Balanced Mix Design: Resources

Mary Robbins, Ph.D., P.E.(OH),
Director of Technical Services

PA Asphalt Pavement Association

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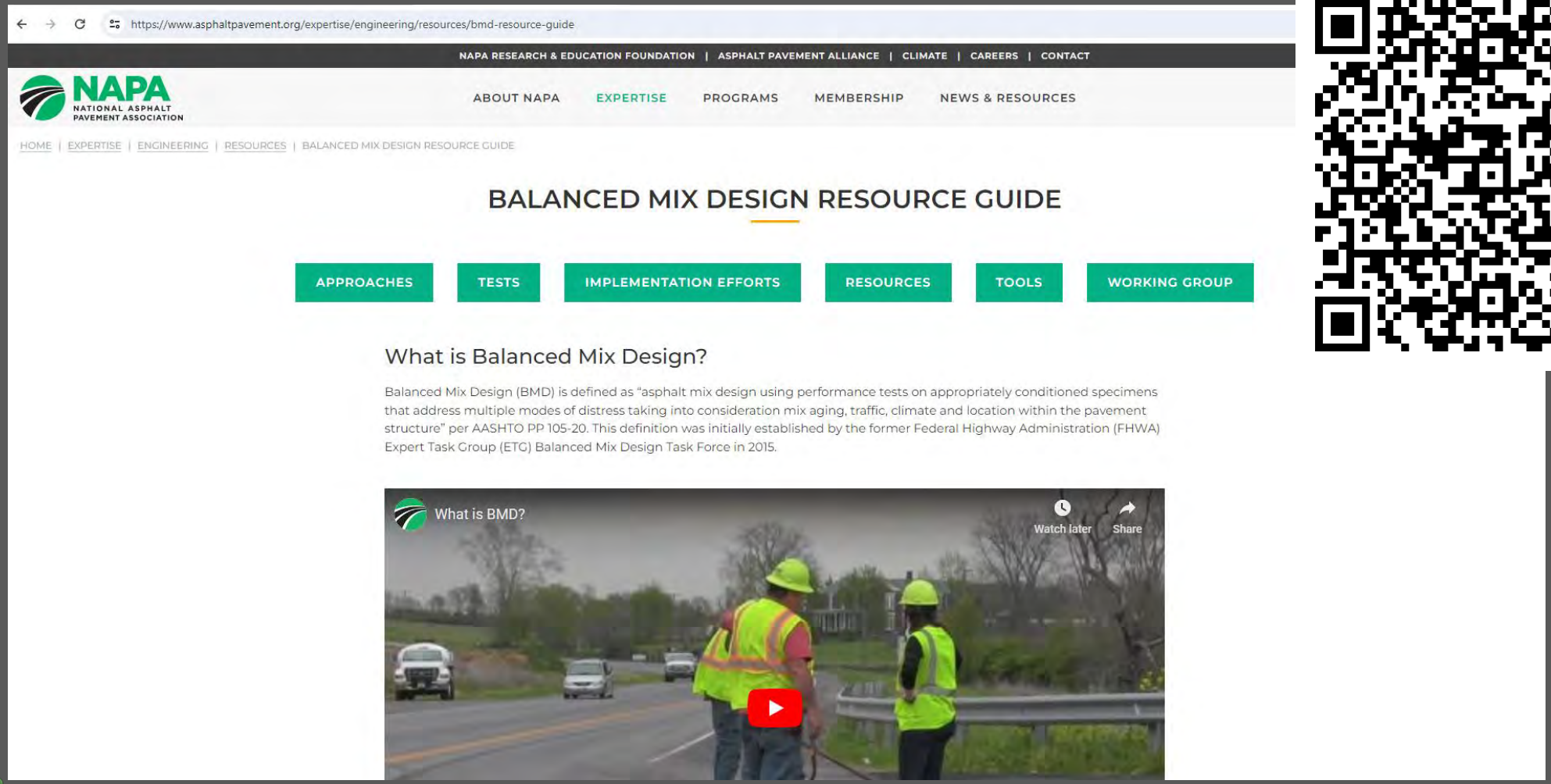
PAPA Regional Technical Meetings

Cranberry Township • State College • Allentown

BMD Resources: NAPA BMD Resource Guide



BMD Resources: NAPA BMD Resource Guide

- Approaches
- Tests
- Implementation Efforts
- Tools
- Resources
- Working Group

