

**U-2519E and
X-0002B**

98
Project Special Provisions
Erosion Control

Cumberland County

SEEDING AND MULCHING:

(East)

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. All rates are in kilograms per hectare.

All Roadway Areas

March 1 - August 31

55kg	Tall Fescue
28kg	Bermudagrass (hulled)
12kg	Centipede
560kg	Fertilizer
4500kg	Limestone

September 1 - February 28

55kg	Tall Fescue
40kg	Bermudagrass (unhulled)
12kg	Centipede
560kg	Fertilizer
4500kg	Limestone

Waste and Borrow Locations

March 1 - August 31

85kg	Tall Fescue
28kg	Bermudagrass (hulled)
560kg	Fertilizer
4500kg	Limestone

September 1 - February 28

85kg	Tall Fescue
40kg	Bermudagrass (unhulled)
560kg	Fertilizer
4500kg	Limestone

Note: 55kg of Bahiagrass may be substituted for either Centipede or Bermudagrass only upon Engineer's request.

Approved Tall Fescue Cultivars

2 nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate

Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

On cut and fill slopes 2:1 or steeper Centipede shall be applied at the rate of 6kg and add 23kg of Sericea Lespedeza from January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. 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 and as directed.

Native Grass Seeding and Mulching

Bermuda

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands, and adjacent to Stream Relocation construction within a 16 meter zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

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. All rates are in kilograms per hectare.

March 1 - August 31

28kg	Bermudagrass (hulled)
7kg	Indiangrass
9kg	Little Bluestem
5kg	Switchgrass
28kg	Browntop Millet
560kg	Fertilizer
4500kg	Limestone

September 1 - February 28

40kg	Bermudagrass (unhulled)
7kg	Indiangrass
9kg	Little Bluestem
5kg	Switchgrass
39kg	Rye Grain
560kg	Fertilizer
4500kg	Limestone

Fertilizer shall be 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.

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

All areas seeded and mulched shall be tacked with asphalt. Crimping of straw in lieu of asphalt tack shall not be allowed on this project.

CRIMPING STRAW MULCH:

Crimping shall be required on this project adjacent to any section of roadway where traffic is to be maintained or allowed during construction. In areas within two meter of the edge of pavement, straw is to be applied and then crimped. After the crimping operation is complete, an additional application of straw shall be applied and immediately tacked with a sufficient amount of undiluted emulsified asphalt.

Straw mulch shall be of sufficient length and quality to withstand the crimping operation.

Crimping equipment including power source shall be subject to the approval of the Engineer providing that maximum spacing of crimper blades shall not exceed 203mm.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 450 kilograms and seeded at the rate of 55kg per hectare. Sweet Sudan Grass, 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 on all roadway areas except slopes 2:1 and steeper shall be 10-20-20 8 grade and shall be applied at the rate of 560kg per hectare. 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 10-20-20 analysis and as directed.

Fertilizer used for topdressing on slopes 2:1 and steeper and waste and borrow areas shall be 16-8-8 grade and shall be applied at the rate of 560kg per hectare. 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 and as directed.

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, with the exception that no centipede seed will be used in the seed mix for supplemental seeding. The rate of application for supplemental seeding may vary from 28kg to 85kg per hectare. The actual rate per hectare will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per 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 102mm.

LAWN TYPE APPEARANCE:

All areas adjacent to lawns must be hand finished as directed to give a lawn type appearance. Remove all trash, debris, and stones 19 mm and larger in diameter or other obstructions that could interfere with providing a smooth lawn type appearance. These areas shall be reseeded to match their original vegetative conditions, unless directed otherwise by the Field Operations Engineer.

SPECIALIZED HAND MOWING:

Description

This work 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.

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 that occur during the construction of the project. The quantity of mowing may be increased, decreased or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Measurement and Payment

Specialized Hand Mowing will be measured and paid for as the actual number of hours worked while hand mowing along the surface of the ground, as directed. Where an area has been mowed more than once, as directed, separate measurement will be made each time the area is mowed.

Payment will be made under:

Pay Item	Pay Unit
Specialized Hand Mowing	Hour

REFORESTATION:**102****Description**

Reforestation will be planted within interchanges, along the outside borders of the road, and in other areas as directed. *Reforestation* is not shown on the plan sheets. See the *Reforestation Detail Sheet*.

