

Description

This SOP outlines procedures for the storage and application of salt and sand 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 salt and sand;
- Establish procedures to minimize the use of sodium chloride and other salts;
- Evaluate the use of alternative materials; and
- Ensure that snow disposal activities do not result in disposal of snow into waters of the United States.

Responsible Personnel

This Winter Road Maintenance Plan is intended to be used by Town of Lynnfield staff who are responsible for snow and ice removal as shown on **Figure 1**.

Equipment

Inventory

The Town owns and maintains the ice control and snow removal equipment listed in **Attachment 1**. General equipment maintenance is conducted in accordance with the *Vehicle & Equipment Storage & Maintenance SOP (VM-1)*. Vehicle washing is conducted in accordance with the *Vehicle & Equipment Washing SOP (VM-2)*. The wash bay is located in the DPW garage.

Calibration

All trucks are maintained using the manufacturer's recommendations to ensure accurate application of snow and ice control materials. Calibration procedures are included in **Attachment 2**.

Materials and Storage

Materials

Lynnfield uses salt for snow and ice control. Approximately 3700 tons of salt are used each year.

Storage

All snow and ice removal materials are stored in a covered shed at the DPW Yard.

Snow Removal Route

Lynnfield has 23 snow routes as shown in **Figure 2**. Snow and ice control generally start with main roads then moves to bus routes (on school days) and finishes at hills and secondary roads. Residential streets are salted only if icy conditions exist.

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, liquid deicer, and salt alternatives applied per season.
- Keep a list of employee training performed.

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.
- Existing conditions of the above infrastructure, or any infrastructure that might be damaged by winter maintenance activities, should be noted for comparison with post-season conditions and evaluation of any damage done.
- Conduct recertification training for all Town staff responsible for ice and snow removal.
- Ensure all snow equipment is in good working order and conduct maintenance as needed (Vehicle & Equipment Storage & Maintenance SOP (VM-1)).
- Install snow plows, spreaders, and brine applicators, as applicable on vehicles.
- Calibrate all snow equipment to ensure efficiency and to minimize salt use. Calibration procedures are outlined in **Attachment 2**.
- 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.
- Load all necessary materials on impervious surfaces. Sweep storage areas and their surroundings after loading/unloading or after spillage.

Snow Treatment and Removal

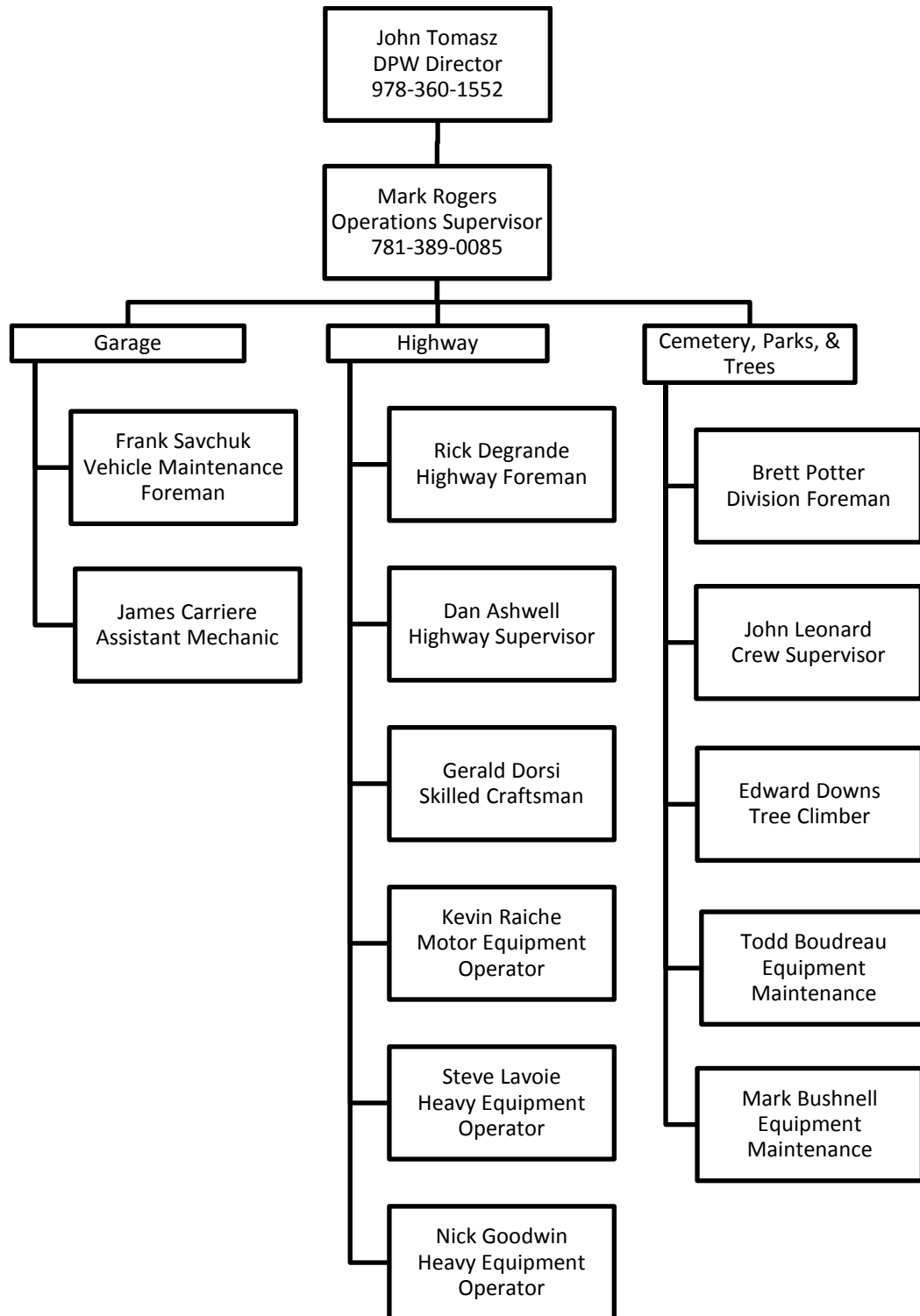
- If anti-icing with brine will be conducted, apply brine before the storm event at the optimal vehicle speed of ~20 MPH.
- For salt application, the optimal vehicle speed is 20 MPH. Salting will not be done when pavement temperatures are below -10 degrees F. When used, the material will be applied at an approximate rate of 200 pounds per lane mile. Use **Attachment 3** for general application rates based on temperature and weather.

