

**B-3652****Project Special Provisions  
Erosion Control****Guilford County****Seeding And Mulching**

(3)

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

## March 1 - September 1

100# (110kg) Tall Fescue	100# (110kg) Tall Fescue
15# (17kg) Kentucky Bluegrass	15# (17kg) Kentucky Bluegrass
15# (17kg) Hard Fescue	15# (17kg) Hard Fescue
500# (560kg) Fertilizer	25# (28kg) Kobe or Korean Lespedeza
4000# (4500kg) Limestone	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
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Spartan

Valda

Waldina

Warwick

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

**Fertilizer Topdressing:**

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

**Supplemental Seeding:**

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

**Mowing:**

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

**Lawn Type Appearance**

All areas adjacent to lawns must be hand finished as directed by the Engineer to give a "lawn type appearance". Remove all trash, debris, and stones  $\frac{3}{4}$  inch (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:**

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

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

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

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

Payment will be made under:

Specialized Hand Mowing.....HR

**Environmentally Sensitive Areas:**

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 area identified on the plans. This also requires special procedures to be used for seeding and mulching and staged seeding within the project.

**Clearing and Grubbing:**

In areas identified on the erosion control plans as “Environmentally Sensitive Areas”, the Contractor may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations as described in Section 200, Article 200-1, in the Standard Specifications. The “Environmentally Sensitive Area” shall be defined as a 50 foot (16 meter) buffer zone on both sides of the stream (or depression), measured from top of streambank, (or center of depression). 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.

**Grading:**

Once grading operations begin in identified "Environmentally Sensitive Areas", work will progress in a continuous manner until complete. All construction within these areas must progress in a continuous manner such that each phase is complete and areas 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" as specified will be just cause for the Engineer to direct the suspension of work in accordance with Section 108-7 of the Standard Specifications.

**Temporary Stream Crossings:**

Any crossing of streams within the limits of this project must be accomplished in accordance with Section 107-13(b) of the Standard Specifications.

**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" as indicated on the E.C. Plans.

**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 which are greater than 20 feet (6 meters) in height or greater than 2 acres (0.8 hectares) in area. Each stage shall not exceed the limits stated above.

All work described above will be paid for at the contract unit prices established in the contract for the work involved. Additional payments will not be made for the requirements of this section as the cost for this work should 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 by the Engineer.

**Stockpile Areas**

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

**Reforestation:**

Reforestation will be planted in areas where the temporary detour is removed and regraded to original contours, as directed by the Engineer. Reforestation is not shown on the plan sheets. See the reforestation detail sheet.

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

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

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

**Waste Areas And Borrow Sources:**

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

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

**Temporary Diversion:**

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

**Safety Fence:****Description:**

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

**Materials:****Fence Material:**

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

**Posts:**

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

**Clearing and Grading:**

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

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

**Installation:**

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

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

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

Method of Measurement:

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

Basis of Payment:

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

Payment will be made under:

Safety Fence.....LF (M)

**Gravel Construction Entrance:**

Description:

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

Materials:

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

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

Construction:

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

**Method Of Measurement:**

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

**Basis Of Payment:**

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

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

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

**Special Stilling Basin(s):****Description:**

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

**Materials:**

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

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

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

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

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

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



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

**Construction:**

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

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

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

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

**Method Of Measurement:**

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

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

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

**Basis Of Payment:**

Payment for special stilling basin will be as follows:

Filter Fabric for Drainage .....	SY(SM)
Sediment Control Stone .....	TON (MT)
Special Stilling Basin .....	EA

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

**Permanent Soil Reinforcement Mat:****General:**

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

**Materials:**

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

Property	Test Method	Value	Unit
Ground Cover	Image Analysis	93	%
Thickness	ASTM D1777	0.63 (16)	in (mm)
Mass Per Unit Area	ASTM D3776	0.92 (0.50)	lb/sy (kg/m <sup>2</sup> )
Tensile Strength	ASTM D5035	480 (714.2)	lb/ft (kg/m)
Elongation	ASTM D5035	49	%
Tensile Strength	ASTM D5035	960 (1428.5)	lb/ft (kg/m)
Elongation	ASTM D5035	31	%
Tensile Strength	ASTM D1682	177 (80.3)	lbs (kg)
Elongation	ASTM D1682	22	%
Resiliency	ASTM D1777	>80	%
UV Stability *	ASTM D4355	151 (68.5)	lbs (kg)
Color(Permanent Net)		UV Black	
Porosity (Permanent Net)	Calculated	>95	%
Minimum Filament Diameter (permanent net)	Measured	0.03 (0.8)	in (mm)

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

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

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

Matting shall be installed according to section 1060-8 of the Standard Specifications.

**Soil Preparation:**

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660. The surface of the soil shall be smooth, firm, stable and

free of rocks, clods, roots or other obstructions which would prevent the mat from lying in direct contact with the soil surface. Areas where the mat is to be placed will not need to be mulched.

