



City of
Peterborough

To: **Members of the General Committee**

From: **Patricia Lester**
Commissioner of Corporate and Legislative Services

Meeting Date: **December 3, 2018**

Subject: **Report CLSFM18-031**
Peterborough Memorial Centre - Findings of Second Structural Review and Increase to the Pre-commitment of the 2019 Capital Budget for Ice Pad Replacement

Purpose

A report to update Council on the findings of the Second Structural Review and to recommend an increase to the pre-commitment of the 2019 Capital Budget for the Peterborough Memorial Centre Ice Pad Replacement.

Recommendations

That Council approve the recommendations outlined in Report CLSFM18-031, dated December 3, 2018, of the Commissioner of Corporate and Legislative Services, as follows:

- a) That staff proceed with the repairs to the Memorial Center in 2019, as identified in Report CLSFM18-021 dated August 27, 2018;
- b) That the pre-committed 2019 Capital Budget for the Peterborough Memorial Centre Ice Pad Replacement be increased by \$1,500,000 from \$2,000,000 to \$3,500,000; and
- c) That staff compensate the Lakers for the value of the ticket sales, using a common accounting standard, typically received during an average season at the Peterborough Memorial Centre during the last three years, less ticket sales at an alternative venue in 2019.

Budget and Financial Implications

The estimated cost of the Peterborough Memorial Centre Ice Pad Replacement is \$3,500,000 and includes the budget required to provide consulting services to design, tender and administer the work and the actual construction itself. The cost, net of HST rebate, has been included in the 2019 Draft Capital Budget. Approval of this report will pre-commit that project and allow staff to tender the project in December 2018.

Background

Brief Description of the Work

City staff presented Report CLSFM18-021 to General Committee on August 27, 2018 (see Appendix A).

Within this report, it was suggested that based on work undertaken by the structural engineering consulting firm of Carvajal Structural Engineers (CSE):

- the existing suspended ice slab should be replaced with an insulated slab-on-grade ice slab;
- the existing brine system should be replaced;
- the south foundation wall should be rebuilt;
- the existing dasher board system should be replaced with a new OHL approved dasher board system; and
- repairs should be undertaken to the surrounding floor areas and ice resurfacers travel path floor.

At the Council meeting of September 10, 2018, Council deferred the motion and provided the following direction to staff:

- a) That the matter be deferred to obtain another opinion on the repair of the floor: and,

Subject to the additional report findings on the repairs being consistent with the original findings:

- i) That staff be directed to proceed with repairs to the Memorial Centre floor in 2019, as identified in Report CLSFM18-021.
- ii) That the pre-committed 2019 Capital Budget for the Peterborough Memorial Centre Ice Pad Replacement be increased by \$1,500,000 from \$2,000,000 to \$3,500,000, subject to the additional report findings on the repairs at the Memorial Centre be consistent with the original findings.

- iii) That staff compensate the Lakers for the value of the ticket sales, using a common accounting standard, typically received during an average season at the Peterborough Memorial Centre during the last 3 years, less ticket sales at an alternative venue in 2019.
- iv) That staff report to Council in early 2019 on the status of the Memorial Centre repairs.

In consideration of Council's direction, staff created and issued an Informal Quotation document QFMD-06-18, inviting seven Forensic Rehabilitation Structural Engineers to provide a second opinion of the work done by CSE.

QFMD Issued

QFMD-06-18 was issued on September 20, 2018 and closed on October 4, 2018. Only one bid was received as shown in Chart 1. Entuitive Corporation (EC) was a firm that the Peterborough Lakers requested be included on the invitation list of bidders. The Facilities & Energy Manager and the Commissioner of Corporate and Legislative Services reviewed the submission.

Chart 1
QFMD-06-18 Summary Chart

Firm Name	Address	Bid Amount (Excluding HST)
Entuitive Corporation	200 University Avenue, 7th Floor Toronto, Ontario, M5H 3C6	\$29,765

EC is a qualified forensic structural engineering firm. Although their price was more than originally estimated by staff, it was important to do the required work in a timely manner and, accordingly, EC was awarded the project.

EC was to perform a peer review of the CSE work, review all reports, findings and recommendations, temporary shoring repairs performed in August 2018, and provide their own independent professional opinion of this work.

EC was also asked to perform their own on-site inspection(s) to investigate and determine their own opinion of the condition of the existing floors and supporting walls. The purpose of the review was to provide a second structural professional opinion and, more importantly, identify possible rehabilitation alternatives that can be made without the removal of the existing brine header or brine feeder lines allowing the existing floor and supporting walls to remain structurally sound for a minimum of ten years. Any rehabilitation alternatives had to include the replacement of the existing dasher board and glass system.

Entuitive Corporation Report and Summary

EC's report, dated November 9, 2018 is attached as Appendix B.

Chart 2 provides a comparison of visual reviews, opinions and comments by both structural engineering firms CSE and EC. In some cases, EC was not able to visually see certain areas due to the ice buildup this time of year.

