



**Subject:** Fire Services Headquarters Station 4-5  
**Prepared by:** Allan D. Downey, Director of Operations  
**Department:** Station 4-5 Update  
**Date:** September 1, 2020

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## **Recommendation**

- 1. That Report No. OPS19-014 be received for information.**

## **Background**

Update No. 1:

On November 10, 2015, four (4) acres of land were purchased at the corner of Earl Stewart Drive and Isaacson Crescent in Aurora.

On February 14, 2017, Joint Council Committee (JCC) approved a budget of \$11,000,000 for the design and construction of the facility.

On March 28, 2017, JCC approved the engagement of Thomas Brown Architects to design the new facility, under the guidance of a Steering Committee comprised of staff from Aurora, Newmarket and CYFS.

Several reports and updates were presented to JCC culminating in the approval of design on June 12, 2018.

Staff received approval to proceed to detailed design, preparation of specifications and tender documents and proceed to public tender based on information provided in staff report OPS18-011.

The project was released for public tender on April 12, 2019 and closed on May 22, 2019. Nine (9) bids were received; however, all bids were over the approved budget.

Following the tender results, the facility was redesigned to provide cost savings that would bring the facility closer to the approved budget. Building Modifications included:

- Deletion of one (1) bay in the Apparatus Bay
- Remaining bays shortened by 20' from 90' to 70'

- Reduction of second floor office area by the width of the deleted bay below
- Deletion of one (1) classroom on the second floor
- Adjustment of the northwest entrance and hose tower by moving both elements east to infill area of deleted classroom

The above-noted revisions achieved a reduction in gross floor area of 4,331 square feet from the original tender gross floor area of 28,099 square feet representing a 15.5% reduction.

The scope of the modifications realized cost reduction in the following categories:

- |                                      |                                   |
|--------------------------------------|-----------------------------------|
| • Bonding                            | • Structural Steel                |
| • Retaining walls                    | • Steel Deck                      |
| • Concrete forming                   | • Waterproofing – Below Grade     |
| • Cast in place concrete             | • Aluminum Cladding Systems       |
| • Concrete finishing                 | • Roofing                         |
| • Concrete reinforcing               | • Apparatus Bay Doors             |
| • Architectural precast              | • Gypsum Board Systems            |
| • Masonry                            | • Acoustical Partitions (folding) |
| • Vehicle Exhaust Extraction Systems | • Flooring                        |
| • Excavation                         | • Mechanical Systems              |
|                                      | • Electrical Systems              |

As a result of the proposed revisions to the facility design, a reduction in the amount of \$1,147,000. Cost savings in the amount of \$1,147,000 have been realized, culminating in an adjusted tender bid of \$10,836,817. Fire Hall 4-5 Revised Project Budget was approved, as follows:

**Non-Construction Costs:**

Architect	\$600,000
Furniture, Fixtures, Signage etc.	506,500
Prefab shed for training	250,000
Allowance for props	100,000
	<u>1,456,500</u>

**Construction Costs:**

Tender Revised Bid	10,836,817
Non-Recoverable HST (1.76%)	190,728
Contingency (10%)	1,083,682
	<u>12,111,227</u>

<b>Total Revised Project Budget</b>	<b><u>\$13,567,727</u></b>
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In addition to this budget, the Town of Aurora has also included \$87,300 for project management fees and public art from its own reserves.

Remo General Contracting Ltd. was awarded the contract for the construction of Station 4-5 in the amount of \$10,836,817.

Site work commenced on May 20, 2020.

## Budget

<b>Non-Construction Costs:</b>	<b>Approved Budget</b>	<b>Payments to Date</b>
Architect	\$600,000	\$384,552
Furniture, Fixtures, Signage etc.	506,500	0
Prefab shed for training	250,000	0
Allowance for props	100,000	0
	<u>1,456,500</u>	
<b>Construction Costs:</b>		
Tender Revised Bid	10,836,817	1,334,140
Non-Recoverable HST (1.76%)	190,728	
Contingency (10%)	1,083,682	\$69,268
	<u>12,111,227</u>	
<b>Total Revised Project Budget</b>	<b><u>\$13,567,727</u></b>	<b><u>\$1,787,960</u></b>

## Schedule

Upon commencement of construction, staff were provided with a project schedule. Completion is presently scheduled for the winter of 2021; however, subject to change.

## Progress to Date

Filling and rough grading of site complete to footing level. Storm, sanitary and water servicing to the site are complete.

Bore hole and pressure testing ongoing as a result of adverse soil conditions.

## Communications

Staff have been in contact with our Communications Division to produce a dedicated webpage for Station 4-5 on both Aurora and Newmarket's website. Virtual site meetings have taken place on a bi-weekly basis since the commencement of construction. At present, six (6) virtual site meetings have been conducted.

On Tuesday, June 23<sup>rd</sup> a Groundbreaking ceremony took place with both Mayors, Fire Chief and General Contractor in attendance.

## **Risks and Issues**

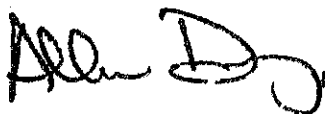
During the filling and grading phase of construction, issues were identified relating to soil stability and bearing capacity. Geotechnical consultants were engaged to investigate and report on these concerns and provide recommendations for remediation.

Several options have been explored and presented to the contractor, architect and owner. Please find attached the architect's recommendation to address adverse soil conditions.

The option to install helical piers was approved at an upset limit of \$700,000. This work will proceed as a result of an approved change order and is within the approved budget.