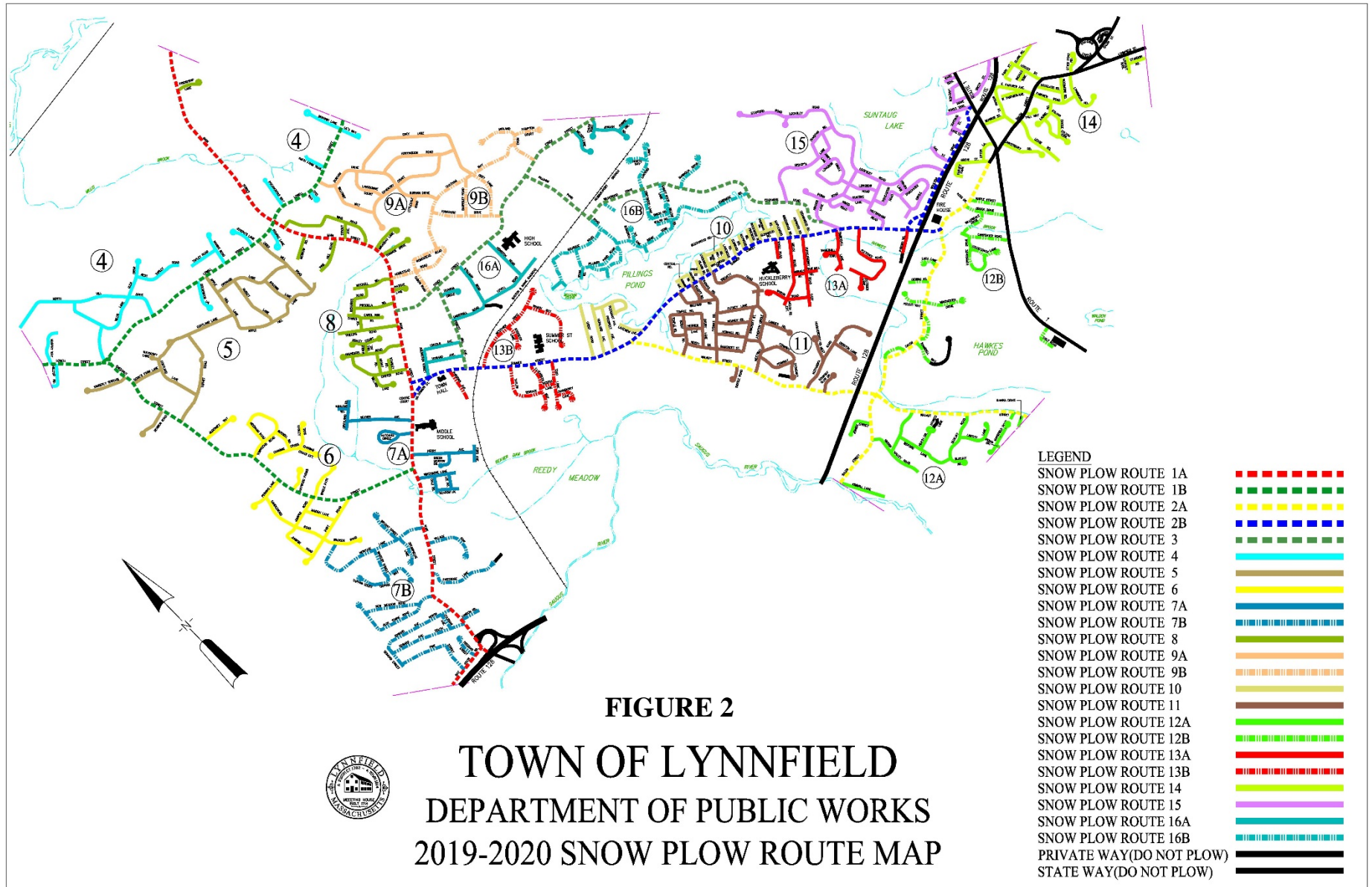
- As the storm develops and 2-3 inches of snow has accumulated, all of the drivers and available equipment will begin to plow their assigned routes.
 - Avoid plowing, pushing, blowing, or storing excess snow, deicer, or other debris in or near creeks, watercourses, or storm drain systems.
 - Reduce plowing speed in sensitive areas to prevent materials from entering waterways.
 - The optimal plowing speed is ~20 MPH.
- Excess snow is not currently an issue for Lynnfield and disposal areas are not specified. If a snow disposal area is needed in the future:
 - Securely install a silt fence or equivalent barrier on the downgradient side of the snow disposal site to reduce the potential for bulk pollutant migration as the snow melts.
 - Maintain at least a 50-foot vegetative buffer strip during growing seasons for all disposal sites adjacent to waterbodies.
 - Clear debris from site prior to snow disposal.
 - Dispose of snow on or near a pervious surface so as to allow the natural infiltration and treatment of snowmelt, and the removal of any associated debris in the spring.
 - Clear snow disposal-related debris from site at the end of the snow season.
 - Do not dispose of snow in salt marshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or Interim Wellhead Protection Areas (IWPAs) of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
 - Do not dispose of snow where trucks may cause shoreline damage or erosion.

