

**Subject:** Alder Recreation Centre Pool – Structural Deficiencies

**Department:** Community Services

**Division:** Facilities/Parks

**Report #:** CMS-2021-020

**Meeting Date:** 2021-10-18

---

### Orangeville Forward – Strategic Plan

Priority Area: Sustainable Infrastructure

Objective: Maintain existing assets; Plan for Growth

#### Sustainable Neighbourhood Action Plan

Theme: Corporate and Fiscal

Strategy: Create and integrate sustainability principles into Town policies, processes and practices.

---

#### Recommendations

**That report CMS-2021-020, titled Alder Recreation Centre Pool – Structural Deficiencies October 18, 2021 be received;**

**And that Council approve additional contingency capital funding in the amount of \$632,633 dollars for the sub-grade remediation and structural upgrades to Alder Recreation Centre Pool area.**

#### Background and Analysis

On September 14, 2020 Council approved the construction of a new expanded stainless steel 8-lane lap pool and leisure pool at Alder Recreation Centre including on deck spray features/slide modification. The total contract price the pool liner project is \$

4,337,625 plus a contingency of \$216,000 for an overall total of \$ 4,453,625 excluding taxes. To date due to structural and geotechnical engineering requirements we have expended \$44,000 to remove, uncover and expose sub-soil and building structural issues to better determine how best to design for remediation and future mitigation of the internal structural integrity of the two pool facilities.

The Alder Pools are not unlike any other pool construction. A major factor involved in a renovation is the unknowns contained underneath concealed surfaces and until the demolition begins, and the contractors begin uncovering all things around and under a pool it is difficult to predict what you will discover. An added challenge with the Alder project is that we were not in possession of structural or as built drawings for the pool.

The pool liner demolition phase began in July, with the saw cutting of the existing deck to make way for the two additional lap lanes and the new stainless steel system, i.e. liner, piping, gutters, exhaust and filtration. This included the removal of the deck around the supporting steel columns near the midway point of the overall pool area between the lap and leisure pools.

Removal of the pool deck was required as part of the base contract, in order to excavate around the pool(s) and remove the failing Myrtha pool systems. In the process of excavation, it revealed significant collapse of base soils in around the pool which was causing tile delamination in and around the pool(s). The pool deck itself, although substantial in size, did not have any structural steel or mesh within it to provide additional strength and resist movement. Due to the soil collapse below, the pool deck was acting as a suspended slab with no structural elements within it. (see photo)

The liquefaction (saturation) of the subsoils is evident due to the collapse, or voids created directly below the pool deck. As the water moves through the soil the water would carry with it small soil particles and sand, known as finds. This is a direct result of water loss from the Myrtha pool system leaking from the pool(s) and / or pool piping and migrating through the sub-soils. Further indication of water damage was noted on the back of the pool walls with a relative straight line of corrosion on the brackets supporting the Myrtha pool walls. (see photo at lap pool excavation)

The backfill directly around the pool and surrounding the pool piping systems was clear stone which is typically made up with 30% void areas, these voids permit water migration, but also allows sub soil material to move around into the voids. This movement is a result of the soil collapse. Typically granular 'A', pea gravel or engineered fill is used for bedding under pools and pipe work, further to this weeping tile (Big-O) drain lines are also installed below pools to ensure any water has a path of travel without undermining decks, pool, or structural building columns. A Geo-Technical Engineer was engaged to review the existing site conditions and to provide recommendations.

The buildings' steel columns pierce the deck and go to footing at the pool slab level, water within the subsoils has had a deteriorating affect on the steel itself. A Structural

Engineer has been to site to review the condition and has provided recommendations to remediate the damage to the building columns and pool deck.

Both Structural and Geo-Technical Engineers have noted the spongy soil condition, with movement of the soil as an individual walks across the excavated material. The native soil retains / holds water, this is the spongy condition that is noted. As the soils become super saturated, water begins to expand due to additional water loss from the pool system(s). With the poor backfill material, the water now has a pathway / channel to escape to other areas in and around the pool and building, thus resulting in the present condition we see of soil collapse at the pool deck level, around structural column bases and emergency exit stairs from the pool deck.

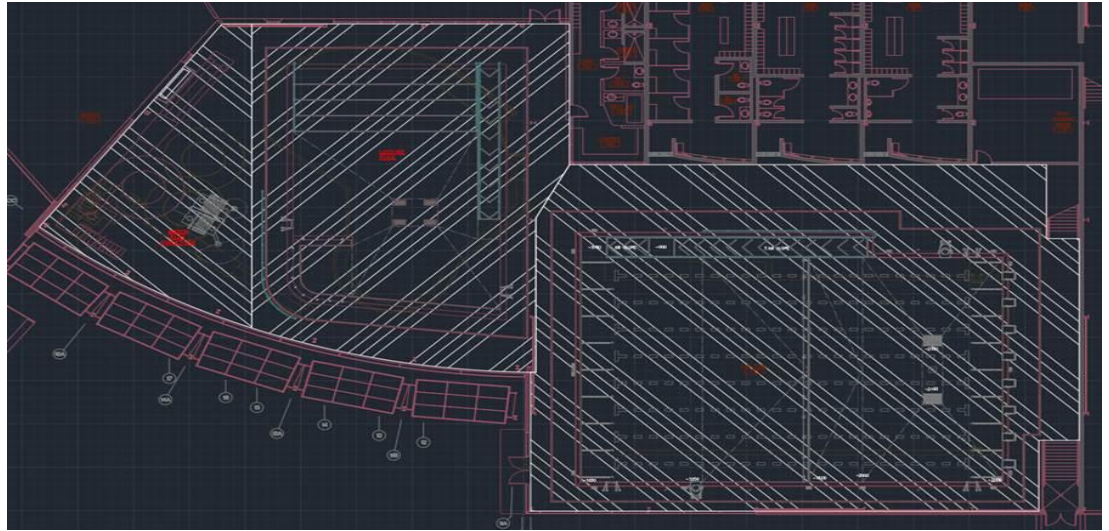
A contemplated change notice (CCN) was issued, in an attempt to capture the magnitude of the remediation needed to correct the condition based on the suggestions from both Structural and Geo-Technical Engineers. The summary of CCN and reports from the engineers are to remove all saturated soils and remaining slabs back to native soil condition. Replace with proper backfills, such as granular 'A', pea gravel or engineered fill, including a weeping tile sub drainage to protect the installation from future water loss or ground water infiltration.

