CP² Center News

Newsletter of the California Pavement Preservation Center

No. 18 June 2011

Tony Tavares

Interview with Tony Tavares, Chief, Division of Maintenance, Caltrans

Tony Taveres has 20 years of State experience. He began his career at Caltrans in 1990 as a Transportation Engineer and worked through the ranks of Senior, Supervising and Principal Transportation Engineer. In September 2009, he was appointed as the Chief, Division of Right of Way and Land Surveys and was responsible for the Right of Way and Land Surveys program statewide. Prior to this appointment, he served as the District 10 Director in Stockton, where he provided strategic direction to a staff of over 900 professionals responsible for all functions and activities within the District. Tony has been a manager in Caltrans for the past 10 years, and he has a diverse background in roadway and structure design and construction. He was appointed Chief, Division of Maintenance effective August 9, 2010.

Tony holds a Bachelor of Science degree in Civil Engineering from the University of California, Davis. He is a Professional Engineer (PE) and Project Management Professional (PMP).

Tony met with Center staff to discuss the following issues:

Please provide an update on Caltrans' pavement preservation efforts.

Pavement preservation continues to be the highest priority as we can't afford to rehabilitate or reconstruct all the pavements. The return on investment (ROI) for pavement preservation is much greater than for rehabilitation (6:1) or reconstruction (10-20:1).

We continue to support innovation in pavement preservation techniques. Using the FHWA Initiative, Every Day Counts, we are expanding our use of green technologies. We are pushing the use of warm mix technologies in preservation, both in mixes and in hot applied chip seals. Over the last few years, there were 20 warm mix projects constructed using 100,000 tons and 23 warm mix projects with over 1.2 million tons are in design or construction. We are also increasing our crumb rubber usage. Currently we are at 30% of total usage statewide, and by mandate we must increase this amount to 50% by 2015. These mixes perform very well when they are applied on the right project at the right time.

Another initiative is the expanded use of pavement recycling. We continue to expand our use of RAP in hot mixes as well as the use of in-place recycling techniques, both surface and full depth.

We are actively pursuing the development of a new pavement management system so we can better-document the life of the pavement preservation treatments and aid in the selection of the right treatment. We will also be able to determine the benefits of these treatments under different traffic and climate conditions. We expect the system will be operational in July 2013 in order to prioritize projects for the 2014 SHOPP.

Participation in the Pavement Preservation Task Group (PPTG) is also important to Caltrans. The sharing of ideas and technology among agencies, industry and academia is very important to ensure the most effective use of limited resources and to develop new and improved pavement preservation products and specifications.

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In this issue

What is the Caltrans budget situation, particularly for pavements?

Currently the budget situation for pavements is not as good as it has been in the past. We have about $234 million for pavement preservation and $406 million for SHOPP per year. Our needs are much greater than this. In the past our budget has exceeded $1 billion per year for these activities. This year we are delivering a record number of projects based on the increased number of competitive bids with bid savings and SHOPP savings.

Pavements have to compete for SHOPP funds with safety, bridges, congestion projects and more. We need a stable transportation funding source, and that is not happening in the current economic climate.

Please expand on the proposed changes in culture within Caltrans.

Deputy Director Steve Takigawa has talked about a change in culture at recent meetings. He has indicated we need to be more accountable in the future. Improving the credibility of the department, keeping our commitments and enhancing our partnerships will help. Bottom line, we need to do a better job of communicating our priorities and letting our partners know the status of our activities.

The PPTG needs to be more proactive. Both Caltrans and industry personnel need to work closely together to move critical issues along. In the past, this process has not been quick enough. To deal with this, we have recently reorganized the PPTG to reduce the total number of sub-task groups and to streamline the decision making process. We need to track the status of these activities using a database on the Center or the Caltrans website. Partnering will ensure we develop specifications, processes, and products that will benefit all.

Training is essential to ensuring and maintaining an educated and knowledgeable workforce. We need to train our engineers on the use of new and innovative pavement preservation strategies. Also our construction and materials inspectors need training on the application and performance of the strategies. We will be conducting a survey using the Center to identify and prioritize our training needs in the pavement areas. We also feel training on pavement management systems is very important.

Who in the State is responsible for pavements and how is this working?

Our Director Malcolm Dougherty expects Steve Takigawa, myself, and Amarjeet Benipal to handle all the pavement issues. We are committed to ensuring the pavement program is successful. We are personally accountable for the delivery of the products within the pavement program. Rebuilding the credibility of Caltrans with industry and others starts with accountability.

One of our biggest contracts is the development of a new state-of-the-art pavement management system called PaveM. PaveM will analyze the condition of the pavements in the state highway system and allow engineers to determine the correct strategy for a particular segment of the network and help us make better decisions for future projects. This in turn will allow us to utilize funds more effectively and program projects more expeditiously. The determination of the as built sections is well underway using ground penetrating radar. Automated pavement condition data is currently being collected on the state highway system. Both contracts are with Fugro from Roseville, California. The entire system is scheduled to be completed by July 2013.

> **"Training is essential to ensuring and maintaining an educated and knowledgeable workforce."**

Pavements will continue to be a priority for Caltrans in the years to come. As our infrastructure continues to age, we will need more pavement preservation and rehabilitation strategies to ensure the mobility of the traveling public. However, we still need stable transportation funding sources from both the federal and state government.

What are Caltrans' plans for pavements in FY 2011-2012?

Currently, Caltrans is delivering almost $2 billion and over 5,300 lane miles of projects this fiscal year. This is the highest delivery for pavement preservation and rehabilitation projects. Unfortunately, this is a one time effort due to funds from more competitive bids and SHOPP savings. As stated earlier, we expect the funds available for the next few years to be much less.

Stable transportation funding continues to be an issue for Caltrans. The SHOPP has a need for $2.8 billion per year. However, there is only $406 million available for pavement in the SHOPP in the next four years. Partnering with industry and academia will assist us in identifying pavement preservation strategies which will allow us to stretch the limited pavement resources and deliver more projects.

We are also trying to streamline processes within Caltrans to accelerate project delivery. In addition, we are implementing the "Every Day Counts" Initiative from the FHWA.

Future of warm mix asphalt concrete (WMA)

By Lerose Lane, P. E., Senior Pavement Preservation Engineer, CP2 Center

Most pavement engineers have heard about warm mix HMA; however, many are skeptical about its advantages for their projects. A number of processes have been developed to allow asphalt mixtures to be mixed and compacted at lower temperatures. These processes tend to reduce the viscosity of the mixture at mixing and compaction temperatures. Collectively, these processes are referred to as warm mix asphalt (WMA). The CP2 Center has observed several warm mix projects and can state the following:

- WMA looks the same during construction as it passes through the paver and is placed over existing surfacing.
- Compaction appears to be easier to achieve and can save on equipment costs.
- The WMA appears to perform the same or better after placement.
- WMA doesn't have a different odor from the regular HMA, but has less odor when used with asphalt rubber.
- With the reduced temperatures, WMA has fewer emissions.
- Lower production and placement temperatures equate to lower energy costs.

Warm mix asphalt concrete also reduces emissions with cooler mix temperatures which can equate to a substantial cost savings to the contractor. The emissions can be reduced at the plant as well as at the construction site with warm mix technology. There is also a potential energy savings, plus an opportunity to achieve better compaction for a more durable HMA surfacing. This makes the product a "win-win" for both the agencies and the contractors.

Figure 1. WMA with Rediset

If the mix lasts just one year longer, there is a potential cost savings of approximately 10%. With the difference in the longevity of the product, everyone ultimately saves money. Figure 1 shows the performance of Manthey Way in Stockton, California, after five months of service with a WMA that incorporated Rediset as an additive. The WMA appears to be no different than the HMA on Airport Way, using the same HMA mix design, contractor, and equipment without a warm mix additive.

With lower allowable mix temperatures, paving can be performed in cooler weather. This allows a larger time window for construction in the mountains and high desert plains and it can increase the contractor's capability of hauling the HMA longer distances. Warm mix technology is also very useful for rubberized asphalt concrete, where temperatures are critical to meet necessary compaction.

The cost of treating binder with a warm mix additive is about $50 per ton, which equates to about $3 per ton of WMA. With the average price of HMA exceeding $87 per ton, the price of treating the binder with a warm mix additive is approximately $90 or 3.5% increase. With better compaction, the mix should last several years longer.

Dennis Hunt with Gencor estimated that a 60°F reduction in mix temperature equated to a $0.42 saving per ton of HMA with fuel oil priced at $1.50 per gallon. Present fuel oil costs are more than double the $1.50 per gallon that he used, so the present cost savings per ton of HMA should be close to a dollar per ton. This would mean that the warm mix HMA should only cost $2.00 per ton more than conventional mix, or about $89 per ton. If the mix lasts just one year longer, there is still a substantial cost savings even with the higher price for the mix. With the difference in the longevity of the product, everyone ultimately saves money.

