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Salt Management Plan

1.0 Introduction

1.1 Overview

In response to concerns over the impacts of road salt on the environment, Environment Canada published in April 2004 the Code of Practice for the Environmental Management of Road Salts in the Canada Gazette stating that road salts are on the Priority Substance List compiled under the Canadian Environmental Protection Act, 1999. The Code of Practice was developed by Environment Canada through a multi-stakeholder consultation and includes practices relating to:

- Salt storage;
- Snow disposal; and
- Salt application with all the environmental impacts considered.

This code applies to organizations that:

- Use more than 500 tonnes of road salts per year (five-year rolling average); and
- Have vulnerable areas that could be potentially impacted by road salts.

Any organization which meets the criteria listed in the code is required to prepare a Salt Management Plan (SMP) and file an annual report with Environment Canada by June 30th each year. The implementation of the SMP is to begin in the financial period of fiscal year immediately following the preparation of the plan.

Since the Town of Caledon meets the criteria listed in the Code of Practice for the Environmental Management of Road Salts the Town has developed this plan to outline their strategies to manage salt use. The maintenance of Caledon's roadways during the winter season is both challenging and costly due to the large area, variety of road types, and diverse topography. Municipal staff currently utilize a salt/sand mix as their main tool in maintaining a safe and efficient roadway systems during the winter season. An efficient winter maintenance plan has many benefits to the community, including but not limited to:

- Providing efficient effective transportation routes for emergency services, residents of all mobility levels, and commuters;
- Lower automobile collision rates;
- Lower associated insurance and liability claims;
- Saving time and fuel from faster travel, better traction, and reduced congestion;
- Minimize productivity losses due to late days and absenteeism;
- Avoidance of lost sales due to inaccessibility or unavailability; and
- Lower the cost of commodities by reducing the transportation costs.

These benefits have also shown to have benefit/cost ratios between 2:1 and 18:1. For every dollar spent on winter maintenance activities two to eighteen dollars are derived in benefits.

An effective winter maintenance plan must include methods to provide safe roadway conditions and to ensure that the right amount of salt is used in the right place at the right time. Reduction

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of salt usage may also be achieved through improved training, new techniques, new technologies, as well as improvements in the type of anti-icing/de-icing materials used.

The SMP is considered to be a "living" document. Once developed, the Town of Caledon will be required to undertake a formal annual review with the goal of improving their winter maintenance operations. This review will also require new technologies be investigated where appropriate, trial/pilots can be conducted and monitored to determine the cost/effectiveness of incorporating new developments into the capital and current budget planning.

1.2 The Purpose of the Document
This SMP is intended to set out a policy and procedural framework for ensuring that the Town of Caledon continuously improves on the effective delivery of winter maintenance services and the management of road salt used in winter maintenance operations, as outlined in the Code of Practice for the Environmental Management of Road Salts.

The SMP is meant to be dynamic to allow the Town to evaluate and phase in any changes, new approaches and technologies in winter maintenance activities in a fiscally sound manner. At the same time any modifications to Caledon’s winter maintenance activities must ensure that roadway safety is not compromised.

As specified in the Code of Practice for the Environmental Management of Road Salts, the SMP is endorsed by the "highest level of government". Therefore, Town Council will be requested to endorse this plan.

1.3 Legislation
The minimum standards for winter maintenance are mandated under provincial legislation. The standards set within the Town of Caledon are currently at the same level or higher than the minimum standards specified in the Ontario Regulation 239/02 of the Municipal Act, 2001. As well, the Town is mandated under provincial legislation to maintain public roads in a good state of repair.

The Code of Practice for the Environmental Management of Road Salts, under the Canadian Environmental Protection Act, 1999 recommends that the Salt Management Plan follow the best management practices that have been set out by the Transportation Association of Canada. This Code of Practice was prompted by subsection 54 (1) of the Act which allows the Ministry of the Environment to issue codes of practice respecting pollution prevention or specifying procedures, practices or release limits for environmental control relating to works, undertakings and activities during any phase of their development and operation.
2.0 Salt Management Policy

2.1 Vision, Mission, Mandate
Vision: The Town of Caledon will be recognized as a leader in improving winter maintenance operations while reducing environmental impacts and ensuring public safety.

Mission: The Town of Caledon Finance & Infrastructure Services Department will continue to optimize the use of deicers on all Town Roads while striving to minimize salt impacts to the environment.

Mandate: The Town of Caledon Finance & Infrastructure Services Department will provide safe winter traveling surface conditions for vehicular and pedestrian movements as required by the level of service policies and funding established by Council.

2.2 Policy Statement
The Town of Caledon will provide efficient and effective winter maintenance to ensure the safety of users of the road network in keeping with applicable Provincial Legislation and accepted standards while striving to minimize adverse impacts to the environment. These commitments will be met by:

- Adhering to the procedures contained within the SMP;
- Monitoring, reviewing, and upgrading the SMP on an annual basis to incorporate new technologies and/or new developments and to ensure the effectiveness of the Plan;
- Committing to ongoing winter maintenance staff training and education; and
- Council allocating sufficient financial resources.

2.3 Application
The SMP is to be endorsed by the Town Council of Caledon, and the SMP, as adopted, will apply to all Caledon Finance & Infrastructure Services Department employees who are involved in winter maintenance operations.

2.4 Principles
To allow for the continued progression of the SMP several principles will be set in place to guide decision making. These include:

- Implementation and documentation of the plan;
- Education and training of staff;
- Monitoring and analysis;
- Yearly management review; and
- Practices and policy revision.
3.0 Current Weather Maintenance Program and Policies

3.1 Introduction
This chapter is intended to provide a brief overview of the present activities, conditions, and policies currently in place for the Town of Caledon as it relates to winter maintenance. The major activities related to winter maintenance are:

- Snow Plowing
- Salt/Sand Application
- Salt/Sand Storage
- Snow Removal
- Snow Storage
- Sidewalk Plowing & De-icing.

3.2 Town of Caledon Program and Policies
Overall the Town is responsible for the maintenance and construction of some 1591.66 lane km of road which is 912.41 lane km are paved; 339.6 lane km are surface treated; and 239.74 lane km is gravel. In turn, the Town roads have been classified (Class 1, 2, 3, 4, 5 and 6) based on the posted/regulated speed and annual average daily traffic (ADT) in order that levels of service and maintenance standards can be clearly defined and accepted by the community at large.

Within these classifications:

- Class 1, 2, and 3 roadways are considered as an arterial in nature;
- Class 4 roadway is considered as a collector in nature; and
- Class 5 and 6 roadways are considered local streets.

Table 3.1 provides a breakdown of the road system by urban/rural and class of road.

