TRANSPORTATION POOLED FUND – 5(478)
TECHNICAL ADVISORY COMMITTEE

2024 VIRTUAL MEETING

VIRTUAL MEETING REPORT

NOVEMBER 18, 2024

U.S. Department of Transportation
Federal Highway Administration

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TECHNICAL ADVISORY COMMITTEE
VIRTUAL MEETING REPORT

November 18, 2024
12:30 – 3:30 p.m. (EST)

1. WELCOME AND MEETING OVERVIEW

Gina Ahlstrom, FHWA Pavement Materials Team Leader

On behalf of the Federal Highway Administration (FHWA), Gina Ahlstrom welcomed meeting participants to the virtual 2024 Transportation Pooled Fund (TPF) – 5(478) Demonstration to Advance New Pavement Technologies Pooled Fund Technical Advisory Committee (TAC) meeting. The primary goals of TPF-5(478) are to ensure the greatest return on investments made during the pooled fund, and to accelerate the process of delivering safe, smooth, durable pavements in a state of good repair. FHWA is leveraging Federal investments through State Department of Transportation (DOT) partnerships for the implementation and deployment of pavement technologies, practices, performances, and benefits that State DOTs could utilize to further develop lessons learned and best practices to advance the management of pavement assets.

Ahlstrom shared that the TAC serves as a forum for the 23 states participating in TPF-5(478) to share their project scope, current status, and key findings. The first hour of the virtual meeting was dedicated to FHWA administrative updates and announcements regarding TPF-5(478) activities. The agenda for this meeting can be found in "Appendix A: Virtual Meeting Agenda."

2. MEMBER ROLL CALL

TPF-5(478) TAC meeting participants were asked to provide their names and affiliations to the group. The attendance record for this meeting can be found in "Appendix B: Virtual Meeting Attendees."

3. TPF-5(478) ADMINISTRATIVE UPDATES: MEMBERSHIP, FUNDING, AND QUARTERLY REPORTS

LaToya Johnson, FHWA Pavement Design & Performance Team Leader

3.1. Points of Contact

LaToya Johnson requested that State DOTs review their following Point of Contact (POC). Please send any POC updates to LaToya Johnson (latoya.johnson@dot.gov).

- Alabama: John Jennings
- Arizona: Steven Olmsted
- California: Tigi Thomas
- Colorado: Craig Wieden
- Connecticut: Eliana Carlson
- Georgia: Ryan Kellett
- Hawaii: Kristi Grilho

- Idaho: John Arambarri
- Illinois: John Senger
- Iowa: Chris Brakke
- Louisiana: Tyson Rupnow
- Maine: Richard Bradbury
- Mississippi: Robert Vance
- Missouri: Jacob Graessle
- New York: Brendan Rock
- North Dakota: Tyler Wollmuth
- Oklahoma: Ron Curb
- Oregon: Erdem Coleri
- Pennsylvania: Halley Cole
- Tennessee: Derek Gaw
- Texas: Travis Patton
- Vermont: Ian Anderson
- Wisconsin: Casey Wierzchowski

3.2. Quarterly Reports

Each quarter, State DOTs that have a decided project, are to provide a progress update on their TPF-5(478) efforts to FHWA. State DOTs are to submit their next quarterly report project updates to Reena Bhardwaj (reena.bhardwaj.ctr@dot.gov) by December 6, 2024. The final quarterly reports are published to the TPF-5(478) Study website.

If a State DOT has finished its TPF-5(478) project(s), it does not need to continue submitting quarterly report project updates. Please note that the project(s) have been completed and funds have been expended in the final quarterly report project update.

3.3. Financial Updates

FHWA processed the following funding allocations in Fiscal Year (FY) 2024.

- Oregon [$250 thousand (K); allocated January 31, 2024]
- Vermont ($200K; allocated January 31, 2024)
- Maine ($250K; allocated January 31, 2024)
- Louisiana ($75K; allocated January 31, 2024; $175K to be received in the following years)
- Alabama ($250K; allocated February 15, 2024)
- Tennessee ($250K; allocated February 15, 2024)
- Iowa ($250K; allocated February 15, 2024)
- Wisconsin ($250K; allocated April 11, 2024)
- Hawaii ($250K; allocated April 30, 2024)

FHWA did not de-allocate funds following the conclusion of FY2024. Any State DOTs that have received allocations, but have not obligated funds, should contact their FHWA division office POC.

FHWA is processing the following pending funding allocations.

- Illinois ($250K)
- Louisiana ($75K; $100K to be received in the following years)

3.4. Close-Out

With participation from 23 states and the project end date on October 30, 2026, additional commitments will not be accepted for TPF-5(478). If State DOTs are producing any documentation as a result of their project(s), please submit them to be uploaded to the TPF-5(478) Study website. If State DOTs cannot upload their documentation to the website, please email LaToya Johnson (latoya.johnson@dot.gov) and Reena Bhardwaj (reena.bhardwaj.ctr@dot.gov).

