B-3509

Project Special Provisions Erosion Control

Rockingham County

Seeding and Mulching:

(West)

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined by the Engineer. All rates are in pounds per acre (kilograms per hectare).

Shoulder and Median Areas:

| August I - June | August 1 - June | 1 |
|-----------------|-----------------|--------------|
|-----------------|-----------------|--------------|

May 1 - September 1

| 20# (23kg) | Kentucky Bluegrass | 20# (23kg) | Kentucky Bluegrass |
|----------------|--------------------|----------------|---------------------------|
| 75# (85kg) | Hard Fescue | 75# (85kg) | Hard Fescue |
| 25# (28kg) | Rye Grain | 10# (12kg) | German or Browntop Millet |
| 500# (560kg) | Fertilizer | 500# (560kg) | Fertilizer |
| 4000# (4500kg) | Limestone | 4000# (4500kg) | Limestone |

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

August 1 - June 1

May 1 - September 1

| 100# (110kg) | Tall Fescue | 100# (110kg) | Tall Fescue |
|----------------|--------------------|----------------|---------------------------|
| 15# (17kg) | Kentucky Bluegrass | 15# (17kg) | Kentucky Bluegrass |
| 30# (34kg) | Hard Fescue | 30# (34kg) | Hard Fescue |
| 25# (28kg) | Rye Grain | 10# (12kg) | German or Browntop Millet |
| 500# (560kg) | Fertilizer | 500# (560kg) | Fertilizer |
| 4000# (4500kg) | Limestone | 4000# (4500kg) | Limestone |

Approved Tall Fescue Cultivars:

| Adventure Apache Brookstone Chesapeake Debutante Finelawn Petite Grande Jaguar III Montauk Phoenix Rebel Jr. Shenandoah | Adventure II Apache II Bonanza Chieftain Duster Finelawn Guardian Kentucky 31 Mustang Pixie Rebel II Tempo | Amigo Arid Bonanza II Coronado Falcon Finelawn I Houndog Kitty Hawk Olympic Pyramid Renegade Titan | Anthem Austin Chapel Hill Crossfire II Falcon II Genesis Jaguar Monarch Pacer Rebel Safari Tomahawk |
|---|--|--|---|
| | | • | |
| wrangici | | | |

Approved Kentucky Bluegrass Cultivars:

AdelphiBaronBristolChallengerColumbiaFylkingGladeKenblueMeritPlushRam IRugbySydsportTouchdownVantage

Approved Hard Fescue Cultivars:

Aurora Bardur Crystal Reliant Scaldis Spartan Valda Waldina Warwick

On cut and fill slopes 2:1 or steeper add 20# (23kg) Sericea Lespedeza January 1 - December 31.

Fertilizer shall be a 10-20-20 analysis. Upon written approval of the Engineer, a different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

Temporary Seeding:

Fertilizer shall be the same analysis as specified for "Seeding and Mulching" and applied at the rate of 400 pounds (450kg) and seeded at the rate of 50 pounds per acre (55kg per hectare). German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

Fertilizer Topdressing:

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre (560 kg per hectare). Upon written approval of the Engineer, a different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis.

Supplemental Seeding:

The kinds of seed and proportions shall be the same as specified for "Seeding and Mulching", and the rate of application may vary from 25# to 75# per acre (28kg to 85kg per hectare). The actual rate per acre (hectare) will be determined by the Engineer prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre (hectare), total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

Mowing:

The minimum mowing height on this project shall be six inches (150 mm).

Project Special Plantings:

Special plantings shall be installed in accordance with plan sheets RF-2, RF-3, and RF-4, and in accordance with Section 1670 of the Standard Specifications. The special plantings shall occur during the months of November through March, or as directed by the Engineer.

Mulch for planting shall be a double shredded hardwood mulch, installed as shown on plan sheets RF-3 and RF-4, and in accordance with Section 1670 of the Standard Specifications.

Water for planting will be applied in accordance with Section 1670 of the Standard Specifications.

Remaining erodible areas in Detail 1 on RF-2 and RF-3 shall be planted with Weeping Lovegrass (Eragrostis curvula) in lieu of the standard seed mix. The Weeping Lovegrass shall be applied with a hydroseeder at a rate of 20 pounds per acre, supplemented with seasonal wildflowers to be provided by the NCDOT. Seeding application shall be during the months of April through June, or as directed by the Engineer. Seeded areas shall be mulched in accordance with Section 1660 of the Standard Specifications. Fertilizer shall be a 10-20-20 analysis. Upon written approval of the Engineer, a different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

Payment for materials for the project special plantings shall be as follows:

Weeping Lovegrass Seeding......Acre

Tree Protection Fence:

General Requirements and Restrictions:

The work of Tree Protection Fence shall consist of furnishing, installing, maintaining, and removing a wood-slat, polyethylene, or polypropylene fence as specified or as directed by the Engineer, and in accordance with the special provisions included herein.

