

Research Summary

Field Study to Determine Salt Usage Efficiency and Transport to the Surrounding Environment on Two Pavement Types

Research Need

MassDOT has concerns that certain pavement surface types are being over treated during winter maintenance. This is because one specific type of pavement surface Open Graded Friction Course (OGFC) will appear visually “white” even after treatment. This could lead to a situation where the road is treated again when it is not necessary. OGFC pavement sections typically adjoin dense-graded (DG) pavement sections. Thus, when the OGFC section is treated, the adjoining DG section is also typically treated leading to excessive treatment application.

The purpose of this study was to compile data in the field to justify winter maintenance treatment efficiency on OGFC and DG pavement surfaces to ensure that the application is not deficient or excessive. Salt deficiency would result in safety concerns.

Goals/Objectives

The objectives of this project were:

- 1.) Compare OGFC and DG pavement response to identical winter maintenance (salt) applications in terms of reflected physical parameters.
- 2.) Investigate the safety implications related to winter maintenance activities for both OGFC and DG pavement types.
- 3.) Evaluate whether either pavement type requires a greater or lower application rate to achieve desired results.



Methodology

The proposed project was a field study that occurred during winter weather events. Both pavement types are located successively on I-95 (Rt 128) Southbound in Needham, MA. Data was collected with respect to each pavement type from:

- 1.) Existing weather stations
- 2.) Invasive sensors installed in each pavement type (OGFC & DG)
- 3.) Winter maintenance activities
- 4.) Friction and surface condition testing
- 5.) Crash data
- 6.) Photographs

With these data, and the known treatment application rate and frequency, the research team attempted to develop a methodology that MassDOT can use to determine if the treatment applications and frequency are correct, deficient, or excessive.

Key Findings

- The internet based survey showed that only 12.5% of respondents currently place OGFC in their state. The reasons noted for opting not to use OGFC included snow and ice concerns, durability issues, project failures, cost, and poor performance issues.
- Survey respondents indicated that they noticed increased damage to OGFC surfaces as compared to DG surfaces due to normal plowing operation, although frequency of plowing was not increased for OGFC as compared to DG surfaces.
- Field instrumentation data combined with winter maintenance treatment (salt) application data indicated that the OGFC and DG pavement types responded similarly to the winter maintenance in terms of pavement temperature and friction (based on both invasive and non-contact sensors).
- The safety implications related to winter maintenance activities for both OGFC and DG pavement types could not be investigated due to incomplete crash data and limited direct friction measurements.
- The invasive and non-contact sensors did not indicate a friction reduction for either pavement type, they performed similarly based on the data collected.
- No evidence was found that OGFC pavement type froze faster than the DG which challenges assumptions about OGFC's vulnerability during winter events.
- The combined analysis of all the anticipated data could not be completed as limited data was collected. The winters of 2023-2024 and 2024-2025 were less harsh than historically anticipated for the region, thus yielding limited data to analyze.

Project Information

This project was completed 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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Key Words:

Winter maintenance, salt, Open Graded Friction Course, OGFC, dense graded mixtures, friction

Use of Findings

- Due to the unseasonably mild winters experienced in 2023-2024 & 2024-2025, the research team was unable to collect enough data to recommend changes to winter maintenance treatment application rate for either pavement type.
- Generally the data collected indicated both pavement types perform similarly when the same winter maintenance treatment is applied.

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