MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

WINTER OPERATIONS FACTS AND FIGURES 2021-2022 WINTER SEASON

MDOT SHA maintains most interstate, U.S., and numbered state routes in Maryland. The Maryland Transportation Authority (MDTA) maintains Maryland's eight toll facilities. ***Know Your Roads*** is a great link to ascertain what agency maintains which roads: https://maryland.maps.arcgis.com/apps/webappviewer/index.html?id=14f27a6cab51422dabdfb168ca603482

Total Quantities of Materials Available at the Start of 2021-2022 Winter Season

Rock Salt at 93 Salt Facilities:	350,000 tons
Salt Brine at 77 Sites:	1.7 million gallons
Abrasives (Statewide) – Sand and Crushed Stone:	40,000 tons
Magnesium Chloride at 16 Sites:	100,000 gallons
Budget for winter 2021/2022:	$71 million
Lane Miles Maintained by MDOT SHA and MDTA: (Length of roadway times the number of lanes, including ramps)	18,100 miles
Pieces of Equipment Available to Fight Winter Storms: (Including MDOT SHA, MDTA and contract forces)	Up To 2,700

Winter Operations Expenditures and Salt Usage (5-year period)

Fiscal Year	Expenditures	Salt Used
2016	$100,176,147	138,231 tons
2017	$53,679,482	92,990 tons
2018	$86,686,146	184,877 tons
2019	$95,498,676	210,660 tons
2020	$36,356,142	39,161 tons
2021	$103,587,875	241,067 tons

MATERIALS AVAILABLE FOR 2021-2022 WINTER SEASON

ROCK SALT is the principal winter material used by MDOT SHA. It is 100% effective at pavement temperatures of 20° F and above but starts to lose its melting properties once below this threshold.

SALT BRINE is a solution that can be used as an anti-icing agent on highways prior to the onset of storms, or as a deicer on highways during a storm. Salt brine is 23.3% salt and 76.7% water. MDOT SHA makes extensive use of this material. It has a freeze point of -6° F and costs approximately 14.8 cents per gallon to produce and transport. Salt brine will be produced and used at MDOT SHA's 15 brine making facilities.

MAGNESIUM CHLORIDE is a liquid winter material used in de-icing operations. The material has a freeze point of approximately -26° F. It is 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 by creating an 80/20 blend which can cut usage costs by up to 80 percent. This not only cuts down on expenditures and impacts to infrastructure but makes salt brine now usable down into negative double-digit temperatures.

ABRASIVES including sand and crushed stone are used to increase traction for motorists during storms. These are only used in Western Maryland due to the steep topography and environmental restrictions across the rest of the state.

Please use the following link for MDOT SHA's Salt Management Plan and more information on our winter resource management initiatives:

https://www.roads.maryland.gov/OOM/Statewide_Salt_Management_Plan.pdf

Almanac Data

Average Number of Winter Snowstorms per Year Since 2010
(Does not include the numerous maintenance shop activations for frost, black ice, and post-storm blowing and drifting snow)

Lower Eastern Shore	5.1
Upper Eastern Shore	10.2
Southern Maryland	5.2
Baltimore/Washington DC Metro Area	10.3
Western Maryland	28.1

Date of Earliest Metro Area Winter Storm since 2010:	10/29/2011
Date of Latest Metro Area Winter Storm since 2010:	3/30/2014

STRATEGIES FOR WINTER OPERATIONS

Anti-Icing – In the days before a storm, MDOT SHA applies salt brine to the pavement, which prevents snow from initially bonding to pavement. MDOT SHA is expanding its operations to lessen salt usage throughout Maryland. Salt brine, which is 23.3% salt and 76.7% water, is produced at 15 MDOT SHA maintenance facilities. MDOT SHA will not anti-ice highways with salt brine if a storm is forecasted to start as rain as this will wash the salt brine solution off the pavement. Additionally, MDOT SHA will not apply salt brine in temperatures 20 degrees or colder because the application may freeze on contact.

Deicing – This is the traditional winter maintenance strategy of salting. 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/salt brine during extremely cold temperatures to enhance the salt's effectiveness.

Liquid Salt Brine Only or Direct Liquid Application (DLA) Snow Routes - This operation 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 only takes place prior to the event, this strategy is performed for the duration of the event. MDOT SHA now has a DLA snow route in each of its seven engineering districts. When compared to snow routes using granular rock salt as the main snow fighting compound, the DLA snow routes not only perform at or above the expected level-of-service but use far less salt. MDOT SHA has strategically placed an additional 79,000 gallons of storage around the state.

Loader Scales - MDOT SHA has purchased a total of 34 loader scales that are mounted on MDOT SHA loaders at salt facilities. The scales accurately capture the precise amount of salt being loaded for distribution onto Maryland roadways. This allows MDOT SHA to accurately control storage, handling, application, and recovery of dispensed granular salt. Precision application of salt helps MDOT SHA reduce overall salt usage.

Rubber Plow Blade w/ 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, MDOT 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 - This takes place in the form of a required Snow College that 20 percent of maintenance personnel are required to attend each year. MDOT SHA's goal is to train 100 percent of our employees at least once every five years. Past data obtained with winter training was so beneficial it led to the creation of a best practices document that was distributed accordingly statewide. This statewide initiative will be a staple in our salt reduction tactics for years to come. Due to COVID-19 protocols in 2020 most of our trainings occurred in a virtual environment, however in 2021 our approach has transitioned back to pre-covid practices.

TECHNOLOGY AVAILABLE FOR 2021-2022 WINTER SEASON

In addition to its fleet of salt spreading/snow plowing dump trucks, MDOT SHA will deploy:

550 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 MDOT SHA's fleet of single axle dump trucks are equipped with this technology.

Slide-In Tanks - MDOT SHA has equipped 10 Quad-Axle trucks with 2,600-gallon slide-in tanks that will be used for anti-icing operations and for DLA snow routes where no granular salt is used. These tanks are easily removed to allow the trucks to spread granular salt if needed.

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.

14 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 Automated Salt Brine Makers - These automated salt brine makers are strategically placed around the state to fill and replenish the 77 brine tank farms throughout Maryland. This year, MDOT SHA has installed all but four of its new brine makers with automated units which can produce up to 9,000 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 MDOT 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 MDOT SHA's fleet will help enhance highway snow clearing operations with fewer passes and less trucks on the highway.

4 Dual-Wing Plows - MDOT 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 - MDOT 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 thus allowing better clearing results.

78 Non-Invasive Roadway Sensors - Non-invasive sensors are 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 condition, and freeze point/salt concentration on the road surface. This type of unit eliminates the need to install a sensor in the pavement.

102 Mobile Advanced Road Weather Information Sensor (MARWIS) - These mobile road weather sensors will transform vehicles into mobile weather stations by detecting several critical road weather parameters, including temperatures, precipitation amounts and type (rain, snow, sleet, etc.), relative humidity, dew points and friction values. Together with other sensors on MDOT SHA weather stations, the technology will enable MDOT SHA maintenance forces to have real-time information and help in tactical deployment of equipment.

Contacting MDOT SHA

Citizens can also log onto **www.roads.maryland.gov** and click "Contact us." There is an online submission form to report any issues pertaining to MDOT SHA-maintained highways for non-emergencies. For real-time travel information, log onto **www.md511.org**. MDOT SHA is on Twitter **@MDSHA** and Facebook at **www.facebook.com/MDOTSHA/**.

###