3.5. Contract Support

FHWA provides the following contract support to states participating in TPF-5(478):

- Task 1: Informational or instructional videos (5-10 minutes)
- Task 2: Technical summaries (1-pagers)
- Task 3: Logistical support for virtual meetings
- Task 4: In-person meetings
- Task 5: Project-documentation reports

Requests for contract support can be submitted through the quarterly update form or by emailing LaToya Johnson (latoya.johnson@dot.gov). Additional, topic-specific contract support may be available as needed.

3.6. Next TAC Meeting

FHWA proposed hosting an in-person meeting for the 2025 TPF-5(478) TAC. Illinois and Louisiana offered to host the in-person meeting, which is expected to have approximately 40 participants.

It was recommended that FHWA consider hosting the in-person 2025 TPF-5(478) TAC in Washington, DC, in conjunction with the Transportation Research Board (TRB) annual meeting. Participants encouraged FHWA to avoid scheduling the meeting during the following dates.

- October 27-30, 2025
- November 17-21, 2025

4. TPF-5(478) BALANCED MIX DESIGN EVENTS

Timothy Aschenbrener, FHWA Asphalt Technical Lead

4.1. Balanced Mix Design Regional Peer Exchanges

FHWA hosted the following regional peer exchanges, focused on Balanced Mix Design (BMD).

- Southeast Peer Exchange hosted in Louisiana (March 1-2, 2023)
- North Central Peer Exchange hosted in Illinois (March 22-23, 2023)
- Northeast Peer Exchange hosted in Massachusetts (March 29-30, 2023)
- Rocky Mountain West Peer Exchange hosted in Utah (November 28-30, 2023)
- Midwest Peer Exchange hosted in Illinois (December 13-14, 2023)
- Mid-Atlantic Peer Exchange hosted in Washington, DC (November 13-14, 2024)

- Mega-States (California, Texas, and Florida) Peer Exchanges are held virtually every six months

During the regional peer exchanges, FHWA gathered feedback on implementation obstacles faced by the states, which identified the following managerial and technical challenges.

- Management Challenges:
  - Change management
  - Cost-benefit analysis
  - Specifications and risk management
  - Resource allocation
  - Implementation planning
  - Stakeholder engagement
- Technical Challenges:
  - BMD tests validation
  - Testing procedures and protocols
  - Variabilities
  - Database setup, collection, analysis, and management
  - Pathway for use in field Quality Assurance (QA)
  - Volumetrics historical usage
- Overlapping Management and Technical Challenges:
  - Integration with existing practices
  - Education, training, and skill development
  - Information sharing and collaboration among peers

4.2. Balanced Mix Design Case Studies Workshops

The BMD Case Studies Virtual Workshop: Moving Forward with Implementation, which is offered virtually and in-person, can serve as a tool to assist with the challenges identified from the BMD regional peer exchanges. Since its conception in 2021, 14 virtual and nine in-person workshops have hosted 843 participants. Currently, four in-person workshops are planned to be held in Arizona, Montana, Pennsylvania, and Wisconsin. States interested in participating in an in-person workshop can contact Derek Nener-Plante (derek.nenerplante@dot.gov).

4.3. Balanced Mix Design Peer Exchange (March 12-14, 2024)

FHWA hosted the Accelerated Implementation and Deployment of Pavement Technologies (AIDPT) Pooled Fund Peer Exchange on BMD at the National Center for Asphalt Technology (NCAT) in Auburn, Alabama, on March 12-14, 2024. All states participating in TPF-5(478) were invited to attend; 15 states attended the meeting. Further meeting information can be reviewed in the AIDPT Pooled Fund Peer Exchange on BMD – Outcomes Summary.

Prior to the meeting, TPF-5(478) participants were polled, and identified their three most common challenges (field validation, specimen fabrication, and moving beyond Approach A) as well as their most common managerial challenges (cost-benefit analysis and gaining support). These challenges were reflected in the meeting's agenda through a series of presentations and discussions, to assist in BMD implementation efforts and to inspire potential pathways toward acceptance.

States were asked to deliver updates on their current state of practice and TPF-5(478) progresses. At the conclusion of the meeting, participating states were asked to identify which of the

following implementation task(s) they would most like to focus on within their TPF-5(478) project(s) and programs.

