

Date: January 31, 2022	Originator's files:
To: Chair and Members of General Committee	
From: Shari Lichterman, CPA, CMA, Commissioner of Corporate Services and Chief Financial Officer	Meeting date: February 9, 2022

Subject

Foundation Repairs at Port Credit Library (Ward 1)

Recommendation

1. That staff be directed to proceed with repairs to the Port Credit Library as outlined in the report dated January 28, 2022 from the Commissioner of Corporate Services and Chief Financial Officer entitled 'Foundation Repairs at Port Credit Library'.
2. That capital project PN 22-272 Port Credit Library be modified as a multi-year project, with an expenditure budget of up to \$8 million funded by the Capital Reserve Fund (Account # 33121), with \$3 million in 2022 and \$5 million in 2023.
3. That all necessary by-laws be enacted.

Executive Summary

- The Port Credit Library building was built in 1962 on a landfill site and was engineered to be supported by 27 foundation piers (caissons) that penetrate deep into the bedrock.
- In 2013, a routine building condition assessment uncovered visual deterioration of some of the piers supporting the building structure. In 2016, an innovative pilot project was undertaken to stabilize the piers by installing 4 to 6 helical piles (steel pipes) around each pier. This methodology was piloted on 3 of the 27 piers (caissons) and was deemed an acceptable means to address the eventual replacement of all the piers supporting the building structure.
- A further structural engineering report recommended a foundation monitoring system be installed and monitoring occur on a bi-monthly basis to ensure the building is structurally stable and safe for public use. Additionally, the engineering firm recommended a more thorough structural inspection and concrete testing regime be undertaken at five year intervals with the first intrusive testing to occur in 2021.
- From 2016 to 2021, the foundation monitoring system indicated no significant

movement and all building monitoring sensors/points were found to be within allowable engineering limits. In spring 2021, structural testing indicated further loss of cross-section of some of the concrete piers and based on the recommendation of the structural engineering firm, and out of an abundance of caution, staff initiated the closure of the library for public use. In the meantime, staff have set up the Port Credit Arena as a temporary pop up location for patrons to use.

- Foundation repairs are typically due at the 75-year mark of a building's lifecycle. With the Port Credit building at 60 years old, and in consideration of the existing structure resting on landfill with a high water table, extensive foundation repairs are required in order for the library to re-open to the public. Total cost of the repairs are estimated at \$6 million to \$8 million and will be further refined once detailed design has been completed. This estimate includes significant room for contingencies at this time.
- With planning, detailed design, tendering and construction activities still to occur and since only one pier can be fixed at any given time, the overall project timeline is anticipated to be between 20 to 24 months. Reopening of the Port Credit Library may occur by late 2023 or early 2024, pending approval to proceed.

Background

The Port Credit Library is built on a historical landfill and was opened to the public in 1962. The library provides approximately 8,200 sq. ft. of library space and program amenities. The building is currently listed as a heritage site.

The building sits on a post and beam concrete foundation grid with a partial 3 foot crawl space and rests on 27 piers (caissons) that are driven deep into the landfill. Based on the original design drawings, the piers were engineered to hit bedrock at 50 feet below grade, but there are no inspection records within the archives to confirm if each pier does in fact, hit bedrock or if each pier has been constructed to withstand the lateral loads and high water table that exist at this location.

The building and site underwent a major renovation in 2009 and reopened to the public in 2011. There are no records on file to indicate issues with the foundation system when the building was redeveloped over 10 years ago.

In 2013, as part of a routine building condition assessment, staff observed visual deterioration of a few concrete piers within the crawl space of the building. From 2013 to 2021 a number of structural assessments and monitoring measures were completed to ensure the building was structurally stable and safe for public use. Although the engineering reports indicated there was no imminent hazard to the building structure, there were comments that repair of the piers (caissons) would be required as a long-term solution.

In 2016, remedial work on the caissons commenced, however the project was halted due to unforeseen site conditions encountered on site including excessive high ground water table,

contaminated water and restricted access to the caissons. As a workaround and as a pilot project, an alternative solution, involving installation of a helical pile system to three caissons was implemented in an effort to see if the foundations could be stabilized. The purpose of the pilot project was to test the feasibility and effectiveness of the proposed solution and to assist in developing a budget to rehabilitate the remaining caissons. Once completed, the solution was deemed an acceptable means to address the repair of the foundations as a long term solution.

In 2016, a further detailed structural assessment and safety report was issued recommending the implementation of a monitoring system and testing of the compressive strength of the concrete in five year increments in order to monitor the progress of deterioration and its impact on concrete strength. The foundation monitoring system has been inspected on a bi-monthly basis under the supervision of a structural engineer with staff receiving reports every 2 months for the past 5 years. Based on the monitoring data available to date, the structural engineer noted that no significant movement has been recorded and all building monitoring points were found to be within allowable limits. The structural engineer also noted that the building continued to be in stable condition and may remain operational while being monitored.

