

A PUBLICATION OF THE FOUNDATION FOR PAVEMENT PRESERVATION

# pavement preservation *journal*

FALL  
2008



## **CONCRETE PAVEMENT PRESERVATION: A BETTER Way of Doing Business**

Rejuvenator Seal Extends  
Life of Austin, Travis  
County, Tex. Roads

New NCHRP Report  
Links 'Nuts and Bolts'  
of Preservation with  
GASB 34 Rules

An aerial, isometric view of a road construction site. The scene is set on a green landscape with numerous stylized green trees. A network of roads is shown, with some sections under construction. Several yellow construction vehicles, including graders and compactors, are positioned along the roads. A white tanker truck is driving on a completed road section. In the foreground, a white car is driving on a road that appears to be newly paved or finished. The overall scene conveys a sense of active roadwork and infrastructure development.

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**By Bill O'Leary**  
President  
Foundation  
for Pavement  
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## Farewell to Gerry Eller, Our Retiring Executive Director

**A**ll good things must come to an end, and now the Foundation for Pavement Preservation (FP<sup>2</sup>) reluctantly announces the retirement of Gerry Eller, P.E., our executive director since 2004.

Under Gerry's leadership, the last four years of the foundation have been a time of stability and growth. While he will be the first to tell you that no one person can claim credit for any specific accomplishment and that everything has been done by partnering in a team effort, Gerry has been instrumental in bringing together people with diverse interests to further FP<sup>2</sup>'s goal of increased pavement preservation in the United States.

Always the gentleman, Gerry makes it a policy to solve difficult problems with a respectful approach to all parties. During his tenure, the *Spray Applied Polymer Sealer Study* was completed, the *Research Roadmap* was written, and pavement preservation centers were set up around the country. At the Federal Highway Administration, he credits Construction and System Preservation Team leader Jim Sorenson as a vital driving force for pavement preservation on a national scale.

These activities—secured with public-private partnerships—really have created a solid foundation for pavement

preservation to become a part of every agency's highway system, on behalf of its constituents.

Building on a B.S.C.E. degree from the University of Nebraska and an M.S.C.E. from the University of Utah, Gerry spent 34 years working for FHWA in various positions in

Utah, Montana, New Mexico, New Hampshire, Saudi Arabia and Washington D.C. He very much was a part of the building of the interstate system.

He served as FHWA division administrator in New Hampshire and chief of the construction and maintenance division at FHWA headquarters. In 1997 he retired as FHWA's director of the office of engineering, where he had been chairman of the asphalt technical work group for Superpave<sup>®</sup>, as well as chairman of AASHTO's subcommittees on construction and design.

While with FHWA in Montana and New Mexico, Gerry helped make federal aid funds available for cold in-place recycling, chip seals and fog seals. Before that, federal aid could only be used for HMA overlays. Because of this change, hundreds of lane-miles of New Mexico interstates and U.S. highways were treated with pavement preservation applications, resulting in a higher quality and more cost-effective overall program. The success of Gerry's program influenced revisions to Title 23 of the *Code of Federal Regulations*, making it clearer to state highway agencies that systematic techniques of pavement preservation were eligible for federal dollars.

From 1997 to 2003 Gerry was a project advisor for Koch Performance Roads, a member of the Dispute Resolution Board for the Legacy Highway Project in Salt Lake City, and served on the advisory board of the National Center for Pavement Preservation. Gerry has received many accolades, including FHWA's awards for Administrator's Superior Achievement and Distinguished Career Service.

As Gerry says, "You pay for good roads, whether you have them or not." It's that passion for doing the right thing—plus his experience, and his diplomatic capability to get people to collaborate—that has fueled the recent work of the foundation. After 45 years dedicated to providing the best possible roads, Gerry will now be "semi-retired" in Montana and Arizona, pursuing his passions for golf, hunting and fishing, as well as continuing his consulting work as president of GLE Technical Services, Inc. Gerry, we will miss you.





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# Concrete Pavement Preservation: A Better Way of Doing Business



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

**A**cross the nation, awareness is growing among transportation officials that portland cement concrete pavement preservation, or CPP, pays significant dividends in managing pavements.

In states such as Texas, New York, California, Kansas, Missouri, Georgia, and others, highway officials realize that their investments in concrete pavement need to be protected to obtain the maximum life span from these pavements.

Concrete pavement preservation is a series of engineered techniques developed over the past 40 years to manage the rate of pavement deterioration in concrete streets, highways and airports. CPP is a non-overlay option used to repair areas of distress in concrete pavement without changing its grade. This rational, preventive procedure restores the pavement to a condition close to or better than original, and reduces the need for major and more costly repairs later.

Research on CPP techniques has shown that the service life of a concrete pavement can be greatly extended when rehabilitated with concrete materials and techniques developed specifically for concrete pavements. But like all pavement preservation treatments, timing is a crucial element for leveraging the life expectancy of any concrete pavement repair technique. If the window of opportunity is missed, the result could be a repair that doesn't last as long as expected.



*Diamond grinding is applied to I-88 near Albany, N.Y. Photo credit: IGGA*

## **METHODS FOR CPP**

Concrete pavement preservation methods are varied and include:

- **Slab stabilization.** This technique restores support to concrete slabs by filling small voids that develop underneath the concrete slab at joints, cracks or the pavement edge.
- **Full-depth repairs.** This is a way to fix cracked slabs and joint deterioration by removing at least a portion of the existing slab and replacing it with new concrete.
- **Partial-depth repairs.** These correct surface distress and joint-crack deterioration in the upper third of the concrete slab. Placing a partial-depth repair involves removing the deteriorated concrete, cleaning the patch area, placing new concrete and reforming the joint system.
- **Dowel bar retrofits.** This method consists of cutting slots in the pavement across the joint or crack, cleaning the slots, placing the dowel bars, and backfilling the slots with new

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## Research on CPP techniques has shown that the service life of a concrete pavement can be greatly extended when rehabilitated with concrete materials and techniques developed specifically for concrete pavements.

concrete. Dowel bar retrofits link slabs together at transverse cracks and joints so that the load is evenly distributed across the crack or joint.

