Concrete Pavement Road Map
Executive Committee Meeting

Chicago, Illinois
January 11, 2011
CP Road Map Committee Agenda
January 11, 2011 – 9 am to 3 pm
9450 Bryn Mawr Avenue, Rosemont, IL

9:00 Welcome

How the Road Map is Making a Difference

Examples of CP Road Map Impacts

10:15 COFFEE BREAK

10:30 Task Order 3 Accomplishments
   • Contractual items
   • Products
   • Interactions

Turner Fairbanks Concrete Pavement Research Program

11:45 LUNCH BREAK

12:30 Task Order 4
   • Tasks
   • Business track

1:00 Future Directions
1. Looking forward from a state’s perspective, how can the CP Road Map further facilitate information exchange, efficiency, and effectiveness in addressing needed concrete pavement research and technology transfer?

2. Where should the CP Road Map’s pooled fund activities be focused to bring the greatest value to the states?

3. Do you support continuing the TPF beyond June 2011?

4. What are your ideas on how the OSG can be most effective within the funding provided: i.e., what activities, efforts, products, etc., do you think will bring the most value?

5. How can this pooled fund work with other existing efforts, i.e., other concrete pavement pooled funds and other related research?

3:00 Adjourn
What is the CP Road Map?

• Working together to solve concrete pavement problems using pooled resources
CP Road Map Goals

• Prioritization
• Implementation
• Publicity
CP Road Map Goals

• **Prioritization**
  – Strategic planning (Gaps)
  – Programmatic thinking
  – Leveraging funding
CP Road Map Goals

- Implementation
  - Connecting people and groups
  - Collaboration / Coordination
  - Demonstrating findings
CP Road Map Goals

• Publicity
  – Publication of research work
  – News about successes
How Does It Work?

- Operation Support Group (OSG) listens to owners and builders for needs
- Committees set priorities
- OSG helps connect funding and researchers
- OSG distributes and implements findings
What’s in it for me?

• Help Funding Agencies
  – Leverage funds
  – Reduce duplication
  – Get answers for their problems

• Help Researchers
  – Get funding for work that is really needed
  – Get visibility for their work

• Help Engineers and Contractors
  – Learn and apply the latest technology
  – Improve specifications
How Can It Make A Difference?

• Highlight strategic needs
• Foster a spirit of collaboration
• Highlight what is being done
• Provide a model for other industries
Examples of CP Road Map Impacts

• A sample of recent and ongoing work that has (or will have) an impact on our industry.

• Work categorized by track, subtrack, and problem statement in the CP Road Map
Track 2: Performance-Based Design Guide for New and Rehabilitated Concrete Pavements

- Examples of projects
  - NCHRP 01-47 Sensitivity Evaluation of MEPDG Performance Prediction (*ongoing*)
  - NCHRP 01-48 Incorporating Pavement Preservation into the MEPDG (*ongoing*)
  - Pennsylvania DOT research of Current Practices in Pavement Performance Modeling
- Not a new design procedure!
- Background of recommended overlay design techniques
- Detailed examples of how to use the existing design techniques
- Learn by example – then apply for your situation!
Track 3: High-Speed Nondestructive Testing and Intelligent Construction Systems

• Example of projects
  
  – SHRP 2 R06(E) Real-Time Smoothness Measurements on Portland Cement Concrete Pavements During Construction (ongoing)

  – FHWA SmartCure Practical Enhancements for Field Application (ongoing)
Track 3: High-Speed Nondestructive Testing and Intelligent Construction Systems

SmartCure (3.2.4)

Miniaturized Weather Station and GPS System

- GPS Tablet PC (or Similar)
- Infrared Pyrometer
- 1-Wire® Weather Station
Track 3: SmartCure

Air Temperature (°F)
- 160
- 140
- 120
- 100
- 80
- 60
- 40
- 20

Mix Temperature (°F)
- 160
- 140
- 120
- 100
- 80
- 60
- 40
- 20

Humidity (%)
- 29.0

Wind Speed (mph)
- 8.7

Station
- 0+00

Time of Reading
- 2:06:06 PM

Evaporation Rate: 0.03 lb/ft²/hr
### Track 3: SmartCure

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![Graph showing evaporation rate](image)

Note: Use Double Coat Liquid Curing Compound.
Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements

- Example of projects
  - TPF-5(063) Improving the Quality of Pavement Profiler Measurement (ongoing)
  - NCHRP 01-43 Guide for Pavement Friction (complete)
Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements

Concrete Pavement Surface Characteristics Program (Track 4)

...we’ll talk more on this at the end...
Track 5: Concrete Pavement Equipment Automation and Advancements

• Example of projects

  - Iowa State University 2009 research and publication of *Stringless Portland Cement Concrete Paving* (complete)

  - Final Report on National Open House Two-Lift Concrete Paving for Interstate 70 in Kansas (complete)
GPS accuracy is good vertically to only one inch, so to get the proper accuracy in the z position you can use laser augmentation on the 4 wheeler. An alternate to the 4 wheeler is to shoot the existing pavement with total station.

Reference points are 250’+ apart and stagger on opposite sides. Vertical (Z) coordinate for reference points established by 3 wire level.
Track 5: Stringless

Proposed Improvement model
Track 5: Stringless
The prisms on the machine tells the total station where the machine is at for x,y,z. This information is related to the computer model on the machine from the total stations through radios on the machine. The model then knows where the machine is at and tells the machine what elevation it needs to be on each of the four corners of the pan.
Track 1: Performance-Based Concrete Pavement Mix Design

- Examples of projects
  - TPF-5(205) Implementation of Concrete Pavement Mixture Design and Analysis (MDA) Track of Concrete Pavement Road Map (*ongoing*)
  - TPF-5(179) Evaluation of Test Methods for Permeability (Transport) and Development of Performance Guidelines for Durability (*ongoing*)
  - FHWA Computer-Based Guidelines for Job-Specific Optimization of Paving Concrete (COMPASS) (*complete*)
**Track 1: Performance-Based Concrete Pavement Mix Design**

**TPF-5(205) Implementation of Concrete Pavement Mixture Design and Analysis (MDA)**

**Track of Concrete Pavement Road Map (Track 1)**

- Lead: Iowa DOT
- Partners: IA, KS, MI, MO, NY, OK, TX, WI
- This TPF project supports activities that align with Track 1 research needs statements.
- Progress (per latest quarterly report):
  - Ongoing work:
    - Investigations into the development of alternate methods for calculating mix proportions
    - Investigations of on-site analysis tools
    - Assessing requirements for the air void system
    - Preparation of Guide Specification
  - Completed work
    - Investigations of acoustical methods to determine setting time
Pooled Fund - Tasks

