Balanced Mix Design (BMD) Task Force Update

FHWA Mixture / Construction ETG
Fall 2016
Shane Buchanan
Task Force Development – Brief History

- Balanced Mix Design Task Force formed at the September 2015 ETG meeting in Oklahoma City
- Task Force is now 1 year old (or 7 in Dog years!)
- Membership is a great group of people focused on improving mix quality and performance!
- Actively sought out and gained more agency membership.
# BMD Task Force Membership

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BMD Task Force Work Items

• **Completed**
  - Definition of Balanced Mix Design
  - Survey of Agency Current Practice
    - Laboratory Balanced Mix Design Protocols
    - Field Acceptance Protocols
  - Research Problem Statement (RPS) Submitted to AASHTO

• **Current**
  - FHWA Technical Brief on Balanced Mix Design
    - Draft prepared, reviewed and being revised
Balanced Mix Design Definition
Balanced Mix Design Definition

• “Asphalt mix design using performance tests on appropriately conditioned specimens that address multiple modes of distress taking into consideration mix aging, traffic, climate and location within the pavement structure.”
Agency Practices Related to BMD
Agency Approaches Identified – Revised Descriptions

- **Performance Design** – this involves conducting a suite of performance tests at varying binder contents and selecting the design binder content from the results. Volumetrics would be determined as the ‘last step’ and reported – with no requirements to adhere to the existing M323 limits. Example States: New Jersey w/ draft approach

- **Performance-Modified Volumetric Design** – the initial design binder content is selected using M323/R35 prior to performance testing; the results of performance testing could ‘modify’ the mixture proportions (and/or) adjust the binder content – and the final volumetric properties may be allowed to drift outside existing M323 limits. Example State: California

- **Volumetric Design w/ Performance Verification** – basically, it is straight Superpave with verifying performance properties; if the performance is not there, start over and re-design the mix. Volumetric properties would have to fall within existing M323 limits. Example States: Illinois, Louisiana, New Jersey, Texas, Wisconsin
Agency Approaches Identified – Revised Single Flowchart

Balanced Mix Design Flowchart: v. 09-08-16

Select Trial Gradation; Ensure Aggregate Blend Properties

Conduct Volumetric Analysis
Select Design Binder Content & Volumetric Properties

Conduct Performance Tests
- Rutting
- Cracking

Performance Passed?
- Yes: Conduct Moisture Damage Test
- No: Redesign Mix

Conduct Moisture Damage Test
- Moisture Damage Passed?
  - Yes: Decrease Moisture Susceptibility
  - No: Perform Volumetric Properties

Adjust Mix Proportions
- Perform Volumetric Design
- Increase Moisture Susceptibility

Conduct Volumetric Analysis
Determine Initial Design Binder Content

Conduct Performance Tests
- Rutting
- Cracking

Performance Passed?
- Yes: Decrease Moisture Susceptibility
- No: Redesign Mix

Conduct Moisture Damage Test
- Moisture Damage Passed?
  - Yes: Determine & Report Volumetric Properties at Design Binder Content
  - No: Perform Volumetric Design

Verify Volumetric Properties

Validate JMF / Production
BMD TF Work Products

Research Problem Statement
+
FHWA Technical Brief
Anticipated Results

1) review of the state-of-the-practice for asphalt mixture design,

2) review the development and state-of-the-practice for performance testing,

3) development of a Recommended Practice for Balanced Mixture Design to implement performance testing in the design of asphalt mixtures, and

4) development of a training and implementation plan and materials to move BMD ahead in State Highway Agencies (SHAs).
RPS was reviewed by several external sources prior to submittal for guidance and input:

- Dr. Ed Harrigan, NCHRP
- Skip Paul, Retired LTRC
- Jack Springer, FHWA

Valuable input related to project phasing, costing, and layout.

VI. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Recommended Funding:**  
Phase I - $1,000,000  
Phase II - $700,000 (2020, 2021)

**Research Period:**  
Phase I: 36 months  
Phase II: 24 months
• Favorable response during August SOM
• Comments from Oak Metcalfe (TS 2d Chair)...
  • Technical Section chairs to rank all the proposed research statements that were submitted during the SOM meeting at the beginning of August.
  • There are eight total research statements from the SOM with the BMD statement being the only one in the area of asphalt mixtures or binder. (There are several in the area of pavement preservation, including fog seals)
  • Rank each RPS on a scale of 1 to 5, with 5 being the highest priority. Our rankings are due to Jack by the 16th of September and there will be a group call to decide the final rankings on September the 23rd.
Research Problem Statement – ~Schedule

- Problem Statements Solicited: July 2016
- Problem Statements Due: October 2016
- Evaluations sent to Submitters: Early December 2016
- Ballot sent to SCOR and RAC Members: Mid-December 2016
- Ballot Due: February 2017
- SCOR Meeting: March 2017
• Tech Brief prepared and reviewed by full ETG.
• Revision work currently being handled by the task force.
• Good document being made better
• Target October for final draft.
Thoughts and Questions?

http://www.pennyauctionwatch.com/