

DIVISION 800

Incidental Construction



SOUTH CAROLINA
DEPARTMENT
OF TRANSPORTATION

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Section 801

Aggregate Underdrains

801.1 DESCRIPTION OF WORK

Aggregate underdrain generally serves the same purpose as pipe underdrain, except that pipe underdrain material will not be placed in the trench prior to backfilling. Aggregate underdrain is commonly used in conjunction with pipe underdrain (see Section 802). See Section 802.1 for additional information on underdrains.

801.2 PRECONSTRUCTION CONSIDERATIONS

See Section 802.2.1.1 for inspection guidance on the granular filter material used for aggregate underdrain and Section 802.2.2 for information on determining underdrain locations.

801.3 INSPECTION DURING CONSTRUCTION

Check the width, depth and grade of each trench for compliance. Verify that the aggregate meets the gradation requirements of the *Standard Specifications*, Section 801.02. Where aggregate underdrain is used as a transverse drain, the bottom of the trench should extend at a minimum to the bottom of the porous foundation material. Verify that the aggregate is placed in lifts of the specified thickness and to the total required depth. A relatively impervious earth material should be placed and compacted over the aggregate to prevent the infiltration of surface water. Outlets will be provided, as directed, and protected appropriately. If recycled material is used, verify that it is backfilled first and then covered with the specified minimum depth of aggregate and thoroughly compacted. See Section 802.3 for additional information.

801.4 POST-CONSTRUCTION CONSIDERATIONS

See Section 802.4 for post-construction considerations.

801.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Aggregate underdrain that has been placed and accepted will be measured by either unit length or unit volume, as specified. If based on unit volume, document the length, depth and width of the aggregate underdrain placed and accepted. Document these measurements in the Daily Work Report. Payment will be based on the Contract unit price. See Section 802.5 for additional information.

Section 802

Pipe Underdrain

802.1 DESCRIPTION OF WORK

A pipe underdrain system is a series of interconnected longitudinal and transverse pipes that are placed in trenches and backfilled with granular filter material for the purpose of intercepting and draining subsurface water that infiltrates the subgrade and pavement structure. If excess water is not drained at locations such as seeps and springs, the load carrying capacity of the subgrade and pavement structure may decrease and become unstable, causing premature failure of the structure. Aggregate underdrains (see Section 801) are commonly used in conjunction with pipe underdrains. These subsurface drainage features are typically installed at project locations to:

- intercept springs and lower the elevation of the groundwater table below the subgrade;
- intercept subsurface water from the backslope before it seeps into the subgrade;
- intercept subsurface water that may cause slides on the side slope of a cut; and
- correct base failures due to seepage of subsurface water.

Once intercepted, the subsurface water will be carried away from the pavement structure to outfalls and into the roadway's surface water drainage system (e.g., ditches, culverts). Although the Contract Plans will designate a total underdrain quantity anticipated for use on the project, the Contract Plans usually will not designate particular installation locations, unless a location is known to be problematic from previous investigations. Care should be taken to ensure that outfalls occur at sags and the outlet elevation is below the drain but higher than the ditch line. The Resident Construction Engineer will be responsible for monitoring earthwork operations for obvious problem locations, such as seeps and springs, and for using sound engineering judgment to determine where underdrains should be installed. If there is any doubt in assessing the need for underdrains, contact the District Construction Engineer for assistance. The Roadway Inspector will be responsible for inspecting the work and materials to verify compliance with the Contract Plans and Specifications and the directives of the Resident Construction Engineer.

802.2 PRECONSTRUCTION CONSIDERATIONS

802.2.1 Materials Considerations

802.2.1.1 Granular Filter Material

Consider the following when inspecting the aggregate materials that will be used as the granular filter material in underdrains:

1. Coarse Aggregate. The coarse aggregate used for granular filter material in underdrains will be supplied from a source listed on SCDOT Approval Sheet 2. A sample must be obtained prior to use and submitted to the Research and Materials Laboratory for

testing. Check the test results to verify compliance. Quality Control Sampling and Testing will be performed as discussed in Section 106.

2. Fine Aggregate. Suppliers should be listed on SCDOT Approval Sheet 1. When its use is specified for granular filter material, fine aggregate will be sampled and tested in accordance with the Quality Control Samples and Tests presented in Section 106. Visually inspect fine aggregate for excessive lumps, organics, trash and debris, and check the test results to verify compliance.
3. Recycled Materials. When allowable recycled materials are being used, pay particular attention to the limits of application and obtain the certified test results demonstrating that the material complies with the requirements of SCDHEC and the Environmental Protection Agency. Additionally, collect samples to ensure that the material meets other applicable requirements

802.2.1.2 Underdrain Pipe Material

Consider the following when inspecting underdrain pipe materials:

1. Corrugated Metal and Corrugated Aluminum Alloy Pipe. It will not be necessary to submit samples of corrugated metal or corrugated aluminum alloy underdrain pipe to the Research and Materials Laboratory for testing, unless the material is suspected of being defective. However, the Resident Construction Engineer will be responsible for obtaining and forwarding Mill Test Reports for these products to the Research and Materials Engineer.
2. Other Pipe Materials. If corrugated polyethylene pipe is used, ensure that the supplier of the material is listed on SCDOT Approval Sheet 30. Polyvinyl chloride, concrete and asphalt-fiber underdrain pipe materials are not pre-approved by SCDOT. The Resident Construction Engineer is responsible for obtaining and submitting samples to the Research and Materials Laboratory for testing before allowing the material to be incorporated. See Section 106 for the required Quality Control Samples and Tests. When polyvinyl chloride pipe is specified, polyethylene pipe meeting the special requirements of subsection 802.07 of the *Standard Specifications* may be substituted.

802.2.1.3 Geotextile Fabric

Geotextile fabric is commonly used in conjunction with pavement edge drains, interceptor drains and wall drains. The fabric will allow water to pass into the drainage structure while retaining the in-situ soil material. Prior to installation, obtain material certifications and forward a copy to the Research and Materials Engineer.

802.2.2 Determination of Underdrain Locations

802.2.2.1 Field Review

Areas suspected of requiring subsurface drainage may have been previously identified prior to plan preparation through test boring and a soils investigation. In such cases, any problematic areas that have been found will be designated on the Contract Plans by stationing and a quantity will be specified with a notation that the underdrain material will be used as directed by the Resident Construction Engineer.

802.2.2.2 Test Boring and Observation

During earthwork operations, the Resident Construction Engineer will inspect the project to determine the exact locations where underdrains will be required. Earthwork and grading often take place during periods of dry weather, which makes it difficult to observe potentially problematic areas. Contact the District Construction Engineer for any needed assistance in making this determination.

802.2.2.3 Fill Sections

Special attention is required in assessing the need and location of underdrains under embankments. The height of fill, the type of fill material and the anticipated traffic load must be considered. Where the fill consists of a granular material, underdrains may not be needed at all. Prior to placing fill material, inspect the area for moist or saturated conditions. Where a clearly defined spring is found, it will usually be necessary to construct a spring box, using a non-perforated pipe to drain the water from the box to a suitable outfall.

802.2.2.4 Cut Sections

During excavation of a cut section, inspect the side cuts and ditches for any unusual moisture conditions. Watch for any abnormal displacement of the ground by earthmoving equipment. This often indicates that the material contains excessive moisture or is of an unstable nature. Where water is found to be seeping through a side cut, it is usually best to run a pipe underdrain parallel to the roadway under the shoulder below the seepage zone. See the *Standard Drawings* for details on installation. Water coming in from a side cut may also be controlled by deepening and widening the ditch. The feasibility of this method will depend upon the anticipated traffic load, the right-of-way available and the cost of the additional excavation. In light cut sections, the cost of additional excavation is typically less than the cost of the underdrain.

802.2.2.5 High Water Table

If an excessively high water table is encountered, the Resident Construction Engineer should contact the District Construction Engineer for assistance.

802.2.2.6 Staking

The Resident Construction Engineer will be responsible for ensuring that underdrain locations are staked and that the requirements for underdrains are clearly communicated to the Contractor. Verify that underdrain staking has been established as directed by the Resident Construction Engineer and that the stakes are properly protected during earthwork operations.

802.3 INSPECTION DURING CONSTRUCTION

802.3.1 Trench Construction

Check for compliance of the width, depth and grade of underdrain trenches. Where underdrains are placed in cut sections, the bottom of the trench must be of a sufficient depth below the side or median ditch to adequately intercept subsurface water. Ensure that the specified type of coarse aggregate material is placed in the proper lift thickness. Prior to placing the pipe, ensure that the specified coarse aggregate is placed in the bottom of the trench to a depth of 4 inches.

802.3.2 Pipe Placement

Verify that the pipe is placed in the center of the trench and firmly bedded in the bottom course of aggregate. Check the pipe grade to ensure that no low areas exist that will hinder proper drainage. Perforated pipe will be laid with the perforations on the underside of the pipe. Ensure that pipe sections are properly joined. The method of joining will differ based on the type of underdrain pipe used. Where bell and spigot type connections are used, the bell end will be laid in the upgrade direction. The intent of joining underdrain pipe is not to create a watertight seal, but to prevent the aggregate material from infiltrating the pipe. Verify that the upgrade terminal end of the underdrain pipe is capped. After placement, inspect the underdrain pipe for approval prior to allowing backfilling to begin.

802.3.3 Backfilling

Verify that coarse aggregate for pipe underdrain or aggregate underdrain (see Section 801), as directed, is placed equally on each side of the pipe in lifts of the proper thickness and to the required depth above the bottom of the pipe. Check for compliance of minimum aggregate cover over large diameter pipe. Watch for pipe displacement during backfilling. Ensure that the top compacted layer of backfill over the aggregate is of an impervious earth material to prevent the infiltration of surface water.

802.3.4 Pipe Outlets

Where perforated pipe is used for outlet sections, the pipe will be laid with the perforations on the top of the pipe. Ensure that pipe outlets are constructed and protected by concrete endwalls, as directed by the Resident Construction Engineer. Joints for outlet pipe must be sealed to provide a watertight connection and the trench backfilled in compacted layers of impervious earth material, not aggregate.

