

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: <input checked="" type="checkbox"/> Quarter 1 (January 1 – March 31, 2020) <input type="checkbox"/> Quarter 2 (April 1 – June 30, 2020) <input type="checkbox"/> Quarter 3 (July 1 – September 30, 2020) <input type="checkbox"/> Quarter 4 (October 1 – December 31, 2020)	
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: 12/31/2021	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
\$1,913,860	\$1,453,169	NA

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$138,586		

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,

- PEM research/implementation team conversations have been held throughout the quarter.
- SHA specification reviews have been completed with the following:
 - Iowa
 - Illinois
 - Tennessee
 - Wisconsin
 - Colorado
 - Michigan
 - New York
 - Minnesota
 - Idaho
 - California
 - Kansas
 - South Dakota
 - Oklahoma
 - Georgia
 - Ohio
 - Pennsylvania
 - Maine

The information collected during these interviews reveals the status of PEM implementation for each state. SHA progress was reviewed at the TAC meeting in November and discussion followed about the need to continue to encourage shadow testing, data collection and analysis, a construction specification incorporating PEM language, pilot projects and state/industry implementation.

- The PEM Team is collaborating with FHWA's Mobile Concrete Technology Center (MCTC), Lisa McDaniel of the IA Division FHWA, SHAs and industry to collect and analyze PEM test data from

around the country. As we gather and review the data, the results will be shared with the PEM TAC.

- The PEM Team is coordinating with the MCTC to schedule 2020 state visits with industry-supported PEM open houses. FHWA and the CP Tech Center have found this partnership for communicating the PEM message quite effective. PEM state visits tentatively planned for 2020 include: Idaho, Georgia and Oklahoma. The status of these visits may be impacted due to the Covid19 restrictions.
- As in the past, PEM Team members were on call to respond to inquiries from SHAs and contractors/producers seeking guidance about testing and response to field issues. This includes PEM pooled fund member SHAs and non-pooled fund member SHAs in our effort to attract additional states to the pooled fund.
- PEM was an education session topic at the 2020 CONEXPO meeting in Las Vegas, NV on March 12, 2020. Team members also presented on PEM at Concrete Paving Workshops/Conferences in Nebraska, North Dakota, Utah, Wisconsin and Virginia this quarter.
- Members of the PEM Team continue conversations with SHA TAC members and industry to identify and arrange training for PEM tests. Our intent is to assure that all SHAs are afforded one opportunity for local training. Currently, training has been provided for 12 of the 19 pooled fund member SHAs. In addition, the following states have been afforded multiple training events: California, Kansas, New York and Wisconsin.
- PEM Team members, led by Cecil Jones, have begun reviewing the 2021 edition of the PP-84 Standard Practice for Developing Performance Engineered Concrete Pavement Mixtures. The revisions will be submitted to AASHTO for consideration and comment this spring. A technical subcommittee ballot is anticipated in early May. There may be some additional standards brought forward as a supplement to PP84.
- PEM Team members also continued to correspond with an AASHTO Task Force that is reviewing proposed PEM tests developed by our researchers.
- LTPP data and cementitious materials suspected for MRD are being analyzed (NCE and Oregon State University).

Anticipated work next quarter:

- The PEM Team will continue to review and program the needs and objectives for the remaining three years of the PEM pooled fund project as discussed at the November TAC meeting.
- Collect, review and process shadow test data using the PEM data entry spreadsheet. Synthesize the information and make it readily available to all TAC members and interested parties.
- Initiate ongoing work (calls) with SHAs and industry to establish their individual PEM implementation strategies.
- Cooperate with the TAC and a Task Group to identify and define current and future needs for training of SHA, private engineering and industry audiences. We will follow with completion of first round training proposed for each state. Then we will work to develop and propose a PEM training program for future advancement of state/industry preparedness.
- Complete specification reviews/recommendations and related conversations with SHA TAC members in Arkansas, and North Carolina. The information will be summarized, reviewed by each state for accuracy and shared with the TAC members.
- 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.

- Provide general outreach and assistance to SHAs and industry as requested/needed.
- Encourage SHAs to consider additional shadow testing for upcoming projects.
- Join FHWA in reminding SHAs or contractors/producers to participate in FHWA's PEM testing equipment loan program and PEM incentive opportunities.
- Advance the development of PEM construction specifications in cooperation with FHWA with SHAs and Industry.
- Continue efforts to expand participation in the TPF study by other states.
- Cooperate with AASHTO toward finalization of the 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 as an update to PEM activity and accomplishments.
- In addition to the PEM TPF work, the PEM Team and FHWA are also expanding the reach of the initiative through the new FHWA "Advancing Concrete Pavement Technology Solutions" cooperative agreement. Early work areas in this program include development of a QC Guide for PEM and Precision and Bias Tests for testing methods that may be considered as acceptance tools.

Significant Results:

While construction activity fades during these winter months, we continue to work in this third year of the PEM TPF Initiative to serve as a resource to agencies and industry regarding the PEM approach to assuring performance of concrete pavements. Interest and implementation consideration is growing 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. While there continues to be some concern about the predictions and reliability of PEM tests, the Team is moving forward to gather and synthesize data, new and old, that will help to confirm applicability 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 specification.

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 / Federal Highway Administration
Baer, Patricia / Pennsylvania Department of Transportation
Richard Bradbury / Maine Department of Transportation
Conway, Bob / Federal Highway Administration
Covay, Jeff / Arkansas Department of Transportation
Dennis, Dan / New York State Department of Transportation
Hanson, Todd / Iowa Department of Transportation
Hayes, Chad / Wisconsin 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
Meggers, Dave / Kansas Department of Transportation
Mellons, Michael J./Tennessee Department of Transportation
Miller, Dan / Ohio Department of Transportation
Praul, Mike / Federal Highway Administration
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