

Amendments to Purchase Order No. 6042338 and 6042339 for Project Management and Engineering Services for the Detailed Design of the Integrated Pumping Station at the Ashbridges Bay Treatment Plant

Date: May 21, 2020

To: Toronto City Council

From: Chief Engineer and Executive Director, Engineering and Construction Services and Chief Purchasing Officer, Purchasing and Materials Management Division

Wards: 14

SUMMARY

The purpose of this report is to request authority to amend Purchase Order (PO) Number 6042338 and 6042339 with Black & Veatch Canada Company (B&V) for additional project management and professional engineering design services for the Integrated Pumping Station Project (IPS Project) at the Ashbridges Bay Treatment Plant (ABTP) in the total amount of \$12,839,917 net of all taxes and charges (\$13,065,900 net of HST recoveries). This revises the total value of the assignment awarded to B&V from \$51,237,492 to \$64,077,409 net of HST and all applicable charges (\$65,202,171 net of HST recoveries).

These amendments are required to finalize the detailed engineering design for what is now a significantly more complex design of the IPS Project, currently the City's largest and most critical wastewater infrastructure project underway.

RECOMMENDATIONS

The Chief Engineer and Executive Director of Engineering and Construction Services and the Chief Purchasing Officer recommend that:

1. City Council, in accordance with Section 71-11.1.C of the City of Toronto Municipal Code Chapter 71 (Financial Control By-Law), grant authority to amend Purchase Order No. 6042338 and amend the agreement with Black & Veatch Canada Company, for the provision of additional project management services for the Integrated Pumping Station

Project at the Ashbridges Bay Treatment Plant by an additional amount of \$3,184,920 net of all taxes and charges (\$3,240,974.59 net of HST recoveries), revising the current contract value from \$7,129,719.45 net of all taxes and charges (\$7,255,202.51 net of HST recoveries) to \$10,314,639.45 net of all taxes and charges (\$10,496,177.10 net of HST recoveries).

2. City Council in accordance with Section 71-11.1.C of the City of Toronto Municipal Code Chapter 71 (Financial Control By-Law), grant authority to amend Purchase Order No. 6042339 and amend the agreement with Black & Veatch Canada Company, for the provision of additional professional engineering services for the detailed design of the Integrated Pumping Station Project at the Ashbridges Bay Treatment Plant by increasing the value of Purchase Order No. 6042339 in the amount of \$9,654,997 net of all taxes and charges (\$9,824,924.95 net of HST recoveries), revising the current contract value from \$17,817,350.10 net of all taxes and charges (\$18,130,935.46 net of HST recoveries) to \$27,472,347.10 net of all taxes and charges (\$27,955,860.41 net of HST recoveries).

FINANCIAL IMPACT

The amendment request included in this report will increase the total contract value of the two contracts by \$12,839,917 net of all taxes and charges (\$13,065,900 net of HST recoveries).

Funding for these Purchase Order Amendments is included in the Toronto Water Approved 2020 Capital Budget and 2021-2029 Capital Plan. Funding details are summarized in Table 1 below (all values are net of HST recoveries).

Table 1. Projected Cash Flow for Purchase Order Amendment No.6042338, 6042339

RFP No. 9117-15-7122		
WBS Element: CWW040		
Year	PO 6042338: Project Management Services for the IPS at ABTP	PO 6042339: Preliminary and Detailed Design Services for the IPS at ABTP
2020	\$0	\$1,090,962
2021	\$1,777,823	\$5,421,638
2022	\$786,930	\$2,531,826
2023	\$207,402	\$780,499
2024	\$207,402	N/A
2025	\$130,709	N/A
2026	\$130,709	N/A
Total	\$3,240,975	\$9,824,925

The Chief Financial Officer and Treasurer has received this report and agrees with the financial impact information.