802.4 POST-CONSTRUCTION CONSIDERATIONS

To facilitate SCDOT maintenance forces locating pipe underdrain outlets, the Roadway Inspector should note the location of outlets on the As-Built Plans and ensure that the locations are marked in the field as shown in the *Standard Drawings*. During earthwork operations, make certain that underdrain pipe is protected from being crushed by heavy construction equipment traversing the area. This is a common problem that should be continually monitored. The Resident Construction Engineer may request the Research and Materials Engineer to perform an inspection of the pipe using an underdrain camera. Periodically check underdrain outlets for proper operation, and require repair work, if needed, in accordance with the provisions of the Contract.

802.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

The Roadway Inspector will be responsible for providing a sketch illustrating the pipe underdrain system, as constructed in the field. The sketch does not need to be to scale, but should accurately document station numbers, distance from roadway centerline, pipe orientation and length of pipe outlets, so that the underdrain system can be accurately drawn on the As-Built Plans. A summary of the total quantity of pipe underdrain should also be noted on the sketch. This information is critical to SCDOT Maintenance Forces. Pipe underdrains and outlets will be measured by unit length of the type and size of pipe underdrain placed and accepted. Document the measurements in the Daily Work Report. Payment will be made at the Contract unit price for the type and size of pipe underdrain specified. Note that concrete for endwalls, where required, will be measured and paid for separately. Pay particular attention to the depth and limits of excavation to properly apply the provisions for unclassified excavation.

Section 803

Pipe Slope Drains

803.1 DESCRIPTION OF WORK

The construction of pipe slope drain generally consists of installing an intake spillway assembly and pipe material along the shoulder, slope and other locations as designated by the Resident Construction Engineer.

803.2 PRECONSTRUCTION CONSIDERATIONS

Check for compliance of the intake assemblies and pipe materials. The size of the intake and pipe should be commensurate with the needs of the drainage area. Contact the Resident Construction Engineer if there is any question regarding the size of intake and pipe. See Section 802.2.1.2 for additional information on pipe material and Section 802.2.2 for information on determining underdrain locations.

803.3 INSPECTION DURING CONSTRUCTION

Ensure that all pipe joints are tightly clamped to provide a watertight connection. Verify that intake assemblies are properly installed and that water will not erode or undermine the pipe. Where an intake assembly is not used, ensure that asphalt paving or other suitable means of erosion protection is provided. In addition, ensure that the outfall of the slope drain does not promote erosion. Rip rap or other slope protection may be necessary.

803.4 POST-CONSTRUCTION CONSIDERATIONS

See Section 802.4 for post-construction considerations.

803.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Pipe slope drain will be measured by the unit length of pipe placed and accepted. Intake assemblies will be measured by the number of assemblies installed and accepted. Document the measurements in the Daily Work Report. Payment will be made based on the Contract unit price for the type and size of pipe slope drain and assembly installed. See Section 802.5 for additional information.

Section 804

Rip Rap and Slope Protection

804.1 DESCRIPTION OF WORK

Rip rap and slope protection are generally specified to protect highly erodible areas along the roadside and beneath and adjacent to structures. The primary responsibility of the Roadway Inspector will be to ensure that the Contractor performs the work in accordance with the requirements of the Contract Plans and Specifications and as directed by the Resident Construction Engineer.

804.2 PRECONSTRUCTION CONSIDERATIONS

804.2.1 Geotextile Fabric and Granular Filter Materials

The use of geotextile fabric under rip rap as a permanent measure to control the erosion of embankment side slopes and stream banks is common on SCDOT projects. This treatment is also used under and around submerged structures to prevent scour by the action of moving water. The class and type of geotextile for use under rip rap will be designated on the Contract Plans. Where designated, or as otherwise directed by the Resident Construction Engineer, the placement of the geotextile fabric and rip rap material will be in accordance with the Contract Specifications. The geotextile fabric must be supplied from a source listed on SCDOT Approval Sheet 44. Obtain the manufacturer's certification. Where granular filter material is specified, ensure that the material is of the proper type and gradation. Pay particular attention to the gradation requirements for each layer of granular filter material applied.

804.2.2 Rip Rap Materials

Stone used for rip rap must be supplied from a source listed on SCDOT Approval Sheet 2. Recycled concrete may be used in some rip rap applications, with written approval of the Resident Construction Engineer. Where used, ensure that no reinforcing steel protrudes from the concrete pieces, because it can be a hazard, tear geotextile fabric and accumulate debris in place. Where bagged sand-cement is specified, check for compliance of the burlap bags, sand and Portland cement materials. Where grout is designated, check the class of stone and the type of grout material for compliance. Consistency should allow the grout to flow between the stone with limited spading. Where precast concrete units are used, check for compliance of the dimensions of the units with the details shown on the Contract Plans. Precast units are not reinforced. Use the following guidelines to correlate Pay Item and Class for rip rap, as designated in the Contract:

1. Hand Placed Rip Rap. Unless otherwise designated on the Contract Plans, hand placed rip rap will be Class B. Where designated, Class A may be placed by hand.

2. Dumped Rip Rap. Dumped rip rap may be Class A, B, C, D, E or F and is typically designated on the Contract Plans. If not designated, Class C will be used.
3. Surge Stone. The class for surge stone will be designated on the Contract Plans. Dumping is permitted, unless otherwise specified.

804.2.3 Gabion Materials

Where gabions are designated, the units will be either galvanized or PVC coated wire baskets, which will be filled with stone, connected together and anchored in place. Check the galvanized or PVC coated wire, fill stone, tie wire and stiffeners for compliance.

804.2.4 Concrete Slope Protection Materials

Where concrete or fiber-reinforced concrete will be used for slope protection, check for compliance of the concrete, wire reinforcement and fiber-reinforced concrete materials prior to use. Obtain the required manufacturer's certifications. Concrete and wire reinforcement must be sampled and tested in accordance with the Quality Control Samples and Tests presented in Section 106.

804.3 INSPECTION DURING CONSTRUCTION

804.3.1 Preparation of Slope

Verify that the slope is properly graded and compacted. Check for compliance of the trench constructed below the toe of the slope; however, not all treatments will require such a trench. Where granular filter material is specified, ensure that it is placed in the proper lifts of graded material. Where geotextile fabric will be placed, inspect the slope for any residual material that may puncture the fabric when laid. Check the placement of the fabric for compliance with respect to orientation and direction of lapping. Verify that the fabric is fastened at the locations and intervals specified. The fabric should lay smooth and be fastened with metal fasteners to prevent shifting when the rip rap material is placed. For placement of large rip rap, additional care may be needed to prevent puncture of the fabric. Once laid, construction equipment should not be permitted to operate directly on the fabric. Note that geotextile fabric deteriorates under prolonged exposure to sunlight. Pay particular attention to the length of time the fabric is exposed without cover, and enforce the provisions of the Contract with respect to the allowable length of time without cover and replacement of damaged fabric.

804.3.2 Placement of Rip Rap Materials

Stone may be dumped or placed by hand, as designated. Ensure that stone is properly seated at the required thickness. Placement will begin at the toe of the slope and proceed upward. Hand rearrangement may be necessary. The height of drop should be limited to prevent damage to geotextile fabric. As needed, require patching or replacement of damaged fabric. Where stone is to be grouted, ensure that it is wetted prior to application and that the grout fills the voids to the specified depth. The faces of stones should be maintained relatively free of

grout. Ensure that the ends of treatment are properly embedded to prevent undermining. Where sand-cement bags are placed, check the sand-cement mixture for compliance and ensure that the bags are properly placed. Pay particular attention to any delays in placing succeeding layers, and inspect the terminal cutoff walls at each end of the treatment. Where precast concrete units are placed, verify that they are placed tightly against one another, starting in a trench below the toe of the slope and proceeding upward. Pay particular attention to the acceptability of the top course.

804.3.3 Placement of Gabions

Verify that empty gabion baskets are placed, anchored and fastened together in the proper alignment. Pay particular attention to any damage to geotextile fabric. Ensure that the stone is placed in the baskets to promote keying and minimize voids and damage to the galvanized or PVC wire, or geotextile fabric. After filling, verify that the baskets are properly closed and secured.

804.3.4 Placement of Concrete Slope Protection

Prior to concrete placement, check forms for proper alignment and thickness. Concrete test cylinders and wire reinforcement samples should be obtained and submitted to the Research and Materials Laboratory in accordance with the Quality Control Samples and Tests presented in Section 106. Verify that wire reinforcement is placed approximately mid-depth of the concrete. Ensure that the surface of the concrete is finished, textured and cured in accordance with the Contract Specifications.

804.4 POST-CONSTRUCTION CONSIDERATIONS

Upon completion of the rip rap or slope protection treatment, inspect the treatment for any obvious signs of defects, especially during high water or rainy conditions. Require rework, if needed, in accordance with the provisions of the Contract.

804.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Rip rap placed and accepted will be measured either by unit weight, unit volume or unit area, depending on the type of treatment specified in the Contract for the class of rip rap designated on the Contract Plans. Slope protection and geotextile fabric will be measured by unit area placed and accepted. Document measurements for payment in the Daily Work Report. Payment will be made at the Contract unit price for the type of treatment placed and accepted. Payment for grouted rip rap is measured and paid for by the square yard. Check material delivery tickets for accuracy (i.e., project, material, date, quantity). Delivery tickets will be retained by the Resident Construction Engineer.

Section 805

Guardrail, Barriers and Impact Attenuators

805.1 DESCRIPTION OF WORK

Where these systems are warranted, they will be designated at specific locations on the Contract Plans and installed to prevent errant vehicles from leaving the traveled way and moving into fixed objects, steep slide slopes and opposing traffic. Different types of designs exist to address specific conditions, including:

- steel beam guardrail (W-beam),
- adjustable guardrail,
- steel beam guardrail (double layer),
- steel beam guardrail (three-beam),
- steel beam guardrail (three-beam, double layer),
- box beam median barrier,
- median cable barrier and anchors,
- tubular beam guardrail (bridge railing),
- temporary guardrail,
- concrete median barrier,
- temporary concrete median barrier,
- end terminals, and
- crash-cushion/attenuating terminal systems.

It is critical that the Resident Construction Engineer and Roadway Inspectors understand the materials and construction details necessary to properly install the systems required for the project. The proper installation of these devices is critical. Section 805 of the *Standard Specifications*, *Special Provisions*, *Standard Drawings* and the manufacturer's installation recommendations, will govern the requirements for these systems. When guardrail pay items are specified in the Contract, the Roadway Inspector will be responsible for verifying that the Contractor sets, resets, adjusts or removes and stores guardrail systems in accordance with the Contract Plans and Specifications.

