CONCRETE PAVEMENT CPTP TECHNOLOGY PROGRAM

Concrete Pavement Technology Update

www.fhwa.dot.gov/pavement/conhome.htm

Participants (left to right) at the International Best Practices Conference on Thin and Ultrathin Whitetopping: Armelle Chabot (L.C.P.C., France), Suneel Vanikar (U.S. Federal Highway Administration), Colin Franco (Rhode Island Department of Transportation), and Gerry Roberts (Cement Association of Canada, Calgary) (see page 8).

The Concrete Pavement Technology Program

CPTP is an integrated, national effort to improve the long-term performance and cost-effectiveness of concrete pavements by implementing improved methods of design, construction, and rehabilitation and new technology. Visit www.fhwa.dot.gov/pavement/conhome.htm for more information.

About CPTP Updates

The CPTP Update is one facet of CPTP's technology transfer and implementation effort. Updates present new products and research findings that emerge from CPTP studies. To place your name on the mailing list, call (202-347-6944), fax (202-347-6938), or e-mail (dblumenthal@woodwardcom.com).

In This Update

U.S.Department of Transportation
Federal Highway Administration

The Pursuit of Long-Life Pavements

Recent advances in design, construction, and materials are increasing the projected service life of properly installed portland cement concrete (PCC) pavements to 40, 50, even 60 years, and beyond. Driven by unprecedented demands on the Nation's highway system from heavier loads, greater traffic volume, and higher speeds, efforts to extend pavement life also reflect the adoption of life-cycle cost analysis in transportation investment decisions. With fewer maintenance closures (less traffic interruption), lower life-cycle costs, improved safety, and conservation of resources, long-life pavements make a significant contribution to FHWA's vital few priorities—safety, congestion mitigation, and environmental stewardship and streamlining.

In support of these national priorities, the long-life pavement program is focused on achieving these performance goals:

- Increased initial service life (40–60 years)
- Lower life-cycle cost
- Shorter construction time
- Better initial ride
- Fewer wet-road accidents
- Fewer maintenance closures
- More efficient equipment and procedures
- Improved quality assurance/control

Progress in the States

Seeking to maximize the longevity of PCC pavements, State highway agencies are implementing new innovations in materials and mix designs, structural designs, and construction and testing practices that hold the promise of long service lives and low life-cycle costs. For example, Minnesota DOT's specifications for jointed plain concrete pavement in urban areas now call for a 60-year design that includes stainless-steel clad dowel bars 38 mm (1.5 in.) in diameter, higher specified air (7.5 percent entrained air), a more durable aggregate (limiting the amount of limestone), 35 percent GGBF slag, w/cm < 0.40, and 356-mm (14-in.) slab thickness.

Illinois DOT, doubling its current 20-year design standard and 22-year statewide average life, has demonstrated a 40-year pavement design for continuously reinforced concrete pavement. According to David Lippert, "Our goal is to provide a zero maintenance pavement for a majority of the first 40 years." The design increases concrete slab thickness to 356 mm (14 in.) and uses a 152-mm

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Testing Concrete Materials Compatibility

Extracting pore water from a mortar sample in a high-load extractor. By tracking changes in pH and in calcium, sulfate, sodium, and potassium content over time, the Task 4 researchers are learning more about the chemical processes that occur in different cementitious systems.

Field engineers and contractors report that certain materials used in combination can produce undesirable effects in concrete: early stiffening, excessive retardation, excessive cohesiveness, air entrainment problems, loss of workability, lower than expected strength and durability, and unexpected cracking at early ages. No tests, however, have been available to determine the effects of specific incompatibilities in concrete mixtures.

