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In this issue... Pavement Preservation

Next issue ... Highways!

What is Pavement Preservation?

By Gerry Eller, P.E.
Executive Director
Foundation For Pavement Preservation
Austin, Texas

This nation's highway system is one of the major engines of our economy. Its performance and the service it provides is vital to economic growth.

For decades, we have been in a constant cycle of build, rehabilitate/reconstruct, and rebuild.

With ever shrinking budgets and more demands from users, this management approach has not provided

Up and running ... *Pavement preservation is the sum of all activities undertaken to provide and maintain serviceable roadways.* **(Photo: ACPA staff.)**

Today, we must manage our public highways with the same attention that private industry manages their assets. One of the major elements of a highway is the pavement structure. It is this element that the public really uses to rate their satisfaction with a highway. How smooth is it, how long does it last, how much interruption is required to keep it in an acceptable condition?

Today, we must find a better way to manage our pavements in a cost effective manner and meet the increasing demands from the public. A pavement preservation program can provide longer lasting pavements, higher serviceability levels, and increase system performance.

Pavement preservation is, 'the sum of all activities undertaken to provide and maintain serviceable roadways. This includes preventive maintenance and some forms of reactive maintenance, as well as minor rehabilitation projects. It excludes new or reconstructed pavements and pavements requiring major rehabilitation or reconstruction.'

The greatest cost benefit is realized from a strong preventive maintenance program. AASHTO has defined preventive maintenance as, "a planned strategy of cost effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without substantially increasing structural capacity)."

Preventive maintenance is not ***worst first***! It is applying the right treatment to the right road at the right time.

A planned program of preventive maintenance, will delay the need for costly rehabilitation projects, reduce user costs by providing better serviceability levels and insure that the original pavement investment provides a higher return.

Documented savings in rehabilitation costs of $6-$10 for every $1 dollar invested in preventive maintenance have been reported. There are three elements required for a successful preventive maintenance program, data, funding and commitment.

Data about the performance of pavements and the rate of deterioration due to traffic and climate is most important. This is the key to knowing the 'right road and the right time.'

Data about the performance of the treatments also is required to know how long the treatment will perform, how effective they are and to determine the cost effectiveness of the treatment.

The public, the users, must understand why work is being done to good roads and not 'worst first.'

Funding is also a necessary element to insure that the preventive maintenance treatment is done at the right time. If not done at the right time, the performance will not be as expected and the full benefit will not be realized. Preventive maintenance activities must be a part of the planning and annual budgeting process.

Finally, a commitment by management is required to keep the preventive maintenance program ongoing. A one time application is not an ongoing program.

This commitment also requires an education element, for employees, contractors, politicians,

decision makers and most importantly the public, the users. They must understand why work is being done to good roads and not 'worst first.'

Assistance is available from industry to help an agency in establishing a good preventive maintenance program.

The Foundation for Pavement Preservation, the National Center for Pavement Preservation, and local LTAP centers can provide information, training, and example programs.

A good preventive maintenance program will result in improved system ratings, help ensure the full service life of the designed pavement, reduce the disruption to traffic over the life of the pavement, and provide a much higher rate of return on the original investment. Preventive maintenance is 'keeping good roads in good condition.'

› Contact author at the Foundation For Pavement Preservation, 8613 Cross Park Dr., Austin, TX 78754. Phone: 1-866-862-4587.

A Strategic Approach to Pavement Preservation

An important first step in a pavement preservation program is to assess the pavement conditions throughout the network, planning for both the current pavement needs and anticipating future needs. The concept is a simple enough, but often overlooked.

The approach involves looking at the needs of the overall network first, and then moving down to the project level.

The concrete pavement industry supports a "mix of fixes" to address both short- and long-term requirements. Too often, we observe cases where cheap, asphalt overlays are placed over structurally sound concrete pavements.

Worse yet, are cases when structurally-sound

Mix of fixes *... The concrete pavement industry offers agencies assistance in using a strategy that addresses pavement needs in the short and long term. The strategy includes allows the use of pavement preservation tactics until eventual reconstruction is warranted.*

concrete pavements have been destroyed prematurely and either resurfaced or reconstructed with asphalt because better alternatives were never considered.