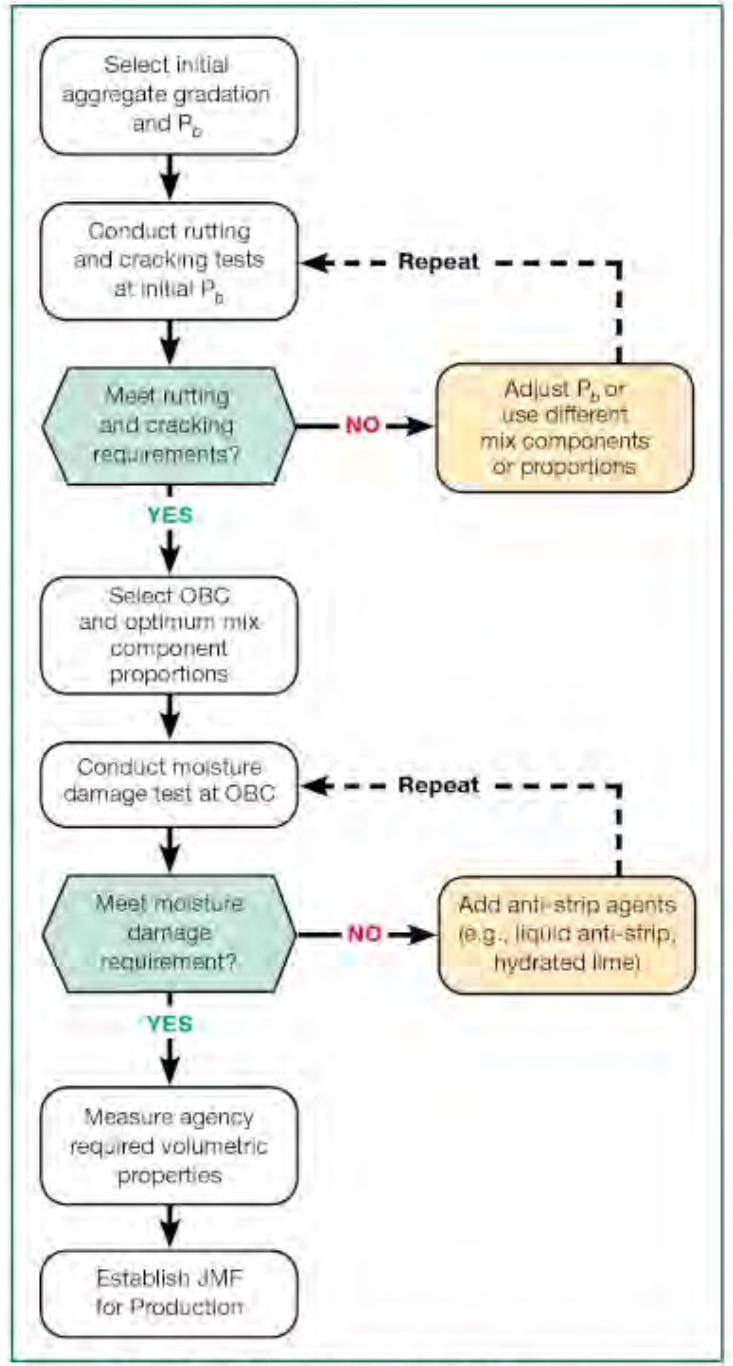


Figure 3. Graphical Illustration of the Performance-Modified Volumetric Design Approach (Approach C)

