

TXLTAP MONTHLY NEWSLETTER

Salt Brine, the Best Deicing Option Available?

Deicing winter roads in North Central Texas is of paramount importance to ensure the safety and mobility of both residents and travelers. Despite our region's relatively mild winter climate, occasional icy conditions can pose significant hazards on the roads. Deicing treatments, such as spreading salt or sand, help melt ice and improve traction, reducing the risk of accidents and ensuring smooth traffic flow. The importance of these measures cannot be overstated, as they not only prevent collisions but also enable emergency services and essential vehicles to operate effectively during adverse weather conditions. By investing in deicing efforts, North Central Texas ensures that its roadways remain accessible and secure, promoting the well-being and safety of everyone in the community.

Initially, Public Works Departments prioritize deicing efforts on the busiest roadways, such as high-traffic freeways and bridges. Once these primary routes are treated, attention shifts to secondary roads. Ideally, crews begin deicing operations approximately 24-28 hours before anticipated major snow or ice storms. Brine, a saltwater solution, is applied to the roads and dries, creating a barrier that inhibits ice bonding. Its liquid form allows it to seep into cracks and crevices, preventing additional damage during the storm. If ice has already formed, crews apply rock salt to the icy surface, accelerating the melting process. Most brine is a mix of rock salt and magnesium chloride, dissolved in water. Brine is an extremely cost-effective and easy to distribute method of deicing.

How does brine prevent ice from forming? Saltwater brine lowers the freezing temperature of water quickly and effectively. This gives crews more time to prepare for the approaching storm. Brine also raises the melting point of ice and stays on the roadway unless a major downpour takes place. If distributors are calibrated properly, it is an extremely cost-effective solution for winter road issues. Brine use prior to a storm can cost half of a granular salt

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application after the fact. A well-designed brine can save 30-40% on materials cost as well as dramatically reduce the amount of salt used.

With all of these positive attributes, why would any DOT want to reduce the amount of salt used outside of cost-effectiveness? Salt brine and rock salt have documented environmental/ecological impact as well as long-term effects to road structure. Imagine after a full winter of ice/snow removal, how much salt run off ends up in the environment. Michigan DOT did a study that revealed up to 40% of rock salt used bounces off of the roadway and ends up on the shoulder. Excess salt in roadsides, rivers and lakes, causes a loss of biodiversity. It brings in invasive species and can cause broad changes to wildlife, fish and bacteria. Roadside plants are found to have higher sodium content, a draw for animals of all sizes. This in turn, causes vehicle versus animal collisions. Lastly, long-term salt use in roadways with any damage can be corrosive to the internal structure, causing a dramatic increase in deterioration.

Viable alternatives to using salt brine and rock salt include beet juice, chip sand, soybean oil and research is currently being done on corn-based derivatives. Wait, beet juice? Yes, crazy as it may seem, beet juice. Sugar beet molasses is the byproduct of sugar beet refining and is usually discarded. It is readily available and very inexpensive. The sugar molecules act similar to the salt in brine, slowing freezing and speeding up thawing. Beet juice, a small amount of salt, and water, create a sticky substance that bonds well with concrete and pavement. It is less corrosive and adheres longer. Aside from looking like a bloody mess on the roadway, there are very few negatives. Unfortunately, sugar in the rivers and lakes attracts bacteria that remove oxygen from the water. Obviously, this is unhealthy for both plants and animals. Conversely, white beet juice can be used for a better appearance and as a bonus, smells like Tootsie Rolls.

Cities like Helena have begun using chip sand. They take discarded chip from previous projects, crush it into smaller granules and add it to traction sand. The chips become flattened over the season and then are swept up in the springtime to be used the next winter, with a lifespan of 3-4 years. Chip sand is comprised of 1-9% salt with magnesium chloride lightly applied to help with binding to the roadway. Negatives include the fact that it will not last on high-traffic roadways and will need to be reapplied often. According to the State of Maine website, an estimated 30% of sand immediately scatters after application. Sand will also not prevent ice from forming, nor thaw ice.

Soybean oil mixtures are being used to seal concrete. Doing so prevents water, salt, chemicals and other corrosives from entering the concrete pores, thus preventing expedited concrete erosion and rebar corrosion. Soybean oil also helps with moisture loss during curing and is environmentally friendly. The final deicing agent being experimented with is also very environmentally friendly. Corn derivatives are being tested by Iowa DOT to see if they can be an effective option as well. The sugars alcohols in corn act similarly to the sugar beet molasses. Corn derivatives mixed with a small amount of salt also showed superior melting capabilities at very low temperatures. On the downside, corn can be cost-prohibitive and not widely available right now. In the future, possibly. But for now, corn derivatives have no real-life application on our roadways.

