DCR Salt Reduction Plan

For compliance with the National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) in Massachusetts

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Introduction

The purpose of this Salt Reduction Plan is to document that the Department of Conservation and Recreation (DCR) is in compliance with the National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MS4 Permit) requirements for discharges to chloride-impaired waters. The MS4 Permit Section 2.2.2.d.i states the following:

"Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA approved Massachusetts 303(d) list where chloride (Chloride) is the cause of the impairment."

OR

"Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to chloride (Chloride)… shall meet all requirements of Appendix H part IV with respect to reduction of chloride discharges from the MS4"

This Salt Reduction Plan (SRP) has been periodically updated since it was first developed in September 2021. Some updates were made to reflect current practices, which have evolved since the plan was developed. Other updates were made to include new chloride impaired waterbodies from the 2018/2020 and 2022 Massachusetts 303(d) lists, as this report was first created using the 2016 303(d) list. DCR's MS4 permit requires that DCR annually review and update the Salt Reduction Plan if necessary.

Visualizations for this SRP are presented in an ArcGIS Online web application, referred to from hereon as the DCR SRP Web App. Figures 1 and 2 in Appendix F provide an overview of the applicable DCR facilities, chloride-impaired watersheds, and chloride impaired streams that are shown in more detail in the DCR SRP Web App. Appendix A also includes metadata for each layer presented in the DCR SRP Web App. The DCR SRP Web App can be found at the following link: DCR Salt Reduction Map

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Review of Direct DCR Discharges to Chloride-Impaired Waterbodies

To create the original version of this Salt Reduction Plan in September 2021, DCR reviewed the Massachusetts 2016 303(d) list, assessed the watersheds of each chloride-impaired waterbody on the list, and determined which DCR properties directly discharged to these waterbodies, thus requiring Salt Reduction Plans. For the December 2024 update of this Salt Reduction Plan, DCR reviewed the 2018/2020 and 2022 303(d) lists and determined which newly listed chloride-impaired waterbodies triggered additional Salt Reduction Plan Requirements for DCR. The following sections summarize DCR's reviews of the 2016, 2018/2020, and 2022 303(d) lists that were performed to determine which DCR facilities must implement SRPs.

2.1 2016 303(d) List Review

For the original version of this Salt Reduction Plan, DCR assessed the watersheds of the 14 chloride-impaired waterbodies on the Massachusetts 2016 303(d) list. Three of these watersheds contained DCR facilities:

- West River (MA51-12)
- Dark Brook (MA51-16)
- Sawmill Brook (MA72-23)

There are 10 DCR facilities within these three watersheds, the remaining 11 of the chloride impaired watersheds do not include a DCR facility. The following sections describe the review of these

watersheds, the DCR facilities they contain and explain how DCR determined whether the facility should be included in the Salt Reduction Plan. Table 1 summarizes this review.

2.1.1 West River (MA51-12) Watershed Assessment

DCR facilities within the West River (MA51-12) watershed include the Blackstone River and Canal Heritage State Park and Upton State Forest. Upon review, the MS4 regulated discharges from the Blackstone River and Canal Heritage State Park discharge to the Blackstone River and not to the chloride-impaired West River. Upton State Forest is not regulated under the MS4 permit, as it is forested and does not have concentrated stormwater discharges. Therefore, no Salt Reduction Plan is necessary for facilities in the West River watershed.

2.1.2 Dark Brook (MA51-16) Watershed Assessment

The Dark Brook (MA51-16) watershed in Auburn includes one DCR facility, the Daniel S. Horgan Memorial Skating Rink. An analysis of drainage patterns suggests this facility directly discharges to Dark Brook and is therefore included in this Salt Reduction Plan; however, DCR does not use salt at this facility. Since no salt is used, DCR complies with all MS4 Salt Reduction Plan requirements, and no further activities are needed.

2.1.3 Sawmill Brook (MA72-23) Watershed Assessment

The Sawmill Brook (MA72-23) watershed in parts of Brookline, Newton, and Boston includes portions of seven DCR facilities. Of these, Hancock Woods and the Lost Pond Reservation are not regulated under the MS4 permit, as they are forested and do not have any regulated MS4 discharges into Sawmill Brook. Since they are not regulated, they are not included in this Salt Reduction Plan. The remaining five regulated facilities directly discharge to Sawmill Brook and therefore are included in this Salt Reduction Plan. These facilities are Brook Farm, Hammond Pond Parkway, Horace James Circle, VFW Parkway, and West Roxbury Parkway. Compliance measures for these facilities are described in Chapter 3 below.

Note that although DCR's original Salt Reduction Plan was finalized in June 2021, in April 2022, using the most recently available aerial imagery data, DCR revised the watershed boundary in our mapping. DCR recognized that the MassDEP GIS line feature for Sawmill Brook incorrectly indicated that the brook began in the City of Newton. However, close inspection of aerial imagery and municipal drainage data revealed that where the Brook's line feature began was the outlet of a culverted section of the Brook. Once the extent of the brook was mapped, DCR delineated a new watershed boundary for Sawmill Brook that extended into the Town of Brookline and included four additional DCR facilities which discharge to Sawmill Brook: Hammond Pond Parkway, Horace James Circle, Lost Pond Reservation, and West Roxbury Parkway. DCR updated this version of the Salt Reduction Plan accordingly.

Table 1. 2016 Massachusetts Chloride-Impaired Waterbodies and DCR Facilities

Waterbody ID	Name	Waterbody Type	DCR Facilities in Watershed
MA51-12	West River	Stream	› Blackstone River and Canal Heritage State Park › Upton State Forest
MA51-16	Dark Brook	Stream	› **Daniel S. Horgan Memorial Skating Rink**
MA51-38	Unnamed Tributary	Stream	--
MA72-23	Sawmill Brook	Stream	› **Brook Farm** › **Hammond Pond Parkway** › Hancock Woods › **Horace James Circle** › Lost Pond Reservation › **West Roxbury Parkway** › **VFW Parkway**
MA72-45	Hobbs Brook	Stream	--
MA72-46	Hobbs Brook	Stream	--
MA72-47	Unnamed Tributary	Stream	--
MA72-48	Unnamed Tributary	Stream	--
MA72156	Cambridge Reservoir, Upper Basin	Lake	--
MA72014	Cambridge Reservoir	Lake	--
MA83-15	Unnamed Tributary	Stream	--
MA83-20	Unnamed Tributary	Stream	--
MA84A-40	Fish Brook	Stream	--
MA92-26	Unnamed Tributary	Stream	--

Bolded facilities directly discharge to the impaired waterbody and therefore are subject to Salt Reduction Plan requirements. Non-bolded facilities do not directly discharge to the impaired waterbody and are not subject to these requirements.

2.2 2018/2020 303(d) List Review

For the December 2024 Salt Reduction Plan updates, DCR assessed the watersheds of the 10 newly listed chloride-impaired waterbodies on the Massachusetts 2018/2020 303(d) list. Nine of these watersheds contain DCR facilities:

- Unnamed Tributary (MA51-08)
- Aberjona River (MA71-01)
- Alewife Brook (MA71-20)
- Little River (MA71-21)
- Beaver Brook (MA72-28)
- Gates Brook (MA81-24)

- Scarletts Brook (MA81-25)
- Unnamed Tributary (MA81-49)
- Unnamed Tributary (MA81-54)

There are 22 DCR facilities within these watersheds. The following sections describe the review of these watersheds, the DCR facilities they contain and explain how DCR determined whether the facility should be included in the Salt Reduction Plan. . Table 2 summarizes this review.

2.2.1 Unnamed Tributary (MA51-08) Watershed Assessment

DCR facilities located within the watershed of Unnamed Tributary (MA51-08) include Blackstone Heritage Corridor Visitor Center and Shine Pool. While both facilities have MS4 regulated discharges within the impaired watershed, a review of drainage patterns suggests that those discharges do not directly discharge into the impaired Unnamed Tributary (MA51-08) and therefore these facilities do not require a Salt Reduction Plan.

2.2.2 Aberjona River (MA71-01) Watershed Assessment

DCR facilities located within the Aberjona River (MA71-01) watershed include Middlesex Fells Reservation, Mystic Lakes, Mystic Valley Parkway, North Border Road, Park Street, Reservoir Street, and South Border Road. All of these facilities were reviewed and confirmed to have MS4 regulated discharges within the watershed but only the MS4 regulated discharges from Mystic Lakes and Mystic Valley Parkway directly discharge to the chloride-impaired Aberjona River. Therefore, only the Mystic Lakes and Mystic Valley Parkway facilities require Salt Reduction Plans.

2.2.3 Alewife Brook (MA71-20) Watershed Assessment

DCR facilities located within the watershed of the chloride-impaired segment (MA71-20) of Alewife Brook include Alewife Brook – Concord Ave Rotary, Alewife Brook Parkway, Alewife Brook Reservation, Concord Avenue, Francis J. McCrehan Swimming Pool, Fresh Pond Pathway, Mystic Valley Parkway, Mystic River Reservation, Sozio Rotary, Terminal Pond, and Fresh Pond Parkway. All of these facilities have MS4 regulated discharges within the impaired watershed. Upon further review, only the MS4 regulated discharges of Alewife Brook Parkway and Alewife Brook Reservation directly discharge to the chloride-impaired Alewife Brook. Therefore, only Alewife Brook Parkway and Alewife Brook Reservation require Salt Reduction Plans.

2.2.4 Little River (MA71-21) Watershed Assessment[1]

DCR facilities located within the watershed of the chloride-impaired segment (MA71-21) of Little River include Alewife Brook – Concord Ave Rotary, Terminal Road, Alewife Brook Parkway, Sozio Rotary, Concord Avenue, and Fresh Pond Parkway. All of these facilities have MS4 regulated discharges within the impaired watershed. An analysis of drainage patterns suggests all these

[1] The Little River Watershed is nested within the Alewife Brook Watershed; therefore, facilities within the Little River Watershed are also listed as facilities within the Alewife Brook Watershed. Although Alewife Brook – Concord Ave Rotary, Concord Avenue, Sozio Rotary, Terminal Road, and Fresh Pond Parkway do not directly discharge into Alewife Brook, they do have direct discharges into the Little River.

facilities directly discharge to Little River. Therefore, all facilities within the Little River watershed require a Salt Reduction Plan.

2.2.5 Beaver Brook (MA72-28) Watershed Assessment

DCR facilities located within the watershed of the chloride-impaired segment (MA72-28) of Beaver Brook watershed include Beaver Brook North Reservation and Beaver Brook Reservation. Both facilities have MS4 regulated discharges, and a closer review of drainage patterns also confirmed that both facilities directly discharge to Beaver Brook. Therefore, both Beaver Brook North Reservation and Beaver Brook Reservation require Salt Reduction Plans.

2.2.6 Gates Brook (MA81-24) Watershed Assessment

The DCR facility within Gates Brook (MA81-24) is the Wachusett Reservoir Watershed. Although this facility has MS4 regulated discharges within the impaired waterbody watershed, analysis of drainage patterns determined this facility does not have any direct discharges into the chloride impaired Gates Brook and therefore does not require a Salt Reduction Plan.

2.2.7 Scarletts Brook (MA81-25) Watershed Assessment

The DCR facility within Scarletts Brook (MA81-25) is the Wachusett Reservoir Watershed. Although this facility has MS4 regulated discharges within the impaired waterbody watershed, analysis of drainage patterns determined this facility does not have any direct discharges into the chloride impaired Scarletts Brook and therefore does not require a Salt Reduction Plan.

2.2.8 Unnamed Tributary (MA81-49) Watershed Assessment

The DCR facility within the Unnamed Tributary (MA81-49) is the Wachusett Reservoir Watershed. Although this facility has MS4 regulated discharges within the impaired waterbody watershed, analysis of drainage patterns determined this facility does not have any direct discharges into the chloride impaired Unnamed Tributary (MA81-49) and therefore does not require a Salt Reduction Plan.

2.2.9 Unnamed Tributary (MA81-54) Watershed Assessment

The DCR facility within the Unnamed Tributary (MA81-54) is the Wachusett Reservoir Watershed. Although this facility has MS4 regulated discharges within the impaired waterbody watershed, analysis of drainage patterns determined this facility does not have any direct discharges into the chloride impaired Unnamed Tributary (MA81-54) and therefore does not require a Salt Reduction Plan.

Table 2. 2018/2020 Massachusetts Chloride-Impaired Waterbodies and DCR Facilities

Waterbody ID	Name	Waterbody Type	DCR Facilities in Watershed
MA51-08	Unnamed Tributary	Stream	› Blackstone Heritage Corridor Visitor Center › Shine Pool
MA71-01	Aberjona River	Stream	› Middlesex Fells Reservation › **Mystic Lakes** › **Mystic Valley Parkway** › North Border Road › Park Street (Stoneham) › Reservoir Street › South Border Road
MA71-20	Alewife Brook	Stream	› Alewife Brook - Concord Ave Rotary › **Alewife Brook Parkway** › **Alewife Brook Reservation** › Concord Avenue › Francis J. McCrehan Swimming Pool › Fresh Pond Pathway › Mystic Valley Parkway › Mystic River Reservation › Sozio Rotary › Terminal Road › Fresh Pond Parkway
MA71-21	Little River*	Stream	› **Alewife Brook – Concord Ave Rotary** › **Terminal Road** › **Alewife Brook Parkway** › **Sozio Rotary** › **Concord Avenue** › **Fresh Pond Parkway**
MA72-28	Beaver Brook	Stream	› **Beaver Brook North Reservation** › **Beaver Brook Reservation**
MA81-24	Gates Brook	Stream	› Wachusett Reservoir Watershed
MA81-25	Scarletts Brook	Stream	› Wachusett Reservoir Watershed
MA81-49	Unnamed Tributary	Stream	› Wachusett Reservoir Watershed
MA81-54	Unnamed Tributary	Stream	› Wachusett Reservoir Watershed
MA82B-22	Coles Brook	Stream	--

Bolded facilities directly discharge to the impaired waterbody and therefore are subject to Salt Reduction Plan requirements. Non-bolded facilities do not directly discharge to the impaired waterbody and are not subject to these requirements.

*The Little River Watershed is nested within the Alewife Brook Watershed; therefore, some facilities within the Little River Watershed are also listed as facilities within the Alewife Brook Watershed.

2.3 2022 303(d) List Review

DCR assessed the watersheds of the six newly listed chloride-impaired waterbodies on the Massachusetts 2022 303(d) list, in addition to the 2018/2020 303(d) list watersheds described in the previous section, as part of the December 2024 Salt Reduction Plan updates. Three of these waterbodies did not contain DCR facilities in their watersheds. The remaining three waterbodies that contain DCR facilities in their watersheds did not directly discharge to the chloride-impaired waterbodies. Therefore, there are no new Salt Reduction Plans required from the 2022 303(d) list review. The review of MS4 regulated discharges from DCR facilities in each watershed is described in the sections below and summarized in Table 3.

2.3.1 Concord River (MA82A-08) Watershed Assessment

DCR facilities within the watershed of the impaired segment of Concord River (MA82A-08) are summarized in Table 3. Of the 28 facilities, only Ashland State Park, Billerica State Forest, Cochituate State Park, John J. Navin Skating Rink, Wachusett Reservoir Watershed, and Walden Pond State Reservation have MS4 regulated discharges within the impaired watershed. Further detailed review indicated that none of these facilities directly discharge into the impaired segment of Concord River. Therefore, none of these facilities require a Salt Reduction Plan.

2.3.2 River Meadow Brook (MA82A-10) Watershed Assessment

DCR facilities within the River Meadow Brook (MA82A-10) watershed include Billerica State Forest, Carlisle State Forest, and Great Brook Farm State Park. Billerica State Forest is the only facility in this watershed with MS4 regulated discharges; however, it does not directly discharge into River Meadow Brook, and therefore no Salt Reduction Plans are required.

2.3.3 Hop Brook (MA82B-20) Watershed Assessment

The only facility in the watershed of the impaired segment of Hop Brook (MA82B-20) is the Hop Brook Flood Control Site. This facility has MS4 regulated discharges within the watershed; however, a review of drainage indicated that this facility does not directly discharge into the impaired segment of Hop Brook. Therefore, no Salt Reduction Plan is required.

Table 3. 2022 Massachusetts Chloride-Impaired Waterbodies and DCR Facilities

Waterbody ID	Name	Waterbody Type	DCR Facilities in Watershed
MA32-22	Potash Brook	Stream	--
MA82A-08	Concord River	Stream	› Ashland State Park › Billerica State Forest › Cochituate State Park › John J. Navin Skating Rink › Wachusett Reservoir Watershed* › Walden Pond State Reservation › Barefoot Brook Flood Control Site › Bay Circuit Trail › Brewer Brook Flood Control Site › Callahan State Park › Carlisle State Forest › Cedar Swamp › Cold Harbor Brook Flood Control Site › Delaney Flood Control Site › George H. Nichols Flood Control Site › Governor Thomas Dudley Park › Great Brook Farm State Park › Hop Brook Flood Control Site › Hopkinton State Park › Marlborough-Sudbury State Forest › Rawson Hill Brook Flood Control Site › Ross Flood Control Site › Sudbury Reservoir Watershed › Tyler Flood Control Site › Upton State Forest › Wachusett Aqueduct › Whitehall State Park › Delaney Flood Control Site / Marlborough-Sudbury State Forest
MA82A-10	River Meadow Brook	Stream	› Billerica State Forest › Carlisle State Forest › Great Brook Farm State Park
MA82B-20	Hop Brook	Stream	› Hop Brook Flood Control Site
MA82B-31	Unnamed Tributary	Stream	--
MA83-06	Vine Brook	Stream	--

3

MS4 Permit Requirements and Facility Compliance

3.1 MS4 Permit Requirements for Discharges to Chloride-Impaired Waterbodies

Appendix H Part IV of the MS4 Permit requires facilities that directly discharge to chloride-impaired waterbodies to develop a Salt Reduction Plan. A Salt Reduction Plan should include specific actions designed to achieve salt reduction on permittee-owned roads and other deiced surfaces, and on private facilities that discharge to its MS4 in the impaired catchment(s). According to Appendix H Part IV of the MS4 Permit, the facilities must include additional or enhanced BMPs for permittee-maintained surfaces including:

i. *"Tracking of the types and amount of salt applied to all permittee owned and maintained surfaces and reporting of salt use beginning in the year of the completion of the Salt Reduction Plan in the permittee's annual reports;*

ii. *Planned activities for salt reduction on municipally owned and maintained surfaces, which shall include but are not limited to the following unless the permittee determines one or more of the following is not applicable to its system and documents that determination as part of the Salt Reduction Plan:*

- *Operational changes such as pre-wetting, pre-treating the salt stockpile, increasing plowing prior to de-icing, monitoring of road surface temperature, etc.;*
- *Implementation of new or modified equipment providing prewetting capability, better calibration rates, or other capability for minimizing salt use;*
- *Training for municipal staff and/or contractors engaged in winter maintenance activities;*

- *Adoption of guidelines for application rates for roads and parking lots (see Winter Parking Lot and Sidewalk Maintenance Manual (Revised edition June 2008) http://www.pca.state.mn.us/publications/parkinglotmanual.pdf; and the application guidelines on page 17 of Minnesota Snow and Ice Control: Handbook for Snow Plow Operators (January 2022)* https://mdl.mndot.gov/items/2022RIC01 *for examples);*
- *Regular calibration of spreading equipment;*
- *Designation of no-salt and/or low salt zones;*
- *Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff; and;*
- *An estimate of the total tonnage of salt reduction expected by each activity."*

3.2 SRP Facility Overview

DCR roadways, pedestrian routes, and parking lots directly discharging to a chloride-impaired waterbody are required to meet the MS4 permit requirements in Section 3.1. DCR-owned roadways and other deiced surfaces that are not maintained by DCR have agreements with MassDOT or other contractors for winter maintenance.

