

PROJECT AT A GLANCE

Winter Road Maintenance Program – Phase 2 Analysis: Deploying Resources

WHY THIS PROJECT MATTERS

It is important to analyze long-term multi-million dollar contracts that are ready for renewal to assess if the City is receiving value for money before entering into new contracts. This report considers whether the City was receiving the best value for money by contracting out winter maintenance services (vs an in-house solution) and identifies opportunities for improved cost-effectiveness in managing the contracted services model.

BY THE NUMBERS

- **\$90M** budgeted annually and **\$411M** spent in last 5 years on winter maintenance
- **57%** or **\$47M** of annual budget and **\$237M** actual expenditures for contractor standby payments in last 5 years

WHAT WE FOUND

A – see Confidential Attachment 1

B – see Confidential Attachment 1

C – Collecting and Using Data

- The Division did not sufficiently analyze operational winter maintenance data to monitor contract performance and realize efficiencies and savings through better management of fleet capacity
- Many issues with the overall consistency of how the payment data was recorded
- It took significant effort and resources to correct the errors and make the data usable for analysis
- The Division could benefit from analyzing valuable operational data to improve operations, specifically, route efficiency and fleet optimization

HOW RECOMMENDATIONS WILL BENEFIT THE CITY

By implementing the four recommendations contained in this report, and depending on the cost model employed in the new contracts, considerable cost savings and operating efficiencies may be achieved for the contracted winter maintenance services.

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Winter Road Maintenance Program – Phase 2 Analysis: Deploying Resources (see Confidential Attachment 1 for confidential portions)

Transportation Services Division

June 22, 2021

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Auditor General

**AUDITOR
GENERAL**

TORONTO

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Executive Summary

Phase 1 audit report issued October 2020 with 22 recommendations

On October 14, 2020 the Auditor General released her report titled:

"Audit of Winter Road Maintenance Program – Phase One: Leveraging Technology and Improving Design and Management of Contracts to Achieve Service Level Outcomes"¹

The Auditor General made 22 recommendations in that report to strengthen the City's winter road maintenance program.

Recommendations to improve efficiency and effectiveness

Implementing those recommendations will help Transportation Services Division (Transportation Services or the Division) to:

- improve the efficiency and effectiveness of the winter road maintenance program
- resolve contract management and contractor performance issues
- measure and meet Council-approved service levels.

Phase 2 objectives and scope

The objectives of our Phase 2 analysis were to:

1. determine whether the best value for money is provided through the contracted services model, or if it would be more cost-effective to perform winter services in-house using City equipment and staff, and to
2. identify opportunities for improved efficiency and cost-effectiveness in managing the contracted services model (e.g. cost drivers).

Our work for this Phase 2 project focussed on the payments and operational information for the period between 2015 and 2020.

47 contracts for approximately 1,130 winter road maintenance vehicles

Transportation Services currently has 47 seven-year contracts, all expiring in 2022. There are currently 21 different contractors and a fleet of approximately 1,130 contracted vehicles delivering winter maintenance activities such as anti-icing, de-icing, snow plowing, and snow removal. In-house staff perform a small portion of winter maintenance work for local roads and laneway salting. The value of these contracts totals approximately \$64 million annually.

¹ <https://www.toronto.ca/legdocs/mmis/2020/au/bgrd/backgroundfile-157521.pdf>

57% of total average annual winter maintenance program expenditures spent on contractors to stand by when not needed

The Division's average annual winter road maintenance expenditures are:

- \$47 million (57%) for contractors to stand by ready to work if needed (\$237 million over five years)
- \$17 million (21%) to contractors for actual on-street services
- \$12 million (15%) for salt
- \$6 million (7%) for divisional staff standby.

October 2020 report recommended better contract management and enforcement of contractual terms

The first phase of our work focused on winter contract management that recommended making better use of GPS technology and enforcing contractual terms and conditions for standby, and for managing contractor non-compliance issues such as:

- Started their shift late
- Claimed more hours than worked
- Took excessive stop times
- Did not make their vehicles available for operations as required.

Cost-benefit analysis of the contracted model

This report is the second phase of the Auditor General's work on winter road maintenance. In this report, we are providing the results of our cost-benefit analysis, comparing the current contracted model to an in-house model where the City's employees would complete the winter road maintenance program.

Data needs to be collected and analyzed regularly

We also concluded that Transportation Services needs to improve its processes for data collection and analysis. We noted several data integrity issues that initially hindered our analysis. It is important to have good quality data to conduct a proper cost-benefit analysis or to identify opportunities for efficiencies. We spent significant resources to correct the errors and make the data usable for our analysis. With accurate and timelier data, Transportation Services could better understand whether it is obtaining good value for money in its winter road maintenance contracts.

