

FHWA's Pavement Design Policy Update and Other Initiatives

63RD ANNUAL PAPA CONFERENCE

JANUARY 17, 2023



U.S. Department
of Transportation
**Federal Highway
Administration**

Disclaimer

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Unless otherwise noted, FHWA is the source of all images in this presentation.

FHWA Pavement Program Highlights

❖ Pavement Design

- Pavement Design Policy review effort and rulemaking
- TPF-5(305) Pavement M-E User Group

❖ Sustainable Pavements Program

❖ Balanced Mix Design (BMD) and Mobile Asphalt Technology Center (MATC)

Pavement Design



Pavement Design Policy Review Effort

Initiated in 2018

Goals:

- Discuss concerns and recommendations on FHWA's Pavement Design Policy
- Discuss and document best practices and barriers to designing cost-effective pavements

23 CFR 626 – Pavement Design Policy

§626.2 Definitions.

“*Pavement design* means a **project level activity** where detailed engineering and economic considerations are given to alternative combinations of subbase, base, and surface materials which will provide adequate load carrying capacity. Factors which are considered include: **Materials, traffic, climate, maintenance, drainage, and life-cycle costs.**” (emphasis added)

§626.3 Policy.

“Pavement shall be designed to accommodate current and predicted traffic needs in a **safe, durable,** and **cost effective** manner.” (emphasis added)

67166 Federal Register / Vol. 61, No. 245 / Thursday, December 19, 1996 / Rules and Regulations

Pavement Design Guidance

Pavement Design Considerations, Formerly Federal-aid Policy Guide Non-Regulatory Supplement NS 23 CFR, Part 626 (April 8, 1999, Transmittal 25)

General Pavement Design Considerations

- *FHWA Evaluation of Pavement Design Procedures*
- *Pavement Design Factors*
 - Traffic
 - Foundation
 - Shoulder Structure
 - Engineering Economic Analysis (Portion Superseded by [*Technical Advisory T 5040.39A Use of Alternate Bidding for Pavement Type Selection*](#), December 20, 2012)
 - Rehabilitation Pavement Design
 - Safety

