Innovation in Concrete Pavements
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www.CPRoadMap.org

CP Road Map

- Track 1: Materials and Mixes for Concrete Pavements
  - COMPASS
- Track 2: Performance-Based Design
  - DowelCAD
- Track 3: Intelligent Construction Systems
  - Real-Time Smoothness
  - Maturity using COMMAND Center
  - HIPERPAV and SmartCure
- Track 4: Surface Characteristics
  - Concrete Pavement Surface Characteristics Program
  - ProVAL
- Track 8: Construction, Reconstruction and Overlays
  - Precast Pavements
  - Nonwoven Geotextile Interlayer (this afternoon)
CP Road Map

Track 1: Materials and Mixes for Concrete Pavements

COMPASS

COMPASS: Why optimize?

COMPASS Modules
DowelCAD: Dowel Sizing

- Peak responses at slab edge
  - Peak responses at slab corner
  - Peak dowel bearing stress

DowelCAD: Dowel Spacing
CP Road Map

Track 3: Intelligent Construction Systems
  - Real-Time Smoothness, SHRP2 R06(E)

Real-Time Smoothness: Equipment

- Real-time Smoothness Measurements
  - Paver-mounted GSI and RTP
Real-Time Smoothness: Equipment

- Real-time Smoothness Measurements
  - GSI Machine

Real-Time Smoothness: Equipment

- Real-time Smoothness Measurements
  - GSI Machine

Real-Time Smoothness: Field Evaluation

- What happened in front of the spreader?
Real-Time Smoothness: Field Evaluation

What happened in front of the paver?

What happened behind the paver?

Real-Time Smoothness: Rough Trackline
Stringless Guidance: Leg Height

Stringless Guidance: Profile

Stringless Guidance
Real-Time Smoothness: Pan Motion

Impact event every 17 seconds

What is it ???

Paver Stop

Pan Motion: Tie-Bar Insertion (18 inches)
CP Road Map

Track 3: Intelligent Construction Systems
- Maturity using COMMAND Center

Maturity: COMMAND Center

Maturity: COMMAND Center

Maturity: COMMAND Center
Maturity: COMMAND Center

Maturity: Full-Depth Patching

MaturityCentral.com
CP Road Map

Track 3: Intelligent Construction Systems
- HIPERPAV and SmartCure

CPROAD MAP
shaping the future of concrete pavement
www.CProadMap.org

HIPERPAV

High PERformance Concrete PAving Software

How does HIPERPAV work?
- It predicts those first 72 hours after placement

- Magnitude of Stress or Strength vs. Time since Construction
- Critical Stress
- Cracking

- Magnitude of Stress or Strength vs. Time since Construction
- Strength
- Cracking
So, what do you do?
Incorporate Blast Furnace Slag as an Aggregate Option in the PCC Mix Window.

Incorporate an Automated Download Feature in the Climate Window.
**SmartCure**

- **Monitors and records** ambient climatic conditions and concrete surface temperatures
- **Tracks** location, date, time, and distance from paver
- **Predicts** evaporation rates, bleed rates, and set times
- **Alerts** user of critical situations and how to cure properly
- **Reports** all information.
Immediate application of curing compound is recommended.
CPSCP: Texture Testing with RoboTex 2.0

- Built around LMI-Selcom RoLine Sensor
- Laser height sensor, inertial referencing
- GPS, DMI encoder, video log

ISO 13473

CPSCP: Measuring Noise using OBSI

AASHTO TP 76

CPSCP: OBSI Testing
A "how to" guide for designing and constructing quieter concrete pavements
Addresses all conventional concrete pavement texture types
Simple and practical guidance

Design and Construction Guidelines

Specifications for Quieter Pavements
- Diamond Grinding
- Artificial Turf Drag
- Longitudinal Tining
- Transverse Tining

Source: Walter-Heilit SurfaceCharacteristics.com
Track 4: Optimized Surface Characteristics
- ProVAL

Profile Viewing and Analysis - ProVAL
- Sponsored by FHWA, LTPP, and Profile Pooled Fund
- Profile Analysis, Localizes Roughness
  - Numerous Specs – AASHTO and State DOT
- New Modules
- Automated Fault Measurement (AFM)
  - October 2010
  - AASHTO R 36
- Optimum Weigh-In-Motion Locator (OWL)
  - March 2011
  - AASHTO MP 14

AFM
Automated Fault Measurement
ProVAL

CP Road Map
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Precast Pavement: Benefits

- Expedited construction
  - Overnight or weekend “invisible” construction
  - Reduced user delay costs
  - Reduced disruption to local businesses
  - Reduced traffic control costs
- Controlled fabrication conditions
  - Improved durability and performance
  - Consistent mix and mixture flexibility
  - Adequate curing
  - Adequate air entrainment

Precast Pavement: Benefits of Prestressed

- Reduces/eliminates slab cracking (maintenance)
- Reduced number of joints (maintenance/smoothness)
- Reduced Slab Thickness (8 vs. 12 in.)
- Ability to span voids/unsound support layers
- Proven Long-Term Performance
  - 6 in. thick CIP post-tensioned pavement constructed in 1985 (near West, Texas)
  - Virtually no maintenance in 26 years

Using this...
to maintain this!

Precast pavement for bridge approach slabs

Precast pavement for 25 miles!