

Tensar® NORTH AMERICAN GREEN®



THE NEW MAXIMUM IN EROSION CONTROL AND TURF REINFORCEMENT



TAKE VEGETATION TO THE HIGHEST POWER



## Maximizing the Use of Vegetation in Place of Hard Armor through:


- 1 Maximum Erosion Control
- 2 Maximum Vegetation Establishment
- 3 Maximum Vegetation Reinforcement



## The **Vmax<sup>3</sup>** Difference

### Composite Construction For Complete Erosion Protection!

North American Green's Vmax<sup>3</sup> Composite Turf Reinforcement Series consists of three different permanent turf reinforcement mats (TRMs) each designed to maximize performance through all three developmental phases of a reinforced vegetative lining (unvegetated – vegetation establishment – vegetation maturity). All three Vmax<sup>3</sup> TRMs feature a patented composite construction that elevates their erosion control and permanent turf reinforcement capabilities well beyond those of conventional TRMs. Each Vmax<sup>3</sup> product begins with a permanent, three-dimensional corrugated turf reinforcement matting structure incorporated with either natural organic or UV stabilized synthetic fibers. This specially designed TRM structure anchors and reinforces the roots and stems of vegetation for long-term stability, and helps create a shear plane that actually deflects the flowing water away from the soil surface – improving its immediate to long-term erosion control capabilities. The fiber matrix further supplements the TRM structure's ground cover and moisture retention properties for dramatically improved erosion control and mulching action. By ensuring effective seed and soil protection immediately after installation, Vmax<sup>3</sup> TRMs give you confidence from the start that your reinforced turf designs will develop as planned. And, with proven vegetation reinforcement capabilities under flow-induced shear stresses of up to 14 lbs/ft<sup>2</sup> (672 Pa), Vmax<sup>3</sup> products give you confidence that your severe slopes, critical channels, or high impact shorelines will withstand nature's forces for years to come. Backed by the most comprehensive product performance guarantee in the industry, Vmax<sup>3</sup> TRMs simply give you confidence to design with vegetation instead of rock riprap or concrete in most critical erosion control applications.





## Why Use Vmax<sup>3</sup> Reinforced Vegetation in Place of Hard Armor?

- Much more economical than rock or concrete at less than 1/3 the installed cost! And Vmax<sup>3</sup> products are easier to install than rock or concrete and require no heavy equipment.
- Recognized and emphasized by the U.S. EPA as a preferred Best Management Practice (BMP) when compared to rock riprap in meeting National Pollutant Discharge Elimination System (NPDES) regulations.
- Unlike “hard” rock, poured concrete and articulated concrete blocks (ACBs), Vmax<sup>3</sup> provides “soft” protection that poses no threat to pedestrians and/or automobiles when used near travel routes.
- Provides a natural filter for runoff water by allowing infiltration, entrapping sediments and absorbing harmful pollutants. Hard armor enables little or no water infiltration and/or pollutant removal.
- Requires little maintenance other than periodic mowing. Rock riprap collects trash, supports weed growth and requires special attention when mowed around.
- Offers a flexible lining that won’t crack and deteriorate like concrete.
- Provides a more natural, aesthetically pleasing and ecologically functional “green” landscape. Rock can harbor undesirable wildlife.

## Why Use Vmax<sup>3</sup> Composite TRMs Instead of “Conventional” TRMs?

### 1 Maximum Erosion Protection

- Vmax<sup>3</sup> Composite TRMs are surface-applied to provide the highest level of erosion protection at the lowest cost. Many conventional TRMs require costly soil in-filling which is extremely vulnerable to erosion.
- The Vmax<sup>3</sup> unique corrugated permanent matting structure forms a shear plane perpendicular to water flow to deflect erosive hydraulic forces away from the soil surface.
- Unlike conventional open-structured TRMs, the Vmax<sup>3</sup> natural or synthetic fiber matrix shields soil from the erosive forces of raindrop impact and prevents shear stress extraction of soil particles from or through the matting structure.

