

## 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(366)	<b>Transportation Pooled Fund Program - Report Period:</b> 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 4 – December 31, 2021)	
<b>Project Title:</b> Development of a Design Guide for the Structural Design of Ultra High Performance Concrete		
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<b>Lead Agency Project ID:</b>	<b>Other Project ID (i.e., contract #):</b> Addendum 618	<b>Project Start Date:</b> 6/15/17
<b>Original Project End Date:</b> 5/31/18	<b>Project End Date:</b> 6/30/2021	<b>Number of Extensions:</b> Pooled fund project – yearly budgets

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
\$179,213	\$145,349.11	65%

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$28,677.34		5%

**Project Description:** Ultra-High Performance Concrete (UHPC) has been recognized as a choice of material for mitigating bridge infrastructure challenges as well as to introduce innovative construction projects. In recent years, the use of UHPC has gained momentum in bridge projects across the country. However, formal structural design guidance for this material does not exist in North America, and therefore a comprehensive effort is required to formulate recommended design guidance so that the application of this material can be broadened.

The overall objective of this study is to facilitate advancement in the state-of-the-practice for UHPC in the US highway sector, which will include development of a design and construction guide specification. These advancements will also focus on other critical needs that are currently hindering the wider use of UHPC

A Steering Committee will be formed for this Pooled Fund Project. This Steering Committee can include contributing entities and will be led by the host State. The tasks are:

1. Coordinate meetings amongst committee members with the goal of study execution and information dissemination.
2. Provide guidance on national level advancement efforts.
3. Develop and prioritize research needs statements.
4. Develop, verify, and/or standardize test methods for assessment of UHPC material properties.
5. Complete structural performance-related research as necessary to develop greater knowledge of structural behavior.
6. Complete construction-related research as necessary to develop greater understanding of optimal construction processes.
7. Coordinate, share, and advance existing special provisions for the use of UHPC in highway construction projects.

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

**Progress This Quarter:**

Test results from four participating labs have been analyzed and discussed in the last pool fund meeting. A draft of a journal article containing the test results has been prepared and submitted to the program manager. This article will be updated as we get the results from the remaining two labs. One set of specimens, the LVDT extensometer unit, and the required wedges were shipped to the University of Houston as their lab has been verified to be able to conduct the tests. A sixth lab has been identified based on the initial set of information but they have confirmed their ability to conduct the tests. Testing in these labs will start by the end of July. Based on the test results and the analyses, an additional task has been identified as part of the pool fund project. The description of this task and the corresponding budget were submitted.

**Anticipated work next quarter:**

Testing in the participating labs is being delayed by the limited lab hours resulting from COVID'19 restrictions and an overload of scheduled work at the testing facilities. Testing of all the specimens is planned to be completed during the next quarter. The journal article will be updated and hopefully submitted for review during the next quarter. The laboratory work described in the new task will also get underway.

**Significant Results:**

The test data from the third and fourth lab showed a better success rate of 60 to 70%. This increased success rate is presumed to be due to reducing the gripping pressure and usage of clamps just outside the grip region. The use of low-capacity uniaxial machines is also found to increase the success rate of the tests. The quality of data depends on whether the localized cracks develop within or outside the gauged region. When the crack develops within the gauged region, the test results show that the tension behavior

is satisfactorily captured. The test results show that the microcracking phase of response is dependent on the type of UHPC. The ability to find labs across the country to conduct the UHPC tension tests with a wide sample size remains to be a concern.