



CP2 CENTER NEWS

Newsletter of the California Pavement Preservation Center

No. 51

September 2019

Francis N. Hveem - Remembered

California State Materials And Research Engineer (1951 To 1963)



Mr. Francis N. Hveem established a national reputation in bituminous mixes and in the general field of highway research and testing.

Mr. Hveem began his career in California State Service in 1917. A native of Lamoine in Shasta County, he went to work for the California Division of Highways as a draftsman for District 2 at Redding. He became a resident engineer in 1924. In 1929, he joined the Materials

Francis N. Hveem

and Research Department, having attracted the attention of its chief, Thomas E. Stanton, by his independent field research in design and control of bituminous mixtures for highway surfacing.

During the ensuing years, Hveem established a national reputation, both as a specialist in bituminous mixes and in the general field of highway research and testing. He was appointed Construction Engineer for the Division in 1950, with responsibility for supervision of highway construction throughout the State. In 1951, on the retirement of Mr. Stanton, Hveem returned to the testing laboratory as its chief. Today, as back then, Caltrans is responsible for testing all materials used in the construction of state highways and bridges. Testing equipment and testing methods, which have been developed under his supervision, are now in extensive use throughout the United States and foreign countries. A list of some of the better known devices and test methods he has developed include the stabilometer, the cohesiometer, the kneading compactor and sand equivalent apparatus, investigation of joint distress in concrete pavement, development of welding inspection techniques for structural steel, design formula for estimating thickness of pavement required, and a study of automobile collisions with highway bridge railing. Pavement testing equipment, procedures, and design theories developed by him and under his supervision have been accepted and used throughout the world. In fact, what was officially the California Method of asphalt mix design, was commonly referred to as



Asphalt Binder and Aggregates = Hot Mix Asphalt

simply the "Hveem Method".

Francis Hveem pointed out, in a 1971 article, "All of the numerous and various types of asphalt pavement mixtures have one thing in common - all are mixtures of stone particles and asphalt, and regardless of special names and proprietary specifications all are variants of the same thing, and all depend on the same basic principles for successful performance. It seems that the materials really do not care what they are called by promoters,

Continued, next page

IN THIS ISSUE

1 Francis N. Hveem

ASPHALT PAVEMENT NEWS

4 CalRecycle Grants Program

4 City of Moraga Success Story

CONCRETE PAVEMENT NEWS

5 MCTC in CA

GENERAL NEWS

6 Small City Strategies

8 CCPIC Update

10 WRAPP Update

11 MTC Update

12 MSA Update

12 FHWA Update

13 FHWA ETG Update

CP2 CENTER NEWS

14 Gary Hicks ASCE Award - Follow-up

15 COMING EVENTS

salesman or engineers - they will all continue to act and respond to the same natural laws."

Below are excerpts from some of Mr. Hveem's recollections offered in a 1963 document titled:

"History and some significant developments as recollected by F.N.Hveem in 1963"

1917 To 1963

(Excerpts from Hveem's article in 1963)

"This treatise pertains to the Materials and Research Department of the California Division of Highways. Organized State Highway Construction in California began with the creation of the California Highway Commission in 1911. This commission was authorized in August 1911 and worked rather rapidly and so effectively that the first contract was awarded and work began on August 7, 1912. Contract #1 was on the Peninsula Highway south of San Francisco near Tanforan. Prior to that date, however, the present Materials and Research Department had been established, although it was not known by that title in the beginning. One of the first acts of the new commission was to employ several geologists in order to investigate the availability of materials for highway construction. As part of the work of the geologists, it was recommended that a testing laboratory be established, and in May of 1912, Mr. Fred Maddocks reported to Sacramento from Oakland to take over the duties of testing engineer. For a time it was a one man job as he did all of the work required of the "Laboratory". Mr. Maddocks reports that in May of 1912 the Laboratory consisted of "a little wooden shack on the north end of the old State Fairground.



The Los Angeles Rattler test was developed by the City of Los Angeles around the years 1916-17 and was adopted by the State as standard practice in 1926. In these earlier years, as today, there was much discussion over the properties of asphaltic road oils and it was thought that there might be important variations in the "stickiness" of adhesive properties. Mr. Osborne developed an apparatus which was known as the Osborn Adhesive Machine or Osborn "Stickey" Machine. Actually, it was simply a crude form of torsional viscometer. It did not measure "stickiness" but gave a reading responsive to the viscosity of the asphalt.

Most of the original laboratory work was related to tests on rock or stone for road

construction as well as tests for road oil or asphalts. Tests on soils were not started until 1923. This soil work was undertaken following many miles of failures of the original light 4" thick concrete pavements subjected to heavy truck traffic during World War I. (The original standard plans and specifications for California highways called for a 4" concrete slab called a "base" on which was to be a 3/8" thick asphaltic wearing course to accommodate iron-tired wagons and iron-shod horses.) It was concluded by the new Chief Engineer, R.M. Marton, that the practice of constructing concrete pavements should be deferred until adequate bases could be provided. This program led to many miles of untreated crushed stone or gravel surfaced roads which, in turn, began to show considerable wear, creating dust problems from the increased traffic, and it was concluded that some bituminous treatment should be employed.

By 1924, the Laboratory was under the direction of the Construction Engineer, Mr. C.S. Pope, and with increased interest in the possibilities of asphalt treatment, it was decided to draw upon the experience of the State of Oregon, and as a result, Mr. C.L. McKesson was brought from Oregon to Sacramento and placed in charge of the Laboratory under Mr. Pope.

Following are some examples of savings which are possible due to the efforts of the Laboratory and which have been made. First, is the practice of the Materials Department to be aware of new materials and new processes so that these may be utilized where suitable. However, a less well-known and less well-recognized function of the Materials Department is to guard against the use of unsuitable or impractical materials or methods. Many new processes have been widely advertised and engineers are prone to be attracted by the alleged benefits or qualities of certain new materials or processes. A competent and well organized Materials Department will often discourage the use of such materials and, in consequence, may bring about considerable savings and avoid the losses which would otherwise occur.

