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FP² Inc. is a non-profit trade association organized under the Internal Revenue Code Section 501(c)6, and is supported by the pavement preservation industry, contractors, material suppliers and equipment manufacturers.

Formerly known as the Foundation for Pavement Preservation, FP² supports the adoption of pavement preservation at all levels of government, and works to ensure that pavement preservation becomes a part of road programs from coast-to-coast. It also supports valuable research in pavement preservation, and works in close cooperation with the Federal Highway Administration (FHWA), the National Center for Pavement Preservation (NCPP), and regional pavement preservation partnerships and state-based pavement preservation centers. FP² also sponsors key promotional activity events, such as international and national pavement preservation conferences. It supports distribution of promotional information to support pavement preservation, such as brochures and the quarterly magazine *Pavement Preservation Journal*.

Please consider joining the leading-edge businesses and national associations above in making a financial commitment to the future of pavement preservation by supporting FP². For more information, contact FP² executive director Rick Church, (630) 230-1397, rickc@cmservices.com.

PRESIDENT'S MESSAGE





Meetings, Conferences Set Stage for 2022 Season

BY TIM HARRAWOOD President, FP² Inc.

y the time this issue hits the stands everyone will have started the 2022 paving season. By all accounts it appears that there will be an abundance of pavement preservation projects to keep the industry busy throughout the construction season.

Agencies' growing interest in preserving their networks will drive the number of projects higher as each year passes. Industry will have to stay diligent in its efforts to keep up with this demand. This, all while the supply chain concerns linger on from last year. Workforce issues have improved at a slow pace, but the truck driver shortages remain front and center with no end in sight.

As with any business there will always be challenges, but the inability to move product from place to place will continue to be a formidable hindrance to productivity. That being said, I wish everyone a safe and successful 2022 construction season.

PPRA ANNUAL MEETING

The PPRA annual meeting—combining the annual meetings of the Asphalt Emulsion Manufacturers Association, Asphalt Recycling & Reclaiming Association, and International Slurry Surfacing Association—was held the week of Feb. 4 in La Jolla, Calif. After two years of restricted meetings in-person, PPRA was well attended, and the program agenda was full of interesting topics.

The combined sessions garnered large crowds and the technical sessions had, in my opinion, the best attendance in years. This may have been due to the locally cool and damp weather, but for whatever reason, it was nice to see the interest in the technical topics.

Along with the three association presidents, during the PPRA awards breakfast, it was my honor to help lead a tribute to FP²'s executive director emeritus **Jim Moulthrop**, **P.E.** Jim, his wife Marty, and their daughter Molly were in attendance, and much to everyone in the room's surprise, a video was displayed of **U.S. Rep. Glenn Thompson (R-Pa.)** recognizing Jim's accomplishments on the floor of the House of Representatives.

Shortly thereafter, Jim was called to the stage to receive awards from each association, and a framed copy of the house declaration in the National Register. I cannot think of a more deserving person for such an honor. Everyone associated with the pavement preservation industry owes Jim a debt of gratitude. Many thanks Jim! Read more about PPRA in this issue beginning on p. 18.

SEPPP MEETS IN GEORGIA

During the last week of March, Jekyll Island, Ga., hosted the Southeast Pavement Preservation Partnership (SEPPP) meeting, and it was refreshing to see a great turnout from the member state departments of transportation. Through its financial contributions to the National Center for Pavement Preservation, FP² funds in-part the four pavement preservation partnerships.

The attendance was great and FP² finally had the honor to formally induct retired FHWA engineer **Luis Rodriguez**, **P.E.** into the FP^2 Hall of Fame. Due to the pandemic and the inability to meet in person, the award originally was sent in early 2020 to Luis at his home in Georgia. We were glad to be able to celebrate his career on stage, in-person. Luis is a true believer in pavement preservation and his contributions to the cause are unmistakable. Congratulations to Luis for his Hall of Fame induction; see p. 33 for more coverage.

ADVOCACY TO CONTINUE

In 2021, FP²'s legislative efforts included over 100 meetings with congressmen, senators, and their staffs to advocate for pavement preservation funding, and to explain what it's all about. Our plan is to continue these efforts throughout 2022. As I write, FP²— along with the help of our Washington D.C. legislative counsel **Tracy Taylor**, of the firm Government Alignment Strategies—was actively setting up Capitol Hill meetings for the **Transportation Construction Coalition Fly-In** scheduled for May 16-17.

Also, May 11 marked the date for the annual preservation research sponsors' meeting at the National Center for Asphalt Technology in Auburn, Ala. I hope everyone interested in pavement preservation was able to attend—along with the Minnesota conference later this year—as they illustrate the unmistakable advantages of preservation as related to life extension and condition improvement.

This research—which started in Alabama in 2012, including Lee Road 159 with low-volume traffic, U.S. 280 with high-volume traffic, and the NCAT test track, in addition to preservation research in Minnesota for northern, cold climate pavements, including U.S. 169 and CSAH 8—is slated to end with a final report due out in mid-2024.

The data generated from this research will undoubtedly be used to update the pavement management software systems currently used by many agencies and will give road agencies the quantitative data they need to justify enhanced pavement preservation spending. This data-driven information will assist agencies decide in favor of preservation, and without doubt will be more useful than the survey-driven information relied on up to this point.





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Challenging Yosemite National Park Slurry Surfacing Wins ISSA President's Award

BY JEFF ROBERTS AND MATT FERGUSON

USS International mobilized its resources to one of the most beautiful places on earth to take on one of the largest and most difficult projects in the company's long history.

At Yosemite National Park in the high Sierras, multiple VSS crews had to overcome start up delays caused by a record 18-year snowfall which did not allow access to some of the work locations until after July 4.

Despite limited access at the higher elevations, steep grades, treacherous curves, the constant threat of fire, small staging areas and extremely limited communication resources, VSS International's team braved it out, living in campsite conditions for over three months to complete this project on time and to the satisfaction of the Western Federal Lands Highway Division.

All work placed approximately two years ago is still in place, and performing to the expectations of the owner's design, despite



harsh weather conditions and winter maintenance operations.

The on-time, on-budget performance of the contractor, and the resulting performance of the pavement preservation techniques, resulted in VSS being awarded the 2022 *President's Award for Excellence* from the International Slurry Surfacing Association (ISSA) at its annual meeting in March at LaJolla, Calif.

CROWN JEWEL OF SYSTEM

Established in 1890, Yosemite National Park is arguably one of the most beautiful places to visit in all of America. Encompassing approximately 750,000 acres, Yosemite is considered to be the "Crown Jewel" of the U.S. National Park System.

Yosemite receives over four million visitors annually and is known internationally for its glacially carved granite cliffs and valleys, waterfalls, clean streams, giant sequoia trees, lakes, mountains, meadows, live glaciers and wildlife.

Despite its beauty, the park's roadways were in immediate need of millions of dollars in infrastructure rehabilitation due to heavy traffic demands, and the impacts of harsh climatic conditions such as extended sub-freezing temperatures in the winter, and the extreme heat of hot summer days.

The \$6.4 million contract was awarded as part of a Multiple Award Task Order Contract (MATOC) by the Federal Highway Administration. The project had to be completed by the fixed date of Nov. 27, 2019. Working hours were restricted to 7 a.m. to 7 p.m., basically sunrise to



At Olmsted Point at elevation 8,141 ft., VSS crew places slurry surfacing on Tioga Road in Yosemite National Park







Slurry surfacing applied on upward grade near parking area in Yosemite National Park

sunset. A contractor quality control plan was required, and very restrictive project phasing maintained visitor traffic flow throughout the park at all times.

PLANNING AND PREP ESSENTIAL

Prior to mobilizing to the remote project location, VSS held dozens of planning and preparation sessions, including a day-long orientation session with all project participants to discuss the plan for executing this complex project.

The VSS technical team prepared mix designs which complied with ISSA A 143 guidelines. All materials were submitted to the FHWA in advance for quality assurance purposes.

The base project consisted of placement of a **Type III micro surfacing** application at large mainline section of State Highway 120 (also known as Big Oak Flat Road and Tioga Road), stretching approximately 50 miles across the width of the massive park. Type III mainline work was performed at elevation 9,074 ft. on Tioga Pass Road, and elevation 8,141 at Olmstead Point parking lot.

An additional 44 parking areas and campgrounds—as well as 45 roadway scenic pullouts—received a **Type II micro surfacing overlay**. Type II work included several large parking areas, such as the Badger Pass Ski area located at elevation 7,200.

VSS International completed all work during peak summer tourist season, requiring completion of over 700,000 sq. yd. of Type III micro surfacing and approximately 150,000 sq. yd. of Type II micro surfacing under intense working conditions.

The total Type III & Type II micro surfacing placed equaled over 11,000 tons of black aggregate supplied by George Reed's Table Mountain Quarry, and over 1,500 tons of MSE emulsion provided by VSS Emultech's plant located in West Sacramento.

