New Concrete Pavement Technologies – FHWA's Concrete Pavement Technology Program

Federal Highway Administration
Office of Pavement Technology

Savannah, Georgia
June 21, 2005

U.S. Department of Transportation
Federal Highway Administration

CONCRETE PAVEMENT
CPTP
TECHNOLOGY PROGRAM

Safer
Smoother
Quieter
Longer-Lasting

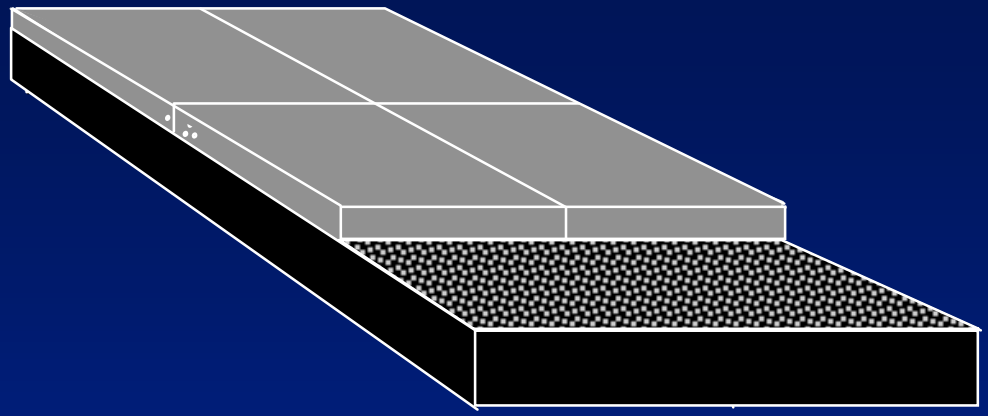
CPTP Primary Focus Areas

- **Advanced Designs**
- **Improved Materials**
- **Improved Construction Processes**
- **Rapid Repair & Rehabilitation**
- **Enhanced User Satisfaction**
- **Trained Workforce**

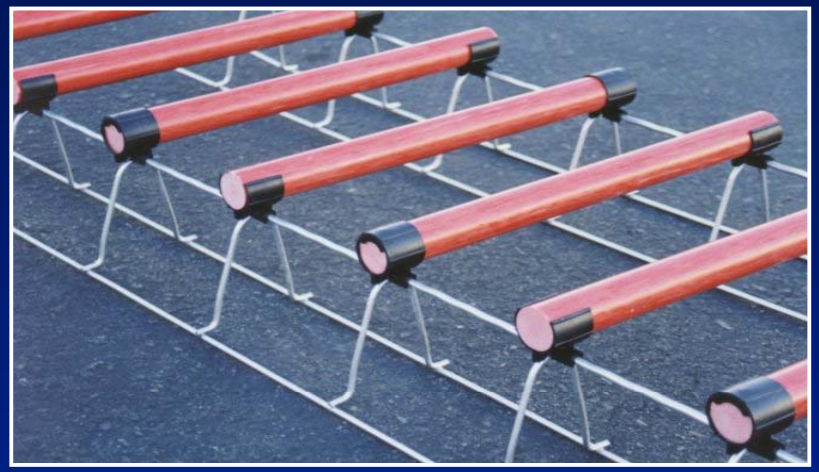
Advanced Design

- **Design Procedures for Ultrathin & Thin Whitetoppings**
- **Assessment of Costs and Performance Benefits of Various Features of Concrete Pavements**
- **Guidelines to Optimize Dowel Bar Design**
- **Guidelines on Joint Sealing**
- **Test for Concrete Coefficient of Thermal Expansion**

