Montana Department of Transportation
Research Program
November 2002

EVALUATION REPORT

FIBER-REINFORCED POLYMER (FRP) PULTRUDED DECKING MATERIAL AND HELICAL ANCHORING SYSTEM FOR USE IN SNOW FENCE APPLICATIONS

Location: Livingston, Montana. Interstate 90, MP-332, Park County

Project No.: IM90-7(63)331

FHWA No.: Experimental Project MT 00-01

Description: Sixth semi-annual evaluation of remaining test section of snow fence using proprietary EZ-Deck Fiber-Reinforced Polymer (FRP).

Evaluation Date: November 21, 2002

Report Origin: Craig Abernathy

Objective


Figure 1

The purpose of this study is to evaluate the feasibility of using a fiber-reinforced polymer (FRP) material in the construction of snow fences. FRP is a process where continuous glass-fiber strands are pulled through a thermosetting polyester resin (or matrix) to form a composite. The main purpose of testing the FRP product is to determine its structural integrity based on MDT's current snow fence design specifications, especially with the harsh climate these structures are subjected to in the state of Montana. In addition, to compare this material in determining its design function as a possible alternative for MDT's current design specifications for the construction of snow fences (Test Section 1 [TS1] vs. Test Section 2 [TS2], as explained in the November 1999 construction report). As noted in the Spring 2001 report, TS2 was found collapsed and was assumed a structural-related failure due to the three rear (sole) supports buckling or snapping in high winds.

The final purpose was to test the Helical Anchoring System as a reliable ground attachment for snow fences (used in TS2). As stated earlier, section TS2 was found collapsed, the helical anchors were not affected by this failure. In addition, the anchor supports competently held the FRP braces on the ground preventing FRP sections becoming missiles that may have caused a safety concern to the nearby interstate. (refer to May, 2001 report; http://mdtinfo/research/docs/epsl/livingston/livingston_may01.pdf).

Inspections are held in early spring and late fall to document the environmental effects of seasonal extremes to the FRP material as well as stability of design. Figure 1 shows the remaining TS1 as seen on November 21, 2002.

Evaluation

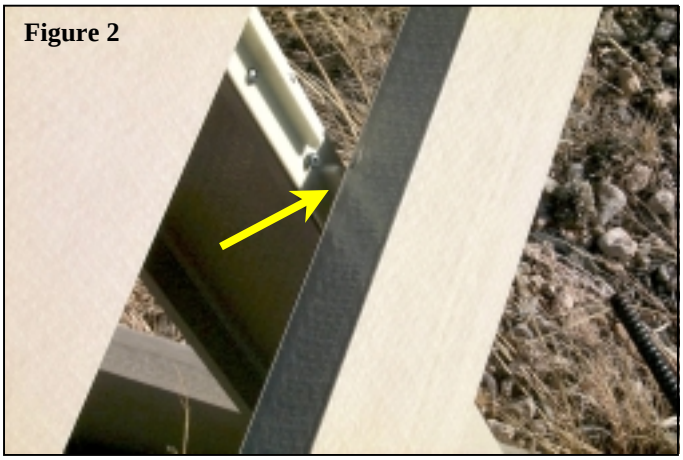
Figure 2

The evaluation consisted of a visual inspection of the FRP material and the structural supports. Special attention was given to the attachments of the FRP planks, (setting screws, bolts, FRP clips).

As detailed in the October 2001 inspection, on of the lower FRP planks, at the top of the center clip attachment seems to have broken or sheared off. Figure 2 shows a front view close-up of the broken clip. The screw used to help secure the plank to clip remains. The plank shows the damage from the screw head as it (apparently) was pulled away. The plank has deflected further away from the clip attachment since the last inspection (Figure 3, rear view). We can assume stress on the front panel from wind turbulence could have caused the separation. This occurrence is just on one clip attachment. The damage was not noticed on any other areas of the test section during this inspection. All other connections used to attach the FRP planking to the frames are intact, with no evidence of loose screws or chipping of the FRP rail attachments. Visual appearance of all the FRP material and plank connections shows no signs of deterioration from sun or wind degradation.


Figure 3

As noted in the October 2000 Report. The right, rear bolt attachment to the frame sill has broken (Figure 4). During this investigation, it was observed the sill had jumped once more to the left of the broken bolt of the rear ground support. This broken sill support has, up to this time, not caused a catastrophic failure of TS1. Nor is there any evidence that this loose rear sill attachment may have caused stress that allowed the center clip bracket to shear off. It was also observed the right front frame to bolt attachment has bent slightly. This may be the result of the freedom of the rear connection, which is allowing the stress from wind turbulence to deflect the bolt. The sill frame will be closely monitored in future

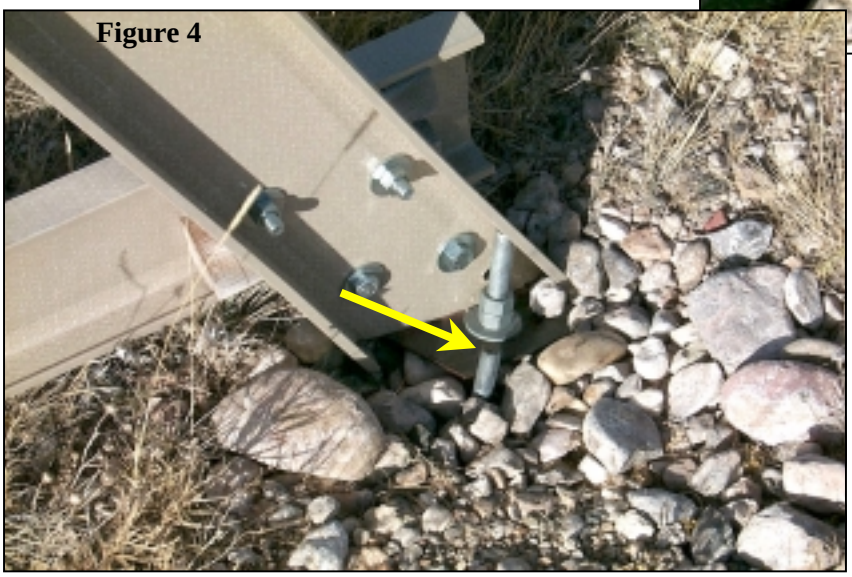
Figure 4

evaluations. For a listing of this and other snow fence reports, visit the Research experimental website at; http://mdtinfo/research/projects/livingston_snowfence.html.

At this time, TS1 is rated as performing well.