TORONTO

REPORT FOR INFORMATION

Supplementary Report – Award for Professional Engineering Services for Phase 5 of the Basement Flooding Protection Program

Date: March 22, 2023
To: City Council
From: Interim Chief Engineer and Executive Director, Engineering and Construction Services and General Manager, Toronto Water
Wards: All

SUMMARY

At its meeting on March 3, 2023, the General Government Committee considered a recommendation to award Request for Proposal, Ariba Document Number 3448368603, Contract Number RFP-22ECS-LU-02FP, for professional engineering services associated with program management, preliminary and detailed design, construction administration and post construction services for Phase 5 of the Basement Flooding Protection Program, to CH2M Hill Canada Limited and Stantec Consulting Limited. Comments were raised at Committee with regards to the delivery model associated with this award and ultimately the General Government Committee voted to forward the item without recommendations to the March 29 to 31, 2023 meeting of City Council.

The purpose of this report is to provide additional information on the program management approach for professional engineering services associated with management, design, construction administration and post construction services that is used by Engineering and Construction Services in delivering Phase 5 of the Basement Flooding Protection Program. This delivery model is widely used by other municipalities to deliver complex multi-year projects and enables an accelerated completion rate to reduce the risk of basement and surface flooding city-wide.

FINANCIAL IMPACT

Financial impacts are described in the February 16, 2023 report for Award of Ariba Document Number 3448368603 to CH2M Hill Canada Limited and Stantec Consulting Limited for Professional Engineering Services for Phase 5 of the Basement Flooding Protection Program presented to the General Government Committee on March 3,

2023. Toronto Water will be submitting a report seeking authorization for reallocation of project costs to align available funding with forecasted expenditures.

DECISION HISTORY

At its meetings of April 25 to 27, 2006, City Council adopted a "Work Plan for the Engineering Review Addressing Basement Flooding (City-wide)" in response to the results of major rainstorm events and significant basement flooding. The work plan focused on 31 chronic basement flooding areas in the City and established performance criteria for managing drainage due to extreme storm events. The Council decision can be viewed at:
http://www.toronto.ca/legdocs/2006/agendas/council/cc060425/wks2rpt/cl016.pdf

At its meetings of September 24, 2008 and September 21, 2011, City Council adopted criteria to prioritize, and sequence recommended Basement Flooding Protection Program projects that are identified through completed studies to protect the greatest number of properties as soon as possible, within approved budgets, as appropriate funding opportunities are available and in coordination with other capital project and population growth needs in the area. The Council adopted criteria and the corresponding staff reports can be found at:
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.EX23.16
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.PW7.6

At its meeting on October 8 to11, 2013, City Council requested the General Manager, Toronto Water, report back to Council during the 2014 budget process on the capital and operating budget impacts of expanding the Basement Flooding Protection Program on a citywide basis beyond the existing 34 priority study areas, including methodologies for setting priorities and resource implications, so that the program continues to address urban flooding risks in a fair, well-organized, and efficient manner. The Council decision can be viewed at:
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.PW25.7

At its meeting of December 16 to18, 2013, City Council expanded the Basement Flooding Protection Program across the entire City, and specifically delineated seven (7) new study areas beyond the previously identified 34 study areas to address the basement flooding impacts associated with the extreme storm event of July 8, 2013. The staff report that provides background information about expanding the Basement Flooding Protection Program can be viewed at:
http://www.toronto.ca/legdocs/mmis/2013/ex/bgrd/backgroundfile-63918.pdf

At its meeting of March 10, 2015, City Council requested that Toronto Water expedite the completion of new Basement Flooding Protection Environmental Assessment studies for the remainder of the City, specifically identified as Study Areas 42 through 67. The Council decision can be viewed at:
https://secure.toronto.ca/council/agenda-item.do?item=2015.EX3.1

At its meeting of June 18, 2019, Council granted the authority to apply for federal funding under the Disaster Mitigation and Adaptation Fund and enter into and execute any agreements, including any amendments, with the Government of Canada under the Disaster Mitigation and Adaptation Fund on terms and conditions satisfactory to the City Manager and the Chief Financial Officer and Treasurer and in a form satisfactory to the City Solicitor. The Council adopted item and the corresponding staff reports can be found at:
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.EX6.4

At its meeting of November 25 to 26, 2020, City Council adopted the amended threshold per benefitting property at the preliminary design phase, and direct that projects identified through completed Basement Flooding studies proceed to detailed design and construction, if the cost per benefitting property, as determined during the preliminary design phase, is less than the amended threshold. The Council adopted item and the corresponding staff reports can be found at:
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE17.5

At its meeting of February 15, 2023, City Council adopted the Toronto water Capital budget for 2023 to 2027. The decision can be found at:
https://secure.toronto.ca/council/report.do?meeting=2023.CC4&type=decisions

COMMENTS

Background

The City's Basement Flooding Protection Program was originally approved by Council in 2006. The purpose of this multi-year program is to reduce the risk of basement and surface flooding during extreme storm events. To achieve this, Council approved new service level standards for sanitary sewer and storm drainage systems to provide an enhanced level of service, where feasible. The targeted levels of service consist of the 100-year design storm for storm drainage systems, and the May 12, 2000 design storm (as recorded by a rain gauge at Oriole Yard in North York) for sanitary drainage systems.