• Tests
  - Mix Proportions in fresh concrete - Portable XRF
  - Set time – calorimetry and/or acoustic methods
  - Protocol for integral waterproofers
• Models
  - What air do we really need
  - Mix proportioning
• Specifications
  - Guide specification
FHWA Contract - Tasks

• Models
  - What air do we really need Year 1-2
  - Mix proportioning Year 1
  - Standard data collection Year 2

• Specifications
  - Guide specification Year 1-2
  - Checksheets Year 2

• Communications
  - Tech briefs Year 2
  - Papers and presentations Year 2
Choose aggregate system
Choose paste quantity
Choose paste quality
  Choose SCM type and dose
  Choose air content
  Choose w/cm
Effect of w/cm
Rapid Chloride Penetration

![Graph showing the relationship between adjusted chloride passed and cement content for different w/c ratios.](image-url)
Track 1: Performance-Based Concrete Pavement Mix Design

Evaluation of Test Methods for Permeability (Transport) and Development of Performance Guidelines for Durability (1.2.5)

Tommy Nantung, INDOT
Kartik Obla, NRMCA, Jan Olek, Purdue and
Jason Weiss Purdue
Project Objectives

Develop a test procedure that directly evaluates the transport properties of concrete and relates these to anticipated performance with the use of exposure conditions.

- Evaluation of existing transport test procedures
- Development of new, or improvement test procedures
- Correlation between transport properties and existing ‘durability’ tests.
- Develop guidelines to relate permeability, exposure conditions, and field performance for use in specifications and quality control
Mechanism of Electrical Conduction in Concrete

Concrete is a composite:

- Solid phase (unhyd Cement, CSH, CH,...); \( \sigma_{\text{sol}} \approx 10^{-9} \text{ S/m} \)
  - Rajabipour 2006 based on results of Hammond and Robson 1955

- Liquid phase (pore solution); \( \sigma_{\text{liq}} \approx 1 \text{ S/m to } 20 \text{ S/m} \)
  - Christensen 1993

- Vapor phase (air voids, emptied pores); \( \sigma_{\text{vap}} \approx 10^{-15} \text{ S/m} \)
  - Aplin 2005

Flow of electricity is essentially ionic and through material’s liquid phase.
Track 1: Permeability

Sorption Test

- Determine the rate of absorption (sorptivity) of water by measuring the increase in the mass of a specimen as a function of time when only one surface of the specimen is immersed in water.
Using Transport Properties to Understand Joint Behavior

Understanding the fluid transport in saw-cut geometries

• X-ray absorption
• Numerical Simulations using transport inputs
• Fluid properties

Often damage is seen in transverse and longitudinal joints in pavements.
Track 1: Performance-Based Concrete Pavement Mix Design

FHWA Computer-Based Guidelines for Job-Specific Optimization of Paving Concrete (COMPASS) (1.2)

- Final Report
- Software
- Provides guidance for:
  - choosing materials
  - optimizing gradations
  - Proportioning mix designs
  - Optimizing mix designs for job-specific needs

Tip of the Day
Concrete with aggregates that are hard and well graded resist abrasion the best.

References
- "Guide to Durable Concrete.\textsuperscript{,} USA, American Concrete Institute, 1992.
- "Design and Control of Concrete Mixtures.\textsuperscript{,} PCA, 1990."
Track 6: Innovative Concrete Pavement
Joint Design, Materials, and Construction

• Example of projects
  – Joint Deterioration Study (Pooled Fund) *(ongoing)*
Track 6: Innovative Concrete Pavement Joint Design, Materials, and Construction
Joint Deterioration Pooled Fund (6.2.2)

- Objective of the project:
  - Identify the failure mechanisms occurring in the joints of concrete pavements in various northern states
  - Develop strategies to prevent the deterioration of new pavement in the future
• Some joints are deteriorating faster than we would like
• We are not sure why
• Most commonly in 5 to 10 year old pavements
• Water seems to be part of the problem
• Borderline air void systems are not uncommon
Track 6: Joint Deterioration

Three Different Types...

• Mechanical?
Three Different Types...

- Air void / water
Track 6: Joint Deterioration
Track 13: Concrete Pavement Sustainability

- Example of projects
  - TPF-5(129) Recycled Unbound Pavement Materials (MnROAD Study) (*ongoing*)
  - CP Tech Center Briefing Document (*complete*) and Manual of Practice (*ongoing*) on *Building Sustainable Pavements with Concrete*
Track 13: Concrete Pavement Sustainability

Concrete Pavement Sustainability Manual

- Must include concrete pavement design, materials construction, use, maintenance, renewal, and recycling
- Must reduce costs, improve the environmental footprint, and increase benefits to society over the life-cycle

Objective:

To identify and conduct research and transfer technology that enhances concrete pavement sustainability through the pavement’s life cycle
Track 13: Sustainability Manual

Cradle-to-Cradle Life Cycle

- Design
- Materials Processing
- Construction
- Operations
- Reconstruction and Recycling
- Preservation and Rehabilitation
- Renewal
“Best Practices” manual to enhance concrete pavement sustainability

Focus on practitioners
- Decision makers, engineers, and contractors

Manual will be part of an implementation package to expedite technology transfer
- Workshop and web-based instruction
Track 7: High-Speed Concrete Pavement Rehabilitation and Construction

- Example of projects
  - CP Tech Center *Guidance for the Design of Concrete Overlays using Existing Methodologies* (ongoing)
  - TPF-5(165) Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements (ongoing)
  - Illinois Center for Transportation research and publication of *Design and Concrete Requirements for Ultrathin Whitetopping* (complete)
Track 7: High-Speed Concrete Pavement Rehabilitation and Construction
Concrete Overlay Program (7.4)

Research
- FHWA/IHRB Research Project (4 projects)

Training
- Workshops (FHWA & CP Tech Center on Overlay Guide)

Design
- Guidance for Design of Concrete Overlays using Existing Methodologies
- CP Road Map Track Leadership

Evaluation & Plan Development
- Overlay Packet (Supplement to Overlay Guide)

Construction
- Field Application Program
- 4 to 5 Site Visits & Reports in 2010
Track 7: Overlays

- Improving Concrete Overlay Construction
- Executive Summary (15 pages)

Improving Concrete Overlay Construction

National Concrete Pavement Technology Center

Final Report
March 2010

Executive Summary
IMPROVING CONCRETE OVERLAY CONSTRUCTION

June 2010

Sponsored by
the Iowa Highway Research Board
(IHHRB Project TR-600)
Federal Highway Administration
(OTFH61-06-H-00011, Work Plan 17)
Track 7: Overlays

Overlay Field Application

Seven Site Visits in 2010

Interested States
1. California
2. Indiana
3. Kentucky
4. Maine
5. Nebraska
6. North Carolina
7. Texas

Iowa – 2009-2010
Field Application
Research Projects

Site Visit & Report
1. Arkansas
* 2. Delaware
3. Georgia
4. Illinois
5. Louisiana
6. Maryland
7. Minnesota
8. Nevada
9. New Mexico
10. North Dakota
* 11. Pennsylvania
* 12. South Dakota
13. Virginia
14. Washington
15. West Virginia
* Construction Complete
Track 11: Concrete Pavement Business Systems and Economics

• Example of projects
  – NCHRP 10-75 Guide for Pavement-Type Selection (*ongoing*)
  – TPF-5(159) Technology Transfer Concrete Consortium (*ongoing*)
The TCCC is a Federal/State/Industry partnership that supports the training of the highway construction personnel.

