PAVEMENT PRESERVATION PEER EXCHANGE

SPRING 2023 | ATLANTA, GEORGIA

TECHNICAL REPORT

MAY 9-10, 2023

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U.S. Department of Transportation
Federal Highway Administration

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LIST OF ACRONYMS

- **AASHTO**: American Association of State Highway and Transportation Officials
- **ADT**: Average Daily Traffic
- **AEMA:** Asphalt Emulsion Manufacturers Association
- **CAPA**: Carolina Asphalt Pavement Association
- **CCPR**: Cold Central Plant Recycling
- **CFR**: Code of Federal Regulations
- **CIR**: Cold In-Place Recycling
- **CRS**: Condition Rating System
- **CSAH**: County State Aid Highways
- **DOT**: Department of Transportation
- **EDC-4**: Every Day Counts Round Four Program
- **ESL**: Equivalent Single Axle Load
- **FDR**: Full Depth Reclamation
- **FHWA**: Federal Highway Administration
- **FWD**: Falling Weight Deflectometer
- **GPR**: Ground Penetrating Radar
- **HIR**: Hot In-Place Recycling
- **HMA**: Hot Mix Asphalt
- **HPTO**: High-Performance Thin Overlay
- **IRI**: International Roughness Index
- **ISSA**: International Slurry Surfacing Association
- **ITB**: Invitation to Bid
- **LCCA**: Life-Cycle Cost Analysis
- **LTPP**: Long-Term Pavement Performance
- **MR**: Minor Rehabilitations
- **NCAT**: National Center for Asphalt Technology
- **NCHRP**: National Cooperative Highway Research Program
- **NCPP**: National Center for Pavement Preservation
- **NHI**: National Highway Institute
- **NHS**: National Highway System
- **NPPC**: National Pavement Preservation Conference
- **OGFC**: Open Graded Friction Course
- **PACT:** Program Area Collaboration Team
- **PCI:** Pavement Condition Index
- **PCR**: Pavement Condition Rating
- **PG**: Performance Grade
- **PMS**: Pavement Management System
- **PSA**: Public Service Announcement
- **QA**: Quality Assurance
- **QC**: Quality Control
- **RAP**: Reclaimed Asphalt Pavement
- **RSL**: Remaining Service Life
- **SDI**: Surface Distress Index
- **SFDR**: Stabilized Full Depth Reclamation
- **SMA**: Stone Matrix Asphalt
- **SOP**: Standard Operating Procedure
- **SRIC**: Snow Removal and Ice Control
- **TAMP**: Transportation Asset Management Plans
- **TAP**: Technical Assistance Panel
- **TOPS**: Targeted Overlay Pavement Solutions
- **TPF**: Transportation Pooled Fund
- **TPM**: Transportation Performance Management
- **UTBO**: Ultra-Thin Bonded Overlay
- **UTBWC**: Ultra-Thin Bonded Wearing Course
- **UTFC**: Ultra-Thin Friction Course
- **VECAT**: Virginia Education Center for Asphalt Technology

PAVEMENT PRESERVATION PEER EXCHANGE
SPRING 2023 | ATLANTA, GA

TECHNICAL REPORT

DAY 1 – TUESDAY, MAY 9

1. OPENING SESSION

1.1. FHWA Welcome and Peer Exchange Scope and Objectives

FHWA leadership welcomed participants to the Sam Nunn Atlanta Federal Center on behalf of the Federal Highway Administration (FHWA). They shared that FHWA's goal in hosting this Peer Exchange is to learn about the design and inspection challenges that State Departments of Transportation (DOTs) and local agencies are faced with regarding pavement preservation. During the Every Day Counts Round Four (EDC-4) Program hosted in 2017-2018, FHWA discovered that a number of associations encounter problems with design and inspection. They also asked that participants share their challenges, solutions found, and encouraged everyone to participate in an open discussion.

1.2. Opening Remarks

Ryan Kellett, Georgia DOT Construction Project Manager

Ryan Kellett welcomed participants to Atlanta, Georgia, and expressed that he is looking forward to the thoughtful discussions to be had over the next day and a half. He shared that Georgia DOT is hoping to gain insight on other state's experiences with pavement preservation.

Every year, Georgia DOT leads Capital Maintenance in conducting resurfacing projects. In fiscal year 2022, approximately $374M in funding was utilized for resurfacing projects at two inches or less. Georgia is made up of seven districts. Each district has its own pocket of operational service contract money that is allotted through invitations to bid (ITBs) to allow each district to conduct its own pavement preservation projects. In 2022, approximately $35M was spent across the seven districts. Georgia DOT is working to get the seven districts to focus more of their capital resources toward pavement preservation. Georgia DOT has learned that the motto of pavement preservation is to perform the right treatment at the right time. Kellett shared that Georgia is aiming to disburse funding for pavement preservation more appropriately and are hoping to gain insights from the Peer Exchange on how to improve those efforts.

2. PAVEMENT PRESERVATION DESIGN POLICIES AND INSPECTION PROCEDURES

2.1. DOT Presentation on Current State of Pavement Preservation Design

Jerry Geib, Minnesota DOT

The following is a summary of the presentation given by Jerry Geib, Minnesota DOT's Research Operations Engineer.

Topics covered:

- Minnesota DOT designs include:
  - Pavement Design Manual.
    - Signed in 2019.
    - Contains a focus on Hot Mix Asphalt (HMA).
      - Minnesota DOT has developed, as part of its program, HMA standards and specifications.
      - Approximately 130 lane miles of HMA on Minnesota DOT properties. Have utilized spray applied rejuvenators on these sections.
      - MnPAVE Flexible is a software program used to evaluate pavement behavior, which has been utilized for HMA structural design.
    - Pavement selection practices.
    - Currently in the process of implementing the Agile Assets Pavement Management Module, which focuses on implementing agile assets for pavement design.
  - Chip seal design.
    - Minnesota DOT follows International Slurry Surfacing Association (ISSA) guidelines but does not require all their tests.
    - Trying to move towards a softer emulsion.
  - Micro Surfacing Specification.
    - Minnesota DOT follows ISSA guidelines but does not require all their tests.
    - Trying to move toward a softer emulsion.
    - Currently studying a nighttime test strip which contains different micro surfacing mixtures. Tests are conducted one hour after sunset for texture and appearance.
  - Major rehabilitation projects design.
    - Major rehabilitations are completed with a structural design process. The design life of an overlay is the number of years it will take for rehabilitation to occur.
    - If a mill and 1.5-inch overlay is done on a pavement in good condition, then the design life could be 7-9 years.
    - The next fix is a rehabilitation activity where something like Cold in-Place Recycling (CIR) is utilized.
    - Surveys are conducted on materials engineers on their expectation for overlays on pavements in poor condition.

- If it has been over seven years since a pavement fix was conducted and the previous fix was not a surface treatment, Minnesota DOT recommends performing a chip seal or micro surfacing treatment.

Questions

The following is a summary of questions asked following the presentation.

- How deep does Minnesota's Stabilized Full Depth Reclamation (SFDR) go?
  - It goes to the bottom of the HMA layer and then tries to pick up a couple inches of gravel. Minnesota has used some of the 50/50 blends, with roughly six inches of HMA granular material (estimate four inches of bit and two inches of granular) before injecting the top six inches with a stabilized emulsion. If over six inches, Minnesota will conduct two passes. One to grind and the second to inject the top six inches. Conducted measurements on this process on MnROAD and have observed the ride of the pavement has become rougher.
  - Sometimes Minnesota will mill approximately two inches off a thick pavement. SFDR is typically six to eight inches, which they try to keep rich in asphalt.
  - Concern was expressed by some participants that SFDR should be considered new construction instead of pavement preservation.
- What would be the difference between a construction specification for MnROAD versus an American Association of State Highway and Transportation Officials (AASHTO) specification?
  - AASHTO has a lot of new specifications coming out. I think in the Chip Seal Specification, AASHTO gradation tables say 100% pass on the first sieve and 80-100% pass on the second sieve. That forces you to have a small percentage of big rocks. The Minnesota DOT Chip Seal Specification asks for 100% pass on the first sieve, but then all other layers pass at 0%.
  - AASHTO and Minnesota DOT are not too different when it comes to micro surfacing. Minnesota runs roughly 13.5% asphalt in its emulsion mix designs and do not have issues with rutting. The one thing Minnesota believes it does differently is that it performs a scratch course with a steel strike off bar. Then it comes back with a surface/finish course with a rubber squeegee, which helps to fill transverse thermal cracks. This process provides a uniform pavement surface.
- How long are the nighttime test strips? Are you trying to determine the set time for the micro surfacing mixtures?
  - Specifications indicate each test strip is to be 1,000 feet long. Temperature Specifications are utilized for emulsions.
- Are the MnPAVE modules adjustable?
  - Yes and no. If you access the advanced settings, you can set your own modulations, but it is rather difficult.
- Does Minnesota crack seal before performing micro surfacing treatments?
  - Unsure. Believe it is project dependent and that some areas may conduct crack fills, but do not perform a whole crack seal operation.

  - Minnesota's test strips with the National Center for Asphalt Technology (NCAT) suggest conducting crack seals prior to chip seal and micro surfacing treatments for better pavement performance.
- With 100% embedment on chip seals, does Minnesota have issues related to bleeding? Does Minnesota allow traffic on its chip seals immediately?
  - 100% embedment occurs at the start of the process. It drops down to about 70% embedment after rolling. Not much bleeding occurs since Minnesota utilizes a cationic polymer modified rapid set asphalt emulsion. On occasion, if too much of the emulsion is used or if too heavy of a fog seal has been placed, then there will be some "richness," but no bleeding.
- Would crack sealing work on the transverse thermal cracking issues that Minnesota has? Minnesota believes a flexible crack seal could help keep water out of the pavement.

2.2. Group Discussion on Pavement Preservation Design

Proposed Discussion Questions from the Meeting Agenda

- *Do you have pavement preservation included within your normal design manual? Do you use it? When was it last updated?*
- *What pavement preservation design methodology does your state use?*
- *What types of preventive maintenance treatments require a pavement design? Is this specified in your manual?*
- *Who performs the pavement designs (state forces or contractors)? Are designs performed at District/Regional Offices or at your Central Office?*
- *When is the pavement preservation design performed? Submitted? Approved? Who does the approvals (District/Regional Offices or your Central Office)?*
- *How to you ensure a cost-effective design? Is there guidance in your pavement design manual?*
- *Do you have environmental/geographical considerations in selecting preventive maintenance treatments?*
- *What are some of the challenges/barriers to pavement preservation design?*
- *Are contractor quality control (QC) plans required?*
- *What is one thing you could improve about your policies/procedures?*

Group Discussion

The following is a summary of the group discussion on pavement preservation design.

Do you have pavement preservation included within your normal design manual? Do you use it? When was it last updated?

- A show of hands was asked for the states that have pavement preservation included in their normal design manuals. Only a few participants raised their hands.
- Of the states that have pavement preservation included in their normal design manuals, many shared that their manuals have not been updated for two to ten years. Many also shared that their manuals only mention pavement preservation without requirements or guidelines.

How is pavement preservation dealt with in your state? Is it handled by planners, pavement management, asset management, pavement designers, pavement preservation folks, and/or construction teams?

KENTUCKY

Kentucky travels in vans and goes around to conduct cracking and rutting evaluations, then the districts will send in their project selections (each of the twelve districts can send in 75 lane miles annually to be evaluated). The Operations and Pavement Management branch also works with construction folks to visit the district's submitted projects to evaluate them. Once those projects are evaluated, then Operations and Pavement Management determines what projects are to be selected and the best preventive maintenance treatments for those projects. Kentucky usually receives $25-30M annually for pavement preservation. Districts do not receive preservation funds unless they have attended the project selection trainings put on by the Cabinet.

ALABAMA

Alabama has an Interstate Maintenance Review Program, where representatives from Bureau of Materials and Tests, Maintenance Bureau, and FHWA travel around the state to scope the actual Interstate. For non-interstate NHS and all other projects, the areas perform their own scoping and report back to John Jennings, who makes the final decisions on the pavement side.