- **Cross-stitching longitudinal cracks or joints.** Cross-stitching repairs low-severity cracks. This method adds reinforcing steel to hold the crack together tightly.
- **Joint and crack resealing.** This technique minimizes the infiltration of surface water and incompressible material into the joint system. Minimizing the amount of water entering the joint reduces subgrade softening, slows pumping and erosion of the subbase fines, and may limit dowel bar corrosion caused by deicing chemicals.
- **Diamond grinding.** By removing faulting, slab warping, studded tire wear and unevenness resulting from patches, diamond grinding creates a smooth, uniform pavement profile. Diamond grinding reduces road noise by providing a longitudinal texture, which is quieter than transverse textures. The longitudinal texture also enhances surface texture and skid resistance in polished pavements.

### DIAMOND GRINDING: A GEM OF A SOLUTION

One CPP method is diamond grinding, a procedure that restores or improves pavement ride quality and surface texture. Although diamond grinding has been available since its first use in 1956 at Davis-Monthan Air Force Base in Tucson, Ariz., recent developments and increased experience have made diamond grinding—with other CPP methods if necessary—the best, first rehabilitation option for concrete pavements.

Diamond grinding is a CPP technique that corrects a variety of surface imperfections on concrete pavements, and should be used in conjunction with other CPP techniques.

Diamond grinding involves the removal of a thin layer of the cured

concrete surface using a machine with closely spaced diamond-coated circular saw blades. Diamond grinding restores rideability by removing surface irregularities. The immediate effect of diamond grinding is a significant improvement in the smoothness of a pavement, and a significant increase

in surface macrotexture with improvement in skid resistance, noise reduction and safety.

The value of diamond grinding is borne out by a California DOT study, conducted to quantify the expected longevity of a diamond-ground PCC pavement and its overall effectiveness

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under various weather conditions and construction practices.

In the study, Caltrans reported that diamond grinding "is a viable and cost-effective rehabilitation measure when properly applied. Diamond grinding not only extends the service life of a concrete pavement, but it also reduces tire-pavement interface noise and improves texture and skid resistance. Because the pavement is much smoother after grinding, highway user costs are also reduced through improved fuel efficiency and lower vehicle maintenance costs."

Caltrans also reported that a state-wide average design life (for a diamond-ground PCC surface) of 16 to 17 years could be used. It has been shown that it is possible in California to diamond-grind candidate PCC pavement up to three times during the life span of the pavement. In other words, if the service life of a well-designed concrete pavement can be extended by 16 to 17 years, on average, with diamond grinding, this technique could be applied two or three times. Thus we can effectively utilize a concrete pavement, without major reconstruction, over a long span with only

routine maintenance, provided the pavement remains structurally adequate.

### ATTRIBUTES OF DIAMOND GRINDING

Diamond grinding provides a smooth surface that can reduce dynamic loading and increase pavement longevity. Increased pavement life will be obtained by reducing the roughness. This is demonstrated using the American Association of State Highway & Transportation Officials (AASHTO) 1993 *Pavement Design Equation*. In that equation, serviceability is analogous to smoothness, which means that increased serviceability (a smoother pavement) will result in more equivalent single-axle loads carried by the pavement.

Diamond grinding enhances surface texture and skid resistance, and reduces road noise. Due to the ever-increasing tire/pavement noise issue, many owners are now specifying diamond-ground surfaces on their new concrete pavements. New York, Missouri, Georgia and other states have utilized this innovative process to increase pavement service life while improving customer satisfaction.

Diamond-ground surfaces have been found to reduce accident rates. The Wisconsin DOT, working with Marquette University, found that the overall accident rate for diamond-ground surfaces was only 60 percent of the rate for nonground surfaces. The diamond-ground pavements provided significantly reduced accident rates up to six years after grinding.

A factor that contributes to the low accident rates on diamond-ground pavements is the mechanical interlock that is formed between the pneumatic tire and the pavement grooves. These shear forces that are developed by the lateral load when cornering opposes the slip of the tire in the radial direction.

Diamond grinding does not affect the fatigue life of a pavement. Although pavement thickness affects fatigue life, the small reduction in thickness due to diamond grinding is offset by the gain of concrete strength over time and the reduction in dynamic loading.

Unlike overlays, diamond grinding does not raise the pavement

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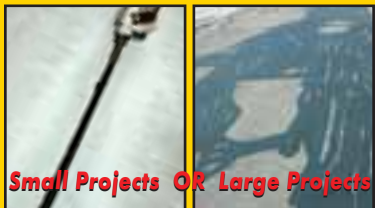


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surface elevation. Grinding does not affect the hydraulic capacities of curbs and gutters on municipal streets, unlike bituminous overlays that fill curb and gutter and reduce their drainage capabilities. Additionally, guide rails, manholes, side slopes and overhead signs don't require costly adjustments.

Also, diamond grinding can be applied only where improvement is needed, and can be performed during off-peak hours.


**FOR MORE INFORMATION, CONTACT IGGA**

The International Grooving & Grinding Association (IGGA) is a nonprofit professional organization that promotes the use of CPP on highways, airports, municipal streets, rural roads, parking areas and other surfaces constructed with portland cement concrete.

IGGA was founded in 1972 by a group of dedicated industry professionals committed to the development of the grooving and grinding processes. In 1995, the IGGA joined

in affiliation with the American Concrete Pavement Association to represent its newly formed Concrete Pavement Restoration Division.

The IGGA/ACPA Pavement Restoration Division serves as the technical resource and industry representative in the marketing of CPP to state

DOTs, municipalities and engineers around the world. For more information, contact John H. Roberts, executive director, IGGA/ACPA Pavement Restoration Division, 12573 Route 9W, West Coxsackie, N.Y., 12192, phone 518.731.7450, e-mail jroberts@pavement.com, Internet www.igga.net. 



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# Rejuvenator Seal Extends Life of Austin, Travis County, Tex. Roads

**By Jim Brownridge**

*Marketing Manager*

*Tricor Refining, LLC, Bakersfield, Calif.*

**T**exas' dynamic capital of Austin is located within Travis County, and a great majority of the road network encompasses Austin.

