# CP Road Map E-News January-February 2012

The ***CP Road Map E-News*** is the bi-monthly 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 research and technologies that can be used now to enhance concrete paving practices.

The January-February 2012 MAP Brief: Full-Depth Repair for Concrete Pavements has recently been published. This MAP brief discusses full-depth repair as a rehabilitation technique for deteriorated concrete pavements.

**Download the January-February 2012 MAP Brief**.

## 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.

### Maryland DOT investigates use of concrete maturity method

In the recent report, *Implementation of the Concrete Maturity Meter for Maryland*, Morgan State University researchers evaluated the use of the concrete maturity method for determining concrete strength. The maturity method is a non-destructive test method that uses concrete temperature history to estimate in-place strength and ultimately expedites the construction process, allowing a pavement to open to traffic sooner. It is more efficient than traditional methods, which rely on compression testing at pre-determined time intervals, because the amount of time necessary for concrete to reach its desired minimum strength is known ahead of time. In this study, a large number of specimens were cast for laboratory and field evaluation. It was demonstrated that the strength-maturity relationship is highly dependent on concrete mixture proportions and constituent materials; deviations between calibration specimens and concrete placed in the field will result in inaccurate strength predictions. In order to fully comply with the ASTM concrete maturity specification
(C1074-11), special care must be taken to ensure that uniformity is maintained and a strength-maturity relationship is developed for every application. By following simple protocol and selecting the proper locations for temperature measurement and estimation of critical strength, the maturity method has consistently proven to be a powerful tool.

Download the report.

This work is contributing to research objectives outlined in CP Road Map Track 3: Intelligent Construction Systems and Quality Assurance for Concrete Pavements.

### National CP Tech Center publishes comprehensive study on pervious

## concrete

The October 2011 report, *An Integrated Study of Pervious Concrete Mixture Design for Wearing Course Applications*, presents the results of a comprehensive study on portland cement pervious concrete (PCPC). In this study, the researchers conducted a variety of fundamental material property investigations, including the role of air entrainment, effect of deicing on durability, and mixture proportions. Test methods and design procedures were also developed to characterize a wide range of properties and identify potential constructability issues. In addition, a PCPC overlay was constructed at the Mn/ROAD facility, where subsequent field investigations and long-term testing were carried out to assess durability and overall performance. Condition surveys, field infiltration testing, and laboratory permeability tests all demonstrated the overlay has performed favorably. Furthermore, noise measurements revealed a quieter pavement compared to traditional (dense) concrete pavements. Overall, this research has shown that pervious concrete overlays can be successfully designed, constructed, operated, and maintained, even in a harsh freeze-thaw environment. PCPC has been shown to possess many advantages, including reduced splash and spray characteristics, hydroplaning potential, and overall noise levels. Future research that may be of particular interest includes addressing design requirements for minimizing clogging, improving acoustical durability, and alternate placement techniques.

Download the report.

This research is helping to fill knowledge gaps outlined in CP Road Map Track 1: Materials and Mixes for Concrete Pavements.

## Wisconsin DOT explores lowering cementitious materials content of concrete pavements

A study designed to explore the feasibility of reducing the cementitious materials content (CMC) in concrete pavements is outlined in the recent report, *Reduction of Minimum Required Weight of Cementitious Materials in WisDOT Concrete Mixes*. The cementitious materials considered in this study included portland cement, fly ash, and ground granulated blast furnace slag. Given that these materials are the most expensive components of a concrete pavement mixture, any reduction in quantity without compromising the integrity of the structure can represent considerable cost savings. It is important to note, however, that a reduction in CMC generally implies an increase in aggregate content and lower volumes of cement paste, both of which can lead to workability issues. As a result, the researchers produced a large variety or concrete mixtures and conducted extensive testing including compressive strength, freeze-thaw, and rapid chloride permeability testing. Fortunately, these trials eventually yielded several successful low CMC concrete mixtures in terms of strength, durability, and workability. It is recommended that mixture proportions for standard WisDOT concrete paving mixtures are expanded to include the findings of this research.

Download the report.

This work is meeting research needs identified in CP Road Map Track 1: Materials and Mixes for Concrete Pavements.

## Michican researchers evaluate use of recycled concrete for new construction

In the August 2011 report, *Using Recycled Concrete in MDOT's Transportation Infrastructure - Manual of Practice*, Michigan researchers analyzed the use of crushed concrete aggregate (CCA) as an aggregate source in new construction. CCA is a granular material manufactured by removing, crushing, and processing existing concrete pavement for reuse

as virgin aggregate. This practice originated during the 1970s in an effort to overcome limited availability of aggregates, conserve resources, minimize solid waste disposal issues, and reduce overall concrete construction costs. The first projects in the State of Michigan to utilize CCA exhibited performance issues that have consequently limited its use today. These issues were due to the unique characteristics of CCA compared to conventional concrete that weren't initially considered, including high alkaline levels, greater angularity, and increased abrasion loss. However, the researchers have shown that effective characterization of these materials during production and throughout the design and construction process can lead to successful pavement applications. Guidance on all aspects of the use of CCA has been provided such as processing and production considerations, properties of pavements incorporating CCA, and the use of CCA in different structural layers. The researchers believe this report will serve as a valuable tool for engineers to utilize in order to improve the sustainability of transportation infrastructure.

Download the report.

This research can be categorized under CP Road Map Track 12: Concrete Pavement Sustainability and Track 1: Materials and Mixes for Concrete Pavements.

## Updates from the States: Oklahoma

In the State of Oklahoma, concrete pavement research is coordinated through the Oklahoma Department of Transportation (ODOT) Research, Development and Technology Transfer (RDTT) Program. This program identifies research needs, arranges for the conduct of, and secures appropriate funding for research projects with specific objectives and prescribed timeframes. Research projects with well-defined objectives are selected by Department personnel with the aim of providing a coordinated and balanced effort among the various technical, socioeconomic, and environmental subject areas. Furthermore, research results are implemented through new specifications, standard plans, test methods, new or revised procedures, computer programs, manual changes, or policy and procedure directives.

Read on for more information about concrete pavement research in the State of Oklahoma.

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The National Concrete Pavement Technology Center at Iowa State University provides operations support services to the CP Road Map program.
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