



**STAFF REPORT
ACTION REQUIRED**

**Purchase Order Amendment
Residue Management Facility
R. L. Clark Water Treatment Plant
Amendments to Orders 47010994 and 47008795**

Date:	April 14, 2008
To:	Public Works and Infrastructure Committee
From:	Executive Director, Technical Services Director, Purchasing and Materials Management Division
Wards:	Etobicoke – Lakeshore (Ward 6)
Reference Number:	P:\2008\Internal Services\pmmd\pw08006pmmd (AFS 5204)

SUMMARY

The purpose of this report is to advise on the request to amend Contract Nos. 47010994 and 47008795 for the construction and engineering services related to the Residue Management Facility at the R. L. Clark Water Treatment Plant.

RECOMMENDATIONS

The Executive Director of Technical Services and the Director of Purchasing and Materials Managements Division recommend that:

1. Funds in the amount of \$850,000.00 net of GST be reallocated in 2009 to CPW028-03 Residue Management Facilities Construction from CPW039-02 Business & Technical Improvements, as outlined below in the Financial Impact Statement. Funding is included in the approved 2008 Toronto Water Capital Budget and 2009-2012 Capital Plan.
2. Subject to approval of Recommendation No. 1, authority be granted to amend Purchase Order 47010994 for the construction of the Residue Management Facility at the R.L. Clark Water Treatment Plant with Bondfield Construction Company Ltd. by an additional amount of \$1,650,000.00 net of GST revising the current contract value from \$33,767,570.09 to \$35,417,570.09 net of GST.

3. Subject to approval of Recommendation No. 1, authority be granted to increase the Purchase Order No. 47008795 for contracted professional engineering services with Genivar Ontario Inc (formally known as MacViro Consultants) for the provision of general office administration and site supervision services during construction by an additional amount of \$170,321.10 net of GST, revising the current value from \$1,677,428.20 to \$1,847,749.30 net of GST.

FINANCIAL IMPACT

The total potential contract amendment identified in this report is \$1,911,337.16 including all applicable taxes and charges. The potential cost to the City is \$1,820,321.10 net of GST. Funding is available in the 2008 Toronto Water Capital Budget and 2009-2012 Capital Plan in WBS Element (CPW028) Clark Residue Management Facility, however at this time, the uncommitted cash flow is insufficient and additional cash flow authority is required to meet these commitments. The amendments require additional cash flow in the amount of \$850,000.00 net of GST. The cash flow requirements are outlined in the table below. The adjustments reflect 2009 Council approved future year commitments.

The additional cash flow and project cost (all net of GST) is to be reallocated from approved 2009 Capital Plan (with net impact of \$0) as follows:

Account	2008	2009
CPW028 Clark Residue Management Facility (current funds)	\$670,321.00	\$300,000.00
CPW039-02 Business & Technical Improvements	-	\$850,000.00
Total – CPW028 (including reallocation)	\$670,321.00	\$1,150,000.00

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

BACKGROUND

Contract 05FS-46WS, Tender Call 53-2005 for the construction of the Residue Management Facility at the R.L. Clark Water Treatment Plant was awarded to Bondfield Construction Company Ltd. by Council at their meetings on June 14, 15, and 16, 2005, by adoption of Works Committee Report No. 6, Clause 16. The Residue Management Facility (RMF) is required to treat the dilute waste stream (residue) from the water purification process containing the particulate to be removed from lake water, and the chemicals used to facilitate their removal. Purchase Order 47010994 in the amount of \$33,267,570.09 net of GST, was issued to Bondfield Construction Company Ltd. for the construction of Contract 05FS-46WS.

COMMENTS

The construction of Contract 05FS-46WS commenced July 21, 2005 and construction is now approximately 85% complete and the project is anticipated to be completed September 2008. During the construction of the Residue Management Facility (RMF), 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. The Purchase Order for the RMF was initially amended in August 2007 for an amount of \$500,000.00 in accordance with the Financial Control Bylaw for additional work items, which included modifications to the existing sewers and sanitary pumping station for improved operational flexibility for future expansion, and additional plant access security measures to meet recent changes to security standards.

The following summarizes the major additional work items comprising the current amendment:

1. Additional Dewatering Pumping Requirements

The contract work included for the refurbishment of the concrete wall and ceilings of three existing sedimentation tanks, and installation of new chain and flight sludge collection equipment in the refurbished sedimentation tanks.

During construction, the flows experienced in the existing sedimentation tanks were approximately double the anticipated flows which required additional effort, over a period of eighty weeks, to dewater and maintain dry conditions necessary for the concrete repair work and the installation of the sludge collection equipment. As a result, Bondfield provided additional pumping equipment and additional labour forces that was not originally contemplated in their tender.

The cost for the above additional work is estimated at this time to be in the amount of \$250,000.00 net of GST

2. Improved Access to Sedimentation Tanks

The contract included for three 1.22 m diameter circular submerged watertight manway accesses for ingress and egress to the three existing in-ground sedimentation tanks for maintenance of the in-tank equipment.

