TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT):
_____FHWA_____

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 # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* TPF5 (521)	**Transportation Pooled Fund Program - Report Period:** X Quarter 1 (January 1 – March 31) ☐Quarter 2 (April 1 – June 30) ☐Quarter 3 (July 1 – September 30) ☐Quarter 4 (October 1 – December 31)

TPF Study Number and Title: TPF5(521) New Performance Approach to Evaluate ASR in Concrete		
Lead Agency Contact: Terry Arnold	**Lead Agency Phone Number:** 202 493 3305	**Lead Agency E-Mail** Terry.arnold@dot.gov
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:**
Original Project Start Date: 07/23/2023	**Original Project End Date: 12/31/2028**	**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
$305,000	0	2

Project Description:
The Turner-Fairbank Highway Research center has developed two new alkali–silica reaction (ASR) tests, the AASHTO TP-144-23 (T-FAST) and the AASHTO T 416-24 (ATT). The T-FAST is sensitive method capable of accurately detecting the presence of alkali–silica reactive phases in any type of aggregate. The ATT is a simple and reliable method to determine the alkali threshold (AT) of any aggregate combination. The AT is defined as the specific alkali level at which the ASR reaction is triggered in an aggregate. Knowing the AT of an aggregate combination is an important piece of

information that provides insight into the field behavior of the aggregates when used in a concrete of specific alkali loading.

A new performance and prescriptive approach have been proposed based on the information provided by the T-FAST and ATT to predict the alkali–silica susceptibility of any concrete mix design. The two newly proposed approaches are based in the widely accepted notion that any given combination of aggregates will develop ASR inside of a specific concrete only when the alkali loading (AL) of the concrete is higher than the AT of the aggregates. The AL of the concrete depends on the mix design proportions, type and content of the cement, and the presence of supplementary cementitious materials. While previous research supports the theory that ASR can be prevented by limiting AL below AT, there is a need to understand the extent of the influence played by available alkalis and aluminum released by SCM in the AL of the concrete and AT of the aggregates, respectively. Lastly, it is also necessary to expand T-FAST capabilities to evaluate ASR mitigation strategies. This is a requirement because it is not always possible to avoid the use of reactive aggregates due to lack of availability or other reasons.

The principal objective of the project is to evaluate a wide selection of concrete mix designs to validate the use of T-FAST and ATT methods in conjunction with mix design data, cement mill reports and SCM properties to determine the likelihood of ASR gel formation in concrete.

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

- Formalized workplan and prepared two presentations for the kickoff meeting. This work includes the definition of the criteria to select aggregates for the study.
- Held a kickoff meeting on January 11, 2024 with all the state partners. The work plan and the criteria for selection of aggregates were discussed.
- Worked on the aggregate procurement. The lead researchers sent a request to the state partners to select coarse and fine aggregate combinations for the study.
- Participated in meetings with MassDOT, CTDOT, NCDOT and SDDOT regarding selection of candidate aggregates and mixes to be incorporated in the test matrix.
- Selected a total of 14 aggregate combinations from Massachusetts, North Carolina, South Dakota, Connecticut, Maryland, and Pennsylvania for the study.

Anticipated work next quarter:

- Assist the state partners on sending the aggregates for the study.
- Work on the T-FAST and ATT characterization of the aggregates alone and combined.
- Preparation of two concrete batches using aggregate combination from Pennsylvania containing 15% and 25% class C fly ash. Stored the specimens in proposed exposure regime of 55 ^{o}C and 100% RH.
- Evaluate first concrete samples from the two Pennsylvania concrete mixes. Complete the SEM analysis of the microstructure and air void quantification at 0 day.
- Plan new concrete mixes.

Significant Results:

Kick off meeting was held on January 11 2024 to establish the research plan.

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).

None

Potential Implementation:

None