



# CP2 CENTER NEWS

Newsletter of the California Pavement Preservation Center

No. 53

March 2020

## WRAPP Workshop Highlights

The annual Workshop of the Western Region Association For Pavement Preservation (WRAPP) is the 'go-to' event for the world of pavement maintenance and preservation. The Workshop alternates between northern and southern California, and this year it was the north's turn to host. Almost 300 people turned out to hear the latest on pavement preservation at the Holiday Inn in Sacramento. In addition to a line-up of timely speaker topics, numerous exhibitors displayed their latest materials and services.



John Fox, Caltrans, with Ding Cheng at CP2C Booth

WRAPP President Jimmy Kendrick (Bergkamp) welcomed the group and introduced the Keynote Speaker, Assemblyman Jim Frazier (Fairfield) of the Chair of the Transportation Committee. Mr. Frazier highlighted the benefits now being realized from SB-1 funding citing the doubling of transportation funding for local agencies. He stressed the importance of accountability for these new fuel taxes, as evidenced by the formation of a new Office of Inspector General.



Assemblyman Jim Frazier

A major focus of this year's Workshop was the "Road Resource" website developed by the Pavement Preservation and Recycling Association (PPRA). This interactive site is a '1-stop shop' consolidating all things related to pavement management and maintenance strategies. Lindsay Matush (Vario Consulting) and Jerry Dankbar (City of Roseville) walked the group through the many capabilities and features of

By Roger Smith CP2 Center

the site, including its educational resources and its ability to compare various long-term pavement maintenance scenarios on a cost-benefit basis. Roseville has been partnering with PPRA for evaluating and improving the "Road Resource" website.



Jerry Dankbar, City of Roseville and Lindsay Matush, Vario Consulting

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Worth noting is that Roseville has increased their overall PCI to 76 utilizing a full menu of pavement strategies including slurry seals, microsurfacing, cape seal, chip seals-over- fabric (GRCS), bonded wearing courses, fiber additives and even roller-compacted concrete.

For more information go to: [www.roadresource.org](http://www.roadresource.org) or contact: [jdankbar@roseville.ca.us](mailto:jdankbar@roseville.ca.us)

The latest directions in the use of **paving fabric interlayers** was presented by Ray Meyers of the Asphalt Interlayer Association (AIA). After reminding folks of the types and best practices for paving fabric interlayers, he covered the use of fiberglass 'mat' products and the availability of new millable fabrics for recycling. Ray also covered the use of **geosynthetic fabric reinforced chip seals (GRCS)**, which involve the placement of a double chip seal over paving fabric. To achieve leveling and smoothness, a GRCS may involve the use of micro-milling prior to application. A high-speed inertial profiler machine can be used for measuring smoothness to assess the need for advance micro-milling on GRCS projects. Ding Cheng of our CP2 Center reported on the GCRS work being done by the Center for Caltrans on their test sections on US395 near Independence. These sections were constructed in 2018 by American Pavement Systems (APS).

For more information go to: [rmroads@gmail.com](mailto:rmroads@gmail.com)

The Bay Area **Town of Moraga, CA**, has a successful program for pavement improvements, as presented by former Town Engineer Edric Kwan. Moraga voters approved 'Measure K', a 1-cent sales tax increase for 20 years, to speed the fix-up of their streets. In 3 years they raised their overall PCI from 49 to 70, winning them widespread recognition and awards. They use the "Street Saver" pavement management program via the Bay Area's Metropolitan Transportation Commission (MTC), which helped them quantify benefits and 'sell' their sales tax initiative to the public. As part of their public relations effort, the Town requires 'Measure K' emblems on contractor equipment and on worker vests.

The **City of Bend, OR** also presented an overview of their very successful pavement maintenance program. Paul Neiswonger and Chuck Swann of the City noted that their PCI is now at 74, up from 68 in 2015.

They sometimes partner with County forces on chip seal work, and in 2020 will be doing more asphalt-rubber chip seals and microsurfacing, as well as Type 2 and Type 3 slurry. Cost savings are realized by doing all ADA ramp construction 'in-house'. They now have a Street Maintenance Funding Committee which reports directly to City Council.

For more information contact: [cswann@bendoregon.gov](mailto:cswann@bendoregon.gov)

The **City of Fairfield** street program was reported on by Pat Giles and Daniel Camara. They reported an overall PCI of 70' with a goal of 75 through a program that was bolstered in 2015 by a local 'Measure P' 1-cent sales tax. They have their streets evaluated and rated every 2 years by a consultant. All maintenance strategies are used including asphalt-rubber cape seals. For chips seal work, they often partner with Solano County. They use "Measure P" shirts, vest and signs on their projects.

For more info contact: [pgiles@fairfield.ca.gov](mailto:pgiles@fairfield.ca.gov)

**Women Of Asphalt** is a newer support group for women in the asphalt industry. Natasha Ozyoko (Road Science) reported on the rapid expansion of this group recognizing the big role that women now play in the asphalt industry, and noted that the Directors of 13 State DOT's are now women. Their new website feature podcasts and information on membership and sponsoring opportunities.

For more info go to: [www.womenofasphalt.org](http://www.womenofasphalt.org)

**High-float asphalt emulsions** and their benefits was the topic on Tom Shamberger of Albina Asphalt. These special emulsions can be an alternate to CRS-2P when an anionic (rather than cationic) product is needed for compatibility with chip seal aggregate. They tend to not run when spray applied, which can be a benefit when chip sealing on steep cross-slopes or slightly rutted pavements, and are used widely in Oregon. Another product highlighted was **low- temperature rapid set emulsion (RS-LTP)**. These specialty chip seal binders rely on a "chemical break", so they can be used at lower ambient temperature - as low as 40F - which can extend the chip seal season and also help with chip sealing in cooler, damp shady areas.

For more information contact: [tom.shamberger@albina.com](mailto:tom.shamberger@albina.com)

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An update on the use of **RAP in pavement preservation** was provided by Jim Emerson of Pavement Recycling Systems (PRS). RAP millings are now valued at \$15 - \$20 per ton, and in metropolitan areas where aggregate sources are getting more scarce, our asphalt streets might be looked at as "urban quarries". In addition to recycling RAP into HMA, it can also be used in our common surface treatments like including it in asphalt rubber chip seals, often with a reduction in the amount of binder required. The list of benefits is long, and numerous agencies in southern California are now using this technology. One Los Angeles County cape seal project boasted a savings of over \$1 million. A newer approach being tried involves micro-milling of the old surface to produce fine aggregate for a trailing, in-line slurry machine.

For more information contact: [jemerson@pavementrecycling.com](mailto:jemerson@pavementrecycling.com)

**WRAPP Awards** are always a part of the annual Workshop. This year a special 'Lifetime Achievement Award' was given to John Fox of Caltrans District 9 (Bishop). John has been a long-time 'go-to' person for Caltrans assistance with research and development of pavement preservation technologies. Congrats and many thanks to John!



