

Description

This SOP outlines procedures for the storage and application of de-icing materials to roadways to control snow and ice and was prepared to meet the requirements of the 2016 MA Small MS4 General Permit (2016 MS4 Permit). The 2016 MS4 Permit requires the municipality to:

- Establish procedures for the storage of de-icing materials;
- Establish procedures to minimize the use of sodium chloride and other salts.

Responsible Personnel

This Winter Road Maintenance Plan is intended to be used by Town of Barnstable staff who are responsible for snow and ice removal as well as any contractors hired by the Town's Department of Public Works. The DPW will assign inspectors to assist the contractors and to insure the timely and satisfactory completion of the routes. The inspectors have authority over whether the work is of adequate quality and has been properly completed. Supervisory staff for snow and ice control management include: the Director of the DPW, the Assistant Director of DPW, the Highway Supervisor, the Highway General Foreman and/or other senior manager's within the department. A command center is located at the Highway Division Headquarters for coordination and communication during storm events.

Equipment

Inventory

The Town owns and maintains some ice control and snow removal equipment, but contractors provide their own equipment and have Commercial snow plowing insurance. Approximately 80 pieces of DPW equipment and 200 pieces of contractual equipment are utilized. Contractor equipment is required to be in good operating condition before and throughout the snow and ice season. The DPW may require vehicle and equipment inspection and their judgement as to the condition shall be final.

Calibration

Spreading equipment provided by contractors must be able to be calibrated by DPW personnel. De-icing application shall be calibrated to dispense at rates prescribed by the DPW. Calibration procedures are included in **Attachment 1**.

Materials and Storage

Materials

The Town of Barnstable uses a contracted straight road salt and pre-mix treated salt consisting of salt and magnesium chloride for snow and ice control. Types and approximate amounts of snow removal materials used each year are listed below.

Type of Material	Source	Approximate amount per year (based on three-year average)
Salt	Morton Salt, Inc*	4,000 Tons
Agricultural Pre-Mix	Champion Salt, LLC*	3,000 Tons
Other		

*Based on Fiscal Year 2019/2020 Regional Cooperative BID for Snow and Ice Removal Products, Town of Plymouth BID# 21929

Storage

Materials are stored in a 3,800 ton capacity salt barn, a pad at the DPW Highway Division located at 382 Falmouth Rd, Hyannis, MA, and 600 tons are stored in the salt barn at DPW Solid Waste Division located at 45 Flint St, Marston Mills, MA. Overflow storage, if needed, is provided on a concrete pad located at the DPW Highway Division. Trucks are loaded outside of the salt barn. Loading areas and yards are swept periodically to help prevent product buildup and runoff.

Snow & Ice Routes

Snow & Ice routes are based on Snow & Ice Management phase: anti-icing/de-icing procedures and snow removal procedures. There are nineteen (19) primary road routes that are assigned to both anti-icing/de-icing and snow removal procedures. There are fifty six (56) secondary road routes, fifty (50) parking lot routes, twenty four (24) sidewalk routes and five (5) bike path routes that are assigned during snow removal procedures.

Barnstable has 145 miles of primary roads and 304 miles of secondary roads. Snow and ice control generally starts with main roads then moves to secondary roads. In the information given to contractors at the beginning of the snow season, they are provided with detailed maps of their routes. Additional contractors are also responsible for sidewalk routes, along with DPW personnel.

Winter Road Maintenance Procedures

Prior to the Start of the Snow Season

- Mark islands, fire hydrants, catch basins, manholes, sidewalk segments, and other infrastructure that could be obscured by snow or cause a hazard to the plow and the operator.
- Conduct training for all Town staff and contractors responsible for ice and snow removal.
- Ensure all snow equipment is in good working order and conduct maintenance as needed.
- Install snow plows, spreaders, and brine applicators, as applicable on vehicles.
- DPW staff will calibrate all snow equipment to ensure efficiency and to minimize salt use. Calibration procedures are outlined in **Attachment 1**.
- Ensure road crews are familiar with mapped plowing routes to efficiently cover the entire municipality. Prioritize primary roads and heavily traveled local roads.