The goals of the TCCC are to:
- Develop and maintain a national curriculum for various transportation disciplines
- Identify training and certification requirements
- Coordinate/facilitate training efforts
**Track 11: Tech Transfer**

Transportation Curriculum Coordination Council

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Concrete Pavement Surface Characteristics Program

Pooled Fund TPF-5(139)

An update for the CP Road Map Executive Committee

11 January 2011
Rosemont, IL
Surface Characteristics

2. Model Specifications for Texture and Noise
Tech Briefs

Surface Characteristics

- Diamond Grinding to Reduce Tire-Pavement Noise in Concrete Pavements
- What Makes a Quieter Concrete Pavement?
- The Language of Noise and Quieter Pavements
- Measuring and Analyzing Pavement Texture
- Tire-Pavement Noise Test Protocols
- Variability of Pavements and Noise
- Advanced Pavement Texture and Noise Specifications
Training & Communication

Surface Characteristics

- Technical Workshops (1 day)
  - Fundamentals (Noise/Texture 101)
  - How-to Guide
  - Model Specifications
  - Selecting the Right Texture
- Webinars (3 × 90 min)
- Upper Management Presentation (30 min)
- Website (SurfaceCharacteristics.com)
What have we built?
Texture Testing: RoboTex 2.0

- Built around LMI-Selcom RoLine Sensor
- Laser height sensor, inertial referencing
- GPS, DMI encoder, video log
Measuring Noise using OBSI
Do Friction and Noise Relate?

Average OBSI Level (dBA) vs. Average DFT/CTM-Estimated SN40S (ASTM E 274 Skid Trailer, Bald Tire)
CP Tech Center Test Sections

• In 5 years, over 1500 unique textures tested
  - Transverse Tining (incl. skewed and cross-tined)
  - Longitudinal Tining (incl. sinusoidal)
  - Diamond Ground
  - Grooved (longitudinal, transverse)
  - Drag (Burlap, Turf, Broom, Belt, Carpet)
  - Shot Peened
  - Exposed Aggregate
  - Porous (Pervious) Concrete
  - Milled
  - HMA and Surface Treatments

• Hundreds of miles in 20 States and 6 Countries
OBSI Testing
OBSI Testing
What we’ve learned

There is a lot of:

VARIABILITY

Variability from project to project, and variability within a given project.
Diamond Grinding

98 dBA  Kansas
98 dBA  Colorado
101 dBA  Minnesota
104 dBA  New York
A-weighted Overall OBSI Level, 60 mph, SRTT (dB ref 1 pW/m²)
What can we do with this knowledge?
Guide Specifications for Quieter Pavements

Standard Practice for

Accepting Concrete Pavement for Tire/Pavement Noise

Designation: CPSCP MP 1-11 (DRAFT)

1. SCOPE

1.1. This practice provides guidance and example specifications for the use by Owner-Operators in development of specific project language for purposes of demonstrating conformance to the relevant performance levels, which is a responsibility of the Owner. Determination of the compliance of the project to the specified performance levels is the responsibility of the Owner.

1.2. If any part of this practice is in conflict with other referenced work, such as ASTM or AASHTO Standards, the practice is subordinate to the referenced work.

1.3. The values stated in SI Units are preferred and should be used as the standard.

1.4. This specification does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this specification to consult appropriate safety codes and standards and determine the applicability of regulatory limitations related to its use.

2. REFERENCED DOCUMENTS

2.1. ASTM Standards

2.1.1. C973 Standard Test Method

2.2. AASHTO Standards

3. TERMINOLOGY

3.1. No difference in performance level between test values

3.2. Weighted Sound Pressure (WSP) — a weighted sound pressure level as defined in AASHTO TP-61

3.3. Sound Reduction Index (SRI) — a weighted sound pressure level as defined in AASHTO TP-62

3.4. Standard Reference Pore (SRR) — a defined in AASHTO TP-63

3.5. Test Procedure — AASHTO TP-64
Quieter Concrete Pavement Guidelines

- A “how to” guide for designing and constructing quieter concrete pavements
- Addresses all conventional concrete pavement texture types
- Simple and practical guidance
Quieter Concrete Pavement Guidelines

Surface Texture

Grooves

Lands

Fins
Quieter Concrete Pavement Guidelines
Quieter Concrete Pavement Guidelines

Paving Equipment
Quieter Concrete Pavement Guidelines

Paving Equipment
Quieter Concrete Pavement Guidelines

Joints
Quieter Concrete Pavement Guidelines
What can we do in the field?
Monitor Construction Operations

Accelerometers

Texture Machine and Paver

Texture and Vibration Feedback

LMI-Selcom RoLine Line Laser

Tech Center
Louder – 106 dBA

Quieter – 100 dBA
Monitor Construction Operations
Task Order No. 3
From Sept. 11, 2008 to Oct. 31, 2010
How Managed

- CP Road Map project team conference calls:
  - 20 held and recorded
  - 10:30 a.m. each Monday morning
  - Reviewed tasks
  - Action items assigned
  - Goals achieved
Task Order No. 3
Scope of Work

Task A: Support Executive Committee

1. Plan, schedule, arrange travel, and recommend sites

2. Develop meeting agendas

3. Facilitate discussions at the meetings

4. Promptly after each meeting make travel expense reimbursements
Task Order No. 3
Scope of Work

Task A: Support Executive Committee (cont.)

