Montana Department of Transportation
Research Program
August 2002

ANNUAL RESEARCH EVALUATION REPORT

Thin-Whitetopping Overlay Composite

Glendive, Montana – Dawson County

STPP 20-1(6)0 P-20

August 19 & 20, 2002

Craig Abernathy, Research Bureau

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RESEARCH EVALUATION REPORT

Thin-Whitetopping Overlay Composite

Location:	Glendive, Montana – Dawson County
Project No.:	STPP 20-1(6)0 P-20, Highway 16, Milepost 0-.6
Description:	Experimental construction project consisting of milling approximately 38mm of Asphalt Cement (AC) and placement of 100mm Portland Cement (PCCP) onto the milled surface to create a composite pavement. Project length-0.9 kilometer (.6 mile)
Date of Evaluation:	August 19 & 20, 2002
Report Origin:	Craig Abernathy, Research Bureau

Purpose

Highway 16 (P-20) suffered from rutting, plastic deformation and transverse cracking with the current AC pavement. The Montana Department of Transportation decided to construct a thin-whitetopping project based on minor rehabilitation criteria. Whitetopping is an alternative to the regular program of mill & fill. This procedure bonds a flexible layer to a rigid layer to form a composite pavement to eliminate rutting and plastic deformation. Currently, the Department considers this type of pavement treatment experimental. This project will be formally evaluated for five years and informally thereafter for the life of the treatment. All documentation regarding this project can be found at the Research website: http://mdtinfo/research/projects/gld_whitetopping.html

Documentation

A visual inspection of the entire project was performed to document all types of surface cracking and distress. Photographic documentation of the cracks as well as a representative crack map is included in this report. Currently three transverse cracks are present on this project, all in the southbound lane. Location as follows (footage counted from the south end of the project going north), #1 at 1244' (541m), #2 at 1380' (420m), and #3 at 1480' (451m). Note that these cracks developed soon after placement during construction, no additional transverse cracking has been documented. Figure 1 is showing the crack at location 1244', figure 2 shows a close-up of the crack. These cracks are widening rapidly since construction and are rated as severe in nature. Incompressible debris (rocks, friables etc,) is entering the cracks and will accelerate the deterioration of the crack with freeze thaw events. It is suggested that these cracks be sealed in some manner to delay further damage.

Figure 1

Figure 2

The rest of the project displayed minimal panel cracking. Three panels are affected at both the north and south end of the project and one panel midway in the southbound lane. The north end of the northbound lane had one panel crack indicative of this type of pavement treatment, without an autopsy of the panel it is difficult to determine the various causes of cracking; which could entail, debonding of the PCCP to the asphalt concrete, structural failure of the underlying AC layer or overloading of the PCCP panel. In addition, this panel has no curb support, which may have allowed cracking at this location. Figure 3 shows the cracked panel on the northbound lane; right side

approximately 250' south at the north end of the project (refer to the crack map for an estimated location), a dark gray line has been superimposed in the visual to better see the crack. The mid-way crack in the southbound lane located at about 1322' (0' starting at the south-end of the lane) has the same characteristics as the previous crack (figure 4) save the fact it is located at the southbound, east edge of the pavement. The east edge of the southbound pavement supported the paver for the northbound placement of the PCCP. This may have acerbated the cracking of the panel.

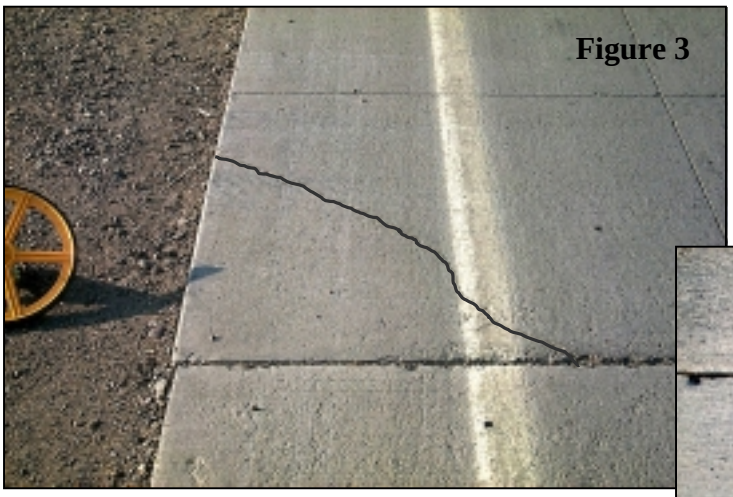


Figure 3

Figure 4

Additional panel cracking was located on the north end of the southbound lane on the west side of the road. It was observed that large truck traffic exiting off the interstate (due to the angle of turn) would roll over this section half on the pavement and partially on the gravel shoulder. Due to the lack of supporting shoulder and heavy loadings this section of pavement is experiencing may be the main reason for

cracking at this location. The cracking pattern also reflects lack of support. Figure 5 shows the area of cracking panels in relationship to the exit lane. Truck tire imprints can be seen in the gravel. The cracks have been superimposed with a dark gray line for better visibility. Figure 6 is a close-up of this area. Due to the nature and location of the cracking, this area will most likely deteriorate rapidly and will require spot repair of the pavement.