Measurement:

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

Basis of Payment:

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

Payment will be made under:

Permanent Soil Reinforcement Mat..... SY (M2)

**Tree Protection Area**

**The Department, in coordination with the Town of Jamestown and The State Historic Preservation Office, is dedicating much effort to preserve the existing trees that do not have to be removed for the bridge construction. The contractor will assist the department by educating its employees, subcontractors and others conducting work in the vicinity, of the efforts and the preservation measures required herein.**

General Requirements and Restrictions:

Delineate the tree protection area with tree protection fence installed at the direction of the Field Operations Engineer of the Roadside Environmental Unit of NCDOT. Clearly label the area as 'Tree Protection Area'. *Do not trespass* in the tree protection area except for designated parties approved by the Engineer for the purpose of tree care and litter pickup.

If the tree protection fence is not in an upright secure position, without gaps and properly signed, work will be suspended wholly or in part until the fence is properly repaired and in a condition satisfactory to the Engineer. Such suspension of work will not be considered justification for additional compensation in accordance with Section 104 or extension of the contract time.

Install erosion control devices in a timely manner in the vicinity of the tree protection area to prevent sedimentation from accumulating that may endanger the tree root zone.

Accomplish seedbed preparation and seeding, both temporary and permanent, in a continuous process so that runoff from slopes to this vicinity is prevented.

Branches that protrude into the construction area that interfere with construction operations will be tied back if possible or pruned if not. Follow pruning techniques as established in American National Standards Institute ANSI Z133.1 and perform pruning by a certified professional arborist. Submit itemized description of proposed work along with arborist credentials to the Engineer for approval prior to conducting work.

Demolition, ground disturbing activities or construction that occurs within a radius three times the drip line of the tree(s) will be done with utmost care. All grading will be accomplished in such a manner to avoid standing water or saturated soils around root systems of trees that are to remain. In areas to be 'cut', prevent shredding, tearing or exposing roots by excavating a trench not less than 6 inches (153 mm) wide and to the maximum depth of the cut up to 24 inches (610 mm) deep and hand saw any roots that are 2 inches (51 mm) or greater in diameter to make a smooth clean cut. If necessary, dig out enough soil to reach an undamaged portion of the root to make the smooth cut. To prevent drying out of roots, immediately cover any exposed root surfaces with 6 inches (153 mm) of approved mulch until 'finish' construction operations dictate removal. Except as provided below, the work required herein is incidental to construction and there will be no direct compensation.

**Water for Existing Trees:**

Apply water as directed by the Engineer with gravity flow or low pressure applicators which have been approved, and which will not erode soil around the tree root system or damage the trees. Saturate the soil around each tree thoroughly at each watering.

**Method of Measurement:**

The quantity of "Water for Existing Trees" to be paid for will be the actual number of 1,000 gallon (kiloliter) units of water which have been applied as directed, to existing trees. Measurement of water will be made by means of an approved metering device at the source of supply, or by determining the volumetric capacity of tank trucks used to deliver water to the project and recording the number of loads delivered by each truck.

**Basis of Payment:**

The quantity of water, measured as provided above, will be paid for at the contract unit price per 1,000 gallons (kiloliter) for "Water for Existing Trees".

**Payment will be made under:**

Water for Existing Trees.....M/G (KL)

**Tree Protection Fence:****General:**

“Tree Protection Fence” consists of furnishing, installing, maintaining, and removing wood or steel post, wood slat fence or orange poly-barricade fence fabric and signs at locations directed by the Engineer in the field and in accordance with the special provisions included herein. Tree protection fence will be installed after slope-stake line is staked and prior to all other work.

**Materials:**

Use *wood posts* that are nominal 4" x 4" (102 mm x 102 mm), length as required, structural light framing, grade No. 2, Southern Pine or *steel posts* that are a minimum of 1 3/8" (35 mm) wide measured parallel to the fence, with a weight of 1.25 lb./ft. (1.9 kg/m) of length. Post must have a means for retaining wire in desired position without displacement. Use of steel posts will be required in any area where the tree protection fence is in close proximity to the tree's trunk or any major roots.

Use orange polyethylene or polypropylene prefabricated barricade type fence fabric that is a minimum of 48 inches (1220 mm) high and approved by the Engineer or wood slat prefabricated sand or snow fence that is a minimum of 48 inches (1220 mm) high and that conforms to the following requirements. The fabric will be constructed of wood slats and twisted wire cables. Vertical slats will be 3/8" to 3/4" (10 to 20 mm) thick and from 1 1/4" to 2" (32 to 51 mm) wide and shall comprise 33% to 50% of the surface area. Slats will be connected by means of a two line twisted cable for each foot of fabric height or fraction thereof. The twisted cable will be a minimum of 13 gauge (2.32 mm) galvanized wire.

Treat wood posts and wood slat fence fabric with a preservative in accordance with Section 1082-3 of the Standard Specifications.

