CP² Center News

Newsletter of the California Pavement Preservation Center

No. 63 September 2022

CCPIC Update: Pavement Training; Scheduling Outreach/Training Events; Superpave for Local Government

By John Harvey (UCPRC), Laura Melendy (UC Berkeley, Tech Transfer), and Gary Hicks (CP2 Center)

Pavement Training Certificate Course Offerings, Package Pricing, and Course Updates

The City and County Pavement Improvement Center (CCPIC) Pavement Engineering and Management certificate and the courses to complete it are offered through UC Berkeley's Tech Transfer Program. CCPIC training is developed with SB1 funding and is currently partially subsidized for local and state agencies with funding from Caltrans under the California Cooperative Training Assistance Program, reducing the cost. Registration and other information is available at: www.techtransfer.berkeley.edu/training/pavement-courses

Core Courses for Pavement Engineering and Management Certificate Now Available and New Inspection Certificate Courses coming soon

The core courses for the Pavement Engineering and Management (PEM) Certificate have been completed and delivered with the offering of CCC-03 in February 2022. Several elective courses are also being offered now. New elective courses are continuing to be put on-line as CCPIC builds out the certificate program.

Classes currently open for enrollment include:

- CCA-02 Pavement Sustainability, September 14-15, 2022 (online)
- CCC-02 Asphalt Pavement Preservation Treatments, Materials, Construction and Quality Assurance, September 19-22, 2022 (online)
- CCB-01 Pavement Life Cycle Cost Analysis: The Basics, December 13-14, 2022 (online)

Other classes for the 2022-23 academic year will be posted soon.

The CCPIC governance board, made up of city and county pavement officials, has also requested development of a new Pavement Construction Inspection (PCI) Certificate. This new certificate program will include some of the pavement engineering and management classes as well as adding new classes to ensure agencies are able to properly inspect all types of pavement projects.

New Package Pricing

TechTransfer now offers a streamlined way for agencies to purchase CCPIC Certificate training packages for employees. Agencies can purchase a prepaid training 'package' for employees to complete an entire certificate program for $2,110 per person. This price

Continued, next page

IN THIS ISSUE

covers over 80 hours of training and includes all core classes and electives to complete either the Pavement Engineering and Management Certificate or the Pavement Construction Inspection Certificate program.

This allows agencies and industry to make one "ask" to funding approvers. Once the training hours package has been purchased, if plans change in the future, those training hours will be held in "escrow" and can be used however the agency or company chooses for CCPIC or other TechTransfer training until they are used up.

For more information, visit: www.techtransfer.berkeley.edu/news/prepaid-training-packages

Putting New Superpave for Local Governments HMA Specification into Action

Several local agencies are using, or preparing to use, the new Superpave for Local Government hot mix asphalt (HMA) specification. It can be found here: http://www.ucprc.ucdavis.edu/ccpic/pdf/HMA-LG%20Specification%20(9-13-21)%20for%20posting.docx, or search on the CCPIC website at www.ucprc.ucdavis.edu/ccpic.

If you are interested in learning more, email Erik Updyke at eupdyke@ucdavis.edu.

Want a CCPIC Technical Topics Event for Your Agency and Neighbors?

This summer the CCPIC has delivered nine sessions of PowerPoint-based presentations on how to get maximum value from condition survey data used in pavement management systems, and on the importance of asphalt compaction and tack coats on pavement life and specifics on how to get maximum value out of investments in asphalt treatments. These sessions have been hosted by two agencies and attended by 6 city or county agencies in Northern California, and hosted by three agencies and attended by 13 local agencies in Southern California, with a total of approximately 190 attendees. The CCPIC is looking to schedule additional sessions across the State in the upcoming months. If your agency is interested in hosting a session, whether in-person or by web meeting, please contact eupdyke@ucdavis.edu. Attendance by multiple agencies at each session from the region around the hosting agency is welcomed and encouraged.

More information on the two subjects covered at recent events is available on the CCPIC website at: http://www.ucprc.ucdavis.edu/ccpic/pdf/PCI%204-Pager%20final%20v2.pdf and http://www.ucprc.ucdavis.edu/ccpic/pdf/CCPIC_4-pgr_asph%20compact_final_May%202017.pdf

If you would like a session on other topics, let Erik Updyke know.

Want to Help Guide CCPIC? Governance Board Recruitment

The Center is looking forward to filling four City Board seats, and one County board seat. If interested in the City Board seats, please contact Damon Conklin at: dconklin@calcities.org. If interested in the County Board seat, please contact Merrin Gerrety at: mgerety@counties.org.

Need Some Pavement Advice? Help Desk for Local Agencies

The Center has also expanded its services to include a 'Help Desk' for local agencies. This year it has helped agencies including the Town of Paradise, the City of Lincoln, Napa County, and Santa Clara County with specific pavement related problems.

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Technical Guidance and Tools from CCPIC

Information, guidance and technical tools downloadable from the CCPIC website at www.ucprc.ucdavis.edu include:

Best Practices for Pavement:

- Writing and enforcing specifications for asphalt compaction
- Writing concrete mix specifications
- 'Unpaving' to Create Affordable, Safe, Smooth Gravel Roads
- Pavement Condition Index: *There's More (and Less) to the Score*

Tools and Model Specifications:

- Pavement life Cycle Cost Analysis Spreadsheet Software
- Asphalt Compaction Model Specification Language
- Concrete Pavement Model Specification Language
- Tack Coat Model Special Provisions
- Superpave for Local Government Model Specification Language (HMA-LG)

Other technical guidance efforts completed or currently underway include:

- Site Investigation guidance manual for local agencies
- Recycling Guidance for Cold In-place (CIR) and Cold Central Plant (CCPR)
- Economic analysis of improvements in local agency pavement practices
- Environmental life cycle assessment tool for local governments
- Interlocking concrete pavement specifications
- Soil Stabilization Guidance for local agencies
- Catalog of pavement designs for local agencies based on CalME software
- Guidance on pavements for bike and walking paths

Let us know if you have other ideas we should consider by sending an email to:

eupdyke@ucdavis.edu.

About CCPIC

The **City and County Pavement Improvement Center (CCPIC)** was officially formed in 2018 to work with local governments to increase pavement technical capability through timely, relevant, and practical support, training, outreach and research. The vision for the Center is to make local government-managed pavements last longer, cost less, and be more sustainable. The scope of the Center's work is to:

- Increase knowledge through **training**, peer-to-peer exchanges, and tech briefs
- Develop sample **specifications** and other resources
- Establish a pavement engineering and management **certificate program, and**
- Serve as a **resource, research and development center**

CCPIC is currently supported by SB-1 (fuel tax) funds provided to the University of California, and to the California State Universities. Campuses involved include UC Davis, UC Berkeley, CSU Chico, CSU Long Beach, Cal Poly San Luis Obispo, and funding partners CSU San Jose (Mineta Transportation Institute), UCLA and UC Irvine.

