MARKHAM

Auditor General
Town of Markham

May 13, 2010

Mayor and Members of Council,

I am pleased to present the Engineering Capital Projects Audit Report of the Auditor General of the Town of Markham. This Report contains recommendations, which if implemented, should improve the management of capital projects.

The audit work was completed on April 30, 2010 and the draft report provided to management on May 7, 2010. The Report was discussed with line management, the Commissioners, and the Chief Administrative Officer, who have committed to implementing corrective actions as detailed in the final Report issued May 13, 2010.

This Report is provided to you for information and adoption of Town staff's proposed action plans.

Based on the audit work completed, the Engineering department has adequate processes and controls in place to manage delivery of major infrastructure and capital projects undertaken by the Town. Some improvement could be made in project reporting, change order process, project and issue closure and document management.

The Town entered into an agreement on rail separation project with significant financial risk that is currently under dispute for additional costs of approximately $8 million. Audit findings related to this project were reported out separately in a confidential report as they involved a confidential matter regarding a litigation or potential litigation, including matters before administrative tribunals, affecting the municipality In accordance with Section 239 (2) (e) of the Municipal Act.

The detailed report will be posted on the Town of Markham's web site and made available to the public after tabling to Council.

Sincerely,

Ingrid Kutter
Auditor General

TOWN OF MARKHAM AUDITOR GENERAL
ENGINEERING CAPITAL PROJECTS
AUDIT REPORT

Audit work completed: April 9, 2010
Final Report Issued: May 7, 2010

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1.0 Introduction

This report presents the results of the Engineering Capital Projects Audit. The audit work was completed on April 30, 2010 and the draft report issued to management on May 7, 2010 and finalized on May 14, 2010 with management responses. This Audit was conducted as part of the Auditor General's 2009 audit work plan approved by Council on November 11, 2008.

This Report contains recommendations, which if implemented, should improve the management of capital projects in the engineering department. This Report was discussed with departmental management, and the Chief Administrative Officer, who have committed to implementing corrective actions as detailed in this Report.

Town staff provided the Auditor General with unrestricted access to all activities, records, systems, and personnel necessary to conduct this audit freely and objectively. All observations, findings, and recommendations of the Auditor General are included in this Report.

2.0 Background

The Engineering department includes a division responsible for delivery of major infrastructure and capital projects undertaken by the Town. Most of the projects consist of roads and bridges construction and installation of water services. The department advises and plans for these projects, but design and construction is contracted out to external companies. The inspection division supports the delivery by ensuring all municipal infrastructures are installed in accordance with Town standards.

Projects typically involve 3 key phases 1) environmental assessment and planning where the problem or opportunity is identified and solutions explored, consultations and studies done, and 2) design phase where the contracted party provides preliminary and final designs, budget cost estimates, prepares the tender package and once the construction contract is awarded, provide contract administration and construction inspection services based on a percentage of the construction cost, and 3) construction phase where the contract is tendered at a fixed price. Projects are often multi-year.

The Infrastructure and Capital Projects division delivers on their five and ten year capital program with a team of 7 project engineers lead by a recently hired manager. There was significant staff turnover and vacancies in the past year, with full complement now achieved. Project engineers oversee several projects at the same time, relying on the design consultants for scope development and record-keeping during both design and construction, in addition to internal processes.

Engineering typically requests $30-$40 million dollars in their annual budget; however for 2010 approximately $10 million was budgeted. With the past staff turnover and 2009 project delays there were uncommitted funds of approximately $75 million with most expected to be carried over into 2010.

As at September 2009, there were 31 open capital projects over $1 million each for a total budget of $158 million of which $87 million was expended or committed. Four

projects were each budgeted for $10 to 16 million, and of those 2 have been completed, and one is in the planning phase.

Project Type	Budget $ millions	Expenditures $ millions
Environmental	$2.9	$0.65
Development Studies	$2.0	$0.57
Transportation (out of scope)	$2.9	$0.97
Capital Projects	$154.0	$90.0

As at September 2009 – approximate numbers

3.1 Audit Scope and Objectives

This audit assessed if capital and infrastructure projects are successfully managed as measured by project cost, timelines, and quality of work. Specifically the audit focused on project management practices to answer the following questions,

- Do contractors comply with contract provisions and specifications?
- Are change orders valid, approved, and reasonably priced, and are they tracked?
- Are contractor payments adequately supported, authorized, monitored and controlled for actual services rendered and work performed?
- Do the contract terms and conditions adequately protect the Town's interests?
- Is there effective monitoring of the construction process? i.e. regular inspections
- Is there effective management of the outsourcing of design and construction?
- Are completed projects subject to sufficient inspection and claims recovery?

