

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): IOWA DOT

INSTRUCTIONS:

Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.

Transportation Pooled Fund Program Project # TPF-5(368)	Transportation Pooled Fund Program - Report Period: X Quarter 1 (January 1 – March 31, 2022) Quarter 2 (April 1 – June 30, 2022) Quarter 3 (July 1 – September 30, 2022) Quarter 4 (October 1 – December 31, 2022)	
Project Title: Performance Engineered Concrete Paving Mixtures		
Project Manager: John Hart	Phone: 239-1471	E-mail: john.hart@dot.iowa.gov
Project Investigator: Peter Taylor	Phone: 515-294-9333	E-mail: ptaylor@iastate.edu
Lead Agency Project ID:	Other Project ID (i.e., contract #): Addendum 629	Project Start Date: 10/1/17
Original Project End Date:	Current Project End Date: 12/31/2022	Number of Extensions: PFS

Project schedule status:

On schedule
 On revised schedule
 Ahead of schedule
 Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Total Percentage of Work Completed
\$2,230,000	\$1,913,983	NA

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$66,909		

Project Description:

Concrete for pavements has historically been specified and field controlled around acceptance criteria that do not relate well to durability (slump, air content, strength). Paving concrete specifications need to be built upon engineering properties that directly relate to good field performance. With the recent advancements in research knowledge on failure mechanisms, and the parallel development of better tests, this is possible.

A review of many current and new specifications has found that they are still largely based on strength, slump, and air, which provide limited correlation with the mechanisms of pavement failure currently observed. The need for change in the way we specify concrete, especially concrete for paving mixtures, is becoming increasingly apparent as mixtures become more complex through a growing use of a range of chemical admixtures and supplementary cementitious materials. Traffic loadings continue to increase, more aggressive winter maintenance practices are implemented, and demand increases to build systems more quickly, cheaply, but with intent for increased longevity.

Tasks include:

- Task 1: Implementing What We Know
- Task 2: Performance Monitoring and Specification Refinement
- Task 3: Measuring and Relating Early Age Concrete Properties to Performance

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):

For Quarter ending March 31, 2022

- The Iowa DOT has agreed to serve as the lead state for a second phase PEM Pooled Fund project, PEM 2. The CP Tech Center is working with agency and industry to define an extended scope of work that will continue to encourage agencies to consider specification changes and procedures that will enhance concrete performance. In addition, PEM 2 will consider needs beyond the mix, exploring operational innovations that can further advance the reliability of new concrete pavements.
- Activities in the past quarter included calls with agencies and contractors focusing on continued shadow testing, data collection and analysis, a construction specification incorporating PEM language, pilot projects and state/industry implementation. Calls were made to Maine and North Carolina to update the specification tracking table and better understand the level of advancement of PEM with respect to state agency specifications.
- The PEM team has continued to look forward to opportunities in 2022 to collaborate with FHWA's Mobile Concrete Technology Center (MCTC) to provide training, assistance and PEM Open Houses. Discussions have taken place for potential PEM open houses in New York, Idaho and Oklahoma during the planned MCTC visits. FHWA is also finding great interest and success with the MCTC on-line test demonstrations/training program.
- It remains the PEM Team's intent to provide all participating SHAs one opportunity for local training. Planning is in the works with Maine DOT for a PEM overview workshop.
- Representatives from the research team provided a two-day workshop at the Georgia DOT Office of Materials and Testing on March 8 & 9. The DOT has requested PEM shadow testing and test training from the CP Tech Center and is also planning a pilot project with an optimized aggregate gradation mixture as a result of the workshop.
- As travel restrictions are relaxed and facilities are reopened, members of the PEM Team prepared to schedule a precision and bias testing event for SAM, Box and VKelly this summer. We have also agreed with FHWA on a plan for precision and bias work on resistivity that Jason Weiss will be coordinating with various laboratories. These activities will assist in moving forward with full standardization of the PEM tests.