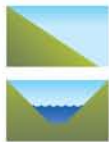
### 2 Maximum Vegetation Establishment

- Unlike conventional open-structured TRMs, fiber matrix better regulates moisture and temperature for maximum seed germination and plant development.
- The Vmax<sup>3</sup> corrugated matting structure deflects shear forces away from newly planted seed and structurally reinforces seedlings.

### 3 Maximum Vegetation Reinforcement

- The Vmax<sup>3</sup> high strength, 3-D matting structure fortifies both stem and root systems for the ultimate in vegetation reinforcement.
- UV stabilized synthetic matting structure maintains strength and integrity even under long-term exposure to sunlight.
- High strength matting structure resists damages from natural as well as man-made forces such as heavy foot, maintenance equipment and vehicular traffic.
- The permanent matting structure of all three Vmax<sup>3</sup> products (without degradable organic fiber matrix) exceeds FHWA FP-03 standards for TRMs.





Severe Slopes  
High-Flow Channels  
Streambanks

# SC250<sup>®</sup> Permanent Turf Reinforcement Mat

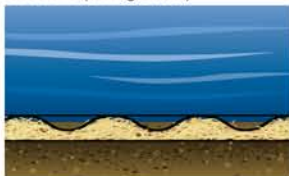
High performance – up to 30" rock riprap

The SC250 is constructed of a permanent, high strength three-dimensional matting structure incorporated with a straw/coconut fiber matrix. It is designed to provide both extended-term, pre-vegetated erosion protection and permanent turf reinforcement in a wide variety of applications.

The straw/coconut fiber matrix enhances the permanent matting's initial mulching and erosion control performance for up to 24 months. Proven in laboratory and field research, unvegetated SC250 reduces soil loss to less than 0.5 in (12.7 mm) under shear stress up to 3.0 lbs/ft<sup>2</sup> (144 Pa). The permanent matting's high strength 3-D structure increases the shear resistance of vegetation up to 10 lbs/ft<sup>2</sup> (480 Pa), 10 times that of comparable unreinforced vegetation! The SC250 enables vegetation to be used in many applications where 24 – 30 in (0.6 – 0.76 m) rock riprap was once the only viable alternative.

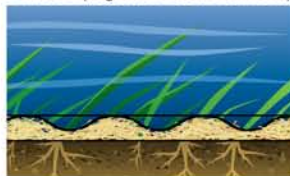
## SC250 Performance Profile

Phase 1 (unvegetated)



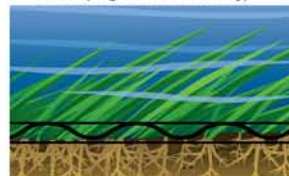
Unprotected seed and soil are highly susceptible to erosion. Upon installation, the SC250's straw/coconut fiber matrix and corrugated matting structure provide a uniform mulch layer and effective erosion protection for seed and soil under flow-induced shear stresses up to 3.0 lbs/ft<sup>2</sup> (144 Pa).

Phase 2 (vegetation establishment)



The tender stems and undeveloped root systems of immature vegetation provide little protection for the soil surface and are prone to damage or removal at shear stresses of only 0.6 lbs/ft<sup>2</sup> (29 Pa).\* The SC250 continues providing erosion protection between, and structural support for, developing plants – increasing the permissible shear stress of new vegetation up to 8 lbs/ft<sup>2</sup> (383 Pa).

Phase 3 (vegetation maturity)



Under flow-induced shear stress of only 1.0 lbs/ft<sup>2</sup> (48 Pa), unreinforced mature vegetation may allow significant soil loss and experience physical damage.\*\* The SC250's corrugated matting structure reinforces soils and anchors vegetation roots and stems – increasing the permissible shear stress of the permanent vegetative stand up to 10 lbs/ft<sup>2</sup> (480 Pa).

\*Based on FHWA HEC#15 Permissible Shear Stress for Class D Vegetation [2 – 6" tall (5 – 15 cm), fair stand].

\*\*Based on FHWA HEC#15 Permissible Shear Stress for Class C Vegetation [6" tall (15 cm), good stand].



