CP² Center News

Newsletter of the California Pavement Preservation Center

No. 28 December 2013

CalAPA Fall Conference - Biggest Ever!

By Roger Smith, CP² Center

Who says asphalt can't draw a crowd? On October 24, nearly 300 attendees and 30 vendors packed the Doubletree Hotel in Sacramento for the biggest-ever Fall Conference of the **California Asphalt Pavement Association (CalAPA),** says Executive Director, Russell Snyder. The line-up of topics and speakers provided a timely overview of the many hot issues of California asphalt pavements, and provided lots of fodder for our lead article in this December newsletter.

Keynote Speakers for the Conference were **Malcolm Dougherty, Director of Caltrans, and Mike Acott, President of the National Asphalt Pavement Association (NAPA)**.

Director Dougherty focused primarily on future funding for street and highway projects, noting that Caltrans is heavily dependent on dollars from the Federal Highway Trust Fund and acknowledged the recent efforts of California Senator Barbra Boxer in helping to win passage "MAP-21" legislation. But the overall MAP-21 legislation expires in less than a year and no consensus has emerged on how to fund transportation after that. The biggest question looming is how to reinvent funding methods and move from dwindling per-gallon gas tax dollars to a more realistic form of user tax– perhaps based on vehicle mile traveled, as is being tried in Oregon. During audience discussion, it was noted that the average driver pays only about $200 per year

Continued, next page

Figure 1. The Asphalt Pavement Alliance presents the Caltrans with the 2013 "Pavement Pioneer" award. Left to right: Chris Cummings, Chris Handley, Malcolm Dougherty, Jeff Reed, Peter Vacura, James Signore, and Russell Snyder

In this issue

in gas tax to maintain California roads, and that amount pales in comparison to what people are willing to pay for things like cable TV, internet and cell phones. A more rational public perspective seems to be needed.

Dougherty also noted that of the monies in the Caltrans pavement program, about 75% is actually going to pavement work, up from 55% in previous years saying.

"The department has made a conscious movement to devote more of its maintenance money to pavements, which is immediately noticeable to motorists." Said Dougherty.

Acott's presentation provided more of a national perspective and outlined NAPA's efforts in the area of legislation, asphalt pavement promotion, environmental issues and current research. A surprise highlight was his presentation of the very first national "Pavement Pioneer Award' to Caltrans for their Long-life Asphalt Pavement projects recently constructed on I-5 in District 2 near Weed and Red Bluff. The award recognizes innovative design and methods used to maximize the value to road users and taxpayers. The award was accepted by Caltrans Director Dougherty and Caltrans Maintenance Chief, Tony Tavares.

Figure 2. Mike Acott (left) and Russell Snyder (right) present the Asphalt Pavement Alliance "Pavement Pioneer" Award to Caltrans Maintenance Chief Tony Tavares

Director, Dr. DingXin Cheng and Dr. Gary Hicks of the California Pavement Preservation Center, provided an overview of pavement preservation options such a crack sealing, fog seals, chip seals and slurry seals -- including information on recent work by Caltrans on "texture seals", a fog seal followed by sand application.

They also highlighted the Center's involvement with an FHWA study to determine the primary factors that affect the performance of pavement maintenance treatments. Original

Figure 3. Caltrans Materials Chief Joe Peterson Gave a Presentation on Superpave

condition of the pavement, materials selection and construction practices appear to be the primary performance factors. A full report is due in February 2014.

Dr. Cheng also gave an overview of the new software that assists pavement managers with selection of the best strategy for pavement maintenance. This software, which is based on the guidelines in the Caltrans Maintenance Technical Advisory Guide (MTAG), considers life cycle costs and ranks appropriate strategies in terms of their average annual cost.

An update on the Federal Highway Administration's (FHWA) "Every Day Counts" (EDC) initiative was presented by **Steve Healow** of the FHWA's Sacramento Regional office. The goal of EDC is to accelerate highway project delivery while improving quality through new technology deployment. Some of the newer technologies of the program are warm mix asphalt, intelligent compaction, the "safety edge", high friction pavements and even design-build projects. The participation of State DOT's in this initiative, although voluntary, has been widespread.

The topic of intelligent compaction (IC) was further detailed by FHWA's **Lee Gallivan**, who touted its many benefits, but noted that IC requires rollers to be equipped with several special items: GPS locaters, mat temperature sensors, accelerometers for assessing mat stiffness, an integrating computer, and a display screen for the operator. All must work in real time to provide feedback to the roller operator as to where more rolling effort should be focused. IC has been used on several projects, including airports, and has received a lot of positive feedback, especially

Continued, next page

Figure 4. Roger Smith of CP2 Center Asked Questions at the Conference

from roller operators. This technology will be of particular value to contractors as a quality control (QC) tool, but will likely not soon be used for acceptance (QA) by agencies.

Caltrans' plan for adoption of **Superpave** HMA technology was outlined by **Joe Peterson**, Chief of the Roadway Materials Branch of Caltrans, who noted that July 1, 2014, is the target date for full implementation. Although the Superpave specifications for asphalt binders (i.e., the "PG" grading / testing system) has been used by Caltrans for several years, the switch to Superpave mix design (from Hveem mix design) will complete the changeover. A joint Caltrans-Industry Task Group has been working to facilitate this major change. Peterson noted that 6 pilot projects have already been completed and 13 more are in progress. They are also working in the lab to evaluate older Hveem mix designs for their compliance with the new Superpave criteria. The Superpave mix design requires labs to prepare trial mix specimens (briquettes) via the Gyratory Compactor, and subject them to Hamburg Wheel Tracking tests, as well as a moisture sensitivity test via AASHTO T-283. The Superpave specifications will also require more angular (crushed) aggregate and the inclusion of 25% reclaimed asphalt pavement (RAP). Asphalt content will be stated as a percentage of total weight of mix (TWM) instead of the historic percentage of dry weight of aggregate (DWA).

As for local agencies, they are not required to change to Superpave specifications, but Caltrans is working on a "minor HMA" specification (so-called "Superpave lite") that may be suitable for some low-traffic local agency pavements. Everyone agreed that a lot needs to be ironed out between now and full implementation in July!

Edgar Hitti of Paramount Petroleum provided an update on efforts to create a generic specification for modified asphalt binders blended at binder suppliers' terminals (as opposed to the classic "asphalt rubber" blended at hot mix plants). After reviewing the basics of blending and handling polymer-modified (PM) asphalts, he described how **terminal-blended rubber** binders (TR) have now been combined with the PM binders under a single new "PG-M" specification. These products may have a combination of polymer and tire rubber modifiers, and would have a label such as PG 64-28M, PG 76-22M, etc.

Pascal Mascarenhas of Vulcan Materials gave the crowd a look at the unique use of reclaimed asphalt pavement (RAP) by the City of Los Angeles, where the use of 50% RAP is now common place. The use of RAP is driven by regulations that prohibit the deposit of pavement grindings in landfills, and has led the City to acquire several milling machines for use by 'in house' crews on their 6500 miles of streets. At this very high RAP percentage, a recycling (softening) agent (RA-5) is added to get the binder in the final mix to meet their target specification grade of PG 64-22. They also must superheat their virgin aggregate to at least 450°F to provide adequate heat transfer to the high percentage of cold RAP.

Rutting and instability of asphalt pavement in hot climates under very heavy traffic loading has been a problem of long standing. But now a special **high stability HMA** specification is offering some help. **Skip Brown** of Asphalt Consulting Services presented an overview of the new Caltrans specification for "Type C" HMA, which he described as a "Type A mix on steroids". The mix was developed through an industry committee working with the City of Sacramento and progressed to use in Caltrans' District 8 (San Bernardino) on several hot desert routes. The Caltrans Type C specification includes high stability / rut resisting features such as lower asphalt binder content, higher mix design air voids, more crushed aggregate, harder asphalt binder and a 2-stage test of mix stability via the Hveem Stabilometer. For purposes of good placement and compaction, the mix should be placed in a lift thickness at least 4 times the maximum aggregate size and subject to tough compaction / density standards. The specification covers ½, ¾, or 1 inch maximum aggregate size mixes, but the ½ inch mix allows for thinner lifts. The mix has been use on numerous projects in hot climates and is performing well.

