CP Road Map Executive Committee
Tuesday, January 10, 2012

Conference Call Agenda

Time: 10:00 Central
Call in number: 866.809.4014
Pass code: 294 8100

1. Welcome (Tom Cackler)

2. Update on Task Order #5 Accomplishments. (Dale Harrington)
   a. Technical training for TPF States (handout)
   b. E-news (handout)
   c. MAP Briefs (handout)
   d. Refreshing of Road Map

3. Brief review of the purpose of the CP Road Map (Tom Cackler) (handout)

4. Discuss future direction of the Road Map
   a. Current CP Road Map sponsorship and funding (Tom Cackler)
   b. FHWA’s plan for future CP Road Map activities (Ahmad Ardani/Cheryl Richter)
   c. Iowa’s willingness to facilitate a new TPF for concrete paving research and technology deployment. What activities related to the CP Road Map should be considered? (Sandra Larson)

5. April 3 physical meeting in Chicago. (This will be the last meeting for this project.)
   • Summarize accomplishments/outcomes from TPF-5(185)
   • Identify what aspects of the Road Map have been of most benefit to the states
   • Prioritize the items identified
   • In depth discussion on the new TPF for concrete pavement research and technology deployment to be led by Iowa DOT
## Attachment 2a. Technical Training for PF States

State Training for 2011 / 2012 on Ten Technical Subjects (as of 1/5/12)

<table>
<thead>
<tr>
<th>Location</th>
<th>Road Map Funding</th>
<th>NC2 Funding</th>
<th>Surf Char Funding</th>
<th>Selected Workshop(s)</th>
<th>Workshop Dates</th>
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<tr>
<td>Michigan, Grand Rapids</td>
<td>X</td>
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<td>IMCP Subjects</td>
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<td>Preservation</td>
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<tr>
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<td>X</td>
<td></td>
<td>IMCP/Preservation</td>
<td>March 13, 2012</td>
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<tr>
<td>Pennsylvania, King of Prussia</td>
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<td></td>
<td></td>
<td>IMCP/overlay</td>
<td>April 12, 2012</td>
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<tr>
<td>Virginia, Richmond</td>
<td>X</td>
<td></td>
<td></td>
<td>Surf. Char.</td>
<td>February 8, 2012</td>
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<tr>
<td>Iowa</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Meeting to decide on multiple courses</td>
<td>Districts to choose specific dates</td>
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<tr>
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<td>X</td>
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<tr>
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<td>X</td>
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<td>IMCP/overlay</td>
<td></td>
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<td><strong>Delaware</strong></td>
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<td></td>
<td></td>
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<td>Alabama, Montgomery</td>
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<td>IMCP-Conc. Mix and PDR/FDR</td>
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<td>Qa for one day</td>
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<td>X</td>
<td></td>
<td>IPS/Overlays</td>
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<tr>
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<td></td>
<td>Surf. Char./Early Age Cracking</td>
<td></td>
<td>April 5, 2012</td>
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<tr>
<td>Indiana, Indianapolis</td>
<td>X</td>
<td></td>
<td>IPS (3 hrs.) Qa (3 hrs.)</td>
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<td>Kansas, Topeka</td>
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<td>X</td>
<td></td>
<td>Surf. Char.</td>
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<tr>
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<td></td>
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<tr>
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<td>X</td>
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<td>RCC</td>
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<td>North Dakota, Bismark</td>
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<td></td>
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<td></td>
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<td>Ohio, Columbus</td>
<td>X</td>
<td></td>
<td>RCC/Preservation/ Overlays</td>
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<td>April 10, 2012</td>
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<tr>
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<td>X</td>
<td></td>
<td>IMCP</td>
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<td>South Dakota, Sioux Falls</td>
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<td>Preservation/ Overlays/Surf Char</td>
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<td>X</td>
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<tr>
<td>Wisconsin, Stevens Point</td>
<td>X</td>
<td>X</td>
<td>QA for one day</td>
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News from the Road

- **Colorado DOT evaluates tie bar system for longitudinal joints**
  The September 2011 report Evaluation of Longitudinal Joint Tie Bar System evaluates the longitudinal tie bar system currently used by the Colorado Department of Transportation (CDOT).

- **FHWA publishes tech brief on the impact of coefficient of thermal expansion in concrete pavement design**
  An FHWA Concrete Pavement Technology Program Tech Brief, Coefficient of Thermal Expansion in Concrete Pavement Design, describes the influence of the coefficient of thermal expansion (CTE) in concrete, test methods used to determine its value for design purposes, and its effect on the prediction models within the Mechanistic-Empirical Pavement Design Guide (M-E PDG).