(One specific) area of savings may be illustrated by the selection of aggregates for portland cement concrete. In California, for example, the transcontinental highway, which traverses the Sierra Nevada Mountains, passing and crossing the summit at elevations in excess of 7,000 feet, is subjected to considerable *Continued, next page*

attack from freezing and thawing. Aggregates of known good quality were only available with a haul of 75-100 miles. Intensive laboratory investigations indicated that local sands and



Deflection Measure by Benkelman Beam

gravel could be used with due precaution using a mixed design with air-entraining agents, etc. It is estimated that on this one route, the State was able to save some \$750,000 through the use of the local aggregates compared to the cost of importing materials with a known record of performance. This point is emphasized because it was necessary for the laboratory to adopt new test procedures, which were not previously in common use. It was essential that any aggregate approaching a so-called borderline quality, must be evaluated very precisely if the use is to be justified.

Tremendous amounts of money can also be saved in the selection of aggregates for bituminous pavements. An asphalt pavement design based upon the voids in the mixture will serve only with a narrow range of aggregate types and aggregate gradations. If one is to use a radically different materials with aggregate materials varying markedly from the conventional, it is then essential that there be means available to establish the amount of asphalt and adjust this quantity to the particular materials.... The State of Oregon, for example, has areas where the only cheaply available aggregate is a porous volcanic rock of low specific gravity. Very successful road surfaces have been constructed of this material using an asphalt content in some cases as high as 20% by weight. While this may seem excessive, it was much more economical to provide the additional asphalt than it would have been to import hard, non-absorbent aggregates from any considerable distance. Furthermore, the values are relative as the actual quantities per mile of road are not in direct proportion to the percentage by weight.

A recent example of major savings possible to the Highway Department is through the use of laboratory tools and techniques in evaluating the condition of existing pavements. By use of deflection measuring devices, such as the

Benkelman Beam or the California Traveling Deflectometer, it is possible to make a survey of an existing pavement and determine the deflections that are caused by each passing heavy wheel load. Intensive work over a number of years has made it possible to relate the measured deflections with the amount of pavement thickness or reinforcing that is necessary to reduce the deflections to a tolerable or an acceptable value.

The Traveling Deflectometer is simply a means for making a large number of such measurements within a short space of time. For example, ten miles of road may be evaluated per day. However, usable results can be obtained with the simple Benkelman Beam or with the curvature meter developed by Dalan of South Africa. In California a major use of the Traveling Deflectometer is by the cities and counties of the State who engage the instrument for surveys prior to setting up projects for resurfacing or reinforcing.



Traveling Deflectometer

In a number of instances they have reported that they were able to reduce substantially the thickness of blanket or overlay after having a precise evaluation of the existing pavement. In fact, one county stated that they had been able to reduce their expenditures by several hundred thousand dollars through basing their redesign on the deflection measurements. This is simply another example of applying precise information and engineering knowledge in lieu of guesswork.

In broad outline, it is usually true that the work of a Highway Materials Department falls into a series of major groups or categories. One is the routine testing which may be carried out before, during or after construction in order to determine the quality of the materials in terms of accepted test methods and accepted standards. In other words, materials are tested according to established procedures. A second phase of the work is that

Continued, next page

which may be classed as special investigation. This work involves trying to find out the reasons for any noticeable condition that develops. For example, the failure in a pavement, cracking of a bridge, or the limited life of any portion of the highway may be worth investigating. A third phase of laboratory work is that of research, which may be classified, in general, as "applied research" or "fundamental research". Applied research is for the purpose of finding usable and workable answers to recognized problems.

The foregoing is, of course, only to be considered as a sketchy outline. It is intended to serve as a basis for justifying the need for the Materials Department and in offering some illustrations of the manner in which such a department can effect improvements and economies in the highway program.

The foregoing represents a view through the "rear view mirror" in 1963."

Signed, F. N. Hveem



CalRecycle Rubberized Pavement Grant Program

By Nate Gauff, CalRecycle



The California Department of Resources Recycling and Recovery (CalRecycle) has released its Fiscal Year 2019-20 applications for the Rubberized Pavement Grant Program. Over \$4 million will be available for grants to local agencies for rubberized asphalt hot-mix overlays

and rubberized chip seals projects. CalRecycle's reimbursements for hot-mix overlays can be up to \$20 per ton and up to \$1 per square yard for chip seals.

The applications were released in late July 2019 with a submission deadline in early October 3, 2019. For information regarding the grant program, visit the Pavement Grant Website.

Rubberized Asphalt Concrete (RAC) has been used in California for more than 40 years, produces superior pavement performance with a longer life than conventional asphalt, and helps to solve the problem of waste tire disposal by adding crumb rubber from recycled tires to asphalt.

Prospective applicants will need to use the CalRecycle GMS system to submit applications. To access, obtain a CalRecycle WebPass. For more information please visit the Pavement Grant Website.

The tentative grant timeline is provided below:

Application Release – Late July 2019

Application Due – October 3, 2019

Secondary Due date (for agency resolutions) – November 2019

Grant Awards – December 2019

Agencies have approximately two years from award date to complete the project(s).

NOTE: Agencies may submit joint applications to increase grant reimbursement rates.

For those interested in other grants offered by CalRecycle, make sure to sign up on the ListServ on our website.

For more info contact Nate Gauff at: Nathan.Gauff@calrecycle.ca.gov



Moraga Wins National Sorenson Award

By Edric Kwan, Town of Moraga

The Town of Moraga in the East Bay Area has received the 2019 "James B. Sorenson Award for Excellence in Pavement Preservation". The town has already resurfaced 10% of the street network.

The award letter from the Foundation For Pavement Preservation (FP2) stated, "The application submitted by the Public Works Department was judged to be exceptional and indicated the commitment that you and your staff since 2012 have made in keeping good roads good and engaging the travelling public in Moraga with the benefits of your program.

