Balanced Mix Design (BMD) Task Force Update

FHWA Mixture and Construction ETG Bozeman, Montana September 2017



BMD Task Force Membership

- Continues to grow.
- Contact Shane Buchanan if interested in participating.
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Current BMD Task Force Activities

- Information Outreach
 - Present BMD concepts
 - Highlight the benefit of BMD concepts
- Field Acceptance
 - Define various approaches for acceptance protocols within a BMD approach





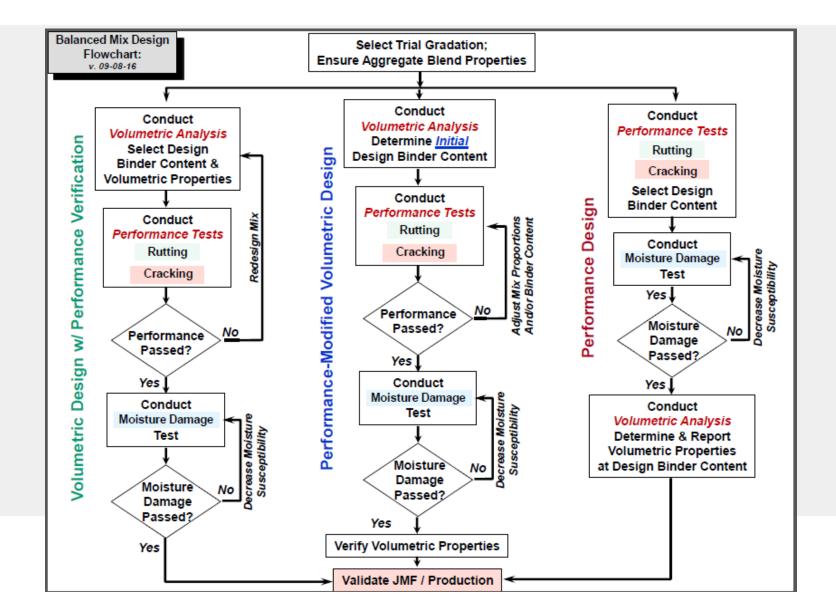
BMD Information Outreach – Highlighting Task Force Work and BMD Concepts

- 1. Virginia Asphalt Association (VAA) Fall Conference, Oct. 3rd
- 2. NAPA Paving for Performance: Designed to Perform Conference, Oct.12th
- 3. Northeast State Materials Engineer Association (NESMEA) Meeting, Oct. 18th
- 4. Northeast Asphalt User Producer Group (NEAUPG) Meeting, Oct. 18th
- 5. Kansas Asphalt Pavement Association (KAPA) Fall Forum, Oct. 25th
- 6. Washington Asphalt Pavement Association (WAPA) Fall Meeting, Nov. 9th
- 7. Illinois Bituminous Paving Conference, Dec. 12th
- 8. AAPT BMD Webinar Series, Nov. 2nd, 9th, 16th



BMD Mix Design Approaches – A Refresher

 Three main approaches were identified for potential use.





BMD Field Acceptance Protocols

- Initial survey of states yielded three primary acceptance approaches.
 - Volumetric
 - Volumetric + Performance
 - Performance
- Key notes
 - Variety of performance tests utilized
 - Differing levels of volumetric acceptance
- States determine (past, present, and future) the best protocols for their given situation and need.



Case Histories of Field Acceptance of Balanced Mix Designs

	State	Mix Design	Acceptance	Initial	Ongoing	Information	Notes on
			Quality	Verification	Go/	Only	Aging for
			Characteristics	Go / No Go	No Go		Cracking
							Test
	California	Volumetric	AC/VTM/VMA			Beam	
		Beam	Field Density			fatigue and	
ي.		fatigue				frequency	
etri		and				sweep	
Model 1 olumetr		frequency				Repeated	
Model 1 Volumetric		sweep				Shear	
		Repeated				Hamburg	
		Shear					
		Hamburg					
g.	Texas	Volumetric	VTM	Overlay	AC/VMA		STA only
auc		Overlay	Field Density	Tester	Overlay		
Ē		Tester		Hamburg	Tester		
유		Hamburg			Hamburg		
Model 2	Wisconsin	Volumetric	VTM	DC(t)	***DC(t)	SCB	Researching
polesule		SCB, DC(t)	Field Density	Hamburg	Hamburg		2 types of
Model 2 Volumetric plus Performance		Hamburg					LTA
etr	Illinois	Volumetric	AC/VTM/VMA	IL-SCB*	**IL-SCB	DC(t)	Researching
<u> </u>		IL-SCB*	Field Density	Hamburg	Hamburg		different
9		Hamburg					types of
							LTA
	New	Volumetric	Field Density	APA	****APA		None
	Jersey	APA		Beam	Beam		
3		Beam		Fatigue	Fatigue		
hel		Fatigue		Overlay	Overlay		
Model 3 rforman		Overlay		Tester	Tester		
Model 3 Performance	Laudat	Tester	Field B. III	000	****		B1:
_	Louisiana	Volumetric	Field Density	SCB	****SCB		Researching
		SCB Hamburg		Hamburg	Hamburg AC/Grad.		2 types of LTA
4 17		Hamburd			AC /Grad		ΙΙΔ

^{*}IL-SCB is now called the Illinois Flexibility Index Test (I-FIT).

