American Concrete Pavement Association

CONCRETE PAVEMENT PROGRESS

Volume 42, Number 2
February 2006

International Scanning Tour to Highlight Long-Life Pavements

A "Long Life Pavements" scanning tour in the spring will take federal and state officials and concrete pavement industry representatives on a global examination of concrete pavement projects with life expectancies of 40 years or more.

Tour participants will examine innovative pavement technologies in Belgium, Austria, Germany, and either Australia or Chile that will help concrete pavements in the United States meet current transportation goals.

The ultimate goal for the scan is to procure practices in materials and pavement evaluation; concrete mixture design; pavement thickness design; specifications and construction proedures that will be an immediate benefit to state DOT efforts at extending service life expectations for the next generation of concrete pavements.

Participants on the long-life pavements scanning tour this spring will examine concrete pavement practices in Belgium, Austria, Germany, and either Australia or Chile.

Long life concrete pavements require less frequent repair, rehabilitation, and reconstruction, and therefore also contribute to FHWA's goals of safety and congestion mitigation.

Participants from the Federal Highway Administration, American Association of State Highway and Transportation Officials, state DOTs, members of the North American Concrete Alliance, and the National Center for Concrete Pavement Technology will embark on the tour May 19 through June 4 to examine these processes and practices.

Return to top

Transportation Board Publications Examine Recent Research

The Transportation Research Board recently announced the update of its publication website, as well as several additions to the collection, including reports on safety and concrete materials.

TRB's newly-updated Publication Index is a searchable bibliographic database containing more than 30,000 records of papers, articles, and reports released since 1923. The update included simplifying the query process so that users can search multiple fields, as well download or e-mail search results.

Click here to search the updated database.

TRB also has released CD-ROM copies of the 2006 Annual Meeting Compendium of Papers for purchase for $70. Available for a limited time only, many of the papers in the CD also will be published as part of the Transportation Research Record: Journal of the Transportation Research Board series. The series will include approximately 50 volumes consisting of papers on specific transportation modes and subject areas.

Click here to purchase the compilation.

In addition, several reports released by TRB cover safety and concrete materials.

The most recent report of TRB's National Cooperative Highway Research Program (546/CD-ROM CRP-CD-62) examines where and how safety can be addressed and integrated into long-range transportation planning.

Click here to view the document.

The board's Transportation Research Record: Journal of the Transportation Research Board No. 1914 also provides a look at:

- the properties of crumb rubber concrete;
- the use of lithium nitrate in controlling alkali-silica reactivity in concrete pavement;
- the performance and uniformity of self-compacting concrete; and
- the influence of supplementary cementitious materials on the strength development of concrete subjected to different curing regimens.

Click here to view the report.

Return to top

Traveler Survey Identifies U.S. Transportation Strengths, Weaknesses

Highway safety and pavement conditions ranked among the most important transportation factors to U.S. travelers, according to results from a survey commissioned by the Federal Highway Administration (FHWA) in 2005.

The FHWA Office of Professional and Corporate Development conducted the *2005 Traveler Opinion and Perception (TOP) Survey* with the objective of understanding the needs and expectations of users of the U.S. transportation system, as well as the extent to which the existing system meets those needs, according to the project overview.

FHWA then translated the results from the survey of almost 2,600 adults into a set of strategic imperatives that federal and state highway agencies can apply to further improve the traveling public's satisfaction.

A survey of the traveling public identified highway safety as a primary strength of the U.S. transportation system.

Primary Strengths

By earning high scores both in importance and in overall grades, highway safety is the primary strength of the U.S. transportation system, according to survey results.

Highway users also are satisfied with the setup of work zones to improve traffic flow and maximize safety.

FHWA recommends that agencies maintain the current levels of service in these areas of strength and invest strategically to improve. Some specific actions in safety and traffic zones identified that could further impact user satisfaction are:

• **Safety:** additional use of roadway materials that increase traction; lengthening merge lanes; increased enforcement of speed limit laws; improved roadway lighting; providing emergency road information.
• **Work zones:** creating better merge patterns; better detour systems; more effective notification of detours.

