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## Specifications for the Selection and Application of Erosion Control Blanket on Slopes or Channels

### Excel PP5-12 - Provided by Western Excelsior

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#### **PART I - GENERAL**

##### **1.01 Summary**

A. The Turf Reinforcement Mat (TRM) contains 100% synthetic, UV stable fibers in combination with UV stable synthetic netting and thread, stitch bonded to form a continuous material for the purpose of erosion control and establishment of vegetation. Further, the TRM is intended to provide a permanent footprint suitable to provide coverage and reinforcement for established vegetation and form an integrated system. The properties and performance of the specified material shall be required as presented herein.

B. This work shall consist of furnishing and installing the Erosion Control Blanket; including fine grading, soil amendment as necessary, seeding, application of ECB, securing ECB by stapling, and miscellaneous related work, in accordance with these standard specifications and at the locations identified on drawings or designated by the owner's representative. This work shall include all necessary materials, labor, supervision, and equipment for installation of a stable system in the unvegetated state and provide a stable stand of vegetation.

C. All work of this section shall be performed in accordance with the conditions and requirements of the contract documents, good engineering practice and agronomic principles. Further, local, state and federal applicable statutes shall be observed.

D. The erosion control blanket shall be used to prevent surface erosion and enhance vegetation establishment. Upon completion of site-specific engineering analysis, the blanket shall be suitable for the following applications as necessary for site protection as designed:

1. Minimization of hillslope erosion when exposed to rainfall
2. Flexible channel liner for the minimization of erosion in channelized conditions
3. Protecting embankments and spillways
4. Protecting culvert inlets and outfalls
5. Bioengineering of dikes, levees, and streambanks

##### **1.02 Performance Requirements**

A. Erosion control blanket shall provide a temporary, biodegradable and/or photodegradable cover material to reduce slope and/or channel erosion and promote accelerated vegetation establishment.

B. Specific performance of an ECB varies by the conditions at the project site. Minimum performance requirements of the ECB shall be as follows:

Performance Parameter	Conditions	Threshold of Performance
C Factor (Hillslope/Rainfall Application)	1:1 Slope, Moderately Erodible Soil, Unvegetated Condition, Exposed to Moderate Rainfall*	0.03
Shear Stress (Flexible Channel Liner Application)	Unvegetated Condition, Moderately Erodible Soil**	2.8 psf (134 PA)
Velocity (Flexible Channel Liner Application)	Unvegetated Condition, Moderately Erodible Soil**	8.0 ft/s (2.4m/s)
Shear Stress (Flexible Channel Liner Application)	Vegetated Condition, Moderately Erodible Soil**	12.0 psf (575 PA)
Velocity (Flexible Channel Liner Application)	Vegetated Condition, Moderately Erodible Soil**	15.0 ft/s (4.6 m/s)
Functional Longevity	Under Nominal Conditions, Actual Field Longevity Dependant on Soil and Climatic Conditions on Site	> 36 Months
*Test conditions correspond to a soil with representative (minimum) K Factor (RUSLE) of 0.14 and rainfall with representative (minimum) R Factor of 150 achieved by a series of rainfall events totaling a minimum of 5.25"; a test slope with representative (minimum) LS Factor of 3.0, executed on a gradient of 2:1 (H:V). Testing shall follow procedures outlined in ASTM D6459 in an unvegetated condition with the exceptions of slope steepness and rainfall intensities as noted herein.		
**Conditions correspond to soil classified as sandy silt with a plasticity index between 3 and 7 or similar soil with critical shear stress greater than or equal to 0.07 psf (3.5 PA). Testing shall follow procedures outlined in ASTM D6460 in an unvegetated condition.		