## Maximum Value with Vmax<sup>3</sup> SC250

Based on costs for protecting a 16 ft wide X 1000 ft long (4.8 m X 305 m) drainage channel.

Cost Comparison	SC250	24" (0.6 m) Rock Riprap
Materials	\$6,400 – 8,500	\$21,500
Labor	\$4,300 – 5,700	\$14,200
Total Installed Cost	\$10,700 – 14,200 \$6 – 8/yd <sup>2</sup> (\$7 – 10/m <sup>2</sup> )	\$35,700 \$20/yd <sup>2</sup> (\$24/m <sup>2</sup> )

## MAXIMUM SAVINGS OF \$25,000

Shown in U.S. Dollars. Cost may vary based on location.





Severe Slopes  
Critical-Flow Channels  
Streambanks  
Shorelines

# C350® Permanent Turf Reinforcement Mat

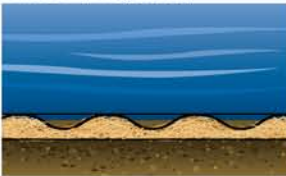
## Super-high performance – 30" and larger rock riprap

The C350 is constructed of a permanent, super-high strength three-dimensional matting structure incorporated with a 100% coconut fiber matrix. It is designed to provide both long-term, pre-vegetated erosion protection and permanent turf reinforcement in a wide variety of applications.

The 100% coconut fiber matrix supplements the permanent matting's initial mulching and erosion control performance for up to 36 months. Proven in laboratory and field research, unvegetated C350 reduces soil loss to less than 0.5 in (12.7 mm) under shear stress up to 3.2 lbs/ft<sup>2</sup> (153 Pa). The super-high strength permanent 3-D structure boosts the shear resistance of vegetation up to 12 lbs/ft<sup>2</sup> (576 Pa), offering permanent erosion protection exceeding that of 30 in (0.76 m) rock riprap. The C350 provides a cost-effective, environmentally friendly "green" alternative for severe erosion control projects.

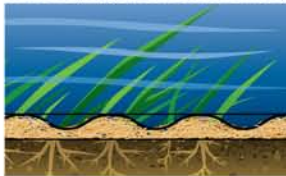
### C350 Performance Profile

Phase 1 (unvegetated)



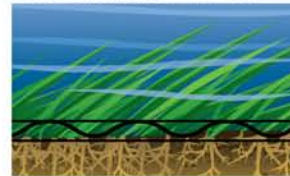
Unprotected seed and soil are highly susceptible to erosion. Upon installation, the C350's coconut fiber matrix and corrugated matting structure provide a uniform mulch layer and effective erosion protection for seed and soil under flow-induced shear stresses up to 3.2 lbs/ft<sup>2</sup> (153 Pa).

Phase 2 (vegetation establishment)



The tender stems and undeveloped root systems of immature vegetation provide little protection for the soil surface and are prone to damage or removal at shear stresses of only 0.6 lbs/ft<sup>2</sup> (29 Pa).\* The C350 continues providing erosion protection between, and structural support for, developing plants – increasing the permissible shear stress of new vegetation up to 10 lbs/ft<sup>2</sup> (480 Pa).

Phase 3 (vegetation maturity)



Under flow-induced shear stress of only 1.0 lbs/ft<sup>2</sup> (48 Pa), unreinforced mature vegetation may allow significant soil loss and experience physical damage.\*\* The C350's corrugated matting structure reinforces soils and anchors vegetation roots and stems – increasing the permissible shear stress of the permanent vegetative stand up to 12 lbs/ft<sup>2</sup> (576 Pa).

\*Based on FHWA HEC#15 Permissible Shear Stress for Class D Vegetation [2 – 6" tall (5 – 15 cm), fair stand].

\*\*Based on FHWA HEC#15 Permissible Shear Stress for Class C Vegetation [6" tall (15 cm), good stand].



### Maximum Value with Vmax<sup>3</sup> C350

Based on costs for protecting a 16 ft wide X 1000 ft long (4.8 m X 305 m) drainage channel.