805.2 PRECONSTRUCTION CONSIDERATIONS

805.2.1 Field Test Notification

The Resident Construction Engineer will be responsible for notifying the Research and Materials Engineer sufficiently in advance of the start of work to perform the required field tests on guardrail materials. Upon notification, a Research and Materials Laboratory Inspector will be sent to the job site to perform field testing of component materials.

805.2.2 Rail sections

Check for visual defects (e.g., burrs, drips, uncoated areas) and that the rail sections are of the proper type, shape, length and curvature for the guardrail system to be installed. Verify that the rail sections are supplied from a manufacturer listed on SCDOT Approval Sheet 29. If a Contractor wishes to use rail sections from a source not listed on SCDOT Approval Sheet 29, contact the Research and Materials Engineer for approval prior to incorporating these sections into the work. In all cases, obtain and forward the Mill Test Report for these sections to the Research and Materials Engineer. A Research and Materials Laboratory inspector will perform one field test for each 500 pieces of 12.5-foot rail sections. If the rail sections are furnished in 25-foot lengths, one field test will be performed for each 250 pieces.

805.2.3 Cable

Cable for median cable barrier is not usually sampled and will be accepted based on Mill Test Reports. Check for visual defects and obtain and forward the Mill Test Report to the Research and Materials Engineer for evaluation. The Research and Materials Engineer may elect to sample and test cable to confirm the manufacturer's test results.

805.2.4 Posts

Check for visual defects and verify that posts are of the proper type and material for the guardrail to be installed. Check the length, dimensions and holes for compliance. During each field test of rail sections, one field test of steel posts also will be performed by the Research and Materials Laboratory Inspector. Treated wood posts are pre-inspected by an approved Independent Inspection Agency. Ensure that each treated wood post bears the Testing Agency's hammer mark of approval. Obtain and forward to the Research and Materials Engineer a copy of the Agency's Inspection Report and Certificate of Compliance.

805.2.5 Blockouts

Check for visual defects and verify that blockouts are of the proper type and material for the guardrail system to be installed. For example, wood blockouts are not permitted in thrie-beam systems, steel blockouts are not permitted in W-beam systems and adjustable blockouts, where designated, will have additional holes for rail-height adjustment. Check the length, dimensions and holes for compliance. Treated wood blockouts will be pre-inspected by an approved Independent Inspection Agency. Ensure that each treated wood blockout bears the Agency's hammer mark of approval. Composite blocks will not be sampled, but will be supplied by a manufacturer listed on SCDOT Approval Sheet 49.

805.2.6 Fastener Hardware

Check for compliance of the type, diameter and length of fastener hardware for the type of guardrail system to be installed. Post bolts should not extend beyond the specified distance beyond the nut and washers; however, cutting of bolts is not permitted. One sample consisting

of a post bolt, splice bolt, nut, rectangular washer, round washer and other similar hardware will be obtained by the Resident Construction Engineer for testing.

805.2.7 End Terminals and Anchors

Ensure that end terminals and anchors are of the proper type for the location designated on the Contract Plans. Check for visual defects and that system components are carefully stockpiled. These systems must meet NCHRP Report 350 requirements and be supplied from a manufacturer listed on SCDOT Approval Sheet 46.

805.2.8 Concrete and Reinforcing Steel

Check for compliance of the class of concrete used for concrete median barrier, anchors and posts, where use is permitted with guardrail posts. See Section 701 and Section 702 for additional information on structural concrete. The Research and Materials Laboratory does not pre-approve sources or pretest shipments of reinforcing steel. Acceptance or rejection will be based on testing samples from the field. Concrete and reinforcing steel will be sampled and tested in accordance with the Quality Control Samples and Tests presented in Section 106.

805.2.9 Galvanization

Check steel rail sections, posts and blockouts for damage to the galvanization and require repairs to be made as specified in the Contract. Where cut or drilled in the field, ensure that the coating is repaired, as specified. For the purpose of verifying galvanization, the Resident Construction Engineer will notify the Quality Assurance Manager of the Research and Materials Laboratory when galvanized steel guardrail components have been delivered to the project. If the guardrail will be stockpiled, the Resident Construction Engineer should provide sufficient advance notification so that the galvanization may be checked while the material is stockpiled.

805.3 INSPECTION DURING CONSTRUCTION

805.3.1 New Installations

805.3.1.1 Slopes and Staking

Check approach slopes for compliance and verify stake locations. Check lateral offset, longitudinal length, termini location, post spacing, and curvature for conformance with the dimensions on the Contract Plans.

805.3.1.2 Post Installation

Guardrail posts may be driven in place, set in dug holes or set on a concrete base, as specified. Check post spacing, elevation and alignment regularly. Where posts are driven, watch for irregular movement, possibly indicating an underground obstruction. Check driven posts for

damage (e.g., distortion, burring). Where posts are set in dug holes, watch for overdrilling and require backfilling and compaction as needed to adjust depth and provide a firm foundation. After setting, verify that backfill material is placed and compacted in layers around posts. Verify that all posts are set firm and plumb and that they are within tolerance of the required alignment and elevation. Where posts are placed within a paved area, ensure that the pavement is restored as specified. Do not allow the sawing of treated wood posts.

805.3.1.3 Installation of Rail Sections

Verify that all fittings and metal plates are securely placed in the correct position. Lap splices of rail sections should occur at posts, not mid section. Verify that rail sections are lapped in the direction of adjacent traffic. The transition at the lap should be smooth. Verify that bolts are drawn tight; however, bolts at expansion joints should only be snugged so that the rail sections are permitted to slide during expansion and contraction. Verify that the expansion splice is located in the proper place, especially where Thrie beam is installed on old bridges. Verify that the top of rail is set at the proper height and is smooth without undulation. Check the face of rail sections with respect to lateral offset and alignment for compliance and any needed adjustment. Where cable barrier is installed, check the cable for tightness.

805.3.1.4 End Terminals, Transitions, Anchors and Delineation

Pay particular attention to the construction details on the *Standard Drawings* and the manufacturer's installation drawings for end terminals, median terminals, bridge rail transitions and anchors. Verify compliance of the post type, post spacing, type and length of rail sections, lapping direction, splices, method of connection, fastener type and application of terminal end reflective sheeting. Specialized designs and hardware are commonly used at these locations and require close inspection prior to acceptance. Check the location of end anchors to verify that the shoulder is wide enough for the anchor. Where designated, verify that the proper type and color of delineators are installed at the proper spacing for the guardrail system.

805.3.1.5 Traffic Considerations

Where the facility will be maintained open to traffic, it is good construction practice for the installation of rail sections to closely follow the installation of guardrail posts. At the end of the workday, check to ensure that the termini of exposed rail sections are treated as specified. Where required due to project phasing, check for compliance of the installation of temporary guardrail. Pay particular attention to the type of system and end treatments required and the timing of installation and removal as the project progresses. If temporary guardrail components will be used in a permanent installation, the materials must be inspected and approved by the Resident Construction Engineer prior to use.

805.3.2 Removal, Resetting, Replacement and Adjustment

SCDOT Contracts frequently specify work involving the removal, resetting, replacement and adjustment of guardrail. When such work is specified, ensure that the guardrail components are

handled and, as specified, stored without damage. Storage of materials must be on dunnage behind an existing roadside barrier or beyond the clear zone. Check the Special Provisions for the disposition of the guardrail with respect to ownership of salvageable materials. Pay particular attention to damage and require galvanization to be repaired as specified. Such work should be completed on a day-to-day basis so that areas requiring guardrail will not be left exposed overnight. Where guardrail adjustment is specified, verify that the rail sections are removed and the blockout assembly adjusted to raise the rail sections to the proper height. Pay particular attention to adjustment requirements at bridge rail transitions. Verify that the area underneath the adjusted guardrail is properly backfilled, graded and compacted.

805.3.3 Temporary Concrete Barrier

Temporary concrete barrier will be precast units placed as designated or directed for roadside and median applications. At transitions, check the installation of connection hardware for compliance. Check the face of the barrier in the longitudinal direction and have sections corrected that are out of tolerance. If temporary concrete median is used on existing bridge deck and the parapet wall is not in place, then the temporary barrier must be bolted to the bridge deck. See the *Standard Drawings* for details. Ensure proper placement of delineators and reflectors as per the *Standard Drawings*. This barrier must meet NCHRP Report 350 requirements and be supplied from a manufacturer listed on SCDOT Approval Sheet 54.

805.3.4 Permanent Concrete Barrier

If permanent concrete median barrier is to be precast, it will be specified. If precast is not specified, the Contractor has the option of using either the slip-form or cast-in-place method. See Section 701, Section 702 and the *Standard Drawings* for inspection guidance on forming methods, placement of reinforcing steel and placement and finishing of concrete using slip-form and cast-in-place methods. Prior to concrete placement, perform survey spot checks on the alignment and height of barrier as discussed in Section 105.8. Where concrete median barrier will be placed directly on the pavement, check drill holes and grouting and placement of dowels for compliance.

805.4 POST-CONSTRUCTION CONSIDERATIONS

At the end of each work day, check the site to ensure that guardrail sections and termini are not left exposed and are treated as specified in the Contract. Materials stored on site must be placed on dunnage behind protective barrier or beyond the clear zone. Final approval of guardrail systems, end treatments and concrete barrier is the responsibility of the Resident Construction Engineer.

805.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

New installation, removal, resetting and adjustment of permanent and temporary guardrail and barrier wall, as accepted by the Resident Construction Engineer, will be measured by length,

including transitions and terminal sections, for the type of work and system designated in the Contract. End anchors and bridge end connections will be measured by the number actually placed and accepted. Pay particular attention to documenting measurements for additional lengths of posts. Document measurements for payment in the Daily Work Report. The locations of the systems installed should be noted in relation to the survey station number. Payment will be made at the Contact unit price for the type of system placed and accepted. As needed, check material delivery tickets for accuracy (i.e., project, material, date, quantity). Field notes, a copy of all certifications and delivery tickets will be retained by the Resident Construction Engineer. A copy of certifications will be forwarded to the Research and Materials Engineer.

