EMCOR Government Services

Plowing a Clear Path to **Effective Snow and Ice Removal**

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Adequate preparation, supported by the right equipment and supplies, can help keep facilities safe and operational when winter storms strike.

Waking up to see an abundance of heavy, wet snow may be a child's dream come true, but to a building owner or manager, it can be a nightmare in the making. Implementing a plan to help keep your facility fully operational throughout the winter season is one thing, but it only takes a single major snowfall to leave your site high and dry—or slippery and wet, as the case may be.

QUICK TIP #1

Start planning for snow removal six months ahead of the winter season for significant cost savings.

The calm before the storm: an important time to plan ahead

Keeping a facility safe and operational after a winter storm requires an effective snow remediation plan. Many assume that preparation begins as the winter season nears, or in the days leading up to the area's first storm. However, as EMCOR Government Services' Director of Operations, Jeff Gaddy, explains, the initial planning should be implemented during the summertime, approximately six months prior to the region's first snowfall.

As counterintuitive as that may sound, this isn't Gaddy's first season. Over the years, he has planned and supervised snow and ice remediation at more than 15 mission-critical government and commercial locations in and around the Washington, DC, metro area. He is currently responsible for keeping more than 75 acres of grounds and walkways safe and accessible for everyone entering and leaving these facilities—which adds up to a lot of snow and ice, when a storm hits.

Gaddy reasons that, though it may be difficult to think about snow and ice while the sun is shining brightly and it's sweltering outside, the summer is an opportune time to implement cost-saving measures, such as purchasing ice melt in bulk from a supplier, while the unit cost is approximately half of what is it is during the peak winter months.

"It's all about supply and demand," he explains. "The supply goes down for ice melt closer to the winter, so the material price jumps up, and there is no way to control that."

In addition to lower costs, a facility can more efficiently absorb the ice melt expense in the months leading up to the winter season, says Gaddy. This approach is similar to buying frequently used consumables in bulk, like air filters.

If a facility does not have a designated staging area on-site to store ice melt throughout the summer and fall months, Gaddy suggests renting an off-site storage unit. Depending on the amount of ice melt purchased, the breakeven cost of storage compared to the savings offseason can often be surpassed, which translates to cost savings over the fiscal year.

QUICK TIP #2

Rock salt is only effective when the pavement temperature is at or above 20 degrees Fahrenheit.

Of all the ice melt on the market, rock salt is typically the least expensive and easiest to find, according to Consumer Reports. However, rock salt is only effective when the pavement temperature is at or above 20 degrees Fahrenheit. When pavement temperatures are well below that, calcium chloride or magnesium chloride are far more effective.

Selecting a snow removal subcontractor should also be completed before the end of the summer, according to Matthew Hoskins, Business Development Executive and Certified Snow Professional at USM, an EMCOR company. Ensuring that the subcontractor is able to successfully meet a facility's needs and execute the scope of work through a wide range of winter conditions is critical. One way this can be done is through an assessment and allocation of a vendor's snow removal equipment to verify if it can accommodate a facility's unique conditions.

"By finalizing a contract in the summer, you should benefit financially by obtaining an early season signing incentive and know your risk will be reduced, because your supplier partner will have enough time to plan for success," says Hoskins.

When locating a vendor, Gaddy also recommends ascertaining each prospective company's minimum hour requirement for mobile snow removal service, which is typically four hours, though minimums may vary by region.

Additionally, "The portal-to-portal terms of a time and materials (T&M) contract are important to remember during a negotiation with a snow removal specialty subcontractor," states Gaddy. "Otherwise, a subcontractor could potentially bill for travel time unrelated to your location's effort."

If at all possible, competing and procuring firm fixed-price (FFP) subcontracts for the total performance of snow removal during the season is preferred. However, if specialty snow removal subcontractors uniformly price in so many risks that it becomes cost prohibitive to go with fixed-price, Gaddy suggests attempting to establish multiple T&M contracts with different vendors. Having more than one T&M contract can provide the flexibility of several vendor choices and possibly the opportunity to dictate labor pricing. Conversely, this approach requires much more planning, supervision, and quality control than FFP, but can be well worth it, if the cost savings are substantial.