For more information on the CCPIC activities please go to our website at: http://www.ucprc.ucdavis.edu/ccpic/ or email us at: eupdyke@ucdavis.edu

Asphalt Emulsions In Pavement Preservation

By Jason Dietz (FHWA-RC) and Gary Hicks (CP2 Center)

ASPHALT PAVEMENT NEWS

The Federal Highway Administration (FHWA), in partnership with the Pavement Preservation and Recycling Alliance (PPRA) held a webinar on April 21, 2022, Agency Experience with Emulsion Preservation Treatments and Research. The goal is to help State highway and local agencies in preserving their investments in roadways, enhance safety, extend pavement life, improve functional performance, and contribute to increased user satisfaction. Three presenters participated: City of Bend, Oregon, Pierre Pelitier, Past President of International Slurry Seal Association (ISSA), and Adriana Vargas, PhD, representing the National Center of Asphalt Technology (NCAT) – MnROAD Joint Study.

City of Bend, Oregon

The presentation on the City of Bend, Oregon experiences was delivered by *Continued, next page*

Chuck Swan (Division Manager) and Paul Neiswonger (Project Manager) from the City of Bend. Chuck briefly discussed:

- Street conditions - Their PCI increased from 68 to 76 in a period of 7 years (Figure 1.) Their target PCI is 80.
- Funding history - A variety of sources has been used, but the City still lacks sufficient funds and is seeking sustainable funding. They have good support from executive teams and elected officials.

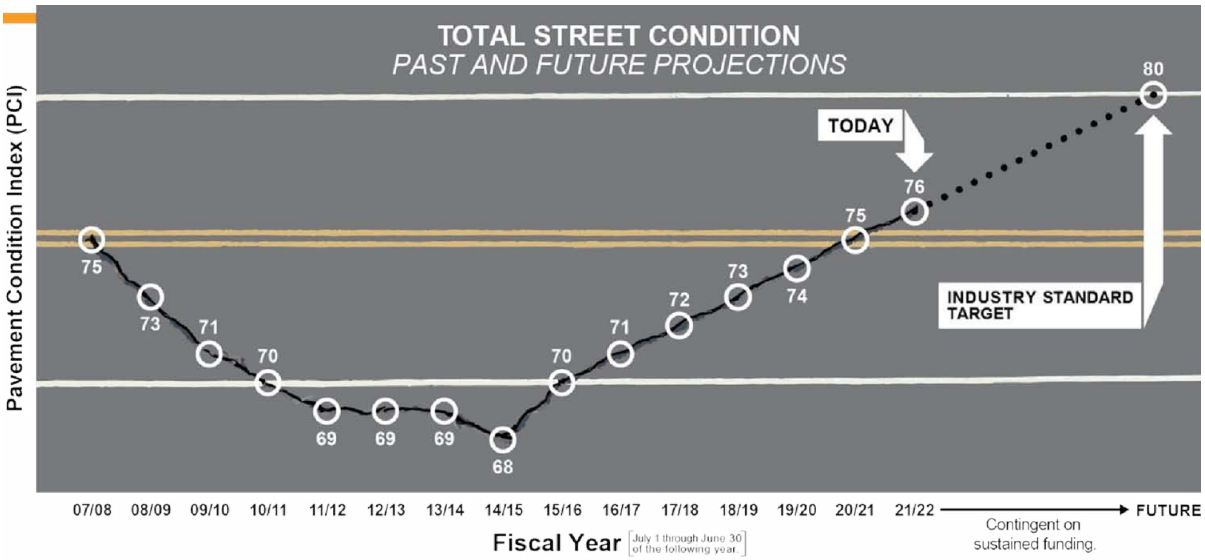

Figure 1. City of Bend Pavement Condition

- Toolbox - Prior to 2015 the City of Bend had two tools in their toolbox. Hot applied chips seal and paving. Since then, they have added several new tools as discussed below and to kicked off the cities first slurry seal program.
- Other goals / challenges - realignments of the department (splitting roads from utilities), educating their community and council on the importance of pavement preservation, rapid growth, finding sustainable funding, using new technologies.

Paul Neiswonger (Project Manager) then discussed the key steps for ensuring good jobs:

- Prep work before the project including selecting the right treatment for the right pavement condition, minor repairs including patching and crack treatments and removing root bumps, removing vegetation and tree trimming, and sweep cleaning the pavement before placing a treatment
- Tools used today which consist of crack seals, chip seals, HMA overlay, grind and inlay, FDR, slurry seals and micro surfacing, and hot rubberized chip seal. Most of the work is done by in-house forces except for the HMA overlays.
- Public outreach via post cards, door hangers, online maps, and forms of other communications
- Agency Inspection using qualified inspectors, setting expectations, testing of oil and rock samples and daily submittals
- Synergy projects - working with other agency's including Oregon DOT, public/private partnerships
- Awards and recognition - The City has been recognized by numerous organizations (WRAPP, APAO, and more) for the excellent work. This is great public relations for their accomplishments in improving the pavement conditions over the past several years.

For more information on their program, please contact either Chuck Swan at cswann@bendoregon.gov or Paul Neiswonger at pneiswonger@bendoregon.gov

Best Practices for State Highway and Local agencies

The second presentation, given by Pierre Pelitier, past president of ISSA and technical sales manager for Strawser construction, covered 'best practices' for state highway and local agencies. This included a short presentation on each of the following:

- **Understanding emulsions and terminology** - simple slides describing what emulsions are and which ones should be used for different preservation treatments
- **Equipment** - what you need to know about

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the distributor – some of the major components and what inspectors need to look for during inspection.