Cost Comparison	C350	30" (0.76 m) Rock Riprap
Materials	\$7,800 – 9,900	\$32,000
Labor	\$6,400 – 7,900	\$21,300
Total Installed Cost	\$14,200 – 17,800 \$8 – 10/yd <sup>2</sup> (\$9 – 12/m <sup>2</sup> )	\$53,300 \$30/yd <sup>2</sup> (\$36/m <sup>2</sup> )

## MAXIMUM SAVINGS OF \$39,100

Shown in U.S. Dollars. Cost may vary based on location.





Ultra-High-Flow  
Drainage  
Channels  
Spillways  
Streambanks  
Shorelines

## P550® Permanent Turf Reinforcement Mat

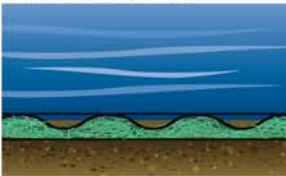
Ultra-high performance – the new maximum in vegetation reinforcement!

The P550 is comprised of a permanent, ultra-high strength three-dimensional matting structure incorporated with a 100% polypropylene fiber matrix. It is designed to provide both long-term, pre-vegetated erosion protection and permanent turf reinforcement in a wide variety of applications.

The 100% polypropylene fiber matrix augments the permanent matting's initial mulching and erosion control performance as well as its permanent vegetation reinforcement capabilities. Proven in laboratory and field research, unvegetated P550 reduces soil loss to less than 0.5 in (12.7 mm) under shear stress up to 4.0 lbs/ft<sup>2</sup> (191 Pa). The P550 drives the shear resistance of vegetation up to 14 lbs/ft<sup>2</sup> (672 Pa) – establishing a new maximum for vegetation reinforcement! The P550 is the ultimate choice for extending the use of vegetation in extreme erosion control projects where only poured concrete or articulated concrete blocks (ACBs) were the only viable alternative.

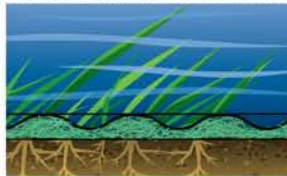
### P550 Performance Profile

**Phase 1** (unvegetated)



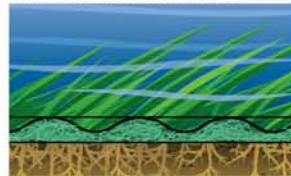
Unprotected seed and soil are highly susceptible to erosion. Upon installation, the P550's polypropylene fiber matrix and corrugated matting structure provide a uniform mulch layer and effective erosion protection for seed and soil under flow-induced shear stresses up to 4.0 lbs/ft<sup>2</sup> (191 Pa).

**Phase 2** (vegetation establishment)



The tender stems and undeveloped root systems of immature vegetation provide little protection for the soil surface and are prone to damage or removal at shear stresses of only 0.6 lbs/ft<sup>2</sup> (29 Pa).\* The P550 continues providing erosion protection between, and structural support for, developing plants – increasing the permissible shear stress of new vegetation up to 12 lbs/ft<sup>2</sup> (576 Pa).

**Phase 3** (vegetation maturity)



Under flow-induced shear stress of only 1.0 lbs/ft<sup>2</sup> (48 Pa), unreinforced mature vegetation may allow significant soil loss and experience physical damage.\*\* The P550 reinforces soils and anchors vegetation roots and stems – increasing the permissible shear stress of the permanent vegetative stand up to 14 lbs/ft<sup>2</sup> (672 Pa).

\*Based on FHWA HEC#15 Permissible Shear Stress for Class D Vegetation [2-6" tall (5-15 cm), fair stand].

\*\*Based on FHWA HEC#15 Permissible Shear Stress for Class C Vegetation [6" tall (15 cm), good stand].

Ultra-High  
Strength  
Top Net

3-D  
Corrugated  
Center Net

Polypropylene  
Matrix  
Material

Ultra-High  
Strength  
Bottom Net

### Maximum Value with Vmax<sup>3</sup> P550

Based on costs for protecting a 16 ft wide X 1000 ft long (4.8 m X 305 m) drainage channel.

