

**PROJECT SPECIAL PROVISIONS**

**WETLAND AND STREAM RESTORATION**

**KEY BRANCH MITIGATION SITE  
ANSON COUNTY, NORTH CAROLINA**

**STATE PROJECT NUMBER: 6.589013T  
T.I.P.: R-2231WM**

**Prepared By:**

**KCI Associates of North Carolina, P.A.  
Landmark Center One, Suite 200  
4601 Six Forks Road  
Raleigh, North Carolina 27609-5210**

*Seal*

---

*Signature*

*Date*

**I. GENERAL SPECIFICATIONS**

1. All restoration operations shall be conducted in accordance with the procedures identified within these special provisions and the 2002 NCDOT Standard Specifications Manual.
2. In the event of an inadvertent conflict between any of these documents, the contractor will give primary importance to these special provisions as well as the drawings and details provided in the Project Plan Set.
3. There is no subsurface information available for this project. The Contractor shall make his/her own investigation of subsurface conditions.
4. The Contractor is responsible for clearing and removal of any fallen trees or any man-made objects that lie within construction limits, as directed by the Engineer.
5. No waste material shall be taken from the mitigation site unless directed by the Engineer.

**II. CONSTRUCTION SEQUENCING**

The following construction sequence shall be followed by the Contractor unless otherwise approved by the Engineer:

1. Install stabilized construction entrance as necessary.
2. Prepare staging areas.
3. Stakeout limits of disturbance (NCDOT).
4. Stakeout limits of operation, specifically the clearing and grubbing limits and sensitive areas.
5. Install necessary sediment and erosion control measures according to the plans and specifications herein.
6. Perform dewatering operations related to existing section of Key Branch that is to be restored by diverting all flows in to existing canal that leads to Brown Creek. In addition, place channel block at point where existing Key Branch planform ties in to existing lateral ditch along western property boundary.
7. Perform mowing operations as indicated on the limits of operation plan sheets or as directed by the Engineer.
8. Perform clearing and grubbing operations in the areas indicated on the limits of operation plan sheets (see Clearing and Grubbing special provision). Salvage hardwood trees with a 12" or greater basal diameter for use as root wad in-stream structures (see Root Wad special provision).
9. Stakeout wetland baseline of construction.
10. Grade site to proposed wetland contours WITHOUT excavating any proposed stream channels. It is suggested that work be initiated in the westernmost portion of the property, to allow the layout of the stream as the grading is completed. Install ditch plugs and fill ditches with compacted on-site cut material (if it meets the fill requirements outlined in these special provisions) or select borrow material as directed by the Engineer. DO NOT FILL THE MAIN DITCH THAT TRANSECTS THE SITE NOR THE EXISTING TRIBUTARY STREAM CHANNEL.
11. Excavate and stabilize the banks of the proposed levee breaks along Brown Creek as indicated in the plans.
12. Stake out the stream alignment, stream offsets (as grade stakes) and location of in-stream structures for the stream. This work can be conducted simultaneously with the wetland grading, once wetland grading has been completed on a portion of the project site.
13. Excavate proposed stream beginning at Station 10+50. Stockpile cut material adjacent to the main ditch that transects the property. This material will be used for backfilling, when water is directed onto the site. In-stream structures and erosion control measures (seeding and mulching) shall be installed at their designated locations and elevations, in accordance with the plans and specifications, in an orderly fashion as construction continues downstream, producing a finished work product. DO NOT direct flow into the constructed channel at this time.

14. Construct the tie-in of the proposed stream planform with the existing channel at the upstream limits of the site (from Station 10+00 to 10+50). After this connection is completed, remove the temporary diversion, install the specified channel blocks, and backfill the existing bypass canal per the grading ("ditch filling") special provision.
15. Dispose of or permanently stockpile and stabilize any waste material not used to fill ditches and abandoned channels as directed by the Engineer.
16. Rip and Disc the areas indicated on the limits of operation plan sheets.
17. Install fencing, gates, and signage in accordance with these provisions as indicated in the plans and as directed by the Engineer.
18. Remove the staging areas that were used for construction.
19. Perform site clean up, removing all foreign materials.

### **III. SITE PREPARATION PRIOR TO GRADING OPERATIONS**

#### **A. Stabilized Construction Entrance**

**Description:**

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

**Materials:**

The filter fabric shall meet the requirements of NCDOT Standard Specifications, Section 1056 for Type 2 fabric.

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

**Construction Methods:**

The Contractor shall install a Stabilized Construction Entrance in accordance with the details in the plans and at the entrance to the site off of Lower White Store Road as directed by the Engineer. Damage to any existing surface roads, gates, or vegetation, adjacent to the designated entrances, shall be repaired by the Contractor to a condition equal to the pre-construction condition. The Contractor shall be solely responsible for the cost of such repairs, and these costs shall not be part of this contract.

