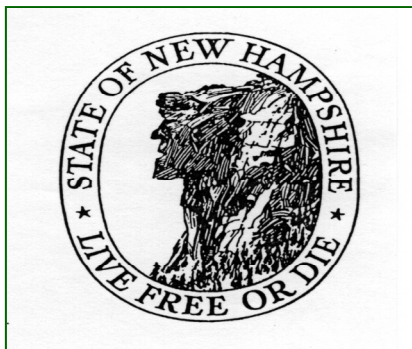


NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION



Winter Maintenance Snow Removal And Ice Control Policy.



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Commissioner

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State of New Hampshire Department of Transportation

SNOW REMOVAL & ICE CONTROL POLICY

GENERAL POLICY:

Winter weather in northern New England is difficult to predict. There are many variables affecting winter maintenance operations such as type of precipitation, air and pavement temperature, traffic, wind, time of day and day of week. Winter maintenance is considered an art, not a science.

The New Hampshire Department of Transportation's (NHDOT) snow removal and ice control policy has been based for many years on the goal of obtaining bare and dry pavements at the earliest practical time following cessation of a storm. It is virtually impossible to provide bare pavement during a winter storm and the NHDOT does not attempt to do so. Judgment based on experience is essential in conducting and timing remedial work to overcome ice and snow hazards. As each storm situation varies, it is important to emphasize that this policy be used as a guideline to assist foremen in making well informed, judgment decisions in the exercise of their snow removal and ice control responsibilities. The Commissioner recognizes that a rigid application of this policy is impossible given the varying conditions that exist in each storm across the 4,000+ miles of State highways. No policy could be prepared that could dictate set procedures under all the variants. Any attempt to dictate the timing of various winter maintenance operations from other than the specific location could create disastrous results. At many locations in the state the same problem does not exist within a single patrol section let alone an entire district or state.

Traffic volume and posted speed are the primary factors in determining the level of winter maintenance service with the highway grade also being an important factor. The Interstate System, Turnpike System and other heavily traveled highways are maintained in such a manner that bare pavement is produced as soon as practical after termination of a storm. On State highways with low traffic volumes, the NHDOT attempts to provide some bare pavement, but not necessarily from shoulder to shoulder, within a day or two after a storm ends.

It is impractical to develop specific rules on winter maintenance operations due to the numerous variables involved in winter storms. The judgment of the local highway patrol foreman governs the type, quantities and application schedule of materials used to control snow and ice. It is the intent of the NHDOT to use the minimum deicing or anti-icing material needed to restore safe travel conditions as soon as practical following termination of winter storms. Salting and sanding units are usually equipped with calibrated mechanical spreaders that accurately control the application rates of materials. Employees are instructed in the proper dispensing of the necessary quantity at the appropriate time.

The winter maintained State highway system is comprised of four roadway types defined as follows and as shown on the attached map:

Type 1 A - Highways on the Interstate and Turnpike Systems and those highways carrying 15,000 vehicles or more daily (green) should have full width bare pavement as soon as practical after a winter storm terminates.

Type 1 B - Highways on the State system and carrying 5,000 to 15,000 vehicles daily (blue) should have full width bare pavement as soon as practical after a winter storm terminates.

Type 2 - Highways on the State system carrying 1,000 to 5,000 vehicles daily (orange) should have some bare pavement as soon as practical after a winter storm terminates.

Type 3 - Highways on the State highway system carrying less than 1,000 vehicles daily (red) should have bare pavement in left wheel tracks near the center of the highway as soon as practical after the winter storm. Included in this classification are highways carrying less than 500 vehicles daily for which snow-covered pavement is deemed acceptable.

These designations have been determined by traffic volume primarily but have been modified to include consideration of posted speed, highway grade, truck volume, accessibility to hospitals and emergency services, special events, second and/or third shifts at major industrial complexes and major commercial traffic generators as well as to establish continuity between highway districts.

OPERATIONS:

Snow removal and ice control usually requires the timely application of either chemicals, abrasives or a chemical-abrasive mixture to roadway surfaces in combination with aggressive snow plowing operations. Choice of material is dependent upon the weather and road conditions. Occasionally conditions such as low temperatures do not require material application. Materials available include the following:

Sodium Chloride – The use of sodium chloride (common salt) combined with snow plowing is the most effective, most economical and safest snow and ice control method currently available. Salt is most effective for melting purposes at temperatures above 20 degrees F., with reduced melting ability as the temperature drops. In general, the purpose of salt is to (1) reduce adherence of snow to the pavement, (2) keep the snow in a “mealy” condition and thereby permit nearly full removal by plowing, and (3) prevent the formation of ice or snow ice (hard pack). Salt is not intended to take the place of snowplows. It is economically and environmentally unacceptable to attempt to melt snow accumulations that are plowable. Salt is also to be added to sand stockpiles to prevent freeze up of the abrasives.

