



Updates from the States: Michigan (June 2010)

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Concrete pavement research and technology development in Michigan is a joint effort of the [Michigan Department of Transportation \(MDOT\)](#), the [Michigan Concrete Association \(MCA\)](#), the [University of Michigan](#), [Michigan Technological University \(MTU\)](#), [Michigan State University \(MSU\)](#), and Michigan research consultants.

Michigan-based research agencies, centers, and programs

MDOT performs in-house research and works closely with MCA, State universities, and other State DOTs provide the highest quality integrated transportation services for economic benefit and improved quality of life. The [Transportation Materials Research Center \(TMRC\)](#) is a partnership between MDOT and MTU, focusing on materials issues related to highways. MDOT also participates in a variety of pooled fund projects to gain knowledge and expertise that can help solve pavement problems.

Concrete research at MTU is conducted under the [Michigan Tech Transportation Institute \(MTTI\)](#). Research initiatives are carried out through a variety of centers and programs including Michigan's Local Technical Assistance Program, Michigan Tech's University Transportation Center for Materials in Sustainable Transportation Infrastructure, Technology Development Group, and Tribal Technical Assistance Program.

Concrete pavement research at MSU is focused on the development of concrete mechanistic-empirical pavement response and performance models, material characterization using nondestructive field and laboratory testing, advanced cost-effective pavement preservation methodologies, rapid construction quality assurance technologies, innovative pavement management strategies, dynamic vehicle-pavement interaction, and modeling of vehicle operating costs. [Click here for more information on this research.](#)

Focal areas for research

Ongoing research efforts in Michigan by the various research entities include investigating the use of sustainable materials for recycled concrete pavements, methods for reducing the carbon foot print of portland cement concrete, the impact of hydrated cement paste quality on entrained air void system, and the use of recycled glass as a supplementary cementitious material.

Recently completed research efforts include characterizing aggregate properties, improving pavement durability for long-term performance, calibrating variables for use in M-E PDG analysis, and improving concrete pavement sustainability. The following text highlights some of these efforts.

Coarse aggregates and freeze-thaw durability

Over the past few years, MDOT has performed research and analysis on coarse aggregates to validate results obtained from MDOT's freeze-thaw testing procedures. This work was in response to contractor concerns regarding the test methods for acceptance of concrete coarse aggregates used in Michigan. The study confirmed, through multi-state testing, that the MDOT freeze-thaw testing program correlates well with testing programs currently administered by other states in a similar geographic region. [Click here to view a report on this topic.](#)

This project is an example of research work categorized under [CP Road Map Track 1: Performance-Based](#)

[Concrete Pavement Mix Design Systems.](#)

Performance of jointed reinforced concrete pavements

A recent MDOT study reported on the performance of jointed reinforced concrete pavements (JRCP) over open-graded drainage courses. The study evaluated the performance of joints in JRCP over treated open-graded drainage courses and concluded that jointed plain concrete pavements (JPCP) constructed in Michigan would have more consistent performance if constructed over a treated open-graded drainage course instead of an untreated base. According to the report, improved long-term performance of JPCP over a treated base is contingent on a properly draining pavement system. [Click here to read the full report.](#)

This project is meeting needs outlined in [CP Road Map Track 8: Long-Life Concrete Pavements](#) and [Track 10: Concrete Pavement Performance](#).

Evaluating concrete pavements with materials-related distress

A recent research project by MDOT and MTU evaluated the performance of six existing pavements in Michigan with materials-related distress. Alkali-silica reaction and paste freeze-thaw deterioration were identified as the primary causes for distress in the different pavement structures that were evaluated. [Click here to read the full report.](#)

This research is an example of work categorized under [CP Road Map Track 10: Concrete Pavement Performance](#).

Implementing the M-E PDG

As MDOT moves towards use of the AASHTO Mechanistic-Empirical Pavement Design Guide (M-E PDG), calibration of many of the required inputs is necessary. MDOT and MSU recently released a report documenting the development of axle load distributions and several other traffic characterizations for the various axle types for use in different regions and different roads for Level 2 inputs for the State of Michigan. [Click here to view the report.](#)

MDOT also conducted research on characterizing the coefficient of thermal expansion (CTE) of portland cement concrete using local aggregates. The project report catalogs Level I inputs (ME-PDG) for CTE, reflecting local materials and PCC mixture design practices.

These projects are addressing needs identified in [CP Road Map Track 2: Performance-Based Design Guide for New and Rehabilitated Concrete Pavements](#).

About the CP Road Map E-News

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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