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2020 RESEARCH PROJECT STATEMENT

Research Topic:

Post-Fire Damage Inspection of Concrete Structures [Research Award - max \$100,000]

Problem Statement and Objectives

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. In addition, in some instances, an inspector may have a short window of time for inspection and be tasked with confirming a tunnel is safe for re-opening.

A better understanding of post-event condition through a visual observation chart/checklist based on physical testing and non-destructive tools that provide more information than visual observations would be instrumental in performing an adequate inspection. For instance, observations of material physical appearance after exposure to specific temperatures could be used to determine the source intensity. Recording surface temperatures immediately after an event with an infrared temperature gauge and taking comparative non-destructive compressive strength readings of an affected area (in comparison with areas outside of an affected area) are non-destructive tools an inspector could use to correlate this data with damage based on lab testing. Between these readings and visual observations, an inspector can make an informed decision on whether a tunnel is safe for operation. However, research is needed to establish and evaluate these methods.

It is expected that physical testing will be limited in this project. However, innovative approaches to obtain data that advances understanding of MassDOT tunnel materials and components are sought. It is expected that proposed tests will result in recommendations for a physical test program.

Anticipated Outcomes and Deliverables

- 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.
- Report including literature review of fire damage to structural elements, with a focus on tunnels.
- Recommendations for physical test program.