- Stakeholder partnerships (Arizona, Connecticut, Hawaii, Louisiana, and Maine)
- Implementation timeline (Connecticut, Hawaii, Maine, and Oregon)
- Validation (Colorado, Georgia, Idaho, and Vermont)
- Clear test method (Arizona, Colorado, North Dakota, Maine, Tennessee, Texas, and Vermont)
- Benchmark (Hawaii)
- Analyze production data (Tennessee and Vermont)
- Pilot specifications and policies (Louisiana and Texas)
- Conduct pilot projects (Connecticut, Idaho, Missouri, Oregon, and Vermont)
- Initial Implementation (Illinois, Louisiana, Missouri, Texas, and Vermont)

TAC meeting participants encouraged FHWA to host another peer exchange ahead of the conclusion of TPF-5(478). Please email Timothy Aschenbrener (timothy.aschenbrener@dot.gov) with suggested dates, locations, and topics for a potential peer exchange.

5. TPF-5(478) STATE PROJECT UPDATES

The following is an overview of the update presentations provided by the states participating in TPF-5(478). States were asked to provide and update on their efforts to advance initiatives set by the AIDPT Program, to include their project scope, current status, and next steps.

5.1. Asphalt

Alabama

Alabama DOT's TPF-5(478) study, focused on BMD validation, was conducted to verify the selection of performance tests in the field, and to categorize their inherent variability. The construction of the project was completed in April 2024. The project is approximately six and a half miles in length, consisting of six test sections, with each section at approximately 1,000 feet in length and containing approximately 100 tons of asphalt. The NCAT mobile laboratory was used to conduct Indirect Tensile Asphalt Cracking Tests (IDEAL-CT) and High-Temperature Indirect Tension Tests (HT-IDT) in the field alongside the testing performed by contractors. Additionally, 250 pounds of each sample was collected for further testing by the DOT and NCAT. The DOT has concluded its testing, which included IDEAL-CT, HT-IDT, and Hamburg Wheel Tracking Tests (HWTT). NCAT is 80-90% finished with its testing. Once NCAT testing is concluded, the DOT expects to have definitive results.

Connecticut

Toward the end of 2023, Connecticut DOT purchased the following equipment for use in its TPF-5(478) study focused on BMD validation: a Pine Superpave Gyratory Compactor, a Troxler Ideal Plus [capable of conducting the Illinois Flexibility Index Test (I-FIT), IDEAL-CT, and Rapid Shear Rutting Tests (IDEAL-RT) re-configuration spring rollers], an Instrotek Hamburg Wheel Tracker, and aging pans (for CT index). In 2024, Connecticut DOT ordered a Controls Group Auto Saw II, a water bath, and a Gmm station, to be delivered.

The Connecticut Advanced Pavement Laboratory (CAP Lab) at the University of Connecticut shared its database with the DOT, which includes testing data collected since 2017, and has provided initial equipment and testing training to DOT staff. In May 2024, the DOT began weekly HWTT, IDEAL-CT, and IDEAL-RT testing; averaging two tests per week. In 2024, mechanical testing performed in the DOT's central laboratory included plant produced samples from nine Hot Mix Asphalt (HMA) plants [e.g., Performance Grade (PG) 64S-22 and PG 64E-22, 15% and 20% Reclaimed Asphalt Pavement (RAP)]. The DOT has been utilizing two aging protocols for IDEAL-CT (short-term and 20-hour). Results have been recorded for 11 HWTT, 33 IDEAL-CT, and 17 IDEAL-RT.

The DOT is saving samples to continue testing throughout this winter and is working to create its own database, based on the meta data file developed by the Northeast BMD Working Group. Connecticut is considering whether to collect I-FIT data, which has previously been collected by CAP Lab, but is not commonly collected among other northeast states.

Connecticut DOT has been participating in the Northeast BMD Working Group, which included a Round Robin on IDEAL-CT. The DOT has also participated in the 2024 American Association of State Highway and Transportation Officials (AASHTO) re:source program for HWTT proficiency samples.

In 2025, Connecticut DOT aims to develop contract specifications and select two pilot projects, to be conducted in 2026.

Louisiana

Louisiana Department of Transportation and Development (DOTD) is utilizing its TPF-5(478) study to develop and implement Quality Control (QC) and QA specifications. Every mix design in Louisiana utilizes BMD; therefore, Louisiana is in Approach B for its TPF-5(478) study, performing volumetric and performance mixture testing.

In Louisiana, Loaded Wheel Testers (LWT) are utilized to measure rutting and Semi-Circular Bend (SCB) tests are utilized to measure cracking. SCB tests are only performed on samples that have undergone long-term aging. Compacted samples are aged for five days at 85 degrees Celsius (AASHTO R 121) and loose mixture samples, used to mimic field aging, are aged for 12-27 days (6-20 mm) at 95 degrees Celsius [National Cooperative Highway Research Program (NCHRP) Report 871].

