NHDOT SPR2 PROGRAM
RESEARCH PROGRESS REPORT

Project # 42372M		**Report Period** Year 2023 ☐Q1 (Jan-Mar) ☒Q2 (Apr-Jun) ☐Q3 (Jul-Sep) ☐Q4 (Oct-Dec)
Project Title: Reduce Concrete Cracking through Mix Design		
Project Investigator: Eshan Dave, University of New Hampshire **Phone:** 603-862-5268		**E-mail:** eshan.dave@unh.edu
Project Start Date: 4/12/2023	**Project End Date:** 12/31/2025	**Project schedule status:** ☒On schedule ☐ Ahead of schedule ☐ Behind schedule

Brief Project Description:

Concrete cracking affects the long-term condition and performance of both bridge and culvert structures. Shrinkage cracking is perceived to be a deterrent to placing exposed decks/slabs during bridge and culvert rehabilitation and replacement projects. Concrete cracking during bridge construction allows oxygen, moisture and salts into the structure accelerating corrosion and deterioration. Understanding methods to avoid cracking at the mix design level will allow exposed decks to be more often considered as a viable option. This is especially critical as more rapid bridge projects are proposed.

Different construction and specification methods have been previously explored to reduce concrete cracking at bridge curb locations. This research will explore alternates to current mix design practice including lightweight concrete, changes to PCC and pozzolan content, etc., to reduce concrete cracking. Stand alone, off structure concrete placement like sidewalks, concrete slabs, etc., could be used as test areas for observation. The Bureau of Bridge Maintenance will work with the researchers at those locations as well as considering placement in bureau projects.

Progress this Quarter (include meetings, installations, equipment purchases, significant progress, etc.):

The project started during the reporting quarter. The research team has started to gather pertinent literature on the topic to conduct a state-of-the-art review. Further, a graduate research assistant has been recruited for this study.

Items needed from NHDOT (i.e., Concurrence, Sub-contract, Assignments, Samples, Testing, etc…):

No specific action is needed from the NHDOT at this time. In the future, the research team will need assistance from NHDOT to identify study locations and to accommodate various PCC mix design trials on bridge sites.

Anticipated research next three (3) months:

During the first part of the upcoming quarter, the research team will organize a project kick-off meeting with the project TAG. At this meeting, the detailed research plan will be presented along with an update on various research activities. Also, during the upcoming quarter, the research team anticipates to complete the majority of the literature review on the topic and to propose to the TAG a laboratory experiment for evaluating various PCC mixes that can help lower cracking potential in bridge curbs and decks. Simultaneously, the research team will work with the NHDOT bridge maintenance unit to identify various existing bridge study sites that can be used to evaluate the amount and severity of cracking in bridge curbs and decks. PCC batching reports from these sites will be used to compare the mix composition with the cracking performances. This information will be used in design of the laboratory experiment for the project.

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Circumstances affecting the Project:

Nothing to report.

Tasks (from Work Plan)	Planned % Complete	Actual % Complete
Task 1 Literature and Current Practice Review	*15*	*15*
Task 2 Mix Design and Lab Evaluation	*0*	*0*
Task 3 Survey of Study Sites for Cracking Performance	*0*	*0*
Task 4 Analysis of Results and Recommendation Development	*0*	*0*
Task-5 Final Report and Poster	*0*	*0*

Barriers or constraints to implementing research results

Nothing to report.