Through sound planning and regular pavement assessments, this approach will not only help address pavement performance issues as early as possible, but also will help in the selection of the *right* corrective action.

The concrete pavement industry offers a wide variety of pavement preservation solutions, including concrete pavement maintenance, restoration (CPR), and resurfacing. But the strategy also allows agencies to assess when reconstruction may be indicated.

Selecting the right option depends on the current conditions of the pavement, traffic requirements, required design life, and the relative life-cycle costs.

Maintenance Basics
Of course, no discussion about pavement preservation would be complete without addressing maintenance.

It's important to note, however, that concrete pavements inherently require little to no maintenance.

The most common type of concrete pavement maintenance is joint re-sealing, which also fits into the industry's broad strategy known as CPR, series of engineered procedures used to manage the rate of concrete pavement deterioration. On average, annual maintenance costs for concrete pavements are one-fourth the maintenance costs of asphalt pavements.

Restoration: Both Preventive and Corrective
Ideally the first rehabilitation procedure applied to concrete pavement is concrete pavement restoration, or CPR.

CPR is best indicated when the pavement exhibits only slight deterioration. CPR techniques fall into a number of subcategories, which may not all be required during the life of a pavement, but should be followed in the appropriate order.

CPR may be either preventive or corrective. Applying the right CPR technique requires identifying and classifying distresses, noting whether they are structural (which affect the pavement's ability to carry traffic) or functional (which may affect ride quality and safety, but do not impact the pavement's load-carrying capability).

Examples of structural distresses include cracking or joint deterioration, while functional distresses include roughness or surface polishing.

Preventive CPR techniques include:
• Joint and crack resealing to minimize the infiltration of surface water and incompressible materials into the joint system;
• Retrofitting concrete shoulders to decrease edge stresses and corner deflections, as well as to reduce the potential for transverse cracking, pumping, and faulting;
• Retrofitting edge drains by adding a longitudinal drainage system to assist in the removal of water that may cause pumping, faulting and durability distress.

Corrective ***and*** preventive CPR techniques include:
• Dowel bar retrofit to increase the load transfer efficiency at transverse cracks and joints;
• Slab stabilization to restore the support to concrete slabs by filling small voids that develop under the concrete slab at joints, cracks, or the pavement edge.
• Full-depth patching, i.e., removing and replacing at least a portion of a slab to the bottom of

the concrete, to restore areas of deterioration. Full-depth patches improve pavement rideability and structural integrity and extend pavement service life.
• Partial depth patching to restore localized areas of deterioration that do not extend through the slab.
• Diamond grinding to remove bumps and reprofile the surface of concrete pavements. This improves safety, riding comfort (smoothness and noise) to motorists, and decreases the severity of dynamic or impact loads from heavier vehicles.

Repairing Medium, High Distress Levels
Concrete pavement resurfacing using overlays is indicated when pavement has medium to high levels of distress and restoration would not be expected to perform effectively. Concrete overlays fall into two basic categories: concrete overlays for concrete pavements and concrete overlays for asphalt pavements. Within each of these categories are two overlay types: bonded and unbonded.

• Bonded concrete overlays of concrete pavements are primarily used to increase pavement structural capacity. They consist of a thin concrete layer (typically 4 in. or less, but they can be thicker) bonded to the top of the existing concrete surface to form a monolithic or composite section. Typically, pavements that have very little deterioration, but are too thin for an increasing traffic volume, are candidates for this technique.

• Unbonded concrete overlays consist of a thicker concrete layer (5 in. or greater) on top of an existing concrete pavement. Unbonded concrete overlays are more effective-in terms of long-term performance and cost-for deteriorated concrete pavements than asphalt overlay options.

Unbonded overlays require a separating layer between the overlay and old pavement.

The separation interlayer is usually a thin asphalt layer of about 0.5 to 1.5 in. thick. The layer is sometimes called a debonding layer or stress relief layer, which separates old and new layers so that they may act independently of each other through temperature cycles and load deflection.

