 **Office of Research and Implementation**

**FFY 2023 Request for Proposals**

Implementation Statement Title:

**Investigate the Aging Behavior of Asphalt Binders at Different Production Stages and During the Service Life of the Pavement**

Problem Statement:

Asphalt binder aging causes an increase in the mix stiffness and a reduction in the resistance of the mix to cracking and fatigue. Several research efforts have investigated the effect of short-term and long-term aging including the work done by the SHRP Asphalt Research Program, the NCHRP 9-52, the NCHRP 9-54, and other studies. Several factors contribute to binder aging including binder chemistry, use of binder modifiers, use of recycled materials, asphalt production temperatures, use of WMA technology, and asphalt plant design. Other variables that may cause additional aging in the plant include silo storage. Recent research has shown that storing the mix in the silo for a few hours can have a notable effect on the asphalt mix properties. The extraction and recovery of asphalt binders can be used as a tool to determine the asphalt binder properties during production and placement, and to assess the rate of aging in the field.

The Oklahoma Department of Transportation (ODOT) is conducting research on the benefit of balanced mix design and performance-related testing. In its efforts to move towards a balanced mix design approach, ODOT has identified the need to properly characterize the aging rate of binders and mixes at different stages during production, and in the field to be able to include the effect of aging in the performance-related design process and to verify the properties of the binder during placement.

Proposed Research:

The proposed research study will investigate the short-term and long-term effect of aging considering different mix types and different production methods.

Suggested Tasks:

The work to be performed includes, but is not limited to the following:

1. Collect plant mixes and evaluate the change in rheological properties of the asphalt binder at different asphalt production stages.
2. Investigate the aging rate of asphalt binders using cores collected from selected pavements.
3. Assess the differences in the rate of aging between the asphalt mixes considering the variation in the mix constituents, and production methods.
4. Provide recommendations and guidance on how to account for the effect of aging in the balanced mix design approach.

Benefits:

A proper analysis of the factors that govern the aging process will provide insight into how to account for aging in the design process, and how to select materials and processes that result in less asphalt aging. The recommendations from this project will lead to better pavement design and extended pavement life reducing the need for costly maintenance or rehabilitation work.

Deliverables:

All projects require the submission of the following reports:

* Monthly Progress Reports
* Multi-Year Projects require a Year-End Annual Report
* Copies of the project Draft Final Report in Microsoft Word and ADA accessible Adobe Acrobat pdf electronic formats
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The Year-End Annual Report, Draft Final Report, and Final Report should be submitted to satisfy all federal and state requirements pertaining to the accessibility of documents including but not limited to:

* Oklahoma State Statute 62 § 41.5e and the Americans with Disability Act (ADA) of 1990, 42 USC 12.01 et seq.

The PI must also participate in the following project meetings:

* New project initiation meeting
* Semi-annual project meeting
* Close-out project meeting
* Continuing project meeting

Existing Research Found in Separate attached file:

