

GeoRunner® Flow Protection Mats are used to protect against scour caused by surface flow, turbulent fluctuations, and wave action. GeoRunner® applications include protecting channel embankments, shorelines, culvert outfalls and areas exposed to concentrated flows. Hydraulic performance testing of GeoRunner® composite systems was conducted at the Colorado State University Hydraulics Laboratory and included GeoRunner® with bare soil, with an unvegetated high performance turf reinforcement mat (HPTRM), with Kentucky bluegrass sod, and with an unvegetated turf reinforcement mat (TRM). Additionally, hydraulic testing of the TRM without GeoRunner® mats was conducted to provide baseline performance data. Twenty-seven tests were conducted under the research program to evaluate the performance of the composite systems, identify stability threshold conditions, and quantify hydraulic forces and soil loss.



The sod and TRMs were secured on top of soil embankments using 6-inch 10-gauge turf staples; and the GeoRunner® Flow Protection Mats were secured on top of the sod and TRMs using soil anchors per the manufacturer’s recommendations. Prior to hydraulic testing, bed-elevation profiles were measured in 2-ft intervals along the left side, centerline, and right side of the flume.

Each configuration was tested in a rectangular flume with a 0.5-hr steady-state flow in accordance with the ASTM D6460-07 testing procedures. The systems were initially seasoned with a low flow rate before increasing the discharge to the target flow rate. Unit discharges evaluated during this research program ranged from 0.10 cfs/ft to 8.13 cfs/ft. Upon reaching the target flow rate, water-surface elevations were recorded along the centerline of the flume at 2-ft intervals. If the system endured the 0.5-hr flow without surpassing stability thresholds, the procedure was repeated for hydraulic conditions of increased intensity. Upon completion of each test, the system was inspected and bed evaluations were recorded to evaluate the Clopper Soil loss Index (CSLI).

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***Test Results:***

Hydraulic performance was evaluated based on the CSLI versus shear stress and flow velocity relationships. The performance threshold for erosion control countermeasures is defined by the ASTM 6460-07 standard as a CSLI value equal to 0.50 in. Performance varied between the composite systems; where GeoRunner® over the TRM performed the best. Using the baseline TRM test, it was determined that shear stress performance increased by a factor of 6.1 with the addition of GeoRunner® mats to the TRM. Similarly, flow velocity performance increased by a factor of 2.6 with the addition of GeoRunner® mats to the TRM.

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