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Lane Km of Roadway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
</tr>
<tr>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>242.08</td>
</tr>
<tr>
<td>4</td>
<td>496.94</td>
</tr>
<tr>
<td>5</td>
<td>194.18</td>
</tr>
<tr>
<td>6</td>
<td>24.19</td>
</tr>
</tbody>
</table>

Table 3.1: Road Classification, Town of Caledon

In compliance with the applicable law, the Town is utilizing the Minimum Maintenance Standards for Municipal Highways (Ontario Regulation 239/02 made under the Municipal Act). Staffs have established winter level of service and maintenance guidelines that have been accepted by the community at large.

For winter operations, these regulations specify for each class of highway:

- Patrol frequency; and
• Clearance of snow/ice.

In addition, Town staff provides winter maintenance services for some 91.7km of sidewalks and paths within the communities of:

• Alton;
• Bolton;
• Caledon East;
• Caledon Village;
• Inglewood;
• Mayfield West; and
• Palgrave.

Council has approved a Level of Service for Winter Operations, Sidewalk Maintenance (Appendix A) which provides for all sidewalks and pathways to be cleared within 48 hours following a storm event. With back to back storms, priority service is focused on priority 1 routes which exceed and ADT of 1000 or within 500m of schools. Once normal operations are restored, all remaining secondary routes would be plowed.

Also, approximately 39 community and Town Hall parking lots, fire, and police facilities are maintained and cleaned of ice and snow during the winter season.

3.3 Winter Patrol
Commencing on October 1st, winter maintenance operations and patrol coverage are maintained around the clock 7 days a week until April 30th each year. As well, the Road Supervisors and alternates will remain on call with a protocol in place to mobilize staff in response to storm and weather conditions.

Table 3.2 outlines the minimum patrol frequency established for each class of highway within Regulation 239/02.

<table>
<thead>
<tr>
<th>Class of Highway</th>
<th>Patrolling Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three times every 7 days</td>
</tr>
<tr>
<td>2</td>
<td>Two times every 7 days</td>
</tr>
<tr>
<td>3</td>
<td>Once every 7 days</td>
</tr>
<tr>
<td>4</td>
<td>Once every 14 days</td>
</tr>
<tr>
<td>5</td>
<td>Once every 30 days</td>
</tr>
</tbody>
</table>

*Table 3.2 Routine Patrolling Frequency*

At the present time Town staff covers all roads at least once within a 1 to 2-week time period. To supplement the Town patrol, Region of Peel staff also provides patrol coverage on all regional roads within Caledon and maintain contact with Town staff to advise changing weather and/or pavement conditions.
3.4 Level of Service

The target timeframe to restore an asphalt roadway to bare pavement will vary depending on the winter traffic, volume, highway type, and surrounding landscape. Some highways that are sheltered from wind and sun, with low volumes of traffic, may remain snow packed longer than others, however winter road maintenance is still completed on these roads to ensure compliance with Ontario Standards.

Bare pavement standard target by highway class:

<table>
<thead>
<tr>
<th>Highway Class</th>
<th>Vehicles per day</th>
<th>Bare Pavement Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway/Urban Highway</td>
<td>More than 10,000</td>
<td>Bare pavement within eight hours of the end of a winter storm.</td>
</tr>
<tr>
<td>(Class 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Highway</td>
<td>2,001-10,000</td>
<td>Bare pavement within 18 hours of the end of a winter storm.</td>
</tr>
<tr>
<td>(Class 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate Highway</td>
<td>1,0001-2,000</td>
<td>Bare pavement within 24 hours of the end of a winter storm.</td>
</tr>
<tr>
<td>(Class 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor Highway</td>
<td>501-1,000</td>
<td>Centre bare pavement within 24 hours of the end of a winter storm; fully bare pavement when conditions permit. (Centre bare means a 2.5m strip in the middle of the road.)</td>
</tr>
<tr>
<td>(Class 4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Highway</td>
<td>Fewer than 500</td>
<td>Snow packed driving surface within 24 hours of the end of a winter storm. Excess snow is plowed off and sand is applied where required to improve friction.</td>
</tr>
<tr>
<td>(Class 5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3 was created referencing bare pavement standards from (Ontario Ministry of Transportation, 2019)

These Levels of Service are intended to meet the roadway needs of residential, commercial, and commuter traffic at an economic cost under most road and weather conditions.

While this section's Levels of Service are for Caledon roads, it is acknowledged that conditions may occur which temporarily prevent achieving the Levels of Service assigned. In such cases, attempts should be made to keep roadways open by utilizing all resources available at maximum efficiency.

Salt should never be applied to snow packed gravel surface roadways or surface treated roads. This is because salt aids thawing of the snow pack during sunny periods, this increases the occurrence and severity of potholes in the snow pack and the gravel surface of the roadway. Make note about how salt will deteriorate the flexibility of the road.
3.5 Material Usage

In 2018-2019, the stockpile contained 100 percent salt for use on paved surfaces, while winter sand and three (3) percent salt mix was used to prevent freezing on gravel roads.

During the 2018/2019 winter season, salt brine was used as a pre-wetting agent in conjunction with on board pre-wet equipment. Moving forward in the 2019/2020 winter season the Town will be using treated salt instead of prewetting to ensure that all material is used the same and is not dependent on the ability of the piece of equipment or the operator to complete.

The use of calcium chloride for dust control during the summer months is a function of the number of gravel roads and general weather conditions. A continuation of the current program of paving rural gravel roads will achieve a reduction in calcium chloride usage. In 2019 the Town successfully surface treated 56.4 lane km of road. This will not only improve the driving experience for the roadway user but, will also improve the Town’s ability to winter maintain and reduce the amount of salt used in those areas. Table 3.4 portrays the chloride material usage over the past 5-year period.

<table>
<thead>
<tr>
<th>Winter Season</th>
<th>Salt Tonnes</th>
<th>Salt/Sand Mix Tonnes</th>
<th>Sand Tonnes</th>
<th>Liquid Liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018 - 2019</td>
<td>11729</td>
<td>4725</td>
<td>4500</td>
<td>182661</td>
</tr>
<tr>
<td>2017 - 2018</td>
<td>7119</td>
<td>6300</td>
<td>6000</td>
<td>182661</td>
</tr>
<tr>
<td>2016 - 2017</td>
<td>11183</td>
<td>7725</td>
<td>7500</td>
<td>151538</td>
</tr>
<tr>
<td>2015 - 2016</td>
<td>7679.94</td>
<td>5150</td>
<td>5000</td>
<td>288000</td>
</tr>
<tr>
<td>2014 - 2015</td>
<td>5972</td>
<td>5000</td>
<td>2000</td>
<td>25000</td>
</tr>
</tbody>
</table>

Table 3.4 Material Usage

3.6 Equipment

For winter maintenance the Town’s fleet consists of:

- 5 Light Duty Pick Up Trucks for parking lot maintenance;
- 7 Trackless machines for sidewalk maintenance;
- 4 Loaders;
- 2 Backhoe;
- 4 Graders;
- 14 Tandem combination spreader/plow/wing units; and
- 13 Single Axle combination spreader/plow units

This equipment is garaged at Yards 1 and 2.

