

Research in Progress

Post-Fire Damage Inspection of Concrete Structures

Research Need

Visual inspections to assess damage to a tunnel after a fire can be difficult as the occurrence of this inspection is rare, and damage may not be visually observable. Currently, there is a lack of an inspection protocol which leads to an uncertainty in tunnel closure decisions.

Goals/Objectives

The objective of this project is to provide a better understanding of post-event condition through visual observations and non-destructive tools using a chart/checklist.

The final outcome will be used to populate the fire section of the MassDOT tunnel inspection guidelines.

In brief, the expected goals of the project are:

- Extensive literature review of fire damage to structural elements, with a focus on tunnels.
- Development of a flow chart/checklist that will be used as a tool for post-fire inspection protocols specific to MassDOT tunnel materials and components. It will also contain photos of actual fire damage.
- Recommendations for physical test program.

Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

Principal Investigators:

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Performing Organization:

University of Massachusetts Amherst

Project Champion:

John Czach, MassDOT

Project Start Date:

February 2020

Expected Project Completion Date:

February 2021

Methodology

This research will develop a review of current state-of-the-art in terms of material behavior, inspection procedures, past events of tunnel fires and methods for assessing the residual capacity of damaged concrete components from fire events. A preliminary experimental program and specific test methods will be followed in order to determine the feasibility of testing. First a high temperature setup will be developed and critical components and materials of tunnels will be identified and prioritized for preliminary testing. The testing will involve subjecting samples to the new heat system and measuring thermal gradient through concrete with different levels of reinforcement. Based on the preliminary testing, an extensive experimental research program will be proposed for future work.

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