All non-maintained riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated with native woody species.

The entire *Reforestation* operation shall comply with the requirements of Section 1670 of the *Standard Specifications*.

Materials

Reforestation shall be bare root seedlings 305mm-457mm tall.

Construction Methods

Reforestation shall be planted as soon as practical following permanent *Seeding and Mulching*. The seedlings shall be planted in a 4.9-meter wide swath adjacent to mowing pattern line, or as directed.

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 designated 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.

Seasonal Limitations: *Reforestation* shall be planted from November 15 through March 15.

Measurement and Payment

Reforestation will be measured and paid for in accordance with Article 1670-17 of the *Standard Specifications*.

RESPONSE FOR EROSION CONTROL: 103

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

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.

Measurement and Payment

Response for Erosion Control will be measured and paid for 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 of the *Standard Specifications* will not apply to this item of work.

Payment will be made under:

Pay Item	Pay Unit
Response for Erosion Control	Each

MINIMIZE REMOVAL OF VEGETATION:

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

STOCKPILE AREAS:

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

ACCESS AND HAUL ROADS:

At the end of each working day, the Contractor shall install or re-establish temporary diversions or earth berms across access/haul roads to direct runoff into sediment devices. Silt fence sections that are temporarily removed shall be reinstalled across access/haul roads at the end of each working day.

WASTE 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 that may be required on a commercial borrow or waste site will be done at the Contractor's expense.

GRAVEL CONSTRUCTION ENTRANCE:**Description**

This work consists of furnishing, installing, and maintaining and removing any and all material required for the construction of a *Gravel Construction Entrance*.

Materials

Refer to Division 10

Item	Section
Filter Fabric for Drainage, Type 2	1056
Stone for Erosion Control, Class A	1042

Construction Methods

The Contractor shall install a Gravel Construction Entrance in accordance with Standard Drawing No. 1607.01 and at locations as directed.

Measurement and Payment

Filter Fabric for Drainage will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

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

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

TEMPORARY DIVERSION:

This work consists of installation, maintenance, and cleanout of *Temporary Diversions* in accordance with Section 1630 of the *Standard Specifications*. The quantity of excavation for installation and cleanout will be measured and paid for as *Silt Excavation* in accordance with Article 1630-4 of the *Standard Specifications*.

SPECIAL SEDIMENT CONTROL FENCE:

Description

This work 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.

Materials

(A) Posts

Steel posts shall be at least 1.5 meters in length, approximately 35 mm wide measured parallel to the fence, and have a minimum weight of 1.86 kg/m of length. The post shall be equipped with an anchor plate having a minimum area of 90.3 square centimeters, and shall have a means of retaining wire in the desired position without displacement.

(B) 6.4 mm Hardware Cloth

Hardware cloth shall have 6.4 mm openings constructed from #24 gauge wire. Install hardware cloth in accordance with Standard Drawing No. 1606.01.

(C) Sediment Control Stone

Sediment Control Stone shall meet the requirements of Section 1005 of the *Standard Specifications*. Install stone in accordance with Standard Drawing No. 1606.01.

Construction Methods

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 in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

6.4 mm Hardware Cloth will be measured and paid for in accordance with Article 1632-5 of the *Standard Specifications*.

Sediment Control Stone will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

SAFETY FENCE:**Description**

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. The fence shall be installed prior to any land disturbing activities.

Materials

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

Either wood posts or steel posts may be used. Wood posts shall be nominal 51 mm x 102 mm or 102 mm x 102 mm lengths as required, structural light framing, grade No. 2, Southern Pine. Steel posts shall be at least 1.52 m in length, approximately 35 mm wide measured parallel to the fence, and have a minimum weight of 1.9 kg/m of length. The steel post shall be equipped with an anchor plate having a minimum area of 90 square centimeters.

Construction Methods

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, minor grading along the fence line shall be performed to meet this requirement provided no obstructions to proper drainage are created.

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. Wood posts may be sharpened to a dull point if power driven. 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 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.

Measurement and Payment

Safety Fence will be measured and paid for as the actual number of linear meters installed in place and accepted. Such payment will be full compensation 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 this work.

Payment will be made under:

Pay Item	Pay Unit
Safety Fence	Linear Meter

PERMANENT SOIL REINFORCEMENT MAT:

Description

This work consists of furnishing and placing *Permanent Soil Reinforcement Mat*, of the type specified, over previously prepared areas as directed.

