

R-2519A

**Project Special Provisions  
Erosion Control**

Yancey County

**SEEDING AND MULCHING:****(WestEd)**

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.

## Shoulder and Median Areas

**August 1 - June 1**

23kg	Kentucky Bluegrass
85kg	Hard Fescue
28kg	Rye Grain
560kg	Fertilizer
4500kg	Limestone

**May 1 - September 1**

23kg	Kentucky Bluegrass
85kg	Hard Fescue
12kg	German or Browntop Millet
560kg	Fertilizer
4500kg	Limestone

## Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

**August 1 - June 1**

110kg	Tall Fescue
17kg	Kentucky Bluegrass
34kg	Hard Fescue
28kg	Rye Grain
560kg	Fertilizer
4500kg	Limestone

**May 1 - September 1**

110kg	Tall Fescue
17kg	Kentucky Bluegrass
34kg	Hard Fescue
12kg	German or Browntop Millet
560kg	Fertilizer
4500kg	Limestone

## Approved Tall Fescue Cultivars

2 <sup>nd</sup> 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	

Approved Kentucky Bluegrass Cultivars:

Alpine	Baris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

On cut and fill slopes 2:1 or steeper add 23kg Sericea Lespedeza and 17kg Crown Vetch January 1 - December 31.

The Crown Vetch Seed should be double inoculated if applied with a hand seeder. Four times the normal rate of inoculant should be used if applied with a hydroseeder. If a fertilizer-seed slurry is used, the required limestone should also be included to prevent fertilizer acidity from killing the inoculant bacteria. Caution should be used to keep the inoculant below 80° F to prevent harm to the bacteria. The rates and grades of fertilizer and limestone shall be the same as specified for *Seeding and Mulching*.

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

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation and/or trout stream 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.

**August 1 - June 1**

28kg Virginia Wild Rye  
 9kg Big Bluestem  
 7kg Indiangrass  
 5kg Switchgrass  
 39kg Rye Grain  
 560kg Fertilizer  
 4500kg Limestone

**May 1 – September 1**

28kg Virginia Wild Rye  
 9kg Big Bluestem  
 7kg Indiangrass  
 5kg Switchgrass  
 28kg German or Browntop Millet  
 560kg Fertilizer  
 4500kg Limestone

**Approved Kentucky Bluegrass Cultivars:**

Alpine	Barris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

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 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 Articles 1660-8 and 1660-9 of the *Standard Specifications*.

**TEMPORARY SEEDING:**

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 450kg and seeded at the rate of 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 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.

**AERIAL FERTILIZER TOPDRESSING:****Description**

*Aerial Fertilizer Topdressing* shall be accomplished by helicopter and shall be required on areas of this project which are determined to be unreachable or inappropriate by traditional methods. The actual areas to be topdressed shall be identified by the Engineer at time of application request. The aerial application of fertilizer topdressing shall be in accordance with Section 1665 of *Standard Specifications* and all federal, state, and local laws and ordinances.

**Materials**

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 560 kilograms 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 is adjusted to provide the same amount of plant food as 16-8-8 analysis.

**Construction Methods**

The Contractor shall obtain aircraft liability insurance with minimum amounts of \$1,000,000.00 for personal injury per occurrence and \$1,000,000.00 for property damage. Evidence of this insurance shall be provided to the Engineer prior to starting the work of Aerial Fertilizer Topdressing.

The Contractor shall be required to utilize equipment capable of uniformly broadcasting a granular fertilizer to obtain a 90% coverage of the areas indicated by the Engineer to be topdressed.

**Measurement and Payment**

*Aerial Fertilizer Topdressing* will be measured in accordance with the requirements of Article 1665-4 of the *Standard Specifications* and will be paid for at the contract unit price per ton (metric ton) for *Aerial Fertilizer Topdressing*.

The above price and payment will be full compensation for all work covered by this section including but not limited to furnishing and uniformly distributing fertilizer topdressing by aerial application.

Payment will be made under:

**Pay Item**

Aerial Fertilizer Topdressing

**Pay Unit**

Metric Ton

**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 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 152 mm.

**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 man 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:

<b>Pay Item</b>	<b>Pay Unit</b>
Specialized Hand Mowing	MHR

### **REFORESTATION:**

#### **Description**

*Reforestation* will be planted within interchanges and 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 305-457mm 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 Articles 1670-17 and 1670-18 of the *Standard Specifications*.

**SEEDING EQUIPMENT:**

Due to the size and environmental sensitivity of this project, the contractor shall retain sufficient equipment and materials onsite to perform seeding, mulching and matting operations on a continuous basis. Since seeding, mulching and matting operations will be performed in a continuous manner, no additional payments shall be made for the requirements of this section

The contractor may utilize equipment from the project during inactive times to perform work on other projects, as directed.

**ENVIRONMENTALLY SENSITIVE AREAS:****Description**

This project is located in an *Environmentally Sensitive Area*. This designation requires special procedures to be used for clearing and grubbing, temporary stream crossings, and grading operations within the Environmentally Sensitive Areas identified on the plans and as designated by the Engineer. This also requires special procedures to be used for seeding and mulching and staged seeding within the project.

