Balanced Mix Design – a definition

An asphalt mix design that uses practical performance tests on appropriately conditioned specimens to ensure resistance to common distresses and considers mix aging, traffic, climate and location within the pavement structure.

Why change?

Most asphalt technologists are not satisfied with the current long term performance of our pavements. There is a desire to significantly improve the life of asphalt pavements.

With the current volumetric mix design system...

• Volumetric properties do not tell us anything about the quality of the binder, or about the interactions of different binder components and additives.
• \( V_{\text{be}} = \) the volume of effective asphalt = VMA – \( V_a \)
• \( V_{\text{be}} \) is dependent on \( G_{\text{be}} \) which is not a reliable property
  • \( G_{\text{be}} \) of source materials are subject to change over time, but not often verified.
  • \( G_{\text{be}} \) has a low level of precision
• \( G_{\text{be}} \) of RAP aggregate is questionable

Balanced Mix Design: What is it?
Balanced Mix Design: What is it?

BMD Optimum Asphalt Content

Numerous options to adjust mixes

The BIG questions

1. What performance tests will be used in BMD for your state?
2. How will the performance tests be used? Where will they fit in the mix design process (i.e. the Framework)?
3. What criteria should be used in specifications?
4. What aging/conditioning protocols should be used for mixtures?
5. How will the performance tests be used in Quality Assurance?
6. What should you do to get ready for BMD?

Cracking Group Experiments

NCAT Test Track

America’s asphalt pavement proving ground

BMD Performance Diagram
Selected Top Down Cracking Tests

All tests have been conducted on:
1. lab prepared mix after short-term aging
2. lab prepared mix after short-term and critical aging
3. plant mix samples that were reheated
4. plant mix samples that were reheated and critically aged

NCAT CG Field Performance

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<tr>
<th>Section</th>
<th>Description</th>
<th>Start of this Cycle</th>
<th>12/6/19</th>
<th>Crit. Aged CT Index*</th>
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<td>10.6</td>
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* Specimens compacted to 7.0±0.5% air voids

Selected Top Down Cracking Tests

Not practical enough for routine mix design

Unable to identify worst and best performing mixes

Balanced Mix Design: What is it?
Selected Top Down Cracking Tests

MnROAD Cracking Group Test Sections

MnROAD Cracking Group Sponsors

MnROAD Cracking Group

MnROAD Cracking Group Field Performance through April 2019

Balanced Mix Design: What is it?
Getting all stakeholders to agree on a common BMD Approach will be like....

Work Ahead

- Selection of Tests
- Ruggedness and Precision studies
- Benchmarking current mixes
- Setting criteria
- Training
- Pilot Projects

Questions

Thank You

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