

0-6621: Developing a Mixture-Based Specification for Flexible Base

Background

The Texas Department of Transportation (TxDOT) currently utilizes Item 247, “Flexible Base,” to specify a foundation course of flexible base utilized in a pavement. Base materials are not allowed to be used by the contractors until the materials have been approved in the stockpile, typically at the point of production or at or near the construction site. This project evaluated the current method of base material acceptance, as required in Item 247, and investigated methods to replace material approval based on stockpile sampling and testing with a mixture design methodology and quality control procedure.

What the Researchers Did

First, researchers created an early formulation of a draft specification and formed an industry working group consisting of representatives from TxDOT and producers/contractors to review and recommend changes to the specification. Researchers then performed a literature review.

The research team performed a sampling and laboratory testing program to investigate the typical variability associated with flexible base material production. Nine production operations from around the state were represented in the

sampling. Repeated loading was applied to all base materials at different levels of confining pressure, and the resilient moduli and permanent deformation properties were measured directly. Researchers conducted other indicator tests on the same materials to determine how well they were correlated to these performance-related properties.

Through the industry working group, TxDOT feedback, literature review, and sampling and testing program, researchers revised the initial draft specification with joint goals of reducing stockpile exclusivity to specific TxDOT projects, improving turnaround time for flexible base production acceptance, reducing TxDOT’s testing burden, and ensuring product quality remains conformant with the TxDOT-specified type and grade.

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What They Found

The research team found the following:

- Approximately 6.7 million tons (3.7 million cubic yards) of base course are purchased by TxDOT statewide on an annual basis.
- The majority of the flexible base course materials used by TxDOT construction and maintenance operations are crushed stone or mixtures of crushed stone and recycled crushed portland cement concrete that satisfy the requirements of either Type A or Type E.
- Some base course materials lose considerable strength at water contents 1 percent above optimum as measured by unconfined compressive strength.
- Index tests exist that can be related to performance, which could allow a more performance-related specification.
- The Texas Asphalt Pavement Association (TxAPA) and TxDOT currently offer technician certification programs. As the specification moves toward a quality management program, TxDOT should consider centralizing the technician certification program where all technicians receive certification from the same source.

- TxDOT and national laboratory accreditation programs are available for some of the test methods utilized in the flexible base specification.

What This Means

Specification development associated with this project will need to be continued to produce a satisfactory product for use by TxDOT. This development effort includes meetings with TxDOT and industry representatives, the use of a shadow specification on several projects, analysis of premature distress information, analysis of the risks and economic benefits of implementing the specification, and delivery of a workshop to the TxDOT districts.

For More Information

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