

### **CITY OF TORONTO**

**Transportation Services Division** 







June 2021

## **CITY OF TORONTO**

**Transportation Services Division** 

## SALT

## **MANAGEMENT**



August 2021

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## **DA TORONTO**

## **INTRODUCTION**

#### **1.0INTRODUCTION**

#### 1.1 Overview

Toronto has approximately 5100 kilometres of roads within the framework of a classification system, which provide for the safe, efficient and affordable means of surface transportation for all road users. We rely on this roadway network throughout the year for transport to the workplace, to recreation and leisure facilities, for the transport of goods and services, and for emergency and security services.

Snow and ice conditions on the road system have a dramatic impact on public safety, roadway capacity, travel time and economic costs. User safety, both pedestrian and driver, remains the most important priority within winter maintenance operations, practices and strategies contained in the Salt Management Plan.

Although there is ongoing research into the use of alternatives to road salt (sodium chloride) in winter maintenance, salt continues to be the most cost-effective de-icer across Canada. However, because of the adverse effects that salt has on the environment, the City of Toronto's Salt Management Plan strives to minimize the amount of salt entering the environment by including best salt handling practices and new technologies to ensure its most effective use over the road system.

The review strategy in the Salt Management Plan requires that new technologies be investigated and that trials be conducted on promising developments and discussed in annual assessments.

On December 1, 2001 Environment Canada published the results of a fiveyear assessment on the effects of road salts on the environment. The assessment concluded that road salts were, in fact, having an adverse effect on freshwater ecosystems, soil, vegetation, and wildlife. In response to the report, Environment Canada assembled the multistakeholder-working group that would go on to develop the "Code of Practice for the Environmental Management of Road Salts" released in April 2004.

The main objective of the Code of Practice is to ensure environmental protection while maintaining roadway safety. Under the Code, all public entities that use 500 tonnes of road salts per year or more and/or have any environmentally vulnerable areas must prepare a salt management plan within a year of the official release of the Code. The Transportation Association of Canada has also prepared and released a "*Syntheses of Best Practices*" in the fall of 2003 which is intended to be used in conjunction with the Environment Canada's Code of Practice.

In a proactive response to both the growing environmental concerns regarding road salt, and the assessment undertaken by Environment Canada, the City of Toronto's Transportation Services began the preparation of a Salt Management Plan in 2001. The Plan was completed in April 2002 and was distributed to managers and operations staff for review and implementation. As an ongoing consequence of the Salt Management Plan, Transportation Services has initiated better handling and washing practices at all City facilities while at the same time continuing to ensure road safety by better managing the City's use of salt. The initial City of Toronto Salt Management Plan submission was filed with Environment Canada in June, 2005.

The City of Toronto's Salt Management Plan continues to be updated.

#### **1.2 Purpose of Document**

The Salt Management Plan is intended to set out a policy and procedural framework for ensuring that the City of Toronto continuously improves the management of road salt used in winter maintenance operations.

Any modifications to the City's winter maintenance activities must be carried out in a way that provides roadway safety and user mobility consistent with the weather conditions experienced during the snow and ice control season.

The Salt Management Plan is dynamic – allowing the City to phase in new approaches and technologies in a way that is responsive to fiscal demands and needs, and that works to ensure that roadway safety is not compromised.

#### **1.3 Legislative Authority**

The City of Toronto is mandated under Ontario Regulation 612/06, Minimum Maintenance Standards for Highways in the City of Toronto, to maintain public roads in a good state of repair. The City's winter operations, standards and guidelines were most recently prescribed in a report to the Public Works & Infrastructure Committee, dated October 28, 2013, titled "Confirmation of Levels of Service for Roadway and Roadside Winter Maintenance Services (see Appendix A).

#### **1.4 Format of Document**

*Chapter 2.0* of this Plan presents the Policy Direction approved by the City of Toronto Council.

*Chapter 3.0* of this Plan presents the Winter Maintenance Policies that are relevant to salt management.

**Chapter 4.0** of this Plan presents the summaries of Operational Practices and Strategies for Snow and Ice Control as they relate to the effective management of road salt. This chapter is presented as a series of sub-sections that can be modified as new policies, procedures and practices are introduced and refined.



*Chapter 5.0* of this Plan presents the approach to monitoring the implementation of the Plan and to maintaining and updating the Plan.

#### **1.5 Responsibilities**

*General Manager, Transportation Services* – Responsible for ensuring that the Salt Management Plan is developed, maintained, and implemented throughout the City of Toronto.

*District Directors,* – Responsible for ensuring that the Salt Management Plan is developed, maintained, and implemented within each District of the City of Toronto.

*District Road Operations Managers* – Responsible for ensuring that the Salt Management Plan is developed, maintained, and implemented in all District Operational Yards of the City of Toronto.

*District Senior Engineers, Superintendents and Supervisors* – Responsible for ensuring that winter maintenance activities are carried out in a way that complies with the Salt Management Plan.

*Winter Maintenance Personnel* – Responsible for ensuring that they carry out their winter maintenance duties in accordance with the policies and procedures set out in the Salt Management Plan as directed by their Supervisors.

## SALT MANAGEMENT POLICY

#### 2.0 SALT MANAGEMENT POLICY

#### 2.1 Vision, Mission, Mandate

#### Vision

The City of Toronto's Transportation Services Division will be recognized as a leader in using de-icers in an environmentally sensitive manner while providing for safe road and sidewalk conditions during the winter season.

#### Mission

The City of Toronto's Transportation Services Division will optimize the use of de-icers on Toronto's roads and sidewalks while striving to minimize salt impacts to the environment.

#### Mandate

The City of Toronto's Transportation Services Division is to provide safe winter conditions for vehicular, pedestrian and cycling movements as required by level of service policies and funding guidelines established by Toronto City Council.

#### 2.2 Policy Statement

The City of Toronto will provide effective winter maintenance to ensure the safety of users of our road network in keeping with applicable Provincial Legislation and accepted standards, while striving to minimize the adverse effects that road salt can have on our environment. To meet this commitment the City of Toronto will:

- Meet and adhere to the guidelines contained within the Salt Management Plan;
- Strive to review and upgrade, as necessary, the standards contained in the Salt Management Plan on an annual basis to take into account new technologies and developments;
- Work with Environment Canada, other transportation agencies and environmental groups to upgrade best winter practices; and
- Commit to ongoing staff training and education.

#### 2.3 Application

This policy is adopted by the City of Toronto's Transportation Services Division and applies to all employees involved in Winter Maintenance Operations.

#### 2.4 Conditions

The following principles will guide the ongoing process to upgrade the Salt Management Plan:

- The Plan is activity-based and follows an Environment Management System framework consistent with the principles of continual improvement. It includes the following elements:
  - Periodic Review and Analysis of Industry Practices;
  - Implementation and Documentation of the Plan;
  - Education and Training of Staff;
  - Monitoring and Analysis;
  - Management Review;
  - Environmental Review; and
  - Practices and Policy Revision.
- The Plan will be reviewed and refined on an on-going basis.

#### 2.5 Implementation

The goal of the Policy Statement is to promote the continuous development of practices and procedures to improve winter maintenance activities while striving to reduce the effects of salt on the environment.

## WINTER MAINTENANCE POLICIES

#### **3.0 WINTER MAINTENANCE POLICIES**

#### **3.1 Introduction**

The major activities related to winter maintenance are:

- Salt and sand storage;
- Salt/sand spreading;
- Snow plowing (roads, sidewalks, laneways);
- Snow removal and disposal from City streets;
- Snow clearing at bus stops; and
- Windrow programme for residential driveways.

#### **3.2** Winter Operations – Road De-Icing and Plowing

The City's level of service policy for roadway de-icing, roadway plowing and driveway windrow opening is provided in Appendices 1 & 2 of the October 28, 2013, report to the Public Works and Infrastructure Committee and subsequently adopted by Toronto City Council. That reports is attached to this document as Appendix A.

Within this framework, District Road Operations Managers are allowed some latitude regarding frequency and timing of applications. Application rates have now been harmonized across the City, which were established through past practices within our urban environment.

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Direct liquid application was introduced during the winter season of 2003-2004. Our current program includes different scenarios for direct liquid application. The standard application rate is 100 litres per lane km. Liquid salt brine may be applied to, hills and bridges during shoulder seasons in advance of a forecast frost event, hills and bridges during the winter season or to designated plow routes in advance of a forecast snow event where it is anticipated that road plows will be activated. Road Operations staff pay close attention to RWIS data and to the regular weather forecasts as provided by the weather forecast provider. With this technique, liquid chemicals are applied prior to a storm and they are allowed to work on roads before snow accumulates on the road and plowing is required. It is not our practice to apply liquid in the absence of a forecast event. Guidelines were laid out so that anti-icing was not to occur more than twelve hours prior to the forecast event as determined by RWIS data or weather forecasts. This was intended both to allow the weather forecast to be as accurate as possible and to ensure that applications would remain on the road. It should be noted that the City does not have at this point, the capability to liquid anti-ice the entire road network or any road classification in its entirety. The focus for anti-icing at this stage is on bridge decks and "priority locations" around the City.

Our present guideline is to apply a solid or solid/pre-wetted de-icer once snow starts to accumulate or "stick" on expressways, arterial roads, and collector roads. This proactive strategy reduces the amount of material that would be lost if solid de-icer was applied onto dry pavement prior to a storm. This also ensures timely applications on major expressways and arterials (i.e. within the first hour of any significant snow or ice accumulation). Timely application of chemicals is critical to preventing snow from sticking to roads. Without the timely application of chemicals, snow could easily bond to roads and in turn become difficult to plow, potentially causing road hazards. As snow accumulates, it is plowed to maintain safe driving conditions. The City still uses traditional methods on local roads that allow for an initial application of de-icer (salt) followed by plowing when storms end or accumulate to a prescribed threshold (8 cm). The development of the capability to apply pre-wet salt to local roads is currently a work in progress and several districts are making significant advances.

Currently the City of Toronto application rates for the application of dry salt on expressways, arterials, and collector roads are; 70kg/lane-km, 140 kg/lane-km and 180 kg/lane-km. Pre-wetting was first introduced to the Winter Maintenance Depots in 2003-2004 when 1/3 of the arterial road salt trucks were equipped with pre-wetting. A further 1/3 of arterial road salt trucks were outfitted with pre-wetting equipment for the winter of 2004-2005 and the final 1/3 were equipped for the winter of 2005-2006. A full 100% of the salt trucks in Winter Maintenance Depots 1 - 14 are now equipped with pre-wetting. The introduction of pre-wetting on salt trucks saw a phased-in reduction of the straight granular application rates of up to 15%. A 10% reduction in dry application rates on all trucks equipped with pre-wetting was achieved in 2004/2005 and reductions of 15% were achieved in limited trials in Toronto - East York District. Whenever pre-wet salt is applied there is now a standard 10% reduction in the dry application rate. The current rate of pre-wetting on conventional side discharge spreaders is 6% by volume.

#### **3.3 Pilot Projects**

Since the introduction of the SMP the city has continued to explore new and emerging technologies through a series of pilot projects. Liquid pilot projects first began in 2001 with the retrofitting of three trucks for prewetting and direct liquid applications. There are now approximately 200 trucks equipped with liquid capability that can be traced back to this initial pilot project. Subsequent pilot projects have focused on pre-wetting and direct liquid application while using alternative liquids with several objectives; to find a liquid pre-wetting agent that would lower the eutectic temperature of salt/salt brine, to reduce salt usage, and to better manage the application of salt. In addition to the work with liquids, pilot projects have dealt with the introduction of GPS/AVL, innovative plow blades, spreader control technologies, combination salter/plow units and snow removal operations.

#### **3.4** Snow Removal and Disposal

As a result of snow plowing operations, snow accumulates at the side of roads as windrows. The City initiates snow removal operations when these windrows reach volumes that create a nuisance or hazard to pedestrians and motorists, to maintain capacity for subsequent snowfalls, or after a designated Type 4 storm.

Experience over the years has shown that the City must have the capability and capacity to remove and dispose of 150,000 loads of snow in a twoweek period. There is currently a capacity shortfall of approximately 50,000 loads. Snow removal operations involve the use of in-house mobile and stationary melters, snow blowers, front-end loaders and trucks in conjunction with various contracted equipment.

Over the years the City has used 30 different land disposal locations, two portable stationary melters, five mobile melters and one sewer snow disposal site to dispose of snow. Many of the snow disposal sites had environmental and operational constraints. Concerns over the potential environmental impacts of these sites led to a Snow Disposal Study in the year 2002. As part of this process, the disposal sites were evaluated on the basis of environmental and technical criteria. As a result of this study, the City has closed several sites and has improved the environmental protection measures at those sites that will continue to operate. There are currently only five snow disposal sites in the City of Toronto.

The City of Toronto sees melting as opposed to snow disposal sites as the way of the future as regards Snow Removal. Where possible, the objective is to melt the snow either onsite or as close to the site as possible. To this end, the City purchased a 350 tons/hr melter in 2005 and two 150 tons/hr mobile melters in 2010.

#### **3.4.1 Snow Disposal Policy**

The City's level of service policy for snow removal is provided in Appendix 4 of the October 28, 2013, report to the Public Works and Infrastructure Committee and subsequently adopted by Toronto City Council. That report is attached to this document as Appendix A.

Snow removal follows the timetable and details outlined in the City's Snow Removal Plan. Snow will be removed from roadways once the net snow accumulation has reached the trigger levels presented in the level of service table. Snow that is removed from roads must only be disposed of at designated Snow Storage Sites. Appendix I shows the City's Guidelines for Snow Removal and Disposal and included the locations of the City's Snow Storage Sites and snow melter locations.

#### 3.5 Sidewalk Snow Clearing

Mechanical sidewalk snow clearing is required along selected eligible sidewalks in the City as adopted by Council at its meeting of July 24 to 26, 2001 and as reported to the Works Committee on September 4, 2001. These levels of service were reconfirmed in October, 2008 and in October, 2013 through separate reports to the Public Works and Infrastructure Committee. Some 6000 km of sidewalk from the 7945 km total are to be mechanically cleared.

The standard of service adopted by Council provides for the clearing of sidewalks approximately twenty four times per winter season. The operation is generally deployed at a total accumulation of 2cm on high and low pedestrian volume sidewalks. Some discretion is necessary in light of prevailing and forecast weather conditions. The entire operation is to be completed within approximately 13 hours of the end of a Type 1(up to 5cm) snowfall, although in high pedestrian traffic areas this may vary due to the need to undertake the work at night for safety reasons. This operation provides a basic level of service, clearing a walking path of about 1.2 m in width, although not to bare pavement, as surface undulations must be accommodated for. Area Managers are allowed latitude in cases of freezing rain. Salt/Sand mixtures appropriate to the conditions are used as required after plowing to provide grit and traction on sidewalks. This salt/sand mixture is placed at an application rate of 100kg/sidewalk km. Criteria established to assist with the determination were as follows:

- (i) Streets greater than 8 m in width;
- (ii) Sidewalks greater than 1.5 m in width;
- (iii) Sidewalk not immediately adjacent to the street;
- (iv) Parking not immediately adjacent to the sidewalk; and
- (v) No obstructions such as utility poles, planters, or retaining walls, immediately adjacent to, or within, the sidewalk that would create significant potential for damage or an operating

safety concern for the equipment operator or members of the public;

(vi) Consideration to be given to whether the mechanical clearing could be done in a contiguous area. Figure 3.5.1 shows the boundaries of the different levels of possible sidewalk snow clearing.

Within the Toronto & East York District, most sidewalks adjacent to local roads do not meet established guidelines and, as such, adjacent residents are required under existing by-laws to clear the snow from sidewalks. The attached schematic map highlights that the implementation of local sidewalk snow clearing in the central areas of the City would present significant challenges due to the preponderance of narrow streets and sidewalks, amount and location of on-street parking, location of above ground utilities and retaining walls, planters, landscaping, garbage collection from the sidewalk, street furniture and lack of boulevard, or front yard snow storage space. There are vast areas where a North York District-style sidewalk plowing operation is not feasible. As well, there are other areas where some streets and blocks are feasible, while others are not.

