

**Amendment of Purchase Orders 47010691  
and 47005370 for Refurbishing of  
Digesters 1 to 8  
Ashbridges Bay Treatment Plant**

<b>Date:</b>	October 19, 2009
<b>To:</b>	Public Works and Infrastructure Committee
<b>From:</b>	Executive Director, Technical Services Director, Purchasing and Materials Management Division
<b>Wards:</b>	Ward 32 – Beaches-East York
<b>Reference Number:</b>	P:\2009\Cluster B\Tec\ PW0938.doc

**SUMMARY**

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The purpose of this report is to request the authority to amend Purchase Orders 47010691 and 47005370 for the construction and engineering services related to the refurbishment of Digesters 1 to 8 at the Ashbridges Bay Treatment Plant. The total amount being requested is \$5,037,031.70 net of GST. The contract completion dates will be extended to June, 2011.

The additional amount being requested for PO 47010691 is \$4,047,031.70 net of GST, revising the current contract value of \$46,752,573.98 to \$50,799,605.68 net of GST.

The additional amount being requested for PO 47003570 is \$990,000.00 net of GST, revising the current contract value of \$3,210,511.22 to \$4,200,511.22 net of GST.

**RECOMMENDATIONS**

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The Executive Director of Technical Services and the Director of Purchasing and Materials Management Division recommend that Public Work and Infrastructure Committee grant authority to:

1. Amend Purchase Order 47010691 for the refurbishment of Digesters 1 to 8 at the Ashbridges Bay Treatment Plant with Bondfield Construction Company Ltd. by an additional amount of \$4,047,031.70 net of GST, revising the current contract value from \$46,752,573.98 to \$50,799,605.68 net of GST.

2. Amend Purchase Order 47005370 for the administration and site services during construction of Digesters 1 to 8 at the Ashbridges Bay Treatment Plant with CH2M Hill Canada Limited by an additional amount of \$990,000.00 net of GST, revising the current contract value from \$3,210,511.22 to \$4,200,511.22 net of GST.

## FINANCIAL IMPACT

The amendment for an additional \$4,047,031.70 net of GST increases the current contract value with Bondfield Construction Company Ltd. from \$46,752,573.98 to \$50,799,605.68 net of GST. The amendment for an additional \$990,000.00 net of GST increases the current contract value with CH2M Hill Canada Ltd. from \$3,210,511.22 to \$4,200,511.22 net of GST. Funding is available in the 2009 Toronto Water Capital Budget in account CWW005-95 (ABTP Digesters 1-8 Refurbishment). Funding details are provided below.

Account	2009	2010	2011	Total
CWW005-95 (ABTP Digesters 1-8 Refurbishment)	\$1,587,031.70	\$1,950,000.00	\$1,500,000.00	\$5,037,031.70

The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact information.

## BACKGROUND

Contract 04FS-48WP, Tender Call 295-2004 for the refurbishment of Digesters 1 to 8 at the Ashbridges Bay Treatment Plant (ABTP) was awarded to Bondfield Construction Company Ltd. (Bondfield) by Council on June 14-16, 2005 by adoption of Works Committee Report No. 6, Clause 9 (<http://www.toronto.ca/legdocs/2005/agendas/council/cc0050614/wks6rpt/cl009/pdf>).

The refurbishment of the Digesters 1-8 is required to make the digestion tanks structurally sound, to bring them up to Building Code standards and to improve the efficiency and performance of the digesters. Purchase Order 47010691 in the amount of \$42,277,570.09 net of GST, was issued to Bondfield for the construction.

The Purchase Order 47010691 was amended by an additional \$4,475,003.89 net of GST on March 28, 2008, with the authorization of Council on March 3-5, 2008, Item PW13.10, (<http://www.toronto.ca/legdocs/mmis/2008/pw/reports/2008-02-08-pw13-cr.pdf>) for an amended total value of \$46,752,573.98 net of GST.