NEW JERSEY

New Jersey utilizes pavement management data which is made up of annual collections of network level data focused on distresses including International Roughness Index (IRI). During project selection, New Jersey first looks at the last construction and pavement age. Then it takes the Surface Distress Index (SDI) and IRI values of those pavements into consideration. Pavements are categorized by conditions such as "good," "fair," "poor," and "very poor." Preservation projects are selected for pavements in good and fair condition if their SDI and IRI criteria are satisfied. Then New Jersey conducts further review using network level video based on geometrical constraint. If there is no geometrical constraint, then the project gets selected.

MASSACHUSETTS

Massachusetts' districts are the designers of their own projects, so not much goes out that the DOT does not agree with. If disagreements are met between the state and a district, then funding can be rerouted to another district. Massachusetts DOT hosts trainings for the districts to attend and has a design manual they are expected to utilize. Its PMS utilizes the optimization reading under the curve for incremental benefit cost analyses, which often recommends UTBO treatments. Massachusetts has placed a cap on the amount of money that can be spent on UTBO, since those treatments are only used on unlimited access highways. Massachusetts is faced with scoping issues from anything off the Interstate. Ultimately, PMS is utilized for some projects but then there is a need to pick out some of the smaller projects manually. At one point, roughly 60% of its interstate system was Open Graded Friction Course (OGFC) which are still presenting no rutting, cracking, or ride quality issues yet they are two years away from a terminal index and causing many financial damages to residents' windshields.

DELAWARE

Delaware's Pavement Management section would develop a list annually (prior to COVID-19) of possible projects and would score each location/pavement. Then, the Pavement Management section would gather with its different maintenance sections to ride along the pavements to determine the best treatments. Delaware is working on updating its Micro Surfacing Specification but has not performed many projects following one bad case that its legislators were not thrilled with. It has an in-house Chip Seal Program that is run on a five-to-seven-year rotating basis on all its locations.

What types of preventive maintenance treatments require a pavement design? When the agencies design their chip seals, do they utilize any kind of spreadsheet or process to follow specifications?

WEST VIRGINIA

West Virginia requires that the contractor perform a test that the DOT needs to approve. For chip seals, West Virginia references the AASHTO Guide Specification (previously PP 82/83), and contractors are required to follow those procedures and then submit to the DOT for approval.

NORTH CAROLINA

North Carolina tends to shy away from putting design rates into its specifications since its rock varies greatly between the western mountains and coastal plain areas. Sometimes struggle with obtaining rock within its coastal counties. It is left to the fourteen divisions to design their chip seals with the support of the DOT in deciding their ideal aggregate and emulsion rates. Sometimes the divisions do not have much of a say in those rates as it will depend on the contractors, who often choose their own local quarries since the DOT is not able to mandate where their rock is supplied from. If a chip seal is being put down in a subdivision in North Carolina, legislation requires a fog seal as well (which is preferably put down immediately following the chip seal). Pavement preservation funding is separate from contract resurfacing funding. North Carolina's pavement preservation treatments include chip seals, micro surfacing, fog seals, cape seals, and a few others.

DELAWARE

Southern Delaware is like North Carolina in the sense that it is entirely made up of coastal plains, so it needs to bring in rock from out of state.

KENTUCKY

Kentucky is gearing up for an experimental project to test Reclaimed Asphalt Pavement (RAP) chip seals. The DOT is finding that aggregate cost is extremely high, so is looking to utilize RAP to mitigate costs. Have any other states experimented with this? Heard that Pennsylvania decreased its residual asphalt for bleeding purposes.

MINNESOTA

Minnesota has not used RAP in a chip seal but used RAP in a slurry seal last year. First performed a micro milling of the previously micro surfaced pavement, stored the milled aggregate, and then had to crush it down to the desired size (did not wash it).

NOTE FROM FHWA
FHWA has published a study titled "RAP Use and Pavement Preservation" which was conducted by Applied Pavement Technology, Inc. They reviewed several case studies out west. New Mexico would stockpile its grindings/millings on the side of the road and provide that product to contractors for chip seals. California would use outfits to put its RAP through a fractionation process and then used the larger stone for chip seals. Another note is that by using existing chips with binder on them, there are cost savings since a smaller amount of binder is needed for the treatment.

MINNESOTA
Minnesota has approximately five different chip seal aggregate gradation tables, but two of them are used the most. Primarily using Type II for micro surfacing.

NORTH CAROLINA
North Carolina has been using Type III for micro surfacing.

WEST VIRGINIA
West Virginia's quarries are not producing the ideal aggregate gradations it would like to use for its chip seals and requesting those aggregates would increase cost and defeat the purpose of a chip seal, so it has been using a AASHTO #67s, #8s, and #9s with a requirement of 0-2% dust.

MINNESOTA
Minnesota is 0-1% and places large penalties for every tenth outside of specification. Handling is important since tests are supposed to be conducted at the hopper.

KENTUCKY
Kentucky tests prior to the beginning of the project (0-2%) and then conducts tests every day on the job site.

What are the states' environmental and geographical considerations?

TEXAS
Texas has twenty-five districts and manages approximately 200,000 lane miles. Texas has a large amount of funding for preventive maintenance and respects its districts' choice in product selection. The DOT uses a formula to distribute its funding to the districts. The districts typically take charge of project selection, and the Central Office oversees data collection (distresses, IRI). Each district reviews its scores for project selection and to perform optimization analyses; each district has its own pavement design manual. The DOT provides trainings that the districts can customize to fit their needs and treatments. The DOT meets with each of the districts every year to go through their four-year management plan. Texas primarily uses chip seals and seal coats. Pavement preservation was added to its pavement manual for the state in 2019. Since each district has the power to handle its own preventive maintenance and pavement preservation projects, it has its own Standard Operating Procedures (SOPs) for corporations.

VERMONT

Vermont's cold climate has made it so that there is one statewide Performance Grade (PG) Binder; use a PG70-28 on all its HMA. Working toward regionalizing binders, but do not expect there will be a lot of variation in the binders.

During EDC-4, FHWA received many questions on when people should be starting their formal preservation programs. Any suggestions?

MINNESOTA

Minnesota has separate start dates for its northern and southern halves (May 15, September 30, and chip seal cutoff on October 15), but these can become dependent on emulsion availability. Want two weeks of warm weather after laying a chip seal.

MISSISSIPPI

Mississippi gives its contractors the option to lay treatments throughout the winter if there are unfavorable downturns in the weather. Last winter was very warm, so the contractors were free to work.

VIRGINIA

Virginia previously started in April but has shifted to temperature-based specifications, where the weather must be a minimum of 50 degrees Fahrenheit.

2.3. Group Discussion on Research Needs

Proposed Discussion Topics from the Meeting Agenda

- *Pooled Fund.*
- *Sources for ideas [AASHTO, Transportation Research Board (TRB), partnerships].*
- *FHWA Pavement Preservation Roadmap.*

The following is a summary of the group discussion on research needs.

Antonio Nieves Torres, FHWA Office of Infrastructure

- FHWA's Turner-Fairbank Highway Research Center is home to the FHWA Office of Research, Development, and Technology. Numerous research projects are conducted at the Center and FHWA is looking for feedback from attendees on their research needs.
- Participants were asked to raise their hands if they were aware of the No Boundaries Transportation Maintenance Innovations Pooled Fund Study. A few participants raised their hands.
  - This study focuses on maintenance and preservation technology, with a smaller focus on problem solving.
  - Currently drafting a new contract to continue to move this study forward.
  - Mississippi DOT is heavily involved in this study.

Joel Ulring, Minnesota DOT
The following is a summary of the presentation given by Joel Ulring, Minnesota DOT's Pavement Preservation Engineer.

Topics covered:

- **Transportation Pooled Fund (TPF) Solicitation #1581; titled "National Partnership to Improve the Quality of Preventive maintenance Treatment Construction and Data Collection Practices (PG Phase III)."**
  - Everyone has heard the statement "right treatment on the right road at the right time," but what about quality?
  - The objective of this TPF is to improve the quality of pavement treatments and data collection practices, as well as implementation of PG-I and PG-II knowledge gained.
  - How will this be accomplished?
    - Specifications:
      - Assist states in developing, reviewing, and enhancing their specifications for pavement preventive maintenance treatments.
      - National harmonization of treatment specifications.
      - Consideration for regional material/environmental conditions.
    - Construction:
      - Assist states in improving construction processes.
      - Training on calibration, inspection, and construction issues.
      - Inspection of treatments.
    - Performance monitoring:
      - FHWA will assist states in performing monitoring of performance.
      - States can utilize their own pavement management monitoring processes.
      - Collected data will be managed using InfoPave and the FHWA Long-Term Pavement Performance (LTPP) system.
  - Pavement Preservation Partnership History:
    - 2012: Lee Road 159 in Alabama.
    - 2015: NCAT-MnROAD Partnership.
    - 2015: US-280 in Alabama.
    - 2016: US-169 and County State Aid Highways (CSAH)-8 in Minnesota.
    - 2019: 70th Street in Minnesota.
    - 2024-2028: Minnesota DOT will lead the PG3 effort.
  - Solicitation #1581 background:
    - Minnesota was approached by FHWA to lead the effort.
    - Duration is five years (Federal Fiscal Years 2024-2028).
    - Seeking 20-25 agencies to contribute $50,000 per year for a minimum of three years.
    - On April 27, 2023, FHWA hosted a webinar presentation on Solicitation #1581.
  - Partner requirements:
    - Join the Technical Assistance Panel (TAP).

    - Actively collaborate and partner with all TAP members to improve the construction and quality of pavement treatments and data collection practices.
    - Financially support and assist states in developing, reviewing, and enhancing their specifications, training on calibration, inspection and construction issues for preventive maintenance treatments.
    - Propose and build one or more preventive maintenance treatments or test decks for the study (most states are doing this already) and monitor performance by SHA or by FHWA support. Collected data will be managed using InfoPave and the FHWA Long-Term Performance (LTPP) system.
    - Attend in-person meetings (two per year, expenses paid).
    - Attend virtual meetings (two per year).
- Phase III (January 2024 – December 2028):
    - TPF Solicitation #1581.
    - Focus on state implementation and documented agency demonstration projects.
    - TAP led 2022-2023 planning meetings, FHWA greater involvement, and additional input from agencies.
    - Texas, Illinois, and Minnesota are committed.
    - Currently have $650,000 committed of the $1.5M required.
- SPR Agency funding request:
    - Need other states' contributions.
    - Five years of SPR funding.
    - $50,000 per year (minimum three years - $150,000).
    - Federal Fiscal Years 2024-2028.
    - Minnesota DOT is the lead state.
    - Texas, Illinois, and Minnesota have contributed online.
- Timeline:
    - May 9-10, 2023: Connect at the FHWA Pavement Preservation Peer Exchange (Atlanta, Georgia).
    - May 9-11, 2023: Connect at the Spring Sponsor Meeting at NCAT (Auburn, Alabama).
    - May 16-17, 2023: Connect at the FHWA Pavement Preservation Peer Exchange (Lakewood, Colorado).
    - May 19, 2023: Online TAP Meeting (10:00 AM, Central Time).
    - June 9, 2023: Online TAP Meeting (10:00 AM, Central Time).
    - July 2023: Tasks and roles finalized by TAP; share with consultants for input and proposal; agencies need to provide funding feedback.
    - August 2023: Minnesota DOT begins contracting with consultant(s).
    - January 2024: Contract(s) start.

Questions

The following is a summary of questions asked following the presentation.

What types of data will the TPF be collecting?

- It is up to the TAP to decide what data will be collected. It will likely include the typical measures such as ride, rutting, and cracking. Looking to keep it simple and consistent with what states are currently collecting to allow for input into the LTPP program.

- Will this be a one-time data capture? Or will data be collected over an extended period?
  - The goal is to get the test sections built and then gather that data annually for three to four years. The end goal is to use the collected data to develop a condition curve.

Morgan Kessler, FHWA Office of Research, Technology, and Development

The following is a summary of the presentation given by Morgan Kessler.

Topics covered:

- FHWA has a Pavement Preservation Research Program that can conduct in-house, contracted research projects. Usually available to take on a maximum of three projects per year.
  - Some research projects include:
    - Pavement Preservation in the Urban Environment Context, led by ARA, Inc.
    - Using RAP in Pavement Preservation Treatments, led by Applied Pavement Technology, Inc.
    - FHWA Pavement Preservation Research Roadmap, led by the National Concrete Pavement Technology Center.

Questions

The following is a summary of the discussion that took place following the presentation.