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## OPERATIONAL PRACTICES & STRATEGIES

#### 4.0 OPERATIONAL PRACTICES AND STRATEGIES

#### 4.1 Overview

This Chapter of the Plan presents a discussion of each of the key operational practices and strategies related to the effective management of road salt during winter maintenance activities.

Each subsection has a summary that presents a discussion of the subject's objectives, environmental considerations, current situations, goals, responsibilities, performance measures and references (documents or tables). Table 4.1.1 provides the summary template for this Chapter and explains the intent of each category.

It is important to recognize that the Plan is dynamic and will take time to implement. Therefore the purpose of this Chapter is to establish the goals of the Plan and a strategy for achieving these goals.

SUBJECT		
OBJECTIVE	This section states the salt management objective that is to be achieved.	
ENVIRONMENTAL CONSIDERATION	It is important that people understand the rationale behind the need to make changes. This section briefly identifies the environmental considerations that make it important to address the subject area.	
CURRENT	This section identifies the status of the subject area at the time of initial	
SITUATION	implementation of the Plan and is revised in subsequent versions of the Plan	
	as the current situation evolves.	
GOAL	The plan must have clearly stated goals and timetables. This section states	
	the goal and timetable for each subject area.	
RESPONSIBILITIES	The Plan must have people assigned the responsibility to implement the	
	elements of the plan. This section assigns responsibilities for each goal.	
PERFORMANCE	It is important to monitor and measure the progress of implementing each	
MEASURE	element of the Salt Management Plan. This section will establish the criteria	
	for measuring performance.	
REFERENCES	This section identifies any reference documents or tables related to this	
	section of the Plan or that provide more detailed direction regarding	
	implementation of the salt management strategy.	

#### TABLE 4.1.1 – SUMMARY TEMPLATE

#### 4.2 Management Practices

#### 4.2.1 Level of Service

LEVEL OF SERVICE	
OBJECTIVE	To ensure that the City's Level of Service (LOS) policy is reviewed and that
	any revisions are approved by Council and communicated to winter
	maintenance personnel.
ENVIRONMENTAL	The prescribed level of service is the foundation for winter maintenance
CONSIDERATION	programs and has a significant impact on salt use.
CURRENT	The City's LOS policy was reviewed and most recently revised in 2013 and
SITUATION	is presented in SMP Appendix A. This objective is now complete.
GOAL	Obtain Council endorsement of the LOS Policy.
	Monitor compliance with the LOS Policy.
RESPONSIBILITIES	General Manager, Transportation Services
PERFORMANCE	Presence of a written LOS policy that has been approved by Council.
MEASURE	
REFERENCE	SMP Appendix A

#### 4.3 Equipment

#### 4.3.1 Fleet Upgrading

ELECTRONIC SPREADER CONTROLS	
OBJECTIVE	To equip all spreaders with electronic spreader controls that are regulated to
	ground speed and generate appropriate salt-use data.
ENVIRONMENTAL	Electronic controllers ensure that a consistent amount of salt is being placed
CONSIDERATION	on roadways and provide data that permits salt use to be tracked.
CURRENT	Currently 100% of spreaders (City and contract) have ground speed
SITUATION	regulated electronic spreader controls.
GOAL	• By 2008 all equipment used to spread salt shall have ground speed
	regulated electronic controllers. (Carried forward to 2011)
	• As part of the 2015 – 2022 winter maintenance contracts all salt
	spreading trucks are now equipped with ground speed regulated
	electronic controllers.
	This objective is now complete.
RESPONSIBILITIES	Contract Inspection and Area Operations Manager(s) – To ensure that all
	new spreaders have ground speed regulated
	electronic controller.
	Fleet Management – Develop a replacement strategy that removes old
	equipment from service, or temporarily relocates them
	to low-salt routes.
PERFORMANCE	Percentage of salt placed by spreaders with electronic controllers, and
MEASURE	ground speed control.
	(Summer Audit 2001 – 89%, Summer Audit 2005 – 98%, Summer Audit
	2015 - 100%)
REFERENCE	Table 5.3.1 – Salter Fleet Audit

PRE-WETTING AND ANTI-ICING EQUIPMENT		
OBJECTIVE	To improve the effectiveness of salt applied to roadways by introducing the use	
	of pre-wetting of salt, and anti-icing techniques.	
ENVIRONMENTAL	Pre-wetting of salt helps to keep the salt on the roadway by reducing bounce and	
CONSIDERATION	activating the salt more quickly. Studies show that the actual amount of rock salt	
	applied can be reduce when pre-wetting.	
CURRENT	• To introduce pre-wetting on 2 units of the fleet by March of 2002 for trials in winter 2002/2003 (done)	
SHOMMON	<ul> <li>Consider requirement for pre-wetting on all contracted units by the fall of</li> </ul>	
	2003 – considered 2003-2005 Arterial Contracts to have provisions for pre-	
	wetting, $1/3$ for 2003/2004, $2/3$ for 2004/2005, and a fleet for 2005/2006	
	season. Further, one anti-icing truck is to be required in each arterial road	
	contract. (done)	
	• To run trials on anti-icing in winter 2002/2003. (done)	
	• Convert 2 flushers to anti-icing capability for fall of 2003. (done)	
	• The primary liquid used for both pre-wetting and anti-icing is salt brine.	
	• City of Toronto specifications for pre-wetting and anti-icing trucks were	
	introduced in the winter of 2003/2004.	
	• Standardized application rates for pre-wetting and anti-icing were also	
	introduced in the winter of 2003/2004.	
	• The City of Toronto also took delivery of 5 in-house Epoke units in March	
	2004.	
	• All salt spreaders are currently equipped with pre-wetting capability as part	
	of the 2015-2022 winter maintenance contracts.	
GOAL	• To introduce pre-wetting on 5 Epoke units for the 2004/2005 season(done).	
	• All new in-house trucks to be equipped with pre-wetting and/or anti-icing	
	capabilities for 2005 and beyond(ongoing)	
	• The Winter Maintenance Subcommittee to review the need for additional	
	Anti-icing vehicles following the completion of 2003-2008 winter	
	• 100% of all solters to be agained with pro-watting by 2011	
	<ul> <li>Too% of all safets to be equipped with pre-wetting by 2011.</li> <li>This objective is now complete.</li> </ul>	
DESDONSIBIL ITIES	Contract Inspective Is now complete.	
RESPONSIBILITIES	- Responsible for developing and implementing the fleet upgrade	
	program	
	– Monitor implementation.	
	<ul> <li>Identify candidate equipment to add pre-wetting units to.</li> </ul>	
	Operations – Develop a spec for pre-wetting and anti-icing units. (done)	
	Operations – Develop a spec for a new spreaders unit for future orders. (done)	
PERFORMANCE	Application rates for pre-wetting and liquid anti-icing introduced in fall	
MEASURE	2003.	
	• Number of units with pre-wetting capabilities as compared to the previous	
	year (Base Audit – 0, Summer Audit 2005 – 89, Summer Audit 2009 - 171).	
	• Number of yards with liquid anti-icing capabilities as compared to the	
	previous year (Base Audit – 0, Summer Audit 2004 – 12, Summer Audit	
	2009 - 17)).	

	• Overall percentage of fleet with pre-wetting capabilities as compared to the previous year (Base Audit 2001 – 0%, Summer Audit 2005 – 43%, Summer Audit 2009 – 77%).
	• Overall percentage of yards with anti-icing capabilities as compared to the previous year (Base Audit 2001–0%, Summer Audit 2004–50%, Summer Audit 2009–55%).
	• One anti-icing truck in each Winter Maintenance Depot contract.
REFERENCE	Table 5.3.2 – Salter Fleet Audit – Pre-wetting, Anti-icing and Calibration

#### 4.3.2 Equipment Maintenance and Calibration

SPREADER CALIBRATION	
OBJECTIVE	To ensure that equipment is properly calibrated at the beginning of the snow
	and ice control season and that calibration is checked and maintained during
	the winter season.
ENVIRONMENTAL	Effective placement of salt depends on accurate calibration of spreaders.
CONSIDERATION	
CURRENT	In 2003, 94% of salter units were calibrated. During any season, Operations
SITUATION	is required to re-calibrate any spreader that is using too little or too much
	salt. Most of the spreaders that are not being calibrated do not have
	electronic controllers. The maintenance of calibration records needs to be
	improved. Standardized Salter Calibration Forms and procedures were
	developed and distributed to the Manager in 2002 for the 2002/2003 season.
	• 100% of all salters were calibrated for the 2015/16 season.
GOAL	• All spreaders shall be properly calibrated each fall.
	• All beats to be benchmarked annually according to the designated
	spreader settings.
	• Salt use will be checked after each storm to highlight equipment that
	needs to be re-calibrated.
	• A calibration history for all spreaders will be maintained by designated
	Supervisors and reviewed annually.
	This objective is now complete.
RESPONSIBILITIES	Contract Inspection and Area Operations Manager(s)
	- Require all contractors and designated Supervisors to file
	calibration records for contracted out and in-house spreaders
	by December 1 <sup>st</sup> each season.
	Supervisors – Establish a benchmark usage for all beats for each of the
	spreader settings and compare actual usage against the
	benchmark for each run. Investigate and correct any
	discrepancies and re-calibrate spreaders within 48 hours of
	identification of a calibration discrepancy.
PERFORMANCE	• Percentage of spreaders calibrated by December 1 <sup>st</sup> annually (Base Audit
MEASURE	2001 –76%, Summer Audit 2005 – 89%, Summer Audit 2009 – 93%)
	• Percentage of beats benchmarked by December 1 <sup>st</sup> annually (done
	annually)
REFERENCE	Table 5.3.2 – Salt Fleet Audit



#### 4.3.3 Equipment Washing

EQUIPMENT WASHING		
OBJECTIVE	To ensure that equipment washwater is managed in a way that minimizes	
	discharges to the environment.	
ENVIRONMENTAL	Vehicle washwater contains sodium, chlorides, oil, grease, and grit. If	
CONSIDERATION	allowed to discharge to ditches or within the yards and depots, these	
	contaminants can have adverse effects on the environment.	
CURRENT	• Vehicle washing is occurring at 71% of Yard/Depot facilities (2003).	
SITUATION	• Washwater is passed through oil/water separators before being	
	discharged at 94% of the sites (17% in 2001/2002 and 48% in	
	2002/2003).	
	• Contractors are permitted to wash vehicles at camps.	
	• During the 2002/2003 season, 2 yards washed salters at other sites with	
	proper washing facilities until proper washing facilities were	
	established.	
GOAL	• By fall 2003 (carried forward to 2004), all City vehicle washing shall be	
	carried out indoors and washwater shall pass through oil/water	
	separators before being discharged to storm sewers, whenever possible.	
	• Outdoor washing facilities with oil/water separators shall be installed at	
	all depots by fall 2003. (carried forward to 2015)	
	• For 2017/18, 100% (17/17) of facilities that allow onsite vehicle	
	washing are equipped with an oil/grit separator	
	• This objective is now complete.	
RESPONSIBILITIES	General Manager – Responsible for ensuring that policies are developed and	
	implemented as funding is made available.	
	Contract Inspection and Area Operations Manager – Responsible for	
	ensuring that policies are followed.	
	Superintendents – Responsible for ensuring that vehicle washing is being	
	carried out in accordance with City policies.	
	Superintendents – By the end of 2003 (revised), arrange outdoor washing	
	facilities with oil/water separators at all depots where	
	vehicle washing is being carried out.	
	Superintendents – By the fall of 2003 (revised), arrange to install indoor	
	truck-washing facilities at designated transportation yard	
	facilities.	
PERFORMANCE	Percentage of facilities where washwater is passed through oil/water	
MEASURE	separators before being discharged (Base Audit 2001 – 17%, Summer Audit	
	2005 – 94%, Summer Audit 2017 – 100%)	
REFERENCE	Table 5.4.2.4 – Facilities Audit	



#### 4.4 Materials

#### 4.4.1 De-icer Ordering and Delivery

DE-ICER ORDERING AND DELIVERY		
OBJECTIVE	To ensure that salt is kept as dry as possible while being delivered and	
	placed in storage facilities.	
ENVIRONMENTAL	• Improper handling and storage of salt can increase loss to the	
CONSIDERATION	environment.	
	• Excessive moisture creates clumping of salt, making salt unusable.	
CURRENT	Rock salt (sodium chloride) is the de-icer most used by the City of	
SITUATION	Toronto. It is tendered in bulk for use by various departments and	
	agencies within the City. Transportation Services accounts for more than	
	90% of the tender for sodium chloride use on roads and sidewalks. Salt is	
	delivered in the fall and is properly scheduled to ensure orderly stockpiling	
	without delays into the storage structure.	
GOAL	• Tarps shall be used on all truck deliveries from the mines and/or salt	
	depots.	
	• De-icer shall be ordered on a more regular basis to provide for deliveries	
	during better weather to facilitate orderly stockpiling into storage facilities	
	at the yards or depots.	
	This objective is now complete.	
RESPONSIBILITIES	Purchasing – The Salt RFQs must comply with these policies – Tender	
	changed for 2001-2003 and included in subsequent	
	procurement processes.	
	Supervisors – Responsible for monitoring salt deliveries to determine	
	compliance with these policies.	
PERFORMANCE	• Percentage of deliveries that are tarped (100% in 2003).	
MEASURE	• Salt is to be moved into storage on same day as it is delivered	
	(100% in 2001)	
REFERENCE	Summary of De-icer Deliveries – Appendix E	

#### 4.4.2 De-icer Record Keeping

DE-ICER RECORD KEEPING		
OBJECTIVE	To provide an accurate record of salt usage by route and vehicle.	
ENVIRONMENTAL	Effective salt management requires an accurate understanding of how much	
CONSIDERATION	salt is being used, and where. It is not sufficient to measure gross totals since	
	these can vary widely year-to-year due to weather fluctuations.	
CURRENT	• Load-rites are used to measure the amount of salt loaded onto spreaders at some yards	
SHOTHOR	<ul> <li>Contractors use salt load measuring devices at most of the camps</li> </ul>	
	<ul> <li>Solt usage is recorded for most of the runs.</li> </ul>	
	<ul> <li>Data from alactronic controllers are downloaded, checked and attached to</li> </ul>	
	daily log sheet for most of the runs.	
	• Salt use is rationalized at the end of each season by comparing the amount	
	of salt ordered to residual and usage data where it is available.	
	• Usage logs are compared to the benchmarks at the end of each day to check calibration	
	<ul> <li>Salt delivery records and end-of-season residual are logged to allow for</li> </ul>	
	year-end reconciliation of salt use.	
GOAL	• Loading data will be obtained for each spreader after every run.	
	• Benchmarking for each beat is established annually.	
	• A standardized usage log was implemented during the 2002-2003 season.	
	(done) Form 02 – Operational Salting Record	
	• Salt delivery records and end-of-season residual will be logged to allow for year-end reconciliation of salt use. (Done April 2003)	
	• This objective is now complete.	
RESPONSIBILITIES	• Management – Responsible for design and implementation of the salt tracking system and doing AVL trials	
	<ul> <li>Contract Inspection and Area Operations Manager(s) – Responsible for</li> </ul>	
	Benchmarking each beat.	
	• Supervisors – Responsible for ensuring that the necessary equipment is	
	available and operating to measure the amount of material placed into the	
	- Responsible for summarizing the data from electronic controllers	
	at the end of each storm.	
	In-house Operators / Contractors	
	<ul> <li>Responsible for completing the "Daily Sanding, Salting and</li> </ul>	
	Plowing" forms at the end of each day, signing it and	
	returning it to the supervisor.	
	• Supervisor – Responsible for comparing the usage to the benchmark and	
	signing the record before sending the record to file	
	• Superintendent – Responsible for periodically comparing salt use by	
	storm amongst Depots and Districts to test consistency.	
PERFORMANCE	• Beat mapping complete for 2003-2008 contracts & 2008-2015 contracts.	
MEASURE	• Completion of year-end salt reconciliation. (done annually)	