VSS utilized both truck mounted and continuous micro surfacing equipment on this project, exhibiting the benefits of both types of equipment on this project.

Project requirements included the masking and protection of dozens of miles of granite curbing and islands throughout the park.

Over 2 million ft. of striping removal and replacement were undertaken by subcontractors. Some 13 miles of crack sealing treatment ensured that any significant cracks were sealed to slow the reflection of these cracks through the new slurry seal application.

Patching of the existing asphalt took place at multiple locations that had deteriorated beyond the point where the slurry seal alone could address the distress. Typically, the repairing of these distressed areas consisted of removing existing asphalt with a milling machine, and replacing the existing asphalt to a depth of 3 to 4 in. This included 10 miles of asphalt milling and replacement at the roadway centerline. Approximately 50 miles of centerline and edge line rumble strips were installed, which were fog-sealed prior to final striping.

KEY SAFETY CONCERNS

Other significant pay items included contractor quality control, contractor testing, construction scheduling, mobilization, and traffic control.

Key safety concerns included:

 Severe wildfire danger, with red flag alerts

Prior to mobilizing to the remote project location, VSS held dozens of planning and preparation sessions, including a day-long orientation session with all project participants

- Limited emergency services due to remote locations
- Environmental issues—Zero tolerance for spills, etc.
- Narrow roadways shared with large recreational vehicles
- Heavy bicycle and pedestrian traffic through the work zones
- Operation near cliff edges and sheer drop-offs
- Tanker and aggregate delivery routes through steep grades
- Park visitors constantly asking crew personnel for directions
- Limited hydration sources for crews in remote locations, and
- Encounters with wildlife.

In consideration of the safety risks, VSS was required to have fire extinguishers in trucks and equipment at all times, with all employees trained on fire suppression techniques. VSS designated a fire watchman on duty at all times who was required to have fire suppression equipment.

VSS utilized satellite phones, installed cell phone boosters and upgraded short range radios to help overcome communication issues created by nature of terrain. VSS installed plastic barriers and containment berms at all materials transfer points to limit potential spills. Traffic control was paramount to the daily success of all operations, with bicycle traffic escorted through the work zone separate from regular traffic. Complicating all this were:

- Extremely limited communications
- Long materials supply line of deliveries and suppliers over 100 miles away
- Distances between worksites consisted of 2+ hours of drive time through congested visitor traffic

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- Historic snowfall levels and summer snowmelt limited VSS' ability to start work in some areas, with meltwater sheeting across pavements; record 18-year snowfall levels were experienced in 2019
- Very limited and small staging areas, and
- Limited housing for crew personnel. Due to limited housing in the remote

location, VSS set up a camp for all employees working on the project complete with recreational vehicles (RVs), tents and food service, to provide three meals per day and needed provisions.

"Park work often entails extremely limited communications (no cellular and internet), and large distances and delivery times from suppliers," said Doug Worley, project engineer for Western Federal Lands Highway Division. "The distance of the Yosemite project's work areas from end-to-end consisted of a travel time of 2+ hours, through heavily congested visitor traffic, and deliveries from suppliers of nearly 100 miles away. NPS and its various departments were appreciative of VSSI's commitment and efforts to anticipate the park's immediate needs, as well as long-term satisfaction."

UNIQUE BLACK AGGREGATE

The Yosemite slurry surfacing project utilized over 11,000 tons of black aggregate supplied by the Table Mountain Quarry of George Reed Inc. Not only are these materials exceptionally hard and clean, but they also provide an added safety element by retaining the road's dark color for the life of the surface treatment, which helps make the pavement markings more visible for the entire life of the treatment.

VSS' experienced personnel rose to meet every challenge, and every shift created a favorable legacy for the future use of pavement preservation techniques in America's National Park System.

There were no lost shifts due to equipment downtime or other issues. The project was executed flawlessly as planned. Excellent planning and communication with all stakeholders, combined with excellent field supervision led to project success.

The Yosemite National Park Pavement Preservation Project provided the owner with substantial costs savings vs. conventional paving techniques, while conserving a significant amount of energy and natural resources.

Project cost calculators at **RoadResource.** org demonstrated this. If a convention minor mill-and-fill approach was used, a unit cost of \$9.80 for 900,000 sq. yd. resulted in a total cost of \$8.8 million, with an equivalent annualized cost of \$0.89, and life extension of 11 years.

The micro surfacing used a unit cost of \$2.77 per 900,000 sq. yd., with a total cost of \$2.5 million with an equivalent annualized cost of \$0.46 and life extension of

six years. By choosing the latter approach, taxpayers saved \$6.3 million, 72 percent less than the minor mill-and-fill.

Importantly, the elimination of haul trucks and other mobile construction equipment by slurry surfacing reduced project potential greenhouse gas emissions by 94 percent, the equivalent of removing 951 vehicles from U.S. roadways for a year.

Roberts is senior vice president, and Matt Ferguson is construction manager, at VSS International, West Sacramento, Calif



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Sustainability at Forefront of 2022 Meetings of AEMA-ARRA-ISSA as PPRA

COMPILED BY EDITORIAL STAFF

or the first time in two years, FP² Inc. founding associations **Asphalt Emulsion Manufacturers Association** (AEMA), **Asphalt Recycling & Reclaiming Association** (ARRA), and **International Slurry Surfacing Association** (ISSA) came together Feb. 22-25 for their 2022 annual meetings at the Hilton La Jolla Torrey Pines resort north of San Diego, Calif. The associations met under the umbrella of the **Pavement Preservation & Recycling Alliance** (PPRA) collaboration.

More than 350 registered attendees including AEMA, ARRA, and ISSA members, non-members, academia, and government agencies joined together to learn from industry leaders, network and enjoy the beauty of the Southern California coastline.

Program chairs **Dan Koeninger**, AEMA, **Kimbel Stokes**, ARRA, and **Brad Pearce**, ISSA, spent months planning the annual meeting with the primary focus on the environmental sustainability of pavement preservation treatments. Each chair was responsible for programming his association's technical session, while working together to create a program for the general session. After reviewing previous feedback, Koeninger, Stokes, and Pearce decided to update the schedule to avoid overlapping association technical sessions so attendees could attend them all if they wished.

GENERAL SESSION

On Wednesday morning, the general plenary session kicked off with keynote speaker **Dirk Beveridge**. Beveridge welcomed attendees while focusing on four key motivational themes: *purpose, alignment, growth, sustainability*.

This was followed by an industry panel moderated by **John Rathbun**, Cutler Repaving, which featured industry association leaders including FP² president **Tim Harrawood**; **Pete Grass**, The Asphalt Institute; **Antonio Nieves**, FHWA;



New 2022 AEMA board of directors are, from left, Arlis Kadrmas, BASF Corp.; Greg Arntson, Albina Asphalt; vice president Dan Koeninger, Terry Asphalt Materials, Inc; Cameron Porter, Asphalt Materials, Inc.; president Bob Huitt, Russell Standard; secretary/treasurer Matt Kennedy, McAsphalt Industries Ltd.; and Scott Dmytrow, Prism Worldwide. Not pictured: Past President Mark Ishee, Ergon Asphalt & Emulsions, Inc.; Rick Madison, Ingevity; Scott Watson, Paragon Technical Services; and Emmanuel Cornet, Colas S.A.



New 2022 ARRA board of directors are, from left, past president Jonathan Pease, RockSolid Reclamation & Stabilization; president Kimbel Stokes, The Miller Group; Eric Baker, Astec Industries; Nick Ware, Alpha Milling Company; David Peterson, Caterpillar Paving Products, Inc.; Marco Estrada, Pavement Recycling Systems; vice president Jason Wielinski, Asphalt Materials Inc/Heritage Research Group; and secretary/treasurer Bryan Ray, Allstates Pavement Recycling & Stabilization. Not pictured: Trevor Moore, Miller Paving Limited; Mark Stahl, Wirtgen Group; and Chris Gallagher, Gallagher Asphalt Corp.



New 2022 ISSA board of directors are, from left, treasurer Eric Reimschiissel, American Pavement Preservation; Jeff Roberts, VSS International, Inc.; Chris Oakes, Pavement Solutions; president, Chuck Ingram, Slurry Pavers Inc.; immediate past president Larry Tomkins, Ergon Asphalt & Emulsions, Inc.; secretary Brad Pearce, Viking Construction; Justin Guiles, Vestal Asphalt Inc.; vice president Dave Welborn, Ingevity; Tim Harrawood, Vance Brothers, Inc., and president, FP² Inc. Not pictured: Jason Lampley, Doolittle Construction; Fabio Mendez, MPI Ltda.; Chris Oakes, Pavement Solutions Inc.; Doug Olsen, Western Emulsions Inc. Bob Jerman continues as ISSA's technical director





AEMA-ARRA-ISSA Recognition Breakfast drew hundreds on second day of meeting



ARRA's Richard E. Lowell President's Award is presented to LaFarge's Tom Kiernan by then-president Jonathan Pease, Rock Solid



Passing the gavel: Jonathan Pease prepares to yield ARRA presidency to incoming president Kimbel Stokes, The Miller Group, while Stokes presents him with commemorative plaque

Dr. Bouzid Choubane, National Center for Pavement Preservation; Dr. Buzz Powell, National Center for Asphalt Technology; Bob Huitt, AEMA, Jonathan Pease, ARRA, and Chuck Ingram, ISSA. Then, Dean Franks, American Road & Transportation Builders Association, reviewed the new Infrastructure Investment & Jobs Act (IIJA) of 2021.

