

Research in Progress

Construction & Materials Best Practices for Concrete Sidewalks: Phase 2

Research Need

Deterioration, such as scaling of concrete sidewalks, is one of the most urgent challenges that need to be tackled. There are currently extensive knowledge gaps in developing durable concrete.

Goals/Objectives

MassDOT is seeking to improve the durability of concrete sidewalks under extreme weather conditions in Massachusetts to reduce the maintenance and reconstruction costs. Specifically the project will:

1. Research proper concrete sidewalk workmanship for sidewalks placed under hot weather conditions.
2. Determine whether curing/sealing compounds can replace moist curing to enable faster placement and return to use.
3. Determine if penetrating sealers are effective at limiting chloride penetration from commercially available chemical deicers.
4. Perform extensive testing on fresh and hardened concrete to identify processes responsible for concrete deterioration.
5. Document the performance of sidewalks through detailed visual and photographic inspection to support lab testing.
6. Perform hardened concrete testing using petrographic methods and chloride ingress testing to identify conditions that may lead to observed degradation in the field.

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:

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Project Start Date:

July 1, 2021

Expected Project Completion Date:

September 30, 2022

Methodology

This project will employ experimental testing of in-situ concrete sidewalk panels, fresh concrete, and hardened concrete. Mix design, curing method, and deicing and sealing treatments will be varied to determine their impact. The sidewalk panels will be monitored over the course of a year via a photogrammetry protocol designed to detect scaling. Parallel to this effort, freeze-thaw testing, scaling testing, and testing to determine the constituent materials in and makeup of the concrete mixes will be conducted. Petrographic analysis of cores extracted from scaled portions of the in-situ sidewalk specimens will also occur as part of the project. A literature review of hot weather concreting practices and their influence on durability will form part of the final report.

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