TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Minnesota Department of Transportation

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 # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* TPF-5(269)	**Transportation Pooled Fund Program - Report Period:** ☐ Quarter 1 (January 1 – March 31) ☑ Quarter 2 (April 1 – June 30) ☐ Quarter 3 (July 1 – September 30) ☐ Quarter 4 (October 1 – December 31)	
Project Title: Development of an Improved Design Procedure for Unbonded Concrete Overlays		
Name of Project Manager(s): Tom Burnham	**Phone Number:** 651-366-5452	**E-Mail** tom.burnham@state.mn.us
Lead Agency Project ID: TPF-5(269)	**Other Project ID (i.e., contract #):** 99008 Work Order No. 83	**Project Start Date:** June 17, 2013
Original Project End Date: May 31, 2016	**Current Project End Date:** October 31, 2018	**Number of Extensions:** 2

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	Percentage of Work Completed to Date
$463,787	$453,800	95%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$41,000	$0	93%

Project Description:

This project was created to address the timely need for an improved mechanistic-empirical based design procedure for unbonded concrete overlays of existing concrete and composite pavements (UCOCP).

The objectives of the projects are:

1. Study and understand the field performance history of UCOCP as demonstrated by various test sections and in-service pavements.
2. Determine suitable separator layer (interlayer) materials and properties to insure long term performance of UCOCP systems.
3. Develop a design procedure for unbonded concrete overlays of existing concrete and composite pavements utilizing existing validated performance models, as well as new analytical models derived to address deficient or missing design parameters in existing methods. The design guide will be based on mechanistic-empirical principles, including the effects of various concrete overlay materials, separator layer (interlayer) types, panel thickness (4" to 10") and panel size, joint load transfer mechanisms, traffic loads, and climates (nation-wide) in which they must perform.
4. Provide improved or supplemental guidance on the suitability of projects for unbonded concrete overlays.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):

During Q2 2018:

• The research team developed a JPCP cracking model for short (6ft x 6ft) slabs, but integrating it into the previously developed JPCP cracking model for conventional unbonded overlay joint spacing (between 12 and 15 ft) and the temperature database based on the EICM analysis with an extended analysis period revealed problems with both models. To address this problem, the built-in curling model and the equivalent temperature calculation procedure were modified to make the final procedure applicable for both conventional and short slab unbonded overlays.

• In addition, several bugs in the rudimentary software were identified and fixed.

• An alpha-version of the rudimentary user interface software was modified to address the TAP comments from the March 2018 meeting.

• The research team continued work on the cracking model for short overlay slab systems and incorporation of the faulting model into the software package.

• The research team re-valuated guidelines on sustainability of unbonded concrete overlays.

Anticipated work next quarter:

During Q3 2018, the major focus for the research team will be to complete all of the remaining tasks outlined in the new contract with the University of Pittsburgh. This includes the final version of the new design procedure, as well as all of the supporting documentation.

A final TAP meeting will be scheduled to discuss the final products from this 5 year effort.

Significant Results:

Laboratory testing of beam samples have revealed some interesting behaviors of interlayers under load, particularly with asphalt-based materials. As a result, significant knowledge has been gained on the characterization of interlayers for UBOLs.

New longitudinal cracking and transverse joint faulting models have been developed, which will significantly advance the design of unbonded concrete overlays.

An improved design procedure for unbonded concrete overlays has been developed.

Circumstance affecting project or budget. (Please 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).

Work on this project is significantly behind the original completion date, due to the relocation of the principal investigator to the University of Pittsburgh. A new contract has been approved, and work has resumed on this project.
There have been significant struggles in Q2 with incorporating new models into the new design procedure.

The remaining work on this project will now be completed by October 2018.

Potential Implementation:

There is great and immediate demand for the product from this project.

Once the design procedure and guidelines are accepted as viable and reliable by the design community, the implementation will occur very quickly.