INTERNAL AUDIT REPORT

Construction Audit of Fire Station #7-4: Phase 3

April 2021

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CONSTRUCTION AUDIT OF FIRE STATION 7-4: PHASE 3

CONCLUSION AND SUMMARY

Fire Station 7-4 is Vaughan's 10th station. The project, managed by the Infrastructure Development department, adds an emergency services base of operation in the Kleinburg community. The 10,250 square foot building has three drive-through bays and living quarters for the crew on shift and meets current Accessibility for Ontarians with Disabilities Act (AODA) standards. Designed with LEED certification standards, there are many energy-saving features, including water-conserving plumbing fixtures, high-performance windows and direct/indirect lighting with occupancy sensors. The station was also designed to meet heritage guidelines established by the Kleinburg-Nashville Heritage Conservation District Study and blend in with the existing community.

Fire Station 7-4 was completed within the revised budget approved by Council in February 2018. The available budget for design and construction was $5,612,167 and the actual spend was $5,606,660, for a favorable balance of $5,507. Although the project was not completed on time, the City's Infrastructure Development staff should be commended for overcoming many obstacles as a result of the general contractor operating under bankruptcy protection during the construction and close out phases of this project.

The following improvements are recommended to ensure risks related to the execution of the City's construction activities are efficiently and effectively mitigated:

- Extending the payment holdback requirements to encompass the warranty period.
- Engaging all stakeholders at key milestones in the project.
- Requesting construction documents and manuals earlier in the process.
- Expanding the vendor performance evaluation process to include vendor suspension.

Warranties are used in construction projects to reduce financial risks associated with equipment and service deficiencies or failures related to construction activities. Section 12.3 of the Stipulated

Price Contract[1] provides for a one-year comprehensive warranty, where the contractor warrants the completed construction work for a period of one year after substantial completion of the project. However, the City does not explicitly provide for a holdback during the contracted one-year warranty period. Adding a warranty holdback would be beneficial in ensuring the contractor remains fully engaged over the warranty period and that the City does not incur additional costs.

Additionally, the City of Vaughan currently requires a one-year warranty period for construction projects. Some municipalities, such as Toronto, Guelph, East Gwillimbury, York Region and the Region of Peel carry a 24-month warranty period for some or all of their construction projects. The City's capital project plan includes a variety of construction activities including projects in building and renovating building and plant facilities and water, sewer and road construction projects. On a project risk basis, the one-year warranty period for construction projects should be re-evaluated to consider the cost effectiveness and benefits of extending construction project warranties and performance bonds.

The audit noted that inspections for verifying substantial performance and for identifying deficiencies during the warranty period are generally conducted in an effective manner. This includes:

- Appropriate deficiency lists are prepared and forwarded to the contractor in a timely manner.
- Estimated value of all defective and remaining work is documented.
- Rectification of deficiencies is followed up in a timely manner.
- Rectification work is inspected and signed-off as completed by City representatives.

However, under the City's current project management framework, Facility Management is engaged in the planning stage of the project then re-engaged in the final stages of the project to receive training on the major systems installed in the building. In a very mature environment where building standards are well established, and construction of facilities is a common occurrence this quality assurance approach may be successful. However, in our current environment, getting Facility Maintenance involved at the planning stage and then again only after occupancy increases the risk of significant deficiencies being discovered during occupancy.

As-built drawings demonstrate how the final construction was executed. As-built drawings and manuals provide critical information such as location and sizes of all components and concealed elements. Therefore, they can ensure that future renovation projects are more efficient and are completed on time, as they allow for confident planning of expansion, additions and modifications of facilities. At one point late in the final phases of construction, the contractor misplaced the manuals and copies of the as-built drawings. At the time, it wasn't clear if they would actually be able to locate the documents. After a significant delay and search effort, the contractor was able to locate the files and forward them to the City's consultants. To facilitate this process, we recommend that management investigate the feasibility of securing as-built drawings and manuals digitally during key milestones of the project.

