

Evaluation of Stripping Potential Tests for Bituminous Concrete

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Introduction

One of the prevalent failure modes of Hot Mix Asphalt (HMA) is disintegration of aggregates over time due to loss of adhesion/binding between asphalt binder and aggregate. This phenomenon, referred to as “stripping”, and in broader terms is addressed as moisture-induced damage in HMA. Screening the HMA mixtures before pavement construction, calls for a quick and reliable test method. One of the prevalently used standard test methods is ASTM D3625, also known as boiling water test. In this research project, VTrans and UVM’s research team are exploring reliability of ASTM D3625, its correlation with other standard quantitative test methods as well as with field condition



Figure 1. Examples of (a) potholes due to moisture damage [2], and (b) stripping of HMA pavement (source: pavementinteractive.org)

Methodology

The research methodology consists of: laboratory testing of plant and laboratory produce asphalt mixtures containing various combinations of asphalt type, binder, and Anti-Stripping Agent (ASA) (a chemical additive that reduces the moisture susceptibility of the bituminous concrete) using ASTM D3625 along with other conventional quantitative methods such as Modified Lottman Test Hamburg Wheel Tracking test.



Figure 2. (a) Portable oven, (b) Asphalt mixture components (c) Prone to stripping aggregate, (d) none-prone aggregate, and (e) laboratory produced asphalt mixture

Results

Based on the results of this research project to this point:

- There is a relatively good correlation between boiling water test and ITS test.
- Boiling test is efficiently capable of distinguishing the prone to stripping and none-prone aggregate, however, quantifying the magnitude of the stripping calls for specifically produced stripping indicator tools (e.g., StripScan, Colorimeter, ACT).
- Boiling test can clearly show the presence of ASA in the mixture, however, determining the quantity of ASA calls for application of stripping indicator devices.

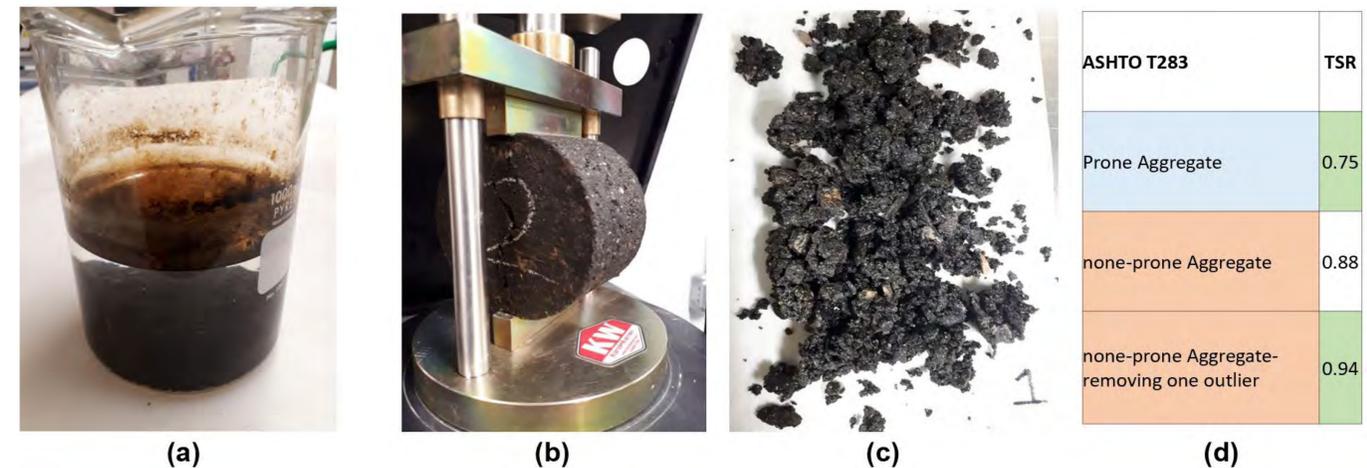


Figure 3. (a) boiled asphalt mixture for 10 minutes, (b) Lottman Breaking head, (c) post-boiling mixture and (d) ITS test results

Conclusion

Capabilities and shortcomings of evaluation of stripping potential of the bituminous concrete using ASTM D3625 without the aid of stripping indicator devices were established.

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References

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