In an effort to minimize the time needed to analyze long-term aging, Louisiana gathered its data on mixes throughout the State to develop an Artificial Intelligence (AI) model [i.e., the Artificial Neural Network (ANN) model] and a scaling factor to predict the long-term aging of plant-produced materials based on Job Mix Formula (JMF) parameters.

The objective of Louisiana's TPF-5(478) study is to develop an implementable methodology that considers practical QC and QA specifications based on Louisiana's asphalt BMD framework. Louisiana would like to perform ten field projects, varying in mixtures and materials. Currently, two field projects have been constructed. The scope of the project includes an asphalt mixture experiment, an asphalt mixture verification experiment, and an asphalt binder experiment. The

TPF-5(478) study can be outlined by following tasks: (1) conduct a literature review, (2) identify field projects and collect mixtures, (3) condition the asphalt mixtures, (4) conduct laboratory experiments, (5) perform data analyses, and (6) prepare the project's final report.

Maine

Maine DOT received the funding allocation for its TPF-5(478) study in summer 2024. The DOT intends to develop a special provision this winter, to begin letting pilot projects in 2025. The special provision will be focused on Approach C, in an effort to lighten current engineering control limits during design. This will allow contractors the ability provide innovative volumetric targets, to be evaluated under current acceptance quality characteristics within the variability they are able to control. The DOT hopes to have conducted four pilot projects by 2026, with different contractors on each of the projects. In future years, the DOT intends on requiring performance test results as part of the mix design submission process.

Following the Northeast Regional Peer Exchange on BMD, Maine joined eight other states to form the Northeast BMD Working Group. The group has been working to promote the standardization of BMD design and implementation (e.g., unified specimen fabrication procedures and long-term aging protocols).

Currently, Maine DOT's largest effort is the development of an interlaboratory regional validation experimental plan. Participating states will construct four different test sections along a roadway segment, which will be tested within their own laboratories as well as the other participating state's laboratories. The experiment's objective is to refine testing plans across the participating states and to work toward a singular procedure in the northeast region.

Within the State, Maine DOT has created technical and administrative working groups, which include agency and industry personnel. The working groups are focused on evaluating the managerial and technical challenges identified from the BMD peer exchanges hosted by FHWA.

Missouri

Missouri DOT is moving forward with its TPF-5(478) study, focused on full-scale BMD. The DOT has purchased BMD testing equipment (e.g., load frames and water baths) for its seven district laboratories to conduct IDEAL-CT and IDEAL-RT. Previously, IDEAL-CT and IDEAL-RT was being performed in the DOT's central laboratory. Once the districts are trained, the DOT intends to host a round robin across the seven district laboratories.

North Dakota

North Dakota DOT constructed its TPF-5(478) BMD field validation project in September 2024. Project construction included a 21-mile Full Depth Reclamation (FDR) with widening, pipe replacements, cattle pass replacements, subcuts, milling, and HMA paving. The project consists of eight BMD test sections, each two miles in length. Two binder types, 58S-28 and 58H-34, were used in four test sections each. For each of the four test sections utilizing the same binder type, the Asphalt Content (AC) binder content was varied by 0.5% from optimum (e.g., 5.5%, 6.0%, 6.5%, 4.5% plus RAP); aggregate properties were kept the same in all eight test sections.

North Dakota DOT partnered with NCAT to conduct IDEAL-CT and IDEAL-RT on the eight sections in both the DOT's central laboratory and on-site in an NCAT mobile laboratory; central laboratory and mobile laboratory test results show varying ranges. Additionally, HWTT was conducted for each of the eight sections in the DOT's central laboratory. In summary, cracking variability was greater during the production stage and good rutting variability was seen both in the mix design stage and the production stage.

Oregon

Oregon DOT has constructed five pilot projects, in different geographical regions, for its TPF-5(478) study. In comparison to Oregon's volumetric Plant Mixed, Laboratory Compacted (PLMC), the BMD PLMC test sections have shown improved cracking resistance and comparable rut depth and roughness. The DOT is performing low-cost full-scale Accelerated Pavement Testing (APT) on some of its test sections, which includes the use of a laser texture scanner, a profilometer system for surface profile monitoring, and a camera system with an image processing code for crack formation and progression monitoring.

The objectives of Oregon DOT's TPF-5(478) study are to (1) compile all findings and information from previous research projects related to BMD to understand the gaps in knowledge and critical points that need to be addressed for seamless implementation, (2) to quantify the effectiveness of the BMD process for Oregon by field performance evaluation, (3) to provide suggestions to improve the accuracy and precision of test and specimen preparation procedures for asphalt plant and DOT laboratories, (4) to evaluate field performance data and laboratory test results to update thresholds for cracking and rutting tests, and (5) to help address other potential issues during the actual BMD implementation process.