Prior to each winter season the fleet undergoes a preseason mechanical review to determine road worthiness; the appropriate winter equipment is installed, and safety checked.

The Town has also equipped vehicles with computerized spreader controllers, air and pavement temperature sensors, and automatic vehicle location devices to maximize route and material application efficiency.
The tandem combination spreader/plow/wing units and the single axle combinations spreader/plow units are equipped with PolarFlex carbide blades and Highware Blades which maximizes snow removal efficiency while still ensuring the protect the wearing surface of the roadway.

All spreader units are tested and calibrated prior to each winter season and are tested periodically to ensure the right amounts of material are being applied.

3.7 Yard Facilities
The Town currently has 3 yards:

- Yard 1, Castlederg Road
- Yard 2, Quarry Road; and
- Yard 3, Highway 50/Columbia Way.

Table 3.7 provides a summary audit of these facilities. While Yard 3 does not contain winter material storage, it is used as a vehicle storage and mobilization area for winter operations.

There is a lack of containment cells for the existing salt brine tanks to contain leaks or a major tank rupture. Yard grading and paving of the outdoor circulation area would improve surface drainage and minimize ponding in all three yards. Plans are underway for Yard 1 and 2 for site improvements in the future which would accommodate these deficiencies. Ongoing Yard grading is completed at all locations. There is currently no set timeline for paving at any location.

3.8 Snow Removal and Disposal
The removal of snow from Town roadways and facilities is undertaken when the accumulation of snow impacts public safety, emergency access routes, street parking in commercial areas, vehicular and pedestrian traffic, and/or parking lot capacity. As well, cul-de-sacs having little or no capacity to store snow are candidates for snow removal.

<table>
<thead>
<tr>
<th>Location</th>
<th>Ground Conditions</th>
<th>Run off</th>
<th>Surrounding Land Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway 50 and Columbia Way</td>
<td>Paved, Unpaved</td>
<td>Controlled, Uncontrolled</td>
<td>East – Highway 50 West – Conservation lands North – Yard 3 South – Nursery/Residential</td>
</tr>
</tbody>
</table>

Table 3.5 Snow Disposal Site

Over the course of a normal winter some 300 truckloads of snow are hauled to one of the two sites:

- Vacant lands on the south side of Yard 3; and
- Region of Peel site, located in Alton (Porterfield Road/Peel regional Road 136)
Table 3.5 describes the general site conditions for the Town's snow storage area south of Yard 3. The storage site at Highway 50/Columbia Way accommodates the snow storage from the eastern sector of the Town. For the western sector, staff currently relies on the Peel Regional facility in Alton. Currently, the Region is reviewing their snow storage sites from an environmental perspective with a view to initiating best practices for the continued storage of snow and/or finding new storage sites.

3.9 Weather Monitoring and Communications
To supplement the Town road patrol information, staff interfaces with emergency service providers and Regional patrolers who monitor regional roads within Caedon. Staff are emailed 4 times per day from the Town's weather monitoring contractor with hourly and daily weather coverage. Staff also accesses the Weather Network website for event and forecast weather information. Weather forecasts are posted, as updates are received, at each yard so that staff who do not have access to the electronic copies are kept informed of the changes in the weather.

Infra-red thermometers (IRT’s) mounted on all of the winter maintenance fleet are capable of measuring pavement temperatures which further improves the storm response capabilities. All winter maintenance vehicles are equipped with two-way radios and staff is responsible for reporting changing weather and/or road conditions. External communication with the general public ranges from media press releases to responding to individual inquiries through the Town’s customer service centre.

3.10 Training and Documentation
The Finance & Infrastructure Services Department provides training for the Town’s maintenance staff annually. Each year the Superintendent, Roads & Fleet together with the key staff within the Department assesses the needs and available resources required for the winter maintenance staff training programs. All current winter maintenance staff have successfully completed training modules to effectively deal with ice/snow control. The Town continues to update their training modules to ensure that all winter road maintenance staff are current with the Regulatory requirements and industry best practices. Training is completed in both a classroom setting as well as hands on practical training.

Prior to each winter season, senior staff convene a full day winter focus session with staff to review the goals and objectives for the upcoming winter season, reinforce procedures and protocols, discuss equipment, material and timing requirements, assignment of tasks and schedules, health and safety issues, and clarify questions or any areas of concern. During the winter season daily meetings are held with the operators at the start of each shift to review operations, areas of concern, upcoming forecasted weather events, and compliance issues. All hazards, areas of concern, and equipment notes are tracked in the Town’s electronic asset and work order management system, hard copy tracking forms, as well as on white boards in the office of each yard to provide operators with the most up to date information possible. In addition, operator training courses and external winter maintenance seminars for supervisors and staff have been provided in the past.

Key staff maintains documentation on:
• Vehicle call numbers by staff;
• Employee/yard/key contacts;
• Sidewalk and walkway winter maintenance route inventory;
• Roadway snow plow routes; and
• Parking lot inventory.

On a daily basis, winter response details are summarized as outlined in Appendix B Daily Activity Sheet that supervisors, patrollers, and operators are required to complete and hand in. Town staff also retains records for the purchase of salt, salt brine, and winter sand. Staff utilized the download capabilities of the electronic controller on their spreaders to obtain detailed spread data by routes and winter events.

Staff have developed winter patrol routes which ensure that all areas are patrolled in a timely manner. These patrol routes are a series of representation roads and areas of winter concern. These routes are patrolled in addition to the daily patrols completed by staff. This is to ensure that the most area is covered in the shortest amount of time during a winter weather event to relay up to date road condition information to supervisory staff.
4.0 Salt Management Plan

4.1 Overview
This chapter will present the elements of the SMP for the Town of Caledon. The plan will outline the steps required to effectively manage road salt for winter maintenance activities within the Town, and will cover the following areas:

- Winter maintenance policies;
- Optimization of Winter Maintenance and Patrol Routes
- Equipment upgrading, calibration and washing;
- Materials ordering, delivery, storage, handling, and record keeping;
- Weather forecasting;
- Storm response;
- Snow removal and disposal;
- Snow and ice control training;
- Technology review;
- Communications strategy; and
- Environmentally sensitive areas.