Your activities for preservation projects to make your constituents aware of the benefits to be accrued by promoting your policies are to be commended."

Here's how Moraga did it...

The Town is responsible for the maintenance and repair of 55.95 centerline miles of paved public streets, which includes 13.8 miles of arterial, 15.8 miles of collector, and 26.3 miles of residential streets. The Town's street network replacement value is estimated at \$100.6 million and assumes replacement of the entire pavement network in present *Continued, next page*

day dollars. This represents a significant asset for Town officials to manage. A Town Council goal for 2019 is to “continue to implement annual Measure K neighborhood streets and roads repair program for Moraga.” In only six years, the Town’s Pavement Condition Index (PCI) increased from 49 to 74.

In 2012, the Measure K sales tax initiative was approved for general purposes and the Town may use the revenue for a variety of purposes, including but not limited to addressing the Town’s most financially critical need to repair its failing streets and storm drains. The Town Council has stated its intention to spend the proceeds from the additional sales tax for road repair, as reflected in its annual goals since 2010 and unanimously supported by the entire Town Council.

In 2013, the Town leveraged \$600,000 of Measure K funds to yield upfront funds of \$7.7 million in Certificates of Participation to spend on a three-year intensive pavement program which significantly increased the Town’s PCI from 49 to 70. In 2015, the Town garnered a Pavement Management Technical Assistance Program (P-TAP) grant from the Metropolitan Transportation Commission (MTC) to survey the pavement condition of all Town streets. The 2015 P-TAP report projected that the network PCI would decline to a 67 by 2018 given the reduced funding level of \$1.1 million. The Town prepared a plan on how to address the remaining 17 years of Measure K with remaining unleveraged annual sales tax to maximize the condition of the pavement network by integrating four new pavement strategies:

- Focus on one type of treatment per year;
- Budget an appropriate percentage of funding for each treatment type;

- Budget non-Measure K funds at or greater than pre-Measure K levels; and
- Partner with other agencies to reduce costs.

In 2018, the Town garnered another P-TAP grant to evaluate the condition of the streets, which resulted in an increase in the Town’s PCI to 74. This increase is a result of the impact of the above strategies, Road Maintenance and Rehabilitation Account (RMRA - new SB1 Gas Tax) revenue, additional Garbage Vehicle Impact Fees, and the success in securing additional funding in excess of \$700,000 annually, on average.

The 2018 P-TAP report also developed budget scenarios to project the effects of the different scenarios on pavement condition index (PCI) and deferred maintenance (backlog). By

examining the effects on these indicators, the advantages and disadvantages of different funding levels and maintenance strategies become clear.

Since the inception of Measure K, the Town has applied pavement treatments on 189 street segments out of the 441 street segments throughout Town, or 43% of the Town’s network. The percentage of “Good” condition streets have increased from 21.0% to 69.5% while the “Poor” and “Very Poor” condition streets have decreased from 57.0% to 17.6%.

In summary, the Measure K sales tax revenue and the Town’s implementation of a comprehensive and innovative pavement management approach has resulted in better than anticipated pavement conditions, which are likely to improve in the future should grants and other funding remain available.

For more information contact: Edric Kwan at: ekwan@moraga.ca.us



Edric Kwan – Town of Moraga



FHWA’s MCTC Comes to California

By Charles Stuart, SWCPA

In our continuing work to improve concrete pavement quality, the Caltrans Pavement Program, FHWA, and the Southwest Concrete Pavement Association (SWCPA) recently collaborated to bring the FHWA ‘Mobile Concrete Technology Center (MCTC)’ to

California for workshops and field support. One of the big priorities of this training was to develop a stronger awareness of the many innovative test methods - like the Rapid Chloride Permeability Test for durability and Maturity Testing for opening strength.

Continued, next page



FHWA's MCTC Trailer

As stated by the FHWA, "The current focus of the MCTC includes assisting State Highway Agencies with the implementation of AASHTO PP 84, Quality Assurance, Performance-Related Specifications (PRS), nondestructive testing, AASHTO Pavement-ME, long life pavements, durability, and sustainability. An active partnership with agencies, manufacturers, contractors, industry associations, and academia is central to all of the MCTC's activities."

The MCTC is capable of running more than 30 different tests related to concrete pavement quality. It's really a state-of-the-art concrete laboratory on wheels, capable of bringing expert knowledge and robust testing capabilities to any highway project in the country. We are thankful for the FHWA's commitment to quality and for the exceptional knowledge MCTC staff provided. It's exciting to think that some of this equipment and the related test procedures will improve the way we specify and construct concrete pavements.

Full-day MCTC workshops were held on June 5th in Sacramento and June 12th in Fontana.

In addition, The MCTC was stationed on 2 concrete pavement projects from early June to mid-July where the MCTC staff tested jobsite concrete and provided QC support to the project teams. One last MCTC Open House was coordinated by Parwaz Khasraw, Caltrans District-8 (San Bernardino) Materials Engineer for the Kramer Junction CMGC project on SR 58 before MCTC staff wrapped things up and headed to Las Vegas for their next stop.



MCTC Lab Demo

A special thanks to Dulce Rufino Feldman with the Caltrans Office of Concrete Pavements, Mike Praul, Jagan Gudimettla, Jim Grove and Bob Conway with the FHWA HQ, Chu Wei and Chris Long with the FHWA California Division Office, and the Concrete Pavement Technology Center for all their help and participation with this event.

To receive invitations for future concrete pavement workshops and events, please contact Charles Stuart, SWCPA, cstuart@swcpa.org.



Small City? Work Smarter!

Even the smallest municipalities - say population less than 10,000 - have pavements to maintain - often with very limited personnel. It's not unusual for smaller cities or towns to have only minimal equipment and less than 5 people assigned to street work - and usually only part-time, as they're expected to multi-task into lots of other general maintenance areas. Small agency crews must be 'jacks of all trades'. So how can a small agency work smarter when it comes to pavement maintenance? From my lengthy experience with road agencies - some quite small - I'd offer the following suggestions.

