CITY OF VICTORIA

Committee of the Whole Report
For the Meeting of June 15, 2017

To:	Committee of the Whole	**Date:**	June 13, 2017
From:	Jonathan Huggett, Project Director, Johnson Street Bridge Replacement Project		
Subject:	Crystal Pool Upgrade – Lessons Learned from Johnson Street Bridge		

RECOMMENDATION
That Council receive this report for information.

EXECUTIVE SUMMARY
This report is a follow up to the City report dated January 25, 2017 presented to the Committee of the Whole on February 16, 2017 regarding the proposed Crystal Pool Project. The report outlines some of the lessons learned from the Johnson Street Bridge Replacement Project which should be considered and applied to the Crystal Pool Project.

The principal issue for successfully delivering a project on time and within budget centre around the identification and management of risk. The main report describes many of the risks that materialized and have had to be managed after the fact, and some of these risks had never been identified. In addition concepts such as "an iconic bridge" and "fixed price contracts" led to challenges that are still being dealt with.

Manufacturing a highly specialized steel structure to North American standards at a plant in China raised complications around language, distance, familiarity with North American requirements and the like. This greatly added to the project challenges. The other significant lesson from the Johnson Street Bridge was the failure to include an adequate contingency to manage risks that materialize and could not be transferred to the contractor. Council were informed that they were entering into fixed price contracts which certainly turned out to be mistaken information.

Management of the PCL and MMM contracts also presented challenges in the early days of the work. The two contracts were intended to be a collaborative venture in which MMM and PCL cooperated to achieve the desired outcome. However it quickly became a more combative approach, though since mediation significantly more cooperation has resulted.

PURPOSE

The City is proposing to replace the existing Crystal Pool at a total cost not to exceed $69.4 million. On February 16, 2017, the Committee received a report dated January 25, 2017 from the Director of Parks, Recreation and Facilities. The Committee discussed lessons staff have learned from the Johnson Street Bridge Replacement Project. This report has been prepared to document those lessons learned to date recognizing that the Johnson Street Bridge Project is still a work in progress and that when that Project is complete a more detailed and full "Lessons Learned" report will be prepared.

BACKGROUND

The Johnson Street Bridge Replacement Project has experienced significant cost overruns and schedule delays. The City will want to review the reasons for these delivery challenges in order to consider what steps it may take to minimize the risk of similar challenges on the Crystal Pool.

ISSUES & ANALYSIS

The successful management of any project can really be summarized as the identification and management of risk. All other issues flow from that one basic issue. To undertake a lesson learned exercise it is necessary to identify the risks that occurred on the Johnson Street Bridge Project, assess what risks are likely to be encountered on the Crystal Pool, and prepare a strategy based on the unique aspects of the Crystal Pool as well as the experience on the Johnson Street Bridge Project to minimize such risks.

Johnson Street Bridge Project

Leading up to the signing of a contract with PCL for the Johnson Street Bridge Project in early 2013 MMM had prepared an indicative design for the bridge, generally characterized as being about 60% complete. When optimization proposals were received from the contractor bidders, and PCL was selected to construct the bridge, a large portion of the bridge had been redesigned and as such the majority of the bridge was generally considered to be about 10% complete. In other words much of the bridge was still no more than a concept, and cash allowances had also been included for items such as, landscaping and other items and the allowances made by PCL for fendering were inadequate. There was a process negotiated in the construction contract to allow for the timely and cost efficient development of design, but PCL and MMM did not follow it.

There are lessons to be learned from the background to this situation. MMM had prepared, and the City had accepted and bought into an "iconic" design; however, as MMM developed cost estimates, it became clear that the design could not be built within the City's budget. This is why the design had to be "optimized" by the contractor bidders. The City protected itself by entering into fixed price contracts (although see the discussion below on the nuances of this concept) with each of PCL and MMM for construction and design services at a time when the design was not complete. This approach was not foreign to either PCL or MMM (as leaders in the industry, they both had experience on collaborative models like P3s); however, the PCL and MMM teams charged with implementing and administering the contracts treated this as a more traditionally structured project. MMM failed to administer PCL's contract in accordance with its terms, particularly in the early years, and City staff struggled to insist or encourage both parties to perform as they had agreed to.

Added to these issues was a fundamental issue that the proposed bridge design, without a central axle, was an innovative and largely untested design. Virtually none of the support design for opening and closing the bridge had been designed at the time of contract.

While a risk assessment for the bridge project had been prepared, a number of the key risks for the Project were not included in that risk assessment, and yet many of these missing risk categories have become significant issues in managing the Project. As an example, the challenges of fabricating the steel in China should have been an identified major risk, but it does not appear to have been addressed when the contract was approved by Council.

Manufacturing a highly specialized steel structure to North American standards at a plant in China raised complications around language, distance, familiarity with North American requirements and the like. We now understand that this was the first significant steel project on which PCL had used a Chinese supplier. This only added to the challenges of building a project within the expected budget and schedule. Under the construction contract, this was PCL's risk, but PCL's inadequate management of these risks has had ramifications for the City in terms of costs and schedule.