Outreach Activities

Division Office Survey

- May 2018

Industry Listening Session

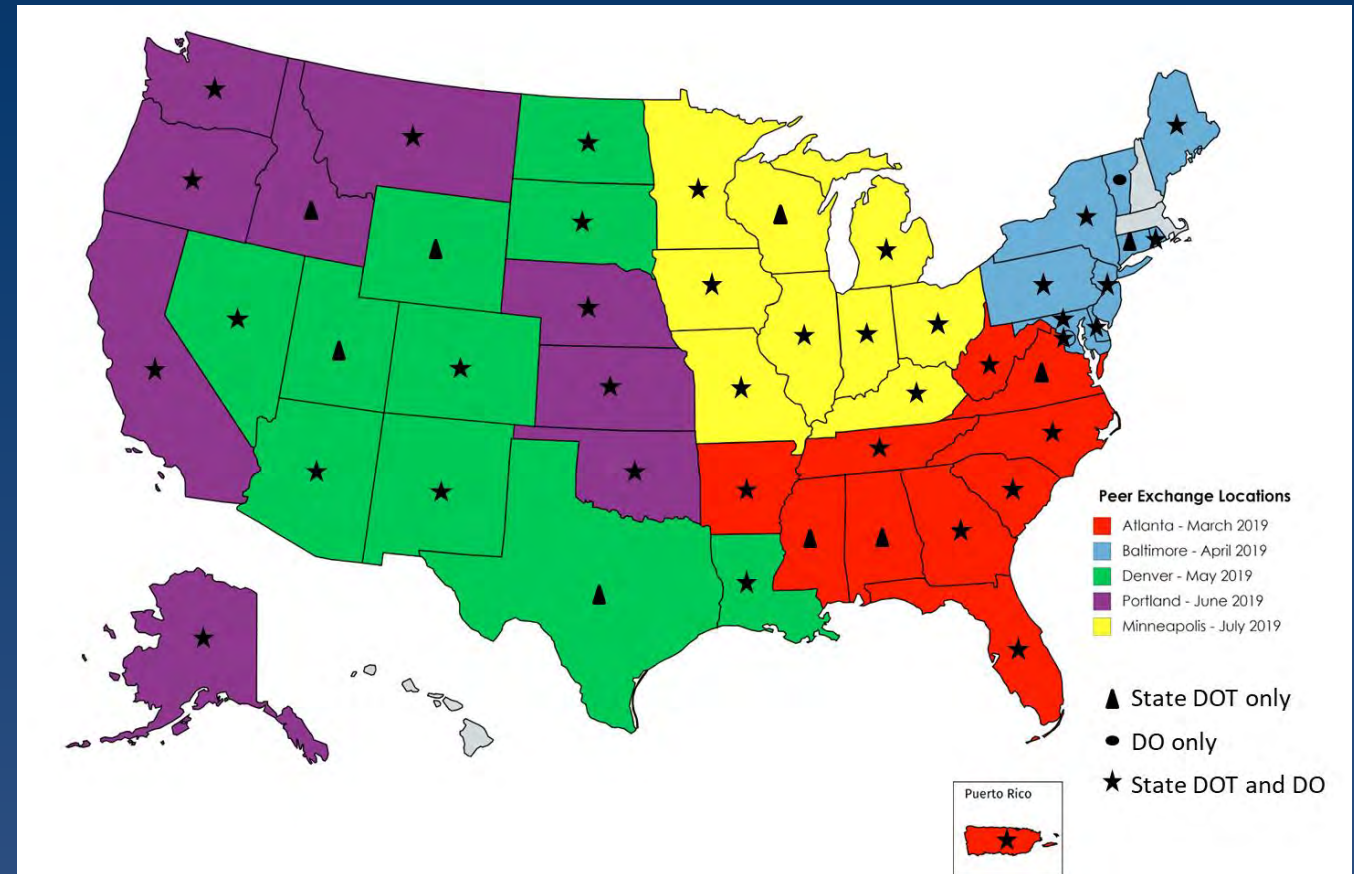
- December 2018

Regional Peer Exchanges

- March–July 2019

National Workshop

- October 2019



Stakeholder Feedback

All stakeholders agreed that there is a need for the pavement design policy. States like the flexibility; however, there is ambiguity in the current policy and it is being interpreted differently by States.

The non-regulatory supplement and LCCA guidance are outdated.

The policy should link pavement design to other requirements, such as pavement management, TPM, and the Transportation Asset Management Plan.

<https://www.fhwa.dot.gov/pavement/notebook/chapter01.cfm>

Key Priorities Identified

23 CFR 626 regulatory action

- Also update guidance in accordance with regulatory changes, including LCCA technical guidance

Create current practices clearinghouse related to pavement design

Identify how pavement design links to pavement management and the TAMP

Pavement webinar series based on topics requested by stakeholders

- 6 webinars from Nov 2020 – Mar 2021

Pavement Policy Rulemaking

Stakeholder feedback recommended regulatory updates including:

- Shift from project-level to programmatic approach
- Eliminate ambiguities
- Update and modernize regulation in response to MAP-21 provisions on performance management, asset management and minimum standard for pavement management systems

Additional considerations with passage of Bipartisan Infrastructure Law

<https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202010&RIN=2125-AF96>

General Rulemaking Process

- Draft proposed language
- Program Office briefing and approval
- FHWA approval
- Publish Notice of Proposed Rulemaking (NPRM) in Federal Register
 - Review and comment period
- Address comments, finalize language, and publish Final Rule



Linking Pavement Design to TAM

Case study to develop framework for linking pavement design to asset management through pavement management