Section 806 Fence

806.1 DESCRIPTION OF WORK

It is SCDOT policy to reset existing fence that is within the Construction Lines on the Contract Plans. As such, new fence is not normally constructed, unless otherwise directed or specified in the Right-of-Way Special Provisions. It may be necessary, however, to erect new fence before existing fence is removed. Fence that is constructed for the purpose of controlling highway access will be placed on SCDOT right-of-way. Fence used for other applications will be placed off right-of-way on adjacent property, after which it will become the property of the landowner. The types of fence typically installed or reset include woven wire, barbed wire and chain-link fence. Strands of barbed wire are often used in conjunction with woven wire and chain-link fences. Where designated, the Roadway Inspector will be responsible for verifying that the work and materials conform to the requirements specified in the Contract Plans and Specifications.

806.2 PRECONSTRUCTION CONSIDERATIONS

Review the Contract Plans and Specifications to understand the location, extent and the type of fences and gates required for the project. Treated wood posts and braces used in fencing applications are pre-inspected by an approved Independent Inspection Agency. Verify that each treated wood member bears the Agency's hammer mark of approval; accept no members without this mark. Additionally, when using more than 300 posts, obtain and forward to the Research and Materials Engineer a copy of the Agency's Inspection Report and Certificate of Compliance. Check lengths and dimensions for compliance. Do not permit field cutting of treated wood, unless pre-approved by the Resident Construction Engineer. Check compliance of steel posts, braces and miscellaneous hardware with respect to size, shape, dimension and weight per unit length, as appropriate. Check woven wire, barbed wire and chain-link fabric for compliance with respect to type, coating, wire gage and mesh dimensions, as appropriate. Pay particular attention to any coating damage and require repairs in accordance with the provisions of the Contract. Ensure that the required samples of wire, fabric, hardware and concrete are sampled and tested for compliance in accordance with the Quality Control Samples and Tests presented in Section 106.

806.3 INSPECTION DURING CONSTRUCTION

Check staking to ensure that the fence is properly located with respect to the right-of-way. Verify that the area where the fence is to be placed has been properly cleared and grubbed and that obstructions have been removed and properly disposed of. The grade at the bottom of the fence should follow the contour of the ground without touching or creating excessive gaps. Verify compliance with minimum requirements for depth of post holes and spacing of posts. Where posts are hand placed and backfilled with earth material, the hole should be of adequate size to allow compaction of the backfill material. Proper hand tamps should be used. Use of

makeshift tamps should be discouraged. Pay attention to fence crossing low, swampy areas. Extra-length posts may be required by the Resident Construction Engineer. Where concrete is used to set posts, do not allow the fabric to be attached to the posts until the specified curing period has elapsed. Verify that the fabric is placed on the side of the post facing the pavement, stretched taut and securely fastened. Splicing between posts is undesirable and should be avoided. Check for compliance of the installation of any gates that may be designated on the Contract Plans.

806.4 POST-CONSTRUCTION CONSIDERATIONS

Inspect the completed fence by walking along the fence and checking compliance of post size and stability, bracing, tautness and fastening of fabric. Pay attention to the number of fasteners used to attach the fabric to the posts. The finished fence should present a good appearance with the tops of the posts being on a smooth grade or curve and of uniform height above the top wire. Ensure that electrical grounds are installed where specified.

806.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

The Contractor is to obtain a release from the property owner on SCDOT Form 800.01 – Agreement for Moving Items Release. Resetting and new installation of fence, as accepted by the Resident Construction Engineer, will be measured by length of the type of fence designated in the Contract. Gates will be measured by the number actually placed and accepted. Pay attention to documenting measurements for additional lengths of posts. Document measurements for payment in the Daily Work Report. The locations of fence reset or installed should be noted in relation to the survey station number. Payment will be made at the Contract unit price for the type of fence placed and accepted. Field notes and copies of certifications will be retained by the Resident Construction Engineer. Copies of certifications will be forwarded to the Research and Materials Engineer.

Section 807

Reset Fence

The Contractor is to obtain a release from the property owner on SCDOT Form 800.01 – Agreement for Moving Items Release. Where reset fence is specified, the Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring that the fence is reset in accordance with the Contract Plans and Specifications. Pay attention to the disposition and ownership of the material, as specified in the Special Provisions of the Contract, and ensure that the material is properly stored for reuse without damage. See Section 806 for additional guidance.

Section 808

Relocation of Structures and Other Items (Moving Items)

808.1 DESCRIPTION OF WORK

Where pay items under Section 808 of the *Standard Specifications* are specified in the Contract, they will be specified for the purpose of relocating miscellaneous structures and other items that will be affected by the project but are required by the property owner to be carefully salvaged and relocated by the Contractor. The Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring that the work and any new materials required are in conformance with the requirements of the Contract Plans and Specifications.

808.2 PRECONSTRUCTION CONSIDERATIONS

Carefully review the Contract Plans and Specifications, including the Right-of-Way Special Provisions, to ensure a complete understanding of the work to be performed. The Resident Construction Engineer should meet with the Contractor and the property owner prior to the work to ensure that all requirements of the work and the new location for the items to be moved are fully understood by all parties. The Resident Construction Engineer will be responsible for assessing damage and suitability of the materials salvaged during the work. See Section 720 where concrete driveways and walkways need to be constructed to replace existing drives and walkways. Any new materials such as brick or block will be sampled and tested in accordance with the Quality Control Samples and Tests presented in Section 106. The Research and Materials Engineer will verify that the proper type of masonry cement is being used. Inspect masonry cement to ensure that it has not been contaminated by moisture.

808.3 INSPECTION DURING CONSTRUCTION

During dismantling, removal and relocation ensure that the work is performed in accordance with the requirements of Section 808 of the *Standard Specifications* and any applicable Special Provisions of the Contract.

808.4 POST-CONSTRUCTION CONSIDERATIONS

Inspect the relocated items with the property owner to ensure completeness and satisfaction, and obtain a signed release from the property owner on SCDOT Form 800.01 – Agreement for Moving Items Release. The release should be signed by the property owner, two witnesses and the Resident Construction Engineer. The Contractor is responsible for obtaining this release.

808.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

The work for dismantling, removing and relocating items will be measured and paid for on a lump sum basis for each item scheduled in the Contract. Field notes should be documented in the Daily Work Report. Payment should not be made for a relocated item until the signed release has been obtained from the Contractor.

Section 809

Right-of-Way Markers

809.1 DESCRIPTION OF WORK

Right-of-way markers are intended primarily to serve as a means of establishing or reestablishing SCDOT right-of-way lines and will be installed or reset on rural and controlled access facilities at the following locations:

- at break points in right-of-way lines;
- at points on the right-of-way line opposite points of curvature control (e.g., PC, PT);
- at points along the right-of-way line that maintain forward and back line-of-sight;
- in rural areas at a maximum spacing along a continuous right-of-way line of 1400 feet on tangents and 700 feet on curves; and
- in urban areas at a maximum spacing along a continuous right of way line of 500 feet on both tangents and curves.

Ideally, right-of-way markers should not be placed at points that are common to property lines or corners.

809.2 PRECONSTRUCTION CONSIDERATIONS

Ensure that reinforced concrete right-of-way markers are provided by a supplier listed on SCDOT Approval Sheet 16. Rebar cap right-of-way markers must meet the requirements of the *Standard Specifications*.

809.3 INSPECTION DURING CONSTRUCTION

Verify that right-of-way markers are installed in accordance with the construction and installation details provided in the Contract Plans and Specifications. Check to ensure the Contractor is set up to place the right-of-way marker in the correct position when the tack point is removed. Right-of-way markers should be installed plumb with the center of the marker placed on the right-of-way line and the hole well compacted.

809.4 POST-CONSTRUCTION CONSIDERATIONS

The Resident Construction Engineer is responsible for final approval of the location and installation of all right-of-way markers.

809.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

The installation or resetting of right-of-way markers will be measured and paid for by the number of markers installed or reset and accepted. Document the measurements in the Daily Work Report. The field notes should indicate the survey station number at which the marker is located, location in relation to the left or right of centerline and the distance from the centerline to the right-of-way markers. Payment will be made at the Contract unit price.

Section 810

Seeding

810.1 DESCRIPTION OF WORK

When pay items under Section 810 of the *Standard Specifications* are specified in the Contract, the seeding will be for the purpose of establishing a vegetative root system to prevent erosion on a temporary or permanent basis. This work must be carefully coordinated with earthwork operations on cut and fill slopes and generally consists of preparing the seedbed and applying seed, fertilizer, lime, mulch and nitrogen, as specified. Note that the type of seed and the application of materials differ based on the location within the State and the type of seeding to be performed (i.e., temporary or permanent). The Resident Construction Engineer and the Roadway Inspectors will be responsible for ensuring that the work and materials are in conformance with the requirements specified in the Contract.

810.2 PRECONSTRUCTION CONSIDERATIONS

810.2.1 Contract Plans and Specifications

Carefully review the Contract Plans and Specifications, including Special Provisions, for the areas requiring temporary and permanent seeding, the type of seed required, the application rate of materials and the allowable time of placement, as specified in the seeding schedule. Measure the areas to be seeded prior to treatment for use in checking compliance of the application rate of lime, fertilizer, seed and other materials.

810.2.2 Agricultural Soil Testing

During construction, isolated areas of problematic soil conditions may be encountered. This may become visually evident after rough grading operations are completed, where the soil types in the area will be exposed and can be identified by color and texture. If a soil type is suspected to be problematic in developing seed growth using the specified seeding schedule, based on previous experience, the Contractor may desire to have the soil tested to determine if the seeding schedule needs to be adjusted.

If the recommendations of the Soil Testing Program indicate a change is required to the specified seeding schedule, the Resident Construction Engineer will be responsible for assessing SCDOT concurrence, approval and the need for a Change Order. In addition, the application of organic topsoil may be required.

810.2.3 Materials Considerations

810.2.3.1 Seed

Seed is controlled statewide by the South Carolina Department of Agriculture, as described in the publication *South Carolina Seed Law and Noxious Weeds and Plants - Rules and Regulations*. As such, with respect to use on SCDOT projects, seed is considered pre-tested and will be accepted based on the official approval tag attached to the seed bag, which shows seed name, net weight, origin, laboratory number of testing agency, date of testing, Lot Number, percent germination and purity (i.e., inert matter, weed seed, crop seed) and the name and number per one hundred of noxious weed seed. For each bag of seed delivered to the project, verify the data on the tag for compliance.

