MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

Operations Facts and Figures for the 2024/2025 Winter Season

The Maryland State Highway Administration (SHA) owns and maintains all non-toll, numbered roads in Maryland's 23 counties. (The Maryland Transportation Authority (MDTA) maintains Maryland's toll roads.)

Total Quantities of Materials Available to SHA at the Start of 2024-2025 Winter Season

- **Rock salt in 87 salt facilities** — 386,000 tons
- **Salt brine at 77 sites** — 1.6 million gallons
- **Abrasives – sand and crushed stone** — 40,000 tons
- **Magnesium chloride at 16 sites** — 100,000 gallons

Budget for winter 2024/2025: $69 million (SHA)
$3,071,200 (MDTA)

Lane Miles Maintained (SHA and MDTA): 18,177 miles
(Length of roadway times the number of lanes, including ramps)

Pieces of Equipment (state and contractor) available: **Approx.** 2,300

Number of Staff (state and contractor) available: **Approx.** 2,300

SHA Winter Operations Expenditures and Salt Usage (five-year period)

Fiscal Year	Expenditures	Salt Used
FY 2020	$36,352,376	36,611 tons
FY 2021	$104,395,711	241,066 tons
FY 2022	$76,975,608	154,650 tons
FY 2023	$35,755,531	29,242 tons
FY 2024	$67,626,206	118,651 tons

Materials Available for 2024-2025 Winter Season

- **Rock Salt** is the principal winter material used by state and contract forces. It's 100% effective at pavement temperatures above 20° F but starts to lose its melting properties once below this threshold.

- **Solar Salt** is created using a unique evaporation process that yields a nearly pure product and is 99% free impurities. This type of salt is necessary for SHA's Brine Production Units to operate at their optimum efficiency.

- **Salt brine** is a solution that can be used as an anti-icing agent on highways prior to the onset of a storm or as a deicer during a storm. Salt brine is 23.3% salt and 76.7% water. SHA makes extensive use of this material. It has a freeze point of -6° F and costs approximately 17 cents per gallon to produce and transport. Salt brine solution is produced using the department's 15 brine-making facilities and used statewide.

- **Magnesium Chloride** is a liquid winter material used in de-icing operations. The material has a freeze point of approximately -26° F. It's used in the colder regions of the state, primarily in the northern and western counties. In Maryland, magnesium chloride is typically used in conjunction with salt brine or treating rock salt to lower the freezing point of each material.

Strategies for Winter Operations

- **Anti-Icing –** In the days prior to a winter storm, SHA applies salt brine to the pavement to prevent snow and ice from initially bonding to the pavement. SHA is expanding its anti-icing operations to lessen salt usage throughout Maryland. Salt brine, which is 23.3% salt and 76.7% water, is produced at 15 SHA maintenance facilities. SHA **will not** pretreat highways with salt brine if a winter storm is forecasted to start as rain as the rain will wash the salt brine solution off the pavement.

- **De-icing –** This is the traditional winter maintenance strategy of applying rock salt. Rock salt requires more material to break the bond than to prevent it. Salt is the primary material used to treat pavement in snow or ice operations. In colder areas or for a thicker snowpack on the road, crews can add magnesium chloride or "Liquid Mag" to rock salt or salt brine during extremely cold temperatures to enhance salt's effectiveness.

- **Liquid Salt Brine-Only or Direct Liquid Application (DLA) Snow Routes –** This consists of a designated snow route that only uses a salt brine solution to prevent the snow and ice from bonding to the pavement. Unlike anti-icing, which takes place **prior** to a winter storm, this strategy is performed for the duration of the storm. SHA has about 400 lane miles of brine-only snow routes throughout its seven engineering districts. When compared to snow routes using granular rock salt as the main snow-fighting compound, the brine-only routes not only perform at or above the expected level of service but use far less salt.

- **Loader Scales -** SHA has purchased a total of 26 loader scales that are mounted on SHA loaders at salt facilities. The scales accurately capture the precise amount of salt being loaded for distribution onto Maryland roadways. This allows SHA to accurately control the storage, handling, application, and recovery of dispensed granular salt and reduce overall salt usage. SHA also utilizes hired contract loaders, with scales, at multiple locations throughout the state.