Long life asphalt pavement (LLAP) projects have now been designed and built on several Caltrans projects around the state. These rehabilitation or reconstruction

Continued, next page

projects involve designing asphalt pavement for at least a 35-year service life, so as to require only minor surface maintenance, long term. One of the primary benefits of LLAP is less future construction disruption to traffic, especially in congested areas. The Conference assembled a panel of experts from Caltrans, **Chris Handley** of HMA producer, Tullis, Inc., and **Jim Signore** of the California Pavement Research Center, University of California, Berkeley. Several important observations and conclusions came out of the discussion including the need to start very early with mix design work, which requires complex lab testing, currently available only via the Pavement Research Center. Also, the importance of pre-bid educational conferences and use of the "partnering" process were stressed. Future work will involve setting up criteria for the selection of candidate LLAP projects.

An update on the use of fabric interlayers was presented by **Ray Meyers** of the Asphalt Interlayer Association (AIA). In addition to the popular use of paving fabric interlayers, Ray noted that Caltrans now has guidelines for the use of geotextiles and grids for subgrade enhancement, which can lead to 30% reduction in thickness of the aggregate base layer. Ray also addressed newer items such as chip seals on fabric, use of special tack coats for bonding paving fabric, and a new requirement for labeling fabric weight along its edge. Guidelines for fabric use are found in the Caltrans "Maintenance Technical Advisory Guide" (MTAG), Chapter 12.

Cathrina Barros of Caltrans outlined the many changes that Caltrans is making in lab accreditation, tester qualification and test procedures as Caltrans moves to the national Superpave standards for mix design. Part of this effort will involve changing from Caltrans test methods (CTM's) to AASHTO test methods and standards. AASHTO test methods for gyratory compaction (T-312) and Hamburg Wheel Test (T-324) are examples of newer tests that will see extensive use under Superpave mix design.

An update on the world of **ground tire rubber** in asphalt pavements was provided by **Cliff Ashcroft** of FNF Construction. He cited the many recent changes in specifications and testing in California. Most of these new challenges revolve around developing Superpave standards for rubberized asphalt mixes. Foremost in this effort is the adaptation of the Superpave "PG" binder tests and specifications for use with asphalt rubber binder. These special "PG-AR" tests (via the DSR lab device) are being evaluated via "round robin testing" involving several labs. The expansion of production control testing at asphalt rubber blending sites is also being addressed by a Caltrans-Industry task force. Ashcroft reminded the group that the state's Cal Recycle grant program under AB 513 has been expanded to help agencies fund asphalt rubber projects.

All in all, the CalAPA Fall Conference was an information-packed, very worthwhile event. Considering the impressive and timely speaker line-up and the many vendor displays of products and equipment, these conferences are a "must see" event for those in the asphalt pavement world.

Mark your calendars now for the **2-day Spring Conference - April 9-10, 2014, in Ontario**.

(The California Asphalt Pavement Association (CalAPA) also contributed to this article.)

ASPHALT PAVEMENT NEWS

Caltrans Using Fog and Rejuvenating Seals on State Highways for Preventative Maintenance

By Peter Vacura, Caltrans; Lerose Lane and Ding Cheng, CP^2 Center

Caltrans completed another series of pilot fog seals projects during the 2013 construction season. Fog seals have required special permission from Caltrans Headquarters, since a moratorium was put in place in 1990s. This study was meant to re-establish best construction practices in an effort to lift the moratorium and allow use of fog seals on state contracts and it will also allow Caltrans the opportunity to develop new comprehensive specifications and guidelines for reviving the standard usage of fog seals for preventative maintenance, at a low cost.

In 2013, District 2 placed four pilot projects on Interstate 5. District 3 had two pilot projects, including one in Colusa County on SR 20, one in Glenn County on SR 45. District 10 placed three pilot projects, two of which were located in Tuolumne County on SR 120, and one in Amador County on SR 104. Pavement types which were seal coated

Continued, next page

Table 1. Project List for 2013

District	County	Route	Dates	PM Start	PM End	Existing Pavement Type
2	Tehama	I-5	6/17-6/18	R17.34	R22.14	HMA-O
2	Tehama	I-5	6/19-6/20	R5.6	R11.34	HMA-O
2	Tehama	I-5	7/8-7/9	R0.0	R5.6	HMA-O
2	Tehama	I-5	7/10-7/11	R11.34	R17.34	HMA-O
3	Glenn	SR-45	6/4	17.2	R20.7	HMA-O
3	Colusa	SR-20	6/5-6/6	23.7	28.2	RHMA-O
10	Tuolumne	SR-120	8/6	46.8	R51.65	RHMA-G
10	Tuolumne	SR-120	8/7	32.8	R35.8	HMA-D
10	Amador	SR-104	8/16	0	R5.0	RHMA-G

included gap-graded, open-graded, and one dense-graded pavement. Various application rates of the fog or rejuvenating seals were used with testing conducted by Caltrans and the CP^2 Center to evaluate the immediate surface characteristics of the fog seals. The projects application rates varied from 0.07 to 0.14 gal/ yd^2. Table 1 shows the 2013 project location list which includes construction dates and pavement types.

The CP^2 Center evaluated several different test methods for measuring friction and used statistical correlation of the results for their comparison, with the objective of maintaining an adequate skid resistance after the fog seal treatments. There was only one project, on SR 120 that had dense graded pavement. The

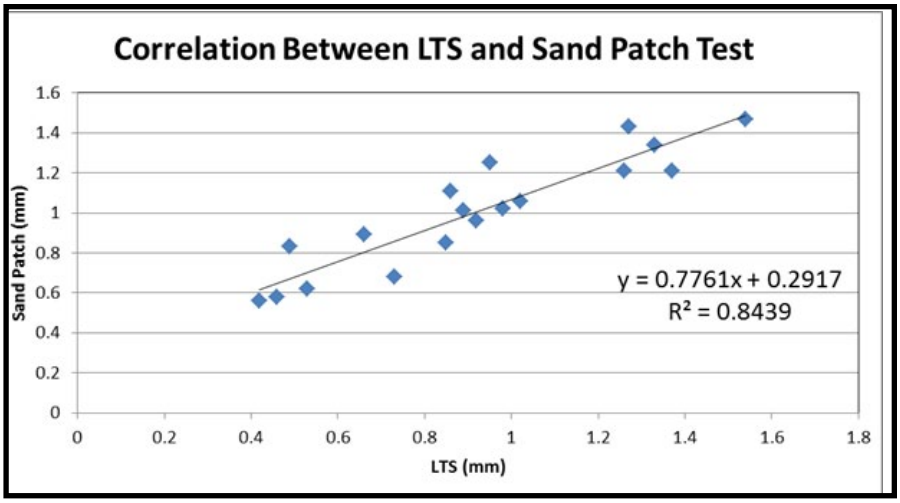


Figure 1. LTS and Sand Patch Correlation

Center is working to tie the macro-texture numbers to skid resistance, both with and without sanding. For the 2013 projects, the Center used the sand patch test, ring test, and a new tool, the **Laser Texture Scanner (LTS)** for measuring pavement texture and friction. More skid testing was also done by Caltrans during 2013, using their **ASTM E 274 skid trailer**. This varied from the 2012 testing, where the **Circular Texture Meter (CTM)**, the **Dynamic Friction Testing (DFT)** apparatus, and the **British Pendulum** was used on several of the projects.

The Center used the LTS on the three projects that were placed in August. The correlation between the LTS and the sand patch is shown in Figure 1. The linear trend line in the figure shows that there is a direct relationship between the LTS and the sand patch test and a strong statistical relationship.

The **Ring Test** was performed to determine optimum emulsion application rate for a 20 minute break time. Figure 2 shows the emulsion at four different application rates.

Figure 2. Ring Test at 4 Application Rates

The **Sand Patch Test**, ASTM E965, was to determine macro-texture of pavement by spreading 25 ml. of glass beads into a circular shape and measuring the diameter of the circle. These beads are to pass a No. 60 sieve. Figure 3 shows a sand patch test being performed.

Figure 3. Sand Patch Test

The Laser Texture Scanner (LTS) was used to scan and precisely measure the texture component of the pavement surface. Once a scan has been done, the scanner immediately calculates the Mean Profile Depth (MPD) and is capable of showing a visual of the scanned results as well as a numerical result. This meter is portable and light weight which allows the

Continued, next page

Figure 4. LTS (Top View)

data to be easily collected and stored. The LTS is show in Figure 4.

The **ASTM skid trailer** was used to measure the friction of paved surfaces with a full-sized automotive tire. The test method used was ASTM E 274. The skid trailer utilizes a measurement that is representative of the steady-state frictional force on a locked test wheel as it is dragged over a wetted pavement surface under constant load and at a constant speed. During testing, the major frictional plane is parallel to the direction of travel and perpendicular to the pavement. The values are initially measured in inch-pounds and converted to a coefficient of friction to evaluate a pavement's skid resistance. To evaluate the change in the pavement's skid resistance, a test needs to be performed both prior to the treatment and after the treatment.