- **Chip seals** - Next, he discussed the importance of the preconstruction meeting (including design, proper signing, equipment calibration, staging and handling of materials, sampling and testing of materials, traffic control, rolling, and sweeping. He emphasized the importance of proper surface preparation, including removal of all thermoplastic and raised pavement markers, cleaning vegetation, patching and crack treatments. It's also important to make sure the weather is appropriate for chip sealing and stop operation if rain is expected within 4 hours. During construction, he emphasized the importance of sweeping before starting each day, use of tar paper to create a good joint, keeping the distributor truck close to the aggregate spreader, rolling the aggregate within 5 minutes to ensure good embedment and keeping the rolling speed at about 5 mph, and allowing time for proper curing before traffic takes to the road. Sweeping of excess loose chips is required at the end of each day of production. Finally, he discussed the importance of a fog seal and some common troubleshooting such as inconsistent emulsion or aggregate application, emulsion running of the roadway, and aggregate loss.
- **Micro Surfacing** - As for chip seals, the importance of the preconstruction meeting was discussed including mix design, public relations information, equipment calibration of the slurry paver, staging and handling of materials, sampling and testing of materials, traffic control, and phasing of equipment operations (microsurfacing application), rolling if needed, and sweeping. Weather conditions should be 50 degrees and rising, with no imminent rain in the forecast. He emphasized the importance of proper surface preparation as for chip seals. In some cases , a diluted tack coat may be used. The importance of a test strip prior to production was discussed to verify the mix design and look for workmanship problems. He also discussed the differences between the slurry machines - mechanical vs. electronic. The mechanical machine runs on a jackshaft and uses adjustable gates to achieve the mix design. The electronic machine uses computer-controlled hydraulic motors to maintain the proper ratio of aggregate and emulsion and other additives. All equipment needs to be calibrated and checked for fluid leaks and to make sure the spreader box is in good condition. Application rates for both leveling and surface courses were provided. An excellent reference for design, construction, and inspection of microsurfacings can be found at the following link:

  https://cdn.ymaws.com/www.slurry.org/resource/resmgr/tbs/A143_Revision_for_Publicatio.pdf . Information on Troubleshooting problems like debonding and raveling or shedding can also be found in this publication.
- **Cape seals** - Cape seals are a combination of a chip or scrub seal followed by a slurry surfacing - either a slurry seal or a micro surfacing. As for chip seals and micro surfacings, the importance of the preconstruction meeting was discussed. Weather conditions mentioned above for chip seals and microsurfacings still apply. Pre-construction practices like those for chip seal and microsurfacing were also recommended. The importance of a test strip prior to production was discussed to verify the mix design and look for workmanship problems.
- **Other considerations.** Finally, he discussed other items such as liquated damages for preservation treatments, to address items not completed during the completion year. Crack seal work done before the preservation treatment can either be done as a part of a separate contract or part of the preservation treatment contract. If part of the treatment contract, it should be done at least 30 days before the placement of the preservation treatment.
- **As always…** The road to success is selecting the right treatment on the right road, placed at the right time, and with the right people.

For more information on this presentation please contact Pierre Peltier at: ppeltier@terry-asphalt.com

Research Findings from NCAT-MnROAD Pavement Preservation Study

The last presentation was by Associate Research Professor Adriana Vargas, PhD, of the National Center for Asphalt Technology (NCAT). It dealt with the findings from the *Continued, next page*

NCAT-MnRoad pavement preservation study. This study has been underway for 10 years, consisting of 145 test sections, many of which are still in fair to good condition. Funding for these studies has been through pooled funds provided by numerous states, FHWA, and Foundation for Pavement Preservation (FP2). Most of the preservation treatments included a variety of chip/scrub seals, micro surfaces and fog seals.

Some of the key findings to date include:

- Target good pavements. There is some benefit on poor pavements, but it is not cost effective
- Life extension may be higher than typically reported. This is partly because of using 'best practices' such as good materials, good designs, good treatment section, and good construction.
- The more you do, the more life extension you get.
- Use of multiple layers gives the best service life until 20% cracking, as shown in Table 1.–
- Treatments can work under different conditions or environments, but be cautious and use best practices.
- Crack reductions are the most notable benefit as shown in Table 1. It's easy to see, but it is not the only distress parameter to monitor.

In summary, NCAT has determined that

- Preservation treatments do extend pavement life
- Some treatments within the same category have similar performance
- No major issues were noted in either location, Alabama or Minnesota - if the work is done correctly.

For more information, please contact Adriana Vargas at: adriana.vargas@auburn.edu . More information on this study can be found at www.ncat.us . A video of the webinar is available at: https://connectdot.connectsolutions.com/pdb836eop5uw/

Future webinars

Finally, for more information on the Pavement Preservation 2022 FHWA/PPRA Webinar Series and upcoming webinars, please contact Jason Dietz at Jason.Dietz@dot.gov

Table 1. Service life (years) until 20% cracking

Treatment	Poor	Fair	Good
Rej. Fog seal	2.4	4.1	6.0
Single chip seal	4.3	8.5	7.9
Single chip seal + crack seal	7.3	7.4	10+
Double chip seal	6.8	10+	10+
Triple chip seal	10+	10+	10+
Fibermat chip seal	7.1	8.8	10+
Scrub seal	10+	10+	10+

In-Place Recycling - Project Selection and Design

By Stephen A Cross (ARRA) and Jason Dietz (FHWA) Smith, CP^2 Center

The FHWA/PPRA Pavement Preservation 2022 Webinar Series continues with the Project Selection and Design for In-place Recycling webinar on May 19, 2022, at which 105 participants attended the webinar. Featured speaker was Dr. Stephen Cross, Technical Director for ARRA. The types of recycling covered included Hot in-place recycling (HIR), Cold in-place Recycling (CIR), Cold Central Plant Recycling (CCPR), and provided some information on Full Depth Reclamation (FDR) which includes soil and base stabilization.

Briefly, the HIR process that was discussed was the 'multiple pass', which includes heating the existing pavement, hot milling or scarifying the existing surface, adding a rejuvenating agent and other additives (new asphalt mix or new aggregate) as needed, mixing, placing and compacting the recycling mixture and placing a wearing surface if required. HIR is not intended to address structural failures, but is intended to treat non-load associated distresses that occur in the top 1-3 inches. Cold recycling (CR) is

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restricted to asphalt pavement and minor amounts of base. CR includes both CIR and CCPR. CIR is generally restricted to pulverizing existing 3-5 inches of existing pavement, sizing the RAP, the addition of a recycling agent (foamed asphalt or an emulsified asphalt) and perhaps lime, cement or more aggregate, mixing the component materials, placement and compaction of the mixture, followed by the placement of a wearing course. CCPR is essentially the same process as CIR except the recycled mix is removed from the roadway and mixed off site. These treatments are meant to treat non-load distress that occur in the top 2-5 inches of the pavement structure. They're excellent for mitigating transverse or reflective cracking, and can be used any place a mill-and-fill or thicker asphalt overlay is being considered. Keys to successful CIR and CCPR projects include project site selection, good communication and education, and good specifications, which was documented in NCHRP 14-43.