Whitetopping — the use of concrete overlays over asphalt pavements — is time-tested technology that has been used successfully for decades. Whitetopping uses between 2 in. and 8 in. of concrete over an existing asphalt pavement.

Whitetopping overlays are effective for almost all applications. They have been successfully used on interstate highways, as well as other roadways, intersections, and airport pavements.

In thinner applications (e.g., 2 in. to 4 in.), they are bonded or partially bonded to the existing asphalt pavement and feature short joint spacings (2 to 6 ft, versus 12 to 15 ft). Bonding the concrete overlay to the asphalt pavement creates a composite section in which the load is shared between the concrete and existing asphalt. The closer joint spacing allows the slabs to deflect instead of bend. This reduces load stresses in the slabs to reasonable values, even at thickness of just 2 inches.

Whitetopping has a well-deserved reputation as an inexpensive, quick, cost-effective, and durable way to eliminate the constant maintenance and frequent repairs of problems such as rutting, shoving, washboarding, and potholes.

Reconstruction: The Final Answer
Pavement reconstruction, the total removal and replacement of worn out or insufficient pavement, is used when the pavement has high levels of distress, when overlays will not solve

the problem, or when the pavement has simply outlived its design life.

There are many factors to consider prior to reconstruction, but one of the most significant is cost.

With the increasing demands on America's highways, it is important to evaluate more than the initial costs, but also consider what the pavement will cost during its entire design life.

Currently pavement itself reflects only about 40 percent of the total project costs, and it is very likely this figure will continue to decrease in the future as other technologies, such as intelligent transportation systems, increasingly find their way into highways applications. The concrete industry remains committed to finding innovative ways to make pavements even better through improvements in materials, equipment, and paving processes.

At the same time, we will maintain our focus on the essential elements of quality design, construction, and rehabilitation of pavements that are sensitive to the environment and the sustainability of our resources and quality of life. The nation's drivers deserve nothing less.

Concrete Pavement Industry Well-Represented in Pavement Preservation

The concrete pavement industry is well-represented in pavement preservation, predominantly through participation with two groups chartered to address this important subject area.

FP2: Preserving Public Assets

The Foundation for Pavement Preservation (click here to see a related story) is comprised of agency personnel, academia, and industry officials with a keen interest in pavement preservation, says John Roberts, Executive Director of the International Grooving & Grinding Association.

Roberts participates as a member of the Board of Directors for the Foundation for Pavement Preservation.

FP2 is continuously developing new methods for future pavement improvement. Among the key charter areas for FP2 are:

- To identify and pursue industry/agency research needs;
- Coordinate with industry partners AASHTO and FHWA;
- Identify "Best Practices" for pavement preservation programming and techniques;
- Promote pavement preservation internationally; and
- Develop activities for highway users and auto industry groups.

Finding Out: Feds Address Pavement Preservation

In 1991, the Federal Highway Administration established the Pavement Preservation Expert Task Group (PP ETG).

The PP ETG is comprised of members representing government agencies and industry. Representing the concrete pavement industry on this group are:

› John Roberts, IGGA;
› Wouter Gulden, P.E., Director of Engineering & Training, ACPA-Southeast Chapter;
› Jim Tobin, P.E., Executive Director, Northwest Chapter - ACPA; and
› Matt Zeller, P.E., Executive Director, Concrete Paving Association of Minnesota.

The PP ETG initially evaluated the Strategic Highway Research Program's Specific Pavement Studies on applications and their performance and assisted in the implementation of SHRP findings.

Today, activities to promote the institutionalization of the pavement preservation concept and practice are being guided and supported by the PP ETG. One such activity has been the development of a series of pavement preservation training courses.

The PP ETG also has been involved and supported numerous reach out activities throughout the years, including conferences and ongoing outreach and informational activities.

They have also provided guidance to the international pavement preservation scanning tour team and to research studies on various pavement preservation practices.

Solving Complex Pavement Lifting and Restoration Problems

Over the years, Federal and State DOT's, Departments of Public Works, Airport Authorities and other transportation asset managers have used an assortment of solutions to address the repair and maintenance of their transportation assets. Some of these traditional solutions include:

1. *Asphalt Overlay* — Asphalt is frequently used to repair deficiencies such as uneven surfaces, misaligned panels and pavement settlement.