**Method of Measurement:**

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

**Basis of Payment:**

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

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

Payment for grading the stabilized construction entrance shall be covered under the contract lump sum price for "Grading".

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

Payment will be made under:

Filter Fabric for Drainage.....Square Yard (SY)  
 Stone for Erosion Control, Class A.....Ton  
 Grading.....Lump Sum (LS)

**B. Staging Areas**

To limit disturbance of soils on site, the Contractor shall restrict the storage and refueling of all construction equipment to the allowable areas shown on plans. Prior to construction activities, the Contractor shall identify and mark the boundaries of all staging areas by using a highly visible tape, silt fencing, or orange boundary fencing, as directed by the Engineer.

**C. Clearing and Grubbing**

**Description:**

Clearing and grubbing operations shall be performed as indicated on the Limits of Operation plan sheets, in accordance with Section 200 of the 2002 Standard Specifications as directed by the Engineer and the following provision.

The Contractor shall salvage hardwood trees with a 12” or greater basal diameter. These trees shall be cut into 12-15’ lengths, beginning at the root ball, and all branches shall be removed. These trees will serve as the materials for the root wad in-stream structure installations.

**Basis of Payment:**

Payment for all work covered by this section will be paid for at the contract lump sum price for “Clearing and Grubbing.”

Payment will be made under:

Clearing and Grubbing .....Lump Sum (LS)

**D. Mowing**

**Description:**

The mitigation site shall be mowed with a rotary type mower to remove all standing vegetation within the area depicted in the plan sheets, according to Section 1660 of the 2002 Standard Specifications, and as directed by the Engineer. The minimum mowing height on this project shall be six inches (150 mm).

**Method of Measurement:**

The quantity of mowing to be paid for will be the actual number of acres, measured along the surface of the ground, which have been mowed.

**Basis of Payment:**

The quantity of mowing measured as provided for above, will be paid for at the contract unit price per acre for “Mowing”.

Payment will be made under:

Mowing .....Acre (AC)

**IV. SITE GRADING AND RELATED OPERATIONS**

**A. Grading**

**Description:**

**Site Grading**

The Contractor shall perform grading as necessary to attain final surface elevations as shown on the Grading Plans (Sheets 12-15) and in the details. Field modifications shall be approved by the Engineer. Final grades shall meet the grading plan and stream dimensions within a tolerance of +/- 0.2 feet (2.4 inches). Cut material that meets specified soil requirements shall be used to backfill ancillary ditches on the site.

**Stream Excavation/Ditch Filling**

Material from the excavation of the new stream channel shall be stockpiled adjacent to the main ditch that transects the property. The main ditch shall remain open for the entirety of the project. Upon completion of all grading and ripping activities, the excavated material shall be used to backfill the main ditch at the direction of the Engineer.

In areas where ditches are to be filled, the Contractor shall comply with the requirements of Section 235-4(C) of the 2002 Standard Specifications. Organic material shall not exceed 10% of the total volume of the fill material used. No compaction shall be performed for graded areas unless directed by the Engineer.

Excess material shall be disposed of as directed by the Engineer.

**Basis of Payment:**

All work completed under this section will be paid for at the contract lump sum price for "Grading."

Payment will be made under:

Grading.....Lump Sum (LS)

**B. Impervious Select Material (Ditch Plugs)**

**Description:**

In locations where the plans specify that impervious "ditch plugs" be installed, the Contractor shall:

1. Clear and grub the ditch plug cross-section on all sides to remove all vegetation and root mat material as directed by the Engineer, to an elevation which is at least one foot below the elevation of the existing ditch cross-section.
2. Construct the ditch plug to the dimensions detailed in the plans.
3. Construct the ditch plug using material that meets the requirement of the Impervious Select Material section of these specifications.
4. After all ditch plug construction operations are complete, the contractor shall stake the ditch plug locations on the ground to prevent any final ripping or discing of these areas.

**Soil Characteristics:**

Materials that will function as impervious barriers to water movement shall be a silty or clayey soil material meeting the requirements of AASHTO 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):

Position of borrow material:	Constraints on Plasticity Index (PI)
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 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 may be necessary to work the soil in order to achieve minimum compaction standards).

**Method of Measurement**

The quantity of impervious select material to be paid for will be the actual number of cubic yards of approved material, measured by cross-sectioning and computing by the average end area method, that has been incorporated into the completed and accepted work. No measurement will be made of any overburden or unsuitable material used.

**Basis of Payment:**

Payment for the complete installation of all "ditch plugs" as indicated on the plans and measured as provided for above, will be paid for at the contract unit price per cubic yard for "Impervious Select Material."