Attendees heard from **Yohan Halpern** and **Clarence Su** of Los Angeles County as they shared how they approached sustainable pavement treatments. Lastly, **Dr. Andrew Braham**, University of Arkansas and PPRA Sustainability Chair, provided an update on PPRA's Sustainability Committee.

TECHNICAL SESSIONS

ARRA's technical session was held Wednesday afternoon. Program Chair



Vario Consulting's Lindsay Matush and Grace Stansbery explain forthcoming improvements in RoadResource.org for 2022; look for article in Fall issue

Stokes put together a session that included mostly host-state job stories and projects.

First, Allen King, Caltrans, provided a DOT's perspective on the current state and future of recycling pavement in California. Bill Morgan, County of San Diego, shared advancements in the use of pavement recycling strategies in the San Diego region. Next, Michael Concannon, Pavement Recycling Systems, Inc. and Josh Nelson, City of Industry, Calif., provided attendees with information on City of Industry's sustainable approach for pavement reconstruction. ARRA's 2022 Hot In-Place Award Winners, Angela Hagger and Lindsey Chieduko, City & County of Denver, shared information on their award-winning project. Lastly, Dennis McElroy, Graniterock, shared information on the S.R. 1 cold in-place recycling project in California.

Thursday morning, AEMA program chair Koeninger created a technical session that included **Tom Flowers**, Ergon Asphalt & Emulsions, sharing information on how Texas is using emulsions in full-depth reclamation. Next, **Jean-Martin Croteau**, Colas Canada Inc., presented remotely on "half-warm" asphalt mix. Attendees then heard an update on the Pavement Preservation Emulsion Task Force (EFT) from **Larry Tomkins**, Ergon Asphalt & Emulsions, and AEMA supplier chair, **Donna Kwapis**, Nouryon, provided information on supply chain issues during 2022.

ISSA's technical session rounded out Thursday afternoon. Pearce, ISSA program chair, filled the session with job stories and updates. First, **Jared Peck**, City of Orem, Utah, shared information on Orem's comprehensive pavement management program. Then, **Dr. Andrew Braham**, University of Arkansas, reported on sustainable aspects of ISSA's core treatments and the evolution of Environmental Product Declarations (EPDs). **Dr. Adriana Vargas**, NCAT, provided an update on ISSA's Field Sampling project, followed by ISSA president **Chuck Ingram**, Slurry Pavers, with an update on ISSA's technical bulletins. Lastly, ISSA's **2022 President Award Winner, VSS International Inc.** had **Matt Ferguson** present on its award-winning **Yosemite National Park** project.

FP²'s Moulthrop Lauded at PPRA, U.S. House



AWARDS BREAKFAST

The annual awards breakfast was an opportunity to see some of the top pavement preservation projects in the country get the recognition they deserve.

It began with **Lindsay Matush** of Vario Consulting conducting another stimulating

Following honors in January at the Transportation Research Board meeting in Washington, D.C. (see *Moulthrop Recalls Evolution of Preservation*, pp 14-15, and *Jim Moulthrop Hailed for Service to FP*², p 16, Spring 2022 issue), FP^{2's} executive director emeritus **Jim Moulthrop P.E**. was honored by AEMA, ARRA, and ISSA individually at their annual meetings in LaJolla, Calif.

A special moment was a video of a tribute to native Pennsylvanian Moulthrop that was presented on the floor of the U.S. House of Representatives by Rep. Glenn Thompson (R-Pa.). You may view the tribute online at https://www.youtube.com/watch?v=yJ2fhB6IRVg. A framed transcript of the tribute taken from the *Congressional Record* was presented to Moulthrop.

Moulthrop also was inducted into the **AEMA Hall of Fame** and presented with **ARRA's and ISSA's Special Recognition Awards**. Coincidentally, it also was Jim's birthday, and he was the target of a rousing chorus of the *Happy Birthday* song.



All three associations honored FP² executive director emeritus Jim Moulthrop in their own way; from left, ISSA president Chuck Ingram with ISSA Special Recognition Award; AEMA president Bob Huitt with AEMA Hall of Fame plaque; Moulthrop with framed excerpt from Congressional Record; ARRA president Jonathan Pease with ARRA Special Recognition Award; and FP² president Tim Harrawood

At left, framed print of tribute to Jim Moulthrop excerpted from Congressional Record was presented at AEMA-ARRA-ISSA awards breakfast session on how contractors and government agencies are using **RoadResource.org** to further pavement preservation, and how it will change in 2022.

AEMA awards committee chair Greg Arntson recognized 10 new Excellence Award winners for 2021: Associated Asphalt's Seaco asphalt emulsion plant, six plants from Ergon Asphalt & Emulsions including Boise, Ida., Butte, Mont., Corpus Christi and Mount Pleasant, Tex., Parsons, Tenn., and Salina, Kan., and Martin Asphalt Company.

AEMA's **Past Presidents Award** was presented to the San Angelo District of Texas DOT for its use of micro surfacing and rejuvenating fog seal on I-10, speeding renewal and enhancing driver safety. The contractor was **Intermountain Slurry Seal** and the emulsion supplier was **Ergon Asphalt & Emulsions**.

AEMA's **Recognition of Achievement Award** was presented to **Herb Wissel** of Asphalt Materials, Inc., for his instrumental contributions to the promotion of pavement preservation and the asphalt emulsion industry.

ARRA honored **Tom Kiernan** for his lengthy and extensive service to ARRA and the recycling and reclaiming industry by naming him as the recipient of the 2022 **Richard E. Lowell President's Award**. Kiernan recently retired from LaFarge, Inc where he was a sales specialist.

ARRA presented **Mike Ristic, P.E.**, Caltrans, with the 2022 **Charles R. Valentine Award for Excellence in Cold Recycling**. As branch chief, Ristic has been instrumental in promoting and coordinating training for new, cost-effective treatments to enhance road performance throughout the Caltrans District 8 network, including cold in-place recycling that has helped Caltrans rehabilitate asphalt roadways through the district, while meeting the state's goal of reducing the carbon footprint.

ARRA's 2022 **Special Recognition Award for Excellence in Full Depth Reclamation** was presented to **Saul Romero**, Texas DOT–Odessa District. Romero has been a strong advocate for the use of emulsion-based FDR treatments to strengthen road bases long term.

Lastly, ARRA presented **Lindsey Chieduko** with the City & County of Denver for the 2022 **Special Recognition for Excellence in Hot In-Place Recycling**. The Citywide Hot In-Place Recycling and Repaving project was the largest asphalt paving project in Colorado, completed in the 2020/2021 construction season, with 130 lane-miles resurfaced.

The ISSA **President's Award for Excellence** was presented to **VSS International Inc.** for its work on the Yosemite National Park Pavement Preservation Project by the FHWA-Western Federal Lands Highway Division.

The ISSA President's Award recognizes those contracting achievements that best exemplify the highest quality of workmanship and materials, as well as conformance to best practices as defined by the International Slurry Surfacing Association. This project is profiled as this month's cover story, see article pp 14-17.





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New FP² Executive Director: Best is Yet to Come

n Feb. 1, Rick Church took the reins of FP² as executive director, succeeding Jim Moulthrop, P.E. Church heads CM Services, an association management firm which offers FP² substantial "back office" support that will refine how FP² does business. He also serves as executive director of FP² founding associations AEMA, ARRA and ISSA, and that will provide a powerful synergy supportive of pavement preservation. To get a vision of FP² moving forward, Pavement Preservation Journal conducted this oneon-one interview with Church.

IN YOUR OPINION, WHAT IS THE STATE OF PAVEMENT PRESERVATION IN THE U.S. AND CANADA?

While pavement preservation has existed for over 100 years, it still is an immature market. Having said that, due to the efforts of organizations such as FP², the Pavement Preservation & Recycling Alliance (PPRA) and its constituent organizations, pavement preservation equipment and material suppliers, as well as pavement preservation contractors, the state of the industry is healthy and growing.

We have many opportunities in the future, especially as they relate to our message of sustainability; not only is pavement preservation better in so many ways for the environment than the alternatives, but research is proving it also allows the useful life of a road to be extended significantly with a high pavement condition index (PCI) while avoiding costly reconstruction.

WHAT HAS BEEN THE ROLE OF FP² INC. IN GETTING TO THIS STAGE?