### 1.03 Submittals

A. Submittals shall include:

1. Comprehensive engineering analysis utilizing Revised Universal Soil Loss Equation (RUSLE) or Hydraulic Engineering Circular 15 (HEC 15) demonstrating stability equivalent to identical design by Excel Erosion Design ([www.westernexcelsior.com](http://www.westernexcelsior.com)), as appropriate.
2. Product documentation sufficient to quantify the verifiable, physical properties and performance of the material
3. Product netting information
4. Material Safety Data Sheets (MSDS)
5. Staple pattern specifications
6. Installation specifications
7. Computer Aided Drawing (CAD) layouts depicting material installation
8. Verification of listing by American Association of State and Highway Transportation Officials' (AASHTO) National Transportation Product Evaluation Program (NTPEP) ([NTPEP.org](http://NTPEP.org)) and listing by Erosion Control Technology Council (ECTC) within product selection tool ([ectc.org](http://ectc.org)).

### 1.04 Delivery, Storage, and Handling

A. The ECBs shall be furnished in rolls and wrapped sufficiently to protect against moisture intrusion and extended ultraviolet exposure prior to placement. Each roll shall be labeled allowing for the identification of the material and its dimensions, and providing sufficient tracking of production for quality control purposes.

B. The ECBs shall be of consistent thickness with matrix fibers distributed evenly over the entirety of the blanket, in conformance with the product specifications.

C. The ECBs shall be free of defects and voids that would interfere with proper installation or impair performance, in conformance with the product specifications.

D. The ECBs shall be stored by Contractor in a manner that protects each roll from damage by construction activities, sheltered from weather and maintains the clean and dry condition of the material.

## **PART II - PRODUCTS**

### **2.01 Erosion Control Blanket**

A. The ECB shall be Excel PP5-12 as manufactured by Western Excelsior, 901 Grand Ave, Mancos CO 81328 (1-866-540-9810, [www.westernexcelsior.com](http://www.westernexcelsior.com)).

B. Excel PP5-12 Turf Reinforcement Mat is composed of 100% synthetic components. A matrix of green polypropylene fibers is mechanically (stitch) bound between two UV stabilized, heavy duty synthetic nets. Stitching is secured on two inch centers using UV stabilized, heavy duty polypropylene thread. Excel PP5-12 is a permanent RECP that provides immediate erosion protection and long term turf reinforcement and is intended for slope or channel applications requiring erosion protection for greater than thirty-six months.

C. The ECB shall be identified by the following properties:

Property	Test Method	Value	Unit
Tensile Strength	ASTM D6818	20.8 (MD), 17.7 (TD)	lb/in
Elongation	ASTM D6818	30.0 (MD), 20.0 (TD)	%
Mass per Unit Area	ASTM D6566	12.0	oz/yd <sup>2</sup>
Thickness	ASTM D1777	9.6	mm
Light Penetration	ECTC TASC 00197	20	% open
Resiliency	ASTM D6524	88	%
UV Stability	ASTM 4355	100	%
Porosity	Computed	96	%

D. The ECB may be furnished any of the following dimensions:

Roll Width	7.5 ft	15.0 ft
Roll Length	120 ft	120 ft
Coverage	100 yd <sup>2</sup>	200 yd <sup>2</sup>
Roll Weight	75 lbs	150 lbs
**Note: Roll weight measured at the time of manufacture.		

### 2.02 Staples

A. Staples shall be a minimum 6” long by 1” wide, 11 gauge wire staple for cohesive soils. For non-cohesive soils, staples utilized shall 8” long by 1” wide, 11 gauge wire staple.

## PART III - EXECUTION

### 3.01 Blanket Supplier Representation

A. Contractor shall coordinate with the blanket supplier for a qualified representative to be present at the job site at the start of installation to provide technical assistance as needed. Contractor shall remain solely responsible for the quality of installation.

### 3.02 Site Preparation

A. Before placing ECB, Contractor shall certify that the ground surface has been properly compacted, graded smooth, is free of depressions, voids, soft or uncompacted areas, obstructions (such as tree roots, protruding stones or other foreign matter), and is seeded and fertilized in accordance with project specifications. Contractor shall proceed only when site is prepared as described herein. Initiation of construction signifies that Contractor has verified and accepted preceding work as in conformance with this specification.

