



**City of Kingston
Information Report to Council
Report Number 15-210**

To:	Mayor and Members of Council
From:	Jim Keech, President and CEO, Utilities Kingston
Resource Staff:	Damon Wells, Director, Public Works
Date of Meeting:	March 24, 2015
Subject:	Winter Control Monitoring and Activity Analysis Report

Executive Summary:

At the December 9, 2014 Environment, Infrastructure and Transportation Policies Committee meeting, the following motion was moved and carried;

That the Environment, Infrastructure and Transportation Policies Committee receive this report, recognizing that staff will continue to monitor winter control activities over the 2014/2015 winter season for the purposes of identifying operational resource requirements/changes for inclusion in future year budgets; and

That staff provide the capital costs for replacing the individual pieces of snow removal equipment for the 2014-2015 winter season in time for the Council 2015 budget discussion; and

That staff supply to Council the analysis that indicates the quality of snow removal and clearance services and standards that will be maintained in the city when the growth since 2008 is taken into account for the Council 2015 budget discussions.

During the 2015 budget approval process, staff provided Council with the information requested in the 2nd and 3rd clauses above. In addition, at that time staff committed to provide Council with an information report in March that would provide detail on winter control activities for the current season and an indication of the data staff was collecting to assist in an analytical review comparing the services being delivered to the adopted service levels.

March 24, 2015

Page 2 of 9

The following report discusses winter control in general, indicates what winter control activity related data will be monitored and how that data will be analyzed, to further impact the level of winter control service delivery that can be maintained.

Recommendation:

This report is provided for information purposes only.

Authorizing Signatures:

ORIGINAL SIGNED BY PRESIDENT & CEO, UTILITIES KINGSTON

**Jim Keech, President and CEO,
Utilities Kingston**

ORIGINAL SIGNED BY CHIEF ADMINISTRATIVE OFFICER

Gerard Hunt, Chief Administrative Officer

Consultation with the following Commissioners:

Cynthia Beach, Corporate & Strategic Initiatives	Not required
Lanie Hurdle, Community Services	Not required
Denis Leger, Transportation, Facilities & Emergency Services	Not required
Desiree Kennedy, Chief Financial Officer & City Treasurer	Not required

March 24, 2015

Page 3 of 9

Options/Discussion:**Background**

Winter Control Operations are carried out on municipal roads, streets, sidewalks and walkways, to effectively and efficiently address winter snow and ice conditions to provide safe and unimpeded vehicular and pedestrian traffic. In Ontario, Provincial Minimum Maintenance Standards for Municipal Highways under Ontario Regulation 239/02, provide minimum level of service delivery standards for municipal roads and streets, but currently do not provide similar minimum standards for sidewalks or walkways.

In 2002, the then Roads Division of the City of Kingston, updated an existing Winter Control Plan to ensure that the City of Kingston's winter maintenance standards met or exceeded the Provincial standards. Additionally, recognizing the importance of winter sidewalk maintenance level of service standards for sidewalks were developed and included in the 2002-2003 Winter Control plan. These (sidewalks) are not covered in the Provincial standards. The Plan was developed based on the existing road, street, sidewalk and walkway networks, and recognized the existing winter control fleet and the then Roads Division staffing complement.

On average the City's road, street, sidewalk and walkway networks, grow by approximately five (5) kilometers per year. By 2008, with that network growth, it was apparent that sidewalk standards could not be met, due mainly to departmental staffing deficiencies and the limited capabilities of then existing winter sidewalk plow equipment. To meet the 2008 demands, these two issues were partially addressed by the now Public Works Department (Public Works), through increases in staffing and a sidewalk equipment replacement program that was implemented between 2009 and 2013.

In 2014, six years after the 2008 review, continued road, street, sidewalk and walkway networks growth, coupled with rising public expectations are again impacting the department's ability to meet winter service levels.

The December 9, 2014 motion gives direction to monitor winter control operations and provide an analysis that indicates the department's ability to meet its winter control level of service standards.

What is Winter Control

As directed, over the course of this current winter control season, Public Works has been monitoring winter control activities and compiling winter control data, to both identify operational resource requirements/changes and to support an analysis that indicates the quality of snow removal and clearance services, and standards that will be maintained in the city when the growth since 2008 is taken into account.

To understand the monitoring and data being compiled in the current monitoring phase and the analysis to be carried out in the next phase of this project, it is important to understand; what

March 24, 2015

Page 4 of 9

Winter Control is, what a Winter Control event is and what factors impact Winter Control operations.

For the city of Kingston, Winter Control, as stated above, consists of operations in response to winter control events, which are carried out on municipal roads, streets, sidewalks and walkways, to effectively and efficiently address winter snow and ice conditions, on those roads, streets, sidewalks and walkways, to provide safe and unimpeded vehicular and pedestrian traffic.