- FHWA is looking for research topics from agencies on future research needs.
- **Live FHWA Pavement Preservation Research Roadmap Update**

West Virginia

West Virginia is interested in performance models and monitoring performance-based field testing.

Mississippi

Mississippi is interested in performance models and monitoring performance-based field testing.

Virginia

Virginia has begun implementing performance specifications last year; utilize both national and Virginia DOT specifications. The DOT is planning to continue monitoring these efforts for a couple more years.

New Jersey

New Jersey's Pavement Support Program is working on a parking lot for slurry seal and micro surface testing. Will update on needs before a a 500-foot test section is performed.

TEXAS

Texas is interested in research concerning concrete pavement management, specifically what kind of pavement management treatments can be used to maintain pavements in good condition. Texas is currently performing localized patching to target specific spots.

GEORGIA

Georgia has a pilot program where it has tested fog seals over its OGFC to extend the life of a pavement; do not currently have a shape for that modified curve. Have three projects within the state, one on an interstate location and two others on state route locations.

MINNESOTA

Minnesota performed a similar pilot project as Georgia a few years ago. The project no longer exists. At one point, approximately 60% of Minnesota's interstate system was OGFC. When its budget was cut from $70M to $21-22M it became unsustainable to maintain OGFC.

2.4. DOT Presentation on Current State of Pavement Preventative Maintenance Treatment Inspection Process

Garrett Lee, North Carolina DOT

The following is a summary of the presentation given by Garrett Lee, North Carolina DOT's Pavement Preservation Engineer.

Topics covered:

- North Carolina's pavement preservation story as it relates to treatment inspection.
- North Carolina DOT had road oil units in all fourteen of its divisions, housed in the maintenance sections. The units were successful in their responsibilities for secondary road construction and chip seal pavements.
- Approximately ten years ago, North Carolina DOT received a legislative mandate that 80% of its pavement preservation work needed to be outsourced. This lead to the disbandment of most of its road oil crews and the loss of their expertise (most crew workers either retired or left the department). There are only two road oil crews left in divisions two and fourteen. All other divisions are utilizing contract work for pavement preservation.
- The Materials and Tests department of North Carolina DOT, located in Raleigh, has been tasked with managing the state's pavement preservation program.
- The Program hired three former road oil supervisors from the coast, the mountains, and Piedmont. These three supervisors have a wealth of expertise in chip seal pavements and managing crews.
- North Carolina's construction offices are resident offices, which are responsible for inspecting and enforcing their own contracts. Typically, the lowest person on the totem pole gets sent out to inspect pavement preservation projects.
- North Carolina DOT's role in the present includes onsite inspection assistance to help the divisions and contractors during the pavement process.

- Last year, North Carolina conducted roughly fourteen million square yards of chip seals and one million square yards of micro surfacing.
  - Last year, the onsite inspection assistants conducted their own surveys and found the following issues present at approximately 10% of their field visits: irregular areas, proper application rates, and patching and road preparation. At approximately 25% of their field visits, "dirty" aggregate was present; most likely caused by quarries adding back fines to their course aggregate material.
  - Another theme is absent and passive inspections.
- North Carolina is seeing the following treatment service lives:
  - Five to ten years for double chip seals.
  - Five to twelve years for a double chip seal that is immediately followed by a fog seal.
  - Five to ten years for micro surfacing.
- Running into issues with how long it takes to get back to preserve these pavements and how long these treatments need to last.
- Inspection is vital in the success of pavement preservation treatments.
- North Carolina's best practices:
  - Longitudinal joints, transfer joints, and intersections.
  - Recently changed specification to require a 500-foot test section the first day of operation.
  - Calibration of equipment before starting the paving process.
  - Clean, compatible aggregate (especially when working with chip seals).
  - The DOT hosts workshops every spring for all of its division inspectors, but most training happens on the first day of a project. If the project is started right, it has a higher rate of success.
- Lessons learned in the last ten years:
  - Proactivity reduces the need for reactivity.
  - Spring workshops have been vital in building relationships when high turnover is present.
  - It is important to circle back in the fall with maintenance folks to educate them on treatment selection.
  - To create an open dialogue with divisions and contractors. The DOT encourages the resident offices to invite them to their pre-construction meetings.
  - Have seen good dialogue result from its Preservation Summits, which includes attendance from local municipalities, DOT representatives, and other contractors.
- North Carolina will be releasing new specifications in 2024.
- North Carolina DOT's IT department has been working on developing its AST 660 Web App to help make its field staff and inspectors' jobs easier.

Questions

The following is a summary of questions asked following the presentation.

- What does North Carolina do for ramp chip seal projects?

  - North Carolina does not typically put chip seals on any roads with ramps. The DOT does not require work to be done with a hand wand, so if it is observed that a contractor can perform a treatment on an intersection with their machine, the DOT will allow them to do that. It's all about knowing the contractor's competency level.
- What are North Carolina's requirements for contractor QC?
  - North Carolina has a one-year warranty with contractors for bleeding and raveling.
  - There is no QC program for aggregate specific to chip seals.
- How is bleeding and raveling quantified for the warranties?
  - If 20% or more bleeding is carried over to the wheel path of a 1,000-foot lot, then the warranty kicks in. The same rule is used for raveling, but it can be a challenge since raveling is more subjective. In the past ten years, there has been very little warranty work performed in North Carolina.
- Kentucky does not have a requirement that its distributors be calibrated every year.
- North Carolina has enforceable QC provisions for standard aggregate products, but not for its chip seal aggregate products.
  - North Carolina can hold chip seal aggregate (on the 200 standard) to 1% by weight of fines at the quarry, then when it shows up at the project site it can be held to 1.5%. North Carolina does not have regular testing of that stone at the job site. It would take an increase in staffing to perform regular testing at the job site, which was previously executed successfully by the disbanded road oil crews.

2.5. Small Group Discussion on the Pavement Preventive Maintenance Treatment Inspection Process

Proposed Discussion Questions from the Meeting Agenda

- *Who performs the inspection (state forces or contractors)? Are inspections performed at District/Regional Offices?*
- *Does your state have a listing of things that need to be inspected?*
- *What are some of the challenges/barriers to inspection?*
- *Anything missing from the specifications that should be added?*
- *What is one thing you could improve about your policies/procedures?*

Breakout Group 1

The following is a summary of the breakout group discussion.

Who performs the inspection (state forces or contractors)? Are inspections performed at District/Regional Offices?

NORTH CAROLINA

North Carolina has contract engineer inspectors.

West Virginia
West Virginia has contract engineer inspectors as well. Within its districts there is a resurfacing department (whether that is pavements, chip seal, etc.), but it is lucky to have an inspector that has worked a micro surfacing job before.

New Jersey
New Jersey has an assigned inspector for every project. The inspectors check weather limitations, lay down temperature, and when the surface can be open to traffic.

Does anyone require certifications?

West Virginia
West Virginia requires at least one person on the contractor crew to be certified with the NCPP's TSP-2 Certification (or another recognized certification).

Massachusetts
Massachusetts' Micro Surfacing Specification has a requirement for certification.

NCPP
States often require certification for HMA but not for preservation. Industry and NCPP would like to require certification, but the states do not wish to have it.

Georgia
Georgia does not think the certification program it has in place gets into micro surfacing and chip seals. Emulsions are restricted in Georgia.

North Carolina
North Carolina had an inspector last year that was a college intern. Hoping to have DOT inspectors certified in the future; currently in the information gathering phase.

Note from FHWA
There is an Asphalt Emulsion Manufacturers Association (AEMA) Pavement Preservation certification in the works, but FHWA cannot mandate anyone to take the course.

NCPP
If the Code of Federal Regulations (CFR) requires Quality Assurance (QA)/QC processes for pavement construction, why doesn't it require it for preservation? If industry driven, the certification could pair with the state.

New Jersey
New Jersey has a joint organization training for its inspectors (covers what the inspector needs to do and the DOT's expectations), but it is not an official certification.

NOTE FROM FHWA

FHWA is encouraging the development of a unified core curriculum of topics that inspectors in pavement preservation should have. There is no need to reinvent the wheel. Look at what is available (for slurry seal, chip seal, etc.) and take/tweak what you need to reach the desired contractor competency level.

AASHTO's TC3 Program has some good trainings that could fit within pavement preservation inspection.

FHWA has NHI courses that could assist in this process.

NEW JERSEY

When trainings do not have exams at the end, there is no way to know who is taking the trainings. Exams should be taken after trainings and should indicate a specific score that qualifies as a pass.

NCPP

There is an NCPP micro surfacing national certification, which contains a test at the end of the training. Several states do not want to require it. There are some states (and some local agencies) that require it for their employees.

WEST VIRGINIA

West Virginia shared that since it requires one contractor employee to be certified in its Micro Surfacing Specification, NCPP has made it easy for the DOT to track who on the contractor crews is certified.

NORTH CAROLINA

North Carolina is struggling with good pavement preservation technicians leaving or getting promoted, which leaves the DOT facing a constant training loop. Turnover has been as high as 25-50% depending on the year.

NOTE FROM FHWA

FHWA says that states need to have a continual training program to keep up with the high turnover rate.

Does your State have a listing of things that need to be inspected?

NORTH CAROLINA

North Carolina has a laminated checklist that is provided as a handout at workshops.

NOTE FROM FHWA

FHWA website has a checklist that can be printed and dispersed.

MINNESOTA
Minnesota disperses the FHWA checklist. The DOT does not edit the checklist before dispersing.

What are some of the challenges/barriers to inspection?

VERMONT
Vermont says staffing.

NCPP
NCPP says knowledge level. Training is needed.

WEST VIRGINIA
West Virginia says it is hard to say what is good or bad with objectives that are not outlined. They do not have quantifiable measures.

FORT MITCHELL PUBLIC WORKS, KENTUCKY
Fort Mitchell Public Works had a lot of project shutdowns based on poor performance of one pavement.

VERMONT
Vermont has had projects protested due to "loud bikers."

DELAWARE
Delaware requires its contractors to give landowners notice of any work that is to be done that affects geometric grade (chip seals, fog seals, etc.).

GEORGIA
Environmental studies should be required.

MASSACHUSETTS
Massachusetts is frustrated with projects that keep getting bundled with other projects and then get extended. Preservation can be delayed (or made irrelevant) when projects get extended.

NOTE FROM FHWA
Some DOTs have agreements in place that help to streamline and set the project scope.

VERMONT
Vermont is experiencing bundling as well, but at a lesser level than Massachusetts.

Breakout Group 2
The following is a summary of the breakout group discussion.

How is inspection completed? Pavement Preservation?

West Virginia
West Virginia's work is done by contractors; state forces do inspection, but they don't do a lot of inspection. The DOT does not often contract out chip seals.

Delaware
Delaware's inspection is all in-house.

Massachusetts
Massachusetts' inspection is in-house, but pavement work is contracted out.

Texas
Texas' inspection is in-house, but pavement work is contracted out.

Kentucky
Kentucky's micro surfacing and chip sealing is all done by contractors. Central Office trainings and field assistance is provided to contractors throughout its four regions.

Connecticut
Connecticut's four districts typically have one district that regularly uses consultants to perform inspection on preservation projects. Its other districts consider using consultants for inspection based on general workload, staffing, and resources. Most commonly, state forces perform inspections on the work performed by contractors throughout the four districts.

Mississippi
Mississippi's preservation work is no longer contracted out. The DOT is building an in-house preservation program.

Minnesota
Minnesota's micro surfacing and chip seals are contracted out and inspection and testing is done by its district offices.

Georgia
Georgia contracts out about 80% of its preservation work. Inspections are done in-house and with the involvement of consultants.

Virginia
Virginia's work is contracted out. Inspections are done in-house by its districts.

Alabama
Alabama contracts out its pavement work. Treatments that are usually performed include micro surfacing, scrub seals, thin asphalt overlays, and bituminous surface treatments. The term "chip seals" is not widely used in the DOT. Inspections are done by project engineers and consultants.

Tennessee
Tennessee contracts out its pavement work. Inspections are done in-house.

How do you train inspectors?

GEORGIA
Georgia hosts in-office trainings.

KENTUCKY
Kentucky hosts in-office trainings and has made reference guides for micro surfacing a chip seal standards/specifications. The DOT would like to have a certification program within the state; could possibly use NCPP's national certification exam as a reference. Feel that consultants and inspectors need more education on pavement preservation in addition to the spring trainings.

