National Concrete Consortium (NCC) E-News March 2019

In association with the CP Road Map Program

The **NCC 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 (515-290-4014).

Moving Advancements into Practice (MAP) Brief


"Moving Advancements into Practice"
MAP Brief March 2019
Fiber-Reinforced Concrete for Pavement Overlays

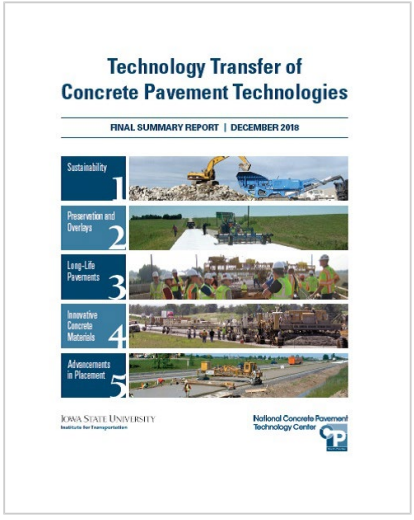
Moving Advancements into Practice (MAP) briefs describe promising research and technologies that can be used now to enhance concrete paving practices.

The March 2019 MAP brief, *Fiber-Reinforced Concrete (FRC) for Pavement Overlays*, summarizes the value of using FRC for concrete overlays and provides methods for determining the appropriate fiber reinforcement performance values to be specified for a project. The MAP brief also includes a summary of a spreadsheet tool—the Residual Strength Estimator—that provides an estimate of the FRC performance values to specify for a project as well as the effective flexural strength to input into mechanistic-empirical concrete pavement design software.

Download the March 2019 MAP Brief.

Latest CP Tech Center Publications

Publication - Technology Transfer of Concrete Pavement Technologies (date: December 2018)



This document is a summary of the accomplishments of the Cooperative Agreement between the Federal Highway Administration (FHWA) and the National Concrete Pavement Technology Center (CP Tech Center) over the last five years. The goal of this project was to help bring the latest concrete pavement innovations, knowledge, and technologies to state highway agencies (SHAs) in support of the Accelerated Implementation and Deployment of Pavement Technologies (AID-PT) program goals.

The purpose of the AID-PT program is to document, demonstrate, and deploy innovative pavement technologies, including their applications, performance, and benefits. With the guidance of the FHWA, the National CP Tech Center delivered products and technical support to SHAs so that they might be better equipped to manage their investments in concrete pavements.

The objectives of this project were to advance the following:

- Sustainability aspects of concrete pavements and materials
- Preservation and maintenance techniques for concrete pavements
- Long-life concrete pavements
- Innovative concrete materials
- New technologies and advancements in concrete pavement placement

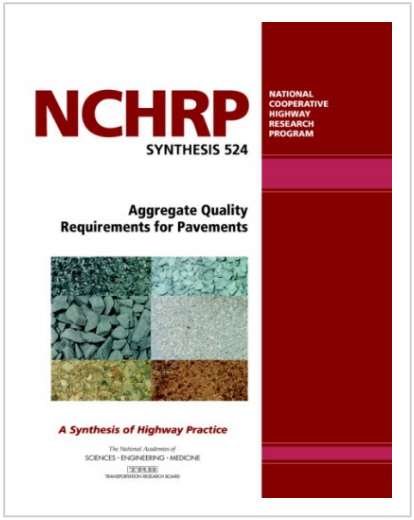
The National CP Tech Center provided nationwide open houses or showcases and workshops, presentations, and webinars in the five advancement areas to an average of 4,500 individuals representing associations, industry, academia, and SHAs each year. In addition to the technology transfer through these activities, the Center developed and delivered a number of resource webpages and a wide array of publications, which are also available online.

Click here to view the report.

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. The research projects and the summaries described herein are the products of the researchers and sponsors.

Aggregate Quality Requirements for Pavements (report date: July 2018)



Constructing and maintaining pavements requires an abundant and dependable supply of quality aggregates. Aggregate comes from a wide range of materials, including quarried rock, sand, and gravel, and materials such as slag, reclaimed asphalt pavement, and recycled concrete aggregate. While all transportation agencies have specifications for aggregate quality, there is wide variation in what different agencies consider suitable aggregates for specific applications.

This synthesis documents transportation agency requirements for the quality of aggregates for various pavement types. Information used in this study was gathered through a literature review and a survey of state departments of transportation and Canadian provincial transportation agencies. Both current agency practices as well as state-of-the-art research findings on sources, locations, standards/provisional testing methods, and ranges for different types of aggregates used in North America are provided. This includes quality assurance methods as well as frequency of sampling and testing established. This synthesis also provides information on how aggregate quality has been documented and linked to both structural and functional pavement performance in the field through agency practices and experience. Environmental concerns such as leaching and potential risk to ground or outfall waters are discussed. Finally, knowledge gaps related to characterizations and classifications of different types of aggregates, including lack of performance-based specifications and implementation of effective aggregate quality assurance programs, are identified.