At the outset of the program, the City identified 31 basement flooding study areas. Subsequently, the program was expanded to 34 study areas and, following the extreme storm event of July 8, 2013, Council, at its meeting of December 16-18, 2013, expanded the program across the entire City to sixty-seven (67) study areas. In March 2015, City Council directed Toronto Water to initiate and expedite the completion of the requisite Basement Flooding Studies for the remainder of the City, specifically identified as Study Areas 42 through 67.

Through these Basement Flooding Studies, which follow the Environmental Assessment Study process, infrastructure upgrades are identified for each study area. These are complex studies that examine the sewer system and above ground areas and prepare recommendations to reduce the risk of flooding. These studies can take two or more years to complete due to their complexity.

Following the completion of the studies, infrastructure upgrades are prioritized and scheduled, as per Council approved criteria, to protect the greatest number of properties as soon as possible within approved budgets. The prioritized upgrades are assigned to Engineering and Construction Services for delivery and this work is undertaken in coordination with other capital projects.

A key criterion in the decision to proceed with the design and construction of the recommended infrastructure upgrades, is the requirement for the capital cost of storm sewer upgrade projects to be less than or equal to $68,000 per benefitting property. Properties are considered as benefitting if they move from not meeting the targeted levels of service for drainage to meeting the targeted levels of service upon completion of infrastructure upgrades.

Projects that meet the $68,000 cost per benefitting property threshold at the completion of the Environmental Assessment Study stage are selected to move forward. Projects are prioritized and assigned by Toronto Water to the Engineering and Construction Services Basement Flooding Protection Program Unit for delivery. The first stage of delivery is the preliminary design, which is followed by detailed design, and ultimately construction.

The goal of the preliminary design stage is to ensure the physical constructability of projects and to better define project cost estimates from the Environmental Assessment Study. The design is refined at this stage, which may result in scope changes and a cost increase. Once the preliminary design is completed, the cost per benefitting property is reassessed, and projects that meet the $68,000 threshold will proceed to detailed design and construction.

Projects that do not meet the $68,000 cost per benefitting property threshold at the completion of the preliminary design stage are removed from the long-term capital plan and added to Toronto Water's deferred projects list. These projects will be prioritized for design and construction in the future on the basis of prioritizing projects that achieve the greatest impact. Projects may be sequenced for detailed design and construction as the replacement of the existing drainage systems becomes warranted due to poor structural condition.

Delivery of the Basement Flooding Protection Program through Engineering and Construction Services

Since 2009, Engineering and Construction Services has successfully employed a program management approach to support the capital project delivery for the Basement Flooding Protection Program.

Under the program management delivery model, an engineering consulting firm is retained through a competitive process to provide program management, preliminary design, detailed design, construction administration and post-construction services for a diverse set of projects through a multi-year assignment. This approach is widely used in the delivery of complex engineering projects within the City of Toronto and by Municipalities and Agencies across the Greater Toronto Area, including City of

Mississauga, City of Markham, Region of Halton, York Region, Region of Peel, Waterfront Toronto.

Program management provides a way of organizing related work into one workflow so that similar projects can be tracked and managed together. It is ideal when there are multiple deliverables with inter-related dependencies that may continue to evolve through the various phases of the program. Use of this delivery model for the Basement Flooding Protection Program increases the efficiency and reliability of delivery through the program. Additional benefits associated with a single consulting firm providing a full scope of services include:

- Eliminating the need for multiple rounds of procurement for consulting services, condensing the overall delivery timelines.
- Allowing for preliminary and detailed design stages of various projects to occur concurrently as the program proceeds, providing consultants the ability to reallocate resources to meet the dynamic needs of multiple projects.
- Providing clear accountability in design development.
- Removing the potential for ambiguity in design liability should an error or omission be encountered during construction.
- Permitting additional flexibility in design delivery, allowing additional investigations to be undertaken earlier in design where possible, improving design efficiency.
- Having the consultant that completed the design providing oversight during construction allows for increased efficiency and reduced time frames for altering components of the design in response to unforeseen conditions encountered in the field during construction

In using this delivery model, Engineering and Construction Services project managers maintain overarching program management responsibility, providing oversight and direction to the engineering consultant teams, as well as oversight and management of construction contracts, including review and authorization of contractor submittals, progress payments, and payment for any changes to base scope (change orders).