Cost Comparison	P550	Concrete
Materials	\$12,800 – 16,000	\$42,600
Labor	\$8,500 – 10,700	\$28,500
Total Installed Cost	\$21,300 – 26,700 \$12 – 15/yd <sup>2</sup> (\$14 – 18/m <sup>2</sup> )	\$71,100 \$40/yd <sup>2</sup> (\$48/m <sup>2</sup> )

## MAXIMUM SAVINGS OF \$49,800

Shown in U.S. Dollars. Cost may vary based on location.





# Product Application Guide

All Vmax<sup>3</sup> rolls have standard dimensions of 6.5 ft (2 m) x 55.5 ft (16.9 m)

Product	Applications	Limiting Shear Stress lbs/ft <sup>2</sup> (Pa) Flow Duration				Permissible Velocity ft/s (m/s)		Typical Projects	FHWA FP-03 TRM Categories
		Bare Soil 0.5 hrs	50 hrs	Vegetated 0.5 hrs	Vegetated 50 hrs	Unvegetated	Vegetated		
SC250 <sup>®</sup>	1:1 & Greater Slopes Medium- to High-Flow Channels  24-month vegetation grow-in period	3.0 (144)	2.5 (120)	10.0 (480)	8.0 (383)	9.5 (2.9)	15 (4.6)	Roadside Ditches; Swales; Streambank Protection	Types 5. A and B
C350 <sup>®</sup>	1:1 & Greater Slopes High-Flow Channels  36-month vegetation grow-in period	3.2 (153)	3.0 (144)	12.0 (576)	10.0 (480)	10.5 (3.2)	20 (6.0)	Drainage Ditches; High-Flow Areas; Shoreline Protection	Types 5. A, B and C
P550 <sup>®</sup>	1:1 & Greater Slopes Extreme High-Flow Channels  36-month vegetation grow-in period or when sparse vegetation stand is expected	4.0 (191)	3.25 (156)	14.0 (672)	12.0 (576)	12.5 (3.8)	25 (7.6)	Spillways; Swales; High-Flow Drainage Areas; Shoreline Protection	Types 5. A, B and C

All unvegetated and vegetated Vmax<sup>3</sup> performance values are based on laboratory research utilizing test methods similar to those detailed in ASTM D 6459-99.

Note: This guide is for general purposes only. Actual product selection and design should be developed using North American Green's ECMDS<sup>®</sup> program.

## The North American Green Advantage

North American Green's Erosion Control Specialists are specially trained to provide on-site support and utilize state-of-the-art North American Green Erosion Control Materials Design Software (ECMDS<sup>®</sup>), to ensure your project design through selection and installation of cost-effective rolled erosion control products.

- As an extra advantage, North American Green's exclusive DOT System<sup>®</sup> is standard on all Vmax<sup>3</sup> products. The DOT System provides installation staple patterns that are clearly marked on the mats. This greatly increases installer accuracy, which ensures proper installation and excellent results for the extremely critical applications Vmax<sup>3</sup> products are used in.
- North American Green products are known for their quality – all blankets and mats produced by North American Green are stitched on 1.5-inch (3.81-cm) centers, adding significantly to field performance capabilities.
- North American Green products are tested thoroughly under field and laboratory conditions to accurately quantify performance.
- North American Green products are backed by our Ultimate Assurance Guarantee – if our products fail to control soil loss to the specified limits, we will upgrade you to the next higher performance product for FREE! You can be 100% confident in your project design. Contact your North American Green Erosion Control Specialist for guaranteed solutions to your most critical erosion problems.



### NORTH AMERICAN GREEN

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North American Green Vmax<sup>3</sup> products are protected by one or more of the following: U.S. patents # 5,849,645 / D456,224S / D456,674S / D466,378S and other U.S. and foreign patents pending.

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All Vmax<sup>3</sup> products have been tested by AASHTO's National Transportation Product Evaluation Program for RECPs.