

EXPERIMENTAL PROJECT

EVALUATION OF RECYCLED PLASTIC MATS AS WEED PREVENTION AND EROSION CONTROL AROUND GUARDRAILS

Annual Report

Location: Interstate 15; Great Falls District, Cascade County,
RP approximately 274

Project name: Great Falls N & S

Project Number: IM 15-5(101)270, UPN 4041

Type of Project: Experimental trial using recycled plastic mats as
weed prevention and erosion control around
guardrails

Principal Investigator: Craig Abernathy
Experimental Program Manager

Date Constructed: June 2007

Evaluation Date: June 2007-April 2008

Objective

The Departments current practice of erosion and weed control around guardrails is to pave the area with asphalt cement (AC). The objective of this project is to evaluate recycled plastic mats to determine if this could be a cost effective alternative to paving with AC.

Experimental Design

Initially two types of guardrail weed mat were to be tested; Durotrim Recycled Rubber Tire Mat and the Universal Weed Cover Recycled Plastic Mat (UWC). The District decided to install only the UWC product. The product was installed in the summer of 2007 near the mile point reference 274, Interstate I-15; on both north and southbound guardrails sections at the overpass that connects the Ulm North Frontage road and the Tri Hill Frontage road.

Analysis

The main objective of the research is to monitor the effectiveness of the device in limiting the spread and growth of weeds around the guardrail structure. In addition to erosion control, and to the durability of the product itself. The following images will detail the efficacy of the product up to August of 2008. The next analysis will be conducted in the early spring of 2009.

June 2007



Representative image of the completed installation of the UWC on the northbound guardrail sections. Prior to placement an herbicide is applied to kill any remaining vegetation and root systems. Weed mat sections are on average 43.8 cm (17.25") in width, 61 cm (24") in length and a thickness of 3.2 mm (0.125"). Each panel overlaps 1 inch with a 3 inch per panel expansion and contraction. Each panel rotates 3 degrees for maximum of 12 degrees per post-to-post guardrail system. The mat is made of 100% recycled high-density polyethylene plastic (HDPE) with black carbon additives. The mats have molded apertures for use if the product is staked to the ground. In this application metal brackets were fabricated and attached to the guardrail posts to assist in keeping the mats in place.



Above: View of completed UWC on northbound shoulder. View is to the north. Note how the mat installation (yellow arrow) is placed back far enough from the edge of the rail as not to hinder snow plowing.

Below: Close-up of bracket placement.



August 2007



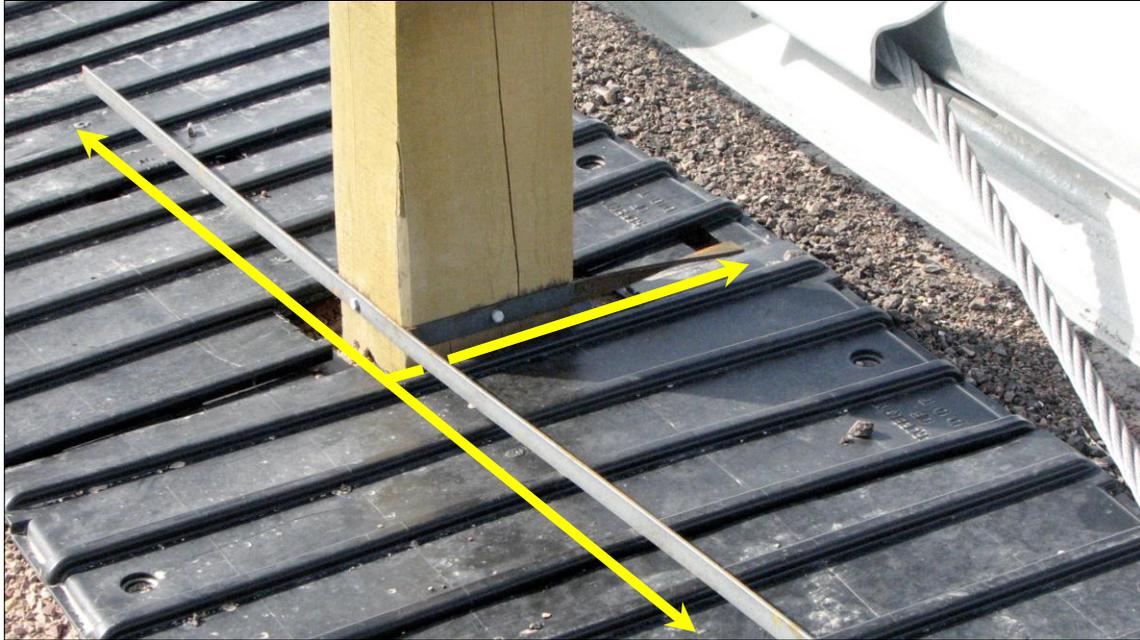
In August 2007 Research was notified that a high wind event had created a failure with the UWC supporting brackets. Over half of the mats (north half of the northbound lane) were displaced by wind as seen in the above image.

