Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England

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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).

Mix Name	Performance	NMAS	Binder	Aggregate	Notes
VTP1	Poor	9.5	58-28	Quartzite	Warm mix/ Anti-Strip Additive
VTP2	Poor	9.5	58-28	Quartzite	Same mix as VTP1, No additive
MEG	Poor	12.5	64-28	Granite	
MEP1	Poor	12.5	64-28	Dolomite	Same mix as MEP2, No additive
MEP2	Poor-Moderate	12.5	64-28	Dolomite	Amine-Based Anti-Strip Additive
VTG	Good	12.5	70-28	Dolomite	WMA Additive
NHG	Good	12.5	64-28	Granite	

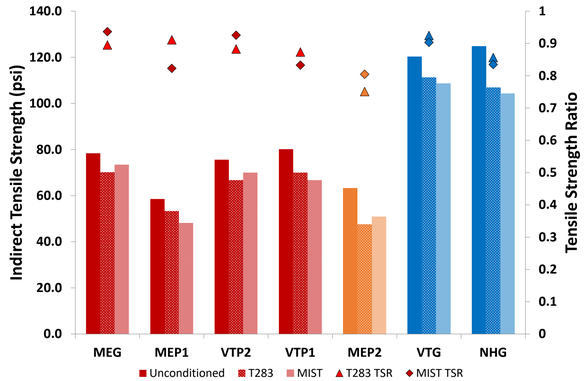
Indirect Tensile Strength (ITS)

- Popular and common method to evaluate moisture susceptibility
- Paired with modified Lottman (AASHTO T283) and MiST (pore water pressure cycling) conditioning

Hamburg Wheel Tracker

- Stripping inflection point (SIP) and final rut depth measured
- TTI method – Measures stripping number (SN) and stripping threshold (ST).

Results

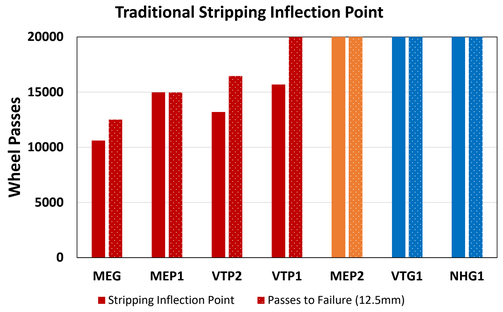


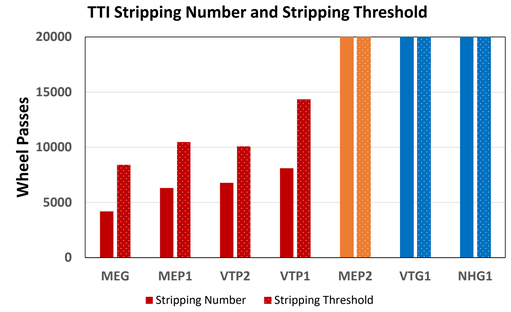
Indirect Tensile Strength

- 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

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