5. Submit to the COTR a discussion of and recommendations regarding any additional support services specifically identified by the Executive Committee

6. Develop recommendations aimed at evaluating the degree of success and value added from the CP Road Map research program
# Executive Committee & Pooled Fund Meetings

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<td>1. Pooled Fund States</td>
<td>March 17, 2009</td>
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<td>2. Executive Committee</td>
<td>April 3, 2009</td>
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<td>3. Pooled Fund States</td>
<td>July 14, 2009</td>
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<td>4. Pooled Fund States</td>
<td>September 9, 2009</td>
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<td>5. Pooled Fund States</td>
<td>November 12, 2009</td>
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Task Order No. 3
Scope of Work

Task B: Support Research Track Teams

The support work described applies to:
  Track 1: Mix Design
  Track 2: Performance-Based Design
  Track 3: NDT/IC
  Track 4: Surface Characteristics
  Track 7: Overlays (sub track)
  Track 11: Business and Economics
  Track 13: Sustainability

1. Identifying collaborative opportunities
2. Establishing track priorities
Task Order No. 3
Scope of Work

Task B: Support Research Track Teams (cont.)

3. Develop project objective statements for each track’s priority projects

4. Assist project champions in developing funding mechanisms for each priority project

5. Planning and scheduling meetings of the individual Research Track Teams
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<td>2. Performance-Based Design</td>
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<td>4. Surface Characteristics</td>
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<td>7. Overlays</td>
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*Four programs underway by FHWA to address NDT/IC
Collaboration

- Industry rep sets up meeting with DOT, in-state university researchers, and OSG
  - OSG explains Road Map
  - Determine research needs of each DOT
  - Determine research capabilities of universities
  - Develop collaboration between DOT/University and others interested in same topic(s)
  - Develop contact list
Collaboration

- OSG assists in development of technology transfer publications
  - OSG receives national research reports from university researchers
  - Develops technical briefs annually summarizing the national research and disseminates them
Research Collaboration

• On December 15, 2009 Web-based meeting with:
  – Wisconsin DOT
  – University of Wisconsin-Madison
  – WCPA
  – FHWA

• On May 25, 2010 Web-based meeting with:
  – PennDOT
  – University of Pittsburg
  – Pennsylvania ACPA
  – FHWA
Research Collaboration

• This process included but was not limited to:
  - Explain Road Map to state
  - Determine research needs of state
  - Determine research capabilities of each university
  - Develop collaboration between DOT and University
  - Develop contact list
  - Collaboration of tech transfer
  - Encourage development of research champions
Research Collaboration

- Information was collected and disseminated in the E-news state highlights of the July and October 2010 editions for Wisconsin and Pennsylvania respectively.

- In January 2009 and 2010 provided research problem statements to the TRB Committee AFH50 from the CP Road Map.
Task Order No. 3
Scope of Work

Task C: Initiate Communications and Outreach Activities

1. Develop a plan to showcase results of current or recently completed research

2. Develop an accomplishment report showing administrative activities completed

3. Develop a plan for conducting videoconferences and/or webinars explaining the benefits of the CP Road Map program
Task Order No. 3
Scope of Work

Task C: Initiate Communications and Outreach Activities (cont.)

4. Continue updating and maintaining the CP Road Map Website
5. Continue the development of CP Road Map brochures and periodic publications
6. Develop and deliver PowerPoint presentations on the CP Road Map program at key stakeholder meetings
CP Road Map E-News September 2010

The CP Road Map E-News is the newsletter of the Long-Term Plan for Concrete Pavement Research and Technology (CP Road Map), a national research plan developed and jointly implemented by the concrete pavement stakeholder community. To find out more about the CP Road Map, or to get involved, contact Dale Harrington, dharrington@snyder-associates.com, 515-964-2020.

New Moving Advancements into Practice (MAP) Brief
Moving Advancements into Practice (MAP) Briefs describe promising technologies that can be used now to enhance concrete paving practices.

MAP Brief B-1: Roller-Compacted Concrete Pavement has recently been published under CP Road Map Track 1: Long-Life Concrete Pavements. This MAP Brief provides an introduction to roller-compacted concrete and its many paving applications.

Download MAP Brief B-1 (387 kb pdf).

News from the Road
News from the Road highlights research around the country that is helping the concrete pavement community meet the research objectives outlined in the CP Road Map.

Indiana evaluates in situ stiffness of subgrade by resilient and FWD modulus
In a recent project conducted by Purdue University for the Indiana DOT, the resilient modulus values of subgrade materials (as determined by laboratory testing methods) were compared to values calculated from falling weight deflectometer (FWD) testing. The study concluded that the modulus values obtained by FWD methods were approximately twice as high as those obtained through laboratory testing, and that these values were affected by seasonal changes. This study enabled the Indiana DOT to develop a more accurate approach for characterizing the subgrade layer when using Mechanistic-Empirical Pavement Design Guide software.

Studies on the use of innovative materials such as nanosilica can contribute to...
E-news Quotes

Thanks. I like the update.”
Leif Wathne, ACPA

“Good Job. Excellent newsletter, good format. I like this a lot.”
Matt Ross, P.E., Penhall Company

“Thank you for sending me the CP Roadmap newsletter.”
John Roberts, PE, M ASCE
Chairman, Northeast Solite Corporation

“Thanks, there were some interesting results here.”
Jim Cable, Cable Construction, LLC

“Great issue! Thanks!”
Steve Kosmatka, PCA

“The monthly summary is much appreciated.”
Jeff Uhlmeyer, P.E., WSDOT, State Pavement Engineer

“Very nice newsletter! Clear, concise and informative.”
Sandra Q. Larson, P.E.
Research and Technology Bureau Director
Iowa Department of Transportation
CP Road Map MAP Briefs
Moving Advancements into Practice

Accomplishments

- 6 MAP Briefs developed
- 5 highlighted in E-News
MD Track 1:
Performance-Based Concrete Pavement Mix Design System

- Goals
- Activities to date
- Publications
- Current projects
- Subtracks
- People involved

Goals
The goal of this track is to develop and deliver integrated tools and techniques for specifying, proportioning, and constructing concrete mixtures that meet the combined needs of owners and contractors: constructible, long lasting, sustainable, cost-efficient, and verifiable concrete mixtures for pavements. This topic is important because today’s materials for concrete mixtures are changing rapidly as environmental, cost, and performance constraints become more stringent.

Activities to Date
- FHWA is identifying improvements needed to enhance, coordinate, and simplify user interface(s) for mix design models (e.g., HIPERPAV, M-E PDG, COMPASS).
- State DOTs are ensuring that critical new tests are implementation-ready (e.g., calorimetry heat and procedures, coefficient of thermal expansion equipment, air-void analyzer equipment and testing procedure).
- Industry, led by the American Concrete Pavement Association, is developing a comprehensive mix design manual that incorporates up-to-date modeling and testing information compiled by FHWA and state DOTs.