To illustrate the importance of macrotexture at high speed, the friction speed curve shown in Figure 5 was developed using the constants developed by University of California Pavement Research Center (UCPRC). Figure 5 shows that the higher the macro texture, the flatter the friction-speed curve and higher the friction at high speed. For low macro texture surfaces, the friction dropped significantly at high speed. Therefore, minimum macro texture level should be provided to ensure the safety of vehicles under high speed and wet pavement conditions.

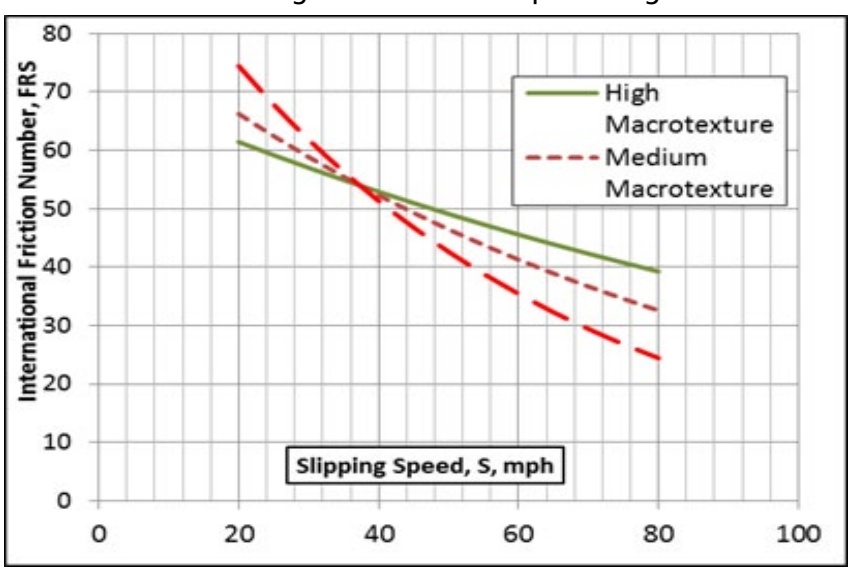


Figure 5. IFI Friction Model for Different Macro Texture depths

Table 2. Test Results Summary

Location	Road Surface Type	Direction / Lane #	Construction Date	Texture (SP) (Before), mm	Texture (SP) (After), mm	Skid Number (Before)	Skid Number (After)
Sha-5-7.2/10.8	HMA-O	NB/#2	8/21/2012	2.23	1.90	54	41
Teh-5-0.0/5.6	HMA-O	NB/#1	7/8/2013	1.82	1.27	52	41
Teh-5-0.0/5.6	HMA-O	NB/#2	7/8/2013	1.15	1.10	47	32
Teh-5-17.3/22.1	HMA-O	NB/#1	6/17/2013	1.36	1.01		42
Teh-5-5.6/17.3	HMA-O	SB/#1	6/19/2013	1.47	1.01	52	39
Teh-5-5.6/17.3	HMA-O	SB/#2	6/19/2013	1.55	1.10	47	30
Teh-5-17.3/22.1	HMA-O	SB/#1	6/17/2013	2.03	1.13		39
Teh-5-17.3/22.1	HMA-O	SB/#2	6/17/2013		0.87	50	29
Col-20-23.7/28.2	HMA-O	WB/#1	6/5/2013	1.63	1.47	42	30
Gle-45-17.2/20.7	RHMA-O	SB/#1	6/4/2013	1.32	0.94	42	32
Cal-12-10.5/18.2	RHMA-G	WB/#1	10/4/2012	1.21	1.05	47	33
Ama-104-0.0/5.0	RHMA-G	EB/#1	8/16/2013	1.37	0.92	47	40
Ama-104-0.0/5.0	RHMA-G	WB/#1	8/16/2013	0.95	0.66	47	36
Tuo-120-46.8/56.5	RHMA-G	EB/#1	8/6/2013	1.06	0.94	51	35
Tuo-120-46.8/56.5	RHMA-G	WB/#1	8/6/2013	0.75	0.66	51	30
Tuo-120-7.4/11.3	RHMA-G	WB/#1	9/30/2012	1.38	1.25	50	42

Based on the testing results of the 2012 and 2013 skid and texture measurement, the recommended minimum macro texture for Open-graded and Gap Graded RHMA are 1.15 and 0.75 mm, respectively. These two macro texture values are corresponding to skid numbers that are greater or equal to SN40 of 30 for ASTM skid trailer test. The summary of test results for open-graded and gap-graded pavement is shown in Table 2.

Conclusions

The following are conclusions from the study:

- The field evaluation showed that fog or rejuvenating seal treatment sections performed better than the untreated or control sections. The treatment reduced the raveling and minimized other distresses.
- Generally, the macro texture decreased when the fog seal application was applied.
- The emulsion breaking times from the ring tests using fog or rejuvenating seals were highly dependent on the temperature, climate, type of fog seal material, application rate, and pavement type. The pavement pilot projects demonstrated a 15-20 minutes emulsion breaking time to be optimum.
- Generally, skid resistance of the pavement surfaces decreased after the fog seal was applied, but then increased on the projects that included sanding or texture sealing with a copper slag product.

Continued, next page

- High macrotexture surfaces generally have higher high speed friction than low macrotexture surfaces for the same type of pavement. Macrotexture is a very important parameter for increasing speed constant and friction number of the international friction index.
- For the 2012 and 2013 pilot projects, the range of texture levels for open-graded asphalt were from 1.15 to over 2 mm. Generally, the skid numbers of these open-graded pavement pilot projects were higher than Caltrans' recommended minimum skid number of 30.
- For the 2012 and 2013 pilot projects, the range of texture levels for gap-graded asphalt were from 0.75 to 1.38 mm. The skid numbers of these gap-graded pavement pilot projects were higher than Caltrans' recommended minimum skid number of 30.

Recommendations

To account for varying textures and pavement types the following recommendations are:

- A ring test (similar to CT 345) should be run to determine the appropriate application rate for the fog seal. This test determines the rate that provides adequate coverage and also has break time approximately 15-20 minutes.
- Good results can be attained when the fog seal is placed at the pavement temperature above 50ºF, ambient temperatures above 60ºF, no anticipated precipitation for 3-5 days.
- The higher the macro texture levels, the less the risk for safety issue due to high speed skid loss. Based on both the 2012 and 2013 Caltrans pilot project studies, a macro texture of 1.15 mm for open-graded mixes, and 0.75 mm for rubberized gap-graded mixes typically resulted in friction numbers above 0.30.
- Sand should be applied to ensure the initial friction is adequate right after treatment.

A project report for the fog seals will be completed by the Center, and the individual projects will be placed into the Center's database for future tracking. The website for the Center's database is *http://www.ecst.csuchico.edu/cp2c/software/pptdb/*.

Caltrans "Hot Topics" Update By Roger Smith, CP^2 Center

Although the dominating issue lately in Caltrans' hot mix asphalt (HMA) pavement technology has been the full implementation of Superpave specifications by July 1, 2014 (see lead article), many other "hot topics" are being dealt with in joint committees with their industry partners. Here are some of the more prominent topics:

- A Superpave "lite" HMA specification is needed for minor HMA work. This would be used for HMA placed outside of the traveled way, usually involving smaller tonnage (say < 1000 tons). A special Superpave mix design specification is also needed for use by local agencies – especially for lower volume roads. The mix testing criteria would not be as rigorous as the full Caltrans Superpave specification, and could provide HMA mixes with slightly higher binder contents for greater durability of low-volume roads.
- New pavement smoothness specifications will be based on measurements by an Inertial Profiler (IP) device, done

at highway speeds. This new method, which will replace the old California Profilograph, will provide data in terms of an International Roughness Index (IRI) measured in each wheel track, which will be averaged and reported as a Mean Roughness Index (MRI). A process for calibration of IP machines in Sacramento has been set up.
- The use of reclaimed asphalt pavement (RAP) and recycled

Continued, next page

asphalt shingles (RAS) poses a challenge as to quantifying to what degree the old asphalt binder from these 'used' products will blend with and affect the final properties of the binder in the new HMA mix. Laboratory evaluation procedures must be developed and mix design specifications written. Current guidelines suggest that asphalt binders introduced from RAP and/or RAS should not be permitted to make up more than 40% of the final binder quantity of the HMA.