The tree protection fence shall be installed to limit access to planting area(s) and allow establishment of plant materials. Do not trespass with vehicles or machinery in the areas indicated for tree protection. Do not park, refuel, repair or maintain vehicles or equipment in the tree protection areas. Do not stockpile materials or store equipment in the tree preservation areas.

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Do not release petroleum products, fuels, paints, or lubricants anywhere within this project in the vicinity of the tree protection areas or in areas that drain into this vicinity. Do not apply or release herbicides, fertilizers or chemicals of any kind that may be toxic to plant life and do not 'clean out' concrete trucks in the vicinity of the tree protection areas, or into areas that drain into this vicinity. Do not burn trash, debris or vegetation in the vicinity of the tree protection areas.

Materials:

The tree protection fence shall conform generally to the following requirements:

The fence fabric shall be constructed of wood slats and twisted wire cables. The vertical slats shall be from 3/8" to 3/4" thick and from 1-1/4" to 2" wide, and the slats shall comprise 33 % to 50% of the surface area. Fence fabric heights shall consist of 4'-0" and 2'-0" sections as required. The slats shall be connected by means of a two-line twisted cable for each foot of fabric height or fraction thereof. The twisted cable shall be a minimum of 13 gauge galvanized wire.

Posts shall be nominal 2" x 4" or 4" x 4", lengths as required, structural light framing, grade No. 2, Southern Pine.

The wood slats and posts shall be treated with a preservative in accordance with Section 1082-3 of the Standard Specifications.

Polyethylene or polypropylene fence shall be a prefabricated sand or snow fence approved by the Engineer.

Installation:

The fence shall be erected to conform to the general contour of the ground. There shall be no removal of existing plant material unless directed by Engineer.

Posts shall be set and maintained in a vertical position and may be hand set or set with a post driver. If hand set all backfill material shall be thoroughly tamped. If power driven, wood posts may be sharpened to a dull point. Posts damaged by power driving shall be removed and replaced prior to final acceptance. The tops of all posts shall be cut at a 30 degree angle. The posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected. The Contractor shall be responsible for locating all utilities prior to installation of fence posts.

The fence fabric shall be attached to the posts with one 2" galvanized wire staple across each cable.

The Contractor shall be required to maintain the tree protection fence in a satisfactory condition for the duration of the project, as determined by the Engineer.

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Method of Measurement:

The quantity of Tree Protection Fence to be paid for shall be the actual number of linear feet of 'Tree Protection Fence', installed in place and accepted.

Basis of Payment:

The quantity of Tree Protection Fence, measured as provided for above, will be paid for at the contract unit price per linear foot of "Tree Protection Fence." Such payment will be full compensation for the work as described above, including furnishing, installing, and removing fence post, fence bracing, fence fabric, staples, tie wires; all tools, equipment, and any other incidentals necessary to complete the work.

Payment will be made under:

Tree Protection Fence......Linear Feet

Response For Erosion Control:

The 2002 Standard Specifications are revised as follows: Page 16-40, Section 1675, Delete Section 1675 and insert the following:

1675-1 Description:

Furnish the labor, materials, tools and equipment necessary to move personnel, equipment, and supplies to the project necessary for the pursuit of any or all of the following work as shown herein, by an approved subcontractor.

- A. Seeding and Mulching
- B. Temporary Seeding and Mulching
- C. Temporary Mulching
- D. Fertilizer Topdressing
- E. Repair Seeding
- F. Supplemental Seeding
- G. Silt Fence Installation or Repair
- H. Installation of Matting for Erosion Control

1675-2 Construction Methods:

Provide an approved subcontractor who performs an erosion control action as described in Form 1675. Each erosion control action may include one or more of the above work items.

1675-3 Measurement And Payment:

"Response for Erosion Control" will be measured by counting the actual number of times the subcontractor moves onto the project, including borrow and waste sites and satisfactorily completes an erosion control action described in Form 1675. The provisions of Article 104-5 will not apply to the item of work.

Payment will be made under:

Specialized Hand Mowing:

The work covered by this section consists of specialized hand mowing around or under fixed objects, including but not limited to guardrails, signs, barriers and slopes in a method acceptable to the Engineer.