Typically, hotmix asphalt (HMA) is spread over an existing surface to fill in and cover up the deficient area.
The thickness of the asphalt overlay can vary anywhere from half an inch to several inches, depending on the magnitude of the problem.

The success of this technique depends to a great extent on the condition of the base soil beneath the roadway. If the base is weak, unstable or voided, the repaired surface is likely to experience a repetition of the failure. The technique also leaves the repair subject to performance of the asphalt, which can rut, shove, and produce a rough ride.

2. *Cementitious Grouting* — This process typically involves the use of a water/soil/fly ash/cement mixture injected by hydraulic pressure under pavements to fill voids and support the damaged or settled areas. Unfortunately, the cementitious material is slow to cure (causing extended lane closures); as it cures it shrinks (taking any lifted panels out of level); and once cured,lacks sufficient tensile strength for long term effectiveness.

When used to fill subsurface voids, significant amounts of the material must be pumped in to ensure the underground space is completely filled. Once the cementitious material hardens, its inherent weight of 140 lbs./ft3 adds excessive weight burden to an already distressed base soil condition. When used to repair bridge approach slabs, the added weight of cementitious grout can also compromise adjacent utility conduits and piping located beneath the surface of the structure. If enough force is applied, the pressurized grout can move existing utilities out of alignment or force its way into cracks that exist within underground pipes or lines.

3. *Full-Depth Pavement Removal and Replacement* — The typical full depth replacement process can take weeks or months to fully complete and rehabilitate. During this period, traffic must be re-routed around the repair area, contributing to greater delays and disruption, to say nothing of the higher cost of such projects.

Some of these solutions are now quickly losing favor as safer, faster, more technologically advanced approaches are being embraced. These advances are being made in both finding and fixing the problems.

Tools of the Trade *... Screen capture of a hyper-optics void detection system (left) and a penetrometer (right) represent two methods for locating sub-surface problem areas.*

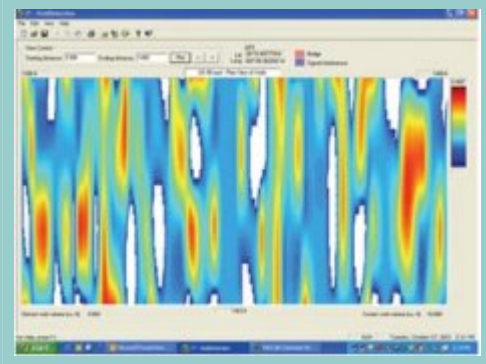


Figure 1

Figure 2

Understanding High-Density Polymer Injection Program

Polymer injection is a multi-step process designed to identify and facilitate the repair and restoration requirements of highways, roadways, airport pavements and other transportation assets.

Locating the Problem Area

Where long expanses of highways and roadways are involved, the analysis process begins by using state of the art "Hyper Optics Pavement Void Analysis" (PVA) to determine the location and extent of voids beneath the surface.

The system (figure 1) locates and quantifies voids and eliminates lane closures and traffic disruptions that would normally occur with traditional detection methods. On-site dynamic cone penetrometer testing (figure 2) measures the comparative strength of the base soil layers beneath roads, airport pavements and bridge approach/departure slabs. This information is used to determine exact locations and levels for the injection of the polymer materials used to strengthen and densify problem soil strata.

