

JOINT TRANSPORTATION RESEARCH PROGRAM

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Tack Coat Installation Performance Guidelines

Introduction

A tack coat is a thin application of asphalt or emulsion placed between asphalt pavement layers to bond them together. Although tack coat is a relatively inexpensive item, its bond failure during or after construction has a great impact on pavement performance and can lead to distresses, including top-down fatigue cracking, delamination, potholes, slippage or shoving, and other effects.

INDOT specifies tack coat practices, including types of materials and construction, in Section 406 of the Standard Specifications. However, it is not clear if the specified range of application rates is necessary and appropriate for currently used materials and construction practices. There is a need to develop methods that assess tack coat quality, including materials, application rates, and performance testing related to long-term pavement performance.

This study investigated the performance of lab- and field-fabricated specimens when various tack types and application rates are applied to concrete and asphalt substrates using a monotonic direct shear test.

Findings

- Other states have had success with the use of conventional, non-tracking, and polymer-modified tack materials when properly applied.
- Tracking tack is a common problem, which has led to increased use of so-called non-tracking tack. Non-tracking tacks reduce, but do not necessarily completely eliminate, tracking.
- A variety of tests exists to assess tack coat quality and/or uniformity in the lab or in situ, but the most commonly used methods are variations of direct shear testing.

- AE-NT produced higher shear strengths, fracture energy and flexibility indices than SS-1h when tested in direct shear and analyzed using the basic principles of the Illinois I-FIT test. On an asphalt substrate, the AE-NT also had lower variability.
- On a concrete substrate, the higher residual application rate (0.10 gal/syd) yielded higher shear strength than the low residual rate (0.03 gal/syd). On an asphalt substrate, the medium residual rate (0.05 gal/syd) produced the highest bond strength.
- Field cores from a trial project using a spray paver exhibited shear strengths equal to or better than a well-applied conventional tack. In addition, the spray paver cores showed much lower variability, which suggests a more uniform application was achieved in the field.
- The use of spray pavers in some other states has led to significant decreases in longitudinal and transverse cracking after five to six years, presumably by making the pavement layers act monolithically. Several states now use spray pavers routinely for certain applications.
- Testing of core samples from a trial project using polymerized VRAM tack material revealed that the VRAM had lower shear strengths, fracture energies and flexibility indices than the control, but the specimen remained intact after shearing.

Implementation

- Based on the findings of this study, some changes to the INDOT Standard Specifications have already been implemented. First, the application rates have been clarified to be undiluted spray rates and dilution has been explicitly prohibited. Different application rates are now specified for different surface types



VRAM specimen

to be more detailed and more in line with nationally recognized rates. The specifications continue to require that tack be placed on clean, dry surfaces. AE-NT and SS-1h have been retained in the specifications, while less commonly used materials have

been deleted. The use of AE-NT could be encouraged since its overall performance was somewhat better than SS-1h.

- Additional field trials using spray pavers and alternate tack materials should be constructed and evaluated to (a) expand on the findings of this study, (b) explore other test methods, (c) gain more experience with shear testing, and (d) assess typical tack applications on non-experimental projects to assess the state of the practice. Additional implementation studies may help to refine performance tests and criteria for use when assessing tack coat quality.
- Lastly, the impacts of tack coats on pavement performance should be stressed to contractors, project engineers, and inspection staff. Simply drawing attention to the importance of proper tack coat application and uniformity may help improve performance.

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