There are basically three different types of warm mix asphalt technologies: 1) wax, 2) foaming, and 3) chemical. Caltrans has enacted an approval process for the various warm mix asphalt technologies. This process requires that the WMA technology provider submit a request for approval and brief report summarizing the results of laboratory and field testing. The testing is to provide evidence that equal or better performance is achieved when compared to conventional hot-mix asphalt controls. Caltrans will review this submittal and determine whether the WMA technology should be approved for use on Caltrans projects. There are currently three products/technologies approved on the Caltrans website at www.dot.ca.gov/hq/esc/approved_products_list/. The Caltrans approved products are Advera, Rediset WMX, and Evotherm. There are other products in the review process and this list will be expanding. Table 1 (next page) summarizes some of the warm mix products currently used in the United States.

A new Caltrans specification is being developed which will allow WMA as a contractor's option. Hamburg testing will be required for moisture sensitivity testing with this new Standard Special Provision. Several projects will be constructed during the summer of 2011 which must pass this test.

In conjunction with Caltrans, CalRecycle, and Industry, the CP² Center will continue to do the following:

- CP² Center will continue to contact warm mix additive suppliers and suppliers of terminal blends and asphalt rubber for information on projects in California and elsewhere.

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Table 1. Partial list of warm mix additives used

Manufacturer	Brand name	Type of Additive	Web site
Advanced Concepts Engineering	Lea-Co	Foaming	www.lea-co.com
Akzo Nobel	Rediset WMX (1)	Chemical	www.surfacants.akzonobel.com
Aspha-min Gmbh	Aspha-min	Foaming	www.aspha-min.com
Astec	Double Barrel Green	Foaming	www.astecindustries.com
British Petroleum	WAM Foam	Foaming	www.wamfoam.com
Gencor Industries	Green machine	Foaming	www.gencorgreenmachine.com
Maxam Equipment	AQUA Black Solutions	Foaming	www.maxamequipment.com
McConnaughay Technologies	Low Energy Asphalt	Foaming	www.lowenergyasphalt.com
MWV	Evotherm	Emulsion	www.meadwestvaco.com
PQ corporation	Advera	Foaming	www.pqcorp.com
Sasol Wax Americas Inc	Sasobit (4)	Wax	www.sasolwax.com
Suit-Kote	Low Emission asphalt	Emulsion	www.lowemmissionasphalt.com
Engineered Additives	Astech PER	Wax	www.engineeredadditives.com
Engineered Additives	Engineered Additive WRM	Wax	www.engineeredadditives.com

- Dr. Cheng and his students will continue to add projects into the database, which are included on the Center's website. www.ecst.csuchico.edu/cp2c/software/pptdb/
- The CP² Center should have a binder lab set up this summer to help with the testing of asphalt rubber products with warm mix additives.
- The CP² Center will continue to monitor projects. A number of warm mix projects will be constructed in Districts 1, 3 and 9 of Caltrans during the 2011 season.
- The CP² Center will continue placing project findings regarding the warm mix products on the Center's website which is available to agencies, industries, and academia.

The advantages of warm mix technology include less energy usage, lower emissions, and larger time windows to gain the necessary compaction. This technology offers the contractor the ability to achieve better quality control on the HMA projects that equates to longer lasting pavements for the agencies. These are desirable benefits for both the agencies and the contractors that choose to use warm mix technology for their HMA projects.

If your company or agency is considering a WMA trial using asphalt rubber or terminal blends, a minimum desired test section would be 800–1000 tons of WMA. This will be approximately four hours of plant time at reasonable production rates. As stated above, it is desirable to have a HMA control section (without the WMA additives) if WMA is specified for your project. Please notify the CP² Center of your planned WMA projects or test sections so that we may monitor your project and add it to our database.

Dowel bar retrofit systems utilizing polyester polymer concrete used on US Route 50

By Shakir Shatnawi, Ph.D., P.E., President of Shatec Engineering Consultants, LLC and Craig Hennings, Executive Director of the American Concrete Pavement Association-Southwest Chapter.

Dowel bar retrofit (DBR) is a cost-effective preservation strategy for Jointed Plain Concrete Pavements (JPCP) originally built without dowel bars. The technique is used to restore load transfer efficiency across the joint and extend pavement life (Figure 1). A major dowel bar retrofit project consisting of 61,200 dowels was completed in the summer of 2010 on the US 50 freeway between Sunrise Avenue and Watt Avenue in Sacramento County, California, utilizing Kwik Bond polyester polymer concrete as the backfill grout material. At least 23 State Departments of Transportation (DOTs) have been using the dowel bar retrofit strategy for load transfer restoration (Figure 2). Between 1993 and 2009 over 5 million dowels were installed nationwide.

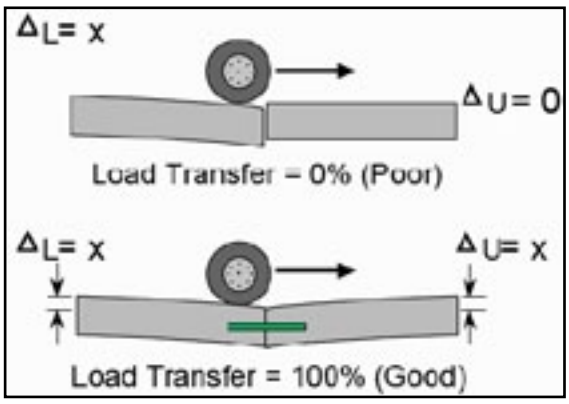

Figure 1. Improving load transfer with dowel bar retrofit (MTAG 2008).

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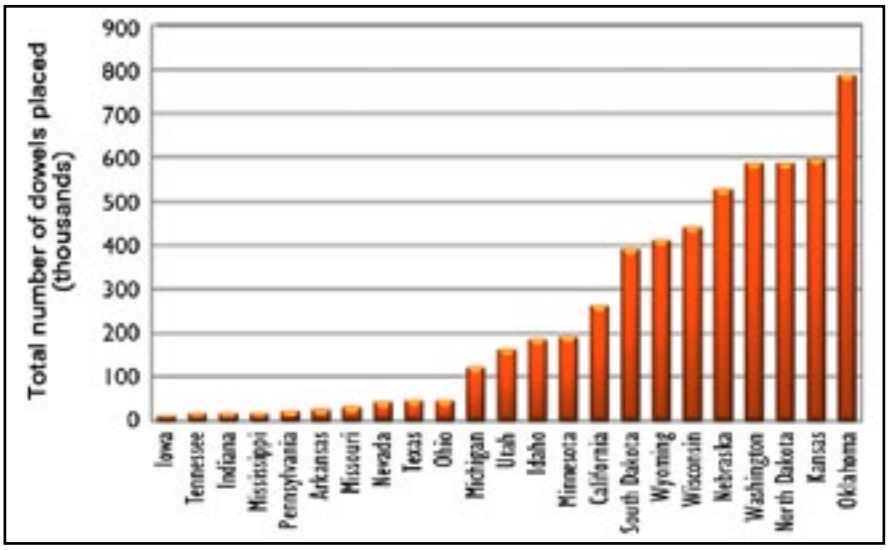


Figure 2. Dowel bar retrofit use by states. Data from IGGA (2011).

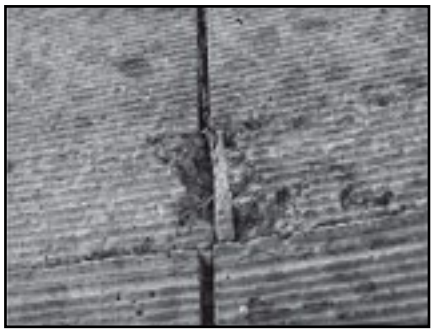
(a) Studded tire wear

(b) Backfill material cracking

(c) Backfill material spalling

(d) Backfill material debonding

(e) Poor consolidation



(f) Foam core board misalignment

Figure 3. Backfill material distresses.

Source: (a)-(e) from Pierce (2009), and (f) from Brian and Harvey (2006)

Different states have reported various degrees of success in using the DBR process for rehabilitation and preservation of concrete pavements. Studies from the most poorly performing DBR projects have shown the poor workmanship and premature failure of the backfill material to be a common cause of failure. The various distresses that DBR projects have exhibited include: backfill material wear, backfill material cracking, backfill material spalling, backfill material debonding, poor consolidation of backfill material, and misalignment of the foam core board (Figure 3).

Numerous state investigations of poorly performing DBR projects that have exhibited deterioration of the backfill material in the DBR slots showed that the primary cause was poor consolidation. Voids occurring due to poor consolidation of the backfill material can lead to significant loss of load transfer, increased levels of dowel bearing on the backfill material, wearing of the dowel sockets and loosening of the dowel, which all result in cracking and spalling of the backfill material. The occurrence of voids under the dowel bars is due to a number of factors including the presence of large aggregates in the backfill material that prevents the backfill material from flowing around the dowel bar and support chairs to completely fill the slot, lack of proper vibration of the backfill material in the slots, and the use of low slump (or high viscosity) backfill material with low workability. Extending vibration duration to improve consolidation, however, may create other problems including increased risk of knocking the dowels out of alignment, which in turn can cause joint lockup and slot failure. The optimal vibration duration is mix dependent, and its timing is very critical after placement of the backfill material especially if rapid-setting concrete is used. The low flowability of the conventional cementitious backfill material due to use of a stiffer mix (with larger aggregate or low w/c ratio) as needed for early high strength is probably the main cause of voids around the dowels and supporting chairs.