To address this need, researchers in CPTP Task 4 are developing practical testing procedures to identify potential problems caused by material incompatibilities. The study, which will conclude in summer 2005, is focused on the role materials play in early stiffening, cracking, and inadequate air-void systems. Using materials known to be problematic, the investigators first created systems that were designed to be compatible or incompatible, then subjected these systems to a suite of tests to, potentially, flag the problematic combinations. Tests that successfully distinguished between incompatible and compatible systems (determined by correlations in results among the tests applied) and also prove practical for field and laboratory use will be included in new protocols. Among the tests under evaluation are the air-void analyzer, calorimetry, consolidation meter, cube strength, foam stability, mini-slump, rheology, ring shrinkage, shear wave, slump loss, and temperature monitoring.

The new compatibility guidelines will enable material suppliers, concrete producers, and users to

- identify combinations that adversely affect the early-age properties of concrete;
- evaluate the uniformity of individual materials from the same source; and
- optimize combinations for predictable early-age performance.

For details, contact Peter Kopac, Office of Infrastructure Research and Development, FHWA: peter.kopac@fhwa.dot.gov.

Concrete Curing—New Guidelines From CPTP

The *Guide for Curing of Portland Cement Concrete Pavements* (FHWA-RD-02-099) is available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

A recent CPTP project has produced new guidelines to help pavement engineers ensure adequate curing of portland cement concrete pavements. The guidelines focus on anticipating and planning corrective actions for possible curing problems that are associated with specific concrete materials properties, mixture proportions, and jobsite conditions.

The *Guide for Curing of Portland Cement Concrete Pavements,* soon to be available at www.tfhrc.dot.gov, examines critical details of the many interactive variables that influence the curing process. It recommends steps to evaluate and control concrete moisture and temperature under different conditions and reviews the pros and cons of curing compounds, as well as water-added and water-retentive curing methods.

Fully referenced, the main chapters cover all stages of the process: General Testing, Analysis, and Planning Before Construction; Initial Curing Period; Final Curing Period; and Termination of Curing and Verification of Curing Effectiveness.

The Guide discusses the use of HIPERPAV to evaluate thermal stress conditions. Prevailing national and State specifications for specific practices are noted.

Volume II of the report, containing supportive technical information, will be available later in 2005.

For details, contact Peter Kopac, FHWA Office of Infrastructure Research and Development: peter.kopac@fhwa.dot.gov.

Using Precast Panels for Concrete Pavement Rapid Repair and Rehabilitation

The use of precast slabs is a promising concrete rehabilitation technique. In many trial applications, the technique has been successfully used for rapid, full-depth repair of localized failures in concrete pavements, and it is now ready for more widespread use. Because the panels are cast offsite in advance, the technology yields more durable repairs, shortens lane closure times, and increases user satisfaction. Precast paving is most applicable when lane closure times, rather than costs, are the primary consideration.

Intermittent Repairs

Under CPTP Task 7E, the use of precast slabs for full-depth repairs of jointed concrete pavements has been demonstrated in Michigan and Colorado. On a business loop of Michigan's I-94, 21 factory-cast panels 3.7 m by 1.8 m by 254 mm (12 ft by 6 ft by 10 in.) were installed to repair deteriorated joints. Deteriorated concrete was removed, base support prepared, fast-setting bedding material placed, precast panels installed, and retrofitted dowel bars installed at the transverse joints. Using this process, repairs can be opened to traffic within 6 to 8 hours of lane closure. The panels were installed in 2001 and 2002. According to Professor Neeraj Buch, Michigan State University, the initial (short-term) performance of the full-depth precast panels has been acceptable. Long-term performance will be monitored by Michigan DOT and assessed for ride quality, concrete durability, and precast repair structural integrity.

Continuous Repairs

CPTP Task 58 is examining the feasibility and cost-effectiveness of using precast panels to rapidly rehabilitate or reconstruct existing concrete or asphalt pavements. In an initial study, researchers developed a concept for using precast, prestressed concrete slabs and recommended pilot projects. Prestressing reduces tensile stresses and required slab thicknesses while allowing panels to span small voids in uneven base layers.