This road system is a blend of moderate and highly traveled residential curb and gutter and lower volume rural areas. Texas uses a gradation numbering system consisting of Type A and B, which are coarse and fine base course mixes; Type C and D being coarse and fine hot mix; and Type F being a fine-graded, high asphalted hot mix used for thin overlays.

Travis County Director of Road Maintenance and Fleet Services Don Ward inherited the maintenance challenge of how to preserve 125 two-lane miles of F mix roadway. Originally F mix was used in residential curb and gutter subdivisions to provide a smooth, appealing surface. But it became evident within four to five years that this mix was prone to weathering and intrusion of moisture, while the high asphalt percent was causing premature oxidation and brittleness in the binder as the lighter oils oxidized from the binder. The county needed a solution to prolong the life of a considerable F mix inventory.

## **MALTENE-BASED REJUVENATOR STUDIED**

In 2005, Travis County looked at the use of a maltene-based rejuvenator that has had over 40 years of use in North America.

Rob Wiggins, president of Pavement Restoration, Inc., Boerne,



*Pavement Restoration, Inc., Boerne, Tex., applies Reclamite rejuvenator to pavement in Travis County, Tex.*

Tex., reviewed the road inventory with Don Ward and along with Tricor, the manufacturer, provided factual data incorporating many years of experience of how a rejuvenator could extend the county's pavement life cycles.

About that time Travis County executives realized that they needed to be proactive regarding road maintenance. The county Commissioners Court approved this rejuvenation process with an eye to extending pavement life an additional five to eight

years, and hopefully beyond with subsequent applications.

The county placed several full road-width test sections of the rejuvenating agent. They saw excellent absorption and penetration into the binder. Testing done by APART, Inc. (Asphalt Pavement and Recycling Technologies, Inc., Shafter, Calif.) revealed to Travis County that the rejuvenator was fluxing with the binder, and results showed a decrease in microviscosity of the binder in the range of 60 to 300

percent, along with a corresponding increase in penetration values.

It became evident that the rejuvenator could work in Travis County. The use of a rejuvenator was of most interest as product cost was one-third to one-half the cost of the closest alternate, which would be a wear course seal. Using that alternative, the condition of the F mix—along with the many miles of inventory—would have deeply impacted the county budget (wear course seals being chip or Type 1 and 2 slurry are placed on more severely distressed pavements in the county).

### PROGRAM COMMENCES

Starting in 2006, Ward and Travis County went forward with a program of rejuvenating 35 to 50 miles per year. The project was let to bid with a tight set of specifications, as the county knew what it wanted to achieve.

Any remedial hot pour rubber crackfilling work was to be done four to eight weeks ahead of the application. In 2008 the program was in its third year. Work is performed during June to August, when ambient temperatures are 65 to 85 deg F (18 to 30 deg C).

The rejuvenating emulsion is applied at application rates of 0.07 to 0.08 gallons per square yard, diluted 2 parts product to 1 part water (0.32 to 0.36 liters/sq. meter). A washed concrete sand is used as a blotter at a rate of 1 to 2 lbs. per sq. yard (0.45 to 0.90 kg/sq. meter). The sand blots any rejuvenator that has not fully penetrated the surface. The rejuvenating emulsion breaks or cures in about 40 minutes.


Typically two to three streets are done at the same time, half of the road per application. Traffic control is maintained by the contractor. Door knockers are used to advise residents

several days ahead of the application, and to-date there has been a 95 percent success rate in clearing the streets of vehicles prior to application.

The subdivision streets are vacuum-swept in 24 to 48 hours after application. A bonus is that because the rejuvenator does not contain asphalt, coal tar base or gilsonite, any tracking

is kept to a minimum with little or no residential complaints.

Factual examples of core data testing are shown in the accompanying table.

Travis County and Pavement Restoration, Inc. have led by example and are showing other Texas municipal agencies their method of extending pavement life at a low cost. 

Travis County, Texas  
Top 3/8-inch of Core Samples

Sample Identification	Microviscosity, 25°C, MP		Equivalent Penetration
	0.05 sec <sup>1</sup>	0.001 sec <sup>1</sup>	
<b>Barton Point Drive</b>			
Before	16.0	17.3	24
After	13.0	14.1	27
<b>Bent Bow Drive</b>			
Before	89.0	128	11
After	46.0	78.5	15
<b>Crystal Mountain</b>			
Before	21.0	35.9	21
After	8.98	10.5	31
<b>Green Emerald</b>			
Before	298	355	6
After	16.5	22.6	24
<b>Grimes Ranch Road</b>			
Before	44.0	60.0	15
After	12.4	42.0	28
<b>Kratzman Drive</b>			
Before	28.0	54.0	19
After	9.60	13.2	32
<b>Scul Creek Drive</b>			
Before	37.5	50.0	17
After	9.89	14.3	32
<b>Summer Court</b>			
Before	97.5	106	10
After	55.5	76.0	14
<b>Wavecrest Blvd</b>			
Before	82.0	137	11
After	13.9	15.0	27
<b>Westminister Glen</b>			
Before	54.2	86.4	14
After	37.8	79.9	17
<b>Winchester Road</b>			
Before	118	164	10
After	14.3	19.9	26
<b>Yarrow Court</b>			
Before	68.0	85.2	12
After	19.0	22.0	23

*On Travis County, Tex., pavements, the top three-eighths inch of each core was removed for testing. The asphalt was extracted and recovered as prescribed by California Test Method 365 (CTM 365). Viscosities were determined on the recovered asphalt binder using a sliding plate microviscometer (CTM 348). Penetrations were calculated from a nomograph.*

# New NCHRP Report Links 'Nuts and Bolts' of Preservation with GASB 34 Rules

**A** new report from the National Cooperative Highway Research Program (NCHRP) provides recommended practices for integrating pavement and bridge inventories, condition assessments, minimum acceptable condition levels, and funding decisions with GASB 34 reporting requirements.

NCHRP Report 608, titled *GASB 34: Methods for Condition Assessment and Preservation*, was released earlier in 2008 and provides a valuable guide to how pavement preservation principles can effectively meet GASB 34 guidelines.

