevention Plan (SWPPP) as it pertains to the portion of the project I am or my company is responsible for, and as required by the coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges From Construction Activities SCR100000 issued to the Owner/Operator of the construction activity with whom I am or my company is under contract to perform construction related professional services;*
- (b) Am legally accountable to the SC Department of Health and Environmental Control (DHEC), under the authorities of the Clean Water Act and the SC Pollution Control Act, to ensure compliance with the terms and conditions of the SWPPP applicable to my or my company's portion of the project;*
- (c) Must comply with the terms and conditions of the Construction General Permit (CGP), will adhere to applicable standards and stormwater erosion control practices established in the SWPPP and in the Best Management Practices (BMP) manual at all times while performing work at the project site, and agree to implement corrective actions identified by the qualified inspector during a site inspection; and*
- (d) Understand that DHEC enforcement actions may be taken against any specific or combination of permittees and contractors if the terms and conditions of the SWPPP are not met.*

Therefore, having understood the above information, I am signing this certification as contractor to the aforementioned NPDES general permit."

Printed Name of Contractor _____

Title/Position _____

Signature of Contractor _____

Date Signed _____

Termination of Contractor Certification Agreement: DO NOT SIGN IN BLACK INK!

(When your land-disturbing activities at this site have been completed, sign and date below). After this date, you may *not* perform any land-disturbing activities at this site unless you sign a new contractor certification agreement).

Signature of Contractor _____

Date Signed _____

CONTRACTOR CERTIFICATION FORM

NPDES Coverage No.: SCR _____

State Permit (Tracking) No.: _____

Project/Site Name: _____

C. Contractor Certification Statements:

All contractors performing any land disturbing activity at a construction site must be certified and listed in the On-Site SWPPP (OS-SWPPP) in order to work on the site. *Read the Certification statements below (in entirety) and provide date and signature of agreement below.*

"I certify by my signature below that I or I (on behalf of my company and its contractors and agents), as the case may be,

- (a) Understand, accept, and will adhere to the provisions of the Stormwater Pollution Prevention Plan (SWPPP) as it pertains to the portion of the project I am or my company is responsible for, and as required by the coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges From Construction Activities SCR100000 issued to the Owner/Operator of the construction activity with whom I am or my company is under contract to perform construction related professional services;*
- (b) Am legally accountable to the SC Department of Health and Environmental Control (DHEC), under the authorities of the Clean Water Act and the SC Pollution Control Act, to ensure compliance with the terms and conditions of the SWPPP applicable to my or my company's portion of the project;*
- (c) Must comply with the terms and conditions of the Construction General Permit (CGP), will adhere to applicable standards and stormwater erosion control practices established in the SWPPP and in the Best Management Practices (BMP) manual at all times while performing work at the project site, and agree to implement corrective actions identified by the qualified inspector during a site inspection; and*
- (d) Understand that DHEC enforcement actions may be taken against any specific or combination of permittees and contractors if the terms and conditions of the SWPPP are not met.*

Therefore, having understood the above information, I am signing this certification as contractor to the aforementioned NPDES general permit."

C. CONTRACTOR CERTIFICATION AGREEMENTS

(Sheet 1)

NPDES Coverage No.: SCR _____
Project/Site Name: _____

State Permit (Tracking) No.: _____

Please print legibly and complete all spaces on the form. *If you are an approved Blanket Utility Provider, you do not need to sign this form, but you must submit a copy of your Annual Blanket NOI registration information to the Owner/Operator.* Abbreviate if necessary and submit the completed form to the Owner/Operator. (When your land-disturbing activities at this site are complete, sign and date the termination agreement below. After this date, you may *not* perform any land-disturbing activities at this site unless you sign a new contractor certification agreement). **Additional certification agreement pages may be attached as necessary. DO NOT SIGN IN BLACK INK!**

Contractor Information:

Name: _____ Title/Position: _____
Company Name (As Applicable) _____
Mailing Address: _____ City: _____ State: ____ Zip: _____
Phone: _____ Email Address: _____

Contractor Certification (Signature of Agreement): Provide date and signature. DO NOT SIGN IN BLACK INK!

Signature of Contractor

Date Signed

Termination of Contractor Certification Agreement: Provide date and signature. DO NOT SIGN IN BLACK INK!

Signature of Contractor

Date Signed

Contractor Information:

Name: _____ Title/Position: _____
Company Name (As Applicable) _____
Mailing Address: _____ City: _____ State: ____ Zip: _____
Phone: _____ Email Address: _____

Contractor Certification (Signature of Agreement): Provide date and signature. DO NOT SIGN IN BLACK INK!

Signature of Contractor

Date Signed

Termination of Contractor Certification Agreement: Provide date and signature. DO NOT SIGN IN BLACK INK!

Signature of Contractor

Date Signed

Contractor Information:

Name: _____ Title/Position: _____
Company Name (As Applicable) _____
Mailing Address: _____ City: _____ State: ____ Zip: _____
Phone: _____ Email Address: _____

Contractor Certification (Signature of Agreement): Provide date and signature. DO NOT SIGN IN BLACK INK!

Signature of Contractor

Date Signed

Termination of Contractor Certification Agreement: Provide date and signature. DO NOT SIGN IN BLACK INK!

Signature of Contractor

Date Signed

C. CONTRACTOR CERTIFICATION AGREEMENTS
(Company Certifications)
(Sheet 2)

Use this sheet for certification agreements of contractors, subcontractors, etc. employed by the Contracting Company identified below **ONLY**. If you do not work for the company listed below, do not sign this sheet. If you are an approved Blanket Utility Provider, you do not need to sign this form, but you must submit a copy of your Annual Blanket NOI registration information to the Owner/Operator.

Abbreviate if necessary and submit the completed form to the Owner/Operator. (When your land-disturbing activities at this site are complete, sign and date the termination agreement below. After this date, you may *not* perform any land-disturbing activities at this site unless you sign a new contractor certification agreement). **Additional certification agreement pages may be attached as necessary.** Please print legibly and complete all spaces on the form. **DO NOT SIGN IN BLACK INK!**

NPDES Coverage No.: SCR _____ State Permit (Tracking) No.: _____
Project/Site Name: _____

Contracting Company Information:

Company Name _____
Mailing Address: _____ City: _____ State: _____ Zip: _____
Phone: _____ Email Address: _____

Contractor Information:

Contractor Name: _____ Title/Position: _____

Contractor Certification (Signature of Agreement): Provide date and signature. **DO NOT SIGN IN BLACK INK!**

Signature of Contractor

Date Signed

Termination of Contractor Certification Agreement: Provide date and signature. **DO NOT SIGN IN BLACK INK!**

Signature of Contractor

Date Signed

Contractor Name: _____ Title/Position: _____

Contractor Certification (Signature of Agreement): Provide date and signature. **DO NOT SIGN IN BLACK INK!**

Signature of Contractor

Date Signed

Termination of Contractor Certification Agreement: Provide date and signature. **DO NOT SIGN IN BLACK INK!**

Signature of Contractor

Date Signed

Contractor Name: _____ Title/Position: _____

Contractor Certification (Signature of Agreement): Provide date and signature. **DO NOT SIGN IN BLACK INK!**

Signature of Contractor

Date Signed

Termination of Contractor Certification Agreement: Provide date and signature. **DO NOT SIGN IN BLACK INK!**

Signature of Contractor

Date Signed

Instructions for Completing the Contractor Certification Form

If you are uncertain whether you need to obtain coverage under the NPDES General Permit for Stormwater Discharges From Construction Activities SCR100000 (CGP), if you cannot access the websites listed in these instructions, or if you have any questions, contact the Bureau of Water Stormwater Permitting Section at (803) 898-4300 or the Coastal Stormwater Permitting Section at (843) 953-0200. Please see the Bureau of Water, Stormwater Permitting website (<http://www.scdhec.gov/stormwater>) for guidance and additional information.

Who Must Complete a Contractor Certification Form

Contractors (who are not Permittees or Annual Blanket Utility providers), employed by a Primary or Secondary Permittee of a construction project or site, must complete a Contractor Certification Form before performing any land-disturbing activities at the construction site. Contractor Certification Forms do not require Department approval, however, this form must be signed, dated, and submitted by each contractor to the Owner/Operator prior to commencement of land-disturbing activities by the contractor.

General Guidance for this Form

Are there Other Requirements for Contractors Completing this form?

Contractors completing this form must also attend a pre-construction conference, and sign and date a Pre-Construction Conference Certification Agreement for each project or construction site where they will be performing construction activities. Contractors *cannot work at a construction site until they sign this certification form and document attendance at the Pre-Construction Conference held for the project or construction site. See Section 4.1 of the 2012 CGP for additional information.*

What Does This Certification Mean?

Upon signing this certification, the contractor is accountable to DHEC to ensure the terms and conditions of the approved Stormwater Pollution Prevention Plan (developed for the respective construction project or site) and the Construction General Permit (CGP) are implemented and adhered to in the respective area(s) of the plan where each contractor and/or company signing this form will be performing work. Each contractor becomes subject to DHEC enforcement actions if permit conditions are not met. *See Sections 2.2.3 and 2.3.2 of the 2012 CGP for additional information.*

Should the Owner/Operator Retain This Form?

The Owner/Operator of the construction site must retain completed Contractor Certification Forms with the approved On-Site SWPPP. This form must be retained for at least three years from the date permit coverage expires or is terminated.

Instructions for Completing this Form

Please print legibly and complete all spaces on the form. Abbreviate if necessary to stay within the space allowed for each item and submit the completed form to the Owner/Operator for the specific project or construction site listed in Section A.

Section A - Project Information

Provide all requested information. Enter the date, NPDES coverage number, and Tracking No. provided by the Department for the approved SWPPP. Enter the official or legal name of the project or site, as approved by the Department. If this project is for an individual lot or group of lots, provide the lot number(s). Provide the name of the Owner/Operator.

Section B – Contractor Information

Provide your legal name and title/position. As applicable, provide the legal (formal) name of the company, firm, public organization, or any other entity (you are employed by or represent) on whose behalf you will be performing contractor construction activities. Provide **your** mailing address, telephone and e-mail address. Briefly describe construction-related duties and responsibilities you or your company will perform for this project at the construction site.

Section C – Contractor Certification Statements & Agreement

Read the certification statements (in entirety). Provide your printed name and title or position. Date and sign the certification agreement. Return the signed and dated form to the Owner/Operator. **DO NOT SIGN IN BLACK INK.** Sheets 1 and 2 are formatted for multiple contractor signatures. Sheet 2 is ONLY for signatures within a specific company. Each may be copied as necessary. Sign and date the Termination of Contractor Certification Agreement when the services you provide for this project are complete. Return the signed and dated form to the Owner/Operator for record retention as a part of the On-Site SWPPP (OS-SWPPP).