[1] *CCDC 2 -2008 Stipulated Price Contract is a standard prime contract between Owner and prime Contractor that establishes a single, pre-determined fixed price, or lump sum, regardless of the Contractor's actual costs.*

As noted in the first phase of this audit, Internal Audit recommended that management implement a vendor performance evaluation process to pro-actively evaluate and improve the performance of all suppliers, vendors and contractors that are sourced by the City. The Vendor Performance Evaluations procedure (PP-14) and the Vendor Performance Evaluation reports for Consultants and Construction Contractors have been developed to support the Vendor Performance Evaluation program. However, to date, there have been no vendors added to the suspended list. Procurement Services is finalizing the wording of the Vendor Performance Evaluations procedure with Legal Services and will be presenting the program to the Senior Leadership Team in Q2 2021 to make them fully aware of the program. If a vendor or subcontractor performs inadequately on an existing or recent contract with the City, the City must formally consider suspending that vendor to reduce the risk to the City's valid commercial or business interests.

Internal Audit will follow up on the status of outstanding management action plans related to this audit and will report the status to the Audit Committee.

BACKGROUND

The time from when physical construction ends until project turnover to the City, is known as the post-construction phase in the Project Life Cycle of a Constructed Facility. Getting a construction project to the milestones of substantial performance and then to completion and turn over are some of the most difficult challenges to be met during the construction of a facility.

As part of establishing substantial performance, it is necessary to place a value on project deficiencies. The consultants, contractor and subcontractors prepare a list of deficiencies, address as many of the deficiencies as possible, and then holds a formal deficiency review. This also typically marks the start of the warranty period for the project.

The post-construction phase is vitally important because it also allows the project team to evaluate, document and learn from the project. A final team meeting is usually held and led by a project manager to officially mark the ending of the project and determine what issues they had and what went well, so that they can make improvements in the future.

OBJECTIVES AND SCOPE

The objective of the audit was to evaluate the effectiveness of construction management policies and procedures related to the fiscal, operational, and administrative controls over construction activities, including project scope, cost, schedule and quality.

Based on consultations with management, the construction of Fire Station #7-4 was selected for the audit. The single-story, LEED certified fire station is in Kleinburg and includes apparatus bays, ancillary offices and living quarters for the fire crew on shift. Construction of the fire station started in the spring of 2018, with a substantial performance date outlined in the contract of May 24, 2019. Due to delays caused by the contractor, substantial performance was actually achieved on November 29, 2019.

Auditing a construction project from beginning to end can provide added assurance, identify problems as they arise, and help improve outcomes. Since the scope of the audit encompassed

the complete lifecycle of the project, audit reports were issued after the completion of the following project phases:

- Planning and Design, Bid and Procurement Phases (Phase 1). The Phase 1 report was presented at FA&A on June 6, 2018 and approved by Council on June 19, 2018.
- Construction Phase (Phase 2). The Phase 2 report was presented at Committee of the Whole (2) on January 21, 2020 and approved by Council on January 28, 2020.
- Close Out Phase (Phase 3).

Phase 3 included a review of:

- Contract Requirements for Closeout.
- Deficiency Inspections and disposition.
- Warranty Administration Process.
- Key Construction Documents and Manuals.
- Post-completion Evaluations.

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DETAILED REPORT

1. Extend the Payment Holdback Requirements to Encompass the Warranty Period

A warranty protects against costs related to construction deficiencies in materials or services for a specific period of time. Warranties can assist in holding contractors accountable for replacement or repair of construction deficiencies. For example, when a deficiency occurs during the warranty period for covered equipment such as an air conditioning unit or furnace, the unit is repaired or replaced at the contractor's expense.