A Winter Control Event is typically a winter weather related occurrence that impacts safe and unimpeded vehicular and pedestrian traffic, i.e.; snow, blowing snow, freezing rain, black ice, etc.

Major factors that impact Winter Control Operations include but are not limited to; the circumstances related to the winter control event, the staff and equipment availability for response to the event and the date/day, winter control shift, time and duration of the event and the required response. Each of these major factors can be broken down into further multiple sub-factors, all of which impact operational responses.

Monitoring and Data Collection for 2014-2015 Operations

Monitoring Weather

Being the driving factor for winter control activities, both weather forecasts and actual weather are being monitored through this winter season. Although current weather forecasting has seen great advancements over the past decade, weather forecasts are still 'forecasts' only, and are subject to many factors that even weather professionals cannot thoroughly predict. A major example that impacts forecasts for the Kingston area is the proximity to Lake Ontario, and for the purposes of winter control, an unfrozen lake adds significantly to weather forecast unpredictability.

Year round and critically during the winter control season, Public Works staff receive 48 hour weather forecasts four (4) times daily by both e-mail and fax, from a weather service provider. These forecasts are monitored upon receipt and are then compared with several other online weather forecasts service providers, to provide a better determination of the probability of a weather event.

Actual weather is also monitored. In 2013 Public Works installed a Remote Weather Information System (RWIS) station on Perth Road. These weather stations provide information on actual weather being received and also provide critical road surface temperature information. Knowing the road temperature, which can vary significantly from the air temperature, is a key factor in determining the use of de-icers and/or abrasives. Having a City owned RWIS station also allows Public Works staff to access the Ministry of Transportation's full RWIS network, which again provides an indication of not only approaching weather event systems, but also the potential type and intensity of those systems.

March 24, 2015

Page 5 of 9

Actual weather information received and recorded at Kingston's Municipal Airport is available as Hourly Weather Data from Environment Canada, and can provide a further indication of actual weather received. Additionally, Public Works 'Shift Completion Summaries', completed by staff at the end of each working shift, have sections for recording current weather.

Monitoring and compiling the above three 'actual' weather received information sources provides key information related to the key driving factor for winter control activities.

Monitoring Event Response Data

For each working shift, Public Works 'Shift Completion Summaries' (SCS), provide a recorded log of what winter control activities were carried out, on what routes, with which piece of equipment and by which Public Works employee. Each Public Works Assistant Supervisor completes an individually numbered SCS at the end of each shift.

Data from each SCS includes; date and time, regular or overtime shift, weather and road and sidewalk surface conditions (typically as observed at the start of the shift), employees, trucks and equipment utilized, what activities and where those activities were carried out. Each SCS consists of two pages, with the second page reserved for additional notes, specific to the shift.

Additionally, each Public Works Assistant Supervisor has a daily journal, in which they record other pertinent information from their shift.

Each Public Works employee completes a 'daily time sheet' for each working shift. These daily time sheets provide an individual per shift record that includes; employee name, date, shift, regular and/or overtime hours, activity, location, hours per activity and vehicle or equipment operated. Additionally, employees record off duty, driving and on duty non-driving hours, to ensure compliance with hours of work regulations. These time sheets are reviewed for accuracy, coded and signed off by the responsible Assistant Supervisor.

The SCS, daily journals and daily time sheets provide per shift information with respect to; weather and road/sidewalk conditions, what date and shift, what type of shift, staff and vehicle/equipment availability and hours, what activities were carried out and where, when an event was actioned and how long operations were required to address the event and the subsequent cleanup.

Monitoring and compiling the above, along with the forecast and actual weather information, provides a broad data resource to enable a comprehensive analysis of the winter seasons weather events and winter control operations.

Monitoring General Winter Season Data

To the end of February 2015, records indicate that Public Works has responded to 38 winter control events, 14 which occurred to the end of December 2014, and a further 24 to the end of February this year.

March 24, 2015

Page 6 of 9

Similarly, for the current winter season, for winter control related Customer Service generated Work Order Requests, to the end of February 2015, Public Works has received 1,094 work order requests, 247 requests to the end of December 2014, and a further 847 to the end of February this year. The Contact Centre tracks these requests by category and type, which provides further data for analysis.

To the end of February, Public Works has applied approximately 22,000 metric tonnes of abrasives for traction (winter sand) and 5,000 metric tonnes of salt for de-icing. To reduce the quantities of winter sand and salt used, approximately 90,000 litres of winter control liquids have been utilized for both anti-icing and pre-wet applications.

To mid-February of this year, for the 2014-2015 winter season, labour costs are approximately \$1,400,000, equipment costs are \$1,000,000, salt and winter sand costs are approximately \$1,110,000, Contracted Services costs are approximately \$1,000,000. Combined, this puts this winter season's cost, to mid-February at roughly \$4,500,000.