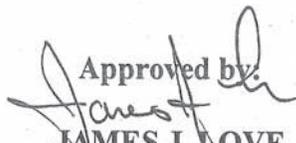
APPENDIX J

**FORT JACKSON HAZARDOUS SUBSTANCE MANAGEMENT
PLAN**

Hazardous Substance Management Plan (HSMP)

*Formerly the Hazardous Material and Waste Management (HMWM)
Plan*

U.S. Army Garrison Fort Jackson

Approved by:

JAMES J. LOVE
COL, AR
Commanding

January 2011

Prepared by:

**Directorate of Public Works (DPW)
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SMS DOC# FJ 4.4.6D F2

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1. PURPOSE

a. The purpose of the HSMP is to assist Fort Jackson (FJ) organizations in complying with environmental regulations pertaining to hazardous substances (HS). Violators can be held personally liable for clean up costs and civil/criminal penalties. Liability can include supervisors and commanders who allow violations to occur and do not take immediate action to prevent or correct the violation. Ignorance of the law is not an acceptable defense.

b. The plan satisfies hazardous waste (HW) minimization requirements by documenting the actions being taken to reduce the quantity and toxicity of HS used and generated on FJ.

2. SCOPE.

a. All organizations, including tenant activities, that manage HS on FJ and do not have their own U.S. Environmental Protection Agency (EPA) Identification (ID) Number, must comply with this plan. Contractors must comply with environmental regulations and contract specifications.

b. Organizations that have their own EPA ID number are not included in this plan. These include the South Carolina Army National Guard (SCARNG); the U.S. Marines, a tenant activity of the SCARNG; the automated fueling facility, operated and owned by Southern Terminal Services, LLC; the laundry facility, operated and owned by Crown Contract Services; and the housing area, operated and owned by Balfour Beatty, Inc.

c. Management of asbestos containing materials and polychlorinated biphenyls (PCBs) are not included in this plan, please refer to the Asbestos Hazard Management Plan and the PCB Management Plan. This plan also does not cover management of munitions and explosives.

3. DEFINITIONS

a. Hazardous substance (HS): Any substance (material or waste) that poses a threat to human health or the environment when improperly treated, stored, transported, or otherwise managed.

b. Hazardous material (HM): A usable HS.

c. Hazardous waste (HW): An unusable HS that meets the regulatory criteria of a listed or characteristic (ignitable, corrosive, toxic, or reactive) HW.

d. Acute HW: A listed HW that has an EPA HW Number beginning with a "P" or the EPA HW Number F020, F021, F022, F023, F026, or F027.

e. Universal waste (UW): A subset of HW. UW includes certain types of batteries, pesticides, mercury-containing equipment, and lamps (i.e. light bulbs).

f. Controlled waste (CW): An unusable HS that does not meet the regulatory definition of HW, but must be managed and/or disposed in accordance with (IAW) South Carolina Department of Health and Environmental Control (DHEC) regulations.

g. Material Safety Data Sheet (MSDS): A hazard information sheet prepared by the manufacturer, specific to a HM, that identifies the hazardous ingredients, physical and health hazards, precautions for safe handling and use, and manufacturer information.

h. Reuse Center: The collection point for unwanted paint related materials, usable materials (including HS and office supplies), empty paint cans and plastic pails, used lamps, rechargeable batteries, mercury containing equipment, cell phones, Tyvek envelopes and compact disc holders, and overhead transparencies. The Reuse Center (751-5121) is located in Building 2558, Essayons Way, and is open Monday-Friday from 1000 to 1400.

i. Recycling Center: The collection point for household-type recyclables including cardboard, newspapers, telephone books (January-March only), magazines, high-grade white paper, high-grade mixed paper, glass, steel, aluminum, plastic #1-7 (except Styrofoam), inkjet cartridges, scrap metal, and Xmas trees (during the holiday season only). Pallet recycling can be coordinated by calling the Recycling Center. The Recycling Center (751-4208) is located in Building 5671, Lee Road, and is open Monday-Friday from 0700 to 1500 and Saturday from 0830 to 1530.

j. Hazardous Material Management System (HMMS): A computer database system that tracks the receipt, use, and transfer of HM. The HMMS Office is located inside the Reuse Center.

k. Satellite Accumulation Area (SAA): An area, located near the point of generation, where HW is accumulated. The total volume of HW must not equal or exceed 55 gallons (1 quart of acute HW) for more than 72 hours (3 days).

l. Container Storage Area (CSA): An area where an unlimited volume of HW can be stored, however, the HW must be transported to a permitted facility within 90 days.

m. Empty: A container is considered empty if the contents have been removed using the practices commonly employed to empty that type of container (i.e. pouring, pumping, scraping, etc.). Except for those containers that held an acute HW, empty containers are not HW.

4. RESPONSIBILITIES.

a. All organizations, including tenant activities, must:

(1) Manage their HS IAW this plan.

(2) Appoint an Environmental Compliance Officer (ECO) to oversee compliance with this plan.

(3) Appoint a HS Manager(s), if applicable, to oversee operations that generate HW or CW, or have a high potential for HW generation or HS violations.

b. Contractors must:

(1) Manage their HS IAW environmental regulations and contract specifications.

(2) Appoint an ECO to oversee environmental compliance, when stated in their contract, and encouraged to do so when not stated.

(3) Appoint a HS Manager(s), if applicable, to oversee operations that generate HW or CW, or have a high potential for HW generation or HS violations.

(4) Dispose of waste IAW environmental regulations and contract specifications. The FJ HS Program Manager is the only person on FJ with the authority to sign HW manifests, therefore, transport of HW off-post requires prior coordination (751-6858).

c. HS Managers must:

(1) Act as organization HS management point of contact and coordinate with EMB.

(2) Attend the annual HS Management Class provided by EMB.

(3) Provide training and pass on information to other organization personnel, as needed.

(4) Maintain documents IAW this plan.

(5) Accompany the FJ HS Program Manager during scheduled and unannounced inspections.

d. FJ HS Program Manager must:

(1) Act as installation HS management point of contact and coordinate with internal and external agencies as needed.

(2) Submit Quarterly HW Reports, annual Waste Minimization Reports, and annual Emergency Planning and Community Right-to-Know Act Section 312 Reports to DHEC.

(3) Prepare a HW Profile Sheet and DD Form 1348-1 Turn-in Document for each waste being disposed through DLA Disposition Services Jackson and coordinate with them on the waste pickup.

(4) Sign the HW manifest and Land Disposal Restriction Form at the time of pickup.

(5) Inspect HW storage areas at least quarterly.

(6) Attend Resource Conservation and Recovery Act (RCRA) refresher training annually and Department of Transportation (DOT) refresher training biannually.

(7) Provide initial and annual refresher training to all personnel that store and manage HW, CW, or UW, or have a high potential for HW generation or HS violations.

(8) Collect waste identification samples and submit for laboratory analysis, if necessary.

(9) Pay annual HW operating fee and annual HW generating fee.

(10) Prepare HW permit and HW transporter permit renewal applications.

5. GENERAL REQUIREMENTS

5.1 WASTE IDENTIFICATION

a. A waste is something that can no longer be used or is intended for disposal.

b. All waste must be evaluated to determine the proper disposal method. This includes anything thrown in the trash, poured down the drain, turned-in to the DLA Disposition Services Jackson, picked-up by a contractor, etc.

c. For common wastes, refer to the Fort Jackson Environmental Guidebook. For uncommon or site-specific wastes, call the EMB at 751-6858 for a waste determination. The FJ HS Program Manager will determine if the waste you generate is hazardous by looking at the MSDS that came with the product. If it is a combination of wastes, or a spent product, then a laboratory analysis is generally used to make a determination.

d. Information from the label is sometimes used to make a waste determination. Whenever possible, keep HM in the original container. If a HM is transferred to another container, the new label must identify the product name and manufacturer.

5.2. WASTE MINIMIZATION

a. FJ must eliminate or reduce the purchase and use of HM (especially those containing toxic chemicals), eliminate the unnecessary disposal of unused HM, and minimize the quantity and toxicity of waste generated.

b. The waste minimization hierarchy is: Reduce, Reuse, Recycle, and Dispose only as a last resort. Source reduction can be achieved through material substitution, good housekeeping, HM control, process or equipment change, and waste segregation.

c. Usable HM may only be disposed after exhausting all other options. You should first attempt to return it to the supplier or manufacturer. If this is not possible, give it to another organization that can use it or store it for future use. Advertise your excess material via e-mail.

d. Empty containers should be reused whenever possible. Empty paint cans and 5-gallon plastic pails should be turned in to the Reuse Center for reutilization or recycling. Triple-rinsed steel drums and steel cans may be recycled as scrap metal.

5.3. HAZARDOUS SUBSTANCE (HS) MANAGEMENT

a. All containers must be in good condition, clean, and marked or labeled to identify the contents. The label must be legible. Containers must be tightly sealed when not in use.

b. If a container is in poor condition, the contents must be transferred to a new container or the damaged container must be over packed (i.e. placed in a larger container). The new label must identify the product name and manufacturer. HS should never be placed in a container that previously held food or drink!

c. Containers must be compatible with the contents (i.e. strong corrosives should not be stored in metal containers) and HS should not be placed in a container which previously held an incompatible substance. Information about compatibility is included in the MSDS.

d. All HM must be inventoried monthly using a Hazardous Chemical Inventory Form (HCIF). The HCIF must be turned in to the HMMS Office (751-5121) by the 10th of each month. *See Appendix A for a blank HCIF.*

e. A MSDS must be maintained for each HS. MSDSs must be located near all HS storage and handling areas, and must be easily accessible by all employees.

f. Before purchasing new items:

(1) Check your HCIF. Contact the HMMS Office (751-5121) to find out if other organizations have excess quantities.

(2) Check the Reuse Center (751-5121) for paint related materials, common building supplies, common household HM, and office supplies.

(3) Contact other organizations (on-post and off-post) to see if they have excess.

(4) Determine if personal protective equipment or cleaning solutions will be needed.

(5) Determine if a non-hazardous, non-shelf-life, or recycled item can be procured.

(6) Determine if a HW will be generated. This should be avoided whenever possible.

g. When purchasing new items:

(1) Comply with Green Purchasing Program (GPP) requirements. GPP concerns the purchase of environmentally preferable products and services. For more information, visit <http://www.epa.gov/epawaste/consERVE/tools/cpg/index.htm>. *Note: Federal agencies are required to purchase recycled engine coolants, re-refined lubricating oil, and retread tires.*

(2) Purchase the least hazardous product that will do the job. Minimize or eliminate the use of toxic chemicals (such as lawn and garden products).

(3) Purchase only what you need (do not stockpile). Do not purchase multiple brands of the same product (i.e. 5 different glass cleaners or 20 different all-purpose cleaners).

(4) Avoid items that cannot be returned to the store (such as custom colored paints).