Publications
- Framing report for Track 1: Performance-Based Mix Design System
- Mix Track Technical Advisory Committee Meeting Minutes, February 13, 2009
- Mix Track Pooled Fund Technical Advisory Committee Meeting Minutes, June 3, 2009
DG Track 2:
Performance-Based Design Guide for New and Rehabilitated Concrete Pavements

- Goals
- Activities to date
- Publications
- Research projects
- Subtracks
- People involved

Goals
The goal of this track is to continue enhancing the next generation of mechanistic approaches to pavement design and improving their integration with materials, construction, and environmental inputs. A major element of the track is helping agencies and contractors successfully make the change from strictly empirical design approaches to mechanistic approaches.

Activities to Date
- Work is underway to develop a guide that outlines the existing concrete overlay design process, defines the key inputs, and provides numerous design examples and typical cross-sections.
- Industry and State DOTs are investigating the size and spacing of concrete tie bars to make their use more efficient and economical.
- The team is planning to evaluate the effect of construction practices on concrete materials properties and develop new tests for characterizing concrete strength and modulus that better reflect field behavior.
- A future project will look at ways to improve distress and smoothness prediction models for jointed plain concrete pavement (JPCP). This project will result in more cost-effective and reliable designs for JPCP.

Publications
- Framing report for Track 2: Performance-Based Design Guide for New and Rehabilitated Concrete Pavements

Research projects
- Soil Mixing Methods for Highway Applications
- Monitoring and Modeling of Pavement Response and Performance
ND Track 3:

High-Speed Nondestructive Testing and Intelligent Construction Systems

- **Goals**
  High-speed nondestructive testing can continuously monitor pavement properties during construction to provide rapid feedback. As a result, automatic adjustments can ensure a high-quality finished product that meets performance specifications. The goal of this track is to develop nondestructive testing methods that use continuous and real-time sampling to monitor performance-related mix properties and reduce the number of human inspectors and improve construction operations.

- **Activities to Date**
  - Research is underway to develop equipment performance specifications for a curing monitoring system similar to SmartCure.
  - State and industry partners are working to identify techniques and technologies to properly measure air-void system in the appropriate location on the paving operation.
  - Future research will assess real-time measurement needs and techniques for concrete mix properties and variability.

- **Publications**
  - Framing report for Track 3: High-Speed Nondestructive Testing and Intelligent Construction Systems

- **Research projects**
  - Development of Performance Properties of Ternary Mixes
  - Evaluation, refinement and on-site demonstration of innovative concrete technologies

- **Subtracks**
  - Subtrack 1: Field Control
  - Subtrack 2: Nondestructive Testing Methods
SC Track 4:
Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements

- Goals
- Activities to date
- Publications
- Research projects
- Subtracks
- People involved

Goals
Under the surface characteristics track, the concrete pavement industry will work together to develop specifications and guidelines to design, construct, and maintain concrete pavements that are safe, comfortable, durable, and cost-effective. The goal is concrete pavements that invoke a pleasant human experience and address an array of societal needs.

Activities to Date
- Industry, in collaboration with FHWA, developed a manual of better practices for constructing and texturing concrete pavements that was published and distributed in 2008.
- The team is developing an Integrated Functional Classification System for concrete pavement surface characteristics
- A project is in development to refine models to relate pavement texture to noise, friction, splash and spray, and other concrete pavement surface characteristics.
- State and industry partners are developing a training program to improve surface characteristics through better practices in concrete pavement design, construction, and maintenance.

Publications
- Framing report for Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements

Research projects
- Improving the Quality of Pavement Profiler Measurement
- PCC Surface Characteristics - Rehabilitation (MnROAD Study)
- PCC Surface Characteristics - Design (MnROAD Study)
RC Track 7:

High-Speed Concrete Pavement Rehabilitation and Construction

- Goals
- Activities to date
- Publications
- Research projects
- Subtracks
- People involved

Goals
The need has never been greater for engineered strategies to preserve and maintain the nation's pavements. This track explores new and existing products and technologies that facilitate high-speed rehabilitation and construction of portland cement concrete pavements. The leadership team has chosen concrete overlays as its first area of focus.

Activities to Date
- A second manual is under development that focuses on design procedures for concrete overlays using best practices from existing methodologies.
- The Concrete Overlay Field Application Program was implemented by States and industry to expand use and knowledge of concrete overlays across the country. Nine States participated in field projects in 2008; 11 more have projects planned in 2009.
- Research is underway to solve construction technique limitations for concrete overlays.

Publications
- Framing report for Track 7: High-Speed Concrete Pavement Rehabilitation and Construction

Research projects
- Extending the Season for Concrete Construction and Repair, Phase III
- Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements
- Develop sound methods to comprehensively identify and quantify the benefit / cost of fast track construction
Concrete Pavement Business Systems and Economics

- Goals
- Activities to date
- Publications
- Research projects
- People involved

Goals
This track addresses business and economic issues in concrete paving. It has two main goals: (1) to address the management and financing of the Executive Committee functions, including innovative management systems, and (2) to address concrete pavement economics.

Activities to Date
- Federal, State, and industry partners in this track are examining the outreach mechanisms available to promote ongoing research sharing, research findings, and education programs.
- Webinars, blogs, and other web-based methods are being investigated as potential outreach mechanisms, especially in light of limited transportation funding to go to conventional conferences and workshops.
- Research is underway to evaluate the impact of alternative bidding for asphalt-concrete solutions and to evaluate the effectiveness of incentives.
- The team has made significant progress in developing effective accelerated technology transfer and rapid education programs for the future concrete paving workforce.

Publications
- Framing report for Track 11: Concrete Pavement Business Systems and Economics

Research projects
- Technology Transfer Concrete Consortium
- Guide for Pavement-Type Selection
- Technology Transfer, Implementation, and Technical Assistance For PCC/HMA MEPDG Deployment
CS Track 13:  
Concrete Pavement Sustainability

- Goals
- Activities to date
- Publications
- Research projects
- People involved

Goals
The Concrete Pavement Sustainability track is the most recent addition to the CP Road Map. The objective of this track is to identify and complete research and implementation that improves concrete pavement sustainability through the pavement's life cycle (design, materials selection, construction, operation, maintenance, restoraton, rehabilitation, and recycling).

Activities to Date
- The team is developing a “best practices” training manual and implementation package for concrete pavement sustainability that will provide detailed technical information to engineers, material suppliers, and contractors.
- Federal and State partners will conduct demonstration projects that feature sustainable solutions and effectively communicate the successes of these projects.

