ROLLMAX™
ROLLED EROSION CONTROL

VMax® W3000™ Large-Scale Testing Summary

QUANTIFYING HPTRM PERFORMANCE

In order to provide complete design protection, a high-performance turf reinforcement mat (HPTRM) must function to effectively control soil and seed loss immediately after installation to ensure the successful development of a permanent vegetative stand. Once vegetated, the matting must continue its role by supplementing the erosion protection provided by the vegetation as well as structurally reinforcing the vegetation against high shear stress water flows. To quantify the total performance of its VMax W3000 HPTRM, Tensar North American Green has recently conducted comprehensive large-scale channel lining testing. The following results of this research demonstrate the exceptional erosion control and permanent turf reinforcement capabilities of the VMax W3000 HPTRM.

TESTING PROTOCOL

The W3000 HPTRM was tested according to ASTM D6460 titled *Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.* This testing standard utilizes full-scale testing protocols to properly evaluate the product's performance. The full-scale testing is intended to simulate the conditions typically found on a construction site, and is a better indicator of true performance compared to bench-scale testing.

The testing was facilitated by TRI/Environmental located in Anderson, SC just outside of Clemson University. The 3 replicated plots of W3000 each received 4 hydraulic runs each lasting 1 hour on a 20% grade rectangular flume in the vegetated condition. The vegetation was cut to a 6-inch height and the seed count was 500 seeds per square foot. The W3000 was installed over a highly erodible loam soil.

One test plot of the vegetated W3000 HPTRM prior to flow events.

TESTING OBJECTIVE

The objective of the ASTM D6460 test is to determine the magnitude of flow-induced shear stress in the vegetative condition at which point excessive erosion will occur. The flow-induced shear stress is the hydraulic pulling force on the protective lining system, while excessive erosion is defined as the removal of an average of 0.5 inches of soil beneath the system. The soil migration was measured and recorded using established standards and methodology as outlined in the Clopper Soil Loss Index. Numerous pre-determined locations across and along each plot were measured for soil loss prior to and after each flow event.

TESTING PRODUCT INSTALLATION

The 20% grade of the slope was established and then protected by installing the W3000 HPTRM directly onto the prepared soil bed. Next, seed was sown into the protective channels of the W3000's corrugated structure. Finally, the product was in-filled with soil and brushed lightly to expose the very top of the mat. One very important feature of the W3000 product is that the channels formed by its corrugated structure, positioned perpendicular to water flow, function as check dams to encapsulate and protect in-filled seed and soil. Other competitive woven TRM products' structures do not have these protective channels, resulting in more seed/soil infill resting on top of instead of within the mat, creating an erosion-prone shear plane.

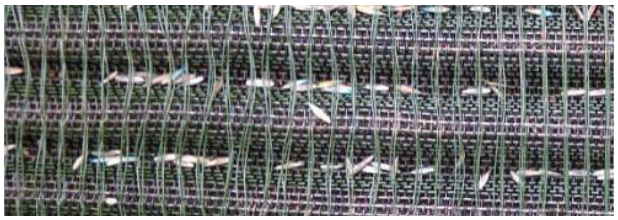


Image of the seed in-filled into the W3000 HPTRM

THE RESULTS

The results derived from this W3000 testing established an exceptional vegetated design shear stress of 16 psf and velocity of 25 fps. The vegetated W3000 was exposed to the testing facility's maximum flow discharge volumes that generated extremely high levels of shear stress, yet never reached the 0.50 inch soil loss failure criteria. The research also concluded that the vegetation's performance was increased by over 250% with the W3000 as a reinforcement structure compared to the same vegetation without the HPTRM. The results from the averages of the 4 flow events for the 3 test plots are summarized in the table below:

AVERAGE RESULTS FROM FOUR FLOW EVENTS

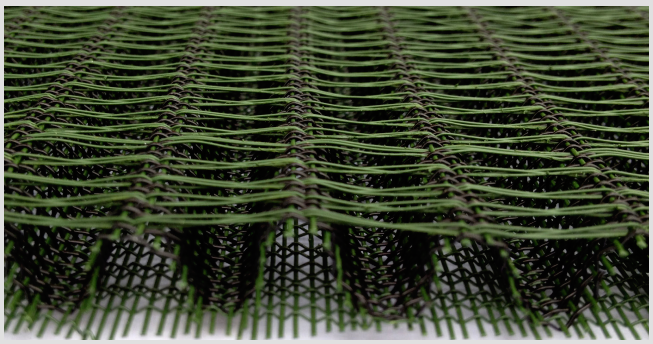
Flow Event	Flow Depth (in)	Velocity (fps)	Shear Stress (psf)	CSLI (in)
Flow Event 1	3.49	6.42	3.61	0.08
Flow Event 2	5.30	10.53	5.47	0.16
Flow Event 3	8.13	16.48	8.41	0.23
Flow Event 4	12.16	23.29	12.56	0.31

NOTE: Discharge volumes in Flow Event #4 were the highest that could be generated by the test facility. Vegetated W3000 sustained these maximum flow events without approaching failure.

Example of the turbulence created in the flume under test flow conditions

PRODUCT DESCRIPTION

The VMax® W3000™ high-performance turf reinforcement mat (HPTRM) is a machine-produced mat of 100% UV stabilized high denier poly yarns woven into permanent, high strength three-dimensional turf reinforcement matting. The mat consists of a woven bottom layer integrally interlaced into a woven corrugated middle layer, with poly tendons on the top side spanning the entire machine direction. The mat is designed to provide sufficient thickness, optimum open area and three-dimensionality for effective erosion control and vegetation reinforcement against high flow induced shear forces. The mat has high tensile strength providing excellent damage resistance and increased bearing capacity of vegetated soils subject to heavy loads from maintenance equipment and other vehicular traffic. The corrugated structure provides a highly frictional surface to prevent sod slippage when sod is installed over the mat. When used as surface protection without sod overlay, the corrugated structure encapsulates the seed and soil in place while promoting self soil-infilling of the system .



Cross section of the W3000 HPTRM

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