RFP 9117-00-7342 was awarded to CH2M Hill Canada Limited (CH2M) by Council on April 30-May 2, 2001 by adoption of Works Committee Report No. 4, Clause No. 13. Purchase Order 47003570 in the amount of \$2,742,624.30 net of GST was issued to CH2M. The Purchase Order was subsequently amended for an additional \$467,886.92 net of GST with the authorization of Council on July 30-August 1, 2002, Works Committee Report No. 9, Clause No. 7, (<http://www.toronto.ca/legdocs/2001/agendas/council/cc010424/pof4rfp/c1013.pdf>) for an amended total value of \$3,210,522.22 net of GST. The amendment was for additional work related to the approved scope change to convert the secondary digesters to primary digesters.

## COMMENTS

The construction commenced in September 2005. The project was divided into three phases of work. Phase 1A, which has been completed, was for the conversion of two existing decant tanks to equalization tanks in order to retain the regulated 15 days solids retention time in the digestion process, thus allowing for the continued ability to dispose of biosolids using land application methods throughout the construction contract. Phase 1B, now completed, was the refurbishment of Digesters 1 to 4, including an upgrade from secondary digesters to primary digesters. Phase 2, which started in June 2009, is the refurbishment of Digesters 5 to 8. Phase 2 is expected to be completed early in 2011. During the refurbishment of the Digesters 1-8 project, additional work has been identified as being required that was not in the original scope of the contract and cannot be accommodated within the awarded contract value.

This amendment is required for this additional work under Phase 2 which comprises the following: a) Digesters 5 to 8 electrical cabling, b) ABTP PT1-9 Substation transformer fire impacts, c) contract changes due to removal of Digesters 9-12 from the work, d) health and safety related work, e) work related to operational constraints and site configuration, and other costs. The following summarizes these major additional work items:

### a) Digesters 5 to 8 Electrical Cabling

The contract includes removal of existing electrical wiring, cable and conduit that terminates within the Digesters 5-8 facilities as part of the refurbishment project. However, a large amount of cables and wiring passes through the Digesters 5-8 facilities for other equipment and services at ABTP, from power cables to the pumping stations and primary treatment, to communication network cables, and even wiring for security cameras and systems. It was intended to have the City assess and deal with additional wiring found in Digesters 5-8 that was not part of the refurbishment, as was done for Digesters 1-4, but ABTP staff did not have the resources available to carry out the more extensive work discovered for the extent of the existing wiring that is routed through Digesters 5-8. The contractor was requested to undertake the wiring identification and tagging, and subsequently the removal of redundant wiring, to enable relocation of existing plant wiring that must remain in service during demolition of Digesters 5-8. During demolition, all existing digester sludge mixing, pumping and heating equipment including associated wiring, alarms and controls will be removed, including cable tray and hangers. Other wiring passing through Digesters 5-8 cannot remain due to the lack of cable support structures, and due to the requirement to clear out areas for structural changes to be made and for placement of the new equipment that will be installed as part of the refurbishment. As the cables for the other equipment cannot remain in their current locations during the demolition phase, but the equipment must continue to function, the cables must be re-routed, with outages timed and scheduled with ABTP plant staff for disconnection and reconnection. The re-routing of the cables needs to be conducted on a case-by-case basis with the new routing approved by plant staff, and the work must be completed in order for demolition to proceed. The contractor has to maintain the electrical integrity and reliability of the wiring and meet ESA requirements. Depending upon the length of the existing cable and the length required for the new cable route, the cables can either be re-used, with a temporary new cable installed while the old one is moved to the new location, or the addition of junction boxes, terminal strips and new sections of cable will be required. The amount of splicing that will be ESA approved is limited, so some cables

are found to require total replacement rather than relocation of existing. ABTP does not have the staff required to relocate the wiring, and a separate contractor cannot be hired to do the work due to the project's Constructor status. If this work is not completed on time, significant delay costs will be incurred by the project. The estimated cost of the cable identification, removal and relocation work is \$913,710.84 net of GST.