- Superpave "PG' tests for use on asphalt rubber binders are being researched via "round-robin" testing involving multiple labs, including Caltrans, CP^2 Center, Washington DOT and Nevada DOT. So far it looks promising that a modified dynamic shear rheometer (DSR) test method, advanced by VSS of West Sacramento, can be used with the rubberized binders with good precision. Once this test is approved, specification limits will need to be developed.
- Asphalt rubber quality control (QC) criteria are being developed for contractors using asphalt rubber binders (field-blended) on RHMA and chip seal projects. Currently only a rotational viscometer test is performed as QC at these field blending operations.
- Intelligent compaction (IC) has become a hot topic nationwide and Caltrans is on board. IC requires rollers specially equipped with mat temperature sensors, GPS positioning devices and accelerometers to provide the operator with real-time feedback as to the stiffness of the HMA mat. Caltrans has a draft specification which will be used on 6 pilot projects in 2014.
- A total of 4 long life asphalt pavement (LLAP) projects have been constructed on various parts of the California Interstate system. These pavements are designed to perform for at least 40 years with only minor surface maintenance. Although more of these projects are planned, several issues must be dealt with, including the fact that no private labs have the specialized mix design & testing equipment that's needed, the testing is costly and requires a lot of lead time, and criteria must be developed for selecting projects where this type of designs is most appropriate.

Chip Seal Association Holds "Roundtables"

By Scott Dmytrow and Katrina Lynch, CCSA

In 2013, the California Chip Seal Association (CCSA) took a new approach to discussing pavement preservation concepts and issues by taking their message 'on the road'. In addition to the annual Pavement Preservation Workshop held in February, 2013, the CCSA initiated pavement preservation "roundtables" in northern and southern California.

The northern California roundtable was held in Sacramento and was attended by 17 agencies and 10 member companies. A presentation on roadway funding was delivered by Kiana Buss, California State Association of Counties, and Jennifer Whiting, with the League of California Cities. The outlook for roadway funding and the impending roadway "fiscal cliff" was discussed. After the presentation, lunch was served followed by an open table discussion with each attendee having the opportunity to raise a question or an issue and have the group offer insight or solutions.

The southern California roundtable was held in Ontario and was attended by 54 people. The main presentation this time was delivered by Basem Muallem, Director, Caltrans District 8.

One of the many things Basem discussed was the innovative processes and materials used in District 8 and the benefits they've provided. Afterwards, the floor was again opened for discussion, and both ideas and frustrations were shared by the group of agency and industry partners.

Major issues raised in both of the roundtables included the following:

- Specifications - making sure the agencies and contractors fully understand the specifications
- Mix Designs - understanding what the mix design means and what to look for during construction
- Product Selection - What is the best product for a given application?

Continued, next page

- Education/Outreach - providing education/outreach through the website or other mailings on issues related to pavement preservation
- Training Employees – providing Just In Time Training (JITT) to make sure both the contractor and the agency are informed as to what to look for during construction

The CCSA is dedicated to pavement preservation. The goal of the CCSA and its' members is to help public agencies in and around California maintain their pavements and roadways in an economical and lasting fashion. These roundtable events, in conjunction with the annual Pavement Preservation Workshop (to be held February 5-6, 2014, in Sacramento), are the CCSA's way of addressing issues surrounding pavement preservation throughout the state of California.

For more information about the CCSA organization, visit *http://www.chipseal.org/*.

Manhole Riser Rings – Working Smarter! by Roger Smith, CP^2 Center

When asphalt pavements are repaved, the so-called "iron" in the street (manhole rings, valve boxes, drain inlets, etc.) must be raised to the grade of the new pavement surface. This is a costly and disruptive activity since it requires a second lane closure and work effort, sometimes involving specialty subcontractors, who must locate the iron, jackhammer out the new overlay and enough old pavement to free-up the old iron, and then raise and anchor the iron to match the new surface elevation. If there's a lot of iron in the street, it will greatly increase the cost of that simple overlay project. But is there a way around all this extra work and traffic disruption?

Fortunately the answer is 'yes'! Many agencies have discovered the efficiency and cost savings of using "riser rings", which extend the old hardware up to the desired elevation. The risers are simply placed inside the old ring or box and they accept the old iron cover. The risers come in many increments of height and also various diameters. There's even a tapered or inclined version of the riser to allow for matching new cross-slope that might be created by the overlay. The risers are typically a cast iron, galvanized steel or heavy-duty plastic. They offer a positive connection provided by turnbuckles, expansion bolts or set screws, requiring only simple hand tools for installation.

A typical installation might include something like this. Just ahead of the paving operation - in the same lane closure - a crew will remove the old manhole cover, clean the seat of the old ring to ensure proper seating of the new riser, place the riser into the old ring, adjust the anchoring hardware, and re-install the old manhole cover in the new riser ring - probably a 10-minute job. Sounds almost too simple to be true. Once in place, the risers are sturdy

Figure 1. Installing Riser Ring onto Old Manhole Ring

enough to be driven over by heavy construction vehicles, even before the new overlay is placed. For extended exposure to traffic prior to paving, the riser ring should be temporarily surrounded by a tapered rubber ramp ring available from some riser suppliers.

The final paving operation simply paves right over the raised manhole, being careful that the paver screed clears the iron. Some agencies apply an oily release agent to the manhole lid to facilitate cleaning off the hot mix asphalt and tack coat.

The City of San Francisco, one of several user agencies in California, discovered this innovative technology about 15 years ago and has never looked back. They manage 25,000 manholes and have used risers at a pace of at least 200-300 per year in conjunction with pavement rehabilitation work, usually mill-and-fill or overlay strategies. Although the rings are usually made to order, the City maintains a stock of rings of different heights (3/4 to 2 inch) in anticipation of their big need.

"All of our manholes are 28 inch in diameter, but we need various thicknesses of the riser rings…perhaps only ¾ inch on mill-and-fill projects, maybe a 2 inch riser Continued, next page

for overlays." said Mike Kelley, Supervisor in the City's Public Works Department. On mill-and-fill projects they use their large Wirtgen milling machines in conjunction with small loader-mounted grinders. Riser rings are used to "fine adjust" to the final grade.

"We shoot for being as close to final grade as we can get," says Kelly.

They use riser rings, from American Highway Products, LTD, with a simple pivoted turnbuckle expansion feature that locks the ring in place. No special tools are required. The efficiency of riser rings is especially important considering the need to minimize traffic disruption on San Francisco's busy streets.

As budgets get tighter and we're forced to work smarter to make our limited funding go further, it seems like reducing the high cost (and traffic disruption) of 'raising the iron' on pavement rehabilitation projects would be a good place to start. It sure works on the streets of San Francisco!

Full Depth Reclamation Used on Ord Ferry Road in Butte County

By Scott Hightower and Mike Crump, Butte County; and Ding Cheng, CP^2 Center

As the budgets are tight for many agencies, Butte County engineers thought outside of the box and asked for more with less. After attending a reception at the California Pavement Preservation Center, the County decided to break the traditional way of rehabilitating their roadways. This time the County settled on Full Depth Reclamation with Cement (FDR-C) and Cold Central Plant Recycling (CCPR) of asphalt pavement for a 3 mile long project on Ord Ferry Road from 300 Feet West of Seven Mile Lane to Dayton Road. The FDR-C is a construction technique that recycles the existing pavement including HMA and base layers with the underlying subgrade. A recycling machine pulverizes the old pavement and base materials and mixes in the cement and water, the mixture is then compacted to form a strong and durable structure section. The new base will be stronger, more moisture resistant than the original base, and more uniform. Most importantly the County saw a 25% cost savings when compared to a conventional reconstruction project. The total cost for the Ord Ferry Road recycling project was $1.69 million. The estimated cost of reconstructing Ord Ferry Road was $2.2 million.

Figure 1. Existing Pavement Condition at the Ord Ferry Road before Construction

Figure 1 shows the condition of the existing pavement with extensive alligator cracking. The existing pavement also suffered from block cracking, transverse cracking, and patching. Some alligator cracks were high severity and potholes had formed. The County felt the road needed a reconstruction or major rehabilitation. The roadway speed limit ranged from 45 to 55 mph. It is mainly used for daily commute and agriculture purposes.