The benefits of in-place recycling are many, including:

- Reuses 90-100% of the existing materials in-place (sustainable, reduces trucking)
- Produces up to 90% less greenhouse gases
- Costs 20-50% less than traditional methods
- Reduces user delays (20 to 40% faster construction)
- Proven performance

Dr. Cross covered project selection for HIR and CIR, including distresses treated, project sampling, and other special considerations. This is covered in detail in Chapter 3 of the Basic Asphalt Recycling Manual (BARM), and includes the following steps:

- Visual pavement surface assessment
- Review of historical information
- Pavement properties and thickness assessment
- Pavement distress evaluation
- Preliminary maintenance or rehabilitation selection
- Economic analysis
- Project design

These factors are considered to determine the proper treatment selection, as shown in Table 1. For each of the attributes, the recommended condition for HIR, CIR, and FDR are provided.

Table 1. Treatment Selection Criteria

Attribute Description	Hot In-Place Recycling (HIR)	Cold In-Place Recycling (CIR)	Full Depth Reclamation (FDR)
Attributes of Existing Pavement	Structurally sound, oxidized, minor cracking, good profile	Structurally sound, cracked, good profile	Requires structural improvement, distorted, heterogeneous
Existing Pavement Depth	> 3-4" (75 - 100 mm)	> 4" (100 mm)	Almost Any Depth
Typical Materials Reclaimed	100 % RAP	100 % RAP	Any combination of RAP and Aggregate
Typical Treatment Depth	¾"-3" (19 – 75 mm)	3-5" (75-125 mm) (≥ 70% of HMA)	4-12" (100 - 300 mm)
Typical Cross Sections Treated	Urban, Rural, Freeway		
Traffic	Capable of Treating Full Range of Traffic		
Potential Geometric Limitations	Tight turns, steep grades, profile correction, widening	Tight turns, steep grades, profile correction	None
Typical Overlay Treatment	None, HMA/WMA, Chip Seals, Slurry Surfacing, Fog seal	HMA/WMA, Chip Seals, Slurry Surfacing, Fog seal	HMA/WMA, Chip Seals
Performance Measures	Removal of surface distresses, restores functional characteristics	Removal of surface distresses, helps mitigate reflective cracking, improves smoothness and profile	Eliminates pavement distresses, increases structural capacity, & restores profile

The PPRA website www.roadresource.org provides information on which treatment is best for a road, using either pavement condition or pavement photos. This information can be found in the treatment 'toolbox' of the website. In addition, he shared ARRA general guidelines table for Recycling Maintenance/Rehabilitation Techniques, which is broken down by the specific pavement distress mode and HIR and CIR applicability tables, which are available on PPRA website. Other issues that can affect the recycling candidates include: clean and dry surfaces, contaminated material, large deep patches, steep grades and tight turns, presence of geotextiles, crack sealing, delaminations and stripped layers in the

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existing pavement, buried ultities, and base or subgrade issues.

Layer thickness assessment is very critical, including having a minimum of one inch asphalt below treatment depth for equipment stability. Ground penetrating radar (GPR) is used as a gold standard for layer thickness, but if that is not available, cores need to be taken. Cores should be from mainline and shoulder areas, staggered, measured and photographed - recording special features (rubber, fabrics, stripping) and identifying whether distresses are top-down or bottom-up.

In terms of structural design, Dr. Cross discussed required testing and sampling, design methods, and the PPRA structural comparison calculator. Structural assessment can be done by non-destructive testing (NDT) or coring to determine the properties of the supporting pavement layers. Design methods that have been used include the 1993 AASHTO or the AASHTOWare Pavement ME Design methods. For HIR, a design method is not always performed since many agencies consider it a maintenance treatment. However, if a design method is used, ARRA recommends a layer coefficient of 0.43 for HIR. For CIR, ARRA uses a layer coefficient of 0.36 in their structural comparison calculator. If a mechanistic design method is used, AARA recommends using the findings of NCHRP report 863 to select E* values.

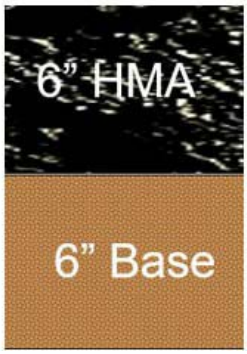
The thickness of the layer over a CIR/CCPR mix can vary considerably depending on traffic or climate. Surface treatments (e.g. chip seal) have been used on low volume roads. Also, 'thinlays' of 1 inch or so, and HMA layers of 2 inches or greater have been used on higher volume roads. NCAT studies have confirmed these findings at their test track or on Lee Road.

The following example is a comparison of a mill-and-fill project vs. a CIR project. This calculator can be found on the

Table 2. Comparison of CIR vs. Mill-and-Fill

- Compare 2" mill with 3" HMA overlay to:
  - CIR for same structural number
  - CIR for equal cost

Existing distressed pavement



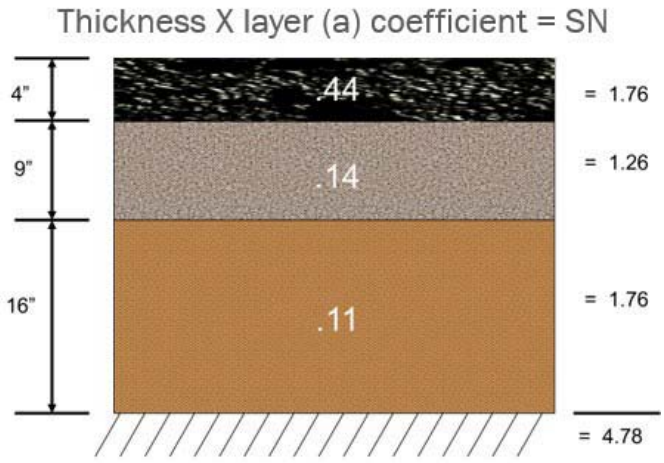


Table 3. Approximatley Equivalent SN and Costs

Total Sq. Yards To Be Treated: 1

Conventional Approach vs. Optimized: Recycling First

yd Export

Layer Type	Depth (in)	Coefficient	Unit Cost		SN
Hot Mix Asphalt	3.00	0.44	4.65	/SY/in	1.32
Cold Planing	2.00	0.00	1.00	/SY/in	0.00
Existing HMA	4.00	0.20	0.00	/SY/in	0.80
Existing Granular I	6.00	0.10	0.00	/SY/in	0.60

ADD ROW

Overall Structural Number: 2.72

1 SY x $15.95 /SY = $16 total

yd

Layer Type	Depth (in)	Coefficient	Unit Cost		SN
Hot Mix Asphalt	1.00	0.44	4.65	/SY/in	0.44
Cold In-Place Rec	4.00	0.36	1.90	/SY/in	1.44
Existing HMA	2.00	0.20	0.00	/SY/in	0.40
Existing Granular I	6.00	0.10	0.00	/SY/in	0.60

ADD ROW

Overall Structural Number: 2.88

1 SY x $12.25 /SY = $12 total

www.roadresource.org website. The AASHTO layer design method is used with the layer coefficients for each layer as shown in Table 2. For the conventional approach, the existing HMA pavement of 6 inches of HMA was cold planed and replaced with 3 inches of new HMA. This left 4 inches of existing HMA and 6 inches of aggregate base for an overall structural number of 2.72. The recycling alternative consisted of CIR of 4 inches followed by a 1 inch HMA overlay, resulting in a SN of 2.88. The difference in cost of the two alternatives was $4/yd^2 as shown in Table3.