Table 4 below includes each DCR facility subject to the Salt Reduction Plan and the corresponding salt procedure each facility follows for roads, pedestrian routes, and parking lots. The specific salting procedures and compliance with the MS4 Permit requirements is explained in detail in the following sections. Areas that don't fall under DCR or MassDOT operational control for salting are listed in the table by the name of the third party that performs salting and snow removal. The salting procedures for these lots are explained in Section 3.5 Third Party Procedures.

Table 4. Facility Salting and Snow Removal Procedures

Watershed	Facility	Roads	Pedestrian Route	Parking Lot
Dark Brook (MA51-16)	Daniel S. Horgan Memorial Skating Arena	N/A	N/A	No salt usage in parking lot

Watershed	Facility	Roads	Pedestrian Route	Parking Lot
Sawmill Brook (MA72-23)	Brook Farm	N/A	N/A	No salt usage in parking lot
	Hammond Pond Parkway	DCR Stony Brook Complex Procedures	DCR Stony Brook Complex Procedures	N/A
	Horace James Circle	DCR Stony Brook Complex Procedures	DCR Stony Brook Complex Procedures	N/A
	West Roxbury Parkway	DCR Stony Brook Complex Procedures	DCR Stony Brook Complex Procedures	N/A
	VFW Parkway	MassDOT Procedures	DCR Stony Brook Complex Procedures	N/A
Aberjona River (MA71-01)	Mystic Lakes	MassDOT Procedures	DCR Mystic Complex Procedures	Winchester DPW & DCR Mystic Complex Procedures
	Mystic Valley Parkway	MassDOT Procedures	DCR Mystic Complex Procedures	N/A
Alewife Brook (MA71-20)	Alewife Brook Reservation	MassDOT Procedures	DCR Mystic Complex Procedures	Somerville DPW & Bullfinch
	Alewife Brook Parkway	MassDOT Procedures	DCR Mystic Complex Procedures	N/A
Little River (MA71-21)	Alewife Brook – Concord Ave Rotary	MassDOT Procedures	DCR Mystic Complex Procedures	N/A
	Terminal Road	DCR Mystic Complex Procedures	DCR Mystic Complex Procedures	N/A
	Sozio Rotary	MassDOT Procedures	DCR Mystic Complex Procedures	N/A
	Concord Avenue	MassDOT Procedures	DCR Mystic Complex Procedures	N/A
	Fresh Pond Parkway	MassDOT Procedures	DCR Charles Complex Procedures	N/A
Beaver Brook (MA72-28)	Beaver Brook North Reservation	DCR Mystic Complex Procedures	DCR Mystic Complex Procedures	N/A
	Beaver Brook Reservation	DCR Mystic Complex Procedures	DCR Mystic Complex Procedures	DCR Mystic Complex Procedures

3.3 DCR Procedures

DCR's Mass Parks Division is responsible for maintenance of DCR facilities in the state. The Mass Parks Division is organized regionally into districts which in turn are divided into complexes[2]. Snow and ice removal procedures for DCR are determined and executed at the complex level. The facilities included in this Salt Reduction Plan fall into three different DCR complexes:

- Stony Brook Complex
- Mystic Valley Complex
- Charles Complex

The sections below explain how each complex meets salt reduction requirements for the applicable facilities.

3.3.1 Stony Brook Complex Procedures

The Stony Brook Complex provides winter maintenance for facilities in the Sawmill Brook watershed, detailed in Table 4. This section outlines the procedures, both planned and currently in effect, that the complex uses to comply with MS4 Permit requirements. The procedures are specifically detailed for roadways and sidewalks. There are no parking lots in the Sawmill Brook watershed requiring SRPs.

Roadway

The first requirement of Salt Reduction Plans is tracking of the types and amounts of salt applied to all permittee-owned and maintained surfaces. For chemical de-icing on DCR parkways, DCR applies sodium chloride rock salt (NaCl). Amounts of salt applied during each reporting period are tracked and presented in DCR's Annual Report. DCR's Annual Reports are available on the DCR Stormwater webpage: DCR Stormwater Management | Mass.gov.

The second requirement of Salt Reduction Plans is to report planned activities for salt reduction on permittee-owned and maintained surfaces, including the following:

- *Operational changes and implementation of new or modified equipment* – Beginning in the 2022-2023 winter season, DCR operational staff increased plowing of these facilities by 25% prior to application of any sodium chloride rock salt. Staff also began plowing each section of these three facilities twice before continuing along the plow route. Since 2020, DCR has purchased four new plow trucks which have improved calibration and application accuracy. The new equipment allows operators to digitally adjust application rates from the cab of the truck, greatly improving accuracy and control of application without having to stop operation or adjust manually. DCR staff also began investigating the feasibility of pre-wetting and the associated costs and equipment required.
- *Training for staff or contractors* – Prior to each winter season, the DCR Stormwater Director provides in-person training to DCR operations staff specifically related to chloride-impaired waterbodies, the impact of road salts, and adjusted operational requirements within the

[2] More information about these regions can be found here: MassGIS Data: DCR Mass Parks Regions | Mass.gov and viewed here: MassMapper by searching for and turning on the "DCR Mass Parks Regions" data layer.

impaired watersheds. This training includes clarification of the watershed boundaries in relation to DCR facilities and where operational adjustments need to occur.

- *Adoption of guidelines for application rates* – DCR follows the MassDOT standard of 240 pounds per lane-mile for application rates, however, DCR applies a 1:1 mix of sand and sodium chloride rock salt. Therefore, the actual rock salt applied is approximately 120 pounds per lane-mile. Notably, DCR also conducts street sweeping operations along these facilities approximately ten times per year, removing excess sand applied over the winter season.
- *Regular calibration of spreading equipment* – At the same annual training event mentioned above and prior to each winter season, DCR staff also conducts calibration of spreading equipment.
- *Designation of no-salt and/or low salt zones* – The entire 1.5 mile (4.8 ln-mi) section will be designated a low salt zone. DCR does not intend to install roadside signage to this extent as plow truck operators will be trained specifically on salt reduction measures along this road corridor and the boundaries of the low salt zone.
- *Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff* – DCR does not store salt stockpiles within the watersheds discussed in this report.
- *An estimate of the total tonnage of salt reduction expected by each activity* – DCR tracks salt usage on an annual basis. As mentioned above, since the 2022-2023 winter season, DCR has been tracking the volume of salt application in the Sawmill Brook watershed. This detailed tracking allows for an estimation of total salt reduction over prior winter seasons due to all salt reduction measures, however, activity-specific reductions are not reported. For estimates of the salt reduction achieved by various activities, refer to Appendix E which provides estimated salt reduction amounts for different salt reduction measures. The estimates were provided by the New Hampshire Department of Environmental Services and are only approximate for planning purpose.

Sidewalks

DCR's Stony Brook Complex provides winter maintenance for all pedestrian routes along the facilities listed in Table 4. Pedestrian routes include sidewalks, crosswalks, curb cuts, bus stops, and other open space pedestrian areas identified by the DCR. Pedestrian routes along these facilities are only plowed and not salted. Since DCR does not apply any salt to these areas, DCR is in compliance with MS4 Salt Reduction Plan requirements for the pedestrian routes maintained by the Stony Brook Complex.

Parking Lots

There are no parking lots requiring a Salt Reduction Plan that receive winter maintenance in the jurisdiction of the Stony Brook Complex.

3.3.2 Mystic Valley Complex Procedures

The Mystic Valley Complex provides winter maintenance for facilities in the Aberjona River, Alewife Brook, Little River, and Beaver Brook watersheds, detailed in Table 4. This section outlines the procedures, both planned and currently in effect, that the complex uses to comply with MS4 Permit

requirements. The procedures are specifically detailed for each of the following areas: roadways, parking lots, and sidewalks.

Roadway

The first requirement of Salt Reduction Plans is tracking of the types and amounts of salt applied to all permittee-owned and maintained surfaces. For chemical de-icing on DCR parkways, DCR applies sodium chloride rock salt (NaCl). Amounts of salt applied during each reporting period are tracked and presented in DCR's Annual Report. DCR's Annual Reports are available on the DCR Stormwater webpage here: DCR Stormwater Management | Mass.gov.

The second requirement of Salt Reduction Plans is to report planned activities for salt reduction on permittee-owned and maintained surfaces, including the following:

- *Operational changes and implementation of new or modified equipment* –
    - Beginning in the 2024-2025 winter season, DCR operational staff will apply durable reflective tape on the spreader equipment to indicate the opening height at the time of calibration. This will help staff visually detect if gate openings have changed during the winter season.
    - The Mystic Complex will evaluate what type of plow blade or cutting edge will remove snow most effectively during different storm events throughout the winter season (such as squeegee or scarifying blades) and determine the feasibility of using these blades. Selecting appropriate plow blades/cutting edges based on the snow conditions can reduce the amount of salt needed if snow/slush/ice is removed properly.
- *Training for staff or contractors* – Prior to each winter season, the DCR Stormwater Director provides in-person training to DCR operations staff specifically related to chloride-impaired waterbodies, the impact of road salts, and adjusted operational requirements within chloride impaired watersheds. This training includes clarification of the watershed boundaries in relation to DCR facilities and where operational adjustments need to occur.
- *Adoption of guidelines for application rates* – The Mystic Complex staff will review the two resources from the MS4 Permit, Appendix H ("Winter Parking Lot and Sidewalk Maintenance Manual" and "Minnesota Snow and Ice Control: Field Handbook for Snow Operators") before winter storms to support the strategic application of salt based on weather conditions.
- *Regular calibration of spreading equipment* – At the same annual training event mentioned above and prior to each winter season, DCR staff also conducts calibration of spreading equipment.
- *Designation of no-salt and/or low salt zones* – The Salt Reduction Plan roadway sections in this complex will be low salt zones. Although there will be no signage indicating low salt zones, all the measures listed above ensure that salt usage is reduced in the areas of concern under the Mystic Valley Complex. Staff responsible for maintaining these areas will be aware of the impact of road salts and trained specifically on salt reduction measures along the impacted areas.

- *Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff* – DCR does not store salt stockpiles within any of the watersheds discussed in this report.
- *An estimate of the total tonnage of salt reduction expected by each activity* – DCR tracks salt usage on an annual basis. This detailed tracking allows for an estimation of total salt reduction over prior winter seasons due to all salt reduction measures. For estimates of the salt reduction achieved by various activities, refer to Appendix E which provides estimated salt reduction amounts for different salt reduction measures. The estimates were provided by the New Hampshire Department of Environmental Services and are only approximate for planning purpose.

Sidewalks

DCR's Mystic Complex provides winter maintenance for all pedestrian routes along the facilities listed in Table 4. Pedestrian routes include sidewalks, crosswalks, curb cuts, bus stops, and other open space pedestrian areas identified by the DCR. DCR plows and salts two pedestrian routes: the Fitchburg Cutoff Path in Belmont and a walkway in Beaver Brook Reservation. All applicable salt reduction methods mentioned in the roadway section above apply to sidewalk areas. Additionally, DCR will apply the following operational changes to the noted pedestrian paths:

- DCR operational staff will increase plowing of the following areas within the applicable facilities prior to application of any sodium chloride rock salt:
    - Beaver Brook Reservation:
        - Walkway/driveway between Wilson Road Lot and Waverly Oaks Parking Lot
    - Alewife Brook Reservation:
        - Fitchburg Cutoff Path

Parking Lots

DCR's Mystic Complex provides winter maintenance for parking lots within Beaver Brook Reservation including Wilson Road Lot, Waverly Oaks Road Lot, Mill Street Lot, and Mill Street Office. All applicable salt reduction methods mentioned in the roadway section above apply to parking lot areas, along with the following operational change:

- DCR operational staff will increase plowing of the following areas within the applicable facilities prior to application of any sodium chloride rock salt:
    - Beaver Brook Reservation:
        - Wilson Road Parking Lot
        - Waverly Oaks Parking Lot
        - Mill Street Parking Lot
        - Mill Street Office

3.3.3 Charles Complex Procedures

The Charles Complex provides winter maintenance for the Fresh Pond Parkway facility pedestrian routes in the Little River Watershed, as noted in Table 4. This section outlines the procedures, both planned and currently in effect, for sidewalks that the complex uses to comply with MS4 Permit requirements. Roadways in the facility are maintained by MassDOT and there are no parking lots that the Charles Complex maintains that are subject to the SRP.

Roadway

Roadways of concern in this complex are maintained by MassDOT. See Procedures in Section 3.4 for MassDOT Procedures.

Sidewalks

DCR's Charles Complex provides winter maintenance for the sidewalks along Fresh Pond Parkway. Salting these sidewalks is not part of routine winter maintenance. If there are public complaints about icy areas during extreme winter conditions, DCR may attend to ice patches, as necessary. Since salting conducted by DCR in this area is in response to infrequent public complaints to mitigate immediate safety concerns rather than being conducted as part of an ongoing maintenance strategy, the planned activities listed in Appendix H of the MS4 Permit do not apply in this case. Staff responsible for maintaining this area are still trained on adjusted operational requirements within chloride impaired watersheds and the impact of road salts.

Parking Lots

There are no parking lots that receive winter maintenance in the jurisdiction of the Charles Complex subject to this SRP.

3.4 MassDOT Procedures

MassDOT provides winter maintenance of the roadway portion of several DCR Parkways according to an agreement signed with DCR in February 2005 and subsequently amended (Appendix B).

Although MassDOT's current MS4 Permit does not require Salt Reduction Plans for MS4 Permit compliance, every five years, MassDOT is required by the Massachusetts Environmental Protection Act to complete an Environmental Status and Planning Report (ESPR) for its Snow and Ice Control Program. The ESPR includes what would otherwise be required in an MS4 Salt Reduction Plan. The ESPR describes MassDOT's winter maintenance operations in detail, outlines practices for improving salt efficiency, and reviews potential environmental and socioeconomic impacts of MassDOT's Snow and Ice Control Program. The most recent ESPR was completed in 2022. The 2022 MassDOT ESPR is available for download on the Massachusetts Environment Policy Act (MEPA) website at https://eeaonline.eea.state.ma.us/EEA/MEPA-eMonitor/project/c3334dc8-b7e3-4b96-ba05-74870313565a.

Below is an explanation of how the 2022 ESPR meets each MS4 Salt Reduction Plan requirement.

1. The first requirement of Salt Reduction Plans is tracking the types and amounts of salt applied to all permittee-owned and maintained surfaces.

MassDOT may apply sodium chloride rock salt, sodium chloride salt brine, and liquid magnesium chloride on the DCR parkways they maintain. MassDOT tracks and reports salt usage by MassDOT district.

2. The second requirement of Salt Reduction Plans is to report planned activities for salt reduction on permittee-owned and maintained surfaces.

The MassDOT ESPR describes the operational changes the department has implemented to date and the planned changes for salt reduction on MassDOT maintained roads, including the following:

- *Operational changes and implementation of new or modified equipment* –
    - MassDOT has made improvements to their pre-treatment practices, which are employed on 45% of their total roadway lane-miles. This includes investments in expansion of pre-treatment capabilities, such as brine production and storage facilities (ESPR Section 3.1.2.2). MassDOT also employs pre-wetting practices (Section 3.1.2.3). In Fiscal Year (FY) 2011 MassDOT revised policies and contractor agreements to require all contractors to have pre-wetting equipment. MassDOT also outfitted its own fleet with pre-wetting equipment and has increased storage capacity for liquid deicers at various depots (Section 3.1.2.2).
    - MassDOT has added over 25 vehicle mounted mobile Road Weather Information System sensors (RWIS; Section 3.1.2.3) which allow pavement temperature and weather data to be collected in key areas not covered by the fixed-tower-based RWIS units. Additionally, MassDOT has piloted GPS/AVL equipment (Section 3.1.3.1) and front-end loader weigh scales.
- *Training for staff or contractors* – MassDOT provides in-house training programs to both MassDOT staff and contractors annually (ESPR Section 1.1.2). These include training videos that provide guidance on various operational aspects including equipment calibration, weather monitoring and the use of liquid deicers.
- *Adoption of guidelines for application rates* – MassDOT has a policy to apply a maximum of 240 pounds per lane-mile. This is stated in MassDOT's Reduced Salt Policy, Standard Operating Procedure HMD-01-01-1-000 (Appendix C) and MassDOT's Snow and Ice Operations Manual Chapter 5 (Appendix D).
- *Regular calibration of spreading equipment* – MassDOT regularly calibrates all spreading equipment, both MassDOT-owned and contractor equipment. Contractor equipment must be calibrated by an approved, third-party calibrator and must be inspected by MassDOT personnel prior to, and throughout the winter season (Section 1.1.1.1). MassDOT's contractor agreement requires third-party calibrators to apply durable reflective tape on the spreader to indicate the opening height at the time of calibration.
- *Designation of no-salt and/or low salt zones* – MassDOT's Salt and Ice program plans to phase out designated Reduced Salt Zones (RSZ) and instead focus on increasing the use of pretreatment and prewetting practices along with other efficiency measures statewide. According to the 2022 ESPR Executive Summary, since 2011, when MassDOT increased the use of liquid deicers and other efficiency measures in earnest, MassDOT has reduced its

average annual statewide salt use by approximately 26% (on a tons per mile basis). Since the 2017 ESPR, MassDOT's average annual statewide salt usage has decreased from 26.9 to 23.0 tons per lane-mile. This statewide focus on reduced salt use will continue to positively impact salt use efficiency and reduced salt use for DCR Parkways and therefore a formal designated Reduced Salt Zone is not needed.

- *Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff* – Neither DCR nor MassDOT stores salt stockpiles in any of the facilities discussed in this report.
- *An estimate of the total tonnage of salt reduction expected by each activity* – MassDOT tracks and reports salt usage by MassDOT district. Activity-specific reductions, such as salting specific DCR roads, are not reported and are difficult to calculate. However, the Snow and Ice Control Program ESPR and associated annual reports do track salt reduction over time from combined salt efficiency best management practices and even account for differences in the severity of winter weather using a Weather Severity Index.

3.5 Third Party Procedures

DCR enters agreements with third parties, in addition to MassDOT, to perform maintenance for certain DCR-owned properties. DCR obtains formalized agreements for any third-party agreement. The following sections document actions each third-party maintainer plans to implement to meet the Salt Reduction Plan requirements.

3.5.1 Town of Winchester Department of Public Works

The Town of Winchester Department of Public Works (DPW) maintains a DCR-owned parking lot at the Wedgemere Commuter Rail Station in DCR's Mystic Lakes facility. The Town of Winchester is subject to the MS4 Permit and is required to develop a Salt Reduction Plan for their properties. The following describes how the Town of Winchester DPW winter maintenance procedures comply with the MS4 Permit requirements at the DCR-owned parking lot.

The first requirement of Salt Reduction Plans is tracking of the types and amounts of salt applied to all permittee-owned and maintained surfaces. The Town of Winchester uses sodium chloride rock salt (NaCl) on the Wedgemere Station Parking Lot. The Town tracks their salt use yearly with an average around 3,300 tons NaCl per year for the whole town.

The second requirement of Salt Reduction Plans is to report planned activities for salt reduction on permittee-owned and maintained surfaces. The Town of Winchester is incorporating salt reduction methods in their MS4 Salt Reduction Plan, including the following:

- *Operational changes and implementation of new or modified equipment* – The Winchester DPW recently purchased four new plow trucks with improved calibration and application accuracy which can reduce oversalting of parking lots and roadway.
- *Training for staff or contractors* – The Winchester DPW has sessions on winter maintenance procedures before the start of each winter season. All staff responsible for snow and ice maintenance are trained on how to properly calibrate their equipment, how to check the salt chute and spinners regularly to ensure they are functioning properly, and other procedures related to salting.

