

Using Guidelines for the Preservation of High-Traffic - Volume Roadways SHRP2 Case Study



Using Pavement Preservation Analysis Tools to Extend Roadway Life

Outreach to New Jersey, Washington State, and West Virginia Leads to More Preservation Opportunities

Applying pavement preservation techniques effectively on high-traffic roadways requires a systematic approach that considers a variety of road conditions and proper timing of treatments to reduce the impacts of environment and traffic. Many conventional preservation techniques as well as new ones can be used to extend the life of high-traffic roadways without major reconstruction and traffic disruption.

Through the Implementation Assistance Program (IAP) sponsored by the Federal Highway Administration (FHWA) and the Association of State Highway and Transportation Officials (AASHTO), the product, *Guidelines for the Preservation of High-Traffic-Volume Roadways* (R26), introduced several state departments of transportation (DOTs) to the concepts, applications, and benefits these pavement preservation strategies could offer to enhance their programs. R26 was offered twice, in Rounds 1 and 7. Case studies related to Round 1 are available at the AASHTO SHRP2 [R26 webpage](#).

This case study focuses on the outcomes of the Round 7 implementation, in which three states received technical assistance to further develop their preservation programs by generating tools – specifically *Just-In-Time Training* – to build awareness within their agencies and sustain their efforts after SHRP2 deployment is completed. These states were New Jersey, Washington, and West Virginia.

Development of Outreach Tools

As part of the Round 7 implementation, an onsite review of existing preservation programs was undertaken in each of the three states to determine the effectiveness of their programs. The review included how each agency addresses high-traffic-volume

What are the Guidelines?

Guidelines for the Preservation of High-Traffic-Volume Roadways (R26) are a set of tools that state and local transportation or public works agencies can use to expand the use of pavement preservation techniques on high-traffic-volume roadways.

Developed through the second Strategic Highway Research Program (SHRP2), the tools offer the technical background and decision-making framework needed to bring preservation strategies widely into practice for high-traffic-volume roads.

They include:

- Data Collection Guide
- Preservation Analysis Tool
- Two Reports: *Guidelines for the Preservation of High-Traffic Volume Roadways* and *Preservation Approaches for High-Traffic-Volume Roadways*
- Online, *Just-In-Time Training*

These tools enable users to quickly identify treatment options by various categories, such as rural or urban roads, climate zones, work zones, traffic volumes, and relative costs.

All can be found at

http://shrp2.transportation.org/Pages/R26_HighTrafficVolRoadways.aspx

highways, gaps in their preservation programs, and recommendations for improvements that could help integrate preservation treatments on facilities with high-traffic-volumes.

These reviews were followed by the development and delivery of **four-hour workshops**, hosted by each of the Round 7 agencies and were based on the research and guidance developed for the SHRP2 R26 project. The workshops enabled participants to:

- Explain the similarities and differences between applying pavement preservation treatments to low- and high-traffic-volume roadways.
- Describe the information needed to make treatment decisions with minimal risk of failure.
- Modify preservation decision-making protocols and tools to include high-traffic-volume roadway (HTVR) candidates.
- Identify other changes that need to be made to an agency's preservation program to successfully include HTVR.
- Describe the resources available to help include HTVR in their agency's preservation program.

The workshops were held in five locations, including the New Jersey (NJDOT), Washington State DOT (two locations) and West Virginia Division of Highways (WVDOH) (which implemented the program for WVDOT) as well as the Georgia DOT, which was a Round 1 IAP agency but not part of the Round 7 IAP.

During visits and workshops with the technical staff and the states, information was gathered to develop online **Just-In-Time (JIT) Training**. The training was created to equip not only designers and planners but also DOT maintenance crews with the knowledge and capabilities to effectively apply pavement preservation techniques. The training is divided into 19 modules; topics were identified and selected by the Round 7 state DOTs to address their interests and needs. To that end, each topic was assigned to an agency "champion" to help guide the development of the module. Table 1 identifies the topics and their agency champions.

Table 1.