**John Fox, Caltrans, receives award from WRAPP Board**

The WRAPP 'Contractor Quality Awards' went to the following:

- **American Pavement Systems (APS)** for capes sealing of numerous streets in the City of Martinez

## Surface Treatment Workshop

The vast expertise of VSS International was on display at another of their popular Workshops held on February 12 at the plush Stadium Theater in downtown Lodi. This unique venue

- **VSS International** for a nighttime slurry seal (Type 3) on Pacific Coast Highway for Caltrans
- **Albina Asphalt** for a special low-temperature chip seal for Lane County in Oregon

Special **donations** were also made by WRAPP to our California Pavement Preservation Center (CP2C) and to the national Foundation for Pavement Preservation (FP2)

The Workshop ended with the passing of the gavel to the new **2021 President, Cesar Lara** of Harris & Associates.

Presentations and additional information can be found at the WRAPP website: [www.wrapp.org](http://www.wrapp.org)



**Ding Cheng (CP2C) accepts donation from Cesar Lara, WRAPP President**



**Jim Moulthrop (FP2) accepts WRAPP Donation from Jimmy Kendrick, WRAPP President**



**By Roger Smith, CP<sup>2</sup> Center**

provided a comfortable, 'big screen' opportunity to see and hear about the latest in pavement surface treatment for pavement preservation or restoration. Rick Cross *Continued, next page*



coordinated the event, which featured speakers on the latest in chip seals - both hot asphalt rubber and 'cold' emulsion types - as well as slurry seals and microsurfacing. On display outside was the new Macropaver machine for slurry and microsurfacing. It eliminates the side motor, resulting in quieter operation, and has the capability of feeding chopped fiber into the slurry mix.



Rick Close and Jon James explain the new Macropaver machine

Sallie Houston provided an interesting overview of asphalt emulsion chemistry and their manufacture, citing the various tests and specifications for these water-based products, and taking the mystery out of the various names and grades designations. She noted that cationic type emulsions (e.g. CRS) work best with most California's

aggregates. She also provided an interesting demonstration of the effects of additives such as cement and aluminum sulfate on slurry seal mixes.

Chip seal best practices and an overview of performance was provided by Jack Van Kirk, a recognized expert in the field of asphalt rubber binders and their use in hot-applied chip seals, which can be done in cooler weather and at night. He highlighted the especially good performance of asphalt rubber cape seal, which involve a slurry seal over the rubber chip seal. The latest in slurry seal and microsurfacing



Sallie Houston demonstrates slurry mixes

technology was covered by Jon James, who stressed the benefits of using polymer-modified emulsion and the fact that microsurfacing can be placed thicker or "stacked" to fill ruts and other surface irregularities. Jon also shared the remarkable performance of their fiber-reinforced slurry and microsurfacing placed over pavements in fair to poor condition. These products have the ability to both level rough, highly cracked areas, and to resist cracking, for excellent long-term performance.

Multi-layer strategies were also discussed, including double chip seals and 3-layer systems, which can use microsurfacing for leveling, followed by an asphalt rubber cape seal for crack resistance and smoothing.

Several award-winning projects were overviewed by Matt Ferguson, including their night microsurfacing work for Caltrans on 24 miles of the busy Pacific Coast Highway.

For more information from the Workshop go to: <https://www.slurry.com/contact/>



## Changes in FAA's 'P-401' Specification

By Danny Gierhart, Asphalt Institute

Because materials, construction methods and test methods are always changing, specifications also need to change to keep up. The Federal Aviation Agency's (FAA) newest revision (10H) of, Standard Specifications for Construction of Airports ( AC 150/5370), which includes 'Item P-401', Asphalt Mix Pavement, was released on December 21, 2018. The FAA made a lot of minor changes in the new spec, but also some substantial ones. Here's what I think are 6 of the most important ones for asphalt contractors, consultants, suppliers, and testing labs to be aware of.

1. The FAA intentionally focused on the idea of contractor quality control (QC) to a greater

degree than ever before, not only in P-401, but throughout their Advisory Circular (AC) 150/5370-10H, "Standard Specifications for Construction of Airports." .” FAA has made a point to say that QC is more than just test results. It also includes using proper materials, workmanship, equipment, inspection, documentation, and communication.

2. The FAA has increased the opportunities for highway asphalt mixtures to be used in airfield construction. Previously, there was language in the specification that said the stricter P-401 guidelines had to be used if the pavement was subject to aircraft loadings of greater than 12,500 pounds.

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The new cutoff is 30,000 pounds, which allows considerably more leeway to use less stringent state highway specifications. It's important to understand why airfields often need a stronger asphalt mixture than highways. Aircraft loads can exceed one million pounds, whereas even very large trucks do not exceed one hundred thousand pounds gross weight. Additionally, aircraft tire pressures can exceed 300 psi, versus semi-truck tire pressures that average around 100 psi. The reasoning behind the FAA change is that typical truck tire loads are similar to aircraft tire loads up to about 30,000 pound aircraft loads. Mr. Doug Johnson of the FAA created Figure 1, which clearly demonstrates the differences between typical highway truck loading and different aircraft loads. It's clear

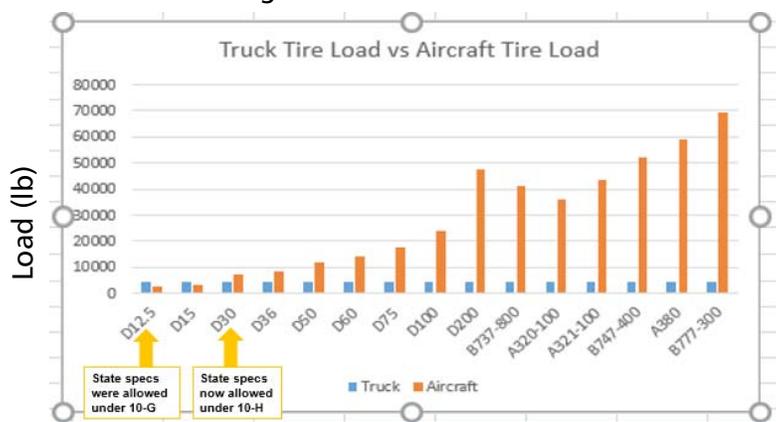


Figure 1. Highway truck tire loads vs. aircraft tire loads

from Figure 1 that loading from aircraft larger than 30,000 pounds is significantly higher than typical truck tire loads and requires a stronger asphalt mixture to withstand the stresses generated by the larger aircraft.

3. The aggregate gradation bands have been adjusted since the last version of P-401. For those more familiar with Superpave asphalt mix gradations, FAA's Gradation 1 is analogous to a 19.0mm nominal maximum aggregate size (NMAS) mix. FAA's Gradation 2 is analogous to a 12.5mm NMAS mix, and Gradation 3 is analogous to a 9.5mm NMAS mix.

4. FAA has provided additional guidance regarding the selection of asphalt binder grades in the new P-401. FAA has added requirements for an additional 'grade bump' - in addition to the project area's environmental grade. Instead of selecting the high temperature grade bump based solely on the aircraft gross weight, designers will now also need to use different selection criteria if the pavement area has slow or stationary aircraft.

5. FAA now requires a new mechanical test for asphalt mixtures– the Asphalt Pavement Analyzer (APA). As shown in Figure 2, the APA is a loaded wheel tester, used mainly for evaluating permanent deformation (e.g, rutting). The test method used for the APA is AASHTO T 340. APA testing variables include the test temperature, magnitude of the load applied, the hose pressure, and the number of cycles. The pass/fail criterion is typically a maximum rut depth, often around 10mm, or even less for mixes using polymerized binders. If the testing laboratory is currently incapable of performing the APA test, FAA allows the Hamburg Wheel Test (HWT) to be used with a pass/fail criterion of less than 10mm rutting after 20,000 passes.