Prioritize work. For in-house pavement repair, make the elimination of safety hazards the highest priority (e.g., pothole patching comes before frequent street sweeping or landscape

Roger Smith, CP² Center

work.) Assign pavement defects slated for 'in-house' repair a GPS location and a simple rating say 1-3, with '1' being 'must-do' repairs that pose safety hazards. Maintain a log of defects and status of their repair. Make sure all '1's' are addressed! These logs also provide documentation of your effort for making reports to City officials.

Work Smarter. Provide adequate cross-training for your limited number of personnel, so they can all do pavement work as needed. Make sure everyone has the same training and there's a standardized approach to making pavement repairs. Then give your small crew members the authority (and responsibility) to work independently and to make decisions in order to streamline the pavement work.

Continued, next page



Define and acknowledge your crew's limits. Clearly define how large a pavement repair you will attempt with your in-house crew vs. contracting out the work. These limits will usually include at least the 'must do' safety repairs like pothole patching, crack sealing, shoulder repairs and even culvert clearing.



Hazardous Pothole

For example, with just a small crew, you may want to limit your in-house repair to only filling dangerous **potholes** using specialty 'cold' **quick-patch materials**, and not take on larger patching that requires digouts and repaving with hot mix asphalt. This approach also saves on investments in larger equipment - and its continual maintenance. There are several proprietary brands of these quick-patch products available. They are blends of modified asphalt binder and aggregate, and can be purchased in bulk or in bags or 5-gallon pails - some even off-the shelf at home improvement stores. They are very effective when used correctly in smaller potholes (say up to 2' x 2'). Minimal preparation is needed... simply remove the larger loose chunks from the pothole. They can even be used on wet potholes!



Pothole filled with quick-patch material

After dumping the quick-patch product into the pothole, hand tamping or simple wheel-rolling is all that's needed. These materials will stick together, stay in place and harden with time as the softening agents cure. All of your agency's

trucks can carry these products for immediate use when a pothole is spotted. They are an ideal way to eliminate hazards until more permanent repairs can be made. And remember, even smaller potholes that an automobile might tolerate, can be deadly to motorcycles and bicycles. So potholes must be dealt with promptly!

Moving one step up ladder for pothole repair, small heated transports for hot mix asphalt (HMA) might be squeezed into a small budget. Simpler versions of these would be in the form of towed trailers or inserts for a dump truck. They allow a crew to pick up a load of hot mix at the local plant and keep it hot and workable for hours as they patch potholes multiple locations.

Also, to aid with the pothole effort, public 'report-a-pothole' programs can help locate where work is needed.

When it comes to **crack sealing**, you may also want to limit your in-house work - possibly to the use of only the simpler 'cold-pour' products. No hot kettle needed! These cold products usually involve water-based polymer-modified asphalt emulsions requiring only special pouring vessels. They're easily stored in pails and clean-up is easy. Of course, being water based they will require warm weather for curing through the evaporation of the water. As with hot-pour crack sealers, only cracks wider than 1/4 inch should be targeted. As for pre-cleaning of the cracks, there are very powerful leaf blowers available today - even the battery powered units can work well. Consider retrofitted these blowers with a smaller nozzle (e.g., an inverted funnel).

Both 'quick patch' products and cold-pour' crack sealers can be carried in a pickup in pails, and often can be used on low-volume streets without the need for lane closures - making any one of your small crew a pothole patcher and crack sealer. Of course, for safety reasons, 2-person crews are usually best.

Another simple useful 'tool' can be parking area **sealcoat products**. These are blends of water-based asphalt emulsions and filler materials (e.g., fine aggregate, cellulose) intended for use as preventive maintenance pavement sealers. Some are available as 'driveway sealers' in hardware stores in 5-gallon pails. They're easy to apply with special squeegee tools. In addition to sealing driveways, pathways and parking lots, they can be used as a smoothing treatment for localized areas

rough, raveled pavement, for obliterating unwanted pavement markings (e.g., painted striping or handicap symbols) and to smooth and define cross-walks.



Cold-pour crack seal

Shoulder repairs can also be made in-house by your crews. The two most common safety problems to look for are dangerous shoulder drop-offs and vegetation 'dams' that won't allow water to drain off the pavement. Drop-offs can simply be filled with shoulder backing material such as Class 2 Aggregate Base and compacted by wheel-rolling. Vegetation dams must be trimmed / scraped away with a small front-end loader and some hand work.

The more major defects (e.g. areas of localized wheel-track failure) should be noted by crews and logged as to location and severity, but for incorporation in a work list for 'contracting out'.

Contractor Work In addition to 'in-house' repairs, small agencies must usually have an annual contract for repairing bigger pavement defects. This 'out-of-house' work package will cover the more major repairs, such as digouts and hot mix patches of failing areas, and possibly some hot-applied crack sealing. Restoring

of paint striping should also be included as an important safety feature. These contracts may have guaranteed minimum work quantities, and an agreed upon unit cost for additional quantities. For example: \$X per square foot of digout & patching; \$Y per lineal foot of hot crack sealing. These two repair operations can also be included in annual contracts for surface treatments like chip seals and slurry surfacing. In-house crews can help with identifying the major repair areas, marking the limits of digouts and crack sealing, and quantifying the amounts for bid purposes.



Summary By working smarter with simpler treatments, and focusing on safety repairs, small cities can get the most out of their limited 'in-house' resources and personnel, while leaving the bigger repairs and maintenance to specialty pavement contractors.