The audit will also assess compliance to Town By-laws and policies, such as the Purchasing By-law, and the Expenditure Control policy.

The audit focused on construction projects with a budget greater than $1 million that were either in the construction phase or completed during the last 12 months and on closed capital projects where the warranty period is over. Design contracts are typically less than $1 million but were reviewed, on a limited basis, with the corresponding construction contract in recognition of their interdependency.

The audit scope excluded the following:

- Environmental process
- Procurement process (tendering and contract award)
- Ongoing programs such as the Sidewalk, Illumination, or Down Stream river improvement programs

3.2 Audit Methodology

The audit process has 4 phases; planning, review, reporting, follow-up.
Critical to the successful completion of the Audit Plan is management's commitment to the published audit schedule and required response timelines. A "terms of reference", outlining detailed audit objectives, scope, and timelines, will be completed for each audit project. Management will have an opportunity to review the document. The Auditor General has the authority to decide the scope of work.

Staff has a duty to co-operate with the Auditor General and provide the necessary assistance in units where audits are performed. Management delay that impedes the ongoing audit and agreed timelines will be escalated as necessary to the Commissioner, Chief Administrator, and ultimately to Council through General Committee.

All audit projects result in an audit report that is provided to management for their comment, however the report is owned by the Auditor General and cannot be altered by management. Where there is agreement, management provides action plan with timelines and the person accountable for the action. Where management disagrees, the disagreement is documented in the Report along with the rationale. Issues uncovered by the Auditor General are reported regardless of whether management has remedied the situation during the course of the audit.

The follow up process by the Auditor General reports on the status of action implementation
The Auditor General follows up on all agreed actions annually to determine if corrective action has been taken and presents a status report to Council through General Committee. It is expected that management sets reasonable and achievable action completion dates. Management is responsible for advising the Auditor General of actions that will not be met on time. Late and overdue actions will be reported to Council through General Committee.

The audit was completed through the following activities:

- Risk assessment of the capital project portfolio using the criteria of project stage, budget, number of change orders, and variance in completion dates;
- Review of policies, legislation, agreements, process maps;
- Walkthroughs of processes: budget tracking, progress and issue tracking, change order approval, invoice payment, project delivery standards, project close out at end of warranty;
- Review of 4 closed projects
- Review of 2 projects in the construction phase with emphasis on:
  - compliance with contract terms and conditions,
  - payments – contractor billing tests, progress billings
  - change orders – logs, trends, approvals,
  - outsourced contract administration and construction inspection.

4.0 Conclusion

Based on the audit work completed, the Engineering department has adequate processes and controls in place to manage delivery of major infrastructure and capital projects undertaken by the Town. Some improvement could be made in project reporting, change order process, project and issue closure and document management.

- Project reporting should be further developed to ensure senior town staff and Council are aware of outstanding project issues and risk mitigation activities in a timely fashion.

- To date, change orders have not generally been a significant cost in projects, averaging less than 2% for current projects, and around 10% for larger, more complex projects that have experienced issues in prior years. The process described by Town staff appeared adequate, however some improvement is needed to ensure availability of supporting documentation for change orders, and to ensure the town formally approves and logs all change orders before the work is started.

- Project closure process should be tightened up to ensure all key documents are retrievable and secured. A "lessons learned" exercise should be completed for larger projects to support continuous learning.

- Consultant contracts for contract administration services should always be formalized to include the scope, expected activities, and mandatory documents.

There was a significant reliance on consultants to provide contract administration services in conjunction with town staff engineers / project managers, resulting in strong project oversight and quality control process. In 2009, the department spent $875,000 on contract administration services. Project quality was monitored by the consultant, through full time site inspections, materials testing and verification of daily work; by the town engineers checking on site, and through bi-weekly site meetings including the town project supervisor.

Project costs were verified by the consultant through field measurements, in addition to town review of all submitted payments. Audit testing indicated that contractor payments were adequately supported, authorized, and monitored for actual services rendered. However, authorization of payments was excessive, with 4 staff members reviewing all invoices. Consideration should be given to reducing the number of reviewers in line with the expenditure control policy.