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Name of Test **Hamburg Wheel-Tracking Test**	Developer(s) Developed in Germany
Test Method(s) AASHTO T 324-19	Adoption by Agencies California, Georgia, Idaho, Iowa, Illinois, Kentucky, Louisiana, Massachusetts, Maine, Missouri, Montana, Oklahoma, Oregon, Tennessee, Texas, Utah, Vermont, Washington
Description During the test, two sets of cylinder or slab specimens are placed side by side, submerged in water, and subjected to repetitive applications of wheel loads. Rut depths at different positions along the specimens are recorded for each wheel pass. The specimens are loaded for a maximum of 20,000 wheel passes or until the specimens deforms by a pre-determined rut depth (typically 12.5mm). Typical result curves consist of post-compaction phase, creep phase, and stripping phase.	Photographs/Illustrations 
Test Results Rut depths, stripping inflection point, creep slope, stripping slope, stripping number, stripping life, rutting resistance parameter	Test Temperature(s) 40 to 70°C
Equipment & Approximate Cost Hamburg Wheel-Tracking Device Saw for cutting specimens	 $40,000-75,000 $6,000
Specimen Fabrication Gyratory specimens, 1 cut (30 minutes) Slab specimens	Number of Replicate Specimens 4 specimens
Specimen Conditioning Conditioning for 45 minutes at the test temperature under water	Testing Time 6.5 hours after conditioning
Data Analysis Complexity Simple	Test Variability Medium (10-30% COV)
Field Validations Good (pavement sections in Colorado, Texas)	Overall Practicality for Mix Design and QA Good for Mix Design Fair for QA

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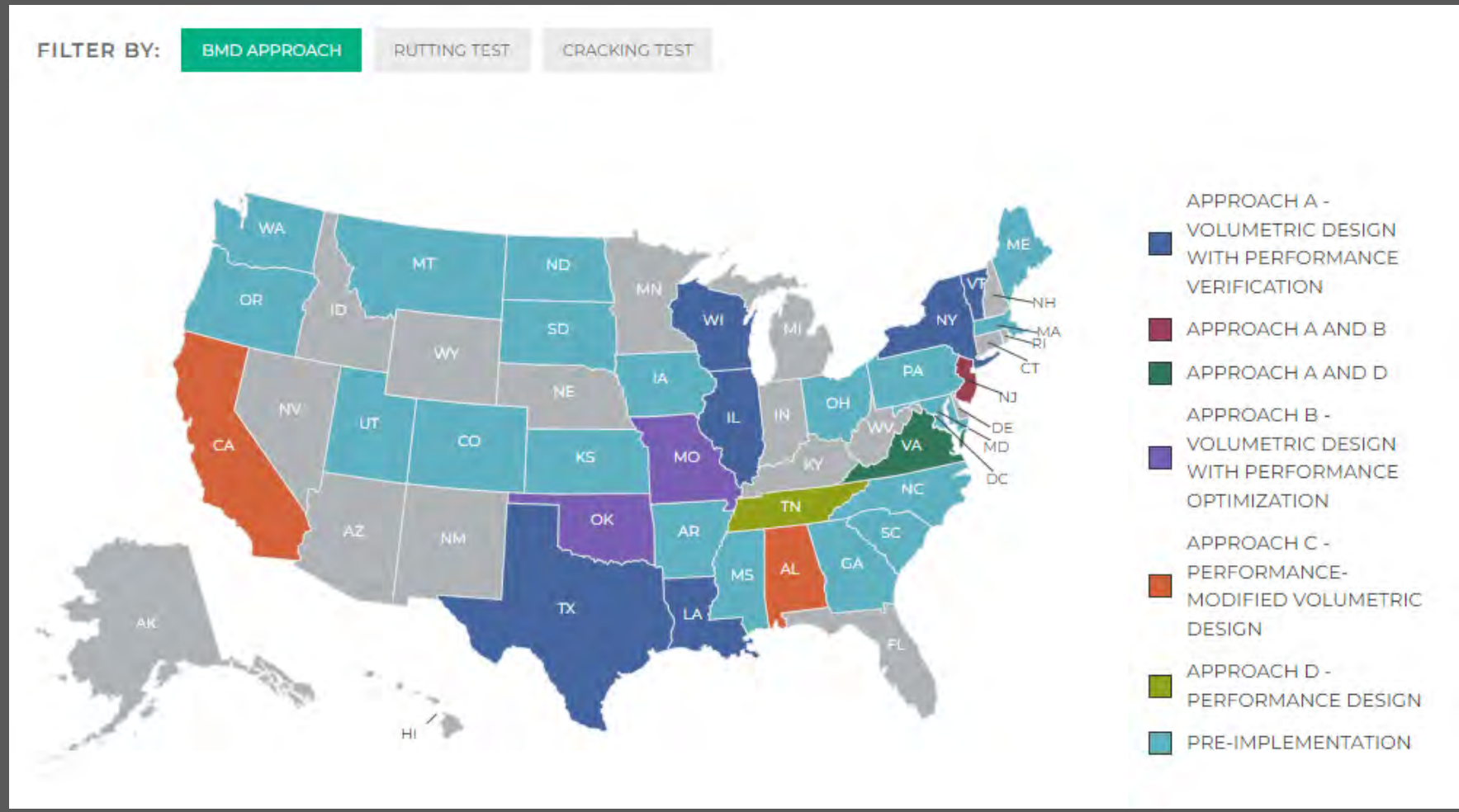