Prior to Leaving the Facility

- Speak with supervisor to determine special circumstances of storm (i.e. heavy rain, temperature conditions). These circumstances will determine if pre-treatment will occur.
- Inspect all vehicles. Check fluid levels and fill to proper levels. Ensure lights are in working order. Document any repairs made to the vehicle.

Snow Treatment and Removal

- For anti-icing/de-icing salt applications, the optimal vehicle speed is 15-20 mph. Anti-icing/de-icing materials will be applied to roadways based on weather and storm conditions. When used, the material will be applied at an approximate rate of 200-250 pounds per lane mile.
- As the storm develops and snow has accumulated, anti-icing/de-icing procedures will transition to snow removal activities and all of the Town and contracted trucks and equipment will begin to plow their assigned routes.
 - The optimal plowing speed is ~20 MPH.
- Excess snow is disposed of at municipal parking lots that are not in high use during the winter. Once the snow melts, staff will sweep the area.

Record Keeping and Documentation

- Maintain a master schedule of prioritized snow and salting routes and the miles or roads plowed or sanded.
- Keep copies of manufacturer's recommendations for equipment calibration, plowing speed, and salt/sand application rates.
- Keep records of the amounts of salt, and salt alternatives applied per season.

ATTACHMENT 1: CALIBRATION PROCEDURES

CALIBRATION CHART (US)

Agency: _____
 Location: _____
 Truck No: _____ Spreader No: _____
 Date: _____ By: _____

Gate Opening _____ (Inches) (Hopper Type Spreaders)			DISCHARGE RATE (pounds discharged per mile)									
Control Setting	A	B	C	TRAVEL SPEED AND COMPUTATION MULTIPLIER ()								
	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED

SPREADER CALIBRATION PROCEDURE

Calibration is simply calculating the pounds per mile discharged for each control setting at various travel speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the weight of salt discharged in one revolution, then multiply the two to obtain discharge per minute, and finally multiplying the discharge per minute by the time it takes to travel 1 mile. Most spreaders have multiple gate openings; so you must calibrate for specific gate openings.

Equipment needed:

1. Scale to weigh salt
2. Salt collection device
3. Marking device
4. Watch with second hand

Calibration steps:

1. Remove, by-pass or turn off spinner.
2. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
3. Put partial load of salt on truck.
4. Mark shaft end of auger or conveyor.
5. Dump salt on auger.
6. Rev truck engine to operating RPM.
7. Count number of shaft revolutions per minute at each spreader control setting, record.
8. Collect salt discharged for one revolution, weigh it and deduct the weight of the container. (For greater accuracy, collect salt for several revolutions and divide by that number of revolutions to get the weight for one revolution.)
9. Multiply Column A by Column B to get Column C; then multiply Column C by the number of minutes to travel one mile () at various truck speeds to get pounds Discharged per mile."

*example : at Control Setting 2, w/ a shaft RPM of 3, a discharge of 18 lbs. per revolution and a speed of 20 mi/hr, the computation is: 3 x 18 x 3.00 = 162 lb/mi. NC

CALIBRATION OF AUTOMATIC CONTROLS

Automatic controls may be calibrated using the following steps:

1. Remove, by-pass or turn of spinner.
2. Set control on given number.
3. Tie sack or heavy canvas under spreader discharge area.
4. Mark specific distance on a highway or other paved area, such as 1000 ft. .
5. Drive that distance with spreader operating.
6. Weigh salt collected.
7. Multiply weight of salt by 5.28 (in case of 1000 ft.).

Answer will be salt discharged per mile which remains constant regardless of speed, but calibration must be done for each control setting. Some automatic control manufacturers have "simulators" which eliminate need for on-road operation for calibration.