CONNECTICUT
Connecticut has an advisory group for inspectors. The advisory group hosts winter trainings, specific to paving operations, with the construction inspectors for each of Connecticut's four districts. The advisory group has recorded training videos of select preservation treatments posted on a public webpage. These training videos include introductions to the treatments, basic considerations for inspection, roadway preparation requirements, the placement process, and information on how to identify problems during construction. The advisory group and Pavement Design Unit also conduct site visits to assist inspectors in identifying preparatory repair work, and often remain onsite during major work operations, such as the first night of a treatment placement.

Connecticut's Central Construction Office holds annual summit meetings, open to all DOT staff, which include lessons learned during the prior construction season.

The inspectors assigned to pavement preservation projects are expected to complete AASHTO TC3 modules for relevant treatments.

VERMONT
Vermont has just recently brought back chip seals. A specialized construction expert serves as liaison for informing pavement preservation.

MISSISSIPPI
Mississippi inspection is in-house, but it's on the construction side. It does not have a formal training program.

TEXAS
Texas gives formal training to all its districts so they can train their own inspectors.

MASSACHUSETTS
Massachusetts has regional trainings with the University of Massachusetts Amherst. The northeast has its own inspection training; otherwise, the DOT is going out and performing the trainings itself. The DOT is trying to start its own certification program. The DOT uses free coated chips, not chip seals. The DOT completes two to three micro surfacing projects per year, but its districts are mostly performing projects themselves.

Delaware
Delaware's inspection experts are primarily consultants.

Minnesota
In Minnesota, everyone is certified in HMA and concrete, but there are no trainings on micro surfacing or chip seals.

North Carolina
North Carolina has no formal training, but rather "recommendations." It has a program that takes college graduates in hopes of providing them with the necessary skills and trainings.

Virginia
Virginia utilizes courses offered by the **Virginia Education Center for Asphalt Technology (VECAT)** for inspection certifications.

Alabama
Alabama has a good asphalt and HMA certification program but does not have a certification program for preservation.

What are the problems/struggles with getting preservation programs inspected and proper training with pavement preservation?

Massachusetts
Massachusetts says there is a lack of experience plus a lack of interest in maintenance.

Georgia
Georgia says that people in the department don't like pavement preservation.

Mississippi
Mississippi says that many in the department think that pavement preservation is a waste of funding.

What do you think is missing from specifications?

Kentucky
Kentucky uses AASHTO specifications but tweaks them to best fit the state.

Mississippi
Mississippi uses AASHTO specifications but tweaks them to best fit the state.

3. PAVEMENT PRESERVATION PROGRAM AND TREATMENT SELECTION

3.1. DOT Presentation on Current State of Pavement Preservation Program

Vincent Allison, West Virginia DOT

The following is a summary of the presentation given by Vincent Allison, Highway Engineer Associate for West Virginia DOT.

Topics covered:

- West Virginia DOT does not have a formal pavement preservation program.
- Background on West Virginia's informal program:
  - Have 39,000 lane miles made up of interstate, US, state, county, and local roads.
  - Do not have a separate county money system for pavement preservation. Used to utilize 15% of the statewide resurfacing budget. This change has caused some issues with contractors not wanting to invest in preservation, since they do not know if the work will be available. This leaves most preservation work to be performed by out-of-state contractors.
  - Have been active in preservation for over ten years but would like to perform more preservation work in the future.
  - Currently perform approximately three micro surfacing projects per year. Most preservation work is focused on micro surfacing and chip seals, have a smaller focus on thin overlays as well (have a specification on thin overlays).
  - Define preservation as a treatment that is two inches or less.
  - Preservation projects are selected informally. The ten districts make decisions on the design and/or maintenance level.
  - West Virginia has an abundance of hills, slides, and bridges.
  - There is a large focus on Snow Removal and Ice Control (SRIC).
  - Pressure is on the DOT to make the politicians and residents happy. If a roadway is falling apart people do not understand why preservation projects are being performed.
- The importance of quality:
  - West Virginia has laid a lot of thin asphalt overlay.
    - Have had a High-Performance Thin Overlay (HPTO) fail verification testing multiple times on an interstate. Use examples such as these to promote micro surfacing to its districts.
    - HMA creates potholes at the end of its life-cycle, but micro surfacing wears away and does not cause as much damage to tires.
  - Have had cape seal jobs where the contractor used an inappropriate application rate on the stone. The result ended in the contractor sweeping the sand-like residue off of the pavement surface, which created a large dust cloud resembling a forest fire.
- Managing quality:
  - West Virginia completed a specification overhaul. It was difficult to stretch beyond the means and methods of these treatments. There is not a solid performance measure like what is found with HMA.

- Have implemented just-in-time training that districts can include in a special provision to require contractors to host trainings on what to expect on the job site.
- Have been training district personnel, which is mostly focused on managing expectations.
- Host a Pavement Preservation Conference every two years.

Questions

The following is a summary of questions asked following the presentation.

- When a state the size of West Virginia with 39,000 lane miles is trying to get a pavement preservation program off the ground, it can be difficult because there needs to be a set of qualified contractors to support the projects. Sometimes for a small program like West Virginia currently has, it can be a challenge to get contractors on board to invest in preservation. This is not a state specific problem. FHWA has been surprised by the number of states that have to source contractors from out-of-state to perform projects. They have heard that states in the past have had to reach out to the states that have qualified contractors to ask if they can utilize them for preservation, which would lead to delayed preservation projects since they had to work around the "qualified" states' project schedules.
  - West Virginia only performs three micro surfacing jobs a year, so it is not running into this issue. It feels that the contractors sourced from out-of-state have done a decent job on projects.
- Contractor buy-in on pavement preservation is important. Alabama has one micro surfacing contract for the state. It had one asphalt contractor buy the equipment to perform micro surfacing treatments and then the rest of its asphalt contractors began trying to pitch thin overlays. Have noticed that if contractors are not on board, they will try to find whatever excuses they can to avoid the work.
  - West Virginia sent out a couple of recommendations to its districts, some of which were micro surfacing recommendations. The districts responded that they can perform thin overlays cheaper than micro surfacing.
- West Virginia and Kentucky are both seeing a cost increase in the square yard price of micro surfacing. Think it may be due to high numbers of project requests and contractor buyouts.
  - North Carolina is seeing the opposite. The cost of thin asphalt overlays has been increasing, so more people are turning toward micro surfacing. The cost of double chip seals has also been comparable to micro surfacing lately.
- New Jersey started micro surfacing in 2011 and slurry seals in 2014. It has one contractor for micro surfacing and slurry seals and has been receiving comments from construction personnel and FHWA to make sure that other contractors are involved in the work. The DOT is working toward improving other contractors' knowledge base to make this possible. It is an internal DOT process to make sure that preservation projects are covering at least 10 lane miles because the DOT believes that pavement preservation is more effective if significant project length can be improved.
- Is anyone bidding micro surfacing alternate to a thin overlay?
  - Kentucky says yes. Kentucky is an asphalt state and if it does not want the industry to kill its preservation program, then it must get out alternates. Kentucky does double micro surfacing projects at 0.75 inch. It has a resurfacing program at a set dollar amount and a

preservation program, which alternates with thin overlays and micro surfacing. The goal is to get micro surfacing projects out. The DOT is seeing more thin overlays chosen over micro surfacing in preservation project bids (only use virgin aggregate in thin overlays, no RAP).

3.2. Small Group Discussion on Pavement Preservation Programs

Proposed Discussion Questions from the Meeting Agenda

- *Does your DOT have a formal pavement preservation policy?*
- *Is it documented well or not?*
- *How many years has your DOT reported having a pavement preservation program?*
- *What is your DOT description of preservation maturity (somewhat mature, improving, fully mature, relatively immature)?*
- *What are your DOT sources of preservation funding?*
- *Who is responsible for preventive maintenance treatments and project selection (Central Office and local input, local level, Central Office, other)?*
- *What methods are being used to construct preservation treatments (both by contractors and in-house forces, constructed by contractors, constructed by in-house forces)?*
- *Is your DOT documenting benefits of pavement preservation (improved performance, reduced the overall cost, achieved system performance targets, increased the number or miles that can treat, reduced crashes or fatalities)?*
- *What additional guidance would your DOT desire (improved performance, reduced overall cost, achieved system performance targets, increased number of miles that are able to treat, reduced crashes or fatalities)?*
- *How do you determine "what," "when," and "where"? Is decision-making centralized or de-centralized?*
- *What techniques/tools do you use to evaluate the existing pavement condition and subsurface investigation prior to rehabilitation or preservation treatments?*
- *How do you design preventive maintenance treatments? Are there certain roadway/traffic levels you use a certain treatment for? Materials requirements? Is guidance provided in your pavement design manual?*
- *Is the use of recycled materials considered as early as possible in the development of every project?*
- *How does one handle the failure of a pavement preservation treatment?*

Breakout Group 1

The following is a summary of the breakout group discussion.

Does your DOT have a formal pavement preservation policy?

DELAWARE

Delaware does not have a formal pavement preservation policy.

GEORGIA
Georgia does not have a formal pavement preservation policy.

MASSACHUSETTS
Massachusetts does not have a formal pavement preservation policy.

VERMONT
Vermont does not have a formal pavement preservation policy.

WEST VIRGINIA
West Virginia does not have a formal pavement preservation policy.

ALABAMA
Alabama has a 10-page document, titled "Alabama DOT Pavement Preservation Policy," that got updated in 2019; originally written in 2012. It divides everything evident into three types of treatments of preventive maintenance. PM-1 includes scrub seals, chip seals, cape seals, OGFCs, and everything that the DOT files under preservation. Thin layer asphalt was later added to this list. PM-2 includes anything mill and filled up to two inches and any preservation treatments. Minor Rehabilitations (MR) consist of mill and fills from two to five inches and any preservation treatments.

- It sounds like this is not specific to pavement preservation but is pavement policy.
- Alabama agrees. As far as project recommendations for each project are concerned with Average Daily Traffic (ADT) and cracking percentage, the document is detailed enough that there are multiple applications, including preservation.

GEORGIA
Georgia does include SFDR as pavement preservation. Has been used heavily by the counties and the state has jumped on the bandwagon.

ALABAMA
Alabama does not include FDR or SFDR as pavement preservation; these are categorized as pavement reconstruction. It is primarily used on county roads, which the DOT has written a specification for, but it is not used on state grounds for money purposes.

Do those that do not have a formal pavement preservation program feel like they need one?

VERMONT
Vermont is small enough that it doesn't really need one. The DOT has monthly meetings with Asset Management and its PMS has written rules that dedicate 25% of funding toward preservation projects. It functions well within the business practices that the DOT uses.

MINNESOTA
Minnesota has decision trees that come out of its Pavement Management Program. Different treatments are decided upon based on IRI and surface condition. It is a fairly formal program, but

the DOT is in the process of switching PMS software which will change the current decision trees and bring in treatments that are not currently reflected in the decision trees. A "homegrown" internal system, developed by a consultant, was previously used and now the switch is being made to agile assets.

NORTH CAROLINA

North Carolina has a general statute that it is to create a pavement preservation program which lists all the allowable treatments and what can be funded with preservation dollars and what things can be funded with contract resurfacing dollars. The allowable treatments include chip seals, micro surfacing, slurry seals, fog seals, thin lifts (one inch or less), and the Carolina Asphalt Pavement Association (CAPA). Then there are separate categories for rehabilitation and construction.

One of North Carolina's divisions (near Charlotte) allocates a lot of its preservation funds toward SFDR.

What is your funding amount?

NORTH CAROLINA

North Carolina has a set dollar amount from the General Assembly. The preservation budget for the whole state is approximately $85M for 80,000 lane miles.

ALABAMA

Alabama has been receiving a heavy push from its administration to move toward pavement preservation, but the design and scoping is more central to local areas for everything off the interstate. There is going to be slower adoption of these treatments in some places, but the DOT has been asked to do so. 45% of the budget is allocated toward treatments done at two inches or less (PM-1 and PM-2). 55% goes toward rehabilitation.

ILLINOIS

Illinois has nine districts which are all required to spend a minimum of 7% of their funding on preservation, which includes both bridge preservation and pavement preservation. The districts make their own decisions on if their funding will go toward bridge or pavement preservation. Have seen that the districts often spend more than 7% on preservation projects.

