
UNDERSTANDING THE CHEMICAL AND MECHANICAL PERFORMANCE OF SNOW AND ICE CONTROL AGENTS ON POROUS OR PERMEABLE PAVEMENTS

Submittal: Task 7: Synthesis of Best Practices - Draft
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1. Introduction

A lot of information about winter maintenance on porous and permeable pavements (PPPs) was identified from the comprehensive literature review and interviews conducted at the beginning of this project. The general consensus was that PPP surfaces freeze more quickly, accumulate snow faster, require greater deicer application rates, require deicer applications for longer duration, and stay wet longer (dry slower) than traditional dense graded pavements (DGPs). Most of reported difficulties with PPPs were at near-freezing temperatures (28–35°F). Thus the laboratory testing and this synthesis was specifically limited to this temperature range. For temperatures lower than 27°F the consensus was that winter maintenance on PPPs was similar to DGPs.

Snow and Ice Formation on PPPs

Snow tends to accumulate on PPPs earlier than DGPs, and remains trapped in the voids longer than DGPs during and after plowing and deicer application. Even when snow is trapped in PPPs, friction tends to be higher than DGPs treated for snow and ice control, owing to the overall greater frictional properties of open graded, ultrathin and permeable friction courses. Skid tests and braking friction tests should be conducted periodically (at least each winter) to measure friction when snow is trapped in voids to ensure deicers aren't over-applied on PPPs just because they appear "white" or "snowy."

Icing and frost formation occurs more often on PPPs than DGPs during cold, clear nights on pavements located near bodies of surface water. Frost and icing can be prevented with liquid material application (e.g., salt brine) at these locations.

PPPs offer better drainage during rainfall than DGPs. However, when snow is melted with deicers, the pumping action of traffic on PPPs makes the roads appear wetter for longer than DGPs. So when DGP wheel paths are dry (thanks to traffic), PPP wheel paths are wet (argh, darn traffic). It's important to keep in mind that PPPs tend to have better frictional properties when wet than DGPs, and that wet PPPs do not necessarily need additional deicer application unless significant

moisture is present (e.g., improper drainage across pavement) and forecast temperatures are very low.

2. Best Practices for Winter Maintenance on PPPs

Materials

A wide variety of products are used for winter maintenance including sand/abrasives, sodium chloride (NaCl), magnesium chloride (MgCl₂), calcium chloride (CaCl₂), and other materials. At temperatures above 28°F, sodium chloride tends to be the most common material used for winter maintenance. Specific recommendations for material application on PPPs are:

- Don't use sand or abrasives on PPPs
- Liquid applicators should use flood or fan nozzles, not stream nozzles
- Larger-grain solid salt is recommended to avoid “losing” the salt in the voids

Treatment Methods and Application Rates

Plowing

PPPs can be more easily damaged by snowplows than DGPs and compacted snow tends to bond stronger to PPPs. To reduce damage to pavement surfaces, shoes should be used to keep plow blades just above the pavement surface.

Anti-icing

Anti-icing PPPs prior to snowfall is recommended to reduce the snow–pavement bond. Anti-icing is recommended if temperatures are above 20°F and snow is not blowing/drifting across the road. Anti-icing with liquids should use flood or fan nozzles (not stream nozzles). Application rates of 50 gal/LM for salt brine (NaCl) or 40 gal/LM for MgCl₂ or CaCl₂ are recommended unless sufficient localized testing is performed to justify reduced application rates.

Deicing

Deicing PPPs during and after a storm is typically required even if anti-icing is conducted prior. PPPs will appear whiter and snowier than DGPs, but will tend to have greater friction than DGPs, making it difficult to use visual observations or optical road surface state equipment in deciding when to apply deicers. Until sufficient field testing is conducted to assess frictional properties of PPPs during winter snowstorms, deicer application rates on PPPs should be 50 percent greater than DGP application rates: (e.g., treat DGP at 100 lb/LM, PPP at 150 lb/LM, treat DGP at 200 lb/LM and PPP at 300 lb/LM).