DECISION HISTORY

At its meeting on August 14, 2019, the Bid Award Panel granted authority to award Contract 18ECS-MI-01DC, Tender Document Number 1722208722, for the Integrated Pumping Station, Construction Contract 2 at the Ashbridges Bay Treatment Plant that involves deep excavation, tunnels and Screen Building shaft, to STRABAG Inc., in the amount of \$141,715,036 net of all applicable taxes and charges (\$144,209,221 net of HST recoveries) having submitted the lowest compliant bid and meeting the specifications in conformance with the Tender requirements. A copy of the Committee Decision Document can be found at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.BA39.5>

At its meeting on February 27, 2018, the Public Works and Infrastructure Committee granted authority to award Contract 17ECS-MI-04DC, Tender Call 221-2017, for the construction of the Coxwell Bypass Tunnel to North Constructors ULC in the amount of \$397,269,000 net of all applicable taxes and charges (\$404,260,934 net of HST recoveries), having submitted the lowest compliant bid and meeting the specifications in conformance with the Tender requirements. A copy of the Committee Decision Document can be found at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.PW27.2>

At its meeting on January 19, 2018, the Public Works & Infrastructure Committee granted authority to award Contract 17ECS-MI-03DC, Tender Call 200-2017, for the Integrated Pumping Station, Site Preparation (Construction Contract 1) at the Ashbridges Bay Treatment Plant, to Kenaidan Contracting Ltd. in the amount of \$23,470,000 net of all applicable taxes and charges (\$23,883,073 net of HST recoveries) having submitted the lowest compliant bid and meeting the specifications in conformance with the Tender requirements. A copy of the Committee Decision Document can be found at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2018.PW26.2>

At its meeting on October 5, 2015, the Public Works & Infrastructure Committee granted authority to the Executive Director, Engineering and Construction Services, to negotiate and execute agreements with B&V, being the highest scoring proponent meeting the requirements of Request for Proposal (RFP) No. 9117-15-7122, to provide professional engineering services for the Project Management, Preliminary Design and Detailed Design, Services during Construction and Post Construction Services for an Integrated Pumping Station in the amount of \$51,237,492.00 net of HST (\$52,139,271.80 net of HST recoveries) at Ashbridges Bay Treatment Plant. A copy of the Committee Decision Document can be found at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.PW8.5>

At its meeting of March 4, 2014, the Public Works & Infrastructure Committee granted authority to the Executive Director, Engineering and Construction Services, to negotiate and enter into agreements with B&V, being the highest scoring proponent meeting the requirements of RFP No. 9117-13-7210, to provide contracted professional engineering services for the Design and Construction Administration of the Wet Weather Flow System to Control Combined Sewer Overflow Discharges to the Don River and Central Waterfront, including the Coxwell Sanitary Trunk Sewer Bypass Tunnel, in the amount of \$57,018,913.00 net of HST. A copy of the Decision Document can be found at: <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2014.PW29.5>

On December 16, 2010, Bid Committee adopted staff recommendations to grant authority to award RFP No. 9117-10-7226 for the Ashbridges Bay Treatment Plant M&T Pumping Station Upgrades Project to B&V, including scope to investigate a new pumping station to replace the M&T Pumping Station, in the amount of \$13,335,299.70 net of HST. A copy of the Decision Document can be found at: <http://app.toronto.ca/tmmis/viewPublishedReport.do?function=getMinutesReport&meetingId=4388>

On January 25, 2006, Bid Committee adopted staff recommendations to grant authority to award RFP No. 9117-05-7299 to Associated Engineering Ltd., being the highest scoring proponent meeting the RFP requirements, for the provision of engineering services for Ashbridges Bay Treatment Plant M&T Pump Station Upgrades Study, in the amount of \$769,974.38 net of HST. A copy of the Decision Document can be found at: <https://www.toronto.ca/legdocs/2006/minutes/committees/bc/bc060125.pdf>

COMMENTS

1. BACKGROUND

A new Integrated Pumping Station (IPS) is required to address critical sanitary sewer infrastructure needs to service the Ashbridges Bay Treatment Plant, as well as to provide new pumping infrastructure for the wet weather flow collection and treatment systems associated with the Don River and Central Waterfront (DRCW) Project.