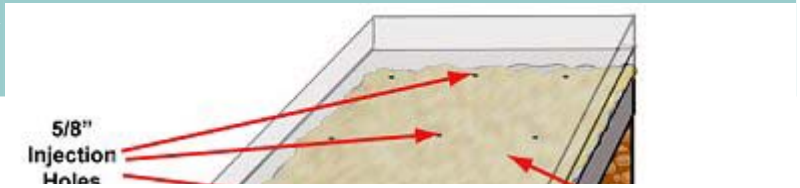
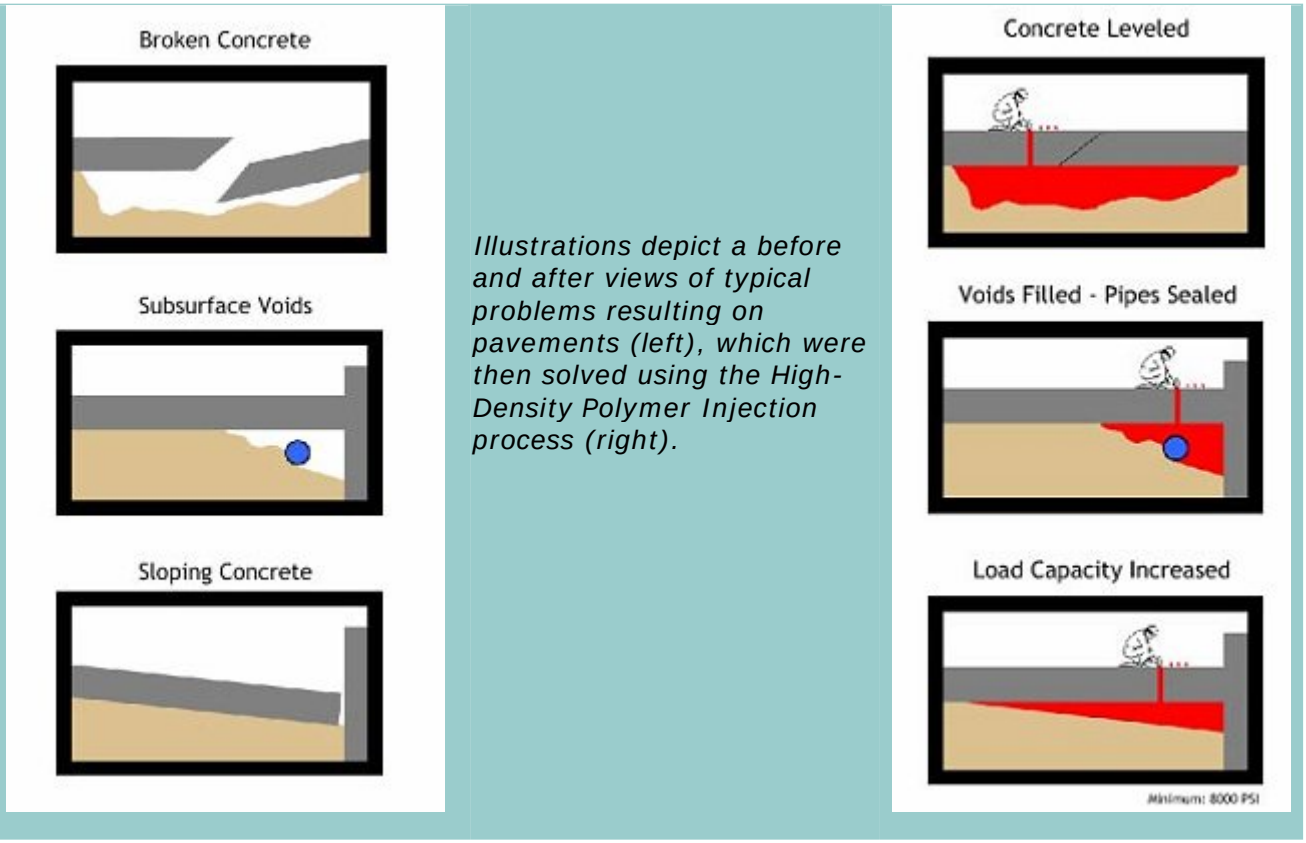


Figure 3

Repairing the Problem Area
Next, surface profiles are made to properly identify any differential settlement of the pavement.

As illustrated in Figure 3, the 486 Polymer material material is precisely injected via small (5/8") diameter holes drilled through the pavement, into any existing void spaces. Once injected, the polymer begins to expand and form a stable, strong, lightweight replacement base material. Being hydro-insensitive, any trapped subsurface water or wet soil has no effect on the material's structural integrity or performance. In fact, the water is forced out and the wet soil densified.

The injection process is repeated, using a gridwork of hole locations (see figure 3), until the entire area is sufficiently filled and sealed by the polymer. If the road, runway or panel also needs to be leveled or raised, this is achieved through further monitored injections.



