

Research in Progress

Evaluation & Mitigation Methods for the Prevention of Cement Concrete Deterioration due to Pyrrhotite: Part 1

Research Need

Aggregates containing reactive iron-sulfide minerals, such as pyrrhotite, incorporated into portland cement concrete cause premature deterioration of the concrete. There is a need to establish a testing program which can accelerate the deterioration under controlled conditions. This will allow to perform and evaluate potential mitigation methods.

Goals/Objectives

- Identify pyrrhotite evaluation and test method protocols, including total sulfur content, pyrrhotite content, expansion, and cement concrete performance.
- Initiating the study and testing of the effectiveness of concrete mixture design mitigation methods on the evolution of deterioration of Portland cement concrete containing pyrrhotite reactive minerals.
- Developing a scope of work of a comprehensive laboratory and field sample study on the effectiveness of deterioration mitigation methods

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:

04/05/2024

Expected Project Completion Date:

09/30/2024

Methodology

A comprehensive literature review will be conducted on sampling and testing methods to evaluate their suitability for aggregate and concrete screening, as well as their effectiveness in accelerating the concrete deterioration. Based in this information, available and potentially successful accelerating test methods will be setup and preliminary laboratory tests will be performed. Close collaboration between the PIs, research personnel and the MassDOT project champions is required to coordinate the research parameters, such as concrete mixture design, iron-sulfide containing aggregate source, sample size, and testing method.

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