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RESEARCH
SERVICES SECTION

TECHNICAL SUMMARY

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PROJECT COST:
$30,000

A contractor lays spun-glass paving fabric over asphalt before overlay.

LRRB
LOCAL ROAD RESEARCH BOARD

Evaluation of Paving Fabrics for Isolation of Bituminous Cracking

What Was the Need?

Because of increasing traffic levels and weights on county state-aid highways, thousands of miles of Minnesota pavement will need to be upgraded in coming years from their current 7-ton capacity to 9- and 10-ton capacities. These highways already require seasonal maintenance to repair thermal and stress cracking: fissures that mar the surface because of freeze-thaw conditions and heavy truck traffic.

To mitigate the impact of these cracks, crews typically mill off several inches of the pavement surface before performing a maintenance overlay, reconstruction or structural upgrade. Milling is intended to isolate the cracks to prevent them from reflecting up through the overlay into the new asphalt surface.

Milling is expensive, as is reconstructing the highway afterward. Pavement fabrics may offer the potential to isolate cracks at a much lower cost, and fabric producers make dramatic claims that their products will extend the performance of rehabilitated pavements. By laying down spun-glass fiber fabrics over damaged pavement, then laying new asphalt over them, the upgraded asphalt pavements may reduce reflection of old cracks into new surfaces.

What Was Our Goal?

This study was initiated to learn if spun-glass fiber fabrics could be effective in:

- Isolating new overlays from cracks and sealants in old pavement, and preventing moisture intrusion.
- Increasing the ability to utilize existing base and pavement layers when upgrading a pavement to higher load-carrying capacity.
- Reducing reflection of old cracks into the upgraded pavement surfaces.

What Did We Do?

The Red Lake County Engineer and his staff studied the impacts of spun-glass paving fabrics in pavement sections in Red Lake County, with similar weather conditions for all sections. The tested pavements were scheduled for structural overlays to bring their capacity to 10 tons.

Crews prepared pavement sections in 300-foot segments. The first and third were milled and overlaid, or were simply given a 0.5-inch leveling course before overlay, and the middle segment was covered with fabric and overlaid. The sections included 11 that used the three-part pavement configuration; one section with a segment of fabric and another without; and two other sections with fabric laid only at the centerline. Specific steps included:

- A video survey documenting the pavement section's condition before upgrade.
- Documentation of procedures and materials used in the installation of fabrics and overlays. Many segments employed leveling courses of asphalt, in which material is laid thinly and leveled with a paver blade before overlay with fabric.
- Evaluation with video of pre- and post-installation surface conditions.
- Testing of sections for strength and cost comparisons to mill-and-replace control sections.
- Monitoring of reflective cracking of fabric and control sections over a three-year period.

continued

"Spun-glass paving fabrics did not appear to significantly retard transverse and longitudinal cracks. Historically, paving fabrics have not performed very well in this environment. I do not think there will ever be a fabric effective for this kind of application."

–Lou Tasa,
Mn/DOT District State Aid Engineer

"Until better data on fabrics is demonstrated, blade laid leveling courses and overlays would be my recommendation for both maintenance and structural overlays."

–Courtney Kleven,
Highway Engineer,
Red Lake County

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After applying a 0.5-inch blade asphalt leveling course, contractors laid paving fabric and overlaid it as in the left lane shown above. The fabric demonstrated no real benefit over sections without fabric.

Investigators evaluated spun-glass paving fabrics in terms of how well they worked with current overlay paving procedures, how well they isolated existing damage from new overlays during installation, how well they reduced propagation of cracks and joints into the new overlays, and how they compared in cost to mill-and-replacement overlays.

What Did We Learn?

According to our evaluation criteria, the fabric performed poorly, countering the claims of pavement fabric vendors. While spun-glass paving fabric can isolate heavy crack sealant from new overlays at less expense than milling and replacing asphalt with sealant, the use of paving fabric between asphalt layers added no structural strength and failed to retard early thermal and centerline cracking. Fabric sections and control sections with no fabric performed equally in terms of distress cracking. This cracking did not reflect through overlays in the first two years following installation. Investigators concurrently examined the impact of subjecting pavement sections to a 0.5-inch leveling course before overlay instead of milling them. They found that this practice also mitigates heavy crack sealant effects on main courses.

Costs can be compared as follows (using 2005 prices):

- 0.5-inch blade laid leveling course: $0.77/square yard.
- Spun-glass paving fabric: $2.50/square yard.
- Milling and replacing 2 inches of asphalt: $3.43/square yard ($0.60 to mill, $2.83 to replace).

The investigator has recommended the use of blade and overlay methods for maintenance and structural upgrade until compelling data is presented that fabrics prevent propagation of damage into overlays.

What's Next?

The project panel has recommended monitoring the test sections at five and 10 years post-installation as reflective cracking develops. The investigator has also recommended a similar evaluation of paving fabric in less severe winter conditions.

The Minnesota DOT State Aid Division will be apprised of the results of this research. Mn/DOT and LRRB will continue to sponsor research into methods and materials to mitigate reflective cracking, and are also very interested in innovations in preoverlay surface preparation.

This Technical Summary pertains to the LRRB-produced Report 2008-02, "Evaluation of Paving Fabrics for Isolation of Bituminous Cracking," published January 2008. The full report can be accessed at http://www.lrrb.org/PDF/200802.pdf.