For more information on the presentation please contact Steve Cross at steve.cross@okstate.edu or Jason Dietz at jason.dietz@dot.gov.

The URL for the Project Selection and Design of In-place Recycling webinar is: https://connectdot.connectsolutions.com/ppmnsbiuedti/

AASHTO ETF Update

By Colin Franco (RI DOT) and DingXin Cheng (CP2 Center)

The American Association of State Highway and Transportation Officials (AASHTO) TSP2-Emulsion Task Force (ETF) had an in-person meeting at the Heritage Group Innovation Center and Research Lab on June 21-22. ETF continues to work on developing material specifications, design practices, quality assurance (QA) specifications and construction guides for emulsion preservation treatments. Many of the materials specifications and design practices have already been developed and published by AASHTO. NCHRP 9-62 Rapid Tests and Specifications for Construction of Asphalt-Treated Cold Recycled Pavements was completed. New test methods were developed for opening of CIR. The construction guides for chip seals, micro surfacing, and fog seals under NCHRP project 14-43 and Cold Central Plant Recycling and Cold In-Place Recycling under NCHRP project 14-44 were submitted to the AASHTO Committee on Material and Pavements TS5b (COMP TS 5b). NCHRP 14-48 Construction Guide Specifications for Sand Seals and Ultra-thin Bonded Wearing Courses was approved and the NCHRP panel has been assembled. NCHRP 10-114 Developing Performance and Safety Specifications for Rejuvenating Seals was approved and NCAT is going to work on this project. NCHRP 10-124 Development of Field tests for Embedment of Chip Seals was approved and a new panel will be established. NCHRP 9-63 A Calibrated and Validated National Performance-Related Specification for Emulsified Asphalt Binder is in the process of revising the residue testing standards with new funding. All the activities including both completed and planned are summarized in Table 1.

Table 1. AASHTO Standards and Guide Construction Specs For Emulsion Treatments

Emulsion Treatments	AASHTO STANDARDS M / MP	R	W/ COMP	Guide Construction Specs
Chip Seal	MP27-16	PP82-16		✓ NCHRP 14-37
Microsurfacing	MP28-17	PP83-16		✓ NCHRP 14-37
Fog Seal	MP33-17	PP88-17		✓ NCHRP 14-37
Cold Recycled Mixtures	MP31-17	PP86-17	2022	✓ NCHRP 14-43 / NCHRP 9-62
Tack Coat	MP36-18	PP93-18	2022	✓ NCHRP 14-44
Scrub Seal	✪	PP91-18	2022	✓ NCHRP 14-44
Slurry Seal	MP32-17	PP87-17	2022	✓ NCHRP 14-44
Sand Seal	MP34-18	PP90-18		NCHRP 14-48
Bonded Surface Treatments (Nova Chip)	✪	✪		NCHRP 14-48
Foam Asphalt Stabilization	MP38-18			
Specifications for Rejuvenating Seals				NCHRP 10-114
Embedment of Chip Seal Aggregate				NCHRP 10-124
Emulsion Binder Standards	**M / MP**	**R**	**W/TRB**	
Emulsified Asphalt	M140-16			
Cationic Emulsified Asphalt	M208-16			
Polymer-Modified Cationic Emulsified Asphalt	M316-16			
Emulsion/Surface Performance Grades (E/SPG)				NCHRP 9-63

Several people gave presentations on various topics related to pavement preservation. Kelly Morse gave a presentation on asphalt content in micro surfacing mixtures. Sallie Houston presented mix design and material testing for slurry seal systems. Mike Anderson gave an update on NCHRP 9-63. Adriana Vargas and Jerry Geib presented the findings of pavement preservation treatments on NCAT and MN Road test section. Dennis Dvorak presented the PWL statistical method for pavement preservation. Collin Franco gave an update on QA, Education and Certification. Larry Galehouse has retired, statements of gratitude and best wishes were made by Franco and the group. Bouzid Choubane is the director of NCPP and replaced Larry on the ETF. Rex Eberly is now working for the NCPP. Bouzid will bring a group of

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trainers together to pursue the unified training and certification effort. All the presentations and the minutes of the meeting can be found at the ETF website located at: http://tsp2-etf.org/meetings-and-presentations/.

In the end, a tour of Heritage Group facility was provided to a group of ETF members who were interested in the lab testing. For more information, please contact Colin Franco at colin.franco@dot.ri.gov.

NCPP Update

By Bouzid Chaubane, NCPP

PCC PAVEMENT NEWS

The National Center for Pavement Preservation (NCPP) was established by Michigan State University and FP2, Inc. to lead collaborative efforts among government, industry, and academia in the advancement of pavement preservation by advancing and improving pavement preservation practices through education, research and outreach.

Some of NCPP recent activities and accomplishments include the following:

- In May of 2021, we held a Virtual National Pavement Preservation Conference over the course of a week. This conference consisted of 9 sessions with over 750 attendees representing 50 states, 4 Canadian provinces and many local agencies.
- In the Fall of 2021, we resumed in-person meetings. We held 2 regional bridge conferences, in Arkansas and in Arizona. In the first quarter of 2022, we held 2 regional pavement preservation partnership meetings, in Georgia and New Hampshire.
- We published a *Bridge Deck Preservation Resource Guide*.
- NCPP was awarded an NCHRP project for the implementation of the ETF-developed specifications for chip seal, micro surfacing, and fog seal. The project includes training and a series of demonstration projects. Training materials have already been developed for fog seal, chip seal, and micro-surfacing treatments.
- The National Bridge Deck Working Group developed a *Concrete Bridge Deck Preservation Resource Guide* and was recently published as a resource to provide basic information on concrete deck preservation actions and links to relevant guidance documents.
- We guided and facilitated the development of an open-access online Database for Preservation Treatments to document related Cost & Quantity for the Midwest states. This allows agencies to learn and understand what neighboring states are doing and benefit from each other's practices. we plan to extend this database to the other regional partnerships.
- The Emulsion Task Force (ETF) has been active developing several specifications for pavement preservation treatments including 10 material standards, 10 design standards, 4 construction guides and 2 quality assurance guides. The Concrete Task Force (CTF) developed the *Construction Guide Specification for Diamond Grinding for Pavement Preservation*.
- The existing Certification Exams (for public agency and contractor personnel) have been developed into optional online exams as well. These exams allow us to expand the reach to individuals who would otherwise need to go to an in-person meeting or College Testing center to take a paper exam. There is also a Spanish version of some of these exams.