Illustrations depict a before and after views of typical problems resulting on pavements (left), which were then solved using the High-Density Polymer Injection process (right).

Monitoring the Repair Process

As the pavement is lifted, its movement is precisely monitored on the surface using laser level measuring devices. The polymer expansion reaches 90% of its full compressive and tensile strength within approximately 15 minutes. Because the polymer material is extremely light, any additional overburden weight is kept to a minimum. The properties of the polymers are carefully matched to typical base material compressive strength characteristics.

Typical Applications for HDP Injection

There are four key applications where HDP injection provides a significant advantage over more traditional methods in solving complex pavement lifting and soil densification problems:

• **Void Filling** - When weather conditions produce rain, snow, or severe temperature shifts, expanses such as fissures and water pockets can be created that in turn form voids just below the pavement surface. These voids can result in settlement, potholes, sink holes or cracking that destabilize road surfaces, highways, bridge approach and departure slabs and a host of additional transportation assets.

HDP injection is very effective in addressing these types of voids. The expansive, hydro-insensitive polymer material drives out any standing water and aggressively fills voids. This also densifies the soil, thereby preventing the formation of new voids in the future.

• **Stabilization** - By undersealing and void filling, HDP injection stabilizes roadways and prevents pumping or further differential settlement of these assets. HDP injection effectively fills, compacts and stabilizes the base soils beneath pavements and seals the area from any further water intrusion that could contribute to degradation.

It is the only process that combines the benefits of sealing, stabilizing, and asset protection, with rapid curing time that allows the project area to be quickly repaired and returned to service.

• **Lifting** - HDP injection is quickly and economically applied to solving the densification, lifting and realignment of both concrete and asphalt roadways. The expansive, hydro-insensitive properties of the polymer and the 10 year material guarantee ensure that settlement problems are properly corrected. Since the material is injected in layers, the amount of lifting can be controlled to within one tenth of an inch, which assures accurate lifting profiles.

• **Sealing** - Sealing joints and cracks from water leakage and seepage is one of the most important and frequently recurring problems facing many roadway surfaces. If left unattended, leaking joints and cracks can grow, further damaging the pavement and compounding void and settlement problems.

To underseal pavements in these environments, the polymer material is strategically injected in a uniform grid pattern just below the surface. As the material is injected, it begins to expand and seeks out and fills sub-surface cracks, leaks, voids and joints, providing a strong, stable and long-lasting seal which also resists further water intrusion into the area.

About The High-Density Polymer Material
The key characteristics of HDP material are:
• Expansive — When injected into a subsurface layer, it expands up to 20 times its original liquid volume.
• Faster Installation — Time requirements for the repair process are reduced to hours instead of the days or weeks for alternative techniques.
• Hydro-Insensitive — The HDP material displaces trapped water and is unaffected by wet conditions during or after installation.
• Lightweight — HDP is extremely lightweight, weighing less than 10% of comparable cementitious-based grouts or asphalt materials.

• Safe — The cured polymer material is inert, environmentally neutral and does not contribute to soil or water contamination, leaching, or pollution.

High-density polymers provide a cost effective, fast, and safe solution to for the stabilization, repair, lifting and restoration of a variety of road surfaces and transportation assets.

› Contact URETEK USA by visiting www.worldofuretek.com or locate a representative at www.uretekusa.com/locations. URETEK USA, Inc., PO Box 1929, Tomball, TX 77377. Phone: 1-888-287-3835.

Save the Date: Popular Tech Day is Back!

ACPA's popular "Tech Day" will be held again during the ACPA Annual Convention.

Tech Day is one of the industry's top technology transfer events and features the latest technical and research & development information.

Top technology topics ... *Cheryl Richter, P.E., PhD, Technical Director for Pavements at the Federal Highway Administration's Turner-Fairbank Highway Research Center, addresses Tech Day participants last year.*

The program is well-suited for contractors and others industry personnel, agency personnel, consultants, and others with an interest in concrete paving.

The event will feature five informative "tracks," including sustainability, surface characteristicss, emerging technologies, research updates, and design/construction issues.

The event will be held, Friday, December 2, the final day of the ACPA's 42nd Annual Convention.