The existing section of the pavement was composed of 4.5 inch HMA and 10.5 inch aggregate base. Based on the traffic index and subgrade conditions, Butte County chose Cold Central Plant Recycling (CCPR) for the top 3 inches and then used FDR-C to create a 16-inch structure section. After the FDR-C, the recycled HMA was paved back as a 3 inch cold mix lift. A 2-inch Caltrans Type A HMA overlay was used as the final surface layer. The following are additional details of the construction process.

1. Cold Milling the Existing HMA Surface

The top three inches of the existing HMA surface was milled as shown in Figure 2 and stored in a reclaimed asphalt pavement (RAP) stockpile shown in Figure 3 adjacent to the project site. The depth, length, width, and shape of the cut were controlled to produce a neat and uniform surface. A drop-off of no more than 0.15 foot between adjacent lanes was required prior to opening to public traffic.

Figure 2. Cold milling of the Existing Pavement on Ord Ferry Road

Continued, next page

Figure 3. The RAP Stockpile from Ord Ferry Road

2. Full Depth Reclamation with Cement

Pulverization

The remaining asphalt concrete surfacing was pulverized with underlying base materials and subgrade soil to a depth of 16 inches prior to spreading cement. After this initial pulverization the roadbed was shaped to the planned cross section.

The asphalt concrete surfacing and underlying base materials were pulverized such that 100 percent of the material passed a 2-inch sieve and a minimum of 90-percent passed a 1 ½ -inch sieve. All materials other than rock and pulverized asphalt concrete were broken up such that these materials passed a one inch sieve.

Cement Application

A Type II Modified portland cement, conforming to the requirements of ASTM C 150/150M, was used on the project. The cement content was 4% based on the dry unit weight of the pulverized material. Figure 4 shows the application of cement to the pulverized materials. No traffic other than the mixing equipment was allowed to pass over the spread cement until the mixing operation was completed.

Mixing in Place

This work consists of mixing in place the pulverized asphalt concrete, underlying base material, and subgrade soil with portland cement and water. The mixing machine(s) were equipped with controlled water distributing equipment and water was applied under pressure. Sufficient passes were made by the mixing equipment to produce a uniformly treated material. Uniformity was determined initially by sampling and testing at variable depths and locations within the treated material. Figure 5 shows the machine in place mixing the pulverized materials with cement and water.

Figure 4. Type II Cement Was Applied to the Pulverized Existing Pavement Materials

Figure 5. FDR Mixing Operation

Compaction

The length of the treated sections was controlled by the Contractor such that final compaction of the mixture to 98% density as determined by California Test 231 was completed within 2 hours between the final mixing of the pulverized material with cement and the completion of compaction with the vibratory steel drum rollers.

The mixture was first compacted with a Rex 3-70 soil compactor shown in Figure 6 and then finished with a vibratory steel drum roller shown in Figure 7. During finishing operations, the surface of the cement-treated material was shaped to the required lines, grades, and cross section, and was kept moist. The mixture was compacted in one layer.

Figure 6. Rex 3-70 Soil Compactor

Continued, next page

Figure 7. Roller Compactor to Finish the FDR-C Compaction

Curing and Finishing

Immediately after compaction, the surface was watered and rolled with a pneumatic-tired roller. The finished surface was maintained and kept free of ruts, bumps, indentations, segregation, raveling and any loose material. During a period from 48 hours to 72 hours after compaction, the surface was micro cracked by applying 3 single passes of a 12 ton vibratory steel drum roller at maximum amplitude traveling from 2 to 3 mph.

Figure 8. Cold Central Plant Operation for Ord Ferry Road FDR-C Project.

The FDR-C surface was finished by applying a fog seal of asphaltic emulsion to the finished surface when it was damp but free of standing water. The application rate of emulsion was from 0.15 to 0.25 gal/sq. yd.

3. Cold Central Plant Mixing

The Cold Central Plant Recycled (CCPR) material consisted of mixing the millings with an emulsified recycling agent at the central plant, then spreading the recycled pavement mixture. The asphalt concrete millings were crushed and screened to conform that 100% passed a 1 inch sieve. During the Cold Central Plant process the existing pavement reinforcing fabric in the RAP was removed by laborers by hand at the screen prior to entering the crusher on the cold central plant. The Cold Central Plant can be seen in Figure 8.

A track asphalt paver was used to place the cold central plant recycled material in a loose lift thickness of 5.5 inches to achieve a compacted layer of 3 inches. Once the final compacted surface of the recycled pavement mixture was completed any areas of surface irregularities such as ruts, bumps, indentations, raveling, or segregation were removed and replaced with full depth HMA.

4. HMA Overlay

The Asphalt Concrete finished surface was Type A, 3/4 inch maximum, medium grading. The asphalt binder was PG 64-10. The 2 inch overlay is expected to provide a good wearing course and protect the underlying layers.

The construction started on August 1, 2013 and completed on October 16, 2013. Figure 9 is a picture of finished project. The County is extremely pleased with the final results and the speed at which the project was completed.

5. Summary

In summary, FDR-C and Cold Central Plant Recycling are sustainable green practices, which fully utilize the existing materials including asphalt and aggregates. With proper design and construction, FDR-C and Cold Central Plant Recycling can be cost effective.

Figure 9. Completed Ord Ferry Road FDR-C Project with Cold Central Plant Recycling and HMA Overlay

2014 CCSA Pavement Preservation Workshop Announced

By Roger Smith, CP^2 Center

The California Chip Seal Association (CCSA) has announced final plans for its 2014 Pavement Preservation Workshop to be held February 5-6 in Sacramento at the downtown Holiday Inn. This 2-day annual event has become a 'must' for pavement managers and pavement maintenance specialists. The 2014 agenda will feature over 20 speakers and numerous vender displays. Keynote speakers will be Will Kempton (Transportation CA) and Steve Takigawa (Caltrans Deputy Director).

In addition to chip seals, technologies such as slurry seals, microsurfacing and cold in-place recycling will be highlighted. The expanded two day format will allow for in-depth small group participation in classes detailing binders, aggregates, mix designs, equipment calibrations, and QC for slurry, microsurfacing, and chip seal applications. Come learn how to read that mix design and see what a good and bad slurry mix looks like in the lab and how that correlates to field performance. There will also be presentations on in-place recycling, multi-layer systems, new products and Federal ADA rulings.

CCSA President Scott Metcalf (Ergon Asphalt & Emulsions) says, "We had almost 300 people attend our 2013 Workshop. We're expecting an even bigger turnout in 2014. We pack a lot of information into the two days and get a lot of positive feedback about the event."

For more information and to register for this popular event, go to: http://chipseal.org/

PCC PAVEMENT NEWS

Nevada's I-80 PCC Receives Fast-track Repair: State's first use of rapid-setting cement for full-depth panel proves successful

By Ashley Kizzire, Construction Communication, Inc.

Near Lockwood, NV, a critical section of I-80 experienced a unique repair situation, but not from typical interstate wear and tear. Instead, the damage occurred at the hands of Mother Nature when boulders rolled down a hillside onto the Interstate (Figure 1). Affecting the westbound number two lane, the damaged portland cement concrete (PCC) pavement created a significant disruption. Nevada Department of Transportation (NDOT) needed a permanent, high-performance repair that would cause minimal disturbance to the public. Until all aspects of the permanent repair could be coordinated, NDOT performed a temporary hot mix asphalt patch.

For the final repair, NDOT desired a rapid-setting, rapid-strength cement with long-lasting performance. NDOT had previous experience with rapid-setting cement from CTS Cement Manufacturing Corporation on dowel bar retrofit projects and specified Rapid Set® Cement for the first time for this type of full-depth PCC panel replacement.

Following California specifications, NDOT and concrete producer Anozira Inc. of Concord, Calif., found guidance through representatives at CTS. California's history of PCC panel replacements with Rapid Set Cement provided a model for this type of repair in Nevada.

Granite Construction Inc. was contracted for the repair. Work began the first weekend in May of 2013 under clear skies with an ambient temperature of 67°F. NDOT wanted Granite Construction to complete the repair within one weekend. The repair encompassed four unreinforced PCC panels, each measuring 12 feet wide by 15 feet long by 9 inches thick. First, Granite's crews removed the existing panels with a mini excavator (Figure 2).

Figure 1. Damaged Slabs by Boulders

Continued, next page

Figure 2. Existing Base Condition

"The rapid-setting concrete was mixed on-site with a volumetric mixer, minimizing over-production and allowing fresh concrete on the jobsite as needed," said Art Bigelow, Field Technician, Engineering Sales for CTS.

What's more, the volumetric mixer permitted crews to start and stop when required. Producing the concrete on the jobsite saved time and minimized waste. When some of the base material came out as the original panels were removed, the volumetric mixer allowed the team to change the mix design on site in order to fill the base, let it harden and then place the new panels.

Figure 3. Placement of Rapid Set

"Crews poured in the base and waited approximately 10 minutes," said Bigelow. "The consecutive pours for the panels only took about 20 minutes." (see Figure 3).

Panels were then finished with a Bunyan screed and a curing compound was applied. The specifications called for 3,000 psi compressive strength at four hours, and the concrete

Figure 4. Finishing of Rapid Set

achieved 3,460 psi at one hour and 5,260 psi at 10 days (see Figure 4). The panel placement was completed faster than expected, and I-80 opened a day and a half early. The panels have performed well with no issues or cracking. The time savings with rapid-setting cement proved essential for the project. The I-80 repair near Lockwood demonstrates rapid-setting concrete's effectiveness for rehabilitating and repairing concrete, while minimizing inconvenience to the public.

According to NDOT's District 2 Engineer, Thor Dyson, "These PCC slab replacements are performing great. Because of the inconsistent, but at times heavy traffic on I-80 we needed to get in and out quickly, so the rapid-setting concrete was the answer." Other NDOT people instrumental in the success of the project were Michon Reede, Project Engineer, and Tony Angelopolulos, Supervisor.

For more information about CTS Cement and Rapid Set, please visit http://www.ctscement.com or contact Thor Dyson (NDOT) at tdyson@dot.state.nv.us.

Fast-Setting PCC Used On the New Bay Bridge: Rapid Set® Makes Fast Setting Repairs on the Largest USA Public Works Project

By Kristen Dispenza, Constructive Communication, Inc.

In 1989, the Loma Prieta earthquake caused a section of decking in the east span of the San Francisco-Oakland Bay Bridge to collapse. After the quake, a series of studies were undertaken to determine the seismic safety of California's bridges. As a result of study findings, in 2002, construction began on the new Bay Bridge. The west span (San Francisco side) was able to be retrofitted through reinforcement, but the east span (Oakland side) needed to be replaced entirely, with its new design including the world's longest self-anchored suspension span (SAS). The Bay Bridge project, which included the removal and replacement of a one mile stretch of I-80 in San Francisco as well as the construction of a transition structure at Yerba Buena Island between the eastern and western spans, is one of the largest public works projects in US history.

While the new span's single-cable suspension system presented a construction challenge that garnered much press, other state-of-the-art engineering systems also

Continued, next page

made their debut in this project. One was fast-setting concrete.

Figure 1. Placing fast-setting Concrete at Seismic Joints

Seismic joints along the east span accommodate hinge pipe beams, massive tubular structures that are designed to move within their sleeves during expansion or contraction of the decks. The beams accommodate minor movements, such as what might occur during simple temperature changes, but they can also absorb the energy of an earthquake by deforming in their middle or "fuse" section.

Because of the variety of materials being used, typical concrete set times of 28 days were impractical. The suspension bridge, being made of steel, can experience expansion of up to 3 inches in a single day, explains Matt Murphy of Precision Concrete Materials, a company that produced concrete for the project. Therefore, the concrete used at joints on the bridge needed to set within a 4-hour time window. Fast-setting concrete was specified at the seismic joints on either side of the SAS so that the concrete was able to set and achieve sufficient strength before bridge movement had time to occur. The fast-setting hydraulic cement also offers low-shrinkage and excellent durability.

Figure 2. Hand Finishing Seismic Joint Areas

Precision Concrete Materials produced the fast-setting concrete using Rapid Set cement. Four bridge hinge locations incorporated this high-early-strength material. At the time of placement, three volumetric mixers were used to provide continuous and consistent concrete. (A fourth volumetric mixer remained on-site as part of the contingency plan for the project.) Finishing techniques included the use of mechanical vibrators, hand screeding and hand finishing. Curing techniques included the use of curing compound and Burlene.

Concrete compression tests were performed on the fast-setting concrete mix at joint segments in time intervals of one, seven, and 56 days. All of the test results proved that the concrete strengths, measured in PSI, exceeded performance requirements, and did so in a shorter time frame than was specified.

On September 2, 2013, the new east span opened to traffic. After almost six years of around-the-clock construction, the bridge combines an enormous number of state-of-the-art engineering techniques. Some of these, like the one-of-a-kind SAS with its single mile-long main cable, have become world-renowned. But many other cutting edge technologies play supporting roles in the completion of the San Francisco-Oakland Bay Bridge, such as the use of fast-setting cement.

For more information about this project and CTS Cement visit *http://www.ctscement.com*. You can also contact Janet Ong, Marketing Director, 800-929-3030 ext. 110.

CP2 CENTER NEWS

CP2 Center Staff Participates in Several Conferences

By Dr. Gary Hicks, CP2 Center

RMWPPP Meeting, October 7-9, 2013

Over 100 people from the western United States attended the Rocky Mountain West Pavement Preservation Partnership (RMWPPP) meeting in Anchorage Alaska. The meeting was hosted by the Alaska DOT&PF and included presentations on the following topics:

Figure 1. Michael San Angelo Presents Jim Moulthrop with Gold Pan Award

- Pavement Preservation in an Asset Management Plan
- FHWA Initiatives and ADA policy Changes
- MAP 21 Funding Update, including Performance Measures for Pavement preservation
- SHRP2 Updates
- Discussion on Pavement Preservation Studies at MN Road and NCAT
- Pavement preservation treatments including High-Friction Surfaces, modified chip seals, microsurfacing and slurry seal training opportunities and new tests for emulsified asphalts.

Dr. Gary Hicks of the CP2 Center gave a talk on modified asphalts.

The highlight of the meeting was the recognition of the contributions of James Moulthrop (FP2) and Larry Galehouse (NCPP) who were awarded the "Gold Pan Award" by Michael San Angelo of the Alaska DOT & PF. They were the first people outside of Alaska to be recognized with this award for their contribution to pavement preservation. Unfortunately, Larry Galehouse was not at the conference to accept his award. All the presentations can be found on the AASHTO TSP2 website at *www.tsp2.org*.

6th Rubber Modified Asphalt Conference, October 15-17, 2013

which was held in Tempe Arizona. The conference was jointly hosted by the Rubber Pavements Association, the Rubber Manufacturers Association, the Scrap Tire Research and Education Foundation, and the Rubber Division of the American Chemical Society. The conference included a lineup of speakers from academia, government, and industry from both the USA and abroad. Topics included presentations on:

- Quiet and green pavements
- Research by NCAT and FHWA on rubberized asphalt
- Performance Grading (PG) of rubberized asphalt
- FHWA's program on Sustainable Materials Management
- Case studies on the use of rubberized asphalt by several agencies, in the US and abroad

Dr. Gary Hicks of our CP2 Center participated in the meeting and presented his work on rubberized asphalt in the Province of Ontario, Canada. The presentations can be found on the RPA website at *www.rubberpavements.org.*

Figure 2. Gary Hicks Giving his Presentation

Nevada Infrastructure Concrete Conference (NICC), November 5 and 7th, 2013

Nearly 300 people attended the NICC workshops held in Reno on November 5, 2013 and in Las Vegas on November 7, 2013. The conferences were held on the campuses of UNR and UNLV and were sponsored by Nevada DOT, FHWA, SW Concrete Paving Association, Sierra Nevada Concrete Association, and the Southern Nevada

Continued, next page

Concrete and Aggregates Association. The conference included speakers from agencies including Nevada DOT, Caltrans, RTC, contractors, academia, consultants, and the FHWA. Dr. Gary Hicks presented the work the CP^2 Center has done on cost effectiveness of concrete pavements.

Figure 3. CalAPA Fall Conference in Sacramento

CalAPA Fall Conference, October 24, 2013

Over 300 people attended the CalAPA Fall Conference in Sacramento. The meeting is featured in the lead story of this newsletter. Drs. Ding Cheng and Gary Hicks gave a joint presentation at the conference titled "Stretching Pavement $$ Through Pavement Preservation". Several of the Center's students also participated in the meeting as guests of CalAPA.

Recent Successes of the California Pavement Preservation Center

By Ding Cheng, Director of the CP^2 Center

The purpose of the California Pavement Preservation Center is to provide pavement preservation services to public agencies and industry, and to integrate the research findings into the teaching experience of the Chico State engineering students. Figure 1 is a photo of civil engineering students participating in the 2013 California Asphalt Pavement Association fall conference in Sacramento.

Figure 1. Chico State Students Brandon Fraser, Marissa Garcia, Brennen Urbanek with Dr. Ding Cheng (left to right) at the 2013 CalAPA Fall Conference

Some highlights on recent achievements at the Center include that the CP^2 Center's lab in civil engineering was certified by Caltrans; the Center has developed a life cycle cost analysis procedures manual for Caltrans; the Center has developed some preliminary rubberized asphalt performance models based on Caltrans and local agencies' data; and the Center is working for the Bay Area Metropolitan Transportation Commission (MTC) on its pavement management program StreetSaver data quality assurance program. It has been a team effort. Center staff such as Lerose Lane and Roger Smith have worked on a variety of Center projects. The following are the details of the highlighted items.

CP^2 Center's Laboratory in Civil Engineering was Certified by Caltrans

In spring 2013, CP^2 Center decided that its laboratory should be Caltrans

Continued, next page

Certified to help expand our services and to ensure confidence in our capability as a research facility. We are now proud to announce that CSU Chico is the only current California University which has a Caltrans certified laboratory. The process of becoming a certified lab started with a visit from Rene Robinett of Caltrans District 2 who mentored our employees on how to become a Caltrans certified laboratory and began the first round of written tests for those who were to become acceptance testers.

Laboratory certification requires that all the equipment be calibrated and documented. A notebook was compiled that includes a personnel hierarchy including resumes and training logs, equipment calibration and maintenance logs, safety procedures, and calibration certificates. In addition, all equipment must be labeled with calibration stickers.

The second part is technician certification which includes written and practical testing. There were seven participants that have become certified lab technicians: Ding Cheng, Brian Winter, Brandon Fraser, Michael Wiedeman, Nicanor Ceja, Marissa Garcia, and Lance Patchin. Certifications included CTM 105, 106, 125G, 201, 202, 226, 308, 309, and LP 11. In the future, the lab and its technicians will also become certified in CTM 304.

Caltrans Realcost 2.5 CA- Manual and Online Training Updates

CP^2 Center worked with Caltrans engineers to upgrade the Caltrans life cycle cost analysis (LCCA) procedures manual and online training. Caltrans worked with UCPRC to improve the Caltrans life cycle cost analysis program Realcost from version 2.2 to version 2.5 CA. The upgrade was completed in August 2013. CP^2 Center supported Caltrans with the following major tasks including (a) reviewing Realcost CA version 2.5; (b) revising Caltrans LCCA Manual with version 2.5; (c) developing examples for typical Caltrans LCCA project scenarios; and (d) upgrading the existing Caltrans online training classes on LCCA. So far, we have completed the new 2013 LCCA Procedures Manual and typical examples. The Center staff is working closely with Caltrans engineers to make the LCCA procedure easier and clearer for Caltrans' engineers.

Figure 2. Caltran's LCCA Icon

CalRecycle Rubberized Hot Mix Asphalt Performance Models

Currently, California generates more than 40 million reuse or waste tires per year. The Department of Resources Recycling and Recovery (CalRecycle) has a goal to increase the usage of processing CA waste tires into more value added tire-derived products in California.

CalRecycle promotes the use of waste tires in various pavement strategies as part of their ongoing efforts to divert waste tires from landfills in California. The long-term performance modeling and development of performance curves of rubberized hot mix asphalt is needed to predict future performance and perform life cycle cost analysis.

The CP^2 Center is working with Metropolitan Transportation Commission (MTC) and local agencies in San Francisco Bay area. It also works with the agencies in the Los Angeles Basin, and the Central valley to develop performance models for local agencies, and with Caltrans and UCPRC to model the performance of Caltrans rubberized asphalt pavements.

In the laboratory, the Center has compacted beam samples from both northern and southern California and run 4-point beam fatigue tests that show the performance differences between rubberized hot mix asphalt and conventional dense graded HMA. Work on this effort is continuing with the project to be completed in April 2014.

Bay Area MTC Pavement Management Quality Assurance Program

The MTC wants to enhance its quality assurance for the MTC StreetSaver pavement management program. MTC contracted with the CP^2 Center to conduct the following major services:

- Task 1. Administer Rater Certification Program
- Task 2. Conduct Audits of Contractor's Quality Control Plan
- Task 3. Verify Data Collected by Contractors

Continued, next page

Figure 3. Erik Updyke from LA County Gave a Guest Lecture at the Chico State

Sui Tan of MTC arranged training for the CP^2 Center staff during the 2012 Fall User Week of the StreetSaver. Professor Roger Smith of Texas A&M University provided detailed training to the Center staff in the last week of March 2013 on detailed flexible pavement condition survey. In July 2013, Center staff learned detailed pavement condition survey on concrete pavements and helped MTC and Professor Smith set up the test sections for the MTC's Rater's Certification Program. In November 2013, Dr. Ding Cheng delivered a workshop at the MTC on how to integrate pavement preservation into pavement management system and to use CP^2 Center pavement preservation strategy selection program with life cycle cost analysis.

Figure 4. Erik Updyke and Gary Hicks at the CP^2 Center

Guest Speaker Highlight

The CP^2 Center welcomed the guest speaker Erik Updyke from the department of public work of the Los Angeles County. He gave a presentation on the field performances of asphalt rubber thin overlay projects to the CIVL 441 Transportation Engineering class.

CP^2 Center is Seeking More Patrons

By R. Gary Hicks and Hans Ho, Co-chairs of the Patrons Program

As you likely know, the California Pavement Preservation Center (CP^{2}C) at Chico State University has been in operation since 2006. We continue to provide services to Caltrans, local agencies including MPO's, CalRecycle, and industry in the pavement preservation area - for both asphalt and concrete pavements.

Unfortunately, the grants we receive do not cover all of our operating costs, including acquisition and maintenance of lab equipment, class development and delivery, participation in conferences, scholarships for students, and more. We therefore rely on Patrons' contributions to help provide supplemental funding.

The CP^2 Center's Patrons Program has been very successful to date, however it is time to expand and bring on additional members to help with some of the Centers efforts. We have developed a Business Plan to identify our specific needs and hope new members can join our other continuing Patrons in supporting our program towards expanding pavement preservation efforts in California. As a patron, you can become a regular participant in our CP^{2}C activities and enjoy the benefits outlined in our Business Plan including:

- Assistance in the promotion of pavement preservation concepts
- An increased market for pavement preservation products and services to state and local agencies
- Training programs in pavement preservation technology to state and local agencies
- Assistance with research, both laboratory and field
- Availability of a credible "3rd party" for technical expertise
- Priority participation in special CP^{2}C-sponsored meetings and conferences

If you need additional information, please feel free to contact Gary Hicks at *rghicks@csuchico*.edu or by phone at 530-588-4446.

GENERAL NEWS

FHWA Update

By Steve Healow, FHWA, CA Division

Innovation and Technology Deployment Grants

State DOTs and local agencies can apply for grants for transportation projects pursuant to the Every Day Counts (EDC) initiative. The purpose of EDC is to deliver projects faster, either by accelerating project delivery and/or expediting construction. State DOTs are eligible to apply; MPOs and local governments may apply through state DOTs as sub-recipients. Eligible projects may involve any aspect of highway transportation including planning, financing, operation, structures, materials, pavements, environment, and construction goals. Projects eligible for funding must include proven innovative practices or technologies, including infrastructure and non-infrastructure strategies or activities, which the applicant intends to implement and adopt as a significant improvement over the conventional practice. (See the 30 proposed strategies listed at *http://www.fhwa.dot.gov/accelerating/.cfm*.

