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Investigation of the Impact of Milling and Construction on the Bond Strength of Remaining Thin (Scab) Layers

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Current Situation

Potholes, raveling, and roughness are common signs a road needs to be repaved. Usually, the repair process involves the road segment being milled and then overlaid with asphalt. But sometimes a very thin layer of the old crumbling surface remains on the segment that has been milled. That thin layer is called a scab. If the segment is not properly milled, the new layer of asphalt will not bond adequately.

Field investigations in Florida have indicated a potential link between weakly bonded scabbed areas and slippage failure, commonly called cracking. Cracking at this level may lead to more involved pavement distress. This obviously poses dangers for road users and can lead to even costlier repairs.

Studies have also investigated the impact of vibrations on stresses near the scabbed areas, from the roller compaction machine used during overlay construction. This suggests the vibrations further weaken bonding on scabbed areas and contribute to cracking.

Research Objectives

The objective of this research was to determine the potential effects of scabbing and roller compaction on overlay performance when a scabbed layer is present.

Project Activities

First, the University of Florida research team conducted a literature review on broader but related topics for background information. The team then developed pavement models with and without scabbed areas, subjected the models to traffic loading, and compared the results. Next, the team evaluated the effects of factors, such as size and thickness of the scabbed area, on potential pavement distresses.

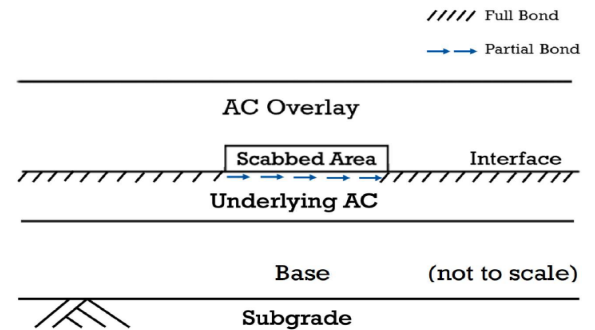
The team used this data to develop pavement models to determine the effect of compaction from different types of rollers on the bond below the scabbed area.

Last, the team provided guidelines for dealing with scabbed sections. This step included identifying factors critical to potential distress in overlay with scabbing and defined ranges for characteristics to mitigate scabbing-related pavement distress.

Project Conclusions and Benefits

The outcome of this project will help mitigate the premature failure of overlay constructed on milled asphalt surfaces and provide greater confidence when dealing with scabbed pavement sections. Benefits of this project also include material and time savings, and the potential to prevent injuries and save lives while in the work zone.

For more information, please see fdot.gov/research.



A schematic of localized weak bond under the scabbed layer along with full bond elsewhere for a hybrid interface bonding condition.