The upcoming in-person regional/national

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Partnership meetings are as follow:

- Midwest Pavement Preservation Partnership - September 12-14, St. Louis, MO
- Rocky Mountain West Pavement Preservation Partnership - September 27-29, Albuquerque, NM

For more information on NCPP activities go to: www.pavementpreservation.org

PCC Rehab on Desert Stretch of I-10

By Mark Gudenas, SWCPA Communications Director

The 30-mile stretch of I-10 across southeastern California is in bleak terrain that simmers in year-round heat, so when Coffman Specialties received the paving contract from Fisher Industries for Caltrans' $250-million I-10 Blythe Pavement Rehabilitation Project, they knew they were facing challenging work.

Nighttime paving helps mitigate the effects of the scorching desert heat on both the crews and the freshly poured concrete. Photo courtesy of Kevin Coffman.

"The temperature on the job this morning was 103 degrees," said Kevin Coffman on Friday, June 17th, driving back from the project. Coffman is in charge of all field paving operations for the company, and if he's not onsite overseeing a project, he's either going to or coming back from one. "The majority of the paving work on this portion of I-10 is done at night to minimize the impact of the desert heat."

Portable batch plants are an essential part of any remote concrete paving project and this one was no exception. Coffman Specialties erected an ERIE Strayer 12-yard Batch Plant equipped with water chillers to lower the temperature of the batched concrete in the hot desert environment. The stockpiles were also watered to lower the temperature, and a mister was set up on the curing machine.

Coffman, however, was met with a challenge when it came to water for the mix. "What was coming up from the well that Fisher drilled was unsuitable," Kevin Coffman explained, "so water is being trucked in from the nearby Colorado River to ensure that we have the right chemistry in the concrete mix."

Paving work began in early June on the first stage of the project in Riverside County and is scheduled to conclude on August 1st of this year. "More than 80,000 yards of concrete will be poured as the new Jointed Plain Concrete Pavement is put in place," Coffman stated.

Coffman is paving I-10 with a GOMACO GP4 Slipform Paver equipped with GOMACO's IDBI Dowel Bar inserter. Along with the new jointed plain concrete pavement (JPCP) roadway, shoulders will be repaved, and new guardrails, rumble strips, drainage systems, and ramps will be built.

Coffman's ERIE Strayer batch plant was in full operation during the cooler nighttime hours in the desert. Photo courtesy of Kevin Coffman.

"Working with Caltrans and Fisher on this project," Coffman continued, "we've formed really good partnerships.

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The GOMACO GP4 Slipform Paver in operation on a new stretch of I-10. Photo courtesy of Matt Fonte.

That enables good communication and helps everyone throughout the project stay on the same page and on schedule."

Onsite Inspector Training at the I-10 Project

In conjunction with this project, Charles Stuart, Executive Director of the Southwest Concrete Pavement Association (SWCPA), and Matt Fonte of Fonte & Co. traveled out to the I-10 jobsite on June 22nd to conduct a Caltrans inspector training workshop for inspectors involved with the paving work on I-10. Caltrans' Resident Engineer for the project was Ryan Espoy.

The boots-on-the-still-wet-pavement instruction focused on the project paving operations and included four hours on site, plus seven hours in the project office. The training focused on the high-priority paving issues that inspectors need to be knowledgeable of during concrete paving inspection. "The Coffman Specialties team presented a good example for the onsite instruction as they run a very impressive operation," said Matt Fonte.

After observing the paving operations, Stuart and Fonte took the workshop indoors where they continued the quality control discussions, highlighting topics that increase the likelihood of successful paving in the desert region of Southern California.

SWCPA is committed to supporting Caltrans and the paving industry with their objectives to build long-life, low-maintenance concrete pavements throughout the state.

The entire section of I-10 that will be rehabbed starts at Desert Center on the western edge, just southeast of Joshua Tree National Park, and extends east to Wiley's Wash, about 15 miles west of Blythe. The targeted completion date for the total project is spring 2025.

For more information about this project – and concrete paving in desert environments, contact Charles Stuart at: cstuart@swcpa.org

The workshop group convened at 5 am to talk through jobsite details. Matt Fonte, right, and Ryan Espoy, Project R.E. (with coffee), were joined on site by the Caltrans construction team. Photo courtesy of Charles Stuart.

Dawn greets the Coffman Specialty crew as they overlook the newest section of pavement on I-10. Photo courtesy of Kevin Coffman.

Pavement Preservation for Concrete Pavements

By Prashant Ram and Kurt Smith, Applied Pavement Technology, Inc.

A recent FHWA project described concrete pavement preservation as "preserving the existing concrete pavement structure to extend its service life for as long as possible, by arresting, greatly diminishing, or avoiding the pavement deterioration process." This can be achieved through three fundamental approaches: (a) designing and constructing pavements that remain structurally adequate and relatively distress-free throughout their service lives (i.e., using long-life concrete pavement); (b) using asphalt or concrete overlays as preservation treatments to maintain the functional performance of the pavement; and (c) maintaining the serviceability of the pavement using proven concrete pavement preservation treatments.

One of the tasks under the project was to visit various concrete pavement projects around the U.S. that have successfully demonstrated the application of these three fundamental preservation approaches and to document their performance. Two west coast projects were included as part of this evaluation. Both serve as excellent examples of the use of preservation treatments on concrete pavements:

- **I-10 near Ontario, California (diamond grinding, diamond grooving, slab replacements).**

  This project was constructed in 1947 as an 8-inch undoweled jointed plain concrete pavement (JPCP) with 15-ft joint spacing and was later incorporated into I-10. Over the years, this pavement has received several diamond grinding treatments (including one of the earliest uses of diamond grinding in California in 1966), along with intermittent slab repairs. The most recent grinding and repair operation was performed in 2016, and after 70+ years of service the original 1947 concrete pavement remains in service (see figure 1). The site visit revealed a few low- and medium-severity mid-panel cracks, some surface wear, and isolated spalling (mainly along the longitudinal joint).

Figure 1. I-10, Ontario, California, concrete preservation project.

- **I-5 near Olympia, Washington (dowel bar retrofit, diamond grinding, slab replacements, joint resealing)**

  Constructed in 1969, this undoweled 8.5-inch thick JPCP featured skewed 15-ft transverse joints. Because of joint faulting and rideability issues, WSDOT retrofitted dowels in the transverse joints of the outer (truck) lanes of this project in 1996 (northbound direction) and 1997 (southbound direction), along with the installation of subdrains, intermittent slab replacements and partial-depth repairs, diamond grinding, and joint resealing; dowel bar retrofit and diamond grinding were also performed in 2010 in the center lane (both directions). This concrete section (see figure 2) has been in service for nearly 50 years and is exhibiting satisfactory performance, with some low- and medium-severity mid-panel cracks, isolated spalling, and wheelpath wear (from studded tires) observed during the site visit.