Figure 2. Asphalt Pavement Analyzer (APA Jr. pictured)

6. The new P-401 also adapts the way pavement density is calculated to be in line with the method contractors, consultants, and laboratories use most often. Before this latest revision, pavement density was expressed at a percentage of the average lab-molded bulk specific gravity of the asphalt mixture. It is now expressed as a percentage of the theoretical maximum density (TMD).

They specification changes all work together to improve the ability of contractors, consultants, suppliers, and testing labs to understand exactly what the FAA wants for its asphalt pavements. That better understanding also increases the likelihood that the FAA will receive they asphalt pavement quality they desire to meet their needs.

For more information contact: [dgierhart@asphaltinstitute.org](mailto:dgierhart@asphaltinstitute.org)

## AASHTO ETF Update

By Colin Franco (RI DOT) and R. Gary Hicks (CP<sup>2</sup>C)

The American Association of State Highway and Transportation Officials (AASHTO) Emulsion Task Force (ETF) met in December in Indianapolis to review accomplishments and plans for developing material specifications, design practices, and quality assurance and construction guides for emulsion preservation treatments. Many of the materials specifications and design practices have already been developed and published by AASHTO. Some of the construction guides have been completed (part of NCHRP project 14-37) and others will be developed as a part of new NCHRP projects 14-43 and 14-44. In addition, two new initiatives were discussed which included the use of rejuvenators in emulsions and messaging and implementation of the new AASHTO standards and guides. All the activities (completed or planned) are summarized in Table 1.

Table 1. Status of AASHTO Standards and Construction Guide Specs for Emulsions

Emulsion Treatments	AASHTO STANDARDS			Construction Guide Specs
	M / MP	R	W/ COMP	
Chip Seal	MP27-16	PP82-16		Completed in NCHRP 14-37
Microsurfacing	MP28-17	PP83-16		Completed in NCHRP 14-37
Tack Coat	MP36-18	PP93-18		To be done in NCHRP 14-44
Fog Seal	MP33-17	PP88-17		Completed in NCHRP 14-37
Scrub Seal	☉	PP91-18	2019	To be done in NCHRP 14-44
Sand Seal	MP34-18	PP90-18		Problem Statement to TRB in 2020
Slurry Seal	MP32-17	PP87-17		To be done in NCHRP 14-44
Foam Asphalt Stabilization		MP38-18		
Bonded Surface Treatments (Nova Chip)	☉	☉	2018	Problem Statement to TRB in 2020
Cold Recycled Mixtures	MP31-17	PP86-17		NCHRP 9-62 /14-43
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)				Ongoing in NCHRP 9-63

**Legend:**

M=Material Specs, T=Test Methods, R=Design Practices, P=Provisional, ☉=Draft w/AASHTO COMP

NCHRP project 9-63 is also underway to develop performance graded (PG) specifications for asphalt emulsions. This will involve developing

a recovery method for emulsions and then a suite of tests which relate to the performance of emulsion treatments like chip seals, slurry surfacings and more. This project is now underway by the Asphalt Institute (AI) and NCAT under the leadership of Mike Anderson of the AI. Phase 1 report has been submitted which lays out the work plan for the Phase 2 effort. Issues to be addressed include the recovery method for the asphalt residue, the low and intermediate properties for the residue, which relate to performance, and the effects of polymer in the binder.

Rex Eberby, of ISSA, discussed the new specification (A-115) developed for polymer-modified emulsion slurry seals. This new specification is to fill the gap between the A-105 spec for emulsion slurry seals and A-145 for microsurfacing, and can be found at [www.roadresource.org](http://www.roadresource.org).

Erik Reimschiessel discussed the need to provide incentives and disincentives for preservation treatments like is done with hot mix asphalt paving. Incentives need to be developed for performance (residue asphalt content, aggregate gradation and cleanliness) and for workmanship. This will require determining the effects of mix variations on performance.

Also discussed was a new 36-month NCHRP project [20-44(26)] "Implementing Guide Specifications for the Construction of Chip Seals and Microsurfacing", designed to implement and facilitate the use of the new specifications and guides. That effort would start in 2020, with tasks of developing the message as to why these guides should be used, outreach to state and local agencies, training, and construction of demonstration projects.

All the presentations and the minutes of the meeting can be found at the ETF website located at: <http://tsp2-etf.org>



## Caltrans Pavement Smoothness Modeling

By DingXin Cheng and Leros Lane, CP<sup>2</sup> Center, Tom Pyle and Allen King, Caltrans

After Caltrans pavement projects are planned, and may be almost ready to go to bid, sometimes the funding gets diverted and the project is delayed. Some high dollar projects may need delays of two or more years between design and construction. Due to Caltrans pavement smoothness specifications, the design engineer needs to know how much the pavement smoothness will deteriorate during

that time, and what condition the pavement will be in in terms of the International Roughness Index (IRI) in one year or two years ahead. Previously, this question has been very difficult to answer. There have been no "tools" for predictions of smoothness, and often Caltrans' District personnel simply made estimates based on their previous personal experiences.

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The questions were, and still are:

- 1) How long does it take for a road to deteriorate, in terms of IRI, to a specified mean roughness index (MRI) trigger value that is used in Caltrans specification or design?
- 2) What are the equations to determine the rate of degradation over time? This will help to determine smoothness for 6 months up to 5 years out.
- 3) Is the deterioration rate affected by the pre-existing IRI, or IRI before and after construction? If so, how does that effect the equation?

Tom Pyle, Office Chief of Caltrans Headquarters Asphalt Pavement, and Allen King, Caltrans Senior Pavement Engineer, tasked the CP2 Center to develop a performance model using historical smoothness (IRI) and pavement thickness data that was collected through their automated data condition surveys. The primary source for this data was the PavEM Program data, which has been updated on a yearly basis. This IRI data was collected electronically by a moving vehicle for the left and right wheel paths and has been collected from 2011 to the present by consulting companies. Figure 1 is an example of one automated survey vehicle used.



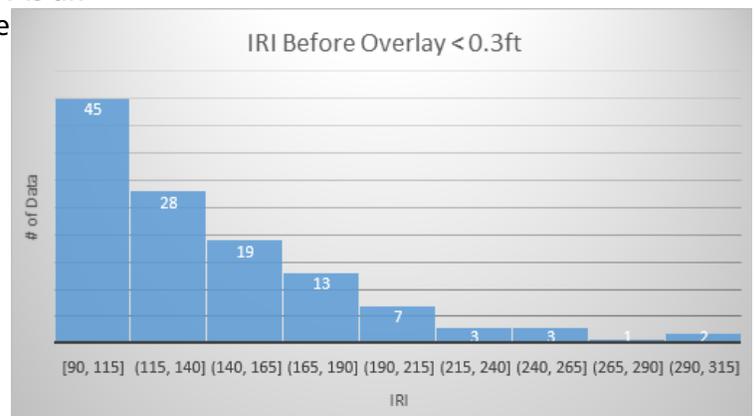
**Figure 1. Example of Automated Pavement Condition Survey (APCS) Vehicle**