These plans are not meant to be a comprehensive consideration of every possible best management practice, yet rather a listing of improvements that are seen to be beneficial and feasible considering current conditions. Each element within the plan will cover:

- The activity intent and current situation;
- The goals;
- The timetable for achieving the stated goals;
- The environmental impacts; and
- Performance measures.

The following provides the elements of the SMP pertaining to the Town of Caledon:

4.2 Winter Maintenance Policies

| General                  | • It is intended that the various policies relating to the winter maintenance program be reviewed on an annual basis to determine whether any revisions are required or warranted.
|                         | • Staff has established the level of service and maintenance operating guidelines in accordance with Minimum Maintenance Standard for Municipal Highways. Which have been accepted by the community; Council has also adopted a level of service policy for the winter maintenance of Town sidewalks and paths.
|                         | • Staff will continue to work in compliance with the Minimum Maintenance Standards for Municipal Highways.

| Goal/Timetable          | • Winter maintenance operating guidelines will be reviewed annually and updated as needed. If changes are required, Council endorsement is to be obtained. |
### Environmental Impacts

- Winter maintenance operating guidelines outline controls to be implemented to manage and prevent negative environmental impacts. Some examples would be a containment site for salt and salt brine storage facilities; another would be researching and testing more environmentally friendly alternatives to the deicer that the Town currently uses. Winter maintenance operating procedures are the foundation for program delivery and can have a significant impact on the environment.

### Performance Measure

- Updating SMP annually;
- # of Standard operating guidelines for winter maintenance reviewed annually; and
- # of training sessions to staff on operating procedures guidelines.

#### 4.3 Optimization of Winter Maintenance and Patrol Routes

<table>
<thead>
<tr>
<th>General</th>
<th>As the development of the Town increases the winter road maintenance and patrol routes will be modified to ensure maximum efficiency for snow and ice removal and monitoring.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal/Timetable</td>
<td>Updating maintenance and patrol routes prior to November 1st each year.</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Minimizing the fuel used by equipment and lowers the emissions from equipment.</td>
</tr>
<tr>
<td>Performance Measure</td>
<td>Maximizing the number of kilometers covered in the shortest amount of time ensuring that areas of concern are also included in the routes for both patrolling and maintenance.</td>
</tr>
</tbody>
</table>

#### 4.4 Equipment Calibration

| General | Properly calibrating equipment is important to the effective placement of deicer material on Town roadways.  
The spreaders are being calibrated and the spreader routes are benchmarked.  
The Ontario Good Roads Association's (OGRA) Good Practices for Winter Maintenance in Salt Vulnerable Areas are being reviewed to determine how best to apply them to the existing and updated maintenance routes. |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Goal/Timetable | All spreaders are to be calibrated and all routes benchmarked each year (i.e. calculate the theoretical material spread /km). During the winter season as the equipment comes in for maintenance the spreader units are to be checked and recalibrated as needed. As a minimum the calibration setting should be rescheduled mid-winter.  
All spreader operators to understand the reasons for the calibrations and how to operate the equipment correctly. |
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Impacts</strong></td>
<td>• Effective equipment calibration and maintenance will ensure that the proper volume of de-icing salts is spread onto the roadway, reducing the usage of road salt.</td>
</tr>
</tbody>
</table>
| **Performance Measure** | • Spreadsers calibrated by November 1st of each year.  
• Routes benchmarked by November 1st of each year.  
• Number of spreaders checked/recalibrated each year.  
• Comparisons are to be developed over the winter season:  
  ○ Material spread rates across routes, across vehicle units and across operators; of each spread and vehicle unit; and of actual spread ratio performance against industry spread rates. |

### 4.5 Equipment Washing

| **General** | • Reduce the amount of chlorides, oil, grease, and grit that is discharged into the environment.  
• All the equipment is washed outside.  
• Building revisions are being explored for Yard 2 to accommodate washing of equipment indoors and collection of all wash runoff. |
| **Goal/Timetable** | • All equipment washing will be brought inside to minimize any discharge into the environment.  
• Obtain proper curtains to minimize contaminants being released into the environment.  
• At the conclusion of each storm cycle, all vehicles involved in winter maintenance activities are to be washed and placed in readiness for the next storm event. |
| **Environmental Impacts** | • The treatment of wash water by removing chlorides, and oil/grease to suitable levels prior to discharge into the natural environment. |
| **Performance Measure** | • Percentage of vehicles washed indoors and passed through oil/water separator before being placed in readiness for the next shift. |

### 4.6 Material Ordering, Delivery, Storage, and Handling

| **General** | • Maintain best practices and procedures in the ordering, delivery of deicer materials, handling, and storage of winter maintenance materials.  
• In the fall season salt, winter sand, and salt brine is delivered and stockpiled at Yards 1 and 2. |
Goal/Timetable

- Tracking of inventory for materials on site, materials being taken to apply on roads, and materials being returned to the stockpile.
- Complete tracking of material with every delivery from suppliers as well as during and after every winter weather event using operators, material tracking and equipment timesheets.
- Minimize salt loss to the environment by taking the following measures:
  - Deliveries of salt and sand are covered with a waterproof tarp and occur in good weather.
  - Loading pads are swept clean following the transfer of the materials to storage.
  - Salt brine tanks have been inspected for leaks and transfer areas are in place to prevent major spills to accepting salt brine deliveries.
  - Storage tanks are protected against damage from vehicles.
  - Storage tanks possess automatic shut off valves.
  - Planning to install containment units for all liquid storage tanks.
  - All deliveries are to be recorded.
  - The initial stockpiling at each yard should be completed prior to October 31st of each year. During the initial stockpiling a sample to ascertain the material gradation and moisture content shall be completed and appropriate action taken should the samples fail.
  - Loading and unloading spreaders occurs on impervious surfaces. Any material spilled on the impervious surface is collected and conveyed back into the storage area.
  - Spreaders are not loaded beyond their capacity.
  - No frozen chunks of material are placed in the spreaders while loading. Any frozen chunks are to be placed in a
corner of the storage area and allowed to thaw and dry prior to placing the material back in the stockpile.
  o Review area lighting daily and report any issues to Supervisor.
  o Document the inspection and repair of storage structures and report any issues to Supervisor.
  o When replacing a storage, a storage structure or adding a new structure the TAC Code of Practice for Design and Operation of Road Maintenance Yards shall be followed.
  • Grading and paving of the yard is required to improve drainage and direct overland run off to areas of runoff collection.
  • Review designs for secondary containment of the salt, brine tanks as well as for drainage tanks for the salt storage areas.

| Environmental Impacts | Reducing amounts of salt being delivered and stored onsite.
|                       | Lowering the possibility of accidental material release into the environments surrounding the stockpile locations.
|                       | Improve housekeeping practices relating to the delivery, storage, and handling of salt will decrease the loss to the environment.

| Performance Measure | Tracking amount of inventory delivered and comparing it to the amount of material applied to roads and sidewalks.
|                     | Percentage of deliveries tared/orderd in good weather.
|                     | Percentage of material put into inside storage within 24 hours.
|                     | Percentage of liquid material placed in containment tanks without incident.
|                     | Percentage of material deliveries passing gradation and moisture contents.
|                     | Loading pad thoroughly cleaned following transfer of material to storage.
|                     | Review compliance through a yard inspection following each winter.