NJ DOT was primary state, but other states were interviewed

Virtual workshop held June 29 – July 1, 2021

- AZ, CO, IA, NJ, PA, TX, VT, WA

Summarizing information in a website format, rather than a lengthy report

Organizational
Structure

Policies and
Procedures

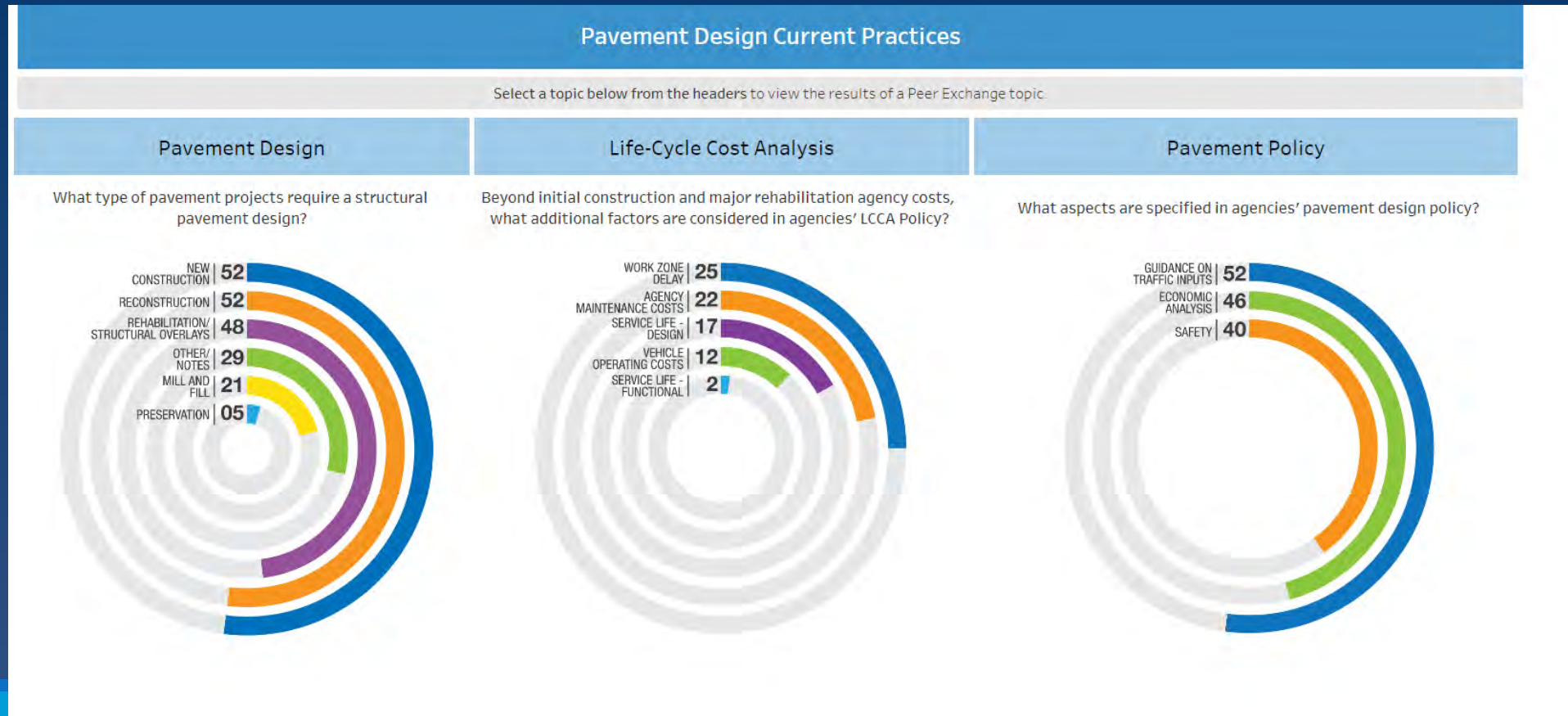
Data and
Feedback
Loops

Linking Pavement Design to TAM



Current Practices Clearinghouse

<https://www.fhwa.dot.gov/pavement/pavementpolicy/visual/>



Pavement ME User Group TPF-5(305)

TPF-5(305): Regional and National Implementation and Coordination of ME Design

Initiated in 2014

Participating Agencies: AL, AZ, CA, CO, FHWA, FL, GA, IA, IL, KS, KY, Manitoba, MD, MI, MO, MS, NC, ND, NV, Ontario, PA, SC, VA, WI

3-year Task Order executed in August 2020

- Conduct 3 annual user group meetings
 - Virtual meetings in 2020 and 2021
 - In-person event in Salt Lake City, UT in Nov 2022
- Deliver up to 6 training webinars
 - Recorded and posted on AASHTO website, links to AASHTO website are posted on TPF website
- Develop MEPDG Implementation Roadmap

Future plan for User Group: AASHTO will take the lead

<https://www.pooledfund.org/details/study/549>

Implementation Roadmap

- 1.5-day workshop held in Chicago, IL on June 1-2, 2022
- Representatives from 12 State DOTs, industry, and academia
- Identify proven practices for expediting and streamlining the Pavement ME implementation process

Design
Policy

Design
Inputs

Verification,
Calibration, and
Validation

Application
and Use



<https://www.pooledfund.org/details/study/549>

Sustainable Pavements Program



Vision and Mission

To advance the knowledge and practice of designing, constructing, and maintaining more sustainable pavements through:

- Stakeholder engagement
- Education
- Development of guidance and tools



SPP Progress



Characterizing Pavement Sustainability and Understanding Current Practices

Life-Cycle Assessment I: Understanding Concepts

- ☑ [Pavement LCA Framework Document](#)
- ☑ [Tech Brief: Pavement Life-Cycle Assessment](#)

Life-Cycle Assessment II: Application to Pavement Systems, Environmental Product Declarations, and Product Category Rules



- ☑ [Pavement LCA Tool](#)
- ☑ [Tech Brief: Life-Cycle Thinking](#)
- ☑ [Tech Brief: Data Needs for Pavement LCA](#)
- ☑ [Tech Brief: Environmental Product Declarations](#)

Resiliency of Pavement Systems

- ☑ [Tech Brief: Climate Change Adaptation for Pavements](#)
- ☑ [Peer Exchange on Pavement Resiliency](#)
- ☑ [Pavement Resiliency Summary Report](#)

PHASE 1: STATE OF KNOWLEDGE

PHASE 2: IMPLEMENTATION

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

Documenting Sustainability Considerations in Pavement Systems

- ☑ [Sustainable Pavements Reference Document](#)
- ☑ [Tech Brief: Pavement Sustainability](#)
- ☑ [Tech Brief: Sustainability Considerations for Asphalt Pavements](#)
- ☑ [Tech Brief: Sustainability Considerations for Concrete Pavements](#)
- ☑ [Webinar Series I: Towards Sustainable Pavement Systems](#)

