

## Balanced Mix Design (BMD) Benchmarking of Asphalt Mixtures

### PROJECT TITLE

Balanced Mix Design (BMD) Benchmarking of Asphalt Mixtures

### STUDY TIMELINE

2015 – Present (ongoing)

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### KEYWORDS

Bituminous Concrete, Performance Testing, Balanced Mix Design

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More information about the VTrans Research Program, including additional Fact Sheets, can be found at:  
<http://vtrans.vermont.gov/planning/research>

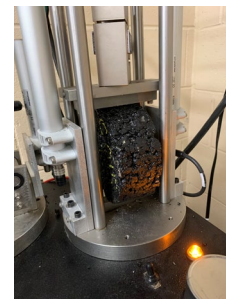
### Introduction

There has been an increased need to develop performance – related specifications for asphalt mixtures on VTrans projects due to severe rutting, raveling, and cracking distresses occurring prematurely after construction. One aspect of performance – related specifications is an emerging design principle known as balanced mix design (BMD). The goal of BMD is to optimize asphalt mix designs such that rutting, cracking, and moisture susceptibilities have an equal chance of occurring and are minimized.

Three (3) tests have been identified for implementation of a BMD approach. They are:

- Hamburg Wheel Tracker Test (HWTT) to analyze rutting and moisture susceptibility.
- Illinois Flexibility Index Test (I-FIT) to analyze cracking susceptibility.
- Indirect Tensile Cracking Test (IDEAL-CT) to analyze cracking susceptibility.

A benchmarking study was conducted by VTrans, FHWA, and NCAT to evaluate the range of test results, with all samples representing plant-produced samples on VTrans' Quality Assurance (QA) paving projects from the 2017 through the 2021 construction seasons.



Benchmarking is a step in establishing baseline data for performance testing, in which a set of currently approved asphalt mixtures are subjected to these tests to determine the range of results and which tests evaluated are most implementable.

### Conclusions

- Mix type plays a statistically significant role on rutting and cracking resistance due to its role in dictating the nominal maximum aggregate size (NMAS) and minimum Voids in Mineral Aggregate (VMA).
- The benchmarking results indicated that the test results appear to reflect the benefits of polymer-modified binders (i.e., PG 70-28) on rutting resistance and finer mixtures (i.e., Type IIIS and Type IVS) on cracking resistance.
- The modified Type IVS mixtures with PG 70-28 binder being produced for VTrans projects are primarily designed for rutting resistance.

### Potential Impacts and VTrans Benefits

Implementation of BMD would allow VTrans to identify asphalt mix distresses before production as a verification tool, and potentially during Quality Assurance (QA) testing with associated incentive/disincentive pay factors. In addition, BMD will also enable VTrans to identify the engineering properties of asphalt mixtures with new materials (i.e., recycled asphalt materials) and technologies (warm-mix, rejuvenators, aromatic oils, etc.).