Design & Performance of Whitetopping

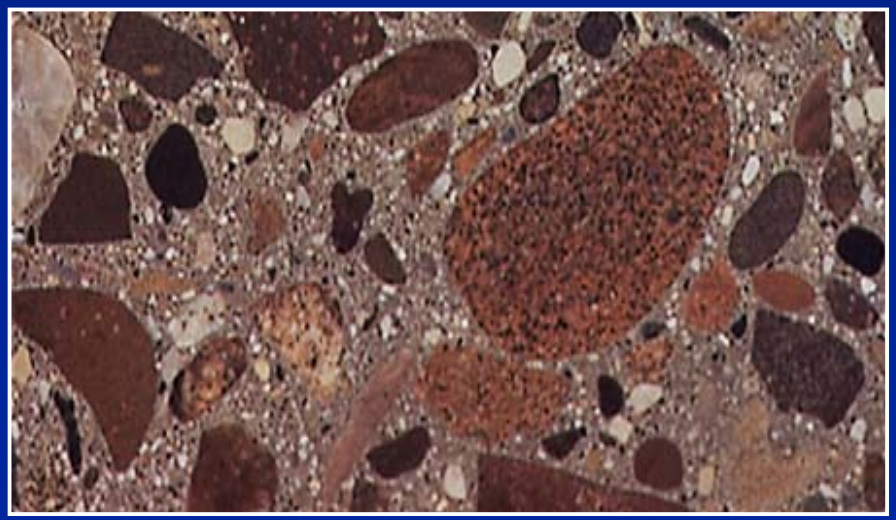


Improving PCCP Joints



Improved Materials Products

- **Tests to confirm the compatibility of concrete ingredients**
- **Improved guidelines for developing job-specific concrete mixtures**
- **Improved procedures for evaluating the potential durability of concrete**