It is evident that besides construction quality, the backfill material can have a great influence on the long-term performance of DBR. The backfill material must achieve an early strength to allow for opening the highway to traffic, needs to be capable to carry the bearing stress applied by the dowel during load transfer, and demonstrate durability for long-term performance. The backfill material should possess desirable properties in relation to compressive strength, flexural strength, modulus of elasticity, bond (adhesion) strength, scaling resistance, abrasion (wearing) resistance, and shrinkage and freeze-thaw resistance. Additionally, the material should be able to flow with ease around the dowel bar assemblies to ensure proper consolidation that does not provide any room for voids under the dowels.

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Because of the high propensity of failures that are largely related to poor consolidation and inadequate adhesion of conventional cement-based grout material in DBR, alternate materials that can offer high flowability during placement and develop and maintain high strength and long-term durability become desirable. In this particular application, polymer concretes offer superior properties to those of conventional cement concrete and have been used in many transportation applications ranging from the repair (patching) of spalls in concrete pavements to overlaying bridge decks. Polymer concretes are composite materials similar to the traditional portland cement concrete consisting of a mixture of a binder and a mineral aggregate such as sand or gravel. Unlike portland cement concrete, the binder is not cement but a polymer resin binder (a synthetic organic polymer).

Among this group of polymer concretes, PPC is of special importance for its widespread use and successful applications. It can fill the DBR slots by gravity due to its excellent flowability; thus completely surrounding the dowel bar. PPC can achieve a much higher strength than cementitious backfill mixes while maintaining high flowability and using a very fine aggregate extender. The high compressive strength is necessary to sustain dowel bar bearing. It is also an essential property for resisting the wearing, abrasion or crushing of the material onto which the dowel bar is bearing which would otherwise result in dowel looseness (even looseness of 0.24 mm or less can be detrimental). The high tensile strength of backfill material is necessary to resist tensile stresses that the pavement experiences due to traffic loadings and temperature and moisture gradients. It is also an important property that controls the grout-concrete interface bond. High bond strength (between backfill material and existing concrete) is necessary to ensure durable slot and monolithic behavior of the slot and existing concrete. Grout-concrete interface bond failure results in the rapid spalling of the backfill grout material in the slots, which eventually results in spalling of the concrete slab around the slots. PPC offers an array of desirable properties and characteristics as a backfill grout material that can make this product superior to the conventional cementitious backfill materials. Among these are: excellent flowability and low viscosity, high abrasion resistance, strong and durable bonding of grout with existing concrete, higher toughness thus providing for a better elasticity and flexibility and better resistance to fracture, more forgiving to construction variability, better creep characteristics, very low permeability thus resisting infiltration of deicing salt and chemical solvents that result in corrosion of steel dowels.

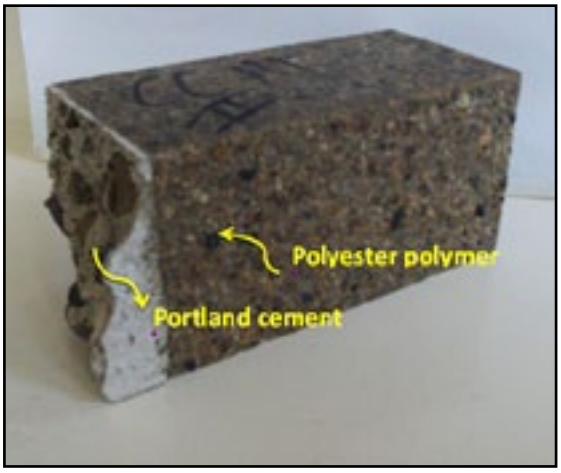

Figure 4. Beam failure in the cement concrete but not in the polyester concrete or at the bond- California Test 551.

Figure 5. Core showing improved consolidation with the polyester polymer grout.

As a first application of its kind in California, the summer of 2010 experienced the installation of 61,200 retrofit dowel bars using Kwik Bond polyester polymer concrete as the backfill grout material in the outermost two lanes in the westbound and eastbound directions of Route 50 in Sacramento, California. This project is located in Sacramento County in and near Rancho Cordova from the Watt Avenue overcrossing to Sunrise Boulevard. This project was encouraged by the numerous laboratory tests on polymer concrete that demonstrated the strong bond characteristics of polyester polymer concrete with conventional portland cement concrete, in addition to a cascade of other desirable features mainly related to workability and strength of the product. Also, polyester concrete has been used in California for nearly 30 years with good success as thin overlays on bridge decks subjected to heavy traffic and as a patching material for concrete pavement repairs.

Results from the California Test 550 have shown about 40 grams of material loss for the conventional cement concrete and only 2–4 grams for polyester polymer concrete, indicating that there will be less erosion and abrasion due to bearing of dowels on the backfill material when polyester concrete is used. Laboratory testing using the bending beam test (California Test 551) showed promising results with the use of polyester polymer concrete grout. Testing was conducted by applying a load directly on the surface of the grout-pavement interface. The test results showed the failure occurring at the interface when various cementitious grouts were used, whereas failure occurred in the concrete when the polymer grout was used and not at the interface as exhibited by the various cementitious grouts (Figure 4). These results indicate the superior adhesion characteristics of the polymer grout, and that it would be less sensitive to construction variability. Additionally, cores taken from the project showed improved consolidation. Figure 5 shows a typical core extracted from a completed dowel bar retrofit slot backfilled with polyester polymer concrete completely surrounding the dowel with intimate bond with the existing concrete.

In a recent visit to the project site, visual inspection revealed the backfill material is still intact since DBR installation, with no signs of wear, debonding, cracking, or spalling. Future monitoring will provide additional information of the superiority

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of polyester concrete as a backfill grout material in dowel bar retrofit projects. PPC offers all of the desirable properties sought in a backfill grout material that can ensure proper placement and long-term performance of DBR projects. It is recommended that more projects using polyester concrete grouts be placed in various locations. To receive a copy of the complete report on this project, contact Shakir Shatnawi at sshatnawi@sbcglobal.net or 916-990-6488.

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Partial depth repair restores rideability and alleviates further deterioration

By Craig Hennings, ACPA Southwest

Partial depth repair (PDR) is a shallow depth repair procedure used to address pavement deterioration that does not fully extend through a concrete slab. This method is used to repair spalling and fraying of concrete slab edges at joints and cracks as well as localized scaling. Spalling, which can occur on both jointed and continuously reinforced pavements, reduces pavement serviceability and can become hazardous to highway users. This type of deterioration can be caused by a number of factors including late sawing, poor joint design, inadequate joint/crack maintenance and material durability issues such as Alkali-Silica Reactivity (ASR). Once initiated, spalls tend to grow under repeated thermal stresses and traffic loadings.

The purpose of PDR is to repair surface defects, reestablish joint reservoirs and restore localized areas of deterioration. PDR replaces unsound concrete to restore rideability and discourages further deterioration. Further, PDR is an excellent preventative maintenance technique as it is proven to last more than 20 years when properly constructed using quality materials and workmanship.

Benefits of PDR include

- Fast: Rapid setting proprietary patching products can allow for opening times in less than one hour if needed.
- Long-Lasting: PDRs have proven to last more than 20 years when properly constructed using quality materials and workmanship.
- Durable: PDRs constructed using concrete pavement repair materials won't rut, shove or deform as do asphaltic repair materials.
- Smooth: The smooth, level surface reduces road noise and improves ride quality.
- Cost-Effective: The use of milling equipment for concrete removal increases production rates and reduces costs significantly.
- Flexible: Although PDR can be used for isolated spalls, the procedure can also be used along the entire joint. If needed, PDR can extend along the centerline of a joint or crack for miles with success.
- Maintains Existing Elements: PDR preserves the same elevation and slope as the surrounding pavement.

Fig. 1. Completed PDR prior to diamond grinding.

Performance

The performance of PDRs is highly dependent upon the quality of construction operations and repair materials utilized in the repair. When properly constructed using high quality repair procedures and materials, PDRs have proven to last more than 20 years and are an effective pavement preservation tool.

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Fig. 2. PDR concrete placement operation.

How it works

The first step is to properly evaluate the extent of the spalling and determine the limits of the repair. When spalling occurs, the deterioration often extends beyond the visibly spalled area. PDR is not always appropriate for use on severe spalls that extend more than 6 to 10 inches beyond a joint or crack, as this may be an indication that more widespread deterioration is taking place beneath the slab surface and will warrant further investigation. Cores can be very beneficial to determine the depth of the deterioration and help determine if PDR is the correct repair method. If it is determined that the deterioration extends through the entire slab, full depth repair should be considered as the preferred repair option as PDR cannot repair a crack that extends through the full thickness of a slab. Depending on the crack's condition, sawing and sealing, dowel bar retrofit, cross stitching or full depth repair may be the most appropriate repair method.

Sounding is an often used procedure to determine the limits of a PDR. To conduct a sounding test, drag a chain and/or drop a hammer near the spalled area. If the sound is solid and resonates with a high pitched sound, no repairs are required. However, if a dull or hollow sound is heard, it indicates that the concrete is delaminated and needs to be replaced. To ensure removal of all delaminated concrete, it is good practice to extend the limits of the repair boundaries several inches beyond the limits determined by the sounding tests. In many instances, it helps to drop a small amount of sand on the questionable concrete and hit the concrete with a hammer, watching the sand bounce in delaminated sections.