b) ABTP PT 1-9 Substation Transformer Fire

A fire occurred August 13, 2009 in an existing 20 year old switchgear and transformer at the PT1-9 substation. This equipment is not part of the contractor's work, but it provides power to the Digesters 1-8 project. The contractor, Bondfield, rented diesel generators to provide temporary power in order to continue construction activities. As full restoration of power could not be provided by ABTP due to the destruction of one transformer and switchgear, the installation and reconnection of temporary power cables from an alternate source at ABTP was required to provide sufficient ongoing power to the construction project. Repairs to the new cables that were installed for Digesters 1-8 connecting to the substation are required to ensure the security of the remaining power being supplied by PT1-9. Cables for Digesters 1 to 4 are functional and in use; the cables for 5 to 8 need to be tested prior to future use. The outer cable insulation was damaged, and if the re-sleeving repairs are not carried out, the contractor will not provide a warranty for the cables in their existing condition due to the lack of full insulation. The total value of this work is estimated at \$305,000.00, net of GST. The work is being tracked for costs as part of the intended insurance claim to be filed by the City (ABTP Operations) and it is anticipated that the City will recover the costs related to the transformer fire.

c) Changes due to Removal of Digesters 9-12 from the contract

The base scope of the contract originally included the refurbishment of Digesters 1 to 12. During Tendering, Addendum 12 was issued to remove Digesters 9-12 from the contract as the General Contractors bidding on the project could not secure the necessary bonding for the entire contract duration anticipated to be 7 years which was required for all proposed contract work. In general, the Surety industry is currently not providing more than 5 years for bonding of construction projects.

The original design for refurbishment of Digesters 1-12 included new drip traps and pressure transmitters for the gas collection headers, and the removal of the obsolete, 50-year-old, not-to-code, gas control building. Digesters 9-12 were removed from the contract via Addendum 12, but demolition of the gas control building was not deleted from the contract. During construction, it was realized that the drip trap and piping for Digesters 9-12 gas collection go through the old gas control building and needed to be replaced and relocated before the old gas control building could be demolished, inclusive of a new pressure transmitter (PIT) to replace the existing obsolete PIT located in the old gas control building. The total cost for this work is estimated at a value of \$90,000.00 net of GST.

d) Health and Safety Related Work

Some changes to the contract are required to meet Health and Safety requirements.

Eyewash stations are required and portable self-contained eyewashes were included in the contract as agreed during the design. ABTP has requested that permanent eyewash stations connected to the City water system be installed to ensure a secure supply of clean water can be maintained, as per the City's revised "Eye and Face Protection / Eyewash Stations Safe Work Procedures, SWP0024.09, May 2009". The cost of providing permanent eyewash stations is estimated at \$100,000.00 net of GST.

Modifications to the ventilation for the Digesters 1-8 sampling sinks are required to meet the current B105 Gas Code as discussed with the Technical Standards and Safety Authority (TSSA). An interlock between the sampling sink access door and the ventilation fan will be installed to automatically turn on the fan when the door is opened, to eliminate the risk of an operator forgetting to turn on the fan. An airflow switch will alarm if the fan does not turn on. TSSA will not approve the installation if the airflow switch is not installed. The estimated cost of these modifications is \$72,732.97 net of GST.

The liquid relief and gas relief port lids on the roofs of Digesters 1 to 4 required modification and re-testing to prevent leakage of digester gas. Leakage of digester gas would result in potential Health and Safety issues for the plant operators, and would also constitute a spill under Ministry of the Environment regulations. As the original design of the relief ports for Digesters 5-8 is the same as the original design for Digesters 1-4, it is expected that the same modifications and individual testing for each digester will be required. This additional cost is estimated to be \$60,000.00 net of GST.

