Minnesota Department of Transportation

Memo

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TO: File: Research on Longitudinal Joint Deterioration

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DATE: 3 February, 2010

SUBJECT: Joint Stabilization (JointBond®) Lab Study

Introduction:
This memo describes the lab study undertaken to evaluate the effect of joint stabilization (JointBond®) treatment on pavement marking retro-reflectivity.

Joint Stabilization (JointBond®) Treatment:
Joint Stabilization (Joint Bond®) is a clear colored polymerized maltene emulsion designed to penetrate into the longitudinal joint. This treatment can be applied 1.0 to 1.5' on either side of the longitudinal construction joint of Hot Mixed Asphalt (HMA) pavements and, according to the manufacturer, doesn't remove the pavement striping.

JointBond was applied on an experimental basis on September 8, 2008 at T.H. 95 (5.75 miles east of TH 169 (Princeton)). This section of roadway had received an overlay one year prior (2007).
Application:

- Started at Reference Point (RP) 28.0 and applied the product as described below:
  - 0.10 gallons per square yard (gsy) for 90 ft
  - skip 45 ft
  - 0.08 gal/SY for 250 ft
  - skip 240 ft
  - 0.07 gal/SY for 210 ft

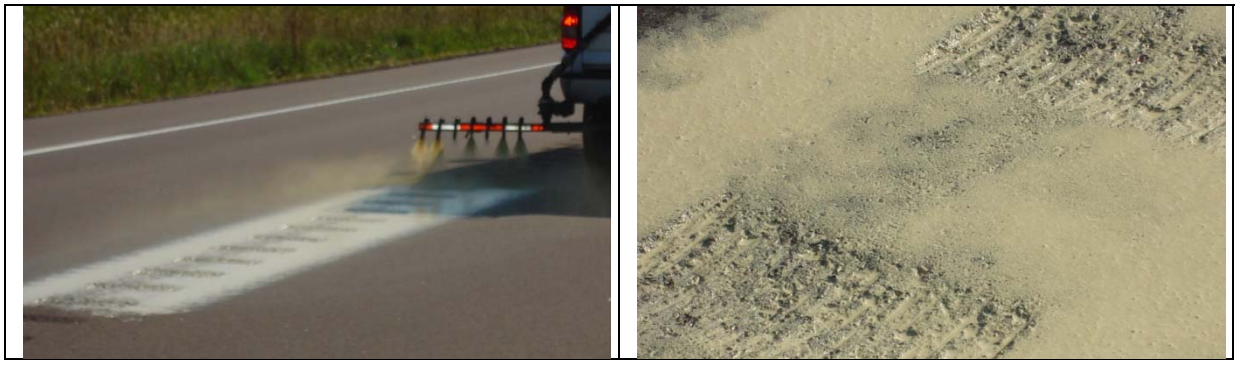

Figure 1. T.H. 95, September 8, 2008 – JB Application

A field visit was made by Patti-Wallin Johnson of D3 on 11-6-2008 (2 months after application) after maintenance reports of color change from clear to brown. This color change prompted the question as to whether or not the retro-reflectivity was reduced. In addition, Pavement marking retro-reflectivity was measured by Dave Gustafson using a hand held LTL-X device shortly after application in 2008 (Table 1). Note that the measurements

were made because of a visible difference between the sealed and unsealed sections on a routine marking evaluation, and not by special request. The results in Table 1 show that retro-reflectivity measurements are reduced by approximately 30 MCD's (29.9 and 33.4% difference for the west bound and east bound centerline, respectively) between the sealed and unsealed sections.