The next step is to remove the deteriorated concrete. A typical method for removing spalled concrete is chipping. A shallow vertical saw-cut, approximately two to four inches deep, is made around the perimeter of the spalled area. A light (15–30 pound) jackhammer is then used to remove the deteriorated concrete until sound concrete is exposed.

An alternative method involves the use of milling equipment to remove the deteriorated concrete. This method is allowed by specification in Minnesota, Wisconsin, Michigan, Missouri and Kansas and has been used in these states with much success. Milling is a very cost-effective and efficient method when used on projects with a large amount of surface spalling. As an example, removal of deteriorated concrete along a 15-foot crack takes less than 10 minutes with a mill. Removing this same deterioration with a saw and jackhammer typically takes between 45 to 60 minutes. The Minnesota specification calls for a minimum removal depth of two inches with a tapered milling head measuring 10-inches at the bottom and 12-inches at the top to leave a tapered edge for the completed patch dimensions. This procedure has had tremendous success as evidenced by decades old PDRs still in service in Minnesota.

After the deteriorated concrete has been removed, the exposed repair surfaces should be cleaned with sandblasting. It is important to expose a fresh concrete surface with a rough texture to ensure that the repair materials create a strong bond. When applying traditional repair materials, it is desirable to screed from the center of the patch out to the patch boundaries. This construction process will strengthen the bond of the repair materials to the concrete. Next, paint the outside edges of the patch with the grout to seal any hairline fissures between the old concrete and the patch mix. Finally, apply a double application of curing compound to the surface as good curing is essential for project success. Curing should begin as soon as possible after the repair materials have been applied. When using cementitious repair material, steps should be taken to reestablish the joint or crack using wax impregnated cardboard or by sawing.

In the past several years, new hot-applied polymer modified resin-based flexible concrete repair materials have entered the marketplace. Due to their flexibility and high tensile strength as well as their ability to bridge joints and offer high compressive resistance, these materials have gained favor with many maintenance practitioners. Please be sure to follow the aforementioned repair area preparation procedures as well as manufacturer recommendations during placement.

For more information, please contact Craig Hennings at chennings@pavement.com.

Fig. 3. PDR with joint reformer placed in crack.

Use of warm mix AR chip seals in California

By Lerose Lane, P. E., Senior Pavement Preservation Engineer, CP2 Center

Good success has been achieved using warm mix additives with the asphalt rubber (AR) binder for chip seals. Intermountain Slurry Seal, Inc. had done several warm mix AR projects throughout California with good results. Figure 1 shows a warm mix AR chip seal applied on the northbound median shoulder constructed on Interstate 5 in 2010. Caltrans, District 6, uses chip seals on shoulders as a maintenance treatment, and to create a rumble strip effect with the noise factor created by the chip seal in contrast with the RHMA surfacing. No efforts were made to prevent the seal coat from being applied to the existing rumble strip.

Figure 1. View of the completed project in District 6.

The City of Roseville applied warm mix AR chip seals to several miles of their city streets in upscale neighborhoods. The HMA surfacing was old and exhibited excessive alligator cracking as well as block cracking. The AR seal coat has performed well on controlling reflective cracking. The contractor expects this treatment to last 10 years, whereas a one inch thin blanket would only control the cracking for a year or two. Figure 2 shows a city street in Roseville after approximately five months of service.

Figure 2. Completed project in City of Roseville.

The absence of loose chips can be attributed to the contractor conducting excellent sweeping operations, along with the fact that the chips in this warm mix AR seal coat are adhering very well.

Figure 3 shows the typical condition of the existing HMA for the City of Roseville project prior to having the warm mix AR seal coat applied, while Figure 4 shows the typical surface condition after approximately five months of service.

Advantages of a warm mix chip seal:

- Hot applications with lower temperatures that produce lower emissions at the plant and at the job site.
- Lower emissions create a healthier work environment.
- Longer time window to apply and roll chips which increases the chance of a successful project.

Figure 3. Pavement condition prior to the chip seal.

Figure 4 (below). Double chip seal after five months of service.

- Longer seasonal period to perform projects with ability to construct projects at cooler temperatures.
- Works well with the AR binders (monitored at three projects by CP^2 Center).
- More cost effective than a 1 inch thin HMA overlay.
- Faster construction, thus less inconvenience to residents and the travelling public.

Cost of product

The cost of treating a ton of binder with 1.5% Sasobit is approximately $50 per ton. Other warm mix asphalt binder additives are competitively priced from $1.30 to $1.50 per pound of additive. There are more than a dozen warm mix additives to choose from. The real savings with using a warm mix asphalt additive is in the reduction of emissions. One warm mix supplier is touting an 80% emission savings, plus sizable energy savings with their surfactant product. Depending on the construction site location, this emission reduction may equate to huge cost savings in permit fees paid to air quality control agencies.

How does it work?

Most warm mix additives lower the asphalt binders' viscosity and are used as asphalt flow improvers, both during the asphalt mixing process and during laydown operations. This reduction in viscosity to asphalt at production temperatures makes the asphalt easier to process, provides the option of reducing working/mixing temperatures and, thereby reduces fume emissions and saves energy. The

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lower temperatures may also reduce production cycle times.

How do you mix a warm mix additive with your binder?

The warm mix additives can be added to the asphalt binder storage tanks that are located near the job site. The binder storage tanks circulate the hot binder and mix the additives. Some technologies require injection and mixing equipment to be utilized.

Disadvantages of a warm mix chip seal:

- Excess chips were left on the sidewalks and driveways for an urban location. This can be remedied by the contractor having a couple of laborers sweep the sidewalks and driveways after the chip seal application.
- At this time, the actual service life of projects using warm mix AR rubber seal coats is unknown. However, opinions are that the warm mix AR chip seal will last up to 10 years and that warm mix will not decrease the life of the product. Further, people associated with the industry believe that warm mix additives will actually increase the durability of the product through improved construction quality.

Conclusions

- AR chip seal is the primary application chip seal recommended for control of load associated cracks and climate associated cracks per the Caltrans Maintenance and Advisory Guide (MTAG).
- Asphalt rubber has shown a long performance history in chip seals and interlayers.
- Warm mix additives in asphalt rubber binders allow the binder to be processed and applied at lower temperatures. This makes the warm mix asphalt rubber product more versatile for applications and at the same time lowers the emissions and health risks to workers.
- WMA may significantly lower permit fees for the contractor to produce warm mix binder and construct hot applied seal coats in areas with sensitive air quality control issues.
- A wide selection of warm mix additives are available to choose from.
- Warm mix additive with asphalt rubber binder makes more projects suitable for this maintenance strategy to be utilized.

If your company or agency is considering a warm mix chip seal coat project, it is desirable to have a control section without warm mix using the same binder and application rate. Please notify the CP^2 Center of your planned warm mix chip seal projects and test sections so that we may monitor your projects and add them to our "Hall of Fame" on the CP^2 Center database.

Los Angeles County brings back bonded wearing courses to Southern California

By Erik Updyke, P.E. and Imelda Diaz, P.E., Los Angeles County Department of Public Works

Los Angeles County roads have not seen bonded wearing course (BWC) in over a decade. BWC is a thin hot mix asphalt mixture applied over a polymer modified asphalt emulsion membrane using a spray paver. In the summer and fall of 2010, the Department of Public Works (County) constructed three projects that included BWC.

Streets and roadways selected were based on information in the County's pavement management system. Each segment had slight to moderate distress, with a pavement condition index (PCI) in the 70s and was structurally adequate (no additional pavement thickness required).

In each of the contracts, polymer modified gap-graded bonded wearing course was placed ¾-inch thick. The special provisions were prepared in Greenbook format based on a modified version of Caltrans SSP 39-640. The contractor was required to prepare and submit a "pull-plan," essentially an annotation of the project plans showing the width of each pull and the sequence of pulls. In addition, the contractor was required to organize and attend a pre-paving meeting prior to placement. A material transfer vehicle was also required.

The first project was on Kanan Road and Kanan Dume Road in the unincorporated area between the City of Malibu and the City of Agoura Hills. Kanan Road/Kanan Dume Road is a major route between the 101 (Ventura) Freeway and Pacific Coast Highway. Two lanes carry a high volume of high speed traffic. The major challenges on this project were not only the high traffic volumes but also the varying roadway widths and intermittent shoulders. On the Kanan Road segment, BWC was placed on a full-width, cold milled surface. On the Kanan Dume Road segment, BWC was placed on the existing asphalt concrete pavement. Approximately 10,700 tons were placed by Windsor Fuels Company. Rolling and other placement-related work was performed by the prime contractor, Sully-Miller Contracting Corporation.

The second project was on Gale Avenue, Stimson Avenue, and Halliburton Avenue in the unincorporated community of Hacienda Heights adjacent to the City of Malibu. Each of these streets has two lanes in each direction and are moderate to high volume, arterial collectors. The distress level on Stimson Avenue pushed the boundary on the use

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Left, construction on Kanan Road; and above, the completed project,

Construction of Halliburton Road at Stimson Ave.