The Environmentally Sensitive Area shall be defined as a 15.2-meter buffer zone on both sides of the stream or depression measured from top of streambank or center of depression.

**Construction Methods****(A) Clearing and Grubbing**

In areas identified as Environmentally Sensitive Areas, the Contractor may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations as described in Article 200-1 of the *Standard Specifications*. Only clearing operations (not grubbing) shall be allowed in this buffer zone until immediately prior to beginning grading operations. Erosion control devices shall be installed immediately following the clearing operation.

**(B) Grading**

Once grading operations begin in identified Environmentally Sensitive Areas, work shall progress in a continuous manner until complete. All construction within these areas shall progress in a continuous manner such that each phase is complete and areas are permanently stabilized prior to beginning of next phase. Failure on the part of the Contractor to complete any phase of construction in a continuous manner in Environmentally Sensitive Areas will be just cause for the Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*.

(C) Temporary Stream Crossings

Any crossing of streams within the limits of this project shall be accomplished in accordance with the requirements of Subarticle 107-13(B) of the *Standard Specifications*.

(D) Seeding and Mulching

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.

Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment. No appreciable time shall lapse into the contract time without stabilization of slopes, ditches and other areas within the Environmentally Sensitive Areas.

(E) Stage Seeding

The work covered by this section shall consist of the establishment of a vegetative cover on cut and fill slopes as grading progresses. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 6.1 meters in height measured along the slope, or greater than 0.8 hectares in area. Each stage shall not exceed the limits stated above.

Additional payments will not be made for the requirements of this section, as the cost for this work shall be included in the contract unit prices for the work involved.

**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

<b>Item</b>	<b>Section</b>
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 the detail in the plans and at locations as directed.

**Measurement and Payment**

*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*.

*Stone for Erosion Control, Class \_\_* will be measured and paid for in accordance with Articles 1610-4 and 1610-5 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*.

**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 Articles 1630-4 and 1630-5 of the *Standard Specifications*.

**SPECIAL SEDIMENT CONTROL FENCE:****Description**

This work consists of furnishing materials, and 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 6.35mm openings constructed from #24 gauge wire. Install hardware cloth in accordance with the detail in the plans.

**(C) Sediment Control Stone**

Sediment Control Stone shall meet the requirements of Section 1005 of the *Standard Specifications*. Install stone in accordance with the detail in the plans.

**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

*6.4mm Hardware Cloth* will be measured and paid for in accordance with Articles 1632-5 and 1632-6 of the *Standard Specifications*.

*Sediment Control Stone* will be measured and paid for in accordance with Articles 1610-4 and 1610-5 of the *Standard Specifications*.

### **SAFETY FENCE:**

#### **Description**

*Safety Fence* shall consist of furnishing materials, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary, or other boundaries located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland, endangered vegetations, culturally sensitive areas or water. The fence shall be installed prior to any land disturbing activities.

Interior boundaries for jurisdictional areas noted above shall be delineated by stakes and highly visible flagging.

Jurisdictional boundaries at staging areas, waste sites, or borrow pits, whether considered outside or interior boundaries shall be delineated by stakes and highly visible flagging.

#### **Materials**

##### **(A) Safety Fencing**

Polyethylene or polypropylene fence shall be a highly visible preconstructed safety fence approved by the Engineer. The fence material shall have an ultraviolet coating.

Either wood posts or steel posts may be used. Wood posts shall be hardwood with a wedge or pencil tip at one end, and shall be at least 1.5 m in length with a minimum nominal 51 mm x 51 mm cross section. Steel posts shall be at least 1.5 m in length, and have a minimum weight of 1.25 kg/m of length.

##### **(B) Boundary Flagging**

Wooden stakes shall be 1.2 m in length with a minimum nominal 19 mm x 45 mm cross section. The flagging shall be at least 25 mm in width. The flagging material shall be vinyl and shall be orange in color and highly visible.

## Construction Methods

No additional clearing and grubbing is anticipated for the installation of this fence. The fence shall be erected to conform to the general contour of the ground.

### (A) Safety Fencing

Posts shall be set at a maximum spacing of 3 m 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.

Place construction stakes to establish the location of the safety fence in accordance with Article 105-9 or Article 801-1 of the Standard Specifications. No direct pay will be made for the staking of the safety fence. All stakeouts shall be considered incidental to Construction Surveying.

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.

### (B) Boundary Flagging

Installation for delineation of interior boundaries shall consist of wooden stakes on 7.6 m maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 152 mm into the ground. Interior boundaries may be staked on a tangent that runs parallel to buffer but must not encroach on the buffer at any location. Interior boundaries of hand clearing shall be identified with a different colored flagging to distinguish it from mechanized clearing.

Installation for delineation of interior boundaries will be placed in accordance with Article 105-9 or Article 801-1 of the Standard Specifications. No direct pay will be made for delineation of the interior boundaries. All delineation shall be considered incidental to Construction Surveying.

Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall consist of wooden stakes on 7.6 m maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 152 mm into the ground. Additional flagging may be placed on overhanging vegetation to enhance visibility but does not substitute for installation of stakes.

Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Sub Article 230-4(B)(3)(d) or Sub Article 802-2(F) of the Standard Specifications. No direct pay will be made for delineation of any jurisdictional boundaries at staging areas, waste sites, or borrow pits. All delineation shall be considered incidental to Borrow Material or Disposal of Waste and Debris.

The Contractor shall be required to maintain alternative stakes and highly visible flagging 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 ~~feet~~<sup>meters</sup> 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 or coconut 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	9	%
Thickness	ASTM D6525	0.40 (10)	mm
Mass Per Unit Area	ASTM D6566	0.55 (0.293)	kg/m <sup>2</sup>
Tensile Strength	ASTM D6818	385 (572)	kg/m
Elongation (Maximum)	ASTM D6818	49	%
Resiliency	ASTM D1777	>70	%
UV Stability *	ASTM D4355	≥80	%
Porosity (Permanent Net)	ECTC Guidelines	≥85	%

Maximum Permissible Shear Stress (Vegetated)	Performance Bench Test	≥8.0 (39.1)	kg/m <sup>2</sup>
Maximum Allowable Velocity (Vegetated)	Performance Bench Test	≥16.0 (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 meters 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 3.35m/s
Weight	678g/SM
Size	100 SM
"C" Factor	0.002
Open Area (measured)	50%

### (B) Staples

Provide staples made of 3.18 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 9-gauge high-tension 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. The top height of the coir fiber baffles shall not be below the elevation of the emergency spillway base of dams and basins. Attach a 9-gauge high-tension 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:

<b>Pay Item</b>	<b>Pay Unit</b>
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 temporary slope drain pipe and coir fiber baffles, furnishing, installation and cleanout of Faircloth Skimmers or other approved equivalent device, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing fabric emergency spillway liner, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drain, coir fiber baffles, fabric liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

#### **Materials**

<b>Item</b>	<b>Section</b>
Stone for Erosion Control, Class B	1042
Fabric for Soil Stabilization, Type 4	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4



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Matting for Erosion Control	1060-8
Staples	1060-8
Temporary Slope Drain	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.

Provide Schedule 40 PVC pipe with a length of 2m to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 64mm and smaller, the arm pipe diameter shall be 38mm. For skimmer sizes of 76mm and larger, refer to manufacturer recommendation.

Provide 102mm diameter Schedule 40 PVC pipe to attach to coupling connection of Faircloth skimmer to serve as the barrel pipe through the earthen dam.

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. Install temporary slope drain pipe and construct the emergency spillway according to the Skimmer Basin with Baffles Detail sheet in the erosion control plans. Temporary slope drain pipe at inlet of basin may be replaced by fabric as directed. 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. Install 102mm Schedule 40 PVC pipe into dam on the lower side of basin 305mm from the bottom of the basin and according to the detail, and attach the 2m arm pipe to the coupling connection and Faircloth skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in skimmer basin. Take appropriate measures to avoid ice accumulation in the skimmer device. 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 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. If fabric for the emergency spillway is not one continuous piece of material, make horizontal 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 305 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. Fabric shall be placed to the bottom and across the entire width of the basin according to the Skimmer Basin with Baffles detail.

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.

*Fabric for Soil Stabilization* will be measured and paid for in accordance with Articles 270-4 and 270-5 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. *\_\_mm Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of *\_\_mm Skimmer* is considered incidental to the measurement of the quantity of *\_\_mm Skimmer* and no separate payment will be made. No separate payment shall be made if *\_\_mm Skimmer*, barrel and/or arm pipe are damaged by ice accumulation.

*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:

<b>Pay Item</b>	<b>Pay Unit</b>
__ 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 basins, installation of coir fiber baffles, installation of temporary slope drains, furnishing, installation and cleanout of Faircloth Skimmers or other approved equivalent device, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing fabric emergency spillway liners, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drains, coir fiber baffles, fabric liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

#### **Materials**

<b>Item</b>	<b>Section</b>
Stone for Erosion Control, Class B	1042
Fabric for Soil Stabilization, Type 4	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	1060-8
Temporary Slope Drain	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.

Provide Schedule 40 PVC pipe with a length of 2m to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 64mm and smaller, the arm pipe diameter shall be 38mm. For skimmer sizes of 76mm and larger, refer to manufacturer recommendation.

Provide 102mm diameter Schedule 40 PVC pipe to attach to coupling connection of Faircloth skimmer to serve as the barrel pipe through the earthen dam.

**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. Install temporary slope drains and construct the emergency spillways 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 152mm, or one radius

width of the temporary slope drain pipe, 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. Install 102mm Schedule 40 PVC pipe into dam on the lower side of basin 305mm from the bottom of the basin and according to the detail, and attach the 2m arm pipe to the coupling connection and Faircloth skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in skimmer basin. Take appropriate measures to avoid ice accumulation in the skimmer device. 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 spillways with 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. If fabric for emergency spillways is not one continuous piece of material, make horizontal 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 305 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. Fabric shall be placed to the bottom and across the entire width of the basin according to the Skimmer Basin with Baffles detail.

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.