Payment will be made under:

Impervious Select Material .....Cubic Yard (CY)

**Separate Excavations to Place Select Material:**

No separate payment will be made for the excavation necessary to construct ditch plugs, ditch constrictions, impervious berms, or any other feature that is constructed with select material, as the cost of same shall be included in the price per cubic yard for "impervious select material."

**C. Ripping**

**Description:**

Ripping shall be performed in all areas identified on the Limits of Operation Plans (Sheets 8-11). These areas shall be ripped with a "V" Ripper tillage tool to a minimum depth of fifteen (15) inches, as directed by the Engineer.

Ripping shall NOT be performed within the specified stream corridor, within the Duke Power right-of-ways, in the proposed floodplain pools, and at the locations where ditch plugs were installed.

**Method of Measurement:**

The quantity of ripping to be paid for will be the actual number of acres, measured along the surface of the ground, which have been ripped.

**Basis of Payment:**

The quantity of ripping, measured as provided above, will be paid at the contract unit price per acre for "Ripping."

Payment will be made under:

Ripping.....Acre (AC)

**D. Discing**

**Description:**

Discing shall be performed in all mowed areas and all areas that have been ripped, as indicated on the Limits of Operation Plans (Sheets 8-11), or as directed by the Engineer. The disc harrow equipment shall be either a tandem disc harrow or an offset disc harrow with a minimum of 18 blades, and sufficient weight and size to provide the eight (8) inch minimum cutting depth and mixing of vegetation debris.

**Method of Measurement:**

The quantity of discing to be paid for will be the actual number of acres, measured along the surface of the ground, which have been disc'd.

**Basis of Payment:**

The quantity of discing, measured as provided above, will be paid at the contract unit price per acre for "Discing."

Payment will be made under:

Discing .....Acre (AC)

**V. STREAM RESTORATION**

**A. Stone**

**Description:**

The work covered in this section consists of furnishing, stockpiling, placing and maintaining an approved stone to be used in the construction of Cross Vane, J-Vane, and Step Pool in-stream structures and for use in other locations as directed by the Engineer.

**Materials:**

Rock material for "Stone, Class II" and "Stone, Boulder," shall consist of blasted stone or other stone approved by the Engineer. The stone shall be sound, tough, dense, resistant to the action of air and water, and suitable in all other respects for the purpose intended.

"Stone" shall meet the following requirements regarding the equivalent class and size distribution:

**ACCEPTANCE CRITERIA FOR STONE**

CLASS EQUIVALENT	REQUIRED STONE SIZES - INCHES		
	Minimum	Midrange	Maximum
II	10	16	22
Boulder	24	30	36

No more than 5% of the material furnished can be less than the minimum size specified nor no more than 10% of the material can exceed the maximum size specified. The size of an individual stone will be determined by measuring its diameter across any axis, and shall be satisfactory if it falls within the acceptable dimensions.

**Construction Methods:**

The Contractor shall place the stone in the constructed stream channels at the locations shown on the plans, to the thickness, widths, and lengths as shown on the plans, or as directed by the Engineer.

All "Stone" shall be placed neatly and uniformly with an even surface to form a natural-like streambed, in accordance with the details in the plans and shall meet the approval of the Engineer.

**Method of Measurement:**

The quantity of "Stone" to be paid for will be the actual number of tons of each class of stone which has been incorporated into the work, or has been delivered to and stockpiled on the project as directed by the Engineer. "Stone" that has been stockpiled will not be measured a second time. The stone will be measured by being weighed in trucks on certified platform scales or other certified weighing devices.

**Basis of Payment:**

The quantity of "Stone," measured as provided above, will be paid for at the contract unit price per ton for "Stone, Class II" and "Stone, Boulder." Such price will be full compensation for all work covered by this section, including but not limited to furnishing, weighing, stockpiling, rehandling, placing, and maintaining stone; and disposal of any stone not incorporated into the project if directed by the Engineer.

Payment will be made under:

Stone, Class II .....Ton  
Stone, Boulder.....Ton

**B. Step Pools**

**Description:**

The work covered by this section consists of the construction of step-pool sequences, an in-stream structure in steeper stream sections designed for grade control to protect against erosion by reducing water velocities and redirecting stream flow away from the stream banks.

**Materials:**

Stone materials utilized to construct the step-pools shall meet all the requirements of Stone, Class II, as specified in these special provisions.

**Construction Methods:**

Step-pools shall be constructed in accordance with details in the plans, at locations as shown on the plans or as directed by the Engineer. The location and nature of the step-pools may be modified during construction at the direction of the Engineer. Such variations will not be considered as alterations in the details of construction or a change in the character of the work.

**Method of Measurement:**

Step-pools will not be measured for payment under this article.

**Basis of Payment:**

The quantity of stone as provided in these provisions will be made at the contract unit price per ton for, "Stone, Class II." This payment shall be considered full compensation for all materials, labor, equipment, and incidentals necessary to construct the step-pools.