Finished project, Halliburton Road east of Stimson Ave.

of bonded wearing course. Halliburton Road has raised medians and numerous left turn pockets. Each street was cold milled full-width. The left turn pockets along Halliburton Road were pulled prior to pulling the through lanes, as required in the special provisions. Approximately 5,500 tons were placed by Windsor Fuels Company. Sully-Miller and Windsor Fuels again were the prime contractor/ subcontractor team.

The last project was on Encinal Canyon Road and Lechusa Road in the unincorporated area adjacent to the City of Malibu. Each is a two-lane, slightly winding, mountainous road with a moderate traffic volume. Similar to Kanan Road/Kanan Dume Road, working hours were restricted and traffic was controlled by the use of pilot cars leading traffic one-way through the paving limits. Approximately 2,200 tons were placed by Southern Nevada Paving. Rolling and other placement-related work was performed by the prime contractor, All American Asphalt.

After completion of the first two projects, a roundtable meeting was held with the contractor, subcontractor, material producer, inspection team, and other stakeholders. Discussion was open and frank and provided valuable feedback from several different perspectives.

Lessons learned from these projects included:

- Cold milling texture. In the future, micro-milling will be required to obtain a finer surface texture with less prominent ribs.
- The importance of a pre-paving meeting. Valuable discussion took place during each meeting which resulted in smoother placement operations.
- Roadway geometrics are a factor. Variable roadway widths are a placement challenge.

Each project was very successful and exceeded the County's expectations. Now that BWC has been added to the County's pavement preservation toolbox, it won't be another decade before County roads see it again!

Construction of Encinal Canyon Road

Twenty years of asphalt rubber hot mix

By Jay Spurgin, Deputy Public Works Director, City of Thousand Oaks

Background

Since 1991, the City of Thousand Oaks has been using asphalt rubber hot mix (ARHM) for its annual street overlay program. The use of ARHM, instead of conventional asphalt, has resulted in extended service life, less road noise, greater aesthetic appeal, and a positive impact on the environment. The rubber used in ARHM is obtained from discarded tires and to date the City has placed more than 500,000 tons of ARHM, recycling 1.7 million tires in the process. Coupled with a strong commitment to maintenance, ARHM can go a long way in protecting your city's most valuable infrastructure network.

Asphalt-rubber is a blend of asphalt cement, ground tire rubber, and other additives in which the rubber component is at least 15% of the total blend. The blend is mixed with aggregate at temperatures upwards of 350° Fahrenheit, causing the rubber particles to swell between the aggregate. This process results in an elastic binder that stays firm at high temperatures and flexible at low temperatures. The elasticity makes the road less susceptible to reflective cracking, produces

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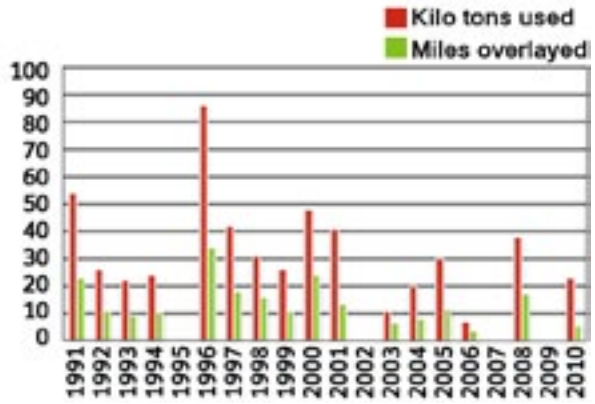
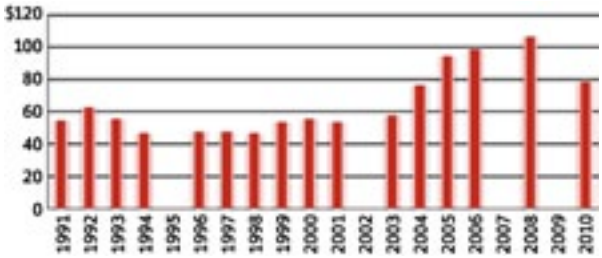
Fig. 1.Thousand Oaks ARHM overlays by year



less road noise, and is more resistant to raveling and delaminating.

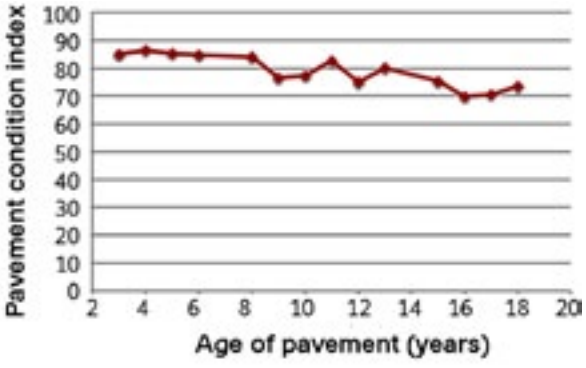
Investing in more durable asphalt technology is especially important in consideration of dwindling revenue sources. High gas prices have resulted in decreased consumption, reducing the City's revenues from gas taxes. At the same time, automobile manufacturers are producing more efficient vehicles than ever before, resulting in less gas tax revenue per mile traveled. This trend is likely to continue with the introduction of more hybrid and full-electric models, which provide little to no gas tax revenues for municipalities. Transportation Development Act (TDA) funds, derived from a portion of state-wide sales tax, have supported municipal street maintenance efforts in the past. However, beginning in 2014, the entirety of TDA funds will be used for public transportation and no longer available for pavement maintenance.

Fig. 2. ARHM cost per ton



Agencies are being squeezed in both directions. Aside from the dwindling revenue sources, the cost to overlay a street has markedly increased over the past several years, primarily due to the rising costs of crude oil. The very same substance that propels vehicles on the road is also making it costly to maintain the road. Crude oil accounts for a mere 5% of the liquid asphalt mix, but accounts for about 50% of the overall project costs. In short, agencies are having to spend more to continue the same level of maintenance.

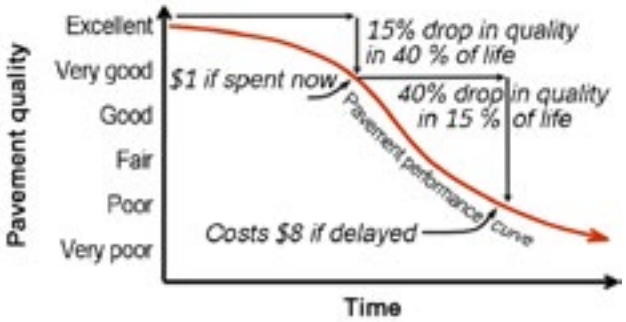
Fig. 3. 2009 pavement condition vs. average city-wide ARHM overlay



For the past twenty years, Public Works staff and residents alike have been able to evaluate how ARHM has withstood the test of time. On average, the City overlays more than eleven miles of roadway every year, using over 26,000 tons of ARHM. To date, 60% of the City's network pavement area has been overlaid with ARHM. These areas with ARHM overlay have experienced less deterioration and require less maintenance compared to conventional asphalt of the same age. Lower maintenance costs enable the City to maintain a healthy average PCI of 81, something that would simply not be possible without ARHM.

Pavement does not degrade in a linear fashion and the timing of street overlays should reflect that. Generally, during the first 40% of a pavement's life, it only degrades by 15%. At this critical point it degrades 40% over the next 15% of its life. The PCI at which pavement begins to degrade rapidly is between 60-69. Thousand Oaks has been able to maintain a PCI of 81 because a commitment was made to overlay with ARHM at this critical point, thereby avoiding costlier improvements in the future. **Agencies that cannot afford maintenance surely will not be able to afford the rehabilitation required down the road.**

Fig. 4. Drop in pavement quality vs. time



A Pavement Management Program (PMP) is the most effective way to determine which parts of your road infrastructure need attention and when they'll need it. Every five years Thousand Oaks takes a PCI inventory of all 375 street lane miles and uses this information to plan the paving schedule. The PMP is able to identify streets in the critical range of 60-69 for immediate attention. More importantly, the program can calculate what the PCI of a particular street will be five years from now or what combination of arterial and residential overlays will make the best use of limited financial resources. Through the PMP, the City has set a goal to maintain an overall PCI of 79. This systematic approach to maintenance ensures that there are no surprises and that no roads are accidentally neglected.

Summary

With the combination of ARHM and an effective PMP, Thousand Oaks has been able to maintain a favorable PCI. Given the volatile state of funding sources for street maintenance, it is imperative that agencies begin to invest in asphalt technologies that perform better and last longer. ARHM has taken care of Thousand Oaks' roads for the past twenty years and is poised to do the same for another twenty.

CIR and FDR in California City, California

By Dragos Andrei, Technical Director, Pavement Recycling and Reclaiming Center, Cal Poly Pomona

On October 1, 2010, I visited a Cold In-Place Recycling (CIR) and Full Depth Reclamation (FDR) project in California City, California. The town has a population of approximately 15,000 and is located in Kern County, about 40 miles north of Palmdale and Lancaster. The road links the town to Highway 14. Closer to town the road transforms into a four lane divided highway. The desert climate has taken its toll on the roadway; oxidation, thermal cracking, longitudinal and alligator cracking were the major forms of pavement distress observed as shown in Figure 1.

