



**Office of the Auditor General: Follow-up to the
2012 Audit of Construction Supervision, Tabled
at Audit Committee – November 9, 2017**



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Executive summary

The Follow-up to the 2012 Audit of Construction Supervision was included in the Auditor General's 2015 Audit Work Plan.

The original audit identified opportunities for the City to improve the effectiveness of its construction supervision processes. The key findings raised in the original audit included:

- The City's procurement is performed by Supply Services in accordance with the Purchasing By-law. The City did not have a policy, consistent practice or system to record and evaluate the performance of contractors on the delivery of construction related contracts for design, construction and contract administration services on previous City contracts. Consequently, this information was not used during the bid evaluations when awarding a new construction contract;
- A change order refers to work that is added to or deleted from the original scope of work of a construction contract and can alter the original dollar amount and/or completion date of a project. In some instances, part of, or the entire cost of the change orders were due to consultant's errors and/or omissions. We found that the City did not always attempt to recover these additional costs from the consultant; nor was there a consistent approach to encourage project managers to recover costs when warranted;
- In one project examined, Dunrobin Road culvert, procedures for the evaluation of renewal alternatives for bridges and bridge-culverts was not followed. Consequently, the road flooded causing the embankment to be washed out and repaired multiple times resulting in costs and impacts to residents which could have been avoided;
- A Real Time Control System (RTCS) is a custom-designed computer-assisted system used, in certain areas of the City, to manage the urban sewerage network. During a rainfall event, the RTCS is activated to control flooding, overflows or surcharges by redirecting the flow to storage areas. Before contractors can perform work on a section of the sewerage network (sanitary, storm, or combined sewers), they are required to submit to the City, for its approval, how they plan to manage the sewer flow (e.g., how they will by-pass the sewer section they are working on). The construction contract documents did not specify the constraint of the RTCS and the potential effects on the sewer system and so the contractor prepared a sewage by-pass plan not knowing the tunnel could flood.

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Consequently, a major sewer surcharge caused by the operation of the RTCS resulted in additional costs of over \$200,000;

- Design and Construction use a Project Intake Form for projects originating from other departments and a Scoping Document for projects initiated by Asset Management. The Project Intake Form and the Scoping Document provide the description of the work that is expected to be performed under a particular contract. These documents did not include a section that explicitly detailed commitments made by all departments. As a consequence, a project was designed without knowledge of an existing agreement resulting in work having to be redone at an additional cost;
- The hourly rate for police assistance at intersections specified in the contract documents provided contractors excessive profit. The City paid contractors a substantially higher rate than the actual cost for police assistance. The City could decrease its costs by reducing the hourly rate in the contract documents, or by paying for the service directly to Ottawa Police Service;
- Water transmission mains convey large volumes of treated water over long distances from a water treatment plant to a water distribution system. The City did not have a program for inspecting its critical water transmission mains. Following a watermain failure, the City carried out an assessment of the pipeline condition and found that certain inspected pipes were damaged; and,
- Construction bidding opportunities were only available through the Ottawa Construction Association (OCA), unless the project required highly specialized contractors, in which case the City posted them on MERX (an electronic tendering service). By advertising tenders more extensively, the City would benefit from greater competitive exposure.

Table 1: Summary of status of completion of recommendations

| Recommendations | Total | Complete | Partially complete | Not started | No longer applicable |
|------------------------|--------------|-----------------|---------------------------|--------------------|-----------------------------|
| Number | 13 | 10 | 3 | - | - |
| Percentage | 100% | 77% | 23% | - | - |

Conclusion

Management has made good progress in fully implementing 10 of 13 recommendations.

The original audit recommended and management agreed to develop a policy or procedure to document the reason for a change order (i.e., work added to or deleted from the original scope of work of the contract) and to recover its costs when the change order was due to a design error or an omission made by a consultant.

Our work confirmed that Infrastructure Services department (ISD) has developed a Change Order Rationale form and has documented its required use in the ISD Project Delivery Manual. However, while project managers are aware of the new form and requirement, our testing demonstrated a lack of compliance with the requirement. Additional efforts are needed to ensure project managers complete the Change Order Rationale form to enable the City to recover costs when warranted.

The 2012 audit also recommended that the City document the performance of contractors on City contracts and use this information when awarding new work. To address this, since 2015, the City has monitored, evaluated and recorded contractor and consultant performance on the delivery of construction related contracts for design, construction and contract administration services through the Vendor Performance Management (VPM) module within the MERX website. We also found that there is currently no process to ensure that all applicable projects/contracts have been entered to VPM for evaluation. The process to document vendor performance is an important activity to ensure the best contractors are selected for future contracts. As the process relies on the Project Manager to provide the information, and a purchasing clerk to enter it into the VPM, there is no assurance that this information is being captured by the VPM each time it is appropriate.

