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L. Allen Cooley Jr.

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This report documents my observation of a construction project west of Nashville, Tennessee that did not use a tack coat during the placement of the hot mix asphalt (HMA). This observation took place on June 23, 1998. For this project, the existing pavement was milled approximately 50 mm (2 in) with the majority of the millings being used as recycled asphalt pavement (RAP) within the mixture being produced. Instead of sweeping the milled portion clean, the contractor lightly swept the milled surface, leaving a small amount of millings primarily in the bottom of the grooves. The new HMA mixture was then placed directly onto the milled surface with no tack coat. The premise of this methodology was that the grooved pavement in conjunction with the melting of the asphalt within the loose millings by the heat of the placed mixture would result in a bond between the placed mixture and underlying pavement. Therefore, a tack coat was not needed.

GENERAL PROJECT INFORMATION

This construction project was conducted during June of 1998, between mile marker 160 and 180 on Interstate 40, approximately 30 miles west of Nashville, Tennessee. The project consisted of milling approximately 50 mm of existing roadway and filling (50 mm) with a Tennessee Department of Transportation (TDOT) BPMB-HM mixture (JMF attached). This type mixture is a polymer modified base mix with a nominal maximum aggregate size (Superpave definition) of 19.0 mm. A surface course was to be placed following the placement of this base mix.

The paving train consisted of a milling machine capable of milling 3.7 m (12 ft) of existing roadway. Next, a sweeper (Figure 1) was used to remove some of the millings from the roadway. Some millings were left in the grooves. About one hour behind the milling machine, the contractor was utilizing a material transfer vehicle (MTV) into which the mixture was unloaded from trucks (Figure 2). Figure 3 shows the surface of the pavement prior to the HMA mixture being placed. The MTV then fed material into the hopper on the paver. Mixture leaving the paver had a temperature of approximately 152°C (305°F). Following the paver, the contractor was using three rollers to achieve compaction. The breakdown roller was a steel-wheel vibratory roller (Figure 4). The intermediate roller was a combination steel-wheel and pneumatic tire roller. The finish roller was a steel-wheel roller used in the static mode.

OBSERVATIONS

While observing the paving operation, the mixture seemed stable under the rollers. No lateral movement was noticed. Once the breakdown roller had made two to three passes, no appreciable roller marks were observed in the pavement. Figure 5 shows the pavement after one pass of the breakdown roller. The contractor and a TDOT inspector said that the pavement was being compacted to 94-95 percent of theoretical maximum density.

The contractor was pleased with the operation since pick-up prior to placing the HMA was not a problem. The tires on the MTV were clean since no tack coat was used (Figure 6).

The bond between the placed mixture and underlying pavement seemed strong. The contractor had cut cores to show the strength of the bond (Figure 7). When cutting and removing the cores from the roadway, they actually broke in the underlying pavement and not at the interface below the overlay.

Figure 1. Milling Machine and Sweeper

Figure 2. MTV Used on Project

Figure 3. Pavement With No Tack Coat Prior to Placement of Mixture

Figure 4. Breakdown Roller

Figure 5. Pavement Surface After One Pass of Breakdown Roller (Roller Mark)

The milling machine was approximately 300 to 460 m (1000 to 1500 ft) in front of the paver. This distance was used as a cushion just in case mechanical problems occurred. If the contractor had desired, the milling machine could have been a lot closer which would have decreased the paving train length. With the 300 to 460 m lead, the paving train was about 760 m (2500 ft) from the milling machine to the finish roller.

Because of the milling operation, the joints on either side of the roadway were vertical (Figure 8). After the placement and compaction of the mixture, the joints seemed to be tight (Figure 9).

Some of the polymer-modified mixture was picked-up with the rubber tire roller but it was not considered a significant problem since this was not a surface mixture.

CONCLUSIONS

Based on conversations with the contractor and my observation on June 23, 1998, the paving project went well. It appears that the bond created by the heating of millings is satisfactory and this approach results in a cleaner operation with a reduction in the length of the paving train.

Figure 6. Tire From Material Transfer Vehicle

Figure 7. Cores Obtained From Project

Figure 8. Milled Roadway Showing Vertical Sides

Figure 9. Finished Joint