DRISI
Caltrans Division of Research,
Innovation and System Information

Research Results

PPRC14 SPE ME-A: Standard Materials Library and Guidance

This research is to expand the Caltrans Mechanistic Empirical (ME) Standard Materials Library to enable more accurate predictions leading to optimized pavement performance

Pavement

MAY 2019

Project Title:
PPPRC14 SPE ME-A: Standard Materials Library and Guidance

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WHAT IS THE NEED?

Current Caltrans Mechanistic Empirical Standard Materials Library lacked data for regional materials including base, subbase and new recycled materials.

WHAT WAS OUR GOAL?

Develop and implement procedures to simplify the selection of material types for ME design and develop guidance for asphalt mix designers to meet performance related mix design requirements.

WHAT DID WE DO?

- Take samples from five different asphalt mixing plants and characterize the materials for ME design.
- Conduct field and lab testing for 16 different sites on Caltrans highway before and after raining season:
  - Back-calculate in-situ stiffness for aggregate base and subgrade.
  - Back-calculate in-situ stiffness for full depth recycling/ reclamation (FDR) material, cold-in-place recycling, pulverized base, lean concrete base, and cement treated base.
- Conduct four rounds of testing to evaluate the effects of aggregate gradation, binder content, and binder grade on stiffness, rutting and fatigue performance of a selected asphalt concrete mix.
- Develop material selection guidance for using the Standard Materials Library.

WHAT WAS THE OUTCOME?

- Five additional asphalt concrete materials added to the Standard Materials Library, providing better coverage for District 4, District 5, District 8 and District 11.
- Better in-situ stiffness data for non-asphalt materials for use in ME design.
- Subgrade stiffness was found to be minimally affected by seasonal moisture change, this is used to improve ME design procedure.
- A mix design guidance for performance related specification is developed. This helps contractor refine their mix design to meet the performance requirements that correspond to the ME design.
- The material selection guidance helps Caltrans engineer design pavement structures using ME method.

WHAT IS THE BENEFIT?

This research supply the Standard Materials Library with regional data. This allow Caltrans pavement designers to use materials that better match their regional condition. The inclusion of more FDR materials helps quantify the benefit of pavement material recycling.
The material selection guidance and mix design guidance helps removes the obstacles facing Caltrans and industry with regard to wider adoption of ME design method in California.

IMAGES

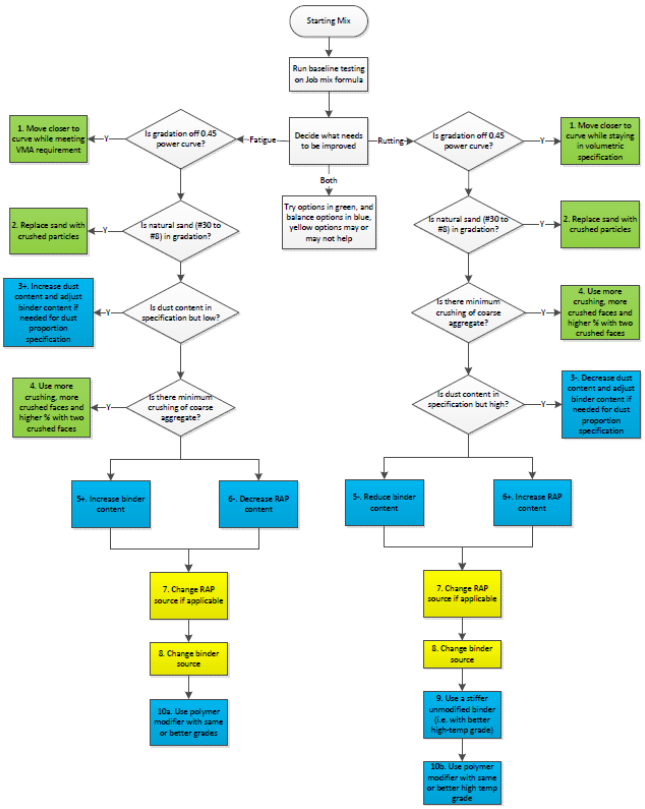

FIGURE 1: Flow chart for improving the fatigue or rutting performance of a Hot Mix Asphalt mix