Figure 2. T.H. 95, November, 2008 –After JB Application

Table 1. T.H. 95 Retro-Reflectivity Measurements

	CL-WB	CL-WB (JointBond)	CL-EB	CL-EB (JointBond)
Retroreflectivity (MCD)	163	83	141	106
	150	73	166	123
	146	65	152	133
	142	96	149	77
	135	117	134	63
	148	123	140	56
	106	66	144	118
	114	57	115	118
	130	69	122	102
	93	150	107	79
	113	119	123	75
	114	132	109	93
Avg.	**130**	**96**	**134**	**95**

Laboratory Retro-Reflectivity Evaluation:

A plant produced HMA specimen was cut from a MN state highway and used for this laboratory evaluation. Two pavement stripes (one white and one yellow) were applied 18 inches long by 4 inches wide in a high humidity environment (to facilitate glass bead embedment), using standard laboratory procedures. The pavement markings were then allowed to cure over the weekend, and the initial retro-reflectivity measurements were taken, denoted "before" in table 1. The JB treatment was applied with a paint brush, at an amount of not more than 15 ml. This corresponds to an equivalent rate of not more than .07 gsy, the smallest rate applied on the TH 95 test section. After the treatment was allowed to cure, retro-reflectivity measurements were taken again, denoted "after" in table 1.

Figure 3. White Stripe, Before (Left) and After (Right) – JB Application

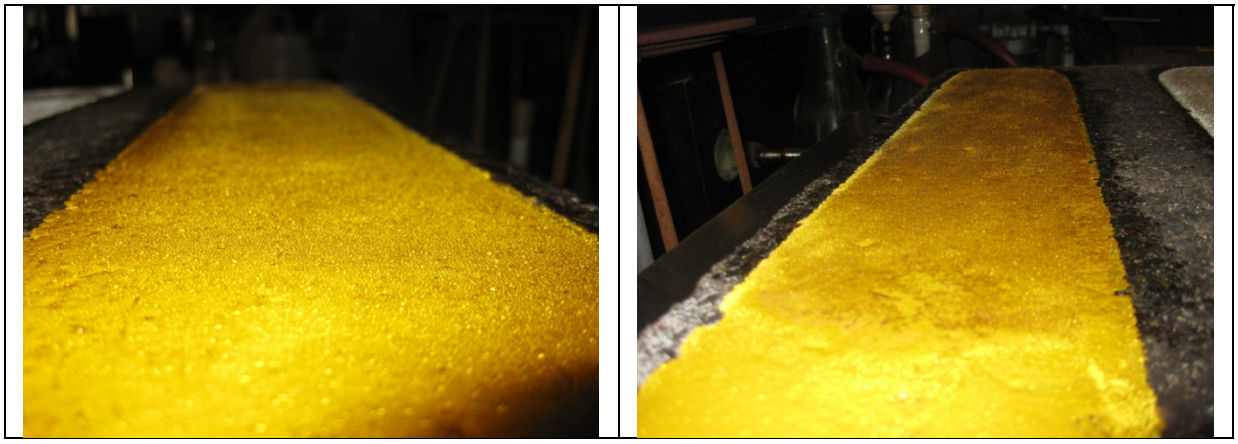

Figure 4. Yellow Stripe, Before (Left) and After (Right) – JB Application

Both treated stripes have approximately 50% of their pre-treatment retro-reflective values. The JointBond treatment appeared to turn the pavement markings brown, and was tacky. It is possible that with time and traffic that this material on the surface could fade away and retro-reflectivity numbers could improve, however it is uncertain how long this process would take.

Table 2. Before and After Retro-Reflectivity Measurements

		White	Yellow
Before (mcd)	1	345	183
	2	355	194
	3	333	206
	Average	**344.3**	**194.3**
After (mcd)	1	181	69
	2	164	102
	3	169	81
	Average	**171.3**	**84.0**

Summary:
The JB Treatment is marketed as a rejuvenater designed to prevent the deterioration of the longitudinal joint without damaging pavement markings. This product is also designed to make the pavement impervious to water and salt brine.

The JB treatment was applied on two test sections in 2008. Upon construction the product penetrated into the pavement surface. On TH 95 there were reports that the pavement surface had turned brown, this was not permanent. Initial measurements of retro-reflectivity indicated a difference of 30 mcd between the control and the treated section. A laboratory evaluation of retro-reflectivity found that the JB treatment reduced retro-reflectivity values significantly (post treatment values were ½ of pre-treatment values). The difference between pre-post retro-reflective measurements of the laboratory and field results seems to suggest that time, weather and traffic may help to remove the JointBond product from the pavement markings and allow the retro-reflectivity to partially recover. It is not clear at this time if a full recovery is possible, or how long it would take.