Developing a Road Map for the Sustainable Pavements Program

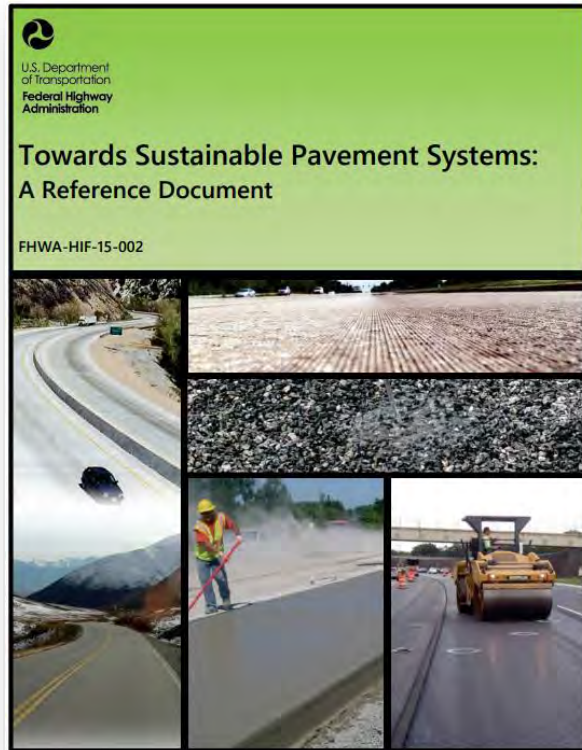
- ☑ [Sustainable Pavements Program Road Map](#)

Implementing Sustainability Concepts and Practices

- ☑ Case studies, video clips, newsletters, and flyers highlighting sustainable technologies and practices
- ☑ [Webinar Series II: Concepts, Practices, Evaluation and Assessment](#)
- ☑ [Deploying Pavement LCA Tool](#)



Sustainable Pavements Can...



1. Achieve the engineering goals (including performance)
2. Preserve and (ideally) restore surrounding ecosystems
3. Use financial, human, and environmental resources wisely
4. Meet basic human needs such as health, safety, equity, employment, comfort, and happiness

Balance of the Triple Bottom Line



Sustainability Rating Systems (e.g., INVEST)
Social LCA (S-LCA)



Performance Testing



Life-Cycle Cost Analysis (LCCA)

Performance Testing



Life-Cycle Assessment (LCA)

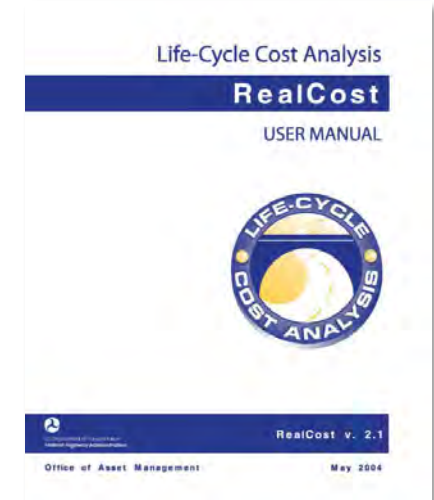
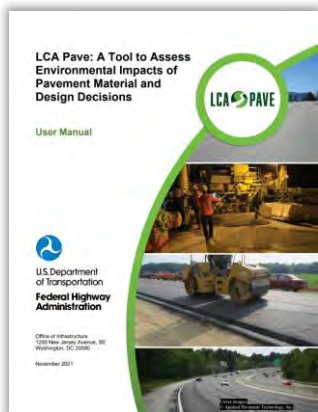


