

Research Problem Statement

Date: 10/19/2021

Project Area: Materials

Title: Exploring Alternative Test Methods to Replace Elastic Recovery Test for Polymer Modified Asphalt Binders.

Problem Statement:

To withstand heavy traffic and extreme weather events, polymer modified binders (PMBs) are often used on Interstate pavements in Arkansas. As part of the QA/QC process, besides the Superpave specifications, these PMBs are to be assessed for their high-temperature performance. ARDOT currently requires PG 70-22 and PG 76-22 binders to possess a minimum elongation recovery (ER) of 40% and 50%, respectively while testing the unaged binder at 25° C ± 0.5°C per AASHTO T 301. However, neither the aging condition nor the testing conditions (e.g., loading/temperature) simulate production or service conditions in T 301. Due to the serious limitations of T 301, many state DOTs including Texas, Oklahoma, and Louisiana have adopted mechanistic tests such as Multiple Stress Creep Recovery (MSCR; AASHTO T 350) to replace it. Besides, AASHTO T 350, other agencies have explored alternate PG Plus tests such as DSR (Dynamic Shear Rheometer)-ER and LAS (Linear Amplitude Sweep), which mimic production and service conditions. For ARDOT to adopt one or more of these mechanistic tests, locally used asphalt binders and mixtures will have to be investigated for local weather and traffic conditions.

Potential Solution to Problem:

To solve the aforementioned problem, PMBs from ARDOT approved suppliers will be aged and tested in the laboratory by following test methods such as MSCR, LAS, and DSR-ER. Furthermore, laboratory and plant-produced asphalt mixtures will be tested for high-temperature performance by following test methods such as Dynamic Modulus, Flow Number, and Hamburg Wheel Track devices. Guidelines will be developed so that the agency will pay based on the quality of binders being received from the supplier. Necessary training will be provided to ARDOT technicians and contractors on the recommended test method. By replacing the obsolete ER method with a mechanistic test method, ARDOT can avoid premature failures of pavements and save taxpayers' money.

Estimated Project Duration: 24 Months

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Standing
Subcommittee Ranking

1/2

Advisory
Council Ranking

5/14

Statement Combined with
Statement Number(s)