



CP2 CENTER NEWS

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Larry Orcutt

Interview with Larry Orcutt, Chief, Division of Research and Innovation

Larry Orcutt is a 25-year veteran of the California Department of Transportation (Caltrans) and currently is the Chief of Caltrans Division of Research and Innovation (DRI). He previously served as the Chief of Caltrans Division of Maintenance and spent 18 months as Acting Caltrans Deputy Director for Maintenance and Operations. Prior to working for Caltrans, Mr. Orcutt spent five years working for the U.S. Forest Service.

Mr. Orcutt has a B.S. degree in civil engineering from California State University, Sacramento and an M.S. degree in Transportation Management from the Business School–Mineta Transportation Institute at San Jose State University. Mr. Orcutt has been a licensed Professional Engineer (PE) by the California Board for Professional Engineers and Land Surveyors since 1982.

Mr. Orcutt is a member of the National Academies of Science, Transportation Research Board (TRB), Research and Technology Coordinating Committee, as well as TRB's Technology Transfer Committee. He serves on a number of university advisory committees, including the Advisory Council of the Institute of Transportation Studies at the University of California at Davis; the Civil Engineering Council at California State University, Sacramento; the Advisory Board of the Center for Environmental Research and Technology at the University of California at Riverside; and the Advisory Committee of the University of California Transportation Center.

The following questions were posed to Mr. Orcutt and here are his answers.

Infrastructure preservation is becoming a major issue nationally. First, do you foresee an increase in research activities for pavements and bridges in California or nationally and secondly, what is the impact of the economy on research funding?

The simple answer is yes. We have to increase our efforts nationally and in California in pavement preservation research. My first involvement with pavement preservation was under Randell Iwasaki, then Caltrans Maintenance Program Manager, in the mid 1990's. Randy (the new Caltrans Director) was one of the founding members of the National Foundation for Pavement Preservation. Randy and I were part of the Pavement Preservation Forum for the Future in 1998. Furthermore, Steve Takigawa,

Chief of the Caltrans Maintenance Division, has also established a fund for pavement innovations that has been in effect since 2006, and is now under the direction of the new Pavement Management Division. Finally, the Caltrans State Pavement Engineer can initiate research on pavement preservation using DRI funds.

Nationally, there is an increase in activity in pavement preservation research at NCHRP and Renewal research under the Strategic Highway Research Program (SHRP) 2. Randy Iwasaki oversees this latter effort, and there are several SHRP 2 renewal projects underway, such as pavement preservation approaches for high-traffic-volume roadways. NCHRP has several projects scheduled for the next fiscal year on pavement preservation which were initiated by Caltrans. However, we need resources to deploy the research findings that will come from SHRP 2, the National Cooperative Highway Research Program (NCHRP), and Caltrans efforts.

We also need to develop simple documents to show agencies why they need to change their strategies for protecting their assets. This is a big problem. The Caltrans Innovation Survey completed June, 2008, documented "resistance to change" as the number one innovation roadblock. Legal and contract issues related to intellectual property have made it more difficult to push California innovations out to the rest of the country.

The economy should lead to more innovation on more cost effective technologies for maintaining

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our infrastructure. We expect the DRI budget to remain more or less the same on the Federal level. California is one of the few states which also has State Highway Account funding. The State funding may be impacted depending on how the current California budget deficit is resolved.

Can you describe the research process within Caltrans? How do the projects get prioritized and approved for funding?

A strategic plan for Caltrans is developed by a Caltrans committee composed of Division Chiefs and some of the District Managers. Pavement research ideas are initiated by the State Pavement Engineer.

Roadmaps are developed for each research area including pavements. Nick Burmas, in my Division, handles all the pavement research projects, including those in the pavement preservation arena.

The final decision on which areas are to be funded is decided by the Division Chiefs and the District

Managers. Pavement Program decisions are made by the Research Deployment Steering Committee, the work is contracted out to a university or consultants, the work is completed, and the deployment of the findings is initiated. As mentioned above, we need to bolster the deployment effort to assure that research gets implemented. This includes doing a better job of selling the new inno-

vations to management and staff at Headquarters and Districts.

What are the pavement research projects that are being funded through DRI?

Right now our primary focus is mechanistic-empirical (ME) design, pavement management, and performance-based specifications. We have been focusing on high-payoff areas. In the near future, we need to make decisions on what process to use for these efforts (e.g., CAL ME vs. AASHTO). Whatever decision we make must address our specific needs, new construction, rehabilitation, and preservation.

We are in the process of purchasing a new heavy vehicle simulator (HVS) to help in these efforts. The HVS has been a very effective tool for solving some of our pavement issues (performance of different materials or treatments including warm mixes, asphalt rubber vs. terminal blends, dowel bar retrofit, and many others). Other projects underway can be obtained from our Office of Materials and Infrastructure at: http://onramp/newtech/offices/materials_and_infrastructure/index.htm.

What efforts are underway to help implement the research products?

Our principal focus is trying to implement innovations. We can solve many problems or issues, but we still need to sell management and districts, as well as industry, on the benefits of these innovations. Warm mix asphalt is an excellent example of how a new innovation can move into the field rapidly. All the parties involved (Caltrans, industry and academia) are very supportive of this concept because they can see the potential benefits.

We have other innovations where Caltrans and industry cannot agree to move forward. This is either because the benefits were not clearly shown, or the processes get in the way and barriers are created. For example, ME design has been around since the 1960's, but it is still in not widely used except by a few states. Also, we have demonstrated the benefits of long-life pavements (i.e., dowel bar retrofits), but not all of our Districts have accepted this concept.

We need a well-thought-out deployment plan for each innovation, and we need to include deployment in the research project plan. The plan needs to indicate who does it and for how long. Research deployment takes additional resources to make it happen. Having sound research reports sitting on someone's shelf is what we are trying to prevent. One of DRI's primary strategies is to make sure research is deployed and the benefits of the research are realized.

DRI has been instrumental in getting project statements from the FHWA Roadmap into the NCHRP program. Do you see more opportunities for including pavement preservation into the local and national research efforts?

One of my staff, Nick Burmas, was responsible for this. He used the FHWA Roadmap project descriptions developed for pavement preservation and submitted it to AASHTO for consideration. It also helps to get the support of the TRB committees responsible for preservation, including the committees on pavement maintenance and pavement preservation.

Former Director Will Kempton and current Director Iwasaki both have been supportive of Caltrans leading national change through the Caltrans National Engagement Plan where Caltrans is stepping up to make sure the Caltrans voice is heard on the national level. By Caltrans being more involved in national TRB and AASHTO Committees it can help drive innovation.

DRI is funding pavement research focusing mainly on new design and/or reconstruction. Do you see an increased interest in funding research on pavement preservation?

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“Our principal focus is trying to implement innovations. We can solve many problems or issues, but we still need to sell management and districts, as well as industry, on the benefits of these innovations.”

All ideas for pavement research are initiated by the State Pavement Engineer, Dr. Shakir Shatnawi. Since he has a strong pavement preservation background, I am confident we can count on his support in this area. Pavement preservation needs to be included in the strategic plan and the projects identified in the Pavement Roadmap.

Is there anything else you would like to comment on?

In summary, we need to focus on the most important issues and improve our deployment of innovations. We also need to get Caltrans and Industry on the same page through the partnering efforts. The Pavement Preservation Task Group (PPTG) is an excellent example of a partnering platform.



Meet the 'Next Generation' of concrete surfaces

By John H. Roberts, Executive Director, International Grooving & Grinding Association

In a time when operator comfort is gaining increased importance, it is nice to know that safety, durability and environmental sustainability need not be sacrificed to meet the needs of the driving public. In recent years, tire/pavement noise has become a hot button issue in areas with large populations and high traffic volumes. Public officials have increasingly sought long-lasting, economical, noise-reducing surfaces for their pavements. The Next Generation Concrete Surface (NGCS), now in the testing stage, is proving to be an ideal solution to meet these needs.