The City is gathering and analysing contractor past performance and is reporting this information to Council. The City is planning to implement the use of vendor scores in bid evaluation when awarding construction contracts in Q1 2018. Having contractors' prior history of performance available to inform the contract award decisions is an important tool to prevent the renewal or award of contracts to contractors with poor performance records.

Acknowledgement

We wish to express our appreciation for the cooperation and assistance afforded the audit team by management.

Detailed report – Assessment of implementation status

The detailed section of this report is currently available in English only. The French version will be available shortly. For more information, please contact Ines Santoro at 613-580-2424, extension 26052.

La partie détaillée de ce rapport n'existe qu'en anglais. Elle sera disponible en français sous peu. Pour tout renseignement, veuillez communiquer avec Ines Santoro, 613-580-2424, poste 26052.

The following information outlines management's assessment of the implementation status of each recommendation as of December 2016 and the Office of the Auditor General's (OAG) assessment as of March 2017.

Recommendation #1

| Status | Management update | OAG assessment |
|---------------|--------------------------|-----------------------|
| | Complete | Complete |

Audit recommendation:

To provide a wider circulation of tenders, that the City, in addition to posting tenders with the Ottawa Construction Association, ensure that all tenders are posted on “Link2Build” and retain documentation of this.

Original management response:

Management agrees with this recommendation and it has been implemented.

Supply Branch now retains documentation on the procurement file confirming that the requirement was also posted on “Link2Build”.

Management update:

Implementation of this recommendation is complete as indicated in the original management response.

OAG assessment:

The actions as described in the management update were verified as part of the Audit of Infrastructure Services department.

The City now posts, with some exceptions, all bidding opportunities greater than \$100,000 on MERX and the Ottawa Construction Association (OCA) website. The June 2014 agreement between the City and Ottawa and the OCA confirms that the OCA agrees to continue its partnership with Link2Build, an online construction bid aggregator, and grant Link2Build access to the City’s bid opportunities. The agreement also states that OCA agrees to retain documentation and make it available to the City for auditing.

Bids where the complexity of the requirement necessitates a formal Request for Tender (RFT) or Request for Proposal (RFP) process despite the opportunity being valued at less than \$100,000 are also posted on MERX or the OCA. All bidding opportunities less than \$100,000 are posted on the City’s website, ottawa.ca.

Recommendation #2

| Status | Management update | OAG assessment |
|--------|-------------------|----------------|
| | Complete | Complete |

Audit recommendation:

That the City formalize its relationship with the Ottawa Construction Association and “Link2Build”, including ensuring that the City’s rights to review and audit the processes are documented.

Original management response:

Management agrees with this recommendation.

Supply Branch will formalize the City’s relationship with the Ottawa Construction Association (OCA) and “Link2Build” including ensuring that the City has the right to review and audit the documented processes, by the end of Q4 2013.

Management update:

Supply Branch formalized the City’s relationship with the Ottawa Construction Association (OCA) and “Link2Build” including ensuring that the City has the right to review and audit the documented processes. The signed agreement is on file.

OAG assessment:

The actions as described in the management update are verified.

In June 2014, the City of Ottawa and the OCA entered into an agreement that includes a right to review and audit clause.

Recommendation #3

| Status | Management update | OAG assessment |
|--------|-------------------|--------------------|
| | Complete | Partially complete |

Audit recommendation:

That the City develop a policy to require project managers to formally document design errors and omissions found during the construction supervision process. The documentation should include the requirement for project managers to classify change orders into categories, such as design errors and omissions, design issues, site conditions, etc., to facilitate the recovery of costs from the consultants.

Original management response:

Management agrees with this recommendation.

Management will develop a policy/and or procedures to document design errors and omissions found during the construction supervision process by Q2 2014.

It should be noted that some categories (i.e., site conditions) will not result in cost recovery from consultants. (See Management Response to Recommendation 4 with regard to cost recovery).

Management update:

The Planning, Infrastructure and Economic Development department has developed a procedure, in consultation with the industry, to document the rationale for change orders. This includes provisions for design errors and omissions that could result in cost recovery.

OAG assessment:

Infrastructure Services (IS) has developed a Change Order (CO) Rationale form and has documented its requirement in the ISD Project Delivery Manual. However, we found that in many cases, the forms are not being used.

