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, 2019) **X** Quarter 2 (April 1 – June 30, 2019) Quarter 3 (July 1 – September 30, 2019) Quarter 4 (October 1 – December 31, 2019)

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: 12/31/2019	**Current Project End Date:**	**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
$1,345,000	$925,670.18	NA

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
$253,125.42		

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 with a growing 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, and with 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, 2019

- Work continues on preparing the one day workshop slides for PEM.
- Research team meetings have been held throughout the quarter.
- Held PEM TAC conference call (states only) on April 17, 2019.
- State specification review meeting with Iowa DOT.
- Performed Rapid Air Testing for South Dakota shadow project.
- We continue work with Tom VanDam and staff at Nichols Consulting Engineers along with Lisa McDaniel, IA Division FHWA, to finalize the PEM database and data collection. Work included modifications to the state data entry spreadsheet and submittal to the states.
- The PEM website has been updated with new Surface Resistivity information from Oregon State University including an instructional video and data entry template.
- The FHWA Mobile Concrete Technology Center (MCTC) visited a PEM shadow project North Carolina during May 6-17. An open house was held in Salisbury on May 15, 2019. The project for the event was the I-85 Widening and Improvements in Rowan County. The event was attended by over 60 people representing the DOT, Academia and Industry. Members of FHWA and the CP Tech Center demonstrated the V-Kelly test, Box test, Super Air Meter (SAM) and the surface resistivity test at the project batch plant site.
- PEM seminars and training were held in the following states:
  - Wisconsin
  - New York
  - Minnesota
  - Idaho
  - Kansas
  - Oklahoma
  - Colorado
  - Michigan
  - Ash Grove

- Hardened air void analysis are in process in the following states:
  - Wisconsin
  - Kansas
  - Colorado
  - Michigan
  - Minnesota
  - FHWA Mobile Concrete Trailer
- As in the past, PEM Team members are on call to respond to numerous inquiries from states and contractors/producers who were seeking guidance about testing and response to field issues.
- PEM meetings and presentations were held at NCC in Denver in April.
- Held discussions and presentation to PCA. Prepared the Box Test for AASHTO and conducted the precision and bias testing for SAM.
- Held conversations and visit with FHWA on formation factory calcium oxychloride and shrinkage.
- Investigated vibration in concrete and how it impacts the air void system. This is addressing field issues brought up by Wisconsin DOT.
- Assistance to finalize SAM test for AASHTO.
- Investigation of measuring the w/cm in fresh concrete. This is a follow up on the work that was presented in Idaho at NCC.
- Members of the PEM Team have continued conversations with SHA TAC members and industry to identify and arrange training for PEM tests.
- PEM Team members, led by Cecil Jones, continue work on the 2020 revision of the PP-84, Standard Practice for Developing Performance Engineered Concrete Pavement Mixtures. Proposed changes will be shared with industry for review and comment and the revised document will be submitted to the AASHTO COMP Technical Committee for comment and action in the second quarter.
- Modification to AASHTO test methods.
- We continue to correspond with an AASHTO Task Force reviewing proposed PEM tests developed by our researchers.
- Refinements of the PEM Website are ongoing. Users will find valuable information about PEM, test method summaries, test procedures, videos, state dot data entry sheet, slide presentations and You Tube links, a schedule of shadow projects and information pertinent to test data entry, a PEM shadow project report from Iowa and a PEM news update. The link is www.cptechcenter.org/pem.

Anticipated work next quarter:

- Shadow projects are planned as follows:
  - Kansas: I-70 near Colby, FHWA MCTC visit (July 29-August 9). Open House in Topeka (August 8th)
  - Minnesota: Trunk Hwy 60 near St. James (June) & I-35W/Lake Street in Minneapolis (July & August)
  - Illinois: I-74 in Moline (July & August) with August 6th open house.
- Receive, review and process shadow test data using data entry spreadsheet.
- Specification reviews/recommendations and related conversation with SHA TAC members.
- Pilot and subsequent presentations of a one day engineering level PEM Workshop for interested agencies and industry.

- Face-to-face full TAC meeting is scheduled for November 18-19, 2019 in Chicago.
- Monitor, assist, advise in FHWA Incentive Program shadow testing on 2019 projects (WI, IL NC, KS, MN, CO)
- General outreach and assistance to SHAs and industry as needed.
- Encouragement of SHAs to consider additional shadow testing on upcoming projects.
- Work with SHAs and industry to establish PEM implementation strategies.
- Join FHWA in reminding SHAs or contractors/producers to participate in FHWA's PEM testing equipment loan program.
- Work with states advancing toward development of PEM construction specifications.
- Continued effort to expand participation in the TPF study to other states.
- Ongoing review and update of PP 84-20, Standard Practice for Developing Performance Engineered Concrete Pavement Mixtures
- Work with FHWA to coordinate additional PEM activities that will be included in the new "Advancing Concrete Pavement Technology Solutions" cooperative agreement. Key topics: QC Guide for PEM and Precision and Bias Tests for testing methods.
- PEM researchers will continue to advance tests and test refinements. Will also work with AASHTO to move tests forward to standards as they deem appropriate to the PEM initiative.
- Identify and define needs for training of SHA, private engineering and industry audiences. We will then follow with appropriate training opportunities and methodologies.
- Provide newsletter update to TAC.

Significant Results:

During the first year and a half of the PEM TPF project has seen considerable effort expended to inform agency and industry about the PEM initiative. We are seeing encouraging interest from states, local paving groups, the national associations and individual contractors who are stepping forward to participate in shadow testing projects. Interest in training, future construction specifications, QC strategies and data analysis combine to suggest that we have a good start on the journey for PEM implementation. In 2019, more than half of the participating SHA will be involved with shadow testing and verification of PEM tests intended to assure long term concrete pavement performance in it's specific environment. In addition to the reported accomplishments, 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 the 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

Ahlstrom, Gina / Federal Highway Administration
Baer, Patricia / Pennsylvania 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