The work of specialized hand mowing shall be completed with mechanically powered trimmers, string trimmers, hand operated rotary mowers, or self-propelled mowers of sufficient size and quality to perform the work timely and efficiently.

The quantity of mowing to be performed will be affected by the actual conditions which occur during the construction of the project. The quantity of mowing may be increased, decreased or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

The quantity of specialized hand mowing to be paid for will be the actual number of man hours worked while hand mowing along the surface of the ground, at the direction of the Engineer. Where an area has been mowed more than once, at the direction of the Engineer, separate measurement will be made each time the area is mowed.

Payment will be made under:

Specialized Hand Mowing......HR

Minimize Removal Of Vegetation

The Contractor shall minimize removal of vegetation at stream banks and disturbed areas within the project limits as directed by the Engineer.

Stockpile Areas

The Contractor shall install and maintain erosion control devices sufficient to contain sediment around any erodible material stockpile areas as directed by the Engineer.

Reforestation:

Reforestation will be planted in areas of pavement removal, and in areas designated by the Engineer. Reforestation is not shown on the plan sheets. See the reforestation detail sheet.

The entire Reforestation operation shall comply with section 1670 of the <u>Standard Specifications</u>.

Seasonal limitations: Seedlings shall be planted from November 15 through March 15.

Seedlings shall be planted as soon as practical following permanent Seeding and Mulching. Seedlings shall be planted in a 16 ft. (5 meters) wide swath adjacent to mowing pattern line.

Root dip: The roots of reforestation seedlings shall be coated with a slurry of water, and either a fine clay ("kaolin") or a superabsorbent that is made to be used as a bare root dip. The type, mixture ratio, method of application, and the time of application shall be submitted to the Engineer for approval. With the approval of the Engineer, seedlings may be coated before delivery to the job or at the time of planting, but at no time shall the roots of the seedlings be allowed to dry out. The roots shall be moistened immediately prior to planting.

Waste Areas And Borrow Sources:

Payment for temporary erosion control measures, except those made necessary by the Contractor's own negligence or for his own convenience, will be paid for at the appropriate contract unit price for the devices or measures utilized in borrow sources and waste areas.

No additional payment will be made for erosion control devices or permanent seeding and mulching in any commercial borrow or waste pit. All erosion and sediment control practices which may be required on a commercial borrow or waste site will be done at the Contractor's expense.

Temporary Diversion:

The work by this section for installation, maintenance, and cleanout of temporary diversions shall be in accordance with Section 1630. The quantity of excavation for installation and cleanout measured as provided in Article 1630-4 will be paid for at the contract unit price per cubic yard (cubic meter) as provided in Article 1630-5 for "Silt Excavation".

Safety Fence:

Description:

The work of "Safety Fence" shall consist of furnishing, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland or water, and as directed by the Engineer in accordance with the special provisions included herein. The fence shall be installed prior to any land disturbing activities.

Materials:

Fence Material:

Polyethylene or polypropylene fence shall be a preconstructed safety fence approved by the Engineer.

Posts:

Either wood posts or steel posts may be used. Wood posts shall be nominal 2" x 4" (51 mm x 102 mm) or 4" x 4" (102 mm x 102 mm), lengths as required, structural light framing, grade No. 2, Southern Pine. Steel posts shall be at least 5 feet (1.6 m) in length, approximately 1 3/8" (35 mm) wide measured parallel to the fence, and have a minimum weight of 1.25 lb./ft. (1.9 kg/m) of length. The steel post shall be equipped with an anchor plate having a minimum area of 14 square inches (90 square centimeters).

Clearing and Grading:

No additional clearing and grubbing is anticipated for the installation of this fence; however, if any clearing and grubbing is required, it will be the minimum required for the installation of the safety fence. Such clearing shall include satisfactory removal and disposal of all trees, brush, stumps and other objectionable material.

The fence shall be erected to conform to the general contour of the ground. When determined necessary by the Engineer, minor grading along the fence line shall be done to meet this requirement provided no obstructions to proper drainage are created.

Installation:

Posts shall be set and maintained in a vertical position and may be hand set or set with a post driver. If hand set, all backfill material shall be thoroughly tamped. If power driven, wood posts may be sharpened to a dull point. Posts damaged by power driving shall be removed and replaced prior to final acceptance. The tops of all wood posts shall be cut at a 30 degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

The fence fabric shall be attached to the wood posts with one 2" (51 mm) galvanized wire staple across each cable or to the steel posts with wire or other acceptable means.

The Contractor shall be required to maintain the safety fence in a satisfactory condition for the duration of the project as determined by the Engineer.

