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14. Supplementary Notes

15. Abstract

Purpose and Need

Thermally segregated asphalt mix is difficult to compact because of reduced time window for adequate compaction. In some cases where the mix temperature drops too low to what is referred to as cessation temperature (Dickson and Corlew 1970), adequate compaction may not take place at all. Thus, thermal segregation can result in portions of the pavement not reaching the required density. Decreased density translates into increased air voids, increased permeability, and decreased shear strength, thereby leading to premature pavement distress and shortened service life. While a few studies have been conducted to determine the effects of thermal segregation on long-term pavement performance, several researchers suggested that thermal segregation would produce similar results to those of aggregate segregation. Since thermal segregation of HMA is generally considered difficult to identify by human visual inspection, previous research efforts have examined the potential of using a thermal camera in identifying portions of fresh laid HMA pavement that have substantial temperature differentials. Some of the past research efforts also showed how a thermal camera can be effectively used in identifying potential thermal segregation during asphalt pavement construction (Amirkhanian and Putman 2006).

Objective

The objective of the research reported here was to determine whether or not thermal segregation occurs in North Dakota asphalt pavement construction and if it does, identify probable causes of it and ways to reduce thermal segregation during asphalt pavement construction. This research was also intended to develop guidelines that will aid NDDOT inspectors in identifying potential thermal segregation using a thermal camera.

Scope

To achieve these objectives, thermal images of HMA were acquired from five active asphalt pavement construction projects in North Dakota, over a two-month period from September 2009 to October 2009. Analyses of these acquired images as well as the review of literature formed the basis for the findings reported here. Specifically, the following tasks were performed as part of this research.

Summary

Since a thermal camera can be an effective tool in identifying potential thermal segregation, it is recommended that NDDOT and asphalt paving contractors consider using one during asphalt pavement construction. Their potential use of a thermal camera may be in identifying cold mat areas for subsequent core density testing, which would complement current QC/QA density testing on random core samples. There are several state DOTs that are currently using thermal cameras for similar purposes.

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