Just-In-Time Training Modules		
Topic Areas	Modules	State Lead
Pavement Preservation Overview	Pavement Preservation: An Overview	NJ
	Pavement Preservation Project Selection	WV
	Pavement Preservation Treatment Selection	WV
	Pavement Preservation: Additional Decision-Making Considerations	NJ
	What to Look for in a Quality Pavement Preservation Project: Preconstruction, Postconstruction, and Beyond	WV
	Asphalt-Surfaced Pavement Distress Identification	WV
Preservation of Asphalt-Surfaced Pavements	Asphalt Pavement Patching Overview	WA
	Asphalt Partial-Depth and Full-Depth Patching	WA
	Crack Preparation	WA
	Chip Seal Overview	NJ
	Chip Seal Preconstruction Inspection	WA
	Chip Seal Construction Inspection	WA
	Scrub Seals	WV
	Planning for Micro Surfacing	WV
	Slurry Seals and Micro Surfacing	NJ
	Thin Asphalt Overlays and Ultra-Thin Bonded Wearing Courses (UTBWC)	NJ
Preservation of Concrete-Surfaced Pavements	Concrete-Surfaced Pavement Distress Identification	WV
	Concrete Pavement Preservation: An Overview	NJ
	Partial-Depth and Full-Depth Repair of Concrete	NJ

This case study will briefly review how each state responded to the workshops and training opportunities made available through the SHRP2 effort as well as their expectations going forward.

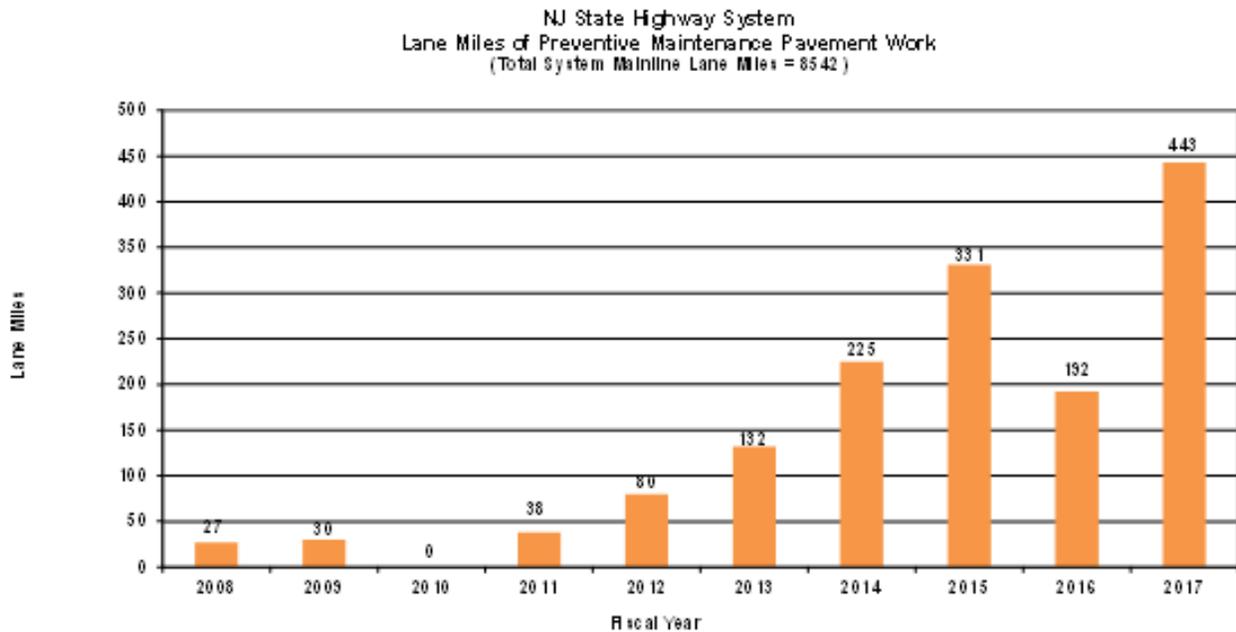
New Jersey DOT's Experience

The New Jersey Department of Transportation (NJDOT) began a preservation program in 2008, when the Department changed its programming to an asset management-based model. The DOT's goal was to have 80 percent of its pavement on the roadway network in a fair or good state, as defined by the International Roughness Index (IRI) and Surface Distress Index (SDI). In 2017, the preservation program treated 443 lane miles and rehabilitation was done on 705 lane miles of the system's total 8,542 lane miles, primarily using high-performance asphalt thin overlay (HPTO) procedures.