In spring 2002, the Texas DOT successfully installed a pilot precast pavement section near Georgetown that was 701.0 m (2,300 ft) long. Longitudinal post-tensioning was used to tie together a series of precast panels, each 3.0 m (10 ft) long, to provide a jointless slab 76.2 m (250 ft) long. Panels were also pretensioned transversely and placed directly over an asphalt concrete leveling course. Each group of 25 panels was installed in 6 hours and post-tensioned in a few additional hours. The pilot successfully demonstrated the method's constructability.

The first precast demonstration project was constructed in California on I-10 in El Monte. The project consisted of 76.2 m (250 ft) of two-lane, precast, prestressed pavement placed over a lean concrete base and post-tensioned longitudinally in 37.8-m (124-ft) sections. Thickness varied from 254 to 330 mm (10 to 13 in.) due to a cross-slope variation built into the panels. The 31 panels were placed in approximately 8 hours over 2 nights with post-tensioning completed in just a few additional hours. The installation is expected to last more than 50 years under extremely high traffic volumes. Demonstration projects of the "Texas method" are also scheduled in Missouri, Iowa, and Indiana.

In Missouri, a 366-m (1,200-ft) section of precast, post-tensioned concrete pavement will be constructed in August 2005 on I-57 near Sikeston. The pavement will replace a jointed reinforced concrete pavement that has developed significant faulting over 45 years of service. The Iowa project, also scheduled for 2005, will use precast, post-tensioned pavement construction for bridge-approach slabs to avoid development of the "bump" experienced where the pavement and bridge-deck surfaces meet. The Indiana project, in 2006, will take advantage of the reduced slab thickness made possible by prestressed design versus the thickness of a typical jointed plain concrete pavement.

For CPTP precast project details, contact Sam Tyson, FHWA Office of Pavement Technology: sam.tyson@fhwa.dot.gov.

Single-panel replacements were installed in lieu of full-depth patches on Michigan's I-94.

In the California I-10 demonstration, the panels used a crown shape that tapers from 330 mm (13 in.) at the high point to 250 mm (10 in.) at the ends.

A 38-m (124-ft) section of post-tensioned, precast pavement in place on the Caltrans I-10 installation.

Other Precast Paving Applications

Caltrans is also evaluating a commercially available precast system. A 7-km (4.3-mi) test section near Devore is being subjected to 4 months of continuous heavy vehicle simulation. This system has been installed in high-traffic projects in New Jersey and New York, and is being demonstrated in Minnesota.

Long-Lasting Pavements: Best Practices Workshops and Presentations for Highway Agencies

CPTP Presentation Topics

- Long-Life PCC Pavement Design Features
- Rapid Repair and Rehabilitation
- Best Practices for Concrete Pavement Construction
- Design, Construction, and Repair of Whitetopping
- High-Performance Concrete Mixtures for Pavements
- Pavement Texturing Recommendations for PCC Pavements
- Measuring Pavement Smoothness for Acceptance on Concrete Pavements
- Construction Management Tools
- Concrete Durability Issues
- Optimizing Pavement Joint Details
- The CPTP Program

CPTP Workshops

- *Concrete Pavement Best Practices*—a broad overview for agencies and other groups not having day-to-day involvement with concrete pavement practices.
- *Optimizing Paving Materials and Mix Design*—for concrete engineers: major changes in concrete technology, mix optimization to meet local needs, and new testing procedures.
- *Best Practices for Concrete Pavement Construction*—new management and inspection strategies for longer lasting pavements.
- *NEW—Best Practices for Thin and Ultrathin Whitetopping*.

Highway agencies and Local/Tribal Technical Assistance Programs can call on CPTP staff to provide state-of-the-practice presentations and workshops on advanced concrete pavement technologies. These sessions can be arranged for State, regional, and industry-sponsored workshops, on-site trainings, and conferences. Delivered by CPTP staff, the content integrates the latest information gathered from CPTP projects and other advanced programs in design, construction, and repair of concrete pavements.

