

**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: Quarter 1 (January 1 – March 31, 2022) x 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	\$1,973,922	NA

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$59,939		

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 June 30, 2022
- In the previous PEM quarterly report it was announced that the Iowa DOT agreed to serve as lead state for a new pooled fund project that incorporates continued support for PEM and an extended scope of work that will continue to encourage agencies to consider specification changes and field procedures that enhance concrete pavement performance. This pooled fund project for *Sustainable Performance Engineered Concrete (SPEC)* is again proposed as a joint agency/industry collaboration. The CP Tech Center is working with agency and industry to define and consider needs beyond the mix, exploring operational innovations that can further advance concrete pavement reliability.
- Activities in the past quarter included calls with agencies focusing on continued shadow testing, data collection and analysis, a construction specification incorporating PEM language, pilot projects and state/industry PEM implementation. Calls were made to Maine and Idaho to identify and address training needs as well as Minnesota, Michigan and Wisconsin to request shadow test data.
- The PEM team has continued to collaborate with FHWA's Mobile Concrete Technology Center (MCTC), providing training, assistance and PEM Open Houses. In May, CP Tech joined FHWA in New York City for a one day PEM event, including demonstration of tests and new technology. We will also be joining the MCTC staff in Minnesota at MnRoad later in the summer.
- 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 meeting.
- In follow up to the Georgia DOT PEM workshop held March 8 & 9, planning is underway for the CP Tech Center to provide sampling, testing and training on a paving project this Fall utilizing PEM methods. The DOT is also planning a pilot project with an optimized aggregate gradation mixture as a result of the workshop.
- Under the FHWA Cooperative agreement, members of the PEM Team will schedule a precision and bias testing event for SAM, Box and VKelly in October. FHWA has also approved a plan for precision and bias work on resistivity. Dr. Jason Weiss is coordinating with various laboratories

for this work. All of these activities will assist in moving forward with full standardization of the PEM tests and providing assurance of dependability.

- A quick reminder to all: the AASHTO Provisional Standard PP84 has now advanced to Full Standard, R 101.
- 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. Oklahoma State University has completed hardened air testing and has sent information to NCE. Oregon State is finalizing lab testing and analysis of LTPP data and cementitious materials suspected for MRD. Testing includes, oxychloride, porosity and resistivity. Oregon State has also received sand samples from pooled fund states to further explore resistivity test results with respect to porous aggregate.
- Dr. Jason Weiss provided a webinar on resistivity on April 28, 2022. The webinar was recorded and posted on the CP Tech Center [PEM website](#).
- Dr. Tyler Ley has provided SAM training in Idaho, Oklahoma City and Tulsa. He also presented at the ACPA meeting in Phoenix and the ACPA National Meeting in Rhode Island.
- Work continues on the TRB Circular focusing on the PEM experience from the following state agencies: New York, Iowa, Michigan, North Carolina and Wisconsin.

Anticipated work next quarter:

- In the coming months, the PEM team will be dedicate considerable time to summarize the accomplishments of the PEM Pooled Fund Proje, TPF-5(368) project as we prepare the final report. The project concludes at the end of this year.
- Ongoing discussion with state and industry will help us to develop interest in a future TPF initiative that will continue to support for PEM implementation and further work in the area to improve paving processes beyond the mix and further enhance concrete pavement performance. (SPEC) in today's environment.
- 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.
- 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, SHAs and Industry.
- 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 announcing and seeking agency and industry support for *Sustainable Performance Engineered Concrete (SPEC)* supporting PEM and thinking beyond

the mix and related tests to specifications and fielded operations. Please give us a call if you might be interested in participating.

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

Prul, 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
Dietz, Dana / Idaho Transportation Department
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