Materials

The product shall be a permanent erosion control reinforcement mat and shall be constructed of synthetic fibers evenly distributed throughout the mat between a bottom UV stabilized netting and a heavy duty UV stabilized top net. The matting shall be stitched together with UV stabilized polypropylene thread to form a permanent three-dimensional structure. The mat shall have the following minimum physical properties:

Property	Test Method	Value	Unit
Light Penetration	ASTM D6567	15	%
Thickness	ASTM D6525	13	mm
Mass Per Unit Area	ASTM D6566	0.339	kg/m ²
Tensile Strength	ASTM D6818	572	kg/m
Elongation (Maximum)	ASTM D6818	49	%
Resiliency	ASTM D1777	70>	%

UV Stability *	ASTM D4355	≥80 %
Porosity (Permanent Net)	Calculated	≥85 %
Minimum Filament	Measured	0.76 mm
Maximum Permissible Shear Stress (Vegetated)	Performance Test	39.1≥ kg/m ²
Maximum Allowable Velocity	Performance Test	4.9≥ m/s

*ASTM D1682 Tensile Strength and % strength retention of material after 1000 hours of exposure.

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

- (A) the chemical and physical properties of the mat used, and
- (B) conformance of the mat with this specification.

Construction Methods

Matting shall be installed in accordance with Subarticle 1631-3(B) of the *Standard Specifications*.

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660 of the *Standard Specifications*. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that 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 and Payment

Permanent Soil Reinforcement Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which Permanent Soil Reinforcement Mat is installed and accepted. Overlaps will not be included in the measurement, and will be considered as incidental to the work. Such payment shall be full compensation for furnishing and installing the mat, including overlaps, and for all required maintenance.

Payment will be made under:

Pay Item	Pay Unit
Permanent Soil Reinforcement Mat	Square Meter

COIR FIBER BAFFLE:

Description

Furnish material, install and maintain coir fiber baffles according to the details in the plans or in locations as directed. Coir Fiber Baffles shall be installed in silt basins and

sediment dams at drainage outlets. Work includes providing all materials, placing, securing, excavating and backfilling of *Coir Fiber Baffles*.

Materials

(A) Coir Fiber Mat

Matting: Provide matting to meet the following requirements:

100% coconut fiber (coir) twine woven into high strength matrix	
Thickness -	7.6mm minimum
Tensile Strength	1650.5 x 766.5 kg/m minimum
Elongation	34% x 38% maximum
Flexibility (mg-cm)	65030 x 29590
Flow Velocity	Observed 3.35 m/s
Weight	678 g/SM
Size	100 SM
"C" Factor	0.002
Open Area (measured)	50%

(B) Staples

Provide staples made of 3.2 mm diameter new steel wire formed into a *u* shape not less than 305 mm in length with a throat of 25 mm in width.

(C) Posts

Steel posts shall be at least 1.5 m in length, approximately 35 mm wide measured parallel to the fence, and have a minimum weight of 1.86 kg/m of length. The post shall be equipped with an anchor plate having a minimum area of 9000 square millimeters, and shall be of the self-fastener angle steel type to have a means of retaining wire and coir fiber mat in the desired position without displacement.

(D) Wire

Provide 8-gauge wire strand of variable lengths.

Construction Methods

Place the coir fiber baffles immediately upon excavation of basins. Install three (3) baffles in basins with a spacing of one fourth (1/4) the basin length and according to the detail sheets. Two (2) coir fiber baffles shall be installed in basins less than 6 m in length with a spacing of one third (1/3) the basin length.

Steel posts shall be placed at a depth of 0.6 m below the basin surface, with a maximum spacing of 1.2 m. Attach an 8-gauge wire strand to the steel posts at a height of 0.9 m with plastic ties or wire fasteners. Install a steel post into side of the basin at a variable

depth and a height of 0.9 m from the bottom of the basin to anchor coir fiber mat. Secure anchor post to the upright steel post in basin with wire fasteners.

The coir fiber mat shall be draped over the wire strand to a minimum of 0.9 m of material on each side of the strand. Secure the coir fiber mat to the wire strand with plastic ties or wire fasteners. Place staples across the matting at ends and junctions approximately 0.3 m apart at the bottom and side slopes of basin. Overlap matting at least 152 mm where 2 or more widths of matting are installed side by side. Refer to details in the plan sheets. The Engineer may require adjustments in the stapling requirements to fit individual site conditions.