- *Adoption of guidelines for application rates* – With the new plow trucks, the Winchester DPW can reduce their application rates depending on the speed of the truck to prevent oversalting.
- *Regular calibration of spreading* equipment – The Winchester DPW calibrates their trucks and spreading equipment prior to the start of every winter season, and as needed throughout the winter season.
- *Designation of no-salt and/or low salt zones* – Although there is no signage indicating a low salt zone, all the measures listed above ensure that salt usage is reduced in this area.
- *Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff* – No salt piles are stored on DCR's parking lot.
- *An estimate of the total tonnage of salt reduction expected by each activity* – Since purchasing four new trucks with calibration capabilities in the 2023-2024 winter season, Winchester DPW has reported that salt usage has decreased by about 200 tons (from 3,300 tons NaCl per year to 3,100 tons NaCl during the 2023-2024 winter season).

3.5.2 City of Somerville Department of Public Works (DPW)

The City of Somerville is responsible for winter maintenance of the Dilboy Stadium parking lot in DCR's Alewife Reservation facility. The City of Somerville is subject to the MS4 Permit and is required to develop a Salt Reduction Plan. Salt reduction actions planned for by the City will be documented in the City's Salt Reduction Plan and will be included in DCR's plan once final.

3.5.3 The Bulfinch Companies Inc

The Bulfinch Companies Inc (Bulfinch) maintains a DCR-owned parking lot on Acorn Park Drive, Cambridge in DCR's Alewife Reservation facility. Bulfinch hires a contractor to perform winter maintenance of the DCR-parking lot in addition to other Bulfinch properties.

The first requirement of Salt Reduction Plans is tracking of the types and amounts of salt applied to all permittee-owned and maintained surfaces. Bulfinch does not currently track application per specific site but applies approximately 2,500 pounds (1.25 tons) of calcium chloride ($CaCl_2$) per winter season on all their properties.

The second requirement of Salt Reduction Plans is to report planned activities for salt reduction on permittee-owned and maintained surfaces. The following notes actions planned to be taken by Bulfinch Companies on the DCR parking lot they maintain:

- *Operational changes and implementation of new or modified equipment* – the contractors in charge of winter maintenance implement pre-treatment measures to reduce salt usage in the area. One of these measures is applying brine within a four-hour window prior to expected snowfall.
- *Training for staff or contractors* – Bulfinch's contractor uses a professional crew to conduct snow removal on Bulfinch properties. Their contractor is a professional landscaping company that is knowledgeable about salting the landscape and lots in moderation. DCR will work with Bulfinch to ensure maintenance staff is properly trained on salt reduction requirements through sharing of this Salt Reduction Plan and other training material, as needed.

- *Adoption of guidelines for application rates* – Schumacher implements a sand and salt mix to reduce salt usage on the Alewife Reservation parking lot.
- *Regular calibration of spreading* equipment – All spreaders are calibrated at the start of each winter season and use edge guards to prevent over spraying.
- *Designation of no-salt and/or low salt zones* – Although there is no signage indicating a low salt zone, all the measures listed above ensure that salt usage is reduced in this area.
- *Measures to prevent exposure of salt stockpiles (if any) to precipitation and runoff* – No salt piles are stored on this parking lot.
- *An estimate of the total tonnage of salt reduction expected by each activity* – Bulfinch tracks salt usage on an annual basis. As mentioned above, this equates to about 2,500 pounds of calcium chloride per season on all Bulfinch properties. Appendix E provides estimated salt reduction amounts for different salt reduction measures. The estimates were provided by the New Hampshire Department of Environmental Services and are only approximate for planning purposes. DCR will work with Bulfinch and its contractors to determine the feasibility of tracking salt usage on the DCR parking lot.

Appendices

A

DCR Salt Reduction Plan Web Map Metadata

Layer Name	Description	Source	Feature Class
DCR Facilities	DCR property (including parks and parkways) mapped as a polygon. Filtered only for DCR facilities that directly discharge to the newly chloride impaired streams.	DCR	Polygon
DCR Chloride Impaired Streams (From DEP 2022 Integrated List of Waters)	"MassGIS Data: MassDEP 2022 Integrated List of Waters (305(b)/303(d)) Waterbody AUs - Rivers (arcs)" data layer filtered for the newly impaired streams that impact DCR Facilities.	MassDEP	Line
DCR Salt Reduction Plan Watersheds	This data layer was created using USGS StreamStats to delineate watersheds for each stream's impaired portion.	USGS StreamStats	Polygon
MA Municipalities	This data provides a polygon version of town boundaries for the 351 communities in Massachusetts, using survey data and coastal boundaries developed in collaboration with state agencies.	Massachusetts Highway Survey Section, MassGIS	Polygon
DCR Drainage Infrastructure			
DCR Outlet	Outlets mapped in DCR's drainage geodatabase	DCR	Point
DCR Inlet	Inlets (e.g., catch basins) mapped in DCR's drainage geodatabase	DCR	Point
DCR Manhole	Manholes mapped in DCR's drainage geodatabase	DCR	Point
DCR Miscellaneous Point	Miscellaneous structures mapped as a point in DCR's drainage geodatabase	DCR	Point
DCR Miscellaneous Polygon	Miscellaneous structures mapped as a polygon in DCR's drainage geodatabase	DCR	Polygon
DCR Linear Feature	Linear features, such as pipes and other conveyances, mapped in DCR's drainage geodatabase	DCR	Line
DCR Surface BMP	Aboveground structural stormwater controls measures (BMPs) mapped in DCR's drainage geodatabase	DCR	Polygon
DCR Subsurface BMP	Belowground structural stormwater controls measures (BMPs) mapped in DCR's drainage geodatabase.	DCR	Polygon

B

MassDOT-DCR Memorandum of Agreement

AGREEMENT CONCERNING SNOW AND ICE REMOVAL ALONG DEPARTMENT OF CONSERVATION AND RECREATION PARKWAYS

This **AGREEMENT** (hereinafter referred to as the "Agreement") made as of this 2nd day of February, 2005 by and between the Massachusetts Highway Department (hereinafter referred to as "MHD"), established pursuant to Chapter 16 of the Massachusetts General Laws, having its principal place of business in the State Transportation Building at 10 Park Plaza Boston, Massachusetts 02116 (hereinafter referred to as "MHD") and the Department of Conservation and Recreation, established pursuant Chapters 21 and 92 of the Massachusetts General Laws, having its principal place of business at 251 Causeway Street, Boston, MA 02114 (hereinafter referred to as "DCR") (collectively the "Parties").

NOW, THEREFORE, in consideration of the mutual covenants, agreements, and promises contained in this Agreement and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

SECTION 1. MHD and DCR hereby agree that MHD shall utilize its employees or its contractors to conduct the removal of snow and ice from curb to curb along certain designated parkways, boulevards and bridges under the care, custody and control of DCR as follows:

Effective February 2, 2005, such snow and ice removal activities shall be conducted by MHD employees and/or its contractors along:

- Alewife Brook Parkway from Rte 2 to Concord Avenue;
- Concord Avenue;
- Fresh Pond Parkway from Concord Avenue to Fresh Pond;
- Soldiers Field Road;
- Storrow Drive;
- Embankment Road (including Mugar Way);
- Charles Street (portion);
- Charles River Dam Road;
- Charlesgate Road (East and West);
- Nantasket Avenue (Hull);
- Hull Shore Drive;
- Wharf Avenue (Hull)

Effective February 7, 2005, such snow and ice removal activities shall by conducted by MHD employees and/or its contractors along:

- Fellsway (Stoneham, Medford, Malden);
- Lynn Fells Parkway (Saugus, Melrose Malden);

- Quinobequin Road (Newton, Weston);
- Reservation Road (Newton, Weston);
- Recreation Road (Newton, Weston);
- Park Road (Newton, Weston); and
- Norumbega Road (Newton, Weston)

MHD and DCR may modify from time to time, in writing, the list of above-identified parkways, boulevards and bridges for snow and ice removal activities by MHD. MHD shall not be responsible for the removal of snow and ice outside the traveled ways identified above.

SECTION 2. DCR agrees to provide access to MHD employees and/or its contractors to DCR depots at the following locations to assist in MHD's performance of the activities identified in Section 1 of this Agreement:

- Fells Labor Yard
  164 Pond Street, Stoneham

- Revere Labor Yard
  620 Ocean Avenue, Revere

- Lower Basin Labor Yard
  10 North Point Blvd, Cambridge

- Upper Basin Labor Yard
  525 Western Avenue, Brighton

- Old Colony Labor Yard
  475 Neponset Avenue, Dorchester

- Nantasket Labor Yard
  215 Nantasket Avenue, Hull

- Blue Hills Labor Yard
  681 Hillside Street, Milton

- Stony Brook Labor Yard
  1603 River Street, Hyde Park

MHD and DCR may modify from time to time, in writing, the list of above-identified depots to grant MHD access to further depots if necessary.

SECTION 3. MHD shall not be responsible for normal operations and maintenance activities associated with the parkways, boulevards and bridges identified in Section 1 of this Agreement.

SECTION 4. The Parties agree that they will not assign this Agreement without the written consent of the other Party.

SECTION 5. This Agreement shall bind and inure to the benefit of the Parties and their respective representatives, successors or assigns.

SECTION 6. This Agreement may be executed in counterparts, each of which shall be deemed an original and all of which shall constitute a single agreement.

SECTION 7. This Agreement may be terminated at any time by either party upon ten (10) days notice to the other party in writing.

SECTION 8. This Agreement constitutes the entire Agreement between the Parties with respect to the subject matter hereof and supersedes all prior oral or written agreements and understandings between the Parties relating to the subject matter hereof. Modifications to this Agreement shall have no force and effect unless and until such modifications are in writing and signed by authorized representatives of the parties.

IN WITNESS THEREOF, the Parties hereto have caused this Agreement to be executed in their respective names by duly authorized representatives as of this 2nd day of February, 2005.

Massachusetts Highway Department

By: _____
Commissioner
John Cogliano
February 4, 2005

Department of Conservation and Recreation

By: _____
Commissioner
Kathy Abbott

November 7, 2005

Stephen H. Burrington, Commissioner
Department of Conservation and Recreation
251 Causeway Street
Boston, MA 02114

Dear Commissioner Burrington:

I am writing to follow up on my memorandum of September 9, 2005 and subsequent discussions between the Massachusetts Highway Department (MassHighway) and the Department of Conservation and Recreation (DCR) regarding furthering our snow and ice removal relationship on parkways and roadways that remain solely under the care, custody and control of DCR. MassHighway is committed to assisting DCR in this effort as our agencies work to improve the capacity and effectiveness of snow and ice removal activities along DCR's historic parkways and other roadways. We propose to amend the "Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways" dated February 2, 2005, as follows:

1. Section 1 of the Agreement is hereby amended to insert, after the list of roadways stated under the paragraph styled "effective February 7, 2005" by inserting:

   Effective November 1, 2005 and lasting through the 2005-2006 winter season, such snow and ice removal activities shall by conducted by MassHighway employees and/or its contractors along:

   - Centre Street, Jamaica Plain
   - Jamaicaway
   - VFW Parkway
   - Mystic Valley Parkway – From Route 16 to Wellington Circle
   - Revere Beach Parkway – From Interstate 93 to Route 107
   - McGrath Highway
   - O'Brien Highway

MassHighway will continue to take responsibility for snow removal on Storrow Drive and Alewife Brook Parkway. The routes covered, as of November 1, 2005, are shown on the maps that are attached hereto and incorporated herein as Attachment B. These routes cover a minimum of 40% of DCR's Urban Parkway System.

2. Section 2 of the Agreement is hereby amended to insert at its end:

   In preparation for the snow and ice season, MassHighway will provide routine mechanical support and repair for DCR snow and ice equipment. As staff and resources permit, MassHighway will assist with routine maintenance and repair throughout the snow and ice season.

MassHighway and DCR personnel will meet at MassHighway's Lexington Repair facility to review equipment repair and maintenance needs.

3. MassHighway will provide snow and ice training to DCR staff prior to the Start winter weather conditions on the roadways, or no later than December 1, 2005.
4. Prior to December 15, 2005, MassHighway will assist DCR in surveying, cleaning and repairing as necessary catch basins along the proposed snow routes.
5. MassHighway will continue to work with DCR to promptly identify locations for the temporary installation and maintenance by MassHighway of snow fencing. The use of snow fencing reduces the amount of wind blown snow that can accumulate within the roadway, thereby increasing safety and reducing the amount of deicing materials that need to be applied. The fencing will be of specification approved by both DCR and MassHighway to fulfill public safety needs while respecting the historic character of DCR's parkway system, will not restrict pedestrian or vehicular movements, and will be removed by MassHighway at the end of the season but no later than April 5, 2006, unless extended by mutual agreement. The recommended locations at this time are shown on Attachment C.
6. MassHighway will support DCR's presentation of the plan for temporary snow fencing to the Massachusetts Historical Commission and to finalize the locations of this snow fencing for submission to and consultation with MHC no later than November 15, 2005. DCR agrees to cooperate with MassHighway to identify suitable locations, as needed, for the temporary storage of snow, in accordance with the Massachusetts Department of Environmental Protection's Snow Disposal Guidance (Guideline No. BRPG01-01, March 8, 2001). In order to improve safety and the effective performance of the agreement, DCR agrees to declare an emergency parking ban in accordance with 302 CMR 5.02 as soon as practicable based on weather forecasts, existing conditions and DCR procedures. MassHighway understands that a declaration of a snow emergency is a difficult decision, but a necessary tool in effectively managing snow and ice removal. MassHighway will continue to work with DCR on establishing the most beneficial time to implement these bans.
7. MassHighway will provide DCR with a list of the hired vendors who will be working along DCR's roadways and will be accessing their depots.
8. MassHighway and DCR agree to exchange emergency contact lists to improve communication. It is also agreed that all requests for assistance or information sharing shall be transmitted through MassHighway's Traffic Operation Center (TOC) and DCR's Snow and Ice Office. To further improve communication, MassHighway and DCR agree to inform each other as to the level of activity during or prior to an event. At a minimum, the beginning and ending of operations shall be reported to each agency.
9. DCR continues to be responsible for all roadway operations - including but not limited to removal of snow and ice from all sidewalks and pedestrian paths, roadway and bridge maintenance and repair, sweeping, catch basin cleaning and emergency management on all of the roadways to be plowed by MassHighway within this agreement. DCR will be responsible for removing

any snow that falls or is pushed by DCR into the roadway due to the clearing of sidewalks and pathways, after a snow or ice event has ended.

10. DCR will provide all salt and deicing materials at existing DCR depots for each of the roadways to be plowed by MassHighway in this agreement. DCR will also provide a loader and operator in each DCR Depot to load material into MassHighway's hired vehicles.

We look forward to working with our colleagues at DCR to provide safe roadways during the upcoming winter.

Sincerely,

Luisa Paiewonsky
Commissioner

ACCEPTED AND APPROVED:

Stephen H. Burrington, Commissioner
Department of Conservation and Recreation

Attachment

cc: Douglas I. Foy, Secretary, OCD
John Cogliano, Secretary, EOT
Stephen Pritchard, Secretary EOEA

November 2, 2006

Stephen H. Burrington, Commissioner
Department of Conservation and Recreation
251 Causeway St., Suite 600
Boston, MA 02114-2014

Dear Commissioner Burrington:

I am writing to follow up on recent discussions between the Massachusetts Highway Department (MassHighway) and the Department of Conservation and Recreation (DCR) regarding furthering our snow and ice removal relationship on parkways and roadways that remain solely under the care, custody and control of DCR. We propose to amend the "Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways" dated February 2, 2005, and as further amended by agreement under MassHighway letterhead dated November 7, 2005, as follows:

1. Section 1 of the Agreement is hereby amended after the words "effective November 1, 2005" by striking the words "and lasting through the 2005-2006 winter season."

2. Section 1 of the Agreement is hereby amended to insert, after the list of roadways stated under the paragraph styled "effective November 1, 2005" by inserting:

   Effective November 1, 2006, such snow and ice removal activities shall by conducted by MassHighway employees and/or its contractors along:

   - Agassiz Road, Fenway
   - Arsenal Street, from Birmingham Parkway to Charles River Rd., Watertown
   - Birmingham Parkway, Watertown
   - Blue Hill River Road, Milton
   - Blue Hills Parkway, Milton
   - Boundary Road, Malden
   - Boylston Street, Fenway – From Park Drive intersection to Charlesgate Overpass, and from Hemenway St. to Charlesgate overpass
   - Brookline Avenue, Fenway – between Park Drive and The Riverway
   - Brooks Street, Brighton (roadway that connects Nonantum and Soldiers Field Roads)
   - Lynnway (a/k/a Carroll Parkway), Lynn – From Nahant Circle to Market St.
   - Charles River Road, Watertown
   - Charlesbank Road, Newton – From Nonantum road to St. James Street
   - Charlesgate Overpass, Boston
   - Chestnut Street, Boston – From Perkins Street to Riverdale Parkway rotary
   - Chickatawbut Road, Braintree, Milton and Quincy
   - East Border Road, Malden – From Highland Ave. to Woodland Road
   - Elm Street, Medford

- Eastern Avenue, Lynn – From Humphrey Street to Lynn Shore Drive
- Fellsway East, Malden (remaining segment -- Pleasant Street to W. Border Rd.)
- The Fenway and Fenway Connector to Park Drive, Boston
- Forest Grove and Woerd Roads, Waltham
- Forsyth Way, Boston
- Furnace Brook Parkway and rotary, Quincy
- Green Street, Canton
- Greenough Blvd., Cambridge and Watertown
- Grove Street Ext., Watertown – From Coolidge Ave. to Greenough Blvd.
- Harvard Avenue, Arlington and Medford – From Mystic River Road to Mystic Valley Parkway
- Hayden Street, Quincy – From Furnace Brook Parkway to Willard Street
- High Street, Medford and Medford Street, Arlington (these are the roadways between Mystic Valley Parkway in Medford to parkway of same name in Arlington)
- Highland Avenue, Malden and Medford.
- Hillside Avenue, Blue Hills Reservation, Canton and Milton
- Humphrey Street, Swampscott
- Lynn Shore Drive, Lynn, Nahant and Swampscott
- Lynnway, Lynn and Revere
- Mystic River Road and Jerome Street, Medford
- Mystic Valley Parkway, Arlington, Medford, Somerville and Winchester
- Neponset Valley Parkway, Hyde Park and Milton (only between Truman Pkwy and Rte 138)
- New South Street, Stoneham
- Nonantum Road, Brighton, Newton and Watertown
- North Beacon Street, Brighton and Watertown
- North Border Road, Stoneham
- Park Drive, Boston
- Park Street, Stoneham
- Parkman Drive, Boston
- Perkins Street, Boston
- Pond Street, Boston
- Ponkapoag Trail, Milton
- Ravine Road, Stoneham
- The Riverway, Boston
- Soldiers Field Road, Boston
- South Border Road, Medford and Winchester
- South Street, Winchester
- Truman Parkway (a/k/a Truman Highway), Boston and Milton
- Unquity Road, Milton
- Wampatuck Road, Quincy
- West Border Road, Malden
- Woodland Road, Medford and Stoneham
- Wyoming Avenue, Stoneham

MassHighway will continue to take responsibility for snow removal on Storrow Drive and Alewife Brook Parkway. The routes covered, as of November 1, 2006, are shown on the maps that are attached hereto and incorporated herein as Attachment 1. In the event of any inconsistencies between the map and the descriptions provided above, the descriptions shall supersede and govern. These routes cover approximately 63% of DCR's Urban Parkway System.