The image on the left shows that the south end (near the overpass) fared better. However, you can see (by the yellow arrows) that some of metal brackets are bent upwards by the force of the wind (apparently) pushing up the mats. Most of the panels were salvageable and were reconnected with a redesigned bracket as seen in the next section.

September 2007



The District reinstalled the UWC mats in September 2007. The metal brackets were redesigned in an effort for a more secure placement. Note that the installation was extended to the end of the guardrail. The initial installation ended the mat placement denoted by the yellow arrow. As seen in this image, by moving the mats to the end of the guardrail it has inadvertently placed the mats beyond the edge of the rail (red arrow).

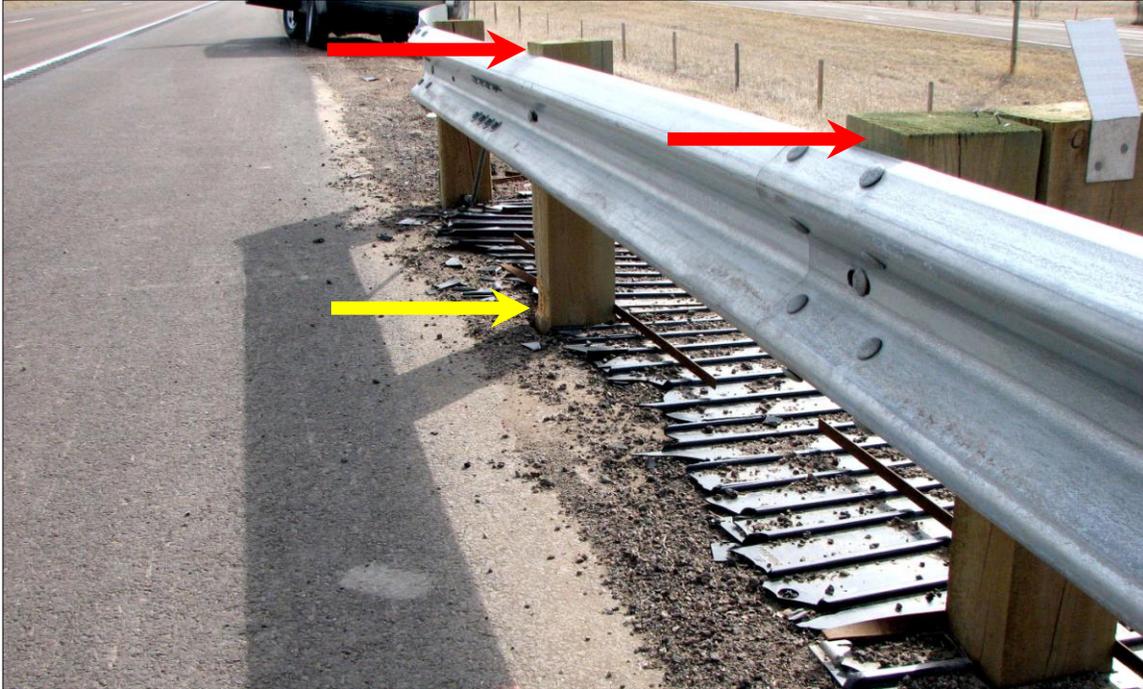


Above: Close-up of the new bracket design. The 'T' shape and double bolt attachment may offer more stability than the previous single bar angle bracket.