Finished surface

In 2005, the Portland Cement Association, through the American Concrete Pavement Association (ACPA), funded research to improve the noise performance of concrete pavements. The International Grooving & Grinding Association (IGGA) and its affiliated contractors supported the research effort

through equipment development and test section construction.

NGCS pavements, designed to provide a consistent profile absent of positive or upward texture, describe a category of textures that have or will evolve through current research. NGCS is a hybrid texture constructed on concrete surfaces that resembles a combination of diamond grinding and longitudinal grooving. The texture can be constructed as either a single-pass or two-pass operation using diamond tipped saw blades mounted on conventional diamond grinding and grooving equipment. These textures, for both new construction and rehabilitation of existing surfaces, will have the desirable characteristics of a very smooth profile, coupled with good micro texture and excellent macro texture.

According to Larry Scofield, Director of Pavement Innovation for the ACPA, NGCS is still in the de-

velopment stage and as more is learned through research, the configuration of the surfaces may change.

"Since the NGCS is more of a 'manufactured' surface, it is more consistent and predictable than traditional surfaces," commented Scofield. "NGCS and conventional diamond grinding are competitive with all surfaces from a noise reduction perspective."

Purdue University's Herrick Laboratories of West Lafayette, IN, conducted the research using its Tire Pavement Test Apparatus (TPTA), which can test any pavement texture. The TPTA allows evaluation of texture designs unconstrained by current construction capabilities or costs associated with field test section construction and evaluation, and without the resulting traffic control or safety issues.

The Purdue work evaluated the variables affecting the construction of diamond ground textures and the joint-slap effect associated with transverse joint noise generation. Test findings indicated that the geometric configuration of the blades and spacers used to construct diamond ground textures was not the controlling factor in noise generation, but rather, the resulting fin profile was the most important factor. Producing a low-noise diamond ground surface required creating uniform and consistent land profiles.

To verify this finding, a new surface – NGCS – was created which consisted of a uniform land profile design with essentially all negative texture. This surface texture produced the lowest tire-pavement noise levels in the study. The surface was then constructed in the field, using actual diamond grinding equipment to confirm the laboratory study.

NGCS field tests currently exist in five locations (Minnesota, Illinois, Wisconsin, Kansas and Oklahoma) with two more planned for Seattle, Wash. The field test sections allow evaluation of the NGCS' effectiveness under various traffic conditions and concrete pavement construction scenarios. Additionally, NGCS is anticipated to be used on I-5 in the Solana Beach, Calif., area later this year or early next year.

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Scofield noted that with the array of aggregates used to construct concrete pavements, it is important to evaluate both the acoustic and frictional longevity of these surfaces when they are constructed on different types of concrete. Through field evaluations, contractors will get a better understanding of the constructability of these surfaces and their cost effectiveness.

Along with the development of the new surface, NGCS LITE was created to provide an economical renewable surface for NGCS. Designed as a “perpetual surface texture,” NGCS LITE offers an efficient method for enhancing the micro texture on the land area of the NGCS. Since very little material removal is necessary, this process is fast, cost-efficient and is an excellent concrete pavement preservation tool.

For the test sections constructed to date, the NGCS begins approximately 1 – 4 dBA quieter than a conventional diamond ground surface and is approximately 0 – 1 dBA quieter after the first year. Although more time is required to establish the acoustic performance of the NGCS pavement, it is not expected to change within the first 10 years of its construction provided it is implemented on well-designed concrete pavements constructed with high-quality, durable aggregates.

As NGCS technology continues to develop, more testing will be conducted to further evaluate these new surface textures. The NGCS represents the concrete industry’s most significant advancements in achieving quieter concrete pavement surfaces to date. All of the NGCS validation tests in the field

have successfully demonstrated that it is a very low-noise concrete surface which provides low-noise benefits when constructed and does not require a wear-in period to break down the fins.

In a time when innovative, cost-effective, environmentally conscious solutions are needed most, concrete pavement once again carries the load. The Next Generation Concrete Surface will provide a renewable maintenance strategy that is low-noise, safe and withstands the test of time.

About IGGA

The International Grooving and Grinding Association (IGGA) is a non-profit trade association founded in 1972 by a group of dedicated industry professionals committed to the development of the diamond grinding and grooving process for surfaces constructed with Portland cement concrete and asphalt. In 1995 the IGGA joined in affiliation with the American Concrete Pavement Association (ACPA) to represent its newly formed Concrete Pavement Restoration Division. The IGGA/ACPA CPR Division now serves as the technical resource and industry representative in the marketing of optimized pavement surfaces, concrete pavement restoration and pavement preservation around the world. The mission of the International Grooving and Grinding Association (IGGA) is to serve as the leading promotional and technical resource for acceptance and proper use of diamond grinding and grooving as well as Concrete Pavement Preservation (CPP) and restoration. For more information, visit www.igga.net



Pavement preservation using dowel bar retrofits

By Shubham Rawool & Richard Stubstad, ARA, Inc.

Background



Many concrete pavements in California were originally built without dowel bars using plain jointed concrete slabs. Typically these pavements had an eight-inch thick concrete layer placed over either a cement-treated or lean-concrete base. Nevertheless, in the moderate climatic zones in California, a number of these pavements have outlasted their design lives and are still in service. After years of service, many of these pavements now exhibit varying degrees of faulting, pumping, and corner breaks. Such distresses may be attributed to the initial absence of dowel bars—which at the time was a Caltrans Standard for concrete pavement design.

Faulting is often caused by the absence of dowel bars, generally combined with deficient subbase and/or subgrade conditions. Faulting in turn increases the stresses in the concrete caused by increased dynamic wheel loadings—which further exacerbates the problem.

Retrofit dowel bars restore the load transfer effi-

ciency at concrete joints and, in turn, reduce faulting and other related pavement distress. Heavy Vehicle Simulator (HVS) accelerated pavement testing conducted by U.C. Davis and U.C. Berkeley has demonstrated significant improvement in load transfer efficiency (LTE), as measured by Falling Weight Deflectometer (FWD) load-deflection testing, and a corresponding reduction in vertical deflection in pavement sections where retrofit dowel bars were installed as compared to similar test sections without dowel bars.

Dowel bar retrofits (DBR) in California

Many state agencies have retrofitted existing, undoweled JPCP (jointed Portland concrete pavement) in an effort to improve joint load transfer at transverse joints, thereby limiting or reducing the progression of joint faulting. Dowel bar retrofit (DBR) followed by diamond grinding is an effective preventive maintenance strategy and can provide excellent benefits if used early in the pavement’s life

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Figure 1. Successful dowel bar retrofit project on I-10 in Pomona, Calif.

cycle. Pavement sections with extensive cracking levels or other related distresses are not good candidates for DBR.

The first DBR project constructed in California was in

1999 on the I-10 freeway in Los Angeles County and proved to be quite successful (Figure 1). Excellent materials and workmanship, together with an adequate time window before opening to traffic, was achieved throughout the project. By 2008, a mere 2% of the 22,000 dowel bars have shown some signs of distress — some 9 years after the fact. Many other successful DBR projects have also been constructed in California, as well as in other states, since the early 2000's.

Meanwhile, there have been some reports of dowel bar retrofit distresses in other California projects. These distresses appear to be mainly related to materials and/or workmanship during the process of dowel bar retrofitting. An example of one of these distressed projects is on I-5 in Orange County in Southern California. In this project, it appears the grouting material was not properly consolidated between the edge of the slot and the dowel bar (Figure 2) and there were many locations of misaligned dowels.

In other instances of premature failure, it has been found that the dowel bar slots were not thoroughly cleaned prior to placing the backfill material, thus resulting in an inadequate bond between the backfill and the original concrete. Also, there were other instances where the dowels were misaligned because inexperienced contractors did not use gang-saws and had difficulties retaining the correct dowel

bar alignment. Dowel bar retrofits are best suited for pavements that are structurally sound but still exhibit low load transfer at joints and/or cracks. Pavements with little remaining structural life, as evidenced by extensive cracking (more than 10% stage 3 cracking) or with high severity joint defects are not good candidates for DBR.

