Enhancing the Science of PAVEMENT PRESERVATION

In Minnesota's most densely-populated county, the public works department works hand-in-hand with the state DOT to expand research on pavement preservation

Transportation officials, whether local, state or federal, share a common goal: getting the best bang for the buck. That is the *raison d'être* for Paul Nolan, research project supervisor in the Materials and Road Research office of the Minnesota Department of Transportation (MnDOT). Nolan serves as a technical resource for cities, counties, and townships, helping to identify, test and implement new tools for agencies and engineers' pavements and pavement preservation toolboxes. His role is to ensure that the right products and techniques are used in pavement projects, so all parties, including government agencies, taxpayers and travelers, benefit.

In Hennepin County, home to the state's largest city — Minneapolis, Nolan is working with the public works department to apply an asphalt rejuvenator and learn how its benefits will impact pavement performance both in the county and throughout the state.

LAYING THE FOUNDATION

Testing first took place in 2019, when representatives from Hennepin County Public Works (HCPW) and MnDOT initially applied Delta Mist, a plant-based asphalt rejuvenator designed to prevent cracking, in six different applications, including pavements of varying age and traffic load. The rejuvenator is manufactured by Lowell, Mass.-based Collaborative Aggregates LLC.

Initial considerations included how the rejuvenator would affect striping, friction, cracking, crack sealant and mastic. "In our first trial, MnDOT tested the reflectivity of the pavement markings," adds Trudy Elsner, P.E., who serves as road and bridge senior professional engineer at HCPW. She noted that while a decline was observed immediately after application, it rebounded.

After being applied on a cool, fall day, the road was reopened to traffic after 90 minutes, using an abundance of caution to ensure it was dry.
Hennepin County Public Works

Applications tested how the rejuvenator performed under various traffic loads by testing it on high and low traffic pavements, parking lots and some of the state's numerous recreation trails. To date, research has been

« Asphalt Testing Solutions & Engineering are analyzing both control and treated core samples. Additional core samples will be taken and studied over the next two years.
Hennepin County Public Works

promising. It has shown that the rejuvenator aids with the retention of the fines, but road officials want to see how that retention plays out in terms of extended pavement life. They are also watching cracking to see if it helps prevent secondary and tertiary cracking.

BUILDING UPON THE BASE

In September 2022, the county undertook a second round of trials. This time, it tested the rejuvenator on a newer pavement to evaluate the impact of application earlier in the pavement's lifecycle and at a lower application rate. It also reapplied the rejuvenator on some of the 2019 trial sections to see if a second application offered additional preservation benefits.

"Looking at the rejuvenator, the recommendation was to apply it early in the pavement life cycle before the oxidation damaged the pavement. We were looking for a pavement that was new for this trial," Elsner says, noting that County Road 92 was quickly identified as a good candidate.

While the goal is to apply a rejuvenator to its roads within the first five years of pavement life, she explains, funding doesn't always allow for that. Rejuvenators, chip seals and micro surfacing all play a role in the county's approach to pavement preservation. "We're looking for life extension of our system and trying to balance all the different treatments," she says. "It's about the right treatment, at the right time, on the right road."

In the case of CR 92, it seemed like the right treatment, at the right time. "We've just done a stabilized, full-depth reclamation on it last year," Elsner explains. "The pavement is just a year old." This offered a good contrast to the county's 2019 application, done on the main line and shoulders of County Road 19, which was 11 years old at the time of the trial. Because the CR 92 pavement was considerably newer, an application rate of 0.06 gallons per square yard was used compared to an application rate of 0.085 gallons per square yard used on CR 19.

The project was aided by Asphalt Surface Technologies Corp. (ASTECH), which donated the distributor truck and operator to Nolan and MnDOT for the field application. ASTECH markets and applies an asphalt rejuvenator called Replentify, available from Flint Hill Resources, in the region. The Delta Mist rejuvenator was applied along one mile in the northbound lane of CR 92.

At the Three River Park District's Lake Rebecca horse trail parking lot, the rejuvenator was re-applied to a portion of the parking lot that was treated in 2019 while another portion was left untreated.

This allows the county and state to evaluate pavement conditions with one, two, and no rejuvenator treatments.

Finally, the city of Eagan's recreational trail, also previously treated, received a second application. The trail had been extended since the 2019 application; therefore, the new portion of the trail received its first treatment. This gives MnDOT an opportunity to compare single and double applications.

The groups took core samples of the control and treated sections of CR 92. Those cores are being analyzed by Jacksonville, Fla.-based Asphalt Testing Solutions & Engineering (ATS) using the FAA P-632 specification for asphalt pavement rejuvenation. Cores will be taken and tested again at the one- and two-year mark to measure the rejuvenator's pavement life extension benefits.

PLANNING FOR THE FUTURE

While the county and state will continue to evaluate the rejuvenator's impact over time, it has already gathered some takeaways from the two trials.

The spray application went down and dried quickly, even on a cool, fall day. "We did find that we were able to open up the traffic within 90 minutes," says Mitch Wolff, HCPW's supervising engineering technician. "From a pavement treatment standpoint, that is quite fast." If applied during the summer, he says, it would likely have an even quicker drying time allowing them to open the road up to traffic even sooner.

Field trials also allayed any concerns about having to redo pavement markings, which saves time and expense for the county compared to other treatments such as micro surfacing or using a chip seal. In addition, treatment of the recreational trail showed that the pavement retained good friction numbers, which is not always the case with polymer-modified fog seals. This was a significant concern for the trails, which are frequently used by bicyclists and rollerbladers.

Finally, the rejuvenator's plant-based formula also factored into its use along the recreation trail because it does not adversely impact any critical habitat. "Hennepin County has a climate action plan," Elsner notes, "so using products that are environmentally-friendly and sustainable is important to the county." AC

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