Measurement and Payment

Coir Fiber Baffles will be measured and paid for by the actual number of linear meters of coir fiber baffles which are installed and accepted. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the coir fiber baffles.

Payment will be made under:

Pay Item	Pay Unit
Coir Fiber Baffle	Linear Meter

SKIMMER BASIN WITH BAFFLES:

Description

Provide a skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Skimmer Basin with Baffles Detail sheet provided in the erosion control plans. Work includes constructing sediment basin, installation of coir fiber baffles, installation of Faircloth Skimmer or other approved equivalent device, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing filter fabric emergency spillway liner, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing filter fabric liner and skimmer, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Filter Fabric for Drainage, Type 2	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8

111

Staples

1060-8

Coir Fiber Baffles shall meet the specifications as provided elsewhere in this contract.

Provide appropriately sized Faircloth skimmer or other approved equivalent device.

Coir Fiber Mat: Coir fiber matting for stabilization of the skimmer outlet shall meet the following requirements:

100% coconut fiber (coir) twine woven into high strength matrix	
Thickness -	7.6mm minimum
Tensile Strength	1650.5 x 766.5 kg/m minimum
Elongation	34% x 38% maximum
Flexibility (mg-cm)	65030 x 29590
Flow Velocity	Observed 3.35m/s
Weight	678g/SM
Size	100 SM
"C" Factor	0.002
Open Area (measured)	50%

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 305mm - 610mm long with a 51mm x 51mm nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 25mm - 51mm long head at the top with a 25mm - 51mm notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 610mm nominal length. The bars shall have a 102mm diameter bend at one end with a 102mm straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 3.18mm diameter new steel wire formed into a *u* shape not less than 305mm in length with a throat of 25mm in width.

Construction Methods

Excavate basin according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Construct the emergency spillway according to the Skimmer Basin with Baffles Detail sheet in the erosion control

plans. Construct the coir fiber baffles according to the details in the plans and as provided elsewhere in this contract.

Install Faircloth skimmer or other approved equivalent device according to manufacturer recommendations. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 305mm in height, and shall have a minimum cross sectional area of 1.2m by 1.2m.

Line emergency spillway with filter fabric unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of fabric in a trench at least 127 mm deep and tamp firmly. Make vertical overlaps a minimum of 457 mm with upstream fabric overlapping the downstream fabric. Secure fabric with eleven gauge wire staples shaped into a *u* shape with a length of not less than 152 mm and a throat not less than 25 mm in width. Place staples along outer edges and throughout the fabric a maximum of 0.9 meter horizontally and vertically.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 0.3 meter apart. Place anchors along the outer edges and down the center of the matting 0.9 meter apart.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3(B) of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Articles 1630-4 and 1630-5 of the *Standard Specifications*, as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

Filter Fabric for Drainage will be measured and paid for in accordance with Subarticles 876-5(C) and 876-6(C) of the *Standard Specifications*.

Coir Fiber Baffles will be measured and paid for as provided elsewhere in this contract.

___mm *Skimmer* will be measured in units of each.

Coir Fiber Mat will be measured and paid for as the actual number of square meters measured along the surface of the ground over which coir fiber mat is installed and accepted.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 and 1610-5 of the *Standard Specifications*.

Seeding and Mulching will be measured and paid for in accordance with Article 1660-8 and 1660-9 of the *Standard Specifications*.

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 and 1620-7 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 and 1620-7 of the *Standard Specifications*.

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 and 1631-5 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
__mm Skimmer	Each
Coir Fiber Mat	Square Meter

TIERED SKIMMER BASIN WITH BAFFLES:

Description

Provide a tiered skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Tiered Skimmer Basin Detail sheet provided in the erosion control plans. Tiered Skimmer Basins shall be installed in areas where topography creates a large elevation difference between the inlet and outlet of a single skimmer basin. Work includes constructing sediment basin, installation of coir fiber baffles, installation of temporary slope drains, installation of Faircloth Skimmer or other approved equivalent device, providing and placing filter fabric emergency spillway liners, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing filter fabric liner and skimmer, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Filter Fabric for Drainage, Type 2	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8

Staples
Temporary Slope Drain

1060-8
1622-2

Coir Fiber Baffles shall meet the specifications as provided elsewhere in this contract.