Calcium Chloride. Calcium chloride is a chemical which melts ice at lower temperatures than sodium chloride. Flake calcium chloride is used as an additive to abrasives (sands) to prevent freezing in stockpiles, to thaw culverts and catch basins, to help hold the abrasive in place on the pavement and on rare occasions to trigger sodium chloride action. Liquid calcium chloride at 32% strength can be used to pre-wet solid sodium chloride to trigger the chemical reaction at low temperatures. The addition of liquid calcium chloride also is beneficial in retaining de-icing material on the roadway by increasing the adhesion of the material to the roadway.

Abrasives. Abrasives (sand and fine mineral aggregates) are used primarily for immediate traction on hills, curves, intersections, railroad crossings and other areas to increase traction and minimize the use of salt. Sodium chloride, calcium chloride or an appropriate mixture of the two are usually added to abrasives in amounts dependent upon existing weather conditions. Stockpiles of abrasives are usually treated with chloride at the start of the season to prevent subsequent freezing.

Alternative De-Icers

There is considerable research being done on new deicing chemicals. Non-corrosive and environmentally friendly chemicals, in solid or liquid form, are now available but widespread use is currently limited due to the high costs and the need for specialized equipment to store & dispense them. NHDOT has and will continue to experiment with new products as they come on the market in an effort to provide an affordable and acceptable level of service while being environmentally responsible. There is considerable research throughout the world going on in this area and NHDOT is an active participant.

Application of De-Icing Materials

The use of chemicals, abrasives or chemical-abrasive mixtures is dependent not only on present roadway and weather conditions, but also on anticipated changes in these conditions and fiscal or logistical constraints experienced by the NHDOT. The effects of peak traffic periods, approaching nightfall or daybreak, precipitation type, and predicted end of storm, are considered and evaluated prior to selecting the proper materials and rate of application.

Adverse roadway conditions existing during periods of low temperatures, which are predicted to rise would generally be treated in accordance with the recommendations for the higher temperature. If the time of day, trend and weather forecast is such that a drop in temperature may reasonably be expected, treatment would generally be in accordance with the recommendation for the lower temperature. Chemicals or abrasives should not be used at low temperatures if the pavement is dry and snow is blowing off the pavement as such use would be wasteful and may be counterproductive.

Rates of Application

Generally straight sodium chloride is the chemical of choice for most storm situations. Sodium chloride is used to prevent snow pack and ice build-up on the pavement and to aid removal of any build-up that occurs. The following instructional guidelines are recommended to adequately maintain highways under most conditions:

RECOMMENDED SNOW AND ICE TREATMENTS PER LANE MILE			
CONDITIONS	TEMPERATURE	TYPE 1A & 1B	TYPE 2 & 3
Sleet & Freezing Rain	Variable	Salt 300 lbs. per lane mile and/or abrasive as needed.	Salt 300 lbs. per lane mile and/or abrasive as needed. (2)
Snow	20° and up	Salt 250 lbs. per lane mile. (1)	Salt 250 lbs. per lane mile. (2)
Snow	Below 20°	Salt 250 lbs. per lane mile. (2&3)	Abrasive-Chemical Mix

- (1) For exceptionally high volume roads where traffic will enhance the action of the salt, this rate may be decreased to 200 lbs. per lane mile.
- (2) Abrasive – chemical mix may be needed at extremely low temperatures or on very lightly traveled highways.
- (3) An alternative low temperature treatment is to use a chemical mix of 2 parts salt to 1 part calcium chloride at 200 lbs. per lane mile.

Chemicals or mixes are normally applied to the middle 1/3 of pavement width and on the high side of banked curves. Spread width may be increased or decreased depending on the action of traffic. Materials are applied early in the storm so that a brine develops on the pavement and prevents build-up of packed snow. It takes much less deicing chemical to remove compacted snow when the treatment is placed between the pavement/snow layer than if it is placed on top of the snow. If snow continues and accumulates on the pavement, plowing should continue and additional chemical or mix treatments should be made if compaction develops.

There are many additional circumstances which will necessitate modification to these treatments. Some of these circumstances are:

1. Rising or falling temperatures.
2. When pavement is cold and dry and snow is falling, chemicals are not applied. Plowing and treatment of icy spots, if they develop, is recommended.
3. As stated in footnote (2) an abrasive-chemical mix may be needed at extremely low temperatures or on very lightly traveled highways. Under these conditions the effectiveness of salt is reduced and abrasives may be needed for traction.