### 4.7 Material Record Keeping

<table>
<thead>
<tr>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Retain an accurate record of the amount of material used by route, vehicle, and storm event.</td>
</tr>
<tr>
<td>• Material usage by route, vehicle, and storm summaries are reported by daily Operator logs. Material usage is rationalized by comparing the amount of material ordered with the residual inventory.</td>
</tr>
<tr>
<td>• Staff have a process for downloading data from the electronic controllers; currently creating process to review and analyze data collected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Goal/Timetable</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The material tracking system by vehicle, route, and storm. This information has been compared to the benchmark information collected in past years. By providing an accurate records of material usage, staff are able to ensure the amount of material to be spread is appropriate for varying climatic and road conditions.</td>
</tr>
<tr>
<td>Environmental Impacts</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Performance Measure</td>
</tr>
</tbody>
</table>

### 4.8 Weather Forecasting

| General | • Provide timely and accurate weather information to assist in decision making.  
• Staff have access to various meteorological sources (Section 3.9). In addition to the weather forecast data, the Town’s supervisory and patrol fleet are equipped with IRT’s to measure pavement and air temperatures. |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Goal/Timetable | • Continue to utilize the pavement and air temperature data from the IRT’s to assist in decision making of when to apply material.  
• Continue to use meteorological services to obtain accurate weather forecasting information four (4) times daily through the winter season.  
• Ensure that the weather forecast data is made available to the appropriate supervisory staff and after-hours patrol staff.  
• Explore opportunities and options with the Region in providing enhanced forecasted and real time weather and pavement information on Town Roads. |
| Environmental Impacts | • The effective use of de-icing material is dependent on accurate weather information and informed decision making. Inaccurate weather information and/or misinformed decision making can result in untimely and/or unnecessary use of salt. |
| Performance Measure | • Delivery of clear, accurate weather forecast at least 4 times daily between November and April each year. |
### 4.9 Storm Response

| General | • Provide criteria and guidelines to standardize staff response for various combinations of precipitation, pavement temperatures, and traffic volumes.  
• Staff react to visual patrols and weather reports from various sources to initiate the mobilization of the operators for plowing and de-icing actions. General guidelines are available to patrollers and operators for storm response.  
• The Town of Caledon has implemented 24/7 coverage for when winter events occur. |
|---|---|
| Goal/Timetable | • A 2 to 5-year goal will be to monitor the records of storm response in relation to the established guidelines to assess any necessary changes.  
• Understand and document storm response approaches for different storm scenarios and improve upon practices. |
| Environmental Impacts | • Snow and ice control decisions that are not consistent with actual road conditions will lead to inefficiencies and inappropriate material usage. |
| Performance Measure | • Accurate and complete record of winter event |

### 4.10 Snow Disposal Sites

| General | • Examine the Town’s existing snow disposal site to reduce or eliminate the environmental impacts.  
• Collected snow is stored in the Town of Caledon’s Yard 3. There has been no benchmark established to determine the levels of salt, oil/grease, and sedimentation at the Yard. The Region of Peel is in the process of assessing the environmental issues surrounding their snow storage areas. |
|---|---|
| Goal/Timetable | • Plan for monitoring of Yard 3 to determine the levels of salt, oil/grease, and heavy metals present. Monitoring would occur prior to, during, and immediately after the winter season. The results of the monitoring program would be used to initiate the mitigation of any adverse environmental impacts which have been identified.  
• Each spring, all litter and debris are collected from the snow storage area and disposed of.  
• Staff are to develop a long-term strategy for snow removal from Town facilities which may include the use of mechanical melters, new storage sites, revised criteria for removal, and site-specific storage design (i.e. ensure storage areas have impervious lines and melt water directed to a collection area prior to its release into a storm water system).  
• Best Practices for site operation and record keeping as it related to snow storage areas (Synthesis of Best Practices, Road Salt |
<table>
<thead>
<tr>
<th>Environmental Impacts</th>
<th>Management, Transportation Association of Canada) are followed on an annual basis.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Review of the snow disposal site and the disposal operations together with a long-term strategy for snow removal operations can lead to a reduction of environmental impacts.</td>
</tr>
<tr>
<td>Performance Measure</td>
<td>Compliance with Ministry of Environment and Climate Change regulations.</td>
</tr>
<tr>
<td></td>
<td>Monitoring of the surface water and soil to see if the it complies with the Ministry of Environment and Climate Change's specifications.</td>
</tr>
</tbody>
</table>

### 4.11 Winter Patrol and Level of Service

<table>
<thead>
<tr>
<th>General</th>
<th>It is intended that winter road conditions are monitored in an appropriate fashion to be able to react to changing weather and road conditions and to ensure that the levels of service for the monitoring public are maintained.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Town provides a patrol to inspect and monitor roads conditions in compliance with the Provincial Minimum Maintenance Standards.</td>
</tr>
<tr>
<td></td>
<td>It should be noted that in providing 24-hour around the clock winter patrol between November and April each year, staff resources are stretched (in some cases beyond the limit) in dealing with “hot spots” between storms, response to public inquiries, and adhering to. Regional patrol offices offer updates and information on road conditions which help to supplement in between shift changes at the Town.</td>
</tr>
<tr>
<td></td>
<td>Winter patrol is completed prior to and throughout the duration of a winter weather event by road supervisors and alternate staff.</td>
</tr>
<tr>
<td>Goal/Timetable</td>
<td>The operating procedures are to be reviewed annually to ensure that the guidelines are consistent with the Town’s level of service expectations.</td>
</tr>
<tr>
<td></td>
<td>Review and update annually patrol routes.</td>
</tr>
<tr>
<td></td>
<td>Provide training and retraining to supervisory and patrol staff annually.</td>
</tr>
<tr>
<td></td>
<td>Complete winter weather road patrol tracking forms prior to and throughout each winter weather event</td>
</tr>
<tr>
<td></td>
<td>Relay information to supervisory staff prior to and throughout winter weather events to ensure they are receiving the most up to date road condition statuses.</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Accurate interpretation of conditions and appropriate levels of action to provide safe road conditions will result in timely and efficient application of winter de-icing materials, therefore, lowering the amount of salt on the roads.</td>
</tr>
<tr>
<td>Performance Measure</td>
<td>Percentage of staff trained in snow and ice decision making.</td>
</tr>
</tbody>
</table>
### 4.12 Snow and Ice Control Training