3. Locations approved last year for temporary snow fencing installation and maintenance by MassHighway will not require new approvals this year. DCR will continue to work with MassHighway to identify and approve locations for the temporary installation and maintenance by MassHighway of new snow fencing. As with last year, all fencing would be of specification approved by both DCR and MHD to fulfill public safety needs while respecting the historic character of DCR's parkway system and will not restrict pedestrian or vehicular movements. Fencing shall be installed by MassHighway no earlier than November 1, 2006, and will be removed by MassHighway at the end of the season but no later than April 5, 2007, unless extended by mutual agreement.

4. MassHighway will support DCR's presentation of the plan for any new temporary snow fencing to the Massachusetts Historical Commission and to finalize the locations of this snow fencing for submission to and consultation with MHC by October 15 of each year. DCR and MHD will work together to identify temporary snow storage areas along or adjacent to the defined roadways. As with last year, in order to improve safety and the effective performance of the agreement, DCR agrees to declare an emergency parking ban in accordance with 302 CMR 5.02 as soon as practicable based on weather forecasts, existing conditions and DCR procedures. MassHighway will continue to work with DCR on establishing the most beneficial time to implement these bans.

5. MassHighway will provide DCR with a list of the hired vendors who will be working along DCR's roadways and will be accessing their depots.

6. DCR and MassHighway agree to exchange emergency contact lists to improve communication. It is also agreed that all requests for assistance or information sharing shall be transmitted through MassHighway's Traffic Operation Center (TOC) and DCR's Snow and Ice Office. To further improve communication, MassHighway and DCR agree to inform each other as to the level of activity during or prior to an event. At a minimum, the beginning and ending of operations shall be reported to each agency.

7. DCR will continue to be responsible for all roadway operations - including but not limited to removal of snow and ice from all sidewalks and pedestrian paths, roadway and bridge maintenance and repair, sweeping, catch basin cleaning and emergency management on all of the roadways to be plowed by MassHighway within this agreement. DCR will continue to be responsible for removing any snow that falls or is pushed by DCR into the roadway due to the clearing of sidewalks and pathways.

8. DCR will provide all salt and deicing materials at existing DCR depots for each of the roadways to be plowed by MassHighway in this agreement. DCR shall be responsible

for compliance with M.G.L. Chapter 85, Section 7A and Chapter 92A1/2, Section 5. MassHighway will station hired loaders at the five work yards cited below and the Revere Work Yard. DCR will provide a secure location and access to an electrical hookup for each loader.

9. DCR will provide MassHighway with office space (desk, chair and file cabinet) at the following DCR facilities:

Blue Hills Work Yard
Lower Basin Work Yard
Middlesex Fells Work Yard
Nahant Work Yard
Upper Basin Work Yard.

MassHighway shall be given access, including keys to the office, for the duration of this agreement. These locations will be staffed by a MassHighway timekeeper and equipped with a MassHighway computer and fax/copier/printer. DCR will provide power and where available a phone line and high-speed internet connection. DCR shall identify which locations the phone line and high-speed internet connection are not available.

We look forward to another successful season in working with DCR to provide safe roadways during the upcoming winter.

Sincerely,

Luisa Paiewonsky
Commissioner

ACCEPTED AND APPROVED*:

Stephen H. Burrington, Commissioner
Department of Conservation and Recreation

*With clarifications noted in attached Nov. 15, 2006 letter.

dcr
Massachusetts

November 16, 2006

Luisa Paiewonsky
Commissioner
Massachusetts Highway Department
10 Park Plaza
Boston, MA 02116

Dear Commissioner Paiewonsky: Luisa

Thank you for forwarding your November 2, 2006, letter to update and amend the agreement between the Department of Conservation and Recreation (DCR) and Massachusetts Highway Department (MHD) regarding our snow and ice removal relationship. Attached please find a copy of that letter counter-signed with my original signature on behalf of DCR.

I wish to note the following clarifications and modifications, which we did have the opportunity to discuss prior to receipt of your letter:

1. While the update and amendment letter states (paragraph 4) that DCR and MHD will work together to identify temporary snow storage areas along or adjacent to the defined roadways, it is DCR's understanding that no DCR locations are under consideration for the temporary storage of snow for the 2006-2007 winter season.

2. The update and amendment states that in the event of "any inconsistencies between the map and the descriptions provided above, the maps shall supersede and govern." This reverses our previous understanding but, given the many refinements to the maps that have been made, DCR does not believe that any inconsistencies exist and that the details shown on the maps, including service road spurs and ramps, are accurately captured in the descriptions.

3. Finally, as agreed during our meeting at your office on November 8, 2006, DCR will comply with paragraph 9 by providing MHD with one key for each location and MHD will designate one responsible and accountable MHD employee to have custody of each key, will not make copies of any key, and will not provide any contractor access to any key. MHD staff will not access DCR records stored at our facilities.

Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston MA 02114-2119
617-626-1250 617-626-1351 Fax
www.mass.gov/dcr

I thank you and MHD staff for your good work in finalizing the amendment to the agreement and collaborating with DCR staff on arrangements for the upcoming winter season. We look forward to working closely with MHD in providing safe roadways to the public this winter.

Sincerely,

Stephen H. Burrington
Commissioner

DEVAL L. PATRICK, GOVERNOR
TIMOTHY P. MURRAY, LT. GOVERNOR
JEFFREY B. MULLAN, SECRETARY & CEO
LUISA PAIEWONSKY, ADMINISTRATOR

Moving Massachusetts Forward. massDOT Highway

October 29, 2010

Richard K. Sullivan, Jr., Commissioner
Department of Conservation and Recreation
251 Causeway Street
Boston, MA 02114

Dear Commissioner Sullivan:

I writing to follow up on recent discussions between MassDOT and the Department of Conservation and Recreation ("DCR") concerning snow and ice removal responsibilities and certain other operation and maintenance responsibilities addressed in the "Memorandum of Understanding and Transfer of Care and Control" dated November 2, 2009 between MassDOT and DCR (the "MOU"). This letter is intended to memorialize the following agreements between the parties.

1. Snow & Ice Removal. Effective November 1, 2010, snow and ice removal services for DCR's parkways, roadways and bridges and for the former DCR parkways, roadways and bridges transferred to MassDOT under the MOU shall be conducted in accordance with the "Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways" between MassHighway and DCR dated February 2, 2005, as amended by letter agreements dated November 7, 2005 and November 2, 2006, and clarified by a DCR letter dated November 15, 2006, except that:

(a) MassDOT shall no longer be responsible for snow and ice removal along Lynn Shore Drive in Lynn, Nahant and Swampscott, Humphrey St. in Swampscott, or Eastern Ave. segment in Lynn.

(b) MassDOT shall be responsible for removal of snow and ice from curb to curb along the following additional roadways:

- Arborway from Casey Highway overpass to Centre Street, including Murray Circle
- Columbia Rd. in Dorchester from the westerly sideline of Kosciusko Circle to Boston Street
- Gallivan Boulevard
- McGrath Highway extension (a/k/a Fellsway) from Interstate 93 to Wellington Bridge
- Middlesex Avenue
- Morton Street
- Monsignor William Casey Highway overpass

(c) MassDOT shall purchase and pay for all road salt to be used by the parties.

DCR shall remain responsible for snow and ice removal along the sidewalks and pedestrian pathways of all such parkways, roadways and bridges of both DCR and MassDOT.

2. Enforcement of Parkway Regulations. DCR shall continue to be responsible for enforcement and administration of the regulations at 700 CMR 5.300 through 5.500 [*MassDOT - Regulation of Certain Roadways and Bridges*], provided however that a snow emergency declaration made by the DCR Commissioner or his/her designee pursuant to 700 CMR 5.502(24) is subject to the concurrence of MassDOT's Highway Administrator or his/her designee.

3. Responsibility for Certain Parkways. Effective November 1, 2010, in order to optimize operational efficiencies, **DCR** shall be responsible for operating and maintaining **Carroll Parkway** in Lynn and **Columbia Road in South Boston** (including all of Kosciusko Circle), notwithstanding the transfer of care and control of said roadways to MassDOT in the MOU. The parties intend to evaluate the appropriate long-term operator of these roadways and the adjacent DCR roadways (Lynnway and Old Colony Ave.) in the parkways report required by Section 177 of Chapter 25 of the 2009 Acts.

MassDOT will remain responsible for operation and maintenance of **Columbia Road in Dorchester** from the westerly sideline of Kosciusko Circle to Boston Street at Edward Everett Square as described in the MOU.

4. NPDES Permit Requirements. DCR shall remain responsible for undertaking all activities associated with the parkways and bridges transferred to MassDOT in the MOU that are necessary to comply with (1) the requirements of DCR's National Pollutant Discharge Elimination System ("NPDES") General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) through **November 30, 2010** (e.g., street-sweeping, catch-basin cleaning, etc.), and (2) the additional related commitments made by DCR in its MOU with the Conservation Law Foundation and the Charles River Watershed Association dated August 18, 2005.

Please indicate DCR's agreement to the above by counter-signing this letter below and returning an original. We look forward to working together to provide safe roadways this winter season and to completing a formal amendment to the MOU that will reflect necessary modifications.

Sincerely,

Massachusetts Department of Transportation

Luisa Paiewonsky
Highway Administrator

ACCEPTED AND AGREED:

Richard K. Sullivan, Jr., Commissioner
Department of Conservation and Recreation

First Amendment to the
"Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways"

MassDOT (former MassHighway) and the Department of Conservation and Recreation (DCR) entered into an "Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways" dated February 2, 2005, (Agreement) that has been amended by letter agreements dated November 7, 2005 and November 2, 2006, and clarified by a DCR letter dated November 16, 2006. MassDOT and DCR have further addressed snow and ice removal responsibilities and certain other operation and maintenance responsibilities in the "Memorandum of Understanding and Transfer of Care and Control" dated November 2, 2009 (MOU) which has been amended by letter agreement dated October 29, 2010.

MassDOT and DCR have agreed to amend these agreements, in the list of roadways that MassDOT and DCR shall be responsible for snow and ice removal effective November 1, 2017 as follows:

a) MassDOT shall be responsible for removal of snow and ice from curb to curb along Morrissey Boulevard from Neponset Avenue in Dorchester to Day Boulevard in South Boston, including Neponset Circle and Kosciuszko Circle, as shown of the attached Exhibit Plan A1 and A2.

   DCR shall be responsible for sidewalk and pedestrian walkway snow and ice removal on both sides of Morrissey Boulevard starting at and around Neponset Circle to and around Kosciuszko Circle (at Columbia Road).

b) MassDOT has been responsible for removal of snow and ice from curb to curb along the Arborway from Casey Highway overpass to Centre Street, including Murray Circle (Arborway 1). By verbal agreement, MassDOT has also been responsible for removal of snow and ice from the upper Arborway from Orchard Street/Parkman Drive to the intersection of Centre Street at Murray Circle (Arborway 2). This is to memorialize the MassDOT and DCR agreement that MassDOT will be responsible for the curb to curb snow and ice removal for the entire Arborway labeled as Arborway 1 and Arborway 2 from Orchard Street/Parkman Drive to and around Shea Circle (at Morton Street) as shown on the attached Exhibit B1 and B2.

   DCR shall be responsible for sidewalk and pedestrian walkway snow and ice removal on both sides of Arborway 1 starting at Murray Circle to and around Shea Circle (at Morton Street). DCR shall be responsible for sidewalk and pedestrian walkway snow and ice removal on both sides of Arborway 2 from Orchard Street/Parkman Drive to the intersection of Centre Street at Murray Circle.

c) DCR shall be responsible for removing snow and ice on the Neponset Bridge up to Neponset Circle including sidewalks and pedestrian walkways as shown of Exhibit A1. MassDOT shall remain responsible for all roadway operations - including but not limited

roadway maintenance and repair and emergency management of the approach roadways and bridge.

All such other applicable agreements, responsibilities and obligations under the Agreement and the MOU, as amended, of DCR and MassDOT shall apply to this amendment.

All of the agreements, terms, conditions and other provisions of the Agreement as amended and the MOU as amended, shall remain in effect and unmodified, except as altered by this Amendment Agreement.

Dated as of November 1, 2017

Massachusetts Department of Transportation
Highway Division

Jonathan L. Gulliver
Highway Administrator

Department of Conservation and Recreation

Leo P. Roy
Commissioner

Second Amendment to the
"Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways"

MassDOT (former MassHighway) and the Department of Conservation and Recreation (DCR) entered into an "Agreement Concerning Snow and Ice Removal along Department of Conservation and Recreation Parkways" dated February 2, 2005, (Agreement) that has been amended by letter agreement dated November 7, 2005 and November 2, 2006, and clarified by a DCR letter dated November 16, 2006. MassDOT and DCR have further addressed snow and ice removal responsibilities and certain other operation and maintenance responsibilities in the "Memorandum of Understanding and Transfer of Care and Control" dated November 2, 2009 (MOU) which has been amended by letter agreement dated October 29, 2010.

MassDOT and DCR have agreed to amend these agreements, in the list of roadways that MassDOT and DCR shall be responsible for snow and ice removal effective January 1, 2019 as follows:

a) MassDOT shall be responsible for removing snow and ice on the Longfellow Bridge vehicle and bike lanes from Main Street in Cambridge through Charles Circle in Boston as shown in Exhibit A1. MassDOT shall remain responsible for all roadway operations including but not limited to roadway maintenance and repair and emergency management of the approach roadways and bridge.

   DCR shall be responsible for sidewalk and pedestrian walkway snow and ice removal on both sides of the Longfellow Bridge from Main Street in Cambridge through Charles Circle in Boston as shown in Exhibit A1.

All such other applicable agreements, responsibilities and obligations under the Agreement and the MOU, as amended, of DCR and MassDOT shall apply to this amendment.

All of the agreements, terms, conditions and other provisions of the Agreement as amended and as the MOUS as amended, shall remain in effect and unmodified, except as altered by this Amendment Agreement.

Dated as of January 1, 2019.

Massachusetts Department of Transportation
Highway Division

Jonathan L. Gulliver
Highway Administrator

Department of Conservation and Recreation

Nicholas Gove
Deputy Commissioner

C

MassDOT Reduced Salt Policy

COMMONWEALTH OF MASSACHUSETTS MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD OPERATING PROCEDURES	S.O.P. NO. HMD-01-01-1-000 PAGE 1 OF 16
SUBJECT: REDUCED SALT POLICY	Distribution: Statewide

EFFECTIVE	ISSUED		APPROVED
April 1, 2014			F.G. DeTale

PURPOSE

To establish reduced salt zones for the purpose of minimizing sodium and chloride effects on an industrial or potable water supply. To clearly identify and delineate the limits of each reduced salt zone in each district, as well as identify the materials and application rates to be used.

RESPONSIBILITY

The District Highway Director (DHD) is directly responsible for maintaining this policy and ensuring that the procedures outlined are followed. The operation and maintenance of reduced salt zones requires increased material expenditures due to the use of calcium chloride, magnesium chloride and/ or salt-sand mixes, as well as the cost for increased supervision and sand disposal. All locations shall be closely supervised during all storm events. The District shall be responsible for ensuring that chemicals for the reduced salt zones are available, and that the maps are distributed in a timely manner to appropriate personnel including privatized forces for increased awareness.

NOTE: **In order to maintain public safety and at the direction of the Highway Administrator or his designee, one or more applications of straight Salt, Pre-Mix or 50/50 may be applied at 240 lbs. per lane mile.**

The Snow & Ice Materials Usage Committee (S&IMUC) shall make recommendations for the addition, deletion or modification of reduced salt zones. Reduced salt zones shall only be established based on scientific data as required by SOP, ENV-01-30-1-000. The failure of a municipality or public water supplier to provide the regular monitoring data as required by the aforementioned SOP to demonstrate the effectiveness of the reduced salt zone may be grounds for MassDOT to discontinue treating the corresponding section of highway as a reduced salt zone.

DEFINITIONS

Salt or Sodium Chloride is the primary deicer utilized by MassDOT due to its chemical deicing properties and cost effectiveness; at 24^0-32^0 F. Applied at 240 lbs per lane mile, salt is the most cost effective and best deicer available. It is a crystal that has to become a liquid or brine in order to work effectively. Salt transforms into brine with the addition of heat, moisture and time.

Pre-wetted Salt is sodium chloride sprayed with Liquid Magnesium Chloride or Blended Brine. The application rate is 8-10 gallons per ton of salt. Best utilized by spraying on salt from 30^0 F and below, and on all applications of material. The act of pre-wetting serves several functions: it reduces bounce and scatter, and accelerates the salt going from a solid to solution or brine.

Pre-mix is a combination of Sodium Chloride and Flake Calcium Chloride (Solid). The ratio of the two products is 4:1, 80% Sodium Chloride and 20% Calcium Chloride. Pre-mix combined with sand is used in some of the reduced salt zones.

50/50 Mix is a 1:1 mixture of sand with a deicing material. The deicing material may be salt or pre-mix. This material is not the most effective deicer but is used in reduced salt zones to reduce sodium and chlorides into the environment. This mixture is sometimes used during sleet or freezing rain events.

Liquid Magnesium Chloride 30% a corrosion inhibited deicing agent. A blend of magnesium chloride 30% and an environmentally friendly (Amine) additive creating a blended chemical 70% less corrosive than conventional deicers. The eutectic temperature is about -28°F at a concentration of 21.6%. Its ice melting capacity is about 40% greater than CaCl2. Utilized for Pre-treating of roads or Pre-wetting of all spread material.

Pre-treatment a proactive strategy designed to prevent a bond between the snow and ice and road surface. This is achieved by the direct application of liquid. The typical application rate is between 20-30 gallons per lane mile. Pre-treatment is normally done on pavement temperatures of between 15-30^0F or 30^0F and falling.

Blended Brine 23.3% salt to water is a cost effective deicing solution used as a blend with liquid MgCl (85% salt). It is applied at a rate of 40-50 gallons per lane mile and used for pre-wetting salt or direct application pre-treatment.

Sand A clean intert, hard material free of organic material with no melting capabilities. Sand is intended to increase friction between vehicles and the pavement. The sand is typically mixed with pre-mix on a 1:1 basis. Because of the environmental and economic impact, MassDOT restricts the use of sand in our operations to reduced salt zones and in extremely cold temperatures.