Spreading Practices

Each spreading unit is calibrated to insure that selected rates of application are attained. Timing of the initial application during each storm is very critical. It should be delayed until there is sufficient accumulation on the pavement to hold and contain the material spread. However, the pavement may become glazed prior to this time and may require an earlier treatment.

Portions of each patrol section are unique due to various physical conditions and will require a greater application rate or an additional application during some storms. However, these areas should be judged and treated separately and not used as a barometer to evaluate and subsequently direct complete applications over the entire section. In order to conduct an efficient operation, periodic observation of the pavement surface conditions must be performed.

Width of material spread (throw plus roll) should be restricted. Reduction of the spread width by windrowing chlorides will increase the concentration of the chemical where it is needed and therefore increase the effectiveness of the application. Spreading operations should generally be conducted at speeds less than 25 mph on two lane roads. Air turbulence created at speeds greater than 25 mph makes it difficult to retain all the material discharged within the desired width. Spinner and belt speeds and spread pattern must be adjusted to obtain the correct spread rate and to retain the material within the lane (s) where the additional material is required.

On a four lane undivided roadway the passing lane in either direction may be spread simultaneously from the adjacent travel lane. Belt speed, spinner speed and vehicle position need not be changed since the normal spread pattern on this type roadway is achieved by spreading simultaneously upon the two lanes during the singular directional pass of the spreading unit.

Special Attention For Bridges

Bridge decks normally freeze or glaze sooner than adjacent pavement sections, especially in the late fall and early winter. Special care and good judgment is required in the use of de-icing chemicals on all bridge decks.

Accumulations of snow along gutter lines and sidewalk or catwalk areas of all bridges should be removed when accumulation of snow and/or ice affects highway safety. Removal operations should commence on the high side of bridges on banked curves to minimize snowmelt and re-freezing or glazing of the travel lanes.

Plowing Operations

Plowing operations are generally initiated after one to two inches of snow have fallen and continue until the storm has ended. Widening and intersection view clearing is performed following cessation of the storm as necessary, and generally during daylight hours when best visibility prevails.

For snow storms with a predicted accumulation in excess of two inches, plowing usually begins after the initial salt application has formed a brine and after one to two inches of snow has fallen (dependent on intensity of snowfall) and continues for the duration of the storm. After a storm terminates, a final cleanup plow run is made and a light salt application is laid down as necessary to remove any remaining residue.

For light accumulation snowfalls, snow squalls, and so-called “Alberta Clippers” of short duration, plowing may begin immediately and may include simultaneous salting and/or sanding to provide the desired results quickly and efficiently.

Truck-mounted snowplows and wing plows are utilized to clear pavements and shoulders of frozen precipitation. Storm intensity (generally measured in inches per hour) varies considerably in New Hampshire but average major snow storms are approximately one inch per hour. This one-inch per hour intensity rate and the allowable snow accumulation is used in planning the availability of equipment necessary for snow removal operations.

SNOW AND ICE MANAGEMENT PLANNING CRITERIA			
HIGHWAY TYPE	PLANNED PLOWING FREQUENCY	PLANNED ALLOWABLE SNOW ACCUMULATION	AVE. MAX. ALLOWABLE ACCUMULATION
TYPE 1A	1½ hours	1½"	3"
TYPE 1B	2 hours	2"	4"
TYPE 2, 4	2½ hours	2½"	5"
TYPE 3, 5	3½ hours	3½"	6"

The preceding table is based on an average accumulation of one inch per hour under optimum conditions (i.e., no traffic tie-ups or accidents, and no equipment breakdowns) and excludes initial response time. The average maximum depth of snow or other accumulation a motorist may encounter on highway pavements, except during blizzard conditions and/or heavy wind and drifting conditions, is shown in the right-hand column of the table.

Frozen precipitation including sleet and the build-up of ice caused by freezing rain are special situations, and not subject to procedures indicated above. When a changeover from snow or sleet to freezing rain is predicted or anticipated, snow and/or sleet is left on the pavement to capture the freezing rain thereby preventing a glare ice situation, which without question is the most treacherous condition that occurs on highways. Treatment includes application of salt at a rate of 300 pounds per lane mile as needed throughout the storm. Heavy rain tends to wash off applied salt or sand, making it difficult to keep the pavement ice-free.

It is the policy of NHDOT to perform snow removal and ice control operations in a consistent and impartial manner throughout the state. There are a few plowing procedures that are frequently misunderstood. In an attempt to clarify our actions the following policies and procedures are explained.