| General | · All staff involved in snow and ice control and effective salt management are adequately trained.  
· Staff receives training on an annual basis which is geared to upcoming winter season, any legislative changes, and hands on training to ensure winter readiness. |
| --- | --- |
| Goal/Timetable | · All staff is trained, and their training is refreshed annually in snow and ice control including salt management practices, training modules are to be provided in the following areas:  
  o Review of good housekeeping practices;  
  o Interpretation of weather and pavement conditions;  
  o Proper use of infrared thermometers;  
  o When and how to apply chemicals;  
  o Understanding of the environmental impacts;  
  o Health and safety requirements, environmental concerns; and  
  o Proper record keeping and review.  
  o Appendix C provides Winter Treatment Chart Priority I & II |
| Environmental Impacts | · Good housekeeping practices, the measures of snow and ice control, proper training in salt management, and the expectations of program delivery will result in a greater probability of success with the salt management plan. |
| Performance Measure | · Percentage of staff receiving snow and ice control training. |

### 4.13 Communications Strategy

| General | · A communications strategy with respect to the Town’s winter maintenance program is effectively communicated to not only staff but also the public.  
· The Town posts a brief winter road operations message on the time to clear roads following winter events.  
· Staffs have produced an Operations Manual which provides:  
  o Key staff contact list with emergency telephone numbers.  
  o Sand/salt, plow, and patrol routes.  
· The Town has partnered with the Region of Peel and the CVC to improve our communication strategies with municipalities and the public including education about the proper uses of road salt. |
| --- | --- |
| Goal/Timetable | · Develop a Communications Plan for Winter Maintenance by 2020.  
· Annually inform Council, public, and local regulatory agencies about Caledon’s Salt Management Plan and current actions. |
<table>
<thead>
<tr>
<th>Environmental Impacts</th>
<th>Notify Environment Canada upon completion of the Salt Management Plan and update them annually on the status of Salt Management activities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Measure</td>
<td>Increased awareness of the role and management of snow and ice control in winter maintenance operations will provide the area residents and staff with greater understanding of the challenges in combating winter storms.</td>
</tr>
<tr>
<td>Performance Measure</td>
<td>Annual revision of Winter Maintenance and Control guidelines.</td>
</tr>
</tbody>
</table>
5.0 Monitoring and Updating

The Salt Management Plan is intended as a starting point for the Town of Caledon to proceed with the implementation and continuance of best management practices for winter maintenance operations. The long-term goal of this plan is to protect the environment from excessive concentrations of road salts while at the same time, ensure that winter roads and their users are kept safe.

The Salt Management Plan proposes goals and estimated timelines for implementation by Caledon. Subject to endorsement and resource allocation by Council, the plan elements are to be programmed into the capital and operating budgets.

As well, in order that Environment Canada is kept abreast with the existence of a Salt Management Plan, its stage of implementation and the use of road salts, each municipality has been requested to submit a report by June 30th, 2004 and every June 30th thereafter.
Glossary of Terms

**Anti-icing:** means the application of liquid deicers directly to the road surface in advance of a winter event.

**Continuous Winter Event Response:** is a response to a winter event with full deployment of manpower and equipment that plow/salt/sand the entire system.

**De-icing:** means the application of solids, liquids, pre-treated material to the road surface after the on-set of the winter event.

**Highway:** includes a common and public highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle, any part of which is intended for or used by the general public for the passage of vehicles and includes the area between the lateral property lines thereof.

**Paved Road:** is a road with an asphalt surface, concrete surface, composite pavement, or Portland cement.

**Pre-treat:** means the application of liquids (calcium chloride, sodium chloride, etc.) to dry sand or salt prior to being loaded for storage or applied to the road surface.

**Pre-wetting:** means the application of liquids (calcium chloride, sodium chloride, etc.) at the spinner of the truck just prior to application to the road surface.

**Surface Treated Road:** is a road with bituminous surface treatment comprised of one or two applications of asphalt emulsion and stone chips over a gravel road.

**Spot Winter Event Response:** is a response to a winter event with only a part deployment of manpower and equipment or with full deployment to only pari of the system.

**Unpaved Road:** is a road where the surface is not paved i.e. gravel is the wearing surface.

**Winter Event:** is a weather condition affecting roads such as snowfall, wind-blown snow, freezing rain, frost, black ice, etc. to which a winter event response is required.

**Winter Event Response:** is a series of winter control activities performed in response to a winter event.

**Winter Event Response Hours:** are the total numbers of person-hours per year (plowing, salting/sanding, winging back, etc.) to respond to winter events.
References


IN THIS SECTION:

- Staff Report 2004-31 Winter Operations Sidewalk Maintenance
Report 2004-31

To: Mayor and Members of Council

From: C. A. Campbell, C.E.T.
      Acting Director, Public Works & Engineering

Meeting: October 26, 2004

Subject: WINTER OPERATIONS - SIDEWALK MAINTENANCE

RECOMMENDATION

1. It is recommended that Council for the Corporation of the Town of Caledon adopt Public Works and Engineering Report 2004-31, Winter Operations – Sidewalk Maintenance;

2. That Public Works and Engineering continue to maintain the existing service level;

3. And that as our community grows, this service level should be re-evaluated to determine financial impacts.

ORIGIN/BACKGROUND

The Town provides winter operations on sidewalks and walkways for safe passage of members of the public.

A review of Town of Caledon service obligations was presented to Council in Infrastructure Report 2001-13, September 2001.

As a result of that report, Council directed that staff provide an expanded service for winter operations on all sidewalks in the Town of Caledon.

Costs for delivery of the existing service level, are in the order of $128,000.00.

Prior to the winter of 2001 residents were required by By-law 93-21 to remove snow and ice off sidewalks in front of their properties where the Town was not providing winter maintenance. Town staff were responsible for the enforcement of that by-law.
DISCUSSION

Existing Service Delivery

Town staff currently provides winter maintenance on approximately 91 km of sidewalks and paths, based on priorities for areas of high pedestrian use, business areas, and routes for children walking to schools.