Chart 2: Comparison of Comments from Engineering Firms

No.	Reviewed Area	CSE Comments	EC Comments
1	Topside and underside of rink slabs	Good	Not visible
2	Underside of original 1955 rink slab	Potential serious structural concern	Not visible. Agree with CSE report
3	Slab/topping exposure to freeze/thaw conditions	Water penetration is evident. Significant repairs and rehabilitation required	Agree with CSE. Recommend steel frame support be installed
4	Condition of concrete along perimeter of ice rink slab	Spalls observed at the locations of the dasher board supports which could lead to a structural concern. Regular monitoring is required.	Not visible. Agree that CSE's assessment is reasonable.
5	Underside of original slab – south bay	Severe, very poor localized conditions observed. Repairs are required.	Not visible. Agree with CSE's assessment and recommendation.
6	Underside of original slab - general	The condition of the original slab underside is expected to vary from location to location but, in general, it is expected to be better as you progress away from the south wall	Agree with CSE's assessment
7	South concrete foundation wall	The concrete foundation wall at the south end, below the dasher boards was observed to be in poor to very poor condition, concrete deterioration was noted over the full length of the wall. Suggest the first cavity be backfilled until the floor is replaced in 2019	Agreed with CSE's assessment but felt the backfill was insufficient and should be removed and replaced with permanent steel framing
8	Zamboni path	Deterioration of the south wall and suspended slabs area over the Zamboni path has progressed to a point where the walls and slab need to be shored immediately	Strongly agree with CSE's assessment and recommendation and recommend slab repairs

No.	Reviewed Area	CSE Comments	EC Comments
9	Condition of brine header and brine feeder system	Based on the methodology of the repairs suggested, the brine header and feeder systems will be replaced	Structural repairs will need to be done taking caution to avoid brine header or feeder pipes. An independent opinion of the condition of the brine header and feeder systems should be sought from a mechanical (refrigeration) consultant.

In general, EC agrees with CSE's observations.

EC has not reviewed the condition of the mechanical brine header system. EC recommends that a Mechanical (refrigeration) Consultant be contacted to comment on the condition of the system. This was, in fact, supplied to EC as part of the QFMD package (see Appendix C).

Regarding the structural integrity of the concrete structure at the south end of the ice rink, EC and CSE agree on the structural condition of this area, however, EC has offered an alternative method of implementing the suggested repairs.

Options available to the City

Based on the work of the consultants, the following two options to implement the required repair/rehabilitation to the rink slab, south foundation wall, south end area around the ice resurfer path and the dasher boards are available assuming the "Null" or "Do Nothing" alternative is not viable.

Option 1 Entuitive Corporation Recommendations

Entuitive Corporation recommends the following:

1. Localized repairs be performed within 3-4 years on the south foundation wall of the brine trench;
2. Install a steel frame support system along the entire brine trench to provide additional support to the original rink slab within the brine trench. The steel frame support will have to be installed during the summer months when ice buildup is not present on the brine header and feeder pipes;
3. Remove the self compacting fill installed under the first cavity to the north of the south foundation wall and install a permanent steel frame system under the full width of the rink;
4. Repair the suspended concrete slab beneath the ice resurfer path at the southeast corner of the ice rink as soon as possible;
5. Undertake localized repairs as soon as possible to the brine header support system prior to the installation of the proposed steel frame slab support system; and

6. Perform any necessary floor and dasher board curb repairs along the perimeter of the rink and at the south end under the movable bleachers that were not visible at the time of inspection.

The estimated costs to supply and install the steel framing floor supports, ice resurfacers floor repairs, new south end dasher board anchoring system, dasher board curb repairs and unknown concrete floor repairs at the south end of the rink and the supply and installation of the new dasher board system is \$1,000,000. This amount is inclusive of all consultant fees, permits and a 20% contingency. The estimated schedule to perform all work is 12 – 14 weeks.

Option 2 Carvajal Structural Engineers Recommendations

In the opinion of Carvajal Structural Engineers, the south foundation wall of the brine header trench should be replaced. In doing so, the brine header and feeder pipes will need to be cut. The existing brine system is 40 years old and has reached the end of its economic life. The pipes are, by now, brittle and, in the opinion of Cimco Refrigeration consultants (Appendix C), it will not be possible to reconnect the pipes after reconstruction of the south foundation wall of the brine trench. Accordingly, the recommendation of Cimco and TS Engineering Inc. (one of the City's Consulting Teams of Record) is to replace the entire rink slab and brine piping.

The estimated cost to remove and replace the existing ice slab, ice resurfacers floor repairs, and the supply and installation of the new dasher board system is \$3,500,000. This amount is inclusive of all consultant fees, permits and contingency. The estimated schedule to perform all work is 20 – 22 weeks.