This project is NCHRP Synthesis 524. The research reported herein was performed under NCHRP Project 20-05, Topic 48-10 and written by Erol Tutumluer, Maziar Moaveni, and Issam I. A. Qamhia, Advanced Transportation Geotechnics Solutions, LLC, Champaign, IL. Click here to access the full document.

This project is contributing to objectives identified in CP Road Map Track 1: Materials and Mixes.

Precast Concrete Panels for Rapid Full-Depth Repair of CRC Pavement to Maintain Continuity of Longitudinal Reinforcement (date: July 2018)

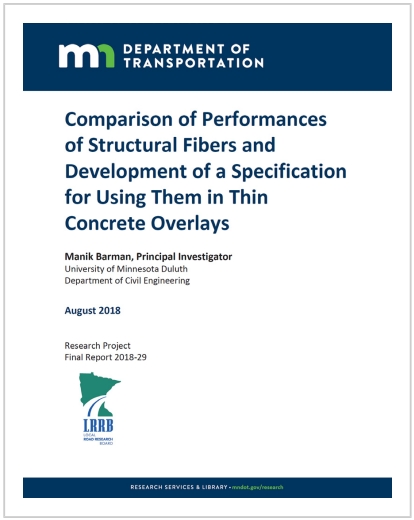
This tech brief describes a recently implemented method for rapid

overnight full-depth repairs of continuously reinforced concrete (CRC) pavements using precast concrete panels. This method, developed by the Illinois Tollway, uses continuous longitudinal reinforcement throughout the repair area to make the method applicable for repairing multiple lanes or large areas, as well as for isolated repairs for long-term performance with minimal impact to traffic. The Illinois Tollway has successfully utilized this method for a high traffic-volume expressway in the Chicago metropolitan area.

The tech brief was written by the FWHA with support from the Illinois Tollway. Click here to access the full document.

This project is contributing to objectives identified in CP Road Map Track 7: Maintenance and Preservation.

Comparison of Performances of Structural Fibers and Development of a Specification for Using Them in Thin Concrete Overlays (report date: August 2018)



Structural fibers improve the long-term performance of concrete pavements and overlays and are potentially useful to reduce the slab thickness. These fibers are available in different parent material compositions, stiffness, shapes, and aspect ratios. The main objective of this study was to characterize the post-crack flexural and joint performance of fiber-reinforced concrete (FRC) to develop a specification for the selection of structural fibers for concrete overlays and/or pavements. The study included a literature review, an online survey, and large-scale laboratory testing. It was found that the majority (almost 94%) of the FRC overlays in this country were constructed with structural synthetic fibers, which provided equal or better performance than projects using the steel fibers. In the laboratory study, a total of 43 different mixes were prepared with 11 different types of fibers. Fiber dosage, stiffness, and geometry significantly influenced the residual strength ratio (RSR) and residual strength (RS). In general, embossed, twisted, and crimped fibers performed better on average than straight-flat synthetic fibers when the comparison was made in terms of RSR or RS. From the joint performance testing, it was found that fibers can greatly improve the performance of the pavement with respect to load transfer efficiency (LTE), differential energy dissipation. The findings from this were used to recommend the target ranges post-crack flexural performance, and joint performance parameters

This project was sponsored by the Local Road Research Board, Minnesota Department of Transportation and performed by University of Minnesota, Duluth. The report was written by Manik Barman, Ph. D. and Bryce Hansen. Click here to access the full document.

This project is contributing to objectives identified in CP Road Map Track 8: Construction, Reconstruction, and Overlays.

Evaluation of Dowel Bar Alignment and Effect on Long-Term Performance of Jointed Pavement (report date: May 2018)

Dowel bars are the current preferred method for providing load transfer for jointed plain concrete pavements (JPCP). For proper load transfer to occur, the dowels must be placed properly (i.e., in the middle of the slab, horizontal to the grade, and in the direction of traffic flow). This project evaluated JPCP performance with relation to dowel bar alignment utilizing the new MIT-SCAN2-BT technology. Four to eight


Louisiana Transportation Research Center

Final Report 595

Evaluation of Dowel Bar Alignment and Effect on Long-term Performance of Jointed Pavement

by

Tyson Rupnow, Ph.D., P.E.
Patrick Icenogle, P.E.
Zachary Collier, E.I.