Critical Weaknesses

Pavement conditions, although ranked high in importance by travelers, also receives failing grades from U.S. drivers.

FHWA recommends that federal and state agencies invest immediately to improve pavement conditions and the following three areas also identified as critical weaknesses in the U.S. transportation system: planning for future transportation needs; efforts to mitigate congestion and improve traffic flow; and pedestrian safety and mobility.

According to survey results, the following improvements in these areas would increase user satisfaction:

• **Highway and roadway surfaces:** decrease the number of surface defects; increase the durability of materials used
• **Efforts to mitigate congestion and improve traffic flow:** better traffic signal timing; implement a system for alternate routes; increase communication
• **Planning for future transportation needs**: better planning to support land use development; public involvement in the planning process.

Other key findings from the survey include:

• 92% of all U.S. travelers are licensed drivers and have access to a personal vehicle that they use almost daily.
• Three out of four (75%) travelers experience delays from congestion at least once a week.
• Approximately 69% of travelers are satisfied with the U.S. transportation system, a significant increase from the 58% of drivers satisfied in 2000.
• Support for future transportation projects has increased since 2000; 11% of travelers are extremely likely and 52% are likely to support future projects.

Click here to view the entire report.

Return to top

Report Cites Cities with Worst Traffic

Travelers in the Los Angeles metropolitan area experience the worst traffic congestion in the United States, according to a mobility report cited by FORBES magazine. Second and third on the list were San Francisco-Oakland Bay and Washington, D.C., respectively.

San Diego ranks as one of the cities with the worst traffic congestion, according to a recent study.

According to the *2005 Urban Utility Report*, conducted by the Texas Transportation Institute (TTI) at Texas A&M University, the estimated cost of U.S. traffic delays is $63.1 billion a year, based on 2003 figures.

Despite increasing congestion, however, the driving public has not changed its habits. Driving has continued, so delays will continue to worsen.

The report calls for planning, political agreement, agency commitment, and thorough follow-up to alleviate the problems associated with bad traffic.

According to TTI's study, the cities with the worst traffic problems are:

1. Los Angeles, Long Beach, Santa Ana, Calif.
2. San Francisco, Oakland, Calif.
3. Washington, D.C.
4. Atlanta
5. Houston
6. Dallas, Fort Worth, Arlington, Tex.
7. Chicago
8. Detroit
9. Riverside, San Bernardino, Calif.
10. Orlando, Fla.
11. San Jose, Calif.
12. San Diego

Return to top

Officials Call for Papers on Road Innovations

The American Association for State and Highway Transportation Officials will coordinate the United States' National Competition for an international competition for both young and established professionals with an interest in the transportation sector. The competition, held by PIARC, the World Road Association, is specifically held to encourage longer-term, innovative thinking on the future of transportation systems.

National winners will go on to compete at the international level and will be invited to attend the XXIIIrd World Road Congress in Paris (September 17-21, 2007). Congress registration, airfares and accommodation will paid by PIARC.

Candidates (either teams or individuals) interested in competing should submit essays in one of four "theme" areas:

1) Construction, Maintenance, and Operation of Roads;
2) Road Safety;
3) Sustainable Development; and
4) Communication.

Entries may be submitted no later than May 1 to Marty Vitale, Administrative Coordinator for Engineering, AASHTO, 444 North Capitol Street N.W., Suite 249, Washington, DC 20001. For more information, contact Vitale at 202-624-5862.

Return to top

TECH CORNER

Proper Project Selection Enhances Long-Term Success of Diamond Grinding

Diamond grinding a pavement exhibiting functional deficiencies can improve smoothness and reduce noise.

When transportation officials choose diamond grinding with careful consideration for the project at hand, the restoration technique can enhance long-term pavement smoothness and performance. Documented performance of diamond-ground concrete pavements nationwide have proven that the technique helps them last far longer than their initial design lives.