QUICK TIP #3

Figure out the minimum hour requirement and travel cost for mobile snow removal service, so you're not getting charged for unused time.

After vendor selections are made, EMCOR Government Services' Program Manager Charles Shirley suggests that a facility develop a "constructive critique" evaluation form for vendor snow remediation performance. Shirley plans and oversees snow and ice remediation at four mission-critical government locations in and around the Washington, DC, metro area. He is a proponent for objective assessments of subcontractor performance.

QUICK TIP #4

Perform PMs on snow removal equipment in the summer months and a dry run of their use in the fall, to ensure reliability.

According to Shirley, the evaluation form should assess how a vendor remediates snow and ice from critical areas at the facility, such as stairs and walkways, at the conclusion of each job. Through this process, a facility is able to provide its vendor with objective rankings and detailed comments on the work. Any performance deficiencies should be documented, but with a focus on the opportunity to implement changes during future remediation jobs. The critique is formally presented to the subcontractor for a response after the conclusion of each job.

"This critique is effective in letting the vendor know what areas were well-performed and what areas require improvement," explains Shirley. "It can be used as a tool for evaluating each snow event and improving performance, as well as in negotiations for subsequent contract awards."

Conducting preventative maintenance on facility-owned snow removal vehicles and equipment, like salt spreaders and plows, is another important action to take during the summer months, says Gaddy. Once the maintenance is performed, conducting a dry run on the equipment during the fall months is also suggested.

Snow removal efforts depend on a storm's accumulation

Understanding how the pavement temperature affects snowfall accumulation is vital when determining if pretreating walkways and parking lots with ice melt alone will be enough, or if shoveling and plowing will also be necessary. Gaddy notes that anticipated snowfall may not always equate to actual accumulation if the ground temperature is above 32 degrees Fahrenheit.

"Many times, the ground temperature—particularly with daytime radiant heat—is not below freezing to let inches of snow accumulate to a storm's highest potential, even if the air temperature is below freezing," explains Gaddy.

QUICK TIP #5

Inexpensive handheld pavement temperature readers can be purchased from suppliers to get a more accurate prediction of snow accumulation.

When weather stations report air temperature, it is measured at least six feet above ground, which may not be helpful when trying to determine if or how much ice melt is needed. Pavement temperature is influenced mostly by the ambient ground temperature and the amount of sun exposure in the days leading up to and following a storm. Fortunately, inexpensive handheld pavement temperature readers can be purchased from suppliers, like auto part stores.

In cases where a cold front is projected to pass the region within a couple of days, it's worth noting that the likelihood of snow or ice accumulation is low, according to the National Weather Service. When the temperature is at or near freezing, the ambient temperature of the air and ground will likely be noticeably higher, just prior to the cold front.

QUICK TIP #6

Pretreating with ice melt will save on snow removal labor for predicted accumulation of four inches or fewer, and a ground temperature at or above 32 degrees Fahrenheit.

If the snowfall from a storm is four inches or fewer, and the ground temperature is at or above 32 degrees Fahrenheit, pretreating the pavement with ice melt typically helps prevent the need to stage robust labor efforts, like continuous shoveling or plowing, according to Gaddy. One to two individuals operating a salt spreader and small plow can cover several miles of walkways, which can save a facility thousands of dollars in overhead costs for subcontracted labor. Assigning a designated "watch stander" to monitor accumulation is another means to gauge and adjust surge operation efforts during the latter half of nights and early mornings, when refreezes may occur.

"When in doubt, it's a good idea to pretreat pavement surfaces, even if you are not sure a projected storm will end up hitting your area," states Gaddy.

If snow accumulation is expected to be more than four inches and ample labor and/or snow removal equipment is not available on-site, a facility may need to contract the job out through one of its preselected vendors.

Classifying snow removal efforts into categories based on accumulation can help provide a clear-cut, standard operating procedure. One classification system is the Regional Snowfall Index (RSI), developed by the National Oceanic and Atmospheric Administration (NOAA), which characterizes and ranks snowstorms in the United States, based on snowfall accumulations of less than one inch to 18 inches or greater. RSI has five categories, which include Notable (1 to 3 inches), Significant (3 to 6 inches), Major (6 to 10 inches), Crippling (10 to 18 inches), and Extreme (greater than 18 inches).