The budgeting process generally over estimates project costs such that projects typically are under budget as they are not incurring all the quantities or activities noted in the tender / contract. In discussion with staff and review of some project data, it was determined that only one project has been over budget since 2008 as a result of delay claims.

Of the eight projects closed or under maintenance since 2008 with budgets over $1 million, seven were under budget, ranging from $86,000 to $2.2 million favourable variance. One project was significantly over budget, a rail separation project undertaken

by an outside agency who is directing the project, however the costs are currently in dispute. Projects over $ 1 million budget in the construction phase are all experiencing favourable variances against budget, except one where legal proceedings are underway.

Based on available data, projects tend to be completed past the original expected completion dates, with some non construction issues outstanding for extended time.

In 2009 / early 2010 there were limited projects in the construction phase, most projects were in the environmental /planning or design phase. The audit had a limited sample to select from. There is expected to be an increase in project activity in 2010 onward, and therefore strengthening capital project management processes in coordination with the upcoming project management office activities as noted in this audit report is recommended.

5.0 Detailed Findings, Recommendations, and Management Responses

Finding 5.1 Project reporting framework is not sufficiently developed to ensure issues are appropriately escalated and risk mitigation is in place.

In 2006 Council, as a result of issues arising from the Enterprise Drive/GO and Rodick Road/Hwy 407 grade separation projects, requested staff to review engineering capital project processes and recommend improvements to such. Of the 4 recommendations, one, requiring at least quarterly updates to Council on major projects, was not consistently implemented.

Town staff did provide two capital project updates in 2007, however since that time no further updates were provided. Not all projects were included in both updates. Staff plans to present to Council on the Capital Program in 2010, however this is not designed to provide an update for all current projects. There was no defined process for summary project reporting to the commissioner or chief administrative officer.

The Rodick Road/Hwy 407 grade separation project status was reported to Council in a confidential report January 2006. The next full report was not until June 2008. There was no further report, either to Council or departmentally. Late outstanding items still remain to finalize the project. Note that construction was completed in December 2006 and dedication as a public roadway was expected in 2008.

The Enterprise Drive/GO project was considered closed in July 2007; however one outstanding non construction issue remains. There was no formal tracking mechanism to ensure project issues are effectively followed up and reported on.

Project status reports are completed monthly by town project managers using standard templates and submitted to the manager for discussion at monthly update meeting. Departmental project status reporting could be improved to ensure issues are readily identifiable and actions are in place to mitigate risks and resolve issues. Status reports are not always complete with financial updates, not clear as to estimate to complete including committments, dates for actions or approvals not provided, and sometimes outdated information. There is a significant reliance on internal departmental knowledge and ad hoc informal discussions. As the departmental project volume increases in the next year, more formalized procedures are needed.

Ref	Audit Recommendation	Town Response / Action plan (who, what, when)
5.1	Working with the newly implemented Project Management Office; ○ Refine the project status reports to clearly identify issues, rate / assess their significance and any key deadlines, and include risk mitigation actions ○ Develop and adopt project reporting framework that includes reporting process to Council and senior town staff, executive summary project dashboards that focus on project status as to time, cost, quality, issues, and ○ Develop / adopt issue tracking mechanism with an escalation process.	Engineering Senior Staff are currently involved in the Cross Commission Team which was setup to establish a Project Management Support Office • The project status reporting is currently being reviewed by one of the sub-committees of the Cross Commission Team. Research and consultation for project status reporting is scheduled to be finalized in Q2 2010. Upon finalization of the status report, the information will be implemented by Engineering Senior Staff. • Engineering Department has recently adopted the Eclipse program and required staff to use the program for managing the capital projects. The Eclipse program will have the ability to provide reporting tools (i.e. Dashboard) to Council and Senior Staff as discussed in the recent Cross Commission Team Meetings. • The issue tracking mechanisms are also being reviewed and will be finalized and implemented by the Cross Commission Team.

Finding 5.2 Project closure process not sufficient to ensure key documents are retrievable, and that project outcomes are assessed for continuous improvement.

Larger projects typically are multi-year, starting with the environmental and planning stage, then into design, construction and finally the maintenance warranty period. Some of the larger projects can span 4-5 years through these stages. With high turnover of staff and the use of consultants for contract administration, documentation of

the project, the designs and work becomes very important for claims recovery, operations, and future projects.

There was not a robust document management system in place. During the audit it was noted that key documents were not always retrievable, such as the consultant contract, certificates of substantial / final completion, payment certificates for one project's change orders after settlement. In one larger project, the contract administrator recommendation to issue substantial completion was through email with no evidence that work was verified, and no formal signed document.