The most significant factors in a successful diamond grinding project are the condition of the existing pavement structure, traffic, and the level of concrete pavement restoration (CPR) applied.

Diamond grinding is most appropriate for pavement that is not structurally deficient. Pavements showing moderate to advanced material-related distresses (such as alkali-silica reaction) are not good candidates for diamond grinding.

Proper timing is essential for successful projects. Construction of a CPR technique such as diamond grinding too early may not produce the significant improvement that the technique has been proven to create. In the same manner, a project chosen for CPR too late may produce significant improvement but at high cost.

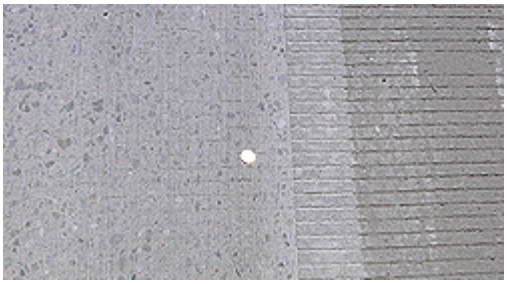
Instead, engineers should perform annual pavement condition surveys and select trigger and limit values for the application of diamond grinding. Trigger values indicate when a highway agency should consider diamond grinding and CPR to restore rideability. Limit values for diamond grinding define the point when the pavement has deteriorated so much that it is no longer cost effective to grind.

By seizing this "window of opportunity," engineers can be assured that the diamond grinding will cause the most immediate effect of improving the riding smoothness of the pavement. By removing faulting at joints and cracks, removing construction curling and moisture-gradient warping of the slabs, and other roughness, diamond grinding can achieve a smooth riding surface that is often as good or better than a new pavement.

Other significant improvements include:

• **enhanced surface texture and friction.** Pavement friction may be improved through grinding by enhancing surface macrotexture. Adequate macrotexture reduces the potential for hydroplaning, especially in cases where studded tire wear has produced "ruts" in the concrete pavement. The increased macrotexture initially provides high skid numbers, but this improvement may be temporary, particularly if the pavement contains aggregates susceptible to polishing. This effect may be offset by properly spacing the diamond saw blades, creating more land area between the grooves on softer coarse aggregate.

• **reduced noise.** Diamond grinding re-textures worn surfaces with a longitudinal texture and provides a quieter surface. Diamond grinding also removes faults by leveling the pavement surface, thus eliminating the thumping and slapping sound created by faulted joints. However, the thumping sound may also be related to wide joints, which will not be affected.



Diamond-grinding a pavement (left) retextures worn surfaces with a longitudinal texture (right) and provides a quieter surface.

• **reduced cracking without compromised surface life.** Diamond grinding generally reduces slab thickness by 4 to 6 mm (3/16 to ¼ in). Since slab thickness is one of the most sensitive factors affecting cracking performance of concrete pavements, any reduction can be a concern.

A cracking model was used to determine the fatigue life of jointed plain concrete pavement (Rao, Yu, Darter). The result indicated that a 5-mm (¼ in) reduction in slab thickness results in about 30% reduction in fatigue life if the concrete strength remains constant. However, long-term strength of concrete is significantly higher than the design strength, which is typically the 28-day strength. The strength of conventional concrete after one year can be up to 20% higher than 28-day strength. If the increase in concrete strength is considered, the small reduction in slab thickness has negligible effect on service life. These results suggest that a typical concrete pavement may be diamond-ground up to three times without compromising its fatigue life. In practice, some States have ground concrete pavements up to three times without reporting any problems (i.e., California and Georgia).

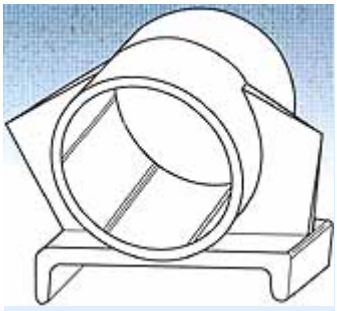
Diamond grinding is one technique used in a CPR program for pavements that can improve the surface characteristics of the pavement. Although diamond grinding will only be effective on pavements exhibiting functional problems, it is a usefool tool in a box of CPR solutions.