Most decision-making for NJDOT's pavement preservation program comes from the Pavement group in the DOT's headquarters, with the exception of certain maintenance operations. The current selection process consists of the following steps: the candidate project list is identified from the pavement management system (PMS); each potential project is then assessed individually through video and condition data; and, finally a field check is conducted before final recommendations are made, a process that takes several months to complete.

Since beginning its program in 2008, NJDOT has had good experiences using a range of pavement preservation treatments, including high-performance, thin overlays (HPTO), ultrathin friction course, micro surface, slurry seal, chip seal, cape seal, fog seal, and crack seal techniques. The program has grown steadily from several million dollars at its inception to more than \$100 million a year on pavement preservation by 2017 (see Table 2). The DOT continues to gain experience and confidence in their preservation activities.

Table 2.



NJDOT approached its R26 project with several goals:

- A review of the agency's current pavement preservation program and feedback on how its practices can be improved
- A review of specifications for the treatments used in New Jersey, and identification of additional acceptance specifications
- Assistance in marketing pavement preservation to the residents of New Jersey to show how preservation works and why it is efficient, and that it is part of a larger national initiative

- Targeted training for staff on a range of pavement preservation techniques and uses to address knowledge gaps
- Increasing the number of available contractors who will do this work

In January 2019, NJDOT hosted a workshop that included participants from many different backgrounds and responsibilities within the Department, as well as representatives of the asphalt paving industry, the preservation industry, and an aggregate supplier. This more inclusive audience enabled the agency to interact with these industries, for the industries to interact with the DOT, and for the industry representatives to interact with each other.

Within NJDOT, the workshop served several purposes:

- Increased the comfort level of staff regarding the use of pavement preservation on high-traffic-volume roadways, since the DOT could see that other states were using these techniques and that it is part of a national initiative supported by experts and by field experience developed over many years;
- Helped to introduce the concepts of pavement preservation on high-volume roads to those who were new to the topic; and
- Provided those with some understanding an even greater familiarity with the practice of preservation on high-volume roadways.

An offshoot of this workshop was the engagement of NJDOT in the development of content for the national *JIT Training*.

Currently, NJDOT's own staff provides winter training with construction resident engineers and inspectors. This training covers Hot-Mix Asphalt (HMA), rehabilitation, and a range of other topics. Pavement preservation, however, is not covered but it is critical that these inspectors understand what makes a preservation treatment successful and what some of the pitfalls can be so that they know what to look for during placement.

NJDOT was eager to participate in the development of the just-in-time pavement preservation topics to be included in the *JIT Training* modules and chose to champion the following topics:

- Pavement Preservation – An Overview
- Pavement Preservation Treatment Selection: What to Know
- Chip Seal Overview
- Concrete Pavement Patching
- Slurry Seals and Micro Surfacing

Next Steps

In the future, given the internal turnover rate, NJDOT would like to hold a training workshop annually, perhaps one that could be adapted to address specific state needs and focus more on local issues. The state champions feel their staffs need to develop more confidence in the agency's preservation practices, and events like this will help that to occur.

The agency also wants to continue to receive more benchmarking information such as additional guidance on treatment selection and how to understand the benefits and costs associated with various preservation treatments. This will contribute to an improved pavement preservation program.

The DOT is also working with Rutgers University to develop outreach materials that will assist in showing New Jersey residents how preservation works and why it is efficient, and that it is part of a larger national initiative.

Regarding the *JIT Training*, Robert Blight, NJDOT Supervising Engineer in the Pavement Design and Technology Section, said that because it is available online and can be taken in segments, his staff can use the modules that cover specific treatments when a related project comes up. "There is a lot of in-depth training on

preservation, but quite often the staff don't have time to go through that training when they need to know something. The 'shallower dive' associated with this format will be very helpful. The project selection, treatment selection, and distress identification topics will be especially helpful to new staff," Blight said.