*Fabric for Soil Stabilization* will be measured and paid for in accordance with Articles 270-4 and 270-5 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.     *mm Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of     *mm Skimmer* is considered incidental to the measurement of the quantity of     *mm Skimmer* and no separate payment will be made. No separate payment shall be made if     *mm Skimmer*, barrel and/or arm pipe are damaged by ice accumulation.

*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:

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

**EARTHEN DAM WITH SKIMMER:****Description**

Provide an earthen dam with a skimmer attached to a barrel pipe at the outlet of a proposed roadway ditch to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Earthen Dam with Skimmer Detail sheet provided in the erosion control plans. Work includes constructing earthen dam, installation of coir fiber baffles, furnishing, installation and cleanout of Faircloth Skimmer or other approved equivalent device, providing and placing stone pad on bottom of ditch underneath skimmer device, providing and placing fabric emergency spillway liner, providing coir fiber mat stabilization for the skimmer outlet, removing earthen dam, coir fiber baffles, fabric liner and skimmer device, and disposing of excess materials.

**Materials**

<b>Item</b>	<b>Section</b>
Stone for Erosion Control, Class B	1042
Fabric for Soil Stabilization, Type 4	1056
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.

Provide Schedule 40 PVC pipe with a length of 2m to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 64mm and smaller, the arm pipe diameter shall be 38mm. For skimmer sizes of 76mm and larger, refer to manufacturer recommendation.

Provide 102mm diameter Schedule 40 PVC pipe to attach to coupling connection of Faircloth skimmer to serve as the barrel pipe through the earthen dam.

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 proposed ditch according to the roadway plans and cross sections with ditch surface free of obstructions, debris, and pockets of low-density material. Construct earthen dam and install the emergency spillway according to the Earthen Dam with Skimmer 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. Accumulated silt behind the earthen dam and baffles shall be removed regularly and as directed.

Install Faircloth skimmer or other approved equivalent device according to manufacturer recommendations. Install 102mm Schedule 40 PVC pipe into dam on the lower side of basin 305mm from the bottom of the basin and according to the detail, and attach the 2m arm pipe to the coupling connection and Faircloth skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water impounded in the ditch. Take appropriate measures to avoid ice accumulation in the skimmer device. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of ditch. 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 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. If fabric for the emergency spillway is not one continuous piece of material, make horizontal 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 305 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. Fabric shall be placed to the bottom and across the entire width of the ditch according to the Earthen Dam with Skimmer Detail.

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.

### **Measurement and Payment**

The construction of the earthen dam will be paid for as *Borrow Excavation* as provided in Section 230 of the *Standard Specifications* or included in the lump sum price for grading.

*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 ditch as shown on the final approved plans.

*Fabric for Soil Stabilization* will be measured and paid for in accordance with Articles 270-4 and 270-5 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. \_\_mm Skimmer will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of \_\_mm Skimmer is considered incidental to the measurement of the quantity of \_\_mm Skimmer and no separate payment will be made. No separate payment shall be made if \_\_mm Skimmer, barrel and/or arm pipe are damaged by ice accumulation.

*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*.

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

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
__mm Skimmer	Each
Coir Fiber Mat	Square Meter

**TEMPORARY ROCK SILT CHECK TYPE A WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM):**

**Description**

Temporary Rock Silt Checks Type A with Excelsior Matting and Polyacrylamide (PAM) are devices utilized in temporary and permanent ditches to reduce runoff velocity and incorporate PAM into the construction runoff to increase settling of sediment particles and reduce turbidity of runoff. Temporary Rock Silt Checks Type A with Excelsior Matting and PAM 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 Temporary Rock Silt Checks Type A, matting installation, PAM application, and removing Temporary Rock Silt Checks Type A with Excelsior Matting and PAM.

**Materials**

Structural stone shall be class B stone that meets the requirements of Section 1042 of the Standard Specifications for Stone for Erosion Control, Class B.

Sediment control stone shall be #5 or #57 stone, which meets the requirements of Section 1005 of the Standard Specifications for these stone sizes.

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

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each Temporary Rock Silt Check Type A. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

**Construction Methods**

Temporary Rock Silt Checks Type A shall be installed in accordance with Section 1633-3(A) of the Standard Specifications, Roadway Standard Drawing No. 1633.01 and the detail provided in the plans.

Installation of matting shall be in accordance with the detail provided in the plans, and anchored by placing Class B stone on top of the matting at the upper and lower ends.

Apply PAM at a rate of 100 grams over the center portion of the Temporary Rock Silt Checks Type A and matting where the water is going to flow over. PAM applications shall be done during construction activities and after every rainfall event that is equal to or exceeds 12 mm.

The Contractor shall maintain the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM until the project is accepted or until the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are removed, and shall remove and dispose of silt accumulations at the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

**Measurement and Payment**

*Temporary Rock Silt Checks Type A* will be measured and paid for in accordance with section 1633-5 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

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 <sup>kilograms</sup> ~~grams~~ of PAM applied to the Temporary Rock Silt Checks Type A. 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:

<b>Pay Item</b>	<b>Pay Unit</b>
Polyacrylamide(PAM)	Kg

**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 fabric liner, maintaining the diversion area in an acceptable condition, removing 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
Fabric for Soil Stabilization, Type 4	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 3.05 mm 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.

