

Preparing for the Winter Weather

When winter storms hit, PennDOT crews are prepared with routes and materials strategies.

District 1's team includes 366 operators and 31 mechanics equipped with 167 plow trucks, 40 loaders, nine anti-icing trucks, five graders and three tow plows at six county maintenance facilities and 25 additional stock piles.



Their main weapons against inclement weather are salt, salt brine and anti-skid materials.

This edition of the Road Trip will examine how these different products help keep our roadways safe and passable, as well as the reasons bridges and overpasses can become icy before roadways.

Trio of Tools Used to Fight Icy Road Conditions

PennDOT relies on salt, salt brine and anti-skid materials to fend off ice and snow on roadways during winter storms. Deciding which item to apply to the road depends on several factors, including the traffic level of the highway and the type of storm predicted.

Salt remains the department's primary weapon for fighting winter storms. Why?

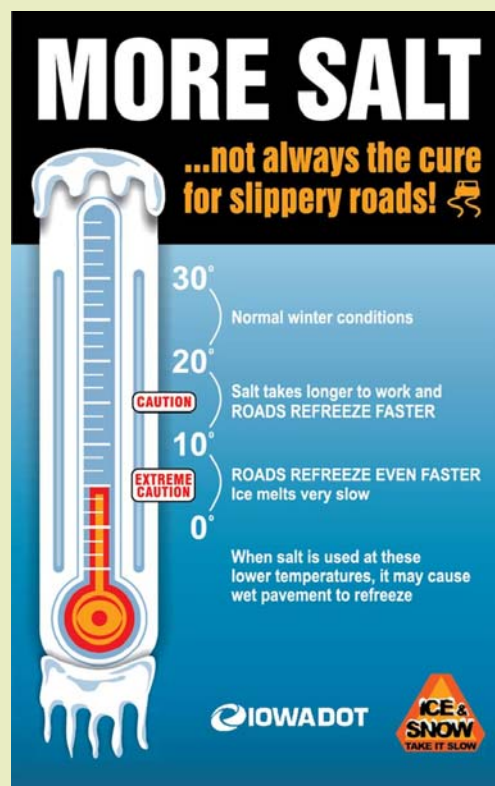
Ice forms when the temperature of water reaches 32 degrees Fahrenheit. Add salt into the mix, and the freezing point of water drops. In other words, salt melts ice.

See it for yourself. Take an ice cube and sprinkle a little salt on the top. The ice will start to melt around the grains of salt. The melting process spreads as the salt continues to dissolve into the liquid water.

While rock salt can lower the freezing point of water, it is only effective in that manner as long as the temperature of the roadway is at least 15 degrees Fahrenheit.

Salt brine is another tool used to combat winter weather. It has the same melting capabilities as rock salt with

(Continued on page 2)



MORE SALT
...not always the cure for slippery roads!

30° Normal winter conditions

20° CAUTION Salt takes longer to work and ROADS REFREEZE FASTER

10° EXTREME CAUTION ROADS REFREEZE EVEN FASTER Ice melts very slow

0° When salt is used at these lower temperatures, it may cause wet pavement to refreeze

IOWADOT ICE & SNOW TAKE IT SLOW

Covered in this issue:

Embedded Tech and Engineering Topics — *Freezing point, Heat conductor*

Vocabulary Terms — *Brine, Fahrenheit, Insulator*

Want to have "Road Trip" sent directly to your email every other month? Submit your email address to jharry@pa.gov and you'll be added to the list.

The newsletter is also available online at www.penndot.gov/RegionalOffices/district-1.

Caution: Bridge May Be Icy

“Bridge Ices Before Road”

“Bridge May Be Icy”

Perhaps you have seen the signs, but do you know what can cause a bridge or an overpass to freeze before the adjacent roadway?

Temperatures at the surface of a roadway might be dropping, but the ground underneath can work as an insulator and might have enough warmth to keep the pavement from freezing.

Bridges have no such insulation. The winds are hitting the infrastructure from **ABOVE** and **BELOW**, causing the bridge to lose heat from every side.

The steel and concrete used to construct most bridges are heat conductors. As air temperatures start to cool the bridge, heat moves to the surface and is lost. Roads are mostly made from asphalt, which is a poor conductor of heat and lessens the rate of heat loss.

As a general rule, a bridge will follow the air temperature very closely. If the air temperature drops below freezing, the bridge surface will



likely follow, causing rain and snow to stick.

Motorists should slow before approaching a potentially slippery bridge or overpass, maintain control of their vehicles, and never slam on the brakes.

(Continued from page 1)

the advantage of being more effectively applied to the roadways under certain conditions.

Whereas rock salt must dissolve into ice as the first step of the melting process, salt brine is already part of the liquid solution. Because of this **pre-wetting**, the salt added to the brine can more quickly begin to lower the freezing

point of water that might be on or hitting the road, and slow or prevent ice from forming a bond with the pavement during the early states of a storm.

Salt brine is sometimes placed on the roadways before a major storm. This process is called **anti-icing**.

Salt and salt brine are more likely to be used on roadways with a higher traffic volume.

For roadways with lower traffic volumes, larger amounts of **anti-skid** are used during storms.

The type of anti-skid used by PennDOT is crushed aggregate mixed with salt. When applied to the roads, the anti-skid creates a surface with better tire traction as it melts the ice.

DID YOU KNOW...

PennDOT produces salt brine at 59 plants across the state.

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