- **Washington State DOT investigates studded tire wear on concrete pavements**
  The recent report Studded Tire Wear on Portland Cement Concrete Pavement in the Washington State Department of Transportation (WSDOT) Route Network explores the impact of studded tire wear on WSDOT roads.

- **National CP Tech Center publishes technology deployment plan for the use of recycled concrete aggregate**
  A cooperative agreement between the National Concrete Pavement Technology Center and FHWA resulted in a published report that provides a technology deployment plan to educate and train State DOT and industry personnel on the use of recycled concrete aggregate (RCA) in new concrete paving mixtures.

Updates from the States: Illinois

In the State of Illinois, concrete pavement research is largely conducted as a joint effort between the Illinois Department of Transportation (IDOT) and the Illinois Center for Transportation (ICT). Illinois also collaborates with a number of organizations to meet its research needs, including the Concrete Pavement Technology Center (CP Tech Center), and is an active participant in various Transportation Pooled Fund (TPF) studies. The Physical Research Section of IDOT, which resides within the Central Bureau of Materials and Physical Research (BMPR), is responsible for pursuing the use of innovative technologies that provide high-quality facilities and reduce life-cycle costs.

- **High Plastic Concrete Temperature Specifications for Paving Mixtures**
  The August 2011 report, *High Plastic Concrete Temperature Specifications for Paving Mixtures*, authored by John Popovics, Carrie Peterson, Andres Salas, Suyun Ham, and Jeffery Roesler, documents a study conducted to assess current IDOT specifications related to concrete pavement construction in hot weather conditions.

- **Performance of Concrete Pavements with Optimized Slab Geometry**
  The 2009 report, *Performance of Concrete Pavements with Optimized Slab Geometry*, by authors Victor Cervantes and Jeffrey Roesler, highlights a new proprietary methodology for designing concrete...
pavements with optimized slab dimensions and slab thicknesses as low as 4 inches, known as Thin Concrete Pavements (TCP).

- **Performance of I-57 Recycled Concrete Pavement**

**CP Road Map Track Status**
Concrete pavement research projects in Illinois that are currently ongoing and recently completed, in addition to Transportation Pooled Fund participation, are depicted in Figure 1. These projects are categorized according to the appropriate CP Road Map Track.

![Figure 1. Concrete Pavement Research in Illinois Categorized by CP Road Map Track](image)

**Transportation Pooled Fund (TPF) Studies**
Concrete pavement research work in Illinois includes work done under various TPF projects. These projects, and how they align under the CP Road Map, include the following.

**Track 1: Materials and Mixes for Concrete Pavements**
- TPF-5(042) Investigation of the Long-Term Effects of Magnesium Chloride and Other Concentrated Salt Solutions on Pavement and Structural Portland Cement Concrete
- TPF-5(117) Development of Performance Properties of Ternary Mixes
- TPF-5(179) Evaluation of Test Methods for Permeability (Transport) and Development of Performance Guidelines for Durability
- TPF-5(014) Advanced Research of an Image Analysis System for Hardened Concrete

**Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements**
- TPF-5(063) Improving the Quality of Pavement Profiler Measurement

**Track 6: Innovative Concrete Pavement Joint Design, Materials, and Construction**
- TPF-5(188) Evaluation of Fiber Reinforced Composite Dowel Bars and Stainless Steel Dowel Bars

**Track 9: Evaluation, Monitoring, and Strategies for Long Life Concrete Pavement**
- TPF-5(013) Effect of Multiple Freeze-Thaw Versus Deep Frost Penetration on Pavement Performance

**Track 10: Concrete Pavement Foundations and Drainage**
- TPF-5(001) Soil Mixing Methods for Highway Applications

**Track 11: Concrete Pavement Economics and Business Management**
- TPF-5(159) Technology Transfer Concrete Consortium
Current Research

Concrete pavement research projects that are currently ongoing, and how they align under the CP Road Map, are listed here.

**Track 1: Materials and Mixes for Concrete Pavements**
- Use of Coarse and Fine Recycled Concrete Aggregate for Airfield Pavement Applications
- Concrete with Ternary Blended Cement and Fractionated, Washed Reclaimed Asphalt Pavement

**Track 2: Performance-Based Design Guide for New and Rehabilitated Concrete Pavements**
- Development of Numerical Tools to Analyze the Effects of Concrete Materials in Various Layers on Slab Response and Behavior
- Theoretical Solution for Temperature Profile in Multi-Layered Pavement Systems Subjected to Transient Thermal Loads

**Track 5: Concrete Pavement Equipment Automation and Advancements**
- Evaluation of Concrete Cylinder Match Curing & Evaluation of 4"x 8" Cylinders

**Track 10: Concrete Pavement Foundations and Drainage**
- Field Performance Evaluations of IL Aggregates for Subgrade Replacement & Subbase - Phase II

Recently Completed Research

Concrete pavement research projects completed since 2007 are listed below, in addition to how they align under the CP Road Map.