CCPIC Update

By John Harvey (CCPIC), Laura Melendy (ITS), and Gary Hicks (CP2C)

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 as follows;

- 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

Information of use to city and county pavement



professionals, and more details on CCPIC can be found at: <http://www.ucprc.ucdavis.edu/ccpic/>

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 San Jose State University 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. A total of 6 counties and 6 cities are represented on the Board along with representatives from the League of California Cities (LOCC),

Continued, next page

California State Association of Counties (CSAC) and the County Engineers Association of California (CEAC). The first 'in-person' meeting of the governance board took place in Davis in the fall of 2018. Meetings are held quarterly, alternating between web calls and in-person meetings. The last in-person meeting was held in Long Beach on May 17th. Visit the CCPIC web page to see minutes of meetings and membership of the Governance Board, or to pose questions or suggestions for CCPIC. Here's some information on our recent accomplishments and future plans:

Training

- The CCPIC team has delivered a total of seven classes to date. The most recent was the first new class for CCPIC, titled "An Introduction to Pavement Engineering and Management", which was presented online in four 2-hour sessions on June 17-20. The class was delivered to a total of 71 local agency people from 21 cities and 17 counties, as well as a few from Caltrans, academic institutions, and private industry. The class was very well received by all, with 100% of respondents satisfied with the class. The only suggestion for improvement was to add additional time to the class. We consider that a great success!
- Additional new classes are being prepared for fall 2019, as well as delivery of several existing and updated ITS Tech Transfer pavement classes at CCPIC subsidized costs. The new class will be delivered in November 2019 by Gary Hicks and Ding Cheng of the CP2 Center at CSU, Chico. The class is "Life Cycle Cost Analysis-The Basics". For more information and to register, visit techtransfer.berkeley.edu/schedule.
- A draft plan for establishing a complete 'Pavement Certificate' program was presented and discussed at the most recent board meeting. The board requested CCPIC partners, led by UC Berkeley's ITS Tech Transfer, to update the plan and submit it for approval. The certificate program is intended to be completed in about 18 months, requiring about 90 hours of training. Core and elective courses are being identified and will be approximately 80 percent web-based and 20 percent classroom instruction. The draft plan is now circulating for approval. We hope to have that approval and make a public announcement

of the program by Fall 2019.

Resource Center

CCPIC is continuing to work on the organization of a 'Resource Center' in Southern California to go along with the one we have at UC Davis. A part-time experienced pavement engineer to operate it is expected to be on board early this fall. Activities include supporting the new Life Cycle Cost Analysis spreadsheet, downloadable from the CCPIC website at:

<http://www.ucprc.ucdavis.edu/ccpic/DownloadHandlerAsync.ashx?Filename=ToolDownloads/LCCA%20for%20Local%20Governments%20CCPIC%20v%2009apr2018.xlsm>

We are working with piloting agencies (City of San Jose, City of Berkeley, and County of Los Angeles) to review their performance and cost data, and development of agency-specific life cycle cost comparisons of treatments and treatment timing, for use in their PMS decision trees. This information will also be used to assist the training courses being developed on life cycle cost analysis for local government pavements.

- The Best Practices brief on "Writing Concrete Mix Specifications To Improve Durability And Sustainability" was updated and reposted to the CCPIC website at: http://www.ucprc.ucdavis.edu/ccpic/DownloadHandlerAsync.ashx?Filename=PDF/CCPIC_4-pgr_conc%20mix%20specs_final_21Jun2019.pdf.
- The California Pavement Preservation Center at CSU Chico has started work on a task order to develop model specifications for concrete pavement and minor concrete for local agencies in California based on best practices.
- Other tasks being worked on this summer with Long Beach State, Cal Poly SLO, and CSU Chico include visiting regional local government groups to talk about CCPIC products, and demonstrating the 'peer-to-peer' exchange (see below) using the Center website.

'Peer-to-Peer' Information Exchange through the CCPIC Website

- This feature has been set up for regional local government pavement groups to share information through an organized 'peer-to-peer' exchange feature on the CCPIC website. Solano County will host and manage the exchange

Continued, next page

program in northern California on a trial basis.

- We are looking for a local agency to host the exchange program in southern California, and encourage other local groups around the state to try it out. Please contact Jon Lea at jlea@ucdavis.edu if you are interested.

Outreach and communications

- CCPIC has proposed to participate in the 2019 CEAC Public Works Officers Institute (PWOI) to be held in Monterey in March 2020, with a session on pavement preservation, including use of LCCA to select and program appropriate preservation treatments, how to get maximum performance out of preservation treatments through specification and quality assurance, and future challenges for delivering multi-functional preservation treatments. The session will address not only preserving the pavement structure, but also active transportation issues, human thermal comfort,

environmental impact of materials and construction.

- CCPIC continues to work with LOCC, CSAC, CEAC, APWA, and NACE to identify other meetings where it would be helpful for the Center to attend and to make presentations on the Center and its activities. We will continue to provide updates on activities through this CP2 Center (CSU Chico) newsletter, and on training using the ITS Berkeley Tech Transfer monthly notifications of upcoming training. ITS will also be working on materials for a booth to be used at various conferences to raise awareness of CCPIC resources and training for local agencies.

Our next face-to-face meeting will be held in San Jose at the Mineta Transportation Institute on November 15, 2019.

News of CCPIC activities will be posted on the CCPIC website at:

<http://www.ucprc.ucdavis.edu/ccpic/> .



WRAPP Update

By Jim Kendrick (Bergkamp, Inc.), WRAPP President

The Western Regional Association for Pavement Preservation (WRAPP) is currently in the middle of two main initiatives. The first initiative we are working on is joint training with Caltrans. The second area of focus is planning our 2020 Workshop. Here's some additional info.

WRAPP/Caltrans Joint Training

The WRAPP Board conducts quarterly meetings with Caltrans officials to discuss current issues in pavement preservation. We also spend time discussing how WRAPP can assist in educating Caltrans officials on the different types of pavement preservation applications and their benefits, and helping to be able to determine which application is the best for each road. In our most recent meeting with Caltrans there was discussion of setting up our first training session in Sacramento. WRAPP will conduct the one-day training session for Caltrans. The agenda, date, and topics are currently being decided. Once this training session is completed, we will begin scheduling other sessions throughout the different Caltrans district offices. WRAPP is eager to assist Caltrans in these partnering efforts, and we look forward to many other opportunities to help Caltrans - and the local agencies -

better understand the benefits of pavement preservation.

WRAPP 2020 Workshop

The WRAPP 2020 Workshop is rapidly approaching and our Board and membership is working hard to make this annual Workshop the best one yet. The 2020 Workshop will be held in Sacramento at the Holiday Inn Capitol Center, and is an important educational event for people from public agencies as well as industry. Last year's Workshop, in San Diego, drew over 240 people, offered 27 vendor displays, and provided a very educational line-up of speakers.

The 2020 program will start with a golf tournament on Tuesday January 28th - then the formal Workshop will be Wednesday January 29th and Thursday January 30th. We are currently working to

finalize this year's agenda with another broad list of speakers and topics that will be beneficial for the entire group. We are hoping to have all of this information finalized and on our website in the next couple of months.

If anyone is interested in joining WRAPP and/or attending our Workshop, please visit our website at: www.wrapp.org

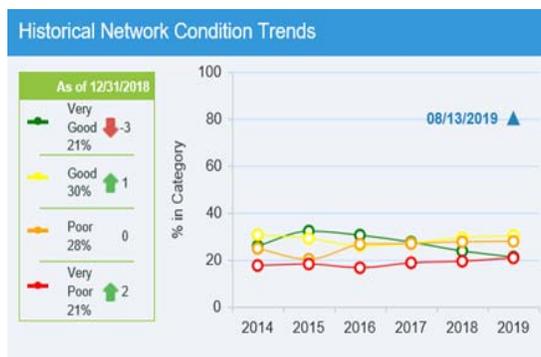


Pavement Performance Measures - Next-Generation'

By Sui Tan, Metropolitan Transportation Commission (MTC)

In December 2015, the "Fixing America's Surface Transportation Act" (FAST Act) was signed into law, building off the "Moving Ahead for Progress in the 21st Century Act" (MAP-21) that creates a performance-based surface transportation program. At the regional level, Metropolitan Planning Organizations (MPO's) like MTC have to collaborate with Caltrans to set performance targets in relation to the pavement performance measures established by FHWA.

Out of four performance measures (PM2) on pavement condition, two are mainly focusing on percent of 'good' condition and percent of 'poor' condition on locally owned segments of the National Highway System (NHS). These percentages can be plotted to show trends in pavement condition.



Data Performance Management Concepts

It is important to understand two concepts in data performance management. First, for the collection and measurement of data, there are quantitative and qualitative methods. Quantitative data refers to data with numbers or a quantity that can be computed and measured. Qualitative data, while hard to measure and compute, provides insights and understanding of an issue. For example, one will look at qualitative data to identify the diversity of a company, while looking at quantitative data for ethnicity and races. Second, within these two methods, data that is used to manage

performance can be further classified as 'leading indicator' and 'lagging indicator'. Leading indicator tends to predict trend and influence end results, while lagging indicator measures result from decisions and actions taken in the past. For instance, losing 10 pounds in three months will

be considered a lagging indicator while daily intake of no more than 2,000 calories will be considered a leading indicator.

MTC has set its own PM2 targets based on FHWA's performance measures on pavement condition. However, pavement condition alone does not provide a full picture of the state of street network. Armed with these two concepts, for the next generation of performance measures, pavement data will need to be either qualitative, quantitative or a combination.

Key Performance Indicators

MTC has developed a new set of performance measures that are meaningful and measurable. It is beneficial to include performance indicators as a way to show progress towards meeting the regional, state, and local performance targets.

Hence, our StreetSaver® software has included a new dashboard on 'Key Performance Indicators' (KPI's) to inform local decision making and help guide pavement strategy decisions to support their local investment policy. To make the data easier to grasp, they are grouped by:

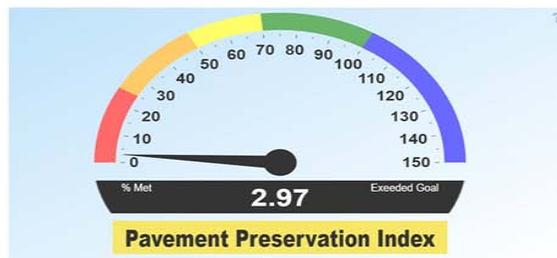
- Current Level of Service,
- Effectiveness of Pavement Preservation, and
- Reasonableness of Investment Level.

To achieve the ultimate goal of pavements in a state of 'Good' repair, it is important to use these KPI's as a way to evaluate the progress towards that goal.

For more information on these concepts contact Sui Tan at: stan@bayareametro.gov

Key Performance Indicators

Based on 10 year Needs analysis



MSA Update

The 51st Annual Conference of the Maintenance Superintendents Association (MSA) will be held September 30 - October 4 in Sacramento at the Holiday Inn Downtown. It will be hosted by the North Central Valley Chapter. These popular conferences feature interesting speakers, vendor displays and several training & educational classes. This year's class offerings have been announced and include the following:

- Introduction to MSA Public Works Specialist Certification Program
- Asphalt Pavement Preservation
- CPRS 'Certified Playground Safety Inspector'
- California Manual on Uniform Traffic Control Devices Updates
- Cal OSHA Safety Overview
- Chainsaw Safety
- Chip Seal Best Practices
- Introduction to Supervision in Public Agencies

By George Bradley, for MSA

- Introduction to Temporary Traffic Control and Flagging
- Stormwater Best Practice and Environmental Management
- Overview of Municipal and Urban Trees
- Pavement New Technology: Interlayers and Top Coats
- GIS Tools for Public Agencies
- WATER Leak Detection and Safety.
- Water and Sewer Maintenance software programs.
- CalPERS Retirement programs
- CalRecycle Tire Rubber Many Uses
- Safe School Grant and Safe Route to School Program
- Hydrocleaning Best Practices

(Course schedule subject to change)

For more information go to:

www.mainsupt.com



FHWA Update - Checklists Available

By Chu Wi, FHWA - Sacramento

Over the years, the Federal Highway Administration (FHWA) has offered printed "Checklist" pocket booklets for various pavement maintenance operations. In the interest of going green, FHWA now only offers these checklists online at: <https://www.fhwa.dot.gov/pavement/preservation/ppcl00.cfm>

Updated "Checklists" are now available for a myriad of pavement treatments, listed below:

Asphalt Pavements

- Crack Treatment
- Chip Seal
- Thin Hot Mix Asphalt Overlay
- Fog Seal
- Micro Surfacing Application
- Hot In Place Asphalt Recycling Application
- Cold In Place Recycling Application
- Slurry Seal Application
- Fabric Interlayer Application
- Full Depth Reclamation Construction

- Asphalt Emulsion Based Tack Coat
- Scrub Seal
- Hot Mix Asphalt Patching
- High Friction Surface Treatments
- Cape Seals
- Ultrathin Bonded Wearing Course

PCC Pavements

- Joint and Crack Sealing
- Diamond Grinding
- Dowel Bar Retrofit
- Partial Depth Repair
- Full Depth Repair of Portland Cement Concrete Pavements
- Cross-Stitching for Portland Cement Concrete Pavements
- Longitudinal Diamond Grooving Of Portland Cement Concrete Pavements

For more information contact Chu Wei of FHWA at: chu.wei@dot.gov



FHWA ETG On Pavement Preservation Update

By Gary Hicks, CP2 Center

The FHWA Expert Task Group (ETG) On Pavement Preservation met on August 27-28 in St. Louis. The ETG was formed in 1991 under the direction of Jim Sorenson of FHWA to help advance and improve the state of the practice in the area of pavement preservation. It was discontinued in 2012 for a short period of time, then re-invented. Antonio Nieves Torres (Construction Engineer, FHWA) and Jon Wilcoxson (Assistant State Highway Engineer, Kentucky Transportation Cabinet), are the current co-chairs of the ETG. Missouri DOT was the host agency for the meeting and they presented information on some of their projects including;

1. Challenges with thin treatments
2. Field implementation of rubberized chip seals
3. Asphalt rejuvenator research study

After these presentations, the group visited some field projects to observe the performance of the thin treatments including ultra-thin bonded wearing course (UTBWC) and high-friction surface treatment (HFST).

MAP-21 and the FAST Act legislation authorized that Pavement Preservation activities are eligible for Federal Funding. Antonio Nieves of FHWA and Ken Warbritton from Missouri DOT led the discussion to begin developing a pavement preservation guide to help agencies determine what treatments and projects are eligible for federal funds, and which are not. FHWA plans to develop something similar to that developed for bridges in spring 2018 as found at <https://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf>. FHWA will be presenting a rough draft of the guide at the next meeting. It was recommended the next meeting be used to brainstorm the content of the guide.

Antonio Nieves, Tom Van and Morgan Kessler of FHWA provided an update on the following activities:

1. SHRP- R 26, which deals with pavement preservation on high volume roads. Information on this project can be found on the following website http://shrp2.transportation.org/Pages/R26_HighTrafficVolRoadways.aspx

2. EDC-4, When and where. Tom Van reported on the peer exchanges, a synthesis of practice, guides for selection and evaluation, and workshops to help with technology transfer. Research and Development activities. Morgan Kessler reported on the results of the FHWA study on the "Use of RAP in Preservation Treatments". A webinar will be held on October 24, 2019, on this topic. You can register at <http://adobe.ly/2Zj74zo>. Instructors will be Morgan Kessler of FHWA, Greg Duncan of Aptech, Lisa Vega of NM DOT, and Van Truong of LA County.
3. Federal Aid Essentials included numerous topics on pavement preservation. These can be found at <https://www.fhwa.dot.gov/federal-aidessentials>.
4. Program Area Leaderships (PAL), which can be the source of funding for FHWA program(s), meets every year to discuss program needs and supply funding for all things FHWA.
5. FHWA has released "Pavement Preservation Checklists". These can be found on the following link <https://www.fhwa.dot.gov/pavement/preservation/ppcl00.cfm>.

Gary Hicks provided an update on the NCHRP 14-37 "Construction Guides" developed for chip seals, microsurfacing and fog seals. This report can be found at the following website http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP14-37_FR.pdf. He focused on the need to implement these guides now that they are being reviewed for publication by AASHTO. The AASHTO ETF has a committee to help market these guides, and FHWA indicated they would help with the implementation.

Judy Corley Lay, the Director of the NCPP reported on the "Research Roadmap" she is working on for FHWA. The report is well underway and should be submitted to FHWA by the end of this year. The road map included recommended studies in the following areas:

1. Asset management, Pavement Management Systems, and Pavement Preservation
2. Treatment design-selection and timing
3. Materials

Continued, next page

4. Treatment application, including construction and contracting
5. Performance
6. Benefits

Larry Scofield (ACPA) discussed the 'Peer Exchange' that was conducted in 2018-19 to determine the types of preservation treatments used by the agencies and issues they may have encountered. This consisted of 10 peer exchanges, with 3-4 states participating in each. A report on the findings from the peer exchange and a tech brief is now being developed.

LaToya Johnson (FHWA) then discussed FHWA's current position on pavement preservation. She assured the ETG that FHWA is committed to preservation and is looking for ideas as to future needs and challenges in growing pavement preservation nationally. The objectives of this program are to increase understanding,

facilitate implementation, coordinate efforts and conduct research.

Gary Hicks gave the final presentation on QA practices developed by the ETG and by Industry. He pointed out the AASHTO ETF has developed several materials specifications and design practices which have been adopted by AASHTO. Also NCHRP has developed construction guides and QA guides which are working their way through the AASHTO process. He pointed out the need to raise the bar on QA for pavement preservation treatments to minimize early failures.

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 ETG meeting will be held in February 2020 at a location still to be determined.



Hicks Delivers ASCE Monismith Award Lecture By Roger Smith, CP²C

Dr. Gary Hicks of our CP²C was the 2018 winner of the ASCE Geo-Institute Award and Lecture on pavement engineering for his 50 years of technical and professional contributions in pavement materials, design, and evaluation and construction and maintenance of transportation facilities. The Monismith Lecture is awarded annually and honors Professor Carl Monismith's contribution to the field. Hicks gave the lecture at the plenary session at the Transportation and Development institute (T&DI) in Chicago on July 23, 2019. He was the first of Carl Monismith's U.C Berkeley students to have received the award.



Hicks giving the ASCE lecture

Hicks is currently at part time project manager for the CP² Center at CSU Chico, which he established for Caltrans in 2006. He has also been a consultant MACTEC (now WOOD LLC) and a Professor of Civil Engineering for over 30 years at Oregon State University and Georgia



Figure 2 Hicks and his wife Joan receiving the award from Professor Imad Al-Qadi

Tech. He was involved in the development of the 1972, 1986, and the 2002 AASHTO Pavement Design Guides. He also worked on the SHRP A-003A contract with Professor Monismith to develop new tests for asphalt contract mixes. For the past few decades he has been a leader in pavement preservation efforts, having served on the Board of the Foundation For Pavement Preservation (FP²), and he now serves on the FHWA ETG for pavement preservation and the ASSHTO ETF, which has been developing national specifications and construction guides for pavement preservation treatments.

His lecture was titled "Pavement Preservation: History, Treatments, Challenges And Opportunities". He received the award for Professor Imad Al-Qadi (Chairman of the ASCE conference and Professor of Civil Engineering at the University of Illinois.)



COMING EVENTS: Mark Your Calendar!

**MSA Annual Conference Sept. 30 – Oct. 4
(Sacramento)**



The 51st Annual Conference of the Maintenance Superintendents Association (MSA) will be held September 30 - October 4 in Sacramento at the Holiday Inn Downtown. It will be hosted by the North Central Valley Chapter. These popular conferences feature interesting speakers, vendor displays and several training & educational classes.

For more information go to: www.mainsupt.com

Balanced Mix Design Class (NCAT)

October 1 (Sacramento)

Balanced mix design (BMD) is an enhanced ap-



proach to designing asphalt paving mixtures to achieve a satisfactory balance between rutting resistance and cracking resistance. Unlike the Superpave design approach, BMD focuses on optimizing mixture performance using simple mixture performance tests. BMD is expected to open the door to utilizing innovative materials and technologies to design asphalt pavements while providing agencies with a more reliable way to accept mixtures. This class is presented by the National Center For Asphalt Technology (NCAT).

For more information go to: <http://eng.auburn.edu/research/centers/ncat/education/training/industry/balanced-mix-workshop.html>

ARRA Mid-Year Meetings

October 21 – 24 (Monterey)

The Asphalt Recycling and Reclaiming Association (ARRA) will offer a full line-up of experts to help expand knowledge of the state-



of-the-art of asphalt pavement recycling. Best practices and innovations will be highlighted.

For more information go to: <https://www.arrya.org/mpage/2019SAM>

**RMWPPP Annual Meeting October 28 – 30
(Park City, Utah)**

The Rocky Mountain West Pavement Preservation Partnership (RMWPPP) is a regional multi-state forum of pavement professionals (state, local, & federal agencies, contractors, suppliers, and academia) working together to promote the benefits of Pavement Preservation through information sharing, education and innovation.



For more information go to: <https://tsp-2pavement.pavementpreservation.org/rocky-mountain-west-rmwppp/>



Life Cycle Cost Analysis Class

November 4-6 (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 function, cost, and performance of pavements, including streets, roads, and highways. Instruction references the 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 at U.C. Berkeley. Instructors are Dr. Gary Hicks and Dr. Ding Cheng of CP2C.

For more information go to: <https://registration.techtransfer.berkeley.edu/CourseStatus.awp?&course=192CCB011104>

Continued, next page



**Airport Pavement Technical Workshop
November 5 - 7, 2019 (Newport Beach)**

Airport topics will include pavement design and evaluation, materials, mix design, construction, preservation and rehabilitation practices, along



Berkeley
UNIVERSITY OF CALIFORNIA

with innovative pavement technologies for airports. This Asphalt Institute workshop provides the most current information for those designing, constructing and managing asphalt airport pavements. The focus is on current FAA and other applicable industry standards, including specifications, advisory circulars, criteria and policy.

For more information go to:
<http://www.asphaltinstitute.org/training/seminars/airport-pavement-technical-workshop/>



**Federal Aviation
Administration**

**CalAPA Fall Conference
November 6-7 (Sacramento)**

The California Asphalt Pavement Association (CalAPA) Fall Conference and Equipment Show is a 'must see' event for the latest on hot mix



asphalt (HMA) technology. A line-up of timely speaker topics, vendor booths and an outdoor equipment display always make this a worthwhile event.

For more information go to : www.calapa.net
**Pavement Maintenance & Rehabilitation
Class December 4 (Sacramento)**

This popular course (IDM-04) via Tech Transfer at U.C. Berkeley provides a solid working knowledge of the most common pavement maintenance and rehabilitation practices and their appropriate uses in an agency's overall pavement management plan. The instructor is Roger Smith of CP2C.

For more information go to: <https://registration.techtransfer.berkeley.edu/CourseStatus.awp?&course=192IDM041203>

**WRAPP Workshop
January 28-30 (Sacramento)**

The 2020 Workshop will be held in Sacramento at the Holiday Inn Capitol Center, and is an important educational event for people from public agencies as well as industry. Last year's Workshop, in San Diego, drew over 240 people, offered 27 vendor displays, and provided a very educational line-up of speakers.



For more information on the WRAPP Workshop go to: www.wrapp.org



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 CP² Center, or the State of California.

Caltrans established the California Pavement Preservation (CP² 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.

CP² Center News is published quarterly by the CP² Center, Langdon Hall Suite 203, California State University, Chico, Chico, CA 95929-0603, Subscriptions by e-mail: contact CP2C@csuchico.edu to add your name to the distribution list.