Publications
- Building Sustainable Pavements with Concrete: Briefing Document
- Framing report for Track 13: Concrete Pavement Sustainability
- Minutes from the first meeting of the Track 13: Concrete Pavement Sustainability Leadership Team

Research projects
- Recycled Materials Resource Center pooled fund
- Recycled Unbound Pavement Materials (MnROAD Study)
- Marginal and Innovative Materials in Concrete Paving (Local / P200 Fines) GAP 2.5
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<tr>
<th>TOPIC</th>
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<tr>
<td>Completed Durability PCC Pavements Subject to Ch Deicers</td>
<td>Track 1 – Mix Design</td>
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<td>Completed Diamond Grinding</td>
<td>Track 4 – Surface Characteristics</td>
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<tr>
<td>Completed Effective Use of Nonwoven Geotextiles as Interlayers in Concrete Pavement</td>
<td>Track 7 – Rehab &amp; Const</td>
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<td>Jan 2011 Smart Pavements (Smart Cure)</td>
<td>Track 10 – Pavmt Performance</td>
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<td>Feb 2011 Intelligent Compaction</td>
<td>Tracks 2 – Design; 3 – Non Destructive; 5 – Equipment Auto</td>
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<td>Mar 2011 Effective Use of Fly Ash &amp; Slag Cements</td>
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<td>Apr 2011 Joint Deterioration</td>
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<td>May 2011 Pavement Preservation – New Partial Depth Patching</td>
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<td>Jun 2011 Identifying and Avoiding Incompatible Combination of Concrete Materials</td>
<td>Track 1 – Mix Design</td>
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CP Road Map E-News
Accomplishments

• 8 E-News issues published

• Each with links to a minimum of four research efforts of interest

• 6 State Highlights
  - Indiana
  - Michigan
  - Wisconsin
  - Minnesota
  - Pennsylvania
  - Washington
CP Road Map E-News

The following topics were covered:

• April 2010
  – Virginia Transportation Research Council studies benefits of nano materials
  – Texas Transportation Institute evaluates effectiveness of curing techniques
  – Minnesota DOT examines effects of pavement drainage on joint behavior

• May 2010
  – Texas Transportation Institute studies design of concrete pavement transitions
  – Washington DOT examines dowel bar retrofit to extend pavement life
  – ACI releases report on pervious concrete
  – Minnesota DOT launches web page on concrete overlays
  – Nonwoven geotextile interlayers gaining popularity in the U.S.
  – Update from Indiana
CP Road Map E-News

• June 2010
  - North Dakota DOT reports on unsealed joints in pavements
  - Louisiana DOT investigates surface resistivity device
  - Research evaluates engineered cementitious composites (ECC)
  - University of California study evaluates accuracy and feasibility of maturity
  - Update from Michigan

• July 2010
  - ACPA launches website database for concrete overlays
  - Virginia Transportation Council investigates high friction surfaces
  - University of Illinois investigates two-stage mixing for recycled concrete aggregates
  - Texas research project evaluates alternatives to asphalt for subbase layers
  - Free ACPA software helps users develop job-specific dowel bar designs
  - Update from Wisconsin
CP Road Map E-News

• August 2010 Special Issue: Updates from the International Technology Scanning Tour on Long-Life Concrete Pavements
  - Two lift concrete paving
  - Concrete pavement design catalogues
  - High-quality concrete pavement foundations
  - Improved concrete mixture designs
  - Geotextile interlayers for cement-bound layers
  - Exposed aggregate concrete pavement surfacing
• September 2010
  - Indiana evaluates in situ subgrade stiffness by resilient and FWD modulus
  - Wisconsin DOT evaluates dowel bar retrofit performance
  - Iowa research investigates ways to improve concrete overlay construction
  - Ontario report quantifies pavement sustainability for Ontario highways
  - Ready Mixed Concrete foundation investigates effect of pavement type on fuel consumption and emissions
  - Update from Minnesota
CP Road Map E-News

• October 2010
  - CPTP publishes tech brief on performance of sealed and unsealed concrete joints
  - Iowa investigates freeze-thaw durability of low-permeability concrete
  - Louisiana research evaluates durability of titanium dioxide photocatalyst coating for concrete pavement
  - Quebec documents three-year performance of continuously reinforced concrete pavement with glass fiber reinforced polymer bars
  - Update from Pennsylvania

• November 2010
  - Wisconsin investigates standardized test procedures for deicing chemicals
  - FHWA conducts interlaboratory study on measuring the coefficient of thermal expansion of concrete
  - Wisconsin research evaluates open-graded base course with doweled and non-doweled transverse joints
  - Research in Malaysia investigates roller-compacted concrete pavements
  - Toronto evaluates performance of permeable pavements in cold climates
  - Update from Washington
• 7 MAP Briefs developed
  • 7-1: Use of Nonwoven Geotextiles as Interlayers in Concrete Pavement Systems
  • 4-1: Diamond Grinding to Reduce Tire-Pavement Noise in Concrete Pavements
  • 1-1: Job-Specific Optimization of Paving Concrete with COMPASS (Concrete Mixture Performance Analysis System)
  • 13-1: Two-lift Concrete Paving
  • 8-1: Roller-Compacted Concrete Pavements
  • 5-1: Stringless Concrete Paving
  • 1-2: Deleterious Chemical Effects of Deicing Solutions on Concrete Pavements
CP Road Map Example MAP Briefs

“Moving Advancements into Practice”
MAP Brief 8-1:

Describing promising technologies that can be used now to enhance concrete paving practices

Roller-Compacted Concrete Pavements

What Is Roller-Compacted Concrete?
Roller-compacted concrete (RCC) gets its name from the heavy vibratory steel drum and rubber-tired rollers used to help compact it into its final form. RCC has similar strength properties and consists of the same basic ingredients as conventional concrete—well-graded aggregates, cementitious materials, and water—but has different mixture proportions.

The major difference between RCC mixes and conventional concrete mixes is that RCC has a higher percentage of fine aggregates, which allows for tight packing and consolidation.

Fresh RCC is stiffer than typical zero slump conventional concrete. Its consistency is stiff enough to remain stable under vibratory roller, yet wet enough to permit adequate mixing and distribution of paste without segregation.

RCC is typically placed and initially compacted with an asphalt-type paver equipped with a standard or high-density screed, followed by a combination of passes with rollers for final compaction. Final compaction is generally achieved within one hour of mixing.

Unlike conventional concrete pavements, RCC pavements are constructed without forms, dowels, tie bars, or reinforcing steel. Joint sawing is not required, but when sawing is specified, transverse joints are spaced farther apart than with conventional concrete pavements.

RCC pavements combine various aspects of conventional concrete pavement materials practices with some construction practices typical of asphalt pavements. However, while RCC pavements are compacted in the same manner and have similar aggregate gradation as asphalt pavements, the materials and structural performance properties of RCC are similar to those of conventional concrete pavements.

