

Payment will be made under:

Item No.	Pay Item	Pay Unit
8091000	Right of Way Marker	Each
8091010	Right of Way Marker (Rebar Cap)	Each
8092000	Reset Right of Way Marker	Each

SECTION 810

SEEDING

810.01 Description. This work shall consist of seeding, fertilizing, liming when specified, mulching, and applying nitrogen when specified on all areas shown on the plans or where directed by the Engineer all in accordance with these specifications.

The Contractor shall coordinate seeding with the construction of fill and cut slopes. In order to limit the area of erodible material, the Engineer may require that partially completed slopes be brought to the required slope and that the Contractor perform seeding operations at that time.

MATERIALS

810.02 General. The Contractor shall, at the time of delivery, furnish the Engineer invoices of all materials received in order that the application rate of materials may be determined.

810.03 Seed. All seed shall conform to all State laws and to all requirements and regulations of the South Carolina Department of Agriculture.

The several varieties of seed shall be individually packaged or bagged and tagged to show name of seed, net

weight, origin, percentages of germination and purity, lot number and other information required by the Department of Agriculture.

The Department reserves the right to test, and reject or approve all seed before seeding.

Mixtures of different types of seed called for in the seeding schedule shall be weighed and mixed in the proper proportions at the site of the work in the presence of the Engineer.

810.04 Seeding Schedule. Unless otherwise provided, the Contractor may select the type of seeding from the table shown below for the upper State and the lower State as applicable to the project.

The upper State shall consist of all counties west of the counties of Aiken, Lexington, Richland, Kershaw, and Chesterfield. The lower State shall consist of the above cited counties and all counties east.

The total seed rate in pounds per acre shall be the sum total shown for all the varieties of seed opposite the schedule number in the seeding schedules below:

Seeding Schedule For Permanent Vegetation - Upper State				
Schedule No.	Common Name of Seed	Rural Rate	Urban Rate ¹	Planting Dates
1	Common Bermuda (hulled) ³	23	23	March 15 to Aug. 14
	Sericea Lespedeza (scarified) ²	50	50	
	Kentucky 31 Fescue	50	60	
	Weeping Lovegrass ²	10	10	

Seeding Schedule For Permanent Vegetation -

Upper State (Continued)				
Schedule No.	Common Name of Seed	Rural Rate	Urban Rate ¹	Planting Dates
2	Kentucky 31 Fescue	50	80	Aug. 15 to March 14
	Sericea Lespedeza (unhulled, unscarified) ²	80	80	
	Common Bermuda (unhulled)	30	30	
	Weeping Lovegrass ²	10	10	
	Reseeding Crimson Clover ⁴	20	0	
	Rye Grain	20	0	

Seeding Schedule For Permanent Vegetation - Lower State				
Schedule No.	Common Name of Seed	Rural Rate	Urban Rate ¹	Planting Dates
3 ⁵	Common Bermuda (hulled) ³	30	30	March 1 to Aug. 14
	Weeping Lovegrass ²	10	10	
	Sericea Lespedeza (scarified) ²	50	50	
4 ⁵	Common Bermuda (unhulled) ³	40	40	Aug. 15- Feb. 28
	Weeping Lovegrass ²	10	10	
	Sericea Lespedeza (unhulled, unscarified) ²	80	80	
	Reseeding Crimson Clover ⁴	20	0	
	Rye Grain	20	0	

Notes:

¹ Includes rural areas adjacent to well-developed lawns.

² Not required on shoulders, medians, etc., and slopes under 5 feet in height.

³ Giant Bermuda seed, including NK-37, shall not be used.

- 4 Reseeding Crimson Clover shall be inoculated in accordance with Subsection **810.05**. Do not plant clover in medians or in rural areas adjacent to well-developed lawns.
- 5 Pensacola Bahia shall be allowed only as shown in Seeding Schedules 3 and 4 at the rate of 50 pounds per acre **only** when seeding pit areas that are governed by the South Carolina Mining Act. Otherwise, do not include Bahia seed in the mix.

The Contractor may include quantities of rye grain and millet in Schedule 1 and 3 in order to establish quick ground cover for erosion control purposes.

Seeding Schedules For Temporary Vegetation Upper And Lower State			
Schedule No.	Common Name of Seed	Rate per acre (Lbs.)	Planting Dates
1	Annual Sudan Grass (Sweet or Tiff)	40	April 1 - August 15
2	Brown Top Millet	50	April 1 - August 15
3	Rye Grain	55	August 16 - March 31

Oat grain is to be added to all schedules, if seeding date is between March 1 and April 16, at the rate of 10 pounds per acre.

810.05 Inoculants. The inoculant for treating reseeded crimson clover seed shall be a pure culture of nitrogen-fixing bacteria selected for a maximum vitality and ability to transform nitrogen from the air into soluble nitrates and deposit them into the soil. Inoculants shall consist of purebred cultures and shall not be more than one year old. All cultures shall be subject to the approval of the Engineer.

810.06 Commercial Fertilizer. Commercial fertilizers shall comply with State fertilizer laws.

In a mixed fertilizer such as 10-10-10, the first number shall represent the minimum percent of nitrogen required, the second number shall represent the minimum percent of available phosphoric acid required and the third number shall represent the minimum percent of water soluble potash required in the fertilizer.

810.07 Lime. Lime shall be agricultural grade, standard ground limestone conforming to the current *Rules, Regulations and Standards of the Fertilizer Board of Control*. These rules, regulations and standards are promulgated and issued by the Fertilizer Board of Control at Clemson University in accordance with Section 16 of the *South Carolina Liming Materials Act*. Each bag shall have affixed in a conspicuous manner a tag or label, or in the case of bulk sales, a delivery slip showing brand or trade name, calcium carbonate equivalent, percent by weight passing prescribed U. S. Standard sieves and other pertinent information to identify lime as being agricultural grade, standard ground limestone.

Liquid Lime may be substituted for ground lime provided it meets all requirements for Agricultural Lime, except percent by weight passing U.S. Standard Sieves, which is waived for Liquid Lime.

810.08 Tackifiers.

A. Emulsified Asphalt. Emulsified Asphalt shall meet the requirements of Subsection **406.05**. Emulsified asphalt shall be diluted at the manufacturing plant with water, if necessary, to provide a homogenous and satisfactory material for spraying.

B. Chemical Tacking Agents. A chemical mulch binder shall consist of a polymer synthetic resin, polypectate, liquid latex, or other material that will give similar adhesive properties as asphalt emulsion when sprayed on straw and cellulose fiber mulches. Chemical tacking agents shall be approved by the Engineer

810.09 Straw Mulch. Straw mulch material shall consist of straw or hay. Straw shall be stalks of wheat, rye, barley, oats or other approved straw. Hay shall consist of Timothy, Peavine, Alfalfa, Coastal Bermuda or other grasses from approved sources. These materials shall be reasonably dry and shall be reasonably free from mature seed-bearing stalks, roots or bulblets of Johnson Grass, Nutgrass, Sandburg, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed and Cocklebur. The Contractor shall also comply with all State and Federal domestic plant quarantine regulations.

810.10 Wood Fiber Hydroseeding Mulch. Wood fiber hydroseeding mulch shall be made from wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form a homogeneous slurry. The fibers shall intertwine physically to form a strong moisture-holding mat on the ground surface and allow rainfall to percolate the underlying soil. The fiber material shall be heat processed and contain no germination or growth-inhibiting factors. It shall be dyed (non-toxic) an appropriate color to facilitate the application of material.

Suppliers shall be prepared to certify that laboratory and field testing of their product has been accomplished, and that it meets all of the foregoing requirements based upon such testing.

Weight specifications of this material from suppliers and for all applications shall refer only to air dry weight of the fiber material. Absolute air dry weight is based on the normal weight standard of the Technical Association of the Pulp and Paper Industry for wood fiber hydroseeding mulch and is considered equivalent to 10% moisture. Each package of the wood fiber hydroseeding mulch shall be marked by the manufacturer to show the air-dry weight content.