- (5) Check expiration dates. Only purchase what can be used prior to the expiration date.
 - (6) Save your receipts.
 - (7) Update the HCIF. Add new or revised MSDSs to your file.
- h. When storing HS:
- (1) Storage areas must be kept neat through good housekeeping practices.
 - (2) Storage areas should be covered and secure to protect the containers from the weather and tampering.
 - (3) Store containers inside whenever possible to prevent containers from rusting and prevent product spoilage due to heat or cold.
 - (4) Store containers on a paved surface, away from floor drains, storm drains, or hazards that might lead to a spill, to prevent soil or water contamination if a leak or spill should occur.
 - (5) Store large containers (>10 gallons) on pallets to prevent rusting and aid in leak detection and spill prevention.
 - (6) Provide secondary containment to hold volume of largest container.
 - (7) Separate incompatible substances, using the MSDS for guidance. Call the Safety Office (751-6004/2542) for additional assistance.
 - (8) Storage of flammable liquids (those with a flash point $\leq 100^{\circ}\text{F}$) must comply with FJ Reg 420-90, "Fire Prevention and Protection Services". To view this regulation, go to the Y: drive, open the "Public" folder, open the "Publications" folder, and click on "FJ Reg 420-90".
 - (9) Use a log, calendar, or other procedure to avoid shelf-life expiration. Request shelf-life extensions for expired items. The policies for optimizing shelf-life are contained in the DoD 4140.27-M, Shelf-Life Management Manual, at https://www.shelflife.hq.dla.mil/policy_DoD4140_27.aspx.
 - (10) Inspect storage areas, including aboveground storage tanks, at least weekly. The area should be free of ground stains, spills, odors, or fumes. Containers should be in good condition, clean, marked or labeled, tightly sealed, and not expired.
- i. When using HM:
- (1) Follow manufacturer's instructions.
 - (2) Use the oldest HM first (or any containers in poor condition).
 - (3) Use the least amount necessary to do the job.
 - (4) Use up the entire product and then reuse or recycle the empty container, if possible.
 - (5) Return, give away, or turn in excess items that you don't plan on using.
 - (6) Update the HCIF when a container is used up or transferred to another location.
- j. Evaluate wastes to determine the proper disposal method. Do not mix wastes - you take the risk of turning a non-HW into a HW. Contact the FJ HS Program Manager for assistance.

5.4. HAZARDOUS WASTE (HW) MANAGEMENT

- a. HW must be carefully managed IAW DHEC regulations. The following are examples of common HW generated on FJ: spent (unusable) mineral spirits, paint thinner, and some solvents; gasoline contaminated soil or absorbent; rifle bore patches/swabs used with unapproved products, such

as WD40 or carburetor cleaner; unused MRE heaters; M17 or M40 gas mask filters (C2 filters only). *See the Fort Jackson Environmental Guidebook for specific instructions and exceptions.*

b. HW must be stored in a HW Satellite Accumulation Area (SAA) or HW Container Storage Area (CSA). Requirements common to both are:

(1) Once HW is placed in a container, a HW label must be put on the container and the contents identified. HW labels are available from EMB (751-6858).

(2) HW must not be mixed. Separate storage containers are required for each type of HW.

(3) If other items are stored in the same area as HW, the boundary of the SAA or CSA must be clearly identified by placing tape on the floor or some other means of identification.

(4) Site-specific spill response plans, spill response kits, and MSDS files must be displayed prominently near all HW storage areas.

(5) HW storage areas must be inspected weekly. The inspections must be documented and kept near the storage area for review by an inspector. *See Appendix B for HW inspection forms.*

(6) Containers holding ignitable or reactive waste must be at least 50 feet from the base property line, and must be separated and protected from sources of ignition or reaction.

c. Requirements specific to a SAA:

(1) The total volume of HW must not exceed 55 gallons (1 quart of acute HW) for more than 72 hours (3 days).

(2) The accumulation start date must be marked on the HW label when the 55 gallon limit (or 1 quart of acute HW) is reached. The HW must be moved to a CSA or transported off-post to a permitted treatment, storage, or disposal facility within 72 hours of the accumulation start date.

(3) The SAA must have a sign identifying it as a "Hazardous Waste Satellite Accumulation Area/No Smoking". SAA signs are available from EMB (751-6858).

(4) The SAA must be located near the point of generation.

d. Requirements specific to a CSA:

(1) The accumulation start date must be marked on the HW label immediately when HW is first placed in the container.

(2) An unlimited volume of HW can be accumulated; however, each container must be transported off-post to a permitted treatment, storage, or disposal facility within 90 days of the accumulation start date.

(3) The CSA must have a sign identifying it as a "Hazardous Waste Container Storage Area/No Smoking".

(4) An alarm system, communication device, fire control, and spill response equipment must be available.

(5) The Fire Department, EMB, hospital, and police must be supplied with a layout of the CSA and a HW inventory.

(6) A copy of the Installation Spill Contingency Plan (ISCP) must be kept near the CSA.

5.5. UNIVERSAL WASTE (UW) MANAGEMENT

a. UW must be carefully managed IAW DHEC regulations. The following are examples of UW: lamps (i.e. light bulbs), batteries, mercury-containing equipment (such as thermometers or thermostats), and unused pesticides. *See the Fort Jackson Environmental Guidebook for specific instructions and exceptions.*

b. It is against the law to mismanage UW. UW must be placed in containers and sealed. Containers must remain closed and lack evidence of leakage, spillage, or damage. UW must be managed in a way that prevents releases to the environment.

c. The accumulation start date and contents must be marked on the container when UW is first placed in the container (i.e. "Used Lamps", "Used Batteries", "Used Mercury-Containing Equipment", and "Waste-Pesticides").

d. UW must be turned in to the Reuse Center within 6 months from the start date. *Note: Organizations in the DOL/DPW Maintenance Complex may take their used lamps to DPW Supply.*

5.6. CONTROLLED WASTE (CW) MANAGEMENT

a. CW must be carefully managed IAW DHEC regulations. The following are examples of CW: used antifreeze, used cooking oil/grease, used motor oil, used oil filters. *See the Fort Jackson Environmental Guidebook for specific instructions and exceptions.*

b. CW must be placed in containers and sealed. The contents must be marked on the container when CW is first placed in the container.

5.7. NON-HAZARDOUS WASTE (NON-HW) MANAGEMENT

a. Any waste that does not meet the definition of HW, UW, or CW is considered non-HW. Disposal of non-HW must comply with solid waste and wastewater regulations, and FJ policy.

b. Liquids and recyclables may not be placed in trash cans, dumpsters, or roll-off bins.

c. The following liquids may not be poured down the drain: any waste that is viscous (i.e. thick) or contains solids capable of obstructing flow, has a pH <6 or >9, or contains more than 100 mg/l oil or grease. These liquids require special handling.

d. The following are examples of non-HW: punctured aerosol cans, used MRE heaters, latex (water-based) paint. *See the Fort Jackson Environmental Guidebook for specific instructions and exceptions.*

5.8. DISPOSAL PROCEDURE

a. Call the EMB (751-6858) to request disposal. EMB personnel will inspect the container(s) and prepare a HW Profile Sheet and a DD Form 1348-1 Turn-in Document. A MSDS or laboratory analysis is required to complete the paperwork. The paperwork must be signed by the HS Manager (or their designee). The DLA Disposition Services Jackson will make arrangements for a contractor to pick up the waste after the EMB provides them with the signed documentation.

b. The container(s) will remain at the generating organization prior to pick-up. If the container(s) need(s) to be moved prior to pick-up, this action will be coordinated by EMB.

c. The FJ HS Program Manager is the only person on FJ with the authority to sign HW manifests. Any organization that plans to have a contractor pick up their waste must first coordinate with EMB (751-6858).

5.9. TRANSPORTATION

a. Transportation of HW off-post by unauthorized personnel is a federal offense, punishable by imprisonment and/or fines.

b. Transportation of HW on-post does not require a DOT placard; however, certain precautions must be taken to ensure safe delivery.

(1) All containers must be secured within the vehicle to prevent spills and accidents. Loads must be balanced in the vehicle lengthwise and crosswise, and braced to prevent movement.

(2) When loading and unloading reactives, care must be taken to keep them dry, out of wet weather, and away from ignition sources.

(3) Keep ignitables away from heat and ignition sources. DO NOT load or unload ignitables from a motor vehicle while the engine is running.

(4) Do not transport incompatible HS together in the same vehicle.

5.10. TRAINING REQUIREMENTS

a. All personnel who manage or handle HS must be trained to respond to spills or other emergencies, protect the environment, and properly handle and dispose of the waste. Training must be completed within six months of employment. HS training includes:

(1) Hazard Communication (HAZCOM) training is required for all personnel exposed to HS. This training is conducted by the organization's Additional Duty Safety Officer (ADSO). Call the Safety Office (751-6004/2542) for additional information.

(2) HS awareness training for ECOs is included in the mandatory ECO Course conducted by ENV. Call ENV (751-5011) to register.

(3) The HS Management Class is required annually for all HS Managers. The class is held quarterly. Additional classes are available upon request. The class is tailored to the participants and is one to four hours in length. Call EMB (751-6858) to register or get additional information.

b. Training files must be updated after each training session, must be readily accessible, and must be kept for at least three years from the employee's termination date. The following documentation must be maintained in the employee's training file:

(1) The HW Training Record or similar records that contain the following: employee's name, job title, job description, and amount and type of training completed (both formal and on-the-job). *See Appendix C for a blank HW Training Record.*

(2) A certificate documenting formal training completed by the employee, or a DD Form 1556 if a certificate is not available.

(3) Documentation for informal on-the-job training that includes topics covered, class time, list of attendees, and instructor's signature.

5.11. SPILL RESPONSE

a. It is the responsibility of each organization to maintain site-specific spill response plans, spill response kits, and MSDS files and display these items prominently near all HS storage and handling areas. These items must be far enough away that they can be accessed in the event of a spill. *See Appendix D for a sample Spill Response Plan.*

b. Personnel must be trained in response procedures and how to use the equipment. Training should emphasize "safety first".

c. Spill response kits must be sufficient to handle the volume of the largest container. Spill kits can be made from locally purchased items and will vary depending on the type and quantity of HS stored or handled.

d. All spills greater than 5 gallons, or spills of any size that can not be safely contained and cleaned up by organization personnel, must be immediately reported to the FJ Fire Department at 911. Spills that are 5 gallons or less must be reported if the spill enters a storm drain, creek, lake, or other body of water, or if not immediately cleaned up.

e. The FJ Installation Spill Contingency Plan (ISCP) establishes procedures and identifies resources for the control and cleanup of HS spills. After receiving notification of a spill, the FJ Fire Department will implement the ISCP. A copy of the ISCP must be located near each CSA, but is not required at other HS storage areas.

5.12. INSPECTIONS

a. HS storage areas must be inspected, at least weekly, for deterioration of containers and the containment system. HW inspections must be documented and kept near the storage area for review by an inspector. Federal regulations require CSA inspection forms to be retained for at least 3 years. SAA inspection forms must be retained for at least 1 year. *See Appendix B for HW inspection forms.*

b. Scheduled and unannounced environmental compliance inspections are routinely conducted by the EMB. Deficiencies observed during the inspections are documented and submitted to the Commander or Director for corrective action. All inspection results, both positive and negative, may be forwarded to the Commanding General for review.

c. Unannounced compliance inspections are routinely conducted by outside agencies. Violations found during a regulatory inspection will result in a warning letter or Notice of Violation (NOV) and can result in fines and/or possible criminal/civil actions.