Presentations are available on 11 topics, and four 2-day, in-depth workshops are available (see sidebar). The specific topics to be included, as well as the format and length of each presentation, are tailored based on advance communication and coordination to meet the needs identified in each State. Typically the workshops attract 40–45 participants from highway agencies and industry. Since mid 2004, CPTP staff have made more than 20 presentations and have conducted 10 best practices workshops across the country.

In April 2005, the FHWA CPTP Task 65 Team presented the Concrete Pavement Best Practices workshop for the Georgia DOT in Forest Park. The new mechanistic-empirical design guide, HIPERPAV, and performance-related specifications are areas somewhat new to the Georgia DOT, according to Allan Childers, ACPA-SE, and the workshop provided a good introduction to each topic. Myron Banks, State concrete engineer in the Construction Division, found the discussion of automatic dowel bar inserters (DBIs) of special interest, since Georgia is considering using DBIs in some upcoming jobs. “Georgia DOT evaluated DBIs in a few installations in the 1970s, but the results were not positive,” Banks said. “Now the MIT Scan 2 offers a nondestructive way to evaluate dowel bar placement as the work progresses.”

An advantage of the breadth of the Best Practices overview, which runs the gamut from design through rehabilitation, is that agency engineers learn about new developments outside their own specialties. This cross-fertilization increases understanding and coordination throughout a pavement program.

David Painter, of FHWA’s Georgia Division Office, said the workshop was excellent. While a good refresher, it also presented information that was new to him. Adding to his understanding in particular, he said, was the in-depth treatment of the micro-behavior of concrete as it cures, where and why stresses develop, how traffic adds additional stresses, and how, from a micro or mechanistic perspective, these stresses result in cracks. Painter also thought the discussion of various cementitious materials and their effect on the curing of concrete was especially valuable. “Many pavement engineers work primarily with asphalt. There is a need for training,” he said, “to increase their familiarity and comfort level with concrete. More training and certification are needed in this area.”

A new best practices workshop on whitetopping was recently launched in Pomona, California. The workshop incorporates the latest findings, as presented at the April 2005 UTW/TW conference in Denver (see page 8).

For More Information

For more details or to schedule a presentation or workshop, contact Sam Tyson, FHWA Office of Pavement Technology: sam.tyson@fhwa.dot.gov; or Shiraz Tayabji: stayabji@ctlgroup.com. Requests should be made at least 1 month in advance of the proposed event.

New Pavement Resource

The Materials and Construction Practices Manual, presenting established field practices and testing methods, is due out in fall 2005. This document draws on a 17-State, pooled-fund study supported by FHWA. For more information, contact Jim Grove (jimgrove@ iastate.edu) .

Concrete Pavement R&D Road Map Moves Toward Implementation

In February 2005, a team led by Iowa State University submitted a final draft of the Concrete Pavement (CP) Road Map, including an innovative research management plan, to FHWA. The ***Long-Term Plan for Concrete Pavement Research and Technology*** is posted at www.fhwa.dot.gov/pavement/pccp, and a print version will soon be available.

The CP Road Map was developed through an inclusive process that involved more than 400 stakeholders from across the country at several focused brainstorming events and more than 20 professional conferences and workshops. Although developed for FHWA (under CPTP Task 15), the Road Map is not just a Federal initiative; representatives of all stakeholder groups provided input to the plan, and all stakeholder groups will have roles in implementing it.

Contents of the CP Road Map

The CP Road Map is a long-term (7- to 10-year) plan for research and technology development for portland cement concrete pavements. The plan combines more than 250 research problem statements into 12 fully integrated, sequential, and cohesive tracks of research (see sidebar) that together would cost approximately $250 million in public and private funds.

The 250 research problem statements are included in a database that can be sorted in a variety of ways. Each of the tracks is a complete research program in itself, with its own budget, 2 to 7 subtracks, and as many as 20 problem statements. One subtrack in every phased track is devoted to training tools and methods of technology transfer to ensure that innovative research products move into practice quickly and efficiently.