1.1 Ashbridges Bay Treatment Plant M and T Building Pumping Stations

The Ashbridges Bay Treatment Plant (ABTP) is the largest and oldest of the City's four wastewater treatment plants operated by Toronto Water. The plant receives raw sewage from the M and T Building Pumping Stations (located north of Lake Shore Boulevard East, immediately north of the ABTP), respectively, and by gravity from the Coxwell Sanitary Trunk Sewer. The M and T Building Pumping Stations convey approximately 70% of the inflow to the Treatment Plant. Combined, the total influent sewage flows to the plant service an estimated population of 1,603,700 residents.

The M Building Pumping Station was constructed in 1911 and the T Building Pumping Station was constructed in 1970. In 2009, a condition assessment study of the pumping stations was undertaken and concluded that both the M and T Building Pumping

Stations are approaching the end of their service life and are in need of significant upgrades.

In 2010, the City retained B&V to undertake the preliminary engineering design for the upgrades identified in the condition assessment. B&V established design criteria, conducted detailed multi-disciplinary engineering condition assessments of all site infrastructure and identified significant risks and costs associated with proceeding with the identified refurbishments and upgrades. Most importantly, the City and B&V concluded that the M and T Building Pumping Stations could not reliably be kept operational during construction, and the proposed upgrades could not resolve systemic operational challenges and issues of long-term reliability. As a result, the project was paused in order to assess other options related to the long term fate of the M and T Building Pumping Stations.

1.2 Wet Weather Flows

In 2008, the Don River and Central Waterfront Trunk Sewers and Combined Sewer Overflow (CSO) Control Strategy Municipal Class Environmental Assessment (also referred to as the DRCW Project) was initiated to provide a comprehensive, systems integration approach to address the dry weather servicing and wet weather flow issues associated with combined sewer overflow discharges to the Don River and Inner Harbour. This project was identified as the most significant water quality improvement project within the City's Wet Weather Flow Master Plan, with the ultimate goal of improving water quality conditions and ecosystem health in the Don River and Central Waterfront area; and thereby advancing the delisting of Toronto as an International Joint Commission (IJC) designated Area of Concern in the Great Lakes Basin.

In 2012, the DRCW Municipal Class Environmental Assessment (EA) recommended construction of a new wet weather flow collection and storage system (DRCW System) which would intercept CSO discharges from 50 outfalls, representing most of the remaining CSOs in the City. The preferred alternative includes an estimated 570,000 cubic metre storage system connected to a new wet weather flow (WWF) pumping station with a capacity of 600 MLD (i.e., equivalent to servicing the sewage flows for a population of 2.7 million residents) located within the Ashbridges Bay Treatment Plant property. The flows from the pumping station would be pumped to a dedicated high-rate treatment facility, including disinfection, prior to discharge to Lake Ontario.

1.3 New Integrated Pumping Station

B&V examined numerous integrated solutions that combined the proposed M and T Building Pumping Station upgrades with construction of the new WWF Pumping Station identified by the DRCW EA. Given the risks associated with the originally proposed M & T Building Pumping station Upgrades and the need to construct a new WWF Pumping Station, the City engaged B&V to undertake a Schedule B Class Environmental Assessment to identify a preferred solution to meet both the dry and wet weather flow needs at the ABTP. The Class EA, completed in 2013, concluded that the preferred alternative was the construction of a single Integrated Pumping Station (IPS) south of Lake Shore Boulevard East within the ABTP property. The IPS will resolve the risks

associated with trying to refurbish and upgrade M & T Building Pumping Stations while maintaining full time operations of the ABTP, resolve a number of systemic M & T Building operational and technical issues that the refurbishment would not resolve, and provide the pumping infrastructure needed for the DRCW system. An added benefit of this solution is that once the IPS is commissioned and in full operation, the City could decommission the existing M & T Building infrastructure and free up added lands for the Tubs & Gee Gage Park north of Lake Shore Boulevard East.