Payment will be made under:

Stone, Class II .....Ton

**C. Cross Vane**

**Description:**

The work covered by this section consists of the construction of cross vanes, an in-stream and bank structure designed to protect against erosion and scour and improve in-stream habitat by reducing water velocities, redirecting stream flow away from the stream banks and toward the thalweg, and trapping sediment.

The quantity and location of cross vanes to be constructed will be in accordance with the plans but may be affected by the actual conditions that occur during the construction of the project. The quantity of cross vanes may be increased, decreased, or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

**Materials:**

Stone materials utilized to construct the cross vanes shall meet all the requirements of Stone, Boulder as specified in these special provisions.

**Construction Methods:**

Cross vanes shall be constructed in accordance with details in the plans, at locations as shown on the Structure Plans (Sheets 16-19) or as directed by the Engineer.

A trench, wide enough for placement of the vane and footer boulders as they cross perpendicular to the channel, shall be dug starting at the station provided for the structure. The trench shall be dug to a depth sufficient to place the footer boulder and then the vane boulder on top, such that approximately 2-3" of the vane boulder are exposed above the finished bed elevation provided. The trench shall be backfilled to the proposed elevation per the Profile Sheets (35-39). The wing portions of the cross vane shall slope back from the "cross" boulder elevation to the top of bank, on a 10-15% slope.

**Method of Measurement:**

Cross vanes will not be measured for payment under this section.

**Basis of Payment:**

The quantity of stone, measured as provided in the special provisions, will be paid for at the contract unit price per ton for "Stone, Boulder" installed and accepted. This payment shall be considered full compensation for all materials, labor, equipment, and incidentals necessary to construct the cross vanes.

Payment will be made under:

Stone, Boulder.....Ton

**D. J-Vane**

**Description:**

The work covered by this section consists of the construction of J-Vanes, an in-stream and bank structure designed to reduce bank erosion and the influence of secondary circulation in the near-bank region of stream bends. The structures further promote efficient sediment transport and produce in-stream habitat.

The quantity and location of J-Vanes to be constructed will be in accordance with the plans but may be affected by the actual conditions that occur during the construction of the project. The quantity of J-Vanes may be increased, decreased, or eliminated entirely at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

**Materials:**

Stone materials utilized to construct the J-Vanes shall meet all the requirements of Stone, Boulder as specified in these special provisions.

**Construction Methods:**

J-Vanes shall be constructed in accordance with details in the plans, at locations as shown on the Structure Plans (Sheets 16-19) or as directed by the Engineer.

A trench deep enough to cover the entire footer rock and 2/3 of the header rock, at the bed elevation, shall be excavated at the J-Vane locations on the plans. Footer rocks shall be placed beneath and slightly

downstream of the header rock. After placing the header rock on top of the footer rock, the trench shall be backfilled to match the proposed grades indicated on the profile and typical cross sections.

**Method of Measurement:**

J-Vanes will not be measured for payment under this section.

**Basis of Payment:**

The quantity of stone, measured as provided in the special provisions, will be paid for at the contract unit price per ton for "Stone, Boulder" installed and accepted. This payment shall be considered full compensation for all materials, labor, equipment, and incidentals necessary to construct the J-Vanes.

Payment will be made under:

Stone, Boulder.....Ton

**E. Root Wads**

**Description:**

The work consists of furnishing and installing all materials required for the construction of root wad structures as detailed in the plans and as directed by the Engineer. The location and number of root wad structures utilized may be modified in the field by the Engineer.

**Materials:**

Individual tree trunk/root-balls proposed for use as root wads shall be approved by the Engineer. All wood materials used for root wad structures shall be from hardwood trees. All material for root wads shall come from trees that were alive and recently harvested (preferably, those taken during clearing and grubbing). Basal diameter of the tree trunk shall be a minimum of 12 inches. The trees shall be cut into 12-15' lengths, beginning at the root ball, and all branches shall be removed. The root-ball portion shall have a minimum diameter of 3 feet. If utilized, all boulders shall meet the requirements specified for "Stone, Boulder."

**Construction Methods:**

The end of the log to be inserted into the bank is first sharpened to a point with a chainsaw. The root wad is then driven or pushed directly into the stream bank using an excavator with a hydraulic thumb. The root wad should be inserted such that the log portion is either level or slightly angled down toward the sharpened end. The root wad should be fully inserted into the bank until the root-ball is flush with the bank. The root wad should be inserted at the toe of the bank slope such that at least one-third of the root-ball is in contact with the streambed and below the normal stream base flow elevation. The root wad should be oriented upstream so that the stream flow hits the root wad at a 90-degree angle, thereby deflecting the flow away from the bank. If necessary, a boulder may be placed on the bank on the downstream side of the root wad (in order to prevent localized scour erosion) at the discretion of the Engineer.