For each change order, the project manager is responsible for completing the CO Rationale form and selecting one of five reasons detailing the grounds for the change order. Additional details are also required if the selected rationale is “Potential Design Error or Omission”.

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We reviewed a sample of 10 project files with change orders signed after July 2014 to conclude on the use of the new form. The City's project managers had completed the required CO Rationale forms in only 2 of the 10 projects reviewed.

Construction projects usually have more than one change order. The 10 project files reviewed had a total of 72 change orders. We found a completed CO Rationale form for 30 of the 72 possible change orders.

We confirmed with several project managers, who had not completed the form, that they were aware of the CO Rationale form and the requirement. In all cases the CO Rationale form was not completed due to oversight.

This recommendation will be considered complete once the CO Rationale forms are consistently used as intended.

Recommendation #4

| Status | Management update | OAG assessment |
|--------|-------------------|--------------------|
| | Complete | Partially complete |

Audit recommendation:

That the City develop a policy and procedures to be followed to recover the costs of construction changes and original engineering costs related to the specific component from the consultants when the additional costs are caused by design errors or omissions.

Original management response:

Management agrees with this recommendation.

Management will develop a policy and/or procedures to recover the costs of construction changes and original engineering costs related to a specific contract component when the additional costs are caused by design errors or omissions. This work will be completed by Q2 2014.

Management update:

The Planning, Infrastructure and Economic Development department has developed a procedure, in consultation with the industry, to document the rationale for change orders. This includes provisions for design errors and omissions that could result in cost recovery.

OAG assessment:

This recommendation is assessed as partially complete due to the forms not being used on a consistent basis as noted in Recommendation 3.

We verified that a process exists including a “Change Order Rationale” form and recovery of costs when the change order is due to “Potential design error or omission” and the costs are greater than 3% of the contract value including contingency.

We reviewed the 30 CO Rationale forms available. One was due to design error or omission.

The Project Manager did follow the procedure by raising the matter and obtaining the Program Manager’s and Design and Construction Manager’s signatures on the CO Rationale Form.

Recommendation #5

| Status | Management update | OAG assessment |
|--------|-------------------|--------------------|
| | Complete | Partially complete |

Audit recommendation:

That the City develop a system to record contractor performance in City contracts, and that the City expand the construction bid evaluation process to include formally the past performance of the bidder in the evaluation and award of contracts, so that contracts are awarded on the basis of past performance, experience, and staffing in addition to lowest cost.

Original management response:

Management agrees with this recommendation.

Currently, City of Ottawa construction bid solicitations include a provision whereby a firm must have experience successfully completing projects of similar size and complexity. Firms that are unable to demonstrate this experience are deemed non-responsive and are not awarded the contract.

A project has been initiated within Supply Branch to develop an electronic system to record and act on a contractor’s past performance. This system will be implemented by Q4 2014. ISD will be working with Supply Branch on how contractors’ past performance will be affecting future award of contracts.

Management update:

Supply branch developed and implemented an electronic system to record and act on a contractor’s past performance. The industry was consulted in the development of the system. The Vendor Performance Management system went live for Infrastructure Services in 2015. This system will track contractors’ past performance, which will affect the future award of contracts.

OAG assessment:

In January 2015, the City started using the Vendor Performance Management (“VPM”), a module within the MERX website, to monitor, evaluate, and record vendor performance.

We found that there is currently no process to ensure that all applicable projects/contracts have been entered to VPM for evaluation. The process to document

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vendor performance is an important activity to ensure the best contractors are selected for future contracts. As the process relies on the Project Manager to provide the appropriate information and ensure it was entered into the VPM module by Supply Services, there is no assurance that this information is being captured by the VPM.

Supply Services has reported that at the end of 2016, 1,056 projects were opened for evaluation; 460 had a final evaluation completed, with an average vendor score of 80%.

The City is anticipating using the scoring of vendor past performance, when awarding contracts starting in January 2018. Once scoring is used as part of the award process, this recommendation will be complete.

Recommendation #6

| Status | Management update | OAG assessment |
|--------|-------------------|----------------|
| | Complete | Complete |

Audit recommendation:

That the City ensure that for culverts where a reduction in conveyance capacity is being considered, the renewal process includes undertaking the required hydrology and hydraulic design.

Original management response:

Management agrees with this recommendation and it has been implemented.

Since February 2011, the Asset Management Branch has modified its practice to include a hydraulic assessment for culvert renewal options that would result in a reduction in the hydraulic conveyance capacity.

Management update:

Implementation of this recommendation is complete as indicated in the original management response.

OAG assessment:

Actions as described in the management update are verified.

We reviewed 8 project files related to 20 culverts. All projects that required a hydrology¹ analysis to confirm hydraulic capacity had one.

¹ Hydraulic/hydrology calculations/analysis are used to ensure that a culvert has the capacity to convey the design flow, and to identify such hydrologic issues as flooding and erosion.

Recommendation #7

| Status | Management update | OAG assessment |
|---------------|--------------------------|-----------------------|
| | Complete | Complete |

Audit recommendation:

That the City undertake a program for inspecting its critical water transmission mains where they are known or suspected to be exposed to corrosive environment, and that it takes action based on the results of the inspection findings.

Original management response:

Management agrees with this recommendation and it has been implemented.

In June 2012, Environmental Services presented to Environment Committee a report on a condition assessment program for drinking water transmission mains (ACS2012-COS-ESD-0014). This report outlines a risk-based approach to the inspection and management of water transmission mains.

Management update:

Implementation of this recommendation is complete as indicated in the original management response.

OAG assessment:

The actions as described in the management update are verified.

The City has undertaken a program for inspecting its critical water transmission mains and provides reporting annually to the Environment Committee.

Recommendation #8

| Status | Management update | OAG assessment |
|--------|-------------------|----------------|
| | Complete | Complete |

Audit recommendation:

That the City submit to Council as part of the Drinking Water Quality Management System annual report a summary of inspections on critical water transmission mains, including an action plan for correction of pipes identified to be in very poor condition.

Original management response:

Management agrees with this recommendation.

A summary of inspections on critical water transmission mains, including an action plan for correction of pipes identified to be in poor condition, will be reflected in the 2013 Drinking Water Quality Management System (DWQMS) Annual Report to be presented to Council in Q2 2014.

Management update:

Implementation of this recommendation is complete as part of Environmental Services' Annual Management Review.

As a requirement of its Drinking Water Quality Management System (DWQMS), the City conducts an annual management review of the Quality Management System. Following the 2012 audit recommendation, the summary of inspections on critical water mains (i.e., Large Diameter Condition Assessments) and consequent action plans for required corrections are included as part of the *results of the infrastructure review* (item n) section of the DWQMS Management Review Report. The DWQMS annual report is received by the Environment Committee and Council. To date, reports have been presented to Committee and Council for the years 2013, 2014 and 2015. The reports are prepared and finalized in Q1-Q2 of the subsequent year, and as such the 2016 DWQMS Management Review report has not been completed at this time.

OAG assessment:

The actions as described in the management update are verified.

Environmental Services department (ESD) provides Council with a summary of the assessment of the condition of large water transmission mains that occurred during the year.

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The 2015 report, tabled in July 2016, informs the Environmental Committee and Council that ESD intends to provide an overall status report to Council in 2017 that will document the program's results to date and identify opportunities to further improve the large-diameter condition assessment program.

Recommendation #9

| Status | Management update | OAG assessment |
|---------------|--------------------------|-----------------------|
| | Complete | Complete |

Audit recommendation:

That the City modify the payment method for services from other City services so that they do not provide an unwarranted profit to the contractor.

Original management response:

Management agrees with this recommendation.

Management will conduct a review of the requirements that will modify the payment method for City services from other City services so that they do not provide an unwarranted profit to the contractor. Unless specific restrictions are identified, this will be implemented by Q2 2014.

Management update:

The Planning, Infrastructure and Economic Development department has modified the rate structure for police services on construction projects to reflect the actual cost of provision of police services. Any overhead and profit allowances have been removed from the rates specified in the construction contracts. This modification has been applied to contracts since 2014.

OAG assessment:

The actions as described in the management update are verified.

The standard tender document, (F-1012) Police Assistance at Intersections, was amended in March 2014. The changes removed overhead and profit allowances from the rates specified in construction contracts.

We reviewed, a sample of five projects where police assistance was required confirming implementation.

Recommendation #10

| Status | Management update | OAG assessment |
|--------|-------------------|----------------|
| | Complete | Complete |

Audit recommendation:

That the City ensure that operational constraints such as the operation of the Real Time Control System are fully described in the contract documents and that the risk for monitoring weather forecasts is transferred to the contractor.

Original management response:

Management agrees with this recommendation.

Management will work with staff in the Environmental Services department to ensure that operational constraints are fully described in contract documents and that the risk for monitoring weather forecasts is transferred to the contractor. This will be built into contract standard specifications by Q2 2014.

Management update:

The Public Works and Environmental Services department has implemented a business process to manage by-pass pumping.

Infrastructure Services will continue to refine the contract specifications and standards documents and business process to address any outstanding components as they arise.