Image Source: FHWA/APTech

Sustainability Initiatives in the Spotlight



3 States have legislated Buy Clean Acts
5+ are considering



EO 14057
specified goal of Net Zero Federal Procurement



25 States (+2 Locals) Participating
35+ projects from 27 agencies
\$7.1M



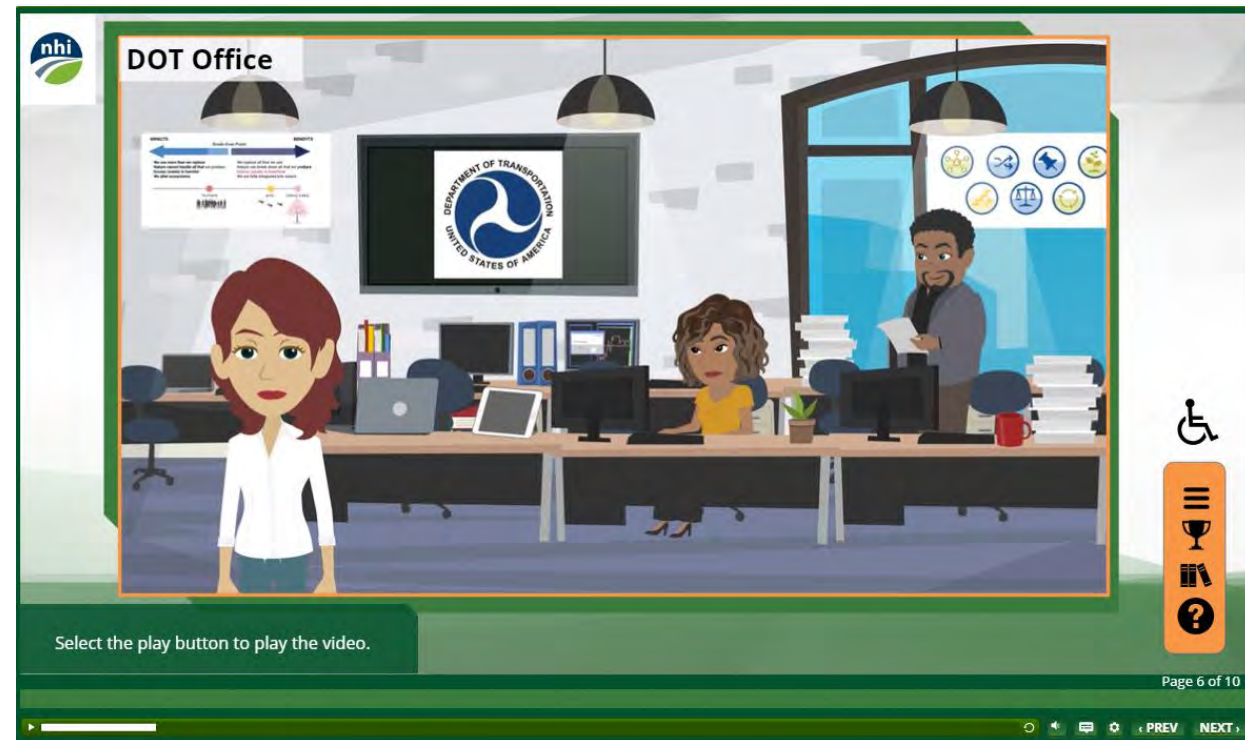
Inflation Reduction Act \$2 Billion for FHWA
Low-carbon transportation materials grants



EDC-7
EPDs for Sustainable Project Delivery

Coming! Sustainability Course NHI-131134

- Addresses the urgent need for sustainability-related education for various audiences
- Leverages the existing SPP materials using:
 - Gamification
 - Micro-learning
 - Self-directed
 - Experiential learning



Resources

- <http://www.fhwa.dot.gov/pavement/sustainability>



Education

[Pavement LCA Framework](#)

[Webinars](#)

[Tech briefs, studies](#)

[Technical articles](#)



Research

[LCA fit in transportation decision-making](#)

[EPDs in Green Public Procurement](#)

[LCA of recycled plastics in pavements](#)

[LCA of ground tire rubber in pavements](#)



Deployment

[LCAPave Tools](#)

[Pilot projects with State DOTs](#)

[Mobile Pavement Technologies Centers](#)

[Informing pre-engineering with ICE Tool](#)