MINNESOTA

Minnesota does not think it has a percentage or minimum dollar amount set aside for preservation. The districts make decisions on budgeting. If they do not encounter natural disasters, flooding, sliding slopes, or anything else that needs to be taken care of, then the money they have left will go toward preservation projects. Preservation money comes from maintenance funding, not construction.

NOTE FROM FHWA

Pavement preservation qualifies for federal funding in every state.

VERMONT
Vermont utilizes federal funding with a state match for preservation.

ARKANSAS
Arkansas has a half-cent sales tax that was originally for a program to expand two-lane roads into four-lane roads. The tax is being continued on the preservation work to maintain those roads the DOT has spent the last decade building. The tax brings in approximately $250M, shared between pavement and bridge. Its Highway Department values system preservation as well as pavement preservation; an example would be its Highway Department considering the addition of lanes to a roadway to be preservation since it is maintaining the level of service in a corridor. 80% of the money goes toward system preservation work and 20% goes toward capital and capacity jobs. The 20% is what is used for the federal funding match.

NEW JERSEY
New Jersey has a pavement preservation policy. It began working on preservation in 2008. In 2022, 50% of its lane miles underwent preservation and resurfacing projects; out of 700 lane miles, 400 lane miles had preservation treatments and 300 lane miles had resurfacing treatments. Preservation costs are less than resurfacing. It has used $100M funding in preservation projects in 2022 and plans to use $150M in funding in preservation projects for 2023. Preservation projects are selected using guidelines, which will have its own section in the Pavement Preservation Manual set to be published by the end of this year.

New Jersey considers SFDR as a reconstruction technique, not preservation, which has been used in shoulder projects. It has also performed a few projects with CIR topped with a fog seal or HMA subbase course, which is considered a combination of rehabilitation and preservation projects.

New Jersey has an internal policy which needs a 20-year Equivalent Single Axle Load (ESL), which is used to recommend preservation treatments. Do not recommend chip or slag seals on high traffic roads. Recommend using HPTO at one inch thickness. For roads with moderate traffic, Ultra-Thin Friction Course (UTFC) at 0.75-inch thickness is recommended. For roads with low to moderate traffic, chip sealing is recommended. For roads with low traffic, slag sealing is recommended.

NCPP
NCPP says that if projects are being planned for five years in advance, the first three years need to be fixed.

DELAWARE
Delaware preservation projects run through its Maintenance Department. The department sets the work order and supplies the contractor with a specific amount of work for fog sealing, etc. Projects are determined by whatever is needed most at the county level. Also keep a list of recent HMA projects, so that two to three years later notice will be given to perform a crack seal, and two to three years after that notice will be given to perform a fog seal. It's a methodical approach that sometimes gets derailed when there is a need to address an area that is receiving complaints.

North Carolina
North Carolina has many divisions that have begun performing section-based preservation projects to optimize their schedules. This allows for sections to become synchronized and mitigates the challenges they face on how long they need a treatment to last. Also assists in lowering contractor mobilization costs.

Vermont
Vermont has a Crack Seal Program where it makes sure to crack seal completed projects within a three-year period. The DOT only maintains 3,200 lane miles, so someone drives the lane miles every spring to develop a candidate list of crack seal projects that get lumped into project planning (stateside focus). The other half of the program is made up of bottom air course budgeting where its nine districts provide the DOT with projects, based on band data evaluating rutting and cracking, to design and get out to contractors.

Georgia
Georgia has a problem on how to properly maintain white pavements. It's critical to build white pavements correctly the right time around, where the importance of inspection comes in to minimize the need for maintenance.

Breakout Group 2
The following is a summary of the breakout group discussion.

How many agencies have a formal pavement preservation policy?

- There are approximately 10 agencies with a formal policy.
- The definition of preventative maintenance and pavement preservation often get convoluted in policy discourse.

Alabama
Alabama has a PM-1 and PM-2.

Mississippi
Mississippi has a mandate to spend 10% of its funding on pavement preservation, but it is not necessarily policy.

Texas
Texas has category one funding for pavement accreditation. Anything less than a 2-inch overlay is considered pavement maintenance, which receives the category one funds. Also have a sub-program.

Massachusetts
Massachusetts drafted its preservation policy in 2016. It has considered calling slurry seal "micro surfacing."

What is the maturity of your pavement preservation program?

GEORGIA
Georgia's is well established, but there is still no official policy. Current efforts include trying to establish a policy. Its districts pick desired projects from a construction work plan.

TEXAS
Texas made its first efforts towards pavement preservation in 1996.

VERMONT
Vermont has had an informal program since 2007. Chip sealing stopped 20 years ago and was reintroduced last year.

NEW JERSEY
New Jersey is still improving its program. It has guidance, but no official policy. The number of chip seal projects performed is increasing. The projects are centralized fairly, but districts still get a say in project selection.

KENTUCKY
Kentucky is improving, but the DOT needs to add more tools to its toolbox and (most importantly) needs to improve its costs.

NORTH CAROLINA
North Carolina's program is very limited, but there are some dedicated funds for preservation. There are statutes about what preservation treatments can be applied.

MISSISSIPPI
Mississippi has extremely limited funding but has seen improvements with its 10% mandate. It has six districts, but only one has a chip seal program, and that is being analyzed to determine whether it is effective. Three of its other districts are working toward establishing chip seal programs.

VIRGINIA
Virginia's program is almost mature. Peer Exchange participants are interested in how Virginia establishes performance targets.

ALABAMA
Alabama's program is being pushed by its Central Office. The DOT is trying to allocate more than 10% of the budget towards its preservation program, but a lot of work needs to be done.

CONNECTICUT
Connecticut's program began in 2009 and received an increase in funding in 2011. It saw a more concerted effort toward the program with the implementation of chip seal and UTBO projects in 2018. The DOT has a guidebook but no official policy. Connecticut is mostly centralized.

West Virginia
West Virginia is on a learning curve right now. It is in the early stages of writing documentation on preservation treatments.

Minnesota
Minnesota's program is in pretty good shape. Its chip seal program was established 25 years ago, and it has a good Micro Surfacing Specification.

Massachusetts
Massachusetts has a very mature program since around 2004, but there are still ongoing efforts towards establishing crack seals; one of its districts will be crack sealing in 2023.

What additional guidance does your DOT need?

- Everyone agrees that there is a need for more guidance.

Has your DOT looked at safety at all?

Kentucky
Kentucky's pavement testing has been done at test centers.

Texas
Texas has developed a safety index in its Austin district. It is working on moving away from HMA and has tried projects for different grooving and grinding techniques to be utilized as preservation.

What technology tools do you use now to evaluate pavement conditions?

Mississippi
Mississippi is making efforts to collect more data through TPFs. Mississippi rides the interstate routes as well, but this does not sufficiently track longitudinal cracks.

Minnesota
Minnesota is making efforts to collect more data through TPFs.

Texas
Texas is making efforts to collect more data through TPFs.

Do agencies have limits on preservation treatments?

Georgia
Georgia's roads are not limited equally. Chip seals are not performed over a certain number of lanes.

West Virginia
All of West Virginia's chip seals are done on back roads. Chip seals are not performed on roads over 18,000 ADT.

Delaware
If Delaware has a road over 500 ADT, chip seals will not be performed. The DOT is trying to push this to 1,000 ADT.

Has recycling been talked about within your agency?

Massachusetts
Massachusetts has faced legal trouble for using certain techniques.

3.3. DOT Presentation on Types of Surface Treatments, Expected Performance, and Contracting

Xiaoyang Jia, Tennessee DOT
The following is a summary of the presentation given by Xiaoyang Jia, Tennessee DOT Maintenance Division's Pavement Management Engineer.

Topics covered:
- Tennessee is responsible for 37,860.131 lane miles, which is made up of interstate, NHS, and non-NHS routes.
- Tennessee DOT's Resurfacing Program:
  - Pavement Office.
  - Resurfacing Coordinators.
  - Statewide Project Manager.
  - Headquarters Materials and Testing.
  - Tennessee DOT's PMS:
    - Pavement condition data.
    - Update construction and traffic data annually.
    - Maintenance and rehabilitation strategy analysis.
    - Network optimization and project prioritization.
  - PMS support:
    - Performance models.
    - Decision trees.
    - Cost analysis.
- Preservation Treatments:
  - Definition of Preservation.
  - Types of treatments used.
  - From 2018-2020, "Mill and 411D" accounted for almost a third of spending.
- Performance models:

- Performance model groupings.
- Major differences in the performance of sections located in Region Four relative to Regions One through Three.

Questions

The following is a summary of questions asked following the presentation.

- Does Tennessee have a fixed dollar amount per year that it is facing budget constraints with?
  - Yes, but for Transportation Asset Management Plans (TAMP), it accounts for inflation rates at about 7%.
  - Recently passed a Transportation Modernization Act through state legislation, but the current 2024 funding is the same as last year. Currently trying to figure out what percentage of funding should be allocated toward its preservation program.

3.4. Group Discussion on Types of Surface Treatments, Expected Performance, and Contracting

Proposed Discussion Questions from the Meeting Agenda

- *What types of surface treatments do you use? Rehab? Preservation? Recycling?*
- *What performance do you expect from your surface treatments?*
- *Is there any feedback from the materials group on whether treatments are being selected and designed properly?*
- *Do you utilize any special/unique contracting mechanisms for preservation or recycling work?*
- *What are some of the challenges/barriers to effective pavement evaluation and treatment selection?*

Group Discussion

The following is a summary of the group discussion.

What types of surface treatments do you use? Rehab? Preservation? Recycling?

VERMONT

Vermont has been using Ultra-Thin Bonded Wearing Course (UTBWC), has started using rubber asphalt chip seal, use two-inch mill and fills for resurfacing (expect eight to twelve years on this), has reintroduced CIR, and uses SFDR. It is only getting six months out of the pavement surfaces placed in cold weather.

KENTUCKY

Kentucky has been using chip seals (seven to ten years expectancy) and micro surfacing (ten years).

North Carolina

North Carolina has been using single lifts of micro surfacing type three (seven to nine years expectancy) and chips seals (seven to ten years) which have an extended expectancy if a fog seal is performed quickly.

Mississippi

Mississippi has one district that has been performing single chip seals for a long time. It also uses scrub seals, two lifts of SMA, and one lift of OGFC.

Nebraska

Nebraska has been using a lot of chip seals (call them "armor coats"), completes one micro surfacing project every two to three years), uses joint and crack sealing for concrete, and does not use a lot of mill and fills for maintenance.

Alabama

Alabama's allowed preservation treatments include crack filling and sealing, surface sealing, chip seals, slurry seals, fog seals, scrub seals, joint crack seals, joint repairs, high friction surface treatments, diamond grinding, concrete grooving, spall repairs, pavement patching, double surface treatments, triple surface treatments, micro surfacing, thin lift asphalt concrete, safety layers, and cape seals. Alabama's Standard Specifications do not include "chip seals" per se but does include bituminous surface treatments which utilize the same technique. In recent years, Alabama has moved away from having bituminous surface treatments as final wearing layers for several reasons. Suggest that those using scrub seal as an interlayer give at least 72 hours before topping with Superpave.

Connecticut

Connecticut has a long life expectancy for its asphalt rubber chip seals at approximately eight to ten years. Hoping to get an additional twelve years with the addition of polymers. It has some UTBO jobs that were put down with a more generic specification that did not call for polymer in the mix, which is causing those roads to ravel.

Connecticut is introducing a third major treatment, thin friction wearing course, to its preservation program in 2023. The intent of adding this treatment to the program is to utilize it on secondary roadways that are not ideal chip seal candidates due to higher traffic volumes, trucks, and unfavorable geometry causing an increased risk of flushing. The specification for thin friction wearing course was developed in close coordination with the University of Connecticut's Connecticut Advanced Pavement (CAP) Lab. An initial trial of the treatment was placed in 2012. The mix has an aggregate structure designed to be slightly more open than a traditional dense-graded Superpave mix, giving the surface increased texture and improving skid resistance. The specified lift thickness is three quarters of an inch, and the materials are applied with conventional paving equipment instead of a specialized spray paver, which are limited in the Northeast region and typically reserved for UTBO treatments. The mix calls for a higher asphalt content (six percent minimum polymer modified binder) with mineral/cellulose stabilizing fibers

to prevent drain down. Bonding is achieved through the requirement of non-tracking tack coat. Its life expectancy is about ten to twelve years.