Figure 1. Distresses noted on the project

Figure 2. Recycling train

Figure 3. Paving the recycled mix

Figure 4. Mixer/reclaimer used for FDR

According to On Man Lau, P.E., G.E., Branch Manager with BSK Associates, the City had a limited budget for the rehabilitation of California City Boulevard. Following an initial pavement investigation, HELT Engineers, the firm that provides engineering services to the City, performed a life cycle cost analysis and compared several rehabilitation alternatives: crack sealing + overlay; crack sealing + fabric + overlay; CIR + overlay; and FDR + overlay. Based on the existing pavement condition and the results of the economic analysis it was decided to use CIR + overlay on 1.5 miles of roadway and FDR + overlay on approximately one mile of California City Boulevard.

Bowman Construction was the general contractor for this project. On the areas selected for cold in place recycling, the contractor milled and recycled four inches of the existing pavement. The mix design was done by Asphalt Pavement and Recycling Technologies, Inc. (APART). The recycling train is shown in Figure 2.

The cold millings mixed with emulsion were placed in a windrow ready for paving and compaction. The recycled mix was allowed to sit for about 24 hours before paving.

Paving of the recycled mix is shown in Figure 3. Figure 4 shows the mixer/reclaimer which was used for FDR.

On the areas selected for FDR, the contractor milled and treated 6 inches of the existing pavement with 4.5% to 5% emulsion and 1.5% Type II portland cement. Both CIR and FDR sections received a two-inch overlay.

Figure 5 shows the completed project taken in February 2011. The Pavement Recycling and Reclaiming Center will revisit the project in the near future to observe and document the performance of the CIR and FDR technologies in California City.

Figure 5. Completed project in February 2011

Preparation for surface treatments

By Roger D. Smith, Senior Pavement Specialist, CP² Center

Introduction

"Surface treatment" is a broad term used to describe a number of asphalt/aggregate systems applied to the entire surface of a pavement, usually for a sealing effect against the intrusion of water and air. Since this sealing effect slows the oxidation (hardening) of the asphalt pavement, it can usually extend the service life of a pavement. Because of this benefit, surface treatments are used as part of an overall pavement preservation program. In this role, they are often applied to pavements that are still in good to very good condition, in accordance with Pavement Management System guidelines. Typical surface treatments include:

- Fog seals
- Chip seals (hot & cold)
- Scrub seals
- Slurry seals
- Parking area sealcoats
- Cape seals
- Microsurfacing
- Thin-bonded wearing course

A microsurfaced treatment in Elk Grove, California.

Most of these treatments involve the use of asphalt emulsions, which are water-based forms of asphalt, requiring a cure or "break" period for the water to evaporate, leaving the asphalt particles to perform their sealing and bonding action. Because they rely on evaporation of water, they're warm weather, low humidity operations. Therefore, a requirement for a good job is warm, dry weather. As an example, most chip seal operations require an air temperature of 70°F or warmer. So the first element of preparation is to plan to do the work only when it's warm enough. Perhaps the only exceptions to this are: 1) hot-applied chip seals, which do not involve emulsions, but rather use a hot asphalt rubber or polymer-asphalt binder, 2) microsurfacing, which contain polymers and cement, and rely on more of a "chemical break" and 3) thin-bonded wearing courses.

This article focuses on *preparation* work necessary for effective surface treatments. It should be noted that even though public agencies usually contract out surface treatment work to specialty contractors, it's not uncommon for many of the preparation tasks to be done "in house" by agency crews. Of course, prep work can also be included in the contract, and in the current economy with agencies downsizing, there may be a trend in this direction.

Typical preparations

Typical preparation tasks for a surface treatment include:

- Cleaning the old pavement surface
- Removal of pavement markings (raised markers, thermoplastic striping)
- Masking of "street iron" (manhole covers, utility boxes, drain inlet grates)
- Sealing of Cracks
- Digouts & Patching (of localized problem areas)
- Leveling and rut-filling

Of course "administrative" preparations must also be made, such as things like press releases and news articles, notifying the neighborhood, posting 'no parking' signs, arranging for tow-away service, ensuring access for equipment and haul trucks and arranging for staging areas. Let's look more closely at the jobsite preparation tasks.

Cleaning the old pavement

The success of any surface treatment depends on the asphalt binder sticking to the old surface. Perhaps the single biggest deterrent to good adhesion is dust. Therefore, the old surface must be clean. At a minimum, power brooms or street sweepers should be used shortly before the surface treatment. Where necessary, water flushing should also be used. Pay special attention to any areas that have been milled as these tend to be dusty surfaces. Parking areas may exhibit oil drip areas. Depending on severity, these may need to be burned off, dug out and patched or sealed with a special oil spot primer.

Removal of pavement markings (raised markers, thermoplastic striping)

It's usually not necessary to remove painted striping, but raised markers and thermoplastic stripes (e.g. crosswalks) and legends (e.g. arrows) should be removed, usually by grinding. In some cases the surface treatment can be placed so as to avoid (and preserve) existing special markings. Temporary markers, usually the peel-and-stick stand-up reflector type, should be installed to serve until the permanent lane striping is applied.

Masking of "street iron"

Street iron such as manhole covers and valve box covers should be protected by masking them with paper or special plastic sheeting. Small peel-and stick markers should be attached to the metal to reference the location of the iron to facilitate removal of the masking material after the surface treatment is applied. Reference staking or GPS logging may also be used for this activity.

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Sealing of cracks

Existing cracks wider than ¼ inch should be sealed with specialty crack sealer material. Both hot and cold applied products can be used. The sealant supplier should be consulted as to the proper product for your location and climate. Different products may be necessary depending on the time of year you're doing the crack sealing.

In climates that experience extreme fluctuations in temperature (e.g. mountains, desert), pre-routing of transverse cracks should be considered.

When sealing cracks, care should be taken to:

- place the sealant only into the crack
- not leave excessive smearing of sealant on the surface of the pavement
- not leave sealant high so as to form a ridge or bump that motorists would feel. A squeegee tool should be used only where needed to knock down high spots.

Crack sealing may be done days or weeks ahead of the surface treatment. Cold-applied sealants should be fully cured prior to covering them with any surface treatment.

If sand is used to prevent tracking of the sealant, a thorough sweeping must be done prior to placing the surface treatment.

Digouts and patching

Although surface treatments are intended for roads still in good condition, there may be some localized pavement problems. These usually take the form of "alligator" cracking or disintegration in a wheelpath of the lane, indicating a load-related, structural failure. These areas should be repaired before placing a surface treatment. The usual approach is to dig out the bad material and replace it with new hot mix asphalt (HMA). Cold mix or proprietary "pothole patch" materials should not be used for patching prior to a surface treatment. They contain volatile elements that would be sealed in by the surface treatment, keeping them from hardening and an unstable, soft spot could result.

"Alligator" cracking

Digout and patching operations are also sometimes referred to as "mill & fill," "plugging" or "R&R". Guidelines for proper digout and patch work include:

- Lay out a cut line at least one foot beyond any visible cracking.
- Use straight lines and square corners to create the cut line.
- For patches thicker than four inches, make the cut wide enough for a small roller to fit into the trench for compacting the base material and lower lifts.
- Where practical, keep the longitudinal cut lines out of the wheel paths.
- Excavate deep enough to permit the new HMA patch to be at least 50% thicker than the old pavement that failed. (This will mean removing some of the aggregate base layer.)
- After excavating, always compact the remaining base material.
- Use an HMA mix type appropriate for the traffic (e.g., Type A, B or C).
- If the HMA in the new patch will be greater than four inches thick, place it in two lifts, if practical.
- Each lift thickness should be at least three times the size of large aggregate in the HMA.
- Make at least four passes of the roller on each lift while the mix is above 175°F.
- Place enough loose HMA so that after four roller passes the surface will be flush with the old pavement.
- Don't use vibratory rolling when the roller drum is touching the old (cold) pavement.
- Check the final patch with a straight edge.

The surface of a new HMA patch will be more "open" (porous) compared to the surrounding old pavement that has been under traffic for years, so an important final step is to apply a tack coat of asphalt emulsion to the surface of the new patch. This will help seal the surface so it won't absorb the binder in the future surface treatment.

Leveling

Some surface treatments (e.g. chip seals, slurry seals) should not be placed on surfaces with rutting in the wheelpaths. In the case of chip seals, the watery emulsion that's spray-applied will simply pond in any ruts and result in the chips being fully embedded or "drowned' in asphalt, resulting in an asphalt-rich, slick wheelpath. In the case of slurry seals, excess slurry mixture will be deposited in the rutted area and will later be unstable under traffic – especially in hot weather. So it's important that the pavement be checked with a straight edge and excessive rutting be corrected via "leveling" work.