Oregon DOT has previously completed the following research projects related to BMD: Adjusting Asphalt Mixes for Increased Durability and Implementation of a Performance Tester to Evaluate Fatigue Cracking of Asphalt Concrete (SPR-785, 2018) and Development of a BMD Method in Oregon (SPR-801, 2020). The DOT is currently working to complete the following research project by January 2025: Implementation of BMD Methods in Oregon to Meet Long-Term Performance Goals (SPR-852).

Tennessee

Tennessee DOT plans to let its TPF-5(478) study pilot project, focused on BMD validation, in February 2025. The project will be constructed on a state route, subject to freeze-thaw cycles in the winter and high temperatures in the summer. The 13 test sections, each approximately a quarter of a mile in length, will include: (1) control plus 0.5% AC, (2) control minus 0.5% AC, (3) control with PG64-22, (4) control with PG76-22, (5) high natural river sand, (6) medium RAP, (7) high RAP, (8) high RAP with recycling agent, (9) high fine RAP, (10) contractor's choice BMD, (11) control back-up one, (12) control back-up two, and (13) control back-up three.

Tennessee partnered with the NCAT Test Track in 2021. In the 2024 Test Track cycle, Tennessee's BMD top performer, 6.5 AC plus RAP [Warm Mix Asphalt (WMA)], had a CT index approximately two times higher than its control section, 6.0 AC.

Tennessee is in the beginning stages of a benchmarking study alongside the University of Tennessee, Knoxville, which aims to ensure representation of the State's various aggregate sources. Tennessee consists primarily of limestone; its other geographical regions include gravel, sandstone, and granite.

Texas

Texas DOT began working on its TPF-5(478) study in 2019 in conjunction with its BMD implementation effort that includes construction and monitoring of multiple field projects. Phase one was completed in 2022 and included nine test projects with a total of 33 sections, constructed over a period of one half to one full day each. Texas is currently in phase two (2022-2025), which now includes four shadow projects with eight sections, constructed over a period of two to three days each. In the future third and fourth phases of its study, Texas intends to construct and monitor lead district pilot projects and statewide projects. Please note that Texas' BMD Special Specification was introduced in 2019 and revised in 2024.

Texas DOT's TPF-5(478) study is focused on BMD performance test threshold validation. Overlay Tester (OT) and IDEAL-CT results are being compared to validate cracking performance values; HWTT and IDEAL-RT results are being compared to validate rutting performance values. Some of the phase one test sections are beginning to display cracking; none of the test sections are failing. Minimal rutting has been displayed on the phase one test sections; and to date Texas believes that IDEAL-RT has correlated better with field rutting better than HWTT. Texas has evaluated its data against WesTrack and NCAT Test Track data for correlations, to increase confidence in its thresholds. Currently, Texas is conducting research to determine acceptable reheating and possibly aging procedures.

Vermont

Vermont Agency of Transportation (AOT) outlined the following objectives for its TPF-5(478) study: (1) to provide training to industry on BMD tests, (2) to collect project sampling to capture production variability and benchmark mix designs, (3) to participate in interlaboratory studies to capture variability between laboratories, (4) to explore surrogate tests and QC applications, (5) to pilot BMD approaches, (6) to assess long-term pavement performance in relation to initial BMD testing, (7) to use BMD as a tool in the evaluation of mixture changes, and (8) to develop and implement BMD specifications. Vermont piloted a high-RAP project with Approach A (and beyond) BMD requirements; pavement life is to be further evaluated.

Vermont AOT hosted an FHWA BMD training workshop in December 2023 for industry partners. Vermont participated in the Northeast BMD Peer Exchange, the AIDPT Pooled Fund Peer Exchange on BMD, and has been actively participating in the Northeast BMD Working Group. Vermont hosted a research project and participated in Round Robins for performance testing, to understand interlaboratory variability.

Vermont has acquired additional equipment to evaluate surrogate rutting tests (e.g., IDEAL-RT as a surrogate for HWTT) and has been utilizing IDEAL-CT as a surrogate for I-FIT. It has been collecting one performance sample per 3,000 tons on all its projects in an effort to conduct IDEAL-CT, IDEAL-RT, and HWTT on each sample. A BMD requirement for HWTT has been

incorporated in standard specifications; working to incorporate a BMD requirement for IDEAL-CT.

Challenges to Vermont AOT's TPF-5(478) study include project funding impeding plans for pilot projects, a delay in establishing a cracking limit has left the standard specification imbalanced, and difficulties in capturing long-term pavement performance (limited information available on existing pavement condition and construction variability).