## 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.

*Fabric for Soil Stabilization* will be measured and paid for in accordance with Articles 270-4 and 270-5 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 feet (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:

<b>Pay Item</b>	<b>Pay Unit</b>
Impervious Dike	Linear Meter

**TEMPORARY PIPE FOR CULVERT CONSTRUCTION:**

**Description**

This work consists of furnishing, installing, maintaining and removing any and all temporary pipe used on this project in conjunction with the culvert construction.

**Construction Methods**

The Contractor shall install temporary pipe in locations shown on the plans in such a manner approved by the Engineer. The temporary pipe shall provide a passageway for the stream through the work-site. The minimum size requirements will be as stated on the erosion control plans.

**Measurement and Payment**

    mm *Temporary Pipe* will be measured and paid for at the contract unit price per linear meter of temporary pipe approved by the Engineer and measured in place from end to end. Such price and payment will be full compensation for all work covered by this

section including but not limited to furnishing all materials required for installation, construction, maintenance, and removal of temporary pipe.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
__ mm Temporary Pipe	Linear Meter

### **SPECIAL STILLING BASIN:**

#### **Description**

This work consists of furnishing, placing, and removing special stilling basin(s) as directed. The special stilling basin can be used to filter pumped water during construction of drilled piers, footing excavation, and/or culvert construction. The special stilling basin can also be used for sediment storage at the outlet of temporary slope drain pipe(s).

#### **Materials**

Refer to DIVISION 10

<b>Item</b>	<b>Section</b>
Filter Fabric for Drainage, Type 2	1056
Sediment Control Stone	1005

The filter fabric and sediment control stone shall be clean and shall not contain debris.

The special stilling basin shall be a water permeable fabric bag that traps sand, silt, and fines as sediment-laden water is pumped into it, or as runoff flows into it through the temporary slope drain pipe(s).

The special stilling basin shall be a bag constructed to a minimum size of 3 meters x 4.6 meters made from a nonwoven fabric. It shall have a sewn-in 203 mm 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:

<b>Test Method</b>	<b>Minimum Specifications</b>
ASTM D-4884	10.7 kg/cm

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:

<b>Property</b>	<b>Test Method</b>	<b>Minimum Specifications</b>
Weight	ASTM D-3776	248.03 g/m

Grab tensile	ASTM D-4632	90.72 kg
Puncture	ASTM D-4833	58.97 kg
Flow rate	ASTM D-4491	0.47 l/s/m <sup>2</sup>
Permittivity	ASTM D-4491	1.2 l/sec
UV Resistance	ASTM D-4355	70.0%

### Construction Methods

The Contractor shall install the special stilling basin(s), filter fabric, and stone in accordance with Standard Drawing No. 1630.06 and at locations on the plans and as directed. The special stilling basin(s) shall be placed on level ground.

The special stilling basin(s) shall be constructed such that it is portable and can be used adjacent to each drilled pier, footing and/or culvert, as required by the project commitments. If needed, temporary slope drain pipe(s) or pump discharge hoses will be attached to the special stilling basin(s) to divert runoff or pumped effluent directly into the special stilling basin(s). The special stilling basin may be cut to allow slope drain pipe to be inserted if needed and tied off tightly. The remaining sleeve or spout of the bag, if present, may be used to connect more than one special stilling basin in series as directed. If not used in this manner, the sleeve shall be tied off tightly to allow the bag to contain the effluent and force it to filter through the sides of the special stilling basin. The special stilling basin(s) shall be placed so the incoming runoff or pumped effluent flows into and through it without causing erosion to adjacent slopes or streambanks. In areas of turbidity and water quality concern, the special stilling basin(s) shall be placed up grade and its runoff directed into a sediment control measure before being allowed to discharge into jurisdictional waters.

The special stilling basin(s) shall be replaced and disposed of when it is  $\frac{3}{4}$  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 shall 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, footing excavation, and/or culvert construction. A sufficient quantity of special stilling basins shall be provided to contain sediment from temporary slope drain runoff.

### Measurement and Payment

*Special Stilling Basin* will be measured and paid as the actual number of bags used during temporary slope drain installation, drilled pier construction, footing excavation, and/or culvert construction as specified and accepted.

*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*.



*Sediment Control Stone* will be measured and paid for in accordance with Articles 1610-4 and 1610-5 of the *Standard Specifications*.

Such price and payment will be full compensation for all work covered by this section, 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.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Special Stilling Basin	Each

### **POLYACRYLAMIDE (PAM) DOSING OF PUMPED EFFLUENT:**

#### **Description**

This work consists of furnishing PAM, solution, mixing tank(s), hose(s), pump(s), and power source for the pump(s) for the purpose of adding PAM to the pumped effluent from a culvert construction site and into a special stilling basin or stilling basin. The Contractor shall install, maintain, and remove all equipment from construction site after the culvert is completed.

#### **Materials**

Acceptable materials shall include but not be limited to mixing tank(s), hose(s), pump(s), and power source sufficient to incorporate PAM into pumped effluent from the culvert construction site.

