



CP Road Map E-News August 2010 Special Issue

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.

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Intro to the Special Issue: Updates from the International Technology Scanning Tour on Long-Life Concrete Pavements

In May 2006, a team of public and private sector concrete pavement stakeholders visited transportation agencies in Europe and Canada to gather information about concrete paving practices that have resulted in long-lasting pavements.

During the tour, the team considered various technologies that, if incorporated into U.S. practice, have the potential to improve the longevity of concrete pavements. This issue describes the six technologies identified by the scan team as having the greatest potential and provides up-to-date information on how these technologies are being implemented in the United States.

To read more about the scanning tour, see the FHWA report [Long-Life Concrete Pavements in Europe and Canada](#).

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 13-1: Two-Lift Concrete Paving](#) has recently been published under [Track 13: Concrete Pavement Sustainability](#). This MAP Brief describes the potential of two-lift concrete paving as a long-lasting, sustainable pavement solution. Two-lift concrete paving was the first promising technology identified by the international scan team.

[Download MAP Brief 13-1](#) (462 kb pdf).

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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.



This issue describes research and technology implementation resulting from the international scanning tour on long-life pavements. It includes the following information about the six topics identified by the scan team as having the greatest potential implementation benefits in the United States:

- [Two-lift concrete paving](#)
- [Concrete pavement design catalogs](#)
- [High-quality concrete pavement foundations](#)
- [Improved concrete mixture designs](#)
- [Geotextile interlayers between cement-bound layers](#)
- [Exposed aggregate concrete pavement surfaces](#)

The research and technology transfer programs resulting from the scanning tour all contribute to research needs identified in CP Road Map Track 8: Long-Life Concrete Pavements. Each program also contributes to other Road Map tracks, as identified in the links below.

Two-lift concrete paving

Two-lift concrete paving involves the placement of two wet-on-wet concrete layers that are placed consecutively to prevent a cold joint from forming between the two lifts.

The two-lift process has great potential as a sustainable paving solution. It reduces the cost of materials and materials transportation, reduces the environmental impact caused by quarrying and importing aggregates, and increases social benefits by maintaining friction and low noise levels and providing a long-lasting pavement that does not need frequent reconstruction.



Two-lift concrete paving can be categorized under [CP Road Map Track 13: Concrete Pavement Sustainability](#). It also contributes to [Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements](#) because the top lift can be optimized to meet surface needs such as low noise and friction.

Two-lift paving website

The National Concrete Pavement Technology (CP Tech) Center has published a website with information on two-lift paving, including presentations and reports on two-lift construction in the U.S. To view the website, [click here](#).

Two-lift paving open house

A national two-lift concrete paving open house will be held September 27-28, 2010 at the Drury Plaza Chesterfield - St. Louis to showcase an upcoming Missouri DOT (MoDOT) two-lift project. The project is part of the reconstruction of Route 141 between Ladue and Olive. The open house will give interested stakeholders the opportunity to learn more about two-lift concrete paving and will give the contractor and material suppliers the opportunity to share details about their approach to this project. For more information, or to register, [click here](#).

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Concrete Pavement Design Catalog

The concrete pavement design catalog is a technique routinely used in Germany and Austria that simplifies pavement design. The implementation of this technology requires the development of look-up charts, or tables, that assign thicknesses based on known climate, materials, and traffic loads. The charts are supported and routinely refined via mechanistic validation efforts.

The development of U.S. versions of this technology is contributing to research objectives outlined in [CP Road Map Track 2: Performance-Based](#)



[Design Guide for New and Rehabilitated Concrete Pavements.](#)

Caltrans design catalog

The current California Department of Transportation (Caltrans) Highway Design Manual (July 2008) includes a design catalog for rigid pavements. The design catalog consists of tables that identify design thicknesses for the pavement surface and support layers based on expected loads, location, type of subgrade, and lateral support conditions. To access Section 600 of the Caltrans Highway Design Manual (where the design tables can be found), [click here](#).

MoDOT design catalog

The Missouri Department of Transportation uses a design catalog during the scoping of new projects. Lookup tables are used to determine design thicknesses for major roads in order to calculate conceptual estimates only. The design tables provide thicknesses based on traffic, but also include assumptions for speed, base type and thickness, number of lanes, and truck distribution categories. To access this information, [click here](#).

Design of concrete overlays (ultrathin whitetopping)

The 2008 Illinois DOT report *Design and Concrete Material Requirements for Ultra-Thin Whitetopping* documents the effort to evaluate and identify the best method for designing concrete overlays over hot-mix asphalt (HMA) pavement surfaces. Chapter 5 of this report presents tables that list design recommendations for concrete thicknesses up to six inches based on HMA thickness, traffic, and fiber reinforcement. For more information, [click here](#).

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Concrete Pavement Foundations

High-quality concrete pavement foundations result in better long-term pavement performance. The scanning team found that pavements constructed in Europe typically incorporate thicker, better quality materials in the foundation layers than those used in the United States.

Currently, there are a number of research and implementation efforts in the United States to develop stricter tolerances for foundation materials and innovative construction techniques to improve the placement of foundation layers. This research is categorized under [CP Road Map Track 8: Long-Life Concrete Pavements](#).

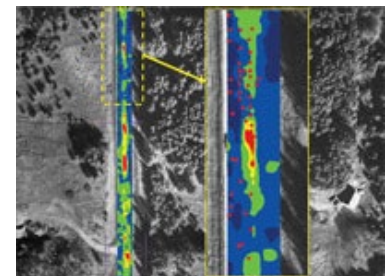


Geotechnical solutions for soil improvement

The Transportation Research Board (TRB) Strategic Highway Research Program (SHRP) 2 R02 project titled *Geotechnical Solutions for Soil Improvement, Rapid Embankment Construction, and Stabilization of the Pavement Working Platform* is currently underway. Consisting of two phases, the intent of this project is to ultimately develop guidance on materials and methods for the new construction or rehabilitation of pavements over poor soil conditions. For more information, [click here](#).

Intelligent compaction pooled fund study

The Accelerated Implementation of Intelligent Compaction Technology for Embankment Subgrade Soils, Aggregate Base, and Asphalt Pavement Material pooled fund study is sponsored by FHWA and includes Georgia, Iowa, Indiana, Kansas, Minnesota, Missouri, North Dakota, Maryland, New York, Pennsylvania, Texas, Virginia, and Wisconsin DOTs as supporting partners. One of this project's objectives is to develop specifications for the implementation of intelligent compaction as a means of constructing better performing subgrade and subbase foundation layers for concrete pavements. For more information, [click here](#).



Pooled fund study on foundation layers

Foundation Layers for Concrete Pavements is a pooled-fund project supported by a partnership between the FHWA and Departments of Transportation in Iowa, California, Michigan, Pennsylvania, and Wisconsin.

According to the project's objectives, all aspects of foundation layers will be investigated in an effort to identify what makes pavement foundations more durable, uniform, constructible, and economical. For more information, [click here](#).

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Improved Concrete Mixture Design

During the scanning tour, the team found that concrete in Europe is quite durable and typically exhibits higher flexural strength values than concrete in the United States. The team concluded that more attention is given to concrete mixture design in Europe and that there is more willingness to adopt innovative materials and technologies in Europe.



There are many ongoing efforts to improve mixture designs in the United States. These efforts are categorized under [Track 1: Performance-Based Concrete Pavement Mix Design Systems](#).

Materials and construction optimization pooled fund study

Pooled-fund study TPF-5(066), Material and Construction Optimization for the Prevention of Premature Pavement Distress in PCC Pavements, was initiated with the goal of identifying ways to improve pavement longevity. The final report, published by the National CP Tech Center in March 2008, marked the end of the project. The report documents an evaluation of conventional and new methods for testing concrete and concrete materials to prevent materials and construction problems that could lead to premature concrete pavement distress. [Download the report](#).

As part of this project, the National CP Tech Center developed a testing guide for implementing quality control procedures for concrete pavements. FHWA is in the early stages of developing a training program based on this project. Download the [Testing Guide for Implementing Concrete Paving Quality Control Procedures](#).



The National CP Tech Center also developed the *Air-Void Analyzer Hyperdocument (AVA Hyperdoc)* as part of this project. The AVA Hyperdoc is a multimedia training document that walks technicians through air-void analyzer (AVA) testing. It offers video clips, photos, and illustrations that lead users from setting up the equipment to interpreting AVA test results.

[Download the AVA Hyperdoc](#) (695 mb pdf). (*Note: due to the file size, it is recommended to save the file to your desktop prior to opening it.)

