

## 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.*

<b>Transportation Pooled Fund Program Project #</b> TPF-5(368)	<b>Transportation Pooled Fund Program - Report Period:</b> <input checked="" type="checkbox"/> Quarter 1 (January 1 – March 31, 2021) <input type="checkbox"/> Quarter 2 (April 1 – June 30, 2021) <input type="checkbox"/> Quarter 3 (July 1 – September 30, 2021) <input type="checkbox"/> Quarter 4 (October 1 – December 31, 2021)	
<b>Project Title:</b> Performance Engineered Concrete Paving Mixtures		
<b>Project Manager:</b> Todd Hanson	<b>Phone:</b> 239-1471	<b>E-mail:</b> todd.hanson@dot.iowa.gov
<b>Project Investigator:</b> Peter Taylor	<b>Phone:</b> 515-294-9333	<b>E-mail:</b> ptaylor@iastate.edu
<b>Lead Agency Project ID:</b>	<b>Other Project ID (i.e., contract #):</b> Addendum 629	<b>Project Start Date:</b> 10/1/17
<b>Original Project End Date:</b>	<b>Current Project End Date:</b> 12/31/2021	<b>Number of Extensions:</b> 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	\$1,752,962.10	NA

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$26,460.81		

## 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, 2021

- In response to suggestions offered after the SHA and Industry web meetings and acknowledging the inherent difficulties in encouraging much discussion in those larger virtual gatherings, the PEM team has been conducting regional calls with agency TPF members and corresponding industry representatives. During the first quarter of 2021, we visited with the **Western** group (California, Idaho and Colorado) completing the first cycle. The other groups included **North Central** (Illinois, Iowa, Wisconsin and Minnesota), **Northeast** (Maine, Michigan, New York, Ohio and Pennsylvania), **Southeast** (Georgia, North Carolina, Tennessee and Arkansas) and **South Central** (Colorado, Kansas and Oklahoma). These successful interactions have allowed all to better understand SHA and industry progress and needs relative to experiences, concerns, and goals for implementation of the PEM initiative. Responses to questions better defined where each state is at in the PEM implementation process. It also helped us to identify individual state or industry emphasis for 2021 and 2021 construction seasons. Summaries of all regional meetings are available on the CP Tech Center's PEM website.
- PEM research/implementation team conversations have been held throughout the quarter. In addition to planning for the final two years 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.
- A reminder; SHA specification reviews have been completed with all of the TPF member agencies. The information collected during these interviews reveals the status of PEM implementation for each state. A summary of findings from the reviews is found at the following link: [https://intrans.iastate.edu/app/uploads/sites/7/2020/07/PEM-State-Spec\\_Reviews-Table-2020-07-02.pdf](https://intrans.iastate.edu/app/uploads/sites/7/2020/07/PEM-State-Spec_Reviews-Table-2020-07-02.pdf)
- Team activities and calls are focused on continuing to encourage shadow testing, data collection and analysis, a construction specification incorporating PEM language, pilot projects and state/industry implementation.
- The PEM team will continue to collaborate with FHWA's Mobile Concrete Technology Center (MCTC) in providing training, assistance and a PEM Open House whenever COVID 19 restrictions

are relaxed and allow travel. In the meantime, the team continues to gather and analyze PEM test data from around the country. FHWA has offered on-line test demonstration/training through the MCTC. It is still our intent is to assure that all SHAs are afforded one opportunity for local training. Those states not receiving training yet include (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 schedule training dates.

- 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.
- With the leadership and dedication of Cecil Jones, the PEM team is now working with Jesus Sandoval-Gill, new chair of the AASHTO 3C Committee Chair 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.
- 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 and Oregon State University continue to analyze LTPP data and cementitious materials suspected for MRD.
- Oklahoma State University presented PEM at the Pennsylvania Concrete Paving Association workshop.
- Snyder & Associates prepared and sent updates for the PEM website which included developing an interactive map with PEM shadow project sites and state PEM status.
- Snyder & Associates provided state PEM status information to FHWA that highlights state progress.

**Anticipated work next quarter:**

- The PEM team will continue to review and provide a program that addresses the needs and objectives of the member states and industry for the remaining two years of the PEM pooled fund project.
- Collect, review and process 2020 shadow test data using the PEM data entry spreadsheet. Synthesize the information and make it readily available to all TAC members and interested parties.
- Cooperate with the TAC through regional virtual discussions that identify and define current and future needs for training of SHA, private engineering and industry. We will work 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.
- 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.
- 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 continue to advance tests and test refinements. They will also work with AASHTO to move tests forward to full standards.
- 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.

### **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  
 Meggers, Dave / 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