District I

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D1-01	Private	Becket	Route 8	Carter Road to Washington TL	2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D1-02	Private	Cummington	Route 9	From the Dudley Manor Bridge & continuing to the westerly entrance to Cummington Village.	3.7	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D1-03	Private	Goshen	Route 9	From the intersection of Ball Road, continuing easterly to approximately 2,500 feet east of the Whale Inn.	6.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D1-03	Private	Goshen	Route 112	From the end of town road, northerly to the intersection with Maple Ave.	6.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 2

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D2-01	Public	Erving	Route 2	From east end of the French King Bridge, easterly to approximately 200 feet prior to the Moore Street overpass.	3	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D2-02	Public	Erving	Route 63	From the intersection with Kennedy Road northerly to the intersection of Poplar Mountain Road.	3.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D2-03	Private	Granby	Route 202	From the Belchertown/Granby TL, westerly to the Granby/South Hadley TL.	17	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D2-03	Private	South Hadley	Route 202	From the Granby/South Hadley TL to the intersection with Route 33.	17	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D2-04	Private	Orange	Route 2	From approximately 250 feet east of the Orange/Wendell TL to the intersection with Route 202, including ramps.	14.5	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 2

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D2-05	Private	Belchertown	Route 9	From the Belchertown/Pelham TL, southerly, to the intersection of Route 202.	13.9	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D2-06	Private	Belchertown	Route 202	From the intersection of Route 202 & Route 9 northerly, to the Pelham TL.	15.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D2-06	Private	Pelham	Route 202	From the Belchertown TL northerly to Kings Road in Pelham.	15.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 3

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D3-01A	Public	Auburn	Route 12	From the Oxford TL to to the Worcester TL.	27.7	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D3-01B	Public	Oxford	Route 12	From the Oxford center of town northerly to the Auburn TL.	27.7	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D3-02	Public	Boylston	Route 70	From Shrewsbury TL to the Clinton TL.	18	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D3-02A	Public	Clinton	Route 70	From the Clinton/Boylston TL to the end of center of town in Clinton.	18	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D3-02	Public	Shrewsbury	Route 70	From the Worcester/Shrewsbury TL to the Shrewsbury/Boylston TL.	18	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D3-03	Private	Charlton	Route 20	From the intersection of Depot Road, westerly to the junction of Route 169.	6	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 3

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D3-04	Public	West Boylston	Route 12	From the intersection with Central Street, northerly to the summit of Balderellis Hill.	5.3	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D3-05	Private	West Boylston	Route 110	From the intersection with Route 12 to the Clinton TL.	12.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 4

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D4-01, A-B	Public	Lincoln	Route 2A	From Hanscomb Dr. in Lincoln to the Lexington TL.	1.63	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-01, A-B	Public	Lexington	Route 2A	From the Lincoln TL to the Arlington TL, including the 128/2A interchange.	15.05	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-01, A-B	Public	Arlington	Route 2A	From Lexington TL to Brattle Rd., Arlington.	7.63	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-02, A-B	Public	Lincoln	Route 2	From Bedford Rd. in Lincoln to Lexington TL.	7.11	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-02, A-B	Public	Lexington	Route 2	From Lincoln TL to Pleasant St. in Lexington (Exit 55), including the 128/2 interchange.	19.82	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-03, A-F	Public	Lexington Waltham	Route 128	From Route 4/225 (exit 31), to Route 20 (Exit 26), including all interchanges and all related ramps.	67.19	Salt	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 4

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D4-05, A-C	Public	Chelmsford	Route 3	From Route 129 (Exit 29) to Route 40 (Exit 33) including ramps and feeder lanes.	39	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-06	Public	Chelmsford	Route 3A Route 4	From the Chelmsford High School to the Chelmford/Tyngsborough TL.	11.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-07	Public	Lowell Chelmsford	Lowell Connector	From Gorham Street to Route 3, including all ramps.	30.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-08	Public	Chelmsford Lowell	Route 110	From Fletcher Street, Chelmsford to Industrial Ave., Lowell.	6.5	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-09, A-C	Industrial	Lynnfield Peabody	Route 128	From Lowell Street, Peabody (Exit 26) to Salem Street, Lynnfield (Exit 42) and all related ramp systems.	63.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-10	Industrial	Lynnfield Peabody Lynn	Route 129	Route From our Lady of Assumption Church in Lynnfield to St Mary's Cemetery in Lynn.	8.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 4

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D4-11	Industrial	Peabody	Route 95	The long ramps connecting Route 95 to Route 128, beginning and ending approximately at the Forest Street overpass.	10.0	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-12	Industrial	Lynnfield Peabody	Route 1/95 Interchange	Route 1 interchange with Route 95 from the Route 1 Jughandle to and including Goodwin Circle.	13.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-13	Public	Andover	Route 93	From Dascomb Road, Tewksbury (Exit 42) to River Road, Andover (Exit 45).	38.8	Salt : Sand (1:1)	240 lbs/ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-14	Public	Andover	Route 495	From Route 133 (Exit 39) to I-93 (Exit 40), including ramp systems.	19.6	Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D4-15, A-C	Private	Danvers Topsfield Middleton Boxford Rowley	Route 95	From the Ferncroft Rotary, Danvers (Exit 50) to Route 133, Georgetown (Exit 54).	45.6	Salt : Sand (1:1)	240 lbs/ln Mile
						Pre-Wet w/ Liquid Magnesium Chloride	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid Magnesium Chloride	30 Gal/Ln Mile

District 5

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D5-01	Public	Avon	Harrison Blvd.	From Route 24 to Route 28.	16.8	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-01	Public	Avon	Route 28	From Randolph TL to Route 37.	16.8	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-02	Private	Freetown Lakeville Taunton	Route 140	From the junction of Chace Road, (Exit 8) in Freetown, northerly, to the intersection of Route 79 in Taunton (Exit 10).	38.6	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-03	Private	Freetown Lakeville Taunton	Route 18 & County Road (Old Route 140)	County Road (Old Route 140), starting @ the New Bedford/Freetown TL to Route 79 in Lakeville.	19.1	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-04	Public	Middleboro	Route 28	From the junction of Route 495 (Exit 3) to the junction of Route 44 rotary (Exit 6).	21.3	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-05	Public	Middleboro	Route 495	From the interchange of Route 28 to the interchange with Route 44.	43.9	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 5

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D5-06	Public	North Attleboro	Route 1	From the Attleboro/ North Attleboro TL northerly to the intersection of Route 120, Hoppin Hill Ave., in North Attleboro.	10	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-07	Public	Attleboro	Route 95	From Route 95 / 295 interchange (Exit 4) extending southerly to & including the Route 123 interchange (Exit 3), except for the ramp from Route 95 North Bound to Route 123 East Bound & the ramp from Route 123 West Bound to Route 95 North Bound.	14.7	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-08	Public	North Attleboro	Route 295	From and including the interchange @ Route 1 (Exit 1) northerly to Route 95 (Exit 2), including the ramp from Route 295 NB to Route 95 SB and the ramp from Route 95 NB to Route 295 SB.	18.6	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 5

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D5-09, A-B	Public & Private	Bourne Sandwich Barnstable Dennis Harwich Brewster Orleans Eastham Wellfleet Truro Provincetown	Route 6	From Sagamore Bridge, Route 6 in Bourne to Province Land Road, Provincetown.	277.9	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-10, A-C	Public & Private	Falmouth Bourne	Route 28 (Palmer Ave.)	From the Cape Cod Canal to the end of the State Highway in Falmouth.	97	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-11	Public	Falmouth	Wood's Hole Road	From the intersection of North Main Street & Route 28 (Palmer Avenue) to Water Street in Falmouth.	14.5	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 5

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D5-12	Public	Harwich Dennis Yarmouth Barnstable	Route 28	From the junction of Route 132 and Route 28 in Barnstable to the Harwich / Chatham TL.	43.2	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-13, A-B	Public	Barnstable Mashpee Falmouth	Route 28	From Falmouth Heights Circle in Falmouth to the junction of Route 28 and Route 132 in Barnstable.	45.08	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-14	Private	Chatam Harwich Orleans	Route 28	From the Harwich / Chatham TL to the Orleans Rotary.	31.7	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-15	Public	Falmouth Bourne	Route 28A	From the junction of Route 28 (McArthur Blvd.) and Roberta Ave. in Bourne to the junction of Sippewisset Road and Palmer Ave. in Falmouth.	15.8	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-16	Public	Barnstable Yarmouth Dennis Brewster Orleans	Route 6A	From the junction of Route 6A and Hyannis Road in Barnstable to the junction of Route 6A and Route 28 (Orleans-Chatham Rd.) in Orleans.	45.1	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-17	Public	Barnstable Sandwich Bourne	Route 6A	From Bourne, at the State Police rotary, to the junction of Route 6A and Old Jail Lane in Barnstable.	37.5	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 5

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D5-18	Public	Sandwich	Route 130	From the intersection of Route 6A to approximately 100 feet east of Tupper Road & from the intersection of Shawme Road to 1,000 feet north of Jan Sebastian Way.	8.8	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-19	Public	Barnstable	Route 132	From the junction of Route 6A and Route 132 to Bearses' Way.	4.1	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-20	Public	Wareham Plymouth Bourne	Route 25	From Exit 1, to approximately 2,100 feet west of the Bourne Bridge.	58.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-21, A-E	Public & Private	Martha's Vineyard	Various	State Road (South Road) West Tisbury Road Upper Main Street in Edgartown Seaview Avenue Beach Road New York Avenue Temahigan Avenue Eastville Avenue State Road (North Road) West Basin Road	101.4	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Wet w/ Liquid CaCl, Liquid MgCl or Blended	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D5-22	Public & Private	North Truro Provincetown	6A	From the junction of Priest Road, and South Hollow Road in North Truro to the junction of Route 6 and Snail Road in Provincetown.	22.31	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

District 6

Map #	Type of Water Supply	Town	Route	Boundaries	Lane Miles	Materials	Application Rate
D6-01	Public	Weston	Route 128	From Route 20 (exit 26) to Route 9 (exit 20), including all related interchanges and all related ramps.	80	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile
D6-02	Public	Weston Waltham	Route 20	From the Wayland/Weston TL to Eddy Street, Waltham, including the 128/20 rotary and ramps.	14.52	Pre-Mix and/or Salt : Sand (1:1)	240 lbs/Ln Mile
						Pre-Wet w/ Liquid CaCl, Liquid MgCl or Blended Brine	8-10 Gal/Ln Mile
						Pre-Treat w/ Liquid CaCl, Liquid MgCl or Blended Brine	30 Gal/Ln Mile

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MassDOT Snow and Ice Operations Manual – Chapter 5

MASSACHUSETTS HIGHWAY DEPARTMENT

MAINTENANCE MANUAL

CHAPTER 5

DIVISION 1

GENERAL

5.1.1 DEFINITION

The term "Snow and Ice Control" is used to denote all operations required to maintain the State Highway System in a reasonably safe condition for travel during the winter months when snow and ice on the highways would make travel hazardous or impossible.

5.1.2 LAWS

Chapter 81, Section 19 of the General Laws as amended by Chapter 187, Acts of 1933 authorizes and directs the Massachusetts Highway Department (MassHighway) to keep such State highways or parts thereof as it may select, sufficiently clear of ice and snow to be reasonably safe for public travel. The Department engages in this activity to promote highway safety and mobility during inclement winter weather.

5.1.3 POLICY, GOAL AND OBJECTIVE

The objective of the Snow and Ice Control Program is to keep the motorist's tires in contact with a surface that enables enhanced vehicle control relative to ice or compacted snow. The means used to achieve this end include: (1) the chemical treatment of ice or snow so that it may readily be removed from the road, (2) the placement of a traction improving agent, sand, on top of the ice or compacted snow and, (3) the physical removal of snow from the road surface by plowing.

Chemical treatment includes anti-bonding and de-bonding technologies in which the bond that can from between ice or snow and pavement is either prevented or broken. The essence of the program is to prevent this bond from occurring through the judicious use of

deicing chemicals and efficient plowing techniques. This work shall be accomplished with a minimum of expense utilizing the most current technology available.

The goal of achieving a uniform standard of maintenance on all State highways that enables reasonably safe travel on them during winter storms shall be maintained while minimizing the environmental impacts associated with this program to the extent practicable. These impacts shall be identified and so far as budgetary appropriations allow, appropriate modification of Department operations shall be instituted.

The policy established by the Department is to maintain the entire width of paved roadways and shoulders of all roads comprising the State highway system free from snow and ice as far as reasonable expenditure of funds will permit. During winter storm conditions, the precipitant will be treated with deicing materials to prevent snow-pack or ice until it can be effectively removed from the pavement surface. Bare pavement shall be attained as soon as possible upon completion of the storm event and operations will be terminated shortly thereafter.

These Standard Operating Procedures are furnished as a guide to be implemented during Snow and Ice Control Operations. The District Highway Directors or their designee shall have the authority to modify these procedures to accommodate the prevailing storm emergency conditions encountered.

5.1.4 DISTRICT RESPONSIBILITY

The District is responsible for:

- Full implementation of the policy as listed hereinafter.
- Providing all management of Snow and Ice Control Operations within the boundaries of the District.
- The care of all unusual and emergency situations that may arise during Snow and Ice Control Operations.

5.1.5 BOSTON HEADQUARTERS RESPONSIBILITY

The Boston Snow and Ice Control Office is responsible for:

- Staff assistance to the Districts.
- Coordination of activities for unusual conditions upon request of the District.
- Provide data collection and retention of all Snow and Ice Control activities.
- Issuance of reports on Snow and Ice Control expenditures and other activities as required and upon request of upper management in the Boston Headquarters.

5.1.6 STORM REPORTS

When Districts are engaged in Snow and Ice Operations, Road and Weather Reports will be prepared by the Districts at 3:30 A.M., 5:30 A.M., 8:00 A.M., 11:30 A.M., 3:30 P.M., 8:00 P.M. and 12:00 midnight. The summary of the Districts gangs' activity shall be conveyed by telephone to the Boston Emergency Storm Center within one-quarter hour after said office becomes operative. In addition, a brief summary of the District road and weather conditions, without the equipment figures, will be reported to the Boston Storm Emergency Center at 10:00 P.M. and 2:00 A.M.

Road and Weather Reports shall also be taken if Districts are involved in spot treatment of isolated squall or icing conditions, post storm cleanup requiring the use of hired equipment or otherwise not in full, District-wide operations. Should the Boston Emergency Storm Center not be staffed, these reports shall be transmitted to the Boston Snow and Ice Section the following working day.

Code for reporting Weather and Road Conditions:

Weather Conditions

B = Time Storm Began

S = Time Storm Stopped

WE = Weather (N=North, S=South)

WD = Winds

Weather Conditions

1. Clean
2. Partly Cloudy
3. Cloudy
4 Raining
5. Freezing Rain
6. Sleeting
7. Light snow (Depth to be given in inches) (Visibility over ½ mile)
8. Moderate Snow (Depth to given in inches) (Visibility over ¼ mile but less than ½ mile)
9. Heavy snow (Depth to be given in inches) (Visibility less than ¼ mile)
10. Storm Over (Total depth for storm to be reported)

Winds/Miles Per Hour

1.	Light	0-12
2.	Moderate	13-22
3.	Strong	23-30
4.	Gale	31-70
5.	Hurricane	71+

Road Conditions

1. Pavement bare and dry
2. Pavement bare and wet
3. Snow on pavement
4. Ice on pavement
5. Slush on pavement
6. Slippery in spots

Operations

1. Patrolling
2. Plowing
3. Applications of sand and chlorides
4. Pushing back
5. Loading and hauling snow
6. Clearing waterways

Reports shall be related using the established code shown above and in the following sequence: District, time, sender, time of start and/or end of storm, weather conditions, wind speed, temperature, snow accumulation, pavement conditions, operations in progress, number of state equipment by category, number of hired equipment, number of personnel broken into the two functional categories of supervision and operations, any tie ups of appreciable duration on the state highway system, accidents to state owned equipment, any traffic accidents resulting in

fatalities involving either state or hired equipment, and any other information which the District considers of significance to report. The road and weather portions of the completed report will be released to the weather consultant immediately by the Storm Emergency Center personnel.

Information pertaining to hired equipment, numbers, type, first time on and last time off, must be accurate for all reports given by the District. This information is utilized by the Boston Snow and Ice Section to generate immediate storm cost estimates for the Boston Headquarters in order to analyze budget impacts.

SPECIAL CONDITION REPORTS

If any District experiences difficulty in coping with a storm, has an instance of complete road tie-up, or if a condition of extreme hazard exits, such information will be transmitted to the Boston Storm Emergency Center immediately and not held for the next scheduled report. These condition reports should be explicit as to location (referenced as to intersections of crossroads or mile markers from point of beginning to ending), cause of incident and estimated time for clearing if know. When the final clearing of such a condition is complete, prompt notification will be given to the Boston Storm emergency Center.

All information relevant to road closures as received by the Boston Storm Emergency Center will be relayed upon receipt to the Department's Public Affairs Director for public dispersal and relayed to appropriate supervisors in the Boston Headquarters.

5.1.7 COIMMUNICATION WITH PUBLIC SAFETY PERSONNEL

The Department has, for a number of years, been working with police organizations to improve reporting of snow and ice related problems. The police agencies have been requested to more accurately detail the nature of their report to provide more precise locations when calling in such problems. During normal operations, when a foreman receives notice that a police agency is reporting an unsafe condition requiring plowing or sanding, it should be assumed that the report

is accurate and men and equipment should be dispatched as needed. The foreman should also personally inspect the site to determine the level of response required.

In instances when the foreman determines that no plowing or sanding is needed, the men or equipment that were dispatched shall be canceled. The foreman shall promptly bring this matter to the attention of the officer in charge of the police agency reporting the condition. All contacts with the police agency should be made in a courteous, professional manner. In the event that the foreman's meeting fails to rectify any inaccurate reporting, the issue should be brought to the attention of the District Snow and Ice Engineer for resolution.

DIVISION 2

PREPARATION

5.2.1 IMPORTANCE OF PREPARATION

Snow and Ice Control is a major traffic service and it is considered an emergency operation. Any operation which is so classified requires extensive preparation to be successful. Personnel must be organized and trained for their assigned tasks. Equipment must be available and in condition to operate on short notice. Materials must be stockpiled and balances under contract so they will be available when needed.

Training sessions for all Department personnel involved in Snow and Ice Control Operations will be conducted annually in the fall by district maintenance and snow and ice engineers. Prior to these district training sessions, the Department Snow and Ice Engineers shall convene for a one day training session which shall address operational and policy details and potential impacts of the program. The District Maintenance and Snow and Ice Engineers shall then incorporate the outcome of this meeting in their training sessions for personnel.

The district pre-season training sessions should include all levels of foremanship, equipment operators, laborers, clerk/tallymen and mechanics. All phases of the winter program should be covered to some degree in each of two training sessions. Management aspects shall be

emphasized at the foreman's meeting, and equipment operation aspects should be emphasized for those personnel who are responsible for field operations. Attendance at these sessions shall be mandatory and questions and discussions should be encouraged so that the operation is understood and improvements can be suggested.

The techniques that can be utilized in pre-season crew training include classroom instruction, shop demonstration, equipment dress rehearsals, and route familiarization. The program can begin by early October but must be completed by November 1. Training should be considered as an on-going, ever changing function, which should continue throughout the winter season as new information or techniques are brought to the attention of the winter maintenance organization.

5.2.2 DEPARTMENT PERSONNEL

A complete list of names, addresses, telephone numbers and radio identification numbers (if assigned) of all District Highway Directors, Maintenance Engineers, Assistant Maintenance Engineers, Snow and Ice Engineers and Assistants, Maintenance Foremen, Motor Equipment Mechanics, Traffic electricians, Traffic Section Foremen, Supervising Tree Surgeons and Bridge Maintenance Foreman shall be submitted by each District to the Maintenance Engineer in Boston, early in September, so that a statewide directory of the Emergency Organization for winter storms and other natural disasters can be prepared. The list shall also include the telephone numbers of all storehouses, section garages, field offices and all other maintenance installations that are used as bases for Snow and Ice Control Operations.

District Maintenance Engineering staff for normal Snow and Ice Control Operations during overtime hours shall be limited without exception to: the Maintenance Engineer or his/her assistant in his/her absence, the District Snow and Ice Engineer and the Assistant to the Snow and Ice Engineer. In the absence of the District Snow and Ice Engineer, the District Maintenance Engineer shall designate his/her replacement. All other backup Engineering staff shall be kept to

the lowest grade, not to exceed Civil Engineer II. The Calcium magnesium Acetate areas in District 5 (for their duration) the Route 128, Hobbs Brook Reduced Salt Area and Eastman Gellatin Project in District 4 are exceptions and shall be supervised with engineering personnel.

Personnel staffing the Main District Garages during snow and ice overtime hours shall be reduced to a maximum of fifty percent of the work force whose function of the equipment. The District Highway Director or their designee may authorize an increase of garage staff from this fifty percent limit to facilitate repair of snow removal equipment breakdowns during severe storm conditions. No more than one person shall staff the storerooms during snow overtime.

Personnel from the labor service that shall be activated during snow and ice control overtime shall also be limited in number. Each piece of working equipment shall be assigned only one operator. Heavy equipment operators will be trained in the proper use of wing plow and when trained, they shall operate both the plow and wing. Equipment operation shall be equitably distributed during overtime hours first utilizing those personnel normally assigned to perform that function. Personnel of other working categories within the labor service with the proper license may then be called upon to ensure that maximum use of operable state equipment is achieved. During all storm conditions, one employee of the lowest pay level available shall be assigned per depot to assist in hired equipment timekeeping, material recordation and miscellaneous work such as answering telephones, relaying messages or pumping gasoline. The employee assigned to the Depot shall be from District available staff and shall be given priority by classification from the labor force, clerical staff, E.A.I. or E.A. II, and C.E.I. No pay grade greater than C.E.I shall be assigned for this function.

