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14. Supplementary Notes

1. Abstract

Purpose and Need

Due to the dwindling sources of aggregate supplies and the need for durable and rut-resistant HMA for use in thin-lift pavement layers, the full or partial use of fine aggregate screenings such as the No. 4 mixes could be beneficial for HMA producers, aggregate producers, and transportation agencies.

Objective

The main objectives of this research study are:

1. To evaluate the rutting resistance performance of the No. 4 NMAS mixtures using the asphalt pavement analyzer.
2. To evaluate the benefits and impacts associated with employing the No. 4 NMAS mixtures as thin overlays or as maintenance applications for low to medium volume highways.
3. To show that the No. 4 NMAS mixtures are useful in providing utility for fine aggregate stockpiles in local gyratory mixes for thin-lift HMA applications

Scope

In this research project, rut-resistance performance and analysis were conducted on the local gyratory HMA mixtures. The performances of the various mixes were evaluated based on their deformation under the wheel load of the asphalt pavement analyzer. A 9.5 mm (3/8 inch) deformation under the wheel load of the APA has been considered the minimum criterion for rutting failure. The relative performances of the mixes are examined based on comparing their APA deformation values.

Summary

The results indicate that the mixes with higher crushed fines (i.e. 50:50 blend) performed better than the mixes with lower crushed fines (i.e. 60:40 blend). For the same blend percentage of natural to crushed fines where only the PG grade is the variable, the results were not conclusive. Comparing the rut depths of the 64 (50:50) and the 58 (50:50) mixes, one can see that the rut depth value for the 58 (50:50) mix is slightly lower than the rut depth value for the 64 (50:50) mix. Also the AC contents for the mixes containing the PG 58-28 and the PG 64-28 binders were 7.0% and 7.1%, respectively. Since the AC contents for the two cases were virtually equal and that the two mixes were tested at different temperatures, the rut depth values for the two mixes can not be compared directly, but they do indicate how the mixes would perform with different binders and temperatures The natural fines used for this study were of marginal quality. The FAA value of 36 was very low and the percent absorption value of 2.9 was relatively high. Needless to say that higher quality natural fines aggregates would help the performance of the No. 4 mixes. Since marginal quality natural aggregates worked very well in blends with relatively equal percentages of crushed fines, higher quality natural fines may allow the use of higher proportions of natural fines in No. 4 mixes and still be successful.

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