Once a root wad has been installed, the adjacent bank should be graded, seeded, and mulched.

**Method of Measurement:**

The quantity of root wads to be paid for will be the actual number of root wads which have been installed and accepted by the Engineer. Boulders utilized as part of the installation will be considered incidental to the installation of root wads.

**Basis of Payment:**

The quantity of root wads, measured as provided above, will be paid for at the contract unit price per each of "Root Wads" installed and accepted.

Such price and payment will be full compensation for all work covered by this section, including but not limited to, furnishing, stockpiling, placing and maintaining root wad structures, and disposal of any materials not incorporated in the project as directed by the Engineer.

Payment will be made under:

Root Wads .....Each (EA)

**F. Channel Blocks**

**Description:**

The work covered by this section consists of the construction and maintenance of physical barriers placed in abandoned channel segments to prevent future stream avulsions.

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

**Materials:**

All materials shall meet requirements in accordance with the following:

Stone for Erosion Control, Class I.....Article 1042-1

Sediment Control Stone .....Section 1005

**Construction:**

Channel blocks shall be constructed in accordance with the details on the plans, at locations as shown on the plans or as directed by the Engineer.

Clear and grub all side slopes of the abandoned channel. Place the channel block in the abandoned channel ensuring that there is at least five (5) feet of embankment material between the block and the face of the restored stream bank. Construct the channel block across the entire width of the abandoned channel to an elevation of 1.5 feet below the proposed fill elevation as shown on the plans. The length of the channel block is to be a minimum of five (5) feet and a maximum of eight (8) feet.

**Method of Measurement:**

Channel block will not be measured for payment under this article.

**Basis of Payment:**

The quantity of structural stone measured as provided in Article 1610-4 will be paid for at the contract unit price per ton for "Stone for Erosion Control, Class I" as provided in Article 1610-5.

The quantity of sediment control stone measured as provided in Article 1610-4 will be paid for at the contract unit price per ton for "Sediment Control Stone" as provided in Article 1610-5.

This payment shall be considered full compensation for all materials, labor, equipment, and incidentals necessary to construct the channel block.

Payment will be made under:

Stone for Erosion Control, Class I.....Ton

Sediment Control Stone .....Ton

**G. Coir Matting****Description:**

Furnish, install and maintain coir matting in locations as directed by the Engineer. Work includes providing all materials, excavating and backfilling, and placing and securing coir matting.

**Materials:**

*Matting:* Provide matting to meet the following requirements:

100 % coconut fiber (coir) twine woven into a high strength matrix.

Size: 6.6 ft x 164 ft (120 SY)

Weight: 20 oz/SY

Thickness: 0.30 in. minimum

Tensile Strength: 1348 x 626 lb./ft minimum

Elongation: 34% x 38% maximum

Flexibility (mg-cm): 65030 x 29590

Flow Velocity: Observed 11 ft/sec

"C" Factor: 0.002

Open Area (measured): 50%

*Staples:* Provide staples made of 0.125 in. diameter new steel wire formed into a "U" shape not less than 12 in. in length with a throat of 1 inch in width.

**Construction Methods:**

In locations where this and other stabilization techniques are jointly utilized, all treatments shall be installed so that they interface smoothly and provide the appropriate protection for the stream banks.

Prior to installation provide a smooth soil surface free from stones, clods, or debris that will prevent the uniform contact of the matting with the soil. Take care to preserve the required line, grade, and cross section of the area covered. Further, apply the specified seed mix, as required.

Start the installation at the upstream end of the channel by placing the matting immediately upon final graded and compacted bank surfaces. Excavate a 12" wide by 12" deep initial anchor trench. Secure the matting by staking, backfilling, and compacting the trench. Apply the matting by unrolling from upstream to downstream without stretching such that the matting will lie smoothly but loosely on the ground and in good contact with the soil surface, without air pockets or gaps beneath the matting.

Secure the top slope end of each piece of matting in a narrow trench 6" wide by 6" deep by staking, backfilling and compacting firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upstream roll over the top of the beginning of the downstream roll so there is a 1-foot overlap and stake the two pieces.

Provide a final anchor trench, 12" wide by 12" deep, at the downstream limits of the application area. Stake the matting, backfill and compact.

Place staples 1-foot apart at all ends, lapped edges and junctions of the matting. Place staples 3-feet apart down the center of each strip of matting. The Engineer may require adjustments in the trenching or stapling requirements to fit individual site conditions.

**Method of Measurement:**

The quantity of coir matting measured will be paid for according to the actual number of square yards measured along the surface of the ground over which coir matting is installed and accepted.

**Basis of Payment:**

The quantity of coir matting, measured as provided above, will be paid for at the contract unit price per square yard for "Coir Matting."