Existing sidewalks have been broken into two categories in the table below, primary and secondary routes. (See Appendix A for routes)

### Sidewalk Plow Routes

<table>
<thead>
<tr>
<th>Village</th>
<th>Primary Routes (m)</th>
<th>Secondary Routes (m)</th>
<th>Total (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alton</td>
<td>3,949</td>
<td>0</td>
<td>3,949</td>
</tr>
<tr>
<td>Caledon East</td>
<td>5,500</td>
<td>3,568</td>
<td>9,068</td>
</tr>
<tr>
<td>Caledon Village</td>
<td>3,787</td>
<td>0</td>
<td>3,787</td>
</tr>
<tr>
<td>Inglewood</td>
<td>1,240</td>
<td>0</td>
<td>1,240</td>
</tr>
<tr>
<td>Mayfield West</td>
<td>3,897</td>
<td>3,897</td>
<td>7,794</td>
</tr>
<tr>
<td>Palgrave</td>
<td>2,886</td>
<td>0</td>
<td>2,886</td>
</tr>
<tr>
<td>North Bolton</td>
<td>6,605</td>
<td>9,910</td>
<td>16,515</td>
</tr>
<tr>
<td>Central Bolton</td>
<td>12,815</td>
<td>5,490</td>
<td>18,305</td>
</tr>
<tr>
<td>South Bolton</td>
<td>14,300</td>
<td>14,300</td>
<td>28,600</td>
</tr>
</tbody>
</table>

**Total Distance**

<table>
<thead>
<tr>
<th></th>
<th>Primary Routes</th>
<th>Secondary Routes</th>
<th>Total (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>54,524</td>
<td>55,320</td>
<td>91,689</td>
</tr>
</tbody>
</table>

|                  | 54.5 km        | 55.3 km          | 91.7 km   |

Service Delivery Option I

Service Delivery Option I would continue to provide winter maintenance on all sidewalk routes, with safe access depending on weather conditions, within 48 hours following a storm.

When back to back storm conditions dictate, priority service will be focussed on (priority routes) streets exceeding an average annual daily vehicular traffic of 1,000 or within 500m of schools. All remaining sidewalk routes (secondary routes) would be plowed once normal operations have been restored.

Under extreme weather conditions, Public Works and Engineering may postpone service on secondary routes.
The service level for winter maintenance on municipal sidewalks is based on:

a) one side of the street on sidewalks and paths within settlement area boundaries,

b) both sides of the street on Regional Roads, and Queensgate Blvd,

c) not through parklands, or open spaces where street based links are available.

Where sidewalks exist on both sides of a street, the Public Works and Engineering Department will determine the most effective side to be clear based on safety, connectivity of routes, and maintenance demand.

Service Delivery Option II

Service Delivery Option II would provide winter maintenance only on the priority sidewalk routes, no service would be provided on the remaining secondary routes. Safe access to the priority routes would be provided depending on weather conditions within 48 hours following a storm.

Option II will provide safe pedestrian access on cleared sidewalks, however there will be sidewalks in the town that will not be maintained through the entire winter season. Residents will be required to clear the sidewalks adjacent to their property in accordance with By-law 93-21.

Risk Assessment

The Municipal Act provides that the municipality is liable in gross negligence if a personal injury is caused by the presence of snow or ice on the sidewalk. The Town of Caledon has received very few of these claims.

In the circumstances of this report, if Council were to select Service Delivery Option II, this would mean a reduction in the level of winter maintenance on sidewalks. Such a reduction would require the Town to notify those homeowners and pedestrians who are accustomed to sidewalks being cleared by the Town that this service is no longer being provided so that they have notice of the need to be more careful.

Preferred Service Delivery Option

Public Works and Engineering recommends winter maintenance on Town sidewalks and paths based on the service standard outlined in Option I. This option will continue to provide adequate safe pedestrian access to sidewalks, and mitigate the Town's risk associated with winter maintenance. Operationally this standard will be more efficient in deployment of resources decreasing non-productive "deadheading" from one location to another.
Equipment Requirements for Service Delivery

For the past four years winter sidewalk maintenance has been delivered by Town staff using park turf lawn mowers equipped to clear and sand sidewalks. This strategy has resulted in a significant maintenance demand to keep the equipment operational during the winter season, and lead to a shortened life cycle of the equipment.

Staff researched equipment that could be effective for both summer turf and winter sidewalk maintenance, and concluded that no joint use piece of equipment could be recommended. Therefore it was not recommend that the park turf equipment purchased this year be outfitted with any attachments for winter sidewalk operations.

Rental equipment dedicated to winter sidewalk maintenance has been confirmed for the upcoming winter season.

FINANCIAL

Funding is included in the Operating Budget for delivery of winter operations sidewalk maintenance. The budget includes funding for equipment, and for manpower to deal with this service.

Staff estimate the total cost for delivery of Option I for winter operations sidewalk maintenance over the next season, depending on winter conditions, is in the order of $128,000.00.

- Equipment @ $75,000.00
- Manpower @ $45,000.00
- Material @ $2,500.00
- Miscellaneous repairs due to winter damage @ $5,500.00.

If alternative service delivery Option II is preferred, staff estimate that one piece of equipment and one operator would be removed from the operation. Savings for the reduced service level would be in the order of $24,500.00, for a total program cost in the order of $103,500.00.

Funding will need to be identified in the 2005 and future Operating Budgets to continue to provide winter operations on sidewalks to meet the Town's approved service standard and legal responsibility.

CALEDON COMMUNITY WORK PLAN

N/A

CONSULTATIONS

Town Counsel
Risk Management Committee
Public Works and Engineering Supervisory and Management Staff.
POLICIES/LEGISLATION

Town of Caledon Service Standards

ATTACHMENTS

Priority sidewalk routes for 2004/2005 winter season.

CONCLUSION

The Town of Caledon has provided winter operations maintenance on all sidewalks for the last three seasons.

There are savings associated with Option II for winter operations maintenance on priority sidewalks. However, in the interests of safety, uniform service delivery and continuity of pedestrian access, Town of Caledon Public Works and Engineering staff recommend that the Corporation of the Town of Caledon endorse preferred Option I for winter operations maintenance on sidewalks across the entire Town.

