New Advances on the Concrete Horizon

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Focus Areas

- Pavement Design and Analysis
- Materials and Construction Technology
- Pavement Management and Preservation
- Pavement Surface Characteristics
- Construction Quality Assurance
- Environmental Stewardship
Cooperative Agreement with CP Tech Center

This Cooperative Agreement will support the advancement of concrete pavement technology through research, technology transfer, innovation, and increased product knowledge.

SAFETEA-LU Authorized $10,000,000 to ISU CP Tech Center from Fiscal Years 2005-2009
Projects with CP Tech Center

- Materials and Construction Optimization for the Premature Prevention of PCC Pavements
- National Training for IMCP Manual
- Improving Variability and Precision of the Air Void Analyzer Test Results
- Self Consolidating Concrete for Slip Form Paving
Projects with the CP Tech Center

Materials and Construction Optimization for the Premature Prevention of PCC Pavements

- Guide outlining a suite of tests to characterize material and concrete properties
Projects with the CP Tech Center

National Training for the IMCP Manual
Projects with the CP Tech Center

Improving Variability and Precision of the Air Void Analyzer Test Results
Projects with the CP Tech Center

Self Consolidating Concrete for Slip Form Paving
Coefficient of Thermal Expansion

Concrete’s Coefficient of Thermal Expansion is sensitive data for M-E PDG performance predictions
HIPERPAV II

Anticipate and Prevent Pavement Performance Problems Early
Concrete Pavement Technology Program

- Integrated effort to improve long-term performance and cost effectiveness of concrete pavements

- Funded under Transportation Equity Act for the 21st Century (TEA-21)
  - $30 Million
  - 6-year program
Concrete Pavement Technology Program

Goals of the CPTP

- Reduce User Delays
- Reduced Costs
- Improved Performance
- Foster Innovation
CPTP – Precast Pavement Rehabilitation and Construction

Innovative long-life pavement application for critical rehabilitation situations reduce user delays by utilizing weekend and night-time lane closures
Precast slabs with pre-positioned dowels provide load transfer and rapid joint placement in one closure.

Innovative repair techniques can be performed by local crews.
Precast Concrete Pavement Projects

- Completed:
  - Texas, California, Missouri, Iowa

- Under Construction
  - Virginia, Florida, California (through Highways for Life funding)

- AASHTO TIG Group Established
Evaluation of a new magnetic imaging device has verified the capability to record 3-D position of all dowels in fresh or hardened concrete within minutes.
CPTP – Design & Construction of CRCP

FHWA guidelines - CRCP remains a viable method for durable, smooth, quiet, and safe concrete pavements
Whitetopping finds a place for concrete overlays on existing PCC as well as HMA as pavement rehabilitation needs continue to outpace construction.
In October 2006 a 2 1/2-day conference provided an international forum to address various aspects of concrete pavement design, construction, and materials technologies that result in long life for concrete pavements.

*Proceedings include 36 state-of-the-art papers*
ASR Program

Project and programs should further development and deployment of techniques to prevent and mitigate ASR, including lithium based techniques, and assist States in inventory of existing structures for ASR.

$2.45 Million per year for fiscal years 2006 through 2009
Framework for ASR Program

- Task 1: Researching the ASR Mechanism
- Task 2: Testing and Evaluation Protocols
- Task 3: Field and Demo Projects
- Task 4: Assist States Inventory for ASR
- Task 5: Support for Deployment Activities
- Task 6: Technology Transfer
- Task 7: ASR Technical Working Group
ASR Field Trials

Within the past 5-years FHWA has funded field trials in:
- Idaho, Boston, and Texas

Lithium surface application in ID

Electrochemical application of lithium in TX
ASR is a Continued Concern

Photo taken in 2005 of a 8-12 years old median barrier wall structure with ASR.
Proposed Action by AASHTO

Is a small team needed???

- Evaluating current specification
- Spearheading the adoption of existing specifications
- Identify the need for new specification
Long-Life Concrete Pavements Study Tour

- Initial Recommendations for Implementation
  - Two-Lift Construction
  - Design Features Catalog
  - Construction of High Quality Foundations
  - Greater Attention to Mix Design Components
  - Geotextile Layer
  - Exposed Aggregate Surface
Two Lift Construction

- Use recycled or more economical materials in most of the slab
- Highest quality aggregate is used in the upper lift of the slab
- Materials optimization cost savings
- Requires 2 pavers and 2 separate batch plants which can increase cost
Two Lift Construction

- Projects Built in the 1990’s
  - Chrysler Freeway in Detroit, Michigan
  - Kansas

- New Projects funded by Highways for Life (HfL)
  - Kansas (WEBINAR held in June 2007, CD is available from HfL)
  - Washington
  - Florida
  - Georgia (?)
  - Pennsylvania(?)
Geotextile Inter-Layer

- Use of a geotextile inter-layer when cement treated bases are used

- Geotextile is porous so that mortar permeates the geotextile and creates a good mechanical bond of geotextile to concrete layer, while achieving separation from the base

- Trial completed in North Dakota in July 2007
Low-Noise Aggregate Surface

- Exceptional high-quality durable aggregates are used in the top course of the concrete slab for the exposed aggregate surface

- Process utilizing a set retarder and abrasion used to produce the exposed aggregate surface
Concrete Pavement Roadmap

- To meet the paving challenges of the future
- To guide the investment of research dollars for the next ten years
- To promote cooperation among fund managers and all stakeholders
Mobile Concrete Laboratory

FHWA’s mobile concrete laboratory is available throughout the year to provide assistance to the States.
Questions?

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