The site of tech day and the convention will be the Renaissance Esmeralda Resort & Spa in Indian Wells, Calif.

The preliminary schedule for Tech Day on December 2 is as follows:

8:00 a.m. to 9:30 a.m. — Tech Day general session.
9:30 a.m. to noon —Tech Day concurrent breakout sessions.

Additional information will be announced by ACPA soon, but in the interim, please contact Polina Demidova or Maryann Beckman-Bergman at 847-966-2272.

TRANSPORTATION NEWS BRIEFS

Surface Texture Advisory Complements Concrete Pavement Industry Goals

States will now have the option of selecting textures for concrete pavements and still meet safety requirements, according to the new Federal Highway Administration surface texture technical advisory (TA).

The concrete pavement industry will no longer be forced to build surfaces with high noise and objectionable tonal characteristics by default, according to the terms of the technical advisory.

"We commend the Federal Highway Administration for developing this new technical advisory, which will allow the states greater flexibility in specifying surface textures," said Gerald F. Voigt, P.E., ACPA President & CEO.

"The new requiremenst will allow

Smooth roads ... *A new technical advisory from the Federal Highway Adminstration will allow contractors to place concrete pavements that have improved surface characteristics and which provide better value to agencies and road users.*

The new TA also discusses what surface component

to provide information on the state-of-the- practice for providing texture/friction on pavements and to issue guidance for selecting techniques that provide adequate wet-pavement friction and low-tire/surface noise characteristics.

The TA not only emphasizes that safety is paramount but also acknowledges that tire/surface noise should be considered when specifying pavement surfaces.

The safety performance is determined by evaluation of wet-weather crash results and friction test results. When selecting a particular surface technique, the TA recommends consideration of the minimum factors: splash and spray, climate, traffic volume and composition, speed limit, roadway geometry, frictional demand, materials and costs, and the presence of noise sensitive receptors.

Click here to view the entire technical advisory. For questions about pavement surface characteristics or questions about optimizing concrete pavement surfaces, contact Larry Scofield, ACPA, at 480-775-0908.

Advisory Complements Industry Positions on Tire Pavement Noise, Surface Characteristics

In December 2004, ACPA's Board of Directors approved a number of industry positions related to tire/pavement noise, as well as surface characteristics.

Among them was a recommendation that the FHWA should change its technical advisory, "Texturing and Skid Resistance of Concrete Pavements and Bridge Decks." The full list follows:

1. Safety of the roadway should never be compromised. The industry challenges the FHWA and states to not only use quieter pavement surfaces, but surfaces that have the right balance of sound, surface friction and durability to last more than a few years before needing maintenance or replacement.

2. Do not compromise the durability of the pavement for the sake of sound characteristics. Responsible asset management requires the prioritization of pavement durability as the primary factor for effective network and project pavement management. Composite pavements (thin asphalt layer over concrete structural slabs) require more frequent maintenance or surface replacement, which places more pressure on the state's roadway improvement and maintenance budgets.

3. The long-term acoustic and friction durability values of pavement surface texture are equally as important, if not more important than the initial values. Comparisons made between surfaces for noise and skid resistance must consider how long these qualities remain and how they change over time and traffic.

4. A standard reference sound-level test method must be used to measure and compare tire/road noise. It is in the best interests of the industry, FHWA, and state DOTs to determine the test method (pass-by, close proximity, sound-intensity, or other) that is most suitable and will allow comparison of the research data and potential noise requirements in specifications or contract documents.

5. Transverse tining for texturing new concrete surfaces should not be used if sound from the tire/pavement interface is a concern and transverse tining results have not been favorable. Quieter concrete textures, such as a turf-drag, longitudinal tining, exposed aggregate or diamond ground textures are available now and are proven low-noise, high-friction surfaces.

6. FHWA should revise its Technical Advisory, T 5140.10 "Texturing and Skid Resistance of Concrete Pavements and Bridge Decks," with the input of industry. Published in September 18, 1979, this advisory statement is outdated and hampers the concrete pavement industry in many states from improving its concrete pavement texture.