Prepared by:
Robin L. Dunn, C.E.T., PAdm.
Manager of Public Works
Public Works & Engineering

Approved by:
C. A. Campbell, C.E.T.
Acting Director
Public Works & Engineering
Appendix B

IN THIS SECTION:

- Town of Caledon Daily Activity/ Hours of Work Time Sheet
### Daily Activity/Hours of Work Timesheet

**Employee #**

**Employee Name:**

**Employee Signature:**

**Authorization:**

<table>
<thead>
<tr>
<th>Location/Road Section</th>
<th>RT</th>
<th>OT</th>
<th>DT</th>
<th>#</th>
<th>Hours</th>
<th>Activity #</th>
<th>Activity Description</th>
<th>Work Units</th>
<th>Traffic Prog. Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comment:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MATERIALS</strong></td>
<td>Description:</td>
<td>Unit:</td>
<td>Quantity:</td>
<td>Description:</td>
<td>Unit:</td>
<td>Quantity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comment:</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>MATERIALS</strong></td>
<td>Description:</td>
<td>Unit:</td>
<td>Quantity:</td>
<td>Description:</td>
<td>Unit:</td>
<td>Quantity:</td>
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</tr>
<tr>
<td><strong>Comment:</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>MATERIALS</strong></td>
<td>Description:</td>
<td>Unit:</td>
<td>Quantity:</td>
<td>Description:</td>
<td>Unit:</td>
<td>Quantity:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Personal Protective Equipment for all jobs includes: Safety Boots, Vests and Hard Hats**

**Hours of Work Daily Record Status – Day Starts at 7:00 a.m. 7-Day Cycle Declared (Daily Status Total Must Equal 24)**

<table>
<thead>
<tr>
<th>Status Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

**Off Duty**

Off Duty

**On Duty (Driving)**

On Duty (Driving)

**On Duty (Not Driving)**

On Duty (Not Driving)

**Pavement Temperature**

Pavement Temperature

<table>
<thead>
<tr>
<th>Status Total</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td></td>
</tr>
</tbody>
</table>

---

**Start Time __________________**

**Finish Time __________________**
<table>
<thead>
<tr>
<th>Winter Maintenance Materials</th>
<th>Drive Times - Route Activity Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route</td>
<td>Salt</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Material Returned</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
IN THIS SECTION:

- Recommended Treatments for Level I – Bare Pavement

- Recommended Treatments for Level II – Snow Packed Roadway
<table>
<thead>
<tr>
<th>TEMPERATURE RANGE (Celsius)</th>
<th>TYPE OF PRECIPITATION</th>
<th>ROAD SURFACE CONDITION</th>
<th>ACTIVITY</th>
<th>RECOMMENDED TREATMENTS FOR LEVEL 1 - BARE PAVEMENT LEVEL OF SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>BEGINNING OF STORM</td>
<td>DURING STORM (1)</td>
</tr>
<tr>
<td>1 Below -18°C.</td>
<td>Dry Snow</td>
<td>No Packing</td>
<td>Plowing</td>
<td>YES: After 6 cm. of Snow Accumulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry Pavement</td>
<td>Sanding</td>
<td>YES: ONLY IF SLIPPERY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>NO</td>
</tr>
<tr>
<td>2 -18°C. to -12°C.</td>
<td>Dry Snow</td>
<td>No Packing</td>
<td>Plowing</td>
<td>YES: After 6 cm. of Snow Accumulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry Pavement</td>
<td>Sanding</td>
<td>YES: ONLY IF SLIPPERY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>NO</td>
</tr>
<tr>
<td>3 -12°C. to -7°C.</td>
<td>Dry Snow</td>
<td>Packing</td>
<td>Plowing</td>
<td>YES: If Temp. Rising: After Salting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sanding</td>
<td>YES: If Temp. Falling: After 6 cm. Accum.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YES: If Temperature Rising: To Bare or Assist In Baring Pavement</td>
</tr>
<tr>
<td>4 -12°C. to -7°C.</td>
<td>Dry Snow</td>
<td>No Packing</td>
<td>Plowing</td>
<td>YES: After 6 cm. of Snow Accumulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sanding</td>
<td>YES: If Temp. Falling: Only if Slippery</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>NO</td>
</tr>
<tr>
<td>5 -12°C. to -7°C.</td>
<td>Dry Snow</td>
<td>Packing</td>
<td>Plowing</td>
<td>YES: 0.5 Hours After Salting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sanding</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>YES: If Temp. Rising: Before 1.0 cm. of Snow Accumulation</td>
</tr>
<tr>
<td>6 Above -7°C.</td>
<td>Wet Snow</td>
<td>Packing</td>
<td>Plowing</td>
<td>YES: 0.5 Hours After Salting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sanding</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>YES: Before 1.0 cm. of Snow Accumulation</td>
</tr>
<tr>
<td>7 Above -7°C.</td>
<td>Sleet Or Freezing Rain</td>
<td>Possible Icing</td>
<td>Plowing</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wet Pavement</td>
<td>Sanding</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salting</td>
<td>YES</td>
</tr>
</tbody>
</table>

NOTES:
1. During storm conditions, plowing should be undertaken to ensure that the snow accumulation on the road surface DOES NOT EXCEED 6.0 cm. for Priority I Level of Service.
2. After the storm, plowing should continue to achieve Bare Pavement or to achieve being of the centre 2.5 metres of pavement within 24 hours, whenever possible, then sand full width when favourable weather prevails. Winging back of the roadway shoulder areas should usually be done only ONCE after the storm.
3. Recommended treatment for various conditions shown on this chart should be used IN MOST CASES however, unusual circumstances may necessitate departure from the recommended treatment.
4. Temperature rising means temperature to remain in or rise above the temperature range shown.
5. Temperature falling means temperature to remain in or fall below the temperature range shown.
<table>
<thead>
<tr>
<th>TEMPERATURE RANGE (Celsius)</th>
<th>TYPE OF PRECIPITATION</th>
<th>ROAD SURFACE CONDITION</th>
<th>ACTIVITY</th>
<th>BEGINNING OF STORM</th>
<th>DURING STORM (1)</th>
<th>AFTER STORM (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Any Temperature</td>
<td>Dry or Wet Snow</td>
<td>Snow Packed</td>
<td>Plowing</td>
<td>YES: CONTINUOUS (Maintain Snow Packed Condition)</td>
<td>YES: Wing Back Shoulder Areas; Scarify Slippery Sections; Cleanup</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sanding</td>
<td>NO</td>
<td>ONLY IF REQUIRED: On Hills, Curves, Hazardous Locations, and Slippery Sections</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sating</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>2</td>
<td>Any Temperature</td>
<td>Sleet or Freezing Rain</td>
<td>Possible Icing</td>
<td>Plowing</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sanding</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sating</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Any Temperature After Storm</td>
<td>No Precipitation</td>
<td>Drifting</td>
<td>Plowing</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td>Sanding</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES: 1. Recommended treatment for various conditions shown on this chart should be used IN MOST CASES however, unusual circumstances may necessitate departure from the recommended treatment.

2. During storm conditions, plowing should be undertaken to ensure that the snow accumulation on the road surface DOES NOT EXCEED 8.0 cm. for Priority II Level of Service.

3. Winging back of the roadway shoulder areas should usually be done only ONCE after the storm.