Use a durable, weatherproof lightweight material to fabricate ‘Tree Protection Area’ signs. Signs will be a minimum of five square feet (0.46 square meter) and lettering will be a minimum of two inches (51 mm) tall and text will be clearly legible. Each sign will contain the following wording

**Tree Protection Area  
Do Not Enter**

and it will be repeated in Spanish on the same sign. Use a white background with red lettering. *Submit sample material (or sign) of appropriate colors to the Engineer for approval prior to fabrication.*

 **100****Installation:**

Erect fence to conform to the general contour of the ground. Do not remove existing plant material or perform any grading unless indicated on the plans or directed by the Engineer. Avoid soil compaction within tree protection area; do not use heavy equipment and stay outside the perimeter of the tree protection area where possible.

Install post as shown on the plan detail and maintain in a vertical position. Post may be hand set or set with a post driver. If hand set tamp backfill material thoroughly. Power driven wood posts may be sharpened to a dull point. Remove and replace posts damaged by power driving prior to final acceptance. At the direction of the Engineer use steel post instead of wood post when installing fence in close proximity to a tree's trunk or any major roots.

Stretch orange poly-barricade fence fabric or wood slat fence fabric taut and attach to post with appropriate means according to post type used. In sections where signs will be located, if orange poly-barricade fence fabric is used reinforce top of fabric by weaving a 12 gauge (2.68 mm) galvanized wire in the fabric and firmly attach to a post at each end of the section. Attach signs to fence fabric at all four corners using appropriate method for fence fabric and sign material that is chosen.

**Maintenance:**

Maintain tree protection fence with required signs in good condition, fully upright with no loose attachments or missing links for the duration of the project. Signs must be visible and legible throughout the duration of the contract. *Routine mowing and litter pickup as required will be conducted by the designated party. **The Engineer must approve in writing access for the contractor, for anything other than routine vegetation maintenance prior to entering the tree protection area.*** Approval must be made for each access occurrence.

**Removal:**

As a last item of work after bridge construction and all related work is completed and at the direction of the Engineer, remove the tree protection fence, backfill post holes and remove and properly dispose of fence materials off the construction site. While performing this work do not use heavy equipment and stay on the outside perimeter of the tree protection area where possible to avoid soil compaction within root zone.

**Method of Measurement:**

The quantity of tree protection fence to be paid for shall be the actual number of linear feet (meter) of "Tree Protection Fence", installed in place and accepted.

**Basis of Payment:**

The quantity of tree protection fence measured as provided above will be paid for at the contract unit price per linear foot (meter) of tree protection fence. Such payment will be full compensation for the work as described above, including but not limited to furnishing, installing, maintaining and removing the tree protection fence and signs.

Payment will be made under:

Tree Protection Fence.....LF (M)

**Liquidated Damages:**

It is mutually recognized that protection of the trees within the 'Tree Protection Area' is an essential element of the contract, and that injury or damage to the trees will result in damages to the public because of esthetic and environmental loss, and costs to the Department for removal and replacement of the trees. Injury or damage to the trees may or may not be immediately evident, and costs may be incurred after completion and acceptance of the work. It is therefore agreed that in view of the difficulty of making a precise determination of such damages, a sum of money in the amount of \$5,000.00 will be charged against the Contractor for each and every violation of the 'Tree Protection Area', not as a penalty but as liquidated damages. The following are considered to be a violation of the 'Tree Protection Area':

Operating, parking, refueling, repairing or maintenance of vehicles or equipment within the 'Tree Protection Area'.

Stockpiling materials in the 'Tree Protection Area'.

Release of petroleum products, fuels, paints, or lubricants anywhere within the vicinity or areas that drain into the vicinity of the 'Tree Protection Area'.

Application or release of herbicides, fertilizers or chemicals that may be toxic to plant life in the vicinity or areas that drain into the vicinity of the 'Tree Protection Area'.

Discharge of wash-water from concrete trucks in the vicinity or areas that drain into the vicinity of the 'Tree Protection Area'.

Burning trash, debris or vegetation in the vicinity of the 'Tree Protection Area'.

In any suit for the collection of or involving the assessment of liquidated damages, the reasonableness of the amount stipulated in the contract will be presumed. The liquidated damages referred to herein are intended to be and are cumulative, and will be in addition to every other remedy now or hereafter enforceable by law, in equity, by statute, or under the contract.

If a careless or other action that is not authorized by the Engineer causes apparent injury to a tree within the tree protection area, the contractor will be liable for the value of the tree. The value of the trees will be charged against him and will be deducted from the payment for the work.

The value of a tree will be \$18.50 times the tree diameter squared,  $\$18.50 \times D^2$  where D equals the diameter of the tree measured in inches ( $\$0.0287 \times D^2$  where D equals the

diameter of the tree measured in millimeters), without regard to condition, location or species of the tree. The diameter of a tree will be measured in inches at a height of 12 inches (305 mm) above the ground for trees up to 12 inches (305 mm) in diameter and at a height of 4 1/2 feet (1.37 meters) above the ground for trees greater than 12 inches (305 mm) in diameter. Multi-stemmed tree diameter will be the combined diameter of all stems. Measurement of the diameter will be made at the locations described above depending on stem size.