Improved Construction Processes

Weekend Intersection Reconstruction

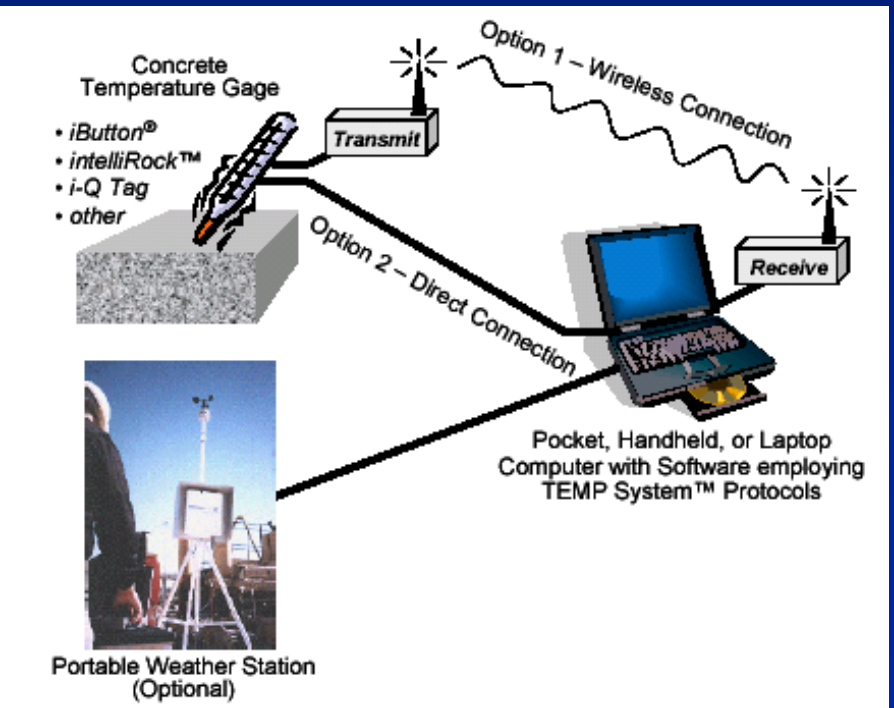
FHWA Mobile Concrete Laboratory

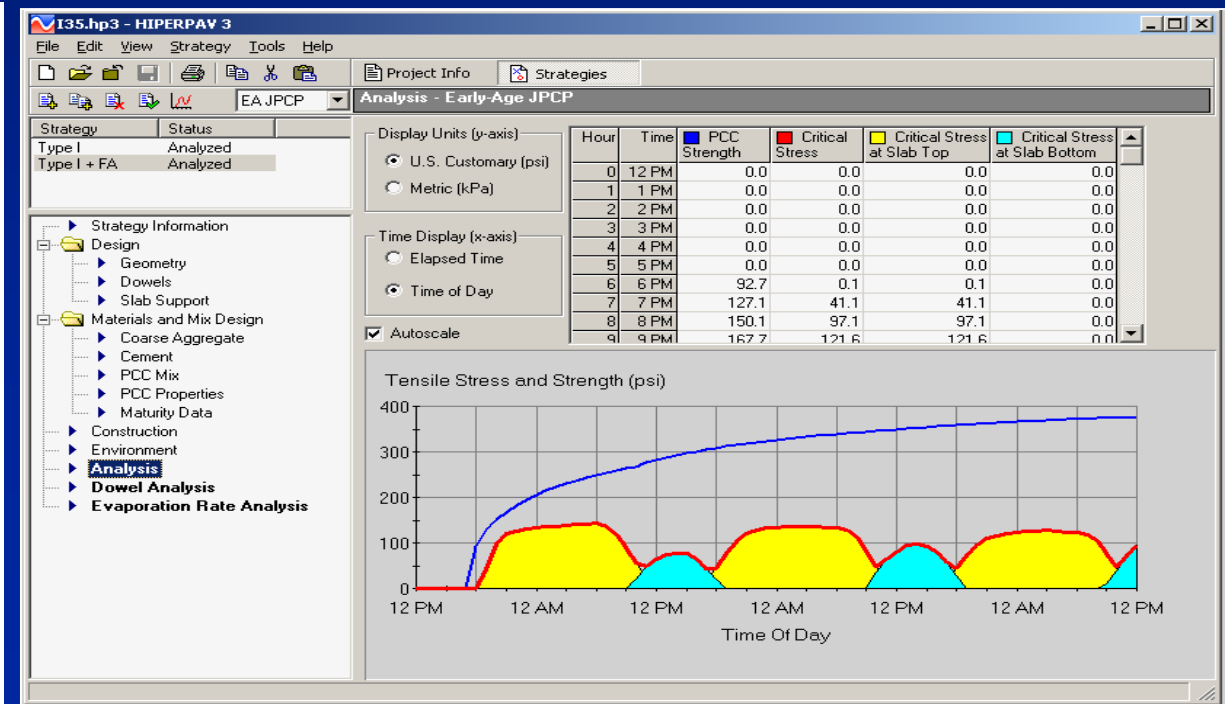
Air Void Analyzer

Dowel Locator

Other Construction Support Tools

Maturity-based system for determining time for early opening to traffic, estimating early age cracking potential, time for sawing joints, and ensuring proper on-site curing –





Rapid Repair & Rehab Products

Precast Concrete Panels for Full-Depth Repairs

Precast Prestressed Concrete Panels to Expedite Pavement Rehabilitation

- **Pilot and demo projects – Texas & California**
- **Future projects in 2005 – Missouri & Iowa**
- **Future Projects in 2006 – Indiana & Texas**

Enhanced User Satisfaction

- **Guidelines for construction traffic management for high-volume roadways**
- **Studies to better understand and define smoothness and surface texture requirements**

Trained Work-Force Activities

Best Practices Workshops

- Design & Construction Features
- Optimized Materials & Mixtures
- Construction Best Practices

Certificate of Training

<Name>

has satisfactorily completed 12 hours of professional development in

Best Practices for PCC Pavements

conducted by

FHWA CPTP Task 65 Team

Location: *Montgomery, AL*

Date: *April 21–22, 2004*

FHWA Representative

Local Coordinator

ALDOT Transportation Director

Instructor

Instructor

Instructor

U.S. Department of Transportation
Federal Highway Administration

Technology Updates –

Safer, Smoother, Quieter, Longer Lasting

CONCRETE PAVEMENT CPTP TECHNOLOGY PROGRAM

Concrete Pavement Technology Update

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

MIT Scan-2 trials at a South Caroline DOT installation.

Streamlining Dowel Bar Inspection

MIT Scan-2—a new magnetic tomography device based on principles of pulse induction—may improve evaluation of dowel bar placement in concrete pavements. The device rides on tracks as it is pulled across fresh or hardened concrete (photo, left) and determines the position and orientation (vertical and horizontal alignment) of all dowels in a joint in a single pass. Preliminary results are displayed almost immediately, and the scanner's automated data analysis produces visual and printed reports. Developed in Germany, the scanner's algorithms and user interface have been adapted for U.S. conditions.

Recently evaluated in a Concrete Pavement Technology Program (CPTP) project (Task 7F), MIT Scan-2 was found to be reliable, efficient, and accurate to within +/- 2 mm (0.08 in) when position errors are minimal. Accuracy depends on the degree of placement error. Within typical placement tolerances—.095 cm (0.38 in) for vertical and horizontal misalignment and 5.08 cm (2 in) for side shift—the range of error is +/- 4 mm (0.16 in). With gross misplacements, the error can be greater. The project tested the device in new concrete pavement construction and in retrofitted dowel bar installations. In new construction, testing

About 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 the use of new technology. Mandated by Congress, this Federal Highway

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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 (< 0.40 cm), 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

continued page 7

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

National Conferences

- **International Conference on Best Practices for Thin & Ultrathin Whitetopping –**
  - **Denver**
  - **April 2005**
- **8th International Conference on Concrete Pavements – *Complimentary Registrations***
  - **Colorado Springs**
  - **August 2005**