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National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

Use this sheet after compacting 2 Trial Specimens

Target Air Voids(%) = 7.00

	Weight	Air Voids (%)
Trail Specimen 1	2,458.0	7.4
Trail Specimen 2	2,478.4	6.6

Instructions:
Input Trial Specimen Info In Green Cells
Rounded Target Weight in Orange Cell

Target Weight = 2,468 grams
Rounded Target Weight = 2,470 grams

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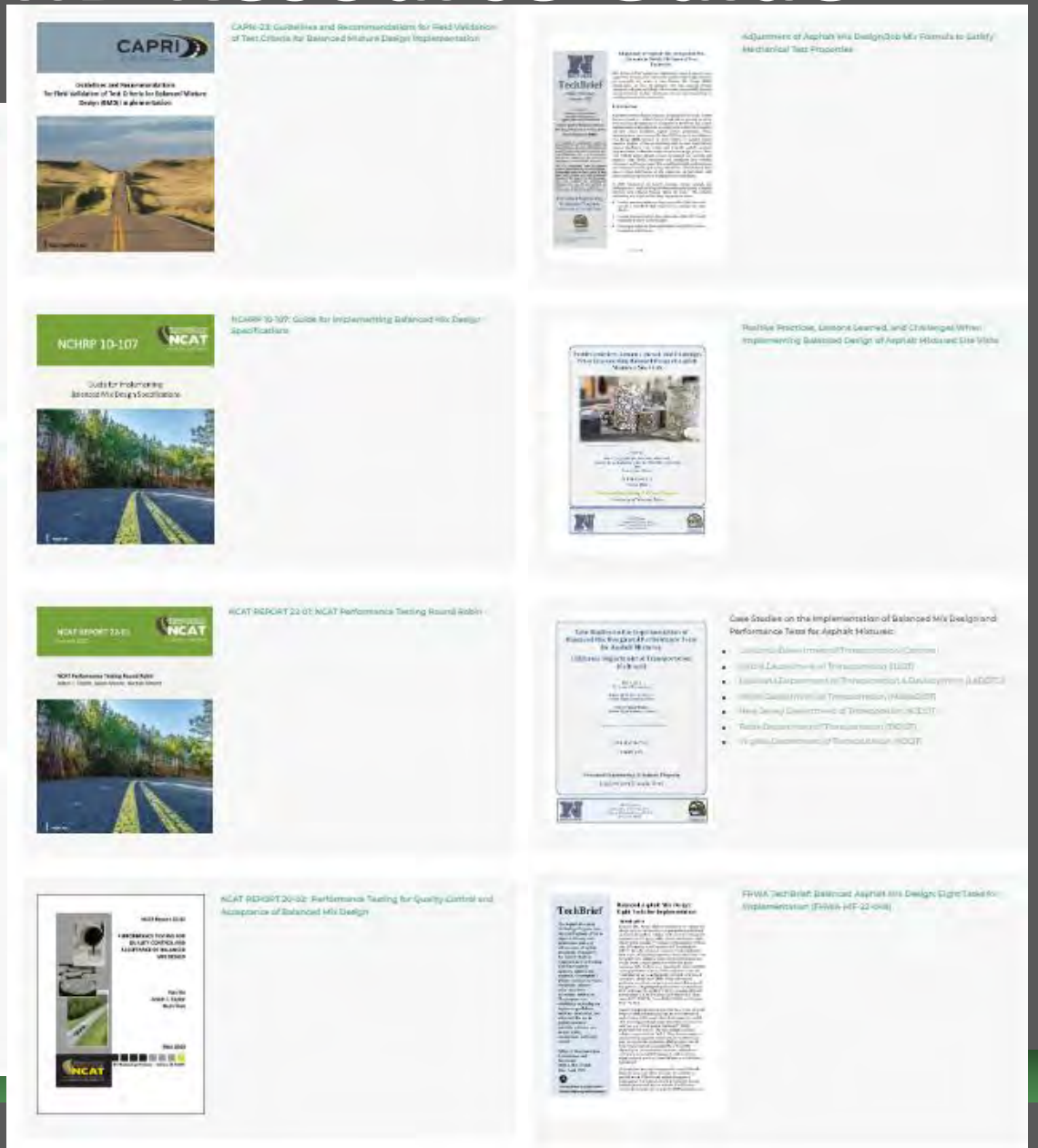