The investigation and subsequent recommendations related to soils, combined with the additional work required to install the helical piers will have an impact on the proposed schedule and anticipated opening with an anticipated opening of early 2022.

Modifications to the footings and structural steel as a result of the need for helical piers are also required.



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**Allan D. Downey**  
**Director of Operations**  
**Operational Services Department**  
**Town of Aurora**

August 21, 2020

Town of Aurora – Joint Operations Centre  
229 Industrial Parkway North  
Aurora, Ontario L4G 4C4  
[www.aurora.ca](http://www.aurora.ca)

Attn: Allan D. Downey  
Director of Operations

Re: Central York Fire Service HQ Station 4-5

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Dear Al,

As the team is aware, we have encountered a site condition that has required a detailed investigation to assess impact to the current design with regard to potential settlement issues that would have a detrimental impact on the performance of the building.

#### **Description of the Issue**

Based on geotechnical calculations, the amount of potential settlement could exceed the allowable limit of settlement of the design which could result in detrimental impacts to the building and surrounding development. Starting From the existing grade elevation of the site, a substantial amount of new fill is required to set the finished floor elevation of the building at a serviceable level relative to the surrounding roads. In some areas, the depth of fill is approaching 4 meters in depth. With this load, there is the potential that the weight of the proposed building and fill would exceed the bearing capacity of the existing native subgrade which could result in a greater than unacceptable settlement both the structure and the surrounding hard surface areas. In essence, there is a very soft layer of material deep below the existing grade of the site that, when subjected to the additional load of the building and new fill on the site, could compress or shift thereby creating an unstable condition that could result in the building and surrounding hard surface areas 'sinking' into the site. It should be noted that the primary concern is the weight of the fill and not the weight of the building which is relatively light compared to the weight of the fill.

#### **Team Response**

At the time the issue became apparent, our office, the office of the General Contractor, Structural Engineer and the Independent Inspection and Testing company began a process of review and information gathering to gain understanding of the issue.

The above noted process involved further subgrade investigations on site, laboratory testing and calculations and detailed conversation between the team members. The results of this process initially identified three possible solutions as described below.

**Solution One** – Reduce the weight of the proposed fill by using Geofoam, which is an EPS or XPS material manufactured into large lightweight blocks. The primary function of geofoam is to provide a lightweight void fill below a highway, bridge approach, embankment or parking lot. EPS Geofoam minimizes settlement on underground utilities. Geofoam is also used in much broader applications, including lightweight fill, green roof fill, compressible inclusions, thermal insulation, and (when appropriately formed) drainage.

**Solution Two** – Reduce the weight of the proposed fill by using lightweight aggregate, which is a material that has a bulk density that is lower than that of common aggregates used for construction.

**Solution Three** – transfer the loads of the building and surrounding fill through the soft layer in the existing subgrade using a deep foundation system comprised of helical piers. A helical pier is a steel pier system that has one or more helical blades welded to a steel shaft. These shafts are driven into the ground around a foundation until strong supporting soils or bedrock are reached.

Each of the above noted solutions was vetted by the team. The pros and cons of each are noted below.

#### **Solution One**

##### **Pros**

- The solution would potentially address the issue by reducing the weight of the proposed development on the existing subgrade.

##### **Cons**

- Concerns were expressed regarding the potential of the material to permanently deform and/or creep under pressure which may impact building performance.
- Concerns were noted that this solution, while addressing the majority of the weight concerns, is not a total solution as there are four locations within the building that would require placement of helical piers to fully resolve the concerns.
- The solution is a unique application of the material and as such, concerns were noted that the team does not have similar examples that could provide verifiable performance.

For the above noted reasons, **Solution One is not recommended.**

#### **Solution Two**

##### **Pros**

- The solution would potentially address the issue by reducing the weight of the proposed development on the existing subgrade.
- The implementation of the solution would fall within common construction practices which the team has experience to execute.

##### **Cons**

- Concerns were noted that this solution, while addressing the majority of the weight concerns, is not a total solution as there are four locations within the building that would require placement of helical piers to fully resolve the concerns.
- There was some concern noted that there may still be some settlement in the subgrade which could not be controlled.

For the above noted reasons, **Solution Two is not recommended.**

#### **Solution Three**

##### **Pros**

- The solution would address the issue by transferring the impacts of the weight of the proposed development below the soft layers into soils with competent bearing capacity on the existing subgrade.
- In Solutions One and Two there are four locations within the building that would require placement of helical piers to fully resolve the concerns. As such, it makes sense to provide a total solution using one system.
- The implementation of the solution would fall within common construction practices which the team has experience to execute.

##### **Cons**

- None noted.

For the above noted reasons, **Solution Three is recommended.**

### **Schedule Implications**

As has been discussed in previous site meetings, the issue has impacted the Construction schedule by approximately two months to date. The Contractor is making every effort to execute work where it is feasible to do so. However, with the information available at this time, it is our recommendation that a decision be made to proceed with Solution Three to minimize further impacts to the schedule.

### **Financial Implications**

As each of the solutions have been developed for consideration, costs have been estimated and discussed. Each of the solutions appear to similar in terms of cost. Currently, based on discussions with the General Contractor, we understand that the maximum upset cost to execute Solution Three would be \$750,000.00, inclusive of overhead and profit. It should be noted that this cost does not include impacts related to the schedule delay (if any).

Please review the above information at your earliest convenience.

If you have any questions or require further clarification, please do not hesitate to call.

Yours truly,

A handwritten signature in black ink, appearing to read 'CKubbinga', written over a light blue horizontal line.

Chris Kubbinga  
M.Arch, OAA

**Thomas Brown Architects Inc.**