The Town has experienced issues with a few larger capital projects over the years that have resulted in financial exposure to the Town from delay claims, and most recently unexpected cost overruns. There have not been formal "lessons learned" exercises to support continuous improvement in managing capital projects.

Ref	Audit Recommendation	Town Response / Action plan (who, what, when)
5.2.1	The close out process for projects should be documented, similar to the documentation maintained by the department for the other project phases. Project close out should include a "lessons learned" activity for continuous improvement.	Engineering will create a project close out form which will also include a section called "lessons learned" for continuous improvement. This form will be created by the end of 2010 and revised as required by the Manager, Infrastructure and Capital Projects. During the regular monthly Capital Works staff meetings, the lessons learned will be reviewed and discussed with the engineers.
5.2.2	Engineering should adopt the use of the town standard project management software (Eclipse) to ensure key project documents are retrievable in the future. Develop a checklist of standard required documents in engineering projects.	Engineering will create a standard checklist of standard documents for engineering projects by the end of 2010. The implementation of Eclipse or other similar project management tool is estimated to be end of 2011 as this will require training and customized "dash board" to suit our needs. Engineering Senior staff will administer the implementation of this program.

Finding 5.3 Consultant contract for contract administration services was not always in place for some preferred suppliers.

The Town retained a consultant, as a preferred supplier, to provide construction administration services, inspection, and materials testing for the Enterprise Drive Phase II project. The project budget was for $xxxx with a planned completion date of xxxx. The purchase order for the consultant services was issued April 2009 for $671,250. The agreement between the consultant and the Town consisted of the purchase order, the Town's general terms and conditions, and a cost estimate from the consultant.

There was no contract document created and executed to protect Town interests and ensure town expectations were delivered. The expected scope of work, responsibilities, and activities to be done by the consultant were not documented and agreed on. If the consultant failed to deliver, the Town would have little recourse, as the services indicated in the purchase order are subject to interpretation. What level of inspection is required? What constitutes sufficient material testing in the Town's view? How is the consultant measured as to fulfilling contractual obligations if they have not been stated?

In discussion with Town staff, this consultant was retained for a previous project, Enterprise Drive/GO grade separation and the consultant contract for that project was likely used to govern this project, however staff was unable to provide the previous contract.

The Engineering department issued 23 purchase orders through preferred supplier staff awards in 2009. A review of other projects, where the consultant was retained as a preferred supplier, identified some with no contract documents clarifying scope and expected activities, and some that did have a proper proposal with scope and activities outlined.

The Town's standard "Request for Proposal" contract document used for competitive procurement does provide a detailed list of expected activities, consultant performance measurements, and mandatory documents such as health and safety policies, insurance and Workers Safety Insurance Board certificates. Similar mandatory documents were not always obtained for the preferred suppliers.

Ref	Audit Recommendation	Town Response / Action plan (who, what, when)
5.3.1	Consultants hired as preferred suppliers should have a contract document created and executed to support the purchase of services. The contract document / consultant quote should at least include the scope, expected activities, mandatory documents, and performance measurements for the consultant. In selecting a preferred supplier for services, there is no required town "Request for Quote" document. It is recommended that standard requirements for contract administration	Engineering will immediately require all "new" engagement of preferred suppliers to include detailed scope of work and sign a consultant service agreement. Engineering Staff has recently obtained a copy of the Contract Supervision and Contract Administration Terms of Reference provided by the Contract Administrator for the Enterprise Phase II Project. A copy of this document is available for review in Engineering.

	be developed to ensure all necessary services and documents have been included in the consultant quote.	Engineering will also develop detailed design and contract administration requirements, standard scope and activity documents by the end of July 2010. Prior to selecting a preferred supplier to perform consulting work, the consultant will be required to incorporate the newly developed documents into their quotes where applicable. Implementation to be administered by Manager, Infrastructure and Capital Projects.
5.3.2	Contract documents should be logged in the contract database as a project separate from the construction contract to ensure the agreement with the consultant is identified, properly executed and managed.	Engineering will immediately log all new contract documents into the filing system. The log will also be incorporated into the implementation of Eclipse or other similar project management tool. This process is estimated to be by the end of 2011 as this will require training and customized template form within Eclipse or other alternative software. Implementation to be administered by Manager, Infrastructure and Capital Projects.
5.3.3	Town project managers should have a copy of the consultant quote / agreement / contract to ensure that services are delivered as agreed to.	Some of the project managers already have a copy of the consultant quotes / agreements / contracts for their projects. For other projects that do not have this documents on file, Engineering will require that this be implement immediately. Implementation to be administered by Manager, Infrastructure and Capital Projects.