FP² has played a critical role in helping the industry get to where it is today. FP² has had two areas of focus: **support** for pavement preservation research, and **advocacy** on behalf of the pavement preservation industry with the federal government, but also with states and local agencies when appropriate and necessary.

The preservation research experiment research project supported by FP² at the National Center for Asphalt Technology (NCAT) and the Minnesota Road Research Facility (MnROAD), which are ending in 2023, are revealing great results, demonstrating the value of pavement preservation that will give supporters of preservation the quantitative data they need to support and expand agency preservation programs.

 FP^2 also has been successful in Washington, D.C., in obtaining and renewing eligibility of pavement preservation for federal funding, and for expanded surface transportation funding across the board. However, it's important to recognize that FP^2 is only successful in these endeavors because of the financial support of its contributors.

IN THIS CONTEXT, WHAT IS THE FUTURE ROLE OF FP² IN FURTHERING PAVEMENT PRESERVATION?

The future of pavement preservation is very bright, and FP² will play a significant role in it. What that role will be exactly will be clearer following an FP² board of directors' strategic planning session in May. Once that strategic plan for the next three years is developed, we will share it with the readers of PPJ.

AEMA-ARRA-ISSA—THREE OF FP²'S MAJOR SUPPORTING ASSOCIATIONS—ALSO PROMOTE PAVEMENT PRESERVATION. HOW DOES FP²'S MISSION DIFFER FROM THOSE THREE ASSOCIATIONS? WHAT SYNERGIES EXIST THAT COMPLEMENT ALL THEIR MISSIONS?

FP²'s mission is to support preserving pavements via the *right* treatment to the *right* pavement at the *right* time.

The Asphalt Emulsion Manufacturers Association is the leader in promoting excellence in asphalt emulsions and



At annual meeting of AEMA, ARRA and ISSA as PPRA in February, Rick Church opens plenary session

providing networking and educational opportunities for the industry.

The Asphalt Recycling & Reclaiming Association is the independent voice of the pavement recycling and reclaiming industry, including hot in-place recycling (HIR), cold in-place recycling (CIR), cold central plant recycling (CCPR) and while technically not a part of pavement preservation, full-depth recycling (FDR).

The International Slurry Surfacing Association is the leading resource for promotion, training, education and best practices for value-added pavement preservation technologies like slurry surfacing systems, chip seals, crack sealing and fog seals.

While AEMA, ARRA and ISSA each has a unique focus on the products or disciplines represented by their members, it's all pavement preservation and recycling, and collectively they support and help grow the pavement preservation industry. In fact, apart from FP², AEMA, ARRA and ISSA work collaboratively on critical industry projects supporting the healthy growth of the pavement preservation industry. Recent examples include development of the essential RoadResource.org website, and work on development of industry life cycle cost analyses (LCAs), pavement condition rating (PCR) systems, and environmental product declarations (EPDs).

YOU HAVE BEEN EXECUTIVE DIRECTOR OF THOSE THREE ASSOCIATIONS FOR A WHILE NOW. WHAT IS THE DIFFERENCE BETWEEN MANAGING MEMBERSHIP-BASED ASSOCIATIONS AND A CONTRIBUTION-SUPPORTED FOUNDATION LIKE FP², WHICH TECHNICALLY DOES NOT HAVE MEMBERS?

This is my sixth year serving as executive director of AEMA, ARRA and ISSA, and I'm looking forward to many more. I've been working with national and international trade associations for almost 30 years. Though several organizations I've worked with over the years have had contribution-supported education foundations, FP² will be my first real experience working with a contribution-supported foundation that doesn't have members per se. Honestly, though, I look at the contributors as members of FP² and want to grow the number of contributors by offering many different opportunities for companies, associations and individuals to contribute their time, talents, and of course their money to FP² so we can continue to make a difference and grow the pavement preservation industry.

HOW DID YOUR WORK WITH AEMA-ARRA-ISSA PREPARE YOU FOR TAKING THE REINS OF FP²?

Getting to know the pavement preservation industry and becoming passionate about the value pavement preservation brings to agencies, governments, communities and ultimately, taxpaying road users by extending the life of roads and getting decision makers to think about their roads not as individual elements, but as an entire road network, has prepared me to become FP^{2'}s executive director. I also think my experience from years of working with industry competitors to find solutions to industry challenges through building consensus will be helpful in my role with FP².

DO YOU HAVE EXPERIENCE LOBBYING HOUSE AND SENATE MEMBERS? WILL FP² CONTINUE ITS LEGISLATIVE OUTREACH SUCH AS CAPITOL HILL VISITS?

Over the years in working with different industry trade associations, I've had the



opportunity to meet with regulators and members of Congress and their staffers on a variety of issues. I am comfortable sharing the importance of an issue or position, and helping others understand how that position will benefit them or their constituents.

I've also had the pleasure of advocating on behalf of a charitable organization that's important to me, the Juvenile Diabetes Research Foundation.

I don't see FP² changing its focus on advocacy on behalf of the pavement preservation industry.

AGAIN, FP² DOES NOT HAVE MEMBERS BUT DOES HAVE STAKEHOLDERS, SUCH AS CONTRIBUTORS, PPJ SUBSCRIBERS AND ADVERTISERS. MAY THEY EXPECT ENHANCED COMMUNICATIONS FROM FP², SUCH AS E-NEWSLETTERS OR OTHER OUTREACH?

One of the areas we'd like to add as a focus for FP^2 is increasing its communications with all stakeholders in addition to our magazine, *Pavement Preservation Journal*. We want to engage our board members and contributors with the actions and positions FP^2 is taking. You will see more regular communications from FP^2 regarding the status of issues we may be advocating, and industry events or research projects we may be supporting.

WITH CM SERVICES FP² GOES FROM BASICALLY A ONE-MAN OPERATION TO ONE WITH SUBSTANTIAL OFFICE SUPPORT. WHAT BENEFITS OF THIS CAN FP² SUPPORTERS EXPECT?

CM Services has more than 45 years of experience partnering with national and international trade associations. We know how to do the back office and administration for organizations very effectively and well.

We'd like to think we'll bring some efficiencies in this area to FP², which will allow FP² and its board to be more focused on FP²'s mission. Keeping the board and leadership more focused on the mission means we can achieve even greater results. That's our hope. WHEN IT COMES TO PAVEMENT MAINTENANCE, WE'VE GOT YOU COVERED



Surface Prep Varies from Agency to Agency

ong-term success of almost every pavement preservation project is dependent on the extent to which necessary maintenance and surface preparation are completed prior to application, but implementation varies from agency to agency, say **David G. Peshkin, P.E.**, and **Gregory M. Duncan, P.E.**, Applied Pavement Technology, Inc., Urbana, Ill., in their 2021 National Cooperative Highway Research Program (NCHRP) Synthesis 565, *Maintenance and Surface Preparation Activities Prior to Pavement Preservation Treatments*.

In 1962 the American Association of State Highway and Transportation Officials (AASHTO) initiated an objective national highway research program using modern scientific techniques. This National Cooperative Highway Research Program is supported on a continuing basis by funds from participating member states of AASHTO and receives the full cooperation and support of the Federal Highway Administration (FHWA), U.S. DOT.

"The objective of this synthesis [565] is to document the types of maintenance and surface preparation activities performed by DOTs before pavement preservation treatments are applied," writes **Jo Allen Gause**, staff officer, Transportation Research Board. "The report includes information on both concrete and asphalt preservation treatments. Information for this study was gathered through a literature review, a survey of state DOTs, and follow-up interviews with selected agencies. Six case examples provide additional information on maintenance and surface preparation activities performed by DOTs.

"David G. Peshkin and Gregory M. Duncan, Applied Pavement Technology, Inc., collected and synthesized the information and wrote the report," Gause continues. "The synthesis is an immediately useful document that records practices that were acceptable with the limitations of the knowledge available at the time of its preparation."

SURFACE PREP = GOOD PERFORMANCE

Surface preparation is essential for a successful pavement preservation application, Peshkin and Duncan assert.

"The performance of each pavement preservation project hinges on many variables, including good project and treatment selection, weather during or immediately after construction, skill of the construction crew placing the treatment, and compatibility and quality of materials used on the job," they say.

However, one project-level factor that is common to the good performance of almost every preservation project is the extent of necessary maintenance and surface preparation actions that are successfully completed prior to the application of the treatment.

"For example, before placement of an asphalt pavement, edge-to-edge treatment, such as a chip seal, micro surface, or thin bonded wearing course, crack sealing, partial- and full-depth patching and surface profile corrections may be required," says NCHRP Synthesis 565. "Similarly, for concrete pavements, diamond grinding may be preceded by partial- or full-depth repairs (and followed by joint resealing). If needed



National Cooperative Highway Research Program

Maintenance and Surface Preparation Activities Prior to Pavement Preservation Treatments



pre-preservation maintenance activities are not performed, the expected benefits from a preservation treatment application may not be fully realized."