Vermont AOT anticipates the following future efforts as related to its TPF-5(478) study: (1) to implement a cracking limit for standard mixes, (2) to establish a surrogate test relationship and evaluate real-time use, (3) to draft and trial BMD Approach C, (4) to conduct validation of specification limits through test sections to evaluate early failure and risk, (5) to consider and utilize long-term oven aging to account for binder aging, and (6) to utilize BMD in conjunction with the FHWA Low-Carbon Transportation Materials (LCTM) Grants Program.

Wisconsin

Wisconsin DOT constructed its first, informational TPF-5(478) pilot project (five BMD test sections) two years ago. The DOT has begun implementing rutting and cracking data, collected annually by vans throughout the entire State highway system, to conduct long-term assessments on the five BMD test sections.

Wisconsin DOT has been conducting BMD research for the past decade. Throughout the DOT's research efforts, it has partnered with NCAT, FHWA, industry, the Consortium for Asphalt Pavement Research and Implementation (CAPRI), and Minnesota's National Road Research Alliance (NRRA). Research has assisted Wisconsin in selecting HWTT, IDEAL-RT, and IDEAL-CT as its BMD performance tests. The DOT has worked alongside NCAT, industry, and NRRA to develop an aging process to refine parameters and reduce the interlaboratory variability identified during the DOT's first informational TPF-5(478) pilot project. Wisconsin has completed some benchmarking and now has a dedicated staff member focused on BMD testing.

Wisconsin is working to procure equipment (e.g., load frames) and host trainings for its seven regional laboratories, with the intent of including them in future round robins to further reduce interlaboratory variability. This will assist in the refinement of the DOT's special provisions to set BMD parameters ahead of letting the its next pilot project. The DOT is considering a tiered approach to incentivize industry buy-in for BMD parameters on future projects. In addition, HWTT are being conducted in wet and dry conditions, to identify correlations with IDEAL-RT. The desired outcome of these correlations could allow the DOT to only require one technician to conduct HWTT in the DOT's central office.

Wisconsin DOT has partnered with the Wisconsin Highway Research Program (WHRP) on a research study to evaluate finer mixes that have been performing well on its pavements but are presenting as failures on HWTT. The objective of this study is to determine if alternative testing parameters could be used to accurately evaluate finer mixtures.

5.2. Pavement Foundations

Iowa

Iowa DOT is utilizing the TPF-5(478) study for additional funding to complete its ongoing Improving Pavement Performance through Pavement Foundation Design Modulus Verification and Construction Quality Monitoring research project. Iowa's current funding does not allow for the sustainment of its pavement system to remain in a state of good repair, which has led Iowa to research how to best extend pavement life through improved material performance, foundations, and construction quality. After compiling data from the first few years of the research project, Iowa found that 70% of its measurements were not meeting the design value on various materials and projects. Iowa has let ten pilot projects with a special provision, which includes compact roller mapping to collect data on soils and to identify if the design value is being met on different pavement layers. Compact roller mapping allows pavement designers and field engineers to make decisions on whether stabilization and/or additional compaction is needed to uphold the design value in areas with weaker soils. In addition, Iowa is working to develop a pooled fund project that would aim to facilitate other states in piloting this technology as well as a set of guidelines for pavement foundation design.

North Dakota

North Dakota DOT responded to FHWA's solicitation to receive additional funding for TPF-5(478) to perform a project focused on pavement foundations, in addition to its BMD field validation project. The project began in 2023 and is expected to conclude in 2025. The project's objective is to determine the subgrade strength of North Dakota's soils, through the completion of Resistance-Value (R-Value) and resilient modulus testing by a consultant, to provide training for North Dakota DOT staff to accurately obtain resilient modulus values. Currently, approximately a third of the allocated R-Value tests have been completed and display higher resilient modulus values than are presently used in North Dakota's pavement designs. North Dakota plans to evaluate the correlation between R-Values and resilient modulus this winter, to coordinate where additional soils information should be obtained in summer 2025.

5.3. Resilience

Arizona

Arizona DOT's first TPF-5(478) study is working to downscale climate models, specifically rutting and cracking models relative to binder grade, mid-century, and late century performance. Arizona's methodology for PG grade selection includes: (1) accessing and downloading downscaled General Circulation Model (GCM) data, (2) evaluating high and low temperature and precipitation projections, (3) observing the Localized Constructed Analogs (LOCA) statistically downscaled climate projections for North America with traffic projections, and (4) making "risk" assessments. Based on the assumptions utilized by Arizona, LOCA and early century projections have shown a higher tipping point in temperature projections between now and 2050 than are shown in late century projections, increased rutting is anticipated to occur in late century predictions, and additional evaluation is needed to anticipate cracking predictions. Arizona has developed a pavement risk assessment, which accounts for pavement grade reliability loss (hazard) and a betweenness score (pavement criticality). Improvements to the

betweenness score will continue throughout 2025, to include Arizona's entire pavement system (i.e., to include locations that have not previously registered as having notable temperature activity). Currently, early century projections display low vulnerability across most road segments, with binder grades performing well under the projected temperatures. Late century projections display a significant increase in vulnerability due to rising temperatures, indicating a higher risk of pavement performance impacts.