810.2.3.2 Fertilizer, Agricultural Lime and Nitrogen

Fertilizer and agricultural lime are controlled through testing by other State agencies. Mixed fertilizer is designated by percent nitrogen-percent phosphoric acid-percent potash, such as 10-10-10. It will not be necessary to obtain samples of fertilizer or agricultural lime; however, the Resident Construction Engineer should inspect shipments received at the project site to ensure that the specified type of fertilizer is being used, that the lime has the required tags or labels affixed and that the material is not damaged or contaminated. Where lime is delivered in bulk, obtain the delivery tickets. Lime and nitrogen are generally not required for temporary seeding.

810.2.3.3 Mulch and Tackifiers

Ensure that the tackifier material (e.g., emulsified asphalt, chemical tackifier) complies with the Contract Specifications or subsection 810.08 of the *Standard Specifications*, as appropriate, and is approved for use by the Resident Construction Engineer. Check compliance of straw mulch where used on the project. Straw mulch must comply with all State and Federal domestic plant quarantine regulations. Wood and cellulose fiber hydroseeding mulch and mulch mixtures are specifically manufactured to be dispersed by hydraulic methods. Mulch and tackifiers are generally not required for temporary seeding.

810.3 INSPECTION DURING CONSTRUCTION

810.3.1 Preparation of Seedbed

The preparation of a good seedbed is the most important factor in the development of vegetative cover. The seedbed is the place where seeds germinate and the medium from which the resulting plants, through their roots, secure moisture and mineral nutrients. It is desirable, therefore that the seedbed be in such condition as to furnish an abundance of moisture, nutrients, air and allow full penetration of plant roots. A well-prepared seedbed is firm beneath, loose and open on the surface and free from clods. Soil in this condition warms readily, holds more water and nutrients in an available form, allows free water and air movement, is favorable for the activity of soil organisms and thereby produces better growth. Where hard and compacted soil exists, the soil should be loosened to promote root growth. The Contractor should be encouraged to prepare the seedbed deeper than the specified minimum 3-inch depth

on flat areas and gentle slopes. On high steep slopes (i.e., 2:1 or steeper), seedbed preparation is critical; and, under these conditions, the surface must be broken and small pockets, trenches or ridges and serrations provided to lodge the seed. Enforce these provisions, because some contractors attempt to avoid such treatment on steep cut slopes. It is important that the soil be worked when moisture conditions are normal. If the soil is saturated, any attempt to prepare a seedbed will cause the seedbed to become very cloddy. Also, verify that the Contractor removes rocks and debris from the seedbed, as specified. After the seedbed has been prepared, vehicular traffic on the seedbed should be minimal to prevent recompaction. This can be accomplished by tracking the slope vertically.

810.3.2 Placement of Select Material on Slopes

The Contract Plans may require that select material be placed on cut and fill slopes. Where select material is to be placed on such areas, cut slopes should be scarified so that the material will have something to bond with. If select material is placed on the slope without proper scarification, much of the select material could be lost due to erosion during periods of even moderate rainfall. As soon as practicable after the select material has been placed on the slopes, seeding should begin.

810.3.3 Application of Lime and Fertilizer

Soils in South Carolina are generally acidic and lime is added to improve this condition. Lime corrects soil acidity, increases the availability of minerals in the soil, improves the physical condition of the soil and increases the efficiency of fertilizer materials. To achieve the most efficient use of lime, it must be applied at the specified rate during preparation of the seedbed. The rate may be adjusted based on the results of soil testing. The lime should be thoroughly mixed and incorporated into the seedbed to the depth of seedbed preparation. Check the application rate of lime and fertilizer for compliance.

810.3.4 Application of Seed

Seeding schedules typically require the use of more than one type of seed. The quantity of each type of seed should be weighed and mixed in the presence of the Roadway Inspector. The seed should be thoroughly mixed before it is placed into mechanical spreaders. However, where hydroseeders are used, the seed proportions may be separately introduced and continuously mixed by the mixing blades throughout the hydroseeding operation. Where hydroseeders are used, the seed should be mixed only for the quantity necessary to treat 1 to 2 acres at a time. Caution should be exercised to avoid using hydroseeders during high wind conditions, which may cause a concentration of seed on lower areas and poor distribution on the top of slopes. Seed should not remain in the fertilizer slurry for a period over 30 minutes, because the fertilizer may decrease the percent germination. In flat areas, such as median strips, shoulders and interchanges, drills or cultipackers must be used, because these methods provide superior results on level terrain. Seed that is allowed to germinate on top of the ground or in air pockets under the ground will result in poor root development or death of the young seedlings. Therefore, after seeding, ensure that the seed is covered and lightly compacted into the soil. Compaction can be achieved using cultipackers, light rollers and soil pulverizers.

Covering seed to the proper depth (approximately 0.25 inch) will greatly aid in seedling emergence and will provide quick erosion control.

810.3.5 Application of Mulch and Tackifier

Know the methods of seeding with and without mulch and verify that the application of these treatments are performed as specified and in the locations requiring such treatments. The use of mulch, when applied at the proper rate, helps to prevent erosion, conserves moisture and regulates soil temperature. If the mulch is applied too light, excess soil erosion or drying may occur under abnormally wet or dry weather conditions. If applied too heavily, the blanket of mulch will prevent sunlight from reaching the seedlings, which may weaken or kill the seedlings. A tackifier, which is sprayed over the mulch, is used to bond the mulch together to prevent it from being blown away by wind or eroded by water. Where tackifier is applied, with or without mulch, care should be taken to avoid heavy application. Doing so will likely kill the seed and prevent additional fertilizer from reaching the seed. Verify that the tackifier is applied at the specified rate and is not oversprayed on private property, bridges, curbs, sidewalks ends of box culverts and other areas. Require the Contractor to clean such areas.

810.3.6 Application of Additional Fertilizer and Nitrogen

Small frequent applications of fertilizer are superior to a large bulk application and greatly assists in establishing seed growth. Complete fertilizers or nitrogen top-dressing should never be applied when plants are going into a dormant stage. A good rule is to apply fertilizer or nitrogen while the grass or plants are coming out of winter dormancy or while actively growing. The Roadway Inspector should be on site to ascertain the application rate and to ensure that a uniform rate of coverage is obtained.

810.4 POST-CONSTRUCTION CONSIDERATIONS

The Roadway Inspector should monitor seeded areas to ensure that the grass is growing and to identify any areas that are in need of fertilizer, nitrogen, additional mulch or overseeding. Verify that mowing is being performed as specified. The Resident Construction Engineer will be responsible for assessing the acceptability of the stand of grass (i.e., 70% density). 70% density is defined as looking at a square yard of coverage, in which 70% of that square yard is covered with vegetation.

810.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Seeding and each mowing operation will be measured by the surface area actually treated and accepted. Fertilizer, lime and nitrogen will be measured by the weight of material actually placed and accepted, based on certified delivery tickets or manufacturer's tags. Acceptance is based on the application rates, as approved by the Resident Construction Engineer. Payment will be based on the Contract unit price. Retain the Contractor's invoices, delivery tickets and manufacturer's tags of materials received on the project, and document all area and application rate calculations in the Daily Work Report. This information will be retained by the Resident Construction Engineer.

Section 811

Planting Trees, Shrubs, Vines and Groundcover

811.1 DESCRIPTION OF WORK

To establish or re-establish vegetation for the purpose of erosion control or highway beautification, pay items under Section 811 of the *Standard Specifications* are frequently specified on SCDOT construction projects. In general, the work will consist of furnishing, delivering and planting trees, shrubs, vines and groundcover of the type and size indicated on the Contract Plans or as stated in the Special Provisions. The Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring that the work and material are in compliance with the requirements of the Contract Plans and Specifications.

811.2 PRECONSTRUCTION CONSIDERATIONS

Review the Contract Plans and Specifications to understand the types, sizes and locations of vegetation to be provided. Plants delivered for this work will be accepted based on the Certificates of Compliance from the supply source. Check and retain these Certificates of Compliance and ensure that the plants are of the type, size and diameter required by the Contract Plans. Inspect root balls and the condition of the plants for acceptability upon delivery, just before planting, during planting and after planting. The plants must be free from disease, pests and damage and must be maintained in a moist and lively condition. Substitutions will require approval by the Resident Construction Engineer and may require a Change Order. Many other materials will be required for this type of work, including topsoil, fertilizer, lime, superphosphate, mulch, water, stakes for bracing and anchoring, weed control cloth, porous material for tree root protection and pipe for underdrains. Ensure that these materials comply with specified requirements. See Section 810.2.3.2 and 810.2.3.3 for additional information on fertilizer, lime and mulch materials. Verify that the planting will occur within the specified planting season specified.

811.3 INSPECTION DURING CONSTRUCTION

Prior to allowing holes to be dug, check for proper clearing, grubbing and grading and that the Contractor's stakes are in the correct locations for the plants to be installed. Pay particular attention to any locations that may encroach the right-of-way line or the roadway. Check the root balls of the plants for acceptability. Verify that the holes are dug to specified dimensions and properly prepared. Verify the proper preparation of backfill soil and that the roots are spread prior to backfilling. Verify the planting procedure used for the type of plant being installed. Ensure that trees are planted straight, properly braced and guyed and wrapped, as specified. Top pruning may be required. Where designated or directed, check compliance of retaining walls, tree-wells and pipe underdrains. Check for proper mulching. Verify that trees and shrubs are properly transplanted, where designated.

811.4 POST-CONSTRUCTION CONSIDERATIONS

Inspect the Contractor's workmanship within 15 days after final cleanup. Perform the final inspection at the end of the specified establishment period to determine the plants, if any, that need to be rejected or replaced. Ensure that rejected plants are properly replaced and enforce the provisions of the Contract with respect to maintenance.

811.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Plants and trees will be measured by the number installed and accepted, as designated on the Contract Plans excluding replacements, and paid for based on the progress schedule specified in the Contract. Porous material for root protection will be measured by weight and drain tile and underdrain pipe will be measured by length of material placed and accepted. All other related work and materials will be included in the Contract unit price for the pay item. Document the measurements on the Daily Work Report. The Resident Construction Engineer will retain all invoices, delivery tickets, tags, labels, Certificates of Compliance and other related documents.