Method of Measurement:

The quantity of safety fence to be paid for shall be the actual number of linear feet (meter) of "Safety Fence", installed in place and accepted. No direct payment will be made for post and post bracing. Cost shall be included in the cost of the fence per linear foot (meter).

Basis of Payment:

The quantity of safety fence measured as provided above will be paid for at the contract unit price per linear foot (meter) of safety fence. Such payment will be full compensation for the work as described in the above paragraphs, including but not limited to clearing and grading, furnishing and installing fence fabric with necessary posts and post bracing, staples, tie wires, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Safety Fence.....LF (M)

Gravel Construction Entrance:

Description:

The work covered by this section consists of furnishing, installing, and maintaining and removing any and all material required for the construction of a Gravel Construction Entrance.

Materials:

The filter fabric shall meet the requirements of Section 1056 for Type 2 Fabric.

Stone shall be Class A Stone and shall meet the requirements of Section 1042 for Stone for Erosion Control, Class A.

Construction:

The Contractor shall install a Gravel Construction Entrance in accordance with the details in the plans and at locations as directed by the Engineer.

Method of Measurement:

Gravel Construction Entrance will not be measured for payment under this section.

Basis of Payment:

Payment for installation of Filter Fabric shall be paid for at the contract unit price per square yard (square meter) "Filter Fabric for Drainage".

Payment for installation of Class A Stone shall be paid for at the contract unit price per ton (metric ton) "Stone for Erosion Control, Class A".

Such price and payment shall be considered full compensation for all work covered by this provision including all materials, construction, maintenance, and removal of Gravel Construction Entrance as directed by the Engineer.

Special Stilling Basin(s):

Description:

The work covered by this section consists of furnishing, placing, and removing a special stilling basin(s) as directed by the Engineer. The special stilling basin(s) shall be used to filter pumped water during construction of drilled piers.

Materials:

The filter fabric shall meet the requirements of Section 1056 for Type 2 Fabric.

Sediment control stone shall meet the requirements of Section 1005. Install stone according to the detail shown on the plans.

The special stilling basin(s) shall be a water permeable fabric bag that traps sand, silt, and fines as sediment laden water is pumped into it. This device shall be constructed such that it is portable and can be used adjacent to each drilled pier.

The special stilling basin(s) shall be a bag constructed to a minimum size of 10' x 15' made from a nonwoven fabric. It shall have a sewn-in 8 in. (maximum) spout for receiving pump discharge. The bag seams shall be sewn with a double needle machine using a high strength thread. The seams shall have a minimum wide width strength as follows:

Test Method ASTM D-4884 Minimum Specifications 60 lb/in

The fabric used to construct the bag shall be stabilized to provide resistance to ultra-violet degradation and meet the following specifications for flow rates, strength, and permeability:

| Property | Test Method | Units | Minimum Specifications |
|---------------|--------------------|------------|------------------------|
| Weight | ASTM D-3776 | oz/yd | 8.0 |
| Grab tensile | ASTM D-4632 | lb | 200.0 |
| Puncture | ASTM D-4833 | lb | 130.0 |
| Flow rate | ASTM D-4491 | gal/min/sf | 80.0 |
| Permittivity | ASTM D-4991 | 1/sec | 1.5 |
| UV Resistance | ASTM D-4355 | % | 70.0 |

Construction:

The Contractor shall install the special stilling basin in accordance with the details in the plans and at locations as directed by the Engineer.

The special stilling basin(s) shall be placed so the incoming water flows into and through the bag without causing erosion. The neck or spout of the bag shall be tied off tightly to stop the water from flowing out of the bag without going through the walls.

The special stilling basin(s) shall be replaced and disposed of when it is 3/4 full of sediment or when it is impractical for the bag to filter the sediment out at a reasonable flow rate. Prior approval from the Engineer must be received before removal and replacement.

The Contractor shall be responsible for providing a sufficient quantity of bags to contain silt from pumped effluent during construction of drilled piers.

Method of Measurement:

The quantity of special stilling basin(s) to be paid for will be the actual number of bags used during drilled pier construction as specified and accepted by the Engineer.

Measurement of filter fabric will be made by the number of square yards (square meters) as measured over the surface of the ground over which filter fabric has been acceptably placed.

The quantity of sediment control stone will be measured according to Article 1610-4.

Basis of Payment:

Payment for special stilling basin will be as follows:

| Filter Fabric for Drainage | \dots SY(SM) |
|----------------------------|----------------|
| Sediment Control Stone | TON (MT) |
| Special Stilling Basin | EA |

Such price and payment will be full compensation for all work covered by this provision, including but not limited to, furnishing all materials, placing and maintaining the special stilling basin(s), and removal and disposal of silt accumulations and bag.