During construction, a proactive, cost effective approach was taken in improving the manway accesses, prior to their manufacture, due to pending changes anticipated in confined space requirements with respect to the Occupational Health and Safety Act O. Reg. 851. As a result, the existing manways were reconfigured and upgraded to larger rectangular watertight submarine doors. These larger doors allow for improved access to the tanks and allow for improved ability to move the

necessary safety equipment required for confined space entry during maintenance work.

The cost for the additional work to provide 3 larger watertight doors openings, in lieu of the three circular manway accesses to the existing sedimentation tanks is \$200,000.00 net of GST.

3. Additional Plate Settlers

The construction contract included for the supply and installation of 40 new gravity plate settler units in Clarification Tanks Nos. 1 and 2 as part of the base scope of work for this contract with a provisional item in the Schedule of Prices for the supply and installation of 8 additional plate settler units.

The gravity plate settler units consist of a series of inclined plates designed to settle the particulates in the residue waste stream. The gravity plate settler units are installed in the existing clarification tanks and are large, custom designed and fabricated equipment, measuring 8 m x 2.7 m x 0.750 m in size, and weighing 1130 kg each.

Following the fabrication and delivery of the 40 gravity plate settler units as required in the base scope of the contract, it was determined at that time, that the existing isolation gates were leaking excessively and leakage rates were approximately twice the anticipated amount. These unanticipated high leakage rates could jeopardize the performance of the clarification system. Further investigation indicated that isolation gates and associated sealing system were aged and deteriorated and the repair of the existing gates may not provide adequate or reliable performance which could impact the process performance of the clarification system.

To ensure long term leak tightness of these gates, it was determined that the existing gates should be replaced with new gates. However, due to the long delivery time (more than six months) required for the fabrication and delivery of new custom ordered isolation gates and as it was realized that replacement of these gates would impact the production of the treated water, this work could only be carried out during the low water demand periods (i.e. between October and April). Recognizing that the additional work and scheduling to replace these gates would impact the critical path of the RMF contract, it was decided to replace these gates in a future assignment as to not delay the contract.

However, to accommodate the larger than anticipated flows into the clarification tanks due to the leakage of the existing gates, it was decided that additional gravity plate settlers should be provided as part of this contract as an interim measure to provide additional settling capabilities of the clarifier tanks. When the new gates are installed in the future, the additional plate settler units would provide standby equipment flexibility during maintenance operation thereby

maintaining firm capacity in the treatment of residue from the water treatment process.

As a result of the above, Bondfield proceeded with the installation of the 40 plate settler units already on site per the base scope of the contract. In parallel, Bondfield ordered 8 additional gravity plate settler units for later installation on their arrival which arrived on site approximately 18 weeks later.

However, due to the staged procurement and installation of the additional plate settler units, Bondfield performed additional work that was not originally contemplated in their tender. This work included additional costs for staged supply of the additional plate settler units related to re-set up and re-tooling for the fabrication of the additional units as well as costs associated with escalation of stainless steel material costs since the placement of the original order for the base units (80 weeks difference between the two orders). Further, there were costs associated with staged installation of the additional units related to remobilization and demobilization of installation equipment (i.e. mobile crane) as this equipment had already been demobilized off site on the completion of the installation of the 40 plate settlers.

The cost for this additional work is \$120,000.00 net of GST.

4. Unanticipated Site Conditions

Over the course of construction several unforeseen conditions resulted in additional work to the contract. These items are described as follows:

- During construction, the presence of existing shafts and sprockets of a previously decommissioned sludge collection system were identified in Sedimentation Tank No. 3. Due to plant operating constraints, this tank could not be made available for inspection during the design phase of the RMF project. It was therefore necessary for Bondfield to remove this equipment due to interference with the installation of the new chain and flight sludge collection system.
- As part of normal quality assurance process during any construction, the bottoms of excavations are reviewed during construction by a Geotechnical Engineer to verify the foundation conditions. The Geotechnical Engineer's review indicated that up to a meter and a half of material had to be removed in several locations to expose material suitable for the foundation design. For this reason, additional costs were incurred for excavation, off site disposal, pumping, and supply and placement of additional fill concrete.
- The construction for the new centrifuge facility required a portion of it to be supported on an existing corbel. When this area was excavated, it was unexpectedly found that surfaces of the corbel were covered with chunks of

concrete. This uneven surface of concrete had to be removed and replaced in order to provide suitable support for the new centrifuge facility.