Ongoing Go / No Go - **Frequency at engineer's discretion

^{***}Required frequency- engineer's judgement on addressing test results

^{****}Required frequency - required results

Case Histories of Field Acceptance of Balanced Mix Designs

California Volumetric Beam Field Density Sear Hamburg Field Density Tester Hamburg Tester Hamburg Wisconsin Volumetric SCB, DC(t) Hamburg DC(t) Hamburg Tester T	Notes on
California Volumetric AC/VTM/VMA Beam fatigue and frequency sweep Repeated Shear Hamburg California Volumetric AC/VTM/VMA Field Density California Volumetric AC/VTM/VMA Field Density Beam fatigue and frequency sweep Repeated Shear Hamburg California Volumetric VTM Overlay AC/VMA STA only	Aging for
California Volumetric Beam Field Density Field Density Field Density Field Density Frequency sweep Frequency sweep Repeated Shear Hamburg Frequency STA only	Cracking
California Volumetric AC/VTM/VMA Beam Field Density fatigue and frequency sweep frequency sweep Repeated Shear Hamburg Texas Volumetric VTM Overlay AC/VMA STA only	Test
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Repeated Hamburg Shear Hamburg Texas Volumetric VTM Overlay ACA/MA STA only	
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Texas Volumetric VTM Overlay ACA/MA STA only	
Texas Volumetric VTM Overlay AC/VMA STA only Overlay Field Density Tester Hamburg Tester Hamburg VTM DC(t) ***DC(t) SCB Researce SCB, DC(t) Field Density Hamburg Hamburg LTA Volumetric VTM DC(t) Value Valu	
Overlay Field Density Tester Overlay Tester Hamburg Tester Hamburg Wisconsin Volumetric VTM DC(t) ***DC(t) SCB Research SCB, DC(t) Field Density Hamburg Hamburg LTA Continued on the province of the provi	TA only
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Hamburg LTA Illinois Volumetric AC/VTM/VMA IL-SCB* **IL-SCB DC(t) Researce	types of
분 Illinois Volumetric AC/VTM/VMA IL-SCB* **IL-SCB DC(t) Researc	
	esearching
IL-SCB* Field Density Hamburg Hamburg differen	
LTA	
New Volumetric Field Density APA ****APA None	one
Jersey APA Beam Beam	
Beam Fatigue Fatigue	
파 등 Fatigue Overlay Overlay Overlay Tester	
Beam Fatigue Overlay Overlay Overlay Tester Tester Tester Tester Tester Tester Tester Tester Tester Tester	
Louisiana Volumetric Field Density SCB ****SCB Research	esearching
	types of
Hamburg AC/Grad. LTA	TA

Field Acceptance Processes Initial Verification Ongoing Verification Mixture Design (Go / No Go) (Go / No Go AND/OR Info Only) 1. Volumetric Note: "Performance" Tests may include fundamental Volumetrics Volumetrics tests and/or empirical tests Field Density Field Density 2. Volumetrics + Performance Ranges from minimal (P_a only) to robust (P_b , P_a , VMA) Volumetrics Volumetrics Volumetrics Field Density **Field Density** Discretionary Frequency Performance Performance Performance And Actions 3. Performance Field Density Note: "Performance" Tests Field Density conducted during mix design may vary from Required Frequency; Performance Performance those used during field Specified Actions verification

Ongoing Go / No Go - **Frequency at engineer's discretion

^{*}IL-SCB is now called the Illinois Flexibility Index Test (I-FIT).

^{***}Required frequency- engineer's judgement on addressing test results

^{****}Required frequency - required results

BMD Field Acceptance – Important Areas and Considerations

Area	Critical Considerations (from Draft Field Acceptance Guidelines, 2016)
Test Standardization	Ensure each test selected for the balanced mix design is well documented with a standard test procedure.
Equipment / Training	Make sure that there is adequate equipment and personnel for the effort. This may include equipment purchases at various locations around the state. This may include technician training. Conduct an inter-laboratory reproducibility study (round robin) with various agency, consultant, and contractor labs in the State.
Field Correlation	Establish mix design acceptance criteria based on pavements of known field performance.
Acceptance Criteria / Threshold	Establish field acceptance criteria based on the results of the inter-laboratory reproducibility study.
Project Use Decision	Establish project selection guidelines. Based on testing equipment and staffing, this approach may be more suitable for more significant projects. At the beginning of implementation, a pilot project approach is recommended.

NCHRP 20-07 Task 406 Project Development of a Framework for Balanced Asphalt Mixture Design and Gap Analysis

- **Time/Funding:** 1 yr. / \$100K
- Objective: Develop a framework that addresses alternate approaches to devise and implement balanced mix design procedures incorporating performance testing and criteria. The framework shall be presented in the format of an AASHTO recommended practice and shall encompass a wide variety of testing procedures and criteria.

NCHRP 20-07/Task 406 [Active]

Development of a Framework for Balanced Asphalt Mixture Design [NCHRP 20-07 (Research for AASHTO Standing Committee on Highways)]

Project Data	
Funds:	\$100,000
Staff Responsibility:	Edward Harrigan
Research Agency:	National Center for Asphalt Technology
Principal Investigator:	Randy West
Effective Date:	5/18/2017
Completion Date:	5/18/2018





Thank You!