Special Sediment Control Fence:

Description:

The work covered by this section consists of the construction, maintenance, and removal of special sediment control fence. Place special sediment control fence as shown on the plans or as directed by the Engineer.

Materials:

(A) Posts:

Either wood or steel posts may be used. Wood posts shall be a minimum of 6 feet long (1.8 m), at least 3 inches (75 mm) in diameter, and straight enough to provide a fence without noticeable misalignment. Steel posts shall be at least 5 feet (1.5 m) in length, approximately 1 3/8 inches (35 mm) wide measured parallel to the fence, and have a minimum weight of 1.25 lb/ft (1.86 kg/m) of length. The post shall be equipped with an anchor plate having a minimum area of 14.0 square inches (9000 square millimeters), and shall have a means of retaining wire in the desired position without displacement.

(B) 1/4 inch (6.4mm) Hardware Cloth:

Hardware cloth shall have 1/4 inch (6.4mm) openings constructed from #24 gauge wire. Install hardware cloth according to the detail shown on the plans.

(C) Sediment Control Stone:

Sediment control stone shall meet the requirements of Section 1005. Install stone according to the detail shown on the plans.

Maintenance and Removal:

The Contractor shall maintain the special sediment control fence until the project is accepted or until the fence is removed, and shall remove and dispose of silt accumulations at the fence when so directed by the Engineer in accordance with Section 1630.

Method of Measurement:

The quantity of 1/4 inch (6.4mm) hardware cloth to be paid for will be the actual number of linear feet (meters) measured along the ground, which has been completed and accepted.

The quantity of sediment control stone will be measured according to Article 1610-4.

Basis of Payment:

Payment for special sediment control fence will be as follows:

| 1/4 inch (6.4mm) Hardware Cloth | LF (M) |
|---------------------------------|--------|
| Sediment Control Stone | (MT) |

Permanent Soil Reinforcement Mat:

General:

This work shall consist of furnishing and placing "Permanent Soil Reinforcement Mat", of the type specified, over previously prepared areas as directed by the Engineer.

Materials:

The product shall be permanent erosion control reinforcement mat and shall be constructed of 100% coconut fiber stitch bonded between a heavy duty UV stabilized cuspated (crimped) netting overlaid with a heavy duty UV stabilized top net. The three nettings shall be stitched together on 1.5 inch (38 mm) centers UV stabilized polyester thread to form a permanent three dimensional structure. The mat shall have the following physical properties:

| Property | Test Method | Value | Unit |
|--------------------------------------|------------------------------|------------------------|---------------|
| Ground Cover Thickness | Image Analysis ASTM D1777 | 93 0.63 (16) | · - |
| Mass Per Unit Area | ASTM D1777 ASTM D3776 | ` / | lb/sy (kg/m2) |
| Tensile Strength | ASTM D5035 | 480 (714.2) | ` • • |
| Elongation Tensile Strength | ASTM D5035 ASTM D5035 | 49 960 (1428.5) | , • |
| Elongation | ASTM D5035 | 31 | % |
| Tensile Strength Elongation | ASTM D1682 ASTM D1682 | 177 (80.3) 22 | ` • |
| Resiliency | ASTM D1777 | >80 | % |
| UV Stability * Color(Permanent Net) | ASTM D4355 | 151 (68.5) UV Black | lbs (kg) |
| Porosity (Permanent Net) | Calculated | >95 | % |
| Minimum Filament Diameter (perman | Measured nent net) | 0.03 (0.8) | in (mm) |

^{*}ASTM D1682 Tensile Strength and % strength retention of material after 1000 hours of exposure in a Xenon-arc weatherometer.

A certification (Type 1, 2, or 3) from the manufacturer showing:

- 1) the chemical and physical properties of the mat used, and
- 2) conformance of the mat with this specification will be required.

Matting shall be installed according to section 1631-3 of the Standard Specifications.

Soil Preparation:

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions which would prevent the mat from lying in direct contact with the soil surface. Areas where the mat is to be placed will not need to be mulched.

Measurement:

The quantity of "Permanent Soil Reinforcement Mat" to be paid for shall be the actual number of square yards (square meters), surface measure, completed, and accepted. Overlaps will not be included in the measurement, and will be considered as incidental to the work.

Basis of Payment:

This work will be paid for at the contract unit price per square yard (square meter) for "Permanent Soil Reinforcement Mat" of the type specified, complete in place and accepted. Such payment shall be full compensation for furnishing and installing the mat in accordance with this specification, and for all required maintenance.

Payment will be made under: