Auditor General's Office

Executive Summary

2011

Audit of Watermain Repairs

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Auditor General, City of Greater Sudbury

2011 Audit of Watermain Repairs

Audit Overview

Fieldwork Complete Date:	February 16, 2012
Draft Report Date:	March 22, 2011
Final Report Date:	April 13, 2012
To:	Nick Benkovich, Director Water and Wastewater Services
From:	Brian Bigger, Auditor General
Audit Number:	2011INFRA05

Summary

Attached is the Auditor General's report entitled "2011 Audit of Watermain Repairs".

The Water/Wastewater division must adhere to government regulated policies and procedures such as Safe Drinking Water Act which defines requirements for operating and maintaining public water supply systems in Ontario. The division conducts internal audits to monitor adherence to these provincial standards with no significant findings and MOE Inspection results are averaging close to 100%.

The primary objective of the Auditor General's review was to identify opportunities to enhance the value for money achieved through watermain excavation and repair processes performed by both City and contractor work crews.

Divisional management have made significant advances, investing in the development of strategic plans for the Water and Wastewater Systems based on industry recognized best practices. Some of these plans include the Water & Wastewater Services Tactical Plan, the Emergency Response Plan and the Water and Wastewater Strategic Technology and Business Plan.

This audit did not duplicate efforts by management, but independently came to similar conclusions through the audit process. It was also intended that any opportunities identified in our review of watermain excavations and repairs should also be considered in all other planned and unplanned water and wastewater excavations and repairs. Therefore, estimates include any excavations that could benefit from the suggestions.

Our review identified that:

- Repairs were generally identified and repaired in a timely manner in order to minimize disruption to customers;
- Based on observations conducted during the audit, repair (excavation / trenching) methodologies of City crews did not consistently meet Ontario Ministry of Labour (MOL), Occupational Health and Safety Act (OHSA), O. Reg. 213/91 regarding excavations, nor the City's Standard Operating Procedures for trenches and excavations;
- The purchase of trench boxes suitable for distribution and collection system excavation and repair was recommended;
- There are opportunities to enhance the value for money achieved through operations by modifying the method, equipment and resources used in the repair process, by reducing the crew size, by modifying the deployment of workers, by establishing an afternoon shift and by centralizing operations and establishing specialty crews.

The attached report contains 11 recommendations along with a management response to each of those recommendations in watermain repairs and excavations.

Excavation and trenching safety improvements are required

Approximately two hundred and seventy eight (278) repairs requiring excavation are completed each year, the City's commitment to workplace safety, and compliance with OHSA regulations is an essential element of watermain excavation and repair activities. However, there is also significant budgetary pressure and with increased surface dimensions, increased damage to roads to contend with. Current excavation work crews may not consistently slope excavations. The Auditors concluded that current partial sloping methods do not follow Occupational Health and Safety Act Regulations, and may expose the City to significant legal liability in the case of an accident.

The auditors found that sloping an excavation in accordance with Occupational Health and Safety Act, O. Reg. 213/91 would potentially require (25%) more hours and potentially cost (40%) more than current partial sloping methods. The Auditors estimated that a budget increase of approximately $322,000 would have been required to comply with the Occupational Health and Safety Act, using only full sloped excavation methods. Once the City was officially made aware of this concern, the schedule to complete the transition to an operating solution was accelerated.

Full sloping excavation methods are generally more costly than trench box methods

After detailed observation of excavations by both the City crews and contractor crews, standard productivity and standard cost models were developed for the excavation and repair process. The auditors also concluded that the use of trench boxes would not require as large an excavation and would save repair costs while meeting Occupational Health and Safety Act regulations.

The ability to use a trench box should always be evaluated, as additional savings can be realized as the use of trench boxes is increased. Management's inquiry with other municipalities, suggested that approximately 50% of excavations could benefit from the use of trench boxes.

Given that the City's only current option is full sloping, the purchase and use of trench boxes suitable for excavations and repairs could potentially save the City an estimated $322,000 per year, and potentially free up 1,668 productive hours if used in about 50% of the excavations when compared to full sloping methodology. NOTE: This translates to a potential net saving to the budget of $31,000 per year when compared against the partial sloping method used in past years.

In order to meet OHSA regulations for sloping, the surface dimensions of the excavations would for example, have to increase from approx 9 ft by 12 ft, to 16ft by 19ft. The larger surface dimensions would likely begin to involve tearing out curbs, centre medians, and involving more lanes of traffic (we did not include these unknown costs in our estimates).

The current partial sloping method being used, does not meet OHSA regulations for sloping. However, relative to the costs of the current partial sloping method being used, our analysis indicated that:

- if 100% of excavations strictly followed the regulations, and relied entirely on sloping, repair costs would potentially be more than $321,664 higher than for current sloping methods.
- if 50% of excavations strictly followed the sloping regulations, and if 50% of excavations strictly followed the trench box regulations, costs would potentially be $31,0000 less than for current sloping methods.
- if 100% of excavations strictly followed the trench box regulations, costs would potentially be $321,664 less than for current sloping methods.

Percentage of Excavations Using Trenchbox Method "D"	Estimate Of Annual Savings By Using Trenchbox Method "D" Instead Of Sloping Method "A"
100%	$ 643,328
90%	$ 578,995
80%	$ 514,663
70%	$ 450,330
60%	$ 385,997
50%	$ 321,664
40%	$ 257,331
30%	$ 192,998
20%	$ 128,666
10%	$ 64,333
0%	$ -

Exhibit 6: Potential cost savings with using a trench box

Dump truck capacity and accessibility of resources and materials have the greatest impact on costs.