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(A'READ)

And while information on the utility and performance of the *right treatment on the right pavement at the right time*—the mantra of pavement preservation—is widely available, "very little information is available on the needed combination of both the preservation treatment application and the maintenance activities performed prior to the treatment to ensure its success," Peshkin and Duncan write. "While such pre-treatments are not always necessary, if they are needed, they become an integral part of a successful pavement preservation project."

Their report's purpose is to convey how agencies address maintenance and surface preparation needs before pavement preservation by exploring the following themes:

- Types of maintenance and surface preparation prior to preservation on flexible- and rigid-surfaced pavements
- Methods to identify the need for maintenance and surface preparation
- Methods to complete the maintenance and surface preparation, and
- Agency practices to track maintenance and surface preparation.
 As noted previously, input from multiple sources form the basis

of this synthesis. In particular, the electronic survey distributed to 50 DOT members of the AASHTO Committee on Maintenance

produced 45 responses, for a response rate of 90 percent. Information collected in in-depth interviews with six agencies also was invaluable.

FORMAL GUIDELINES LACKING

Few agencies have formal guidelines for the maintenance and surface preparation activities required prior to pavement preservation, the authors write.

"Such guidance includes timing issues, which can be important for some combinations of maintenance and preservation," say Peshkin and Duncan. "For example, the literature widely acknowledges that cracks should be sealed (and certain patches placed on asphalt-surfaced pavements) well ahead of the placement of thin preservation treatments such as chip seals and micro surfacing. However, this guidance is not consistently incorporated into agency programs." This lack of an explicit link between maintenance and surface preparation, and the subsequent pavement preservation, is less of a concern for concrete pavements, they say.

The contribution of maintenance and surface preparation conducted prior to preservation is acknowledged in the findings of several studies on that specific topic, the authors write. At the same time, the ability to track whether and where such maintenance is performed is inconsistent in day-to-day practice, often recorded in different databases, if at all, and the data locations may be identified in different ways that preclude linking the two sources of information, they say.

ASPHALT SURFACE PREPARATION

Typical preparation in advance of asphalt pavement preservation treatments can include milling to correct high spots, leveling to fill depressions ranging from localized wheelpaths to longer depressions in multiple lanes, pothole, base and edge repair, and crack sealing for fractures greater than ¼-inch wide, they quote Testa and Hossain (2014).

The synthesis is a treasure chest of operational guidelines. For example, **Texas** chip seal guidelines note repairs that are needed prior to placing a chip seal, specifically indicating that cracks wider than 1/8-in. should be crack-sealed well ahead of seal coat placement (Texas DOT 2017). These guidelines are similar to **Ohio** recommendations for chip seals (which, at the time of publication in 2001, were viewed as low-volume road preventive maintenance).

The authors report the Ohio DOT identifies the following conditions that call for repairs before a chip seal: wheelpath cracking, potholes, debonding, patches, cracks, longitudinal joint deterioration, and edge cracking (Ohio DOT 2001). It specifically states that cracking should be repaired prior to a chip seal to ensure its success.

The **New York State** DOT provides guidance on pavement preparation for preventive maintenance in Chapter 10 of its *Comprehensive Pavement Design Manual* (New York State DOT 2005), which addresses the following specified treatments and recommends the identified pretreatment preparation:

 Chip seal: crack sealing, removal of epoxy, polyester, thermoplastic and preformed markings, pavement cleaning

- **Slurry seal:** crack sealing (at least three months prior), rut filling, removal of thermoplastic and preformed markings, clean pavement surface
- **Micro surfacing:** crack sealing, removal of thermoplastic and preformed markings, clean pavement
- Paver-placed surface treatment: crack sealing, removal of thermoplastic and preformed markings, and clean pavement (similar preparation is identified for thin overlays and 6.3 mm polymer-modified HMA overlays, which also require rut filling).

RIGID PAVEMENT PREPARATION

"The body of literature on links between maintenance and pavement preservation is much smaller for rigid pavements than for flexible pavements," Peshkin and Duncan write. "This level of attention could reflect the total number of miles of flexible pavements versus rigid pavements, or could indicate that preservation is more commonly applied to flexible pavements."

The concrete industry recommends a sequence of pavement repair procedures that includes treatments associated with pavement preservation, but also considered by some to be maintenance, they state. This sequence begins with treatments starting with partial-depth repairs and ends with joint and crack resealing.

The **South Dakota** DOT recommends a similar sequence, observing that "for rigid pavements, an appropriate treatment sequence consists of the following: full- or partial-depth repairs, load-transfer *Continued on page 41*



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Flameless Mobile Patching Machine is Weapon in Quincy's War on Potholes

hen Mike Troup, mayor of Quincy, Ill., was sworn into office in May 2021, he immediately began to address a campaign promise of alleviating the potholes that had plagued Quincy for years.

Rich in period architecture as a 19th century port on the Mississippi River along the western border of Illinois, Quincy is a city of 39,400 residents, and maintains 420 lane miles of streets and roads. According to Jeffrey Conte, Quincy's director of utilities and engineering, while the city has directed money and efforts toward pavement preservation in recent years, the new mayor made improving the city's overall pavement efforts a priority, starting with pothole repairs. In this endeavor, he wasn't receiving any pushback from Conte or Quincy central services director, Kevin McClean.

"For years, we had repaired potholes using the 'throw and go' method, using cold patch, filling the pothole, driving over it to compact it, and moving on," says McClean. "Ever since I came into this position, I had been looking for a better way. I knew the best way to repair a pothole is to square up the hole, fill it correctly with hot mix, and compact it. But volume-wise, without the right equipment, it's difficult to keep up that way."

RENTAL OFFERS QUICK FIX

By renting a pothole patcher, the city's leaders hoped to make some quick inroads, creating better-quality patches for a number of the city's worst potholes. But also, they knew a rental would allow the city to test the viability of a more permanent solution for repairs.

Initially interested in renting a spray injection patcher, Conte and McClean had talked with representatives from several manufacturers, including Sara Olberding from Bergkamp Inc. McClean says Olberding helped them to determine that while spray patching would work to repair Quincy's smaller potholes and areas where pavement seams were separating, the sourcing and storing of necessary materials for that type of patcher would be problematic. "Instead, she recommended Bergkamp's FP5 Pothole Patcher," he says.

The FP5 Flameless Pothole Patcher, from Salina, Kan.-based Bergkamp Inc., uses an all-in-one patching method that removes all of the fragmented asphalt, leaving only sound material. The damaged area is broken and squared off using a pavement breaker. The broken-out material is tossed into an onboard spoils bin. An air and tack wand blows out any remaining debris and applies the bond or tack coating; this helps bind the new asphalt to the existing pavement and seals out moisture for a better patch. A material chute delivers the fresh hot asphalt to the prepared area, and a plate compactor then consolidates the material evenly with the existing pavement.

While hot-mix asphalt is the ideal material for the FP5, the truck will heat cold mix to 125 deg F, creating a heated mix. Compared to traditional "throw and go" methods, the all-in-one patching method provides a long-term, semi-permanent to permanent patch solution with a professional appearance. Because the patching material is placed against straight, square edges, it will not push out. This method is endorsed by the U.S. Army Corps of Engineers.

When a rental unit became available from Bergkamp in July 2021, Quincy took delivery of the FP5 patcher that month. McClean chose to add a swing auger and pivot tack as options on its FP5 rental.



Prepared cavity is filled with patching material via mounted chute

The swing auger offers a big advantage in repairing large areas and doing shoulder work. The pivot tack system holds the tack hose off of the ground to eliminate a tripping hazard for the operator.

PERMANENT SOLUTION

Following delivery, Bergkamp provided training on the patcher unit to a full crew of approximately eight to 10 workers. In addition to permanent employees, the city had also hired several temporary workers to help operate the patcher, as the Central Services Department began working two shifts of two workers each on the FP5 to repair potholes.

McClean says the patching steps with the FP5 are straightforward, and the crews picked up the process quickly. Skill with the machine improved in a short period of time, and quality pothole patches were beginning to be noticed not only by management and legislators, but also by residents.

The city had initially intended to rent the patcher for three months, but ultimately extended the lease through the end of October 2021, performing more than 5,000 sq. ft. of patching. "There is only one company in town that makes hot mix, and we extended the rental as long as possible, until we couldn't get hot-mix asphalt anymore," McClean explains.



Filled patch is seated with onboard plate compactor

"After only a week or two with the patcher, the improvement was obvious," Conte adds. "And it has been clear through the winter that the patches hold up. They're durable. Even the initial 'learning curve' patches, which might not be as pretty as the later ones—they're lasting, and that is the important thing."

Both McClean and Conte note that renting the machine provided a means to test it as a potential purchase. McClean says, "By renting, we got to operate it over a period of time and see that it would work for what we needed. Plus, it was like having a four-month training period for our crews, prior to any potential purchase."