West Virginia

West Virginia has some districts that like micro surfacing and some that outsource chip seals. A lot of crack seal projects have been performed on its roads. The life expectancy of treatments is all over the place.

Arkansas

Arkansas has recently started using slab jacking. It has had two failures with micro surfacing and scrub seal in recent years. It is working to improve its documentation.

Massachusetts

Massachusetts does not use a full chip seal (nine to fifteen years expectancy) and prefers rubber over polymer. It tries to not categorize thin overlays as preservation. It has also used a chemical crumb rubber that works well in a pinch, micro surfacing (eight years), CIR, fog seals on shoulders, and have been using rejuvenators as softeners.

Delaware

Delaware has been using chip seals, thin overlays (five to seven years expectancy), and some CIR with a two-inch overlay (lifespan unknown).

Virginia

Virginia has been using chip seals, slurry seals, micro surfacing, HMA, and thin asphalt overlays at 5/8-inch. All of these have five to eight years of life expectancy.

Tennessee

Tennessee's most used treatment is mill and fills (12 to sixteen years life expectancy). It also uses micro surfacing (six to eight years), cape seal, double chip seal, scrub seal, and CIR. Treatment type depends on location. Sometimes west Tennessee uses temporary treatments to supplement before it can perform a mill and fill.

Georgia

Georgia recently conducted a study on its fog seals, to prolong its treatments by approximately two years. It has also been using micro surfacing, chip seals (six to ten years life expectancy; ten to twelve years is used as an interlayer), and HMA (ten to twelve years). Some of its districts do not like micro surfacing. It considers treatments as preservation if they are less than one-inch thick.

New Jersey

New Jersey considers treatments as preservation if they are less than one-inch thick. Approximately 50% of funding is allocated toward preservation. It has been using fog seals, micro surfacing, chip seals, cape seals, slurry seals, SFDR, CIR, and scrub seals.

TEXAS

Texas has been using fog seals, chip seals, micro surfacing, and sometimes scrub seals. It has very few sections that have utilized fog seals and micro surfacing. Chip seal is the main surface treatment. ADT and cracking measurements are used for treatment selection.

4. DAY 1 WRAP UP

During EDC-4, FHWA released several Tech Briefs for different states, and asked that everyone review those and provide feedback before the conclusion of the Peer Exchange on if they would like these to be updated to reflect new treatments that states are utilizing.

PAVEMENT PRESERVATION PEER EXCHANGE
SPRING 2023 | ATLANTA, GA

TECHNICAL REPORT

DAY 2 – WEDNESDAY, MAY 10

1. OPENING SESSION

1.1. FHWA Welcome

FHWA leadership welcomed participants back to the Peer Exchange. They expressed that in the future, FHWA would like to discuss all uses of pavement preservation materials, as those uses could possibly help with furthering states to have their own informal/formal pavement preservation programs

During this Peer Exchange, participants have confirmed that their issues are not specific to their state, but are universal experiences being crossed over state lines. FHWA encouraged all participants to read the FHWA Pavement Preservation Roadmap and to review the Pavement Preservation 2020, 2021 and 2022 webinars series released in collaboration with the roadmap's update during EDC-4. FHWA has observed that there is a need for increased inspector training and that many states' pavement systems are not reflected in their PMS.

1.2. Continued Group Discussion on Types of Surface Treatments, Expected Performance, and Contracting

Proposed Discussion Questions from the Meeting Agenda

- *What types of surface treatments do you use? Rehab? Preservation? Recycling?*
- *What performance do you expect from your surface treatments?*
- *Is there any feedback from the materials group on whether treatments are being selected and designed properly?*
- *Do you utilize any special/unique contracting mechanisms for preservation or recycling work?*
- *What are some of the challenges/barriers to effective pavement evaluation and treatment selection?*

Group Discussion

The following is a summary of the group discussion.

What contracting mechanisms do you use for treatments?

ALABAMA

Alabama asked if anyone has contracted out crack sealing and if so, do they pay by the pound?

KENTUCKY

Kentucky contracts out crack sealing and pays by the pound but shared that most people pay by square foot.

DELAWARE

Delaware contracts out crack sealing by the linear foot. Its inspectors do not like wheeling it out.

MASSACHUSETTS

Massachusetts contracts out crack sealing by the gallon and use roughly 800 gallons per day. It performs mostly over band and has people monitoring the work to ensure it gets done correctly. Preferred crack sealant is front rubber polymer modified binder with fibers, but also uses a PG binder with polyester binders.

GEORGIA

Georgia DOT does let projects, but it also has a simplified version of a master service agreement which functions like an ITB. These agreements are written based off what the district's needs are, which allows the districts to write off smaller contracts for pre-qualified contractors. If a district wants to complete a smaller project, under $1.5M, they can write that off. If they approach a project greater than $1.5M, then it goes to the Commissioner. This allows the districts freedom to get a lot of work done that they cannot perform within their crew.

NEW JERSEY

New Jersey DOT's operations group has a crack sealing contract, which gets evaluated for funding allotment annually and then locations are chosen later. Potential locations are sent to the pavement design group to check if there are any conflicting projects within the database.

WEST VIRGINIA

West Virginia has a special provision for statewide crack sealing which is performed by contract and bid on. The contract pays for two items: crack sealing and traffic control. The crack seal is over 1,000,000 linear feet, so the proposal includes all the locations needed. The department performs random checks on reports from the contractor. Do note that this is set up for the sealing of longitudinal joints rather than cracks.

ALABAMA

We are concerned that if inspectors are not available to watch the projects, then it becomes difficult to hold contractors responsible. A possible solution could be categorizing surfaces by their level of distress so that the DOT and the contractor are not taking as big of a risk.

VIRGINIA

Before Zhaohua Wang joined Virginia DOT, he conducted research where images were used for automatic crack detection to provide an accurate mapping of potential crack seal projects. This made it possible to quantify the linear measurements of crack seal projects.

GEORGIA
Georgia has pavement images available that help to identify where the majority of propagation of cracking is, which is then used to strategically plan the annual budgets and projects.

KENTUCKY
Kentucky has vans that conduct photo logging and evaluate for cracking and rutting. This helps to recommend projects to districts and in estimating how long pavements and treatments are lasting. These maps are publicly available and Kentucky has shared them with out-of-state contractors for web-based pre-construction meetings.

ILLINOIS
Illinois has a similar program that color codes the cracks for width size.

MASSACHUSETTS
Massachusetts shared that there are programs out there that can provide crack depth. These programs are very accurate if you run QC.

GEORGIA
Georgia reiterated the importance of running QC checks. When data is showing self-healing roads, that is a good indicator that QC is needed.

MASSACHUSETTS
Massachusetts is going to begin contracting QC with an outside vendor next year. The outside vendor will run the QC, take the entire image, and run it through an auto crack package that will identify and quantify all distresses.

KENTUCKY
Kentucky uses its pavement evaluations to make sure its pavement histories are up to date. If the system is showing that a road is thirteen years old and in good condition but no projects are reflected in the history, it knows there is a need to look back and update for a project.

NCPP
Technology is improving every year but it is important to note that evaluations still need to be done in the field to account for distresses such as rutting, which is not yet read by this software.

TENNESSEE
Tennessee has noticed an increase in cracking from utilizing automatic technology for OGFC pavements. The data collection vendor was asked to adjust the parameters to remove the "false crack" in the report. It is important to know how to calibrate the testing equipment to make sure readings are correct and do not skew ratings.

Who experiences bundling?

North Carolina
North Carolina tries its best to steer clear of bundling. It must let HMA contracts to eighteen months minimum, so it tries to keep its preservation contracts separate when possible (preferably at twelve months). This plan seems to work with chip seals. Chip seals are paid for by square yard and then emulsion by the gallon is paid separately. This encourages contractors to increase emulsion use, but if too much emulsion use results in bleeding the warranty kicks in.

Vermont
Vermont bundles if there are 2-3 maintenance projects with the same scope of work within the same geographic region.

Can anyone speak to the work performed by their local agencies? Do they ever work together to reduce costs?

Massachusetts
Some of Massachusetts' municipalities group together. Since they are smaller towns, they can group up to five together at a time.

Kentucky
Kentucky has tried to reach out to some of its local agencies to work together on chip seals to get a cheaper price for its emulsions, but they are faced with the challenge of separate funding and how to quantify the division of materials.

NCPP
NCPP is having a hard time finding ways to include local agencies. Local agencies are limited in their ability to travel and attend peer exchanges such as these. NCPP has tried to create a council, but councils are primarily driven by industry. NCPP thinks it is important to find ways to include local agencies since pavement preservation is not as prevalent in local agencies as it is within the DOTs at the state level.

2. LINKING PAVEMENT PRESERVATION TO PAVEMENT MANAGEMENT

2.1. State DOT Presentation on Linkages Between Pavement Preservation Design and Pavement Management

Joseph Locore, Connecticut DOT
The following is a summary of the presentation given by Joseph Locore, Transportation Engineer for Connecticut DOT.

Topics covered:
- Unit organization:
  - Overview of pavement management and pavement design at Connecticut DOT.
  - Background.
  - Roles.
  - Successes.

- Preservation design/selection process:
  - Design process:
    - Overview.
    - Candidate generation.
    - Candidate reviews.
    - Project selection.
    - Design phase.
    - Construction/post.
  - Performance measures:
    - Overview.
    - State.
    - Ride quality.
    - Federal.
- Performance measures – goals and optimization:
  - Program optimization:
    - Overview.
    - Strategy.
    - Quick check.
    - Goals.
    - Funding increase.
- Successes and remaining challenges.

Questions

The following is a summary of questions asked following the presentation.

- Who sits on Connecticut's pavement committee aside from maintenance and design?
  - There is involvement from bridges, private design, lead designers, pavement management, pavement design, planning bureau, and construction.
- Does the committee work on the network level?
  - No, it operates at the project level with a focus on planning, pavement management, pavement design. The network level units are involved in the committee to provide insight into the big picture as well.
- Does the committee serve as a QC check on your pavement designs?
  - Yes, it provides a scope perspective of what the needs are so that they can be best considered while planning for upcoming projects.
- It seems this committee performs well for Connecticut because it is a small state, but this can be adopted by larger states.
- Massachusetts conducts scoping meetings that function similarly to Connecticut's committee. It has 30-50 people providing a feedback loop, which can be good and bad (bad in the sense that it can extend the time it takes for project delivery).
  - Connecticut is wary of the scope creep and has dealt with it in the past. Think it may be a good idea to define the policy so that new people coming in with the turnover rate know what can and cannot happen.

  - Georgia DOT had a similar committee that disbanded in 2017 due to scope creep.
- It is essential to set an arbiter to ensure that project scope does not get out of hand.

2.2. Group Discussion on Linkages Between Pavement Preservation Design and Pavement Management

Proposed Discussion Questions from the Meeting Agenda

- *How are pavement preservation design and pavement management organized within your state?*
- *How is the PMS used as a tactical tool to select projects? How should it be used? Pavement condition triggers used for preventive maintenance treatments [IRI or Pavement Condition Index (PCI) as a rating system for good, fair, poor]?*
- *How does pavement preservation design impact your plans to meet Transportation Performance Management (TPM) rules?*
- *How is pavement preservation design used in your TAMP?*
- *What feedback loops exist between pavement preservation and pavement management?*
- *How are you tracking pavement performance (type of treatment, methodologies, materials)? Does performance get communicated back to pavement preservation design unit?*
- *What are some of the biggest challenges/barriers to making use of your PMS and linking pavement preservation design and pavement management?*
- *Are your pavement management performance models linked to pavement preservation design?*
- *Is your PMS able to determine network level and project level Remaining Service Life (RSL)?*
- *Is RSL being used as a factor in your decision making?*
- *Is your PMS capable of supporting project level LCCA?*
- *What are your immediate needs in this area?*
- *Please list the product (data, reports, applications) that your PMS is currently capable of producing.*
- *Please list the products that you would like to produce with your PMS.*
- *Is PMS used to conduct engineering analysis?*
- *What information are top DOT decision makers looking for that they cannot obtain from the PMS?*
- *Do you use PMS information to help evaluate the performance of your preservation programs?*
- *Please share any successes as they relate to the use of PMS (i.e., improved ride quality on roadways, longer periods between rehabilitation, lower operations and maintenance costs, justifying increased levels of funding, etc.).*

Group Discussion

The following is a summary of the group discussion.

