Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England

Chris DeCarlo, Eshan V. Dave¹, Jo Sais Daniel¹, Rajib Mallick²,
¹Department of Civil and Environmental Engineering, University of New Hampshire
²Department of Civil and Environmental Engineering, Worcester Polytechnic Institute

Introduction & Objectives

• Moisture damage, caused by loss of adhesion between binder and aggregates or cohesion within the binder, is a common and challenging asphalt distress in wet climates.

• Moisture susceptibility usually assessed with laboratory tests; methods have been met with mixed success historically (relation to field performance), especially in New England.

• Test methods need to be able to reliably and consistently distinguish good and poor performing mixtures.

Materials and Methodology

• Mixtures selected from New England region on basis of historic performance in terms of moisture susceptibility (10 selected, results for 7 are presented here).

Indirect Tensile Strength (ITS)

• Popular and common method to evaluate moisture susceptibility

• Paired with modified Lottman (AASHTO T283) and MiST (pore water pressure cycling) conditioning

Results

Indirect Tensile Strength

• No clear distinction between good and poor TSR values (MiST or T283 Conditioning)

• Some differentiation in strength values

Hamburg Wheel Tracker

• Clear distinction between good and poor performers for both traditional SIP and TTI methods

• Also able to distinguish between mixes with and without additives

Conclusions

• ITS, whether paired with Lottman or MiST conditioning, was unable to clearly distinguish good and poor performers

• The Hamburg Wheel Tracker clearly distinguished good and poor performers as well as mixes with and without additives. The TTI method shows larger differences between good and poor performers than traditional SIP analysis

• Ultra-sonic pulse velocity (UPV) based modulus can be used as surrogate test

Acknowledgments

• New England Transportation Consortium (NETC) for funding and support

• Dr. Nivedya M.K, and Ram Kumar Veeraragavan (WPI) for test and conditioning support

• Maine DOT for conducting Hamburg tests