810.11 Cellulose Fiber Hydroseeding Mulch. Cellulose fiber hydroseeding mulch shall consist of recycled magazine stock products that are shredded into small pieces for application by hydraulic seeding equipment. It shall mix readily and uniformly under agitation with water and blend with grass seed and fertilizer to form a homogeneous slurry. When applied to the ground surface, the material shall form a strong moisture-holding mat, allow rainfall to percolate the underlying soil and remain in place until the grass root system is established. The material shall contain no growth inhibiting characteristic or organisms. Suppliers shall be prepared to certify that their product meets these requirements.

810.12 Wood/Cellulose Fiber Mix Hydroseeding Mulch. Wood/cellulose fiber mix hydroseeding mulch shall consist of a combination of Subsections **810.10** and **810.11**, at a ratio recommended by the manufacturer. The two mulches may be combined by the Contractor, depending on the site situation.

CONSTRUCTION REQUIREMENTS

810.13 Stand of Grass. Before acceptance of the seeding performed for the establishment of permanent vegetation, the Contractor will be required to produce a uniform perennial vegetative cover with a density of 70% of the seeded area. The root system shall be developed sufficiently to survive dry periods and winter weather and be capable of re-establishment in the spring.

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

810.14 Seeding Dates and Rates of Application. Seeding shall be performed during the periods and at the rates specified in the seeding schedules in Subsection **810.04**. Seeding

work may, at the discretion of the Contractor, be performed throughout the year using the schedule prescribed for the given period. Seeding work shall not be conducted when the ground is frozen or excessively wet. The Contractor will be required to produce a satisfactory stand of grass meeting the requirements of Subsection **810.13** regardless of the period of the year the work is performed.

810.15 Preparation of Ground Before Seeding. The areas to be seeded shall be uniform and shall conform to the finished grade and cross-section shown on the plans or as otherwise designated. Minor shaping and evening of uneven and rough areas outside the graded section shall be performed as directed by the Engineer in order to provide for more effective erosion control and for ease of subsequent mowing operations.

The seedbed (including cut slopes) shall be loosened to a minimum depth of 3 inches before agricultural lime fertilizer or seed is applied. The areas to be seeded shall be cleared of stones larger than 2 1/2 inches in any dimension, roots, and other debris.

810.16 Applying Organic Topsoil. At areas to be grassed where the existing seed bed has little or no topsoil, the Contractor may furnish and place topsoil on the seed bed in order to ensure a good stand of grass. Organic Topsoil furnished and placed by the Contractor shall be measured and paid for by the cubic yard.

810.17 Applying Lime and Fertilizer. Following advance preparation and placing selected material for shoulders and slopes when called for in the contract, lime and/or fertilizer shall be spread uniformly over the designated areas and shall be thoroughly mixed with the soil to a depth of approximately two inches. Fertilizer shall be applied at the rate of 1000 pounds per acre unless otherwise directed. Lime shall be applied at the rate of 2000 pounds per acre, unless otherwise specified in the proposal, or as authorized by the Engineer. Unless otherwise provided, lime will not be applied for

temporary seeding. On steep slopes subject to slides and inaccessible to power equipment, the slopes shall be adequately scarified. Fertilizer and lime may be applied by approved mechanical spreaders or by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied in combination seed and fertilizer drills, no further incorporation will be necessary. The fertilizer and seed shall be applied together when the hydraulic method of seeding is used. Any stones larger than 2 1/2 inches in any dimension, larger clods, roots or other debris brought to the surface shall be removed.

The Contractor may substitute a fertilizer of a different analysis than that specified on the plans. If a different fertilizer is used, the fertilizer shall be applied at such a rate per acre as to give at least the amount of nitrogen, phosphoric acid and potash as would have been accomplished had the specified fertilizer been used and applied at the specified rate. If the substitute fertilizer meets the minimum analysis of at least one or more of the three basic ingredients, the excess shall not be considered in calculating the required quantity of the substituted fertilizer. The Contractor will be paid for the number of tons of fertilizer which would have been required if the specified fertilizer had been used at the specified rate.