Comparison of RCC materials and construction practices with conventional concrete and asphalt pavements

Conventional Concrete Pavement

Asphalt Pavement

RCC Pavement

“Moving Advancements into Practice”
MAP Brief 1-2:

Deleterious Chemical Effects of Deicing Solutions on Concrete Pavements

Introduction
Safety and mobility are key concerns for State Highway Agencies (SHAs), especially during the winter season when ice and snow accumulation on roads and bridges can create hazardous or impassable driving conditions. Various chemicals, including magnesium, sodium, and calcium chloride, magnesium magnesium acetate and urea, are used by SHAs as anti-icing and deicing solutions on transportation infrastructure.

The effectiveness of these chemicals for de-icing and anti-icing has been demonstrated. However, the possible detrimental effects to concrete in transportation structures have not been fully examined and documented.

Although these chemicals offer possible cost savings advantages to SHAs, the true cost effectiveness cannot be determined without establishing the potential for chemical attack and premature deterioration leading to costly rehabilitation or replacement.

The goal of this study was to examine the chemical effects of deicing and anti-icing chemicals on Portland cement concrete and to recommend changes to concrete mixture designs, construction practices, and winter maintenance procedures that will not compromise concrete durability.

Research Description
The degradation of concrete used in pavements and bridges that may occur as a result of attack by deicing and anti-icing solutions is the result of an increased concentration of dissociated calcium, magnesium, and chloride ions in the concrete pore water. These ions are available to combine with materials in the concrete to form expansive or weak reaction products such as brucite or magnesium silicate hydrates.

The dissociated chloride ions in the pore water solution are well documented as a primary cause of reinforcing steel corrosion. In addition, the study identified the formation of destructive mycelial bodies as a potentially significant cause of deterioration, even though this has been poorly documented in the literature.

A series of field explorations and laboratory experiments were performed including the characterization of field specimens, laboratory experiments on Portland cement mortars, and laboratory experiments on Portland cement concrete.

Characterization of field specimens
In general, the pavement sites examined lacked unambiguous evidence of distress associated with deicers. The research team also obtained cores from a number of bridge decks that were exhibiting distress. Although these bridge decks were in recent years maintained using various non-NaCl deicers, they had been in service for numerous years and as a result, have been exposed to NaCl deicers for a significant portion of their service lives. Ultimately, because of this history, any distress identified would be difficult to associate with a specific deicing chemical.
CP Road Map MAP Briefs

Moving Advancements into Practice (MAP) Briefs
Describing promising technologies that can be used now to enhance concrete paving practices

1. Deleterious Chemical Effects of Deicing Solutions on Concrete Pavements (Track 1: Performance Based Concrete Mix Design)

2. Stringless Paving (Track 3: Intelligent Construction Systems)

3. Roller-Compacted Concrete Pavements (Track 8: Long-Life Concrete Pavements)

4. Two-Lift Concrete Paving (Track 13: Concrete Pavement Sustainability)

5. Job-Specific Optimization of Paving Concrete with COMPASS (Concrete Mixture Performance Analysis System) (Track 1: Performance-Based Concrete Pavement Mix Design Systems)

6. Diamond Grinding to Reduce Tire-Pavement Noise in Concrete Pavements (Track 4: Concrete Pavement Surface Characteristics)

7. Use of Nonwoven Geotextiles as Interlayers in Concrete Pavement Systems (Track 7: High-Speed Concrete Pavement Rehabilitation and Construction)
CP Road Map Interactions

• **Interactions = Outreach**
  – To know what is going on where
  – To help provide strategic guidance if possible

• **Accomplished by -**
  – Contact with state research agencies:
    » DOT
    » Universities
    » Industry
  – Construction of database
## CP Road Map Interactions

### CP Road Map Database

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Project Overview</th>
<th>Contact</th>
<th>Date/Status</th>
<th>Sponsor (or principal investigator)</th>
<th>Sponsor (or principal investigator)</th>
<th>Lead (if any)</th>
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<tr>
<td>FHWA</td>
<td>Research during the design phase to develop a rating system for system identification and maintenance. The objectives include the identification of the state of the art, the development of a new rating system, and the assessment of the system's effectiveness through feedback from users.</td>
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**Notes:**
- FHWA: Federal Highway Administration
- NCHRP: National Cooperative Highway Research Program
- TPF: Transportation Performance Forum

**Related Projects:**
- FHWA, NCHRP, TPF Projects
## CP Road Map Interactions

### Project Title

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<th>State</th>
<th>Contains Repeated Research Project Year</th>
<th>Project Description</th>
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*CP Tech Center*

its your move.
## CP Road Map Interactions

### Project Description

| State | Contractor Institution | Project Description | Funding Source | Project Manager | Contact | Start Date | End Date | Status | Task 1 | Task 2 | Task 3 | Task 4 | Task 5 | Task 6 | Task 7 | Task 8 | Task 9 | Task 10 | Task 11 | Task 12 |
|-------|------------------------|---------------------|----------------|----------------|---------|------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| MHHA  | Recycled Building Center | This project is to develop new mixes of recycled building | FHWA | Tom Mitchell | Hydrogeologist | Aug 2022 | Nov 2023 | In Progress | | | | | | | | | | | | | |
### Participating TPF States, Contacts, and Dates

<table>
<thead>
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<th>State</th>
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<td>1/1/20</td>
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<tr>
<td>NY</td>
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<td>Jane Smith</td>
<td>NY</td>
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This table lists the participating TPF States, contacts, and dates for the CP Road Map Interactions project.
<p>| State | Project Description | Participant States | Local Entities | Contact | Start Date | End Date | Track | Track 2 | Track 3 | Track 4 | Track 5 | Track 6 | Track 7 | Track 8 | Track 9 | Track 10 | Track 11 | Track 12 |
|-------|--------------------|--------------------|----------------|--------|------------|---------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| State 1 | Description 1 | States 1, States 2, States 3 | Entities 1, Entities 2, Entities 3 | Contact 1 | Start 1 | End 1 | Track 1 | Track 2 | Track 3 | Track 4 | Track 5 | Track 6 | Track 7 | Track 8 | Track 9 | Track 10 | Track 11 | Track 12 |
| State 2 | Description 2 | States 4, States 5, States 6 | Entities 4, Entities 5, Entities 6 | Contact 2 | Start 2 | End 2 | Track 1 | Track 2 | Track 3 | Track 4 | Track 5 | Track 6 | Track 7 | Track 8 | Track 9 | Track 10 | Track 11 | Track 12 |
| State 3 | Description 3 | States 7, States 8, States 9 | Entities 7, Entities 8, Entities 9 | Contact 3 | Start 3 | End 3 | Track 1 | Track 2 | Track 3 | Track 4 | Track 5 | Track 6 | Track 7 | Track 8 | Track 9 | Track 10 | Track 11 | Track 12 |</p>
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<thead>
<tr>
<th>State</th>
<th>Procurement/Research/Project Year</th>
<th>Project Description</th>
<th>Participating States</th>
<th>Local Initiatives</th>
<th>Contact</th>
<th>EIA (Number or Share)</th>
<th>Status (in progress or completed)</th>
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<tr>
<td>NY</td>
<td>2010-2013</td>
<td>Recycling and Reuse of Highways and Materials</td>
<td>NY, PA, CT, NJ, MA, ME, VT, NH</td>
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<td>Andrew McQuade</td>
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<td>NJ</td>
<td>2011-2014</td>
<td>Sustainable Urban Drainage Systems</td>
<td>NJ, PA, DE, MD, VA</td>
<td>NJDOT</td>
<td>Michael W. King</td>
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<td>WV</td>
<td>2012-2015</td>
<td>Innovative Pavement Technologies</td>
<td>WV, VA, KY, OH, IN, IL</td>
<td>WPdot</td>
<td>John A. Smith</td>
<td>304-558-7011</td>
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<td>IL</td>
<td>2013-2016</td>
<td>Performance of New Materials</td>
<td>IL, WI, MN, IA, WI</td>
<td>ILC</td>
<td>James O. Brown</td>
<td>309-318-7077</td>
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Link to more information:
- [Link to more information](http://example.com)
### CP Road Map Interactions