Section 12.3 of the Stipulated Price Contract[2] provides for a one-year comprehensive warranty, where the contractor warrants the completed construction work for a period of one year after substantial completion of the project. It is equivalent to the contractor warranting that no defects or deficiencies will develop in its construction work for a period of a year, combined with a promise to return to the jobsite to repair or replace any work which is found to be defective or deficient before the expiration of the one year period.

Generally, the Contractor warrants several things to the City:

- Materials and equipment are of good quality and new.
- Work will be free from defects (meets quality required or permitted).
- Work will conform to the requirements of the contract documents (i.e. the work is per plans and specs).

If the City discovers that any of the above is not true, the contract provides two basic remedies:

- If nonconforming work is discovered during construction, the City can reject the nonconforming work and have the Contractor remove and replace it.
- If nonconforming work is discovered within one year of substantial completion, the City can require the Contractor to return to the site and correct the nonconforming work.

Because the provision contemplates actions being taken after final payment and completion or termination of the contract, it explicitly provides for survival of these obligations beyond those events. The remedy for breach of warranty is the recovery of monetary damages incurred by the City by reason of the breach. So, for example, if defective materials need to be repaired or replaced by the City during the warranty period, the City is entitled to recover from the contractor the cost of the repairs or replacement. If available, this recovery can be drawn against any available warranty holdback.

Holdback obligations under the Ontario Construction Lien Act (CLA[3]) are stringent. Anyone making a payment on account of a construction contract or subcontract is entitled to retain, from those payments, 10 per cent of the amount of the payment. Holdbacks also act as an insurance policy for the owner in ensuring that the contractor has a financial incentive to meet

[2] *CCDC 2 -2008 Stipulated Price Contract is a standard prime contract between Owner and prime Contractor that establishes a single, pre-determined fixed price, or lump sum, regardless of the Contractor's actual costs.*

[3] *https://buildersontario.com/construction-lien-in-ontario*

all the contracted obligations. Holdback is a mechanism designed by the provincial government to ensure that subcontractors and suppliers are paid for their work and materials.

However, the City of Vaughan does not explicitly provide for a holdback during the contracted one-year warranty period. The contractor is paid upon completion of the identified list of deficiencies and there is no holdback for the warranty period. Holding a warranty holdback would be beneficial in ensuring the contractor remains fully engaged over the warranty period and that the City does not incur additional costs.

The City's capital project plan includes a variety of construction activities including projects in building and renovating facilities and water, sewer and road construction projects. The diverse projects vary in size and complexity. Some municipal organizations require a 24-month (2 year) warranty period, versus the one-year requirement at the City of Vaughan. Contractor's warranties bind not only the contractor for the period, but also the contractor's surety under a performance bond[4]. This extended period reduces the risk of additional costs related to defects or deficiencies for a longer period. However, it should be noted that the surety industry pre-qualifies contractors' bonds based partly on the scope of contract risk assumed. Generally, higher risk involves higher surety costs.

Recommendations

We recommend that management:

- Work with Legal Services to modify the Stipulated Price Contract to extend the holdback obligations to encompass the warranty period.

- Re-evaluate the general use of a one-year warranty period for construction projects, considering the cost effectiveness and benefits of extending construction project warranties and performance bonds. This assessment should be done by considering the complexity and risks associated with various types of projects.

Management Action Plan

Management agrees with the audit recommendations.

Facility Management will initiate and collaborate with Legal and Procurement Services to modify the Stipulated Price Contract with Supplemental Conditions to include Warranty Holdback provisions.

Facility Management will also assess options available to the City to extend warranty periods considering project complexity, risks, and incremental cost.

We will follow up with Legal and Procurement Services to confirm a completion target of this work by Q4 2021.

[4] *A performance bond is required to secure the satisfactory completion of a project upon default by the contractor.*

2. Engage All Stakeholders at Key Milestones in the Project

When a construction contract is awarded, a challenge which is always present during the life of the contract is to assure that the contractor's product is meeting the minimum levels of quality established in the contract plans and specifications. Maintenance costs and operating efficiency of a facility are directly proportional to construction quality. In most cases where poor construction quality is evident, catastrophic failure is not the result; rather, there is an increase of maintenance and repair costs to the City.