Section 812 Sprigging

812.1 DESCRIPTION OF WORK

To establish or re-establish vegetation for the purpose of erosion control or highway beautification, pay items under Section 812 of the *Standard Specifications* are frequently specified on SCDOT construction projects. In general, the work will consist of furnishing and planting sprigs of live grass on slopes and shoulders and other areas where designated on the Contract Plans or as stated in the Special Provisions. The Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring that the work and material are in compliance with the requirements of the Contract Plans and Specifications.

812.2 PRECONSTRUCTION CONSIDERATIONS

812.2.1 Contract Plans and Specifications

Carefully review the Contract Plans and Specifications, including Special Provisions, for the areas requiring sprigging, the application rate of materials and the allowable time of placement. Measure the areas to be sprigged prior to treatment for use in checking compliance of the application rate of lime and fertilizer.

812.2.2 Soils Testing

See Section 810.2.2 for information on soils testing. Topsoil may be required.

812.2.3 Materials Considerations

Check for compliance of the sprig harvesting operation and the sprigs that are delivered to the project. Reject those that do not comply with specified requirements. See Section 810.2.3.2 for information on fertilizer and lime.

812.3 INSPECTION DURING CONSTRUCTION

Verify compliance of the preparation of the areas to be sprigged (see Section 810.3.1). Ensure that the application rate of fertilizer and lime meets specified requirements. Ensure the sprigs are maintained in a healthy condition during the operation. Check for the proper planting of sprigs.

812.4 POST-CONSTRUCTION CONSIDERATIONS

The Roadway Inspector should monitor sprigged areas to ensure that the grass is growing and to identify any areas that are in need of fertilizer, nitrogen or re-sprigging. Verify that mowing is being performed as specified. The Resident Construction Engineer will be responsible for assessing the acceptability of the stand of grass (i.e., 70% density of each square yard).

812.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Sprigging and each mowing operation will be measured by the surface area actually treated and accepted. Fertilizer, lime and nitrogen will be measured by the weight of material actually placed and accepted, based on certified delivery tickets or manufacturer's tags. Topsoil will be measured by the volume of material delivered, placed and accepted. Acceptance is based on the application rates, as approved by the Resident Construction Engineer. Payment will be based on the Contract unit price. Retain the Contractor's invoices, delivery tickets and manufacturer's tags of materials received on the project, and document all area and application rate calculations in the Daily Work Report. This information will be retained by the Resident Construction Engineer.

Section 813 Sodding

813.1 DESCRIPTION OF WORK

To establish or re-establish vegetation for the purpose of erosion control or highway beautification, pay items under Section 813 of the *Standard Specifications* are frequently specified on SCDOT construction projects. In general, the work will consist of furnishing and laying sod on slopes and shoulders and other areas where designated on the Contract Plans or as stated in the Special Provisions. The Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring that the work and material are in compliance with the requirements of the Contract Plans and Specifications.

813.2 PRECONSTRUCTION CONSIDERATIONS

813.2.1 Contract Plans and Specifications

Carefully review the Contract Plans and Specifications, including Special Provisions, for the areas requiring sodding, the application rate of materials and the allowable time of placement. Measure the areas to be sodded prior to treatment for use in checking compliance of the application rate of lime and fertilizer.

813.2.2 Agricultural Soils Testing

See Section 810.2.2 for information on soils testing. Topsoil may be required.

813.2.3 Materials Considerations

Check for compliance of the sod that is delivered to the project. Reject sod that does not comply with specified requirements. See Section 810.2.3.2 for information on fertilizer and lime.

813.3 INSPECTION DURING CONSTRUCTION

Verify compliance of the preparation of the areas to be sodded (see Section 810.3.1). Ensure that the application rate of fertilizer and lime meets specified requirements. Ensure that the sod is maintained in a healthy condition during the operation. Check for the proper placement of sod. After sodding, verify the proper rolling of the sod.

813.4 POST-CONSTRUCTION CONSIDERATIONS

The Roadway Inspector should monitor sodded areas to ensure that the grass is growing and to identify any areas that are in need of fertilizer, nitrogen or re-sodding. Verify that mowing is

being performed as specified. The Resident Construction Engineer will be responsible for assessing the acceptability of the stand of grass (i.e., 70% density of each square yard).

813.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

Sodding and each mowing operation will be measured by the surface area actually treated and accepted. Fertilizer, lime and nitrogen will be measured by the weight of material actually placed and accepted, based on certified delivery tickets or manufacturer's tags. Topsoil will be measured by the volume of material delivered, placed and accepted. Acceptance is based on the application rates, as approved by the Resident Construction Engineer. Payment will be based on the Contract unit price. Retain the Contractor's invoices, delivery tickets and manufacturer's tags of materials received on the project, and document all area and application rate calculations in the Daily Work Report. This information will be retained by the Resident Construction Engineer.

Section 814

Waterproofing

814.1 DESCRIPTION OF WORK

Waterproofing is typically specified for the waterproofing or dampproofing of concrete surfaces. Two methods of substructure waterproofing are generally used. The first is used to protect bents, piers, abutments and other structures constructed in salt water, excluding prestressed concrete piles. The second is used to protect the inside of spandrel-filled arches, backs of abutments and retaining walls. Bridge deck waterproofing is sometimes used before placing an HMA overlay to serve as a barrier against penetration of water, salt solution and other contaminants that can deteriorate bridge deck concrete. When specified, the Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring compliance with the requirements of the Contract Plans and Specifications.

814.2 PRECONSTRUCTION CONSIDERATIONS

For substructure waterproofing, acceptance of the materials will be based on the manufacturer's certification, so no samples will be necessary. Refer to Section 814 of the *Standard Specifications* for the applicable AASHTO or ASTM standards for which the material must be certified. Verify proper storage of fabric. Inspection upon delivery of materials may require representative check samples to be tested. For bridge deck or pavement waterproofing, approved materials suppliers are listed on SCDOT Approval Sheet 9 and SCDOT Approval Sheet 10 for pavement and bridge decks, respectively. The Contractor should provide manufacturer certifications indicating that these materials are approved for SCDOT work and the Resident Construction Engineer should check to ensure that the materials provided are the same as those listed on the applicable Approval Sheets.

814.3 INSPECTION DURING CONSTRUCTION

During waterproofing, check the application rate and number of coats for compliance. In the first method described in Section 814 of the *Standard Specifications*, the concrete surfaces to be waterproofed must be water-cured for the specified period. The use of curing compound is not permitted. The surface will be allowed to dry for the specified period. The surface then will receive a number of coats of tar primer, as specified, and allowed to absorb. A tar seal coat will then be applied, as specified, and allowed to dry for the specified period. Water or earth will then be allowed to come into contact with the treated surface. In the second method, the surface must be dry and free of irregularities that could puncture the membrane. The surface then will be cleaned of dust and loose materials. A thorough coat of asphalt primer will be applied and allow to set. Then, three asphalt mop coats and two layers of fabric will be applied, alternating mop coat and fabric. Check for proper lapping when specified.

814.4 POST-CONSTRUCTION CONSIDERATIONS

Check for damage to the waterproofing and enforce the provisions of the Contract with respect to any needed repairs. Acceptance will be based on final approval of the Resident Construction Engineer.

814.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

The first method specified for substructure waterproofing will not be measured separately for payment. Otherwise, waterproofing will be measured by the area actually treated and accepted. Document area measurements in the Daily Work Report. Payment will be based on the Contract unit price for the type of waterproofing specified. The Resident Construction Engineer will retain copies of all manufacturer certifications. Copies of certifications should be sent to the Research and Materials Engineer.

Section 815

Erosion Control

815.1 DESCRIPTION OF WORK

Erosion is a natural process whereby soil materials are detached, transported and then deposited from one location to another by the action of water, wind, ice and gravity. Erosion can take the form of sheet erosion, rill erosion, gully erosion and channel erosion. The erosion potential of any area is determined by interrelated factors, including soil characteristics, vegetative cover, topography and climate. Highway construction projects disturb large areas of natural vegetation that can accelerate the rate of erosion and cause unwanted sediment to be deposited into adjacent waterways. As such, erosion and sediment control is required on all SCDOT construction projects. All projects with 1 acre or more disturbed area are governed under the provisions of the NPDES permit. The primary legal reference is the Erosion and Sediment Reduction Act of 1983 (SC Code Annotated, Section 48-18-10, et. seq.). In compliance with this Act, SCDOT requires that all land disturbing activities under the jurisdiction of SCDOT will be performed in such a manner that erosion is controlled and sediment is retained on-site to the maximum extent feasible, and stormwater is managed in such a manner that neither any significant on-site nor off-site damage or problem will be caused or increased.

Stormwater run-off, erosion and sediment will be controlled so that off-site run-off will pass directly across the construction site through appropriate drainage structures and on-site drainage will be retained on-site until it has been properly treated before it is released. If run-off will be released from any disturbed areas in a concentrated form, such as at the outlet from a median drain or ditch, the area downstream will be assessed during project development for environmental sensitivity. Environmentally sensitive areas are defined as regulated wetlands and areas where the deposition of sediment would deprive a property owner of the intended use of the land or cause significant financial loss to the property. If the downstream area is environmentally sensitive, the Contract will specify the need for mitigation. See Section 107.26 for additional information on environmental protection and water pollution control.

815.2 PRECONSTRUCTION CONSIDERATIONS

815.2.1 Stormwater Pollution Prevention Plan (BMPs for Water Quality Control)

At the Preconstruction Conference, the Contractor is required to submit SCDOT Form 100.15 – Stormwater and Pollution Prevention Plan for Highway Construction. This plan will include detailed half-size plans that define the Best Management Practices (BMPs) required for water quality control by type and project survey station. BMPs are schedules of activities, prohibitions and practices that are employed to control erosion and sediment and to minimize pollution of stormwater run-off and receiving waters both during and after construction. BMPs may be categorized as follows:

1. Soil Stabilization Practices. Soil stabilization practices (e.g., seeding, mulching, sodding) are temporary or permanent treatments that stabilize and protect exposed earthen surfaces from erosion due to rainfall, overland flow and runoff.
2. Structural Practices. Structural practices (e.g., silt fences, check dams, silt basins) are temporary or permanent treatments that protect soil surfaces from erosion by interrupting, diverting and storing water runoff.
3. Pollution Mitigation Practices. Pollution mitigation practices are used to protect receiving waters from pollutants other than sediments due to erosion (e.g., material spill prevention, waste disposal practices).