In spring 2021, testing on the compressive strength of the concrete was completed by a structural engineer and a final report of the findings was issued to the City on June 30th, 2021. The results of the testing indicated a considerable loss of cross-section on 4 caissons during the past 5 year timeline. Although there were no obvious signs of distress or structural failures observed in the caissons during the condition survey, the consultant noted that the remaining life of the foundation cannot be determined and is deemed to be exhausted. Foundation upgrades need to be undertaken before it can re-open to the public because of the unknown rate of deterioration of the caissons. It was recommended that the Library be closed for public use; however, it may stay open for maintenance and limited staff until the foundations have been upgraded.

Comments

Following the findings of the structural engineering report and out of an abundance of caution, staff decided to proactively close the library for further use in early July 2021. Communications to the public went out informing them of the closure until further notice. Staff continue to receive bi-monthly engineering reports that indicate there has been minimal movement of the foundations and all building monitoring points are still within the allowable engineering limits and safety factors.

Due to the closure, contactless pick up service and subsequently a Pop Up library was introduced at the Port Credit Memorial Arena which includes a small collection of popular items, 4 public-access computers, a printer/photocopier, a small children's area, limited study/seating space and a staff service point. Since its opening, use of the Pop Up location has grown, but due to its size, usage remains far below pre-closure levels, and service delivery and programming options have been limited.

Over the past few months, staff have been reviewing and researching a number of go forward options including cost impacts, including the possibility of repairing the existing foundation, redeveloping the site entirely with a new, larger library, or relocating the library to a new permanent location in Port Credit.

Rebuilding a new library on the existing site is not recommended, as this is high risk and not a practical solution to pursue due to existing landfill site, high water table and floodplain zone. Also, costs could also be in the \$18 million range and would include a 3 year timeline (planning, design and construction) to implement.

Relocating the library to another location within the Port Credit catchment area is also not recommended. Suitable sites are not currently available; in addition capital costs would be in excess of \$22 million to acquire land, develop a site and construct.

Staff are recommending to proceed with the rehabilitation of the caisson foundations and leave the existing building in its current location. There are a total of 27 deteriorated caissons supporting the library structure and so far 3 of the caissons have been rehabilitated as a part of the pilot project that occurred in 2016.

Staff have continued to monitor the helical piles solution and have confirmed this methodology is an acceptable method to rehabilitate the concrete foundations. This solution involves underpinning the existing structure and installing new steel beams at the perimeter of the building along the base and between each pier (caisson). Helical piles will be drilled into place to a depth of approximately 50 feet below the ground surface (based on the pilot project), or until it hits bedrock. Approximately 4-6 helical piles will be drilled surrounding each existing caisson and will be designed to take on the load of the existing structure, providing structural stability.

Since this construction work will be occurring under the library, a majority of the earth surrounding the library will be removed to expose the caissons and perform the installation of the helical piles. Once the below grade work is complete, the new foundations will be backfilled and new concrete walkways, paths, stairs and patios will be reinstated in its original locations. Special attention and detail to the perimeter base will be required in order to encase or conceal the steel beams which will protrude from the base of the building. The design will look at incorporating hard and soft landscape materials as appropriate to camouflage the new structural elements of the foundation design.

The estimated project cost to rehabilitate the remaining 24 caissons and site amenities is in the range of \$6 million to \$8 million. Project costs will be further refined through the detailed design phase of the project and overall costs will include appropriate construction contingencies to deal with landfill conditions and high water table. Staff are requesting \$8 million to ensure there are enough funds to deal with site unknowns and to make sure the foundations are solid and will last another 50 years.

The project duration to perform the work is approximately 20-24 months due to the phasing required to rehabilitate one pier at a time, complexity of stabilizing the existing structure and access to all underground caissons. This timeline includes months for detailed design, permit approvals, procurement and allows for construction activities to occur in a sequential manner. The anticipated reopening of the Library is planned for late 2023 or early 2024.

Notwithstanding the space limitations at the Port Credit Memorial Arena, given all the factors, the modified service level for the Library is still the best option during the anticipated 2 year rehabilitation period.

Financial Impact

Through the 2022 capital budget process, Project PN22-272 Port Credit Library was established with a budget of \$5 million. Additional funding for this library has also been budgeted in later years in the 2022 – 2031 Capital Plan.

To fund the repair work estimated at up to \$8 million over 2022 and 2023, staff recommend advancing future tax funding and adjusting the PN 22-272 to be a multi-year tax funded project with \$3 million in 2022 and \$5 million in 2023. Any non-tax funding in PN22-272 is to be returned to the reserve fund.

Conclusion

Port Credit Library is 60 years old and requires rehabilitation of the structural foundations prior to reopening the building to the public. While a number of alternate options were considered, the most prudent and cost effective solution is to fix the structural issues such that the building can continue to operate at the same location for another 50 years.



Shari Lichterman, CPA, CMA, Commissioner of Corporate Services and Chief Financial Officer

Prepared by: Raj Sheth, P.Eng. Director – Facilities & Property Management