**Track 1: Materials and Mixes for Concrete Pavements**
- High Plastic Concrete Temperature Specifications for Paving Mixtures

**Track 2: Performance-Based Design Guide for New and Rehabilitated Concrete Pavements**
- Evaluation and Implementation of Improved CRCP and JPCP Design

**Track 3: Intelligent Construction Systems and Quality Assurance for Concrete Pavements**
- Evaluation of 3-D Laser Scanning for Construction Application

**Track 6: Innovative Concrete Pavement Joint Design, Materials, and Construction**
- Evaluation of the Long-Term Durability of Joints Cut Using Early-Entry Saws on Rigid Pavements
- Performance of Concrete Pavements with Optimized Slab Geometry

**Track 7: Concrete Pavement Maintenance and Preservation**
- Update of Condition Rating Survey (CRS) Calculation/Prediction Models: Final Report

**Track 8: Concrete Pavement Construction, Reconstruction, and Overlays**
- Design and Concrete Material Requirements for Ultra-Thin Whitetopping

**Track 10: Concrete Pavement Foundations and Drainage**
- Characterization of Illinois Aggregates for Subgrade Replacement and Subbase

**Track 12: Concrete Pavement Sustainability**
- Performance of I-57 Recycled Concrete Pavement
The CP Road Map Moving Advancements into Practice (MAP) Briefs describe promising research and technologies that can be used now to enhance concrete paving practices. The following MAP Briefs were developed from October-December 2011.

**Precast Concrete Pavements**

**Introduction**

Since 2003, some within the realm of pavement construction have been content to install asphalt pavements. Novel ideas to redefine the construction process are now being implemented around the world. While high-quality materials and state-of-the-art technologies have been utilized, the industry has been slow to adopt new methodologies for pavement construction. Precast concrete pavements offer an alternative to traditional pavements, allowing for a more controlled environment and faster construction times. However, the adoption of precast concrete pavements has been limited due to a lack of awareness among contractors and the lack of standardized specifications. The CP Road Map Moving Advancements into Practice Brief describes the benefits and potential applications of precast concrete pavements.

**Primary Methods**

Precast concrete pavements are manufactured in a factory setting, where the materials are carefully controlled and the work is performed in a consistent, efficient manner. This allows for a higher quality of construction and reduces the potential for errors. In addition, precast concrete pavements can be installed more quickly than traditional pavements, reducing the time and cost associated with construction projects.

**Figure 1** Precast concrete pavement panels are fabricated and cured in a controlled environment. They are then transported to the job site and installed in a pre-determined sequence. This allows for a more efficient and cost-effective construction process.

**Full-Depth Reclamation of Asphalt Pavements with Cement**

**Introduction**

As the transportation industry evolves, there is a growing need for innovative solutions to enhance the performance of asphalt pavements. Full-depth reclamation, using cement as a binder, has emerged as a promising technology. This MAP Brief describes the benefits and potential applications of full-depth reclamation with cement, including case studies and best practices.

**Full-Depth Reclamation with Cement**

- **Advantages**: Full-depth reclamation with cement is a cost-effective solution that can extend the service life of existing pavements. It also reduces the need for new construction, making it an environmentally friendly option.
- **Techniques**: The process involves the use of cement to bind the asphalt, allowing for a stronger, more durable pavement. The cement is typically placed in layers, with each layer compacted to ensure a strong bond.

**Candidates for Full-depth Reclamation**

- **Rotational Slump testers**: The use of cement in asphalt pavements can improve the performance of existing pavements. The rotational slump tester is a laboratory tool used to evaluate the workability of the cement.
- **Cementitious binders****: The use of cement in asphalt pavements can improve the performance of existing pavements. The cementitious binder is a mixture of cement and other materials that can be used to improve the durability of asphalt pavements.

**Figure 1** The use of cement in asphalt pavements can improve the performance of existing pavements. The cementitious binder is a mixture of cement and other materials that can be used to improve the durability of asphalt pavements.
THE CP ROAD MAP

The CP Road Map is a comprehensive and strategic plan for concrete pavement research that guides the investment of research dollars. It is a living plan with broad stakeholder involvement. For the last 5 years, it has tracked and facilitated technologies that have been helping the concrete pavement community meet the paving needs of today as well as the paving challenges of the future. The CP Road Map is guiding the industry work towards a new generation of concrete pavements for the 21st century.

WHAT IS UNIQUE ABOUT THE CP ROAD MAP?

Strategic: It combines more than 270 research problem statements into 12 integrated and cohesive tracks of research, leading to specific products that dramatically affect the way concrete pavements are designed and constructed.