This work we describe in this report was not an audit

The work performed in relation to this report **does not constitute an audit conducted in accordance with Generally Accepted Government Auditing Standards (GAGAS)**. However, we believe we have performed sufficient work and gathered sufficient appropriate evidence to provide for a reasonable basis to support our observations and recommendations.

Program Background

Transportation Services' mission is to provide a safe, efficient, and effective transportation system that serves the residents, businesses, and visitors of the City of Toronto in an environmentally, socially, and economically sustainable manner.

Winter Road Maintenance program annual budget - \$90M

Transportation Services is responsible for delivering the City's Winter Road Maintenance program with an annual budget of \$90 million.

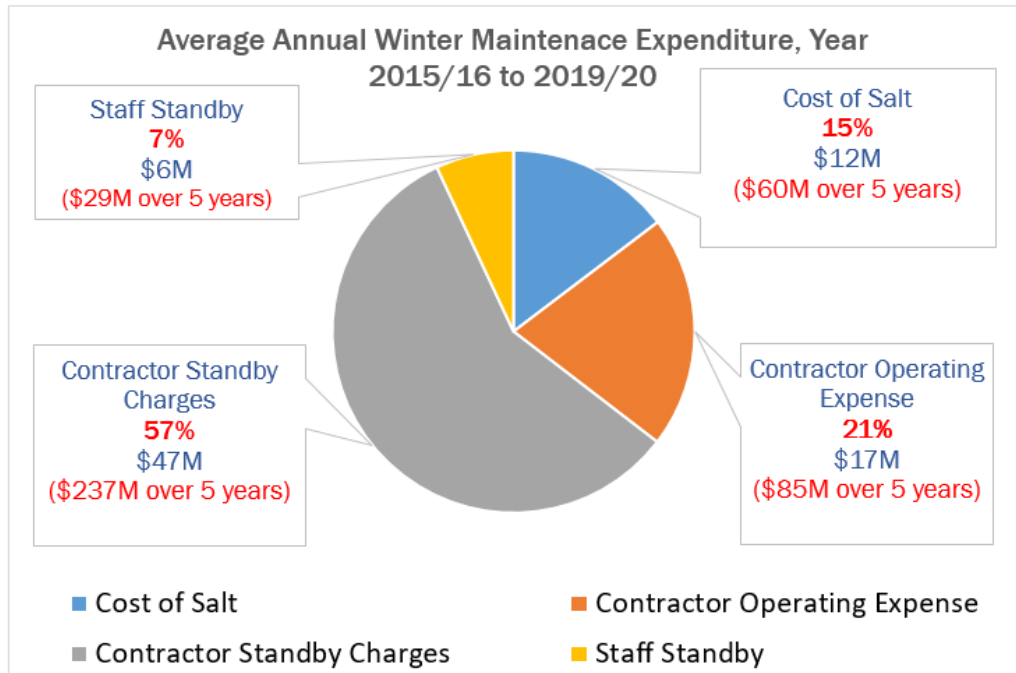
Fleet of 1,130 contracted vehicles, 47 contracts

The majority of winter services provided by the Division are delivered using contractors. The Division currently has 47 seven-year contracts with 21 different contractors and a fleet of approximately 1,130 contracted vehicles to deliver winter maintenance activities such as anti-icing, de-icing, snow plowing, and snow removal. In-house staff perform a small portion of winter maintenance work for local roads and laneway salting.

57% (\$237M over 5 years) of total average annual winter maintenance expenditures spent for contractors to be available on standby

The Division's average annual winter road maintenance expenditures are:

- \$47 million (57%) for contractors to stand by ready to work if needed (\$237 million over five years)
- \$17 million (21%) to contractors for actual on-street services
- \$12 million (15%) for salt
- \$6 million (7%) for divisional staff standby.



Contractor standby payments are directly correlated to the fleet size – the larger the fleet, the larger the standby payments

As part of our phase one report "Audit of Winter Road Maintenance Program - Phase One: Leveraging Technology and Improving Design and Management of Contracts to Achieve Service Level Outcomes," we highlighted that the biggest expenditure for winter maintenance services is the contractor standby payments. Contractor standby payments represent 57 per cent of the total winter maintenance program expenditures and 73 per cent of the total contractor payments. The standby payments are directly correlated to the fleet size. The larger the fleet, the larger the standby payments.