The Center was able to develop statistical project level smoothness models from actual project IRI measurements. The factors that were considered were: pre-existing IRI, IRI prior to construction, final IRI after and construction, overlay thickness, traffic levels (AADT, AADTT, and ESALs), and climate regions. Projects were selected from the PavEM database based on their treatment types. The overlay treatments that were selected included HMA, HMA type-A and RHMA-G. The variables that were used were pre-existing and current IRI roughness numbers, ESAL (from AADT and AADTT),

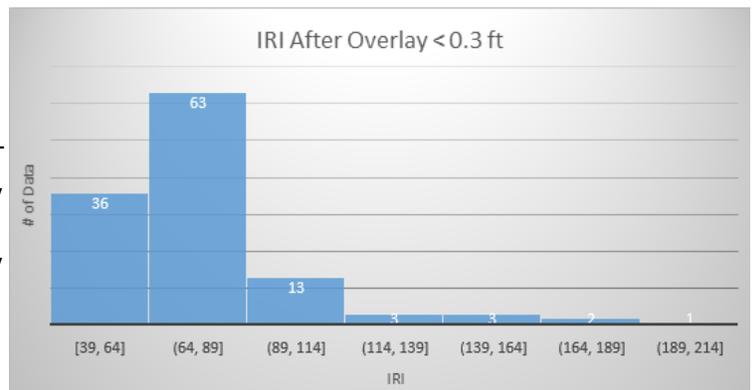
climate (severe or mild), and overlay thickness (less than 0.3 foot, or more than 0.3 foot).

Four 'network level' performance models were developed for two different pavement thickness ranges, various traffic levels, and two climate regions by using statistical performance equations. Ultimately, a computer program tool was developed for implementation of the model at 'project level'. This tool can be used to calculate the rate of IRI deterioration and predict what the IRI will be over time.

HMA overlay construction could be triggered for a multitude of reasons, i.e. structural failure of the pavement, significantly high IRI decreasing the quality of the ride, or HMA distress due to aging. By comparing the IRI values before and after construction, the average IRI value decreased from an approximate value of 140 to 60 (for pavement thickness less than 0.3 ft). These results are shown by comparing Figures 2 and 3 below. A Network Performance Model Formula for predicting IRI was developed based on Caltrans Smoothness data, climate regions, and traffic loading information.



**Figure 2. Spread of Data for IRI before Overlay < 0.3 ft.**



**Figure 3. Spread of Data for IRI after Overlay < 0.3 ft.**

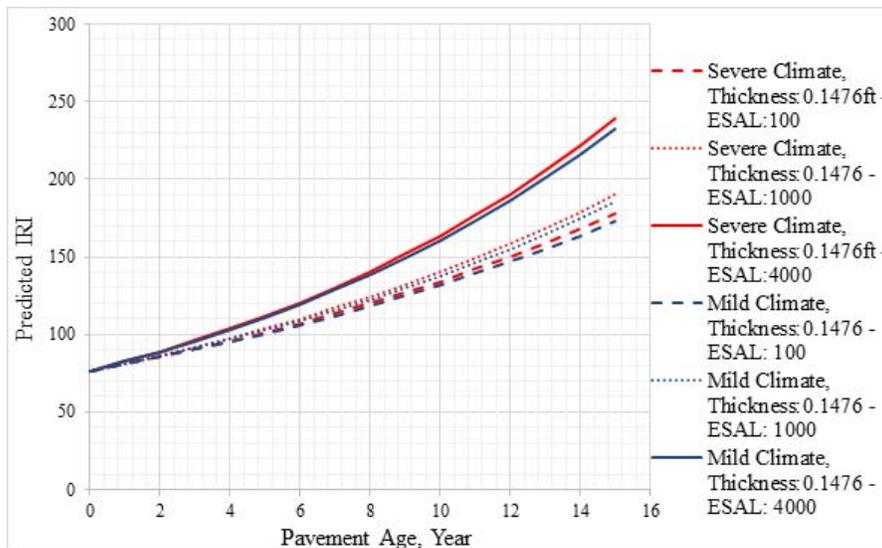
Table 1 shows the parameters that were developed for equations used in the model for the predicted IRI results. A statistical software was used to develop these parameters.

average of two wheelpaths) for a future year 2021 and the IRI degradation rate (Delta IRI) per year.

**Table 1. Developed Parameter Values for IRI Models**

	A1	B1	B2	B3
Mild <0.3 ft.	76.6	-0.11	5.067	0.07
Mild >= 0.3 ft.	60.3	-0.115	4.7	0.09
Severe < 0.3 ft.	76.6	-0.098	5.08	0.07
Severe >= 0.3 ft.	60.3	-0.105	4.8	0.07

Project level models are created based on 'network' performance models. The model curves displayed in Figure 4 shows that the 'severe climate' IRI increases more rapidly with age when compared to the 'mild climate' IRI in all cases. Another visible trend is that as ESALs increased, the IRI also increased, regardless of climate type.



**Figure 4 Severe vs. Mild with Different Traffic Levels Using <0.3 ft Models**

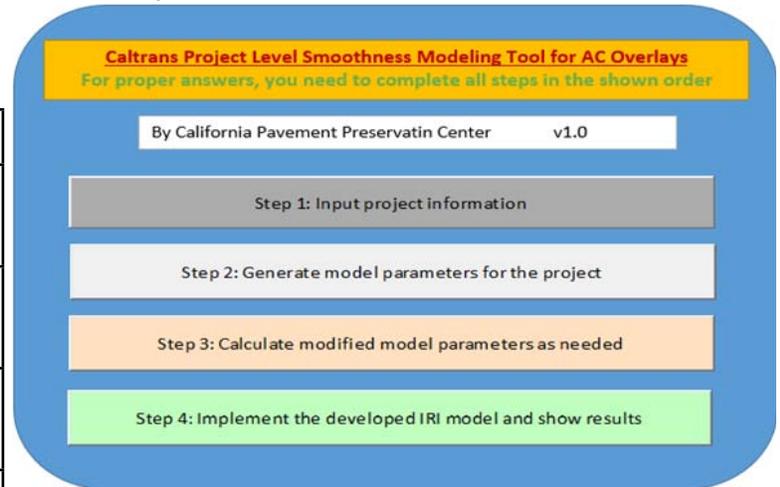
The development of these smoothness prediction models and their validations for asphalt overlays is an amazing start. These models are designed for both accuracy and ease of use by Caltrans engineers.

A smoothness modeling tool process (Figure 5) has been developed for engineers, and Table 2 shows that a designer can predict the average IRI (or Mean Roughness Index, (MRI) - the

As more data is collected in the future, the IRI performance models should be updated for achieving more accurate predictions. More models should be developed using low, medium, and high traffic levels along with thin, medium, and thick overlay thicknesses to match actual project conditions more accurately.

A users manual should also be developed so that Caltrans engineers can more effectively use the Smoothness Modeling Tool, and a webinar for the smoothness modeling tool should be developed so that this technology can be used for generating the best predicted results. Future refinement of the smoothness modeling tool includes programming for the tool to recognize insufficient project data and to steer the user to the network model. Presently, this "tool" is in a Beta stage, and requires more usage to develop future refinements.