<table>
<thead>
<tr>
<th>Title</th>
<th>General Functional (Primary Functional)</th>
<th>Project Description</th>
<th>Participants</th>
<th>Lead States</th>
<th>Domain</th>
<th>Next Step</th>
<th>Data/Information/Proposed Implementations</th>
<th>Track 1</th>
<th>Track 2</th>
<th>Track 3</th>
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<th>Track 5</th>
<th>Track 6</th>
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<td>TPF-0979</td>
<td>Evaluation of Tools Methodology for Transportation Emergency and Resilience</td>
<td>Improve tools to support the evaluation of transportation emergency and resilience scenarios</td>
<td>CSUL, UC, UC</td>
<td>WI, FL, NY, VA</td>
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<td>Testing</td>
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<td>TPF-0802</td>
<td>Increasing Resilience</td>
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<td>WI, PA, CA</td>
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The potential benefits of this collaborative management structure are significant:

- Ability to fund major research that is too expensive for any one organization or program.
- A strategic, proactive approach to optimizing pavements of the future that goes beyond knee-jerk reactions to existing challenges.
- Less duplication of effort across the country.
- Faster and broader implementation of results.
- Less waste.
CP Road Map Interactions

• Reaching out to the states
  - Indiana
  - Michigan
  - Wisconsin
  - Minnesota
  - Pennsylvania
  - Washington
CP Road Map Interactions

- Michigan
  - Michigan Concrete Association (MCA)
  - University of Michigan (U of M)
  - Michigan Technological University (MTU)
  - Transportation Materials Research Center (TMRC)
  - Michigan Tech Transportation Institute (MTTI)
  - Michigan State University (MSU)
CP Road Map Interactions

Recently Completed Research in Michigan

Current Research in Michigan

- Track 1
- Track 2
- Track 3
- Track 4
- Track 7
- Track 11
- Track 13
CP Road Map Interactions

- Pennsylvania
  - Pennsylvania State University (Penn State)
  - Mid-Atlantic Universities Transportation Center (MAUTC) Partnership
  - University of Pittsburg
  - Temple University
CP Road Map Interactions

Recently Completed Research in Pennsylvania

Currently Research in Pennsylvania

- Track 1
- Track 2
- Track 3
- Track 4
- Track 7
- Track 11
- Track 13
CP Road Map Interactions

Current State Research
including
Transportation Pooled Fund Efforts

- Track 1
- Track 2
- Track 3
- Track 4
- Track 7
- Track 11
- Track 13
CP Road Map Interactions

• Why is this important?
  – Maintain synergy

• What for?
  – The CP Road Map is a “living” document
  – The CP Road Map is a strategy tool
CP Road Map Interactions

- Questions?
Task Order No. 4
From Nov. 1, 2010 to June 30, 2011
Scope of Work

Task A: Review/Refresh Alignment with Needs

The current CP Road Map was published in September 2005 as a seven to ten year plan

1. Review the CP Road Map for priorities related to:
   - Pavement preservation/rehabilitation
   - Pavement foundations
   - Identify research and technology transfer needs
Task A: Review/Refresh Alignment with Needs (cont.)

2. Provide opportunity for input from:
   - Transportation Research Board
   - National Concrete Consortium
   - American Association of State and Highway Transportation Officials

3. Based on findings from SubTask A.1 and A.2, along with additional input from Track leadership and Executive Committee, reorganize Research Tracks as needed
Task B: Plan/Schedule/Facilitate Meetings

1. Update the track leadership teams and hold team meetings
2. Plan and schedule Web-based team meetings for all the priority tracks
3. Plan, schedule and facilitate Web-based meetings of the Executive Committee. Support Executive Committee & CP Road Map Pooled Fund Committee
Task Order No. 4
Scope of Work

Task C: Conduct Communications and Outreach Activities

1. Continue updating and maintaining the CP Road Map website
2. Continue outreach to State DOTs, industry, and the research community
3. Continue the CP Road Map e-news on a monthly basis including highlighting research from different state DOTs and MAP briefs
4. Continue to develop the MAP briefs and include at least one new MAP brief with each e-news
Task Order No. 4
Scope of Work

Help Desk

• The CP Tech Center will continue to be a resource for connecting stakeholders

Research Database

• The CP Tech Center will continue to provide links to TRIS and RIP on their web page
• Maintain database
Future Directions

CP Road Map
Executive and Pooled Fund Committee Meeting

January 11, 2011
The Long Term Plan for Concrete Pavement Research is a holistic, strategic plan for concrete research and technology transfer and serves as a framework for stakeholders committed to the value of innovation and implementation of new knowledge and approaches. It is not just a listing of 250 research project statements that outline research needs.
1. Looking forward from a state’s perspective, how can the CP Road Map further facilitate information exchange, efficiency, and effectiveness in addressing needed concrete pavement research and technology transfer?
2. Where should the CP Road Map’s pooled fund activities be focused to bring the greatest value to the states?
3. Do you support continuing the TPF beyond June 2011?
4. What are your ideas on how the OSG can be most effective within the funding provided: i.e., what activities, efforts, products, etc., do you think will bring the most value?
5. How can this pooled fund work with other existing efforts, i.e., other concrete pavement pooled funds and other related research?
Questions?