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West Virginia's Effort to Enhance Training

The West Virginia Department of Transportation (WVDOT) implements a statewide preservation program on its 35,000-lane mile system. Within WVDOT, the Division of Highways (WVDOH) is responsible for planning, engineering, rights-of-way acquisition, construction, reconstruction, traffic regulation, and maintenance, focusing its work on paved sections that are longer than 0.5 mile. Based on MAP-21 criteria, pavements in West Virginia are generally in very good condition.

West Virginia's pavement preservation program uses robust pavement management practices and since 2010 has expanded the list of treatments it uses to improve network pavement performance. The WVDOH focuses its preservation work on pavements rated as "Fair" in their IRI dashboard. To strengthen its employees' access to technical content on pavement preservation, the agency has invested in the Transportation Curriculum Coordination Council (TCCC) and WVDOH employees have access to the full catalogue of this training through OneNote. The agency also uses the [Guidelines](#) developed in R26 as part of its training effort.

"Preservation is young enough in West Virginia that we want to see a variety of treatments here. The state's participation in Round 7 is helping us advance the processes and select the treatments that best suit the individual site."

- Travis Walbeck, WVDOH
State Pavement Engineer

The agency's goals in implementing R26 were to:

- Receive a comprehensive review of its preservation program to identify any existing gaps
- Identify any additional requirements needed to integrate high-traffic-volume roads into the preservation program
- Develop a WVDOH-specific "preservation manual"
- Widen the knowledge of the industry about preservation options

As part of implementation, WVDOH hosted a workshop in November 2018 attended by representatives from cities, the DOT central office, Districts, and West Virginia University. WVDOH is actively working to increase and improve the practice of pavement preservation, and the workshop helped to generate a greater general awareness.

During the workshop, the need for customized pavement preservation guidance was identified to assist District Design Engineers and District Maintenance Engineers. In the past, some projects selected for pavement preservation were not actually good candidates; with access to better guidance, those instances could be reduced or eliminated.

For example, six projects in one WV District were identified as options for cape seal preservation treatments. Since alternate bids are allowed as part of the state's contracting process, all six were contracted to be constructed as HMA overlays. A subsequent value engineering process found that only two were actual candidates for preservation. This process affirmed the need for better guidance on project selection and for treatment selection, as well as for having a larger pavement preservation toolbox as an easy reference for engineers and contractors alike.

Although the initial R26 report helped identify a better understanding statewide of the “when and where” of pavement preservation, WVDOT intends to develop guidelines that address the specific needs of the Department and its staff. Serving as a champion for the development of key **JIT Training** topics, as shown below, is a step toward developing the customized guidance the agency seeks.

- Pavement Preservation Project Selection
- Asphalt Pavement Distress Identification
- Concrete Pavement Distress Identification
- Pavement Preservation: What to look for
- Planning for Micro Surfacing
- Scrub Seals



Participants at the workshop hosted by the West Virginia Department of Highways.

- Photo courtesy David Peshkin

Next Steps

West Virginia also recently hosted its second statewide pavement preservation conference with 150 participants. Outreach efforts such as these are educating more highway staff in the state about the benefits of preservation and the techniques that are being used. By continuing these efforts, the state hopes its preservation program will continue to grow and see positive results.

Additional training will help expand the understanding of pavement preservation techniques at the District and local level. The agency intends to use the **JIT Training** to support the TCCC training as well, finding that the project selection, treatment selection, and distress identification topics within the **JIT Training** will be especially helpful to new staff.

WVDOH is also developing a special provision that can be inserted into any contract for a preservation-related construction project, which would require the vendor to have taken some type of “just-in-time” pavement preservation training, which could be online or the R26 **JIT Training** modules. This will be a very useful way of getting the right type of technical information into the hands of those who need it most in a timely manner.

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Washington State DOT's Preservation Focus

The Washington State DOT estimates it can extend a pavement's life cycle by a minimum of two years by using strategic preservation activities. The agency has established a policy requiring strategic preservation activities on all capital preservation projects prior to funding rehabilitation. The net savings once the policy is fully implemented is expected to be \$15 million per year. The agency is also adopting the use of chip seal surfacing (instead of hot-mix asphalt) for pavement surfaces carrying up to 10,000 vehicles per day as a standard practice, saving \$40 million per year when fully implemented by 2025.