DBR projects elsewhere in U.S.

As part of their CPR program, Puerto Rico has installed many kilometers of retrofitted dowel bars since 1983. In 1991, a review of over 7,000 installed dowel bars found that less than ½ percent

of DBR repairs have failed. Similarly, a review of retrofitted dowel bars by the South Dakota Department of Transportation (SDDOT) also found less than a ½ percent failure rate. SDDOT has now retrofitted nearly all of its JPCP on their interstate system and has begun to retrofit JPCP sections of the secondary highway network.

Between 1997 and 2000, the Michigan DOT constructed seven dowel bar retrofit projects to evaluate the cost effectiveness of dowel bar retrofitting cracks at an early stage rather than conduct full-depth repairs at a later date. Current indications are that dowel bar retrofitting of cracks costs about one-third of the cost of full-depth repairs. Yearly monitoring of these projects has shown that the majority of DBR's are performing as expected and MDOT is planning to continue dowel bar retrofits in the future.

The Washington State Department of Transportation (WSDOT) has been rehabilitating its aged JPCP pavements since 1992 using dowel bar retrofits, panel replacements, and diamond grinding. Between 1993 and 2002, WSDOT has used dowel bar retrofits to rehabilitate 20 different projects over 250 lane-miles of pavement. Based on its 10-year experience, WSDOT has significantly modified the design and construction of dowel bar retrofits. Construction inspection was recognized to be one of the primary factors for ensuring the success of dowel bar retrofits. Using proper slot cutting techniques is also important, since improper slot cutting may contribute to increased stresses on the dowel bars, resulting in premature corner cracking. Also, heavy (more than 14 kg (30 pound)) jackhammers can punch through the bottom of the slot, resulting in an increased joint failure rate. Finally, dowel bar retrofitting was limited to PCC pavements with less than 10 percent slab replacements and average faulting levels between 3 mm (0.125 in) and 13 mm (0.5 in). Based on these modifications and enhancements, WSDOT considers dowel bar retrofits to be a successful and viable alternative for rehabilitating faulting concrete pavements in Washington State.

Special considerations

To ensure success in DBR projects, the following guidelines are provided (www.igga.net/File/Dowel-Bar-Retrofit-Do_s-and-Don_ts-_2003.pdf):

- For pavements with skewed joints, the saw cuts for the slots should be parallel to the roadway centerline regardless of skew. If dowel bars are retrofitted perpendicular to skewed joints, this can lead to joint lock-up and ultimately result in pavement cracks.
- Dowel bar placement tolerances:
 - a. ± 1 inch from the middle of the concrete slab depth;
 - b. ± 1 inch of being centered over the

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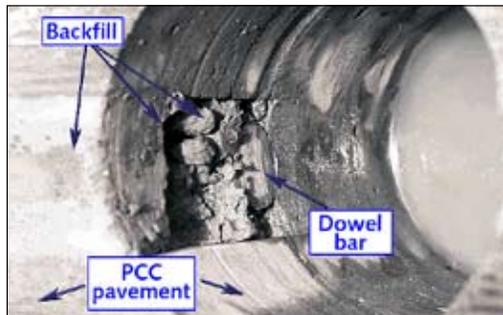


Figure 2. A poorly performing dowel bar retrofit on I-5 in Orange County, Calif.

- c. $\pm \frac{1}{2}$ inch at the ends from being aligned parallel to the center line; and
- d. $\pm \frac{1}{2}$ inch from lying parallel to the roadway surface.
- Saw cuts that are sawed too deep will contribute to corner cracks when traffic loads are applied.
- Slots should be aligned to miss any existing longitudinal cracks. Slots that intersect longitudinal cracks are destined to fail. The failure mechanism is typically the debonding of the concrete patching material from the walls of the saw cut slot. Shifting slots, three to four inches one way or the other will prevent this problem and will still provide the required load transfer.
- Patching concrete material should meet the following criteria in California:
 - a. Compressive Strength: 3 hours – 3,000 psi (21 MPa)
 - b. Compressive Strength: 24 hours – 5,000 psi (35 MPa)
 - c. Flexural Strength: 24 hours – 500 psi (3.5 MPa)
 - d. Bond Strength: 24 hours – 300 psi (2.1 MPa) for SSD concrete

e. Bond Strength: 24 hours – 400 psi (2.8 MPa) for dry concrete

- The pavement should not be opened to traffic until the patching material achieves a compressive strength of > 3000 psi.
- Polyester concrete and latex modified concrete may provide better bonding strengths due to their inherent properties. Use of these materials in lieu of traditional backfill materials should be considered and evaluated.

Summary

There are five major factors to consider when evaluating a potential project for DBR:

- Structural condition of the slabs (should be good or better)
- Structural condition of the base (should exhibit low FWD deflections)
- Measured load transfer efficiency (> 60% LTE as measured by an FWD)
- Magnitude of faulting (0.1 - 0.5 in. (2½ - 13 mm))
- Condition of joints and/or cracks (moderate severity spalling or better)

Finally, and most importantly, good materials and workmanship and adequate time allowed before opening to traffic are mandatory prerequisites for a successful dowel bar retrofit project.



Warm mix technologies used with asphalt rubber mixes

By Cathrina Barros, Caltrans

Warm mix asphalt (WMA) is the name given to certain technologies that allow a reduction in temperature at which asphalt mixes are produced and placed. They were originally developed in Europe but have been used in the United States since 2005. Nationally, warm mixes are gaining considerable momentum and, as such, a WMA technical working group was established to help provide guidance for research and implementation of warm mixes. Find out more at: www.warmmixasphalt.com.

RHMA projects placed to date

Caltrans has been involved with the deployment of warm mixes, both with conventional hot mix asphalt (HMA) and Rubber HMA (RHMA). Since July 2006 Caltrans has placed several WMA projects using RHMA. These include:

- Santa Clara, Route 152 – This project placed in July 2006, consisted of a thin overlay on the shoulder using RHMA-G with Sasobit. The control window temperatures were 320° F while the WMA sections ranged from 275-285°. Similar drops were also noted for the breakdown temperatures. The condition of the pavement is currently rated as good.



Marysville warm-mix RHMA-O project on Highway 70 – night time paving.

- Granite Rock Facility, Watsonville – The next project was a series of test sections in a Granite Rock Facility. This was a cooperative effort between Caltrans, UCPRC, and industry. The three warm mix technologies employed were Sasobit, Evotherm and Advera along with a control section. The pavements were tested using the HVS to monitor rutting and to perform accelerated lab tests to measure rutting and fatigue. The next phase is to evaluate moisture sensitivity of the mixes and to test RHMA using warm mix technology.

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- I-5 near Fresno – As a part of an existing project (September 2008), Caltrans used warm mix technologies in a thin overlay on the shoulder. The contractor initiated this effort using a no cost contract change order. The warm mix technologies used were the Astec Double Barrel Green and Evotherm. No major problems were reported with this project. The temperature drops on this project were from 325° F on the control to 270° and 290° F on the warm mix technologies. Compaction temperatures ranged from 275-300° F for the control and 220 -275° F for the warm mixes.
- I-5 near Orland – This project was placed in May 2009. It was a thin RHMA-O which included Evotherm. The project consisted of



Orland warm-mix RHMA-O project on I-5.

a control section and the RHMA section. Mixing temperatures for the control were about 325° F while for the RHMA it was about 290° F. As a result there was much less smoke noted during the operation. Compaction temperature was also lower for the

RHMA mix. A similar project was placed in October 2007 using the RHMA-O just south of Orland on I-5 without warm mix. The early distress on this project suggested that the binder content on RHMA-O should be higher and that the colder temperatures during construction may have contributed to early raveling.