The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

#### **Construction Methods**

The dosing rate of the PAM into the pumped effluent shall be 5 mg per liter and as directed. The PAM shall be mixed in a tank at the recommended dosing rate, and then pumped into the intake hose at the location of the culvert construction site. See the following website for additional construction guidelines:

<http://www.soil.ncsu.edu/publications/Soilfacts/AG439-68W.pdf>

#### **Measurement and Payment**

Solution, mixing tank(s), hose(s), pump(s), and power source for the pump(s) is considered incidental to this work and no separate payment will be made. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, and removal.

*Polyacrylamide(PAM)* will be measured and paid for by the actual weight in ~~grams~~ <sup>Kilograms</sup> of PAM applied to the pumped effluent. 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:

<b>Pay Item</b>	<b>Pay Unit</b>
Polyacrylamide(PAM)	Kg

**STREAM CHANNEL RELOCATION LIMITATIONS:**

The following sequence of construction shall be followed in the areas designated on the plans as stream relocations. Failure on the part of the Contractor to follow this sequence, and complete each step prior to proceeding in this area as specified, will be just cause for

the Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*.

- (A) Clear, but do not grub area within the Environmentally Sensitive Area on the existing stream to be relocated.
- (B) Construct and stabilize, with vegetation or erosion control materials sufficient to restrain erosion, the proposed stream channel relocation as shown on the plans.
- (C) Divert water into newly constructed channel only after it has been stabilized and approved.
- (D) Begin grubbing and/or grading within the Environmentally Sensitive Area of the existing stream.

The Contractor shall perform seeding and mulching and install erosion control matting to all cut/fill slopes adjacent to stream relocations in accordance with the contract.

The above requirements apply to the stream channels being constructed at the following stations:

- Approx. -L- Sta. 314+04 to 315+67
- Approx. -Y30- Sta. 10+28 to 10+98
- Approx. -Y33- Sta. 9+86 to Sta. 10+40
- Approx. -Y32- Sta. 9+86 to Sta. 10+34

**STREAMBANK REFORESTATION:**

**Description**

*Streambank Reforestation* will be planted in areas designated on the plans and as directed. See the Streambank Reforestation Detail Sheets.

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

## Materials

### Live Stakes:

*Type I Streambank Reforestation* shall be live stakes, planted along both streambanks. Live stakes shall be 13mm - 51mm in diameter. Stakes shall also be 0.6 meter - 0.9 meter in length.

Live staking plant material shall consist of a random mix made up of 50% Silky Willow (*Salix sericea*) and 50% Silky Dogwood (*Cornus amomum*). Other species may be substituted upon approval of the Engineer. All plant material shall be harvested locally (within the same physiographic ecoregion and plant hardiness zone) or purchased from a local nursery, with the approval of the Engineer. All live stakes shall be dormant at time of acquisition and planting.

### Coir Fiber Matting:

Provide matting that meets 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%

Staples, stakes, or reinforcement bars shall be used as anchors and shall meet the following requirements:

### 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.

**Bare Root Seedlings:**

*Type II Streambank Reforestation* shall be bare root seedlings 305mm – 457mm tall.

**Construction Methods**

Coir fiber matting shall be installed on the streambanks where live staking is to be planted as shown on the Streambank Reforestation Detail Sheets and in locations as directed. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber mat.

Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the matting with the soil. Place the matting immediately upon final grading and permanent seeding. Take care to preserve the required line, grade, and cross section of the area covered.

Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Bury the top slope end of each piece of matting in a narrow trench at least 152mm deep and tamp firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upper roll over the buried end of the second roll so there is a 152mm overlap. Construct check trenches at least 305mm deep every 15.2 meters longitudinally along the edges of the matting, or as directed. Fold over and bury matting to the full depth of the trench, close and tamp firmly. Overlap matting at least 152mm where 2 or more widths of matting are installed side by side.

Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the Streambank Reforestation Detail Sheets and as directed. Place anchors across the matting at ends, junctions, and check trenches approximately 0.3 meter apart. Place anchors down the center of each strip of matting 0.9 meter apart. Place anchors along all lapped edges 0.3 meter apart. Refer to the Streambank Reforestation Detail Sheets for anchoring pattern. The Engineer may require adjustments in the trenching or anchoring requirements to fit individual site conditions.

During preparation of the live stakes, the basal ends shall be cleanly cut at an angle to facilitate easy insertion into the soil, while the tops shall be cut square or blunt for tamping. All limbs shall be removed from the sides of the live cutting prior to installation.

Live stakes shall be installed within 48 hours of cutting. Outside storage locations should be continually shaded and protected from wind and direct sunlight. Live cut plant material shall remain moist at all times before planting.

Stakes shall be spaced approximately 1.2 meters on center. Live stakes shall be installed according to the configuration presented on the Streambank Reforestation Detail Sheets.

Tamp live stakes perpendicularly into the finished bank slope with a dead blow hammer, with buds oriented in an upward direction. Stakes should be tamped until approximately 3/4 of the stake length is within the ground. The area around each live stake shall be compacted by foot after the live stake has been installed.

25mm – 51mm shall be cut cleanly off of the top of each live stake with loppers at an angle of approximately 15 degrees following installation. Any stakes that are split or damaged during installation shall be removed and replaced.

