

## CONSTRUCTION REPORT

### FIBER-REINFORCED POLYMER (FRP) COMPOSITE 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

Description: Installation of two test sections of snow fencing using two proprietary materials; Pultronex EZ-Deck and A. B. Chance Helical Anchoring System.

Date of Construction: November 11, 1999

Weather: Windy, overcast; 55°F

This report will be on the two test sections erected by Dave Morris of Four Seasons Sunroom Company of Helena Montana. The first section (TS1) was erected to MDT specifications. The second section (TS2) was based on the design submitted by Dave Morris. The TS2 design will use the Helical Anchor and less bracing than TS1.

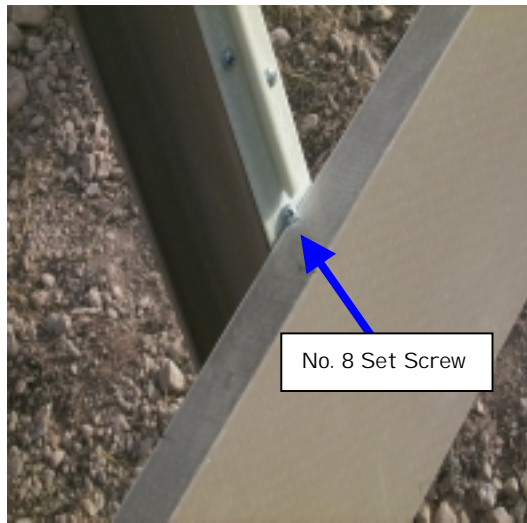
Construction of TS1 began approximately 8:45 am. Knopfle Construction had drilled and set concreted anchor bars prior to the construction of TS1. The FRP bracing supports were pre-cut and brackets attached in-shop as seen in figure 1. The clip bracket attachment, which secures the slat to the brace frame, was also installed in-shop.



The FRP decking planks were attached by snapping the c-shaped material to the clip bracket. In normal application of this product, the 'boards' are side by side in close proximity to each other (within a ¼ inch). This insures a stable, tight fit. In this situation, there is a missing board due to the required design of snow fence (alternating plank, then space and plank). To compensate for the lack

*Figure 1.*

of support, a no. 8 setting screw was used to secure the plank to the clip attachment (see figure 2). This will substitute support, which the missing plank would have done. Installation of the MDT design (TS1) was completed in approximately 2.5 hours. The TS1 Front brace consisted of two FRP planks, overlapped by one foot against each other (figure 5). MDT design had specified a single length brace. Anchor system #3 (MDT Standard Spec. 607) specified #19 rebar for sill isolation (restricting lateral movement and sawing action).



*Figure 2.*

The Contractor did not have the correct size of rebar, they used a smaller diameter rod and bent the rods over the sill and tied them with baling wire (figure 3).



The fence sill was connected to the anchor bar (TS1) by two nuts with washers. The height of the anchor attachment apparently was set to high within the concrete pile to set the sill placement firmly to the ground. This has the TS1 Snow fence section setting approximately two inches above the ground, the section is sitting on the bolted anchor and not on the ground. This was a concern of Scott Keller that

*Figure3, Anchor Sill.*

the structure may have too much lateral movement during high winds that may result in premature failure of the anchor bolts or other attachment hardware in the fence due to turbulence and vibration, (see figure 4).



*Figure 4.*

Figure 5, Completed TS1 snow fence section.



Figure 5.

Test Section 2 (TS2), was constructed using the design submitted by Dave Morris. Prior to installation, the Helical Anchors were drilled into the ground using a hydraulic rotary device attached to a backhoe (figures 6 & 7).



Figure 6.



Figure 7.

The Helical Anchor used was a high-strength, 1.75 inch by five-foot single coil as seen above.

All four anchors were in place within 45 minutes upon the arrival of the backhoe. The ground appeared to be rubble/cobble type material. The anchor was inserted about a foot below the surface. A second threaded shaft was connected to the anchor with a u-shaped bracket (figure 8). The sill was then attached to the threaded bracket.



Prior to sill attachment, an extraction and compression test was performed on the first Helical Anchor installed. The extraction psi went at 35,000. The compression test resulted in a 40,000 psi. 10,000 is the MDT spec. No other tests were performed on the remaining anchors (see figure 9). Test section 2 was constructed in one hour once all anchors had been installed. No problems were reported during construction of TS2.

*Figure 8.*



*Figure 9.*

Below are the completed test sections.



The following are additional images of the project.



FRP frame attachment to Helical Anchor.



Side view of completed test sections 1 & 2.