The *City of Toronto Act, 2006 (Ontario Regulation 612/06)*, mandates the minimum maintenance standards for highways in the City of Toronto. These standards cover various winter maintenance activities undertaken by the Division, including snow plowing and road salting.

Council approves service levels for Toronto annually

City Council approves the City's winter maintenance service levels for various road types. These service levels are higher than the provincially mandated minimum maintenance standards. This approval is done annually during the Operating Budget approval process. See the figure below for Council-approved service levels.

Levels of Snow Clearing Service, Toronto

Road Type	When does the City start salting?	When does the City start plowing?*	How many hours after the snow stops falling does it take to clear an average storm?
Expressways (Don Valley Parkway & Gardiner Expressway)	When snow first accumulates	2.5 cm	2-3 hours
Major roads, streetcar routes, bus routes, streets with hills and bike lanes		5 cm	6-8 hours
Neighbourhood roads		8 cm	14-16 hours

*Council-approved service levels, 2015-2022

In 2019-2020, the sidewalk and transit snow clearing level of service was updated to reflect a 2 cm activation of operation for sidewalks with low pedestrian volumes. Previously, the low volume sidewalks were being cleared at 8 cm accumulation of snow.

The City's 7-year winter maintenance contracts are nearing the end of their term

The winter maintenance contracts were signed in 2015 and are nearing the end of their seven-year term.

This Phase Two report considers whether the City was receiving the best value for money by contracting out winter maintenance services (vs an in-house solution). The report also identifies opportunities for improved cost-effectiveness in managing the contracted services model in the Division's upcoming contract cycle.

Results

A. Cost Benefit Analysis

A. 1. Background

We considered potential benefits of bringing the winter road maintenance program in-house

As the Auditor General concluded in her October 2020 Phase 1 audit report, Transportation Services could have obtained considerable savings with better management of winter road maintenance contractors. However, a reasonable question to be posed after that conclusion is whether a City workforce with City equipment would be more efficient and economical. In other words, would it be more cost-effective for the Division to manage its own employees and equipment than using a contracted work force? Accordingly, we undertook an analysis in our Phase 2 project to consider that question.

Phase 2 objectives and scope

The objectives of our Phase 2 analysis were to:

1. determine whether the best value for money is provided through the contracted services model, or if it would be more cost-effective to perform winter services in-house using City equipment and staff, and to
2. identify opportunities for improved efficiency and cost-effectiveness in managing the contracted services model (e.g. cost drivers).

Our work for this Phase 2 project focussed on the payments and operational information for the period between 2015 and 2020.

Confidential Attachment contains the analysis

The remaining analysis is contained in Confidential Attachment 1.

B. Refer to Confidential Attachment 1

C. Collecting and Using Data

C. 1. Background

TMMS database captures all contract related operating transactions and payments and other key information

In order to perform our analysis for both the cost-benefit evaluation and in identifying areas of efficiencies, we required the Division's information on historical usage and used the historical payment data captured in the Toronto Maintenance Management System (TMMS) database. The TMMS database captures all contract related operating transactions and payments.

Transportation Services staff enter the contractor operating sheets into the TMMS database including information such as the contractor name, shift date, hours or kilometers of operation. This information is logged by vehicle ID and becomes the basis for payment to the contractor. The database also captures other information such as standby payments, hourly operating payments for the days when vehicles are active, GPS equipment rental, and other miscellaneous payments to the contractors.

Since 2015, the TMMS database includes 261,000 transactions

Since 2015, the TMMS database has recorded 261,000 transactions including \$46 million for operating payments, \$237 million for standby and \$32 million for other operating charges.

TMMS data captures valuable information that can be used to monitor contractor performance and provide insights on winter maintenance operations

TMMS data captures very valuable and useful operational information that can be leveraged for monitoring contractor performance and improving overall efficiency of winter services.

The data can provide valuable insight on the winter operations. For example, this data can be used to:

- calculate average trip hours and length, hourly operating rates,
- review deployment patterns,
- review vehicle utilization information (e.g. if certain vehicles or contractors are underutilized or have redundant capacity),
- analyze type of activity being performed, and
- hold contractors accountable for performance and service levels.

C. 2. Finding

Substantial efforts and time spent to clean-up the data

We faced several challenges and issues with the data as part of this project. We had to make substantial efforts and invest significant time to clean up the data to make it useable for our analysis.

Given the value of this data, we are highlighting these issues as the data will only be valuable to management if it is consistent and accurate.

