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(366)*	**Transportation Pooled Fund Program - Report Period:** x Quarter 1 (January 1 – March 31, 2021) Quarter 2 (April 1 – June 30, 2021) Quarter 3 (July 1 – September 30, 2021) Quarter 4 (October 4 – December 31, 2021)

Project Title:
Development of a Design Guide for the Structural Design of Ultra High Performance Concrete

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Lead Agency Project ID:	**Other Project ID (i.e., contract #):** Addendum 618	**Project Start Date:** 6/15/17
Original Project End Date: 5/31/18	**Project End Date:** 6/30/2021	**Number of Extensions:** Pooled fund project – yearly budgets

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
$179,213	$116,671.77	65%

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
$676.81		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:

Testing at four participating labs has been completed, while the last two sets of specimens have been prepared and ready to be shipped. Two facilities indicated in doing the tests but it has become clear that we won't be able to use that facility due to lack of ability to use a defined lateral gripping pressure. Therefore another lab has been sought and it looks like the University of Houston can participate in the testing. The second lab has not committed to the testing yet despite the discussion over several weeks, and thus, inquiries are being made yet with another test facility. Testing in these labs will start by April/May after they receive the specimens and LVDT extensometers. Test data have been obtained from the four participating labs for all test units, and basic data analyses have been. A draft document containing the test results is being prepared.

Anticipated work next quarter:

Testing in the participating labs is being delayed by the limited lab hours due to 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 document will be continued to be prepared for a journal paper submission.

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 because of the suggested recommendations of reduced gripping pressure and usage of clamps, and also may be due to the use of low capacity uniaxial machines for these 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 UUPC.