5.13. REPORTING AND RECORD KEEPING

a. The following documents should be maintained at each organization:

(1) HSMP and Environmental Guidebook

(2) FJ Regulation 200-8 "Environmental Protection and Enhancement" - To view this regulation, go to the Y: drive, open the "Public" folder, open the "Publications" folder, and click on "FJ Reg 200-8".

(3) FJ Regulation 350-14 "Post Range Regulation" – Units only

(4) ECO appointment letter

(5) MSDSs - A MSDS must be available for all HS.

(6) HCIFs

(7) HW training records - Federal regulations require retention for at least three years from the employee's termination, departure, or transfer date.

(8) Site-specific spill response plan

(9) ISCP (only at CSAs)

(9) ISCP (only at CSAs)

(10) HW inspection form (if applicable) - Federal regulations require CSA inspection forms to be retained for at least three years. SAA inspection forms must be retained for at least one year.

(11) Fort Jackson Unit and Activities Environmental Compliance Checklist

b. Any organization that has a contractor pick-up their waste (such as batteries or oil/water separator sludge), must provide EMB (751-6858) with pertinent data, including pick-up date, type of waste, and quantity, immediately after shipment. The FJ HS Program Manager is the only person on FJ with the authority to sign HW manifests. Any organization that plans to have a contractor pick up HW must first coordinate with EMB (751-6858).

c. Any organization that has a SAA or CSA must provide EMB (751-6858) with the amount (volume or weight) of HW in storage at the end of each month.

6. REFERENCES.

- a. South Carolina HW Management Regulations
- b. DOT, 49 CFR 171-173
- c. EPCRA, 40 CFR 355 & 370
- d. AR 200-1, Environmental Protection and Enhancement
- e. FJ Reg 200-8, Environmental Protection and Enhancement
- f. FJ Reg 420-90, Fire Prevention and Protection Services
- g. FJ SOP 385-1200, Hazard Communication
- h. AR 420-1, Army Facilities Management, chapter 25, Fire & Emergency Services
- i. FAR Part 23, Environment, Energy and Water Efficiency, Renewable Energy Technologies, Occupational Safety, and Drug-Free Workplace

7. SCHEDULE OF REVIEW. The HSMP will be reviewed and evaluated for revision at least once every three years.

8. REVISION HISTORY.

Date	Revision Level	Change Description	Initial(s)

9. COPIES OF THE PLAN. A copy of the plan will be maintained by all ECOs and HS Managers.

APPENDIX B

SATELLITE ACCUMULATION AREA INSPECTION FORM

ITEM TO BE INSPECTED	WK 1	WK 2	WK 3	WK 4	WK 5	CORRECTIVE ACTION NEEDED	DATE COMPLETED
AREA							
Warning signs are present & legible							
Area is secured & covered							
Area is clean & neat							
Total volume of HW is less than 55 gal (1 qt of Acute HW)							
CONTAINERS							
Incompatible containers are segregated							
Containers are properly labeled & the contents identified							
Containers are in good condition							
Large containers are on pallets							
There are no spills, odors, or fumes present							
Containers are tightly sealed							
SPILL RESPONSE PLANNING							
Spill supplies are readily available							
Spill response plan is nearby							
MSDS file is nearby							

Location of SAA _____

Week 1 – Inspection Date: _____

Week 2 – Inspection Date: _____

Week 3 – Inspection Date: _____

Week 4 – Inspection Date: _____

Week 5 – Inspection Date: _____

Amount of HW in storage at end of month _____

Signature of Inspector: _____

CONTAINER STORAGE AREA INSPECTION FORM

ITEM TO BE INSPECTED	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	CORRECTIVE ACTION NEEDED	DATE COMPLETED
AREA							
Warning signs are present & legible							
Area is secured & covered							
Area is clean & neat							
Aisle space is adequate							
CONTAINERS							
Incompatible containers are segregated							
Containers are properly labeled & the contents identified							
Accumulation start date is within 90 days							
Containers are in good condition							
Large containers are on pallets							
There are no spills, odors, or fumes present							
Containers are tightly sealed							
SPILL RESPONSE PLANNING							
Spill supplies are readily available							
Spill response plan/ISCP is nearby							
An alarm system, communication device, and fire control is available							
MSDS file is nearby							

Location of CSA _____

Week 1 – Inspection Date: _____

Week 2 – Inspection Date: _____

Week 3 – Inspection Date: _____

Week 4 – Inspection Date: _____

Week 5 – Inspection Date: _____

Amount of HW in storage at end of month _____

Signature of Inspector: _____

Spill Response Plan

The goal of the spill response plan is to reduce safety, health, and environmental risks associated with a hazardous substance incident. In the event of a spill, the following actions should be implemented:

SECURE AND EVACUATE THE AREA - Keep unauthorized persons out of the area.

REPORT THE SPILL - All spills >5 gallons must be immediately reported to the Fire Department at 911. Spills that are ≤5 gallons must be reported if the spill enters a storm drain, creek, lake, or other body of water, or cannot be safely contained and cleaned up by organization personnel. Provide any pertinent information, including:

- Substance spilled.
- Location of spill.
- Nature and extent of injuries.
- Extent to which spill traveled.
- Estimated amount spilled.
- Time spill occurred.

PROTECT YOURSELF - Extinguish smoking material and ignition sources. Identify the substance spilled and obtain appropriate personal protective equipment, such as:

- Protective Goggles.
- Protective Apron.
- Rubber Overboots.
- Compatible Rubber Gloves.
- Respirators.

STOP THE FLOW - Stop or slow flow of hazardous substance if it can be done safely.

- Plug or patch punctured container(s).
- Upright overturned or tipped container(s).
- Close appropriate valve(s).

CONTAIN THE SPILL - The spilled substance should be contained within the immediate area. Prevent flow to drains, drainage ditches, and sewer systems if it can be done safely.

- Place nonreactive absorbent material such as sand, earth, straw, vermiculite, absorbent pillows or booms on the spill.
- Block the spill from entering storm drains or sewers by constructing a dike around all points of entry.
- If the spill is on the ground, clean it up immediately by digging up the contaminated soil, placing it in proper containers, and disposing of it properly.

APPENDIX E
ACRONYMS

ADSO	Additional Duty Safety Officer
CSA	Container Storage Area
CW	Controlled waste
DHEC	South Carolina Department of Health and Environmental Control
DOL	Directorate of Logistics
DOT	Department of Transportation
DPW	Directorate of Public Works
ECO	Environmental Compliance Officer
EMB	Environmental Management Branch
ENV	Environmental Division
EPA	U.S. Environmental Protection Agency
FJ	Fort Jackson
GPP	Green Purchasing Program
HAZCOM	Hazard Communication
HCIF	Hazardous Chemical Inventory Form
HM	Hazardous material
HMMS	Hazardous Material Management System
HS	Hazardous substance
HSMP	Hazardous Substance Management Plan
HW	Hazardous waste
IAW	In accordance with
ID	Identification
ISCP	Installation Spill Contingency Plan
MSDS	Material Safety Data Sheet
NOV	Notice of violation
PCB	Polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
SAA	Satellite Accumulation Area
SCARNG	South Carolina Army National Guard
UW	Universal waste

APPENDIX K

SEDIMENT BASIN DESIGN INSTRUCTIONS

FLOATING SKIMMER & BAFFLE SEDIMENT BASIN DESIGN GUIDLEINES



FORT JACKSON, SOUTH CAROLINA

May, 2013

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FORT JACKSON FLOATING SKIMMER & BAFFLE SEDIMENT BASIN DESIGN GUIDELINES

1.0 INTRODUCTION

These *Floating Skimmer & Baffle Sediment Basin Design Guidelines* are developed to provide guidance in designing Sediments Basins that incorporate floating skimmers, baffles, and surface withdrawal at Fort Jackson, South Carolina and includes design guidelines, Design Aids, and design details.

These *Design Guidelines* includes the following:

- Appropriate Floating Skimmer & Baffle Sediment Basin Design Methodology.
- NEW Graphical Design Aids(based on SEDIMOT modeling) specific to soils found at Fort Jackson which incorporate Floating Skimmers and Baffles to design Sediment Basins for minimum 80% trapping efficiency.
- Design of Floating Skimmer and Baffle Sediment Basins that will be Multipurpose Basins used for post construction water quality and quantity control including the design of Forebays.

2.0 DESCRIPTION

Provide a *Floating Skimmer & Baffle Sediment Basin* to remove sediment from construction site runoff. A *Floating Skimmer & 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 *Floating Skimmer & Baffle Sediment Basin* is to collect and store sediment from disturbed areas cleared or graded during construction. To maximize effectiveness, locate *Floating Skimmer & Baffle Sediment Basins* at the lowest points or near the edge of a watershed catchment.

Floating Skimmer & Baffle Sediment Basins include 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. These Baffles may consist of Porous Baffle materials or Class A or B riprap.

Traditional temporary Sediment Basin designs typically used a perforated riser or staged riser with a low flow orifice for dewatering. This Specification utilizes dewatering from the water surface where the density of total suspended solids (TSS) is at a minimum in the water column. A *Floating Skimmer & 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 Outflow Barrel. 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 dewateres the volume below the Primary Riser in a time period ranging between 24 to 72 hours.
3. A stabilized Emergency Spillway that safely passes the 100-year 24-hr storm event with a minimum 1.0-foot of freeboard from the 100-year 24-hour water surface elevation to the top of the dam.

3.0 SITE ASSESSMENT

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

Consider construction phasing when selecting locations for *Floating Skimmer & Baffle Sediment Basins*. Select a location that allows the Temporary or Multipurpose *Floating Skimmer & 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. Identify locations for sediment disposal as part of the Temporary or Multipurpose *Floating Skimmer & Baffle Sediment Basin* site selection. Identify sediment disposal locations on the Plans or as directed by the Engineer.

4.0 DESIGN REQUIREMENTS

Design **Temporary** *Floating Skimmer & Baffle Sediment Basins* that do not require peak flow reduction to pre-development conditions with no perforations in the Primary Riser structure.

Design permanent **Multipurpose** *Floating Skimmer & Baffle Sediment Basins* requiring peak flow reduction to keep the 2-year 10-year (25-year if required) 24-hour storm disturbed-state peak flow rates from the Basin less than or equal to the pre-disturbance peak flow rates with orifices and weirs incorporated into the Primary Riser structure. Ensure that all **Multipurpose** *Floating Skimmer & Baffle Sediment Basins* are designed to meet any post-construction water quality requirements if required.

4.1 GENERAL DESIGN REQUIREMENTS

Use **Temporary** or **Multipurpose** *Floating Skimmer & Baffle Sediment Basins* on sites where 10 or more acres are disturbed and drain to a single point. Do not install **Temporary** or **Multipurpose** *Floating Skimmer & Baffle Sediment Basins* in Waters of State designated by a solid or dashed blue line on USGS 7.5 minute quadrangle maps). Utilize **Temporary** *Floating Skimmer & Baffle Sediment Basins* until the contributing flow areas to the basin have undergone final stabilization.