Provide appropriately sized Faircloth skimmer or other approved equivalent device.

Coir Fiber Mat: Coir fiber matting for stabilization of the skimmer outlet shall meet the following requirements:

100% coconut fiber (coir) twine woven into high strength matrix	
Thickness -	7.6mm minimum
Tensile Strength	1650.5 x 766.5 kg/m minimum
Elongation	34% x 38% maximum
Flexibility (mg-cm)	65030 x 29590
Flow Velocity	Observed 3.35m/s
Weight	678g/SM
Size	100 SM
"C" Factor	0.002
Open Area (measured)	50%

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 305mm - 610mm long with a 51mm x 51mm nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 25mm - 51mm long head at the top with a 25mm - 51mm notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 610mm nominal length. The bars shall have a 102mm diameter bend at one end with a 102mm straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 3.18mm diameter new steel wire formed into a *u* shape not less than 305mm in length with a throat of 25mm in width.

Construction Methods

Excavate basins according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Construct the emergency spillway according to the Tiered Skimmer Basin Detail sheet in the erosion control plans.

Construct the coir fiber baffles according to the details in the plans and as provided elsewhere in this contract. Multiple upper basins, or Modified Silt Basins Type 'B' as labeled on the detail, may be required based on site conditions and as directed.

Install a minimum of 2 (two) temporary slope drains to dewater the upper basin to the lower basin. The slope drains shall be installed a minimum of 25mm below the base of the emergency spillway section of the upper basin. The outlet of the slope drains shall be placed on the bottom elevation of the lower basin.

Install Faircloth skimmer or other approved equivalent device according to manufacturer recommendations. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 25mm in height, and shall have a minimum cross sectional area of 1.2m by 1.2m.

Line emergency spillways with filter fabric unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of fabric in a trench at least 127 mm deep and tamp firmly. Make vertical overlaps a minimum of 457 mm with upstream fabric overlapping the downstream fabric. Secure fabric with eleven gauge wire staples shaped into a *u* shape with a length of not less than 152 mm and a throat not less than 25 mm in width. Place staples along outer edges and throughout the fabric a maximum of 0.9 meter horizontally and vertically.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 0.3 meter apart. Place anchors along the outer edges and down the center of the matting 0.9 meter apart.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3(B) of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Articles 1630-4 and 1630-5 of the *Standard Specifications*, as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

Filter Fabric for Drainage will be measured and paid for in accordance with Subarticles 876-5(C) and 876-6(C) of the *Standard Specifications*.

Coir Fiber Baffles will be measured and paid for as provided elsewhere in this contract.

mm Skimmer will be measured in units of each.

Coir Fiber Mat will be measured and paid for as the actual number of square meters measured along the surface of the ground over which coir fiber mat is installed and accepted.

Temporary Slope Drains will be measured and paid for in accordance with Subarticles 1622-4 and 1622-5 of the *Standard Specifications*.

Stone for Erosion Control, Class will be measured and paid for in accordance with Article 1610-4 and 1610-5 of the *Standard Specifications*.

Seeding and Mulching will be measured and paid for in accordance with Article 1660-8 and 1660-9 of the *Standard Specifications*.

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 and 1620-7 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 and 1620-7 of the *Standard Specifications*.

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 and 1631-5 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
<u> </u> mm Skimmer	Each
Coir Fiber Mat	Square Meter

WATTLES WITH POLYACRYLAMIDE (PAM):

Description

Wattles are tubular products consisting of excelsior fibers encased in polyethylene netting. Wattles are used on slopes or channels to intercept runoff and act as a velocity break. Wattles are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of wattles, matting installation, PAM application, and removing wattles.

Materials

Wattle shall meet the following specifications:

100% Curled Wood(Excelsior) Fibers	
Minimum Diameter	305 mm
Minimum Density	42 kg/m ³ +/- 10%
Net Material	Polyethylene
Net Openings	2.5 cm x 2.5 cm
Net Configuration	Totally Encased
Minimum Weight	9.08 kg +/- 10% per 3.05 m length

Anchors: Stakes shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes a minimum of 61 cm long with a 5.1 cm x 5.1 cm nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving down into the underlying soil.