The IPS is now the City's largest wastewater infrastructure project underway, and will be one of the largest wastewater pumping stations in the world, with limited comparable installations on a global scale for reference. The scope and scale of the IPS will make it one of Toronto Water's most critical infrastructures that must be both highly reliable, have multiple levels of redundancy and must be designed to accommodate highly variable flow regimes. The IPS is the most downstream point in the ABTP sanitary sewershed and will be responsible for directing all influent flows to the ABTP and from the wet weather flows captured within the DRCW Project to the dedicated high rate treatment facility. Failure of the pumping station would result in widespread discharge of raw sewage to the Don River and Lake Ontario as well as surface and basement flooding. Further, the design and construction staging of the IPS to ensure that the current pumping stations and the ABTP remain fully operational during construction and compliant with regulatory requirements is paramount.

1.4 Components of the Original Contract for Engineering Services

When Request for Proposal (RFP) No. 9117-15-7122, for the provision of professional engineering services for the project management, preliminary design and detailed design, contract administration services during construction and post construction services for an Integrated Pumping Station, was written in 2014, the scope and scale of the design requirements was based on the 2013 EA preliminary concept.

The objective was to provide an operationally robust, reliable solution that integrates the functionality of the existing M and T Building Pumping Stations and provides the wet weather flow pumping requirements for the DRCW Project. The City planned the construction of the Project in three stages which include three separate construction tenders as follows:

- Construction Contract 1 (CC1) for site preparation including site clearing, conduit isolation work, and re-routing of existing electrical cabling and ducting;
- Construction Contract 2 (CC2) for demolition of the ABTP water tower, tunnelling and civil site works for deep excavations including the Mid-Toronto Interceptor (MTI), Low Level Interceptor (LLI) tunnel, the Screen Building shaft, and the IPS Pump House shaft with concrete structural works to grade; and
- Construction Contract 3 (CC3) for general construction of the complex IPS buildout including structural, process, mechanical, electrical, and instrumentation and control; and the final commissioning of the new facility.

Construction of preliminary concept described in the RFP was estimated at \$352 million. The contract for all professional engineering services, as referenced above, was valued at an estimated \$51.2 million (net of HST). The upfront professional engineering

services for project management, preliminary design and detailed design represented approximately 7.1% of the construction costs at the time, and was reflective of market rates for this type of project.

2. PROJECT EVOLUTION

The original design concept for the IPS on which the RFP for professional engineering services was based, could not have envisaged the complexity of issues which had to be addressed through the preliminary engineering design process.

For example, the project design was constrained by the limited site footprint area available within the ABTP property, by existing large sewage influent conduits and significant buried infrastructure; and the challenges of incorporating design constraints imposed by other projects which at the time were in their early design phases. Further, given the criticality of this project, it was important to expend extra time and effort upfront to properly address issues as they arose through the development of the preliminary engineering design. Effort spent upfront will lead to a more efficient detailed design, and if operational issues are properly considered and addressed upfront, will diminish operational risks and lead to a more efficient long term operation of the facility.

Throughout the preliminary design, the scope and growing complexity of the project, including the challenge of maintaining uninterrupted operations during construction, necessitated extensive peer review involving internationally recognized hydraulic, mechanical and civil engineering experts to review and provide input on functional and design aspects, detailed hydraulic modelling, and extensive design workshops with Toronto Water and Engineering and Construction Services staff to address various unique design challenges.

Through this extensive preliminary design work, several improvements were made to the original design concept which included:

- Structural and mechanical design changes driven by the physical hydraulic modelling;
- Functional improvements to the connecting sewers and improved construction sequencing to reduce impact on operations and construction risk;
- Increase in sizing of pumps, motors and drivers to provide maximum flexibility for highly varied flow conditions;
- More robust screen and HVAC equipment given the physical sizing of the facility;
- Modifications to the existing on-site electrical facilities and distribution infrastructure including a new medium voltage electrical power distribution system which benefits the IPS operation, while supporting the ABTP site wide distribution;
- A more robust building for a new 16 MW site standby power generation facility; and
- An upgraded IPS Screen Building sub-structure to reduce the construction risk, facilitate maintenance, and provide more flexible hydraulic operation and sediment clearance under the full range of flows.