- San Diego County, Route 94 – This project was placed in June 2009 using 3 warm mix technologies (Advera, Saobit, and Evotherm) and a control. The rubber mix was a thin RHMA-O overlay. The pavement was placed during the day with a haul time of about 1 hour. There were some production issues during the placement of the mix, but otherwise the mix seemed to work out fine. Even without a MTV, the mix was placed and compacted within specification.
- SR 70, north of Marysville – This project, placed in June 2009, consisted of a thin RHMA over a leveling course on a heavily travelled 2-lane road. The project was placed at night to minimize interference to the traffic. Mixing temperatures were dropped from the normal 325° F to about 290° F. The nighttime air temperature cooled to 60° F at times with no problems with the paving. Evotherm was used in this project.



San Diego warm mix RHMA-O project on Highway 94.

What is planned for the rest of this year and in 2010?

Caltrans has a number of projects scheduled for construction in the near future. They are described as follows:

- Humboldt SR 101 – This will be a RHMA-G project to be placed in August 2009. It will be a 2.5 inch overlay over the existing pavement. The coastal highway is generally faced with cool paving temperatures during the summer. This will be an excellent way to pave using asphalt rubber on this project.
- Lake County SR-53 – This project is tentatively scheduled for August 2010. It will also be a RHMA-G placed alongside a control section.

Caltrans, with the assistance of the Center, will monitor the performance of all these sections in 2010. This information will be used to fine tune the existing specifications and ensure the mixes are performing to Caltrans' expectation. Right now it appears that warm mix technology can be successfully used with RHMA mixes and that they lower the mixing and compaction temperatures substantially. This results in less energy consumption along with less emissions including smoke.



AASHTO TSP2 regional partnerships

By Steve Varnedoe, NCPP

The AASHTO Transportation System Preservation Technical Services Program or TSP2 has been in operation for over three years now, serving as a "one stop shop" for pavement preservation practitioners through its technical help desk, web-based document library and facilitation of regional preservation partnerships. Managed by the National Center for Pavement Preservation (NCP) at Michigan State University, the program can attribute much of its success to the establishment of Pavement Preservation Partnerships in each region of the country.

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These partnerships create a unique opportunity for interaction between highway agencies, industry and academic professionals. Each partnership is governed by its own set of bylaws and elects officers, which in some cases include an industry vice-chair. Annual partnership meetings are facilitated by NCPP staff and travel costs for two members from each participating state are covered as part of their annual voluntary contribution to AASHTO for the TSP2.

AASHTO is currently expanding the TSP2 to include a parallel Bridge Preservation component. The annual voluntary state contributions were increased last fall to \$20,000 to cover the two programs. As a result of interest in the program and in view of the budget challenges facing many state DOT's, the FHWA waived the required state match, allowing 100% SP & R funds to be used to cover the cost of the voluntary contribution.

AASHTO TSP2 Pavement Preservation Partnerships are now active in four regions of the country. The Western States Partnership is managed by the Washington State DOT through a pooled fund outside of the AASHTO program, though in the future they may opt to come in to the TSP2.

The Southeast group, SEPPP, held their annual meeting this past May in New Orleans, opting for a joint conference with the Southeast Pavement Management Association. The conference agenda was structured to include a joint plenary session with a theme of "Integrating Pavement Preservation and Pavement Management". The conference included numerous presentations from state, federal and industry members and other participants. SEPPP Task Forces are currently focusing their work efforts on developing template specifications for their region, communicating the message of preservation

through articles and pamphlets, comparing pavement distress identification methods and triggers for preservation treatments and exploring the possibility of a pilot pavement preservation contractor certification program.

The other three TSP2 partnerships have scheduled their annual meetings for the fall beginning with the Rocky Mountain States, RMPPP, which will be meeting in Salt Lake City, Utah, October 13-15. The Midwest group, MPPP, will be meeting in Shaumburg, Illinois, October 27-29, followed by the Northeast, NEPPP, November 3-5 in New Jersey. Each of the partnerships are currently busy preparing their meeting agendas. Meeting proceedings, presentations and minutes for each partnership can be viewed on the NCPP website at www.pavement-preservation.org.

Since their formation in 2007, the partnerships have provided an excellent forum for state and industry peer to peer exchange on preservation treatments, programs, specifications and best practice. The work efforts of partnership Task Forces will, over time, lead to common regional specifications along with continual improvement in quality and consistency of work performed by contracting industry. This in turn will be enhanced through increased agency-industry training efforts.

Partnerships are also looking for ways to capitalize on the data collected through the FHWA State Preservation Program reviews that have now been completed in 41 states through the sharing of best practices. Consideration is also being given to the development of a "self assessment tool" as well to periodically refresh the data from this effort. More information on the AASHTO TSP2 is on the program website at www.tsp2.org.



Pavement preservation loses a giant

Jim Sorenson.
A superstar.



Jim Sorenson unexpectedly passed away on June 27, 2009 at the age of 59 while convalescing from scheduled surgery June 2, 2009. He is survived by his three daughters, Dana, Jamie and Amber, and 12 grand children. Funeral services were held on July 11, 2009. Family, friends, and colleagues attended the services. His daughters set up a memorial website located at: <http://james-sorenson.memory-of.com/About.aspx>.

Jim received his BSCE in 1976 from Montana State University at Bozeman, where he had worked as an Engineering Assistant to the City Engineer after returning from four years in Viet Nam in 1971.

Jim worked in several FHWA field and headquarters offices and was most recently FHWA's Senior Construction and System Preservation Engineer. He was responsible for technical assistance, policy development, and research guidance in the areas of Construction and Maintenance Operations, Transportation System Preservation, Asset Management, and FHWA's external Quality Management Program.

He was instrumental in moving the national pavement preservation program ahead during the last two decades. Jim's efforts and hard work will be sorely missed by the profession.

He was a good friend of the Californian Pavement Preservation effort having worked with management and the PPTG on a number of issues. His close friendship with our new Director Randy Iwasaki as well as Division Heads Larry Orcutt, Shakir Shatnawi and Steve Takigawa will not be forgotten.

Terminal blend chip seal project placed by County of Los Angeles Public Works

By Erik Updyke, L.A. County

The County of Los Angeles Department of Public Works Department has long been a major user of rubberized asphalt concrete and has utilized both asphalt rubber and terminal blends. Since



Erik Updyke and Larry Dunlop opening the project.

1997, the Department has hosted the Southern California Rubberized Asphalt Concrete Technology Center which provides technical assistance to other local agencies and their consultants. In May, 2008, the California Integrated Waste Management Board awarded Los An-

geles County a grant to construct a chip seal using terminal blend binder. In July, 2008, the Los Angeles County Board of Supervisors formally accepted the grant. Exhibit A of the grant states "This contract will help build the knowledge base for terminal blend materials in pavement strategies such as chip seals by creating in-field test sections that will be monitored for material performance."

Roads suitable for chip sealing were identified using the Department's RoadMatrix Pavement Management System and field reviews of the identified potential segments. Segments of Avenue J and Avenue O, both east-west arterial roads, in the unincorporated community of Lake Los Angeles totaling seven centerline miles were chosen. These segments had a PCI of about 50, which would typically correlate to a rehabilitation strategy, but were deliberately chosen in order to provide a further

test of the terminal blend binder. In addition, one segment, Avenue J, received full pavement preparation, while the other segment, Avenue O, only received minor rut filling and edge restoration. In addition, at the request of the California Interlayer Association, a section of Avenue J (approximately 1600 feet in length) received a chip seal over pavement fabric.

The chip seal was placed the week of July 6, 2009. The work was coordinated and supervised by Larry Dunlop, the Department's Road Maintenance Superintendent of Road Division 555. Chip and binder spreading work was performed by vendors supported by Department road maintenance forces. Paramount Petroleum supplied the PG76-22TR binder containing 15 percent crumb rubber. Certificates of Compliance were furnished for each load delivered to the job site. Pre-coated 3/8 inch screenings were supplied by Vulcan Materials from their Littlerock quarry. Quality assurance monitoring was performed by Erik Updyke and Paul Deaville of the Department's Construction Division. Aggregate and binder content testing was performed by the Department's materials lab. Dr. Gary Hicks, of the California Pavement Preservation Center, observed the project on behalf of the California Integrated Waste Management Board.

