

**Arkansas State Highway and Transportation Department
Transportation Research Committee**

RESEARCH PROBLEM STATEMENT

DATE: 09/12/2016	PROJECT AREA: Pavements
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TITLE: Compaction of Asphalt Mixtures: From the Lab to the Field

PROBLEM STATEMENT:

It has long been universally acknowledged that proper compaction of asphalt mixtures plays a critical, significant role in flexible pavement performance. Indeed, AHTD (e.g. District 3 and District 7, responding to a recent survey) is well aware of the importance of compaction. Improperly compacted asphalt concrete in the field can lead to premature deterioration of the pavement surface - resulting in increased costs of construction, maintenance, and rehabilitation. Compaction issues may be compounded when additives such as RAP, RAS, and various Warm-Mix technologies are included in the asphalt mixture; these materials can significantly alter asphalt mix behavior during the construction and compaction process. Therefore, understanding how asphalt concrete compacts is vital to proper design and performance of flexible pavements.

There have been significant advances in characterizing compaction in the laboratory (using the Superpave gyratory compactor) and in the field (Intelligent Compaction, among other technologies). Research is needed to fully characterize both the laboratory and field compaction characteristics of Arkansas asphalt mixtures - and to relate lab and field compaction metrics. It would be highly advantageous to evaluate the compactability and workability of mixes during the mixture design process, and subsequently monitor field compaction metrics through Intelligent Compaction and/or other techniques. Such a 'systems' approach may be used to customize/optimize mixtures and processes to ensure proper compaction of the finished pavement.

OBJECTIVES:

The overall objective of the research is to improve both the level and consistency of compaction for asphalt pavements in Arkansas. Specific objectives include:

- (1) Establish laboratory compaction characteristics for a variety of Arkansas asphalt concrete mixes - including mixes containing RAP, RAS, or other additives;
- (2) Verify and evaluate field compaction characteristics for the subject mixes, i.e. rolling patterns, density development, etc.);
- (3) Relate laboratory and field compaction characteristics - to validate laboratory measures of compactability and workability during the mixture design process;
- (4) Evaluate, if available, Intelligent Compaction technologies - regarding the ability to improve compaction characteristics of field mixtures.
- (5) Draft a compaction-related Special Provision specification regarding mixture compactability and workability - including potential minimum and/or maximum values of metrics used to evaluate compaction in both laboratory and field mixes.

FORM OF RESEARCH IMPLEMENTATION:

Key deliverables from the proposed project include:

- (1) Recommendations concerning the measurement, use, and evaluation of laboratory and field asphalt mixture compaction characteristics and metrics - including Intelligent Compaction if available, incorporated into a Draft Special Provision Specification;
- (2) A guidebook and webinar developed for AHTD engineers which details the concepts and principles of compactability and workability metrics, and how material selection and construction processes influence these metrics both in the lab and the field.

REVIEWER: Bryan Signorelli **Estimated Project Duration:** 24 mo.

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