The first nine tracks consist of timed sequences of research leading to particular products that are essential to reaching overall research goals. Tracks 10, 11, and 12 are not phased because their timing is not as critical.

The Research Management Plan

The research management plan outlines a four-tiered system of participation and responsibility through which public and private organizations can volunteer to identify common interests, partner with one another to leverage funds and human resources, and execute specific contracts.

1. A three-party *executive advisory committee,* representing FHWA, State DOTs, and industry, would provide broad oversight and serve as a decision- and policy-making entity.

2. An *administrative support group* would provide professional management services for the executive advisory committee. The group would coordinate and support activities such as maintaining the research database.

3. *Team leaders* for the research tracks would coordinate and oversee all activities within specific research tracks, such as validating and updating the track, developing broad problem statements into specific research projects, identifying organizations to conduct or partner in the research, and ensuring proper integration of work within the track and across track lines.

4. Finally, *sustaining organizations,* including highway agencies, consultants, universities, professional associations, and other organizations that have specialized interests and skills and are interested in pooling dedicated funds, would assume responsibility for conducting research through cooperation, partnerships, and funding agreements. Sustaining organizations would always retain full fiscal and technical control of the work under their jurisdictions.

For More Information

Contact Cheryl Richter, FHWA (cheryl.richter@fhwa.dot.gov), for details on the Road Map. To receive a printed copy of the draft Road Map, contact Peter Kopac, FHWA (peter.kopac@fhwa.dot.gov).

The 12 Research Tracks

1. Performance-Based Mix Design System
2. Performance-Based Design Guide for New and Rehabilitated Concrete Pavements
3. High-Speed Nondestructive Testing and Intelligent Construction Systems
4. Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements
5. Equipment Automation and Advancements
6. Innovative Joint Design, Materials, and Construction
7. High-Speed Rehabilitation and Construction
8. Long-Life Concrete Pavements
9. Accelerated and Long-Term Data Collection
10. Performance of Concrete Pavements
11. Business Systems and Economics
12. Advanced Concrete Pavement Materials

An in-depth article on the CP Road Map will appear in a 2005 issue of *Public Roads* (www.tfhrc. gov/pubrds/pubrds.htm).

Highlights of CPTP Expert Task Group Meetings

Engineering Expert Task Group Members (April 2005)

State and Provincial Transportation Agencies

Ahmad Ardani, Colorado
Michael Brinkman, New York
Tom Burnham, Minnesota
Mohamed Elfino, Virginia
Todd Hanson, Iowa
David Huft, South Dakota
Tom Kazmierowski, Ontario
David Lippert, Illinois
Michele Maher, Nevada
Jeff Uhlmeyer, Washington

Industry

Mike Ayers, American Concrete Pavement Association (ACPA)
Jim Duit, Duit Construction Co., Inc.
Ron Guntert, Guntert & Zimmermann, Inc.
David Howard, Koss Construction Company
Colin Lobo, National Ready Mixed Concrete Association
Charles Nmai, Master Builders, Inc.
Mike Plei, Pavement Consultant
Randy Riley, Illinois Chapter, ACPA
Oscar Tavares, Lafarge North America

Academia

Paul Tikalski, Penn State University
Moon Won, University of Texas

Federal Highway Administration

Division Offices
Iyad Alattar, Nevada
Jason Dietz, California
Jim Phillips, North Carolina
Jim Travis, Texas
Office of Infrastructure Research and Development
Tom Harman
Peter Kopac
Office of Pavement Technology
Sam Tyson
Resource Center at Atlanta
Angel Correa

Executive ETG

CPTP's Executive Expert Task Group (ETG) held its first meeting in Washington, DC, on August 26, 2004. The membership, including a full spectrum of stakeholder representatives, provides guidance concerning CPTP-related needs of transportation agencies and industry and on product implementation strategies.