This CCN is a result of an unknown condition, as found condition, due to poor installation and water loss from the pool system(s). This condition was not evident from previous finished installation as all conditions were only revealed at time of demolition and excavation. The main concern is the possible damage to the building structural columns and undermining of the existing pool slabs.

### **Required Remediation and Future Mitigation Measures**

**Item 1.** Remove sub-soils below level of existing clear stone to expose virgin soil and prepare for new pool(s) concrete slabs. Provide engineered fill to bring excavation of removed 'spongy' material to an acceptable depth, based on recommendations from Terrapex-Geotechnical Engineers, including delivery, placement, compaction, etc.

- a) Waterslide and splash pad area of approximately 166m<sup>2</sup>
  - b) Leisure pool area of approximately 455 m<sup>2</sup>
  - c) Lap pool area of approximately 830 m<sup>2</sup>
- Cost estimates are based on price per cubic meter of soil above and beyond original contract base price to satisfy geotechnical engineer recommendations.



2. Provide new concrete slab(s) for pool tank and deck including all rebar, for additional requirements, majority in base contract. Slab preparation and recommendations shall be as directed by Terrapex-Geotechnical Engineers for sub-soils base build-up and preparations. Shop drawing stamped by Structural, Ontario Professional Engineer will be provided by DEI/Aquatic Design and their sub-consultant structural engineer. New concrete slab to include a weeping tile system (Big-O), complete with a geo-technical fabric cloth and existing to day-light, c/w a back water valve, or installation of a storm water sump in the new filtration room.

- a. Waterslide and splash pad deck area of approximately 166 m<sup>2</sup>, based on a 150mm (6") slab for new pool deck, cost estimates are based on fixed pricing for 24 cubic meters, including tiles finishes.
- b. Leisure pool area deck of approximately 211 m<sup>2</sup>, based on a 150mm (6") slab for new pool deck, cost estimates are based on 32 cubic meters of concrete and tile finishes.
- c. Lap pool area deck included in based pricing. Addition of two (2) lap lanes and portion of Lap pool basin slab included in base pricing. Additional cost for removal of slab, as directed by Terrapex, 369 m<sup>2</sup>, based on a 200mm (8") slab = 75m<sup>3</sup>.
- d. Estimated cost for new slab, to accommodate larger pool, 487 m<sup>2</sup>, , based on a 200mm (8") slab = 99m<sup>3</sup>.

### **Alder Pool Column Base Condition Assessment**

The Alder Pool structure is a combination of conventional structural steel columns, beams and open web steel joists on the south side of the pool area (Alder street side)

and pre-engineered steel building with welded I-beam columns and frames on the north side (Food Court side).

In late August during phase one of the deck and pool liner demolition, seven (7) column bases were exposed and reviewed by Wytzel Dyce Engineering, Structural Engineer. Four columns were noted to have bad to severe rusting at the column bases (floor slab below the tile-see Column 1 photo attached).

Based on these findings and preliminary observations from the initial assessment of seven columns the Structural Engineer recommended that all (16 total) column bases within the pool area be fully exposed to review the existing condition of the steel. This required the removal of the surrounding deck slab in order to take accurate measurements to determine if reinforcing of the columns would be required. Based on the final review of all exposed columns it was recommended that reinforcing details and methods be developed to protect the columns from future rusting. To date structural engineers have not finalized their report and plan recommendations to mitigate any future damage as well required upgrades to the steel columns.

In order to facilitate the full investigation of all steel columns it was necessary to remove decking and sub-soil around 16 columns in order for the structural engineers to complete their report.

Since we do not have the recommendations, we are having to estimate the cost to remediate the steel columns and we have estimated based on a worst-case scenario.

---

## Notice Provisions

---

## Financial Impact

The following are estimated budget pricing based on Geotechnical and Structural Engineer findings and recommendations for remediation of the pool area:

Item 1: Removal of saturated/unstable subgrade material,

removal of lap pool slab and leisure pool footing,

prepare for new pool concrete slabs

\$222,577.00

Item 2: Removal and replacement of lap pool tank slab, installation of additional decking, tile finishes, weeping tile system,

back water valve or stormwater sump in filtration room - \$381,056.00

Steel Column repairs/upgrades and associated works, i.e. \$200,000.00

Total Estimated Remediation Cost \$803,633.00

Remaining Project Contingency (\$171,000.00)

**Additional Contingency Requirement \$632,633.00**

In consultation with the Treasurer, it is recommended that the additional contingency requirement of \$632,633 (as shown above) is covered by transferring the remainder capital funding allocated for the Alder Recreation Centre Sustainable Refrigeration Project. As Council is aware, originally \$2 million dollars were budget for the design and installation of the sustainable refrigeration system which was scheduled for completion in 2022.

Respectfully submitted

General Manager Community Services

**Attachment(s):** Please see photos attached.

**Attachment(s):**

1. Pool Demolition photo
2. Mrytha Pool steel bracing photo
3. Centre Steel Column #1