All Highway Maintenance Foremen or Contract Specialist are to be utilized for supervision with additional assistance to be provided by the Traffic Maintenance Foremen, Bridge Maintenance Foremen and Supervising Tree Surgeons as needed. All Foremen or

Contract Specialist shall be under the direct supervision of the Highway Maintenance Foreman III or Contract Specialist III's in turn report directly to the District Snow and Ice Engineer.

The regular maintenance organization may be augmented during the snow season by emergency employees who are employed under the provision of section 4, Chapter 31 of the General Laws and all amendments thereto. This act provides in part for: "(1) Laborers employed between October thirty-first and April fifteenth to be used in connection with the removal of snow and sanding of slippery surfaces with the incidental work thereto on the highways of the Commonwealth, such employment in each case not to exceed a total of ninety days within that period, and such employees shall not be used to do work performed by regular employees when available and able to perform the work satisfactorily; and (2) such temporary employees as required during and following a disaster or period of extreme danger when and as authorized by the Governor, but not to exceed ninety days. Preference shall be given to veterans in making appointments and employing persons under the provisions of clauses (1) and (2) of this paragraph."

Temporary employees hired under the provisions of Chapter 31 for snow removal operations shall have a valid Commercial Driver's License, Class "B" or better, with the appropriate endorsements for the position for which they are employed.

The use of employees in a grade higher than their permanent rating is sometimes necessary during Snow and Ice Control Operations. The practice of secondary classifications must be kept under close control within the districts. Secondary ratings shall be used only for the length of time the employee is actually engaged in the work covered by such classification, and only when absolutely necessary. Permanent employees who are qualified to do the work required for secondary classification shall be given the preference over temporary employees.

The above listed staffing levels are the maximum that may be utilized during Snow and Ice Control Operations. Attachment 1 is an illustration of the District Table of Organization to be followed during these operations**.**

5.2.3 DEPARTMENT OWNED EQUIPMENT

All Snow and Ice Control equipment should be in good operating condition prior to the start of the snow season. Each year the District Equipment Engineers will inventory the condition of state owned equipment which will be utilized in snow removal operations. This inventory information should specify necessary parts for repairs that can be accomplished by the District garages and outline heavy repair work that would have to be done by the Heavy Equipment Repair Section or outside vendors. The inventory shall then be forwarded to the Director of Equipment and Material Resources by August 15 so that plans may be formulated to effect repairs of this equipment before November 15.

All operable state owned spreading equipment shall be calibrated by November 15 and inspected and re-calibrated monthly throughout the winter to ensure that the ground speed control unit is functioning properly and the calibration is within the designated limit.

Snow and Ice Control equipment shall be operated only by qualified and competent operators. Operators shall have a valid Commercial Driver's License (CDL), Class "B": or better, with the appropriate endorsements for the duty assigned. The director of Equipment and Material Resources will arrange for snow equipment schools to be conducted in the various Districts in advance of the snow season and all CDL's will be checked at that time to ensure validity. Correct methods for the operations and care of the equipment will be demonstrated and explained and each District Highway Director will make sure all personnel involved with the operation will attend. Chapter 6, "Equipment", deals with the operation and servicing of equipment.

5.2.4 HIRED EQUIPMENT

Hired Equipment shall be authorized for use only as a supplement to state equipment and is to be called upon when storm duration or severity is such that state equipment alone is inadequate to cope with the situation. Every effort shall be made to first utilize available state equipment including the shifting of equipment and personnel between District Maintenance Sections within reason and when conditions allow.

Each September l, the Foremen III or Specialist III's shall submit to the District Snow and Ice Engineer their request for rental equipment which shall be submitted by gang. The criteria for this request shall be defined by size and category taking into consideration availability of state equipment and operators. The District Snow and Ice Engineer shall allow the sign up of only that quantity of equipment necessary to ensure a full complement, according to this policy, for the upcoming winter. No allowance shall be made for excess equipment.

The District shall submit a hired equipment request for each highway section outlining the lane miles and the number and type of equipment requested. This request shall encompass plows, spreaders and front end loaders. If unusual conditions exits, the request shall so stipulate and include the number of vehicles needed for that condition. The hired equipment request shall be submitted to the Boston Snow and Ice Office no later than November 1 of each calendar year.

Hired equipment rates will be reviewed annually in July and recommended revisions presented to the Department's Board of Commissioners for approval shortly thereafter. District Maintenance organizations shall, utilizing the latest approved Maximum Hourly Rental Rates, contact owners and/or owners' representatives of the equipment deemed necessary for Snow and Ice Control Operations in their respective districts and arrange for rental as required.

Hired equipment shall be in first class operation condition. Preference shall be given to the rehiring of vendors who have demonstrated satisfactory past performance. Priority for hiring

prospective equipment vendors shall be given to those contractors who have exhibited good past performance and furnish late model equipment.

A record of snow and ice equipment vendor's performance shall be completed by the Highway Maintenance Foreman II or Contract Specialist II who directly supervise their work, using the form in Attachment 2. These forms shall be used to evaluate each vendor over the course of the winter. The evaluation forms shall be completed once each season by the Foreman II or Specialist II and submitted to the District Snow and Ice Engineer by April 15. This information shall be kept on file at the District Headquarters. Any disputes over conditions of employment shall be noted on this document and shall be referenced during future arbitration.

In early September, the Boston Headquarters shall prepare a mailing to all vendor's who have furnished hired equipment to the Department the previous winter. This package shall include an instructional letter, a preprinted rental agreement listing equipment, a calibration certificate for spreading machinery with a listing of approved vendors for calibration, a map delineating district boundaries with addresses and a copy of the latest approved hourly rental rates. Packages with blank rental agreements will be sent to all the district headquarters to be distributed to new vendors.

Vendors shall sign and return the agreement along with a photostatic copy of the current motor vehicle registration and insurance binder to the District headquarters to be distributed to new vendors.

Vendors shall sign and return the agreement along with a photostatic copy of the current motor vehicle registration and insurance binder to the District headquarters or depot where employed. The district shall keep a copy of the agreement on file along with the registration and certificate of insurance. The original signed rental agreement shall be sent to the Boston Headquarters on a weekly basis until submissions are complete. The District Snow and Ice and Administration Section shall be responsible for dispensing vendor's code numbers for new

vendors and changes to existing numbers **as well as equipment numbers.** A complete listing of all available hired equipment with registration numbers, vendor's code numbers, contact names and telephone numbers shall be kept in each repair section headquarters and updated by the Highway Maintenance Foreman II or Contract Specialist II throughout the winter.

Hired equipment used by the Department shall be registered in Massachusetts, without exception, and insured with at least the minimum coverage as defined by the Massachusetts Registry of Motor Vehicles. Vendor's vehicle registrations shall be kept on file in the district headquarters and depot assigned and updated as changes occur, in particular after January 1.

The Department shall not utilize equipment for snow and ice control operations registered with "Repair" plates, "Dealer" plates, or "Farm" plates. "Owner Repairman" (O.R.) plates may only be used on rubber tired back-hoes, front-end loaders and road graders used for snow and ice operations. **Apportioned plates shall be allowed on equipment only with a base registration issued by Massachusetts.**

All hired equipment operators shall be required to carry an operable pager. The number to the pager shall be given to the Highway Maintenance Foreman II or Contract Specialist II to which the equipment is assigned and kept on file for call-outs and dismissals. It shall be the responsibility of the equipment operator to notify the Foreman or Specialist of any number changes.

The calibration of hired material spreaders shall be inspected annually, by dealers authorized by the Department, to ensure that the unit is operating within the manufacturer's specified tolerances and that the dispensing rates are set according to Department standards. The dealer shall furnish a certificate of certification and calibration to the vendor when the work has been completed. A listing of all dealer inspections performed on hired equipment employed by the Department shall be furnished to the Boston Headquarters **on a biweekly basis** and shall be distributed to the districts as a further check.

All trucks used for plowing shall carry ballast as necessary. All trucks shall carry a minimum of three flares for use when disabled on the highways. The work "flare" shall mean a red electric lamp or a red emergency reflector warning device which must conform to the requirements of the Interstate Commerce Commission and must bear the label of the Underwriter's Laboratory.

All hired equipment while working on the highway involved in Snow and Ice Control Operations shall have a minimum of one amber flashing light mounted on the cab roof or the highest practical point of the machinery. Amber flashers must be visible to both on-coming and overtaking traffic and shall have a minimum of 32 candlepower and a flashing frequency of 50 to 60 times per minute. Vehicles which have a tare weight of 10,000 pounds or greater shall have two additional flashing red lights mounted on either side of their rear assemblage no less than six (6) feet above the roadway and shall have a minimum of 25 candlepower and be no less than six (6) inches in diameter.

Hired deicing material spreading trucks shall be automated with ground speed control systems and equipped with a "A" frame, pump and ram plow attachment complete with plow and cutting edges of suitable size for the vehicle. Priority in utilizing hired material spreaders shall be given to the automated spreader plow combination units.

All hired equipment shall report to their Department depot or where assigned after being called in to work. Every effort shall be made to utilize all hired equipment on a rotational basis by size and category according to requirement by storm condition, with consideration given to responsiveness, condition of equipment and the operator's knowledge of assigned routes. Equipment shall be allowed travel time of one half hour to report, one way, and must show up within a maximum of one hour. Equipment which show after one half hour shall be paid from the time that they actually report. Equipment consistently late shall be released from the

operation after suitable replacement has been procured. Lateness or refusal to report should be documented on the record of vendor's performance sheet.

All hired material spreaders shall report back to the depot where assigned before release and any material remaining shall be spun off and placed in storage. The hopper body of all hired spreaders shall be visually inspected as a check to ensure no material is remaining. Hired plowing equipment may be released directly in the field when their services are no longer required. All Foremen II or Specialist II's shall be charged with keeping precise records of hired equipment's time, logging time called, reporting time and time dismissed.

Hired equipment will be paid the established hourly rate, which includes provision of operator and fuel, for the actual time worked for the function performed and the accessories actually used. All hired equipment involved in Snow and Ice Control Operations are guaranteed a minimum of **two** (2) hours work per call out.

5.2.4A HIRED EQUIPMENT PAYMENT SEQUENCE

All hired equipment shall be inspected annually by the Foreman II or III or Contract Specialist II or III in charge of the depot to which the equipment is assigned before its use. This inspection is to confirm that the required safety devices are present, the vehicle is duly registered and insured, the accessories contracted for are being provided and that the vehicle is functioning properly. In the case of deicing material spreaders, ground speed controllers must be checked to confirm proper operations and calibration inspected. The original certificate of certification and calibration shall be delivered to the Foremen or Specialist at this time and kept on file at the District Headquarters. The equipment vendor shall keep a copy of the certificate in the vehicle's cab at all times. The original copy of the signed Rental Agreement with all information complete (including vendors code and equipment numbers), Certificate of Insurance and Photostatic Copy of the vehicle registration are to be submitted to the District Snow and Ice engineer daily as submitted by vendors. It shall be the responsibility of the Highway

Maintenance Foreman II or Contract Specialist II to ensure that those agreements being held in their depot awaiting vendor information or equipment numbers are being addressed by the District Headquarters and that the agreements are submitted in a timely manner to the District Headquarters.

The following pints of control have been established for the computerized Snow and Ice Control Payment System and are to be maintained by the District.

CONTROL POINT 1 – DISTRICT SNOW AND ICE SECTION

The District Snow and Ice Section shall compile the vendor and equipment data base from the information contained on the Equipment Rental Agreement Form for each unit of equipment. This shall be accomplished once each agreement is signed by the Vendor and all District authorizing signatures are affixed.

The Vendor data base shall then be accessed and the fields for the vendor's name, address, F.I.D. or Social Security Number and Massachusetts vendor's code shall then be input. The equipment data base, on a separate screen, shall require entering the vehicle identification number, vehicle registration number, registration year, type, model year, make, capacity, and the appropriate class codes assigned from the approved MHD rate schedule particular to that unit of equipment. Listing s of makes of equipment and equipment types (from the approved rate schedule for snow and ice hired equipment) are provided on separate pull down screens.

SYSTEM APPLICATION

The District Snow and Ice Section shall then use the compiled data base to generate a biweekly, four part PV Form for each unit of hired equipment. The PF form is shown as Attachment 6. The PV Forms shall be distributed to the various district operational gangs for use as required during a biweekly period throughout the winter. **The fields completed by the computer consist of: District and Organization, Budget Fiscal Year, Massachusetts Vendor's Code, Vendor's**

Name and Address, Equipment Number, Description, and all the information required on the Reference Line 1. The approved By Field, the District Highway Director, and the Entered By Field, the District Snow and Ice Engineer, will be preprinted by the computer.

Each depot in the District involved in Snow and Ice Control Operations shall maintain a Standardized Hired Equipment Time Log for the duration of the winter season. The Hired Equipment time Log is shown in Attachment #4. It shall be the responsibility of the Highway Maintenance Foreman II or Contract Specialist II to ensure that this log is properly maintained and that it is properly secured when not in use to prevent fraudulent tampering.

The PV Forms shall be completed by the Foreman II or Specialist II (or by MHD personnel assigned by them if available) from the information transposed from the Hired Equipment Time Log.

The information required to be manually completed by the Maintenance Foreman II or Contract Specialist II consists of the Week Numbers, Detail on Hours Worked, Hours worked each day for a particular Class Code, the Class Code referenced, the applicable Rate and the Dates of Service for the biweekly period.

The PV Forms shall then be signed by the vendor certifying services rendered, and approved by the Foreman III or Specialist III. A copy of the signed PV Form shall be given to the vendor at this point for his/her records. The Foreman III or Specialist III shall randomly select a representative cross-section of these PV Forms and check them against the Hired Equipment Time Log for accuracy before submitting them to the District Headquarters. The PV Forms shall be forwarded to the District Headquarters no later than the Tuesday following the end of the biweekly period. **The submission of PV Forms for omitted time will not be allowed.**

The information on the completed PV Forms submitted to the District Headquarters for processing shall be checked for accuracy by the District Maintenance Engineer or designee **who shall initial each PV signifying concurrence.**

Data Entry Operators, with MMARS Vendor Payment Security Clearance assigned to the District Snow and Ice Operational Section, shall then begin transferring information into the Hired Payment Program. The names of all data entry personnel involved in this project shall be submitted to the Director of the Fiscal Management Section in the Boston Headquarters for approval and updated as changes occur.

Payment data is entered by drawing up the Payment Voucher screen, keying in the equipment number, which will draw up the complete equipment file, then entering data in the appropriate fields for the particular weekly time period. The computer program then calculates the total hours worked for each weekly period, the total amount to be paid for the week and generates the PV Date which is set at the Tuesday following the close of the biweekly period, a Document ID Number for each unit of equipment (with the first number denoting the fiscal year, the second number referencing the district and the remaining five numbers sequentially preprinted) and Vendor Invoice Number (consisting of the five digit equipment number followed by a / and the odd week number and the last two digits of the calendar year). In turn, this information is tabulated to generate totals for the biweekly billing. The Data Entry Operator shall then transpose this information to the hard copy of the PV Form.

The PV Form will then be initialed by the District Snow and Ice Control Engineer next to his/her preprinted name signifying approval of the completed document.

After all appropriate signatures are in place, the PV Form and timesheet are then submitted to the District Administrative Assistant's Office. **The complete Hired Equipment PV Forms shall be retained by the District in accordance with State Archive Regulations.**

The information used to create each PV Form is then stored in an ASCII File which is also to be backed up daily on floppy disk. This universal language file will store the PV data for all the district equipment weekly until such time as the PV's for the period have been approved and inspected. The information contained in the ASCII File for each biweekly period shall be reformatted on a floppy disk for electronic transmission into MMARS.

A snow payment warrant shall then be produced by the District Snow and Ice Section covering the biweekly period of Sunday through Saturday. This warrant will indicate a disbursement of all documents scheduled for the state warrant. The district warrant shall be compiled by vendor, vendor code, operational gang, equipment number, hours worked and total amount to be paid to each unit of equipment. Additional shall be a summary of each vendor's total hours worked for the period and total amount to be paid.

The snow equipment warrant and floppy disk shall then be release to the District Administrative Assistant.

CONTROL POINT 2 – DISTRICT ADMINISTRATIVE ASSISTANT'S OFFICE

It shall be the responsibility of the District Administrative Assistant to; audit the time sheets and PV Forms for accuracy, endure the separation and attachment of PV and appropriate timesheet, and disburse all copies of the packets according to MHD procedures. The District Administrative Assistant shall be responsible for maintaining separate fiscal control and shall be held accountable for the actual release of the payment data into the state warrant system.

Upon completion of verification of accuracy of the data contained on the district warrant and before its transmission to OMIS, the Administrative Assistant shall have the District Highway Director sign the approval statement on the warrant.

The payment data shall then be electronically transferred to OMIS and shall be accomplished after a maximum of a week's delay.

5.2.5 MATERIALS

Snow fence and steel post requirements shall be submitted to the Boston Headquarters by the District Snow and Ice Engineers in the late part of June for requisition in the first part of the fiscal year. The Department specifications for this product are that it be manufactured from high density polyethylene plastic in a rhombus configuration, with fifty percent porosity in a height of four feet. Quantities for procurement will be based upon budget allocations.

Snow fence is to be installed along the state highway system in selected areas to control drifting snow. The use of adequate snow fencing helps reduce the cost of snow removal, improve visibility and reduce accidents. The locations for installation shall be selected by the Highway maintenance Foreman II'' and recommended to his/her immediate supervisor in advance of the snow season. All snow fence should be erected prior to the first snowfall. Permission must be obtained from the property owners wherever snow fence is erected outside the highway layout. All snow fence and materials shall be removed as soon as possible following the winter and safely stored for future use.

Consideration shall be given to the use of "living" snow fence in areas where this concept is feasible. The District Snow and Ice Engineer shall work with his/her foremen and roadside personnel in locating and establishing these areas.

At all structures, such as drop inlets, catch basins, ends of curbing and guard rail, critical waterways, etc., which are subject to being covered by snow, markers shall be placed to indicate their locations, thus protecting them from plows. The markers also serve to facilitate the location of waterways which must be reopened after each storm to permit the runoff of water.

Plastic delineators shall be used, whenever available, for this purpose and shall be as specified in the Department's Standard Drawings for Signs and Supports and installed as indicated therein. Markers for obstructions such as guard rails and curb ends shall be colored red

for beginning and green for end. Markers for drainage shall be colored amber for areas adjacent to the highspeed lanes and white for the breakdown lanes.

Wooden markers, 2" X 2" X 6', may be substituted in place of plastic delineators. The bottom of each marker shall be tapered to facilitate driving and each marker shall be equipped with a reflective product 3" down on the side facing traffic. The top 6" of each marker are to be painted with the color scheme as defined above. Further, a 3" band of red above a 3" band of black shall indicate a curb inlet.

Markers indicating the location of drainage structures and waterways, in place of delineators, may be painted or taped on the pavement. These markers indicating a curb inlet. Markers indicating the location of drainage structures and waterways, in place of delineators, may be painted or taped on the pavement. These markers shall be "tear-dropped" shape and shall be placed on the surface in the traffic lanes nearest the structures being marked. The markers shall <u>not</u> be placed on the shoulders.

It shall be the responsibility of the Municipal Water Department Officials to properly mark and so identify their hydrants.