FHWA representatives King Gee, Paul Teng, Tommy Beatty, and Sam Tyson welcomed the group with brief overviews of the ETG's anticipated role in CPTP implementation. Some emphasis areas are the new mechanistic-empirical pavement design guide, guidelines for portland cement concrete pavement repair and rehabilitation, and new equipment for characterizing concrete quality. Implementation plans will target customer needs. The group recommended using a "tailored technology transfer" approach to meeting customer needs, including these methods:

- E-mail and Web-casting to convey research findings and enhance training.
- Pooled and State Planning and Research program funds for equipment, product implementation, and training.
- Lead State, "champion," demonstration project, workshop, and user group approaches to implementation.
- Industry organizations and professional agencies as conduits for information transfer.

The Executive ETG's second meeting, on June 1, 2005, in Atlanta, included discussions of CPTP products, their benefits to agencies, plans for marketing and demonstrations, and review of the CPTP long-term research and development plan for concrete pavements (see page 5).

Engineering ETG

The Engineering ETG focuses on CPTP technology transfer, marketing, and communications. The group has met twice since the August 2004 Update was published. In Chicago, on November 18, 2004, an ambitious agenda included a report on the evaluation of whitetopping design software and a complete update of CPTP activities. In addition, Executive ETG Chairman Joseph Deneault gave an overview of that group's August meeting. The Engineering ETG reached consensus on continuing the technical review of the whitetopping design software and concrete curing guidelines, and proposed expanding the Update mailing list.

The group met in Denver on April 12, 2005. The agenda addressed CPTP presentations and workshops as well as completed and ongoing projects. Member-moderated discussions were held on agency and industry needs and CPTP's role in meeting those needs (moderated by David Huft and David Howard) and on CPTP products and implementation issues (moderated by Ahmad Ardani).

The group encouraged early publication of reports on the dowel bar scanning technology, the TEMP (Total Environmental Management for Paving), and concrete curing guidelines; the development of concise summaries on completed CPTP products; and early interaction of the CPTP with AASHTO pavement and materials groups.

Left to right, Ron Guntert, Jeff Uhlmeyer, Ken McGhee, Ernie Barenberg, and Peter Kopac at the Engineering ETG meeting in Chicago, IL, November 2004.

Innovations for Concrete Pavement:

Technology Transfer for the Next Generation

The 8th International Conference on Concrete Pavements
August 14–18, 2005 — Colorado Springs, Colorado

Reduced-Fee Registration for Government Engineers

New, implementable technologies related to concrete pavement design, construction, and rehabilitation will be the focus of this conference, which is organized by the International Society for Concrete Pavements (ISCP) and co-sponsored by FHWA, ACPA, and nine other organizations.

Conference presentations and panels will address aspects of design, materials, and construction technologies that are essential for achieving long-lasting, high-performance, concrete pavements.

Maintenance, performance, evaluation, and structural rehabilitation will also be covered in the conference's 16 sessions, four workshops, and plenary session, with emphasis on implementable approaches.

FHWA and ISCP have partnered to provide 25 complimentary registrations for State DOT pavement and materials engineers (one per State) on a first-come, first-serve basis.

To encourage strong government agency participation, reduced-fee registrations are also available to State DOT, FHWA, and local agency engineers. Travel and accommodation costs are *not* included in complimentary or reduced-fee registrations.

State engineers should contact their FHWA division office or Sam Tyson (sam.tyson @fhwa.dot.gov).

For more information about the conference, visit www.concretepavements.org.