BMD and MATC Initiatives



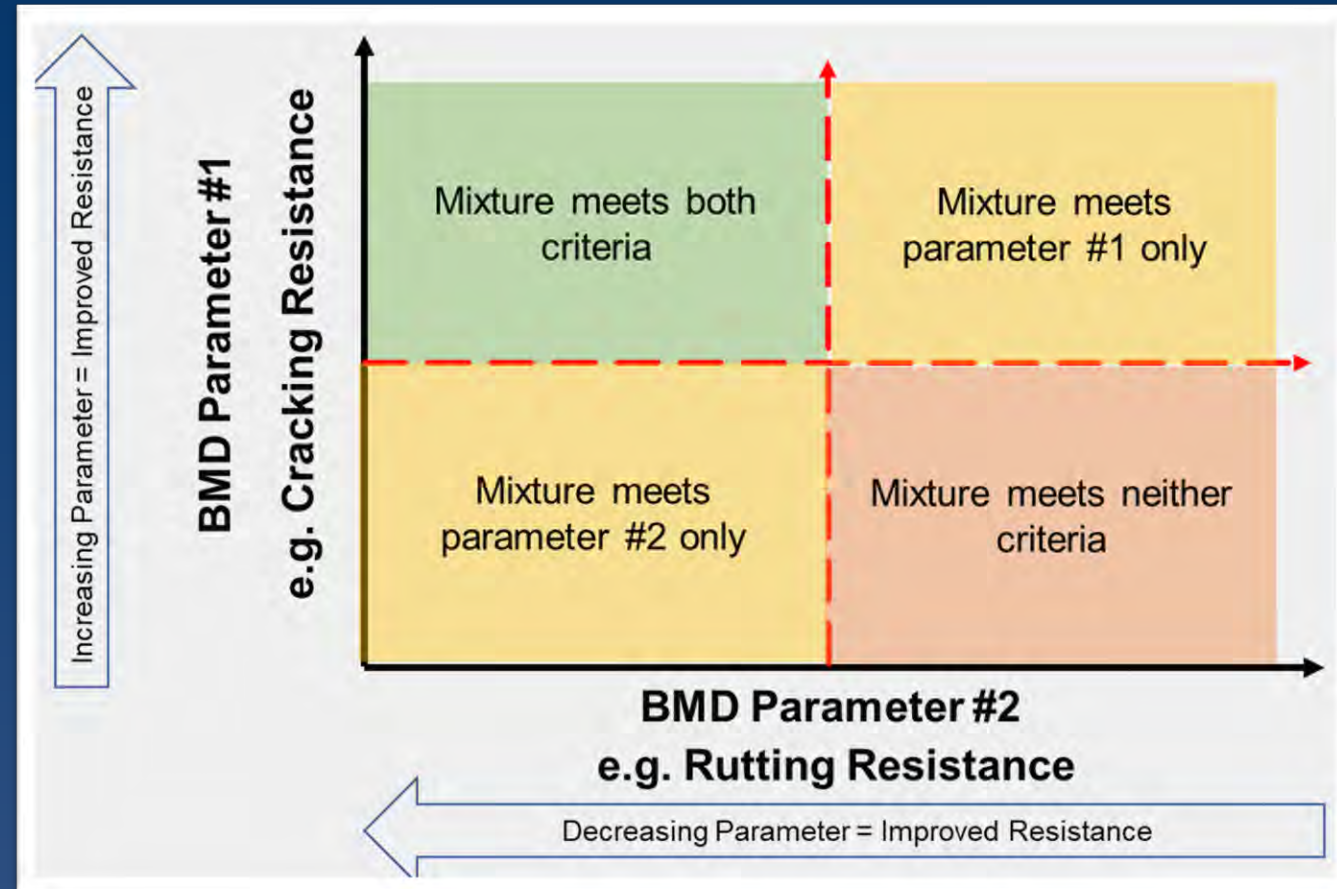
Balanced Mix Design

BMD is not solely about achieving the 'right' quantity of asphalt!

FHWA partners with stakeholders to advance and implement BMD in a data-informed manner

What is BMD?

An asphalt mixture design framework using *mechanical tests correlated to field performance* on appropriately conditioned specimens that address multiple modes of asphalt layer distress taking into consideration mixture aging, traffic, climate, and location within the pavement structure.



Balanced Mix Design Tests

Mechanical tests correlated to field performance

Tests that are conducted on the mixture that may relate to resistance to actual distresses



Overall BMD Implementation Process

8 Tasks That Can Be Undertaken (Example)

Task	Sub Task	Description	Years										
			-1	1	2	3	4	5	6	7			
1	Understanding the why and benefits of Performance Specifications		●										
2	Overall Planning	2.1 Identification of Champions		●									
		2.2 Establishing a Stakeholders Partnership		●									
		2.3 Doing Your Homework		●									
		2.4 Establishing Goals		●									
		2.5 Mapping the Tasks		●									
		2.6 Identifying Available External Technical Information and Support (periodically)		●	—	—	—	—	—	—	—	—	—
		2.7 Developing an Implementation Timeline		●	—	—	—	—	—	—	—	—	—
3	Selecting Performance Tests	3.1 Identifying Primary Modes of Distress.		●	—	—							
		3.2 Identifying and Assessing Performance Test Appropriateness.		●	—								
		3.3 Validating the Performance Tests			●	—	—	—					
4	Performance Testing Equipment: Acquiring, Managing Resources, Training, and Evaluating	4.1 Acquiring Equipment			●	—	—	—	—				
		4.2 Managing Resources				●	—	—	—	—			
		4.3 Conducting Initial Training			●	—							
		4.4 Evaluating Performance Tests				●	—	—					
		4.5 Conducting Inter-Laboratory Studies					●	—	—				
5	Establishing Baseline Data	5.1 Reviewing Historical Data & Information Management System			●	—							
		5.2 Conducting Benchmarking studies				●	—						
		5.3 Conducting Shadow Projects					●	—					
		5.4 Analyzing Production Data						●	—				
		5.5 Determining How to Adjust Asphalt Mixtures Containing Local Materials							●	—			
6	Specifications and Program Development	6.1 Sampling and Testing Plans							●	—			
		6.2 Pay Adjustment Factors (If Part of the Goals)							●	—			
		6.3 Developing Pilot Specifications and Policies							●	—			
		6.4 Conducting Pilot Projects							●	—			
		6.5 Final Analysis and Specification Revisions								●	—		
7	Training, Certifications, and Accreditations	7.1 Developing and/or Updating Training and Certification Programs							●	—			
		7.2 Establishing or Updating Laboratory Accreditation Program Requirements							●	—			
8	Initial Implementation										●		

Not all tasks may be applied/considered.

Considerations to:

- Organizational structure, staffing, workspace, asphalt tonnage, etc.
- Industry experiences and practices.

Inter-related tasks or subtasks activities.