See also the Notice of Funding Availability for Accelerated Innovation Deployment (AID) Funds at: *https://www.federalregister.gov/articles/2013/11/01/2013-26053/notice-of-funding-availability-for-accelerated-innovation-deployment-demonstration*)

Enhanced National Highway System

As a result of Section 1104 of MAP-21 the National Highway System (NHS) was expanded by 55,000 miles nationally (+7,000 miles in California) by adding urban and rural principal arterials. This is a significant development for the local agencies which own and operate the added principal arterials because of applicable Federal regulations, which include design standards, contract administration, State-FHWA oversight procedures, Highway Performance Monitoring System reporting, National Bridge Inventory reporting, and national performance measures data collection. This latter requirement will be the subject of a "Notice of Proposed Rulemaking", which will be published in early 2014. Congress relies on condition and performance data to estimate future highway investment needs. For more information see NCHRP Synthesis 442, "Practices and Performance Measures for Local Public Agency Federally-Funded Highway Projects" [*http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_442.pdf*]

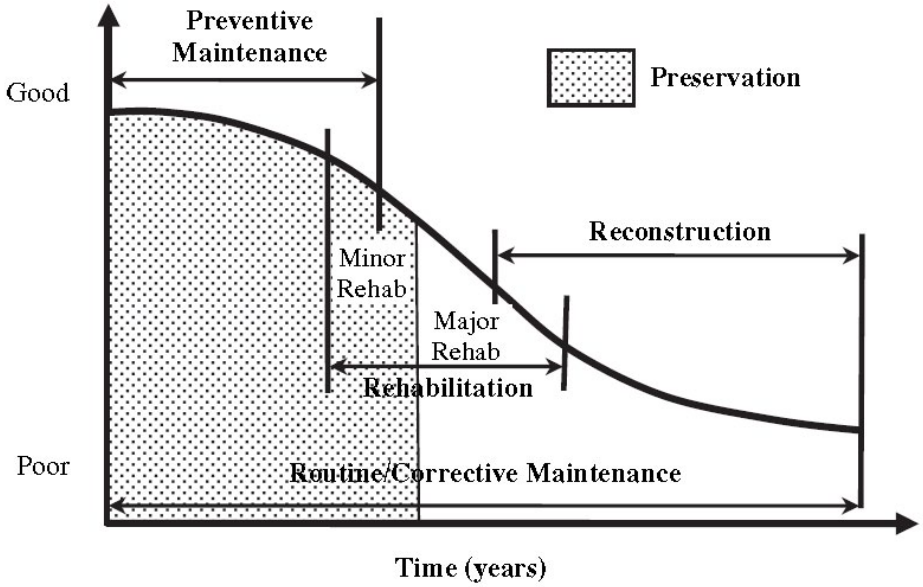
Figure 1. Innovations: Precast Concrete Pavement System (precast modular concrete panels at offsite location)

Risk Assessment

Another "Notice of Proposed Rulemaking" expected in January will provide more detail regarding the risk-based asset management and performance management required in MAP-21, Sections 1106 "National Highway Performance Program" and 1108 "Surface Transportation Program". We're all used to risks associated with natural disasters such as fires, floods and earthquakes. In the future look for more consideration of new risks and opportunities due to competing priorities, limited resources, advanced technologies, political uncertainties, and economic volatility. Risk assessment doesn't mean emphasis on administrative procedures or avoiding action due to regulatory controls. Rather it means systematically assessing these circumstances so the risk can be quantified and managed.

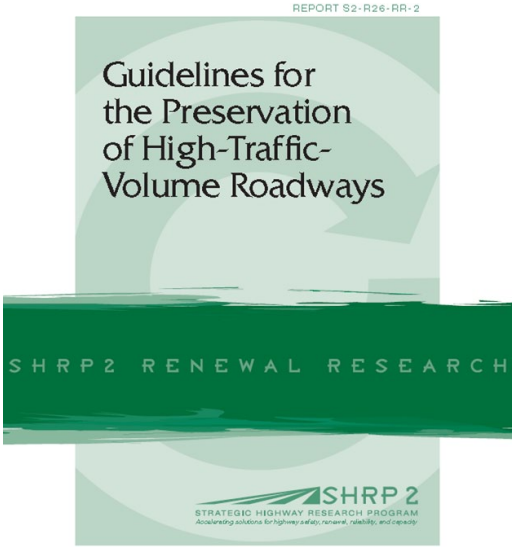
For an executive summary on risk management see: *http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24(74)_ExecutiveSummary.pdf.*

Continued, next page



Source: Adapted from Peshkin et al. 2007.

Figure 1. Relationship between pavement condition and different categories of pavement treatment



Recommended Reading

The following SHRP2 publications were developed to name and explain proven strategies for preserving high-volume roadways.

1. "Preservation Approaches for High-Traffic Volume Roadways, 179 pages [*http://www.trb.org/Publications/Blurbs/165280.aspx*]
2. "Guidelines for the Preservation of High-Traffic-Volume Roadways", 62 pages, [*http://www.trb.org/Publications/Blurbs/164965.aspx*]

FP^2 Inc. Update By Jim Moulthrop, Executive Director, FP^2 Inc.

At the recently completed Midwest Pavement Preservation Partnership meeting in Indianapolis, IN, The Foundation for Pavement Preservation (FP^2 Inc.) provided our annual FHWA/James B. Sorenson Excellence in Pavement Preservation award to the New Hampshire Department of Transportation. Commissioner Chris Clement and Pavement Management Engineer Eric Thibadeau were both present and Commissioner Clement accepted the award and presented New Hampshire DOT's vision of preservation, some of the difficulties in championing such a program and the benefits of a robust pavement preservation program.

The FP^2 Inc. board members and contributors convened a Strategic Planning Session in late October to discuss current issues and plan for future activities. First and foremost, FP^2 will continue its advocacy for keeping good roads good with national, state, and local officials. FP^2 will be engaged in shaping the new legislation that will emerge in 2014 as the current MAP-21 legislation expires. The major issue in the next funding bill will be the revenue source to adequately enhance the federal Highway Trust Fund. Secondly, FP^2 plans to support strategic importance that have long-term consequences. And thirdly, FP^2 will promulgate the pavement preservation message to a broad array of audiences.

The pavement preservation treatments study by NCAT on Lee County Road 159 continues to be monitored with an array of equipment on a weekly and monthly basis. Various surface treatments are being monitored as part of this study. Construction information for each treatment can be accessed at *www.pavetrack.com* by clicking on each section of Lee Road 159 (displayed near the bottom of the page). Performance data for each test section should be available soon and funding partners (seven state DOT's and FP^2 Inc.) will meet in early December to review results.

FP^2 continues to be involved in trying to understand the July "Technical Memo" issued by the Department of Justice and FHWA regarding maintenance and possible "alterations" to the pavement surface during resurfacing. Some preservation treatments that in the past have been exempted from compliance with the Americans with Disabilities Act (ADA) are now considered "alterations" to the surface. Local governments

Continued, next page

are particularly affected by the memo, which attempted to provide clarity to the provisions of the existing statute.

If you are planning to attend the annual Transportation Research Board meeting in Washington during January, 2014, plan to stop by the FP2 hospitality room (9021 in the Marriott Wardman Park) and talk pavement preservation with your colleagues from around the nation and world.

COMING EVENTS

Mark Your Calendar (Coming Events)

Transportation Research Board Meeting - January 12-16, 2014

The spotlight theme for the 2014 TRB Annual Meeting is Celebrating Our Legacy, Anticipating Our Future. More than 30 sessions and workshops will focus on this theme, which reflects the last year of the Annual Meeting at the Connecticut Avenue hotels, where it has been for nearly 60 years, and the move to the Walter E. Washington Convention Center in 2015.

Construction of Quality Hot Mix Asphalt Pavements - February 4 (San Diego) and February 6 (Las Vegas)

The Asphalt Institute presents this 1-day course on the basics of HMA pavement construction. Covered topics include, materials, mix design, plant operations, paving and rolling equipment and practices, inspection and testing. For more information, please visit the website: *www.asphaltinstitute.org*

Pavement Preservation Workshop – February 5-6 (Sacramento)

California's premier event for those involved in asphalt pavement maintenances and repair. The event is put on by the California Chip Seal Association. Hear the latest on pavement maintenance and preservation strategies by experts from both industry and agencies. Exhibitors will also be on hand to showcase their latest technologies and equipment. For more information, please visit the website: *www.chipseal.org*.

CalAPA Spring Conference – April 9-10 (Ontario)

The California Asphalt Pavement Association's (CalAPA) Spring Conference will be held in Ontario on April 8-9. The popularity of this big even has led to it being a 2-day event for 2014. Hot topics in the world of asphalt pavement technology will be the focus by a variety of speakers and exhibitors. For more information, please visit the website: *www.calapa.net*.

CalAPA Regional Technical Mtgs. (various dates and locations)

These regional meetings bring agency and industry people together to discuss asphalt pavement issues. For more information, please visit website: *www.calapa.net*.

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

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.

The Center works closely with the Pavement Preservation Task Group (PPTG), a statewide volunteer group consisting of members from Caltrans, Federal Highway Administration (FHWA), industry, various public agencies and academia to help promote cost-effective pavement preservation.

CP^2 Center News is published quarterly by the California Pavement Preservation Center
CP^2 Center, 35 Main Street, Suite 205, California State University, Chico, Chico, CA 95929-0603
Subscriptions by e-mail: contact CP2C@csuchico.edu to add your name to the distribution list