Figure 2. I-5, Olympia, Washington, concrete preservation project.

Taken together, the evaluation of these and other projects demonstrated the effectiveness of preservation in prolonging the service life of the concrete pavement. Key factors contributing to the performance include an adequate structure, good foundation, durable concrete mixtures, and the timely intervention of preservation treatments. In particular, diamond grinding (often in conjunction with dowel bar retrofit and other treatments) was demonstrated to effectively restore and maintain pavement smoothness.

Another part of the study evaluated different

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engineering economic analyses that could be used in the pavement decision-making process. This was in recognition to some of the limitations associated with conventional life-cycle cost analysis (LCCA) procedures, including the inability to accurately predict the actual timing and costs of future rehabilitation work, the use of an appropriate discount rate, the assumption of equal benefits and service among competing alternatives, and the consideration of end-of-life value. Two approaches were evaluated and used to quantify costs and benefits for the case study projects: Remaining Service Interval (RSI) and Cost of Ownership or Dollars per Lane-Mile per Year (DLMY). Both have a basis in LCCA techniques, with the DLMY approach noted to offer promise for widespread implementation, particularly for pavement preservation strategy selection at both the project and network-levels. Still, it is recognized that there are many non-monetary factors (e.g., agency preference, contractor experience, construction duration, and work site safety) that can drive the selection of pavement preservation strategies.

The final report documenting this study is undergoing review, but is expected to be available shortly. An interim report is available from FHWA here and several papers are available in the Proceedings of the 12th International Conference on Concrete Pavements (pages 414 and 578).

For more information contact Kurt Smith, APT at: ksmith@appliedpavement.com

WRAPP Update

By Matthew Conarroe, President

GENERAL NEWS

Federal Highway Administration (FHWA) guidance describes preservation as work that is planned and performed to improve or sustain the condition of the transportation facility in a state of good repair. A common mantra of pavement preservation is keeping good roads good. Constructing quality pavement preservation treatments when the pavement condition is still satisfactory can impede deterioration, extend service life, and improve functionality in a cost-effective manner while also enhancing safety and contributing to customer satisfaction.

The Western Regional Association for Pavement Preservation (WRAPP) is a non-profit trade organization consisting of over 25 member companies dedicated to the education and implementation of pavement preservation systems. Our member companies have been very busy this summer installing pavement preservation systems to help extend the service life of California's pavements. We have also been actively participating in specification updates for both Caltrans and the Greenbook.

WRAPP is pleased to announce the dates for our 2023 Pavement Preservation Workshop, "Don't Distress", to be held on February 1st and 2nd in Long Beach, California. This 2-day workshop will feature informative presentations concerning the design, materials selection, and implementation of pavement preservation systems from industry and public works experts. Details and registration can be found at www.wrapp.org.

FHWA Update

By Chu Wei, FHWA - Sacramento

Newer Asphalt Overlay Types - Case Studies

The Federal Highway Administration (FHWA) has recently published four case studies as part of its Every Day Counts – Six (EDC-6) Targeted Overlay Pavement Solutions (TOPS). A factsheet can access here , and it indicates the benefits of TOPS stating: "By enhancing overlay performance, State and local highway agencies can maximize this investment and help ensure safer, longer-lasting roadways for the traveling public."

The case studies for TOPS are listed below:

- **Crack Attenuating Mixture, Texas DOT**.

Crack attenuating mixture (CAM) interlayers may reduce the number of reflective cracks and slow the rate of reflective cracking by up to 50 percent. The concept of CAM interlayers for overlays was initially developed as a rehabilitation strategy for Jointed Reinforced Concrete Pavement (JRCP). CAM mixes have also been used successfully on Continuously Reinforced Concrete Pavement (CRCP) and with overlays of asphalt pavements where crack mitigation is desired. The document can be accessed directly at: https://www.fhwa.dot.gov/pavement/tops/pubs/TOPS_CAM_Case_Study_2-pager.pdf

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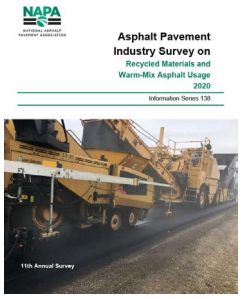

- **Highly Modified Asphalt, Florida DOT**. Highly Modified Asphalt (HiMA) used in thin overlays has potential benefits of reduced rutting, delayed fatigue cracking, mitigated crack reflection and improved durability of open-graded mixtures. The document can be accessed directly at: https://www.fhwa.dot.gov/pavement/tops/pubs/TOPS_HiMA_Case_Study_2-pager.pdf
- **High-Performance Thin Overlays, New Jersey DOT**. High-performance thin overlays (HPTO) can be used in high-traffic areas with minimal impacts to traffic due to short road closures. Benefits include an improved ride quality (depending on existing pavement conditions) and extended pavement service life - without raising profile grade by more than 1 inch. The document can be accessed directly at: https://www.fhwa.dot.gov/pavement/tops/pubs/HPTO_Case_Study_2-pager.pdf.
- **Stone Matrix Asphalt, Georgia DOT**. Stone matrix asphalt (SMA) overlays' potential benefits include greater rutting resistance, longer fatigue life, longer service life and lower annualized costs. The document can be accessed directly at: https://www.fhwa.dot.gov/pavement/tops/pubs/TOPS_SMA_Case_Study_2-pager.pdf.

Asphalt Pavement Industry Survey on Recycled Materials WMA Usage

A report on recycled materials and warm mix asphalt (WMA) usage for 2020 was published and can be accessed here. Based on the report, over 96 million tons of RAP was reclaimed for future use. This report includes results from 274 companies with 1,406 plants in 50 U.S. states and the District of Columbia.

Of the 96 million tons of RAP reclaimed, contractors reused 87.0 million tons in new asphalt pavements in 2020. This represents a 55.4 percent increase from the total estimated tons of RAP used in 2009, when this annual report was first prepared.

If you took all the newspapers, aluminum and steel cans, glass, and plastic bottles the U.S. recycles annually and put them on a scale, they would still weigh less than that of the RAP reclaimed.

The report also evaluated greenhouse gas emissions, finding that RAP usage saved 2.3 million metric tons of CO_2e, the equivalent of removing 510,000 passenger vehicles from the road.