The Facility Management Department is the Product Owner of City buildings. Under the City's current project management framework, Facility Management is engaged in the planning stage of the project. They are asked to review the plans and make any recommendations regarding defining the scope of work and final approval of scope related to overall maintenance. Facility Management's input is used to develop and refine building specifications. The Facility Management Department is then engaged again in the final stages of the project to receive training on the major systems installed in the building. This training is provided after a formal deficiency review is conducted by the consultants, contractor and representatives from the Infrastructure Delivery Department.

The major system training session for Fire Station 7-4 was held on Wednesday January 29, 2020. However, this training session developed into a defacto facility deficiency review[5] rather than a standard training session. It became evident that many of the deficiencies that were outlined by the Facility staff at the meeting, should have been addressed as part stakeholder review. For example, during the training meeting, the test of the manual release function of the front bay doors was tested and failed. Issues such as not being able to open the front bay doors in the event of a power failure can impact VFRS response time significantly.

There needs to be a more comprehensive assessment of the building during the deficiency review. The methodology of not permitting Facility Maintenance to attend the discrepancy review meetings and not assess the building until after occupancy contributed to this situation. In a very mature environment where building standards are well established, and construction of facilities is a common occurrence this quality assurance approach may be successful. However, in our current environment, getting Facility Maintenance involved at the planning stage and then again only after occupancy increases the likelihood of significant deficiencies being discovered during occupancy.

Recommendations

We recommend that management:

- Ensure that Facility Maintenance formally review the original specifications and construction plans and provided detailed confirmation of that review to the Infrastructure Delivery Department.

[5] *Before Substantial Performance or any occupancy takes place, an initial review is conducted, and a list of deficiencies is prepared by the consultant, contractor and infrastructure Delivery. For purposes of clarity the list created by the contractor is typically referred to as a "Punch List" and the consultant's list is referred to as the deficiency list.*

- Reiterate and reinforce close out procedure and process with all stakeholders.

Management Action Plan

Management agrees with the audit recommendations.

In 2020, the organizational structure was modified to have Infrastructure Delivery report directly to the Director, Facility Management services. This has contributed to improved communication and coordination of activities between Facility Management and Infrastructure Delivery. Nevertheless, management will continue to communicate and reinforce roles and responsibilities with all stakeholders, including close out procedures and processes.

3. Request Construction Documents and Manuals Earlier in the Process

As-built drawings are revised sets of drawings submitted by a contractor upon the completion of a particular construction contract. They show all the minor and major modifications made by the contractor to the original drawing to provide an exact rendering of the project. Once the drawings have been completed, they can be used as a basis for future additions or system changes. Any renovations will be easier to complete with these drawings, as all the information will be accurate, up-to-date, and shared with everyone in the project. The Operations and Maintenance staff can also use the as-built drawings to know where shut off valves are located or where other items are in case of an emergency. Manuals are used to help service and maintain equipment based on manufacturer specifications.

Although paper based as-build documents and equipment manuals have been the standard, in recent years, new kinds of digital architecture software has made it easier and more accurate to create as-built drawings to a higher standard than traditional mark-ups on paper. These tools are more convenient for architects, contractors and project managers to record changes to a building plan (especially if it is based on a BIM design[6]).

The contractor experienced a number of setbacks during the construction of Fire Station 7-4. At one point late in the final phases of construction, the contractor misplaced the manuals and copies of the as-built drawings. At the time, it wasn't clear if they would actually be able to locate the documents. After a significant delay and search effort, the contractor was able to locate the files and forward them to the City's consultants.

