TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): ____Oklahoma DOT_____

INSTRUCTIONS:
Lead Agency contacts 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(550)	**Transportation Pooled Fund Program - Report Period:** ☐Quarter 1 (January 1 – March 31) XQuarter 2 (April 1 – June 30) ☐Quarter 3 (July 1 – September 30) ☐Quarter 4 (October 1 – December 31)
TPF Study Number and Title: **TPF-5(550) - Performance Based Specifications of Fiber Reinforced Concrete**	

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Lead Agency Project ID: **1-527626**	**Other Project ID (i.e., contract #):** **JP# 38798(04)**	**Project Start Date:** **March 5th, 2026 (This is when the PO was received)**
Original Project Start Date: **March 5th, 2026**	**Original Project End Date:** **March 5th, 2029**	**If Extension has been requested, updated project End Date:**

Project schedule status:

X On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

Total Project Budget	Total Funds Expended This Quarter	Percentage of Work Completed to Date
$300,000 has been released	$13,000	4%

Project Description:

Fiber reinforced concrete has a long history of usage in highway infrastructure. Some promising applications include reducing crack sizes and reducing the amount of steel rebar. Either macro synthetic (rigid plastic), glass, basalt, or steel fibers are used to improve the performance of hardened concrete. These fibers are designed with proprietary combinations of aspect ratios (diameter versus length), material type, and unique fiber design to improve the anchorage to the concrete. While the fibers are responsible for improving the performance of the hardened concrete it is also essential that the concrete designed with the fibers is constructable. For example, high dosages of fibers can create

issues with pumping, finishing, and an overall loss of workability. This means high dosages of fiber can cause constructability issues with the concrete. This shows that fiber design is a balance between structural performance and constructability.

The current tests to evaluate fiber reinforced concrete include the slump test (ASTM C 143) and the residual strength in cracked concrete (ASTM C 1609). While these tests are useful, more insights are needed to determine how fibers perform. The research team at Oklahoma State University has developed two tests to provide new insights into fiber reinforced concrete performance. These include the Split Beam Test and the Float Test. Both of these tests will be expanded and improved upon in this research and also will be applied to a large number of different fibers. These tests will be the basis of the performance-based specifications developed in this project. As part of this work, these tests will be standardized.

By implementing these tests, this would allow DOTs to specify the desired performance a fiber-reinforced concrete for a certain application. The performance of the mixtures in these tests will help guide which fibers are used in practice. This means that different commercial fibers may need to be used at different dosages to provide the required performance. This will ensure that the correct fiber design and dosage are chosen to meet the performance required by the DOT.

Objectives
This work aims to develop a prescriptive and performance-based specification that states could adopt to ensure the required performance in both crack resistance and contractibility of the fiber reinforced concrete. This specification would use the Split Beam Test, ASTM C 1609, creep, and the Float Test to set performance limits for the different fibers. This performance could then be specified based on the required performance or safe dosages of fibers could be prescribed based on the member. For example, a sidewalk, overlay, and bridge deck may have different performance criteria.

Scope of Work
Based on the objectives the following deliverables will be produced:

- Standards for the Split Beam Test and Float Test,
- Round robin testing with the Split Beam Test and Float Test,
- Performance criteria for different applications such as bridge decks, overlays, and sidewalks,
- Creep performance of macrosynthetic fiber,
- Model specifications for different elements,
- Guide document for producers on how to design and troubleshoot fiber reinforced

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

The first kickoff meeting was held with ODOT and other DOTs during the first quarter. The float test development is ongoing. The equipment required to conduct the ASTM C1609 test is currently being procured. The plan and drawings for the punch test have been completed, and we are currently in the process of manufacturing the components required for the test.

Currently, we are investigating the impact of different slump values (3–8 in.) on the float test. We are also evaluating the effects of different dosages of plastic fibers on the float test and surface finishing. In addition, we are studying how fiber-reinforced concrete responds to vibration.

Anticipated work next quarter:

Next quarter, we will continue purchasing and manufacturing the necessary testing equipment and materials. In addition, the float test will continue to be developed and evaluated using different methods and various commercially available fibers. We will also explore the split-beam test, which does not require internal reinforcement.

Significant Results:

Through the experiments conducted on the development of the float test, the following conclusions can be drawn:

1. Properly mixed concrete with appropriate aggregate gradation is essential for the float test. The float test is a time-dependent experiment as concrete's workability changes with time.
2. A high fiber content affects both surface finishing and float test performance. A strong inverse relationship was observed between slump and the number of float passes required to fill the holes when fibers were used. Fibers make it more difficult to achieve a smooth finished surface, and this effect becomes more pronounced at higher slump values.
3. As the slump value increases, the number of bull-float passes required to fill the artificially created 1-in. hole decreases. Similarly, the number of passes required to achieve the desired surface finish also decreases. Concrete with lower slump values is harder to finish and requires more bull-float passes for both hole filling and surface finishing.

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).

There are no issues so far in this project.

Potential Implementation:

Over time, performance-based tests and specifications will be developed that can be implemented by each one of the states.