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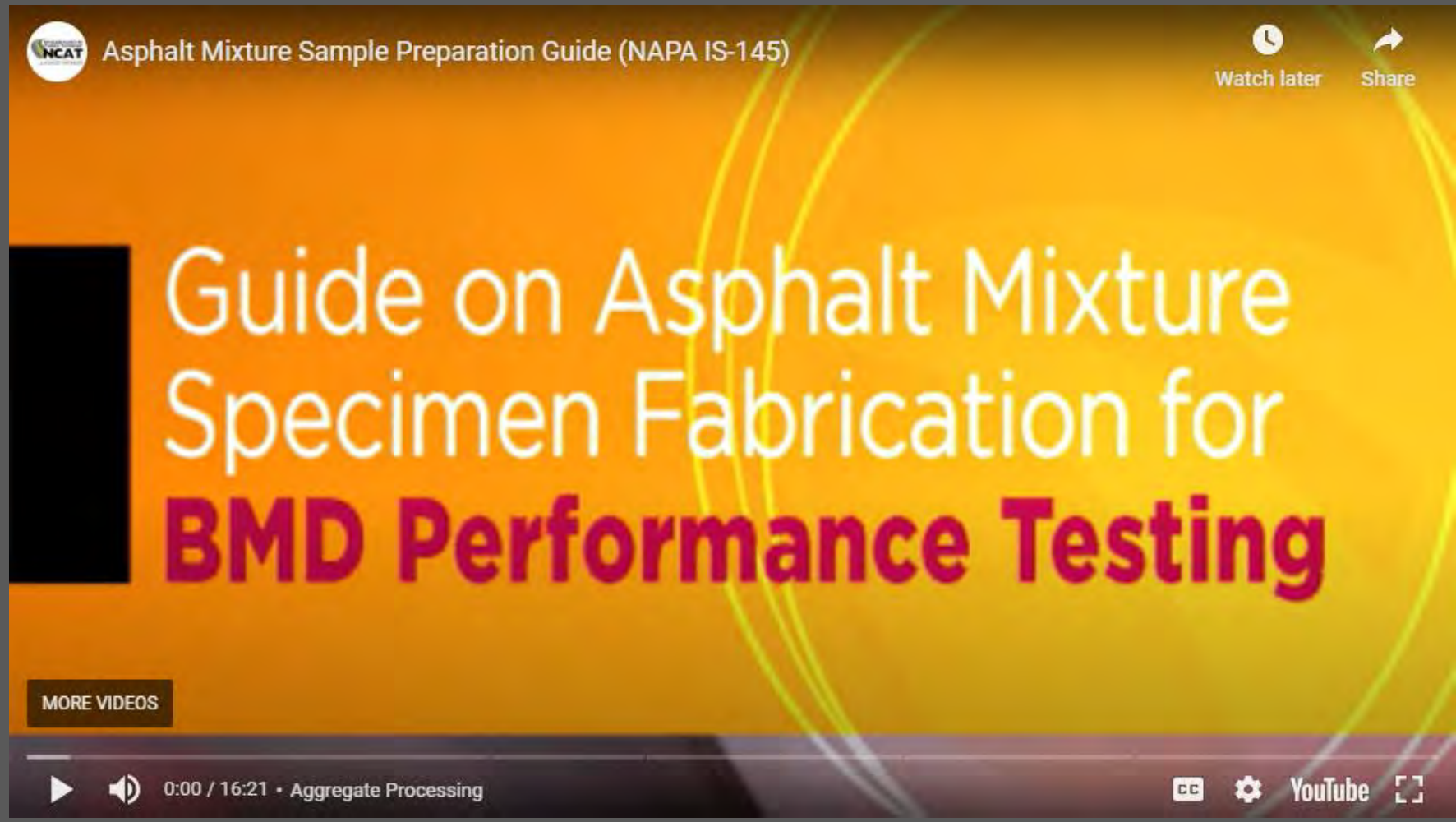

