Montana Department of Transportation
Research Programs
January 2009

EXPERIMENTAL PROJECT

EVALUATION OF GEORIDGE PERMEABLE PLASTIC BERM FOR EROSION AND SEDIMENT CONTROL (INFORMAL)

Evaluation Report

Location:	Powder River County, Highway 212; C000037 – MP Reference Approximately 85-96: Glendive District
Project name:	Epsie-East & West
Project Number:	NH 37-3(11)85
Type of Project:	Experimental Trial using GeoRidge Permeable Plastic Berm for Erosion and Sediment Control
Principal Investigator:	Craig Abernathy Experimental Program Manager
Date Constructed:	May 2006-April 2007
Evaluation Date:	June 2007-May 2008

Objective

The Glendive District initiated to test the effectiveness of the GeoRidge Permeable Plastic Berm (PPB) as compared to conventional use of straw wattles for erosion and sediment control on project right-of-way. The District asked research to informally document the efficiency of the PPB for the duration of its intended use.

Product Description

GeoRidge consists of an 'A' shape frame of gridded high-density polyethylene plastic (HDPE). The design allows water to flow through the grid reducing the velocity and energy. Silt and sediment are deposited upstream of the berm. The individual sections are approximately one meter (3.28') in length, 22.5 cm (8.8")

in height at the crest, with a grid porosity of 35-40%. The devices are staked to the ground using a 250mm (10") galvanized spike with washer. Panels are overlapped at a minimum of 50mm (approximately 2"). Erosion control mats may be used in conjunction with the PPB.

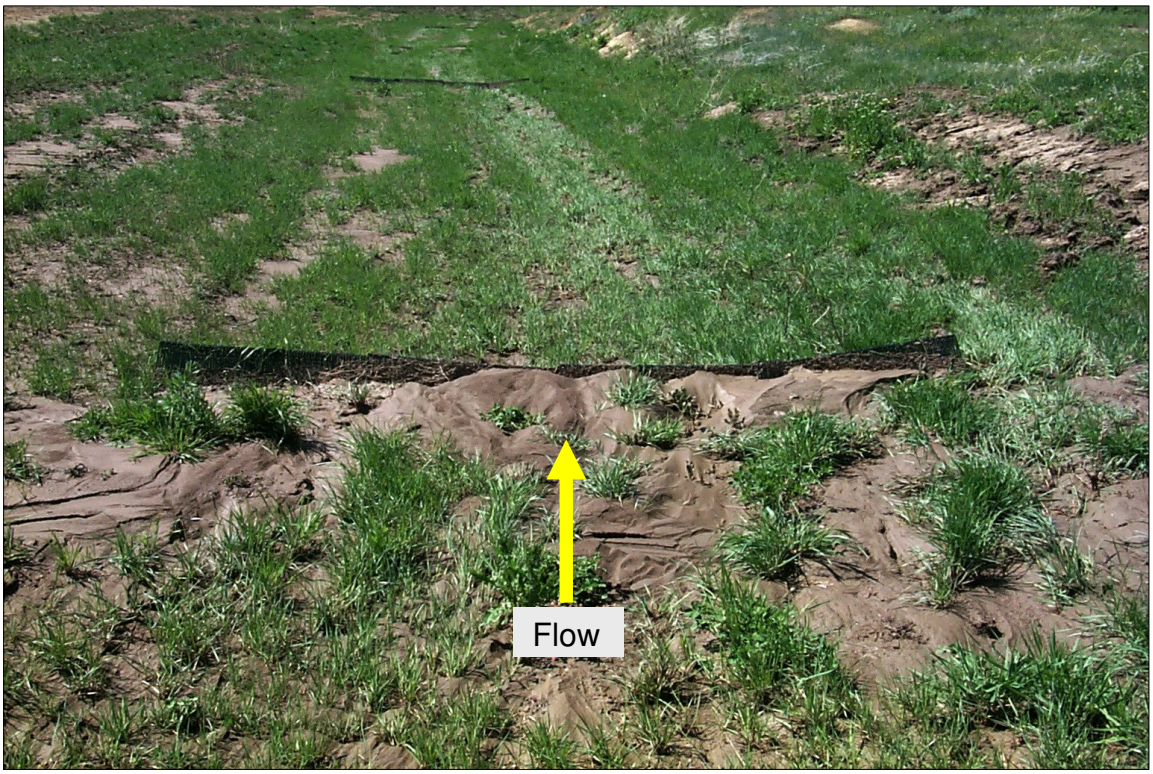
Experimental Design

The project is located in the Powder River County, highway 212, at various locations between mile points 85-96. Two types of GeoRidge PPB were deployed, same design but of different materials. The first is a durable HDPE, black in color to be removed once vegetation is stabilized. The second is a biodegradable HDPE; red or tan in color meant to be permanently installed with a usable life of 18-30 months, depending on environmental conditions.

Analysis

The following are images with descriptions of the initial site visit in June 2007 and the follow-up visit on October 2008. The images represent the practice per application and examples of procedure may be taken from different locations on the project. Research will conduct a final inspection in the summer of 2009.

Durable PPB



June 2007: A good example of the effectiveness of the durable PPB. Note how the sediment is deposited on the upstream side of the berm allowing vegetation to establish on the downstream side.

June 2007: Same image as previous with the view of the PPB from the downstream side.

June 2007: Above image shows break in the PPB section either due to improper installation or a significant hydraulic event. However the device appears to be functioning nominally.

Biodegradable PPB

June 2007: Image representing the biodegradable PPB use in conjunction with an erosion mat.

June 2007: This image shows the biodegradable PPB used conjunction with conventional wattles and erosion blankets.

June 2007: Image of biodegradable PPB which has exceeded capacity to retain sediment. Silt deposited on the upstream side of the PPB must be removed periodically to maintain the permeability and, therefore, the optimum performance of the PPB. Allowing excessive sediment to accumulate on the upstream side of the berm will create a non-porous structure. As water flows over the plugged berm, the impact of the water on the downstream side of the terrace will promote the dislodgment and transportation of sediment, leading to failure of the system.

June 2007: Image at left; two sections of PPB are placed at discharge of the culvert outlet. Outlet is out of view the image which would be located off to the lower left of the picture. The flow of sediment and debris has circumvented the PPB as seen on the right side of the channel, most likely caused by a significant hydraulic event. The PPB's have accumulated a large amount of silt upstream of the devices.

May 2008: Same site depicted in the previous image. Sand bags were placed to supplement the gaps in the berm sections (yellow arrows). It also appears that some of the accumulated sediment may have been removed and the PPB's cleaned and reset. Revegetation below the PPB's was well established.

May 2008: PPB used to mitigate further erosion of slope. An erosion blanket was place directly upstream of the device; however it is difficult to see in this image.

Supplemental

May 2008: Example of GeoRidge and erosion blanket lay-out on the Angela N & S project located in the Glendive District, highway 59 (P-18) approximate mile point 24; north of Miles City.

Conclusion

To date the GeoRidge permeable plastic berm is effective in the control of erosion and sediment as it applies to its use on this project. It appears that there have been substantial hydraulic events that have exceeded the capacity of the devices on areas of the project; but that can apply to other erosion control products as well. As stated earlier, Research will conduct one more site evaluation in the summer of 2009.