	• AVL trials carried out during 2004-2005. 100% of arterial road salt trucks
	equipped with AVL.
	• Percentage of daily records completed accurately.
	• District compliance with reporting measures for salt usage.
	• Timely reporting of year-end and season end salt usage to Financial
	Services.
	65% compliance in completion of Salt Usage Summary
REFERENCE	Form – Daily Sanding, Salting and Plowing form – Appendix E

#### 4.4.3 Sand/Salt Blends

SAND/SALT BLENDS		
OBJECTIVE	To optimize the amount of salt in sand/salt blends required to maintain	
	sidewalks.	
ENVIRONMENTAL	High amounts of salt in sand/salt blends can result in unnecessarily high	
CONSIDERATION	quantities of salt entering the environment for the task.	
CURRENT SITUATION	• No sand/salt mixtures are to be used on roads commencing in the 2002-2003 season. (done)	
	• Sand and salt mixtures are now used wherever mechanically possible to provide traction on sidewalks after sidewalk plowing is completed.	
	• Mixes vary from 50/50 salt to sand to 90/10. The sand provides grit and traction until the de-icing occurs.	
	• Approved practice is to apply a sand/salt mix appropriate to conditions at a target rate of 100kg/linear km	
	• The practice in the last two years has been to move towards higher salt	
	concentrations due to sand clogging spreader units.	
GOAL	• To reduce the amount of salt in sand/salt blends to the level required to achieve traction and sufficient de-icing.	
	• To record amounts of salt and sand being applied to sidewalks within two years.	
	• To conduct pilot project within two years to explore feasibility of direct liquid application on sidewalks (done in NYD for 2009/2010). No	
	further plans to expand direct liquid application to sidewalks.	
	• This objective is now complete.	
RESPONSIBILITIES	Operations – Responsible for resolving the issue of sand clogging the	
	sidewalk sanding equipment. (not done)	
	Management - Responsible for investigating the merits of other sand/salt	
	blends and testing lower salt options.	
PERFORMANCE	• Percentage of salt in sand/salt blends.	
MEASURE		
REFERENCE	None	



#### 4.4.4 Material Storage

SALT STORAGE		
OBJECTIVE	All de-icing chemicals shall be stored inside proper storage structures in order	
	to minimize loss of salt to the environment.	
ENVIRONMENTAL	If not properly stored, de-icing chemicals can be lost to the environment in	
CONSIDERATION	large quantities due to exposure to precipitation and wind. This loss can be	
	costly due to the actual loss of salt and can also lead to environmental harm.	
CURRENT	• The City currently stores salt at 18 sites.	
SITUATION	• 100% of the sites (80 % - Base Audit in 2001) where salt is stored has the	
	salt placed inside structures.	
	• 100% of storage is on impermeable pads for City owned sites.	
	• 100% (75% - Base Audit in 2001) of the sites have loading pads.	
	• 88 % (50% - Base Audit in 2001) of the sites are graded to ensure that	
	water runs away from the storage structure.	
GOAL	• By fall 2003 all salt shall be stored inside buildings on impermeable floors	
	(done).	
	• All new maintenance facilities will be designed in accordance with the	
	principles set out in TAC's Code of Practice for the Design of	
	Maintenance Yards.	
	• This objective is now complete.	
RESPONSIBILITIES	Operations – Proceed with the planning, design, acquisition and construction	
	of new and upgraded salt storage facilities to ensure that all salt	
	is stored inside a building. (Reference: TAC Code of Practice	
	for the Design of Road Maintenance Yards)	
	Supervisor – Ensure that all salt is under cover.	
PERFORMANCE	• Percentage of salt storage locations with inside storage (Summer Audit	
MEASURE	2005 - 100%).	
REFERENCE	• Table 5.4.2.1, Table 5.4.2.2	
	BLENDED SAND STORAGE	
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OBJECTIVE	All blended sand shall be stored so as to minimize loss to the environment.	
ENVIRONMENTAL	If not properly stored, de-icing chemicals in blended sand can be lost to the	
CONSIDERATION	environment in large quantities because of exposure to precipitation. This loss	
	can be costly due to the actual loss of salt and can lead to environmental harm.	
CURRENT	• The City currently stores sand/salt blends at 16 sites (Base Audit 2001 -	
SITUATION	18) across the City.	
	• Sand/salt blends are currently stored inside domes (Summer Audit 2005	
	- 63%).	
	• 40% of outside storage is tarped (Base Audit 2001 – 73%).	
	• 100% of outside storage is placed in small plastic 'cover-all' structures.	
GOAL	• At a minimum, 100% of all salt/sand blends to be stored on impermeable	
	pads under tarps for 2004 (carried forward to 2005).	
	• Desired objective is to have 100% of all salt/sand blends stored inside	
	some type of fixed structure on impermeable pads.	
	• This objective is now complete.	
RESPONSIBILITIES	Area Operations Manager	
	<ul> <li>Ensure that all sand/salt blends are stored under cover.</li> </ul>	
	Management – Proceed with the planning, design, acquisition and	
	construction of new and upgraded storage facilities to	
	ensure that all sand/salt blends are stored inside a building.	
	(Reference: TAC Code of Practice for Design of Road	
	Maintenance Yards)	
PERFORMANCE	Percentage of sand/salt blends stored inside (Summer Audit 2005 -	
MEASURE	63%).	
	• Percentage of sand/salt blends stored inside (Summer 2016 - 100%).	
REFERENCE	• Table 5.4.2.3.	

# 4.4.5 Good Housekeeping Practices for Maintenance Yards and Depots

GOOD HOUSEKEEPING PRACTICES		
OBJECTIVE	To ensure that practices at salt storage and handling facilities are geared	
	towards reduction in salt loss to the environment.	
ENVIRONMENTAL	Improper handling of salt at maintenance facilities can result in significant	
CONSIDERATION	amounts of salt being lost to the environment. Good housekeeping practices	
	can help to reduce this loss.	
CURRENT	• In the past, the City had informal understandings about good	
SITUATION	housekeeping at its yards and depots. The City now has documented	
	guidelines for City staff and contractors.	
	• OGRA training package delivered annually to Inspectors, Operators and	
	Supervisors in beginning in 2003 includes modules on good housekeeping	
	and best handling practices.	
GOAL	• Implement the guidelines for Good Housekeeping Practices.	
	• This objective is now complete.	
RESPONSIBILITIES	Contract Inspection and Area Operations Managers	
	<ul> <li>Ensure that the guidelines for Good Housekeeping Practices</li> </ul>	
	are implemented.	
	Senior Engineers, Superintendents & Supervisors – Inspect yard and depots	
	to ensure that the guidelines for Good Housekeeping Practices	
	are followed.	
	Operations Personnel – Comply with the guidelines for Good Housekeeping	
	Practices	
PERFORMANCE	• Audit compliance through periodic yard and depot inspections.	
MEASURE		
REFERENCE	Appendix F – Guidelines for Good Housekeeping Practices	

## 4.5 Storm Response

## 4.5.1 Weather Forecasting

WEATHER FORECASTING		
OBJECTIVE	To provide timely and accurate weather information to assist in snow and ice	
	control decision-making.	
ENVIRONMENTAL	Effective use of salt is dependant upon good snow and ice control decision-	
CONSIDERATION	making, which in turn depends on good weather information.	
	Salt can be wasted if information is inaccurate or not timely.	
CURRENT	• The City of Toronto uses a private forecasting service, DTN, to provide	
SITUATION	four standard daily reports that are sent by E-mail to all Transportation	
	Services Operations Managers, Superintendents and Supervisors and	
	faxed to all Transportation yards. New criteria for weather forecast	
	reports were developed in 2001.	
	• Weather training is delivered annually to Superintendents, Supervisors, Inspectors & Patrollers by DTN	
GOAL	Develop on component with a weather provider to provide dedicated	
UUAL	• Develop an agreement with a weather provider to provide dedicated forecasts and web site before the start of each snow and ice controls	
	season. (done)	
	• Ensure that weather data is integrated with RWIS information. (done)	
	• Provide access to Doppler radar for all personnel making call-out	
	decisions (done).	
	• Provide annual training in use of weather information(done).	
	OGRA training program developed with weather component for fall 2003     by the Ontario Road Salt Management Group	
	• Finalized version of AASHTO Anti-icing/RWIS Computer Based	
	Training Program to be completed by Superintendents. Supervisors and	
	Inspectors by December 2004 (done)	
	• Annual agreement with DTN to provide weather forecasting and RWIS	
	hosting services	
	This objective is now complete.	
RESPONSIBILITIES	Management – Develop training modules for Management Staff on radar,	
	web site use $-2002$ (done $-VAM$ provided)	
	Contract Inspection and Area Operations Manager – Arrange to provide all	
	key stall with access to weather forecasting	
PERFORMANCE	Delivery of clearly formatted weather forecasts to those that need them	
MEASURE	four times per day between October 1 <sup>st</sup> and April 30 <sup>th</sup> of each year (done	
	annually)	
	• Percentage of decision-making staff trained in interpreting weather	
	forecasts.	
REFERENCE	Table 5.5.1.1, Table 5.5.1.3, and Appendix G – Sample weather forecast –	
	Figure G-1	

<b>ROAD WEATHER INFORMATION SYSTEMS / INFRARED THERMOMETERS (IRT)</b>		
OBJECTIVE	To provide forecasted and real-time pavement information to assist with snow	
	and ice control decisions.	
ENVIRONMENTAL	Snow and ice control decisions that are based on road temperature as well as	
CONSIDERATION	air temperature information are more accurate and also result in better salt use.	
CURRENT	• Four RWIS stations were installed in 2001 and are functioning for the	
SITUATION	2003/2004 season. Access to shared MTO information was made	
	available starting in January 2003. Arrangements have been made to	
	integrate weather and pavement condition forecasting services. All	
	staff have been introduced to the merits of pavement temperature	
	forecasts from RWIS system during 2001, with a renewed fall training	
	program for the 2002/2003 season. (Base Audit $2001 - 7$ hand held	
	and 3 truck mounted, Summer Audit 2005 – 9 hand held and 56 truck mounted IRTs).	
	• All existing RWIS stations were upgraded in 2009/2010	
	• Fifth RWIS station installed in 2012 on FGGE at DVP	
	• Sixth & seventh RWIS stations installed in 2017 in Etobicoke-York	
	District	
	• Eighth RWIS station installed in 2018 in Toronto & East York District	
	as part of the York-Bay-Yonge FGGE off ramp Fixed Automated	
	Spray Technology (FAST) system.	
	• Four RWIS stations were upgraded in 2020	
GOAL	• Contract with a private company to provide pavement condition	
	forecasts and web site prior to each season.	
	• Train decision-making staff on the use of pavement condition forecasts	
	and pavement temperature data annually.	
	• Install additional RWIS stations and Snow Gauges by 2018. Three	
	additional stations were installed in 2017-2018.	
	• This objective is now complete.	
RESPONSIBILITIES	• Operations to arrange for pavement condition forecast training.	
	• Contract Inspection Manager(s) – to arrange for acquisition, installation	
	and training on IRTs.	
PERFORMANCE	• Availability of pavement forecasts for maintenance staff. (All supervisors	
MEASURE	and winter contract inspection staff have computer access to new web site)	
	• Number of staff trained on the use of pavement condition forecasts.	
	• Number of IRTs in use. (Summer Audit 2005 – 63 IRTs throughout the	
	whole City)	
REFERENCE	• Table 5.8.1, Table 5.8.2 and Appendix G – Table G-1	

## 4.5.2 Storm Response and Communications

STORM RESPONSE AND COMMUNICATIONS		
OBJECTIVE	To provide criteria and guidelines to standardize storm response and	
	communications across the City.	
ENVIRONMENTAL	Snow and ice control decisions and communications that vary across the	
CONSIDERATION	City may lead to inefficiencies in responses and can ultimately result in less	
	efficient salt use.	
CURRENT	• Guidelines have been developed for storm response and communications.	
SITUATION	• Winter Communications Protocol designed for 2003/2004 to ensure co-	
	ordinated mobilization of winter equipment across District boundaries	
	(done).	
	• District Winter Communication Centres developed in 2008.	
	• Toronto Snow School introduced in 2011 and delivered annually.	
	• Social media account @TO_WinterOps implemented in 2014 to distribute	
	winter maintenance operations information to media and residents	
	• Public facing website showing real-time location of salt trucks, plows and	
	sidewalk machines implemented in 2015 <u>www.toronto.ca/plowTO</u>	
GOAL	• Provide annual training on storm response and communications (done).	
	• Winter Maintenance Subcommittee to review mobilization procedures	
	during summer 2005 to ensure consistent mobilization across District	
	boundaries (done).	
	• Annual Toronto Snow School training program to be developed and	
	delivered annually (done).	
	• Enhanced social media and internet presence (done).	
	• This objective is now complete.	
RESPONSIBILITIES	• Management – Responsible for developing training modules.	
	• Contract Inspection and Area Operations Managers – To provide	
	training to appropriate staff.	
PERFORMANCE	Preparation of the Storm Response and Communications Training	
MEASURE	module(s) completed and provided for the 2002/2003 season.	
REFERENCE	Table 5.5.1.3. Appendix D and Appendix G	

#### 4.5.3 Storm Response Record Keeping

STORM RESPONSE RECORD KEEPING		
OBJECTIVE	To provide accurate documentation of actions taken during a storm response.	
ENVIRONMENTAL CONSIDERATION	Accurate record keeping and reporting during snow and ice control activities will allow a review of storm responses and ultimately result in the most effective response in similar situations. This will optimize the use of salt and will also provide information for due diligence defence in the event of a	
	lawsuit.	
CURRENT SITUATION	Information is summarized in each District and forwarded to District Superintendents, Managers and Directors. A standard methodology to report/summarize storm response has been developed. A new process for Communications was developed in December 2002 and implemented in January 2003. Appendix G of the SMP has been revised.	

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GOAL	• Implement standard methodologies to report and summarize storm
	responses (done)
	responses. (done)
RESPONSIBILITIES	Contract Inspection and Area Operations Managers – Provide training in
	proper record keeping.
	Supervisors – Audit records to ensure that proper records are being maintained.
	– Ensure that maintenance personnel are provided with forms to
	record their actions on an on-going basis.
	Patrollers/Inspector(s) – Maintain diaries and patrol reports showing actions
	taken and the rationale for those actions.
PERFORMANCE	• Accurate and complete record of storm response. (done for the
MEASURE	2003/2004 season)
	• Percentage of staff trained in proper record keeping(85% of Supervisors
	trained, 61% of Patrollers trained for 2004/2005).
REFERENCE	Appendices D, E and G

## 4.5.4 **RWIS in Patroller Logs/Reports** (Introduced in the 2004 SMP)

ROAD WEATHER INFORMATION SYSTEMS IN INSPECTOR LOGS/REPORTS		
OBJECTIVE	To prompt inspector to check the RWIS station daily for anticipated freeze	
	points.	
ENVIRONMENTAL	Snow and ice control decisions that are based on road temperature information	
CONSIDERATION	as well as air temperature information are more accurate and should result in	
	the more efficient use of salt.	
CURRENT	• Four RWIS stations were installed in 2001 and functioning for 2002/2003	
SITUATION	season. Access to shared MTO information was available starting in	
	January 2003. Arrangements have been made to integrate weather and	
	pavement condition forecasting services. All staff have been introduced	
	to the merits of pavement temperature forecasts from RWIS system	
	during 2001 with a renewed fall training program for the 2002/2003	
	season. Nine hand held and fifty six truck mounted IRTs are in use	
	versus nine hand held and seven truck mounted recorded in the 2001	
	Audit. Currently there is no reminder on inspector logs/reports for	
	patrollers to check RWIS stations every day for freeze points.	
	• Form 41 – Winter Daily Inspection Report revised approx 2004 to include	
	requirement for Inspector/Patroller to check RWIS at commencement of	
	the shift and to attach RWIS record to Form 41 (done).	
GOAL	• New forms to be in place and in use for winter 2004/2005 (done). Forms	
	revised to require inspectors to record RWIS information (done).	
	• All inspectors to have access to computers to view RWIS for the	
	2004/2005 season (done).	
	• For winter 2017/2018 winter patrol & inspection logs will be recorded	
	electronically (done).	
	This objective is now complete.	
RESPONSIBILITIES	• Winter Maintenance Subcommittee (WMS) to discuss, propose and	
	finalize changes to inspector log/report forms.	
	• Superintendents to ensure that revised patroller log/report forms are	
	introduced to inspectors and that they are properly completed.	