Long-Life Concrete Pavement, continued from page 1

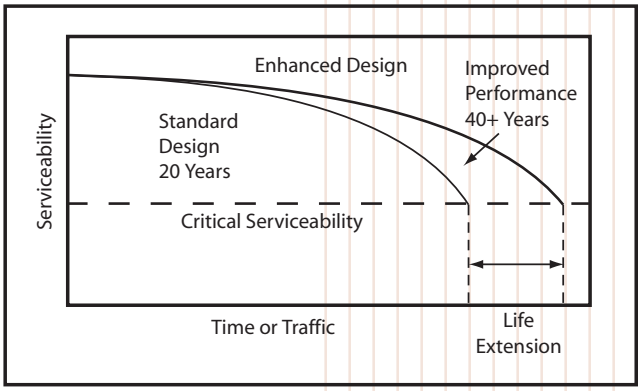
(6-in.) asphalt-treated base over an aggregate subbase that is 31 to 91 cm (12 to 36 in.) thick; uses the most durable aggregate, low-alkali cement, and nonreactive fly ash or aggregate combinations; calls for epoxy-coated steel and tie-bars; and requires 7-day curing to decrease permeability. The required 5-year pavement warranty is considered an incentive for good construction performance.

Caltrans has developed guidelines for considering long-life pavement for reconstruction in locations where 20-year projected traffic exceeds 150,000 vehicles or 15,000 trucks per day.

Long-Life Design and Construction

To achieve long-life service, pavement designs must provide features that minimize both premature and progressive (fatigue) cracking, improve deflection response, and minimize maintenance operations. Complex interactions of factors inherent in the local site, structural design, and materials mix have a long-term impact on performance and length of service. Even a pavement designed to the highest standards, however, will not perform to expectations if it is not constructed well. Construction requirements and specifications must be well defined, while allowing for innovations by the contractor. In addition, concrete production, placement, and finishing operations need to be carried out with care.

Efforts are underway to develop and implement test methods that will evaluate the quality of concrete right behind the paver, so that any corrective actions that are needed can be taken immediately. Timely evaluation of dowel bar alignment is also now possible. Consistent quality control is critical to pavement service life and cost control.



Advances in design, materials, and construction practices are extending pavement life and improving pavement performance significantly.

International Conference on

Best Practices for Ultrathin and Thin Whitetoppings

Held April 15–16, 2005, in Denver, Colorado, the whitetopping forum was sponsored by FHWA, ACPA, Colorado DOT, and the International Society for Concrete Pavements.

Above: Master of ceremonies Tim Aschenbrener, Colorado DOT, moderating the plenary session.

Upper right: One of 32 conference presentations on a wide range of whitetopping applications and techniques, including rural, urban, highway, and airport applications and research.

The April 2005 UTW/TW best practices conference attracted participants from six countries—Canada, France, Guatemala, Japan, Korea, and 26 States across the U.S.A. Attendees included Federal and State DOT officials, contractors, materials suppliers, consultants, equipment manufacturers, and other industry professionals.

The program consisted of presentations and discussions on new developments related to UTW and TWT technologies and lessons learned over the last decade in the use of these technologies. Implementable design and construction techniques that result in long-lasting UTW and TWT were the focus. Ahmad Ardani, Colorado DOT, commented that the conference was a "one-stop shop for everything you wanted to know about whitetopping. The speakers brought practical information that can be put to work." Topics included fatigue analysis, pavement evaluation, reflective cracking, joint spacing, high-performance concrete, and heavy loading. The conference proceedings should be of special interest to city, county, and State DOT engineers and related professionals who are using or contemplating the use of UTW and TWT.

According to Colin Franco, who presented the Rhode Island DOT's experience with intersection overlays, the conference confirmed that whitetopping is a good solution in places where asphalt under heavy loading and environmental considerations are concerns. "Those of us from State highway agencies are pretty much all in the same boat," said Franco, "convinced that whitetopping is a good technique and ready for the next steps."

CPTP Task 65 has developed a best practices workshop on whitetopping that incorporates the findings from this conference (see page 4). Related information is available in NCHRP Synthesis 338, *Thin and Ultra-Thin Whitetopping—A Synthesis of Highway Practice.*

For details on the new whitetopping workshop or the conference proceedings, contact Shiraz Tayabji (stayabji@ctlgroup.com).

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