Requirements for polyethylene stockpile covers shall be submitted by the District Snow and Ice Control Engineers to the Boston Headquarters in the late part of June for requisition in the early part of July. The material to be specified shall be black in color, 8 mil. In thickness and supplied in 40' X 100' sheets. Quantities for order shall be based upon budget appropriations.

All sodium chloride stored in Department owned depots is to be housed in the available permanent, water tight chemical storage sheds. Polyethylene sheeting is to be used to cover outside stockpiles of sand charged with sodium chloride, to prevent freezing, and sand and sodium chloride mixes that cannot be stored in buildings. Auxiliary stockpiles of sodium chloride located on rental property where no permanent covered storage can be constructed must also be securely covered with polyethylene sheeting. Stockpiles of deicing materials so stored

must be on impervious bituminous concrete pads in good repair with provision made to contain spillage and control drainage. At the conclusion of storm events, stockpile covers must be secured to prevent the intrusion of water and the resulting leach of salt brine into the environment. Sodium chloride and all admixtures spilled in depots during operations shall be cleaned up within 24 hours after the conclusion of storms.

Sand, sodium chloride, industrially pre-mixed sodium and calcium chloride, and calcium magnesium acetate are the primary materials used during snow and ice control operations. All materials are to be ordered in bulk and delivered by vendors to Department depots. Request for initial orders of these materials shall be submitted by the District Snow & Ice Engineers to the Boston Headquarters not later then July 1.

The Department shall submit the special provision, delivery locations and estimated tonnage's for furnishing sand and deicing chemicals to the Department of Procurement and General Services (DPGS) by the end of July for advertising and bid opening in September. The Department shall recommend vendors for award to DPGS based upon price, experience and total quantity of material to be supplied by each vendor using estimated quantities. Contracts shall be in place by the end of October and initial material deliveries completed by the middle of November.

Material expenditures and inventories shall be reported to the Boston Headquarters the day following storm events. This information shall be used for programming the even distribution of materials to all districts utilizing the funding allocated for this purpose.

DIVISION 3

OPERATIONS

5.3.1 WEATHER FORECASTS

The Department shall contract annually with a meteorological consultant to provide a weather forecasting and consulting service. The weather service shall be opened and staffed 24 hours per day, seven days a week for supplemental consultation as required by authorized Department personnel. Forecasts shall be specifically written for the Department and its Districts.

Scheduled forecasts shall be transmitted twice a day to the 24 hour staffed Department Communications Center at the Boston headquarters at 6:00 A.M. and 1:00 P.M. for broadcast at 8:45 A.M. and 2:00 P.M. this schedule shall be increased to four times a day from November 15 through April 15 with additional forecasts at 2:00 A.M. and 10:00 P.M> An additional forecast will be sent by 5:00 A.M. if the consultant deems that conditions warrant the transmission.

Weather forecasts shall contain a brief summary of the consultant's data and the analysis used in generating the forecast that follows. The statement shall accurately reflect the forecast period of two days and provide long range insight for the following week to enable Department operational managers long range planning capabilities. The substance of the forecasts shall contain general weather, temperatures, wind speeds and direction, precipitation, humidity, warning of severe local storms, visibility, air pollution, storm tides and thaw and freeze cycles. When a winter storm is impending, a detailed forecast shall be transmitted at any time of the day or night with the following essential information and the probability of occurrences specific for each of the Department's five districts as required: the time storm will begin in each forecast area; the type of precipitation expected (sleet, freezing rain, ice or snow); expected accumulations, rate of all, timing of active accumulations and total accumulations; temperatures and wind speeds and directions before, during and after the storm; the time storm will end and

weather expected after the storm ends. A revised forecast shall be sent promptly whenever a significant change in the original forecast is expected to occur.

Upon receipt of a winter storm forecast, the Dispatcher on duty shall convey the report to the Boston Snow and Ice Control Engineer. During normal working hours, a determination will be made when this report shall be broadcast based upon its content. Outside normal working hours, the weather forecast shall be relayed to the Snow and Ice Control Engineer at his/her home. Instructions for dissemination shall then be given the Dispatcher on duty based upon the Engineer's interpretation of the data contained in the forecast.

During impending storm conditions when districts are in operation with their radio staffed, a rebroadcast of only that portion of the weather forecast pertinent to the district shall be allowed. Weather forecasts outside of storm events are not to be rebroadcast after originally transmitted by the Communications Center in the Boston Headquarters.

5.3.2 PRE-STORM PATROLS

During overtime hours, patrol activity may be initiated, at the desecration of the District Snow and Ice Engineer, up to one hour before a forecasted storm event. The District Snow and Ice Engineer shall establish these patrols based upon the predicted timing in the most recent weather forecast received or information of snow or ice activity in adjacent districts relayed to him. The maximum number of allowable patrols, other than the District Snow and Ice Engineer, shall be a maximum of one per Highway Maintenance Foreman III or Contract Specialist II Area and shall be staffed by the Highway Maintenance Foreman III or Contract Specialist III or his/her designee.

The patrol personnel shall operate radio equipped Department pickup trucks and should be capable of receiving transmissions from adjacent district base stations and mobile units. The patrol units shall report to their assigned areas and notify the Boston Communication Center of their presence by radio. The function of these patrols are to monitor radio broadcasts and actual

weather conditions in their sections. When analysis of conditions indicate the actual approach of the storm is imminent, the patrol shall notify the District Snow and Ice Engineer immediately. After consulting with the patrol, the District Snow and Ice Engineer shall then direct the appropriate initial level of response necessary to be activated for the storm event. The District Snow and Ice Engineer, at his/her discretion, may authorize the opening of the District Radio Base Station after three Highway Maintenance II or Contract Specialist II Sections are in operation.

All districts, except District 1, wishing to establish night patrols throughout the winter must adjust shift coverage so that no overtime is incurred. The Boston Snow and Ice Control Engineer must be notified of any patrol setups of this nature.

District 1 shall be allowed to maintain overnight patrols and staff the district radio beginning December 1 and ending on March 31, Sunday through Saturday between the hours of 11:00 P.M. and 7:00 A.M. Personnel used to implement these patrols shall be a maximum pay grade of Highway Maintenance Foreman I and one patrol will be operational per gang. Each patrol will be assigned a radio equipped material spreader and shall be responsible for Snow and Ice Operations in their section. When storm conditions escalate to the degree that the patrols alone can no longer maintain roadways, then the district Snow and Ice Engineer or his/her designee shall be consulted and a determination of the response necessary shall be made and implemented.

5.3.3 EMERGENCY RESPONSE TO ICING INCIDENTS

During overtime hours, icing conditions on state highways that are deemed hazardous to the motoring public by police agencies are reported to the Communications Center at Dewey Square in Boston. The Dispatcher on duty shall request the police agencies to provide specific information of the problem being reported including roadways and approximate distances to

intersections or crossroads. This information is then conveyed to the District Snow and Ice Engineer who determines the initial level of response.

The District Snow and Ice engineer notifies the appropriate Highway Maintenance Foreman III or Contract Specialist III of the icing incident and directs the activation of personnel as required. A reported confined icing incident should require a maximum dispatch of a Foreman or Specialist I or II, a Skilled Laborer and a maintenance Foreman III or Contract Specialist III shall respond to the area of state highway where the icing incident was reported and personally inspect the site to determine if the level of response is adequate or needed. If the Foreman III or Specialist III determines that no response is required than all equipment and personnel dispatched shall be canceled. Conversely, if more personnel and equipment is necessary than initially responded, then the Highway Maintenance Foreman III or Contract Specialist III shall apprise the District Snow and Ice Engineer of the condition and request his/her approval.

All personnel responding to icing incidents shall notify the Dewey Square Communications Center when they are operational in their assigned area and when they have secured operations.

Should the Highway Maintenance Foreman III or Construction Specialist III be unavailable or select not to respond to the scene of the icing incident, the Foreman II or Specialist II shall report in his/her place. If the Highway Maintenance Foreman III or Contract Specialist III receives the report of the icing event and directs others to respond without himself going, the maximum overtime the Foreman III or Specialist III may be allowed to collect is one half hour per incident.

5.3.4 POST-STORM PATROLS

Upon discontinuation of Snow and Ice Control Operations, it may be necessary for districts to issue post-storm patrols. The District Snow and Ice Engineers shall make the

decision to staff these patrols based upon conditions encountered in their district and in each storm individually. The main purpose for utilizing these patrols are to prevent the refreeze of pavements when left clear of snow but still wet, when the bulk of the storm has subsided but flurries or ran still linger and there is a danger of refreeze or when gusting winds are forecast which will cause the blowing and drifting of previously cleared snow back onto the highway system.

The maximum number of patrols that shall be authorized in these situations shall be one per Maintenance Section. The patrol unit shall operate a radio equipped material spreader and inspect highways in his/her assigned area while making applications of deicing material as needed. The patrols shall also be responsible for responding to icing calls in his/her area as passed by the Dewey Square Communications Center.

When the patrol is functioning, the District Snow and Ice Engineer shall notify the Dewey Square Communication Center of their assignment and radio identification number. The patrols will be in operation until the pavements are in no further danger of refreeze which shall be determined by the District Snow and Ice Engineer or hi/her designee in consultation with patrol personnel. When patrols are terminated, notification shall be given by radio to the Dewey Square Communication Center.

DIVISION 4

USE OF DEICING MATERIALS

5.4.1 DEVELOPMENT OF SPREADER ROUTES

Assignment of routes for the spreading of deicing materials, utilizing both Department and Hired Equipment, shall be established by the Highway Maintenance Foreman III or Contract specialist III for each gang under his/her supervision.

The spreader routes shall define roadways covered from the point of beginning to the point of ending and include the linear and lane mileage for the length of the route.

Spreader routes shall be arranged in a grid-like fashion to ensure that no portion of the state highway system within the Maintenance Section is omitted and that the overlapping of routes is kept to a minimum. Routes shall be defined utilizing the following: the maximum capacity of the available spreading machinery; the maximum speed of the spreading machinery which shall be limited to a maximum speed of between 25-35 miles per hour; and the maximum time of 1¼ hours shall be used as a base guide. Deadheading time for equipment to care for isolated segments of highway shall be kept to a minimum.

Reduced salt areas on state highways, which are reestablished annually by a vote of the Department's Board of Commissioners, shall be integrated into the spreader route submission by the Highway Maintenance Foreman III or Contract Specialist III. Every attempt shall be made to establish reduced salt areas over full-length spreader routes wherever it is logistically feasible, thereby saving the requirement of assigning additional equipment. The District Snow and Ice Engineer shall be informed of any additional low salt areas to be incorporated into the district program by the Boston Snow and Ice Office early in August to ensure that the requisite signage and materials are ordered and in place for the winter.

Spreader routes will be submitted by the Foremen III or Specialist III to the District Snow and Ice Engineer for approval by September 1 each year prior to the submission of their rental equipment request. Upon review and approval of the spreader routes submitted from his/her foremen or specialists, the District Snow and Ice Engineer shall organize all submissions by gang using the form in Attachment 3. The typed compilation of the district spreader routes shall be submitted to the Snow and Ice Control Office at the Boston Headquarters by November 1. Any changes or updates to these routes over the course of the winter shall be furnished to the Boston Snow and Ice Office as soon as possible.

5.4.2 MIXTURES OF DEICING MATERIALS AND APPLICATION RATES

The basic materials to be utilized during snow and ice control operations shall consist of sand, sodium chloride, pre-mix (a commercially blended mixture of sodium chloride and calcium chloride furnished) and calcium magnesium acetate (C.M.A.).

Sand which is to be stockpiled shall have 50 pounds of sodium chloride added per ton at the time of delivery to Department Depots to prevent freezing and keep it free flowing.

Treated Sand is stockpiled sand to which an additional 100 pounds of sodium chloride per ton has been added at the time of loading into trucks for spreading. **The maximum application rate for applying treated sand shall be 240 lbs. per lane mile.**

Specially Treated Sand is a mixture of 50% sand by volume blended with 50% sodium chloride by volume. This mixture should be blended prior to storm conditions during dry weather and stored under cover for future use. **The specially treated sand mixture shall be applied at the rate of 240 lbs. per land mile.**

Straight Chloride is deep mined sodium chloride. Sodium chloride shall be stockpiled under permanent cover wherever possible, and under polyethylene sheeting when permanent cover is not available. **The sodium chloride shall be applied at the maximum rate of 240 lbs. per lane mile.**

Pre-Mix is an industrially blended mixture of sodium chloride and calcium chloride to be furnished in the ratio of 4:1 by weight. **Pre-mix shall be applied at the maximum rate of 240 lbs. per lane mile.**

Calcium Magnesium Acetate, a deicing substitute for sodium chloride, shall be stockpiled under permanent cover. **The Calcium Magnesium Acetate shall be applied at a rate which may fluctuate with storm conditions to achieve the same results as sodium chloride applied at 240 lbs. per lane mile.**

Admixtures of Sand and Pre-mix, utilized primarily in reduced salt areas, shall be blended prior to storm conditions. It is imperative that these mixtures be made using sand that is dry and free flowing. The mixtures shall be housed under permanent covered storage and the ratios by volume and application rates shall be as specified in the annual salt reduction policy.

Admixtures of Sand and Sodium Chloride, utilized primarily in reduced salt areas, shall be blended prior to storm conditions during dry weather. Whenever logistically feasible, these materials shall be housed under permanent covered storage.

5.4.3 APPLICATION PROCEDURES

The objective of applying deicing materials is to prevent the bonding of ice or snow to the pavement surface and to expedite the work of furnishing clear and safe roadways for vehicular traffic. This shall be accomplished by the controlled use of chlorides while utilizing a minimal amount of sand.

In total costs form purchase to clean up, sand has proven to be more expensive than sodium chloride or its mixtures with calcium chloride. Sand causes abrasive damage to vehicles, its buildup along the edges of confined roadways and at intersections can enhance the probability of accidents through skidding, and its discharge into drainage systems causes blockage resulting in flooding. Considering its limited effectiveness for providing traction on high speed roadways, its overall use shall be minimized and confined to necessary instances only where needed such as on steep grades, sharp curves or intersections at grade.

The effectiveness of any plan for Snow and Ice Control depends on the choice of the correct procedure to be followed and the close adherence to the procedures as outlined. The results of the selected methods to be followed should be closely monitored to determine their efficiency.

There are two basic methods of dispensing deicing materials from spreader trucks, by “broadcasting” the material across several lanes of highway or “windrowing” the material in a

narrow band. The purpose of windrowing deicing material is to obtain a concentrated solution that flows under the snow along the pavement towards the low side of the road. The windrow method of application allows the brine to act directly at the pavement snow/ice interface where the bond is occurring. Deicing material that is broadcast must melt and penetrate the entire thickness of accumulation before it reaches this critical interface.

Most deicing applications of straight sodium chloride or pre-mix shall be made utilizing the windrow method. Windrowed material should be spread near the center of two lane roads, the crown of multi-lane highways or as high as possible on a super-elevated curve. When windrowing material, the spreader's spinner shall be shut off and the flaps surrounding the spinner shall be completely lowered. The few exceptions to windrowing straight sodium chloride or pre-mid shall be on low volume rural and secondary roads and during off peak travel hours on highways when it is determined that vehicular traffic is not sufficient to "work" the material.

Applications of treated sand, specially treated sand and admixtures of sand and either sodium chloride or pre-mix shall be placed using the broadcast method. When material is to be broadcast, precaution must be taken to ensure that the spinner speed and flaps are properly adjusted so that the deicing material is applied only to the full width of the pavement and not thrown off the roadway.

The procedure to be followed in combating any storm will depend upon the temperature, the condition of the pavement, the nature of the precipitation and the forecast at the start of the storm.

It is not the intent to completely detail the methods to be employed in combating every possible condition. There are, however, three basic conditions, one of which will exist at the start or in the early stages of almost every storm, and the procedures to be followed under these three conditions (excluding reduced salt areas) are as follows:

Condition 1:

Air temperature 25 F. to 34 F. and rising. Pavement wet. Precipitation snow, sleet or freezing rain.

This condition may prevail until the temperature rises through and above the critical zone (28.F to 34 F.) in which case the precipitation will gradually change to rain and the chance of packing or icing will diminish as the storm progresses. The temperature may, however, level off at a temperature within the critical range in which case packing or icing will take place. Actual temperatures and precipitation should be checked periodically with the forecast. The initial treatment should be the application of straight chloride at the rate of 240 pounds per lane mile. If the temperature moves at a rapid rate through he critical zone, further applications may be necessary in storms of long duration. If the temperature levels off below the critical zone and the storm continues in the form of snow and packing is imminent, it may be necessary to commence plowing and to retreat the potential pack areas with deicing chemicals.

Condition 2:

Air temperature 20 F. to 32 F., pavement wet or icing precipitation rain, snow, sleet or freezing rain.

Under this condition ice is likely to form on the pavement. There is a distinct possibility that the precipitation will turn to snow even through it may start as rain. The initial treatment is the application of straight chloride or the mixture of calcium chloride and sodium chloride at the rate of 240 pounds per land mile as soon as possible. If this treatment is effective the pavement will remain wet or will be covered with a slush according to the degree to which the temperature fails. If a slush develops, it should be removed and/or chemically treated before it is hardened by freezing or by traffic. Subsequent treatment, when required, should consist of another application of chlorides or plowing whichever is indicated. Spot sanding with treated sand may be necessary at the conclusion.

Condition 3:

Air temperature below 25 F., pavement dry, precipitation snow. Obviously this condition calls for plowing when sufficient accumulation occurs, followed by chemical treatment. Plowing should continue for the duration of the storm and until pavement and shoulders are clear. If the temperature rises through the critical zone (28 F. to 34 F.) the application of sodium chloride at the rate of 240 pounds per lane mile may be necessary to prevent icing.

Applications of deicing materials shall commence when the precipitant in the form of snow can be seen "tracking' in the traveled lanes. When the precipitation is in the form of freezing rain or sleet, the initiation of applications shall be determined by actual observation of the roadway surface for braking action and the physical observation of the ambient temperature and the forecasted accumulations. Priority consideration must be given to those areas most prone to ice first. These areas known as "white spots" shall be identified by the Highway Maintenance Foreman II or Contract Specialist II and shall be among the first areas inspected.

The Foreman II or Specialist II shall determine the need to begin application of deicing chemicals. After consultation with the approval of the Highway Maintenance Foreman II or Contract Specialist II, spreading machinery shall be called in to work. The determination of the amount of equipment to be brought in will be based upon the individual storm condition forecasted and the actual conditions encountered. When the decision to call in hired spreading equipment is made, the Foreman II or Specialist II shall reference his list of available hired equipment. Every effort shall be made to utilize vendors on a rotational basis with priority given to spreader/plow combination units and consideration given to the size of equipment required, responsiveness, condition of equipment and the operator's knowledge of assigned routes.

Reapplication of deicing materials shall be determined by the physical monitoring of field conditions through the checking of braking action, observance of surface conditions and performance of clearance crews. Physical examination of the pavement through touch can also

provide a valuable indication of icing. The foreman must be able to distinguish between acceptable conditions that do not require deicing chemical reapplication, such as mealy snow which is not bonding to the pavement or the slipperiness of a wet but not icy pavement and the onset of icing which would require chemical reapplication. It should be recognized that "white spots" where freezing is more prone to occur will require more frequent applications of deicing materials than the adjacent sections of the highway network. These areas shall be effectively selected and reapplication should be confined only to these segments rather than the entire repair section. During plowing operations, precaution must be taken to ensure that deicing material applications are placed following plow echelons and not before.

In storms occurring during normal working hours, calibration checks shall be make on all spreading equipment to ensure conformance with application rates. This inspection shall be carried out by the assignment of two 2 man teams, consisting of low pay grade engineering staff, in each district and shall be performed without impeding operations. The Highway Maintenance Foreman II or Contract Specialist II shall immediately be notified of the results of these inspections and the calibration teams shall issue a follow up report directly to the District Snow and Ice Engineer. Hired equipment not meeting the specified application rate shall be release from service unless correction can be made to a reasonable tolerance immediately. This equipment will not be used again unless proof of re-calibration by a certified vendor is represented to the District Snow and Ice Engineer and is confirmed by his inspection.