B. Contractor shall fine grade the ground surface by hand or small machine, addressing where necessary to remove local depressions, voids, rills or accumulations.

C. No vehicular traffic shall be permitted directly on the erosion control blanket.

**NOTE: Application of topsoil, seeding, and fertilizing are not included in this specification.**

### 3.03 Slope Installation

A. The ECB shall be installed as directed by the owner’s representative in accordance with the manufacturer’s installation guidelines (document WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative). staple pattern specifications and CAD drawings as provided by Western Excelsior. The extent of erosion control blanket shall be as shown on the project drawings.

B. The ECB shall be applied parallel to the main direction of flow (downslope) and anchored with staples (2.02) with the specified stapling pattern (3.03A). Seams shall be overlapped as directed by the installation instructions provided by Western Excelsior (WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative).

C. Where exposed to overland sheet flow, a trench shall be located at the upstream termination. Anchor trenches shall be constructed to the extent and to the dimensions as specified by Western Excelsior (WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative).

D. ECBs installed as slope protection overlapping channel liners shall be installed such that flow does not undermine ECB.

### **3.04 Channel Installation**

A. The ECB shall be installed as directed by the owner's representative in accordance with manufacturer's installation guidelines (WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative), staple pattern specifications and CAD drawings as provided by Western Excelsior. The extent of erosion control blanket shall be as shown on the project drawings.

B. Erosion control blanket shall be installed parallel to the flow of water. The first roll shall be centered longitudinally in mid-channel (lateral) and anchored with staples (2.02). Subsequent rolls shall follow from channel center outward and be overlapped as shown in manufacturer's installation specifications (WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative).

C. Successive lengths of erosion control blanket shall be overlapped sufficiently for a common row of staples with the upstream end on top (shingled). Staple the overlap across the end of each of the overlapping lengths so that staples anchor through the nettings and bodies of both blankets. Overlapping of blankets shall be conducted as per manufacturer's installation instructions (WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative).

D. An anchor trench shall be constructed at the upstream termination and along the longitudinal edges to prohibit overland flow from proceeding unabated under the blanket. Erosion control blanket shall be stapled to the bottom of the trench. The trench shall be backfilled, compacted and wrapped with the remaining tail of the ECB as per manufacturer's specifications (WE\_EXCEL\_PP512\_INL available at [www.westernexcelsior.com](http://www.westernexcelsior.com) or by manufacturer representative).

### **3.05 Quality Assurance**

A. Erosion control blankets shall not be defective or damaged sufficiently to compromise the specified performance. Damaged or defective materials shall be replaced at no additional cost to the owner.

B. Product shall be manufactured in accordance with a documented Manufacturing Quality Control Plan (MQCP). At a minimum, the following documentation shall be provided upon request:

1. Inspection report of material produced in manufacturing lot.
2. Recorded weight of each blanket as manufactured.
3. Verification of material conformance with MQCP.

### **3.06 Clean-up**

A. Upon completion of this scope of work, Contractor shall remove from the job site and properly dispose of all remaining debris, waste materials, excess materials, equipment and packaging

required of or created by Contractor in the process of construction. Disposal of waste materials shall be solely the responsibility of Contractor and shall be completed in accordance with applicable waste disposal regulations.

**3.07 Method of Measurement**

A. The erosion control blanket shall be measured by the surface area covered in square yards. No measurement for payment shall be computed for overlaps, fine grading, trenching, staples, or other miscellaneous materials necessary for placement of the erosion control blanket.

**3.08 Basis of Payment**

A. The accepted quantities of erosion control blanket shall be paid for at the contract unit price per square yard, complete in place. Payment shall be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Erosion Control Blanket	Square Yards