7. Sound-optimized diamond grinding should be used to alleviate noise on existing concrete or asphalt pavements. Sound-optimized diamond grinding is among the quietest surfaces and provides a more durable and environmentally friendly surface than rubberized or HMA asphalt.

8. Demonstration projects of available quiet concrete pavement textures should be pursued by FHWA and state DOT's in partnership with industry. Quieter concrete textures, such as a turf-drag, longitudinal tining, exposed aggregate or diamond ground textures are available now, but some states are reluctant to use them because they have never tried them before.

9. The industry's goal is to develop an optimized concrete surface texture that minimizes and sustains low tire/road sound levels better than any available pavement surface within three years. Tire manufacturers are a resource to consult in development of the new texture.

10. In addition to tire/road noise, FHWA and state DOT's should consider other environmental and safety factors, such as surface friction, urban heat island effect, fuel consumption differences, health issues and the sustainability impacts of roadway materials.

PRODUCTS & SERVICES SPOTLIGHT

Company Offers Innovative Construction Software ... A full line of modular software is available to contractors and other construction businesses. The modules allow a range of planning and asset management functions to be performed, including:

• Subcontract control, tracks subcontracts by job, vendor and subcontract number. The software module also records description of work, retainage/holdback percentage, with automatic release of retainage/holdback in detail or in summary. This program can also track expiry on workman's compensation, insurance, and more.

• Equipment management, tracks and reports profitability of each equipment unit. This module supports equipment maintenance scheduling, with ability to add inventory parts required for the work.

The software module also tracks equipment usage by location, with hourly, daily, weekly, monthly or standby rates. Several reporting and inquiries options, including detailed transaction report, trial balance, depreciation, maintenance and next scheduled maintenance. A range of other software modules are available and may be purchased individually or bundled to use as an integrated system.

Examples of other modules include programs designed for change order management; payroll (U.S. or Canada); and construction project management. Please mention that you saw this product in ACPA's **CONCRETE PAVEMENT PROGRESS**!

For additional information, contact Marc Bernard, Business Development Representative, Gary Jonas Computing Ltd., 125 Mural St., Ste. 100, Richmond Hill, Ontario L4B 1M4 (Canada). Phone 1-888-789-9073.

TECH CORNER

Diamond Grinding Yields Safer Pavements

Smoother, safer longer ... *Diamond grinding can remove bumps and impart a new texture, thereby extending the service life of a concrete pavement.*

Diamond grinding the surface of a concrete pavement is typically done to restore smoothness, friction, and low-noise characteristics.

Continuous diamond grinding usually gives the pavement better smoothness than bump grinding, where smaller grinding machines take off the high spots of the pavement based on a longitudinal profile.

There are millions of square yards of continuous diamond-ground concrete pavements on the nation's highways ... and millions more are ground every year.

Diamond-ground textures also enhance the safety features of a pavement. They have better surface texture and skid resistance, resulting in lower accident rates and lower hydroplaning potential.

A number of resources document the benefits of diamond grinding. One such report may be found on the website of the International Grooving & Grinding Association (IGGA). "Crash Experience on Tined and Continuously Ground Portland Cement Concrete Pavements" shows that diamond-ground pavement sections in the study had accident rates that were 60% lower on average than un-ground sections.

ACPA also offers a number of resources that address both the benefits and best practices for diamond grinding. One such example is "Diamond Grinding and Concrete Pavement Restoration" (TB008P). To order this publication, log-in to the ACPA members only section (to receive the member discount) at www.pavement.com; call toll-free 1-800-868-6733; or fax requests to 847-966-9666.

Among the other available resources is an online guide to diamond grinding, published by the Federal Highway Administration. Click here to view this resource.

The benefits of diamond grinding, not the least of which are extending the life of pavements and saving taxpayer dollars, are well-documented. To find out more, call the ACPA technical staff at 847-966-2272 or IGGA at 518-731-7450.

Return to top

ACPA Concrete Pavement Progress is published 12 times per year and covers current practices and case histories in the concrete pavement industry. **ACPA Concrete Pavement Progress** is distributed free of charge to public officials, ACPA members, executive committee, board of directors, and affiliated chapter/state paving associations.

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