A contractor must record all the changes made on the original drawing and is fully accountable for the actual construction. It can be frustrating and costly for the City, as well as for future contractors, to do work on a building that has no as-built drawings or manuals, because they don't know the intricacies that they might encounter. The potential of having them available digitally also streamlines the process and make these documents available to all stakeholders.

Recommendations

We recommend that management investigate the feasibility of securing as-built drawings and manuals digitally during key milestones of the project.

Management Action Plan

Management agrees with the recommendation and will investigate options available to the City in securing construction documents. We expect this assessment to be completed by Q3 2021.

[6] *Building Information Modeling or Building Information Management (BIM) is a collaborative process that allows architects, engineers, contractors, manufacturers, and other construction professionals to plan, design, and construct a structure or building within one 3D model.*

4. Expand the Vendor Performance Evaluation Process to Include Vendor Suspension

As noted in the first phase of this audit, Internal Audit recommended that management implement a vendor performance evaluation process to pro-actively evaluate and improve the performance of all suppliers, vendors and contractors that are sourced by the City. A pilot program was completed in 2019 to assess the Vendor Performance Evaluation procedure. The Vendor Performance Evaluations procedure (PP-14) and the Vendor Performance Evaluation reports for Consultants and Construction Contractors have been developed to support the Vendor Performance Evaluation program.

The contractor working on Fire Station 7-4 faced significant financial difficulties that ultimately resulted in substantial delays in completing the construction and incremental costs to the City. These difficulties were amplified by the poor performance of some of its key subcontractors.

Section 3.1 of Vendor Performance Evaluations procedure (PP-14) states the following:

> *"If unacceptable performance or the actions or inactions of a Vendor at any time during Contract performance violates a health and safety regulation or jeopardizes the health and safety of a representative of the City or a member of the public or a major breach of Contract or risk to City assets, immediate action is warranted. Completion of a Performance Evaluation Report need not apply under these circumstances. The Contract should (if allowed) be terminated immediately and the Vendor Suspension provisions provided in this PP should be considered..."*

To date, there have been no vendors added to the suspended list. Procurement Services is finalizing the wording of the Vendor Performance Evaluations procedure with Legal Services and will be presenting the program to the Senior Leadership Team by Q2 of 2021 to make them fully aware of the program.

If a vendor or subcontractor performs inadequately on an existing or recent contract with the City, the City must formally consider suspending that vendor as per the above policy. The suspension of a vendor should not be exercised for the purpose of punishing a vendor. It should be based on a balanced review of whether the vendors conduct presents a risk to the City's valid commercial or business interests.

Recommendations

We recommend that management proactively implement and monitor the vendor suspension process as defined in the Vendor Performance Evaluations procedure (PP-14).

Management Action Plan

Management agrees with the audit recommendation.

Early last year, Procurement Services acquired the Contract Management and Vendor Performance modules in Bids and Tenders. These modules provide a centralized location for

easy access to contracts and allow a more robust on-line evaluation tool, helping client departments more effectively manage their contracts and vendor performance assessments.

In a memo sent to the Senior Leadership Team and Managers on February 24th and a follow-up memo on November 12th, 2020, the Director of Procurement Services communicated the implementation of the on-line Vendor Performance Evaluation Program. The November 12th memo highlighted the collective responsibilities with respect to the Vendor Performance Program as outlined in the Corporate Procurement Policy, Section 8, Vendor Performance.

The Vendor Performance Program is in its early stages of capturing contract performance and no recurring marginal and/or unacceptable vendor performance assessments have been identified by client departments to date that require decisions leading to a suspension. However, Procurement Services will maintain an up-to-date and current list of all suspended vendors, retaining all original Performance Evaluation Reports, including any information captured in the Vendor Performance module in Bids & Tenders.

Procurement Services is working with Legal Services to revise the composition of the Appeal Review Committee (ARC) in PP-14 and plans to present the program to SLT-E in Q2 2021 to ensure program awareness and clarify client department responsibilities to evaluate and improve the vendor performance of all awarded contracts.