For more information contact: [dxcheng@csuchico.edu](mailto:dxcheng@csuchico.edu)



**Figure 5. Smoothness Modeling Tool Steps**

**Table 2. Example of Output Results for Degradation of IRI (MRI) per Year**

Year	Pavement Age Yr	Predicted MRI	(Delta IRI)/yr
2021	12.0	177	15





## PCC Pavement in Santa Rosa

By Greg Dwyer, City of Santa Rosa & Clay Slocum, CNCA

The City of Santa Rosa's Fulton Road Reconstruction project, between Occidental Road and West 3rd Street, repaired approximately 3,200 lineal feet of 4-lane principal arterial pavement and associated bike lanes. This North-South arterial is separated by a landscaped median and sees a remarkable 25,000 vehicles per direction per day. Innovation and adaptability were key to the success of this project in both short and long-term aspects.

In the end, the RCC was swapped out for traditional PCC pavement. This decision was based on a collaborative analysis of the construction time window, innovation of Ghilotti Bros. Inc. (GBI), and input from California Nevada Cement Association (CNCA). The City and GBI adapted the project to accommodate this change and took this opportunity to use a draft version of the PCC Pavement Specifications that are soon to be available on the City and County Pavement Improvement Center (CCPIC) website. Vetting of the specs will facilitate other agency's use to prove the replicability of this pavement solution!

The PCC design utilized the commonly used unreinforced, jointed plain concrete pavement (JPCP) design, 8 inches thick with sawcut weakened-plane joints every 12-13 feet. The base was recompacted existing material. The PCC was provided by River Ready Mix out of Forestville, CA, and achieved an early maturity opening strength within a short window of just a day or two, facilitating traffic control.

Safety, accessibility, and resiliency aren't buzz words in Santa Rosa. The devastating Tubbs Fire in 2017 heavily impacted the region challeng-



Fulton Road in Santa Rosa

The City strives to be a pioneer in the region, testing and implementing new solutions, construction systems, materials, and bidding practices. Fulton Road exemplified this using Alternative Design/Alternative Bid (AD/AB) bidding, which allowed both traditional hot mix asphalt (HMA) and Roller Compacted Concrete (RCC) pavement sections to compete in a live and competitive bid. Implementing AD/AB saved the City over \$1 million, as the RCC could cost far less than the normal asphalt pavement. Furthermore, the concrete pavement featured a minimum 40-year design life, with expectations that it performs similar to Alston Way or other north Bay Area concrete pavements that are obtaining 50 to 100 years of service life with little to no maintenance. The expected reduced maintenance with concrete could mean that road closures due to maintenance could be lessened, increasing safety for drivers and road crews that no longer need to be on the roadways as often. Positive environmental effects were also achieved as the concrete section recycled the existing base in-place eliminating the need to off-haul/landfill over 5,000 CY of material, eliminating roughly 500 dump trucks and another 5,000 CY or 500 trucks of virgin material.



Placing PCC with laser screed

ing the infrastructure to (and sometimes past) its limits. Fulton Road was designed to meet the burden of heavy truck traffic while providing safe, long-term access. Tragedy struck again with the Kincade Fire breaking out on October 23rd, 2019. Fulton Road was actively under construction, but the City and Ghilotti Bros. acted quickly to make the road a drivable evacuation route for those fleeing the fire's path.

We hope the many lessons learned during this project can act as an example in the quest for innovative and sustainable infrastructure!

For more information contact: [GDwyer@srcity.org](mailto:GDwyer@srcity.org) or [Clay.Slocum@cncement.org](mailto:Clay.Slocum@cncement.org)



## P2 Training for PCC Available

Pavement preservation is a proactive approach to protecting and maintaining existing pavements. The National Highway Institute (NHI) now offers a 5-course series that focuses on different pavement preservation techniques for Portland Cement Concrete (PCC) pavements.

This training package is titled Constructing Quality PCC Pavement Preservation Treatments. All the courses in the series provide detailed, how-to instruction covering the full scope of tasks involved in successfully completing each preservation technique. The Web-based trainings use short, focused, task-based lessons with creative instruction that make the lessons directly applicable to your work in the field. You'll find checklists, visual aids and graphics, and videos that reinforce the content so you can apply new knowledge right away. Enrolling in this series gives you access to the following courses - each highlights a specific preservation technique:

- How to Construct Durable Full-Depth Repairs in Concrete Pavements (FHWA-NHI-134207A)
- How to Construct Durable Partial-Depth Repairs in Concrete Pavements (FHWA-NHI-134207B)
- Proper Diamond Grinding Techniques for Pavement Preservation (FHWA-NHI-134207C)

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- Proper Construction Techniques for Dowel Bar Retrofit (DBR) and Cross-Stitching (FHWA-NHI-134207D)
- Proper Joint Sealing Techniques for Pavement Preservation (FHWA-NHI-134207E)

Whether you work for a contractor or a transportation agency (Federal, State, or Local), take this series to increase your knowledge about constructing durable, quality PCC pavement projects using specific pavement preservation treatments. Each of the Web-based training products is also available as a standalone course that can be accessed by registering for the individual course number listed above.

This course provides support and instruction for individuals involved in construction projects using concrete pavement preservation techniques. The training is appropriate for learners regardless of experience level with the techniques. This course will appeal to individuals in the following roles: agency inspectors and construction managers; construction supervisors, workers, and technicians; and engineers. This free web-based training is approximately 13.5 HOURS (CEU: 0 UNITS)

For more information contact NHI Customer Service: (877) 558-6873 or go to [nhicustomerservice@dot.gov](mailto:nhicustomerservice@dot.gov)



## CCPIC Update

By John Harvey (UCPRC), Laura Melendy (Tech Transfer), and Gary Hicks (CP<sup>2</sup>C)

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 is to:

- increase knowledge through on-line and in-person training, peer to peer exchanges through tech briefs, sample specifications, and other resources
- establish a pavement engineering and management certificate program
- 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. UC Davis, UC Berkeley, CSU Chico, CSU Long Beach, Cal Poly San Luis Obispo, and CSU San Jose are all involved with CCPIC. Oversight is provided by a Governance Board, which is chaired by Randy Breault (City of Brisbane), with Matt Tuggle (Solano County) as the co-chair. Primary leadership is provided by John Harvey (UCPRC at UC Davis) and Laura Melendy (Tech Transfer at UC Berkeley). A total of 6 counties and 6 cities are represented on the Board along with representatives from the League of California Cities (LOCC), California State Association of Counties (CSAC) and the County Engineers Association of California (CEAC). Meetings are held quarterly, alternating between web calls and in-person meetings. The following provides an update



on recent accomplishments and future plans of the CCPIC.

### Training

- Pavement engineering and management curriculum and certificate program. The final version of the certificate program was submitted and approved in August 2019. The proposed curriculum will consist of 92 hours of core classes and electives.
- Training given. Classes held include the Life Cycle Cost Analysis (LCCA) online class, which had 130 participants, and the Pavement Maintenance & Rehabilitation (IDM-04) class in Santa Clarita, attended by 41 people. In total for 2018 and 2019, CCPIC hosted 10 classes and trained 619 people.
- Upcoming scheduled classes include:
  - CCB-02 Pavement Management and Preservation Strategies (April 2020)
  - IDM-04 Asphalt Pavement Maintenance and Rehabilitation (May 2020)
  - CCB-01 Pavement Life Cycle Cost Analysis (May 2020)
  - CCA-02 Pavement Sustainability (July 2020)
- New classes being planned include:
  - CCC-02 Pavement Preservation Materials and Treatments (fall 2020)
  - CCC-23 Gravel Roads Engineering, Construction, and Management (fall 2020)
  - CCC-01 Asphalt Concrete Materials and Mix Design (spring 2021)
  - CCC-03 Pavement and Hardscape Construction Specifications and Quality Control Management planned (spring 2021)

### Technical guidance and tools

- Construction specifications for HMA compaction. CSU Long Beach is working to develop specifications for local agencies modeled after the Greenbook for southern California and Caltrans specifications for northern and central California.
- Sample specifications for PCC mix design. CSU Chico has been working on this with industry. The final version of the specs is due to be completed by March 19, 2020.
- Life cycle cost analysis (LCCA). The scope of the project is to build performance models for predicting crack growth due to loads and the environment, and to use the LCCA process to optimize decision trees in an

agency's pavement management system. A guide will be developed to help local agencies be able to develop their own models.