FAST TRACK TO PURCHASE

According to Conte, Mayor Troup was pleased with the patching process, and he expressed the desire to turn the pothole patcher rental into a permanent solution.

The city's leaders came together and put what normally would have been a longer purchase process onto a fast track. "We did this because of supply chain issues," Conte says. "For example, getting a chassis was over a year out. That meant we would not have the machine for the summer of 2022. But we found out Bergkamp had a chassis available from a cancelled order,

Pothole Repair: Practice Makes Perfect

As Quincy's crews learned the ins and outs of operating the Bergkamp FP5 Pothole Patcher, they picked up on a number of do's and don'ts. Central Services director **Kevin McClean** shares some best practices below.

- Follow all the prescribed steps. Don't cut corners—especially when clearing out the hole. This may be more important than squaring it up.
- Potholes with (radiating) "alligator" cracks are not ideal for this patching method because they lack the necessary solid edges. Pieces will continue to break on the sides of the patch, and the pothole will form again.
- There is a learned art to putting the correct amount of material into the cleared pothole, so that as it is compacted, it matches the edges for a long-lasting patch.
- Rake the material so that it is mostly flat prior to compacting. This will help it to match the edges and compact correctly.
- Make sure to clean the auger, or the hot mix will set up and stick to it.

and we were able to order the unit. It came together perfectly for us to take delivery in late spring 2022."

The FP5, as ordered by the City of Quincy, will have the same swing auger and pivot tack options as the rental unit. In addition, the new truck will use Bergkamp's *InPave* Technology Pothole Patching Management System, a telematics system that automatically generates reliable performance information for the crew, patcher, and all patching materials. InPave reports all data to a backend server, which can export mapping data. "This is a big thing for us," says Conte. "It's important for us that we keep, track, and share repair information with the public. We want to incorporate it into the GIS (Geographic Information System) and put up maps so the public can see where we've been and where we will be going next."

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Join Phase III Pavement Preservation Research





FP² Inc. – and the staffs of the National Center for Asphalt Technology and MnROAD – profoundly thank the businesses and associations above that have made a special contribution supporting important new research in pavement preservation at those research facilities.

A partnership between the National Center for Asphalt Technology in Alabama and the MnROAD Road Research Facility of the Minnesota DOT is

advancing research in preservation techniques for both low-volume and high-volume roadways, and is supported by stakeholder contributions channeled through FP², and a pooled fund supported by state departments of transportation and administered by the Alabama DOT.

The partnership will provide research in preservation techniques for both flexible [bituminous] and rigid [portland cement concrete] pavements, and supply real-world accelerated pavement preservation performance testing in both hot and cold climates. By leveraging economies of scale, it may deliver research products for a larger base of supportive agencies and private sector clients at lower buy-in costs. The partnership has the potential to play a much larger role in the national effort to validate pavement performance. Sharing resources and expertise will improve coordination of experiments and expand evaluation of pavement performance in both northern and southern climates. Also, the collaboration permits testing of PCC pavements and the inclusion of the results in comprehensive research products, which is not possible when NCAT works on its own.

The NCAT test facility (left) has multiple test sections on its 1.7-mile oval track, while the Minnesota DOT's MnROAD facility track (right) consists of a 3.5-mile interstate (l-94) high-volume roadway, and a 2.5-mile closed loop low volume road simulating rural roads.

The goal of this research is to quantify the life-extending benefits of different pavement preservation treatments for roadways in different stages of life and decay. Both facilities have a history



of evaluating the performance of pavement preservation treatments, including chip sealing, micro surfacing, crack sealing and thin overlays.

Now, accelerated testing – including actual low- and high-volume pavements in the field – is providing unique opportunities to determine the field performance of breakthrough materials and pavement preservation concepts without the risk of failure that local and state agencies are unwilling to accept. To address the needs of northern and southern climates, similar test sections have been developed for both Alabama and Minnesota.

Please join your fellow stakeholders in pavement preservation by making a financial contribution to research at NCAT and MnROAD. For more information, contact FP² executive director Rick Church, (630) 230-1397, rickc@cmservices.com.



BY MICHAEL VRTIS, PH.D, P.E.

he Minnesota Road Research Facility (MnROAD) partnered with the National Center for Asphalt Technology (NCAT) to create test sections in Minnesota in 2019 that featured cold-in-place recycling (CIR), cold central plant recycling (CCPR), stabilized full-depth reclamation (FDR), conventional [thin] asphalt overlays (*Thinlays*) and conventional mill/inlay treatments.

Minnesota's harsh environmental conditions and the very poor pre-existing conditions are providing rapid results on the performance of these sustainable pavement solutions. This effort is part of the Preservation Group Experiment funded in part by FP² Inc. with a pooled fund supported by state DOTs.

SEVERE CRACKING PRESENT

Test sections were constructed on one mile of local roadway, 70th Street, in Albertville/ Otsego, Minn. The existing 4-in. asphalt concrete surface was in very poor condition with severe fatigue cracking and wide transverse thermal cracks.

The test sections were constructed in both directions of travel on the local two-lane roadway. Due to anticipated continued development in the area and roadway expansion, the roadway owners were willing to allow the research team to experiment with various treatment strategies and technologies, including a minimalist approach of a 1-in. asphalt overlay.



Fig. 1: IRI test conditions

NCAT coordinated construction efforts with collaboration from Astec Industries (Roadtec) and Wirtgen Group. All sections had a 1-in. asphalt overlay (Thinlay) surface. Thinlay control sections only had the 1 in. placed over the existing asphalt surface. Additional control sections featured conventional HMA mill-and-inlay at 2 in. and 3 in. mill-and-inlay depths prior to the Thinlay.

FDR sections were constructed at a depth of 7 in. with emulsified and foamed asphalt. CIR sections were constructed using CIR at a depth of 3 in. with foamed and emulsified asphalt. A cold mixing plant was brought to the project to facilitate the CCPR sections, which were constructed using at a depth of 3 in. with emulsified and foamed asphalt.

MONITORING PERFORMANCE

MnROAD performance monitoring tools are being used to monitor the performance of this project. Surface performance (roughness, cracking, ride) is measured with a high-speed, digital inspection vehicle and manual visual distress surveys. Additionally, the structural performance of each section is being monitored with ground penetrating radar and falling weight deflectometer.

Since construction in August 2019, the sections have been subjected to Minnesota's harsh environmental conditions. Temperatures recorded at MnROAD's nearby weather stations ranged from -30 deg F to

Fig. 2: Cracking in lane area conditions

100 deg F, resulting in measured pavement temperatures below the asphalt surface of -20 deg F to 139 deg F.

MnRCAD

As shown in the plots, roughness and cracking for all 70th Street sections have been greatly improved. Preconstruction conditions measured in 2018 are compared with current conditions measured at the end of 2021 or early 2022. Federal Highway Administration's MAP-21 Performance Criteria are included to show the "good," "fair," and "poor" categories for with green, yellow, and red shading, respectively.

LARGE IRI IMPROVEMENT

There was a very large improvement in IRI post-construction for all sections with values still in the "good" category at the end of 2021 (Fig. 1). However, the IRI of the Thinlays is quickly increasing into the "fair" category as reflective cracking increases. It should be noted that the test sections were 500 feet and thus limited the ability greater IRI improvements for the reclamation/recycling technologies.

The percentage of cracking in the lane area over time is also presented (Fig. 2). The heavily distressed nature of 70th Street must be kept in mind; preconstruction condition was assumed to be 100 percent cracked.

The Thinlay sections are quickly approaching their pre-existing condition due to reflective cracking. The CIR and CCPR sections have "good" overall performance and are not rapidly deteriorating. The FDR sections had more cracking than expected (further investigation ongoing) but is still providing "good" ride values. The project will continue to be monitored to capture the full field performance of each treatment.

This project has already proven the effectiveness of all treatments on severely deteriorated roadways. It has shown recycling and reclamation treatments are effective strategies for rapidly constructed long-lasting treatments on local roadways.

Vrtis is research project engineer, MnROAD



U.S. Gas Tax 'Holiday' Puts Financing at Risk

BY TRACY TAYLOR

he Infrastructure Investment and Jobs Act (IIJA) that passed last November, as is often noted, provides a "once in a generation" investment in our infrastructure.

The U.S. DOT has begun implementing the bill, which provides \$351 billion in funding over the next five years, which is a 34 percent increase over prior funding levels. This substantial investment in our nation's infrastructure is a "rising tide" which will "lift all boats," and is a much-needed investment in our roads which will be used for pavement preservation as well as new construction and reconstruction.

This needed investment is great for our roads, but Congress' lack of focus on finding a solution to the Highway Trust Fund (HTF) continues to be problematic.