How is leveling accomplished? The most common approach is to simply "blade lay" a HMA leveling course, usually with aggregate no larger than ½ inch, and "feathering" the edges by careful hand raking to remove larger aggregate. This is followed by rolling. In more severe ruts, >½-inch depth, rolling should be done with a rubber-tired (pneumatic) roller. Care should be taken to minimize any edge ridges as they will reflect through and be visible after the surface treatment. As with digouts and patching, a leveling patch should also be fog sealed with asphalt emulsion and allowed to cure prior to placing any surface treatment.

A rutted pavement may also be leveled by filling the ruts with microsurfacing, or by grinding it

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down with either a diamond grinder or a milling machine. These operations often involve subcontractors with special equipment, and may not be cost effective. Remember also, that after any milling or grinding, it's important to thoroughly sweep (and wash) the surface to remove the dust created by the operation.

Summary

Surface treatments are important "workhorse" strategies used by pavement managers nationwide. Like many operations – including painting your house – their success depends highly on the degree of preparation that's done on the old pavement. When applied to pavements still in good condition, and with an effort on pre-cleaning and proper repair of major defects in the old pavement, these pavement preservation procedures will fulfill their mission of extending the life of a pavement and protecting this important investment.

California loses a valuable resource at UC Berkeley

(Modified with permission from the ITS newsletter, June 2011)

After more than 25 years serving local agencies, the California Department of Transportation, Division of Local Assistance did not renew the California Local Technical Assistance Program (LTAP) and Cooperative Training Assistance Program (CTAP) contracts at the University of California, Berkeley.

Laura Melendy

The CP² Center has worked closely with Laura Melendy and her fine staff to deliver the highly successful California Pavement Preservation Conferences and the International Conference on Pavement Preservation (see www.cp2info.org). The future of these conferences is now uncertain.

What's going away

The following training, information resources and technical assistance services previously supported by LTAP and CTAP will be discontinued as of June 30, 2011:

- Low-cost, subsidized, open enrollment training classes offered statewide
- Free federal aid compliance training held in your district
- Intensive training for Resident Engineers in our annual academies around the state
- Practical, low-cost "Road Shows" delivered at your location on your request
- The Training Clearinghouse listing hundreds of training classes held in California, in neighboring states, and online
- Free reference services and loans from the Transportation Library
- Free loans of training videos, DVDs and CDs
- Free expert technical assistance from our Field Agents and our Ask-an-Expert service
- Free resources and materials via the Going… Going…Gone service
- Free retroreflectometer loans
- Quarterly newsletters and other publications to keep you current
- Monthly emails alerting you to upcoming training opportunities
- The stunningly beautiful and useful annual calendar

Starting July 1, 2011, local agencies should contact the California Department of Transportation, Division of Local Assistance for LTAP and CTAP training, information resources, and technical assistance. Please contact Ron Hall, Training Programs Specialist (ron_hall@dot.ca.gov, 916.653.9251) for all of these services.

What to look forward to

Going forward, the Technology Transfer Program will dissolve and be absorbed into the greater Institute of Transportation Studies at the University of California Berkeley (ITS). Integration into ITS, Berkeley means greater access to Transportation Engineering and Urban Planning faculty and other University resources than ever before. ITS will be able to offer you state-of-the-art professional development to put you on the cutting edge.

At the same time, ITS will continue to offer a number of services you have come to depend on. They will continue to host regional, national and international conferences, conduct professional development short courses, and deliver other specialty training to meet your professional development needs. They will continue to offer their award-winning work zone safety training for delivery at your location and provide our nationally recognized, free Traffic Safety Evaluations and Pedestrian Safety Assessments for cities and counties.

Thank you

Laura Melendy and her staff have enjoyed serving California over the years with LTAP and CTAP programs. She looks forward to meeting your ongoing professional development needs with specialized training programs under their new name and thanks you for the opportunity to help you work safer and smarter, year after year. Her new contact information is:

Laura Melendy, Director
Technology Transfer Program
Institute of Transportation Studies
University of California, Berkeley
phone 510-665-3608, fax 510-665-3454
www.techtransfer.berkeley.edu

FP² Inc. update

By James Moulthrop, Executive Director

FP² Inc. continues to be engaged with the re-authorization of SAFETEA-LU although at this time not much has emerged in the form of a bill from either the House or the Senate. The Administration has circulated partial drafts of a bill but no firm language. Rumors abound as to when a bill will be introduced, by Memorial Day, by Labor Day, or beyond. What the eventual bill will contain remains to be seen.

The FHWA Pavement Preservation Expert Task Group (ETG) met in conjunction with the Southeast Pavement Preservation Partnership meeting in Oklahoma City the first week in May. FP² participated in both meetings with a number of supporters actively participating in both meetings with presentations and booths. A highlight of the PPP meeting was a field trip to view a number of flexible and rigid preservation treatments that were recently constructed and are currently under evaluation by the University of Oklahoma and the Oklahoma DOT.

FP² participated in the American Road and Transportation Builders Association fly-in in late May in Washington, D.C. This event allowed participants to be attuned to the latest efforts on Capitol Hill with the re-authorization bill and the opportunity for constituents to visit with their representatives. We prepared talking points for those who took advantage of the opportunity.

All the Partnerships have agreed in principal to participate with the National Center, FHWA, and FP² to undertake a national media campaign to inform the general public and legislators at all levels about the need, benefits, and eco-friendly aspects of pavement preservation in our goal to "Keep Good Roads Good".

Also, FP² Inc., in conjunction with the National Center for Pavement Preservation (NCPP), will be hosting a National Conference on Pavement Preservation the last week of August 2012, at the Renaissance Hotel in Nashville, Tenn. Honorary, Organizing, Technical, Demonstration, and Spouses Committees have been formed and plans are already underway to develop and present an exceptional program dealing with all aspects of pavement preservation. In addition, demonstrations, both live and pre-constructed, of current and innovative techniques for pavement preservation will be held. All four regional Preservation Partnerships will be sending representatives and will have individual meetings during the conference. Mark your calendar and plan to attend. For more information on the conference, check out the NCPP website at www.pavementpreservation.org.

Finally, there is still time to nominate a local government agency to receive the 2011 James B. Sorenson Excellence in Pavement Preservation Award. Send nominations to FP² Inc. at jimmoulthrop@gmail.com.

PRRC announces new Executive Director

The Pavement Recycling and Reclaiming Center (PRRC) at Cal Poly Pomona is pleased to announce that Dr. Stephen A. (Steve) Cross, P.E. has accepted the role of Executive Director. Dr. Cross comes to the PRRC with over thirty years experience in teaching, research, design and construction of transportation facilities with a major emphasis on cold in-place recycling, bituminous materials characterization and mix design, pavement construction, and soil stabilization. Dr. Cross has authored numerous journal articles and technical reports on all phases of pavement recycling and pavement construction. He is a co-author of the Asphalt Recycling and Reclaiming Association's *Basic Asphalt Recycling Manual*. Other notable achievements include being named *Visiting Research Professor, Research Institute of Highways, Ministry of Communications, P. R. China*; membership in the *Arkansas Academy of Civil Engineering*, and receiving ARRA's *Award for Excellence in Cold In-Place Recycling*.

Steve Cross

Dr. Cross received his B.S. and M.S. degrees in Civil Engineering from the University of Arkansas and his PhD in Civil Engineering from Auburn University. He currently is a professor in the School of Civil and Environmental Engineering at Oklahoma State University. Previous academic appointments include the University of Kansas and the National Center for Asphalt Technology (NCAT) at Auburn University.

Dr. Cross will be joining Dr. Dragos Andrei, Technical Director of the PRRC. He will maintain dual offices in his home state of Oklahoma and in Pomona.

PPTG Update

The Pavement Preservation Task Group (PPTG) held it first meeting in 2011 in Sacramento on April 12. The results of the meeting can be found at www.cp2info.org/PPTG. Items discussed include the new organization, the role of the PPTG, priorities for 2011-2012 and more. The next meeting will be held in December 2011, at a location still to be determined. Co-chairs of the PPTG are Peter Vacura (Caltrans), Hans Ho (Industy) and Craig Hennings (Industry).

Center news

CalRecycle projects

The CP² Center continues to work on two projects for CalRecycle. The first deals with the use of warm mix technology for asphalt and terminal blend hot mixes. The second is addressing the cost effectiveness of the products. Both projects will end in 2012. For more information about this work, please contact either Dr. Gary Hicks or Dr. Ding Cheng.

RPA meeting

Ding Cheng provided an update on the LCCA project in April 2011 to the Technical Advisory Board in Phoenix, Ariz. All of the presentations given at this meeting can be found on the RPA website at www.rubberpavements.org.

Caltrans MTAG update

The Center is working on updates to the Maintenance Technical Advisory Guide (MTAG) for Caltrans. Two new chapters will be added to the Caltrans MTAG: Chapter 14 on pre-overlay treatment for flexible pavements for the MTAG Volume I and pre-overlay treatments for rigid pavement for MTAG Volume II. The first drafts have been submitted to Caltrans and Caltrans is reviewing both chapters.

The other chapters that the Center will be working on during the summer of 2011 are Chapter 3 flexible pavement strategy selection, Chapter 5 patching, Chapter 6 fog and rejuvenating seals, Chapter 11 bonded wearing course, Chapter 13 in place recycling for the MTAG flexible pavement; and Chapter 3 rigid pavement strategy selection for the MTAG rigid pavement.