Questions about diamond grinding or CPR? Click here to download the most recent R&T Update from ACPA's website or contact Steve Waalkes at 847-966-2272.

Return to top

PRODUCTS & SERVICES SPOTLIGHT

Retro Dowel Chair/Caps Allow Easy, Speedy Installation



Meadow Burke's retro dowel chair/caps are built to ensure proper dowel bar placement.

Meadow Burke Products' retro dowel chair/cap (RDCC) is designed to insure proper dowel placement in Dowel Bar Retro-fit projects.

The RDCCs support the ends of the dowel to prevent it from lifting at ends when backfilling or vibrating the grout into a slot. They include self-centering gussets for proper side-to-side centering in the slot to hold the dowel perpendicular to the joint.

RDCCs also include a built-in stop for expansion; clear color for easy inspection of dowel expansion capability; and the cap and chair combination as a single piece makes installation quicker and easier.

Please contact Meadow Burke Products at 800-207-7778 for pricing and product availability.

Glare-Free Lighting Systems Ideal for Paving Projects

Multiquip's new Moonlight glare-free lighting systems can rise to a height of 10 ft and can illuminate areas up to 100 ft. from the light source, ideal for freeway paving projects and traffic control.

The lighting systems feature 150-, 400-, and 1000-watt outputs that can last up to 10,000 hours, as well as a compact design that is stable in winds up to 55 mph.

Assembled for use in just five minutes, each of the units in the Moonlight series is available with a host of accessories and offered in push cart, wheeled stand, and tripod configurations.

The Moonlight series also eliminates the need for fans to maintain air in the balloon, as the balloon in these systems inflates in seconds. A simple plug also maintains air pressure and protects the light.

Multiquip Inc.'s new Moonlight series can illuminate paving projects and stand up to strong winds.

Without the need for a fan, dirt and other debris are not blown into the unit, extending balloon and engine life while maximizing productivity.

For more information on Multiquip Inc.'s Moonlight series, click here or call 1-800-421-1244.

Return to top

RESOURCES

Technical Publication to Assist Design for Streets, Roads

ACPA recently announced the release of its newest technical publication, "Design of Concrete Pavement for Streets and Roads."

The 16-page publication provides an overview of all major variables in street and roadway design and also offers tips and technical information to assist designers, consultants, contractors and others involved in pavement design.

The publication is organized into seven discrete topic areas, including street classification and traffic; geometric design considerations; subgrades and subbases; and concrete quality. Also included are thickness design; jointing; and construction specifications.

The design guide, an updated and expanded version of a 8-page document first produced in 1992, includes more than a dozen charts that provide a quick reference to help plan and design roadways for current and future demands. Examples of topics covered in the tables include reliability; projected slab cracking values; traffic and thickness correlations; axle load distributions; and subgrade/subbase strength models.

This handy reference resource also includes engineering drawings showing typical cross sections of joint types; typical two-lane roadway sections; two-lane sections with parking; and three-lane sections.

To order a copy of "Design of Concrete Pavement for Streets and Roads," call 1-800-868-6733; fax orders to 847-966-9666; or visit ACPA's website at www.pavement.com. (Click on the tab marked "Order Products;" ACPA members may visit the "members only" area for discounted rates. Be sure to mention or key in literature code IS 184.03P. The cost of this publication is $3.00 for members; $9.00 for non-members.

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.

American Concrete Pavement Association
5420 Old Orchard Road, Suite A100
Skokie, IL 60077
Phone: 847-966-2272. Fax: 847-966-9970

(Washington) 1130 Connecticut Ave., N.W.
Suite 1250
Washington, DC 20036
Phone: 202-887-8290. Fax: 202-887-8298

(Mesa, AZ) 807 W. Keating Ave.
Mesa, AZ 85210
Phone: 480-775-0908

Visit our website at http://www.pavement.com/