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Adjustment of Asphalt Mix Design/Job Mix Formula to Satisfy Mechanical Test Properties

Table 6. Summary of Experienced Most Sensitive and Least Sensitive Mixture Components to Mechanical Test Criterion

Organization	Most Sensitive Mixture Component	Least Sensitive Mixture Component
Advanced Asphalt Technologies	Binder content (by weight or effective by volume).	Aggregate gradation.
Advanced Materials Services	Aggregate angularity. Binder grade.	Percentage of fines and type of fines.
Barre Stone Products	Binder content.	Binder ratio.
Blankenship Asphalt Tech and Training	Time under heat. Conditioning of specimens.	Gradation curves – every mix has unique gradation curves.
Granite Construction	Binder content. Virgin binder stiffness. RAP binder stiffness (by changing RAP percentage).	Anti-strip additive.
Howell Paving Inc	Binder content. Aggregate angularity.	Did not provide.
Mathy Construction	Binder content. Aggregate angularity.	Binder ratio (asphalt binder replacement ratio).

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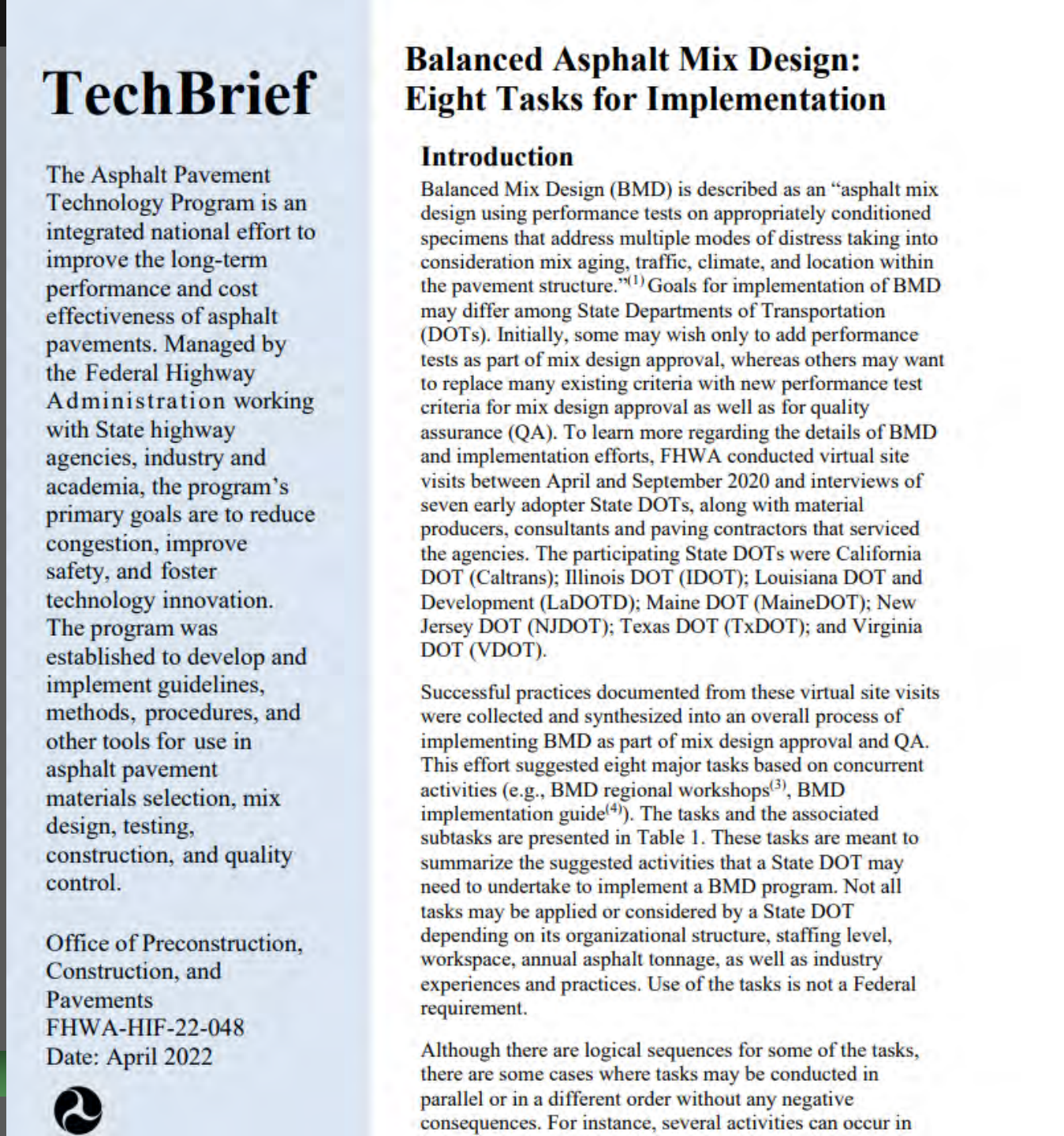

