QPL 41 ROCKFALL MITIGATION

SECTION A: ROCKFALL FENCE (TN TYPE I, II, III & IV)

PROCEDURES

GENERAL

This evaluation procedure outlines the Department's approval process for Rockfall Fence Systems. The products for each of the sections have been pre-qualified for use. The products on this list must meet the material requirements set forth in the Special Provisions. Upon any change of the product, the manufacturer must submit the changes for approval and placement on the Qualified Products List.

SPECIFICATIONS

SP707H Special Provision Regarding Rockfall Barrier Systems

PROCEDURES

Rockfall Fence systems shall be specified on the plans as Tennessee Type I, II, III, IV, and may also have a supplementary minimum energy rating specified in the plans. If the energy rating on the plans is higher than the minimum energy rating shown for Tennessee Type, plans energy rating shall control. Height of Rockfall Fence, unless otherwise specified on the plans, shall be 10 feet. TDOT has four classifications of Rockfall Fence systems covered by this QPL:

Tennessee Type	Description	Rockfall Net Material Allowed	Minimum Energy Rating Ranges
I	Lower Impact	Ring Net, Cable Net/ Woven Wire Rope Net, High Tensile Wire Mesh	100 kJ (37 ft-ton) – 500kJ (185 ft-ton)
II	Moderate Impact	Ring Net, Woven Wire Rope Net, High Tensile Wire Mesh	500 kJ (185 ft-ton) – 1000 kJ (370 ft ton)
III	High Impact	Ring Net	1000 kJ (370 ft-ton) - 3000 (ft-ton)
IV	Very High Impact	Ring Net	3000 kJ - 5000 kJ (1843 ft-ton)

Please note: double twisted hexagonal wire mesh is only acceptable as an added mesh to a rockfall barrier system and shall not be used as the primary net.

Payment will be made under:

Item No.	Pay Item	Pay Unit
707-10.01	ROCKFALL FENCE (TYPE I)	Linear Foot
707-10.02	ROCKFALL FENCE (TYPE II)	Linear Foot
707-10.03	ROCKFALL FENCE (TYPE III)	Linear Foot
707-10.04	ROCKFALL FENCE (TYPE IV)	Linear Foot
707-10.08	WIRE MESH (DESCRIPTION)	Linear Foot

Qualified Rockfall Fence Systems Suppliers and Products:

Note: Systems and manufacturers not on this list may be submitted for consideration to the Geotechnical Engineering Section at least 30 days prior to letting in order to be added to the qualified products list. No system shall be approved as substitution for those on this list without prior concurrence and acceptance by the TDOT Geotechnical Engineering Section.

Required for submittal to add product to list:

1. Name, specifications, drawings and design details for Rockfall Fence system including materials used, braking element design, foundation design and anchoring system. Designs as submitted to the TDOT Geotechnical Engineering Section shall comply with this special provision.
2. Date and location of previous installations for the Rockfall Fence system to be considered as well as contact information for an "owner" representative for whom this system was installed.
3. Test reports of rockfall net materials and rockfall systems verifying that the system and elements can withstand the design energy rating.

SECTION B: ROCKFALL SLOPE DRAPE (TN TYPE I, II, III & IV)

PROCEDURES

GENERAL

This evaluation procedure outlines the Department's approval process for Rockfall Slope Drape Systems. The products for each of the sections have been pre-qualified for use. The products on this list must meet the material requirements set forth in the Special Provisions. Upon any change of the product, the manufacturer must submit the changes for approval and placement on the Qualified Products List.

SPECIFICATIONS

SP707D Special Provision Regarding Rockfall Slope Drape

PROCEDURES

Rockfall Slope Drape systems shall be specified on the plans as Tennessee Type I, II, III, IV.

TDOT has four classifications of Rockfall Slope Drape systems covered by this QPL:

Tennessee Drape Type	Description	Rockfall Drape Material Allowed
I	Standard	Wire mesh
II	Moderate	High Tensile Wire Mesh, Wire Rope Net
III	High	High Tensile Wire Mesh, High Tensile Cable Net
IV	Very High	High Tensile Rope and Cable Net

Quantities and Pay Items:

The quantity of rockfall drapery to be paid for will be the number of square yards, measured along the surface over which mesh has been acceptably placed. The quantity of rock anchors to be paid for will be the actual number linear footage of anchors installed in the completed work.

The quantity of rockfall drapery, measured as provided for above, will be paid for at the contract unit price per square yard for "Rockfall Drape". Such price and payment will be full compensation for all work covered by this special provision, including but not limited to labor, materials and equipment (furnishing all wire mesh, hog rings, clamps, rings, wire, placing and securing the wire mesh), and for all incidentals necessary to complete the work satisfactorily. It also includes pruning, excavating, and removing any vegetation required to satisfactorily install rockfall drape system. Where rockfall fabric that has a greater than 4 inches opening, Wire Mesh – Standard or Wire Mesh – High Tensile with a maximum opening size of 4 inches shall be required and this additional mesh is included in the item cost for Rockfall Drape.