	•	Superintendents to ensure that Inspectors have access to a computer to check RWIS.
PERFORMANCE	٠	New forms in place and being utilized (done).
MEASURE	•	Inspectors have access to RWIS.
REFERENCE	٠	Appendix G – Table G-1

## 4.5.5 Winter Patrol

WINTER PATROL		
OBJECTIVE	To provide winter patrol and monitoring of road and sidewalk conditions and	
	initiation of storm response through the Supervisors.	
ENVIRONMENTAL	Accurate monitoring of winter maintenance activities will provide effective	
CONSIDERATION	snow and ice control decisions, leading to timely and efficient use of salt.	
CURRENT	Road Patrol Guidelines are in place.	
SITUATION	Winter Contract Inspection Manual developed in 2005	
	All patrol vehicles and contracted winter maintenance vehicles are	
	equipped with AVL/GPS	
GOAL	• AVL trials on-going to establish the feasibility of automated record	
	keeping for patrolling. To become part of pilot project program for	
	2005/2006.	
	• 100% of all winter patrol vehicles equipped with AVL/GPS (done, 2008)	
	• 100% of all contracted winter maintenance vehicles equipped with	
	AVL/GPS (done, 2008)	
	• New 10 year telematics contract in place for the 2017/2018 winter season	
	This objective is now complete.	
RESPONSIBILITIES	Contract Inspection Managers	
	- Ensure that patrollers and inspectors are properly	
	trained in monitoring and responding to road and	
	sidewalk conditions.	
	Patrollers/Inspectors – Responsible for monitoring road and sidewalk	
	conditions and weather information and making	
	timely response in accordance to established	
	guidelines.	
	– Responsible for documenting the road and sidewalk	
	and weather conditions, the decision made and the	
	rationale for these decisions and the actions taken.	
PERFORMANCE	• Percentage of patrol staff trained in snow and ice decision-making.	
MEASURE	• AVL trials introduced in the 2003/2004 season (On-going for	
	2005/2006).	
	• AVL placed in 9 patrol vehicles (2003/2004 season).	
	• 65 % of patrol staff were trained in the AASHTO program (2004/2005	
	season).	
	• New version of AASHTO AI/RWIS program introduced for 2009/2010	
	• Toronto Snow School Program delivered on an annual basis to targeted	
	groups of staff	
REFERENCE	Appendix H	
	Table 5.6.1 – Snow and Ice Control Training Audit: In-house Staff	

# 4.6.1 Snow and Ice Control Training

SNOW AND ICE CONTROL TRAINING		
OBJECTIVE	To ensure that all management staff and operators are trained in snow and ice	
	control, including salt management practices.	
ENVIRONMENTAL	To achieve effective implementation of a salt management program, those	
CONSIDERATION	people charged with delivering the snow and ice control program must	
	understand the rationale behind the measures being implemented as well as	
	what is expected of them. This can only come through a proper education	
	program.	
CURRENT SITUATION	<ul> <li>Prior to November 2001, the City's training program did not include salt management elements. In the fall of 2001, approximately 350 City and contract staff were provided with a 4 hour salt management training programme. For the 2002/2003 season, training was provided to inhouse staff and the Contractors responsible for salting/plowing of the Arterial Roads and Expressways. Approximately 200 staff received training. For 2003/2004, 302 staff received winter maintenance training as part of the OGRA program. Training modules have been provided in the following subject areas:         <ul> <li>Interpretation of weather and pavement conditions and use to make snow and ice control decisions;</li> <li>Proper use of infra-red thermometers;</li> <li>When and how to apply chemicals;</li> </ul> </li> </ul>	
	<ul> <li>Concepts and merits of use of liquid chemicals for pre-wetting and anti-icing; and</li> <li>Proper record keeping and review.</li> <li>Training is delivered to key staff annually on a rotating basis utilizing material developed by OGRA/ORSMG and customized for the City of Toronto context</li> </ul>	
GOAL	<ul> <li>City to develop a comprehensive new training program for 2003/2004 season incorporating new AASHTO and OGRA materials when available for Management staff and operators (done).</li> <li>All Superintendents, Supervisors and Inspection staff to complete AASHTO/OGRA computer based training program by December 1, 2004(carried forward to December 1, 2005).</li> <li>City of Toronto Snow School introduced in 2011 and delivered annually to key staff (done).</li> <li>This objective is now complete.</li> </ul>	
RESPONSIBILITIES	Management – Responsible for preparing the training packages and presenting	
	<ul> <li>Contract Inspection and Area Operations Managers)</li> <li>Responsible for arranging annual training sessions.</li> </ul>	
PERFORMANCE	Number of staff receiving training	
MEASURE	• OGRA training program has been developed (done)	
	• A SHTO Computer Based Training Program developed	
PEEPENCE	A SHTO Computer based framing Flogram developed.	
NEFERENCE	<ul> <li>AASH TO training package</li> <li>ORSMG/OGRA training package</li> </ul>	

#### 4.6 Snow Removal and Disposal

## 4.6.1 Snow Removal and Disposal Plan

SNOW REMOVAL AND DISPOSAL PLAN			
OBJECTIVE	To ensure snow removal and disposal operations are done efficiently and in		
	an environmental friendly manner by identifying secure and environmentally		
	acceptable sites to accommodate 150,000 truckloads of snow in a two-week		
	period.		
ENVIRONMENTAL	A review of disposal operations can lead to the adoption of methods that are		
CONSIDERATION	less harmful to the environment.		
CURRENT	• Existing Snow Removal Plans are in-place in each District.		
SITUATION	• A snow disposal study was completed and 10 Primary Snow Disposal		
	Sites and 6 Emergency Snow Disposal Sites were identified. Two of the		
	Primary Sites are stationary melter sites. The remainder are land disposal		
	sites.		
	• Purchase of 350 ton stationary melter in 2003		
	• Purchase of two 150 ton mobile melters in 2010		
	Construction of new Snow Disposal Site at New Toronto St in Etobicoke		
	York District. Completed 2012.		
GOAL	To upgrade the City-wide Snow Removal Plan as required (carried		
	forward to 2010)		
	• Sites identified in the Snow Disposal Strategic Plan are to be remediated		
	by the year 2014		
	• To complete District Snow Removal Plans prior to each winter season		
	<ul> <li>To complete District Show Removal Plans during declared snow</li> </ul>		
	• To implement the show Kemoval Trans during declared show		
	• Complete minor mitigation measures at all primary sites by 2003		
	<ul> <li>Complete minor mitigation measures at an primary sites by 2005.</li> <li>Optorio Place site to be readied to best mobile malter for 2005/2006</li> </ul>		
	Ontailo Flace site to be readied to host mobile menter for 2005/2000		
	Season.		
	• A revised Snow Removal Plan that has been developed for 2017/18, is		
	reflective of the enhanced resources available through the 2015-2022		
	winter maintenance contracts and includes mapping for all locations and		
	classifications of road where snow removal may be required.		
	This objective is now complete.		
RESPONSIBILITIES	Management – Responsible for finalizing the City-wide Snow Removal		
	Plan.		
	Contract Inspection and Area Operations Managers		
	<ul> <li>Responsible for developing annual District Snow Removal</li> </ul>		
	Plans consistent with the City-wide plan.		
	- Responsible for completing minor mitigation measures at all		
	primary sites		
	- Responsible for implementing District Snow Removal Plans		
	In response to Type 4 storms.		
PERFORMANCE	• Finalization of the Snow Removal Plans. (carried forward to 2005))		
MEASURE	• Compliance with Snow Removal Plans. (done annually)		
	• Mitigation measures carried over to the 2006 season.		

	<ul> <li>One (1) 350 tone mobile snow melter purchased in 2005 (done)</li> <li>Upgrades to Ontario Place site to host mobile melter for 2005/2006 season (done).</li> <li>Two (2) 135 ton mobile snow melters purchased in 2010 (done).</li> <li>Snow Removal Plan mapping updated in 2017 including revised priorities for transit rights of way, cycling infrastructure and emergency snow routes (done).</li> </ul>
REFERENCE	Appendix I and District and City-wide Snow Removal Plans.

# 4.6.2 Clean-up of Retired Snow Disposal Sites

CLEAN-UP OF RETIRED SNOW DISPOSAL SITES									
OBJECTIVE	To clean up snow disposal sites no longer in use as a result of the snow								
	disposal site review completed in 2001/2002.								
ENVIRONMENTAL	Environmentally sensitive areas should not be utilized as snow disposal								
CONSIDERATION	sites.								
CURRENT	The City's 2001/2002 review of snow disposal sites recommended that the								
SITUATION	City clean up and close all the following sites immediately:								
	• Leslie Street Spit (done in 2002);								
	• Humber Filtration Plant (done in 2002);								
	• Finch West of Leslie Street (done in 2002);								
	• Gerrard Street (done in 2002);								
	• Lawrence Under Bayview Ave. (done in 2002); and								
	• Skymark Park (done in 2002).								
GOAL	• Clean up and close all the following sites immediately:								
	• Leslie Street Spit								
	Humber Filtration Plant								
	Finch West of Leslie Street								
	Gerrard Street								
	Lawrence Under Bayview Ave								
	Skymark Park								
	This objective is now complete.								
RESPONSIBILITIES	Management – Responsible for designing and implementing the retired								
	Snow Disposal Clean-up Plan.								
	Contract Inspection and Area Operations Managers								
	<ul> <li>Responsible for carrying out remedial measures.</li> </ul>								
PERFORMANCE	• Completion of the retired snow disposal sites. (100% completed								
MEASURE									
REFERENCE	Appendix I								

# 4.6.3 Snow Disposal Site Upgrade

SNOW DISPOSAL SITE UPGRADE					
OBJECTIVE	To upgrade snow disposal sites in order to ensure that (potential) environmental				
	effects are effectively managed.				
ENVIRONMENTAL	Snow disposal sites with improper environmental control systems in place can have				
CONSIDERATION	adverse effects including: discharge water containing elevated TDS, heavy metals,				
	oil, grease, bacteria, sodium and chlorides, litter, noise, and visual intrusion.				
CURRENT	The City has completed a Snow Disposal Study and identified 10 Primary Snow				
SITUATION	Disposal Sites and 6 Emergency Snow Disposal Sites. The Study identified				
	modifications to these sites that will be carried out over the next several years. These				
	modifications will improve the management of runoff and litter from the sites.				
GOAL	• Establish a Snow Disposal Site Upgrade Plan(s) in 2003 that sets out a program, timetable and budget to upgrade all primary and emergency sites. (done) RFP to be prepared in 2003. (not completed – carried over to the 2004/2005 season)				
	• Install the initial phase of mitigation and simplified enhancement measures at all primary snow disposal sites in 2003. (carried over to the 2004/2005 season)				
	• Implement the major site upgrades in accordance with the Upgrade Plan. (deferred to the 2004 Study)				
	• Assign snow removal co-ordination responsibilities by July 2002 and establish a Field Control Centre by October 2002. (done)				
	• Assign site supervision responsibilities for each Primary Site by July 2002. (done)				
	• Obtain tenure for all snow disposal sites by October 2002. (done)				
	• Locate portable melter(s) at site(s) where the meltwater discharges either directly or via sewers, to Lake Ontario for the 2003/2004 season. (deferred to the 2005/2006 season)				
RESPONSIBILITIES	Management – Responsible for designing and implementing the Snow Disposal Site Upgrade Plan and assigning responsibilities.				
	Contract Inspection and Area Operations Managers				
	<ul> <li>Responsible for implementing the initial phase of site upgrades in 2003.</li> </ul>				
	<ul> <li>Responsible for assigning snow disposal site supervision responsibilities each fall.</li> </ul>				
	Snow Removal Co-ordinator – Responsible for developing and implementing the snow disposal scheduling and management program each fall.				
	Disposal Site Supervisors – Responsible for ensuring that snow disposal guidelines are properly implemented at sites each fall.				
PERFORMANCE	Preparation of the Snow Disposal Site Upgrade Plan (s) (done).				
MEASURE	• Establishment of a Field Control Centre (done)				
	<ul> <li>Assignment of clear responsibility and accountability for implementation of the elements of the Snow Disposal Site Upgrade Plan (annually).</li> </ul>				
	• Implementation of the Snow Disposal Site Upgrade Plan (s) in accordance with the timetable set out in the plan. (pending the 2004 Study)				
	<ul> <li>Achievement of tenure for all snow disposal sites annually</li> </ul>				
	<ul> <li>Confirmation that all snow melter site(s) discharge to Lake Ontario. (Only one</li> </ul>				
	site currently selected at Ontario Place. A greement in place for 2009/2010)				
REFERENCE	Appendix I				

## 4.6.4 Snow Disposal Site Monitoring and Maintenance

SNOW DISPOSAL SITE MONITORING AND MAINTENANCE									
OBJECTIVE	To monitor the quality of discharge from representative snow disposal sites								
	to determine if mitigating measures are effective.								
ENVIRONMENTAL	Environmental concerns with snow disposal sites are not being effectively								
CONSIDERATION	designed and managed. The City is taking measures to improve its sites.								
	The monitoring programme will help to confirm the environmental								
	effectiveness of the City's snow management programme.								
CURRENT	• The City has established a network of monitoring sites (16) in								
SITUATION	consultation with the TRCA and Toronto Water.								
	• Transportation Services has partnered with the University of Guelph								
	for the ongoing monitoring of water quality in the Scarborough								
	District								
GOAL	• To develop an initial program for monitoring of the quality of runoff from								
	two snow disposal sites.								
RESPONSIBILITIES	Toronto Water – Develop and implement the monitoring programme.								
	Snow Removal Co-ordinator – Responsible for developing and								
	implementing the Snow Disposal Site Management								
	Programme annually.								
	Disposal Site Supervisors – Responsible for ensuring that the Snow Disposal								
	Site Management Programme is properly implemented at								
	their site(s).								
PERFORMANCE	• Levels of Chlorides, metals, TDS and Oil and Grease in runoff leaving								
MEASURE	the snow disposal sites. (Toronto Water currently reviewing programme)								
REFERENCE	Appendices I and J								

# 4.7 Liquid Trials

LIQUID TRIALS									
OBJECTIVE	To ensure the more efficient use of road salt through the introduction of liquids.								
ENVIRONMENTAL CONSIDERATION	Effective use of liquids may reduce the amount of road salt entering the environment.								
CURRENT SITUATION	Initial salt brine trials were undertaken in winter 2002/2003. The liquid program was extended to WMDs on arterial roads using salt brine in winter 2003/2004. During winter 2003/2004, small amounts of Caliber M1000 and Geomelt 55 were introduced as trials. The Winter Maintenance Subcommittee met throughout 2004 to develop an enhanced liquid program aimed at testing alternative liquids with freeze points lower than traditional road salt. Eight separate pilot projects were undertaken in 2004/2005								
GOAL	To develop a program for the use of liquids in anti-icing and pre-wetting that contributes to a reduction in salt usage.								
RESPONSIBILITIES	<ul> <li>The Winter Maintenance Subcommittee developed the 2004/2005 liquid program and will develop a similar program for 2005/2006.</li> <li>District Managers to support initiatives under expanded program.</li> </ul>								
PERFORMANCE MEASURE	<ul> <li>Enhanced liquid program in place for 2004/2005.</li> <li>Alternative liquids tested during 2004/2005, 2008/2009, 2009/2010 and 2017/2018</li> <li>Transportation Services continues to explore the use of alternative deicing materials.</li> </ul>								
REFERENCE	TBA								

#### 4.8 Winter Maintenance Subcommittee

WINTER MAINTENANCE SUBCOMMITTEE								
OBJECTIVE	• Winter Maintenance Subcommittee is to mirror the Ontario Road Salt Management Group (ORSMG).							
	Objective of this group is to develop a more thorough understanding of salt management issues and emerging technologies.							
ENVIRONMENTAL CONSIDERATION	<ul> <li>Effective salt management requires a strong understanding of new advances in technology, RWIS, AVL/GPS, pre-wetting/anti-icing etc. This group will facilitate this understanding.</li> </ul>							
CURRENT SITUATION	• At present, there is no group in the City of Toronto whose prime responsibility it is to champion salt management and to develop new technologies for use. The purpose of this group is to open lines of communication between districts and create a forum for the discussion of issues related to salt management in particular and to winter maintenance in general. Several members of the group have high levels of expertise in areas such as AVL/GPS, RWIS, contracts etc. This expertise is currently not being shared as much as it could be.							
GOAL	<ul> <li>Promote the City of Toronto as a champion of salt management.</li> <li>Create, within the City of Toronto, a group dedicated to the discussion and resolution of issues related to salt management (done).</li> </ul>							
RESPONSIBILITIES	• It is the responsibility of all group members to take the knowledge gained as a result of participation in this group back to their respective districts and to promote the goals and objectives of the SMP.							
PERFORMANCE MEASURE	<ul> <li>Group in place.</li> <li>Regular meetings held.</li> <li>Ideas discussed and implemented.</li> <li>2004 - 2010 Pilot Projects implemented</li> <li>2008 - 2015 Winter Maintenance Contracts prepared</li> <li>2005 - 2008 &amp; 2008 - 2011 Salt Tender(s) prepared</li> <li>2015 - 2019 Salt Tender(s) prepared</li> <li>2015 - 2022 Winter Maintenance Contracts prepared</li> <li>2019 - 2022 Salt Tender(s) prepared</li> </ul>							
REFERENCE	Minutes of meeting.							

