

RESULTS SUMMARY

Researchers sought out current material application practices through a literature review and extensive interviews with practitioners from state DOTs and other agencies. They produced an updated guide to best practices for applying anti-icing and deicing materials.

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BEST PRACTICES FOR MATERIAL APPLICATION

Knowledge of up-to-date best practices in winter road maintenance is essential to enable transportation agencies in winter-weather states to perform their jobs effectively and efficiently. Many guides to materials and application methods exist, but today's state of rapidly evolving technologies and material innovations requires that guides be updated with new information more frequently than in the past.

Need for Research

Historically, transportation agencies have referred to a few key guidance documents to help manage their application of anti-icing and deicing materials, including:

- FHWA Test and Evaluation Project 28 report, "Manual of Practice for an Effective Anti-icing Program" (1996).
- NCHRP Report 526, "Snow and Ice Control: Guidelines for Materials and Methods" (2004).
- NCHRP Report 577, "Guidelines for the Selection of Snow and Ice Control Materials to Mitigate Environmental Impacts" (2007).

Many agencies have also developed their own protocols to supplement these national guidance documents. Research was needed to review and synthesize these documents and create an updated guide to best practices for applying winter maintenance materials.

Objectives and Methodology

The goal of this project was to identify the current best practices for material application employed by state DOTs and other agencies, with the understanding that in the last two decades, technological advances and material innovations have likely caused changes in agency practices and policies. The desired product of this effort was the creation of a guide to winter maintenance material application that is usable by both supervisors and equipment operators.

First, researchers conducted a literature review to examine the current state of material application methodologies. This effort included consulting approxi-

PROJECT DETAILS

Project Title: Synthesis of Material Application Methodologies for Winter Operations

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Common equipment for winter road maintenance includes snowplows with hopper-type spreaders (lower left) and trucks that hold tanks of liquid deicers (upper right). Photo courtesy of Utah DOT.

mately 120 research reports on many winter maintenance topics, as well as many comprehensive guides from state DOTs and national organizations.

To supplement the information gathered in the literature review, investigators interviewed a representative group of winter maintenance practitioners. The research team spoke with practitioners from 16 state and provincial DOTs, eight local agencies, and one foreign country (Norway), with interview questions spanning a wide range of winter maintenance topics.

Results

Based on the results of the literature review and the practitioner interviews, researchers created an updated best practices guide to material application for winter maintenance. The *Material Application Methodologies Guidebook* was written and organized to be clear, accessible and practical for supervisors and operators. Chapter titles include:

- Materials Used for Winter Operations
- Material Application Strategies
- Material Application Rates
- Equipment for Material Application & Snow Removal
- Equipment Maintenance and Calibration
- Storage and Handling of Materials
- Minimizing Risk and Adverse Effects
- New Technology

The guidebook provides suggested application rate ranges for the most common liquid products (salt brine, magnesium chloride and calcium chloride) and for dry and prewetted salt. Application rate tables from 11 agencies are included as appendices to the final report that accompanies the guidebook.

Building on previous guides, the new guidebook reflects a growing awareness of the environmental impacts of winter maintenance materials. The guide captures practitioners' experience with alternative deicers and additives, including agricultural-based products like beet juice. It also reflects an expanded use of application strategies that make the most efficient use of deicing agents, such as anti-icing, prewetting and regular equipment calibration, and emphasizes the importance of proper material storage to minimize chloride leaching into the environment.

The guidebook's final chapter gives an overview of new and emerging technologies, such as pavement temperature sensors (which help agencies optimize deicer use) and automatic vehicle location systems (which provide real-time data on equipment location and material application).

Finally, the guidebook contains five one-page operator handouts that can be printed and kept on hand for reference. The handouts summarize key points regarding road weather, materials, application strategies, maintenance and calibration, and storage and handling.

Benefits and Further Research

The *Material Application Methodologies Guidebook* provides a concise, accessible reference to the most up-to-date practices used by agencies across the country and beyond for selecting and applying winter maintenance materials. Using the new guidelines will help agencies stay abreast of the most efficient methods and materials, which will ultimately lead to lower costs and minimized environmental impact.

“This project resulted in a clear and easy-to-read guide that presents the best current practices for applying the full range of materials used for winter road maintenance.”

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