How is your pavement preservation design and pavement preservation management organized within your state?

VERMONT

Vermont's pavement management operates within Asset Management and pavement design operates within Project Delivery.

NEW JERSEY

New Jersey's pavement management and pavement design operate under the same manager. Pavement management collects and analyzes network level data. Pavement design uses pavement management's data to generate projects. The two groups work closely together.

GEORGIA

Georgia's pavement design engineering works with the Office of Materials and Testing. It recommends that all the interstate projects go through the Pavement Design Engineer. The districts have their own money to take care of the planning for state routes, but they can work with and submit projects to the Pavement Design Engineer.

TEXAS

Texas' twenty-five districts each have their own style, but most of the District Pavements Engineers and Maintenance Area Supervisor Engineers are involved in their processes. They come up with project lists that are input into Texas DOT's PMS. The DOT's Maintenance Division Director and engineers meet with each of the districts every year for two weeks to review the project plans for the next four years.

TENNESSEE

Tennessee's pavement design is carried out by its Roadway Design Division. The DOT uses AASHTO 93 design for pavement design. To support the DOT's resurfacing program, which includes pavement preservation, the Texas DOT Pavement Office under the Maintenance Division compares the existing structural number determined by Falling Weight Deflectometer (FWD)/Ground Penetrating Radar (GPR) against the required structural number provided by the Pavement Design Office to identify projects where structural improvements are needed.

VIRGINIA

Virginia's pavement preservation design functions differently depending on location. It has a Materials Group and a Project Design Group. The Project Design Group utilizes IRI to evaluate engineering analyses.

KENTUCKY

Kentucky's districts submit projects that get reviewed by the Pavement Management Group, which then decides which projects go out for pavement preservation.

NORTH CAROLINA

North Carolina's Pavement Design Unit is located within the Materials and Testing Unit. The Pavement Design Unit works on everything outside of pavement preservation. If preservation

requests are received, the unit directs those requests to Garrett Lee. The Pavement Management Unit is located within the Operations Program Management Unit. County and district engineers use pavement condition survey data as a starting point for picking roads that need treatments.

MISSISSIPPI

Mississippi's pavement preservation is not part of the design oversight process. Districts bring large project recommendations, unrelated to pavement preservation, to Mississippi's bi-monthly Pavement Design Committee, design engineers, materials engineers, construction, and the Chief Engineer. The committee reviews the district recommendations and suggests project plans to move them forward.

The PMS contains decision trees that give the districts a starting point. They are becoming less granular with the PMS' to become more precise. Precision will hopefully encourage the districts to increasingly utilize the PMS for project recommendations.

NEBRASKA

Nebraska has a Roadway Asset Team in charge of data collection and vans utilized to travel the state every year. The team inputs the collected data into the pavement condition program, which the districts will review and consider when submitting project requests. Projects do not typically go through pavement design unless they are larger projects such as mill and fills, micro surfacing, etc. Typically, the districts develop their own project plans and designs.

ALABAMA

Pavement Design is under the Bureau of Materials and Tests. Interstates have Pavement Design involved at an early stage while the state routes bring it in on the back end. The Pavement Management Section is also under Materials and Tests, which provides Pavement Condition Ratings (PCRs) for the entire state and provides those scores to the areas. The areas have their own scoping meetings (pavement preservation gets discussed during these meetings at the area level). The designs come out of the areas for non-NHS and are given to the Bureau of Materials and Tests for approval. The DOT has more control over Interstate pavement preservation; the Interstates are in better shape (98% PCR score in the last TAMP) than the state routes. The DOT has been encouraging areas to make more of an effort on pavement preservation for the non-NHS routes. Unfortunately, not all preservation treatments done at the area level are reported to the Pavement Management Section.

Everything concerning Alabama's TAMP is located within the Maintenance Bureau. The Pavement Management Section of the Bureau of Materials and Tests maintains the PMS. Alabama runs tests for FWD on many of its projects. The information gathered from those tests is provided on all the materials reports.

MISSISSIPPI

Mississippi sets specification rates to be used by the contractors. Think that pavement design is more imperative to something like SFDR which contains a structural component. With

preservation treatments there is no structural component. It's all about staying within a specific gradation of aggregate and a specific application rate of emulsion.

NCPP
Thinks the design is more on the materials side since pavement design comes from software. Design exists for preservation treatments, but it is not pavement design.

ALABAMA
The more ownership the DOT takes for mix design, the greater the risk that the contractors will point at the DOT for mistakes in the finished product. It is easier for state agencies to create specifications and have contractors design their own mixture following said specifications.

GEORGIA
Agrees with Alabama but expressed concern over contractor workmanship.

MISSISSIPPI
There is a gap in construction specifications for these newer treatments.

NOTE FROM FHWA
Test sections can be used to see if the work that is being performed is going to address your state's needs.

WEST VIRGINIA
Ohio has its own micro surfacing mix design equipment to run tests like abrasion loss, etc.

How do you determine RSL?

NEW JERSEY
New Jersey is unsure if it records from RSL in its TAMP, but it does perform project pavement testing such as FWD to determine existing structural capacity.

NCPP
Surface treatment is not structural treatment. Performing FWD will not provide insight on what treatments should be selected for a pavement.

NEW JERSEY
New Jersey does FWD for its resurfacing projects. Its contractors do not have the freedom to work on pavement design. Once a pavement preservation project is selected, then its Pavement Design group will choose the design based on the data collected by its Pavement Management group. ESL analysis findings have guidelines for treatment selection. The design then gets submitted to its Capital Design Committee for approval. Once the Project Manager receives approvals from the units, then the project will go into final design.

Are any of you performing raveling tests for data collection?

DELAWARE

Delaware recently collected raveling data on its chip seals but is unsure what the outcome was.

MASSACHUSETTS

Massachusetts has less OGFC than it used to, and it is interested in procuring a new testing device for raveling. The DOT is trying to decide what kind of device to get (texture laser or new three-point continuous texture laser). The DOT is concerned that this will heavily increase the amount of data coming into its systems, which requires an additional workforce to manage and analyze.

NCPP

If a pavement condition survey is being utilized already, it is a simple process to add another distress to it. Storage of the data is cheap, so collecting more data where possible could be a benefit.

2.3. Group Discussion on Identified Obstacles to the Effectiveness of Pavement Preservation Programs

Proposed Discussion Questions from the Meeting Agenda

- *Construction quality issues?*
- *Inadequate funding?*
- *Customer complaints?*
- *Contractor vulnerability?*
- *Pressure to address more urgent needs?*
- *Other?*

The following is a summary of the group discussion.

Dennis Bachman, FHWA Illinois Division

- Provided a rundown on Illinois' DOT's pavement preservation program.
- Illinois began preservation work in 2010. Its preservation dollars were coming out of maintenance funding around that time (around $7M statewide for preservation).
- In 2017-2018, EDC-4 and TAMP requirements helped to pick up its program.
- The DOT went to FHWA Illinois Division to find out what was federally eligible for pavement preservation. This led to the creation of guidance which was included in the DOT's Initial TAMP and programming of pavement preservation projects with federal funds.
- Illinois uses a Condition Rating System (CRS) and limits on treatments to assist with selection. If the CRS rating is too low, then preservation will not work.
- Illinois had a committee to review submitted pavement preservation projects and provide feedback to the districts, as necessary, before approval. This became an education source for the districts as pavement preservation became a larger part of the program.
- The committee was a big time commitment, so it disbanded around two years ago once Illinois felt comfortable with what the districts were putting forward as preservation projects.

- The guidance in its Initial TAMP became incorporated into its design manual, which includes decision trees and matrices that assist in treatment selection based on distresses.
  - Illinois DOT's Chapter 53 "Pavement Preservation and Rehabilitation Strategies" from its Bureau of Design and Environment Manual.
- When the TAMP was first initiated, there was a requirement that a minimum of 5% of its funding had to be spent on pavement and bridge preservation projects. That minimum is now up to 7%, but the most recent TAMP reflects that more than 7% of funding was spent on preservation.
- Illinois is now working on updating and tightening its preservation specifications.

Group Discussion

What are some obstacles that you are dealing with? What are your success stories on overcoming obstacles?

Massachusetts

Massachusetts' biggest challenge is getting the program to stay within its lane and focus on pavement preservation without projects getting blown into reconstruction. Managing scope creep is imperative to remaining within the preservation sphere.

Note from FHWA

FHWA discussed the trend of treatments being "thrown out" if a program experiences a failure. It is important to not get discouraged and to evaluate those failures because they can benefit the understanding of how to best apply treatments for future successes. Contractors will likely shy away after a failure.

Georgia

Georgia tries to dive deep into evaluation after it experiences a failure. It will review the laydown process, application, materials, weather, etc. to figure out what exactly went wrong. Georgia no longer throws out treatments after one failure. If a treatment is not working after several attempts to improve, then a decision is made on whether that treatment should remain within its program.

North Carolina

North Carolina formerly performed chip seals in-house but has moved toward contracting out its chip seals. The DOT has found historical aggregate and emulsion rates that its road oil crews used to use and are implementing it into contracts, which has been a great success.

Illinois

When Illinois began focusing on pavement preservation, Dennis Bachman suggested the DOT talk to its local agencies since they had been performing chip seals for a long time. Illinois is still working on updating its chip seal specification and also developing a Chip Seal Manual.

Massachusetts

Massachusetts drafted a preservation policy through EDC-4 which has not gone through but has been a huge step in the right direction. It has also conducted a 120-lane mile project which is still in good condition seven years later.

Note from FHWA

A sieve test is included in the specifications for some of the pavement preservation treatments. FHWA assisted on a project for one agency where the contractor was not meeting ISSA requirements and were testing high on sand equivalent. Requirements are not going to be met if there is an abundance of dust on the aggregate. The source the contractor had decided to use did not meet specifications. After the agency stood firmly behind its specification and the contractor went to another source, the project went on without failure.

Having trainings on the specifications and application process could mitigate issues such as these.

Kentucky

When Kentucky begins a chip seal project, it will pretest the aggregate to check the sand equivalent. If the test results do not meet specification, then a stiff penalty (based on the bid item, not the bin price) will be placed and the project will get shut down before it starts. Tests are also performed frequently on the projects to make sure contractors are staying within the sand equivalent listed in the specification.

West Virginia

West Virginia is strict on sand equivalent as well. If contractors performing micro surfacing jobs want to change sources, they must submit a new mix design in most cases.

Are you completing any Public Service Announcements (PSAs) and/or educational outreach to elected decision makers or the public to promote a positive outlook on pavement preservation?

Illinois

Illinois does not do much in terms of PSAs, television commercials, or details on its website.

Delaware

Has created a flyer on chip seals for its elected officials and residents. Chip seal projects are started by wedging the roadway with HMA to improve longitudinal and transverse ride, then the chip seal is performed, and then a fog seal is used as a finish. Started this process last summer and wanted to utilize the flyer to get ahead of complaints. The flyer includes details on the process stages and why the process is being implemented.

Vermont

Vermont does not have any direct efforts for pavement preservation outreach, but the agency has an online platform for transparency. It includes a map view of all the capital projects across the

state and each project has a fact sheet, bid and award prices get added to at the end of the project. This is available to the public and is utilized by Vermont's legislature as well.

Vermont plans its projects three years out and is pretty good with scheduling. If its project details are going to be publicly available, it is important to stick to a strict schedule. Projects with a lengthier design process do not show up on the platform until it is certain when the project will take place.

MASSACHUSETTS

The town of Lexington, Massachusetts, is very invested in pavement preservation and sends out a flyer every year that includes a map of its planned projects. The DOT is a fan of this flyer and has considered putting something similar into its specifications for treatments like micro surfacing.

2.4. Group Discussion on Training Needs

Proposed Discussion Questions from the Meeting Agenda

- *Do you provide training on your pavement preservation policies and procedures described in your pavement design manual?*
- *What other types of training are available? For pavement design staff? For pavement management staff? (For both Central Office and District staff?)*
- *What is the frequency for training?*
- *Are there gaps? What are your future training needs over the next one to three years?*
- *What future research areas would be helpful in supporting your pavement management activities?*

Group Discussion

The following is a summary of the group discussion.