A predecessor, companion NCHRP Report 522, *A Review of DOT Compliance with GASB 34 Requirements*, was released in 2004. Together they are indispensable reading for public

**The Governmental Accounting Standards Board (GASB) is the independent organization that establishes and improves standards of accounting and financial reporting for U.S. state and local governments.**

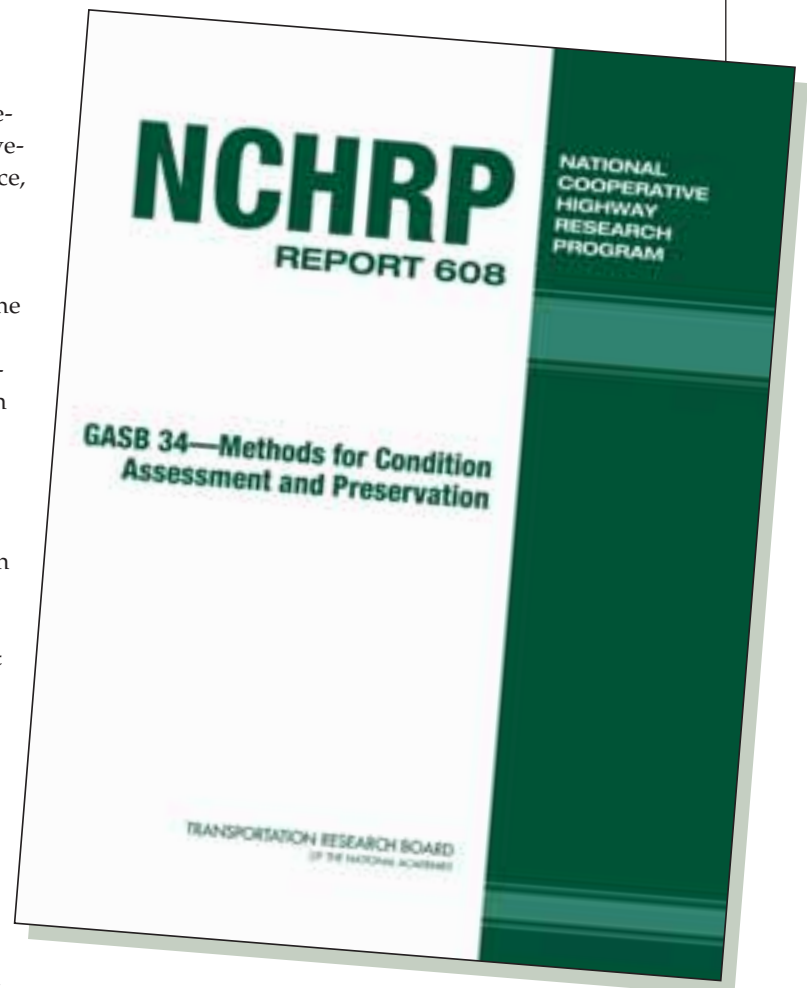
works officials responsible for pavement maintenance, management, and financial accounting.

In actuality, the new Report 608 updates the findings contained in NCHRP Report 522, which provided a comprehensive look at approaches taken by American Association of State Highway & Transportation Official (AASHTO) member departments to comply with the requirements of Governmental Accounting Standards Board (GASB) Statement No. 34.

## WHAT IS GASB 34?

The Governmental Accounting Standards Board (GASB) is the independent organization that establishes and improves standards of accounting and financial reporting for U.S. state and local governments.

Established in 1984 by agreement of the Financial Accounting Foundation and 10 national associations of state and local government officials, the GASB is recognized by governments, the accounting



*New NCHRP Report 608 is available for download at no charge and will be valuable to pavement preservation practitioners and agency accounting personnel.*

industry, and the capital markets as the official source of generally accepted accounting principles for state and local governments.

In 2000, GASB began implementing GASB Rule No. 34. Prior to Statement 34, government agencies generally accounted only for cash flow. Under GASB 34, government agency accounting records also need to reflect the value of infrastructure assets, which in

turn will reflect on the bond rating or borrowing capacity of the agency. The more valuable the infrastructure assets, the better the financial performance.

This is critical for the pavement preservation community, because only a pavement inventory/pavement management system—incorporated into a larger asset management system including bridges and other capital structures—will provide the agency verifiable information as to the value of its infrastructure assets.

And only pavement preservation practices as articulated by the Foundation for Pavement Preservation can maintain the value of a pavement system in the most cost-effective manner.

#### WHAT'S IN THE REPORTS

NCHRP Report 522 documented how the requirements set by GASB 34 were addressed and catalogs the various approaches that were implemented in the first year. NCHRP

522 revealed that additional, more detailed research was needed to answer some fundamental questions including, what are the most effective methods for condition assessments for GASB 34 reporting and asset management, and how are the variability and the reliability of condition assessment methods used in estimating expenditures for GASB 34 reporting. NCHRP Report 608 builds on the results of NCHRP Report 522.

To assess the operational and financial impacts of reporting under GASB 34, the NCHRP research team performed a literature review and conducted a series of workshops and interviews with government transportation agencies, and other organizations that use effective methods for infrastructure inventory, condition assessments, minimum acceptable condition levels, funding decisions, and GASB 34 reporting requirements.

Representative agencies participating in GASB 34 asset management workshops for Report 608 include Florida DOT, Ohio DOT, Oregon DOT, Texas DOT, Washington DOT, Hillsborough County, Fla., and the City of Saco, Me.

The result is the new NCHRP Report 608, which provides a recommended practices guide that will be helpful to professionals who work with state DOTs and local governments in the areas of finance, auditing, asset management, and policymaking.

#### DOWNLOAD THE REPORTS

Like most NCHRP reports, both 608 and 522 can be downloaded at no charge. NCHRP Report 608, *GASB 34: Methods for Condition Assessment and Preservation*, can be downloaded in pdf format at [http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp\\_rpt\\_608.pdf](http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_608.pdf).

NCHRP Report 522, *A Review of DOT Compliance with GASB 34 Requirements*, at [http://gulliver.trb.org/publications/nchrp/nchrp\\_rpt\\_522.pdf](http://gulliver.trb.org/publications/nchrp/nchrp_rpt_522.pdf).