Arizona DOT's second TPF-5(478) study, in partnership with Arizona State University, is focused on Wildfire and Post-Wildfire Debris Flow (PFDF) threats to roadways. The study's modeling approach includes: (1) consider environmental hazards (e.g., precipitation and fire risk), (2) evaluate the infrastructure network, (3) determine PFDF (e.g., vegetation, topography, soil conditions, and watersheds) likelihood to determine infrastructure threats, and (4) set infrastructure vulnerability.

Arizona's goals for both TPF-5(478) studies is to conclude climate data analyses in 2025. Products resulting from the studies will include how-to videos, displaying the processes used to downscale climate data and reconcile the data with different pavement Mechanistic-Empirical (ME) design, and case study modeling approaches.

5.4. Sustainability

Colorado

Colorado DOT concluded its TPF-5(478) study in June 2024. The project's objective was to assist in meeting the legislation requirements placed on the DOT by House Bill (HB) 21-1303 (i.e., the "Buy Clean Colorado" bill), to strive to achieve continuous reductions of Greenhouse Gas (GHG) emissions. Section 118 of HB 21-1303 required Colorado DOT to begin collecting Environmental Product Declarations (EPDs) on eligible materials, including asphalt and asphalt mixtures, cement and concrete mixtures, and steel. Since July 2022, Colorado has partnered with consultants and a Subject Matter Expert (SME) to engage industry partners and collect EPDs to prepare for policy creation in January 2025, which requires the DOT to set a maximum allowable Global Warming Potential (GWP). Currently, the DOT is working to address feedback received from industry partners on its draft GWP thresholds. Other key dates include EPD requirements to be set in July 2025, DOT reporting of GHG reduction progress in 2026, and DOT review and adjustment of policy every four years to begin January 2027.

5.5. Pavement Management

Illinois

Illinois DOT is conducting a profiler certification experiment for its TPF-5(478) study. The experiment is focused on the comparison of the FHWA benchmark profiler and the Urban Low-Speed Profiler (ULSP), to determine if a high-speed inertial profiler can be used as a reference profile device. The repeatability and accuracy of the ULSP has been comparable to the benchmark profiler; although the benchmark profiler remains more accurate. Illinois DOT plans to utilize the ULSP and benchmark profiler in future research efforts related to ride quality, advancing technology for profilers, and in additional pavement measurements made with non-contact sensors.

6. WRAP-UP AND NEXT STEPS

LaToya Johnson, FHWA Pavement Design & Performance Team Leader
LaToya Johnson thanked participants for their attendance and TPF-5(478) state project updates before concluding the meeting with the next steps to be taken by the State DOTs and FHWA as well as a list of helpful resources, outlined below.

Next steps for the State DOTs (as applicable):
- State DOTs are to transfer contributions to FHWA;
- State DOTs are to submit their next quarterly report project updates by **December 6, 2024**, to Reena Bhardwaj (reena.bhardwaj.ctr@dot.gov);
- State DOTs are to request contract support as needed;
- State DOTs are to submit their ideas for peer exchanges and the next TAC meeting; and
- State DOTs are to administer their pooled fund projects.

Next steps for FHWA:
- FHWA is to finalize the next quarterly report;
- FHWA is to manage funding transactions and send allocations;
- FHWA is to manage contract support;
- FHWA is to coordinate project funding and technical support;
- FHWA is to coordinate peer exchanges to discuss technologies advanced via the pooled fund study; and
- FHWA is to begin planning the next TAC meeting.

Helpful Resources:
- FHWA Pavements & Materials Website
- TPF Website
- TPF-5(478) Solicitation Page
- TPF Program Procedures Manual

7. ADJOURN

8. APPENDIX A: VIRTUAL MEETING AGENDA

NOVEMBER 18, 2024	
TIME (EST)	**SESSION**
12:30 p.m.	**Welcome and Meeting Overview** *Gina Ahlstrom, FHWA Pavement Materials Team Leader* *LaToya Johnson, FHWA Pavement Design & Performance Team Leader*
12:40 p.m.	**Member Roll Call**
12:45 p.m.	**TPF-5(478) Administrative Updates: Membership, Funding, and Quarterly Reports**
1:05 p.m.	**TPF-5(478) BMD Events** *Tim Aschenbrener, FHWA Asphalt Technical Lead*
1:30 p.m.	**TPF-5(478) State Project Updates** *Each State will have up to 10 minutes to provide their project scope, current status, and key findings*
3:20 p.m.	**Wrap-Up and Next Steps** *LaToya Johnson, FHWA Pavement Design & Performance Team Leader*
3:30 p.m.	**Adjourn**