- A show of hands was asked for those familiar with the Transportation System Preservation Program (AASHTO TSP2). A fair number of hands were raised.
- A show of hands was asked for those that participate in the Preservation Partnerships. Roughly less than half of participant hands were raised.
- A show of hands was asked for those not familiar with the NCPP Certification. There were quite a few participants unfamiliar with it.
- A show of hands was asked for those planning to attend the National Pavement Preservation Conference (NPPC) to be held in Indianapolis, Indiana, in September 2023. Most participants are planning to attend.
- FHWA has partnered with ISSA for years to sponsor people to attend the Slurry Systems Workshop held in Las Vegas, Nevada, in January every year.
  - It had been held virtually throughout the COVID-19 pandemic.
  - The NCPP Certification exam is proctored on the last day of the workshop.
  - FHWA will announce in September/October if they will be sponsoring in-person candidates for the next workshop.

- NCPP has initiated an Education and Training Questionnaire to assess current available trainings to see if they are up-to-date and to see how they can be harmonized to address all pavement preservation needs. They will be conducting a gap analysis to see if current trainings can be updated instead of having to start new.
  - A survey was sent to training providers, state agencies, and the industry.
  - A show of hands was asked for those that have received the survey. There were not many participants that had received the survey.
- FHWA Pavement Preservation 2020 Webinar Series:
  - Emulsions 101
  - Milling Best Practices
  - Introduction to Slurry Systems
  - Crack Treatments (Series I)
  - Hot In-Place Recycling (HIR)
  - Engineered Emulsions
  - Chip Seal Introduction, Site Selection, Design, and Materials
  - Cold In-Place Recycling and Cold Central Plant Recycling (CCPR)
  - Tack Coat and Fog Seals
  - Micro and Slurry Mix Design and Material Testing
  - Full Depth Reclamation
- FHWA Pavement Preservation 2021 Webinar Series:
  - Need for Environmental Product Declarations (Asphalt Emulsions)
  - Instrumented Pavement Recycling Performance on 64 by VDOT
  - Crack Sealing (Series II)
  - Use of RAP in Pavement Preservation Treatments
  - Storage and Handling of Asphalt Emulsions
  - Chip Seal Equipment Calibration
  - Emerging Asphalt Emulsion Technologies
  - Construct High Quality Slurry/Micro Surfacing Treatments, Part I
  - Chemistry Formulation, Manuf. Precision and QC for Emulsions
  - CIR/CCPR Mix Design Guidelines and Practices
  - Construct High Quality Slurry/Micro Surfacing Treatments, Part II
- FHWA Pavement Preservation 2022 Webinar Series:
  - Asphalt Emulsions 102: Beyond the Basics
  - Mississippi DOT Micro Surfacing Project Yields High Return on Investment
  - Scrub Seal Pavement Treatments
  - Agency Experiences with Emulsion Preservation Treatments and Research
  - Project Selection and Design of In-Place Recycling
  - Proven Preservation Strategies for Your Network
  - Emulsions – What is it good for?
  - The Use of Cold In-Place Recycling as Innovative Solution for a Sustainable World
  - Introductions to the ISSA Inspectors and Designers Manual

- FHWA is in the process of working to create an NHI training on the design and inspection of pavement preservation treatments. Once it gets awarded, he will be looking for curriculum ideas.
- FHWA has been working with Arkansas DOT to update two web-based trainings on slurry seal and to create a third training focused on combination treatments.
- **FHWA would like to get in contact with all state training coordinators.**

What are the current training gaps?

MISSISSIPPI

Mississippi sponsored research in 2022 for a Guide for Pavement Preventive Maintenance Inspector Training, which was a product being made by the National Cooperative Highway Research Program (NCHRP). It utilized the top research problem statements in the FHWA Pavement Preservation Research Roadmap.

This training was not published. The DOT is asking if Peer Exchange participants would be interested in a training like this and their intent is to put it forward again this year.

KENTUCKY

Kentucky found that there are problems regarding the lack of knowledge across its state regarding preservation and the intimidation factor of the equipment needed for preservation. Kentucky is now giving presentations to its cities, counties, contractors, and in other states to help grow their projects and practices.

Kentucky is also wanting to develop a certification program.

MASSACHUSETTS

Massachusetts does not have a formalized training program that it is happy with. The DOT tries to get out in the field on preservation projects, which is not always possible. The DOT does not run through a checklist with the contractor and inspector during preconstruction. Most of these are QC jobs, but there is a difference between having the requirements and enforcing them.

During EDC-4, the DOT held bi-weekly meetings for the demonstration project since it was the first time using UTBOs.

ARKANSAS

Arkansas does not currently have a formal training program. The DOT is working in collaboration with FHWA to update web-based trainings on slurry seal and combination treatments.

NORTH CAROLINA

North Carolina hosts inspector training that the DOT has created every spring. The DOT is trying to decide if it wants to add an exam at the end of this training. A team of retired engineers was employed to develop the program. The DOT also hosts workshops with its engineers in the fall

to problem solve preservation needs within divisions and how to best maximize those needs. A large amount of the training performed with inspectors happens on job sites.

West Virginia

West Virginia does not have a formal training program. It hosts a Pavement Preservation Conference every two years, which provides a mic of training and information sharing. The DOT requires that the contractor have at least one person onsite that is NCPP certified (or has completed another recognized certification). The DOT also requires a QC plan.

Delaware

On the statewide side, Delaware does not have a formal training program. Estimate that 90% of its inspection force is made up of consultant inspectors. The DOT will train inspectors that are aware of the ongoing and upcoming projects, but there is no guarantee that they will be the ones inspecting the projects.

Delaware's Southernmost district had NCPP visit for three days in December 2022 to give a lecture to its maintenance crews that are performing chip seals. There was one full day of lecture and one half day of field application using their own equipment.

Connecticut

Connecticut has an advisory section that supports its districts through presentations; this is not a deep dive into specific treatments. The advisory section is also involved in preconstruction and provides early project support. The issue Connecticut has is that its designs are not influencing the trainings. The DOT is writing the specifications needed but is not preparing the training material.

On the construction side, one out of its five districts rely on the TC3 training. Unsure about the other four districts.

Connecticut may start to target its training based on what treatments are to be used on projects within a given year.

Tennessee

Tennessee does not have a formal training program specific to pavement preservation. It hosts trainings focused on materials which includes some training on emulsions.

Alabama

Alabama does not have a formal training program specific to pavement preservation. It has a training bureau and certification program for asphalt and concrete materials and construction. Alabama has brought in ISSA to conduct regional trainings. A former employee of Alabama DOT used to host a few classes on slurry seal, but that is long gone.

Nebraska

Nebraska does not have a formal training program specific to pavement preservation. The DOT conducts asphalt and concrete trainings, which primarily consists of getting people out in the

field to observe. Estimate that 95% of the preservation work is done by its maintenance forces; unsure if they are completing any training.

NOTE FROM FHWA

FHWA has an NHI Maintenance Leadership Academy, which takes thirteen weeks to complete. It consists of alternating between one week of in-person training and one week of remote readings, web-based trainings, and workbook lessons.

VIRGINIA

Virginia has a formal training program through VECAT, which can be taken by both Virginia DOT and industry personnel. Its contractors need this certification.

GEORGIA

Georgia's let projects have more of a formalized training. The DOT performs an annual two-minutes construction joint mix with a contractor, which is usually run out of its Office of Materials and Tests along with construction and the contractor. The DOT trains inspectors in each of the districts in the winter, which mostly covers HMA and chip seals.

Its Maintenance Office meets quarterly with each of the districts to encourage them to let more "true" pavement preservation projects. If the districts are trained to let the projects, then they will have the need to train the inspectors on more treatments.

The DOT has a consultant whose primary responsibility is to ensure that the pavement preservation program is continued, which includes training for pavement preservation.

MINNESOTA

Minnesota's contracting arm has "eroded." Its contractors knew more about the pavement preservation treatments than the inspectors did, but now they are facing increased failures and inspectors do not know what they are looking at. Minnesota is back to trying to grow its in-house preservation instead of relying on the contract side.

TEXAS

Texas does have trainings. From a planning perspective within the PMS training class (two-day class for each district), both preventive maintenance and preservation treatments are covered. The DOT has found this beneficial because those attending the classes are the ones that make decisions on selecting treatment types. Seal coat is one of Texas' major treatments, which has specific trainings for that through the Maintenance Division.

Its trainings on seal coat design, construction, and inspection are by request. The DOT receives many requests per year. Training is done through the Texas A&M Transportation Institute.

Do you include training with their annual pavement or engineering conferences?

- Most states do include training with their annual conferences.

NEW JERSEY

New Jersey does provide training for its construction resident engineers and inspectors every year in the winter. These training are put on by its Pavement Design Unit.

Internally, the DOT requires the pavement design team to take the AASHTO TC3 and Pavement Preservation and Recycling Alliance (PPRA) trainings as well.

3. DAY 2 WRAP UP

FHWA leadership thanked everyone for attending the Peer Exchange and for their active participation in providing the feedback loop FHWA was hoping to receive. They also stated the importance of training and encouraged participants to discuss training needs at their Pavement Preservation Partnership meetings and encouraged everyone to continue discussions they had through the contacts made at the meeting.

APPENDIX A: MEMBER BULLETIN

The following is a list of resources shared by Peer Exchange participants for your reference.

Separate from this file:
Please send an email to Erin Murray (*erin.murray@weris-inc.com*) if you would like any of these files forwarded to you.

- Guide for Pavement Preventive Maintenance Inspector Training
  - *Mississippi DOT*
- Alabama DOT Pavement Preservation Policy
  - *Alabama DOT*
- Delaware DOT Public Outreach Brochure on Pavement Preservation
  - *Delaware DOT*
- Illinois DOT's Chapter 53 "Pavement Preservation and Rehabilitation Strategies" from its Bureau of Design and Environment Manual
  - *FHWA Illinois Division*

Webpage links:

- NCPP – Education and Training Questionnaire
  - *NCPP*
- Virginia Education Center for Asphalt Technology (VECAT) Certification Classes
  - *Virginia DOT*
- RAP in Pavement Preservation
  - *FHWA Office of Research, Development, and Technology*
- Pavement Preservation Roadmap
  - *FHWA Office of Research, Development, and Technology*
- Live FHWA Pavement Preservation Research Roadmap Update
- FHWA Pavement Preservation 2020 Webinar Series:
  - Emulsions 101
  - Milling Best Practices
  - Introduction to Slurry Systems
  - Crack Treatments (Series I)
  - Hot In-Place Recycling (HIR)
  - Engineered Emulsions
  - Chip Seal Introduction, Site Selection, Design, and Materials
  - Cold In-Place Recycling and Cold Central Plant Recycling (CCPR)
  - Tack Coat and Fog Seals
  - Micro and Slurry Mix Design and Material Testing
  - Full Depth Reclamation
- FHWA Pavement Preservation 2021 Webinar Series:

- Need for Environmental Product Declarations (Asphalt Emulsions)
- Instrumented Pavement Recycling Performance on 64 by VDOT
- Crack Sealing (Series II)
- Use of RAP in Pavement Preservation Treatments
- Storage and Handling of Asphalt Emulsions
- Chip Seal Equipment Calibration
- Emerging Asphalt Emulsion Technologies
- Construct High Quality Slurry/Micro Surfacing Treatments, Part I
- Chemistry Formulation, Manuf. Precision and QC for Emulsions
- CIR/CCPR Mix Design Guidelines and Practices
- Construct High Quality Slurry/Micro Surfacing Treatments, Part II

- FHWA Pavement Preservation 2022 Webinar Series:
  - Asphalt Emulsions 102: Beyond the Basics
  - Mississippi DOT Micro Surfacing Project Yields High Return on Investment
  - Scrub Seal Pavement Treatments
  - Agency Experiences with Emulsion Preservation Treatments and Research
  - Project Selection and Design of In-Place Recycling
  - Proven Preservation Strategies for Your Network
  - Emulsions – What is it good for?
  - The Use of Cold In-Place Recycling as Innovative Solution for a Sustainable World
  - Introductions to the ISSA Inspectors and Designers Manual