Recent changes in ABTP site Health and Safety orientation frequency to an annual orientation as mandated by the plant required the re-orientation of all contractor staff. This requirement was not in the original contract and costs have been incurred by the contractor for all construction staff to take a 3 hour course in order to be allowed re-entry to the plant. Toronto Water Environmental Health and Safety (EHS) Section has deemed this orientation frequency as a new requirement for all contractors now working at this site. The estimated cost of annual re-orientation for this contract is \$100,000.00 net of GST.

During the plant staff walk-through after the Pre-Start Health and Safety Review and prior to commissioning of Digesters 1-4, plant operations expressed concern over inadequate lighting on the roof and requested that it be addressed as a Health and Safety item. Roof access is required during all operational shifts as part of routine process system monitoring for due diligence. Lighting on the digester roofs is required to be an explosion proof installation. The estimated cost of installing lighting on the roofs of Digesters 1-8 is \$200,000.00 net of GST.

During the same Digesters 1-4 walk-through for Health and Safety, it was identified that pump hoists would be required to lift the hot water recirculating pumps, and the sludge pumps in the basement for full maintenance access. The estimated cost to provide pump hoists is \$55,000.00 net of GST.

Paint removal in the basement of digesters 5-8 is required prior to demolition work such as removal of piping and ductwork. Paint sample tests were done for lead; wall areas sampled did not contain lead, but handrail paint sampled did contain lead. Due to the flaking layers of paint and presence of lead in some samples, removal of the paint is advisable to ensure protection of

the workers in accordance with MOL regulations from the designated substance, lead, which is a health hazard. The estimated cost for paint removal is \$30,000.00 net of GST.

e) Work Related to Operational Constraints and Site Configuration

The contract required a connection into ABTP's existing plant water main. The plant was unable to isolate the necessary pipe due to leaking valves, without a major system shutdown, which was not possible due to operational requirements for plant water elsewhere in the plant. The contractor was therefore instructed to proceed with a hot tap connection procedure to prevent plant shutdown. The estimated cost of the hot tap connection is \$10,587.89 net of GST.

Existing steel grating supports in the basement of Digesters 5-8 were found to be rusted out and required replacement for structural integrity to enable personnel access to the area. The basement walls of digesters 5-8 were found to require additional concrete and reinforcing for structural integrity. These walls will remain in place to support the new digester roofs and top wall sections that will be provided in the refurbishment contract. The refurbishment project requires cutting of openings in the walls to accommodate installation of the new equipment. The wall sections adjacent to the planned new openings could not be fully inspected until the digesters were decommissioned. The wall reinforcement work must be done concurrent with the wall opening cutting process part of the demolition. The wall opening cutting requires dust containment structures for worker health and safety and for equipment protection, and is planned to be done before further work can proceed. This is a work scheduling issue and deferment of the cutting and structural reinforcement would result in project delay and associated costs. The estimated cost of this structural work is \$110,000.00 net of GST.

During commissioning of Digesters 1 to 4, it was found that valves would be required on the Treated Waste Activated Sludge (TWAS) line connections to maintain separation of the TWAS from the raw sewage and prevent the TWAS from entering the raw sewage header, to prevent cross-contamination and ensure process operation consistency. The estimated cost of installing these valves is \$40,000.00 net of GST.

Concrete and crack repairs to existing structures were required in Phase 1B for Digesters 1 to 4, and it is expected that similar repairs will be required for Digesters 5 to 8. The estimated value of this work is \$100,000.00 net of GST.

Existing electrical cable located in D Tunnel was unexpectedly found to have deteriorated and requires repair, at an estimated cost of \$10,000.00 net of GST

The existing overflow chambers at Digesters 5 to 8 are open to atmosphere. There is a concern that during freezing weather, sludge in the pipes connecting to the overflow chambers could freeze. If this occurred and there was a subsequent process overflow, with the overflow piping blocked, the sludge would force open the pressure relief valves and spill on to the roof resulting in a contamination spill requiring clean-up. The estimated cost of providing insulated overflow chamber covers is \$30,000.00 net of GST.