BMD Key Considerations

Establish the “Why?” for your state (i.e., longer life, more recycled materials)

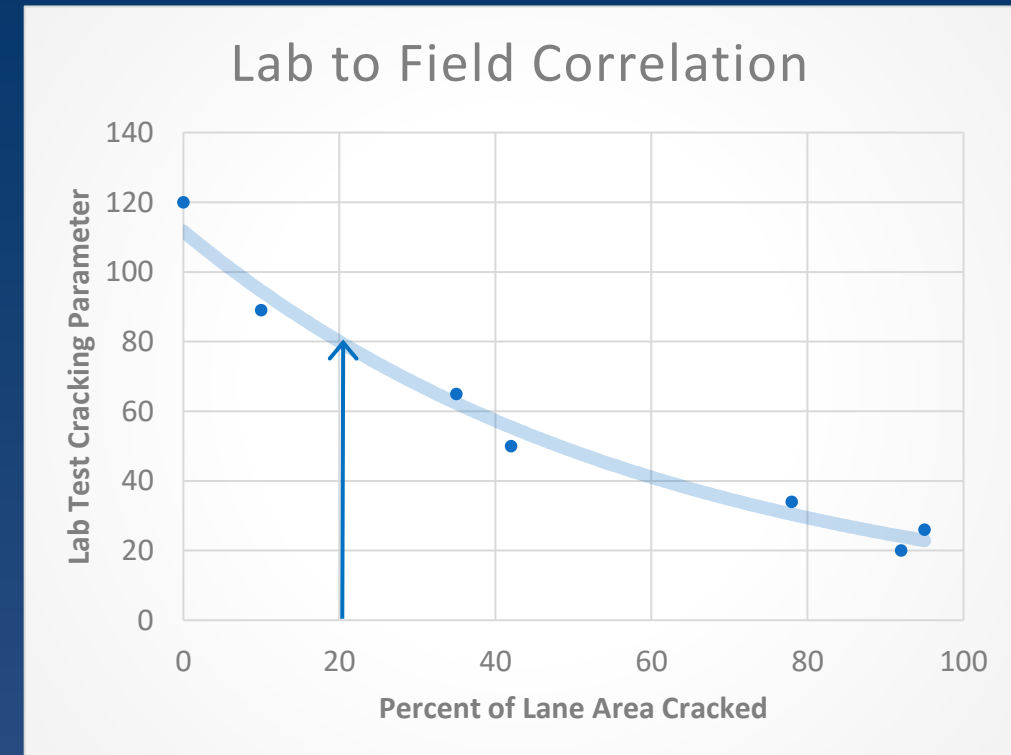
Establish goals and scope for implementation

- Mix design only?
- What projects and what mixes?

Stakeholder partnerships are important

Establishing relationship between BMD tests and field performance is important to developing appropriate criteria

Significant time for implementation



Key FHWA Documents & Efforts

Tech Brief: Eight Tasks for BMD Implementation

https://www.fhwa.dot.gov/pavement/pub_details.cfm?id=1144

Tech Brief: Performance Engineered Pavements

https://www.fhwa.dot.gov/pavement/pub_details.cfm?id=1102

Index-Based Tests for Performance Engineered
Mixture Designs for Asphalt Pavements

https://www.fhwa.dot.gov/pavement/pub_details.cfm?id=1101

Scan QR Code Below to
Get to the Tech Brief!



BMD Case Studies Virtual Workshop

Free to interested states

Delivered to agency, contractor, and academia personnel

Can be done in-person by request

Contact Derek Nener-Plante

derek.nenerplante@dot.gov



Scan to read the flyer and learn more!

A flyer for the 'Balanced Mix Design (BMD) Case Studies Virtual Workshop: Moving Forward with Implementation'. The flyer is tilted and features the U.S. Department of Transportation Federal Highway Administration logo and the 'RESOURCE CENTER' logo. It includes a photo of construction workers on a road. The text on the flyer is as follows:

Description
This free Federal Highway Administration (FHWA) workshop will provide State DOTs with knowledge on how to get started and/or move forward with the implementation of BMD as learned from in-depth case studies of key State DOTs. It is **customized** to a State DOTs current situation with its BMD implementation program. This unique workshop includes providing managers and practitioners with knowledge on:

- the overall BMD process and its benefits;
- the planning and activities needed for the selection, evaluation, and implementation of performance tests for routine uses in a BMD process; and
- positive practices and lessons learned by key State DOTs.

The workshop will focus on a BMD implementation process that was developed and conducted from in-depth case studies of key State DOTs.

Outcomes
Upon completion of the workshop, participants will be able to:

- Understand the overall benefits of BMD.
- Recognize the planning and coordination effort associate with the implementation process of BMD.
- Identify the tasks that need to be completed for the development and implementation of BMD.
- Recognize successful key State DOTs practices and experiences related to BMD.
- Recognize available external technical information and support.