Overall, the project went very smoothly except for the chip over fabric section. The binder temperature apparently caused some wrinkling in the edges of the pavement fabric and there was adherence of the fabric to the tires of the pneumatic rollers. A second application of binder and chips were applied to the affected areas. The Department will continue to monitor the performance of the pavement during the next few years.



Differences between asphalt rubber and terminal blend modified asphalts

By R. Gary Hicks, CP2 Center

Based on some of the calls we get, there appears to be some confusion as to the difference between asphalt rubber (a field blended product) and terminal blends (blended at the refinery). Asphalt rubber has been in use since the 1960s and is currently widely used in California, Arizona, and Texas. The product consists of about 18-22% crumb rubber modifier (CRM), but may contain other additives including extender oils and polymers. The CRM has a maximum #8 or 10 mesh size depending on where it is used. In California, the rubber is mixed and reacted in the field at elevated temperatures (375° F) for a predetermined period of time (45 minutes) to allow a reaction to take place between

the rubber particles and the asphalt. It has been a successful product when used in chip seals, interlayers and hot mixes. By ASTM definition, asphalt rubber must contain a minimum of 15% CRM from waste tires.

Terminal blends (or rubber-modified asphalts) have been used since the 1980's in Texas. They have been used in California, Florida, and Nevada in hot mixes and chip seals. In the beginning, the terminal blends contained less than 10% CRM in the binder which meant they did not meet the ASTM requirement for the minimum % CRM. The size of the CRM is much smaller as well with a maximum size of

Continued, next page

about 40 mesh size. In the 2000's, the producers of terminal blends increased the amount of CRM in the binder so now it can contain from 15% up to 25% CRM. They may also include some polymers making the terminal blends similar in production to polymer modified asphalts. The terminal blends now meet the ASTM definition for minimum CRM content. Some have expressed concern that there is no way to verify the amount of CRM used in this product. However, the process is a batch process like that used for asphalt rubber and a copy of the components can be provided to the agency on request. Furthermore, the suppliers of CRM must certify whether the rubber used in this process comes from California, just like it is done for the field blended asphalt rubber.

The CIWMB allows terminal blends for chip seals to be included in their grant program and, under contract to the CP2 Center, are evaluating the inclusion of terminal blends for hot mixes. Terminal blends have also been emulsified to produce slurry seals which are being used by local agencies in both Northern and Southern California. This product is different than the rubber emulsion asphalt slurry



Figure 1. Asphalt rubber vs. terminal blend.

(REAS) in that the rubber is integrated into the asphalt. It is still too early to tell how they will perform in comparison to REAS where the rubber is basically a filler in the emulsion.

Figure 1 shows difference in appearance between asphalt rubber and a terminal blend. As can be seen, the asphalt rubber binder has clear evidence that the rubber is present in the binder. The terminal blend, because of the finer size of CRM, and the fact that the rubber is essentially dissolved and homogenized with the asphalt, does not show any rubber particles.

Asphalt rubber (high viscosity binders which require agitation) and terminal blends (lower viscosity with no agitation) are not the same product. Neither type should be directly substituted for the other without appropriate lab testing.

Caltrans evaluations

Caltrans undertook, or sponsored, a number of studies comparing terminal blends to asphalt rubber as discussed in the following sections. These include the following studies, all of which are inter-related.

Five-year warranty projects

Five projects were placed throughout the State during the 2002-2004 construction seasons and the contractor had to supply a five-year warranty for the project. Four of the five projects contained asphalt rubber, while one contained a terminal blend.

Based on the most recent review of all projects (2005), they are all expected to reach the five-year warranty period and should reach their design life of 10 years. The next survey is expected to take place in the fall of 2009. More details on this study can be found at the Caltrans website: <http://www.dot.ca.gov/hq/esc/Translab/ofpm/deliverables.htm>.

University of California Partnered Research Center (UCPRC) HVS studies

This study was part of the Caltrans Sponsored Partnered Pavement Research Center program that was carried out at the UC Berkeley Richmond Field Station. The test consisted of six experimental overlay sections, including an HMA (DGAC) control, an RHMA-G control, and four terminal blend sections, two with 7% CRM and two with 15% CRM. The sections were placed over a cracked pavement and Heavy Vehicle Simulator (HVS) testing was used to assess rutting and reflective cracking performance of the thin overlays. Comprehensive laboratory testing was also used to assess the rutting and fatigue cracking performance of the mixes.

Severe fatigue cracking was observed on the 90 mm HMA and 45 mm RHMA-G sections after the equivalent of 16 million and 60 million equivalent standard axle loads (ESALs), respectively, had been applied with the HVS. No fatigue cracking was observed on any of the terminal blend sections after 60 million ESALs. The study results indicate that half-thickness gap-graded mixes with terminally blended rubber modified binders will provide superior performance in terms of reflective cracking compared to the full-thickness HMA or to the same half thickness of RHMA-G, when used in thin overlays on cracked asphalt pavements.

The final summary report (UCPRC-SR-2007-03) plus the other supporting documents can be found at www.its.berkeley.edu/pavementresearch by clicking on "publications: and then "reports for client agencies".

Full scale demonstration project, SR 33, near Firebaugh

The Fresno Highway 33 experimental overlay project is located near the town of Firebaugh in the central valley of California. This project (constructed in 2004) consisted of nine pavement test sections with a variety of rubber-modified asphalt concrete mixes and a control section of a Type A dense-graded asphalt concrete (DGAC). The rubber-modified sections include a gap graded rubberized asphalt concrete (RHMA-G), a Rubber Modified Asphalt Concrete – Gap Graded (RUMAC) dry process, and two terminal blends, a gap graded G Modified Binder (MB-G), and a dense graded Modified Binder (MB-D) containing 15% CRM. All rubber-modified pavement test sections include two thicknesses: 45 mm and 90 mm. The DGAC control section was

Continued, next page

90 mm thick. Pre-construction, construction and performance information for the Highway 33 project is described in three separate volumes and can be found on the Caltrans website: <http://www.dot.ca.gov/hq/esc/Translab/ofpm/deliverables.htm>.

The results of the field monitoring and laboratory testing activities for the Fresno Highway 33 experiment indicate the following:

- The MB-D mix performed best, followed by MB-G and DGAC at about the same level of performance, followed by the RAC-G and RUMAC-GG sections.
- While the MB-D, MB-G and DGAC appear to meet or exceed the performance requirements for the projected 10-year design life, the RAC-G and RUMAC-GG sections are already in poor condition after only four years of service.

Based on the relative field performance of the MB-D and MB-G mixes, the results suggest the terminal blend binders are better suited for use in dense-graded mixes than in gap-graded mixes. Although highly modified, these terminal blends do not build viscosity like the high viscosity asphalt rubber binders and should not be used to try to mimic RAC-G mixes.

Full scale demonstration project, SR 20

Mendocino Highway 20 was also an experimental overlay project located near the town of Ukiah, Calif. It consisted of three pavement test sections with a variety of rubber-modified asphalt concrete

mixes and a control section of a Type A dense-graded asphalt concrete (DGAC). The rubber-modified sections include a rubberized asphalt concrete (RHMA-G), a Rubber Modified Asphalt Concrete – Gap Graded (RUMAC, dry process), and a dense graded terminal blend (MB-D). All rubberized asphalt con-

crete overlays are 60 mm thick. The DGAC overlay is 105 mm thick. The project was constructed in 2005.