OAG assessment:

Before contractors can perform work on a section of the sewerage network (sanitary, storm, or combined sewers), they are required to submit to the City, for its approval, how they plan to manage the sewer flow (e.g., how they will by-pass the sewer section they are working on). The standard specification F-1007 (i.e., Sewer Flow Management Plans) documents the directives that contractors must follow. This standard was revised and became effective March 1, 2017.

In addition, in certain areas of the City, a Real Time Control System (RTCS), which is a custom-designed computer-assisted system, is used to manage the urban sewerage network. During a rainfall event, the RTCS is activated to control flooding, overflows or surcharges by redirecting the flow to storage areas.

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Special Provision – General (D-008) standard document requires that such operational constraints and work priorities are documented by the designer. The standard was updated, and became effective in March 2014, to reflect that when the project limits fall within the zone of influence of the RTCS, the individual designing the project must provide specific details related to operational constraints on the contractor, including weather monitoring and communications.

Revisions to both special provisions (i.e., D-008 and F1007) were communicated to project managers and staff at the Infrastructure Services Annual Specification Information sessions.

Recommendation #11

| Status | Management update | OAG assessment |
|---------------|--------------------------|-----------------------|
| | Complete | Complete |

Audit recommendation:

That the City specify, in sewer renewal projects, the location for sewer by-passes and require the contractor to use by-pass locations on existing right-of-ways or appropriate existing easements. Sewer by-pass plans proposed by the contractor using other locations must be at the contractor's risk and expense, including the consequences of delays.

Original management response:

Management agrees with this recommendation.

In all future sewer renewal contracts, the City will specify the location for sewer by-passes on existing right-of-ways and appropriate easements. Should the contractor propose other locations, the contract will specify that this will be at the contractor's risk and expense, including the consequences of delays. This will be built into contract standard specifications by Q2 2014.

Management update:

The City has implemented business processes to manage by-pass pumping. In all sewer renewal contracts, the City will specify the location for sewer by-passes on existing right-of-ways and appropriate easements. Should the contractor propose other locations for consideration by the City, the contract will specify that this will be at the contractor's risk and expense, including the consequences of delays. This has been built into contract standard specifications.

OAG assessment:

The actions as described in the management update are verified.

The requirements for sewer by-passes were well defined, when required, in the tender documents of the projects reviewed.

Recommendation #12

| Status | Management update | OAG assessment |
|---------------|--------------------------|-----------------------|
| | Complete | Complete |

Audit recommendation:

That the City modify the Scoping Document so that commitments made by all departments are explicitly discussed in the document.

Original management response:

Management agrees with this recommendation.

Management will amend the scoping document to ensure that commitments made by all departments are explicitly expressed. This work will be complete by Q2 2014.

Management update:

The scoping document and Project Intake Form templates have been updated to clarify the requirement to reflect commitments made by all departments.

OAG assessment:

In Q2 2016, ISD implemented a new process where a Project Charter is used for Design and Construction projects, replacing scoping documents and project intake forms.

We reviewed the new template, the template instructions and a sample of four project charters. The new template clearly identifies and documents relevant stakeholders (i.e., internal, external and public) confirming implementation.

Recommendation #13

| Status | Management update | OAG assessment |
|---------------|--------------------------|-----------------------|
| | Complete | Complete |

Audit recommendation:

That the City instruct the project managers that the liquidated damages are provided to assist in keeping the contractors on schedule, but are not effective unless the project manager actually charges them to the contractor.

Original management response:

Management agrees with this recommendation and it has been implemented.

In Q3 2013, management issued a directive to ensure that project managers impose liquidated damages on contractors pursuant to the City’s Standard Tender Documents.

Management update:

Implementation of this recommendation is complete as indicated in the original management response.

OAG assessment:

The actions as described in the management update were verified as part of the Audit of Infrastructure Service Department.

Management’s directive dated July 2013 is included in the ISD Project Delivery Manual.

All contract documents reviewed as part of the audit of Infrastructure Services included either a provision for liquidated damages or an incentive/disincentive clause.

The audit found that the City initiated the process to charge liquidated damages projects when the contractor exceeded the time allowed for completion.

Table 2: Status legend

| Status | Definition |
|-----------------------------|--|
| Not started | No significant progress has been made. Generating informal plans is regarded as insignificant progress. |
| Partially complete | The City has begun implementation; however, it is not yet complete. |
| Complete | Action is complete, and/or structures and processes are operating as intended and implemented fully in all intended areas of the City. |
| No longer applicable | The recommendation is obsolete due to time lapses, new policies, etc. |