The design requirements outlined in this Specification must ensure a minimum of 80% trapping efficiency of total suspended solids (TSS).

Ensure Temporary or Multipurpose Floating Skimmer & Baffle Sediment Basins adhere to the following requirements:

- Drainage Area: 5 acre minimum, 100 acre maximum.
- Drainage Area: 10 acres or more draining to one location requires a *Floating Skimmer & Baffle Sediment Basin*.
- Minimum 80 percent design removal efficiency for TSS.
- Sediment storage volume accounted for in the overall design volume of the sediment basin.
- Do not incorporate side slopes steeper than 3H:1V where applicable.
- Optimum Basin length to width ratio is 2L:1W.
- Temporary Basin bottom slope of 0.5%.
- Permanent Dry Multipurpose Basins final Basin bottom slope of 2%.
- Anti-vortex device / trash rack required for Primary Riser.
- Floating Skimmer with minimum dewatering time of 24 hours and maximum dewatering time of 72 hours. (See Attachment 1 for Floating Skimmer requirements)
- Minimum of 1 row of Baffles installed in the Basin. (See Attachment 2 for Porous Baffle requirements)
- At least one row of Baffles placed between the Primary Riser structure and all pipes or channels discharging into the Basin.
- Minimum embankment width at the top of the dam is 8 feet.
- Antiseep collars required on all penetrations through the dam.
- Perform temporary stabilization by seeding and install Temporary Erosion Control Blankets on exposed basin side slopes.

4.2 SAFETY

Follow the safety design criteria such as those outlined by the USDA Soil Conservation Service (previously the Natural Resources Conservation Service), U.S. Army Corps of Engineers, and the Dam Safety.

Incorporate all possible safety precautions such as signs and fencing for permanent Multipurpose Basins that are readily accessible to populated areas. Ensure the inside pond slopes are no steeper than 3H:1V where applicable. A safety fence or vegetative barrier is required where a permanent Multipurpose Basins interior side slopes are steeper than 3H:1V or when the impoundment is a wall greater than 24 inches in height. If the wall is adjacent to a walkway or street a railing may be required instead of a fence.

5.0 FORT JACKSON TEMPORARY FLOATING SKIMMER & BAFFLE SEDIMENT BASIN DESIGN

Design **Temporary** *Floating Skimmer & Baffle Sediment Basins* using the following strategies.

1. Use the Design Aids provided in the Attachment 3 of this document.
2. In accordance to the requirements in standards for Stormwater Management and Sediment Reduction Act 72-300 using Sedimot, SEDCAD4, Pond Pack, SEDPRO and other computer models that utilize eroded particle size distributions and calculates a corresponding 80% trapping efficiency for TSS.

5.1 TEMPORARY FLOATING SKIMMER & BAFFLE SEDIMENT BASIN DESIGN AIDS

For true **Temporary** *Floating Skimmer & Baffle Sediment Basins*:

1. Utilize a Temporary sediment basin non-perforated Primary Riser configuration.
2. Design a Primary Riser consisting of a solid circular concrete monolithic base or extended base riser with no staged discharges or low flow orifices.
3. Design the Basin so stormwater runoff enters the Primary Riser by overtopping the riser structure and through a Floating Skimmer.
4. Design the Primary Riser with a Floating Skimmer attached to the bottom of the riser dewatering the runoff volume below the top elevation of the riser in a time period ranging between 24 to 72 hours.
5. Provide calculations or Design Aids showing that this Basin will meet a minimum 80% TSS trapping efficiency.
6. Provide a minimum of 1 row of Baffles in the Basin. Place a minimum of 1 row of Baffles between the riser structure and all pipes or channels discharging to the Basin. Designers may use 0% dead space when using Baffles.
7. Design a stabilized Emergency Spillway that safely passes the 100-year 24-hr storm event with a minimum 1-foot freeboard from the 100-year 24-hour water surface elevation to the top of the dam.

5.2 TEMPORARY RISER AND SPILLWAY DESIGN

1. The Primary Riser consists of a solid circular concrete monolithic base or extended base riser with no low flow orifice or staged orifice/weir discharges. Runoff only enters the Primary Riser structure by overtopping and through the Floating Skimmer.
2. Design the 10-year 24-hour storm event peak stage in the Basin at a maximum elevation of approximately 6 inches above the top elevation of the Primary Riser.
3. Design the Primary Riser and Outlet 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.

4. Minimum 1.5-foot elevation difference from the top of riser to the crest of the emergency spillway.
5. Design the Emergency Spillway to safely pass the peak runoff from the 100-year 24-hour storm event storm with a minimum 1.0-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.
6. Show all Basin dimensions and slopes on the Plans.

6.0 PERMANENT MULTIPURPOSE FLOATING SKIMMER & BAFFLE SEDIMENT BASIN DESIGN

The Primary Riser spillway configuration for **Permanent Multipurpose** Basins used for both during construction sediment control and post construction water quality and quantity control for peak flow rate reduction contains orifices/weirs in the Primary Riser Structure.

6.1 OPTION A (PEAK FLOW CONTROL DURING CONSTRUCTION REQUIRED)

1. Design and utilize one Permanent Riser and outlet barrel configuration for both phases of the project that is based on post-construction water quality and quantity control.
 - a. This ensures that there is no damage or introduction of a point of structural weakness to the primary riser, outflow barrel and permanent dam structure as a result of installing a temporary riser, removing it, and then installing a permanent riser. Maintaining the structural integrity of the outflow barrel and permanent dam structure is of the highest importance.
 - b. This ensures that a small temporary riser is not installed to maintain peak flow rates by forcing a large head on top of the riser that could jeopardize the stability of the riser, barrel, and permanent dam.
2. Design the Primary Riser to have a Floating Skimmer attached to the bottom of the riser (typically the post construction water quality low flow orifice) during the construction phase of the project to dewater in a time period ranging between 24 to 72 hours.
 - a. The Floating Skimmer provides withdraw from the water surface for the majority of storm events during the construction phase of the project.
3. Design the Primary Riser with orifices/weirs to provide peak flow rate control.
4. Design the Primary Riser to have a trash rack and anti-vortex device.
5. Provide a minimum of 1 row of Baffles during construction. Install at least 1 row of Baffles between the riser structure and all pipes or channels discharging to the Basin. Designers may use 0% dead space when using Baffles.
6. Provide calculations using Sedimot, SEDCAD, Pond Pack and other computer models or Design Aids showing that the basin will meet a minimum 80% trapping efficiency during the construction phase of the project.

7. Provide calculations showing that the basin is designed to meet pre-construction peak flow rates for the 2-year 10-year, and 25-year 24-hour storm events.
8. Design a stabilized Emergency Spillway that safely passes the 100-year 24-hr storm event with a minimum freeboard of 1.0 feet between the 100-year 24-hour water surface elevations to the top of the dam.

Post construction staged orifices, low flow orifices, or staged weirs are installed in the Primary Riser structure prior to the construction phase.

6.2 OPTION B (PEAK FLOW CONTROL DURING CONSTRUCTION NOT REQUIRED)

Two spillway configurations are required for **Permanent Multipurpose** Basins that will not control peak flow rates during the construction phase of the project.

The first configuration is the **Temporary** *Floating Skimmer & Baffle Sediment Basin* Primary Riser Spillway consisting of a solid 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 Multipurpose** Basin Riser spillway designed to reduce post-development peak flow rates to pre-development peak flow rates for the 2-year 10-year, and 25-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 Floating Skimmer & Baffle Sediment Basin* of deposited sediment and re-grade the Basin to meet the Permanent Basin contours if necessary when the construction phase ends.

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

A **Temporary** *Floating Skimmer & Baffle Sediment Basin* that is converted to a **Permanent Multipurpose** post-construction basin will be retained and maintained after completion of the project.

6.3 FOREBAYS

Forebays are required for all **Multipurpose Basins**. The function of the Forebay is to trap the majority of the coarse fractions of the suspended solids in the runoff before it enters the main dry detention area.

Provide a Forebay for all inlets to a Multipurpose Basins and place Forebays upstream of the main detention area. Each Forebay is sized according to the outlets contribution to the basin. A Forebay is not required for an outlet that contributes less than 10% of the total drainage area or to the basin.

Design forebay side slopes to be 2H:1V or flatter.

The Forebay is separated from the larger Multipurpose Basin area by berms, barriers, or baffles that may be constructed of earth, stones, riprap, gabions, or geotextiles. The berm, barrier, or baffles act as a trap for coarse sediments and minimize their movement into the main detention basin.

Design the Forebay in a manner that it is accessible for easy cleanout because it will eventually fill in with coarse particles. Design the access to the Forebay with a maximum slope of 15-20 percent extending from the top of the embankment to the toe.

6.3.1 DRY PERMANENT MULTIPURPOSE BASIN FOREBAYS

Design the Forebay volume (or combined volume of Forebays):

- Equal to a minimum of 10% of the overall post construction water quality treatment volume of the Multipurpose Basin, and/or
- Equal to approximately 75 percent of the required sediment storage volume based on a minimum cleanout cycle of 5 years.

The forebay berm may incorporate drain pipe to drain the Forebay so it does not maintain a permanent pool.

6.3.2 WET PERMANENT MULTIPURPOSE BASIN FOREBAYS

Design the Forebay volume (or combined volume of Forebays):

- Equal to a minimum of 10% of the overall post construction water quality treatment volume of the Multipurpose Basin, and/or
- Equal to approximately 75 percent of the required sediment storage volume based on a minimum cleanout cycle of 5 years.

For Wet Permanent Multipurpose Basins, the forebay berm may incorporate drain pipe or be constructed of riprap to facilitate equalization of the pond over time. Design the top of the

forebay barrier a maximum of 1-foot below the permanent pool elevation, and it may extend above the elevation of the permanent pool.

Design the forebay depth, as measured from the maximum water quality event surface level, between 4 and 6 feet. To minimize the re-suspension of settled particles, design the minimum permanent pool depth of water in the forebay 3-feet above the design sediment storage elevation.

Size the Forebay such that the average velocity of the flow in the Forebay for the 2-year 24-hour storm event does not exceed 1.0 foot per second (flow rate /average cross sectional area).

7.0 CONSTRUCTION

Construct the *Floating Skimmer & Baffle Sediment Basin* in accordance with these Specifications, Standard Drawings, as indicated on the Plans, or as directed by the Engineer.

7.1 EQUIPMENT

Ensure that the equipment necessary for the proper installation of the *Floating Skimmer & Baffle Sediment Basin* is on site, in acceptable working condition, and approved by the Engineer regarding both type and condition before the start of work under this section. Provide sufficient equipment to execute the work in accordance with the project schedule.

7.2 INSTALLATION REQUIREMENTS

Installation includes constructing the sediment basin, installing the Primary Riser Structure, installing the Riser Outlet Barrel, installing Baffles, furnishing, installation and cleanout of Floating Skimmers, providing and placing Riprap pad on bottom of 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.