The existing roof drain downspouts on Digesters 1-4, located between the digester walls and the outer brick covering, have been found to be leaking at the bottom inside the existing brick wall

and some deterioration of the brick is occurring. If this is not corrected, the brick will continue to deteriorate and major repairs including brick replacement will be required. The repairs to the roof drain downspouts are estimated to cost \$50,000.00 net of GST.

f) Other Costs

Phase 1B work on Digesters 1 to 4 encountered a number of delays, with the most significant delay due to a stop work in the contract when dewatering the Digesters. The contract included dewatering of the digesters and allowed the drained liquid and sludge to be pumped to the headworks of the plant. Due to a number of operational constraints experienced by ABTP, the additional influent stream of the dewatering from the Digester 1 could not be accommodated in the process stream, as this was compounding the impacts the plant was experiencing on effluent water quality and the numerous complaints that were being received from the public due to odour issues. Accordingly, in discussion with Toronto Water, the contractor was requested to stop their process, and the City arranged for a mobile centrifuge to be brought to site, before work could resume. In addition to the extended dewatering period, delays were experienced due to TSSA inspection delays, additional unexpected work, liquid and gas relief valve testing, and an extended digester filling and process seeding period prior to the final Digesters 1 to 4 performance test.

It is anticipated that there will be delay claims for Phase 2 for Digesters 5 to 8. Claims have already been submitted for the impacts resulting from the 6 week City strike, and further claims are anticipated to be submitted for the impact of rescheduling the digester roof work to the winter period.

As Phase 2 has just started it is probable that there will be some additional work required due to unexpected site conditions that may be found during construction. An additional contingency of \$300,000.00 net of GST is therefore requested.

Due to the critical nature of the work activities noted in this report, it was essential to authorize the contractor to proceed with some of the work items in order to continue construction activities and mitigate the risk to the City of further delay claims. A total of \$1,600,000.00 of the work has been authorized for Bondfield to address a) Digesters 5-8 electrical cabling, b) ABTP PT 1-9 Transformer fire impacts, requirements for Digesters 1-4 under d) Health and Safety related work, and the initial structural work for Digesters 5-8 basement area under e) Work related to Operational Constraints and Site Configuration. Failure to proceed on these items while awaiting PWIC approval would have further delayed the contract, exposing the City to significantly greater costs.

Based on the above additional construction activities which are necessary for the effective completion of the ABTP Digesters 1-8 Refurbishment project, it is recommended that P.O. 47010691 to Bondfield Construction Company Ltd. be amended by an additional amount of \$4,047,031.70 net of GST, including allocations of funds for potential claims noted in the report. This amendment revises the current contract value with Bondfield Construction Company Ltd. from \$46,752,573.98 to \$50,799,605.68 net of GST.

The timeline identified in CH2M's contract for carrying out the construction site engineering services was 54 months. A weekly rate of \$10,195.00 net of GST has been negotiated as an escalated rate to account for the 3 year extension of time from the original anticipated construction completion date at the time of RFP award in 2001. The Digesters 1-8 refurbishment project will exceed 54 months of work in February 2010. The contractor's current schedule indicates project completion in March 2011. The estimated expenditure at a weekly rate of \$10,195.00 net of GST for the additional 13 months is \$570,920.00 net of GST. An additional 12 weeks at \$10,195.00 net of GST per week for a cost of \$122,340.00 net of GST is requested, in the event of project delays that extend the project completion date. The estimated value of additional consultant site engineering work to support additional unexpected work added to the Bondfield construction contract is \$296,740.00 net of GST, for a total amendment value of \$990,000.00 net of GST. This amendment revises the current contract value with CH2M Hill Canada Limited from \$3,210,511.22 to \$4,200,511.22 net of GST.

The above work activities will be performed as required with approval from the Executive Director, Technical Services, or designated representative, in accordance with delegated signing authority.

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## **SIGNATURE**

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