- Existing manholes, MH 8 and MH18 were to be removed in order to accommodate the construction of the new backwash bypass conduit and clarification facility. When these structures were exposed during excavation, the bottom section of MH 8 and MH 18 were unexpectedly found to have been constructed monolithically as one unit rather than as separate units. As a result of this unexpected site condition, the construction sequence was altered in order to maintain separate flows within these structures, as well, additional demolition and removal was required.
- Rock anchors are embedded in the rock to resist uplift pressures on the structure resulting from ground water pressures. The contract documents required that one out of every ten rock anchors were to be subjected to a “proof load” test. At one of these locations, the rock anchor repeatedly failed to meet the acceptance criteria specified in the contract documents for these tests. This situation was reviewed by a Geotechnical Consultant, and it was recommended to locally increase the embedment length of the rock anchor by one (1) meter resulting in a total “rock embedment” of eight (8) metres.
- Contract documents included for the installation of a new waterproofing assembly on the roofs of the existing Flocculation and Sedimentation Tanks. This work included the installation of a vertical section of water proofing to the buried portion of the north wall of the Dry Chemical Building. However, the existing parging at the existing north wall of the Dry Chemical Building had deteriorated to the extent that it was not possible to provide a suitable substrate for waterproofing. Various methods were reviewed to correct this unforeseen site condition, and it was determined that the cost effective solution was to overlay the existing wall surface with a cement board.

The cost for the above additional work due to unanticipated site conditions is in the amount of \$150,000.00 net of GST.

5. Curb Replacement

As part of the Site Plan Approval for the Residue Management Facility Project, there was a requirement to add a sidewalk on the east side of Twenty Third Street, adjacent to the existing curb. During construction, it was determined that the existing east curb along Twenty Third Street (approximately 250 metres) was not suitable for the construction of a new adjacent sidewalk and would lead to possible settlement between the new sidewalk and the existing curb. Based on this assessment, Bondfield was instructed to proceed with removing the existing curb and replacing it with curb that interlocked to the new sidewalk as well as repairing related existing catch basins and manholes that were unexpectedly found to be deteriorated and in need of repair.

The cost for the above additional work is in the amount of \$80,000.00 net of GST.

6. Process Control Standards Changes

The Residue Management Facility project was designed in 2004 concurrent to the implementation of Toronto Water's Process Control System (PCS) Upgrade Program. The contract required the contractor to complete programming of the process control system for the new Residue Management System in accordance with the requirements of Toronto Water's PCS Standard issued in 2003, which was the latest standard available at the time of tendering this contract.

The hardware and software specified in the contract documents which were released for tender in 2004 are now dated and newer version releases of both hardware and software were required to be used to meet the current standards in place. Further, PCS standards have been updated since the completion of the PCS program, particularly with respect to the SCADA development software, known as "iFIX", and simulation testing and training software, known as "PICS", as well as updates made to the Remote Processing Unit (RPU) programming module requirements. The overall updates incorporate improvements gained from other projects and plant experiences.

Further, additional work related to the programming and integration of the existing plant equipment and processes was identified as necessary to optimize the overall plant hydraulics and mitigate risks of potential flooding overflow conditions in order to ensure the plant operates in compliance within regulatory requirements.

Changes to the PCS requirements including updates to the PCS standards related to programming, hardware and software requirements, and optimization requirements have resulted in additional work. It is estimated at this time, that the cost for the above additional work is \$500,000.00 net of GST.

P.O. No 47010994 was initially amended in August 2007 by \$500,000.00 net of GST. The estimated cost of the current additional work is \$1,650,000.00 net of GST which includes a contingency allowance of \$350,000.00 net of GST, if necessary and authorized by the Executive Director, Technical Services, for a revised total of \$35,417,570.09 net of GST.

Based on the additional work required it is requested that Contract No. 47010994 be further amended for an additional amount for \$1,650,000.00 net of GST (\$1,732,500.00 inclusive of GST) for the additional work items which are critical to the operation of the facility. This additional amendment results in an overall 4.7% increase to the awarded value. These charges will only be approved if and as required and in accordance with the City's financial signing authority.

Requirement for Additional Contracted Professional Services from Genivar:

Request for Proposal No. 9117-03-7264 was awarded for the general office administration and site supervision services during construction for the Residue Management Facility at the R.L. Clark Water Treatment Plant to Genivar. Genivar's proposal had identified an amount of \$5,677.57 per week net of GST, for any additional general office administration and site supervision services during construction. The timeline for the completion of the construction work is extended by 40 weeks. We have sufficient funds in Genivar's Purchase Order to provide for 10 weeks of additional general office administration and site supervision services during construction. We, therefore, request additional funds to provide for 30 weeks of general office administration and site supervision services during construction.

Based on the weekly rate of \$5,677.57 the additional 30 weeks of construction results in an additional \$170,321.10 net of GST (\$178,837.16 inclusive of GST) to accommodate Genivar's additional time for engineering site services.

P.O. No 47008795 for the provision of engineering site services by Genivar related to the construction of the Residue Management Facility was initially amended in December 2006 by an additional amount of \$370,180.54 net of GST in accordance with the Financial Control Bylaw, 71, for additional work items which included engineering services and contract administration for the unanticipated rehabilitation (crack repair) of existing sedimentation and flocculation tanks and asbestos abatement and site services. The estimated cost of the current additional work is \$170,321.10 net of GST for a revised total of \$1,847,749.30 net of GST.

Based on the above additional time required it is requested that Contract No.47008795 be further amended for an additional amount for \$170,321.10 net of GST (\$178,837.16 inclusive of GST) for additional work items which are critical to the operation of the facility. This additional amendment results in an overall 1.3% increase to the awarded value.

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