The work plan, pre-construction, construction and performance reports for this project is described in several separate volumes, which can be found on the Caltrans website located at <http://www.dot.ca.gov/hq/esc/Translab/ofpm/deliverables.htm>. After three years of service, the rubberized asphalt concrete overlays, as well as the control DGAC overlay, are in very good condition and will likely meet the performance requirements for the projected 10-year design life.

Summary

Asphalt rubber and terminal blend are different products and should not be interchanged. However, both provide superior cracking performance at one-half thickness, when compared to conventional dense graded HMA. Only when there are construction issues will the products not be expected to perform in a superior manner.

With respect to chip seals, both the asphalt rubber and terminal blends have been used for a number of years. Again, the early terminal blend chip seals contained 10% or less of CRM. Currently, agencies are using this product with CRM contents of 15% or higher and are achieving good performance. The asphalt rubber chip seals have been used for a long time and are still known for their excellent performance. Studies currently underway in Caltrans District 11 show that both products can exhibit bleeding in hot climates and under heavy traffic. The results of these studies should help with mitigating this problem

Emulsions made from terminal blends rubber modified asphalts are being used in Southern California. Alternative processes of integrating the rubber into the emulsion are also being evaluated, including asphalt rubber oxidation shield (AROS). Field test sites have been placed with this process as well. They are integrated into the binder, but the added benefits have not yet been fully quantified in the field. 

Asphalt rubber and terminal blend technologies will also be discussed in an article entitled *Rubber Roads: Waste Tires find a Home* in the October 2009 issue of Pavement Technology Update, a publication of the Technology Transfer Program at the University of California, Berkeley. Pavement Technology Update will be distributed as an insert in the fall issue of Tech Transfer, the Technology Transfer Program's quarterly newsletter.

A pavement management system for L.A. County Public Works

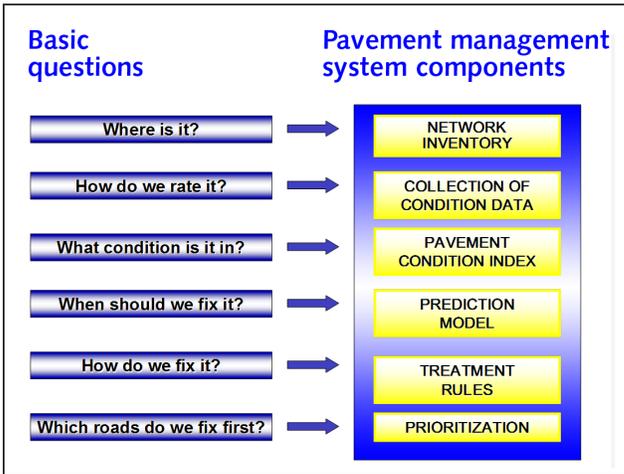
By Imelda Diaz, P.E., L.A. County

What condition is the road in? When should we fix it? How do we fix it? "Which roads do we treat first?" These are simple questions that may not necessarily have straightforward answers especially for a local agency that has one of the largest number of maintained miles in the State of California. The County of Los Angeles Public Works Department is responsible for managing and maintaining approximately 3,281 centerline miles (8000 lane miles) of paved roads. The Department is able to provide reliable and sound answers to these basic questions as a result of our systematic approach

and use of a robust pavement management system, Stantec's RoadMatrix V3.0.

Not only does the Department have a large network, it is also a highly complex network due to large variations in geographical settings, climate conditions, functional road classifications, traffic volumes, soil conditions, pavement types and age. RoadMatrix is capable of handling the complexity of our network and can process a large amount of pavement data relatively quickly. The thematic GIS Maps in the RoadMatrix are also extremely useful

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in identifying and grouping projects, and we can literally see the “big picture.” The Department’s objective is to select appropriate and cost effective treatments for our roads as well as schedule these treatments in a timely manner.

The following is a description of how each of the components of RoadMatrix is used to help answer these fundamental questions.

RoadMatrix stores the road location, the geometrics, the pavement structural data (i.e. AC thickness, base thickness, etc), and traffic data (i.e. Traffic Index, AADT) as part of the network inventory.

Our first step is to obtain a network level assessment of the condition of all the County roads. To accomplish this, Department staff drives each road; carefully identifies the type, severity, and extent of the cracks or distresses on the road; and documents the conditions. Photographs of representative road sections are also taken. This information is then entered into RoadMatrix which converts the data into a pavement condition index (PCI) on a scale from 0 to 100, with 100 being best. The PCI helps us answer the question “What condition is it in?”

Once the PCI is determined, the next question is “When should we fix it?” Our objective is to catch roads before they reach a condition level that would require a more costly treatment. Pavement performance models contained within RoadMatrix show how the PCI changes over the years. How fast the road deteriorates depends on the following factors: (1) type of pavement; (2) thickness of the pavement structure; (3) traffic volume, and; (4) sub-grade strength. Using these factors, RoadMatrix matches each County road to a pavement life cycle curve, which enables us to predict pavement condition at any time in the future. Using these curves, we set PCI thresholds consistent with the Department’s treatment strategies for preservation and rehabilitation. Our goals are to focus on keeping our good roads in good condition by utilizing pavement preservation treatments and to fix the roads that are on the verge of going to major rehabilitation or reconstruction. RoadMatrix is also able to quantify the Remaining Service Life (RSL) which estimates when the road will reach a PCI level for reconstruction. The models and triggers have assisted us in prioritizing and scheduling preventative maintenance and rehabilitation treatments in a timely manner.

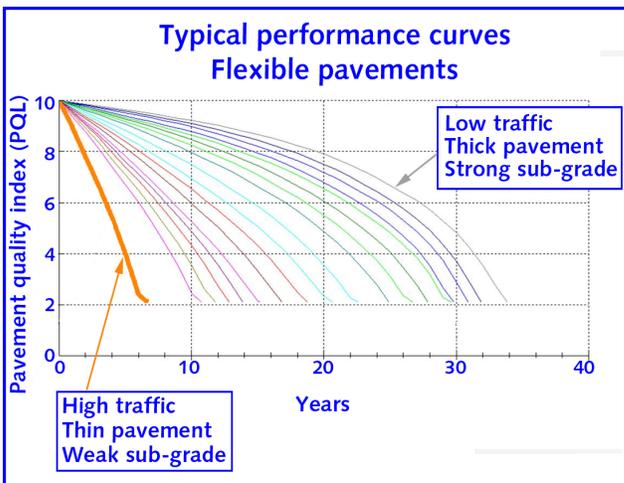
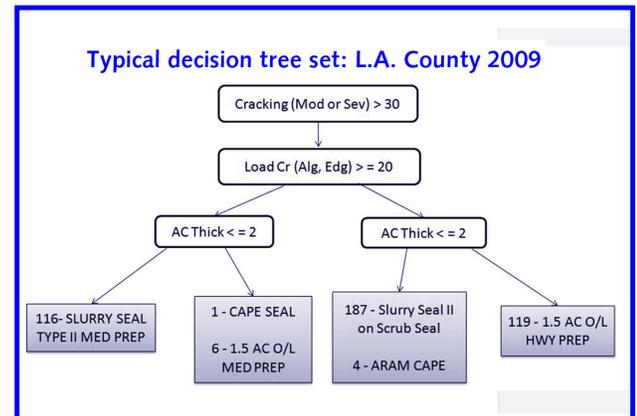
Once we know what condition the road is in and when we should fix it, the next question is, “How do we fix the road?” In RoadMatrix, the Department established its treatment protocols in decision trees which are logical flow charts with a series of “yes” or “no” answers to questions pertaining to pavement condition, cracking severity and extent, structural thicknesses, traffic conditions, etc., that lead to the appropriate and most cost effective treatment selection.