Like many agencies, WSDOT faces challenges of employee retention and the constant need to provide training to a new group of maintenance employees. As a result, WSDOT's goal in implementing the **Guidelines** product was to develop useful just-in-time training that could be available by tablet, phone, and laptop.

Currently, the agency holds three to four maintenance forums a year with an average of 40 to 50 participants at each. Additionally, 1,300 maintenance employees statewide have access to internal training; however, employees are not required to take the training.

To ascertain their training needs, two workshops were held across the state, and, by design, the invited participants were mostly from local agencies who may not have had much exposure to pavement preservation

techniques and tools. Their day-to-day responsibilities more often involve materials testing, design, and inspection. Furthermore, maintenance employees work on a variety of activities over the course of a year, cycling through snow removal, litter pick-up, mowing, and pavement preservation. Since every technician has an iPad in the field, the online just-in-time training could provide a refresher and could be accessed just when it was needed the most.

WSDOT also had an interest in understanding how to select the right materials for their environment and how to select better pavement preservation projects. This is especially important for new inspectors, and, could ultimately improve the quality of the preservation work done by state crews.

As part of the Round 7 implementation support, WSDOT elected to serve as the lead agency for the development of the following *JIT Training* lessons:

- Crack Filling and Sealing Preparation
- Chip Seal Pre-Construction
- Chip Seal Construction
- HMA Patching Overview
- HMA Surface Patching

These topics will help answer the questions routinely asked by maintenance and construction workers in the field. WSDOT wanted training that informed its staff about what to look for on a preservation project, as well as how to identify what shouldn't be there. The audience for the *JIT Training* within WSDOT is at the supervisor level and those working in the field, specifically maintenance workers who require task-driven training.

In the process of developing the *JIT Training*, the state's R26 IAP team was introduced to a variety of other training options, including the work done by the Transportation Curriculum Coordination Council (TCCC, or TC3); Every Day Counts; asphalt Tech Briefs being developed by the University of Nevada-Reno; concrete preservation treatment training developed by Iowa State; and certification work by the National Center for Pavement Preservation.

The state also supports a Bituminous Surface Treatment design and construction training program. This program discusses the use of crack sealing, chip seals, and fog seals for pavement preservation and covers quality verification and assurance.

Next Steps

The *JIT Training* fits well into the overall WSDOT training program. The format will help them to share focused technical content in a concise, timely, and targeted manner with access to a library of content. The agency plans to tailor the content to suit its specific conditions, where needed.

Looking ahead, WSDOT may want to augment the training to address different investment strategies to extend pavement life. Success stories from other states may also be helpful. At a minimum, they would like to host additional workshops. WSDOT also plans to repeat its successful National Highway Institute Maintenance Leadership Academy, first held by the state in 2017.

The staff are also investigating opportunities to better integrate the training that is available into achieving WSDOT's goals. For example, this could include tracking the training taken by employees so that managers better understand their knowledge and experience level, or by linking training to pay increases or promotions.

Among the WSDOT practices targeted for future improvements is the goal of gaining a better understanding of the impact of preservation on pavement performance, such as life extensions and improvements in project and network performance. By continuing its preservation program and enhancing the skills of the state's maintenance employees, WSDOT is working to maximize the return from their investment in pavement preservation

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Resources

The outreach conducted in Round 7 was developed in close interaction with the Round 7 agencies, but also with an eye on a much broader use of the R26 product post-SHRP2. The *JIT Training*, in particular, is based more on generally accepted best practices rather than any single agency's specific practices. These modules provide useful information, as well as links to sources that offer more detailed information.

For more information on the *Guidelines* product, contact Thomas Van at FHWA at thomas.van@dot.gov or visit the AASHTO R26 web page: http://shrp2.transportation.org/Pages/R26_HighTrafficVolRoadways.aspx. Available through 2021, the web page includes links to the *JIT Training* and associated workshops; the *Data Collection Guide; Preservation Analysis Tool; Guidelines for the Preservation of High-Traffic Volume Roadways, Preservation Approaches for High-Traffic-Volume Roadways*; several case studies; presentations; webinars; and brochures.