Concrete mix design pooled fund study

[CP Road Map Track 1](#) is specific to concrete mixture design concepts that are being implemented through pooled-fund TPF-5(205), Implementation of Concrete Mixture Design and Analysis (MDA) Track of the Concrete Pavement Road Map. Researchers involved with this pooled fund are tracking a majority of ongoing and recently completed research on concrete pavement materials and mix design. The objectives of this pooled fund are to evaluate emerging testing technologies and models, develop guidelines and specifications for testing mixtures, and provide outreach and technology transfer. For more information, [click here](#).

COMPASS software

The FHWA Concrete Materials Performance Analysis System Software (COMPASS) is a computer-based guidance tool that helps users design concrete mixture proportions. COMPASS includes four individual modules that guide users through the process of choosing proper materials, gradation analysis, mixture proportioning, and job-specific optimization procedures. Pending a formal implementation effort, the unofficial version of COMPASS can be downloaded free by [clicking here](#).

To find out more about COMPASS, [check out MAP brief 1-1](#).

Guide for design and proportioning of concrete mixtures

The Portland Cement Association and the American Concrete Pavement Association are currently developing a guide for concrete mixture designs for paving applications. The guide, titled *Design and Proportioning of*

Concrete Paving Mixtures, will be a resource for designers, concrete producers, paving contractors and any other stakeholder interested in learning more about concrete paving materials and construction.

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Geotextile Interlayers for Cement-Bound Layers

The use of nonwoven geotextile interlayers between cementitious pavement layers is gaining momentum in the United States, due to the scanning tour and subsequent research on German practices. A 2009 study provided recommendations for U.S. materials and construction standards and specifications for nonwoven geotextiles.

The advantages for using nonwoven geotextile interlayers include expedited construction schedules, the potential for significant cost savings, and the elimination of an asphalt interlayer that has the potential to strip. The key to the success of these interlayers is to facilitate drainage beneath the concrete.



The efforts associated with the transfer of this technology to the U.S. industry can be categorized under [CP Road Map Track 7: High-Speed Concrete Pavement Rehabilitation and Construction](#).

For more on geotextile interlayers, check out [MAP brief 7-1](#).

An expert task group (ETG) that includes researchers, contractors, and representatives from both the concrete pavement and geotextile industries has formed to facilitate the implementation of geotextile interlayers in the United States. Recently, this group launched a website, [ConcreteOnTop.com](#), that provides basic information about geotextile interlayers, materials and construction recommendations, and case studies, as well as an interactive form for frequently asked questions. [Visit the website](#).

Exposed Aggregate Concrete Pavement Surfacing

During the scan tour, the team found that some countries used an exposed aggregate concrete surface to minimize noise caused by tire-pavement interaction. Efforts to implement this technology in the United States are categorized under [CP Road Map Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements](#).



Report on noise reduction methods

In July 2006, the CP Tech Center published [Evaluation of U.S. and European Concrete Pavement Noise Reduction Methods](#). The report documents Part 1, Task 2 of the a seven-year Concrete Pavement Surface Characteristics Project initiated by a partnership between the National CP Tech Center, FHWA, American Concrete Pavement Association (ACPA) and International Grooving and Grinding Association (IGGA).

Exposed aggregate surfaces are identified in the report as having the potential to reduce tire-pavement noise while providing adequate friction. The report also presents details on a project along Interstate 75 in downtown Detroit, where an exposed aggregate surface was constructed on a large scale for the first time in the United States. [Click here to read more](#).

Exposed aggregate test section in Kansas

In 2008, a test section was constructed in Saline County, Kansas, that included an exposed aggregate surface. The test section was constructed using similar techniques to those used in Europe, and it incorporated two-lift construction methods. Subsequent noise testing of the surface showed that the exposed aggregate surface was quieter than a conventional pavement surface. In fact, the section in Kansas showed a lower tire-pavement noise than the average noise measured on European roadways with exposed aggregate surfaces. For more information on the Kansas trial section, including surface characteristics reports, [click here](#).



Presentation at October 2010 International Symposium on Concrete Roads

The U.S. experience of constructing an exposed aggregate surface in Kansas will be presented at the 11th International Symposium on Concrete Roads on October 13-15, 2010, in Seville, Spain. The opportunity to present such a successful project will provide the opportunity for U.S. representatives to exchange knowledge and may lead to further improvements of this technology. For more information about the symposium, [click here](#).

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