The factors considered when selecting a treatment include:

The factors considered when selecting a treatment include:

- Pavement condition
- Structural adequacy
- Urban vs. rural setting
- Traffic conditions
- Climatic conditions
- Availability of materials or contractors
- Past performance

An example of one of the decision trees is shown below:



Using these curves, we set PCI thresholds consistent with the Department’s treatment strategies for preservation and rehabilitation. Our goals are to focus on keeping our good roads in good condition by utilizing pavement preservation treatments and to fix the roads that are on the verge of going to major rehabilitation or reconstruction. RoadMatrix is also able to quantify the Remaining Service Life (RSL) which estimates when the road will reach a PCI level for reconstruction. The models and triggers have assisted us in prioritizing and scheduling preventative maintenance and rehabilitation treatments in a timely manner.

RoadMatrix has the flexibility to address the complexities and variations of our road network. RoadMatrix enables us to customize the trees with our own criteria or protocol based our experience with treatments. For example, our experience has shown that Rubberized Asphalt Concrete (RAC) is a very cost effective treatment requiring little or no maintenance treatments for 12 years or more compared to conventional asphalt concrete when properly designed and constructed as a surface course on roads with high traffic volumes. Since the Department has traditionally taken the “worst first approach”, our tool box of treatments had limited preventative maintenance treatments. For the past

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couple of years, we have expanded our tool box to include more pavement preservation strategies such as polymer modified cape seals or scrub seals. Since RoadMatrix decision trees could easily be set up, we were able to incorporate best management practices for pavement preservation in our treatment selection.

After the maintenance and rehabilitation decision tree analysis is complete, RoadMatrix calculates the benefit/cost ratio for each street. 'What-if' scenarios are run to determine the optimal programs of preservation and rehabilitation for the network based on funding constraints and/or performance goals. RoadMatrix performs several iterations on each road to determine the optimal treatment and when to perform the treatment based on a cost effective approach. The results of these analyses are then used to develop work programs for planning and budget preparations. Once funding is secured, a project level study is conducted to further refine

the scope of work and prepare construction contract bid packages.

With drastic cuts in transportation funding and a growing backlog, the Department recognizes that it is not business as usual and that the challenges ahead to maintain our infrastructure will not be easy. We need to be more creative in the use of funds to get the most 'bang' for our buck. The Department has embraced the preservation mantra - right treatment, on the right road, at the right time. We recognize that implementing pavement preservation strategies is key in maintaining the condition of our network cost effectively, especially in these challenging times. To help us live up to this commitment, we have utilized our pavement management system to make better decisions, develop better groupings of projects, improve the allocations of limited funds, and improve the road network conditions cost effectively.



Center news

By Mary Stroup Gardiner, CP2 Center

New training tools starting development at the CP2 Centers

The Center is currently starting the development of a Pavement Academy for Caltrans. This is a joint effort between the CP2 Main Center staff at CSU, Chico and Dr. Dragos Andrei and Dr. Shadi Saadeh from the newly formed CP2 satellite Centers at Cal Poly Pomona and CSU, Long Beach, and the Caltrans Division of Pavement Management. The Pavement Academy will provide applied knowledge and training to pavement engineers in materials characterization, mix design, field testing and distress identification, pavement strategy selection, design and detailing, preservation, maintenance, and rehabilitation, construction related quality assurance and control, and, pavement management systems and life cycle analysis.

The Center will follow a five-step approach to developing the training materials for this Academy:

1) identify existing pavement design related training tools and courses; 2) identify training needs for different target audiences; 3) assess existing training materials for gaps and inconsistencies in relation to statewide policies, standards, and guidance; 4) develop the needed training materials, and; 5) deliver the needed training. Work is just starting on the first step in the project.

Fall plans for the Pavement Preservation Certificate Program

No on-line classes will be offered this fall. All four classes will be on-line and ready to go for the spring 2010 semester.

- CIVL 682 – Introduction to Pavement Preservation
- CIVL 683 – Flexible Pavement Preservation
- CIVL 684 – Rigid Pavement Preservation
- CIVL 685 – Pavement Management Systems



CP2 Center ongoing research updates

NCHRP Syntheses Development Nearing Completion – The final report for the NCHRP 40-01 synthesis on Recycled Materials and Byproducts in Highway Applications is currently being drafted. The synthesis, when completed, will include information on a wide range of byproducts as well as a summary of downloadable software tools for assessing the potential impact of these materials on our environment and examples of implementation by states of environmental regulations and byproduct characterization.

The final report for the NCHRP 40-13 synthesis on Recycling and Reclamation of Asphalt Pavements Using In-Place Methods is also in development. This project used surveys of both State Materials Engineers and the Asphalt Recycling and Reclaiming Association (ARRA) members to identify topics on which further education on the appropriate selection and use of recycling methods is needed.

Both of these syntheses will be available soon from NCHRP.

NHI Emulsions Course Outline – The outline developed for the National Highway Institute for Emulsions has been submitted. This outline will be used by NHI to develop a new class that will provide basic emulsion concepts, manufacture, quality control,

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Left to right, Ding Cheng with Professors Cindy Estakhri and Tom Scullion of Texas A&M at the Geohunan conference.

and product selection for various pavement construction and preservation treatments.

Ding Cheng participates in the 2009 GeoHunan International Conference

The 2009 Geohunan International Conference was held in Changsha, Hunan province of China on Aug 3-5. Dr. DingXin Cheng attended this conference and presented the paper "Incorporating Expert System Concept into Pavement Treatment Strategy Selection". The co-authors of the paper are Gary Hicks, Mary Stroup-Gardiner, and Haiping Zhou. More than 200 people from 20 different countries attended this conference. This conference provided a showcase for recent developments and advancements in pavement and geotechnical engineering, and offered a forum to discuss and debate future directions for geo-engineering in the 21st century.

The conference involved several important topics in pavement engineering, such as Warm Mix Asphalt development, bridge deck pavement, performance modeling, evaluation of pavement systems and materials, roadway pavement material characterization and rehabilitation, material, design, construction, maintenance and testing of pavement, accelerated testing, and highway management.

There were several co-sponsors from the United States for this conference, including ASCE, TRB, FHWA, Asphalt Institute, TTI, Texas Department of Transportation, and International Society for Asphalt Pavement.

Are you looking for help on pavement preservation issues?

The Center has established a help desk to answer your questions. Please feel free to contact Dr. Gary Hicks at (530)898-3685 or rghicks@csuchico.edu if you need technical assistance on pavement preservation issues.



Former Caltrans Director Will Kempton

Conferences

NAPA brings its 'Warm-Mix Asphalt and Recycling' symposium to Sacramento

More than 250 people attended the meeting held in Sacramento, Calif., June 8-10, 2009. Director Will Kempton started the program by discussing some of the budget issues facing the state and the nation. He also addressed the environmental and energy issues (global warming, emissions, and more) facing the state and indicated that California is a leader in a number of these efforts. He pointed out that Caltrans had recently formed a new Pavement Management Division (headed by Dr. Shakir Shatnawi) which will address many of the items to be discussed at this conference including pavement recycling, warm mixes, and supply of pavement materials.

Peter Stephanos, Head of the FHWA Pavements Division, presented a national perspective on some of the key focus areas of the Federal Highway Administration. He discussed one of the key focus areas in detail, FHWA's Environmental Stewardship program, which covers the topics of recycling, warm mixes, modifiers for asphalt and use of marginal materials in pavements. Though not discussed in detail, another focus area is the one dealing with Pavement Management and Preservation, which directly affects some of the things our Center is working on.

Dr. Jon Epps of Granite Construction delivered the keynote address on recycling and warm mixes. He said we have come a long way in the development and deployment of these technologies, but there are still barriers to be overcome. Some of the barriers for both technologies are:

- Resistance to change
- Documenting the performance of the technologies
- Technical and engineering issues such as mix design
- Marketing the benefits of the technologies

Though he discussed primarily the use of recycled asphalt pavement (RAP) in central plants, Caltrans is now looking at increasing recycling both at the plant and using in-place techniques. Recycling has been around since the 1970's, but still is not used as widely as it should be.