The quantity of rock anchors measured as provided for above will be paid for at the contract unit price per either each or per linear foot as indicated in the plans and Quantity Estimate Table for Rock Anchors, Type I or Type II. Such price and payment will be full compensation for furnishing all labor, materials, equipment, and supervision necessary for the actual installation of the rock bolts and the performance of pull tests as specified by the Engineer.

Payment will be made under:

Item No.	Pay Item	Pay Unit
-	-	

707-10.05	Rockfall Drape, Type I	S.Y.
707-10.06	Rockfall Drape, Type II	S.Y.
707-10.07	Rockfall Drape, Type III	S.Y.
707-10.21	Rockfall Drape Type IV (A)	S.Y.
707-10.22	Rockfall Drape Type IV (B)	S.Y.
707-02.41	Rock Anchor, Type I	EACH
707-02.42	Rock Anchor Type II	EACH
707-02.43	Rock Anchor, Type I	L.F.
707-02.44	Rock Anchor, Type II	L.F.

Qualified Rockfall Drape Suppliers and Products:
Note: Systems and manufacturers not on this list may be submitted for consideration to the Geotechnical Engineering Section at least 30 days prior to letting in order to be added to the qualified products list. No system shall be approved as substitution for those on this list without prior concurrence and acceptance by the TDOT Geotechnical Engineering Section.

Required for submittal to add product to list:

1. Name, specifications, drawings, and design details for rockfall drape system including materials used and anchoring system. Designs as submitted to the TDOT Geotechnical Engineering Section shall comply with this Special Provision.
2. Date and location of previous installations for the drape system to be considered as well as contact information for an "owner" representative for whom this system was installed.
3. Test reports of rockfall drape materials and system verifying that the system and elements can withstand the tensile requirements and block sizes specified in this provision.

SECTION C: PINNED ROCKFALL SLOPE MESH (TN TYPE I, II & III)

PROCEDURES

GENERAL

This evaluation procedure outlines the Department's approval process for Pinned Rockfall Slope Mesh Systems. The products for each of the sections have been pre-qualified for use. The products on this list must meet the material requirements set forth in the Special Provisions. Upon any change of the product, the manufacturer must submit the changes for approval and placement on the Qualified Products List.

SPECIFICATIONS

SP707E Special Provision Regarding Pinned Rockfall Slope Mesh Systems

PROCEDURES

Pinned Rockfall Slope Mesh systems shall be specified on the plans as Tennessee Drape Type I, II & III. TDOT has three classifications of Pinned Rockfall Slope Mesh systems covered by this QPL:

Tennessee Drape Type	Description	Rockfall Drape Material Allowed	Design Boulder Diameter
I	Standard	Wire mesh – Standard	>2 feet
II	Moderate	Cable Net, High Tensile Wire Mesh, Ring Net	2-4 ft
III	High	High Tensile Cable Net, High Tensile Rope Net, Ring Net	3-6 feet

Quatities and Pay Items:

The quantity of pinned rockfall mesh to be paid for will be the number of square feet, measured along the surface over which mesh has been acceptably placed. The quantity of rock anchors and grouted rock nails to be paid for will be the actual number and type of rock anchors installed in the completed work.

The quantity of pinned rockfall mesh, measured as provided for above, will be paid for at the contract unit price per square foot for "Rockfall Drape". Such price and payment will be full compensation for all work covered by this special provision, including but not limited to labor, materials and equipment (furnishing all wire mesh, hog rings, clamps, rings, wire, placing and securing the wire mesh), and for all incidentals necessary to complete the work satisfactorily. It also includes pruning, excavating and removing any vegetation required to satisfactorily install rockfall drape system.

The quantity of rock anchors and grouted rock nails measured as provided for above will be paid for at the contract unit price per each for Rock Anchors, Type I or Type II. Such price and payment will be full compensation for furnishing all labor, materials, equipment, and supervision necessary for the actual installation of the rock bolts and the performance of pull tests as specified by the Engineer.

Payment will be made under:

Item No.	Pay Item	Pay Unit
707-10.05	Rockfall Drape, Type I	S.Y.
707-10.06	Rockfall Drape, Type II	S.Y.
707-10.07	Rockfall Drape, Type III	S.Y.

707-02.41	Rock Anchor, Type I	EACH
707-02.42	Rock Anchor, Type II	EACH

Qualified Pinned Rockfall Mesh / Rockfall Drape Suppliers and Products:

Note: Systems and manufacturers not on this list may be submitted for consideration to the Geotechnical Engineering Section at least 30 days prior to letting in order to be added to the qualified products list. No system shall be approved as substitution for those on this list without prior concurrence and acceptance by the TDOT Geotechnical Engineering Section.

Required for submittal to add product to list:

1. Name, specifications, drawings and design details for rockfall drape system including materials used and anchoring system. Designs as submitted to the TDOT Geotechnical Engineering Section shall comply with this special provision.
2. Date and location of previous installations for the drape system to be considered as well as contact information for an "owner" representative for whom this system was installed.

3. Test reports of rockfall drape materials and system verifying that the system and elements can withstand the tensile requirements and block sizes specified in this provision.