Several issues in consistency of recording payment data in TMMS database

We noted several issues with the overall consistency of how the payment data was recorded in the TMMS database.

For example, some of the types of issues noted with the data are shown in the table below.

Examples of Data Issues

	Issues noted	Example	Implication
1	Inconsistent Vehicle IDs from year to year	i.e. for the same vehicle, the following vehicle IDs were used: <ul style="list-style-type: none"> • 34EY1A01 • 28EY1A01 • EY1A01 • EY-1A01 	Difficult to compare vehicle utilization across multiple-years to assess optimum fleet levels
2	Inconsistent contract naming conventions – TMMS contract numbers change from year to year	i.e. for different contracts, different naming conventions are used: <ul style="list-style-type: none"> • 15EY193-Y1 • 19TEY093Y5 	Difficult to perform multi-year analysis on operational and standby data for contractors
3	Several days of operational activity lumped together and entered on a single day	i.e. 167.5 hours of operating activity entered for a single vehicle in a 24-hour period	Difficult to analyze service levels
4	Very low usage recorded for salting and plowing operations	<ul style="list-style-type: none"> • For plowing - 0.02 hrs, 0.05 hours, 0.08 hours • For salting - 5 km 	These are potentially data entry errors

Other examples of the types of issues found in the TMMS data can be found in Appendix 1.

Many problems caused by inaccurate data entry and not protecting key fields

Many of these problems were caused by inaccurate data entry. Also, certain key fields in the system are not protected and can be overridden. It is important to implement data edit controls so that the data being entered into the database is consistent. For example, it will ensure the naming convention used for the contract year is the same year-over-year. For example, "Year 1" instead of "Yr1," "Year1," or "2015."

If these issues are addressed, it will help Transportation Services to have data that can be more easily analyzed and monitored in managing the contracts.

The Division has also not benefited from valuable operational data gathered over the past many years to improve their operations, specifically, route efficiency and fleet optimization. Management should:

- implement a specific process to periodically download operational data from TMMS (or the new system) for performance analysis of contracted services,
- analyze trends for fleet deployment (frequency and timing), productivity and route efficiency (trip duration, average speed, kilometers driven), operating days, type of activity, and event tracking (i.e. linking trip data to snow advisory information,
- assign unique trip identifiers and advisory document numbers, and
- capture key data from snow advisories (weather road condition, forecast, temperature, accumulation etc.; trip start and end information).

Can use data to plan route and fleet design and optimize deployment

In the long-term, this information can be used for route design, fleet design, and optimizing deployment.

Transportation Services should have access to reliable and accurate data in order to drive informed decision making by management.

C. 3. Conclusion and Recommendations

It is important that strict data edit controls are implemented to ensure consistency, integrity and reliability of data for analysis.

Improving the reliability of data entered into the system is important for decision making, trend analysis, monitoring of compliance with contract terms and ensuring that City funds are spent correctly.

Recommendations:

- 3. City Council request the General Manager, Transportation Services Division, to:**
 - a. identify and remediate data entry errors and omissions in the TMMS Database for its winter maintenance program as part of an ongoing quality control process, and**
 - b. implement system-based controls such as data edit controls to validate data entry and protect key fields in the TMMS Database.**
- 4. City Council request the General Manager, Transportation Services Division, to use the data from its TMMS Database to measure and monitor contractor performance, analyze operational trends, and inform decision making.**

Conclusion

Further, by implementing the four recommendations contained in this report, and depending on the cost model employed in the new contracts, considerable cost savings and operational efficiencies may be achieved for the contracted winter maintenance services.

Our recommendations highlight the need for the Division to:

- collect accurate, timely, relevant and useful data and operational information for improved decision making and better contract management of winter maintenance services.

Objectives, Scope and Methodology

Objectives

The objectives of our Phase 2 analysis were to:

1. determine whether the best value for money is provided through the contracted services model, or if it would be more cost-effective to perform winter services in-house using City equipment and staff, and to
2. identify opportunities for improved efficiency and cost-effectiveness in managing the contracted services model (e.g. cost drivers).

Our work for this Phase 2 project focussed on the payments and operational information for the period between 2015 and 2020.

Methodology

Our analysis included a review of all winter maintenance activities in Scarborough, Etobicoke, North York, and Toronto East York Districts conducted over the five years starting in 2015.

We reviewed the winter maintenance operational data including contractor payments recorded in the TMMS system since 2015. This included:

- 261,000 payment transactions
- \$46 million in operating payments, \$237 million in standby, and \$32 million in other operating charges
- 79,000 salting and plowing trips comprising 511,000 trip hours, and 1,479,000 kilometers.