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## Pavement Preservation Promoted at International I-SWEEEP Olympiad

**P**avement preservation research and sustainable design—as executed by grade and high school students—was in the spotlight in May at a sustainable design competition that brought youth and their projects from around the world to Houston.

The *International Sustainable World (Engineering, Energy & Environment) Project Olympiad (I-SWEEEP)* took place in Houston May 2-4. Hosted by the Cosmos Foundation, I-SWEEEP brought together over 800 young scientists in grades six to 12 from 57 different countries and 38 different states within the United States to compete in an international science fair centered on preserving and recycling the Earth's resources. This year, over 400 research projects were presented.

**I-SWEEEP brought together over 800 young scientists in grades six to 12 from 57 different countries and 38 different states within the United States.**

The Texas Pavement Preservation Center (TPPC) took particular interest in I-SWEEEP, and launched a “mentorship” for the students of the Harmony Science Academy in Austin working with four middle and high school students on four different projects focused on finding practical solutions to challenges in pavement preservation. The four students mentored this year were **Andy Lai, Serghei Cabaniuc, Magaliel Garcia, and Mario Gutierrez.**

Lai entered an impressive project titled *Seal Coat: Making the World a Safer Place* in the Junior Engineering Division. This project centered on finding how seal coat applications to pavements affected the road's skid resistance. Lai's results demonstrated that seal coats increase the friction coefficient, and therefore, the safety of drivers. This project won two special awards from Foundation for Pavement

use in copiers and printers. Through precise laboratory experiments and DSR tests, Garcia discovered that the addition of carbon black to asphalt was indeed beneficial to preserving asphalt pavements, improving the asphalt's stiffness and resistance to rutting. Garcia's ingenuity won three special awards in Senior Engineering Division in I-SWEEEP from the Martin Asphalt, Texas DOT, and Cbp Carbon Black Co.



*Dr. Yetkin Yildirim, P.E., director, TPPC, presents Center for Transportation Research special award to Magaliel Garcia at I-SWEEEP in Houston.*

Preservation and from Texas DOT.

Three other students entered equally successful projects in the Senior Engineering Division at I-SWEEEP. Gutierrez's project, *How Does a Permeable Friction Course on Roads Affect Safety?*, tested the effects of applying a layer of permeable friction courses on pavements. Gutierrez's insightful project won two special awards in I-SWEEEP, one from the Martin Asphalt Co., and the other from Texas DOT. This project also won the Materials Science category in the Austin Science Fair.

Garcia's project focused on the use of waste carbon black in preserving roads. Into asphalt, she blended carbon black which did not meet standards for

Cabaniuc's project was titled *Ice Detection in Bridges*. He attempted to improve safety on bridges by finding a way to detect ice formation and alerting drivers before they approach the bridge. Cabaniuc chose to monitor the road with a drilled-in thermochron; Cabaniuc hypothesized that because ice only forms under certain conditions, monitoring the road for the presence of these conditions would be the best and most accurate way of detecting ice on roads and bridges. Cabaniuc received a special award at I-SWEEEP for his innovative ideas from Texas DOT, and was awarded the National Oceanic and Atmospheric Administration Medallion at the Austin Science Fair.

# N.C. Mobile Loading Simulator Evaluates Surface Treatments

By Y. Richard Kim, Ph.D., P.E.

Department of Civil, Construction & Environmental Engineering  
North Carolina State University

As the general performance of some roadways in the United States continues to deteriorate, an increased interest has arisen in preventive maintenance and rehabilitation. Without appropriate preventive maintenance over the course of a pavement's life cycle, the costs to restore the pavement can more than quadruple.

In 2006, the North Carolina DOT treated over 2,500 miles of roads using asphalt surface treatments. The effectiveness of these surface treatments in North Carolina is evident in that they cover 56.5 percent of the total paved miles, while using only 16.8 percent of the total pavement construction budget. Thus, it becomes imperative for the state to optimize the use of asphalt surface treatments to ensure prolonged service life, decreased life cycle costs, increased operational efficiency, and enhanced safety.

In an effort to accomplish these objectives, the NC DOT has supported asphalt surface treatment research at North Carolina State University over the last five years, with goals of optimizing aggregate gradation, rolling patterns, evaluating polymer-modified emulsions, and developing a performance-based asphalt surface treatment design method.

The NCSU research team has developed several test procedures for the performance evaluation of asphalt surface treatments, including

the aggregate retention and bleeding tests using the third-scale Model Mobile Loading Simulator (MMLS3), the modified sand circle test for aggregate embedment depth determination, and the laser profiler method for determination of aggregate exposure depth. The MMLS3 accelerates wear on pavements and allows researchers to simulate years of damage in mere days. The MMLS3 test procedure utilizes the modified sweep test specimens that have the same width as the MMLS3 wheel path. The advantage of using the modified sweep test specimens is that the aggregate loss can be determined accurately because the weight of the specimen can be measured by first removing the specimen



from the bottom plate.

The MMLS3 test is composed of two parts, an aggregate retention test at 25°C (77°F), followed by the bleeding test at 50°C (122°F). Digital imaging analysis of the sample surface after the bleeding test is used to quantitatively determine the bleeding area. The MMLS3 is aided by a new laboratory sized chip spreader, ChipSS, developed at NCSU. ChipSS allows the consistent fabrication of test specimens in the laboratory.




Top of page, right: Model Mobile Loading Simulator (MMLS3) accelerates wear on pavements; above, asphalt surface treatment aggregate test specimen is prepared at NCSU lab. Photo credits: North Carolina State University

This research has found:

- Aggregate gradation plays a critical role in the aggregate retention performance, regardless of the aggregate type. The amount of fine has much less effect on aggregate loss when the aggregate gradation is more uniform.
- Polymer-modified emulsion improves the aggregate retention performance.
- Pneumatic tire and combination rollers are recommended for the rolling of asphalt surface treatments.
- Three rolling coverages are recommended; only a slight increase in aggregate embedment depth is found when the number of coverages increases from three to five.

Today the NCSU research team is developing a performance-based mix design method for asphalt surface treatments in North Carolina using these advanced pavement test methods. Various performance test methods that have been developed at NCSU will be verified and calibrated throughout this study.