810.18 Permanent Vegetation. The Contractor shall obtain a satisfactory stand of perennial vegetation whose root system shall be developed sufficiently to survive dry periods and winter weather, and be capable of re-establishment in the spring. The perennial vegetative cover shall have a minimum coverage density of 70% for the seeded areas. Using the seed specified in Subsection **810.04**, the Contractor shall determine all rates of application necessary to produce the required stand of grass, and shall follow the application procedures as specified herein.

810.19 Temporary Vegetation. The Contractor shall obtain a satisfactory stand of vegetation that is capable of erosion control. Using the seed specified in Subsection **810.04**, the Contractor shall determine all rates of application necessary

to produce the required results. The temporary vegetation shall provide minimum density coverage of 70% of the seeded area.

810.20 Temporary Seeding. Seed shall be sown within 24 hours following the application of fertilizer and preparation of seedbed as specified in Subsection **810.15**. Seed shall be sown at the specified rate by hand or by methods as outlined in Subsection **810.21**. The seeded areas shall be compacted or covered as specified in Subsection **810.21**. On small areas inaccessible to machinery, the seed may be covered by hand rakes or other methods satisfactory to the Engineer. Fertilizer shall be applied at the rate of 500 pounds per acre or as directed by the Engineer. Lime will not be required in temporary seeding unless otherwise specified. No tackifiers or mulches will be required for temporary seeding.

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

810.21 Seeding (Unmulched). Seeding without mulch (unmulched) shall conform to Methods A or B as prescribed below, except that Method A shall not be used in urban areas or in areas adjacent to sidewalk, guardrail, curb, curb and gutter, or concrete median.

Method A: Seeding (Emulsified Asphalt Tackifier).

Seed shall be sown within twenty-four (24) hours following the application of fertilizer and lime and preparation of the seedbed as specified in Subsections **810.15** and **810.17**. Seed shall be uniformly sown at the rate specified by the use of approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or any other type of equipment that will produce a uniform application of the seed.

Except on steep slopes where mechanical equipment cannot operate satisfactorily, all seeded areas shall be

lightly compacted by means of a cultipacker or light roller. Compaction will not be necessary if seeds are planted by mechanical seed drills that perform a compaction procedure. On slopes inaccessible to compaction equipment, the seed shall be covered by dragging spiked-chains, by light harrowing or by other satisfactory methods.

Within twenty-four (24) hours following compaction of the seeded areas, emulsified asphalt, diluted at the manufacturing plant with an equal amount of water, shall be uniformly applied over the seeded areas at a rate of 0.15 to 0.32 gallon of the dilution per square yard. The exact amount shall be as fixed by the Engineer.

Method B: Seeding (Wood Fiber Mulch Tackifier, Cellulose Fiber Mulch Tackifier, or Wood/Cellulose Fiber Mix Tackifier.) This work shall consist of applying lime and preparing the ground as shown on the plans or as directed by the Engineer, in accordance with Subsections **810.15, 810.16** and **810.17**. One of the tackifiers listed above, chosen by the Contractor, shall be applied at the rate of 1500 pounds per acre in a mixture of water, seed, and fertilizer. Hydraulic equipment shall be used for the application of fertilizer, seed, and slurry of the prepared mulch. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of mulch, fertilizer, seed and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles that will provide even distribution of the slurry on the various areas to be seeded. The slurry tank shall have a minimum capacity of 1000 gallons.

The seed, fertilizer, mulch and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method specified herein. The materials shall be combined in a manner recommended by the manufacturer. The slurry mixture

shall be so regulated that the amounts and rates of application shall result in a uniform application of all materials at rates not less than the amounts specified. Using the color of the mulch as a guide, the equipment operator shall spray the prepared seedbed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream, to fall like rain, allowing the mulch to build upon each other until an even coat is achieved.

810.22 Seeding (Mulched). Seeding with mulch (mulched) shall conform to Methods A, B, or C as prescribed below, except that Method A shall not be used in urban areas or in areas adjacent to sidewalk, guardrail, curb, curb and gutter, or concrete median.