APPENDIX 1: Examples of Data Issues

We noted several issues with overall consistency of how payment data was recorded in the TMMS database. TMMS data captures very valuable and potentially useful operational information that can be leveraged for monitoring contractor performance and improving overall efficiency of winter services. However, due to the inconsistent recording of key information by staff, the data is less usable and effective for analysis.

The following are the examples of issues we found:

	Issues noted	Implication
1	Bid Item # changes from year to year and contract to contract	Difficult to analyze the type of operating activity performed or type of vehicle deployed
2	Incorrect unit of measure used (km used for hours and vice-versa)	Difficult to calculate daily trip lengths and utilization
3	Payment entries booked to incorrect contract year	Impacts summary level information
4	Several days of operational activity lumped together and entered on a single day	Understates the deployment frequency
5	Standby payments lumped together (or paid by month or days) or entered inconsistently	Difficult to trace standby payments to specific vehicles
6	Vehicle descriptions on vehicle inventory list and deployment schedule didn't match with TMMS data	Minor issue
7	Lack of standard description labels for vehicles	Difficult to analyze activity and costs trends by vehicle type
8	KM not captured for plowing vehicles and hours for salting vehicles	Difficult to assess route efficiency
9	Type of payment not separately identified through proper labels (e.g. Operating, Standby, Other etc.)	Minor issue – however, in absence of this information one has to rely on long bid descriptions which are also not consistent
10	Zero entries / zero amounts (no usage or operational activities)	Impacts quality of data
11	Negative usage (potential reversals)	It was unclear what these reversals or credit entries were for
12	Loading time not tied to vehicles IDs	Understates trip duration as it may be difficult to estimate how long a vehicle is occupied (operating time)

APPENDIX 2: Management’s Response to the Auditor General’s Report Entitled: "Winter Road Maintenance Program – Phase 2 Analysis: Deploying Resources"

Recommendation 3: City Council request the General Manager, Transportation Services Division to:

- a. identify and remediate data entry errors and omissions in the TMMS Database for its winter maintenance program as part of an ongoing quality control process, and
- b. implement system-based controls such as data edit controls to validate data entry and protect key fields in the TMMS Database.

<p>Management Response: <input checked="" type="checkbox"/> Agree <input type="checkbox"/> Disagree</p>
<p>Comments/Action Plan/Time Frame: Transportation Services proposes to:</p> <p>a) engage regularly scheduled data entry audits to identify and remediate data entry errors and omissions noted from the Report, as effectively as possible, within the TMMS Database. This quality control process will be documented for reference. It will ensure that the review itself is documented, and that it occurred prior to payment. The process will identify who is responsible and/or accountable for each task. This will be ready for Q3 2022.</p> <p>b) consult with the TMMS group in Technology Services in order review how/what system based controls can be implemented to validate data entry and protect key fields, as noted in the Report, in the TMMS Database however, the current budget and resources are dedicated to implementing the new Work Management System. Consultation will be done by Q3 2021.</p> <p>The rollout of the new Enterprise Work Management System (EWMS) to Operations and Maintenance for delivery of the new Winter Services Contracts is currently scheduled to be ready in time for the 2022/2023 winter season. There are controls and features around data entry, such as vendor remote data entry, which will remove or mitigate some current data risks that exist in TMMS, such as double entry errors, entry omissions and other data integrity errors. There is also an improved capacity in the EWMS related to reporting, budgeting, item usage and controls to ensure accurate information is entered into the system. The quality controls procedures created for TMMS data entry errors will be reviewed for applicability to Maximo when appropriate.</p>

Recommendation 4: City Council request the General Manager, Transportation Services Division to use the data from its TMMS Database to measure and monitor contractor performance, analyze operational trends, and inform decision-making.

<p>Management Response: <input checked="" type="checkbox"/> Agree <input type="checkbox"/> Disagree</p>
<p>Comments/Action Plan/Time Frame: Transportation Services proposes to review operational data regularly in order to monitor performance, analyze trends and inform decision making. This review will consist of a regularly scheduled data analysis to be performed after each winter event through GPS and operating sheets. Divisional staff are currently conducting year end item usage of contracts within the TMMS Database. Verification of operating rates in TMMS is being cross referenced with operating sheets</p>

provided by contractors and GPS usage reports.

This review process will be documented as part of a regular contract management exercise, and the procedures will identify who is responsible and/or accountable for conducting the review. SOP to standardize the review. This will be ready for Q2 2022.

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