# 4.9 Technology Review

TECHNOLOGY REVIEW									
OBJECTIVE	To review existing and new technologies on an annual basis and recommend								
	pilot studies on relevant technologies and winter maintenance methodologies.								
ENVIRONMENTAL	New techniques, procedures, and technologies may provide new methods for								
CONSIDERATION	reducing salt entering the environment.								
CURRENT	• Pilot studies on GPS/AVL completed in 2002/2003.								
SITUATION	• GPS/AVL expanded to arterial salt trucks for the 2003/2004 season.								
	• Pilot studies on pre-wetting and anti-icing using salt brine comple 2002/2003.								
	• Pre-wetting and anti-icing trials expanded to all Winter Maintenance Depots and select in-house operations in 2003/2004.								
	• Pilot Projects in use of alternative liquids and technologies developed fo 2004/2005								
GOAL	• Conduct pre-wetting trials in 2002. (done)								
	• Conduct anti-icing trials in 2002. (done)								
	• Conduct AVL study for 2002. (carried forward to 2005/2006)								
	• Review technologies and develop trials and methodologies for the								
	2003/2004 season. (done)								
	• Develop an enhanced liquid trial program for 2004/2005 utilizing alternatives to salt brine (done).								
	• Develop an enhanced liquid trial program for 2005/2006 utilizing alternatives to salt brine and testing new technologies.								
	<ul> <li>On-going technology review through the Winter Maintenance Subcommittee.</li> </ul>								
	<ul> <li>Upgrades to existing RWIS stations undertaken in 2017</li> </ul>								
	<ul> <li>Opgrades to existing RW15 stations undertaken in 2017</li> <li>Winter patrol &amp; inspection forms to be completed on tablet device for 2017/2018 winter season</li> </ul>								
	<ul> <li>Alternative de-icing material pilot projects continuing in 2017/2018 and</li> </ul>								
	2017/2018								
	• Upgrades to four existing RWIS stations completed in 2020								
RESPONSIBILITIES	Management assign dedicated personnel to implement, monitor and report on								
	trials and do the technology review.								
PERFORMANCE	• Report on new development(s) in Annual Audit Report and through								
MEASURE	minutes of the Winter Maintenance Subcommittee								
	• Prepare summary report on 2004/2005 liquid trials (done).								
	• Approximately 1300 units equipped with AVL (2015/2016)								
	• 10yr telematics contract in place for 2017/2018 winter season								
REFERENCE	Salt Management Plan								

## 4.10 Communications

COMMUNICATIONS								
OBJECTIVE	To inform the public about the City of Toronto's winter maintenance program							
	and Salt Management Plan.							
ENVIRONMENTAL	Increased awareness of the role of road salt in winter maintenance and the							
CONSIDERATION	opportunities for managing road salt can enhance understanding of the							
	Importance of proper salt management.							
CURRENT	• Misunderstanding exists about alternative de-icers to road salt and the							
SITUATION	reasons why salt is used.							
	• The City currently wants to produce a Winter Roads Information brochure.							
GOAL	• To produce an information brochure for the public explaining the City's							
	winter maintenance program and the highlights of the Salt Management Plan annually.							
	<ul> <li>To produce a summary of the Salt Management Plan that can be reviewed annually</li> </ul>							
	<ul> <li>To inform workers that road salt is not toxic to humans</li> </ul>							
	<ul> <li>Provide information about road salt on the City's Web site</li> </ul>							
	<ul> <li>Annual media day to display winter equipment and update on new</li> </ul>							
	initiatives							
RESPONSIBILITIES	Management – Produce/update the Winter Roads Information brochure for distribution to the public by October of each year. Salt Management Plan Co-ordinator							
	<ul> <li>To update the Salt Management Plan annually (every May)</li> <li>To produce an annual summary of the Salt Management Plan each year.</li> <li>To assist Corporate Services in maintaining the road salt</li> </ul>							
	component of the City's Web site							
	Supervisors							
	- To inform workers at the annual training sessions that salt							
	is not narmful to numans.							
MEASUDE	• Distribution of a Winter Roads Information brochure each fall.							
MEASURE	• Completion of the annual summary audit of the Salt Management Plan.							
	Establishment and maintenance of up-to-date information on road salt management on the City Web site.							
	Website used to advise residents on location of Snow Storage Sites							
	throughout the city							
	• @TO_WinterOps Twitter account set up for 2013/2014 winter season							
	• <u>www.toronto.ca/plowTO</u> public website set up in 2015/2016 winter							
	season for real-time viewing of winter maintenance operations							
REFERENCE	Information brochures and City of Toronto Web site.							

## 4.11 Environmentally Sensitive Areas

ENVIRONMENTALLY SENSITIVE AREAS								
OBJECTIVE	To determine if any environmentally sensitive areas are potentially impacted							
	by the use of salt.							
ENVIRONMENTAL	Environmentally sensitive areas that are impacted by salt use may require							
CONSIDERATION	unique solutions, including the use of other strategies or more expensive de-							
	icers to sustain the unique environmental features and functions of the area.							
CURRENT	The TRCA is currently undertaking a Natural Heritage Study for the City.							
SITUATION	Once completed this study will help identify environmental areas that are							
	particularly sensitive to salt. The City has established a network of							
	monitoring stations (16) to track water quality in specific watersheds. This							
	network is still being reviewed. Some permanent stations will be installed in							
	2003/2004. Environment Canada has also prepared a Code of Practice for							
	the Environmental Management of Road Salts in 2004 to assist							
	municipalities in identifying environmentally sensitive areas.							
GOAL	To review the TRCA's Natural Heritage Study and use the outcome of the							
	study to identify any potential salt sensitive areas, and revise the monitoring							
	programme accordingly.							
RESPONSIBILITIES	Management – Track the progress of the Natural Heritage Study and take							
	appropriate action.							
	<ul> <li>Initiate actions to address salt sensitive areas using</li> </ul>							
	Environment Canada's Code of Practice.							
PERFORMANCE	Identification of environmentally sensitive areas within the City is still being							
MEASURE	done.							
REFERENCE	TRCA Natural Heritage Study.							
	Environment Canada's Code of Practice for the Environmental Management							
	of Road Salts (2004) (Appendix K)							

# 4.12 Monitoring Programme

MONITORING PROGRAMME							
OBJECTIVE	To monitor contaminant levels in watercourses, meltwater leaving snow disposal						
	areas, and runoff from salt storage facilities to evaluate present impact on water						
	quality and to determine effectiveness of future salt reduction strategies.						
ENVIRONMENTAL	By monitoring the effectiveness of the Salt Management Plan mitigation strategies,						
CONSIDERATION	this may lead to improvements to the reduction of the amount of salt entering the						
	environment.						
CURRENT SITUATION	<ul> <li>The TRCA has several stream flow monitoring stations across the City. The City has an on-going sampling program that takes monthly grab samples from designated locations on its watercourses. The City will augment these stations with continual sampling stations to measure chloride and other contaminant levels on designated watercourses.</li> <li>Installed monitoring stations on the Don and Humber Rivers near the mouth and where they enter the City to measure chloride, cyanide and heavy metal levels.</li> <li>Installed additional monitoring stations in Highland Creek, Morningside Tributary, and Wilket Creek to measure chloride levels. (done)</li> <li>Worked with TRCA to upgrade the Black Creek/Scarlett Rd and Don River/York Mills sites to include chloride-monitoring capabilities. (done)</li> <li>Installed a monitoring station at Depot 5 in West District to measure chloride levels in storage site runoff. (done – removed for the 2002/2003 and 2003/2004 seasons)</li> <li>Installed a monitoring station on the Willowdale/Silverview storm outfall to assess chloride levels from a residential/commercial sewershed drainage area. (done)</li> <li>Obtain grab samples annually from drainage from the two snow disposal areas to measure chloride, TDS, heavy metal and oil and grease levels. (done)</li> <li>Developed a monitoring protocol and initiated baseline monitoring by September 2002. (done)</li> </ul>						
	<ul> <li>Instituted an on-going winter monitoring programme for surface waters in October 2002. (done)</li> <li>Implemented monitoring Protocol for streams and rivers throughout winter</li> </ul>						
	2002/2003.						
GOAL	Annual monitoring report to be done by Water and Wastewater (WWW).						
RESPONSIBILITIES	WWW to develop and carry out the monitoring programme and annual report for						
	surface water systems in conjunction with Transportation Services, Technical						
	Services, and the IKCA. Responsibility for monitoring other components to be						
DEDEODMANCE	determined.						
PERFURMANCE	• Monitoring at stations is done annually each winter by WWW.						
MEASUKE	• Development of an initial Environmental Monitoring Programme and						
	associated Surface Water protocol by October 2002. (done)						



	<ul> <li>Implement monitoring Protocol for streams and rivers throughout winter 2002/2003. (done)</li> <li>Partnered with University of Guelph to conduct water quality monitoring</li> <li>Evaluate suppose of manifering and modifu accordingly. each fall.</li> </ul>
	• Evaluate success of monitoring and modify accordingly – each fall.
REFERENCE	Appendix J – Monitoring Protocol

# MONITORING AND UPDATING THE SALT MANAGEMENT PLAN

#### 5.0 MONITORING

#### 5.1 Overview

This chapter of the Plan includes table summaries of current practices to allow benchmarking to track future improvements and changes to the Plan.

An annual Management Review will take place as part of the implementation of the Plan. The Salt Management Plan will be updated as needed to include changes in Divisional Policy, as well as to summarize new strategies and techniques deployed. The monitoring will also allow Transportation Services to measure and report upon progress towards established goals and standards outlined in Chapter 4 – Operational Practices and Strategies.

The following areas will be included in the annual analysis and review:

- Management Practices
  - Level of service
- Equipment
  - Fleet Audit
  - Calibration Audit
- Materials
  - Salt Usage Summaries
  - Storage Facilities Audit Salt and Salt/Sand Mixtures
- Storm Response Summary
  - Weather Forecast Equipment Summary
- Snow and Ice Control Training Summary
- Snow Removal and Disposal Summary
- Liquid Trials
- Winter Maintenance Subcommittee



- Technology Review
  - Equipment Summary
  - Methodology Review
- Communications Summary
- Environmentally Sensitive Areas
- Monitoring Programme Chloride Level Monitoring

#### **5.2 Management Practices – Application Rates**

Current application rates are summarized in Appendix A. This section will summarize any studies where application rates were varied and present any proposed changes to the Policy.

#### 5.3 Equipment Audits

#### 5.3.1 Salter Fleet Audit

This section summarizes the total number of salt spreader units across the City (Table 5.3.1) in terms of location, in-house vs. private ownership and what equipment, such as electronic spreaders, spinners, etc. are on the spreaders. Table 5.3.2 summarizes the extent of pre-wetting, anti-icing and calibration being done.

#### SALTER FLEET AUDIT (2020)

YARD/DEPOT FACILITY			SALTER FLEET REVIEW						
LOCATION	OWNERSHIP	Salters		Ownership	Electronic	Dual	Single	Rear	
	CITY - C	In-use	Spare	1	Controllers	Spinners	Spinners	Discharge	
TORONTO-EAST YORK AREA 1									
Depot 1 – 777 Bayview Ave.	С	11	1	CONTRACT	12	12	0	0	
Depot 6 – 7 Leslie St.	С	14	1	CONTRACT	15	15	0	0	
433 Eastern Avenue Yard	С	10	2	INHOUSE	12	3	0	9	
TORONTO AND EAST YORK AREA 2									
Depot 7 – 677 Wellington	С	13	1	CONTRACT	14	14	0	0	
1401 Castlefield Ave. Yard	C	4	3	INHOUSE	7	3	3	1	
1116 King St. Yard	С	5	0	INHOUSE	5	0	3	2	
ETOBICOKE-YORK DISTRICT									
Depot 5 - 40 Boncer Dr.	С	22	1	CONTRACT	22	22	0	0	
Depot 9 - 49 Toryork Dr.	С	18	1	CONTRACT	19	21	0	0	
Depot 10 - 150 Disco Rd	С	11	1	CONTRACT	12	12	0	0	
Toryork Yard - 61 Toryork Dr.	С	0	0	INHOUSE	0	0	0	0	
320 Bering Avenue Yard	С	0	0	INHOUSE	0	0	0	0	
NORTH YORK DISTRICT									
Depot 2 - 64 Murray Rd	С	18	1	CONTRACT	19	19	0	0	
64 Murray Rd. Yard	C	10	0	INHOUSE	1	0	0	1	
Depot 3 - 195 Bermondsev Rd	C	16	1	CONTRACT	17	17	0	0	
Depot 12 - 2750 Old Leslie St.	C	8	1	CONTRACT	9	9	0	0	
Oriole Yard - 2751 Old Leslie St.	С	1	0	INHOUSE	1	0	0	1	
Depot 11 - 86 Ingram Dr.	С	8	1	CONTRACT	9	9	0	0	
SCARBOROUGH DISTRICT									
Depot 4 - 1 Nantucket Blvd.	С	18	1	CONTRACT	19	19	0	0	
Depot 8 – 8270 Sheppard Ave	С	14	1	CONTRACT	16	16	0	0	
Depot 13 – 1050 Ellesmere Rd	С	6	1	CONTRACT	7	7	0	0	
Depot 14 - 891 Morningside Ave.	С	6	1	CONTRACT	7	7	0	0	
Ellesmere Yard - 2000 Midland	С	2	0	INHOUSE	2	2	0	0	
Morningside Yard – 891 Morningside	С	2	0	INHOUSE	2	2	0	0	
TOTAL(S)	22	210	19		229	207	6	14	
SUMMARY	22	ALL -	- /2.29		229/229	227/229	6/229	14/229	
PERCENTAGE (%)	100%	-	-		100	90	3	6	
							-		