- **Rubber Plow Blade with Ceramic Inserts -** The rubber/ceramic blades are superior to steel blades from both a performance and efficiency perspective. These newer plow blades move more snow from the roadway, which results in less salt to treat the road during plowing operations. To meet the demands of our operators, SHA placed a bulk order for the hybrid blades this winter season to ensure enough resources are on hand for each facility.

- **Winter Operations Training** –20%SHA requires maintenance personnel to attend Snow College where they will focus on responsible resource use and tracking, environmental stewardship, equipment calibration and maintenance, efficient plowing/salting operations, and public safety. The goal is for 20% of these employees every year, so that all take the course at least once every five years. This winter will focus on the negative and lasting impacts that salt has on our infrastructure. Past data obtained with winter training was so beneficial it led to the creation of a best practices document that was distributed statewide. This statewide/virtual initiative will be a staple in our salt-reduction tactics for years to come.

Technology Available for 2024-2025 Winter Season

In addition to its fleet of salt spreading/snow plowing dump trucks, state and contractor crews will deploy:

- **600 truck-mounted saddle tanks:** This equipment is used to pre-wet salt with salt brine or liquid magnesium as the salt is spread on highways. Pre-wetting salt helps it adhere to the pavement (reducing waste), dilute into a brine solution quicker (making salt more effective) and work at lower temperatures. Nearly all SHA's fleet of single-axle dump trucks are equipped with this technology.

- **310 wing plows:** A wing plow is an additional plow mounted on the right side of a plow truck or grader. The extra plow allows crews to clear more snow from the road and shoulder in one pass, increasing efficiency while reducing the need for extra trucks and our carbon footprint.

- **23 truck/trailer-mounted liquid applicator spray tanks:** These units are used for anti-icing operations and liquid-only routes (spraying salt brine on roads and bridges prior to precipitation to prevent snow and ice from bonding to the pavement).

- **15 salt brine makers:** These 15 salt brine makers are strategically placed around the state to fill and replenish up to 77 different locations throughout Maryland. This year, SHA is replacing its brine makers with automated units that can produce up to 8,000 gallons of brine per hour. This will help ease the burden of brine tank replenishment by quadrupling the output of our current units while producing a perfectly blended solution.

- **2 tow plows:** A tow plow is a separate plow that is towed behind an SHA salt/plow truck and will clear an extra highway travel lane. Tow plows will be used in conjunction with snowplow trains (several trucks driving in tandem). The introduction of the tow plow into SHA's fleet will help enhance highway snow-clearing operations with fewer passes and fewer trucks on the highway.

- **4 Dual-Wing plows:** SHA is employing four dual-wing plows in Allegany, Frederick, Garrett, and Montgomery counties. The extra wing plow can clear a two-lane highway in one pass.

- **23 Quad-Axle trucks:** SHA is employing trucks with enhanced material carrying capacity to treat longer sections of road. The enhanced capacity will allow the plow trucks to apply anti-icing material to more lane miles for better clearing results.

- **78 Non-Invasive Road Sensors:** Non-invasive sensors mounted to overhead signs or poles and can detect the thickness of water, snow, or ice within 1 mm of accuracy. It also measures surface temperature, road conditions, and freeze point/salt concentration on the road surface. This type of unit eliminates the need to install a sensor in the pavement.

- **105 Mobile Advanced Road Weather Information Sensor (MARWIS) -** SHA has installed 100 of the 105 MARWIS sensors on maintenance equipment used in snow operations. The mobile road weather sensors will transform vehicles into mobile weather stations by detecting several critical road weather parameters, including temperatures, precipitation amounts and types (rain, snow, sleet, etc.), relative humidity, dew points, and traction. Together with other sensors on SHA weather stations, the technology will enable SHA maintenance forces to have real-time information and help in the tactical deployment of equipment.

Contacting SHA

Citizens can also log onto **www.roads.maryland.gov** and click "Contact us" to obtain the online submission form to report non-emergency issues on SHA-maintained highways. Residents can track where SHA and contractor crews are during a storm by using the Statewide Transportation Operations Resource Map (STORM). For real-time travel information and access to hundreds of live traffic cameras, log onto https://chart.maryland.gov/. SHA is on Twitter @MDSHA and Facebook @MDOTSHA

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