### Outreach

At the November meeting, Laura Melendy provided the group with copies of the new CCPIC brochure and bookmarks, and displayed the new CCPIC booth materials. A CCPIC presentation is ready for use and can be modified as needed to share with local agencies.



**New CCPIC Display Booth & Materials**

### Resource Centers

Three CCPIC 'Resource Centers' have formed - for the Southern, Northern and Central California regions.

- Southern California Resource Center. Erik Updyke (formerly of LA County) has agreed to help the CCPIC. Erik will work on outreach and on specifications initially. Shadi Saadeh (CSU Long Beach) plans to meet with some APWA and ASCE sections, as well as City and County Engineering organizations.
- Northern California Resource Center. Gary Hicks (CP2C) participated in a meeting with the Northern California Road Superintendents meeting in January and passed out brochures and discussed the CCPIC.
- Central California Resource Center. Ashraf Rahim (Cal Poly) reported he has met with the county of San Luis Obispo and the City of Pismo Beach. An he will also be reaching out to APWA/ASCE sections in central California as well.

### Peer-to-Peer Exchange

In addition to its website, CCPIC is creating 'peer-to-peer' communication capability for regional local government discussion groups. The 'Peer-To-Peer Exchange' is not for the public, but for agencies only.

*Continued, next page*

Its intent is to cover 'hot topics' facing local agencies, such as specifications, pavement engineering and materials and contract information. If interested in participating in the Exchange group, please contact Jon Lea

at: [jlea@ucdavis.edu](mailto:jlea@ucdavis.edu) .

For more information on the CCPIC go to: <http://www.ucprc.ucdavis.edu/ccpic/> or email [ccpic@ucdavis.edu](mailto:ccpic@ucdavis.edu) .



## WRAPP Update

By: Cesar Lara - Harris & Associates, WRAPP President

The Western Regional Association for Pavement Preservation (WRAPP) is working with Caltrans to put on pavement preservation workshops for all Districts over the next few years.

The goal of the workshops, is to help educate Caltrans staff on pavement preservation, including information on:

- Treatments available (chip seals, slurrys/micros, cape etc.)
- Picking Right Treatment - Right Pavement - Right Time
- Cost / Benefits
- Specifications
- For 2020, WRAPP and Caltrans are planning to do 4 workshops. Two will be held

in March in Southern California and two in April in Northern California.

WRAPP is an industry-run, volunteer-based association, with members that have years of experience applying/making pavement preservation products. We also offer an annual 'public' Workshop, where we take pride in offering and sharing valuable educational programs. Next year's Workshop will be in San Diego.

The 2020 WRAPP Officers are: President – Cesar Lara (Harris & Associates), Vice President – Matt Conarroe (Western Emulsions), Secretary – Tim Schmid (Pavement Coatings) and Treasurer – Todd Vargason (Ergon Asphalt & Emulsions).

For more information visit our website at: <https://wrapp.org/>



## FHWA Update

By Chu Wei, FHWA – Sacramento

A key area for FHWA is pavement performance and durability. A series of Tech Briefs and informational documents to frame the topic of pavement performance are currently in development. The first Tech Brief in this series, titled "Performance Engineered Pavements", has recently been published. This document provides an overview of several initiatives that encompass the concept of Performance Engineered Pavements (PEP) as it relates to the design and acceptance of concrete and asphalt materials. This document is available at: [https://www.fhwa.dot.gov/pavement/pub\\_details.cfm?id=1102](https://www.fhwa.dot.gov/pavement/pub_details.cfm?id=1102).

FHWA also published another Tech Brief: "Cyclic Fatigue Index Parameter (Sapp) for Asphalt Performance Engineered Mixture Design". This Technical Brief provides an overview of how to determine the cyclic fatigue index parameter using the Asphalt Mixture Performance Tester. It also presents index threshold values for use in asphalt mixture design and construction. <https://www.fhwa.dot.gov/pavement/pubs/hif19091.pdf>

Future FHWA technical summary documents will focus on Asphalt Performance Testing (APT), Concrete Performance Testing (CPT), and

Performance Related Specifications (PRS). Additionally, FHWA software and informational guidance for PRS are also in development.

For more information contact: [chu.wei@dot.gov](mailto:chu.wei@dot.gov)

FHWA/PPRA will provide a series of pavement preservation webinars for the third Thursday of each month at 2 pm EST. More information will be posted on [Roadresource.org](http://Roadresource.org) .

Month	Topic	Association
February	Emulsions 101	AEMA
March	Milling Best Practices	ARRA
April	Intro to Slurry Systems and Site Selection	ISSA
May	Crack Treatments Overview, Project Selection and Design	ISSA
June	HIR & CIR	ARRA
July	Tack and Fog Seal	AEMA
August	Chip Seal Introduction, Site Selection, Design and Materials	ISSA
September	FDR and Soil Stabilization	ARRA
October	Engineered Emulsions	AEMA
November	Slurry/Micro Mix Design and Material Testing	ISSA
December	Bringing it all Together with Alternative Cross Sections	ARRA

FREE Pavement Preservation Online Courses from National Highway Institute *Continued, next page*

The FHWA in cooperation with the National Highway Institute (NHI) have just completed and posted online a series of web based training (WBT) pavement preservation courses. The courses are offered to provide support and instruction for individuals involved in construction projects using concrete pavement preservation techniques. Participants may have some awareness and past involvement with paving processes, but the training is appropriate for learners regardless of experience level with the techniques. These courses will appeal to individuals in the following roles: agency inspectors and construction managers; construction supervisors, workers, and technicians; and engineers. The courses are offered free of charge as part of an NHI 50th Anniversary promotion, and are available in English and Spanish as well. Please see the NHI website for more

information: <https://www.nhi.fhwa.dot.gov/course-search?tab=0&key=134207&res=1>  
Constructing Quality PCC Pavement Preservation Treatments:

- How to Construct Durable Full-Depth Repairs in Concrete Pavements (FHWA-NHI-134207A)
- How to Construct Durable Partial-Depth Repairs in Concrete Pavements (FHWA-NHI-134207B)
- Proper Diamond Grinding Techniques for Pavement Preservation (FHWA-NHI-134207C)
- Proper Construction Techniques for Dowel Bar Retrofit (DBR) and Cross-Stitching (FHWA-NHI-134207D)
- Proper Joint Sealing Techniques for Pavement Preservation (FHWA-NHI-134207E)



## FHWA TFG on Pavement Preservation Update

By R. Gary Hicks, Program Manager (CP<sup>2</sup> Center) and Member, FHWA TFG on Pavement Preservation

The FHWA Pavement Preservation Technical Feedback Group (PP TFG) met on Feb 25-26 in San Antonio Texas. The group was formed in 1991 as the Pavement Preservation ETG under the direction of Jim Sorenson of FHWA. Antonio Nieves Torres, Construction Engineer for FHWA, is the leader of the group. Texas DOT was the host agency for the meeting, and they presented information on the state of the practice of pavement preservation in Texas, as well as the San Antonio District.