Finding 5.4 Change order process could be strengthened to ensure cost control.

Change orders are used to authorize and manage work that was not included in the contract or a change in contracted work. The Town typically tenders the construction contract for fixed prices on estimated quantities with payment made on actual quantities used. Change orders can represent a high risk on construction contracts in terms of

the pricing, ensuring work is necessary and duplicate invoicing. The consultant retained for contract administration is expected to manage proposed changes orders and obtain Town approvals.

To date, change orders have not generally been a significant cost to the Town. For two of the larger closed projects over $10 million each that experienced issues, change orders were 10% of the project budget. Current active projects are experiencing generally less than 1% of the project budget in change orders to a maximum of 2% for one of the larger projects midway through the construction phase.

The change order process described by town staff appears adequate to ensure that extra work charged was outside the original contract, prices are reasonable, and work was appropriately completed as needed, and approved.

In reviewing the change orders for one of the larger active projects the following was noted:
1

- Change orders are not logged and formally approved by the Town until payment is requested. The Town's project manager becomes aware of requested or proposed change orders from the consultant and in the site meetings, however formal town approval is given after the work is completed. The consultant does verify the daily work done. A large number of change orders had the work completed 4-6 months before the actual change order was Town approved and payment requested. With such a lag between the work, the payment request, and logging the change, there is a risk that budget impacts may not be well understood or systemic issues not identified.

- Change orders are not categorized as to the reason for the change, for example, errors/omission from the contract or design, unexpected services not located and marked, or contractor error. Categorizing change orders would help the Town to better manage costs and be proactive if needed.

- Support for change orders was not always available or filed in a accessible manner, such as the consultant's approval and direction to the contractor, or the contractor's daily work report.

- Proposed change orders that the consultant could not immediately identify as valid, were completed by the contractor under the advice of the consultant on the understanding that they may be rejected. There was no formal notification that these change orders were not approved and could be rejected. Approximately $175,000 of completed change orders were rejected, with some still unresolved.

- Not all change orders priced by time and material had supporting daily work reports or the work reports were not always signed off by the contract administration consultant.

Ref	Audit Recommendation	Town Response / Action plan (who, what, when)
5.4.1	Change orders should be logged at the time they are proposed and a copy of	All new change orders will be logged immediately. Implementation to be

	that log kept with town staff.	administered by Engineering Senior Staff.
5.4.2	Town approval for the work request should be formalized outside of the site meeting minutes or emails.	Engineering will develop a change order update sheet by the end of June 2010, which will incorporate a status update function and the requirement to provide formal documentation. Implementation to be administered by Manager, Infrastructure and Capital Projects.
5.4.3	Change orders should be categorized as to the reason.	Engineering will develop a change order update sheet by the end June 2010, which will require the change orders to be categorized into scope change, unexpected circumstances and design related. Implementation to be administered by Manager, Infrastructure and Capital Projects.
5.4.4	Proposed change orders that cannot be identified as valid, should be resolved prior to the contractor starting the work or else formal notification that the Town may not approve should be provided to the contractor.	Engineering will implement immediately a requirement for the consultant to respond or reject extra claims within 2 weeks (whenever possible) after the contractor has initiated a formal claim. Otherwise, the consultant will advise the contractor to follow the dispute mechanism as described in the contract document and to continue with the required construction. At the same time, the consultant will keep track of all related time and material costs associated with the "outstanding" formal claim. Implementation to be administered by Manager, Infrastructure and Capital Projects.

Finding 5.5 Town entered into an agreement on rail separation project with significant financial risk that is currently under dispute.

Project Background

In June 2006, the Town of Markham entered into an agreement with GO Transit to proceed with construction of rail grade separation (Hagerman). The construction required the relocation of existing Town services, such as sanitary sewers, watermains, and storm sewers at the Town's expense. The Town is currently in negotiations regarding costs as there has been significant change in the original estimates.

Audit findings related to this project were reported out separately in a confidential report as they involved a confidential matter regarding a litigation or potential litigation, including matters before administrative tribunals, affecting the municipality In accordance with Section 239 (2) (e) of the Municipal Act.