The bare root seedlings shall be planted as soon as practical following permanent *Seeding and Mulching*. The seedlings shall be planted from top of bank out, along both sides of the stream, as designated on the plans.

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: Streambank reforestation shall be planted from November 15 through March 15.

**Measurement and Payment**

*Streambank Reforestation* will be measured and paid for as the actual number of hectares of land measured along the surface of the ground, which has been acceptably planted in accordance with this section.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Streambank Reforestation	Hectare

## **IMPERVIOUS SELECT MATERIAL:**

### **Description**

This work consists of furnishing, stockpiling, placing and maintaining impervious select material for stream plugs in locations as shown on the plans and cross-sections or as directed.

The quantity of impervious select material to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of impervious select material 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.

### **Materials**

Materials that will function as impervious barriers to water movement shall be a silty or clay soil material meeting the requirements of AASHTP M 145 for soil classification A-2, A-6 and A-7 provided such materials do not have a Liquid Limit (LL) greater than 50. To maintain soil workability for placement and compaction, the following criteria shall apply for Plasticity Index (PI):

<u>Position of Borrow Material</u>	<u>Constraints on Plasticity Index (PI)</u>
Below the water table	Must be greater than 7 and less than 25
Above the water table	Must be greater than 7 and less than 35

Plasticity Index shall be determined in accordance with AASHTO T90 and the Liquid Limit shall be determined in accordance with AASHTO T89. The Contractor is cautioned that soils tend to become less workable as the PI increases above 20. Although a PI of 35 may be acceptable, the Contractor should be aware that additional efforts might be necessary to work the soil in order to achieve the minimum compaction standards.

### **Construction Methods**

Impervious select material for stream plugs shall be constructed at locations as shown on the plans and cross-sections or as directed. Impervious select material for stream plugs shall be used at the outlet end of uncompacted channel fills, and may be used at other locations to provide surface drainage relief from the uncompacted fills.

#### **(A) Clearing and Grubbing**

Clear and Grub the stream plug cross-section on all sides to remove all vegetation and root mat material as directed to an elevation at least 0.3 m. below the elevation of the existing channel cross-section.

**(B) Construction**

Construct the stream plug using material that meets the requirements of the Materials section listed above. Construct the stream plug to the dimensions detailed on the plans.

**Measurement and Payment**

*Impervious Select Material* will be measured and paid for as the actual number of cubic meters of material, measured in their original position and computed by the average end area method, which has been acceptably excavated in accordance with the plans and specifications. Original cross-sections for the determination of the excavation quantities will be taken before any grading begins. Final cross-sections will be taken after the excavation has been completed, except that the plan typical sections will be used for the final cross-sections where, in the opinion of the Engineer, the work has been constructed in reasonably close conformity to the plan typical section. Original and final cross-sections will be taken by either ground or aerial survey methods, as determined by the Engineer.

Such price and payment will be full compensation for all work covered by this section, including but not limited to furnishing the source of the impervious select material, providing and implementing a development, use and reclamation plan; building, maintaining and obliterating haul roads; clearing and grubbing the source; removal and disposition of overburden and other unsuitable material; excavation; hauling; restoration of the source and haul roads to an acceptable condition, seeding and mulching and maintaining the work.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Impervious Select Material	Cubic Meters

**STREAM PLUG:****Description**

This work consists of the construction, maintenance, and removal of physical barriers placed in ditches, diversions or swales to reduce water flow.

The quantity of stream plugs to be constructed will be affected by the actual conditions that occur during the construction of the project. The quantity of stream plugs 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.

## Materials

Stream plugs shall consist of *Impervious Select Material* that shall meet the specifications as provided elsewhere in this contract.

## Construction Methods

Stream plugs shall be constructed at locations as shown on the plans or as directed. Clear and grub all side slopes of the channel. Place stream plug in channel ensuring that there is at least 1.5 m. of embankment material between the plug and the face of the restored stream bank. Construct the stream plug across the entire width of the channel and to an elevation of 1 m below the proposed fill elevation as shown on the plans. The length of the stream plug is to be a minimum of 3 m and a maximum of 5 m.

## Measurement and Payment

Stream plugs will not be measured for payment under this article. *Impervious Select Material* will be measured and paid for as provided elsewhere in this contract. This payment shall be considered full compensation for all materials, labor, equipment, and incidentals necessary to construct the stream plug.

The removal and disposal of silt accumulations will be measured and paid for as *Silt Excavation* in accordance with Article 1630-4 of the *Standard Specifications*.

## STRUCTURE STONE:

### Description

This work consists of furnishing, stockpiling, placing and maintaining approved stone used to construct rock cross-vanes, rock vanes, j-hook vanes, w-rock cross vanes, log vanes, root wad/log vanes, log cross vanes, root wad structures, rock cross vanes for step pools, channel blocks, double wing deflectors, single wing deflectors, stream crossings, rock energy dissipaters, constructed riffles, and for use in other locations as directed.

The quantity of stone to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of stone 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.

### Materials

Refer to Division 10

Item	Section
No. 57 Stone	1005
Riprap, Class A, B, 1, and 2	1042



## Filter Fabric for Drainage, Type 2

1056

Boulders shall meet the requirements of Section 1042 of the *Standard Specifications*. Boulders of minimum dimension 1.2 m x 0.9 m x 0.6 m shall be individually picked for use in the structures. Boulders shall be relatively flat on either side in the same dimension, preferably the long dimension.