FHWA then presented an update on the latest efforts regarding their "Pavement Preservation Research Roadmap", and also presented a draft of the new "Pavement Preservation Guide". The group provided feedback on the document. The document will be similar to the one developed for bridges, which can be found at <https://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf>. FHWA expects to have an updated version of this guide sometime in the fall of 2020. It will include the following;

- Introduction and purpose of pavement preservation
- Definitions and related commentary
- What is a pavement preservation program
- How to establish a pavement preservation program
- Summary section

One of the important activities reported on in this meeting was the new partnership between FHWA and the Pavement Preservation and Recycling Alliance (PPRA) for the development of a new webinar series on pavement preservation. Each webinar is tentatively scheduled for the third Thursday of each month at 2pm EST. The first webinar was given on Feb 27, 2020 on "Emulsions 101". These webinars will be recorded and posted on various websites for future viewing. Other topics will include slurry surfacings, crack treatments, HIR and CIR, tack coats, fog seals, chip seals, FDR, engineered emulsions, slurry surfacing mix design and testing and more. Additional information on these webinars will be posted on the PPRA website, [www.roadresource.org](http://www.roadresource.org). Similar webinars are being planned for concrete preservation treatments.

The group also discussed future "Every Day Counts Innovations" for 2021-2022, and discussed state and local agency needs and roadblocks. Copies of all the presentations can be found on the NCPP website at the following link; <https://www.pavementpreservation.org/links/fhwa-resources/expert%20task%20group/>.

The next PP TFG meeting will be held in August or September 2020 at a location still to be determined. For more information on the group, please contact Antonio Nieves at [Antonio.Nieves@dot.gov](mailto:Antonio.Nieves@dot.gov)



## FP2 Update

By Jim Moulthrop, FP2

The national Foundation For Pavement Preservation's (FP2) plans are continuing for the National Pavement Preservation Conference that will be held in Indianapolis, IN, in 2021. More information about the meeting dates, program agenda, and travel details will be forthcoming from the National Center for Pavement Preservation (NCP) by mid-year.

Attendance at the Western Regional Association for Pavement Preservation (WRAPP) Workshop in Sacramento at the end of January was exceptional. In addition to FP2's presentation on reauthorization of transportation legislation, there were many interesting presentations ranging from an overview of Roadresource.org (a web-based resource), high float emulsions for chip seals in damp, cool weather with tree canopy, and the use of RAP in preservation treatments. Other sections of this newsletter provide a more detailed account of the meeting.

FP2 also participated in the annual meeting of the Association of Modified Asphalt Producers (AMAP) meeting in Rancho Mirage, CA, in mid-February by discussing Federal funding reauthorization legislation. Dr. Jon Epps received the AMAP 'Lifetime Achievement Award', and was inducted into the AMAP Hall of Fame. He also delivered the 'Hall of Fame Lecture' on "Innovative Asphalt Pavement Technology: Paving the Way for the World's Roadways". One of the hallmarks of the meeting was that Dr. Epps' lecture and the following two days of sessions were presented live on YouTube.



Dr. Jon Epps receives award from AMAP Board  
L to R - Everett Crews, Ingevity and current  
President of AMAP;

Mike O'Leary, Ingevity, Jon Epps; Jim Sattler,  
AMAP Executive Director

The many excellent presentations at the AMAP meeting, included several on using recycled plastics, 'Graphene' modification of binders, modification and rejuvenation using coal-derived chemicals, ground tire rubber (GTR), and Isocyanate-based chemistry.

Upcoming national meetings of note include the Association of Asphalt Paving Technologists (AAPT) in San Diego, March 22-25. Coverage of most of these meetings and other interesting topics will be provided in FP2 Pavement Preservation Journal.

For more information go to: [www.fp2.org](http://www.fp2.org)



## Road Superintendents Meeting

By R. Gary Hicks, CP2C

The Northern California Road Superintendents met on January 16, in Williams as part of their "What Works For Us" Workshops program. The topic of the day was an interesting presentation on the use of stabilized base in local road construction and maintenance. Over 70 city and county personnel heard Brian Jackman, the Managing Director of Claycrete Global, give most of the presentation. Their offices are headquartered in Singapore, but he was joined by members of his team from the USA, Canada, and Kazakhstan.

The product discussed was Claycrete II™, which is used as an acid-base additive in base material with high clay content. During construction, the additive is added to water to achieve the optimum water content of the base material and then compacted to achieve density and



Brian Jackman of Claycrete Global

strength. The resulting stabilized base was reported to achieve excellent compaction with low permeability and high strength. It is similar to some of the stabilized bases that have been used for gravel roads

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by the U.S. Forest Service and others internationally, but without the additive. The compacted base can be sealed or not, and has been chip sealed, covered with a thin HMA, or just covered with a polymerized dust palliative where the traffic volume might be low, such as helicopter pads in remote areas.

The Claycrete II™ liquid additive alters the ionic charge on the clay, using about 8 oz. of product per cubic yard of material, some of which is clay. It was pointed out, that too much clay is not good. The components of the additive include acids and surfactants. These serve to alter the surface of the clay and serve as a compac

tion aid. The additive has a pH of less than 1 and a shelf life of greater than 10 years. The types of material treated are controlled by the Cation Exchange Capacity (CEC), which is a factor dependent on the PI of the clay and the P200 aggregate fraction. The maximum limit for the CEC is given as 400.

Examples of completed projects and more information on the product can be found at [www.claycreteglobal.com](http://www.claycreteglobal.com) or @ClaycreteGlobal on Twitter.

For more information on these Workshops contact: [stephen.stangland@countyofnapa.org](mailto:stephen.stangland@countyofnapa.org) 

## New P<sup>2</sup> Manuals Now Available

By Gary Hicks, Lerosé Lane, and Ding Cheng

California Senate Bill 1 (SB-1) passed in April 2017 raised fuel taxes. As part of that legislation \$2 million per year goes to the California State University (CSU) system to conduct transportation research and related workforce education, training, and development. The California State University Transportation Consortium (CSUTC) led by the Mineta Transportation Institute (MTI), fosters synergies of the entire California State University system to conduct impactful transportation research and engage in workforce development initiatives that increase the mobility of people and goods and strengthen California's economy.

As part of the tasks and funding from MTI, the CP2 Center has developed three new manuals on the design and construction of Chip Seals, Slurry Surfacing, and Cape Seals. The cover page of the Manual For Cape Seals is shown in Figure 1. Training materials have also been developed to support these manuals. The manuals can be found at the following links:

<https://transweb.sjsu.edu/research/1845B-Slurry-Surfacing-Manual>

<https://transweb.sjsu.edu/research/1845C-Cape-Seal-Manual>

<https://transweb.sjsu.edu/research/1845A-Chip-Seal-Manual>

During 2020, we will develop on-line training

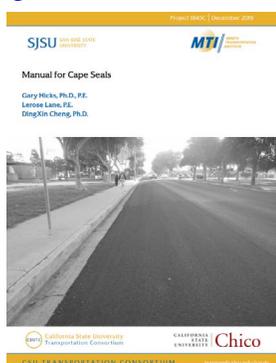


Figure 1. Manual for Cape Seals developed by CP2 Center



Figure 2. A new Manual on chip seals is also now available.

materials for each of these treatments, and CP2 Center staff will also be available for onsite classroom training for either 1-hour or 3-hour sessions.