7.3 SITE WORK

Locate and construct the *Floating Skimmer & Baffle Sediment Basin* before performing other earthwork on-site. Clear and grub the entire area of the Basin and Emergency Spillway in accordance with the Plans. Turn the entire area to a depth of 6 inches with a disk harrow and compact it to 95.0% compaction. Fill all holes in the foundation area of the dam with suitable material and compact to 95.0% compaction.

7.4 TEMPORARY AND PERMANENT SEDIMENT CONTROL BASINS

Locate and construct the *Floating Skimmer & Baffle Sediment Basin* as shown in the Plans. Construct the bottom of the Basin on a 0.5% slope. If the inflow into the Basin is from a pipe or from a ditch with a flow line higher than the bottom of the basin, place Riprap at the end of the pipe or ditch down to the bottom elevation of the Basin to prevent erosion.

Perform Temporary Stabilization by seeding and protect the temporary seeded area with a Temporary ECB on all areas of the Basin, except for the bottom of the Basin.

When grading operations are complete and the permanent grassing or stabilization is in place, restore the area occupied by the temporary *Floating Skimmer & Baffle Sediment Basin* as nearly as practicable to the original ground line and seed the area.

7.5 EARTH DAM EMBANKMENT

Construct the earth dam to the dimensions shown on the Plans. The maximum earth dam inside slopes is 3H:1V., and the maximum earth dam outside slopes is 3H:1V Typical earth dam height to top width dimensions are provided in the following table.

Dam Height (Ft)	Minimum Top Width (Ft)
<10	8
11-14	9
15-19	10

For Permanent Multipurpose Basins construct a key and core on all earth dam embankment areas. Construct the key and core with clay or other impervious materials. Construct the dam core to the dimensions shown on the Plans and to an elevation level with the flowline of the Emergency Spillway. Construct the core with a top width of 8 feet and 1:1 side slopes. Place fill adjacent to pipes or other structures in 4-inch layers and compact by hand or by manually directed tampers or plate vibrators. Place the fill over pipes to a minimum of 2 feet before using heavy equipment. Do not place fill around concrete structures until the concrete has cured sufficiently to support the load. As soon as final grades are reached, seed all areas.

7.6 AGGREGATE DIAPHRAGM OR ANTI SEEP COLLARS

Construct an aggregate diaphragm or anti seep collar parallel to the dam, around the outlet pipe immediately at the outlet side of the cutoff trench. Construct the aggregate diaphragm to a depth of 2 feet extending three times the pipe diameter vertically and horizontally, and a minimum of 18 inches beneath the pipe. Use FA-10 fine aggregate. Place a minimum of 2 feet of fill material over the diaphragm.

7.7 AGGREGATE DIAPHRAGM OR ANTI SEEP COLLARS

Construct an aggregate drain for the diaphragm, 1.5 times the diameter of the pipe or a minimum of 1 foot around the pipe, to the downstream edge of the dam. Use FA-10 fine aggregate for the aggregate drain. Install a Riprap pad over a fabric filter where the drain and the outlet pipe exit the fill. Extend the Riprap pad at least 2 feet outside the aggregate drain in all directions.

7.8 EMERGENCY SPILLWAY

Construct an Emergency Spillway on original ground at the grades and locations shown on the Plans. Construct a spillway outfall channel to the main outfall channel as shown on the Plans. Protect the Spillway by:

1. Seeding the sides and bottom of the Emergency Spillway and spillway outfall channel and protecting the Spillway with an appropriate TRM as directed by the Engineer unless otherwise specified on the Plans.
2. Lining the sides and bottom of the Emergency Spillway and spillway outfall channel with a non-woven geotextile fabric and protecting the Spillway with Class B Riprap, as directed by the Engineer, or as shown on the Plans.

7.9 PRIMARY RISER SPILLWAY AND OUTLET BARREL

Temporary Floating Skimmer & Baffle Sediment Basin Primary Riser Spillways consists of a solid circular concrete monolithic base or extended base riser with no staged orifices.

Multipurpose Floating Skimmer & Baffle Sediment Basin Primary Riser Spillways consist of a reinforced concrete riser with staged orifices/weirs.

For Temporary Floating Skimmer & Baffle Sediment Basin, install the top of the Primary Riser at a minimum elevation 4.0 feet above the Basin bottom.

Install the Primary Riser Spillway after final grading and excavating the Basin footprint is complete. Use the following instructions when installing the Primary Riser Spillway:

1. Remove all loose soil and debris in the area where the riser is installed.
2. Excavate, prepare, and compact the location of the riser with dimensions two (2) feet greater than the riser bottom diameter.
3. Place the concrete Primary Riser and level the structure with the appropriate equipment.
4. Join all Outlet Barrel Pipe sections to the Riser so that the connections are water tight.
5. Fill the riser bottom to the flow line of the Outlet Barrel Pipe as required.
6. Join all Outlet Barrel Pipe so that the connections are water tight.

For Temporary Floating Skimmer & Baffle Sediment Basin, use either polyethylene Type C or corrugated steel pipe or reinforced concrete pipe for the Outlet Barrel, and use reinforced concrete pipe or corrugated metal pipe for the Primary Riser. Use the pipe sizes shown on the Plans.

For Multipurpose Basins, construct a Primary Riser consisting of reinforced concrete pipe. Place a stub out de-watering orifice at the same flow line as the Outlet Barrel as shown on the Plans. Use either reinforced concrete or aluminum alloy pipe for the Outlet Barrel. Join all pipe sections so that the connections are watertight.

Place a trash rack and anti-vortex device over the top of the Primary Riser as shown on the Plans. Use the diameter indicated on the Plans for the Primary Riser and the Outlet Barrel.

Place the Outlet Barrel on a minimum 0.5% slope.

Provide outlet protection to prevent erosion and scouring using Riprap, TRM, or similar erosion prevention at the barrel outlet of the Basin. Ensure outlet velocities do not exceed the capability of the BMP selected.

Line the outflow channel with Class B Riprap or install a stilling basin as indicated on the Plans. Use a non-woven geotextile under the Riprap.

7.10 FLOATING SKIMMER

Install an appropriate Floating Skimmer attached to the bottom of the Primary Riser structure.

Excavate a shallow pit under the Floating Skimmer to account for sediment that accumulates on the Basin bottom around the Floating Skimmer. The pit allows the Floating Skimmer to completely drain the basin. At a minimum, the pit has dimensions of 4feet x 4feet with a minimum depth of 2 feet. Fill the Skimmer Pit with Class A or Class B Riprap to the top elevation of the Skimmer Pit. Ensure the top elevation of the Skimmer Pit is lower than the invert of the outlet barrel from the riser.

7.11 BAFFLES

Install 1 row of Baffles a minimum of 4-feet in height with a spacing of 1/3 the basin length.

Ensure that at least 1 row of Baffles is placed between the Primary Riser structure and all pipes or channels discharging to the Basin.

Baffles may consist of Porous Baffles, or Riprap Baffles.

Install Riprap Baffles a minimum of 4-feet in height consisting of Class A or B Riprap. Do not place washed stone on the face of the Riprap Baffles.

7.12 SEDIMENT CLEANOUT STAKE

Install a metal sediment clean out stake that is 4-feet above the Basin bottom in the first Baffle cell upstream of the first Baffle. Cleanout the Surface Outlet and Baffle Sediment Basin when the sediment level reaches the 2-foot mark on the sediment cleanout stake (50% of the sediment storage volume).

8.0 INSPECTION AND MAINTENANCE

The key to a functional *Floating Skimmer & Baffle Sediment Basin* is continual monitoring, regular maintenance and regular sediment removal. Attention to sediment accumulations within the Basin is extremely important. Continually monitor sediment deposition in the Basin.

Inspect *Floating Skimmer & Baffle Sediment Basins* a minimum of once per week and make necessary repairs immediately, inspections are also recommended within 24-hours after each rainfall event that produces ½-inches or more of precipitation until final stabilization is achieved. Inspect all *Floating Skimmer & Baffle Sediment Basin* components including but not limited to:

- Inlet/outlet pipes – Inspect pipes for sediment and debris blockage, maintenance is required when the pipe is 1/3 blocked or damaged to a point to restrict flow.
- Inlet /outlet protection – Inspect inlet/outlet protection and repair or replace when protection is damaged, Riprap is displaced, or covered by sediment.
- Floating Skimmer - Inspect the Floating Skimmer after each rain event to ensure that it is not clogged with sediment. Remove sediment that accumulates on the Riprap pad underneath the Floating Skimmer.
- Inspect *Floating Skimmer & Baffle Sediment Basin* after each significant rainfall.
- Inspect the Emergency Spillway for erosion and damage.
- Clean trapped sediment from Surface Outlet and Baffle Sediment Basin when sediment accumulations reach the 2-foot mark on the sediment clean out stake.
- Remove trapped sediment from the site, or stabilized on site.
- Repair, seed, and replace ECBs on Basin side slope areas that have eroded or have become damaged by equipment from silt cleanout.
- Inspect Baffles after each rain event for erosion damage.

9.0 REMOVAL

Remove Temporary *Floating Skimmer & Baffle Sediment Basin* when the watershed is completely stabilized. Remove Temporary *Floating Skimmer & Baffle Sediment Basin* within 30 days after final site stabilization is achieved or after it is no longer needed.

Permanently stabilize areas disturbed as a result of Temporary *Floating Skimmer & Baffle Sediment Basin*.

10.0 ACCEPTANCE

Remove Floating Skimmers and Baffles from Multipurpose *Floating Skimmer & Baffle Sediment Basins* when the construction phase of the project ends when the Basin is converted to the permanent Multipurpose Basin for permanent water quality and quantity control. Remove deposited sediment, re-grade the Multipurpose Basin contours as needed, and make any necessary modifications to the Emergency Spillway to meet the Permanent Basin requirements when the Basin is converted to the permanent Multipurpose Basin.

Temporary *Surface Outlet and Baffle Sediment Basins* converted to Permanent Multipurpose Basins will be retained and maintained after completion of the project by the owner of the site.

Obtain Engineer acceptance and approval of all Temporary and Multipurpose *Floating Skimmer & Baffle Sediment Basin* installations.

Provide an As-Built plan to the Fort Jackson certified by a registered professional upon the completion of the construction of the Permanent Multipurpose Basins submitted in the Final Storm Water Management Site Plan. The registered professional certification ensures that Permanent Multipurpose Basins are constructed as shown on the As-Built plans and that Permanent Multipurpose Basins meet the approved site plan and specifications or achieve the function they were designed to perform.

ATTACHMENT 1
FLOATING SKIMMER REQUIREMENTS

1.0 Floating Skimmer

This Specification is for Floating Skimmers used as surface dewatering devices for sediment basins and sediment traps.

1.1 Description

Use Floating Skimmers as a surface dewatering device that floats at the water surface of a sediment basin or sediment traps. Use Floating Skimmers that dewater from the water surface where sediment concentrations are at a minimum in the water column. Floating Skimmers release a low rate of flow draining the basin slowly at a constant rate. The inlet of the skimmer device is sized according to the basin volume and designed to drain the basin in a fixed amount of time.