Research products from NCSU will be useful for division bituminous supervisors, county maintenance engineers, and division maintenance and operations engineers in ensuring optimal placements in their annual programs, and in evaluating their performance whenever necessary. 

### Contribute Your Technical Paper to *Pavement Preservation Journal*

Prospective authors are invited to present articles on original research on any topic relevant to pavement preservation, such as preservation techniques, materials, construction, testing, performance, recycling, and pavement management to *Pavement Preservation Journal*.

Papers discussing best practices for pavement preservation treatments, including asphalt overlays, scrub and fog seals, crack sealing, chip seal, hot in-place recycling, microsurfacing, and slurry seals, would be welcome as well.

Authors must prepare their manuscripts in accordance with the guidelines outlined by the *Pavement Preservation Journal*. All articles should be submitted as an email attachment to Dr. Yetkin Yildirim, P.E., at [yetkin@mail.utexas.edu](mailto:yetkin@mail.utexas.edu).

For more information, including style guidelines, please visit the *Pavement Preservation Journal's* home page at [www.fp2.org/](http://www.fp2.org/).



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# State, Municipal, County Delegates Get Facts at California Conference



By M. Stroup-Gardiner

California Pavement Preservation Center

Over 330 representatives from local, regional, state and federal agencies, industry and academia attended the third annual *California Pavement Preservation Center Conference* held April 9-10 in Newport Beach.

Participants shared their considerable expertise and wide-ranging experience in the areas of pavement preservation for both flexible and rigid pavements. Over 30 exhibitors were on hand to share their knowledge on specific pavement preservation treatments and techniques. A number of pavement preservation tool box treatments were included in the conference. **All of the presentations are available for download at [www.cp2info.org/conference](http://www.cp2info.org/conference).**

Two of the new highlights of the conference were the first annual presentation of the Pavement Preservation Task Group (PPTG) awards, and a section on how to initiate, fund and implement pavement preservation programs.

## AWARDS CEREMONY

The nominating committee presented eight awards in three categories: *Individual Award*, *Program Award*, and *Project Award*.

The first individual award was presented to **Dr. Shakir Shatnawi** for his vision, innovation and dedication; without him there would have not been a PPTG. Shatnawi also recognized the need for education, technical assistance and independent assessments of innovation projects, which led to the establishment of the California Pavement Preservation (CP<sup>2</sup>) Center at California State University-Chico.

The second individual award was presented to **Gary Hildebrand**. Hildebrand also is a co-founder of the PPTG.

And the third individual award was presented to **Bill Robertson**, director, Department of Public Works, Bureau of Street Services, City of Los Angeles. Robertson has displayed an exceptional understanding of what it takes to implement pavement preservation. His community communication programs and methods serve to educate both the decision makers and the general public about the needs, options and benefits of pavement preservation programs. He has used innovative processes and materials to preserve, maintain, and rehabilitate more roads per dollar spent.

Three program awards were presented to agencies whose use of progressive pavement preservation techniques resulted in documented benefits of pavement preservation, while at the same time provided the best maintenance to construction dollar ratio.

The first program award was presented to **Santa Barbara County** for its use of a pavement preservation program developed in 2001. The second was presented to **Contra Costa County** for its pavement preservation program which, with 750 lane miles, has one of the best pavement condition index in the Bay Area. The **City of Lakewood** was the recipient of the third program award. The city demonstrated its political will in using funds to resurface approximately 80 percent of their street mileage with rubberized asphalt concrete.

The two project awards were presented for installations which have demonstrated significant advances in the development and use of new technologies which resulted in significant favorable public comments. The first project award was presented for the 2007 **Lake County Cape Seal Project**, Buckingham and Riviera



CP<sup>2</sup> Center's Gary Hildebrand



CP<sup>2</sup> Center's Shakir Shatnawi



L.A.'s Bill Robertson

West Subdivisions. The second project award was presented to the **City of Watsonville** for its 2005 Chip Seal Innovation project, in which 27 roadways throughout the city were selected for a three-part surface treatment.

## PAVEMENT PRESERVATION PROGRAM FUNDING

Another new component to the annual conference was a section on how pavement preservation programs are initiated, funded, implemented and managed by local and regional agencies.

**Scott McGoupin** and **Kevin Donnelly** provided a presentation *Getting Ahead in Pavement Preservation: Santa Barbara County's Perspective*. The Santa Barbara County system consists of 1,667 lane miles of asphalt pavement, 110 major bridge structures, 48 traffic signals, over 15,000 street trees, concrete hardscape improvements, and over 4,100 drainage facilities. Topics covered included a brief description of the evolution of the pavement preservation program in Santa Barbara County, challenges to implementing a pavement preservation program, and its Road Maintenance Annual Plan (RdMAP) and the success of its emulsion program (rejuvenating fog seals and cape seals).

**Theresa Romell**, Metropolitan Transportation Commission (MTC), discussed the *Regional Benefits of Pavement Management*. The San Francisco metro region has a population of 7.1 million spread over nine counties, 109 jurisdictions with 41,000 lane miles of local roads and streets, 1,500 miles of highways, 23 transit agencies, and seven toll bridges with a replacement value in assets of between \$40 billion and \$50 billion.

The MTC's asset management program, *StreetSavers*, consists of three main components: software with training and user support, federal grant program, and policy and advocacy. The StreetSaver program was developed about 20 years ago; 108 of the 109 jurisdictions use the network level program. The information obtained from the management system provides users and the Local Streets and Roads Committee with condition summaries,



Aggregate is seated into PASS QB polymer modified emulsion on Santa Barbara County, Calif. local street, as part of county's award-winning program. Photo credit: Kevin Donnelly

needs and shortfall assessments, funding guidelines and criteria.

**Nephele Barrett**, Mendocino Council of Governments, Lake County/City Area Planning Council, provided a look at smaller agency efforts to implement pavement preservation with her presentation *Funding Pavement Preservation: Sales Tax and Other Revenues: A Regional Perspective*. Mendocino County has a population of about 90,000 people, 75 centerline miles of county roads, 100 centerline miles of city streets and 389 state highway centerline miles.