We are also currently working on a fourth manual dealing with thin HMA overlays (Thinlays). It is expected to be completed soon and will undergo peer review and formatting by the MTI staff. Training materials will also be developed for this treatment.

Finally, performance models for these treatments are also being developed using pavement management data from select local agencies. These performance models will be available in 2021.

For more information contact Dr. Ding Cheng at: [dxcheng@csuchico.edu](mailto:dxcheng@csuchico.edu) 

## COMING EVENTS - Mark Your Calendar!

**MTC User Week March 31- April 2 (Oakland)**

Users of the Metropolitan Transportation Commission's (MTC) 'Street Saver' Pavement Management System (PMS) will gather to hear

By Roger Smith, CP2C

the latest updates and information on this popular pavement management tool.

For more information contact: [stan@bayareametro.gov](mailto:stan@bayareametro.gov)



**"Asphalt Pavement 101" .....**  
**April 7 (East Bay Area)**  
**April 8 (San Jose)**

This popular half-day class from CalAPA offers an overview of the basics of asphalt pavement including asphalt materials and HMA pavement construction. In addition to scheduled 'public' sessions, it is available by request to companies or road agencies.

For more information go to: [www.calapa.net](http://www.calapa.net)

**Airfield Paving Clinics .....**  
**April 7-8, Denver, CO, and May 12-13**  
**(Nashville, TN)**

This new Asphalt Institute clinic provides focused and detailed guidance on constructing asphalt pavements for Federal Aviation Administration (FAA) funded airfield pavement projects. Participants will take a deep-dive into the design and production of asphalt mixtures, focusing on the most current FAA P-401 specification and all its recent updates. For more information go to:

<http://www.asphaltinstitute.org/training/seminars/airfield-paving-clinic/>

**Asphalt Mix Design Certification .....**  
**April 14-17 (Sacramento)**



The Asphalt Institute's "Mix Design Technology Certification (MDT) Course" provides advanced technicians, designers, and engineers responsible for mix designs with a thorough understanding of the

properties of the materials that compose asphalt mixtures, as well as the physical and mathematical processes involved in producing a successful asphalt mixture design. Students will receive training on aggregate and binder selection, material properties, development of trial blends, batching, volumetric calculations and analysis, Superpave mix criteria, mix performance tests and criteria, use of RAP in asphalt mix designs, plus an overview of SMA and open-graded mixtures.

For more information go to: <http://www.asphaltinstitute.org/training/seminars/>

**Concrete Expo 2020 .....****April 15th (Reno)**

The Sierra Nevada Concrete Association (SNCA) is an active force in promoting the use of quality concrete



for all types of construction, from tilt-up logistics and manufacturing facilities to lower-life cycle cost concrete pavements for roadways and parking lots. Contractors, architects, building officials, engineers, public works officials and construction consultants are expected to attend this day-long event. On-line registration is available at <https://snca.123signup.com/event/registration/rnjvs> or contact: [www.sier-ranevadaconcrete.com](http://www.sier-ranevadaconcrete.com)

**CalAPA Spring Conference .....**  
**April 16-17 (Anaheim)**

The CalAPA Spring Conference will be held at a special location - the Disney Grand Hotel in Anaheim. The Conference will feature prominent speakers from industry, government agencies and academia, as well as breakout technical sessions and vendor exhibits. For more information go to: [www.calapa.net](http://www.calapa.net)

**"Pavement Management Systems and Preservation Strategies"**

**April 29-30 (Alameda)**



This class will cover the fundamentals of pavement management systems (PMS). The student will learn the types of distresses included in a typical PMS, how pavements are surveyed for condition, and how condition and classification is used within a PMS. In addition, the inner workings of a PMS are described, covering prediction models and the use of varying funding scenarios and prioritization techniques to maximize your pavement network condition. This is the primary overview course in the training certificate program offered by the City and County Pavement Improvement Center (CCPIC) in partnership with TechTransfer. For more information go to: <https://registration.techtransfer.berkeley.edu/CourseStatus.awp?&course=204CCB020429>

**"Asphalt Pavement Maintenance & Rehabilitation" (IDM-04)..... May 21 (San Diego)**



This popular class from the Tech Transfer Program at UC Berkeley, provides

*Continued, next page*

a solid working knowledge of the most common pavement maintenance and preservation practices. Topics include pavement management system concepts, pavement distress types and causes, asphalt materials, maintenance vs. rehabilitation concepts, repair options and common pavement maintenance and preservation strategies.

For more information or to enroll, go to: <https://registration.techtransfer.berkeley.edu/wconnect/CourseStatus.awp?&course=142IDM041203>

**"Pavement Life Cycle Cost Analysis" (CCB-01)..... May 26-28 (Online)**



This course introduces the principles and application of life cycle cost analysis (LCCA) for pavements. LCCA is an important tool for making well-informed decisions regarding pavement treatment selection and timing, and materials and construction specifications and their enforcement. The course will provide a basic understanding of how decisions and actions regarding materials, design, and pavement treatment strategy selections interact to affect the functional, cost, and performance of pavements, including streets, roads, and highways. Instruction references use of a computer program, the Life Cycle Cost Analysis Comparison Spreadsheet, to perform LCCA calculations. This is an introductory-level course offered by the City and County Pavement Improvement Center (CCPIC) in partnership with Tech Transfer, UC Berkeley.



<https://registration.techtransfer.berkeley.edu/wconnect/CourseStatus.awp?&course=204CCB010526>

### **Asphalt Pavement Technology & Material Test 2020 Summer Workshop: June 1-3, 2020**

#### Workshop Program

The three-day workshop aims to engage transportation workforce development by introducing the state-of-practice on asphalt technology and pavement material testing on aggregate, asphalt binder, and asphalt mixture, following AASHTO and Caltrans test methods.



For more information contact Dr. Kun Zhang at [kzhang2@csuchico.edu](mailto:kzhang2@csuchico.edu) or Dr. Steffen Mehl at [smehl@csuchico.edu](mailto:smehl@csuchico.edu)

#### Participants

This workshop will host 15 participants. Current students from Butte College, Feather River College, Shasta College, and Yuba College are eligible to apply. Entry-level engineers from industry and local agencies in Northern California are welcome to participate.

### **International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020 June 3-6 (Sacramento)**

This event will include keynote speakers, plenary presentations, parallel podium sessions, poster sessions, panel sessions with group discussions on all topics related to Life Cycle costing of major roadway facilities. Form more information go to: <http://www.ucprc.ucdavis.edu/LCA2020/Program.aspx>



**Disclaimer: Caltrans does not endorse any industry products or services, and the contents of newsletter articles reflect the views of the authors and do not necessarily reflect the official views or policies of Caltrans, the CP<sup>2</sup> Center, or the State of California.**

Caltrans established the California Pavement Preservation (CP<sup>2</sup> 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. Hector Romero 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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