# Table 5.3.2SALTER FLEET AUDIT – PRE-WETTING,<br/>ANTI-ICING & CALIBRATION (2020)

YARD/DEPOT FACIL	ITY		SALTER OP	ERATIONS	
LOCATION	OWNERSHIP CITY – C	Pre-wetting Equipment	Yard Anti-Icing Capability	Calibration	Methods
TORONTO- EAST YORK AREA 1					
Depot 1 - 777 Bayview Ave.	С	11	2	12	B/E
Depot 6 - 7 Leslie St.	С	14	2	15	B/E
433 Eastern Avenue Yard	С	8	2	12	B/E
TORONTO- EAST YORK AREA 2					
Depot 7 – 677 Wellington	С	13	1	14	B/E
1401 Castlefield Ave. Yard	С	0	1	1	B/E
1116 King St. Yard	С	0	0	0	B/E
ETOBICOKE YORK DISTRICT					
Depot $5 - 40$ Boncer Dr.	С	22	2	23	B/E
Depot 9 - 49 Torvork Dr.	C	19	2	19	B/E
Depot 10 - 150 Disco Road	C	11	0	12	B/E
Torvork Yard - 61 Torvork Dr.	C	0	0	0	n/a
320 Bering Avenue Yard	C	0	0	0	n/a
NORTH YORK DISTRICT					
Depot 2 - 64 Murray Rd.	С	19	2	19	B/E
64 Murray Rd. Yard	С	1	1	1	B/E
Depot 3 - 195 Bermondsey Rd.	С	17	2	17	B/E
Depot 10 - 2750 Old Leslie St.	С	9	0	9	B/E
Oriole Yard - 2751 Old Leslie St.	С	1	1	1	
Depot 11 - 86 Ingram Dr.	С	9	0	9	B/E
SCARBOROUGH DISTRICT					
Depot 4 - 1 Nantucket Blvd.	С	19	1	19	B/E
Depot 8 - 8270 Sheppard Ave.	С	16	2	16	B/E
Depot 13 – 1050 Ellesmere Rd	С	7	0	7	B/E
Depot 14 - 891 Morningside Ave.	С	7	0	7	B/E
Ellesmere Yard – 2000 Midland	С	2	0	2	B/E
Ave Morningside Verd 201	C	2	0	2	D/E
Morningside Ave	C	2	U	2	D/E
<u>_</u>					
TOTAL(S)	22	205	23	229	19
SUMMARY	C - 21/21	205/229	Y - 15/22	229/229	B/E - 19/19
PERCENTAGE (%)	100	90	68	100	100

B – Calibration Box E – Electronic S – Scale

#### 5.4 Material Usage Audit

#### 5.4.1 De-icer and Abrasive Usage

This section currently documents salt usage for the City, the Districts and the Arterial Roads. The purpose of this section is to compile the necessary data to assess areas of over use and measure progress in salt management. Salt use is presented in tabular form (Tables 5.4.1.1 to 5.4.1.6) and in graphical form (Figures 5.4.1.1 to 5.4.1.4).

YEAR	DEPOT 1 Arterials	DEPOT 6 Arterials	DEPOT 7 Arterials	TEY DISTRICT TORONTO AREA 1-Locals	TEY DISTRICT TORONTO AREA 2-Locals	TOTAL
1999 - 2000	6,023.00	4,722.00	4,594.00	20,357.00	# 15,288.56	50,984.56
2000 - 2001	10,352.00	8,932.00	6,816.00	15,905.00	# 17,277.4	59,282.40
2001 - 2002	6045.55	3575.05	2,432.66	2,011.80	5,155.76	18,866.34
2002 - 2003	12,828.00	10,039.07	7,567.99	20826.94	20,449.99	71,711.99
2003 - 2004	9,229.35	8,580.77	6,837.51	6,030.31	11,838.62	42,516.56
2004 - 2005	8,712.31	9,276.96	6,782.00	4,152.22	10,459.00	39,382.49
2005 - 2006	6,458.90	5,483.74	3,558	2,833.94	3924.08	22,258.66
2006 - 2007	6,597.55	8,604.00	4,873	5,767.07	6,445.32	32,286.94
2007 - 2008	10,553.23	12984.97	7,296.00	9,756.36	10,000.00	50.590.56
2008 - 2009	7,766.00	9,277.00	6,300.00	7,834.00	7,800.00	38,977.00
2009 - 2010	3,979.43	4,960.50	2,640.00	4,198.50	4,381.00	20,159.43
2010 - 2011	8083.72	10,770.00	8259.00	11,439.15	6654.87	45,206.74
2011 - 2012	3157.34	3450.12	2480	3980.69	3598.32	16,666.47
2012 - 2013	6348.00	7489.00	5870.00	8203.00	5643.00	33553.00
2013 - 2014	10218.04	12980.11	10765.00	14751.37	12163.63	60878.15
2014 - 2015	7143.01	8520.22	7917.00	9293.29	8729.79	41603.31
2015 - 2016	4106.00	6035.00	8150.00	409	1.00	22382.00
2016 - 2017	6352.12	7622.03	11104.24	496	3.97	30042.36
2017-2018	7792.30	10511.99	15524.19	823	9.89	42068.37
2018 - 2019	8724.32	11965.77	14477.32	549	5.23	40662.64
2019-2020	6529.30	12,062.49	10,023.00	549	6.61	34,111.40
2020-2021	6274.43	6424.85	8302.30	406	9.14	25,070.72

Table 5.4.1.1 Toronto-East York District-Salt Usage

# Estimated seasonal figure

YEAR	DEPOT 5	WEST DISTRICT Locals	TOTAL
1999 – 2000	9,283.96	26,478.66	35,762.62
2000 - 2001	13,163.80	28,771.44	41,935.24
2001 - 2002	9,907.83	2,529.89	12,437.72
2002 - 2003	11,085.77	29,976.75	41,062.52

#### Table 5.4.1.2 Etobicoke-York District-Salt Usage

	DEP	OT 5	DEP	OT 9	ETOBICOKE-YORK	
YEAR	Arterials	Collectors	Arterials	Collectors	INHOUSE Locals	TOTAL
2003 - 2004	3,303.29	5,692.63	5,938.99	4,295.28	3,156.53	22,386.72
		New District	Boundary Cha	anges in 2004 -	– 2005 season	
2004 - 2005	2,463.11	6,054.03	4559.20	12,340.68	6,035.80	31,452.82
2005 - 2006	2,417.26	4,373.42	5.038.50	6569.62	2437.73	20,836.53
2006 - 2007	3579.78	4745.28	5275.39	6992.96	4900.81	25,494.22
2007 - 2008	5634.60	9,621.28	8,538.10	14,741.58	10,464.61	49,000.82
2008 - 2009	6896.18	7860.15	9495.47	7340.48	6614.90	38,207.18
2009 - 2010	3,078.35	4,014.63	5,661,44	4,726.58	2,168.97	19,649.92
2010 - 2011	6578.87	4607.78	6742.29	6406.09	7247.80	31582.83
2011 - 2012	2303.98	1613.68	2045.91	2769.85	592.67	9326.09
2012 - 2013	5144.86	3429.91	7154.42	5556.93	5382.34	26668.46
2013 - 2014	11013.06	7342.04	12427.07	8284.72	7358.50	46425.39
2014 - 2015	6319.66	6212.74	6481.23	3910.37	3912.40	26835.40
2015 - 2016	5046.46	3468.37	4857.37	2529.09	2878.75	18790.04
2016 - 2017	5349.34	4410.55	6511.53	3882.32	3286.66	23440.40
2017 - 2018	7256.45	5898.96	10281.53	5208.34	3438.16	32083.44
2018 - 2019	7415.60	6100.32	7406.34	4031.50	3714.93	28668.69
2019-2020	7299.10	5362.90	7506.10	4868.90	5443.29	30,480.29
2020-2021	7483.37	6761.16	6855.11	4788.11	3474.36	29,362,11

#### Table 5.4.1.3 North York District-Salt Usage

YEAR	DEPOT 2	DEPOT 3	NORTH DISTRICT	TOTAL
1999 - 2000	6,773.40	4,110.60	10,529.00	21,413.00
2000 - 2001	10,467.00	5,987.00	15,968.80	32,422.80

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2001 - 2002	4,328.58	2,660.12	7,190.03	14,178.73
2002 - 2003	13,008.92	11,499.77	23,844.83	48,353.52

			NORTH	DISTRICT	
YEARS	DEPOT 2	DEPOT 3	INGRAM	ORIOLE	TOTAL
1 Li ilto	Arterials	Arterials	DEPOT	DEPOT	TOTAL
			Locals	Locals	
2003 - 2004	5,960.92	3,664.18	4,440.23	5,309.46	19,374.79
2004 - 2005	10,269.00	10,449.57	8,969.61	10,874.29	40,562.47
2005 - 2006	6,056.27	4,788.37	4,725	8,783.24	24,353.52
2006 - 2007	6,412.55	4,547.24	7,852.64	8,987.28	27,799.71
2007 - 2008	12,182,.42	8,394.33	9283.57	14,182.33	44,042.65
2008 - 2009	14,707.19	14,024.50	6554.24	9,990.68	45,276.61
2009 - 2010	5,817.56	7,013.50	3,855.83	5,521.87	22,208.76
2010 - 2011	10,359.93	9686.51	3541.16	5623.19	29,210.79
2011 - 2012	6467.32	6643.21	3662.47	4044.30	20,817.30
2012 - 2013	12015.44	12128.63	2416.15	2990.87	29551.09
2013 - 2014	22296.44	18824.51	3607.40	4360.06	49088.14
2014 - 2015	14422.84	13153.00	4603.12	5223.18	37402.14
2015 - 2016	8098.54	9488.92	2201.19	3182.60	22971.25
2016 - 2017	10234.93	11936.90	3213.26	4402.97	29787.96
2017 - 2018	13125.87	11997.95	6243.15	5667.02	37033.99
2018 - 2019	12682.30	1223.34	5701.76	5498.94	36106.34
2019-2020	11,161.60	10,383.65	4854.75	6956.74	33,356.74
2020-2021	12,464.04	11,657.51	4894.73	5194,64	34,210.92

#### Table 5.4.1.4 Scarborough District-Salt Usage

YEAR	DEPOT 4 Arterials	DEPOT 4A Locals	ELLESMERE & MORNINGSIDE YARDS In-House Locals	TOTAL
1999 - 2000	11,104.00	0.00	23,605.00	34,709.00
2000 - 2001	17,273.27	12,519.87	13,160.97	42,954.11
2001 - 2002	5,913.71	2,838.40	2,638.20	11,390.31
2002 - 2003	24,595.12	12,778.52	9,728.13	47,101.77

YEAR	DEPOT 4 Arterials	DEPOT 8 Arterials	ELLESMERE & MORNINGSIDE YARDS In-House Locals	TOTAL
2003 - 2004	9,163.77	9,436.43	5,273.80	23,874.00
2004 - 2005	16,245.70	12,845.04	7,304.55	36,035.29
2005 - 2006	12,886.86	8,324.92	6,012.74	27,224.52
2006 - 2007	10,342.59	9,436.81	4,720.52	24,499.92

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2007 - 2008	21,037.09	18,399.28	12,574.41	52,010.47
2008 - 2009	23,277.15	17,998.21	9,244.40	29,686.80
2009 - 2010	13,286.24	8,775.80	5,983.78	28,045.82
2010 - 2011	25,075.80	15,952.81	11,782.93	52,811.54
2011 - 2012	13,344.74	9,666.65	5,228.40	28,239.79
2012 - 2013	17,804.83	12,738.07	6,036.43	36,579.33
2013 - 2014	24548.77	21774.07	15881.32	62204.16
2014 - 2015	18582.37	13188.86	7973.52	39744.75
2015 - 2016	9239.62	9379.98	5376.71	23996.31
2016 - 2017	14484.89	11429.11	6854.00	32768.00
2017 - 2018	19728.02	14875.17	6941.10	41544.29
2018 - 2019	17499.26	14128.36	8323.95	39951.57
2019-2020	17,376.77	11132.86	8726.90	37,236.53
2020-2021	13,444.20	9711.22	6054.45	29,209.87

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#### Table 5.4.1.5 Salt Usage – Arterial Roads

YEAR					SALT SPREAD	IN TONNES				
	DEPOT 1	DEPOT 2	DEPOT 3	DEPOT 4	DEPOT 5	DEPOT 6	DEPOT 7	DEPOT 8	DEPOT 9	TOTAL
1986 – 1987	5,272.65	5,754.03	6,340.66	7,672.03	5,530.65	4,369.62	4,018.48	N/A	N/A	38,958.12
1987 – 1988	5,103.41	6,332.46	7,502.54	7,238.55	5,219.21	4,089.71	4,011.51	N/A	N/A	39,497.39
1988 – 1989	4,033.09	6,930.81	6,459.99	6,952.13	6,487.64	4,242.00	4,243.79	N/A	N/A	39,349.45
1989 – 1990	7,130.00	9,553.22	9,978.97	11,244.20	9,781.43	5,940.84	6,852.75	N/A	N/A	60,481.41
1990 - 1991	4,743.10	10,552.19	9,313.00	7,567.30	10,410.86	5,877.37	6,783.76	N/A	N/A	55,247.58
1991 - 1992	5,297.36	8,532.35	8,192.33	8,219.48	7,347.81	3,978.14	5,723.97	N/A	N/A	47,291.44
1992 - 1993	7,817.34	12,543.17	10,394.03	11,703.91	9,583.83	5,504.69	7,698.75	N/A	N/A	65,245.72
1993 - 1994	8,139.89	11,015.42	11,830.93	11,079.77	9,869.07	6,300.12	9,237.40	N/A	N/A	67,472.60
1994 - 1995	3,604.61	5,774.62	5,615.95	5,838.74	4,559.76	2,694.48	3,601.05	N/A	N/A	31,689.21
1995 – 1996	6,256.72	9,023.69	7,443.40	8,752.61	7,129.09	3,837.37	4,809.87	N/A	N/A	47,252.75
1996 – 1997	7,530.00	12,582.00	8,426.00	10,749.00	9,093.90	5,629.00	6,436.28	N/A	N/A	60,446.18
1997 – 1998	3,738.00	6,448.67	6,500.00	6,375.20	5,527.41	2,927.00	5,376.51	N/A	N/A	36,892.79
1998 - 1999	7,118.00	12,548.82	7,000.00	9,606.00	9,596.12	5,985.00	5,585.19	N/A	N/A	57,439.13
1999 - 2000	6,023.00	6,773.40	4,110.00	11,104.00	9,283.96	4,722.00	4,594.00	N/A	N/A	46,610.36
2000 - 2001	10,352.00	10,467.00	5,987.00	17,273.27	13,163.80	8,932.00	6,816.00	N/A	N/A	72,991.07
2001 - 2002	6045.55	4,328.58	2,660.12	5,913.71	9,907.83	2,962.71	2,432.66	N/A	N/A	34,251.16
2002 - 2003	12,828.00	13,008.92	11,499.77	24,595.12	11,085.77	10,039.07	7,567.99	N/A	N/A	90,624.64
			New Distric	t Boundary Change	es and Contracts be	ginning in 2003-20	04 season			
2003 - 2004	9,229.35	5,960.92	3,664.18	9,163.77	3,303.29	8,580.77	6,837.51	9,436.43	5.938.99	62,115.21
2004 - 2005	8,712.31	10,269.00	19,449.57	16,245.70	2463.11	9,276.96	6,782.00	12,845.04	4559.20	90,602.89
2005 - 2006	6,458.90	6,056.27	4,788.37	12,886.86	2417.26	5,483.74	3,558.00	8324.92	5,038.50	55,012.82
2006 - 2007	6,597.55	6,412.55	4,547.24	10,342.59	3,579.78	8,604.00	4,873	9,436.81	5,275.39	59,668.91
2007 - 2008	10,553.23	12,182.42	8,394.33	21,037.09	5.634.60	12,984.97	7,296.00	18,399.28	8,538.10	105,020.02
				New Contracts	beginning in 2008-	2009 season.				
2008 - 2009	7,766.00	14,707.19	14,024.50	23,277.15	14,756.33	9,277.00	6,300.00	17,998.21	16,835.97	124,932.35
2009 - 2010	3,979.43	5,817.56	7,013.50	13,286.24	7,092.98	4,960.50	2,640.00	8,775.80	10,387.97	64,493.98
2010 - 2011	8083.72	10,359.93	9686.51	25,075.80	6578.87	10,770.00	8259.00	15,952.81	6742.29	101,508.90
2011 - 2012	3157.34	6467.32	6643.21	13,344.74	3917.66	3450.12	2480	9,666.65	4815.76	53,942.80