The remainder of the first day focused on supply issues for both asphalt and aggregate as well as additional discussion on the value of RAP and the western agency (Washington, Oregon and California, including the City of L.A.) perspective on using recycled asphalt pavements. Most have used central plant recycling, but some agencies also discussed their experiences with in-place recycling.

The second day continued with discussions on various aspects of recycling, while the last day focused exclusively on warm mixes.

All the presentations suggest that warm mixes can perform as well as conventional hot mixes, but have significant benefits including:

- Energy use and emission reductions
- Allowing mixes to be placed at night or in cooler climates
- Improved workability and compaction at lower temperatures

In summary, the event brought together industry, agencies and academia to discuss important issues facing the implementation of these new (but not so

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Pete Stephanos



Dr. Jon Epps

new) technologies. Bottom line, change is difficult to implement and things that get measured get done.

First International Conference on Pavement Preservation

Plan to attend the First International Conference on Pavement Preservation (ICPP), during the week of April 13-15, 2010, in Newport Beach, CA at the Radisson Hotel. The ICPP will bring together researchers and experts working in the field of pavement preservation to exchange ideas and discuss critical issues and concerns. This will be a "don't-miss" event for anyone in the pavement preservation field.

The conference is sponsored and co-organized by Caltrans, the Federal Highway Administration (FHWA) and the Foundation for Pavement Preservation (FP²). Other agencies participating in the planning of the conference include the California Pavement Preservation (CP2) Center, the National Center for Pavement Preservation (NCP), and the University of California, Berkeley. Non-participating sponsors include TRB, APWA, NACE, and the IRF.

The conference venue will be in sunny Southern California, close to the John Wayne Airport, in Newport Beach, Orange County. Hotel information will be provided soon via the event's website. In 2010 the conference will be held in place of the successful California Pavement Preservation Conference. Organizers are inviting bids for a location for the second conference to be held in 2014.

Main themes and program

The main theme of the conference will be pavement preservation and sustainability. The conference will address an array of issues relevant to the pavement preservation community.

The program will consist of peer reviewed papers and selected invited presentations. Highlights of the conference are to include case studies of preservation from U.S. highway agencies, industry, and international organizations. The presentations are expected to take place on April 13-15, 2010, with workshops and/or demonstrations tentatively scheduled to take place on April 12th and 16th.

Full papers are being peer reviewed for selection to be included in the conference proceedings or in *Pavement Preservation Journal*. The final camera-ready papers are due on November 1, 2009. The official language of the conference will be English for both papers and presentations. Papers from the conference will be included in conference proceedings and/or on a CD.

Contact Information

Visit the conference website at www.pavement-preservation.org/icpp/ for more information including exhibiting and sponsorship opportunities. Registration information for the conference and the hotel should be available in September 2009 on the conference website or you can contact conferences@techtransfer.berkeley.edu.



PPTG News

By Larry Rouen, Craig Hennings and Hans Ho

PPTG Co-chairs meeting held in Sacramento



PPTG co-chairs, left to right, Craig Hennings, Hans Ho, and Larry Rouen.

Larry Rouen, the new interim Chief of the Office of Pavement Preservation and PPTG co-chair for Caltrans, presided over the meeting of the Caltrans and industry co-chairs of the sub-task groups in Sacramento on May 27, 2009. His industry co-chairs, Hans Ho and Craig Hennings, assisted in overseeing the meeting. Items discussed included the following:

- PPTG news and directions
- Rock products procedures
- Innovation projects for 2009
- Specifications for the 2010 book
- Nominations for new co-chairs beginning in 2010
- PPTG self evaluation
- Subtask group reports

Next All-Members meeting scheduled

The PPTG members have cast their votes for the day and time for the Fall, 2009, All-Members PPTG meeting. It will be held December 7, 2009, at the Caltrans offices, 2800 Gateway Oaks Dr. Sacramento, Calif., in the Yosemite A & B meeting rooms. The agenda is on the CP2 Website www.cp2info.org/taskgroup. See you there!

Roles and expectations of PPTG leadership

Following is a summary of the roles and expectations of the PPTG leadership group:

PPTG co-chairs (Larry Rouen, Hans Ho and Craig Hennings) will:

- Provide leadership on all pavement preservation-related issues
- Conduct regular meetings and teleconferences to brainstorm issues, new technologies, and other ideas
- Keep the PPTG informed on important issues

Continued, next page

- Arrange for the PPTG All Member meetings and plan the agendas
- Participate in the planning for the annual Pavement Preservation Conference

PPTG sub-group co-chairs (Caltrans and industry chairs of the 22 subgroups) will:

- Develop a work plan for the sub-group and update it periodically. Work plan should be submitted to the co-chairs for approval
- Arrange for subgroup meetings or teleconferences at least 4 times per year to execute the work plan. Projects related to specs, guides, and training or those identified by the PPTG co-chairs should be part of the effort

- Provide review comments and input related to the MTAG and other related documents
- Participate in the All Members PPTG meetings
- Share information resulting from sub-group meetings to all members of your subgroup
- Provide membership information to the coordinators for the flexible and rigid groups.

CP2 Center

- Maintain mailing list for PPTG subgroups (flexible and rigid)
- Maintain mailing list for all PPTG members and friends (flexible and rigid)
- Support the PPTG co-chairs in distributing mailings to the PPTG



September 2009

Sept. 13–16, 2009 – Public Works Congress and Exposition. Columbus, Ohio www.apwa.net

Sept. 15, 2009–CP2 Task Group Pavement Management Workshop. Santa Barbara, Calif., www.alturl.com/8cgq

Sept. 16, 2009 – Municipal Concrete Pavement Workshop. Ontario, Calif., www.acpa-southwest.org/workshops.htm

Sept. 29 – Oct. 1, 2009 – *Concrete Pavements 101*. Oakland, Calif.

Sept. 30 – Oct. 2, 2009 – International Conference on Perpetual Pavement. Columbus, Ohio, www.ohio.edu/icpp

October 2009

Oct. 8, 2009 – Calif. Concrete Pavement Workshop, Sacramento Convention Center, Sacramento, Calif., Contact Craig Hennings (209) 499–9052. Registration opens Sept. 1. www.acpa-southwest.org/workshops.htm#oct9

Oct. 19–21, 2009 – Eighth National Conference on Transportation Asset Management: *Putting the Asset Management Pieces Together*. Portland, Ore., www.trb.org/conferences/2009/asset

November 2009

Nov. 2–4, 2009 – Asphalt Rubber 2009. Nanjing, China, www.conslpav.com/ar2009/

Nov. 5, 2009 – California Asphalt Pavement Conference, Ontario, Calif., www.apaca.org

Nov. 12, 2009 – California Asphalt Pavement Forum, Sacramento, Calif., www.californiapavements.org

Nov. 12–13, 2009 – *Developing a Research Agenda for Transportation Infrastructure Preservation and Renewal*. Washington, D.C., www.TRB.org/conferences/2009/Infrastructure

December, 2009

Nov. 30, 2009 – Dec. 4 – ACPA Annual Meeting. Orlando, Fla., www.pavement.com/Events_and_Programs/

Dec. 2, 2009 – CP2 Task Group Pavement Management Workshop. Bakersfield, Calif., www.alturl.com/8cgq

Dec. 7, 2009 – PPTG All members meeting, Sacramento, Calif.; refer to PPTG web site: www.cp2info.org/taskgroup

January 2010

Jan. 10–14, 2010 – Transportation Research Board Meeting. Washington, D.C., www.trb.org/AnnualMeeting2010/Public/AnnualMeeting2010.aspx

Jan. 20–21, 2010 – California Chip Seal Association Annual Meeting. Seaside, Calif., www.chipseal.org/2010_conference.htm

Jan. 17–21, 2010 – NAPAs 55th Annual Meeting. Maui, Hawaii, www.hotmix.org

March, 2010

March 7–10, 2010 – Association of Asphalt Paving Technologists 85th Annual Meeting. Sacramento, Calif., www.asphalttechnology.org/annual-meeting.html

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