The costs expended in 2014 are covered in the 2014 operating budget whereas the costs expended from January to mid-February noted above, are covered in the 2015 operating budget. These expenditures combined are higher than budgeted which are not unexpected considering the winter weather we have encountered.

Anti-icing or 'Direct Liquid Application' (DLA) is carried out by applying winter control liquids directly to road and street surfaces prior to the start of a winter event, to help prevent snow from forming a bond with the road surface. This improves the efficiency of plowing operations and helps prevent hard packed snow conditions and reduces the amount of de-icing salt usage. It is important to note that DLA is only effective for temperatures above -10°C.

Pre-wet is the application of winter control liquids to the winter sand or salt, as that material is coming off the plow truck conveyor, during sanding or salting operations. Pre-wet winter sand or salt is more effective both as an abrasive and as a de-icer, again reducing the total winter sand and salt usage.

This data, along with labour and vehicle/equipment hours and costs, will be more closely assessed during the analysis phase of this project.

Analysis and Update to Winter Control Plan

At this time, with the current focus being the monitoring phase including the compilation of related weather and operational data, possible elements for inclusion in the analysis phase are still being considered but are expected to include the following.

Operational Response Assessment

The monitored and compiled weather and shift completion summary data will provide the basis for an analysis of winter control clearing and removal capabilities, taking into account the road,

March 24, 2015

Page 7 of 9

street, sidewalk and walkway networks growth since 2008, as related to the current winter control level of service standards. That analysis will look at the Public Works operational winter control response to each winter event for the 2014-2015 winter season and will look at the season as a whole. For each response the analysis will consider weather and other relative factors experienced, operational resources applied to roads, streets, sidewalks and walkways, operational time required to complete clearing activities and/or clearing achieved prior to the initiation of a further subsequent event and other further operational detail as may be pertinent.

This assessment of the current winter control operational capabilities will be used to identify gaps in achieving the current Winter Control Plan service level standards. These gaps may be identified to be associated with staffing and fleet complement, communications and customer service responses and/or accommodation of growth and new or changing service demands.

Roads/streets and sidewalks/walkways will be assessed separately, with the availability of staffing resources being a key consideration in both cases.

Operational Improvements/Efficiencies Assessment

Further to identifying current capabilities, an assessment of industry best practices and potential operational improvements and efficiencies will be undertaken to identify process improvements that may be undertaken.

For example, road, street, sidewalk and walkway winter control routes will be reviewed and route optimizations will be considered, with route re-configurations to be carried out prior to the 2015-2016 winter season, where applicable and possible. Route optimization is typically used to match current fleet complements to existing networks, taking into consideration level of service standards. Route optimization can also indicate optimum fleet complement size for current and expected future network size.

Similarly, snow removal operations will be reviewed and compared to similar operations in other municipalities. Recognizing the growing demand for removals during winters as experienced this and last winter season, and recognizing that we will need to do more 'day time' removals, we are looking at the whole removals process. We have this winter been on site during removal operations in other municipalities, with their supervisory staff, to see how they carry out these operations. For the operations that our staff observed, like us, those municipalities typically utilize a grader or loader and sidewalk plow in conjunction with the blower for each operation.

Communicating operational capabilities, managing customer expectations and providing appropriate customer service request response is critical to the customer's perception of the service being delivered. Winter Control related communications enhancements may be explored to provide a better understanding of winter control operations and limitations. Customer Service winter related Work Order Requests will be reviewed to confirm common themes such that communications, work order responses, response activities and/or operational changes may be considered.

March 24, 2015

Page 8 of 9

Winter Control Plan Update

An additional analysis will include a review of the current 2002-2003 Winter Control Plan and associated service level standards, including a comparison to other municipalities' winter control plans. This assessment will support an update of the current plan, with the intent to have an update completed prior to the 2015-2016 winter season.

Long Term Operating and Capital Requirements

As road, street, sidewalk and walkway network growth and winter control service demands are expected to continue, long term resourcing plans need to be developed to ensure that both operational and capital requests are properly forecast. Technology trends need to be reviewed from operational enhancement and efficiency perspectives. Additionally, customer service requests and demands need to be anticipated, so that communications efforts and operational responses are proactive.

These long term assessments will be considered as a part of this analysis phase, but the actual assessments will be carried out subsequent to the completion of this project.

Current Capital Requirements

A summary of capital costs for additional vehicles and equipment was provided in conjunction with the 2015 Public Works Services Budget Presentation.

These capital costs will be updated to include expected future capital needs as a result of the analysis to be carried out.

Existing Policy/By Law:

2002-2003 Winter Control Plan

Notice Provisions:

Not Required

Accessibility Considerations:

Not applicable.

Financial Considerations:

Not applicable.

Contacts:

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March 24, 2015

Page 9 of 9

Other City of Kingston Staff Consulted:

Mark Van Buren, Director, Engineering

Exhibits Attached:

Not applicable.