Upon Return to Facility

- Wash vehicle following the *Vehicle & Equipment Washing SOP (VM-2)*.
- Before parking any truck or equipment after use, check all fluid levels. Note any minor repairs conducted and other repairs that may be needed. Follow the *Vehicle & Equipment Storage & Maintenance SOP (VM-1)*.
- Report amount of snow removal materials used to supervisor using the log in **Attachment 4**.

Figure 1. MS4 Responsible Personnel





Attachment 1. Snow Removal Equipment Inventory

Equipment #	Make	Equipment Description	Primary Use	Driver
1	Ford	2012 F550, 1-ton dump	Sander & Plow	Boudreau
2	Chevy	1997 Kodiak 8500, rack	Plow	Lavoie
3	Ford	2012 F550, 1-ton dump	Sander & Plow	Dorsi
4	Ford	2006 F250, ¾-ton PU	Plow	Rogers
5	Ford	2012 F550, 1-ton dump	Sander & Plow	Goodwin
6	Ford	2012 F750, large dump	Sander & Plow	Bushnell
8	International	2014 700ER, large dump	Sander & Plow	Downs
9	Freightliner	2009 M2106V, large dump	Plow	Raiche
12	Sterling	2005 7500, large dump	Sander & Plow	Ashwell
13	Freightliner	2007, large dump	Plow	Spare
14	Ford	2011 F550, rack	Plow	Savchuk
16	Ford	2017 F250, ¾-ton PU	Plow	Potter
17	Ford	2012 F750, large dump	Sander & Plow	Leonard
	John Deere	2011 JD544K, loader	Loading Salt	Degrande
	Volvo	2012 BL70B, backhoe	Intersections	Carriere

Attachment 2: Calibration Procedures

Spreader Calibration Procedure

Calibrating Automatic Controls

Spreader Calibration Procedure

Equipment Needed

1. Scale for weighing.
2. Canvas or bucket/collection device.
3. Chalk, crayon or other marker.
4. Watch with second hand.