Payment will be made under:

Coir Matting ..... Square Yard (SY)

**H. Temporary Channel Diversion**

**Description:**

The work covered by this section consists of furnishing, installing, maintaining and removing any and all temporary channel diversions used on this project in conjunction with the stream restoration construction. The contractor shall install temporary channel diversions in locations as required in such a manner approved by the Engineer. The temporary channel diversion shall provide a passageway for the normal stream flow through the work-site.

**Materials:**

A pump-around method is suggested as the best alternative for accomplishing the temporary channel diversion. However, other materials or devices may be utilized upon approval of the Engineer.

**Construction Methods:**

The Contractor is responsible for providing a Temporary Channel Diversion of sufficient size to safely pass the normal daily discharge of the stream flow. Any method used must divert 100% of the stream flow through the work area without allowing any direct contact between the stream flow and the disturbed work area.

**Method of Measurement:**

The quantity of temporary channel diversion to be paid for will be the actual number of linear feet of temporary channel diversion, measured in place from end to end, installed and approved by the Engineer.

**Basis of Payment:**

The quantity of temporary channel diversion measured as provided above will be paid for at the contract unit price per linear foot for "Temporary Channel Diversion". Such 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 channel diversion.

Payment will be made under:

Temporary Channel Diversion .....Linear Foot (LF)

**I. Impervious Dike**

**Description:**

The work covered by this section consists of furnishing, installing, maintaining, and removing an impervious dike for the purpose of preventing normal stream flow and dewatering a stream segment for construction operations.

**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.

**Construction Methods:**

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. The impervious dike shall be constructed of an acceptable material in locations as directed by the Engineer.

**Method of Measurement:**

The quantity of impervious dike to be paid for will be the actual number of linear feet of impervious dike(s) constructed, measured in place from end to end of each separate installation which has been completed and accepted.

**Basis of Payment:**

The quantity of impervious dikes measured as provided above will be paid for at the contract unit price per linear foot for "Impervious Dike".

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 materials in the impervious dike, construction, maintenance, and removal of the impervious dike.

Payment will be made under:

Impervious Dike.....Linear Foot (LF)

**J. Live Staking**

**Description:**

The work covered by this section consists of furnishing, transporting, installing and maintaining live stakes as shown on the plans and as directed by the Engineer. Work includes providing all materials necessary to install the live stake cuttings.

**Materials:**

Live staking plant material shall be composed of freshly cut, dormant branches consisting of a random mix made up of native species as listed in the planting plan. Species composition may not be modified without the prior approval of Engineer. Live stakes shall be ½" - 2" in diameter and 2 - 3 feet in length.

**Construction Methods:**

Prior to the start of work on this item, the Contractor shall submit a proposed harvest/procurement and installation schedule, including source of supply of live cuttings, to the Engineer for review. No work shall be performed until the Engineer approves this schedule.

*Procurement* - Live staking materials may either be harvested locally by the contractor or procured from a certified nursery specializing in the production of bioengineering plant materials.

If harvesting bioengineering plant materials from existing native or naturalized stands, the source of all live cuttings shall be located on-site, within practical hauling distance to the site, and/or within the same physiographic ecoregion and plant hardiness zone as the site.

For harvest sites located on properties not owned by the Contractor, the Contractor shall provide the Engineer with written permission from the property owner to harvest materials on their property. The Contractor shall locate, flag and code plants to be used at the live cutting sites. The Contractor shall notify the Engineer seventy-two (72) hours prior to harvesting to review and approve all harvest sites.

In lieu of harvesting the plant materials, the cuttings may be obtained from a local certified nursery that specializes in the production of bioengineering plant materials. The Engineer must approve the source of supply of live cuttings. Live stakes obtained from a nursery must meet the same physiographic ecoregion and plant hardiness zone requirements as harvested stakes, and must be protected during shipping as detailed below.

*Handling during harvest and/or transport* - The Contractor shall be responsible for harvesting and transporting the cuttings to the job site. Live cuttings shall be bundled together securely at the collection site for easy loading, handling and protection during transport. If transport by vehicles is necessary, the bundles shall be covered with a tarpaulin, transported in unheated vehicles, and moistened to prevent drying-out and additional stress. Live cuttings shall be transported to the construction site within 8 hours of harvest and shall be installed within 48 hours of cutting (especially if the ambient temperature is 50°F or above).

*Storage* - If the cuttings are not installed immediately following harvesting or shipping, they shall be promptly and properly placed in controlled storage conditions and protected until installation is possible. During storage, live stakes must be protected against drying out and overheating (e.g., by storing in controlled conditions, storing in shade, covering with watered-down burlap, coir fiber matting or straw, placing in moist soil, or spraying with anti-transpirant chemicals). Regardless of the storage method utilized, live stakes shall receive continuous shade, shall be sheltered from the wind, and shall be continuously protected from drying-out. If storage is required, live branch cuttings shall be stored for a period no longer than three (3) days. The Engineer must approve any storage of live branch cuttings.