Caltrans training contract

Working with Caltrans, Ding Cheng and LeRose Lane have developed a survey to determine pavement training needs for Caltrans. It is expected the survey will be conducted in June 2011. The purpose of the survey is not only to identify training needs, but also to establish priorities in terms of the classes to be delivered. For more information, please contact Dr. Ding Cheng or LeRose Lane.

Pacific Coast Conference on Asphalt Specifications

The PCCAS meeting was held in Sacramento on May 2-3, 2011. Roger Smith of the Center participated in the meetings for both recycling and asphalt specifications. The organization coordinates asphalt specifications in the western United States. For more information on the PCCAS, please refer to their website at www.pccas.org.

FHWA Expert Task Group (ETG) on Pavement Preservation

Ding Cheng and Gary Hicks participated in this meeting on May 2-4, 2011. Dr. Cheng is a member of the ETG while Dr. Hicks is a member of the Emulsion Task Force (ETF), which is part of the ETG. Chris Newman (FHWA) co-chairs the ETG along with Dennis Jackson (formerly with the WSDOT). Dr. Cheng gave a report on the pavement preservation database that the Center has developed for Caltrans while Dr. Hicks gave a report on the activities of the emulsion mix group for the ETF. Minutes from both meetings can be found on the website of the National Center at www.pavementpreservation.org. The next meeting will likely be held in late 2011 at a location to be determined.

Steve Mueller and Larry Galehouse at the FHWA PPETG meeting in Oklahoma City

NHI course on pavement preservation

Dr. Hicks along with Bill Ballou, formerly head of the Foundation for Pavement Preservation (FP2), gave a two-day workshop on pavement preservation to the FHWA Eastern Direct Federal Division in Sterling, Virginia, on May 16-18, 2011. Both served as consultants to APTech on this effort which developed the materials for NHI. The course focused on pavement preservation techniques for flexible pavements.

Gary Hicks, Bill Ballou and Jason Dietz (FHWA)

Alaska DOT & PF

The Center is currently working with the Universities of Alaska at Fairbanks and Alaska at Anchorage to assist Alaska DOT's PF in the development of a pavement preservation program for the state. They have developed a report laying out a roadmap for the development of the program and have conducted a survey and literature review on pavement preservation treatments used in cold regions. A pavement preservation database and strategy selection guide, modeled after the ones developed for Caltrans, are underway. The project is expected to be completed by the end of 2011.

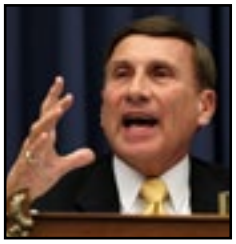
FHWA News – Surface Transportation Reauthorization

By Steve Healow, FHWA California Division

Current situation

After nineteen months and numerous continuing resolutions, the word from our nation's capital regarding Surface Transportation Authorization (STA) seems to be: wait awhile.

By now the reader must be familiar with the chairman of the House Transportation and Infrastructure (T&I) Committee, Rep. John Mica (R-FL) and chairwoman of the Senate Environment and Public Works (EPW) Committee, Senator Barbara Boxer (D-CA). Their committees traditionally draft STA legislation. As recently as January, John Mica and Barbara Boxer shared a common goal. Both planned to draft the next STA legislation through their respective committees by Memorial Day. Recently Rep. Mica reported his schedule has fallen "a little behind" due to other priorities. Similarly, Senator Boxer announced she will present her legislation sometime in June.



Rep. John Mica

Rep. Barbara Boxer

Draft legislation circulating between the White House and the U.S. Capitol would be a positive indication that STA legislation is on track. However, the White House has not announced when or if it will circulate draft legislation. Thus far the White House has disassociated itself from any circulated draft bill.

In February 2011, the White House released a budget proposal for FY 2012 which included a 43% increase in highway funding, a 127% increase in transit funds and $53B for high speed rail. On April 15 the House of Representatives passed a budget resolution for fiscal years 2012- 2021 which includes a proposed 30% reduction below current federal transportation spending, a $6B cut to transit spending and no proposed spending for high speed rail. The resolution cuts domestic discretionary spending to below FY2008 levels where it will remain for five years. The House resolution isn't binding as a law; however, it is used by the respective committees to plan their legislative agendas.

Rep. Mica has explained his T&I draft bill will emphasize privatization through Public Private Partnerships and more state control of transportation decisions. In response to public testimony at twelve public hearings held throughout the country between February and April, the T&I draft bill will delegate to the states more control over transportation decisions, streamline the project delivery process, encourage private sector investment in transportation projects through Public Private Partnerships and consolidate over fifty existing USDOT programs down to four core activities.

Congress and the White House agree in principle on several facets including streamlining federal participation by combining or eliminating duplicative programs, expediting project delivery, encouraging private sector financing, and stabilizing the highway trust fund by making it self-sustaining without increasing the gas tax. There seems to be consensus on keeping existing roads and bridges in a state of good repair. There's also continuing dialogue with respect to fostering innovation and implementing performance measures. Our lawmakers have heard extensive testimony with respect to granting flexibility to the states and regulatory relief.

The White House hasn't said when it will release its draft surface transportation bill. It is expected to consolidate and simplify the structure and programs within the USDOT. It will also include expanded funding for transit, an infrastructure bank, more TIFIA loans and TIGER grants, and continue the president's livability and sustainability initiative.

Congress and the White House disagree on cuts to infrastructure spending. They also disagree on how to best stabilize the highway trust fund. The White House would like to increase revenue with a tax on vehicle miles traveled (VMT) and introduce tolls on congested urban freeways. The House of Representatives would like to trim infrastructure spending not to exceed the current revenue stream, approximately $38B per year. The initial White House proposal for a six-year surface transportation program totaled $556 billion, with an up-front FY 2012 appropriation of $50 billion. Thus the funding gap persists and the impasse continues.

Summary

There is plenty of dialogue concerning surface transportation re-authorization, but precious little action thus far. The conversation endlessly revolves around revenue. Spending plans by Congress and the White House are hundreds of billions of dollars apart. Furthermore, 42% of their current spending is borrowed money. While the president advocates increasing surface transportation funding, members of Congress would limit the federal highway program to the existing gas tax revenue in the highway trust fund.

Our elected officials have been distracted from their work by the threat of a government shut-down, high unemployment, budget deficits, the debt ceiling, and three wars. The debt ceiling and budget issues are expected to dominate Congress through the summer. In the meantime H.R. 662, the Surface Transportation Extension Act of 2011, expires on the last day of September.

Continued, next page

The following websites offer more on Federal highway legislation.

www.foxnews.com/politics/2011/03/09/gao-report-shows-redundancies-red-tape-department-transportation/

www.aashtojournal.org/Pages/050611reauthorization.aspx

http://budget.house.gov/News/DocumentSingle.aspx?DocumentID=237237

http://transportation.nationaljournal.com/2011/04/infrastructure-whats-it-going.php

www.aashtojournal.org/Pages/040811budget.aspx

http://dc.streetsblog.org/

www.infrastructureusa.org/skepticism-greets-us-dot%E2%80%99s-draft-transportation-bill/

Upcoming events

June 2011

27–29 – 2011 Sustainability in Public Works Conference, Portland, Ore. www2.apwa.net/events/

July 2011

11–14 – 2011 Petersen Asphalt Research Conference and Pavement Performance Prediction Symposium, Laramie, Wyo. www.petersenasphaltconference.org/

15–19 – National Association of Counties (NACO) 2011 Annual Conference and Exposition, Portland, Ore. www.naco.org/meetings/dates/

17–20 – WASHTO 2011, Oklahoma City, Okla. www.okladot.state.ok.us/washto2011/

20–22 – AASHTO 2011 Mississippi Valley Conference, Cincinnati, Ohio. – www.transportation.org/meetings/

24–27 – International Conference on Low–Volume Roads, Orlando, Fla. Email: TRBMeetings@NAS.edu

August 2011

1–5 – IRF Preserving Our Highway Infrastructure Assets, Orlando, Fla. www.irfnet.org/

3–5 – 7th International Conference on Road & Airfield Pavement Technology (ICPT), Bangkok, Thailand. http://icpt2011.org/

September 2011

18–21 – APWA 2011 Show, Denver, Colo. www.apwa.net

26–30 – XXIV World Road Congress, Mexico City, Mexico. http://aipcrmexico2011.org/

October 2011

4–6 – Rocky Mountain West Pavement Preservation Partnership, Reno, Nev. www.tsp2.org/rmwppp

11–13 – Second International Conference on Warm Mix Asphalt, St. Louis, Mo.
Email: matthew.corrigan@fhwa.dot.gov

13–17 – AASHTO 2011 Annual Meeting, Detroit, Mich. www.transportation.org/

25–26 – AEMA Emulsion Technology Workshop, St. Louis, Mo. www.aema.org/downloads/AEMA2010n3.pdf

25–27– Midwestern Pavement Preservation Partnership 2011 Meeting, Bismarck, N.D. www.tsp2.org/pavement/mppp/

27–28 – Fifth Asphalt Shingle Recycling Forum, Dallas, Texas. www.shinglerecycling.org/

Published quarterly by the California Pavement Preservation Center
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