Comparison of Options

In comparing the two options, there are five main areas that need to be examined as listed below:

- Cost of the repairs;
- Time to do the repairs;
- Impact on the tenants of the Memorial Centre;
- Risk during the repairs and after the repairs; and
- Final product.

Chart 3 examines each of the alternatives under these five criteria.

Chart 3: Comparison of Alternative Repair Scenarios

No.	Criteria	CSE Repairs	EC Repairs
1	Cost	\$3,500,000	\$1,000,000
2	Time	20-22 weeks	12-14 weeks
3	Impact on Tenants	Lakers will lose 2019 season in the Memorial Centre and the Petes will have to play away games (8 +/-) games until November 2, 2019.	Lakers will lose 2019 season in the Memorial Centre and the Petes would have to hold training camp at another facility until September 7, 2019.
4	Risks	<p>Minimal risk.</p> <p>Entire south foundation wall, rink slab and brine header and feeder system will be replaced. There are very few other elements that will be impacted by implementing the repairs as suggested by CSE so little risk will be incurred.</p>	<p>There are two significant risks.</p> <ol style="list-style-type: none"> 1. If the brine header and/or feeder pipes are impacted and broken, and a reconnection cannot be made, then the entire floor must be replaced. This, however, will not have been planned for and potentially another tender will have to be called. In this instance, the price jumps substantially and the Peterborough Petes will be in danger of losing their season at the Memorial Centre. 2. The south end of the rink slab is deteriorated beyond the point where the new dasher boards can be properly installed. In this instance, extensive repairs to the rink slab will be required, including the possibility of replacing the entire rink slab. Again, the price will jump substantially, and the Peterborough Petes will be in danger of losing their season at the Memorial Centre.
5	Final Product	The new south foundation wall, including structural repairs to the resurfacers path and the new rink slab/brine system will allow the Memorial Centre to operate effectively and efficiently for another 10-25 years without concern for major repairs to these main ice rink elements.	The brine header and feeder systems will still be beyond their economic life and could leak at any time. If a leak does occur, the Memorial Centre will need to be immediately shut down until repairs can be implemented. This would most likely happen during the winter season so the Peterborough Petes and potentially the Peterborough Lakers will be adversely impacted. The most significant concern is that planning for a managed repair will not be possible.

Discussion

Option 1 (EC recommended course of action) provides the minimum amount of work, shortest construction time lines, is the least costly alternative and is least the impactful to the Petes. However, it also is the highest risk alternative.

All construction activities involve risk but, for the most part, these risks can be mitigated and accounted for in the preparation of tender documents and construction specifications. The main concern (outside of cost) with respect to the Peterborough Memorial Centre is the adverse impact on the Centre's tenants. Regardless of the alternative selected, the Lakers 2019 season at the Peterborough Memorial Centre is lost. If Option 1 is selected, there is a good chance the Petes 2019/2020 season at the Peterborough Memorial Centre will also be lost. Even if the work of Option 1 is undertaken and the brine system is not impacted and the floor at the south end of the rink is acceptable to attach the new dasher boards system to, the result will still be a rink slab and brine system that are both beyond their economic life with the potential for failure at any time.

The best-case scenario to replace the Peterborough Memorial Centre would be to have the location, approvals, design, construction drawings and funding all available today. If all this were true, a new building could be operational in 2-3 years. As Council is aware, none of this is true today and, accordingly, a more logical scenario would see a Peterborough Memorial Centre replacement available sometime in the 6-10 year time period with the longer time frame being the more likely. This means the Peterborough Memorial Centre must remain as the major sports and event arena for at least another 10 years, or well beyond the life of the existing rink slab and brine system.

Based on all the above considerations, it is the opinion of staff that the risk of a future failure, or a failure during construction, of the brine system and/or rink slab is too high and, accordingly, the best alternative is to undertake the necessary repairs to the Peterborough Memorial Centre as was described in the report presented to Council on September 10, 2018 and as outlined as Option 2 in this report.

Summary

A second structural engineering opinion of the condition of the Peterborough Memorial Centre rink slab and foundation walls has been obtained. Although the second opinion is very similar to the first opinion in terms of what repairs and rehabilitation needs to be done, an alternative methodology has been suggested to implement these repairs.

Although the alternative repair methodology is cheaper and faster, the inherent risk the City has to assume in going this way, plus the fact that after the repairs, the major elements such as the rink slab and brine system will still be beyond their economic life has led staff to the recommendation that the original repair method of totally replacing the south foundation wall, rink slab and brine system is the best overall solution.

If Council accepts the recommendations contained in this report, staff will proceed with tendering the project in December 2018 with a confirmed start date of June 3, 2019 and total completion date of November 1, 2019.

Submitted by,

Patricia Lester
Commissioner of Corporate and Legislative Services

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Attachments:
Appendix A – Report CLSFM18-021 dated August 27, 2018
Appendix B - Structural Review Report by Entuitive dated November 9, 2018
Appendix C – Cimco Refrigeration Letter dated September 19, 2018