- It is understood that AASHTO provisional standard PP84 has advanced to full standard R 101. A published document is forthcoming.
- NCE is continuing to manage the sampling and reporting of the test results from the SPS-2 sites. 101 cores from six states were sampled and delivered to Oregon State University and Oklahoma State University who continue to perform lab testing and analysis of LTPP data and cementitious materials suspected for MRD. Testing includes hardened air, oxychloride, porosity and resistivity.
- A webinar on resistivity has been finalized and is scheduled for presentation on April 28, 2022 at noon central time.
- Work continues on the TRB PEM Circulars focusing on the PEM experience from the following state agencies: New York, Iowa, Michigan, North Carolina and Wisconsin.
- During the first few weeks in March, the MCTC visited six locations in Ohio as part of a statewide PEM tour coordinated with industry and the Ohio DOT. Each of the locations followed an open house format including presentations from FHWA on the PEM initiative as well as PEM related testing followed by a lunch and hands-on demonstrations on PEM tests and other state of the art concrete testing from the MCTC.

Anticipated work next quarter:

- In the coming months, we will begin the task of summarizing the accomplishments of the PEM Pooled Fund project in preparation of a final report to be provided this year.
- Ongoing discussion with state and industry will help us to develop interest in a future TPF initiative that will continue support for PEM implementation and further work in the area of improving paving processes beyond the mix to further enhance concrete pavement performance.
- Snyder and Associates will be contacting state agencies that have completed additional PEM shadow testing to obtain test data. The data will be added to the PEM database and reviewed for general trends and test performance. The research team will synthesize the information with the intention of including it in the final report.
- The research team will continue to reach out to state agencies to schedule and present the one-day engineering level PEM worksop. The intended audience is the group of central office and district SHA materials and construction engineers who will be directly responsible for guiding the PEM implementation in their state. We will also explore the concept of offering the webinar in a multi-day format.
- Provide general outreach and assistance to SHAs and industry as requested/needed.
- Encourage SHAs to consider additional shadow testing for upcoming projects and share test data with the research team.
- Further discussion about of developing model PEM construction specifications in cooperation with FHWA with SHAs and Industry.
- Continue work work with AASHTO to move tests forward to full standards.
- Develop and present a webinar on SAM testing to include the latest test updates.

Significant Results:

During this final year of the first PEM initiative, we continue to see increasing interest and commitment to the PEM principles, recognizing the improvement that implementation promises for enhanced long term performance of concrete pavements. We are hearing from states, local paving groups, the national associations and individual contractors who are stepping forward to participate in shadow testing projects. Several SHAs are moving toward development of construction specifications, QC strategies and expanded data analysis. This illustrates continuing progress on our journey to PEM implementation. The team is moving forward to gather and synthesize data, new and old, that will help to confirm

applicability of key tests to PEM objective. Finally, we are moving forward to define the next phase, PEM 2, for concrete pavements, thinking beyond the mix and related tests.

Circumstances affecting project or budget (Describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope, and fiscal constraints set forth in the agreement, along with recommended solutions to those problems).

TAC members

Praul, Mike & Bob Conway / Federal Highway Administration
Baer, Patricia / Pennsylvania Department of Transportation
Richard Bradbury / Maine Department of Transportation
Covay, Jeff / Arkansas Department of Transportation
Dennis, Dan / New York State Department of Transportation
Hart, John/ Iowa Department of Transportation
Hodges, Darin / South Dakota Department of Transportation
Hunter, Brian / North Carolina Department of Transportation
Krstulovich, James / Illinois Department of Transportation
Lim, S. David / California Department of Transportation
Masten, Maria / Minnesota Department of Transportation
Wadley, Dan / Kansas Department of Transportation
Mellons, Jason/Tennessee Department of Transportation
Miller, Dan / Ohio Department of Transportation
Parry, Jim / Wisconsin Department of Transportation
Prieve, Eric / Colorado Department of Transportation
Johnson, Daryl / Oklahoma Department of Transportation
Bahmer, Thomas / Michigan Department of Transportation
Waters, Jason / Georgia Department of Transportation
Wielenga, Craig / Idaho Transportation Department