Mailboxes And Other Structures Within The Highway Right-Of-Way

Occasionally mailboxes or other devices are damaged by snow plowing operations due to poor visibility, the mailbox being buried in a snow bank or the weight/volume of the snow being plowed. This damage is not deliberate and in most cases is unavoidable. NHDOT is not responsible for damage and does not repair, replace or re-erect boxes that are located within the highway right-of-way. These devices are located within the highway limits and are the responsibility of the property owner. NHDOT will work with the box owners to locate the box in the safest possible location and offer advice on its design to minimize potential damage.

Widening Or Pushing Back Snow Banks

Following storms with heavy snowfall or when several storms result in substantial snow bankings, NHDOT will undertake a roadway widening procedure, which will push back the snow banks. This is a necessary operation because it accomplishes the following:

- (A) Provides room for future snow storage.
- (B) Reduces or prevents melted snow from running out onto the roadway pavement and creating icing conditions.
- (C) Increases safe sight distance at intersections and driveways.
- (D) Maintains a uniform line by eliminating protrusions at driveways and intersections.

Unfortunately there is no way to prevent depositing snow in previously cleaned driveways or walkways except to leave a hazardous projecting mound of snow. With thousands of driveways of all sizes and descriptions along our highway system it is impossible to clear these individual drives as the cost would be prohibitive and would probably result in complaints of highway funds expended for the benefit of certain individuals.

Signalized Intersections

At those locations where there is steep highway grades law enforcement officials or authorized NHDOT employees may put traffic signals on flash for the duration of the storm.

Sidewalks

NHDOT in conjunction with construction projects occasionally reconstructs or constructs new sidewalks adjacent to highways. However, the maintenance of the sidewalks, including snow removal, is the responsibility of the local community. This policy is firm and longstanding statewide. In addition, in those communities where on-street parking is permitted, snow removal from the parking areas, including plowing and or hauling away, is a local responsibility. The local NHDOT crew will adjust its plow pattern when possible to assist the community if at all possible, which could include pushing back snow banks during No Parking hours, or leaving a windrow as close to the traveled way as possible. Usually these arrangements are made locally between the municipality and the NHDOT Patrol Foreman.

Reduced Winter Maintenance

The NHDOT will evaluate the feasibility of establishing low or no salt sections on selected low volume roadways following a written request from the local governing body. To facilitate this program two additional highway types are specified as follows:

Type 4—Highways on the State highway system carrying less than 2,500 vehicles daily for which all municipal officials, including all selectmen, the police chief, the fire chief, the chief of ambulance service, and the superintendent of schools or the school board, have signed and submitted a written request to establish low (minimum) salt sections on existing Type 2 highways (orange routes) shown on the winter maintenance system map.

Type 5—Highways on the State highway system carrying less than 1,000 vehicles daily for which all municipal officials, including all selectmen, the police chief, the fire chief, the chief of ambulance service, and the superintendent of schools or the school board, have signed and submitted a written request to establish no salt sections on existing Type 3 highways (red routes) on the winter maintenance system map.

RECOMMENDED SNOW & ICE TREATMENTS PER LANE MILE FOR REDUCED WINTER MAINTENANCE AREAS			
CONDITIONS	TEMPERATURE	TYPE 4	TYPE 5
Sleet & Freezing Rain	Variable	Salt 250 lbs. per lane mile and/or abrasives as needed	Abrasives only
Snow	20 degrees Fahrenheit	Salt 250 lbs. per lane at beginning and/or end of storm only	Abrasives only
Snow	Below 20 degrees Fahrenheit	Abrasives only except salt 250 lbs. per lane mile at end of storm	Abrasives only

The process to establish reduced winter maintenance areas commences when NHDOT receives a written inquiry from a municipality's authorized officials. The NHDOT will field review the section(s) requested to see if the section's geographic, traffic and environmental conditions would permit consideration of reduced winter maintenance. If NHDOT determines it is feasible to reduce the level of service, the municipality must submit signed approvals from governing town officials, police chief, fire chief, chief of ambulance service and the school board/superintendent of schools. A public meeting will be convened to accept comments from the public. The level of service anticipated will be discussed and will include items such as the amount of bare pavement that would be expected, the surface condition, and the time of treatment. If the conditions are acceptable the location will be approved and public notices made. Additionally, roadway signs will be erected delineating the area as a reduced winter maintenance zone. NHDOT officials reserve the right to change the designation if safety concerns arise and the designation is found to be inappropriate. Reclassification of the roadway to a Class V (town maintained highway) will also be discussed with the municipality's officials.