*Stake Preparation* - Side branches and brushy limbs shall be cleanly removed and the bark of the stake must remain intact. Buds on the stakes shall be oriented towards the top of the stake. Live stakes shall be cut to size as specified above. All cuts shall be smooth and the cut surface shall be kept as small as possible. The cut on the bottom end of the stake shall be angled to 30 to 45 degrees for easy insertion into the soil. The cut on the top end of the stake shall be at a 90-degree angle to the stake to ensure a flat surface for hammering into the slope. The use of large pruning shears may be required with larger branches.

*Stake Installation* - Live stakes shall be spaced approximately two (2) feet on center and should be installed in accordance with the details provided in the plan sheets. Buds of the stakes shall be oriented upwards during staking. Live stakes shall be tamped perpendicularly into the ground, as shown on the details on the plans, using a dead blow hammer. A minimum of 2/3 of the length of the live stake shall be installed into the ground. The area around each live stake shall be compacted by foot after the live stake has been installed. Stakes that split during installation shall be promptly removed and replaced. Following installation, the top 1"-2" of each live stake shall be cut cleanly off (with loppers) at an angle of approximately 15 degrees following installation.

**Method of Measurement:**

The quantity of live staking to be paid for will be the actual number of square yards measured along the surface of the ground over which live stakes are installed and accepted.

**Basis of Payment:**

The quantity of live staking, measured as provided above, will be paid for at the contract unit price per square yard for "Live Staking". The above prices and payments will be considered full compensation for all work covered by this Section, including but not limited to furnishing, and installing all live stakes.

Payment will be made under:

Live Staking .....Square Yard (SY)

**VI. MISCELLANEOUS**

**A. Woven Wire Fence**

The work in this section consists of the installation of property boundary fences in locations as indicated in the plans, and as directed by the Engineer.

All materials, installation, and payment for property boundary fencing shall be in accordance with Section 866 of the 2002 Standard Specifications, Standard Drawing 866.02 and as directed by the Engineer.

Payment for fence installation shall be made under:

Woven Wire Fence, 47" Fabric.....Linear Foot (LF)  
4" Timber Fence Posts, 8' Long.....Each

**B. Gate Installation**

The work in this section consists of the installation of an access gate at the site entrance off of Lower White Store Road as directed by the Engineer.

The gate shall be a single, 52-inch high by 14-foot wide, Stock Guard Gate constructed of 2" diameter tubular pipe. The gate shall be installed in accordance with Section 866 of the 2002 Standard Specifications and Standard Drawing 866.04 and as directed by the Engineer.

Payment for gate installation shall be made under:

Gate, SGL, 52"x14'x14' .....Each

**C. Sign and Support Installation**

The work in this section consists of the installation of project signage and supports as directed by the Engineer and in accordance with the following:

NCDOT shall supply the Contractor with the appropriate Type "F" signs. The Contractor shall furnish required supports.

One sign shall be placed on each side of the gated entrance to the project site. Signs shall be placed every 200 feet along the project boundary facing outwards from the project site. Signs shall be posted on 8" U-Channel posts using vandal-proof fasteners such that the top of each sign is a minimum of 6 feet above the natural ground surface.

All materials, installation, and payment for signs shall be in accordance with Section 904 of the 2002 Standard Specifications, Standard Drawing 904.50 and as directed by the Engineer.

All materials, installation, and payment for sign supports shall be in accordance with Section 903 of the 2002 Standard Specifications, Standard Drawing 904.50 and as directed by the Engineer.

Payment for sign and support installation shall be made under:

Sign Erection, Type F.....Each  
Supports, 3-lb Steel U-Channel.....Linear Foot (LF)

**VII. COOPERATION BETWEEN CONTRACTORS**

In accordance with Section 105-7 of the Standard Specification, the DOT reserves the right at any time to contract for and perform other or additional work on or near the work covered by the contract.

When separate or additional contracts are let within the limits of any one project, each Contractor shall conduct his work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. Contractors working within the limits of the same project shall cooperate with each other. Each Contractor shall conduct his operations in such a manner as to avoid damaging any work being performed by others or that has been completed by others.

When a project is let under more than one contract and the plans and/or special provisions include a construction schedule, it shall be the responsibility of the Contractors to complete the various phases of the project in accordance with the time limits specified such that the total contracts will be completed by the completion date. This construction schedule will remain in effect until such time as the Contractors at their option submit to a joint construction schedule, meeting the approval of the Engineer. This joint construction schedule shall be signed by authorized representatives of each firm and upon the approval of the Engineer shall be binding on each Contractor and made a part of the contract documents. Subsequent modifications to the joint construction schedule may be made during the course of the work in the same manner.

