



Peabody Coal High Flow Channel Lining
Project
ShearForce10 Hybrid-Turf Instant Armor Mat

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- ***Hybrid-Turf Instant Armor Mats – Immediately Effective Soft Armor Alternatives to rock riprap in high flow applications***
- **The first and only soft armor mats with immediate erosion protection equal to large rock**
- **Over 3X the unvegetated permissible shear stress ratings of conventional TRMs/HPTRMs**
- ***Hybrid Vegetative Armoring Systems***
 - ***Simulated Turf protecting, establishing and permanently reinforcing***
Natural Vegetation



Hybrid-Turf Instant Armor Mat

- 1 inch thick monolithic UV stabilized PE simulated turf structure
- Engineered lightweight PET geotextile fabric backing
- **Forms a virtually non-erodible boundary on the soil surface against high flow-induced shear stresses, while facilitating the establishment and reinforcement of natural vegetation**
- 3ft/6ft wide x 45ft rolls
- Installed over seeded soil surface with 8+ inch wire staples or fabric pins
- Easy to Maintain, Mowable Surface



Peabody Coal Channel Project Details

- **Project Name:** Peabody Coal Channel Stabilization Trial vs Rock Riprap
- **Product:** InstaTurf™ ShearForce10™ Hybrid-Turf Instant Armor Mat
- **Application:** High Flow Channel Lining
- **Project Owner:** Peabody Coal, Somerville IN Mine
- **Time Frame:** Installation of ShearForce10 on Sep 10, 2019
- **Site Description:**
 - Standard cool season annual/perennial grass and legume mix
 - Silty Clay Loam soil
 - Approximate 4ft wide channel bottom (left unprotected for natural substrate)
 - Bed gradient 3 - 5%
 - 4:1 sideslopes
 - Drainage from 13 acre overburden cap
- **Objective:** Evaluation of the InstaTurf ShearForce10 for potential use in place of rock riprap on other critical areas of mine

Peabody Coal – ShearForce10 Instant Armor Mat Field Trial



ShearForce10 Installed over cool season grass mix in high flow channel at the base of an overburden cap on September 10, 2019. Objective: Evaluate potential as rock riprap replacement in high flow areas.

ShearForce10 Installation



Mats were installed between rock checks using 8 inch sod staples and 6 inch fabric pins on 1.5 ft centers according to published InstaTurf installation guidelines. Note small sections of channel downstream and upstream of mats left unprotected for comparison.



Upslope terminal ends of mats were trenched in approximately 6 inches (left). Mat edges at top of both sideslopes (Right photo) and downstream terminal ends were simply stapled on 9 inch centers with loose soil placed over edges.

ShearForce10 Installed and Ready for Action!



Completed ShearForce10 Installation looking down channel grade

Nearly One Month Later, ShearForce10 Waiting for Rain



Due to the lack of rainfall in September (.6 inch total), very little germination had occurred by Oct 7

Major Erosion Damage of Unprotected Areas Caused by Late October Storm Flows



...Just two weeks later, the rains came, with major storm events on Oct 21 (1.65 in) and Oct 26 (2.2 in) wreaking havoc on straw mulched slopes/channel bottom and riprap check dams as apparent in these photos taken Nov 20. Over 6.5 inches of rain fell in October, what a mess!

Nov 2019 - ShearForce10 Channel Test Section



As illustrated by the severe erosion and scour of adjacent unprotected soils , the ShearForce10 performed incredibly well at armoring the channel, while growing and reinforcing natural grass under extreme conditions!



Upslope view of ShearForce10 just after installation on Sep 10 (left) and on Nov 20 (right).

The Consequences of Underestimating Flow Depth



But wait, there's more. Apparently we should've used more ShearForce10! The right sideslope (looking downstream) where no ShearForce10 was used was badly scoured by over 8 inches. Incredibly, the ShearForce10 prevented erosion of soils and vegetation directly under it. Never seen anything like this before!

Dec 2019 - ShearForce10 Test Section



Dec 2019 - Scour of Unprotected Downstream “Control” Section



Scour of Unprotected Downstream “Control” Section



The unprotected area downstream from the ShearForce10 and rock check exhibited severe scour.

May 2020 – Spring Green Up



May 1, note in-filled gully left side of test section



May 28, in-filled soil washed out, rock deposited from check dam upstream

May 2020 – Spring Green Up



May 1, downstream rock check dam damage



May 28, leveled rock check dam



Installed - September 10, 2019

Reinforced Veg - May 1, 2020



Installed - September 10, 2019



Reinforced Veg -May 28, 2020