Method A: Seeding (Straw or Hay Mulch). Seed shall be sown as specified in Method A of Subsection **810.21**. Within twenty-four (24) hours following covering of the seed, straw or hay mulch material shall be uniformly applied at the rate of 2 tons per acre. Mulch may be spread either by hand, by appropriate mechanical spreaders or by blowers. The mulch shall not only allow sunlight to penetrate and air to circulate, but also partially shade the ground and conserve soil moisture. The newly laid mulch shall be held in place by emulsified asphalt meeting the requirements of Subsection **810.08**, or other approved tacking agent.

Emulsified asphalt shall be diluted at the manufacturing plant with an equal amount of water and shall be uniformly applied over the mulch material as a film. The film shall be applied at approximately 0.20 gallon of dilution per square yard and shall be sufficient to bond together the mulch particles without giving a heavy coating of the asphalt material and shall prevent wind erosion. Other tacking agents that may be used shall be applied at the manufacturer's recommended rate. Displaced mulch shall be replaced.

Method B: Seeding (Straw and Hydroseeding Mulch).

Seed shall be applied as in Method A in Subsection 810.21, then cover with straw tacked with manufacturer's recommended rate of wood, cellulose, or a wood/cellulose mix hydroseeding mulch; or straw tacked with manufacturer's recommended rate of a combination of tacking agent and any of the aforementioned hydroseeding mulches.

Method C: Seeding (Hydroseeding). Hydroseed using 1500 pounds per acre wood, cellulose, or a wood/cellulose mix hydroseeding mulch with the manufacturer's recommended rate of an approved tacking agent.

810.23 Protection of Structures Before spraying emulsified asphalt, the Contractor shall cover any parts of bridges, culverts, guardrail, signs, sidewalk, curb and gutter, catch basins, pipe ends, and other structures as necessary to prevent discoloration.

810.24 Application of Nitrogen. As soon as the plants show satisfactory growth, nitrogen shall be applied evenly at the rate of 48 pounds per acre on the areas designated by the Engineer. Unless otherwise permitted, the nitrogen shall be applied in a solid form rather than in a liquid state. Nitrogen shall not be applied to stands of sericea lespedeza. Unless otherwise provided, nitrogen will not be applied to temporary vegetation.

810.25 Mowing. This work shall consist of the mowing of areas seeded or sodded under the contract or other areas as necessary to provide adequate sight areas and to maintain the project in a satisfactory manner. Mowing shall be performed by the Contractor where directed by the Engineer and such mowing shall commence within three (3) business days following verbal notification by the Engineer. Failure of the contractor to comply with the above may be grounds for stopping work on the project or withholding payment of the Monthly Construction Estimate.

Mowing equipment used by the Contractor shall be equipped with safety devices designed to prevent injury or property damage caused by flying debris propelled from under the mowing equipment. All mowing equipment shall be kept in good operating condition and shall be maintained to provide a clean, sharp cut of vegetation at all times. If the Engineer determines the equipment is defective to the point that the quality of work or safety is affected, the equipment shall be immediately repaired or replaced.

Mowing shall result in a vegetation height of 4 to 6 inches, unless otherwise directed by the Engineer. The Contractor shall mow as closely as possible to all fixed objects, exercising care not to damage trees, plants, shrubs, signs, delineators or other appurtenances which are a part of the facility. Hand trimming around such objects may be required of the Contractor.

The Contractor shall immediately remove and properly dispose of any debris thrown on the roadway by the mowing operation. Mowed grass will not normally be removed unless it becomes a hazard as determined by the Engineer.

Mowing will not be performed when in the opinion of the Engineer, soil and weather conditions are such that rutting or other damage to the project may occur. The 3 business day period noted above shall be extended by such time that the soil and weather conditions prevent mowing of the project.

810.26 Maintenance. The Contractor will be required to do all maintenance necessary to keep seeded areas in a satisfactory condition until the work is finally accepted. This includes mowing and repairing washes and additional seed, fertilizer and mulch applied to areas where a satisfactory stand of grass has not been achieved.