#### SALT MANAGEMENT PLAN

-										
2012 - 2013	6348.00	12015.44	12128.63	17,804.83	5144.86	7489.00	5870.00	12,738.07	7154.42	86,693.25
2013 - 2014	10218.04	22296.44	18824.51	24548.77	11013.06	12980.11	10765.00	21774.07	12427.07	144847.07
2014 - 2015	7143.01	14422.84	13153.00	18582.37	6318.66	8520.22	7917.00	13188.86	6481.23	95727.19
				New Contracts	beginning in 2015-	2016 season.				
2015 - 2016	4106.00	8098.54	9488.92	9239.62	5056.46	6035.00	8150.00	9379.98	4857.37	64411.89
2016 - 2017	6352.12	10234.93	11936.90	14484.89	5349.34	7622.03	11104.24	11429.11	6511.53	85025.09
2017 - 2018	7792.30	13125.87	11997.95	19728.02	7256.45	10511.99	15524.19	14875.17	10281.53	111093.47
2018 - 2019	8724.32	12682.30	12223.34	17499.26	7415.60	11965.77	14477.32	14128.36	7406.34	106522.61
2019 - 2020	6,529.30	11,161,.60	10,383.65	17,376.77	12,662.00	12,062.49	10,023.00	11,132.86	12,376.00	103,707.67
2020-2021	6274.43	12464.04	11657.51	13444.20	7483,37	6424.85	8302.30	9711.22	6855.11	82617.03

#### Table 5.4.1.6 Total Salt Usage by Districts and City–Wide

	SALT SPREAD IN TONNES							
YEAR	Toronto-East York	Etobicoke-York	North York	Scarborough	TOTAL			
1986 - 1987	47,723.14	17,343.65	35,364.69	23,949.43	124,380.91			
1987 - 1988	33,925.63	20,495.21	37,351.00	27,849.55	119,621.39			
1988 - 1989	43,641.88	28,166.64	36,770.80	19,807.13	128,386.45			
1989 – 1990	65,973.59	27,794.43	43,132.19	28,412.20	165,312.41			
1990 - 1991	48,267.23	37,278.86	45,365.19	23,132.30	154,043.58			
1991 - 1992	29,755.47	22,040.81	37,324.68	23,407.48	112,528.44			
1992 – 1993	41,611.78	27,526.83	47,437.20	31,896.91	148,472.72			
1993 – 1994	43,048.41	31,568.07	45,546.35	29,483.77	149,646.60			
1994 – 1995	24,035.14	24,377.76	27,190.57	19,526.74	95,130.21			
1995 – 1996	38,039.96	24,485.09	37,867.09	27,584.61	127,976.75			
1996 – 1997	49,500.65	32,185.90	41,008.00	34,890.00	157,584.55			
1997 – 1998	35,260.29	17,545.41	27,948.67	21,184.20	101,938.57			
1998 – 1999	45,763.55	37,242.12	36,548.82	20,856.00	140,410.49			
1999 - 2000	50,984.56	35,762.62	21,413.00	34,709.00	142,869.18			
2000 - 2001	59,282.40	41,935.24	32,422.80	42,954.11	176,594.55			
2001 - 2002	18,886.34	12,437.72	14,178.73	11,390.31	56,893.10			
2002 - 2003	71,711.99	41,062.52	48,353.52	47,101.77	208,229.80			
	New District B	oundary Changes and Co	ontracts beginning in 200	03-2004 season				
2003 - 2004	42,516.56	22,386.72	19,374.79	23,874.00	108,152.07			
2004 - 2005	39,382.49	31,452.82	40,562.47	36,035.29	147,433.07			
2005 - 2006	22,258.86	20,836.53	24,353.42	27,224.52	94,673.33			
2006 - 2007	32,286.94	25,494.22	27,799.71	24,499.92	89,112.17			
2007 - 2008	50,590.96	49,000.82	44,042.65	52,010.47	195,644.90			
		New Contracts beginnir	ng in 2008-2009 season.					
2008 - 2009	38,977.00	33,189.38	45,276.61	29,686.80	147,129.79			
2009 - 2010	11,579.93	19,649.92	22,208.76	28,045.82	81,484.43			
2010 - 2011	45,206.74	31,582.83	29,210.19	52,811.54	158,811.30			
2011 - 2012	16,666.47	9326.09	20,817.30	28,239.79	75049.65			
2012 - 2013	33553.00	26668.46	29551.09	36,579.33	126,351.90			
2013 - 2014	60878.15	46425.39	49088.41	62204.16	218596.1			
2014 - 2015	41603.31	26835.40	37402.14	39744.75	145585.60			
		New Contracts beginnir	ng in 2015-2016 season.					
2015 - 2016	22,382.00	18790.04	22971.25	23996.31	88139.60			
2016 - 2017	30042.36	23440.40	29787.96	32768.00	116038.72			
2017 - 2018	42068.37	28645.28	37033.99	41544.29	149291.93			
2018 - 2019	40662.64	28668.69	36106.34	39951.57	145389.24			
2019 - 2020	34,111.46	30480.29	33356.74	37236.53	135185.02			
2020-2021	25070.72	29,363.08	34210.89	29253.09	117,897.78			

#### Table 5.4.1.7 Salt Brine Used By District (Pre-wetting & DLA)

BRINE USAGE(litres)									
SEASON	Toronto-East York District Area 1	Toronto-East York District Area 2	Etobicoke- York District	North York District	Scarborough District	TOTAL			
2002 - 2003	n/a	570.00	n/a	n/a	58 745.60	59 315.60			
2003 - 2004	355.34	68 685.53	n/a	242 948.22	200 164.71	512 153.80			
2004 - 2005	638,000	243,000.00	682,394.00	440,152.60	227,743.10	2,231,339.00			
2005 - 2006	312,157	250,224.20	610,739.86	276,361.50	388,676.17	1,838,158.60			
2006 - 2007	424,073	216,902.50	390,416.69	451,884.90	419,507.09	1,902,784.00			
2007 - 2008	658,873.00	300,000.00	797,622.31	543,111.90	272,332.40	2,571,939.61			
2008 - 2009	542,005.00	204,000.00	909,553.74	480,000	160,877.80	2,296,435			
2009 - 2010	311,439.00	201,174.70	712,554.13	393,911.10	62,156.46	1,681,235.39			
2010 - 2011	573,512.00	231,867.50	749,391.98	389,274.95	260,989.24	2,205,036.67			
2011 - 2012	578,921.50	218,999	942386.80		769,773.95	2,510,081			
2012 - 2013	523732.00	254427.00	1445837.7	723,076.00	474,763.80	3,421,836			
2013 - 2014	371515.10	161112.60	1015625.86		309957.40	1858210.96			
2014 - 2015	492876.00	140322.20	1226257.84	784347.00	101286.30	2745089.34			
2015 - 2016	1018724.00	334393.00	1626469.44	1647855.83	389473.10	5016915.37			
2016 - 2017	1,238,3	318.00	1,919,742.80	1,423,005.77	569,650.13	5,150,716.70			

2017 - 2018	886,748.30	797,111.21	1,190,854.10	225,486.20	3,100,199.81
2018 - 2019	1277884.00	612614.53	36106.34	362276.36	2288881.23
2019-2020	764045.89	1258764.85	1577803.00	411949.70	4012563.44
2020-2021	185,270	743,534	1329734.00	327,526	2,586,065

#### 5.4.2 Materials Storage

Tables 5.4.2.1 to 5.4.2.4 summarize the existing in-house and private materials storage facilities and provide an indication of the conditions identified at these facilities.

			(202	20)						
YARD/DEPOT FACILITY		FACILITIES AUDIT								
TARD/DEFOT FACILI	11 1		SALT STORAGE REVIEW							
LOCATION	OWNERSHIP CITY – C	Salt Storage	Salt Structure	Floor Impervi ous	Loading Inside	Door / Overhang	Lighting	Ventilation	Loading Pad	Grade Pad
TORONTO-EAST YORK AREA 1										
		N/		37		¥7		17	37	37
Depot 1 – /// Bayview Ave.		Y	Y	Y	N N	Y	Y V	Y	Y V	Y V
Depot 6 – 7 Leshe St.	<u> </u>	Y V	Y Y	Y V	N	Y N	Y V	Y Y	I V	I V
TORONTO-EAST YORK AREA 2		1		1	I		I		1	I
Depot 7 – 677 Wellington St. W.	С	Y	Y	Y	N	Y	Y	Y	Y	Y
1401 Castlefield Ave. Yard	С	N								
1116 King St. Yard	С	N								
ETOBICOKE-YORK DISTRICT										
Depot 5 – 40 Boncer Dr.	С	Y	Y	Y	Ν	Y	Y	Y	Y	Y
Depot 9 – 49 Toryork Dr.	C	Y	Y	Y	Ν	Y	Y	Y	Y	Y
Depot 10 - 150 Disco Road	С	Y	Y	Y	Ν	Y	Y	Y	Y	Y
Toryork Yard – 61 Toryork Dr.	С	N								
320 Bering Avenue Yard	С	Y	Y	Y	N	N	N	N	Y	Y
NORTH YORK DISTRICT	<b></b>							 		
Depot 2 – 64 Murray Rd.	С	Y	Y	Y	Ν	Y	Y	Y	Y	Y
64 Murray Rd. Yard	С	N								
Depot 3 – 195 Bermondsey Rd.	С	Y	Y	Y	Y	Y	Y	Y	Y	Y
Depot 10 – 2750 Old Leslie St.	С	Y	Y	Y	Y	Y	Y	Y	Y	Y
Oriole Yard – 2751 Old Leslie St.	C	N								
Depot 11 - 86 Ingram Dr.	С	Y	Y	Y	N	Y	Y	Y	Y	Y
SCARBOROUGH DISTRICT			<u> </u>							
Depot 4 – 1 Nantucket Blvd.	С	Y	Y	Y	Ν	Y	Y	Y	Y	Y
Depot 8 – 8270 Sheppard Ave	С	Y	Y	Y	Ν	Y	Y	Y	Y	Y
Depot 13 – 1050 Ellesmere	С	Y	Y	Y	Ν	Y	Y	Y	Y	Y
Depot 14 - 891 Morningside Ave.	С	Y	Y	Y	N	Y	Y	Y	Y	Y
TOTAL SITES	21	21	16	16	16	16	16	16	16	16
SUMMARY	C-21/21	Y – 16/21	Y – 16/16	Y – 16/16	Y - 4/16	Y – 14/16	Y - 16/16	Y – 16/16	Y - 16/16	Y – 16/16
PERCENTAGE (%)	100	76	100	100	25	88	100	100	100	100
	<sup>!</sup>	I	<b> </b>	<u> </u> '				<u> </u>	<sup> </sup>	

5.4.2.1 SALT STORAGE FACILITIES (2020)



- Not Applicable

<b>TABLE 5.4.2.2</b>							
SALT STORAGE FACILITIES - OUTDOOR STORAGE							
(2020)							

YARD/DEPOT FACILIT	Y	FACILITIES AUDIT OUTSIDE SALT STORAGE			
LOCATION	OWNERSHIP CITY – C	Loaded On Impervious Pad	Salt Pile Covered		
TORONTO-EAST YORK DISTRICT AREA 1					
Depot 1 – 777 Bayview Ave.	С				
Depot 6 – 7 Leslie St.	С				
433 Eastern Avenue Yard	С				
TORONTO-EAST YORK DISTRICT AREA 2					
Depot 7 – 677 Wellington St. W.	С				
1401 Castlefield Ave. Yard	С				
1116 King St. Yard	С				
ETOBICOKE-YORK DISTRICT					
Depot 5 – 40 Boncer Dr.	С				
Depot 9 – 49 Toryork Dr.	С				
Depot 10 - 150 Disco Road	С				
Emery Yard – 61 Toryork Dr.	С				
320 Bering Avenue Yard	С				
NORTH YORK DISTRICT					
Depot 2 – 64 Murray Rd.	С				
64 Murray Rd. Yard	С				
Depot 3 – 195 Bermondsey Rd.	С				
Depot 11 – 2750 Old Leslie St.	С				
Oriole Yard – 2751 Old Leslie St.	С				
Depot 12 – 86 Ingram Dr.	С				
SCARBOROUGH DISTRICT					
Depot 4 – 1 Nantucket Blvd.	С				
Depot 8 – 8270 Sheppard Ave	С				
Depot 13 – 1050 Ellesmere Rd	С				
Depot 14 - 891 Morningside Ave.	С				
TOTAL SITES	21	0	0		
STIMMADA	C 21/21	0	0		
	100				
FERCENTAUE (%)	100				

- Not Applicable

#### TABLE 5.4.2.3 SAND/SALT STORAGE REVIEW (2020)

YARD/DEPOT FACILIT	FACILITIES AUDIT SAND/SALT STORAGE REVIEW					
		Inside Storage Outside			e Storage	
LOCATION	OWNERSHIP CITY – C	Salt/Sand Storage	Inside Structure	On Impervious Pad	Pad	Tarped
Toronto-East York District – Area 1						
Depot 1 – 777 Bayview Ave.	С	Y	Y	Y		
Depot 6 – 7 Leslie St.	С	Y	Y	Y		
433 Eastern Avenue Yard	С	Y	Y	Y		
Toronto-East York District – Area 2						
Depot 7 – 677 Wellington St. W.	С	Ν				
1401 Castlefield Ave. Yard	С	Y	Y	Y		
1116 King St. Yard	С	N				
ETOBICOKE-YORK DISTRICT						
Depot 5 – 40 Boncer Drive.	С	Y	Y	Y		
Depot 9 – 49 Toryork Dr.	С	Y	Y	Y		
Depot 11 - 150 Disco Road	С	Y	Y	Y		
Toryork Yard – 61 Toryork Dr.	С	Ν	Y	Y		
320 Bering Avenue Yard	С	N				
NORTH YORK DISTRICT						
Depot 2 – 64 Murray Rd.	С	Y	Y	Y		
64 Murray Rd. Yard	С	Y				
Depot 3 – 195 Bermondsey Rd.	С	Y	Y	Y		
Depot 11 – 2750 Old Leslie St. *	С	Y	Y	Y		
Oriole Yard – 2751 Old Leslie St.	С	Ν				
Depot 12 - 86 Ingram Dr. *	С	Y	Y	Y		
SCARBOROUGH DISTRICT						
Depot 4 – 1 Nantucket Blvd	C	v	Y	V		
Depot 8 – 8270 Sheppard Ave.	C	Y	Ŷ	Y		
Depot $13 - 1050$ Ellesmere Rd.	C	Y	Ŷ	Y		
Depot 14 – 891 Morningside Ave.	C	Y	Y	Y		1
TOTAL SITES	21	21	16	16		
SUMMARY	C - 21/21	Y - 16/21	Y - 16/16	Y - 16/16		
PERCENTAGE (%)	100	76	100	100		

-Not Applicable

#### **TABLE 5.4.2.4**

#### FACILITIES AUDIT – SITE DRAINAGE ISSUES

(2019)

YARD/DEPOT FACI	FACILITIES AUDIT SITE DRAINAGE ISSUES				
LOCATION	OWNERSHIP CITY – C	Vehicle Washing On Site	Washing Inside/Outside	Oil/Water Separator	Drainage
Toronto-East York District Area 1 1					
Depot 1 – 777 Bayview Ave.	С	Y	OUTSIDE	Y	STORM
Depot 6 – 7 Leslie St.	С	Y	OUTSIDE	Y	STORM
433 Eastern Avenue Yard	С	Y	INSIDE	Y	SANITARY
Toronto-East York District Area 2					
Depot 7 – 677 Wellington St. W.	С	N			
1401 Castlefield Ave. Yard	С	N			
1116 King St. Yard	С	Y	INSIDE	Y	SANITARY
ETOBICOKE-YORK DISTRICT					
Depot 5 – 40 Boncer Dr.	С	Y	OUTSIDE	Y	STORM
Depot 9 –49 Toryork Dr.	С	Y	OUTSIDE	Y	STORM
Depot 11 - 150 Disco Road	С	N			
Toryork Yard – 61 Toryork Dr.	С	Y	INSIDE	Y	SANITARY
320 Bering Avenue Yard	С	Y	INSIDE	Y	SANITARY
NORTH YORK DISTRICT					
Depot 2 – 64 Murray Rd.	С	Y	OUTSIDE	Y	STORM
64 Murray Rd. Yard	C	Y	INSIDE	Y	STORM
Depot 3 – 195 Bermondsey Rd.	С	Y	OUTSIDE	Y	STORM
Depot 11 – 2750 Old Leslie St.	С	Y	OUTSIDE	Y	STORM
Oriole Yard – 2751 Old Leslie St.	С	Y	INSIDE	Y	SANITARY
Depot 12 - 86 Ingram Dr.	С	Y	OUTSIDE	Y	STORM
SCARBOROUGH DISTRICT					
Depot 4 – 1 Nantucket Blvd.	С	Y	OUTSIDE	Y	STORM
Depot 8 – 8270 Sheppard Ave	С	N			
Depot 13 – 1050 Ellesmere Rd	С	Y	INSIDE	Y	SANITARY
Depot 14 – 891 Morningside Ave.	С	Y	INSIDE	Y	STORM
TOTAL SITES	21	21	22	22	22
SUMMARY	C - 21/21	Y - 17/21	O – 9/17	Y - 17/17	SAN-6/17
PERCENTAGE (%)	100	81	53	100	35



- Not Applicable
## 5.5 Storm Response

### 5.5.1 Weather Forecasting

In November and December of 2001, weather forecast needs were discussed with the weather provider and reviewed and revised. Training on reading and interpreting weather forecasts is provided to key staff annually on a rotating basis. Training will continue to be provided typically prior to each season, on reading & interpreting weather and pavement temperature forecasts.