TechBrief

The Asphalt Pavement Technology Program is an integrated national effort to improve the long-term performance and cost effectiveness of asphalt pavements. Managed by the Federal Highway Administration working with State highway agencies, industry and academia, the program's primary goals are to reduce congestion, improve safety, and foster technology innovation. The program was established to develop and implement guidelines, methods, procedures, and other tools for use in asphalt pavement materials selection, mix design, testing, construction, and quality control.

Office of Preconstruction, Construction, and Pavements
FHWA-HIF-22-048
Date: April 2022

Balanced Asphalt Mix Design: Eight Tasks for Implementation

Introduction

Balanced Mix Design (BMD) is described as an "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."[1] Goals for implementation of BMD may differ among State Departments of Transportation (DOTs). Initially, some may wish only to add performance tests as part of mix design approval, whereas others may want to replace many existing criteria with new performance test criteria for mix design approval as well as for quality assurance (QA). To learn more regarding the details of BMD and implementation efforts, FHWA conducted virtual site visits between April and September 2020 and interviews of seven early adopter State DOTs, along with material producers, consultants and paving contractors that serviced the agencies. The participating State DOTs were California DOT (Caltrans); Illinois DOT (IDOT); Louisiana DOT and Development (LaDOTD); Maine DOT (MaineDOT); New Jersey DOT (NJDOT); Texas DOT (TxDOT); and Virginia DOT (VDOT).

Successful practices documented from these virtual site visits were collected and synthesized into an overall process of implementing BMD as part of mix design approval and QA. This effort suggested eight major tasks based on concurrent activities (e.g., BMD regional workshops[3], BMD implementation guide[4]). The tasks and the associated subtasks are presented in Table 1. These tasks are meant to summarize the suggested activities that a State DOT may need to undertake to implement a BMD program. Not all tasks may be applied or considered by a State DOT depending on its organizational structure, staffing level, workspace, annual asphalt tonnage, as well as industry experiences and practices. Use of the tasks is not a Federal requirement.

Although there are logical sequences for some of the tasks, there are some cases where tasks may be conducted in parallel or in a different order without any negative consequences. For instance, several activities can occur in

