TECHSUMMARY

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Best Practices for Achieving and Measuring Pavement Smoothness, a Synthesis of State-of-Practice

The RAC Region II has initiated a collaborative research program consortium through the Transportation Pooled Fund (TPF) Program. The research program is called the Southeast Transportation Consortium (STC) and is intended to encourage coordination among member states, as well as provide resources and management of collaborative studies. The Consortium intends to address high priority transportation research topics of common interest to the southeastern and adjoining states. Louisiana serves as the lead agency in the STC.

INTRODUCTION

Pavement smoothness specifications have evolved significantly over the past decade. More and more states are moving away from profilograph-based smoothness specifications to International Roughness Index (IRI)-based specifications. Unfortunately, a limited history with the usage of IRI-based specifications has led to some confusion over how best to structure specifications in terms of test methods and profiling equipment, thresholds for pay adjustments, and requirements for localized roughness. Additionally, contractors accustomed to profilograph-based specifications can struggle to achieve the same level of quality under IRI-based specifications. This project addressed a need to synthesize the state-of-practice for IRI-based specifications and best practices for construction of asphalt and concrete pavements to achieve these specifications.

OBJECTIVE

The objective of this research was to provide a synthesis of state-of-practice summarizing existing practices for IRI-based smoothness specifications for asphalt and concrete paving. The specific goals of this synthesis were to document and summarize ongoing and completed research related to pavement smoothness, best construction practices for achieving required pavement smoothness, agency specifications/criteria for IRI-based pavement smoothness, technologies and practices for IRI collection and processing, and educational and training practices for agency and contractor personnel.

METHODOLOGY

The methodology used to develop this synthesis on the state-of-practice for pavement smoothness included the following:

1. A literature search was used to identify recent and ongoing research and implementation activities related to pavement smoothness.

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2. A 12-question survey was sent out to American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Materials representatives from all 50 states as well as Canadian provinces to help assess current practices.
3. Current pavement smoothness specifications from all 50 states were compiled to summarize additional details of current specifications, including pay adjustments, localized roughness, and practices for collecting smoothness data.
4. Best practices for constructing smooth pavements, as gleaned from current literature and known contractor practices, were compiled and summarized.

CONCLUSIONS

Overall, the state-of-the-practice is moving towards IRI-based specifications for construction acceptance nationwide. Currently, 78 percent (up from 66 percent in 2009) of asphalt pavement specifications are IRI-based and 46 percent (up from 21 percent in 2009) of concrete pavement specifications are IRI-based. States continue to realize the importance of collecting data that is more representative of actual ride quality and recognize the importance of collecting smoothness data for construction in the same manner as network-level data. Other key outcomes from this synthesis included:

- Of the states with IRI-based specifications, 85 percent provide incentive and disincentive pay adjustments for asphalt pavements, while 78 percent provide these adjustments for concrete pavements.
- There is still a fairly wide range of IRI thresholds for incentives, disincentives, full pay, and correction, and no general consensus what thresholds are most appropriate.
- There is a wide range of pay adjustments for pavement smoothness, with the majority of states applying pay adjustments on a dollar amount-per-lot basis versus a percentage of the contract price.
- Although most states have localized roughness provisions, there are a variety of localized roughness methodologies used and no general consensus as to which is best.

It is important to note that pavement smoothness specifications and practices are effectively a moving target. Agencies are continually refining specifications based on evaluations of existing programs and improved technology. As such, this synthesis represents just a snapshot of current practices, challenges, and knowledge gaps.

RECOMMENDATIONS

Although the state-of-the practice for pavement smoothness continues trending towards profiler-based measurement of pavement profiles, and IRI-based specifications, there are still some gaps in current knowledge which should be further investigated. Some of these key issues identified by the project team include (note that some are already being investigated):

- Timing of profile data collection on concrete pavements
- Establishing clear guidance for localized roughness.
- Profiler certification practices
- Specifications for low-speed and urban roadways
- Evaluation of the "Return on Investment" for smoothness

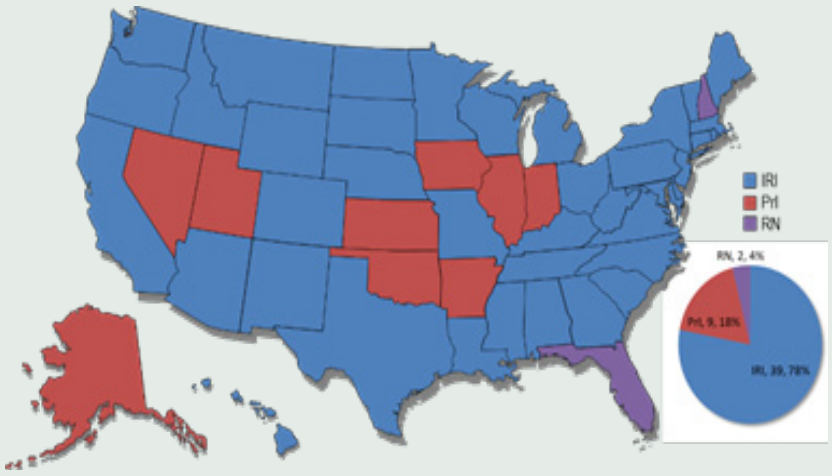

Figure 1
Current asphalt pavement smoothness specifications