The other significant lesson from the Johnson Street Bridge was the failure to include an adequate contingency to manage risks that materialize and could not be transferred to the contractor. As the design and cost estimates were developed, the contingency was reduced, and at the time of contracting, the level of contingency was less than 4%; whereas a prudent contingency would likely be well above a normal project to account for the unique design. Even at contract award a 20% contingency was likely appropriate though it is worth noting that even that would have been insufficient to manage the risks that ultimately materialized.

City Council was advised at the start of the Project that they were agreeing to a fixed price contract. It is important to understand that there are no truly fixed price contracts. The best the City can obtain is a fixed price for a fixed scope of work and a fixed assignment of risk. If any of those three categories change, then the price will also change. A contract where a contractor assumes all risks for all eventualities is usually not practical and would not represent good value for money even if it were offered.

Crystal Pool Project

While the two projects may appear to be very different in nature, one a one-off, specialist bridge versus the design and construction of an aquatic centre, there are common issues to both projects. In terms of risk assessment, the primary risk for the Crystal Pool Project is likely unknown conditions. These could include:

- Unforeseen geotechnical conditions;
- Ground water issues.

The Crystal Pool Project requires careful management of risk which would typically include:

- Due diligence inspection and surveys ahead of time to determine all potential problems. However, it is extremely unlikely that 100% of problems can be identified in advance;
- Carrying an adequate contingency to manage risks that the City is responsible for;
- Having contingency plans as to how unforeseen conditions can be dealt with;
- Ensuring a full scope of work has been prepared.

Management of Risk

On any construction Project there are three usual ways of managing risk. These are:

1. Transferring risk to the contractor – the usual accepted process for that is to only transfer risks that the contractor is able to manage, or able to manage at a reasonable price. The City should not transfer risk the contractor has no way of controlling, since if the City does attempt to do that the Contractor will price it as certainty, even if the risk does not materialize – in other words the City will pay for the risk whether or not it occurs.

2. Sharing the risk – there are times when it makes more sense to share risks between the City and the Contractor so there is an incentive on both sides to manage the risks and deal with them appropriately. There are many mechanisms for achieving this objective.

3. Retention of the risk by the City – some risks cannot be shared or transferred. The City must identify those risks it is retaining and then have a strategy to deal with them. Strategies include:

- Insuring the potential risk;
- Developing strategies to deal with the risk if it materializes;
- Including an adequate funding contingency;
- Undertaking due diligence to identify the risks and their implications.

A key part of risk management is preparing a complete risk matrix for the Project. A realistic risk matrix for the Crystal Pool project must be prepared and constantly updated throughout the term of the project development and construction.

Financial Management

Successful financial management begins with preparing a realistic and complete budget. The financial lessons learned from Johnson Street Bridge are as follows:

1. An adequate contingency must be carried at all stages of the Project to deal with risk. That contingency needs to consider the current stage of design and the likely risks to the project. The contingency carried for the Johnson Street Bridge was totally inadequate.
2. If cash allowances are used to make allowances for work that cannot be completely specified in advance, those allowances need to be realistic to accommodate the work, and they cannot unrealistically be compressed in order to keep the project on budget. The cash allowances used for the Johnson Street Bridge Replacement Project were significantly different from the actual costs experienced.
3. The full scope of the work must be included. In the budgets for the Johnson Street Bridge, there were significant work items excluded. Examples included an independent quality assurance program and parts of the fendering.
4. It must be kept in mind that no contract can be viewed as a truly fixed price contract. While there were those that viewed the contract for the JSB as a fixed price, Council should have been informed that the fixed price would only be valid if the scope remained unchanged, the cash allowances were accurate, and the risks assigned to the City did not materialize. This is why contingencies are set.
5. It should be noted that much of this recommended financial management falls within the gambit of the scope of services provided by the project consultant. If the City is paying for these services, it should insist that they be provided.

The lesson learned is that when cost estimates are brought forward for the Crystal Pool they need to include all of the above considerations.

Scope of Work/Implementation Team

Developing a complete scope of work has been referenced in a number of the preceding sections. The Johnson Street Bridge Replacement Project was contracted based on a 10% design when much of the work was unspecified. As an example the fendering for the bridge was part of the contract, but the details of the scope are very different from what has been later determined to be required.

In addition to the scope of the design and construction contracts, the JSB Replacement Project budget did not have adequate allowances for other required work which has since been identified. Ensuring a total and complete budget for all work required, not just design and construction must be included.

Finally, the quality and experience of the contractor's and the design consultant's team during construction is critical to success of the project. This can be addressed during procurement and with strong contract clauses.

Respectfully submitted,

Jonathan Huggett
Project Director, Johnson Street Bridge

Report accepted and recommended by the City Manager:

Date: June 13, 2017