<https://www.newsobserver.com/news/local/article257580103.html>

<https://publications.iowa.gov/35238/1/Iowa%20DOT%20Research%20Solutions%20-%20Corn-based%20deicers%20-%20web.pdf>

<https://modernfarmer.com/2022/01/beet-juice-deicer/>

<https://www.giatecscientific.com/education/using-beet-juice-keep-streets-healthy-clear-ice/>

<https://www.midwestfarmreport.com/2020/10/01/soybeans-protecting-road-surfaces/>



Tailgate Talks: Winter Weather Slip and Fall Prevention

Winter weather comes an increased risk of slips and falls due to icy or snow-covered sidewalks, parking lots and work areas. According to the National Safety Council, these injuries account for about 15% to 20% of all workers' compensation costs. Now is the time to ensure precautions are taken to minimize the risk of slip and fall injuries in the winter months ahead. Here are some tips for winter safety around the garage, yard, outpost, precinct, city and county locations:

- Keep adequate supplies of snow and ice removal tools in readily accessible areas. Shovel and salt as often as necessary to keep walking areas clean and dry.
- Make a note of areas where ice tends to form and deal with those right away. A single person should be assigned responsibility for monitoring and coordinating snow and ice removal efforts.
- Limit walking to designated walkways and don't take shortcuts over snow piles and in areas where snow and ice can't be removed.
- Test the travel path for slickness by sliding your shoe or boot on it before walking. Take short steps to maintain your center of balance over your feet. Walk slowly and never run on snow or ice-covered surfaces.
- Place high quality, beveled-edge mats in walking areas subject to water or snow accumulation. Change these mats regularly to ensure those in place are reasonably dry.
- Be extremely careful when climbing on and off trucks and heavy equipment, especially after running a snow route. Always observe the "three points of contact" rule and never jump off a truck or loader. Watch out for icy conditions on the garage floor, wash bay, or outdoor location when power washing equipment after a storm has passed.

While snow removal and frequent salting can help, there are times when totally eliminating the hazard can't be done right away. If you're the first to arrive at work, being aware of the danger of slipping and falling is important. You should anticipate the fact that you're likely to fall at any moment when walking on ice. If you do fall, you should try to avoid landing on an elbow, knee or outstretched hand. Taking the full impact of a fall on a small area many times results in a broken bone.

If you wear leather-soled shoes in bad weather, you're asking for trouble. That's because there's no friction between your shoes and the ice. Wear shoes with low heels and soles with slip-resistant material such as soft rubber, neoprene, or crepe. Take shorter steps to keep your center of gravity right over your feet. Smooth and flat surfaces such as those on an ice rink are less hazardous than the usually rough surface found on roadways, parking lots and sidewalks. That's because there are fewer places to cause a stumble, trip or twist. Also, snow is a lot less slippery than ice, so it might be better to drive or walk through snow to avoid an icy spot. However, there might be a surprise - snow on top of ice is extremely dangerous and more slippery than bare ice. Also, try not to track snow into buildings. Wipe your feet at the entrance so others won't slip and fall on melted snow.

Tailgate Talks available at: <https://nltapa.org/information-exchange/nltapa-tailgate-talks/>



Focus on Training: Installation and Maintenance of Signs and Pavement Markings

TxLTAP's Installation and Maintenance of Signs and Pavement Markings course is designed to help participants understand accepted practices in the application, installation, maintenance, and operation of signs and pavement markings typically used on public roadways as laid out in the TMUTCD. The TMUTCD governs the placement of signs, signals, and pavement markings on every public road in Texas and even on certain private roads. These private roads include Toll roads and roads within shopping centers, airports, sports arenas, theme parks, and similar business or recreation facilities that are privately owned, but the public is allowed to travel without access restrictions. Under state law, each local road authority is required to follow the provisions of the most recent TMUTCD.

This course covers:

- Types of traffic signs and their purpose
- Different sign and pavement markings materials
- Proper techniques for locating traffic signs and positioning pavement markings
- The importance of inspecting and maintaining signs and pavement markings, including compliance with the TMUTCD requirements regarding the maintenance of sign retroreflectivity

To request this course, please email TxLTAP at txltap@uta.edu or kerri.farley@uta.edu.

Instructor Spotlight

RAY BELK



Ray retired from the Texas Department of Transportation in 2018 and became a consultant for TxLTAP. At TxDOT, he served as a Senior Project Manager and as the Director of Workforce Development responsible for the training of TxDOT's 12,000+ employees. He has over 45 years of management, training, and workforce development experience. Ray has developed 12 new training courses for TxLTAP and actively instructs most of them. He is a frequent speaker at the Texas Association of Counties, APWA, and TACERA conferences. He has developed customized workforce plans for over 60 cities and counties in the past five years.

Ray has been married to his wife, Tammy, for 34 years. They have three grandchildren they love to spoil. Ray enjoys hunting, fishing and outdoor activities in his spare time. He strongly believes in passing forward knowledge and advice to help others attain their career goals.



Instructor Reviews

- “Great Instructor!” “Well organized instructor.”
“Ray was awesome. Kept the class engaging.”
“Very impressed with Mr. Belk’s knowledge and experience.”
“Best class I have taken so far about management!” “Instructor did an excellent job.”
“Ray is an excellent instructor.”
“This was the best training course I have attended and kept my attention for 2 whole days!”



INSTRUCTORS WANTED

Are you looking for your next
adventure in the great state
of Texas?



TxLTAP IS LOOKING FOR EXPERTS IN:

Email Your Resume and
Letter of Interest to:
TxLTAP@uta.edu



- ✓ Work Zone
- ✓ Infrastructure
- ✓ Safety
- ✓ Heavy Equipment
- ✓ Management
- ✓ Flagging
- ✓ Environmental
- ✓ Electrical



UTA | Division for Enterprise Development | TxLTAP
817-272-2581 | txltap@uta.edu | 140 W. Mitchell St. Arlington, TX 76019