After the dimensions of the excavation, the largest constraint that has the greatest impact to the cost of the job is the capacity of the dump trucks used. There is wait time for the entire repair crew while the dump truck removes spoil materials or brings back new materials. The Water/Wastewater department currently has access to five dump trucks. Two are 20 tonne trucks and three are 10 tonne trucks.

Once a smaller dump truck (10 tonne) is used, the costs for a repair almost doubled due to the increased cycle time in filling and emptying the truck. When this unproductive time was being paid as overtime, there were further costs to the City. The use of 10 tonne dump trucks often increases costs, extends the time required for each excavation and should be monitored more closely.

A reduction of crew size and unproductive wait times is possible.

The Auditors discussed the productivity of crews with management who decided to pilot the removal of one of the Relief Operators (labourer) from the repair crew.

Assuming that the recommended mix of trench box excavation methods are implemented in accordance with OHSA O. Reg 231/91 by management, this reduction in crew

size would potentially free up 1,807 productive hours which could be used for other core Distribution and Collection work.

The Auditors did note that there was still unproductive wait time with the Operator B while the excavation and restoration work was being done. The Auditors observed that redeployment of the Operator "B" to do preventative maintenance work within the area of the watermain break would potentially free up 904 productive hours which could be used for other core Water/Wastewater work.

The Auditors also identified that the deployment of excavation work resources before locates were received consumed as much as 33% of elapsed time required to complete an excavation and repair. A more flexible deployment approach was recommended.

Enhanced supervisory control over overtime is required to eliminate abuse

While conducting a detailed observation of an excavation by one City crew, the Auditors observed a case of overtime abuse. Supervisory review and approval of timecards is a key managerial and financial control, yet the abuse was not identified through this review. Once brought to management's attention, they immediately verified the discrepancies, retracted the overtime and took corrective disciplinary action with those involved. Improved controls intended to detect overtime abuse will save on overtime costs.

Collective bargaining agreement and labour law constraints are impacting divisional performance.

There is no afternoon or weekend shift provided for in the current Collective Bargaining Agreement (CBA). Article 18.01 of the Outside Unit collective agreement with CUPE Local 4705 specifies that: "The normal work week for all Employees, except employees of the Plants section, shall consist of five eight hour days from Monday to Friday inclusive for a total of forty hours per week. The normal work day shall not commence before 8:00am nor finish later than 4:30pm." These hours of work are modified in Schedule B of the collective agreement to include afternoon shift, night shift and weekend work for certain employees, but not for the employees who perform water and sewer main repair.

According to management, in 2010 negotiations, the Union agreed to increase the amount of work performed on shifts other than dayshift in an effort to reduce the amount of work that would have to be performed by outside contractors. CUPE agreed to meet with the Employer shortly after the signing of the last collective agreement to establish a schedule that would meet the needs of the Employer and allow for a reduction in the amount of work that is currently contracted out. The Union has not agreed to several

alternative proposals put forward by the Employer with respect to afternoon shifts for water and sewer main repair.

According to the Employment Standards Act (ESA), an employee must receive at least 11 consecutive hours off work each day. If a repair job were to run more than 13 hours, the City would either have to cordon the work site off and return to it the next day, or call in a second crew or contractor to complete the work.

Although most employees exhibit strong ethical behaviour and commitment to public service, the potential for inferring the abuse of overtime as crews may not work as efficiently during the regular scheduled hours in order to obtain overtime premiums. Audit did observe inefficiencies in watermain repairs which in part, contributed to overtime costs on the job.

Management confirmed that they had identified the need for an afternoon / weekend shift in their past efforts to modify the Collective Bargaining Agreement, and expand non-dayshift operations. The Auditors observed that the fact that collective bargaining agreement does not allow for an afternoon shift appears to be causing work to be provided to the contractor. In comparing costs between City crews and contractor crews assuming the same productivity, the Auditors analysis found that if work can be completed at straight time rates, the City crews would be the less expensive option, and greater value for money could be achieved. However, it should be noted that despite City crews being proven less expensive, the total current emergency and preventative workload would exceed the capacity of current internal City employee resources and a blend of City and contracted forces will still be required.

Centralized deployment of water/wastewater distribution and collection work crews may aid in improving divisional performance

If all crews were dispatched from one location that is central to their busiest service area, the department would be able to assemble specialty teams. By having specialty teams, the City would develop and preserve excavation and repair or preventative maintenance knowledge and expertise of certified water distribution system professionals.

A separate memo containing additional suggestions has been issued to management.

Audit Impact

Implementing the recommendations contained in this report will improve management's ability to meet both budgetary and regulatory pressures.

Given that the City's only current option is full sloping, the purchase and use of trench boxes suitable for emergency excavations and repairs will potentially save the City 31,000 per year, and potentially free up 1,668 productive hours which should be used for other core Water / Wastewater - Distribution and Collection work.

Assuming that the recommended mix of trench box and safe excavation methods are implemented by management, the recommended reduction in crew size will potentially free up 1,807 productive hours which can be used for other core Distribution and Collection work.

The Auditors observed that redeployment of the Operator "B" to do preventative maintenance work within the area of the watermain break will potentially free up 904 productive hours which should be used for other core Distribution and Collection work.

The extent of any further cost savings resulting from implementing the recommendations in this report is not determinable at this time.

Recommendations

The Auditor General recommends that:

1. Recommendations in the attached Auditor General's report entitled "2011 Audit of Watermain Emergency Repairs" be adopted.

2. This report be forwarded to the Operations Committee for information.

Comments

The Auditor General's full report is attached as Appendix 1.

Management's response and proposed actions are attached as Appendix 2.

Contact

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Signature

Brian Bigger, Auditor General

Attachments

Appendix 1: Full Report

Appendix 2: Management Response And Proposed Actions