### Construction Methods

The Contractor shall place filter fabric and stone in locations and to the thickness, widths, and lengths as shown on the plans or as directed. All stone shall be placed to form a sediment and erosion control device, an in-stream structure, or a channel lining neatly and uniformly with an even surface in accordance with the contract and shall meet the approval of the Engineer.

### Measurement and Payment

*No. 57 Stone* will be measured and paid as the actual number of tons that have been incorporated into the work, or have been delivered to and stockpiled on the project as directed. *No. 57* stone that has been stockpiled will not be measured a second time.

*Riprap, Class \_\_* will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

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

*Boulders* will be measured and paid for as the actual number of tons that have been incorporated into the work, or have been delivered to and stockpiled on the project as directed. Stone that has been stockpiled will not be measured a second time.

Such price and payment will be full compensation for all work covered by this section, including but not limited to furnishing, weighing, stockpiling, re-handling, placing, and maintaining the stone and disposal of any materials not incorporated into the project.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
No. 57 Stone	Metric Ton
Boulder	Metric Ton

**ROCK CROSS VANE:****Description**

This work consists of the construction and maintenance of physical barriers placed in and along the stream at locations designated on the plans to direct the stream flow (thalweg) toward the center of the channel and to provide grade control.

The quantity of rock cross vanes to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of rock cross vanes 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.

**Materials**

Refer to Division 10

<b>Item</b>	<b>Section</b>
Boulder	1042 and SP for Structure Stone
No. 57 Stone	1005
Riprap, Class A	1042-1
Filter Fabric for Drainage, Type 2	1056

Boulders shall be used as header and footer rocks for this device.

**Construction Methods**

Rock cross vanes shall be constructed in accordance with the Rock Cross Vane Detail shown in the plans or as directed. Two vanes, each approximately 1/3 of the stream channel's bankfull width, will form a 20°– 30° angle out from the streambank toward upstream. The top elevation of both vanes will decrease from bankfull elevation toward the center of the channel at a slope of 4 to 10 percent. A vane running perpendicular to the stream's flow will connect the two outside vanes on the upstream end. Install header and footer rocks according to the detail and plate the upstream side with Type 2 filter fabric and No. 57 stone. Voids between the header and footer rocks can be filled with hand-placed Class A riprap as directed. Footer rocks shall be placed such that the header rock is at streambed elevation. The rock cross vane shall be keyed into the bank at the downstream end as shown on the Rock Cross Vane Detail.

**Measurement and Payment**

*Boulders* will be measured and paid for as provided elsewhere in this contract.

*No. 57 Stone* will be measured and paid for as provided elsewhere in this contract.

*Riprap, Class \_\_* will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

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

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 construct the rock cross vanes.

### **PUMP AROUND OPERATION:**

#### **Description**

The work covered by this section consists of furnishing, installing, maintaining and removing any and all pump around systems used on this project. The Contractor shall install a pump around system in locations chosen by the contractor and approved by the Engineer. The pump around system shall provide a passageway for the stream flow around the work site.

The quantity of pump around systems 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. See example pump around operation detail on the plans.

#### **Construction Methods**

Install a temporary impervious dike as shown on the detail. Pump water around the work site. If the water is turbid or exposed to bare soil, pump through a special stilling basin. Follow detail for the pump around operation. Once the work is complete in an area remove the impervious dike and pump system. Place structures in the area and stabilize immediately following removal of pump around system.

#### **Measurement and Payment**

Temporary impervious dikes will be considered incidental to the pump around operation.

The pump around operation will be measured and paid for as lump sum for Diversion Pumping. This measurement shall include multiple installations and removals of the pump around system.

The above prices and payments will be full compensation for all work covered by this section including, but not limited to furnishing all of the necessary materials, construction, maintenance and removal of the impervious dike and pump around system.

Payment will be made under:

**Pay Item****Pay Unit**

Diversion Pumping for Mitigation

Lump Sum

**JAPANESE KNOTWEED TREATMENT:**

All Japanese Knotweed (*Polygonum cuspidatum*) populations located in the project corridor shall be treated with herbicides by NCDOT State Forces. Any Japanese Knotweed populations disturbed by construction activities shall have the plant material and soil with root mass buried 2 meters under fill or in waste areas. Contact Roadside Environmental Field Operations Engineer for plant identification.

**TEMPORARY SILT FENCE:****(10-19-10)**

Revise the *Standard Specifications* as follows:

Page 16-1, **Subarticle 1605-2(C) Filter Fabric**, replace the only sentence with the following:

Provide Type 3 Engineering Fabric meeting the requirements of Section 1056 of the *Standard Specifications*.

Page 16-1, **Article 1605-3 INSTALLATION**, replace the third sentence with the following:

Filter fabric may be used without woven wire fence backing in accordance with the following conditions:

Page 16-1, **Subarticle 1605-3(B) Post spacing is inclined.....**, replace first item in list with the following:

- (1) Attach filter fabric to the post with wire or other acceptable methods.