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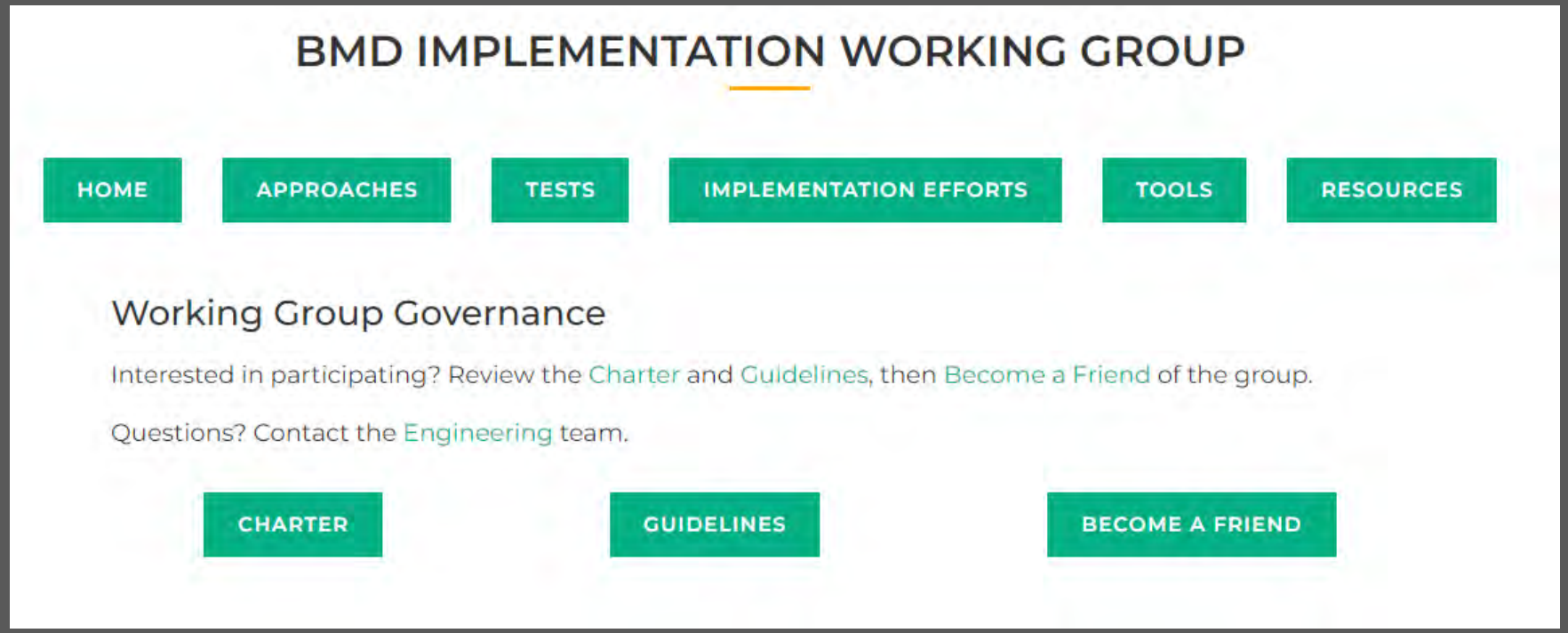
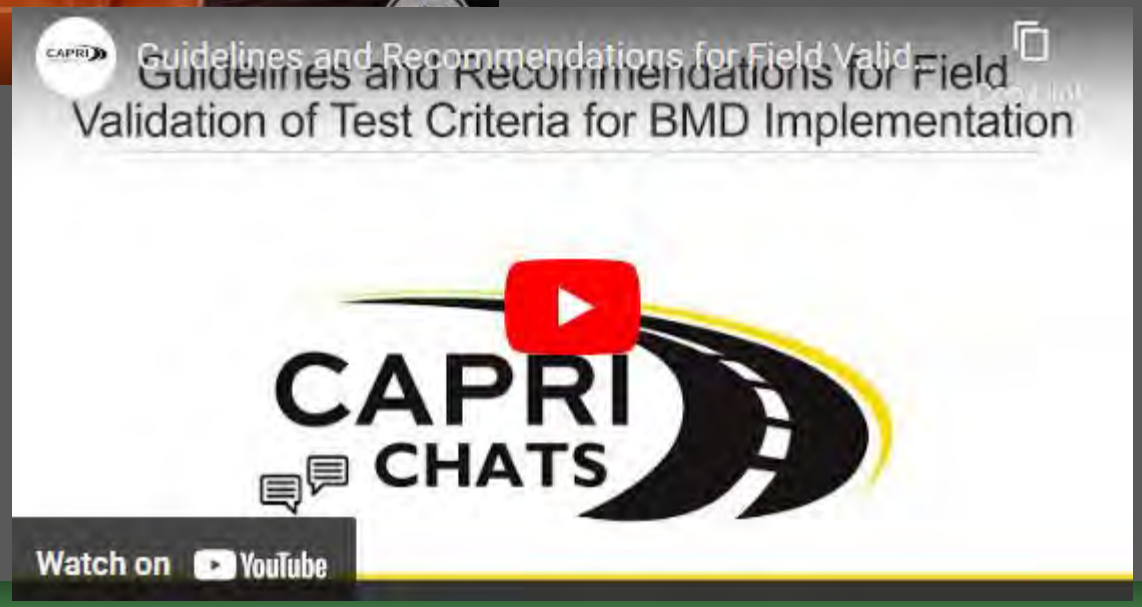


BMD Resources: Webinars, Videos, etc.



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Thank you....

Mary Robbins, Ph.D., P.E.
DIRECTOR OF TECHNICAL SERVICES
mary@pa-asphalt.org
(717) 657-1881 ext. 2
(419) 290-6360