Table 5.5.1.1 provides an overview of the annual performance measures for the dedicated forecasts.

Season	# Required Reports ( # day x 4 )	Missing Reports	Compliance (%)	Total Snowfall (cm)
2000 - 2001	724	0	100	165.0
2001 - 2002	728	2	99.7	74.4
2002 - 2003	724	1	99.9	168.3
2003 - 2004	724	1	99.9	98.2
2004 - 2005	724	0	100	135.2
2005 - 2006	728	0	100	61.0
2006 - 2007	724	0	100	133.0
2007 - 2008	724	0	100	206.7
2008 - 2009	724	0	100	126.3
2009 - 2010	728	0	100	46.2
2010 - 2011	728	0	100	123.3
2011 - 2012	728	0	100	34.1
2012 - 2013	848	0	100	104.5
2013 - 2014	848	0	100	134.2
2014 - 2015	848	0	100	110.7
2015 - 2016	848	0	100	65.7
2016 - 2017	848	0	100	79.8
2017 - 2018	848	0	100	111.9
2018 - 2019	848	0	100	135.1
2019-2020	848	0	100	138.4
2020 - 2021	848	0	100	134

 Table 5.5.1.1 WEATHER FORECASTS RECEIVED AND DISTRIBUTED NOVEMBER 1<sup>st</sup> – APRIL 30<sup>th</sup> (2000 – 2012)

 OCTOBER 1<sup>st</sup> – APRIL 30<sup>th</sup> (2012 – 2020)

# 5.6 Snow and Ice Control Training Audit

In November and December 2001, a four hour training programme was presented to in-house and contracted staff. Operators and Supervisory staff were trained. The training consisted of the following modules:

- Salt Science and Application
- Record Keeping
- Weather
- Infra-red Thermometers
- Pre-wetting and Anti-icing

Over 350 personnel (In-house and Contractor) were trained, representing approximately 90% of the personnel providing snow and ice control services for the City. A training program has been delivered annually to staff involved in winter maintenance. The training material has been a combination of presentations developed inhouse that outline the City of Toronto experience with respect to salt management and also utlizes programs developed in conjunction with the Ontario Good Roads Association (OGRA) and the American Association of State Highway Transportation Organizations (AASHTO). Tables 5.6.1 and 5.6.2 summarize the attendance at the 2017-2018 salt management training programme.

#### Table 5.6.1 SNOW AND ICE CONTROL TRAINING AUDIT INHOUSE STAFF (Winter 2020/2021)

YARD/DEPOT FACILITY	STATUS STAFF FORMAL TRAINING SUMMARY											
LOCATION	Trained – T Untrained - U	Total Salters	Managers	Superintendent / Sr Engineer	Supervisors/ Analysts	Patroller/ Inspectors	Spreader Operators					
TORONTO-EAST YORK DISTRICT AREA 1												
433 Eastern Avenue Yard	T U	10	1	1	20	8	45 12					
7 Leslie St.	T U	0	0	0	0	0	0					
TORONTO -FAST YORK DISTRIC	T AREA 2		0	Ū	0	0	0					
1401 Castlefield Ave. Yard	T HILA 2	9	0	1	10	4	0					
1116 King St. Yard	T U	11	0	0	3	0	28 0					
	U		0	0	0	0	34					
ETOBICOKE-YORK DISTRICT	т		0	1	3	0	0					
Toryork Dr . Yard.	U	0	0	0	0	0	0					
320 Bering Avenue Yard	T U	0	1	2	5	14	0					
NORTH YORK DISTRICT												
64 Murray Rd. Yard	T	1	1	2	12	12	0					
Oriole Yard - 2751 Old Leslie St.	T U	2	0	1	3	3	0					
	0		0	0	0	0	0					
Sheppard Yard – 8270 Sheppard	Т		0	0	2	11	0					
Ave	U		0	0	0	0	0					
Ellesmere Yard – 2000 Midland Ave	T U	2	1	2	10	0	0					
Morningside Yard - 891	T	2	0	1	1	0	0					
Morningside Ave.	U	2	0	0	0	0	8					
TOTAL(S)	Т		4	12	66	52	56					
	U	26	0	0	0	0	91					
SUMMAKY PERCENTAGE (%)		36	4/4	T = 12/12 100	1 - 66/66	1- 52/52	<u>1 – 45/91</u> 36					
			100	100	100	100	50					

#### Table 5.6.2 SNOW AND ICE CONTROL TRAINING AUDIT CONTRACT STAFF (Winter 2020/2021)

YARD/DEPOT FACILITY	STATUS	TUS STAFF FORMAL TRAINING SUMMARY										
LOCATION	Trained – T Untrained – U	Total Salters	Superintendent	Dispatcher	Operators Loader	Spreader Operators						
TORONTO-EAST YORK DISTRICT AREA 1												
Depot 1 - 777 Bayview Avenue	T	11	1	1	1	11						
	U		0	0	0	0						
Depot 6 - 7 Leslie Street	U	14	0	0	0	0						
TORONTO-EAST YORK DISTRICT AREA 2												
Depot 7 677 Wellington St. W	Т	12	1	1	1	13						
Depot 7 – 677 weinington St. w.	U	15	0	0	0	0						
ETOBICOKE YORK DISTRICT												
Depot 5 - 40 Boncer Drive	T	21	1	1	1	21						
· · · · · · · · · · · · · · · · · · ·	U		0	0	0	0						
Depot 10 – 150 Disco Rd	I	11	0	0	0	0						
	T		1	1	1	18						
Depot 9 - 49 Toryork Dr.	U	18	0	0	0	0						
NORTH YORK DISTRICT												
Depot 2 - 64 Murray Rd	Т	19	1	1	1	19						
Depot 2 of Manay Rd.	U	17	0	0	0	0						
Depot 3 - 195 Bermondsey Road	T	16	0	1	1	16						
	T		1	1	1	8						
Depot 12 – 2750 Old Leslie St.	U	8	0	0	0	0						
Donot 11 96 Ingrom Drive	Т	0	1	1	1	8						
Depot 11 - 80 lingram Drive	U	0	0	0	0	0						
SCARBOROUGH DISTRICT												
Depot 8 - 8270 Sheppard Ave	Т	16	1	1	1	16						
	U	10	0	0	0	0						
Depot 4 – 1 Nantucket Blvd	II	19	0	0	0	0						
Dopot 12 1050 Ellosmoro	T	6	1	1	1	6						
Depot 15 – 1050 Ellesillere	U	0	0	0	0	0						
Depot 14 – 891 Morningside Ave	T	6	1	1	1	6						
· · ·	U		0	0	0	0						
	Т		14	14	14	186						
101AL(S)	U		0	0	0	0						
SUMMARY			14/14	14/14	14/14	186/186						
PERCENTAGE (%)			100	55	65	100						
						1						

\*Contractors also have lists of Operators and additional staff being trained and may have more staff listed than salter units.

## 5.7 Snow Removal and Disposal Audit

The City completed a Snow Disposal Study in 2002. As part of the recommendations many sites have been closed over the past few years due to environmental concerns. As well, several recommendations were made regarding upgrades to the sites to address environmental issues. There are currently twelve snow disposal sites in the City of Toronto.

Table 5.7.1 identifies the upgrades proposed for each site and provides a form for confirming the completion of the improvements.

#### **TABLE 5.7.1**

#### ANNUAL SNOW DISPOSAL SITE AUDIT (2020)

Site	Delineate Boundary		Drainage Management		Litter Control		Plant Visual Barrier		Noise Control	
	Need	Done	Need	Done	Need	Done	Need	Done	Need	Done
Unwin Ave	Х	$\checkmark$	Х		Х	$\checkmark$	Х			
Bloor/Bayview	Х	$\checkmark$	Х		Х	$\checkmark$			Х	
North Keelesdale	Х	$\checkmark$	Х		Х	$\checkmark$	Х			
Budapest Park – Melter Site (1)	X	$\checkmark$			Х	$\checkmark$				
New Toronto St.		$\checkmark$	Х	$\checkmark$	Х	$\checkmark$		$\checkmark$		$\checkmark$
Allan Rd. North of Transit Road – Melter Site (2)			Х		Х	$\checkmark$				
Conlins Rd / Morningside Yard – Melter Site (3)		$\checkmark$	X		Х	$\checkmark$	X		X	

## 5.8 Technology Audit

Table 5.8.1 provides a yearly technology summary for the snow and ice control technologies used by the City of Toronto.

# TABLE 5.8.1ANNUAL TECHNOLOGY SUMMARY2020/2021

YARD/DEPOT FACILITY	TECHNOLOGY										
		Infra	Infra-Red Thermometer						AVL		
LOCATION	RWIS	Hand Held	Spreader Trucks Mounted	Pickup Trucks Mounted	Salter Trucks (All)	Electronic Controllers	Salters with Pre- wetting	Anti-icing Trucks	On Spreader Trucks	On Staff Trucks (Patrol/Super/ Invest)	
Toronto-East York Area 1											
Depot 1 - 777 Bayview Avenue	2	0	0	4	11	11	11	2	11	2	
Depot 6 - 7 Leslie Street	0	0	0	3	14	14	14	1	14	0	
433 Eastern Avenue Yard	0	0	0	3	10	10	8	0	0	0	
Toronto-East York Area 2											
Depot 7 – 677 Wellington St. W.	1	0	0	0	13	13	13	1	13	0	
1401 Castlefield Ave. Yard	0	2	0	2	4	4	4	1	0	1	
1116 King St. Yard	0	0	0	0	5	5	5	0	0	0	
ETOBICOKE YORK DISTRICT											
Depot 5 – 40 Boncer Drive	1	1	0	7	21	21	21	2	23	0	
Depot 9 - 49 Toryork Dr.	1	0	0	7	18	18	18	2	19	0	
Depot 10 - 150 Disco Road	1	0	0	0	11	11	11	0	3	0	
Toryork Yard - 61 Toryork Dr.	0	0	0	0	0	0	0	0	0	0	
320 Bering Avenue Yard	0	3	0	10	0	0	0	1	13	13	
NORTH YORK DISTRICT											
Depot 2 - 64 Murray Rd.	0	0	0	2	18	18	18	1	7	0	
64 Murray Rd. Yard	0	0	0	0	1	1	1	0	0	0	
Depot 3 - 195 Bermondsey Road	0	0	0	2	16	16	16	1	5	0	
Depot 11 – 2750 Old Leslie St.	0	0	0	0	8	8	8	0	0	0	
Oriole Yard - 2751 Old Leslie St.	0	1	0	1	1	1	1	0	0	0	
Depot 12 - 86 Ingram Drive	0	0	0	1	8	8	8	0	0	0	
SCARBOROUGH DISTRICT											
Depot 4 - 1 Nantucket Blvd.	0	1	0	0	19	19	19	1	19	0	
Depot 8 – 8270 Sheppard Ave.	0	1	0	11	16	16	16	2	14	0	
Depot 13 – 1050 Ellesmere Yard	0	0	0	0	8	8	8	0	0	0	
TOTALS	1	9	0	53	8 210	8 210	8 210	2	210	53	
IUIALS	1 /		U	55	210	210	210	45	210	55	

# 5.9 Environmentally Sensitive Areas

To be determined in discussion with the Toronto Region Conservation Authority once the Natural Heritage Study has been completed.

# 5.10 Monitoring Programme

A monitoring programme has been developed by Transportation Services in conjunction with Toronto Water and the Toronto Region Conservation Authority (TRCA). The first three years are being used as a methods development activity and is organized as a set of "Pilot Projects". The monitoring programme includes chemical and flow monitoring of surface water systems and meltwater from snow disposal sites. Surface water monitoring builds upon preliminary sampling conducted in 2001.

The programme for the 2002/2003 season consisted of the monitoring of sixteen sites on various watercourses, at a sample treatment plant, at snow disposal sites and at campsites across the City. The programme included two stations owned and operated by the TRCA. Stream flow data was obtained from designated sites. In addition, measurements of conductivity (an indication of chloride levels) were obtained and auto samplers collected discrete samples during storm events for heavy metals and cyanide. Grab samples were collected at two snow disposal sites (North Keelesdale & Bloor/Bayview). Finally, the chloride levels were compared over time to determine trends in an effort to correlate them to road salting activities.

Monitoring to support mass balances depends on surface water data and measurement of salt applications on a subwatershed/stormsewershed boundary basis. Salt application data was provided to the Toronto Water for two designated subwatersheds and corresponding mapping was prepared.

The monitoring programme will be reviewed and revised based on the data gathered and the results of the analysis.

# **5.11Environment Canada Reporting**

On April 3, 2004, Environment Canada released a "Code of Practice" for the Environmental Management of Road Salts." All organizations that utilize more than 500 tonnes of road salts per year and/or have any environmentally vulnerable areas are subject to this Code under the Canadian Environmental Protection Act, 1999. The purpose of the Code is to assist relevant organizations in managing their road salt usage in a more environmentally conscious manner. The two goals of the Code are to develop salt management plans all over Canada and to implement best management practices as indicated in the Transportation Association of Canada's Syntheses of Best Practices. All relevant organizations are required to prepare a Salt Management Plan within a year of the official publication of the Code in the Canada Gazette. The Code sets out specific guidelines and criteria that must be included in a Salt Management Plan. Annex A of the Code contains guidance on identifying environmental impact indicators for road salts. Annex B provides direction for identifying areas that are vulnerable to road salts. Annex C sets out criteria for monitoring and measuring progress.

The City is required to send Environment Canada a notice of intention to prepare a salt management plan within six months of the Code's publication or within six months of becoming subject to the Code. Information contained in Annex C is to be reported to the Minister of the Environment annually starting June 30, 2005. In the year 2008, relevant organizations will be asked to participate with Environment Canada in the review of the progress of salt management plans and discuss the need for future action.