NO FIX FOR TRUST FUND

A downside to IIJA is no fix for the Highway Trust Fund was provided. Congress missed a big opportunity by not grappling with a long-term, sustainable solution to fixing declining income in real terms to the Highway Trust Fund. During passage of the IIJA, Congress had the opportunity to evaluate whether the current user fee—the federal gas tax—was adequate, needed adjustment, or whether an alternative approach needed to be taken given the increase in the use of alternative fuel vehicles on our nation's roads.

The current federal excise tax on gas was last raised in 1993, nearly 30 years ago and it was not indexed to inflation, which has increased 96 percent from 1993 through the end of 2021.

Clearly, the current system, which requires substantial annual transfers from General Fund, is not sustainable. The substantial investment authorized in the IIJA—which enables transfers from the General Federal Funds account—expires in 2026. Meanwhile, the Highway Trust Fund is expected to become insolvent in 2027, just six months after the expiration of the IIJA. Given current inflationary trends and the push for electrification of cars and trucks, this picture may even be bleaker. While this discussion may sound tone deaf as gas prices soar, had Congress put even a modest plan in place in 2008, when the Highway Trust Fund first experienced insolvency—like adjusting the gas tax for inflation, requiring an annual user fee for alternative fuel vehicles, or seriously working on alternative approaches such as a vehicle miles-driven system—would not have us staring down this substantial funding cliff in the mid-2020s.

GAS TAX 'HOLIDAY'?

The HTF shortfall now is facing a new challenge: recent federal calls for a "gas tax holiday."

Earlier this year, the *Gas Prices Relief Act* was introduced in both the House (H.R. 6787) and Senate (S. 3609). This bill would provide a temporary exemption through 2022 from the excise tax on gasoline. FP² Inc. was among the many organizations that came out strongly against these bills, and its ultimate function of further degrading the user-pays system.

While pain at the pump is real for consumers and businesses and not to be minimized, there is no easy solution to this problem, and the Gas Prices Relief Act, rather than provide a real, thoughtful solution, is an election-year gimmick which will likely provide no real relief for the people it is intended to help: those struggling to pay for gasoline.

Federal motor fuel taxes are applied at the wholesale level, so even if the Gas Prices Relief Act were to be enacted, there is no guarantee that reducing the federal tax by 18.4 cent per gallon will result in an 18.4 cent per gallon reduction to drivers filling their tanks.

While there is no guarantee that consumers would benefit, depending on when the bill were to be enacted, it could cost the Highway Trust Fund upwards of \$20 billion, which would likely be backfilled by another General Fund transfer, further moving away from a user-pays system. This sets a bad precedent for the user-pays system we have historically relied on, and which FP² supports, to maintain our nations' roads. While the Gas Prices Relief Act has gained some modest support in both the House and the Senate, thanks to the long-term educational efforts of those in the transportation construction industry, including FP², the bill has been met with a healthy dose of skepticism by some key leaders such as House Speaker **Nancy Pelosi** (D-Calif.) and House Transportation and Infrastructure Committee Chairman **Pete DeFazio** (D-Ore.), as well as Senate Environment and Public Works Committee leadership **Tom Carper** (D-DE) and **Shelly Capito** (R-WV).

While it's hard to predict how gimmicks such as a gas tax holiday would fare in a tough election year, fortunately, at least as of this writing, the bills are not gaining momentum. While that could all change given world events and inflation at home, FP² will continue to advocate against legislation that would have a negative impact on our roads and will do little to provide relief for consumers at the pump.

Taylor is principal at FP²'s legislative counsel, Alignment Government Strategies, Washington, D.C.



BETTER LATE THAN NEVER: At the Southeast Pavement Preservation Partnership meeting at Jekyll Island, Ga., the last week in March, retired Federal Highway Administration engineer Luis Roderiguez, P.E., receives FP² Hall of Fame Award in person from FP² president Tim Harrawood. COVID-19 cancellations of SEPPP in 2020 and 2021 delayed a formal presentation, so Roderiguez first received the honor at home in Atlanta in Spring 2020. He retired from the industry after 38 years of service, 34 with FHWA, where he championed pavement preservation and infrastructure improvements. Read more about him in our Summer 2020 issue; see FP² Honors FHWA's Luis Rodriguez with its Hall of Fame Award; view it online at https://f2.org/pavement-preservation-journal/ and locate Summer 2020, p 10



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Virgin Materials, High Binder Content, Polymer Modifier Key to PennDOT Thinlays

BY GARY HOFFMAN

ollowing the economic downturn in 2008, the Pennsylvania Department of Transportation (PennDOT) lacked the funding to properly manage and maintain its 40,000 centerline miles of pavements. Consequently, PennDOT moved primarily to a preventive maintenance and preservation program using micro surfacing and ultra-thin bonded wearing courses that were constructed, for the most part, by out-of-state subcontractors.

In early 2011 a joint task force including representatives from PennDOT, the Pennsylvania Asphalt Pavement Association (PAPA) and the Federal Highway Administration (FHWA) was empaneled to develop and implement a cost-effective, plant-produced thin hot mix asphalt overlay (THMAO).

The fine, densely graded material would be paver-placed (3/4 to 1 in. deep) and would be an option in the pavement preservation "toolbox."

A review of literature and a national survey revealed that a number of states had "Thinlays" as they would become known, that were cost-beneficial, were smooth and quiet, sealed the surface and restored friction. The task force chose to look at the *Smoothseal* Ohio DOT overlay, and the 6.3mm NYDOT Thinlay specifications as these states were contiguous to Pennsylvania, and also because both states had successfully used Thinlays over a 10-year period.

FOUR YEARS OF RESEARCH

PennDOT and the FHWA sponsored a four-year research project to assist the task force in specification and guidelines development, materials testing and field performance validation on three pilot projects. The research project was conducted by the Northeast Center for Excellence for Pavement Technology (NECEPT) at The Penn State University.

The task force was determined to develop a premium mix specification that would have a high probability of good performance for 10 years or more. After evaluating the details of the Ohio DOT and the NYDOT specifications, the 6.3mm NMAS used by the NYDOT was selected, although the PennDOT



Fig. 1: Lancaster County Site 2 S.R. 230, before and after rut depths

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gradation band is tighter, since it has to meet limits at six different sieve sizes.

As maintaining good surface friction over high traffic loadings is a very important safety factor, the highest of the five aggregate skid resistance levels (i.e., Skid Resistance Level E) in Pennsylvania was required. All the many aggregate sources in the state are assigned an SRL (Skid Resistance Level) based on their resistance to polishing.

A polymer modified PG 64E–22 asphalt binder was required for all design equivalent single axle loads greater than 3 million, in order to achieve good resistance to rutting. The Superpave volumetric design criteria of 75 design gyrations, voids in mineral aggregate of at least 17.0 percent, and design air voids of 4.0 percent produce a high asphalt binder content around 7.0 percent. This high AC content and the polymerized binder provide good top-down crack resistance. Another important decision toward ensuring successful, longer-term performance was requiring all virgin materials (no RAP).

BOND OR TACK COAT CRITICAL

Recognizing the critical importance of a good, uniformly applied bond or tack coat to prevent delamination and shoving of the THMAO, the task force queried states that were using thin asphalt wearing courses about what tack coat material they specified.

Most were using a slow-set undiluted asphalt emulsion with a high percent asphalt residue and a low- penetration asphalt residue (CSS-1h). PennDOT not only adopted this tack coat material for THMAO, but it also changed its general tack coat specification for all layers to require an undiluted emulsion with at least a 60 percent residue.

PennDOT selected three locations to construct pilot projects to validate the performance life of the new THMAO material.

At the first site in **Harrisburg**, the 1-in. THMAO was placed directly on a 37-year-old jointed reinforced concrete



pavement that had been diamond-ground and patched several years prior. The second site was in **Lancaster County** where the 1-in. thick overlay was placed on a composite pavement (concrete previously overlaid with asphalt). The third site was near **Williamsport** in Lycoming County. This third site was a full-depth asphalt pavement that was milled before being overlaid.

An extensive construction monitoring and testing program was performed by the researcher from NECEPT. Standard pay factors (gradation, AC content and field density) were closely monitored. Mix delivery temperatures and mat temperatures were taken with both "stick" thermometers and infrared (IR) guns.

The time available for compaction was about 12 minutes, and it tracked closely with mat temperatures predicted by the *PaveCool* software. This 1-in.-thick lift lost about 100 deg F in the first 10 minutes, even though air and pavement surface temperatures were in the 70s deg F.

RAPID TEMPERATURE LOSS

This rapid temperature loss accentuates the need for attention to adequate compaction equipment and roller sequences when placing a thin lift. In addition to randomly located density cores, an infrared thermography (IRT) survey was conducted on the first site to determine thermal profiles and temperatures gradients of the THMAO mat. Ground penetrating radar also was used to evaluate the consistency of the density across the mat.

Cores from the Harrisburg pilot project were subjected to mechanical testing to include shear test for permanent deformation, shear test for tack coat bond evaluation, Hamburg Wheel Track Test for evaluation of rutting resistance and susceptibility to moisture damage, and the Texas Overlay Tension Test to evaluate cracking resistance. These mechanical tests showed very acceptable results. In fact, all the preconstruction and construction testing results indicated that the THMAO should perform as planned.