Matting shall meet the requirements of section 1060-8 of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Provide staples made of 3 mm diameter new steel wire formed into a *u* shape not less than 305 mm in length with a throat of 2.5 cm in width.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the wattles will be placed and analyzed for the appropriate PAM flocculant to be utilized with each wattle.

Construction Methods

Wattles shall be secured to the soil by wire staples approximately every 0.3 linear meters and at the end of each section of wattle. A minimum of 4 stakes shall be installed on the downstream side of the wattle with a maximum spacing of 0.6 linear meters along the wattle, and according to the detail. Install a minimum of 2 stakes on the upstream side of the wattle according to the detail provided in the plans. Stakes shall be driven into the ground a minimum of 254 mm with no more than 5.1 cm projecting from the top of the wattle. Drive stakes at an angle according to the detail provided in the plans.

Install wattles to the top of the ditch according to the detail provided in the plans. Overlap adjoining sections of wattles a minimum of 15.2 cm.

Installation of matting shall be in accordance with the detail provided in the plans, and in accordance with section 1631-3(B) of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Apply PAM over the lower center portion of the wattle where the water is going to flow over at a rate of 100 grams per wattle. PAM applications shall be done during construction activities after every rainfall event that is equal to or exceeds 6 mm.

The Contractor shall maintain the wattles until the project is accepted or until the wattles are removed, and shall remove and dispose of silt accumulations at the wattles when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Wattles will be measured and paid for by the actual number of linear meters of wattles which are installed and accepted. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Wattles*.

Matting will be measured and paid for in accordance with section 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in kilograms of PAM applied to the wattles. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply the *Polyacrylamide(PAM)*.

Payment will be made under:

Pay Item	Pay Unit
Polyacrylamide(PAM)	Kg
Wattle	Linear Meter

CULVERT DIVERSION CHANNEL:

Description

This work consists of providing a *Culvert Diversion Channel* to detour the existing stream around the culvert construction site at locations shown on the plans. Work includes constructing the diversion channel, disposing of excess materials, providing and placing filter fabric liner, maintaining the diversion area in an acceptable condition, removing filter fabric liner, backfilling diversion channel area with suitable material, and providing proper drainage when diversion channel area is abandoned.

Materials

Refer to Division 10

Item	Section
Filter Fabric for Drainage, Type 2	1056

Construction Methods

Grade channel according to the plans with channel surface free of obstructions, debris, and pockets of low-density material. Utilize suitable material and provide disposal area for unsuitable material.

Line channel with fabric unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury top of slope fabric edge in a trench at least 127 mm deep and tamp securely. Make vertical overlaps a minimum of 457 mm with upstream fabric overlapping the downstream fabric.

Secure fabric with eleven gauge wire staples shaped into a *u* shape with a length of not less than 152 mm and a throat not less than 25 mm in width. Place staples along outer edges and throughout the fabric a maximum of 0.9 meters horizontally and vertically.

Measurement and Payment

Culvert Diversion Channel will be measured and paid for as the actual number of cubic meters excavated, as calculated from the typical section throughout the length of the diversion channel as shown on the final approved plans.

Filter Fabric for Drainage will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of *Culvert Diversion Channel*.

Payment will be made under:

Pay Item	Pay Unit
Culvert Diversion Channel	Cubic Meter

IMPERVIOUS DIKE:

Description

This work consists of furnishing, installing, maintaining, and removing an *Impervious Dike* for the purpose of diverting normal stream flow around the construction site. The Contractor shall construct an impervious dike in such a manner approved by the Engineer. The impervious dike shall not permit seepage of water into the construction site or contribute to siltation of the stream. The impervious dike shall be constructed of an acceptable material in the locations noted on the plans or as directed.

Materials

Acceptable materials shall include but not be limited to sheet piles, sandbags, and/or the placement of an acceptable size stone lined with polypropylene or other impervious fabric.

Earth material shall not be used to construct an impervious dike when it is in direct contact with the stream unless vegetation can be established before contact with the stream takes place.

Measurement and Payment

Impervious Dike will be measured and paid as the actual number of linear meters of impervious dike(s) constructed, measured in place from end to end of each separate installation that has been completed and accepted. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, and removal of the impervious dike.

Payment will be made under:

Pay Item

Impervious Dike

Pay Unit

Linear Meter