For more information contack Chu Wei (FHWA) at: chu.wei@dot.gov

CSU-Chico Civil Engineering and CP2 Center Hosted the 2nd Annual Summer Asphalt Workshop for College Students

By Kun Zhang, CSU, Chico

CP2 Center News

The Department of Civil Engineering at California State University (CSU)-Chico and California Pavement Preservation (CP2) Center hosted the 2nd Annual Summer Workshop on Asphalt Pavement Technology and Material Tests for college students on June 7-9, 2022 (Video Link). Student participants were from Butte College, College of Desert, UC Berkeley, Chico High, and Chico State. The workshop was sponsored by the American Public Works Association (APWA) - Sacramento Chapter, which also supported the upgrading of the Civil Engineering Materials Lab (Video Link). Rick Liptak and Marco Palilla served as the representatives for APWA-Sacramento Chapter to make opening remarks for this workshop.

This three-day workshop aims to promote transportation workforce development for public works by introducing state-of-practice knowledge and training on asphalt paving technology and pavement materials testing following the AASHTO and Caltrans testing methods. Dr. Kun Zhang and Dr. DingXin Cheng lectured on various topics of Introduction to Pavement Engineering, Pavement Preservation, Aggregate, Asphalt Binder, Superpave Mix Design, Recycling of RAP and RAS, Balanced Mix Design, and Asphalt Plant Production and Field Compaction. Participants completed extensive hands-on labs over the three days, including Aggregate Gradation, Fine Aggregate Angularity, Specific Gravity of Coarse and Fine Aggregates, Rotational Viscosity of Asphalt Binders, Performance Grade Tests of Asphalt Binders using Dynamic Shear Rheometer and Bending Beam Rheometer, and Superpave Mix Design Tests of Asphalt Mixtures in terms of Mixing, Gyratory Compaction, Rice Density, Bulk Specific Gravity, and Indirect Tensile Strength. Participants also learned how

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to fix road potholes using asphalt concrete made of waste cooking oil and RAP, and visited a Chico Asphalt Plant. We sincerely thank Knife River Construction for hosting the asphalt plant tour.

The APWA-Sacramento Chapter is committed to sponsoring the Annual Summer Asphalt Workshop at Chico State for the next five years. We will keep recruiting college students and entry-level engineers from the asphalt industry in northern California to attend this asphalt workshop. If you are interested to join in this workshop in the summer of 2023, please simply send an email to Dr. Kun Zhang (kzhang2@csuchico.edu). We very much look forward to your participation!

Coming Events – Mark Your Calendar!

By Roger Smith, CP2 Center

COMING EVENTS

U.C. Berkeley Technology Transfer Courses

These courses were developed in partnership with the City and County Pavement Improvement Center (CCPIC) and funded by California Senate Bill 1, *the Road Repair and Accountability Act of 2017*.

Classes currently open for enrollment are:

Pavement Sustainability (CCA-02)

September 14-15, 2022 :: Online :: $145 Public Agency Fee, $290 Standard Fee

Instructor: John Harvey and Ali Butt

Asphalt Pavement Preservation Treatments, Materials, Construction and Quality Assurance (CCC-02)

September 19-22, 2022 :: Online :: $190 Public Agency Fee, $380 Standard Fee

Instructor: DingXin Cheng

Pavement Life Cycle Cost Analysis: The Basics (CCB-01)

December 13-14, 2022 :: Online :: $145 Public Agency Fee, $290 Standard Fee

Instructor: DingXin Cheng

More information is at:

TECH TRANSFER

https://www.techtransfer.berkeley.edu/

MSA Conference: September 11-15 (San Diego)

The San Diego Chapter of the Maintenance Superintendents Association (MSA) has announced that its annual *Training Conference and Equipment Show* will be held at the Town and Country Resort in San Diego. For more information got to:

San Diego Area Chapter

www.mainsupt.com/conference

WRAPP Workshop: February 1-2 (Long Beach)

The 2023 WRAPP Workshop will feature informative presentations given by industry experts on pavement preservation techniques and systems proven to extend the service life of pavements. As well as presentations on specification updates and pavement preservation strategies employed by multiple agencies. For more information got to: www.wrapp.org

WRAPP

FHWA/PPRA Webinars: Various Dates (Online)

FHWA will continue to team up with the Pavement Preservation and Recycling Association (PPRA) to offer short webinars on various popular pavement maintenance treatments, including crack sealing, slurry surfacing, chip seals, Cape seals, and proper handling of asphalt emulsion products. Registration is at:

https://connectdotcqpub1.connectsolutions.com/content/connect/c1/7/en/events/catalog.html?folder-id=1296478025&from-origin=connectdot.connectsolutions.com

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Find more information and dates contact: Jason.Deitz@dot.gov

Nevada LTAP Center Classes: Various Dates (Online)

The Nevada center for the Local Technical Assistance Program (NV-LTAP) regularly offers classes on a variety of pavement maintenance topics. For more information go to:

https://nvltap.com/

RMWPPP Meeting: Sept. 27-29 (Albuquerque)

The Rocky Mountain West Pavement Preservation Partnership (RMWPPP) is a regional forum of pavement professionals from State and Provincial Agencies, Contractors, Suppliers, Academia, Local and Federal Government Officials.

For more information got to:

https://tsp2pavement.pavementpreservation.org/rocky-mountain-west-rmwppp/

The Asphalt Institute and NAPA Webinars (Online)

The Asphalt Institute offers national training on pavement design, asphalt binders, mix design and asphalt construction. For more information go to:

http://www.asphaltinstitute.org/training/seminars/

The National Asphalt Pavement Association (NAPA) offers webinars on various asphalt pavement topics. For current listings go to:

https://www.asphaltpavement.org/programs/napa-webinars

The National Center for Pavement Preservation (NCPP) Training (Online)

NCPP was established by Michigan State University and FP2, Inc. to lead collaborative efforts among government, industry, and academia in the advancement of pavement preservation by advancing and improving pavement preservation practices through education, research and outreach. Training is an integral part of any Pavement Preservation Program. Preservation practices are constantly evolving as new techniques and products are developed. Courses are offered periodically throughout the year and are advertised on this website.

www.pavementpreservation.org

Caltrans established the California Pavement Preservation (CP^2 Center) at CSU, Chico in July 2006, and fully funded the Center in January 2007. Dr. DingXin Cheng is the current Director of the Center. Mr. Rukesh Maharjan is the current Contract Manager of Caltrans.

The purpose of the Center is to provide pavement preservation support services to Caltrans and other public agencies, and to industry. Unique services include developing educational programs in pavement preservation, providing training and staff development opportunities, providing needed technical assistance to public agencies and industry, and managing/conducting research and outreach services, such as this newsletter.

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