Failure of the Contractor(s) to complete the various phases of work within the time limits set forth in the construction schedule or latest approved joint construction schedule shall be just cause for removing the Contractor(s) from the DOT's list of qualified bidders. A Contractor disqualified from bidding by reason of this provision will not be reinstated until such time as his progress is in accordance with the latest approved construction schedule or until the project is completed and accepted, whichever occurs first.

The DOT will under no circumstances be liable for any claim for additional compensation due to the acts of one Contractor holding up the work of another. The DOT will under no circumstances be liable for any damages experienced by one Contractor as a result of the presence and operations of others Contractors working within the limits of the same project.

**EROSION CONTROL****Seeding And Mulching**

(6)

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

## August 1 - June 1

100# (110kg)	Tall Fescue
15# (17kg)	Kentucky Bluegrass
15# (17kg)	Hard Fescue
30#(34kg)	Switchgrass
35#(39kg)	Rye Grain
500# (560kg)	Fertilizer
4000# (4500kg)	Limestone

## May 1 - September 1

100# (110kg)	Tall Fescue
15# (17kg)	Kentucky Bluegrass
15# (17kg)	Hard Fescue
25#(28kg)	Browntop Millet
30#(34kg)	Switchgrass
500# (560kg)	Fertilizer
4000# (4500kg)	Limestone

**Approved Tall Fescue Cultivars:**

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

**Approved Kentucky Bluegrass Cultivars:**

Adelphi	Baron	Bristol	Challenger	Columbia
Fylking	Glade	Kenblue	Merit	Plush
Ram I	Rugby	Sydsport	Touchdown	Vantage

**Approved Hard Fescue Cultivars:**

Aurora	Bardur	Crystal	Reliant	Scaldis
Spartan	Valda	Waldina	Warwick	

On cut and fill slopes 2:1 or steeper add 25# (28kg) Rye Grain November 1 - March 1.

On cut and fill slopes 2:1 or steeper add 30# (35 kg) Sericea Lespedeza January 1 - December 31.

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

**Temporary Seeding:**

Fertilizer shall be the same analysis as specified for "Seeding and Mulching" and applied at the rate of 400 pounds (450kg) and seeded at the rate of 50 pounds per acre (55kg per hectare). Kobe or Korean Lespedeza,

German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

**Fertilizer Topdressing:**

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

**Supplemental Seeding:**

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

**Special Sediment Control Fence:****Description:**

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

**Materials:****(A) Posts:**

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

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

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

**(C) Sediment Control Stone:**

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

**Maintenance and Removal:**

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

**Method of Measurement:**

The quantity of 1/4 inch (6.4mm) hardware cloth to be paid for will be the actual number of linear feet (meters) measured along the ground, which has been completed and accepted. The quantity of sediment control stone will be measured according to Article 1610-4.

**Basis of Payment:**

Payment for special sediment control fence will be as follows:

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

**Erosion Control Matting for Levee Break:**

**Description:**

Furnish material, install and maintain erosion control matting for levee break in locations shown on the plans or in locations as directed by the engineer. Work includes providing all materials, excavating and backfilling, and placing and securing Erosion Control Matting for Levee Break. Erosion Control Matting for Levee Break shall meet the 2002 Standard Specifications for Roads and Structures Article 1060-8 (Matting for Erosion Control).

**Construction Methods:**

Place the matting immediately upon final grading. Provide a smooth soil surface free from stones, clods, or debris which will prevent the contact of the matting with the soil. 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 6 in. (150 mm) 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 6 in. (150 mm) overlap. Construct check trenches at least 12 in. (0.3 m) deep every 50 ft. (16 m) longitudinally along the edges of the matting or as directed by the Engineer. Fold over and bury matting to the full depth of the trench, close and tamp firmly. Overlap matting at least 6 in. (150 mm) where 2 or more widths of matting are installed side by side.

Place staples across the matting at ends, junctions, and check trenches approximately 1 ft. (0.3 m) apart.

Place staples along the outer edges and down the center of each strip of matting 3 feet (1 meter) apart. Place staples along all lapped edges 1 ft. (0.3 m) apart.

The Engineer may require adjustments in the trenching or stapling requirements to fit individual site conditions.

**Method of Measurement:**

The quantity of erosion control matting measured will be paid for according to the actual number of square yards (square meters) measured along the surface of the ground over which erosion control matting is installed and accepted.

**Basis of Payment:**

The quantity of Erosion Control Matting for Levee Break, measured as provided above, will be paid for at the contract unit price per square yards (square meters) for "Erosion Control Matting for Levee Break."

Payment will be made under:

Erosion Control Matting for Levee Break.....Square Yards (Square Meters)