Lake County is somewhat smaller with a population of about 64,000, 500 centerline county road miles, 95 city street centerline miles, and 138 state highway centerline miles. When the program was started, the average PCI in Mendocino County was 50, 51 in Lake County, and 38 in the City of Clearlake.

The low PCI values indicated a need for pavement preservation funding. This started the exploration of implementing local sales taxes. AB 902 went into effect in 2003 and amended the Revenue and Taxation Code to allow cities in Lake and Mendocino

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### LOCAL REVENUE BONDS

**Souri Amirani**, City of Santa Ana public works agency, discussed Santa Ana's journey towards pavement preservation in her presentation *Local Revenue Bond Program*. Santa Ana—"downtown Orange County"—covers an area of 27 square miles, has more than 60 neighborhoods and a population of 353,428, 112 miles of arterial streets, 311 miles of local streets. Their option was a \$60 million bond as a Certificate of Participation (COP) with \$40 million in local funds (preferred option) and \$100 million total.

As the total \$300 million backlog could not be financed, the main focus of the program was street pavement only. The scope of the implemented program was removal of industrial streets (12 percent), removal of concrete streets (12 percent), consideration of alternatives to reconstruction to reduce cost, minimize concrete repairs (critical only), and removal of areas improved within the last seven years (13 percent).

L.A.'s **Bill Robertson**—a recipient of one of the individual awards—provided insight on pavement preservation programs in his presentation *Pothole Politics: The Road to Pavement Preservation*. The City of Los Angeles covers 468.85 square miles and is the largest municipal street system in the United States, with 6,500 centerline miles, 28,000 lane miles with 69,507 segments. The current PCI of the system is 62, with about 1,000 failed streets and a \$2.3 billion backlog (target PCI of 80).

The strategic game plan was presented as: identify the goal, create a pavement preservation plan, budget allocation, pavement management (MicroPAVER), recycle-recycle-recycle, and tell the story. The pavement preservation plan identified rubberized slurry seal as providing the most "bang for the buck." MicroPAVER was used to develop the budget allocation. The current budget

allocation formula is based on pavement condition (distress and ride quality), pavement area (factors in the varying sizes of lane miles), and bus/truck traffic (dictates pavement thickness).

Robertson created the character *Professor Pothole* as a way to "tell it like it is." The public outreach program involved 89 certified neighborhood councils, provided outreach to elected officials and their staff, embraced the media, and worked with local colleges and universities. The results of this

effort were an increase in crack sealed, slurry seal, and resurfacing work from 310 miles in 2002, to 675 miles in 2008.

### NEXT CONFERENCE ON WAY

The third annual conference was a great success. Plans are already underway for a fourth conference which will take place in northern California in April 2009. Announcements for the next conference will be included on the conference web site at [www.cp2info.org](http://www.cp2info.org).



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## Northeast Pavement Preservation Partnership Plans Second Annual Meeting, in Hartford

By Ed Denehy

New York State Department of Transportation

The Northeast Pavement Preservation Partnership (NEPPP) will hold its second annual official meeting Oct. 20-23 in Hartford, Conn. at a location to be determined.

The Northeast Pavement Managers (NEPM) Group will integrate a meeting of its group with the NEPPP meeting. Both the NEPPP and the NEPM group recognize that pavement management and pavement preservation are two interrelated program areas. Joining forces will enable the two groups to strengthen technology development and delivery by pooling limited resources, enhancing communication and improving program coordination within their organizations. In addition, this should allow the meeting to target a wider audience of state, local, federal, academic and private sector individuals.

At the business session of the NEPPP meeting, new officers will be appointed through the established succession planning and any proposed changes to the bylaws will be considered. Due to the resignation of one of the officers and the succession plan, a new agency vice-chair and a secretary-treasurer will be elected. The terms of three directors of the NEPPP will expire at the meeting, so three new directors will be elected. The officers will determine which directors' terms will expire prior to the meeting.


The existing three officers of the NEPPP held a planning meeting in April 2008, and discussed agenda topics. Technical presentations and state preservation programs reports will be scheduled along with progress reports from

the Task Groups: *Promotion, Marketing, Public Relations and Success Stories; Specifications, QC/QA, Quality Contracting; Treatment Performance, Cost Effectiveness; and Workforce Development, Training, Education, and Certification.*

Tentatively planned technical presentations include *Portland Cement Concrete Pavement Preservations Practices and Techniques, Thin Lift Overlay Research Update, and Energy Efficiency of Pavement Preservation Treatments.* Representatives of each of the NEPPP's member states and Canadian provinces will report on specific success stories and/or difficulties encountered with their pavement preservation treatments and programs.

On Wednesday, Oct. 22, a training session entitled *Integrating Pavement Preservation with Pavement Management* is tentatively scheduled. The meeting will end with the NEPM group directing the agenda for the morning of Thursday, Oct. 23. This agenda is under development.

Minutes from previous meetings of the NEPPP are available on the National Center for Pavement Preservation's web site at [www.pavementpreservation.org/northeast](http://www.pavementpreservation.org/northeast). The minutes include the complete list of directors, an attendance list with contact information, the NEPPP's By-Laws, and information on joining the NEPPP.

Please contact any of the officers or directors of the NEPPP with suggested agenda items or to get involved with the NEPPP. Additionally, contact Joe Huerta of FHWA's Resource Center in Baltimore at [joseph.huerta@dot.gov](mailto:joseph.huerta@dot.gov) with suggested agenda items for the NEPM group meeting. 





## Pavement Preservation Help Desk, Web Site Gain Broad-Based Utilization

By **John B. Johnston**

Technology Engineer

National Center for Pavement Preservation

**A**ctivity associated with the *Transportation System Preservation Technical Services Program* (TSP<sup>2</sup>) pavement preservation Help Desk and web site has continued to gain broad-based user support over the last quarter, with utilization of the latter reaching in excess of 710,000 page views over the last 12 months.

The TSP<sup>2</sup> pavement preservation Help Desk has fielded numerous requests for assistance this year, covering areas such as preservation treatment and project selection, construction best practices, information on state preservation funding (both regionally and nationally), treatment application conditions, materials, and cost-benefit analysis.