810.27 Method of Measurement. The quantity of Permanent Vegetation, Temporary Vegetation, Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched) to be paid for

shall be the actual number of thousand square yards (MSY), measured along the surface of the ground of surface area, seeded and completed.

Fertilizer and lime will be measured by the ton. Nitrogen (actual) will be measured by the pound. Weights will be determined by approved scales or by guaranteed weight of sacks shown on the manufacturer's tag. The Contractor shall furnish the Engineer with invoices of the above materials received on the project.

The quantity of mowing to be paid for will be the actual number of thousand square yards (MSY), measured along the surface of the ground, which has been mowed at the direction of the Engineer. Separate measurements will be made each time the area is mowed.

The quantity of topsoil to be paid for will be the actual number of cubic yards measured and placed on site.

810.28 Basis of Payment. The accepted quantities of vegetation areas will be paid for at the contract unit price for Permanent Vegetation or Temporary Vegetation, which price and payment shall be full compensation for furnishing all materials (including fertilizer, lime and nitrogen when called for), labor, tools, equipment and incidentals necessary to complete the work herein prescribed in a workmanlike and acceptable manner.

The accepted quantities of seeded areas will be paid for at the contract unit price for Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched), which price and payment shall be full compensation for furnishing all materials (excluding fertilizer, lime, nitrogen and selected material for shoulders and slopes), including all, tools, equipment, labor and incidentals necessary to complete the prescribed work in an workmanlike and acceptable manner. Payment to the Contractor shall not exceed 90% of the contract unit price for these items until a satisfactory stand of grass meeting the requirements of Subsection **810.13** has been obtained.

Fertilizer furnished, applied, complete in place and measured as provided in Subsection **810.27**, will be paid for at the contract unit price for Fertilizer, which price and payment shall be full compensation for furnishing and applying fertilizer, including all materials, tool, equipment, labor, and incidentals necessary to complete the work.

Lime furnished, applied, complete in place and measured as provided in Subsection **810.27**, will be paid for at the contract unit price for Lime, which price and payment shall be full compensation for furnishing and applying lime, including all materials, tool, equipment, labor, and incidentals necessary to complete the work.

Nitrogen (actual) furnished, applied, complete in place and measured as provided in Subsection **810.27**, will be paid for at the contract unit price for Nitrogen, which price and payment shall be full compensation for furnishing and applying nitrogen, including all materials, tool, equipment, labor, and incidentals necessary to complete the work.

The quantity of mowing, measured as provided in Subsection **810.27**, will be paid for at the contract price for Mowing, which price and payment shall be full compensation for all materials, tools, equipment labor, and incidentals necessary to complete the work. No adjustments in unit price will be made in case of overruns or underruns.

The quantity of topsoil, measured as provided in Subsection **810.27** will be paid for at the contract unit price for Organic Topsoil, which price and payment shall be full compensation for furnishing and placing topsoil and all materials, tools, equipment, labor, and incidentals necessary to complete the work.

Payment for each item includes all direct and indirect costs and expenses required to complete the work.

Payment will be made under:

Item No.	Pay Item	Pay Unit
8100001	Permanent Vegetation	MSY
8101000	Seeding (Mulched)	MSY
8102100	Seeding (Unmulched)	MSY
8103000	Temporary Seeding	MSY
8103001	Temporary Vegetation	MSY
8104X00	Fertilizer (<i>analysis</i>)	Ton
8105000	Lime	Ton
8106000	Nitrogen	Pound
8109900	Mowing	MSY
8101100	Organic Topsoil	Cubic Yard

SECTION 811

PLANTING TREES, SHRUBS, VINES, AND GROUNDCOVERS

811.01 Description. This work shall consist of furnishing, delivering, and planting trees, shrubs, vines, and groundcover plants of the type and size indicated on the plans or in the special provisions. This work shall also including all materials and incidental operations (including plant maintenance and guarantee) completed in accordance with these specifications and in conformity with the locations and elevations shown on the plans or specified by the Engineer.