LTRC

4101 Gourrier Avenue | Baton Rouge, Louisiana 70808
(225) 767-9131 | (225) 767-9108 fax | www.ltrc.lsu.edu

jointed concrete pavements of each of the following ages were measured: 0-10 years, 10-20, years, and 20+ years of age to determine the effects of dowel bar misalignment on pavement performance indicators such as faulting, load transfer, and ride quality. For each project, about 5 percent of the joints were tested, (about 15 joints per mile). The joints were tested in groups of five at 0.3-, 0.3-, and 0.4-mile increments. Every joint on the newly constructed I-49 corridor from LA1 to the Arkansas state line was measured.

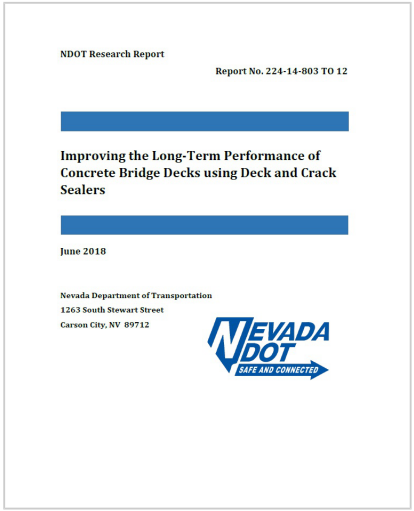
The results of this project show that the MIT-SCAN2-BT device is accurate, but the flexible track is fragile and will need repairs in extended testing scenarios. Testing rates range from 32-45 joints per hour for full width pavement sections in a closed road condition. The pavement surface must be free of debris and measurements should be conducted prior to application of raised pavement markers. Pavements constructed over the past 30 years that contain dowel bars in the joint detail are performing well with regards to measurable faulting. Measured joints were constructed with no horizontal skew, vertical translation, vertical tilt, or horizontal translation.

The results indicated that the pavement sections should not exhibit joint lock due to skew or tilt. The MIT-SCAN2-BT device is very capable of locating and measuring dowel bars and assemblies. It is also capable of determining whether or not a bar is missing, or if the load transfer device is something other than a dowel bar. The results also indicate that the effect of longitudinally translated dowel bars is negligible. Acceptable long-term performance was observed in joints with less than 4 in. of embedment and some joints with 2.5 to 3 in. of embedment. The Department's current dowel placement specifications lead to acceptable long-term joint performance.

This project was sponsored by the Louisiana Department of Transportation in cooperation with FHWA and performed by the Louisiana Transportation Research Center. The report was written by Tyson D. Rupnow, Patrick Icenogle, Zachary Collier. Click here to access the full document.

This project is contributing to objectives identified in CP Road Map Track 8: Construction, Reconstruction, and Overlays.

Improving the Long-Term Performance of Concrete Bridge Decks Using Deck and Crack Sealers (report date: June 2018)


NDOT Research Report

Report No. 224-14-803 TO 12

Improving the Long-Term Performance of Concrete Bridge Decks using Deck and Crack Sealers

June 2018

Nevada Department of Transportation
1263 South Stewart Street
Carson City, NV 89712

NEVADA DOT SAFE AND CONNECTED

Maintaining bridge decks is a challenge for state DOTs. It is critical to extend the life of a bridge deck as long as possible since bridge deck replacement is difficult, expensive, and significantly disrupts the traveling public. NDOT currently utilizes overlays, but effective use of sealants and deck treatments could delay overlays, save costs, and extend bridge deck life. The primary objective of the project was to develop a bridge deck maintenance guide that focuses on weather conditions that are common in the desert southwest. This includes areas of extreme dry heat to mountainous regions with snow that use deicing salts. The primary focus of this research is to take best practices from other states and determine the best implementation plan for the SOLARIS members. Therefore, the research focused on reviewing the literature for current best practices. After collecting the literature, comparisons were made between states in terms of bridge maintenance, construction practice, and deck conditions. An

experimental phase tested these materials under accelerated conditions and then used test bridges to apply the knowledge in the field. The final step was a comprehensive report that describes the work and provides recommendations for bridge deck maintenance.

This project was sponsored by Nevada Department of Transportation and performed by the University of Nevada, Reno. The report was written by David Sanders and Karim Mostafa. Click here to access the full document.

This research is contributing to objectives identified in CP Road Map Track 7: Concrete Pavement Maintenance and Preservation.

Newsletter staff

- Dale Harrington, HCE Services
- Sabrina Shields-Cook, Editor

The National Concrete Pavement Technology Center at Iowa State University provides operations support services to the CP Road Map program.
CP Tech Center
2711 S. Loop Drive, Suite 4700
Ames, IA 50010
Phone: 515-294-5798
Fax: 515-294-0467
Email: Program Management ~ Communications ~ Webmaster