9. APPENDIX B: VIRTUAL MEETING ATTENDEES

State Representation

- Alabama (2)
- Arizona (3)
- California (1)
- Colorado (3)
- Connecticut (5)
- Georgia (1)
- Hawaii (2)
- Idaho (2)
- Illinois (2)
- Iowa (2)
- Louisiana (2)
- Maine (2)
- Missouri (2)
- New York (2)
- North Dakota (2)
- Oregon (2)
- Pennsylvania (2)
- Tennessee (1)
- Texas (2)
- Vermont (5)
- Wisconsin (3)

Federal Highway Administration (FHWA) – HQ Team

- Austin Jarrell, *Resilience Technical Lead*
- Brian Dobling, *Sustainability Technical Specialist*
- Gina Ahlstrom, *Pavement Materials Team Leader*
- LaToya Johnson, *Pavement Design & Performance Team Leader*
- Migdalia Carrion, *Sustainability Technical Lead*
- Reena Bhardwaj, *FHWA Program Support*
- Stephen Cooper, *Resource Center, Pavement & Materials Specialist*
- Timothy Aschenbrener, *Asphalt Technical Lead*
- Tom Yu, *Design Technical Lead*

Facilitators

- Eric Schulman, *Weris, Inc.*
- Erin Murray, *Weris, Inc.*

Virtual Meeting Participants

ALABAMA

- John Jennings, *Alabama Department of Transportation*
- Kristy Harris, *FHWA – Alabama Division*

ARIZONA

- Jesús Sandoval-Gil, *Arizona Department of Transportation*
- Steven Olmsted, *Arizona Department of Transportation*
- Thomas Deitering, *FHWA – Arizona Division*

CALIFORNIA

- Kee Foo, *California Department of Transportation*

COLORADO

- Bill Schiebel, *FHWA – Colorado Division*
- Craig Wieden, *Colorado Department of Transportation*
- Vincent Battista, *Colorado Department of Transportation*

CONNECTICUT

- David Howley, *Connecticut Department of Transportation*
- Eliana Carlson, *Connecticut Department of Transportation*

- Jonathan Boardman, *Connecticut Department of Transportation*
- Michael Judson, *Connecticut Department of Transportation*
- Timothy Merrill, *FHWA – Connecticut Division*

GEORGIA
- Ryan Kellett, *Georgia Department of Transportation*

HAWAII
- Kristi Grilho, *Hawaii Department of Transportation*
- Mung Fa (Mel) Chung, *Hawaii Department of Transportation*

IDAHO
- John Arambarri, *Idaho Transportation Department*
- Mike Copeland, *Idaho Transportation Department*

ILLINOIS
- David Adedokun, *FHWA – Illinois Division*
- John Senger, *Illinois Department of Transportation*

IOWA
- Joshua Stott, *FHWA – Iowa Division*
- Lisa McDaniel, *FHWA – Iowa Division*

LOUISIANA
- Louay Mohammad, *Louisiana State University*
- Scott Nelson, *FHWA – Louisiana Division*

MAINE
- Casey Nash, *Maine Department of Transportation*
- Nico Trebouet, *Maine Department of Transportation*

MISSOURI
- Jacob Graessle, *Missouri Department of Transportation*
- William Johnson, *Missouri Department of Transportation*

NEW YORK
- Daniel Wood, *FHWA – New York Division*
- Thomas Kane, *New York State Department of Transportation*

NORTH DAKOTA
- Jared Loegering, *North Dakota Department of Transportation*
- Tyler Wollmuth, *North Dakota Department of Transportation*

OREGON
- Chris Duman, *Oregon Department of Transportation*

- Erdem Coleri, *Oregon State University*

PENNSYLVANIA
- Evan Zeiders, *Pennsylvania Department of Transportation*
- Halley Cole, *Pennsylvania Department of Transportation*

TENNESSEE
- Tyler Lacy, *Tennessee Department of Transportation*

TEXAS
- Amy Epps Martin, *Texas A&M Transportation Institute*
- Wade Odell, *Texas Department of Transportation*

VERMONT
- Aaron Schwartz, *Vermont Agency of Transportation*
- Emily Parkany, *Vermont Agency of Transportation*
- Ian Anderson, *Vermont Agency of Transportation*
- Larkin Wellborn, *FHWA – Vermont Division*
- Nick Van Den Berg, *Vermont Agency of Transportation*

WISCONSIN
- Casey Wierzchowski, *Wisconsin Department of Transportation*
- Erik Lyngdal, *Wisconsin Department of Transportation*
- James Pforr, *FHWA – Wisconsin Division*