Traditional sediment basin outlet designs use a perforated riser for dewatering, which allows water to leave the basin from all depths. Under the requirements of the new CGP, this perforated design is no longer acceptable.

1.2 Materials

Use Floating Skimmers purchased from a manufacturer listed on *SCDOT Qualified Product List 81*. Materials and sizes of Floating Skimmers vary depending on device type and design. Regardless of device type or design, all PVC materials used are Schedule 40 or greater.

1.2.1 Quality Assurance

Provide Floating Skimmers listed on the most recent edition of *SCDOT Qualified Product List 81*. At the time of delivery, provide the ENGINEER with the Floating Skimmer packing list containing complete identification, including but not limited to the following:

- Manufacturer's name and location.
- Manufacturer's telephone number and fax number.
- Manufacturer's e-mail address and web address.
- Floating Skimmer name, model, and/or serial number.
- Floating Skimmer dimensions.
- Certification that the Floating Skimmer meets the physical and performance criteria of this specification.

1.3 Design & Construction Requirements

1.3.1 Dewatering Rates

Skimmers are designed to completely dewater sediment basins from the top of riser elevation in 24 to 72 hours. See Graph 1 in this Specification to estimate the required drawdown rates for Floating Skimmers based on the sediment basin volume to dewater. Submit flow rates for the Floating Skimmer prepared by a qualified individual in accordance with standard practices for construction projects. Provide Floating Skimmer dewatering flow rate tables signed and sealed by a qualified individual who is licensed as follows:

1. South Carolina registered professional engineer as described in *Title 40, Chapter 22*;
2. South Carolina registered landscape architect as described in *Title 40, Chapter 28, Section 10, item (b)*;
3. South Carolina registered Tier B land surveyor as described in *Title 40, Chapter 22*.

1.3.2 Floatation Requirements

Floating Skimmers which sink or completely suspend under the water surface are not be accepted. A portion of the Floating Skimmer must be visible above the water surface at all times. Vent holes are required on all Floating Skimmers to ensure the device drains by gravity flow. Inlets or orifices to the skimmer may be submerged no greater than 6 inches below the water surface.

1.3.3 Trash Guard & Maintenance Rope

All Floating Skimmers designs include a trash guard and maintenance rope in order to prevent and remove blockage from floating debris. Trash guards prevent larger debris from entering the skimmer which may cause internal blockage. The maintenance rope is used to remove trash and debris which accumulates on the outside of the trash guard. Ensure the maintenance rope is floatable.

1.3.4 Skimmer Pit

Excavate a shallow pit filled with riprap under the Floating Skimmer to account for sediment that accumulates on the sediment basin bottom around the Floating Skimmer. The pit allows the Floating Skimmer to completely drain the basin. At a minimum, the pit has dimensions of 4ft x 4ft with a minimum depth of 2 ft. Ensure the bottom of the pit is lower than the invert of the outlet barrel from the riser.

Floating Skimmers that have a footed design which prevents the device from lodging in accumulated sediment do not require a skimmer pit.

1.3.5 Installation

Assembly of the Floating Skimmer components varies by device type and design. Install manufactured Floating Skimmers in accordance with the manufacturer's written installation instructions. Position the Floating Skimmer over the excavated skimmer pit (when applicable). Ensure the Floating Skimmer is assembled level over the skimmer pit in order to prevent debris from floating under the skimmer which can create a blockage of flow and damage the device. Install a flexible joint with a section of Schedule 40 flexible PVC pipe at the connection with the riser. The flexible joint and flexible PVC pipe allows the Floating Skimmer to be retrieved from the bank using the maintenance rope.

A stable, water tight connection between the skimmer barrel and basin riser is extremely vital to ensure sustained functioning. To ensure a proper connection, use a manufactured bracket, construct an extended PVC connection apparatus to the basin riser, or grout the open space between the skimmer barrel and riser.

Tie one end of the maintenance rope around a secure portion of the Floating Skimmer. Tie the other end of the maintenance rope to a metal stake driven into the basin embankment near the riser. Ensure the rope attachment to the metal stake is higher than the design water surface level. Ensure a good knot is established that will not become loose. Put tension on the rope but ensure there is enough slack in the rope to allow the Floating Skimmer to float up and down through its full range of motion so the Floating Skimmer settles into the skimmer pit after the basin drains.

Remove Floating Skimmers at the end of the construction phase of the project. If the Basin is to be converted to a permanent water quantity or quality basin, ensure the orifice where the Floating Skimmer was attached to the Basin riser is covered, adjusted, or modified according to the Project Plans and Specifications.

1.3.6 Inspection and Maintenance

Inspect Floating Skimmers together with the Sediment Basin inspections. Inspect the Floating Skimmer for any structural damage, clogging, or excessive sediment accumulation.

While draining the basin, the trash guard of the Floating Skimmer may clog with debris. Typically, a few jerks on the maintenance rope will clear the Floating Skimmer of debris and restore flow. If jerking the maintenance rope does not work, pull the Floating Skimmer to the embankment with the maintenance rope and manually remove all debris from the trash guard. An internal clog or blockage may require the device to be disassembled and repaired.

If the skimmer becomes stuck in the mud at the bottom of the basin it must be freed to allow for normal operation. This can typically be done by use of the maintenance rope.

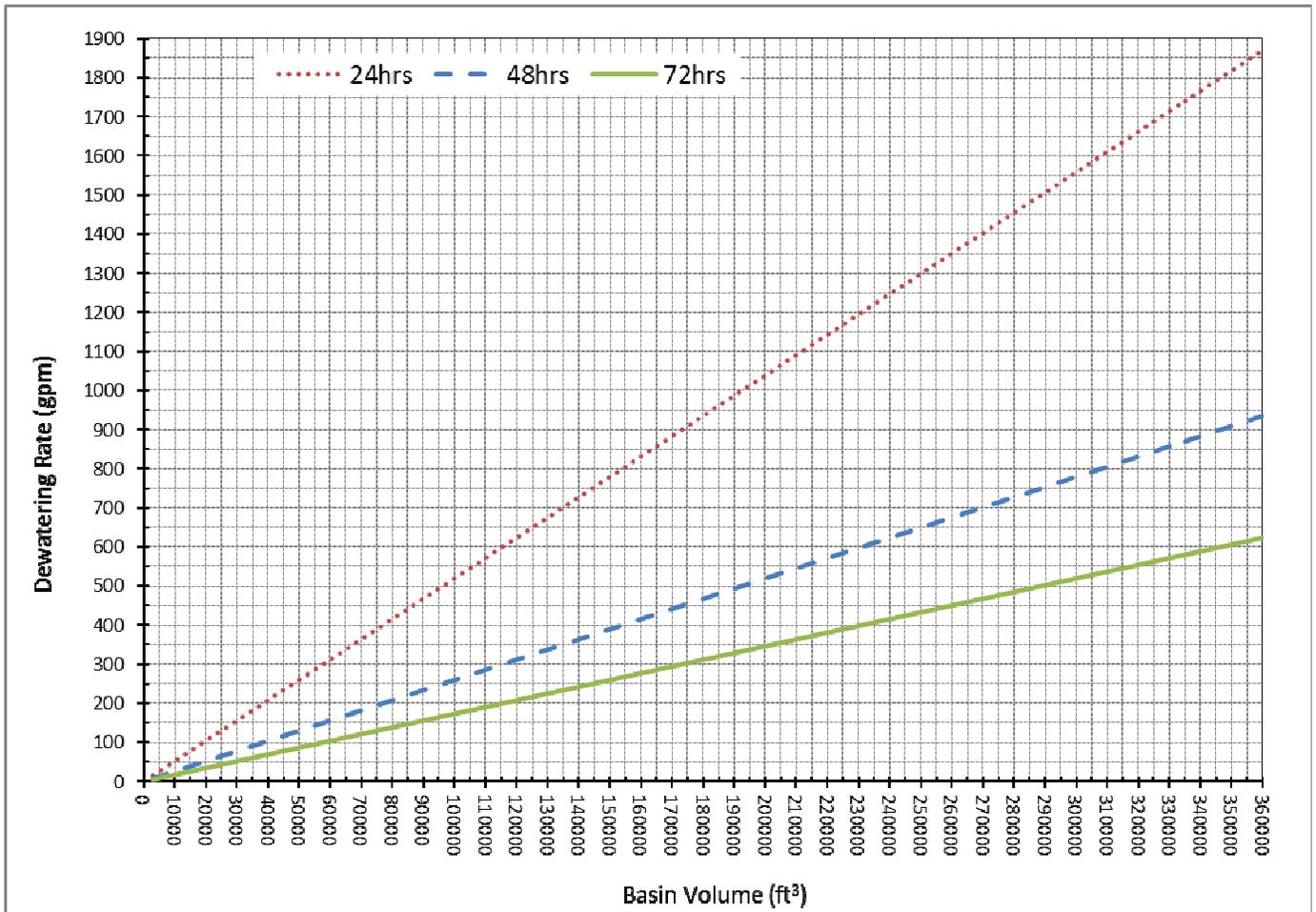
Remove sediment deposits when the Floating Skimmer cannot settle low enough to completely drain the entire basin. Remove or pull the skimmer to a side embankment using the maintenance rope and remove sediment from the skimmer pit.

The Floating Skimmer remains the property of the contractor and may be used in other locations provided the materials meet the appropriate requirements contained in this Specification and/or on the Plans.

1.3.7 Acceptance

Obtain Design Engineer acceptance and approval of Floating Skimmer installations. When requested by the Design Engineer, ensure that a manufacturer's representative is on-site to oversee and approve the initial installation of Floating Skimmer operations. Obtain a letter from the manufacturer approving the installation when requested by the Design Engineer.

Graph A-1 – Floating Skimmer Dewatering Rates



*Basin volume at top of Primary

ATTACHMENT 2
POROUS BAFFLE REQUIREMENTS

1.0 Porous Baffle Systems

1.1 Description

Porous baffle systems are used inside temporary sediment detainment structures such as sediment traps and sediment basins to reduce the velocity and turbulence of water flowing through the structure by spreading the flow across the entire width of the basin. The reduction of turbulent flow facilitates the settling of sediment and improves sediment retention efficiency for sediment detainment structures.

1.2 Materials

Provide porous baffle system material consisting of turf reinforcement matting (TRM), coconut erosion control blanket, or excelsior erosion control blanket meeting the requirements of this Specification. **Do not use** Silt Fence material for porous baffle systems under this Specification.

1.2.1.2 Porous Baffle TRM Material

Provide turf reinforcement matting (TRM) composed of non-degradable synthetic fibers, filaments, nets, processed into a permanent, three-dimensional matrix. The non-degradable three-dimensional matrix may be infilled with coconut or excelsior materials. Do not use TRMs infilled with straw materials.

Provide TRMs with properties derived from quality control testing listed in the American Association of State Highway and Transportation Officials (AASHTO) National Transportation Product Evaluation Program (NTPEP) for Erosion Control Products (ECP) and conforming to the performance and physical requirements shown in Table B-1.