Spreading operations are most critical during the onset of storm conditions. Timing and placement of the first application of deicing materials are pivotal in the snow and ice operation. The amount of spreading equipment brought in to apply initial applications are most times not necessary for the duration of the storm condition. Every effort shall be made to disengage excess hired spreading equipment as soon as possible after the four hours minimum, unless this

equipment is intended to be used for opening waterways of "slushing off" of the high speed or breakdown lanes.

Deicing material applications shall continue as long as the danger of refreeze exits. The District Snow and Ice Engineer in consultation with the Highway Maintenance Foreman III or Specialist III shall determine when operations are to be secured.

DIVISION 5

SNOW PLOWING

5.5.1 PLOWING PROCEDURES

Assignment of routes for the plowing of snow, utilizing both Department and hired equipment, shall be established by the Highway Maintenance Foremen III or Contract Specialist III for each gang under his supervision. These routes and quantity of plowing equipment required shall be submitted to the District Snow and Ice Engineer for his approval each August prior to the Highway Maintenance Foreman III or Contract Specialist III's submission of their rental equipment request. Plow Routes shall then be submitted to the Boston Snow and Ice Control Engineer by November 1 on the form shown in Attachment 3A.

The plow routes shall be arranged in a grid-like fashion to ensure that no portion of the state highway system within the Maintenance Section is omitted and that the overlapping of routes is kept to a minimum. Routes shall be defined using a maximum plowing speed limit of 25 miles per hours and approximate time of 1¼ hours to negotiate the route. Main line plows in echelon shall clear a minimum width of 8 feet and shall include a maximum overlap of 2 feet. The assignment of plows will be based upon the average width of pavement to be cleared, from the edge of the high speed lane to the shoulder of the breakdown lane and may include up to 3 additional plowing units to accommodate the variation of roadway width at ramps and intersections. The maximum number of plows in a ramp battery should not exceed 3 to 4 plow

units (depending on size of available equipment and width of ramps) and their assignment shall also be based on an approximate time of 1¼ hours to traverse their assigned area.

Upon receipt of the Department issued weather forecast indicating plowable depths of snow, primarily for the first winter storm, the Highway maintenance Foreman II shall contact hired plowing equipment to ascertain their availability. Throughout the winter when storms of plowable depth are forecasted, it shall be the responsibility of the Highway maintenance Foreman II or Contract Specialist II to confirm that an adequate amount of plowing equipment is available and make the immediate preparations for plowing.

Snow shall be considered to be at a plowable depth when it meets the ensuing criteria: Snow to a depth or consistency that cannot be removed by the controlled application of deicing chemicals, under existing traffic conditions, which if allowed to remain in place or accumulate on the paved surface will adversely affect he safe flow of traffic.

The progression for initiating various levels of plowing operations during storm events shall be based on the following scenario: when snow has reached a depth of 1 inch (and is still falling) and the current forecast projects accumulating snow to continue for at least 2 additional hours or predicts a total depth of over 2½ inches.

Level 1: The staffing of ramp batteries shall commence when accumulations on ramp areas, only, exceed 1 inch while the main line highway has only trace accumulations. This condition occurs because traffic assists in activating the deicing chemicals and the main line is more traveled than the ramp areas. This traffic pattern allows the falling snow to accumulate faster in the ramp areas than on the main lines and continued deicing material applications alone would be imprudent.

Level 2: Limited main line plows shall begin being called in to clear the high-speed and breakdown lanes when the high-speed lane accumulations exceed 1 inch while other lanes retain only trace accumulations and the skip lines between lanes remain visible. This condition occurs

because vehicular traffic is "working" the deicing material and is placing the chemically treated snow in those lanes which are most heavily traveled. The high-speed lane has lighter traffic while the breakdown lane has virtually none, and the deicing material is not being assisted to the same degree as the other lanes. Continued material applications on these lanes without the physical removal of snow would be imprudent.

Level 3: Plows shall be called in to commence full width plowing when accumulations in all remaining lanes on the main line exceed 1 inch. The buildup of snow will now continue and repeated applications of deicing materials without the physical removal of snow would result in excessive and needless material being applied. Also, the chance of packed snow occurring is now greater at this point if the existing snow is not removed.

The District Snow and Ice Engineer shall authorize the initiation of plowing operations after consultation with the Highway Maintenance Foreman III or Contract Specialist III. The Highway Maintenance Foreman II or Contract Specialist II shall organize the plow batteries based upon instructions received and ensure adequate equipment availability for the level of operations. When the decision to call in hired plowing equipment is made, the Foreman II or Specialist II shall reference his list of available hired equipment. Every effort shall be made to utilize all hired plowing equipment on a rotational basis by size and category according to requirement by storm condition, with consideration given to responsiveness, condition of equipment and the operator's knowledge of assigned routes.

5.5.2 ECHELON PLOWING

When possible, plows in echelon operating on the main line of highway shall have radio equipped state equipment in the lead and as the last unit in the echelon. The largest plowing units, ten wheel trucks, if available, shall be sued for the mainline batteries and lighter, more maneuverable equipment shall be sued to staff the ramp batteries. Wherever possible spreader/plow combinations shall be utilized during all levels of plowing operations.

Plows shall not be equipped with skids or wheels. All plowing equipment when in operation shall have their cutting edge flush against the pavement and there shall be no tension in their lift chains.

During full width plowing, the plowing of crowned roadways shall start at the center of the road to prevent the formation and packing of a windrow of snow on the crown. The plowing of roads having median strips will start at the edge of the shoulder on the median side. Plowing on the left hand side of the road opposing traffic si not permitted. When plowing highways having a depressed median strip and more than two lanes on each roadway, snow may be plowed from the left lane onto the median strip.

Plowing procedures are illustrated in Plates 1 through 7. These illustrations are furnished as a guide and it is anticipated that field adjustment swill be made based upon actual conditions encountered as operations progress. Should a full plowing complement on multi-lane roadways not be available due to delayed arrival or equipment breakdowns, plow batteries shall be arranged so as to clear travel lanes until replacement equipment becomes available to allow full width clearance.

Every effort shall be made to secure plowing operations within 2 hours after precipitation ends. Post storm cleanup, pushing back, cleaning of points and the extensive opening of waterways shall be done during normal working hours. The exception to this shall be in the event that the weather forecast predicts an immediate, prolonged cold snap at the termination of the storm event. The District Snow and Ice Engineer shall specify the equipment to be sued and the work to be completed during post storm clean up operations.

5.5.3 TOWING OF STALLED VEHICLES

Section 2A of Chapter 338, Acts of 1957, provides that the Department may with its own employees, or with such other assistance as it may require, remove or cause to be removed to some convenient place any vehicle interfering with the free flow traffic during snow removal

operations. In such instances, the initial responsibility for removing such vehicles shall rest with the police agency having jurisdictional control of the section of highway. Department vehicles requesting towing of stalled vehicles shall notify their district radio base stations when operational or the Dewey Square Communications Center and provide a description of the vehicle, registration number and approximate location. This information shall then be relayed by the Department dispatcher on duty to the appropriate police agency for their response.

In all cases where it is necessary to move privately owned vehicles for purposes of snow removal and police with tow equipment are not available, extreme caution must be sued to prevent damages to the vehicles moved.

All abandoned or stalled vehicles must be removed from interchange ramps as soon as possible. Local or State Police shall be requested to arrange for the removal of vehicles from ramps or for the removal of obstructing vehicles form the highways.

5.5.4 PROPERTY DAMAGE

Extreme caution shall be used during plowing operations to avoid damage to private and public property. Particular care shall be taken while removing snow on overpasses. Any such damage shall be reported promptly by operators to the Highway Maintenance Foreman II or Contract Specialist II using the standard accident report form, and these reports shall be passed on to the District Snow and Ice Engineer. If proven negligent, hired equipment involved in damage to vehicles passing below on overpass by plowing snow over the top barrier will be liable for damages and may have their services terminated.

5.5.6 WINTER MAINTENANCE

It is the policy of the Department not to perform snow removal functions on sidewalk areas abutting state highways or bridges. The exception to this policy shall be for the removal of accumulated snow on moveable bridge pedestrian walkways.

A certain amount of winter maintenance is essential to combat the effects of weather and snow and ice operations. Plowing may cause damage to pavement, curbing, drainage structures, guard rail, etc., and sand will accumulate on pavement and shoulders in varying amounts. Foremen or specialists should take advantage of favorable weather to patch damaged pavement sand to repair other winter damage as well as remove excess sand before it is carried into drainage systems. If permanent repairs cannot be made immediately, temporary repairs should be made.

Waterways should be checked frequently to insure run off is maintained. Along with the operation of opening up waterways immediately after a storm, all snow shall be removed from exposed cement concrete bridge decks.

ATTACHMENT 2

MASSACHUSETTS HIGHWAY DEPARTMENT

RECORD OF CONTRACTOR'S PERFORMANCE

DATE: _____

DIST.# ( ) GANG # ( ) _____
EQUIPMENT _____
TYPE/STYLE EQUIP: _____

CONTRACTOR'S NAME: _____
ADDRESS: _____
CITY/TOWN: _____
TEL. #: _____

COMMENTS & RATING ON CONTRACTOR'S PERFORMANCE

Foreman's Comment-Rating	10		9		8		7		Rating
1. Workmanship		Very Good		Good		Fair		Poor	X 4 =
2. Cooperation		Very Good		Good		Fair		Poor	X 3 =
3. Equipment		Very Good		Good		Fair		Poor	X 2 =
4. Organization		Very Good		Good					X 1 =

Contractor's Overall Rating: _____

5. Rating of Owner		Very Good		Good		Fair		Poor
6. Rating of Equipment Driver		Very Good		Good		Fair		Poor

NOTE: GIVE EXPLANATION OF ITEMS 1 THRU 6 ON REVERSE SIDE IN NUMERICAL ORDER IF RATING IS BELOW 80%, USE ADDITIONAL SHEET IF NECESSARY…..

_____
Highway Maint. II (Signature)

RECOMMENDATIONS

I RECOMMEND THAT THE CONTRACTOR NOT BE REHIRED DUE TO HIS UNSATISFACTORY PERFORMANCE…..

_____
Highway Maint. Foreman III (Signature)

E

Estimated Salt Reduction for Existing and Planned Reduction Activities

This table was taken from the New Hampshire Small MS4 Salt Reduction Plan Template: https://www.nhms4.des.nh.gov/documents/new-hampshire-small-ms4-salt-reduction-plan-template

This table was provided by SBSC and can be used for reference to provide estimates for salt reduction. Currently, no similar resources exist for Massachusetts.

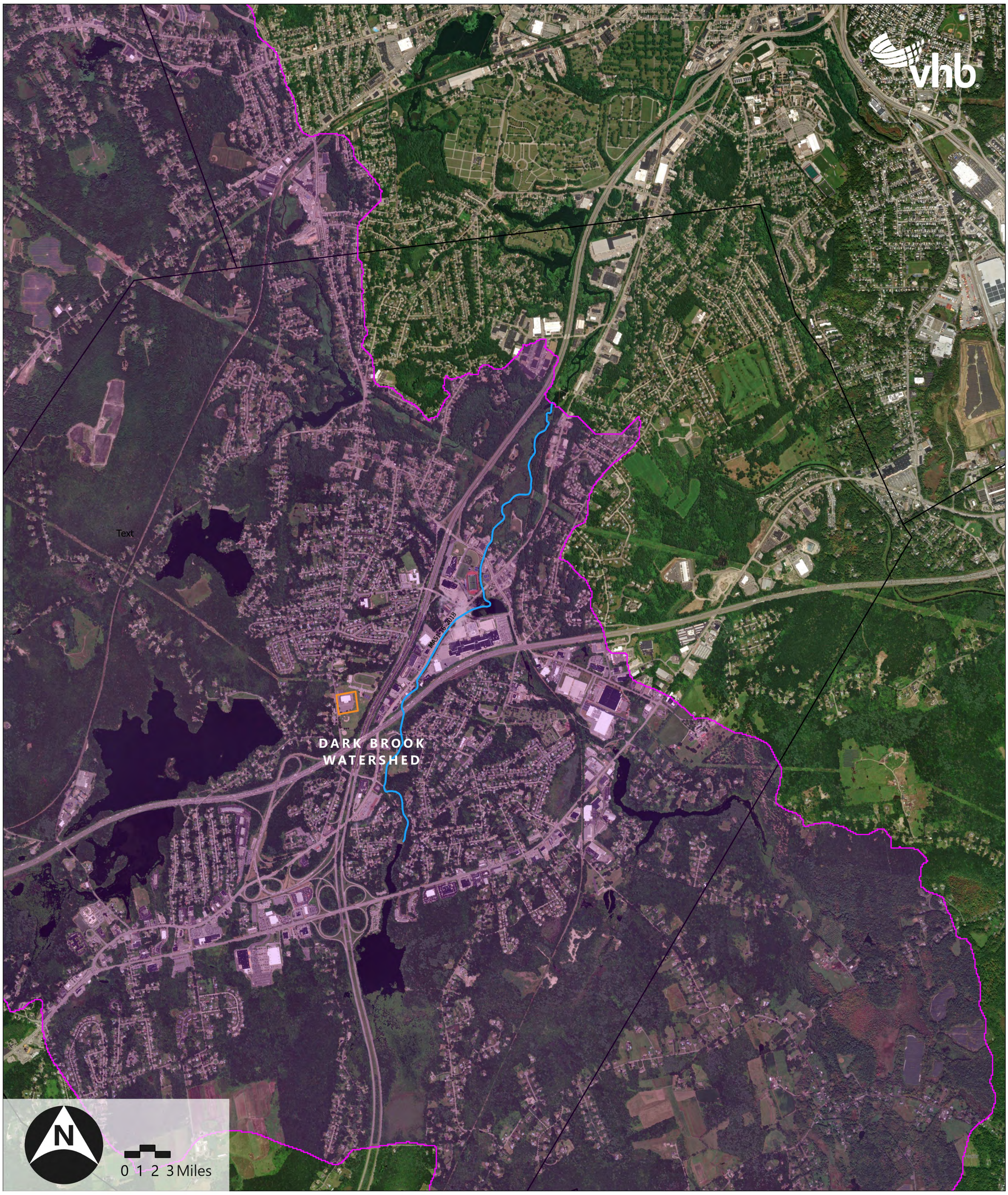
Reduction Activity or Practice	Municipal Recommendations	Estimated % Reduction per storm
Pre-treated salt	Utilize pre-treated salt	20%
Roadway anti-icing	Utilize Anti-Icing in advance of Storms	20%
Adapt Application Rates to Pavement Temperatures	Utilize Lower application rates at warmer pavement temperatures.	5-10% (dependent on existing usage)
Spreader Calibration	Calibrate all spreaders minimally annually to ensure accurate application amounts	5-30% (dependent on existing usage)
Ground-Speed Controls	Equip trucks with ground speed controllers	5%

F

Overview Figures of DCR Facilities within Chloride Impaired Watersheds

Figure 1: Overview of DCR Facilities within Chloride Impaired Watersheds (1/2)

Salt Reduction Plan | Massachusetts

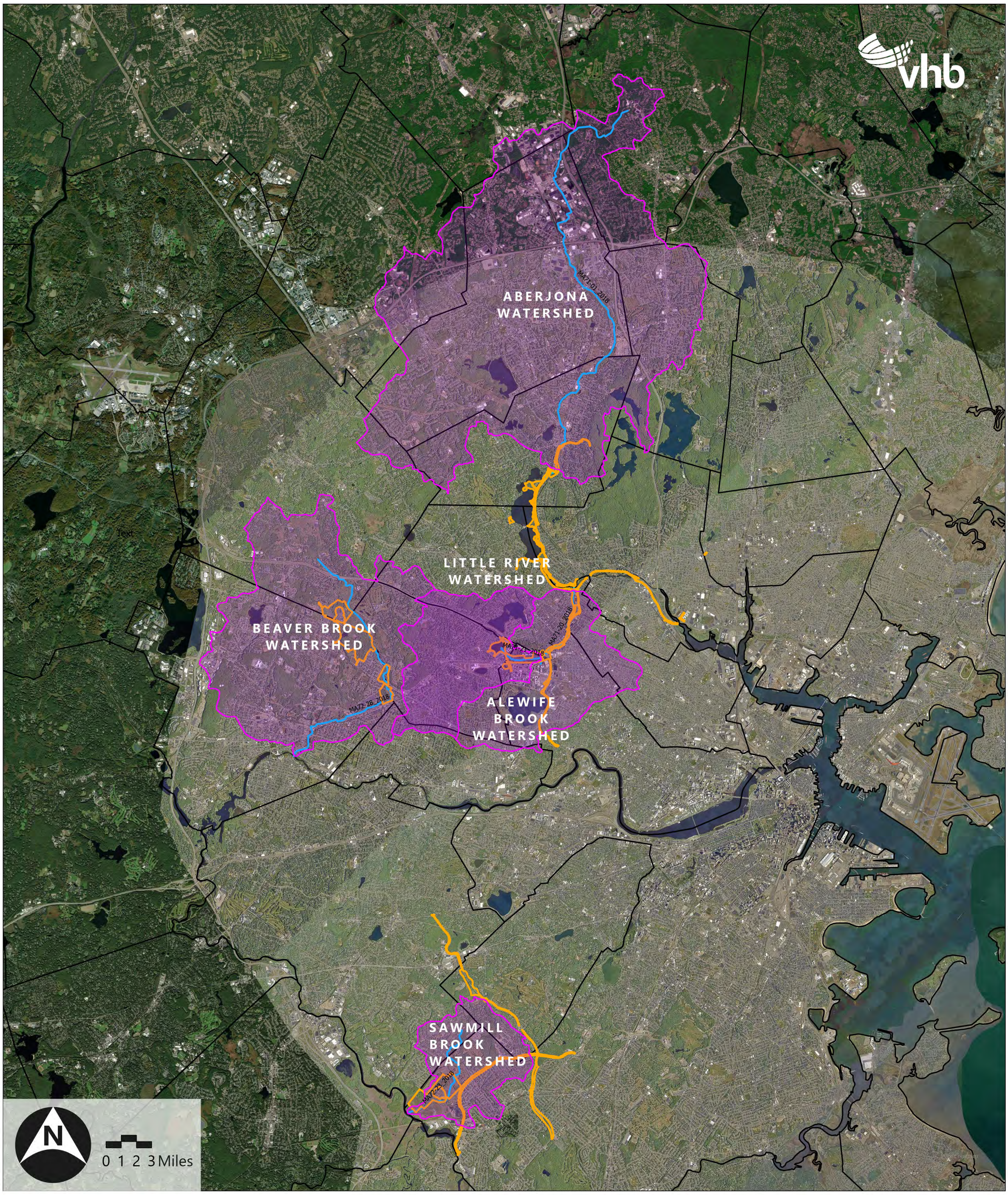


Source: MassDCR, MassDEP, USGS, VHB

Path: \\vhb\gis\proj\Wat-EV\14371.00 DCR Stormwater-Statewide\Project\IWP\IWP_Working_Projects\IWP_SSM2_Working\IWP_SSM2_Working.aprx

Figure 2: Overview of DCR Facilities within Chloride Impaired Watersheds (2/2)

Salt Reduction Plan | Massachusetts



Source: MassDCR, MassDEP, USGS, VHB

Path: \\vhb\gis\proj\Wat-EV\14371.00 DCR Stormwater-Statewide\Project\IWP\IWP_Working_Projects\IWP_SSM2_Working\IWP_SSM2_Working.aprx