Research in Progress

Post-Fire Damage Inspection of Concrete Structures Phase II – Experimental Phase

Research Need

Visual inspection protocols to assess damage to a tunnel after a fire. Currently, there is a lack of a concise inspection protocol based on visual observation of non-structural & structural fire damaged tunnel components.

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 goals of the project are:
- Report experimental results of heating structural and non-structural elements using the new heating setup at the Brack Structural Testing Facility at UMass.
- Conduct residual strength tests of structural components.
- Provide an updated/improved 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.
- Further investigate the efficiency of non-destructive testing techniques.
- Provide recommendations for future research.

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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.

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Performing Organization:
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Project Champion:
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Project Start Date:
June 2021

Expected Project Completion Date:
February 2023

Methodology

For Phase II, the proposed testing plan includes heating structural elements to given temperatures for given durations and performing residual strength tests afterward to determine the extent of strength & stiffness loss after a known heat exposure, correlating the visual condition and non-destructive testing values of these components, heating non-structural components to given temperatures to observe and document their visual condition, and investigating the use of non-destructive testing tools for post-fire inspection. Experimental testing involves samples of - but is not limited to - precast prestressed ceiling panels, ceiling panel hanger rods & angle supports, mechanical concrete anchors and phenolic light fixtures.

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