Register Today
Contact **Derek Nener-Plante** at derek.nenerplante@dot.gov for more information.

Location
The free virtual workshop will be delivered using Microsoft Teams or any other virtual meeting platform accepted by a State Department of Transportation (DOT).

Length
The workshop is a total of six hours and will include multiple segments with a maximum of three hours per segment. The workshop can be delivered over the course of several days.

Target Audience
The successful implementation of BMD will need to be a team effort. Thus, the target audiences for the workshop are managers and practitioners interested in the implementation of BMD from State DOTs, industry, academia, and consultants. This involves participants from various offices of a State DOT, such as materials, pavement design, construction, and pavement management.

Hot off the press!

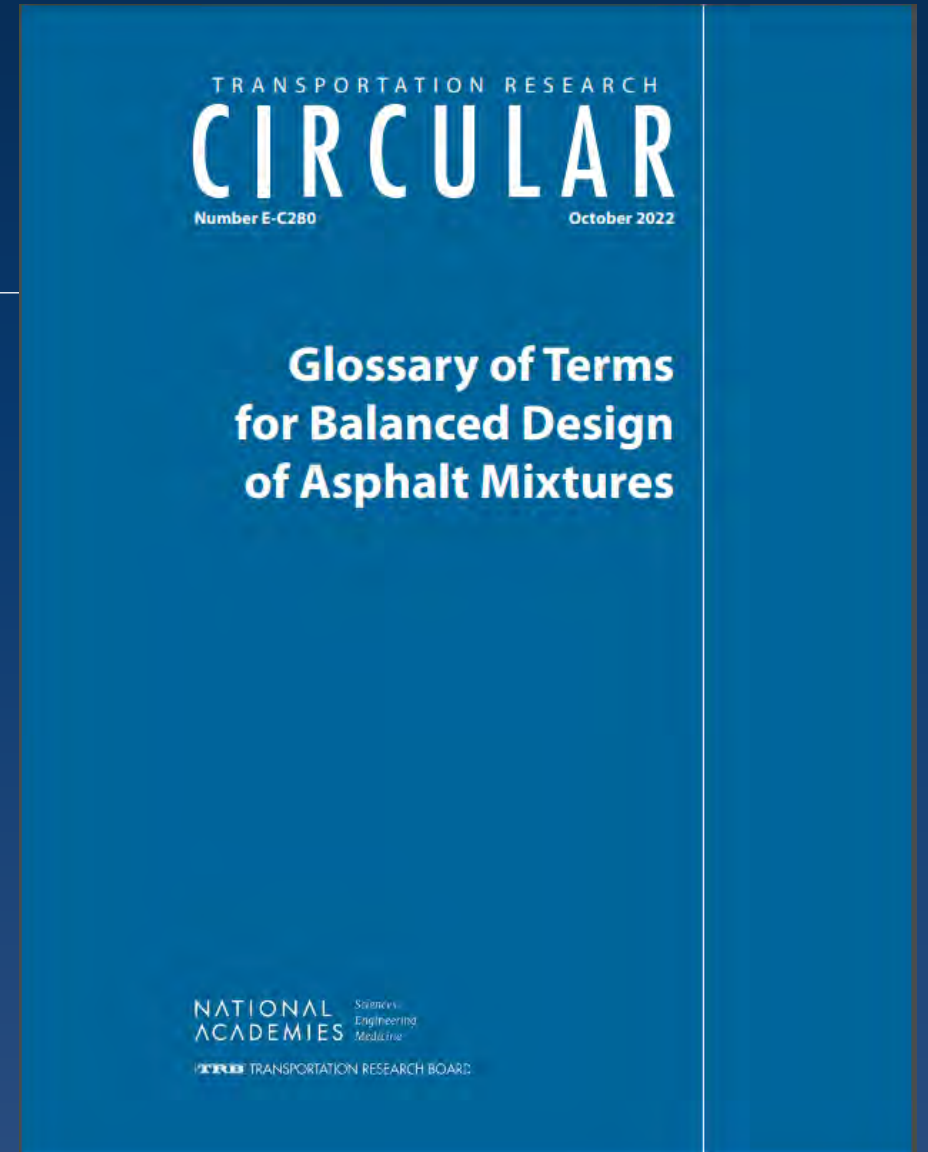
Glossary for BMD Terms developed and
championed by TRB Committee AKM10

TRB E-Circular E-C280

<https://onlinepubs.trb.org/onlinepubs/circulars/ec280.pdf>



**Scan to get the
document!**



Source: TRB

Mobile Asphalt Technology Center

Site visits

Technology transfer

Technical assistance

Equipment loans

Specification reviews



***Visit the MATC Website
to Learn More!***

MATC

MOBILE ASPHALT TECHNOLOGY CENTER

**SPREADING ASPHALT PAVEMENT
TECHNOLOGY INNOVATION**

<https://www.fhwa.dot.gov/matc>

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Thank You!

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