Unfortunately, there is no exact methodology to calculate exactly when a winter storm will hit, nor its overall accumulation. Nevertheless, there are several credible news and weather sources that can be referenced in the days leading up to a storm, such as NOAA's National Weather Service and The Weather Channel. Monitoring the weather closely to prepare for a storm enables you to act early and pretreat paved surfaces with ice melt efficiently.

"Credible weather sources provide roughly 24 to 48 hours of warning of snowfall, if not more," says Gaddy. "Look at the three- to four-day projection leading up to a storm, and get ready to pretreat."

QUICK TIP #7

Reference credible weather sources, like NOAA and The Weather Channel, for 24 to 48 hours of snowfall warning.

ICE MELT COMPARISON GUIDE | Data provided by *Consumer Reports.*

ICE MELT	USE	ESTIMATED PRICE PER 50 LB BAG*	EFFECTIVE TEMPERATURE	ASPHALT/ CONCRETE DAMAGE	BENEFITS	PRECAUTIONS
Calcium Chloride	Residential & Commercial	$10.00 to $19.00	-25° F	Minimal to moderate	More effective than sodium chloride; fast acting	Can damage grass and plants when over-applied
Calcium Magnesium Acetate	Parking garages	$20.00 and up	20° F	Moderate	Environmentally friendly; less corrosive than chloride products	Can damage concrete
Magnesium Chloride	Residential & Commercial	$10.00 to $19.00	-13° F	Moderate to significant	Environmentally friendly; safer around pets; more effective than sodium; fast acting	Can damage plants when over-applied; lethal to pets that suffer from kidney disease, if ingested
Potassium Chloride	Residential, esp. properties with pets	$20.00 and up	25° F	Minimal to moderate	Environmentally friendly; safer around pets	Can damage plants when over-applied; lethal to pets that suffer from kidney disease, if ingested
Sodium Chloride/ Rock Salt	Residential & Commercial	$10.00 or less	20° F	Minimal to moderate	Inexpensive	Can damage asphalt, concrete, brick, stone metal, grass, plants, and wood decks; lethal to pets, if ingested
Urea/ Carbonyl Diamide	Residential, esp. properties with pets	$10.00 or less *These figures are estimates provided by *Consumer Reports.*	10° F; better at 25° to 30° F	Minimal to almost nonexistent	Environmentally friendly; safer around pets	Can damage plants when over-applied; not very effective as a de-icer

Keeping safety at the forefront

Snow removal can be a strenuous job that can injure even the most seasoned and fit professional. Exhaustion, back injuries, heart attacks, and dehydration are some of the potential dangers, if proper safety precautions are not exercised. According to the Occupational Health and Safety Administration (OSHA), workers should warm up prior to removing snow, scoop snow in small amounts at a time, and push snow instead of lifting it, if possible. If lifting snow, workers must keep their backs straight, lift with their legs, and avoid turning or twisting their bodies.

Workers should also take frequent breaks in warm areas sheltered from the winter weather and ensure that they are properly hydrated throughout the day. Gaddy points out that drinking tepid water is a better alternative to hot, caffeinated drinks, like coffee and tea, which act as a diuretic and can increase fatigue.

People removing snow can also experience heat exhaustion or heat stroke, despite freezing temperatures. "EMCOR staff wear several layers, while out in the cold," explains Gaddy. "It's easy to forget to drink water when the temperature may be at or below freezing, but heat exhaustion can still occur, just as it does during the summer months."

QUICK TIP #8

To lessen the risk of injury or exhaustion, workers should warm up prior to removing snow, scoop snow in small amounts at a time, push snow instead of lifting it, and stay cool and hydrated.

In addition to the physiological safety practices, Shirley says that Proper Protective Equipment (PPE) is necessary. Anti-slip boots, reflective vests and clothing, and insulated gloves are paramount. Using strobe lights for increased visibility during heavy snowfall while operating equipment is also important.

Prior to the winter season, Gaddy says it is valuable for Facility Managers to conduct "Toolbox Talks," which are brief safety educational sessions with the building maintenance staff. Topics to review include: the dangers of heat exhaustion or heat stroke while shoveling snow, proper clothing layers and PPE materials, hydration and rest tips to avoid overexertion, and tips on how to operate equipment safely.