If the affected area is less than 1 acre, the Stormwater Pollution Prevention Plan (SWPPP) will be reviewed by the Resident Construction Engineer and forwarded to the District Engineering Administrator for signature approval. If the affected area is 1 acre or greater, the SWPPP will be reviewed by the Resident Construction Engineer and forwarded to the Director of Construction, through the District Engineering Administrator, for signature approval. The importance of verifying the proper installation of BMPs and inspecting these facilities for operational compliance cannot be overemphasized. The governing provisions of the NPDES permit require the scheduled inspection of these facilities. Check the Special Provisions of the Contract. A copy of the SWPPP needs to be maintained at the Resident Construction Engineer's office. If the project warrants a construction trailer, the SWPPP must be maintained at the project site. The SWPPP needs to be updated as erosion control measures are changed.

815.2.2 Notice of Intent (NOI)

SCDOT Form 100.16 – Notice of Intent must be completed for any project in which 1 acre of land or greater will be disturbed. The Notice of Intent will be completed by the Resident Construction Engineer and submitted to the District Engineering Administrator for signature approval. Once signed by the District Engineering Administrator, a signed copy will be returned to the Resident Construction Engineer for filing. The District Engineering Administrator will forward the Notice of Intent to SCDHEC at least 48 hours prior to the start of work. A signed copy of the Notice of Intent should be kept at the Resident Construction Engineer's office. If the project warrants a construction trailer, the Notice of Intent must be maintained at the project site.

815.2.3 Notice of Termination

SCDOT Form 100.17 – Notice of Termination must be prepared at the completion and acceptance of any project in which 1 acre of land or greater was disturbed. The Notice of Termination will be completed by the Resident Construction Engineer and submitted to the District Engineering Administrator for signature approval. Once signed by the District Engineering Administrator, a signed copy will be returned to the Resident Construction Engineer for filing. The District Engineering Administrator will forward the Notice of Termination to SCDHEC.

815.2.4 NPDES Areas

815.2.4.1 Purpose and Location of NPDES Areas

NPDES areas on the Contract Plans are designated for the construction and maintenance of erosion and sediment control and stormwater run-off management features. NPDES areas can and frequently extend not only beyond the construction lines but also the project right-of-way lines. Where warranted, NPDES areas for temporary features may be located off project right-of-way on adjacent property, as permitted through a landowner agreement. NPDES areas for permanent features must be maintained after completion of the project and will be located on project right-of-way. Project right-of-way will also be used for both temporary and permanent sediment control basins.

815.2.4.2 NPDES Lines

The NPDES lines on the Contract Plans will designate the NPDES areas extending outside the construction lines (i.e., beyond the cut/fill slope line) on the Contract Plans. The Contract Plans will also include offset distances at each station from the construction centerline to the NPDES line, as measured at right angles from the centerline. NPDES lines will be designated on the Contract Plans as shown in Figure 815A.

----- NPDES ----- NPDES ----- NPDES -----

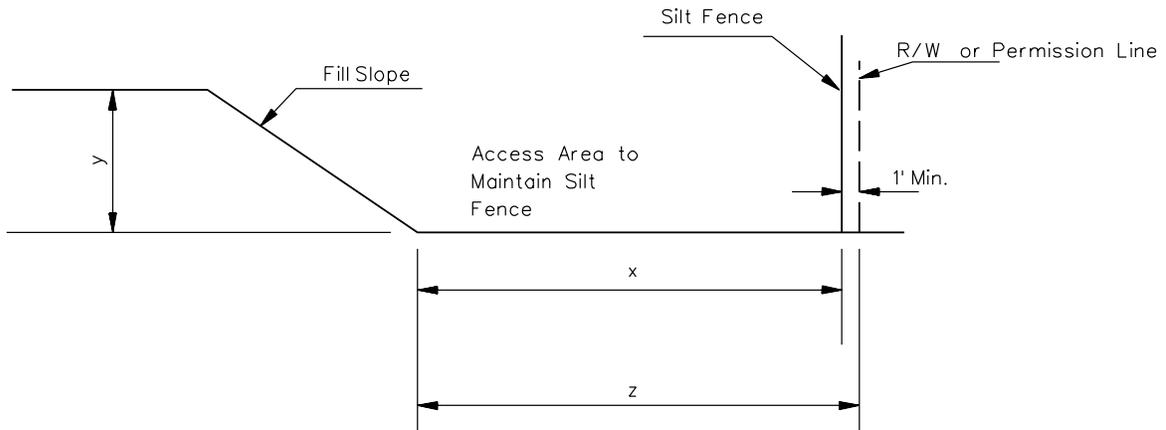
SYMBOL FOR NPDES LINES ON CONTRACT PLANS
Figure 815A

815.2.4.3 Treatment of NPDES Areas

During construction, treatment of NPDES areas will be as follows:

1. Clearing and Grubbing. All NPDES areas require clearing and grubbing. See Section 201 for additional information on clearing and grubbing.
2. Seeding. All NPDES areas require seeding during construction. Use the normal seeding schedule for all permanent NPDES features. For seeding of NPDES areas on adjacent properties, use the temporary seeding schedule at the time of installation and the permanent seeding schedule during land reclamation. Measure and pay for this work based on the seeding schedules specified in the Contract. See Section 810 for additional information on seeding.
3. Reclamation. The quantity of soil for regrading NPDES areas to be reclaimed will be included in the total quantity for silt basins. The work for removing and disposing of appurtenances for temporary sediment control basins (e.g., rip rap, pipe, anti-seep collars, fence, gate) will be included in its respective pay item.

FILL HEIGHT (y – feet)	FILL SLOPE	MINIMUM OFFSET FROM TOE OF FILL SLOPE	
		Silt Fence (x – feet)	Right-of-Way (z – feet)
<6	2:1	2	3
	4:1		
	6:1		
6-10	2:1	12	13
	4:1	3	4
	6:1		
>10	2:1	12	13
	4:1	4	5
	6:1		



MINIMUM OFFSET OF SILT FENCE FROM TOE OF FILL SLOPE
Figure 815B

4. Silt Fence. Verify that all required silt fence is installed beyond the toe of fill slopes as shown in Figure 815B. The area between the NPDES line and the toe will be cleared and grubbed and seeded using the temporary seeding schedule. The area between the toe and the silt fence is needed to accommodate equipment necessary to remove sediment collected by the silt fence and basins. Where this area cannot be obtained, maintenance will be performed using some other practical means. Ensure that silt fence is cleaned or replaced as needed and silt basins are cleaned when they are half full.

815.2.5 Materials Considerations

815.2.5.1 Geotextile Fabric for Silt Fence and Filter Fabric

The geotextile fabric used for silt fence and filter fabric must be supplied from a source listed on SCDOT Approval Sheet 34. Obtain from the Contractor and submit to the Research and Materials Engineer for approval the manufacturer's certification for the geosynthetic material, which should include the manufacturer's name, fabric type or trade name, the project, the intended application on the project and the required test results (e.g., Minimum Average Roll Value). Verify that the material delivered to the project is labeled with the manufacturer's name, fabric type or trade name, Lot Number and the quantity of shipment. Retain these labels in the project file, referencing the information in SCDOT Form 100.10 – Materials Certification Log.

815.2.5.2 Corrugated Metal Pipe and Pipe Underdrain

The Research and Materials Laboratory does not inspect or pre-approve metal pipe culverts used for sediment dams and other types of facilities. The Resident Construction Engineer will require the Contractor to furnish Mill Test Reports, which will be forwarded to the Research and Materials Engineer for evaluation. It will not be necessary to submit samples for testing, unless the Resident Construction Engineer feels that a problem exists. See Section 802.2.1.2 for information on pipe underdrain materials used in erosion and sediment control facilities.

815.2.5.3 Seed, Fertilizer and Lime

See Section 810.2.3 for information on seed, fertilizer and lime materials used for temporary seeding.

815.2.5.4 Other Erosion and Sediment Control Materials

Many other types of materials may be specified in the Contract for use in erosion and sediment control facilities, including fiberglass and polymer roving, erosion control mats and blankets and floating turbidity barrier. Verify compliance of these materials and submit to the Research and Materials Engineer the manufacturer's certification for the materials.

815.3 INSPECTION DURING CONSTRUCTION

815.3.1 Responsibilities

The Resident Construction Engineer will be responsible for ensuring that the provisions of the NPDES permit are adhered to throughout the life of the project. The requirements are documented in the NPDES permit, which is a part of the Contract for each individual project. The following summarizes the key points of inspection:

- check the Contract Plans and Special Provisions for the types of control required;
- verify that all materials are certified or sampled, as required;
- determine the on-site location of each control measure;
- ensure compliance of the installation of all controls;
- use SCDOT Form 800.02 – Sediment and Erosion Control Site Inspection Report on all projects for which SWPPP is required;
- inspect the controls weekly and after each 0.5-inch rainfall event;
- perform follow-up inspections to verify compliance of deficiency corrections;
- update the half-size plans with the locations of all erosion control measures in place;
- maintain the half-size plans in the Resident Construction Engineer's office. If the project warrants a construction trailer, the plans must be maintained at the project site.

815.3.2 Primary References

The following sections (i.e., both this *Manual* and the *Standard Specifications*) apply to the inspection of temporary and permanent erosion and sediment controls on the project:

- Section 107.26 – Environmental Protection and Water Pollution Control,
- Section 804 – Rip Rap and Slope Protection,
- Section 810 – Seeding,
- Section 811 – Planting Trees, Shrubs, Vines and Groundcover,
- Section 812 – Sprigging,
- Section 813 – Sodding, and
- Section 816 – Sediment Control Basins and Stormwater Detention Ponds.