Innovative: From the way it was developed, to its unique track structure and cross-track integration, to the plan for conducting the research, the Road Map introduces a new, inclusive, and far-reaching approach to pavement research.

Stakeholder involvement: The Road Map plan is for the Federal, State, and private concrete pavement community. Peers helped create it, so it reflects all needs. It has guided stakeholders in both research selection and prioritization.

No cost or time limitations: The research contained in the Road Map is estimated at overall cost of $275 -$500 M.

Independent of any one agency or pot of money: Stakeholders with funds and expertise will pool their resources, jointly conduct and coordinate the research, and apply the results. The plan incorporates innovative, effective research implementation to move useful new products and systems to the field quickly.

PURPOSE - A VISIONARY CHARGE

For most of the 20th century, the same materials—Portland cement, high-quality aggregate, and water—were used in pavement concrete with only minor refinements. It was a fairly forgiving formula that allowed some variations in subgrade quality, construction practices, and other variables without sacrificing pavement performance. For generations, the industry had the luxury of keeping traffic off new concrete pavements for several days (even weeks) while the concrete developed its intended design strength.

In the past 20 years, the industry has experienced more changes than those that occurred in the previous 80 years, and the following changes are turning the process of building concrete pavements on end:

- Today’s concrete mix designs must integrate a multitude of new, sometimes marginal materials, resulting in serious compatibility problems, and reduced tolerance for variations.

- Motorists are more demanding. They will tolerate only minimal road closures and delays due to roadwork, increasing the need for new paving methods that allow road crews to get in, get out, and stay out. And motorists want smoother, quieter pavements, pushing the industry to control pavement surface characteristics.

- Highway agency focus has shifted from building new pavements to rehabilitating and maintaining existing ones, which requires different designs, systems, materials, and equipment.

- Environmental pressures, including traffic congestion and drainage and runoff issues, are affecting mix designs and pavement construction practices.

- Highway budgets are being squeezed at every level. The pavement community simply must do more with less.

In this environment, the old system for constructing concrete pavements is not meeting today’s demands. Pavement failures have occurred that were unheard of 30 years ago. The concrete pavement community cannot continue business
as usual if it is going to meet the growing demands on highway construction and rehabilitation. The CP Road Map gives the community an opportunity to proactively reinvent itself through research.

THREE SPECIAL RESEARCH MANAGEMENT CHALLENGES

Three issues are particularly important: ensuring initial projects are begun quickly, supporting significant changes to business systems, and focusing on technology transfer.

Early Financing and Conduct of Research
Industry leaders should validate quickly the credibility of the CP Road Map and demonstrate their own commitment to work cooperatively to fund and implement it. Research track team leaders should begin at least one project in each track as quickly as possible. In addition, each track should be updated as soon as possible to show new starts and other ongoing work being accomplished by agencies across the country, including FHWA, the National CP Tech Center, and State transportation departments.

Business System Changes
The CP Road Map recognizes a significant transfer of roles and responsibilities from State Transportation departments to industry. To succeed, such a transfer requires a new business model—that is, a new way for transportation departments and industry to do business together. This model should include pavement economics, capital availability, risk and risk transfer, warranties, innovative contracting, incentives, and standards ownership.

The first objective is to determine the best combination of concrete pavement solutions (mix of fixes) that balances funds, traffic impact, and network efficiency. The second is to take advantage of an array of alternate contracting techniques that could enhance the procurement of concrete pavements with an improved determination of risk between the owner and the contractor.

Technology Transfer
Stakeholders are concerned about the slowness of communicating research results to agencies and industry, as well as the slowness of industry to accept new ideas and technologies. They were especially concerned about the lack of technology transfer and training materials for the workforce.

Effective technology transfer strategies will be critical for every research project that comes out of the CP Road Map, but particularly in the mix design and NDT/ICS tracks, where research results eventually will impact the job of every person on the construction site.

One stand-alone project under track 11 is to develop an expedited technology transfer plan. Marketing and technology transfer resources available through projects such as FHWA’s Advanced Concrete Pavement Technology (ACPT) should be built into the technology transfer plan.

GETTING STARTED: NOT BUSINESS AS USUAL

Beginning a long-term research program is a slow process. During the final 3 years of the original CP Road Map development, the development team worked closely with stakeholders to enlist support.

The research tracks are ambitious but achievable. The research management plan is sound. Together, they identify what needs to be done and how to succeed to achieve the new goal of the CP Road Map:

By 2020, the highway community will have a comprehensive, integrated, and fully functional system of concrete pavement technology that provides innovative solutions for customer-driven performance requirements.

Peer review, coordination, leveraging, and partnering are all valid strategies. For this plan to work, however, champions must step forward and join together, believing in the synergy the CP Road Map can generate. The EAC, supported by the administrative support group, and the research track team leaders should be true champions.