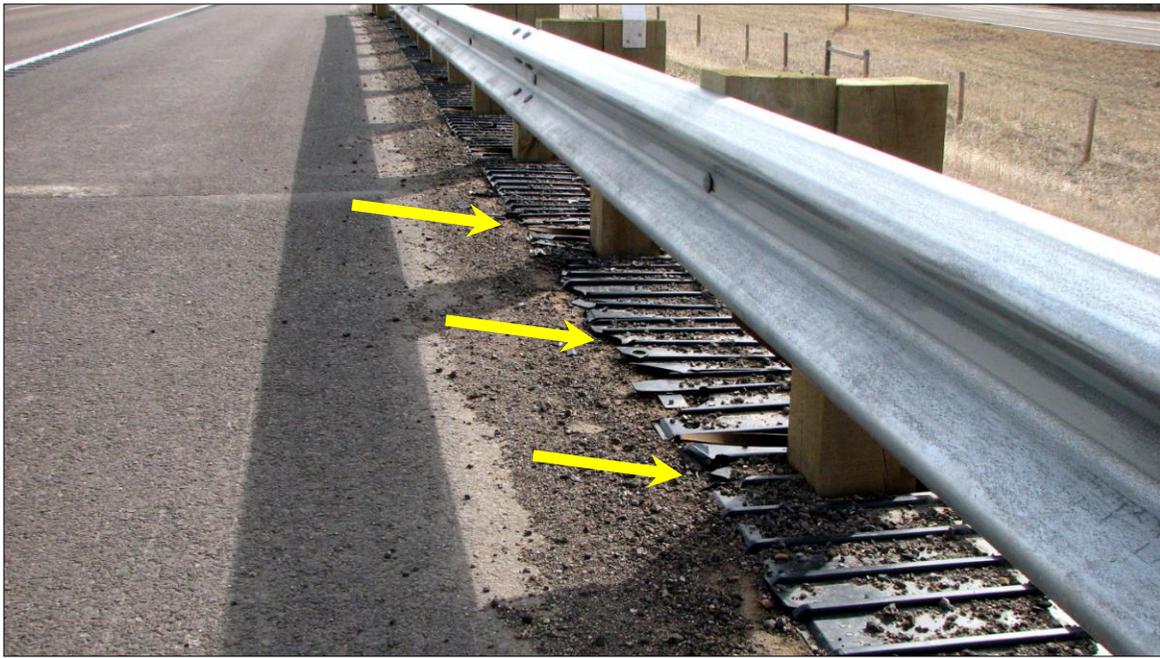
Southbound guardrail: Image of UWC with the new bracket design

April 2008



In early April 2008, the District again notified Research of damage to mats on north end of the northbound lane guardrail. Based on documentation at the time it appears that the mats were struck by some moving object which fragmented the shoulder edge of the mats. As noted earlier in this report, the UWC was extended to the end to the guardrail which placed the leading edge of the mat beyond the boundary of the rail due to the change in post design as indicated by the red arrows. Further evidence of damage by moving object was the gouge in the guardrail post (yellow arrow) and bending of the UWC bracket. The image below is a close-up of the damage.





Additional damage has occurred in other areas of the UWC mats as seen in these images. Since the shoulder edges of the mats are set back from the leading edge of the rail it is difficult to ascertain the cause.

Speculation may surmise that accumulated snow, ice, and sanding material on the roadway shoulder, while being cleared by a snow plow; may be forcing that mass against the mats and supporting brackets creating pressures that are fracturing the UWC and deforming the brackets without the plow blade coming in contact with the UWC.

Supplemental – Curling

Curling of the edges of the UWC mats has been documented at various locations of the installation as indicated by the images on the right. This edge curling is appearing on both sides of the mat, but to date, predominately on the shoulder side. This may be a condition caused by extreme temperature swings, sunlight deprecation or a combination of both. Amplified curling on the shoulder side may be from snow, ice and/or particulates being forced under the mat by plowing activity, deforming the mat. This will be reported on in future analysis.



Below is another example with curling of the UWC mat installed on Highway 59 (P-18) approximately 10 miles north of Miles City. Date of installation is unknown.



Conclusion

The objective of using the Universal Weed Cover recycled mat is to inhibit weed growth and to reduce erosion. To date this product is effective in mitigating those elements. Durability of the product will be the main concern in upcoming evaluations. The damage that was documented in April 2008 is not germane to this analysis since it was caused by an object hitting the exposed edge of the mats due to the reasons explained earlier in this report. However the fragmented edges observed throughout the installation, and mat curling is an issue to be addressed. Based on current performance the product is rated as fair. This report and other project information are available at the following URL:

http://www.mdt.mt.gov/research/projects/gtf_rubber.shtml