815.3.3 Types of Erosion and Sediment Control Facilities

The following provides a brief description of the most common types of facilities that are installed for the purpose of erosion and sediment control:

1. Brush Barriers. Brush barriers are occasionally used during the clearing and grubbing operation, which makes good use of the spoils of the operation.
2. Permanent Erosion Control Mats. Permanent erosion control mats consist of non-biodegradable synthetic fibers. They provide permanent reinforcement of erodible soil areas and promote the root system of grasses and vegetation. Permanent erosion control mats are used primarily on steeper slopes and ditches and in areas where germination is slow.
3. Erosion Control Blankets. Erosion control blankets generally consist of biodegradable materials such as curled wood cellulose, straw, coconut fibers or a combination of these materials. They provide temporary reinforcement of erodible soil areas prior to the establishment of vegetation. They are commonly used on cut and fill slopes.
4. Sediment Tube. The purpose of a sediment tube is to provide a flexible, lightweight and porous sediment control device that conforms to the terrain and dissipates water velocity in concentrated flow areas. The sediment tube is typically installed immediately after ditch grading and construction of catch basin boxes.
5. Silt Fence. The use of geotextile fabric for silt fence, which is a temporary erosion and sediment control measure, is common on SCDOT projects. Where designated in the Contract Plans, or as otherwise directed by the Resident Construction Engineer, the geotextile fabric will be installed in accordance with the Contract Specifications. The function of the silt fence is to remove suspended particles from surface run-off as the water passes through the geotextile fabric. The area provided between the silt fence and the toe of the slope must be wide enough to accommodate the collection and removal of the trapped sediment. Periodic removal of the trapped sediment is required and must be closely monitored during construction. See Section 815.2.4.3 and Figure 815B for additional information.
6. Silt Basins / Silt Ditches. Silt basins and silt ditches are provided to trap and retain silt on the project for later removal. Ensure that basins are cleaned when they become half full.
7. Sediment Dams / Sediment Control Basins / Stormwater Detention Ponds. These facilities are provided on a temporary or permanent basis. The primary purpose of these facilities is to intercept, trap and retain on-site water until sediment has sufficient time to settle to the bottom of the facility. These facilities require monitoring and maintenance during and, in the case of permanent facilities, after construction. Sediment control basins and stormwater detention ponds will be constructed in accordance with the requirements of Section 816 of the *Standard Specifications*.
8. Temporary Seeding. Temporary seeding is provided to establish a root system to hold the soil in place and minimize erosion. See Section 810 for additional information on temporary seeding for erosion control.
9. Wood Chips. The creation and stockpiling of wood chips from material that has been cleared and grubbed on the project is sometimes included in the Special Provisions.

The wood chips are used as an erosion control measure by spreading the material over disturbed areas.

10. Anionic Polyacrylamides (PAM). Anionic polyacrylamides are non-toxic chemicals used for controlling soil erosion and sedimentation on construction sites by acting as temporary soil binding agents. This temporary practice is intended for direct soil surface application in sites where the establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate. Anionic PAM are available in emulsions, powders, gel bars or logs. The use of seed and mulch for additional erosion protection beyond the life of the anionic PAM is required.
11. Energy Dissipaters. Energy dissipaters may be used at culverts or bridges and in roadway / outfall ditches. They may be temporary or permanent and will require maintenance.

815.3.4 Temporary Facilities

Verify that the temporary facilities required by the Contract (e.g., berms, dikes, slope drains, terraces, earth rolls, sediment basins, seeding) are properly installed at the correct location and that they are operational as soon as practical. Ensure that these temporary facilities are maintained operational until the required permanent facilities are installed. Unless otherwise specified in the Contract, temporary facilities, excluding sediment control basins, fiberglass roving, silt fence, fabric for slope protection, terraces and temporary seeding, will not be measured and paid for separately, but will be included in other pay items.

815.3.5 Permanent Facilities

Verify that the permanent facilities required by the Contract (e.g., culvert pipes, terraces, gutters, asphalt curbs, permanent slope drains, rip rap, vegetation) are properly installed at the correct location and that they are installed as soon as practical without delay.

815.3.6 Additional Facilities (Unscheduled)

Watch for areas that may require installation of additional facilities, such as those with highly erodible soils. The Resident Construction Engineer may require that additional facilities be installed if the scheduled facilities are not sufficient to control erosion and sediment and manage stormwater run-off.

815.3.7 Weekly Inspections

On a weekly basis and after every 0.5-inch rainfall event, inspect each facility with a Contractor representative to ensure that it is operating and being properly maintained. Note that this is a provision of the NPDES permit. Use SCDOT Form 800.02 – Sediment and Erosion Control Site Inspection to perform this task. Note the condition of each facility, including any deficiencies and the corrective actions needed. Obtain Contractor concurrence. The Contractor is responsible for implementing corrective action for all noted deficiencies as designated on

SCDOT Form 800.02 – Sediment and Erosion Control Site Inspection. Failure to comply will be cause for the Resident Construction Engineer to issue a stop-work order until the deficiencies have been corrected, reinspected and approved.

815.3.8 Borrow Pit Excavation

When material is excavated from pits, verify that temporary and permanent erosion, sediment and stormwater run-off control facilities are installed and maintained so that sediment run-off does not enter streams, wetlands or other bodies of water. This provision applies during excavation and when the land is reclaimed. See Section 106.11 for additional information.

815.3.9 Haul Roads

Where haul roads are constructed, ensure that they are located and treated to prevent sediment from entering streams or other adjacent bodies of water. If any sediment is observed, notify the Contractor immediately. See Section 104.6 for additional information on haul roads.

815.3.10 Cut and Fill Sections

Verify that cut and fill sections are graded to the typical section without delay and that the required erosion and sediment control measures are promptly installed.

815.3.11 Drainage Profiles

Check existing and proposed drainage profiles to ensure existing drainage has not changed, proposed drainage will not flow onto adjacent property and natural drainage has not been altered to impact landowners or structures. Impacts can extend a considerable distance from the point of soil disturbance.

815.3.12 Clearing and Grubbing

Sediment basins should be used in areas of concentrated flow to capture and retain drainage before it exits the project right-of-way. To reduce the size of the basin, off-project water should not be allowed to enter the basin. Ensure that the Contractor clears areas and constructs sediment basins prior to initiating other work. Verify that silt fences are installed in areas of fill as the clearing progresses and that access is provided to maintain the fence. Ensure that a sufficient buffer is placed between the fence and the toe of the fill to retain the silt. Because silt will migrate along the fence to low areas and areas with a flat slope, ensure that silt basins are provided at these locations. Allow the Contractor to clear only a limited area. The provisions of the Contract (see Section 107.26) permit only 750,000 square feet (i.e., approximately 17 acres) to be disturbed at a time. Consider the location of the project, nature of the soil, topographic features and proximity to watercourses when imposing this restriction. Verify that steep slopes

that will not be immediately graded are temporarily seeded. See Section 201 for additional information on clearing and grubbing.

815.3.13 Grading and Drainage

Ensure that the Contractor properly places and extends temporary slope drains as the construction of the embankment fill section progresses. Verify that filter structures are provided at basins located in ditches (i.e., Type 12 and 14 catch basins, drop inlets). Verify that the drainage features are efficient enough to keep the water from bypassing the basin causing erosion downstream or water to back up onto the roadway (e.g., inlet sediment filters, inlet filter pads, basin box acting as a standpipe). The Contractor should construct asphalt and concrete ditch paving as soon as practicable. Verify that permanent seeding is provided as the grading operation progresses, scheduling at regular intervals on large projects. Ensure that temporary seeding is used where needed.

815.3.14 Curb and Gutter / Valley Gutter Construction

The most effective way to mitigate sediment is by locating sediment basins at the storm drain outlets. Inlet filters should be used at the inlet of catch basins, but they must not cause water to back up into the traveled roadway. Verify that a 12-square inch opening is provided in the face of box masonry to allow the water to flow into the storm drain system as soon as practicable. Check that earth rolls are provided where necessary to direct water into the opening. Continually monitor the operation to ensure that the Contractor maintains other erosion and sediment control measures, as needed (e.g., sediment basins, silt fence, permanent and temporary seeding, filter structures). See Section 720 and Section 721 for additional information on curb and gutter construction.

815.3.15 Subbase and Base Course Construction

Verify that the Contractor maintains the 12-square inch openings provided in the faces of box masonry in curb and gutter and valley gutter sections and that the water is properly diverted into the openings with sand bags, asphalt rolls, etc. Ensure that slope drains in shoulder-ditch sections are properly maintained. Continually monitor the operation to ensure the Contractor maintains other erosion and sediment control measures, as needed (e.g., sediment basins, silt fence, permanent and temporary seeding, filter structures). See Division 300 for additional information on subbase and base courses.

815.3.16 Surface Course Construction

Check to make sure the Contractor closes up the 12-square inch openings in the curb and gutter and valley gutter sections and removes the slope drains provided in the shoulder-ditch sections. See Division 400 and Division 500 for additional information on surface course construction.

815.4 POST-CONSTRUCTION CONSIDERATIONS

After the seeding has been established and all permanent control devices are in place, verify the proper removal of silt fence and the reclamation of sediment basins. After the project has been completed and accepted, SCDOT maintenance forces will maintain the NPDES areas with top priority to the continuance of proper erosion and sediment control and stormwater management measures to prevent on-site and off-site damage or contamination of water courses and impoundments. The As-Built Plans will note all permanent erosion control measures and a copy will be provided to the Resident Maintenance Engineer.

815.5 DOCUMENTATION AND PAYMENT CONSIDERATIONS

See Section 815 of the *Standard Specifications* for the method of measurement and basis of payment for erosion and sediment control. Document measurements in the Daily Work Report. Payment will be based on acceptance and the Contract unit price.

Section 816

Sediment Control Basins/Stormwater Detention Ponds

When pay items under Section 816 of the *Standard Specifications* are specified in the Contract, the Contractor will be responsible for constructing detention ponds for temporary and permanent sediment control basins and stormwater detention ponds, including the dam, primary spillway, emergency spillway, excavation for storage, fencing, seeding, erosion protection of outlet, removal and disposal of sediment and removal of and site restoration for temporary ponds. The Resident Construction Engineer and Roadway Inspectors will be responsible for ensuring that the work and materials comply with requirements of the Contract and constructed in accordance with Section 816 of the *Standard Specifications* and the applicable *Standard Drawings*. See Section 815 for additional information on erosion and sediment control.