Further, while this preliminary design process was underway, the detailed design for other connected projects were also progressing, and their outcomes also influenced

design aspects of the IPS. The most significant project impacting the IPS is the DRCW Project's Coxwell Bypass Tunnel. The design impacts are summarized below.

2.1 Don River & Central Waterfront Project Requirements

Subsequent to the start of the preliminary design for the IPS, there were fundamental changes made to the original design concept for the DRCW Coxwell Bypass Tunnel (WWF tunnel). Given that this Tunnel connects to the IPS, a number of significant design changes were required on the IPS Project which included:

- Increased diameter and depth of the IPS Screen Building WWF shaft to compensate for changes in the WWF tunnel diameter;
- Increase in sizing of pumps, motors and drivers to provide maximum flexibility for highly varied wet weather flow conditions; and
- A new Coxwell Bypass Tunnel emergency overflow to Lake Ontario, established through the hydraulic modelling referenced above, to eliminate flooding of upstream basements as well as the ABTP property in the event of blockages or loss of power from the backup power system.

2.2 HLI Sewer Rehabilitation Project Requirements

The High Level Interceptor (HLI) Trunk Sanitary Sewer, which runs along the south side of Queen Street, serving the downtown and waterfront areas, conveys sewage flows to the T Building Pumping Station. However, the flows will be diverted directly to the new IPS through a new HLI Flow Diversion Chamber – which will be constructed through the IPS Project. However, a separate engineering design assignment was underway for the HLI Sewer Rehabilitation Project, and when the IPS preliminary design was at 70% completion, the City requested B&V to modify the chamber design to accommodate the design requirements for the HLI Sewer Rehabilitation Project. While this results in an increase in engineering design costs for the IPS, this additional cost is offset by not having to construct a second redundant chamber under the HLI Sewer Rehabilitation Project.

2.3 Project Status

As referenced above, the IPS Project consists of three phases:

- Construction Contract 1 (CC1) for site preparation including site clearing, conduit isolation work, and re-routing of existing electrical cabling and ducting;
- Construction Contract 2 (CC2) for demolition of the ABTP water tower, tunnelling and civil site works for deep excavations including the Mid-Toronto Interceptor (MTI), Low Level Interceptor (LLI) tunnel, the Screen Building shaft, and the IPS Pump House shaft with concrete structural works to grade; and
- Construction Contract 3 (CC3) for general construction of the complex IPS buildout including structural, process, mechanical, electrical, and instrumentation and control; and the final commissioning of the new facility.

The preliminary design work, now complete, was far more extensive in scope, scale and level of effort required than what was contemplated in 2014, through the original professional services RFP. By way of reference, the cost of the IPS based on the

original design concept was an estimated \$352 million, which has now increased to an estimated \$635 million based on a far more complex design required to address the factors and design issues referenced above.

The detailed designs for CC1 and CC2 have been completed and the CC1 construction has been completed, and CC2 construction is well underway and is expected to be completed in 2022.

The preliminary design work for CC3 is now complete and the detailed design has advanced. However, a Purchase Order Amendment of \$12,839,917, net of all taxes and charges (\$13,065,900 net of HST recoveries) is required for additional project management and detailed engineering design services, for the increased time and effort required to complete this complex design, by Q2 2022. Construction is expected to commence in Q4 of 2022, extending to Q4 2030, such that the IPS can be fully operational by 2031 to accommodate the servicing of the DRCW System, integral to the success of the City's Wet Weather Flow Master Plan.

With approval of the proposed Purchase Order Amendment, the professional engineering services fee for the project management, preliminary design and detailed design, represents approximately 6.0% of the updated capital cost of the IPS, which is within industry standards. The City reviewed B&V's estimates for the additional professional services required for completion of the Integrated Pumping Station Project, as described above, and found them to be fair and reasonable given the scale and complexity of the Project.

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SIGNATURE

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