Figure 6

Cracking appeared at the south end of the project on both southbound and northbound lanes. This cracking was located adjacent to the full-depth PCCP at the Towne St. intersection (P-57). The cracks within these panels line up directly with the saw cuts on the full-depth PCCP. This cracking is sympathy stress from the full depth pavement. Installing a bond breaker between the full depth and whitetop sections may have alleviated this condition or (if possible) matching up saw cuts with the whitetopping and full-depth pavements. Figures 7 & 8 shows the sympathy cracking, gray lines have been superimposed over the cracks.


Figure 7

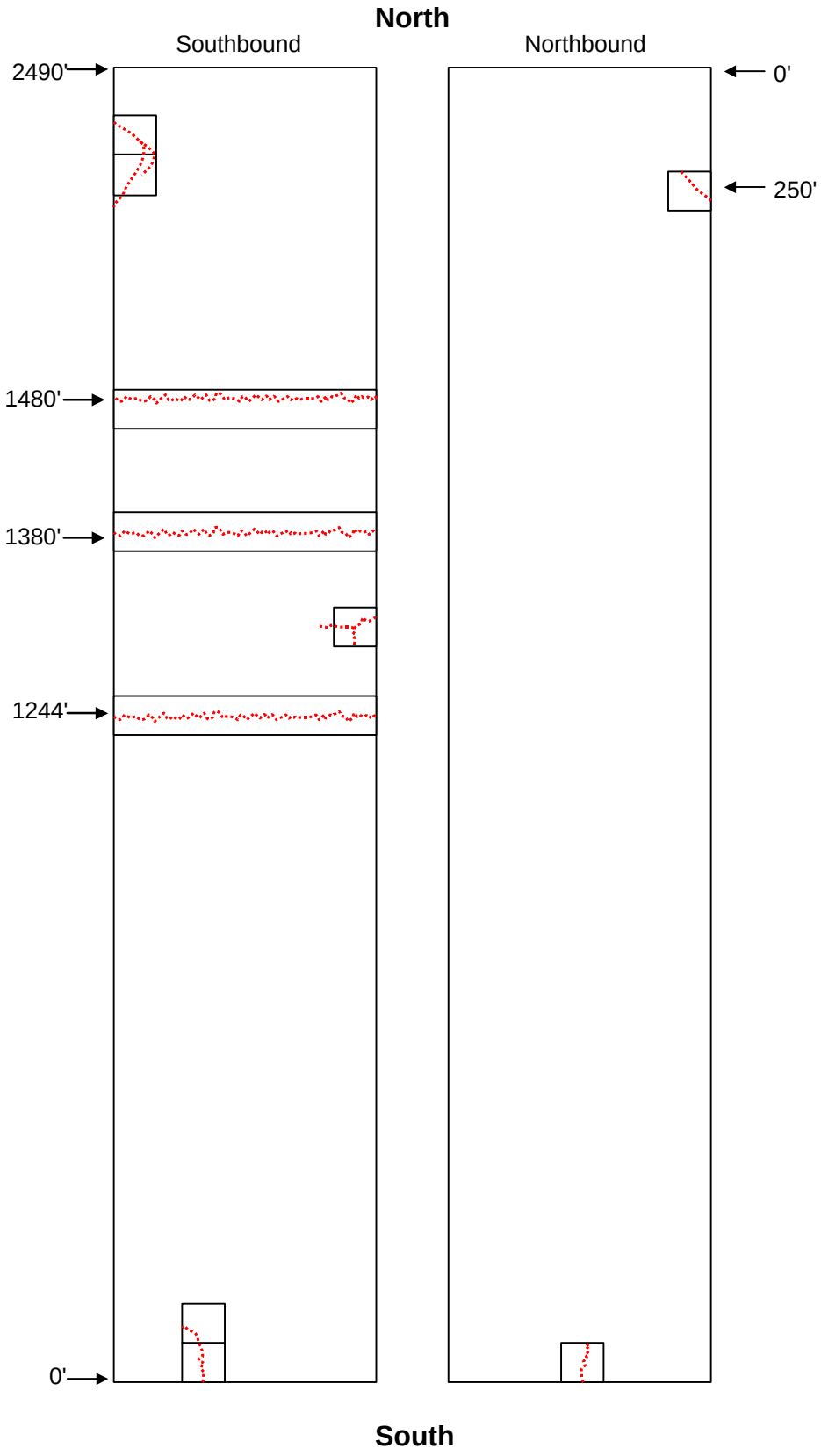

Figure 8

The Ride Index for the northbound lane is rated at 52 (IRI-180) and for the southbound lane at 56 (IRI-164) both grouped as being in the ‘poor’ ride category. The northbound lane as being rougher than the southbound. This may have been caused by the type of paver that was used during construction. The contractor

used an old style, Alan three-tube paver, which could have inadvertently (due to the back and forth action of the unit) created the undulation or ‘rough ride’ as indicated. In addition, since the paver rested on the east edge of the previously placed southbound lane during construction, it most likely accelerated the roughness aspect of the ride for the northbound lane. Regardless of the ride analysis and the transverse cracking, which can be attributed to constructability issues, this project is performing well. The next evaluation will be held in the summer of 2003.

South view of project

Glendive Whitetopping Representative Crack Map



Legend

Crack

Saw-cut Representation

All values and symbols are approximate

Highway 16 (P-20), .Milepost 0-.6 mile - Glendive, Montana