Calibration Steps

1. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
2. Put partial load of salt on truck.
3. Mark shaft end of auger or conveyor.
4. Dump salt on auger or conveyor.
5. Rev truck engine to operating RPM (at least 2000 RPM)/
6. Count number of shaft revolutions per minute at each spreader control setting, and record.
7. Collect salt for one revolution & weigh, deducting weight of container. For greater accuracy, collect salt for several revolutions and divide by this number of turns to get the weight for one revolution. This can be accomplished at idle or very low engine RPM.
8. Multiply shaft RPM (Column A) by discharge per revolution (Column B) to get discharge rate in pounds per minute (Column C), then multiply discharge rate by minutes to travel one mile at various truck speeds to get pounds discharged per mile. For example, at 20 MPH with 30 Shaft RPM and 7 lbs discharge – $30 \times 7 = 210 \times 3.00 = 630$ lbs. per mile.

Truck No.			Spreader No.									
Date:			By:									
Gate Opening _____ (inches) (Hopper Type Spreaders)			POUNDS DISCHARGED PER MILE									
Control Setting	A	B	C	MINUTES TO TRAVEL ONE MILE								
	Shaft RPM (Loaded)	Discharge Per Revolution (constant)	Discharge Rate (lbs/min)	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 1.5	45 mph x 1.33
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Note: Different materials will spread at different rates at the same setting, so spreaders must be calibrated with the material that will be used.

Calibrating Automatic Controls

Equipment Needed

1. Scale for weighing.
2. Canvas or bucket/collection device.
3. Chalk, crayon or other marker.
4. Watch with second hand.

Calibration Steps

1. Remove or turn off spinner.
2. Set auger on given number, such as No. 2.
3. Tie sack or heavy canvas under discharge chute.
4. Mark specific distance, such as 100 or 1,000 feet.
5. Drive that distance with spreader operating.
6. Weigh salt collected in sack or canvas.
7. Multiply weight of salt by 5.2 (in case of 1,000 feet) or 52.8 (in case of 100 feet). This will be the amount of salt discharge per mile, which remains constant regardless of speed, but calibration must be done for each control setting.

Attachment 3: General Roadway Treatment Application Rates

Pavement Temp. (°F) And Trend (↑ ↓)	Weather Condition	Maintenance Actions	Application Rate (lbs./per lane mile)			
			Salt Prewetted/Pre-Treated with salt brine	Salt Prewetted/Pre-Treated with other blends	Dry salt	Winter Sand
>30 ↑	Snow	Plow, treat intersections only	150	125	150	Not Recommended
	Frz. Rain	Apply chemical	175	150	200	Not Recommended
30 ↓	Snow	Plow & apply chemical	175	150	200	Not Recommended
	Frz. Rain	Apply chemical	200	175	225	Not Recommended
25-30 ↑	Snow	Plow & apply chemical	200	175	225	Not Recommended
	Frz. Rain	Apply chemical	225	200	225-275	Not Recommended
25-30 ↓	Snow	Plow & apply chemical	250	200	275	Not Recommended
	Frz. Rain	Apply chemical	275	250	275-300	450
20-25 ↑	Snow or Frz. Rain	Plow & apply chemical	275	275	275-300	450 for Frz. Rain
20-25 ↓	Snow	Plow & apply chemical	275	250	300-325	Not Recommended
	Frz. Rain	Apply chemical	300	275	325-400	450
15-20 ↑	Snow	Plow & apply chemical	300	275	325	Not Recommended
	Frz. Rain	Apply chemical	300-375	275-350	325-400	450
15-20 ↓	Snow or Frz. Rain	Plow & apply chemical	325	300	350	450 for Frz. Rain
0-15 ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not Recommended	300-350	Not Recommended	600 and spot treat as needed
< 0	Snow	Plow, treat with blends, sand hazardous areas	Not Recommended	350-500	Not Recommended	600 and spot treat as needed

Source: UNH Technology Transfer Center

Note: The Operations Supervisor, depending on actual conditions, may adjust rate of application depending on how the area treated reacts.

Attachment 4: Deicing Product Log for Snow Removal Operations

Date: _____ Weather Event: _____ Precipitation (in): _____

Material	Target Application Rate (lbs/lane miles)	Amount Used (lbs)	Lane Miles Treated (lane miles)	Actual Application Rate (lbs/lane miles)	Difference in Target and Actual Rates (lbs)
	A	B	C	D	E
Salt					

Deicing Product Log Instructions:

1. Record the target application rate based on the weather conditions present in column A.
2. Weigh deicing material as it is loaded into distribution vehicles. Weigh any leftover material once snow removal operations have ceased. Subtract the weight of leftover materials from the initial load weight to calculate the weight of material applied to roads. Record the result in column B.
3. Track the lane miles treated prior to or during snow removal operations and record the result in column C.
4. Divide the weight of material used by the lane miles treated during snow removal operations to calculate the actual application rate of the equipment, and enter the result in column D.
5. Subtract column D from column A to calculate the difference in target and actual application rates and record the result in column E.
6. Review results and make changes to the target application rates and/or vehicle spreader calibrations as needed.