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, 2021) x Quarter 2 (April 1 – June 30, 2021) Quarter 3 (July 1 – September 30, 2021) Quarter 4 (October 1 – December 31, 2021)

Project Title: Performance Engineered Concrete Paving Mixtures		
Project Manager: Todd Hanson	**Phone:** 239-1471	**E-mail:** todd.hanson@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:

X 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	$1,785,748.02	NA

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
$32,785.92		

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.):

- PEM research/implementation team conversations have been held throughout the quarter: with April 6, April 26 and June 28. In addition to planning for the final year of the TPF project, we are exploring alternative training possibilities and identifying individual state needs. Conversations about a second phase of PEM development and implementation continues with a number of interested parties, including the FHWA, Agencies and Industry
- Team activities, calls with agencies and contractors are focused on continuing to encourage shadow testing, data collection and analysis, a construction specification incorporating PEM language, pilot projects and state/industry implementation. Calls were made to Idaho, Arkansas, Maine and Kansas.
- The PEM team continues to collaborate with FHWA's Mobile Concrete Technology Center (MCTC) in providing training, assistance and a potential PEM Open Houses. Unfortunately, this activity has been delayed pending the relaxation of COVID 19 restriction. FHWA has offered on-line test demonstration/training through the MCTC. It remains our intent provide all participating SHAs one opportunity for local training. Those states not receiving training yet include (Arkansas, Georgia, Illinois, Maine, Ohio, Pennsylvania and Tennessee). We have contacted those states and are in discussion to see what training needs they have and to tentatively schedule training dates and formats. We have scheduled a virtual PEM overview and discussion with Arkansas DOT on July 27 and tentively scheduled a training event with Tennessee DOT the week of August 23.
- As in the past, PEM team members are on-call to respond to inquiries from pooled fund member SHAs and contractors/producers, providing guidance about testing and response to field issues.
- Oklahoma State University has corresponded with FHWA, MNDOT, NYDOT, Wisconsin DOT, Kansas DOT and Pennsylvania DOT on PEM related testing questions. Oklahoma State also provided SAM training to North Carolina DOT staff and contractors.
- Oregon State University has corresponded with California, Colorado and Texas on calcium-oxychloride and SCMs.

- With the leadership and dedication of Cecil Jones, the PEM team is working with Jesus Sandoval-Gill, chair of the AASHTO 3C Committee to advance PP-84 2021 through the COMP with hopes for seeking full standard status this year.
- PEM team members Gordon Smith, Peter Taylor and Jason Weiss continue to visit with FHWA regarding collaborative efforts in moving forward with programs that could further the standardization of the PEM tests relative to precision and bias tests.
- In a related action, a new AASHTO Task Force has been established on "Concrete Resistivity and the Formation Factor" to address comments and look at TP 358, TP 119 and PP84 standards to assure proper terminology and address issues related to conditioning methods and geometry corrections.
- NCE began collecting pavement samples from SPS-2 sites with Oregon State University to provide lab testing and analysis of LTPP data and cementitious materials suspected for MRD.
- Snyder & Associates provided additional shadow project information to populate the interactive PEM map on the PEM website.
- Snyder & Associates and CP Tech Center have participated in calls with state agencies and industry on the development of e-circulars that highlight the state perspective on PEM. Calls have taken place with Wisconsin, Minnesota, North Carolina and Michigan.

Anticipated work next quarter:

- CP Tech and Snyder and Associates will begin visits with each SHA and industry representation this quarter to assure that we are providing a program/assistance that addresses their needs and objectives.
- The visits will also help us to determine interest in a future TPF initiative that will continue support for PEM implementation and further work in the area of improving paving process beyond the mix, further enhancing concrete pavement performance.
- The discussions will also include a review of the SHA specification summary table for possible updates regarding the practice of the PEM principles and specification updates. https://intrans.iastate.edu/app/uploads/sites/7/2020/07/PEM-State-Spec_Reviews-Table-2020-07-02.pdf
- Collect, review and process 2020 and 2021 shadow test data using the PEM data entry spreadsheet. Synthesize the information and make it readily available to all TAC members and interested parties.
- Engage the TAC in discussions that identify and define current and future needs for training of SHA, private engineering and industry. We intend to develop and propose a PEM training program for future advancement of state/industry preparedness.
- Schedule and present the one-day engineering level PEM workshop to interested agencies and industry. 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. Continue to schedule and confirm the one day workshop for the week of August 23 in Tennessee. The agenda for the one day workshop was updated
- Provide general outreach and assistance to SHAs and industry as requested/needed.
- Provide virtual presentation to Arkansas DOT on July 27.
- Encourage SHAs to consider additional shadow testing for upcoming projects and share test data with the research team.

- Explore the development of PEM construction specifications in cooperation with FHWA with SHAs and Industry.
- Cooperate with AASHTO toward finalization of PP 84-21, Standard Practice for Developing Performance Engineered Concrete Pavement Mixtures.
- PEM researchers will also continue to advance tests and test refinements. They will also work with AASHTO to move tests forward to full standards.
- Develop webinar on updated resistivity testing.
- Develop webinar on SAM testing to include the latest test updates.
- Continue to collect pavement samples from SPS-2 sites and related lab testing for comparison with current PEM test protocol.
- Provide the TAC with a periodic newsletter updating PEM activities and accomplishments.
- In addition, the PEM Team and FHWA are also expanding the reach of the initiative through the "Advancing Concrete Pavement Technology Solutions" FHWA cooperative agreement. Work in this program includes development of a QC Tool for PEM and Precision and Bias Tests for testing methods that may be considered as acceptance tools.
- On June 28, a concept of Phase 2 of the TPF 5(368) was submitted to the Iowa DOT to begin the review process and the move towards project development. Matching funds would include state agencies and FHWA.

Significant Results:

We continue to see increasing interest and commitment to the PEM Initiative and the improvement that implementation promises for long term performance of concrete pavements. The PEM Team is reconized as a resource to agencies and industry regarding the PEM approach. 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 good 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. In addition to the accomplishments reported herein, we are moving forward with a plan to involve SHA and Industry TAC members in small task groups focused on training, implementation, QA/QC, and development of a PEM related construction specifications. Finally, we are looking ahead to define the next phase of PEM 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
Hanson, Todd / Iowa 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
Staton, John / Michigan Department of Transportation
Waters, Jason / Georgia Department of Transportation
Wielenga, Craig / Idaho Transportation Department