



NEVADA DEPARTMENT OF TRANSPORTATION RESEARCH DIVISION

DEVELOPING LOWER MODULUS POLYMER RESIN BINDER SYSTEMS SPECIFICATIONS FOR HIGH FRICTION SURFACE TREATMENT (HFST) ON ASPHALT PAVEMENTS IN NEVADA

Key · Points

Project Number:
302-19-803

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Duration:
28 months

Project Cost:
\$150,000.00

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PROBLEM

While the Nevada Department of Transportation (NDOT) has used thin bonded multilayer overlays on bridge decks routinely, the use of single layer high friction surface treatments (HFSTs) on asphalt surfaces is a relatively new technique in the state. Premature cracking has been observed. The high service temperatures and temperature differentials experienced in the state may also cause aggregate loss and delamination to occur. One possible way to improve the performance of HFSTs on asphalt pavements is to use a lower modulus resin, as long as other properties are not negatively affected. For example, the Indiana DOT (INDOT) has reduced the required resin modulus for HFSTs to 90,000 psi (at 77°F and 7 days) to reduce incompatibilities between the resin and asphalt pavement. So far it appears there is no increase in aggregate loss or delaminations. Conditions in Nevada, however, are

more severe than in Indiana, so research is needed to establish whether a lower modulus binder will perform under those conditions. This research is aimed at identifying a polymer resin that can perform better in HFSTs under the conditions experienced in Nevada.

OBJECTIVE

The ultimate objective is to develop specifications for polymer binder(s) suitable for use in HFSTs on asphalt pavements in Nevada. Such a binder would be expected to have lower tensile strength, higher tensile elongation, higher heat deflection temperature or glass transition temperature, better UV stability, and improved thermal compatibility with the underlying asphalt pavement. There should ideally be an improvement in adhesion to the aggregates or substrate or at least no negative effect. These improved binder properties should lead to increased service lives, thus improving the life cycle costs of the safety improvements.

METHODOLOGY

The research needs will be addressed by identifying suitable polymer binders for use in HFSTs on asphalt surfaces under typical Nevada environmental conditions. Appropriate test methods and specification limits will be recommended. After a suite of possible polymer binders is identified, their performance in terms of aggregate retention will be tested using a three-wheel polishing device.

IMPLEMENTATION POTENTIAL

This research is aimed at producing specifications for appropriate materials (polymer resins) for use in HFSTs in Nevada. Known, commercially available polymers will be specified, perhaps with additives to improve certain critical properties. The materials suppliers will be responsible for formulating, testing and certifying the resin properties. If desired, the performance of HFSTs could be monitored to ensure the performance has been improved. The outcome of this research will dramatically reduce the potential for the failure of these treatments that are valued as a safety countermeasure for preventing crashes and saving lives.

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