The three pilot projects were evaluated annually for rutting, smoothness, and surface friction. The first site in Harrisburg has been in service over nine winters, and the other two sites have been in place over eight winter seasons.

Rut measurements were made using a 10 ft. straight edge placed transversely



Compaction of Site 3 S.R. 220 Smooth 6.3 mm Thinlay wearing course

across the full lane. Site 1 had approximately a 3mm total rut depth, and sites 2 and 3 had less than 2mm of rut depth. All three sites experienced less than 1mm of additional rutting after the initial few months under traffic. The mix showed excellent rut resistance as shown in Fig. 1.

Smoothness or ride quality was determined using the PennDOT's profilometer, and the International Roughness Index (IRI) was calculated. IRI units are reported in inches/mile, and the lower the number, the smoother the pavement. Not only did all three projects experience a significant improvement in ride quality, but that improvement also was maintained over the evaluation period.

It's important to note that the before and after IRI numbers on the full-depth asphalt pavement (third site in Lycoming County) were significantly better than the overlays directly on existing concrete or composite pavements.

Friction numbers were obtained using the department's locked wheel skid trailer at 40 mph using a ribbed tire. Surface friction or skid numbers improved and were maintained well above the department's threshold (30) at which corrective actions are initiated.

In addition to these physical measurements of surface conditions, visual inspections were done to assess cracking, delamination and raveling. Pilot projects 2 and 3 have experienced minor reflective cracking at concrete and paving construction joints, but there is no delamination or raveling at these cracks. Indeed, the overlay was "sawed and sealed" over the joints in the reinforced concrete pavement on site 1. There is no raveling or delamination at these sealed joints after nine years.

NEW THINLAY SPEC

PennDOT now has incorporated a new Section 412 Plant Mix 6.3mm Thin Asphalt Overlay into its General Construction Specification (Publication 408). It also has added this specification as an alternate pavement preservation treatment to its Pavement Policy Manual (Publication 242). Over the past nine years, PennDOT and the Pennsylvania Turnpike Commission have constructed numerous THMAO projects on interstates and state routes.

In summary, the THMAO material placed at 3/4- to 1-in. depth has shown to be a competitive preservation treatment alternative to micro surfacing and ultra-thin bonded wearing courses. It has the following advantages:

- It improves and maintains both longer term surface smoothness and friction
- · It provides excellent rutting resistance
- It uses conventional mix production and paving methods and equipment
- It provides 10 years of service with minimal maintenance
- It adds limited structural value to the pavement
- It can be installed by any of PennDOT or Pennsylvania Turnpike prequalified paving contractors, and
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Edited by Pavement Preservation Journal from material provided by the National Asphalt Pavement Association. Hoffman is executive director of the Pennsylvania Asphalt Pavement Association, Harrisburg

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Researching Structural Benefits of Preservation

WHAT GOT YOU INTERESTED IN PAVEMENT PRESERVATION?

In 2017 I was looking for a graduate study opportunity in the field of pavement materials engineering, and in fall of 2017 I was hired by Dr. Adriana Vargas, assistant research professor at the National Center for Asphalt Technology. At that time, I knew pavement preservation would be my work in the coming years.

During my undergraduate studies, I was taught that preservation treatments were meant solely for the functional healing or repair of the pavement surface. But after a few months of work, pavement classes at Auburn University, discussion in the breakroom over mugs of coffee, and reviewing the documents at NCAT, I was convinced that pavement preservation has many more benefits than supposed.

Pavement preservation is less frequently studied than it deserves, but as an impactful research topic it will take me a long route ahead. Extensive research scopes and data availability to validate the findings helped me anchor my ship at NCAT.

HOW IS YOUR RESEARCH RELATED TO PAVEMENT PRESERVATION?

Preservation treatments don't add structural capacity to the pavement, but they seal the cracks, which stops water infiltration. Sealing up the cracks and resurfacing the pavement with a thin layer of new materials doesn't show an immediate structural improvement, but over the service life the contribution of preservation treatments to the structural health of the pavement is significant.

During the last five years of working with Dr. Vargas on the NCAT-MnROAD Preservation Experiment [funded in part by FP² Inc.], we have observed the benefits of pavement preservation not only on the surface, but on the entire pavement structure.

My doctoral dissertation looks to model structural condition indicators based on functional parameters and site-specific characteristics, and to predict performance Editor's Note: This is the 21st of a continuing series of profiles of civil engineering students who are undertaking pavement preservation as a course of study. These students bring a different perspective of why a young civil engineer would pursue preservation study. This issue we look at **Md. Towhid Ur Rahman**, E.I.T., graduate research assistant, National Center for Asphalt Technology (NCAT) at Auburn University, Ala.



Md. Towhid Ur Rahman at National Center for Asphalt Technology, Auburn, Ala.

to be able to anticipate future needs. All of this is accomplished thanks to continuous data collection, quality control, analysis, modeling, and validation from NCAT and MnROAD's test sections.

HOW HAS YOUR PERSPECTIVE CHANGED ABOUT OUR ROAD INFRASTRUCTURE SINCE BEGINNING RESEARCH?

I have never been as close to the roads as I am now. Throughout my work at NCAT with Dr. Vargas, I am learning to study the same pavement structure from different standpoints.

Not only do I get to look at the data from a computer screen, but I also get a chance to look at these treatments in the real world. Close inspection of our live traffic sections located on Highway U.S. 280 and Lee County Road 159 in Alabama has allowed me to better understand the performance of preservation-treatments.

A pavement structure is complex, and deterioration can occur differently, depending on the existing conditions. It is always important to keep an adaptive mindset while investigating a problem statement in pavement research.

During my years of my work on pavement preservation, I have developed that adaptive and resilient engineer's mind.

DO YOU HAVE PLANS TO CONTINUE IN THE FIELD OF PAVEMENT PRESERVATION ON GRADUATION?

Of course, pavement preservation will always remain in the scope of the professional objective I plan to achieve. After I graduate from NCAT with my doctorate, I hope to join a company that combines industry practice with scholarly research.

I anticipate that a perfect blend of industry-academia experiences will help me achieve my career goal faster. My mission is to enhance pavement network sustainability, reduce emissions, provide accurate tools to assist stakeholders, and develop more knowledgeable road users in the United States.

SURFACE PREP VARIES...

Continued from page 27

restoration, diamond grinding, and joint resealing" (South Dakota DOT 2010).

New Mexico DOT also discusses a sequence of pavement activities. Specifically for diamond grinding, it notes that "the road may have localized failures that should be corrected by crack treatments, partial-depth repairs, full-depth repairs, dowel bar retrofitting, etc." (New Mexico DOT n.d.).

AGENCY CASE HISTORIES

Following a complete review of the state-of-the-practice across multiple states regarding surface prep for preservation, Peshkin and Duncan highlight maintenance and preservation practices in detail at **Georgia DOT**, Washington State DOT, Indiana DOT, Kentucky Transportation Cabinet, New Jersey DOT, and Montana DOT.

"Two studies of the performance of preservation treatments applied with and without prior crack sealing both reported better performance when the preservation treatments—chip seals in Washington State and micro surfacing in National Center for Asphalt Technology tests—were preceded by crack sealing," Peshkin and Duncan found.

They report that for flexible pavements, the most common maintenance and surface preparation actions prior to pavement preservation are as follows:

- · Crack sealing and filling (89 percent)
- Partial-depth patching (84 percent)
- Full-depth patching (76 percent), and
- Rut filling (69 percent).

For rigid pavements, the most common actions are the following:

- Full-depth repair (74 percent)
- · Partial-depth repair (69 percent), and
- · Joint resealing (62 percent).

While 56 percent of the responding agencies report no set time interval between the maintenance and surface preparation and the pavement preservation, the authors say, 16 percent do have a set time lag, and 27 percent say that it depends on the project.

A large majority of the agencies (84 percent) report that it is a local decision to complete maintenance before preservation. However, almost half of the agencies also indicate that the central office plays a role in the decision. And they find although pavement preservation is eligible for federal funding, 78 percent of the respondents report using state agency funds.

No standard method is used to track the maintenance and surface preparation actions prior to preservation. The state agencies identify use of a maintenance management system (MMS) in 29 percent of the responses and a pavement management system (PMS) in 16 percent, with other responses suggesting no tracking; tracking only if the work is conducted under contract; tracking in both an MMS and a PMS; or tracking that depends on the project.

Edited by Pavement Preservation Journal under fair use guidelines. The full document from the National Academies of Sciences, Engineering, and Medicine: Maintenance and Surface Preparation Activities Prior to Pavement Preservation Treatments, Washington, D.C.: The National Academies Press, may be downloaded as a pdf at no charge at https:// doi.org/10.17226/26269; or hard copy purchased there as well.



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