Table B-1: Minimum TRM Porous Baffle Material Performance Requirements

Physical Property ¹	Test Method	Required Value
Light Penetration (% openings)	ASTM D 6567 or Equivalent	10% Min 35% Max
Tensile Strength ²	ASTM D 6818	145 X 110 lb/ft min.
Ultraviolet Stability (retained strength after 1000 hrs of exposure)	ASTM D 4355	80%

¹Unless otherwise indicated, numerical values represent the MARV

² Minimum tensile strength in both machine and cross machine directions, under dry or saturated conditions using ASTM D6818.

1.2.1.2 Porous Baffle Coconut / Excelsior Blanket Material

Provide Coconut / Excelsior erosion control blankets (ECBs) composed of un-dyed and unbleached 100% natural fibers that are totally biodegradable. Do not use erosion control blankets composed of straw.

Provide Coconut / Excelsior erosion control blankets with properties derived from quality control testing listed in the American Association of State Highway and Transportation Officials (AASHTO) National Transportation Product Evaluation Program (NTPEP) for Erosion Control Products (ECP) and conforming to the performance and physical requirements shown in Table B-2.

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

Physical Property	Test Method	Required Value
Light Penetration (% openings)	ASTM D 6567 or Equivalent	10% Min 35% Max
Tensile Strength ¹ (machine direction)	ASTM D 6818 ASTM D 4595	145 lb/ft Min

¹ Minimum tensile strength in the machine direction under wet conditions.

1.2.1.3 Steel Posts

Furnish steel posts meeting the following minimum physical requirements:

- Minimum length of five (5) feet.
- Composed of high strength steel with minimum yield strength of 50,000 psi.
- Standard “T” section with a nominal face width of 1.38 inches and nominal “T” length of 1.48 inches.
- Weighs 1.25 pounds per foot ($\pm 8\%$).
- Painted with a water based baked enamel paint.
- Has a soil stabilization plate made of 15-gauge steel with a minimum cross section area of 17 square inches.

Use steel posts with the addition of a metal soil stabilization plate welded near the bottom. When the post is driven to the proper depth, the plate will be below the ground level for added stability. Attach soil stabilization plates to the steel posts according to Table B-3.

Table B-3: Soil Stabilization Plate Requirements

Post Length (feet)	Top of Soil Stabilization Plate Relative to Bottom of Steel Post (inches)
5.0 and 5.5	13.0
6.0, 6.5, and 7.0	15.25

1.2.2 Quality Assurance

Provide porous baffle material listed on the most recent edition of *SCDOT Qualified Product List 82* in the appropriate category, or Equivalent. Porous baffle material acceptance is granted based on the manufacturers' certification and testing with the American Association of State Highway and Transportation Officials (AASHTO) National Transportation Product Evaluation Program (NTPEP) for Erosion Control Products (ECP).

At the time of delivery, provide the Design Engineer with the porous baffle material packing list containing complete identification, including but not limited to the following:

- Manufacturer name and location,
- Manufacturer telephone number and fax number,
- Manufacturer's e-mail address and web address, and
- Porous baffle material name, model and/or serial number.
- Certification that the specific porous baffle material meets the physical and performance criteria of this specification.

1.3 Construction Requirements

Install the porous baffle systems in sediment detention structures perpendicular to the flow of water to ensure porous baffles achieve coalescent flows through the sediment detention structure. Extend porous baffle systems up the side slopes of the detention structure to prevent flow around the porous baffle system.

Ensure the inlet zone is accessible for frequent maintenance as the majority of sediment is trapped before the first baffle. Secure the porous baffle system to the basin bottom and sides using 12-inch anchors (stakes, pins, or staples). If necessary, install a support wire across the top of the porous baffle system to prevent sagging. The expected design life of porous baffle systems is 6-12 months, but may require replacement more frequently if blocked or damaged.

1.3.1 Installation

Construct the porous baffle system inside sediment traps and sediment basins with appropriately sized zones to ensure flow is coalesced to the maximum extent. Ensure porous baffles are installed perpendicular to flow within the sediment control structure. Install porous baffle systems across the entire width of the sediment basin/trap.

Install 1 row of Baffles minimum with a spacing of 1/3 the sediment traps and sediment basins length.

Ensure that at least 1 row of Baffles is placed between the primary outlet structure and all pipes or channels discharging to the Basin.

Do not install porous baffle systems until the sediment trap or basin is excavated and graded with a level bottom surface.

Install steel posts and porous baffle system material according to Table B-4:

Table B-4: Porous Baffle Installation Requirements

Min. Porous Baffle Material Height Above Bottom (ft)	Steel Post Length (ft)
3*	5
4*	6
5*	7

*As directed by the Design Engineer, height may be greater based on the 10-yr 24-hour design water surface elevation of the basin. In no case will the porous baffle material height be higher than the primary spillway elevation of the sediment basin or sediment trap.

Install steel posts on maximum 4 foot centers across the structure bottom and up the embankments. Drive steel post to a minimum depth of 2 feet or to the maximum extent practicable.

Attach porous baffle system material to the upstream side of the steel posts using heavy-duty plastic ties, or wire ties that are evenly spaced and placed in a manner to prevent sagging or tearing of the fabric. In all cases, affix ties spaced at maximum 6 inch intervals.

Use 12-inch anchors (stakes, pins, or staples) spaced on 1 foot intervals to secure the porous baffle system material to the bottom and up the sediment basin/trap embankments. An alternative installation method is trenching the porous baffle material into the basin bottom by excavating and backfilling a 6-inch deep by 6-inch wide trench.

In cases where the porous baffle material sags between support posts, weave a 9 gauge steel wire or rope support across the top of the porous baffle system to prevent sagging. Drive a steel post on each side of the sediment trapping structure and attach one side of the support wire to the post. Pull the support wire tight and attach the support wire to each porous baffle system steel post and the opposing steel wire support post.

Purchase porous baffle material in continuous rolls and cut to the specific length of the baffle to avoid joints. When joints are necessary, wrap the materials together at a support steel post with both ends fastened to the post, with a twelve (12) inch minimum overlap.

1.3.2 Inspection and Maintenance

Inspect porous baffle system every seven (7) days and inspections are recommended within 24-hours after each rainfall event that produces ½-inches or more of precipitation until final stabilization is achieved. Immediately correct any deficiencies. Check for sediment buildup and structure integrity. Remove sediment when it reaches 50% of the height of the first baffle row.

Check where runoff has eroded a channel beneath the baffle, or where the baffle has sagged or collapsed. Ensure that baffle material stays securely installed along the basin sides and in the bottom. Ensure the baffle system does not sag across the top of the baffle system. Replace baffle material if torn or if evidence of deterioration is noted.

Remove porous baffles and replace whenever it has deteriorated to the extent that it reduces the effectiveness of the porous baffle system. Maintain access to the porous baffles and replace promptly if the baffle collapses tears, decomposes or becomes ineffective. Remove sediment deposits when it reaches ½ the baffle height in the first baffle cell. Remove sediment deposits with care to avoid damage during cleanout. Install additional porous systems as directed by the Design Engineer where deficiencies exist.

1.3.3 Acceptance

Obtain Design Engineer acceptance and approval for all porous baffle system installations.

ATTACHMENT 3

TEMPORARY

FLOATING SKIMMER & BAFFLE BASIN DESIGN AIDS

FORT JACKSON TEMPORARY SEDIMENT BASIN DESIGN AID INSTRUCTIONS

To Design **Temporary** *Floating Skimmer & Baffle Sediment Basins* with a minimum of 80% Trapping Efficiency, use the Fort Jackson Design Aids (Chart C-1 and Graph C-1) to determine the Temporary Sediment Basin size, runoff storage volume, sediment storage volume, Primary Riser spillway, Outlet Barrel configuration, and Emergency Spillway.

1. Determine the required Temporary Basin volume by using one of 3 strategies:
 - a. Use Chart 1 to determine the Basin bottom Length and Width based on the Basin drainage area classification (5, 10, 15, 20 and 25 acres). Drainage Area classifications shown in Chart C-1 used to select the basin bottom Length and Width must be greater than the actual construction site Basin drainage area.
 - b. Use Graph C-1 to determine the total required Basin Volume below the top elevation of the Primary Riser.
 - c. Calculate the total Basin volume at the top elevation of the Primary Riser with:
 - i. **1,000** cubic feet per disturbed acre of runoff volume, and
 - ii. **450** cubic feet per disturbed acre sediment storage.
2. The Basin volumes calculated using Method 1.b, or 1.c represent the Basin volume between the Basin bottom and the Primary Riser top elevation. Basin stage area calculations must be calculated when using Method 1.b, or 1.c.
3. Use Chart C-1 to select Basin requirements (Primary Riser Diameter, Outlet Barrel Diameter, Emergency Spillway Bottom Width and Riser Concrete Foundation) corresponding to one of the 4 drainage area classifications (5, 10, 15, 20, and 25 acres). Drainage Area classifications shown in Chart 1 used to select the Basin requirements must be greater than the actual construction site Basin drainage area.
4. Freeboard as shown in Chart C-1 is the Vertical distance between the top elevation of the Primary Riser and the top elevation of the Basin Dam.
5. The following **Temporary** *Floating Skimmer & Baffle Sediment Basins* design features are constant for all drainage area classifications less than or equal to 25-acres when using the Design Aids of Attachment 3:
 - a. Total Basin Depth: 7-feet
 - b. Primary Riser Top Elevation: 4-feet above the Basin bottom
 - c. Freeboard Height: 3-feet
 - d. Emergency Spillway Depth: 1.5-feet
 - e. Pipe Barrel Slope: 1.5% when feasible.
 - f. A Recessed Riser configuration is required for 60-inch and 72-inch Riser diameters. The riser bottom and outlet barrel pipe invert elevation is located below the basin bottom elevation.

CHART C-1: TEMPORARY SURFACE OUTLET AND BAFFLE SEDIMENT BASIN DESIGN AIDS

(*Basin Side Slopes are 3H:1V)

MAX AREA DRAINING TO BASIN	RUNOFF STORAGE VOLUME	SEDIMENT STORAGE VOLUME	SEDIMENT BASIN TOP OF DAM (LENGTH X WIDTH)	SEDIMENT CONTROL STRUCTURE SIZE (RISER DIA)	BARREL DIAMETER	RECESSED RISER	TOP OF RISER TO BASIN BOTTOM HEIGHT	FREEBOARD HEIGHT	EMERGENCY SPILLWAY DEPTH	EMERGENCY SPILLWAY BOTTOM WIDTH	48-HR SKIMMER DEWATERING RATES
5	1000FT ³ /AC	450FT ³ /AC	110' x 55'	48"	24"	NO	4' - 0"	3' - 0"	1' - 6"	10'	30 GPM
10			132' x 66"	48"	30"	NO				18'	60 GPM
15			150' x 75'	60"	36"	YES				22'	90 GPM
20			168' x 84'	72"	42"	YES				22'	120 GPM
25			182' x 91'	72"	42"	YES				28'	146 GPM

GRAPH C-1: TEMPORARY BASIN VOLUME DESIGN AID (AT TOP OF RISER)