Pavement preservation Help Desk assistance requests may be made through the TSP<sup>2</sup> web site, or by contacting the NCPP at 517.432.8220, or by emailing us at [ncpp@egr.msu.edu](mailto:ncpp@egr.msu.edu).

### ARRA IN-PLACE RECYCLING WORKSHOPS

The NCPP has recently established a web site presence to host proceedings and meeting information for the newly formed Asphalt Recycling & Reclaiming Association (ARRA) *In-Place Recycling Workshop* effort.

Working cooperatively with the FHWA, the ARRA In-Place Recycling Workshops will offer regional forums where pavement and recycling professionals can work together to take advantage of the synergy to be gained from the sharing of information and identifying common issues for further research. Information is currently available for the Western States Conference held in June 2008. For more information, visit the recycling workshop web site at [www.pavementpreservation.org/recyclingworkshop/](http://www.pavementpreservation.org/recyclingworkshop/).

### PME STUDY MOVES FORWARD

The NCPP has completed its draft formulation of recommendations for the Federal Lands Highway Division study on *Polymer-Modified Emulsions (PME) in Thin Surface Treatments*. Presently, the NCPP and FLH plan on a September 2008 release of the Interim PME Report, which will contain the results of the literature review, input by industry suppliers, recommendations on PME best practices

going-forward, and a Testing and Analysis Plan that will eventually be used to develop draft specifications.

### VOICE YOUR OPINION ON RESEARCH ROADMAP

The Transportation System Preservation Research Roadmap is currently available for download on the TSP<sup>2</sup> web site. Developed through a series of national workshops in 2007, the Research Roadmap was created to delineate the most critical knowledge gaps in pavement and bridge preservation and the research which is necessary to fill those gaps (see *New 'Road Map' Offers Pavement Preservation Path to Progress*, *Pavement Preservation Journal*, Spring 2008, p 15).

The NCPP is currently seeking pavement and bridge practitioner input on specific research problem statements identified through the Roadmap workshops. To cast your votes and voice your viewpoint, please visit: [www.tsp2.org/roadmap/](http://www.tsp2.org/roadmap/) and complete the brief survey found there.

### PAVEMENT PRESERVATION PARTNERSHIP UPDATE

The first meeting of the *Rocky Mountain Pavement Preservation Partnership* (RMPPP) was held on April 29-30, and was deemed a success.

Feedback from meeting participants on the proceedings was overwhelmingly positive, with member agencies voting to move forward with future partnership



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meetings. Participants also took the first steps in permanently establishing the group by drafting bylaws to govern partnership voting and membership procedures; steering committee responsibilities; and mission goals and objectives.

The next meeting of the RMPPP has been scheduled for October 2008 in Albuquerque, N.M.

The 2008 meeting of the *Southeastern Pavement Preservation Partnership* (SEPPP) was held May 6-8 in Atlanta, Ga. Participation was enthusiastic, particularly with respect to the level of technical exchange facilitated during the meeting. The next meeting of the SEPPP is currently scheduled for May 2009 in Baton Rouge, La.

Other regional partnership meetings scheduled for 2008 include:

- Northeast Pavement Preservation Partnership (NEPPP), October 2008, Hartford, and
- Midwestern Pavement Preservation Partnership (MWPPP), September 2008, Minneapolis.

To download meeting proceedings or brochures, please visit the NCPP web site at [www.pavementpreservation.org/partnerships/](http://www.pavementpreservation.org/partnerships/), or for more information on any of the partnership groups, please contact the NCPP at 517.432.8220.

#### SLURRY SEAL AND MICRO SURFACING TRAINING

Considerable interest has been expressed in the NCPP's newest training course offering in *Slurry Seals and*

*Micro Surfacing*, which was developed in cooperation with the International Slurry Surfacing Association (ISSA). In addition, NCPP courses in *Chip Seal Best Practices* and *Applied Asset Management* remain in strong demand, with several classes being facilitated over the last three months in Indiana, Louisiana (4), Oregon (3), Ohio, and Ontario.

For more information on NCPP preservation training, please visit the training web site at [www.pavementpreservation.org/training/](http://www.pavementpreservation.org/training/).



## Calendar of Events

### 2008

- Sept. 9-11 Midwestern Pavement Preservation Partnership, Minneapolis
- Sept. 10-11 Regional Asset Management Conference, Albuquerque
- Sept. 14-17 American Public Works Association (APWA) Congress and Exposition, Indianapolis, Ind.
- Sept. 23-24 Second National Maintenance Quality Assurance (MQA) Peer Exchange, Durham, N.C.
- Sept. 24-26 International Symposium on Asphalt Emulsion Technology (ISAET 2008) Hyatt Regency, Crystal City, Va.
- Sept. 24-26 National Workshop on Highway Asset Inventory and Data Collection, Durham, N.C.
- Sept. 24-26 International Symposium on Asphalt Emulsion Technology, Crystal City, Va.
- Oct. 6-8 Pacific Northwest Bridge Maintenance Conference, Seaside, Oregon
- Oct. 16-20 AASHTO Annual Meeting, Hartford
- Oct. 20-22 10th International Bridge and Structure Management Conference, Buffalo, N.Y.
- Oct. 20-23 Northeast Pavement Preservation Partnership Meeting, Hartford
- Oct. 28-30 Rocky Mountain Pavement Preservation Partnership, Albuquerque
- Nov. 11-12 AEMA Asphalt Emulsions: User Focus, Indianapolis
- Nov. 13-14 AEMA Asphalt Emulsions: Producer Group, Indianapolis
- Nov. 13-14 Road Dust Management Practices and Future Needs Conference, San Antonio
- Nov. 17-20 Southeastern Asphalt User/Producer Group Meeting, Birmingham

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- Jan. 11-15 Transportation Research Board, Washington, D.C.
- Jan. 27-30 Slurry Systems Workshop, Palace Station Hotel & Casino, Las Vegas
- Feb. 15-16 AEMA-ARRA-ISSA Annual Meeting, Palm Springs, Calif.
- Mar. 9-12 World of Asphalt, Orlando
- April 19-23 National Association of County Engineers, Peoria
- May 4-6 Southeastern Pavement Preservation Partnership, Baton Rouge

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