Phase 5 of the Basement Flooding Protection Program

Phase 5 of the Basement Flooding Protection Program includes improvements in multiple wards across the City with an anticipated capital construction value of $215 million over a period of 5 years. These assigned projects are included in Toronto Water's 2024-2032 Capital Plan and are scheduled to commence construction in late 2026. In order to achieve this delivery schedule, preliminary design work on the assigned projects must commence by Q2 2023.

Attachment 1 provides maps that show delivery assignment locations, costs and benefitting properties by Ward under Phase 5 of the program. Table 1 total cost and benefitting properties by Ward.

Table 1 - Environmental Assessment Estimated Costs and Number of Benefitting Properties by Ward

Ward	Name	Environmental Assessment Estimated Cost	Number of Benefitting Properties
1	Etobicoke North	$ 6,657,000	190
2	Etobicoke Centre	$31,972,000	1,023
3	Etobicoke-Lakeshore	$26,760,000	685
8	Eglinton-Lawrence	$36,794,000	1,642
12	Toronto-St. Paul's	$25,616,000	776
15	Don Valley West	$20,197,000	1,241
20	Scarborough Southwest	$17,108,000	801

The costs shown on the maps and summarized in Table are the costs for constructing the infrastructure improvements recommended in the Environmental Assessment Studies for basement flooding protection. The works to be delivered through Phase 5 of the Basement Flooding Protection Program also include roadway improvements, state-of-good-repair upgrades to sewers and watermains, and other assigned scope located in close proximity to the planned works, with a combined maximum capital cost of $215 million.

The program management delivery model will be utilized for Phase 5 of the Basement Flooding Protection Program, with two engineering consulting firms providing professional engineering services associated with program management, preliminary and detailed design, construction administration and post construction services for a distinct bundle of projects. Due to the anticipated construction value, it was decided to split the assigned projects into two bundles, with each delivered by a separate consulting firm, based on the anticipated delivery capacity. Engineering and Construction Services staff will be responsible with managing each consultant and directly overseeing all stages of the work. The total annual peak capital delivery rate of Phase 5 between both consultants is anticipated to be $50 million.

The projects delivered by the Basement Flooding Protection Program are often complex in nature and must be designed to working around the constraints of the City's existing overland drainage systems, roadway networks, as well as the underground networks of sewers, watermains, and utilities. Projects can include significant upsizing of existing sewer infrastructure, in-line and off-line storage, tunneling work, and upsizing or retrofitting of existing outfalls. This type of work requires an extensive amount of engineering design and results in complicated construction projects, which together carry higher delivery costs relative to other types of municipal infrastructure upgrades.

To deliver Phase 5 of the Basement Flooding Protection Program each consultant has assembled a dedicated team of over thirty qualified practitioners with expertise in a broad range of disciplines, including hydrotechnical modeling, civil design, tunnelling, structural design, electrical design, geotechnical engineering, construction administration, site inspection, and public consultation. In addition, during periods of intense delivery, consultants can draw from an extensive internal pool of additional resources as necessary. Consultants also bring with them external resources in the

form of sub-contractors that provide additional expertise for topographic Survey, subsurface utility engineering, cultural heritage resource management and Archaeological Surveys.

Once the detailed designs are complete, separate tenders will be issued for construction through a competitive process. It is anticipated that a minimum of five (5) construction contracts will be tendered for delivery through Phase 5 of the Basement Flooding Protection Program.

To address lessons learned through the delivery of past phases of the program, as well as other programs delivered through Engineering and Construction Services, the requirements of Phase 5 of the Basement Flooding Program consulting agreement have been expanded to incorporate the following components:

- Expanded reporting requirements to improve transparency and oversight.
- Use of Professional Services Performance Evaluations to record and evaluate consultant performance over the course of the program.
- Clearly established processes for addressing consultant design liability.
- Increased allowances for investigatory work during the engineering design phase to reduce the potential for unforeseen conditions during construction.

Phase 5 will continue to employ the use of full-time Field Ambassadors to serve as public information liaisons for all Basement Flooding construction projects. The Field Ambassadors, who are staff from the consultant team, will address resident issues and complaints, oversee notices to residents in design and construction, and liaise with local stakeholders and business as required. This model has been successfully implemented and refined through the delivery of Phase 4, and will be further refined through feedback from Councillors, Stakeholders, and the Public over the course of the Phase 5 assignment.

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SIGNATURE

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ATTACHMENTS

Attachment 1 - Maps Showing Assignment Locations, Costs and Benefitting Properties by Ward