



STAFF REPORT ACTION REQUIRED

Purchase Order Amendment Residue Management Facility R. C. Harris Water Treatment Plant Amendments to Contract 47009953 and Purchase Order 6015044

Date:	September 11, 2007
To:	Public Works and Infrastructure Committee
From:	Executive Director, Technical Services Director, Purchasing and Materials Management Division
Wards:	Ward 36 – Scarborough Southwest
Reference Number:	P:\2007\Internal Services\pmmd\pw07032pmmd (AFS #5203)

SUMMARY

The purpose of this report is to request the authority to amend Contract 47009953 and Purchase Order 6015044 related to the construction of the Residue Management Facility at the R.C. Harris Water Treatment Plant.

RECOMMENDATIONS

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

1. Funds in the amount of \$4,390,000 net of GST be reallocated for payment of the enhancements made to the Residual Management Facility during construction as follows: \$1,500,000 from CPW543-05 Watermain Rehabilitation Cathodic Protection, \$400,000 from CPW537-05 Easement Acquisition, \$1,000,000 from CWW088-44 Humber WWTP Waste Activated Sludge Upgrade, \$900,000 from CWW037-07 New Groundskeeping Building, \$300,000 from CPW020-22 Controlled Substances Identification and Abatement and \$290,000 from CWW447 Wet Weather Flow Master Plan Design & Implementation to CPW007 RC Harris Residue Management.

2. Subject to approval of recommendation (1), authority be granted to amend Contract 47009953 for the construction of the Residue Management Facility at the R.C. Harris Water Treatment Plant with Kenaidan Contracting Ltd. by an additional amount of \$2,757,460.41 excluding GST revising the current contract value from \$61,596,612.00 to \$64,354,072.41 excluding GST.
3. Subject to the approval of recommendation (1), authority be granted to amend the Purchase Order 6015044 for contracted professional engineering services with CH2M Hill Canada Limited for the provision of general office administration and site supervision services during construction by an additional amount of \$570,000.00 excluding GST, revising the current value from \$1,792,251.30 to \$2,362,251.30 excluding GST.

FINANCIAL IMPACT

The amendments require additional cash flow in the amount of \$3,327,460.41 net of GST. This project is included in the approved 2007-2011 Toronto Water Capital Budget in WBS Element (CPW007) R.C Harris Residue Management Facility, however, at this time, the uncommitted cash flow is insufficient and additional cash flow authority is required to meet these commitments. As well, an additional \$1,062,539.59 is required for plant security and construction testing and other additional expenses anticipated in order to complete the construction of the plant for a total of \$4,390,000, net of GST.

The additional cash flow and project cost (all net of GST) is to be reallocated from approved 2007 capital projects (with net impact of \$0) as follows:

Account Number	Account Name	Amount
CPW543-05	Watermain Rehabilitation Cathodic Protection	\$1,500,000.00
CPW537-05	Easement Acquisition	\$ 400,000.00
CWW008-44	Humber WWTP Waste Activated Sludge Upgrade	\$1,000,000.00
CWW037-07	New Groundskeeping Building	\$ 900,000.00
CPW020-22	Controlled Substances Identification and Abatement	\$ 300,000.00
CWW447-06	Wet Weather Flow Master Plan Design & Implementation	\$ 290,000.00
TOTAL		\$4,390,000.00

BACKGROUND

Contract 04FS-50WS, Tender Call No 170-2004 for the construction of the Residue Management Facility at the R.C. Harris Water Treatment Plant was awarded to Kenaidan Contracting Ltd. by Council on September 27, 2004 by adoption of Works Committee Report No. 8, Clause 20. The Residue Management Facility (RMF) is required to treat the dilute waste stream (residue) from the water purification process containing the particulate removed from lake water, and the chemicals used to facilitate their removal.

Contract 47009953 in the amount of \$61,096,612.00 exclusive of GST, was issued to Kenaidan Contracting Ltd. for the construction of Contract 04FS-50WS.

COMMENTS

The construction of Contract 04FS-50WS commenced in November 2004 and construction is now approximately 85% complete and the project is anticipated to be completed January 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. Contract. 47009953 for the construction of RMF was initially amended for an amount of \$500,000.00 excluding GST, in accordance with the Financial Control Bylaw, for additional work items, which included modified telephone and paging system to meet new security standards, upgrade of deteriorated existing service water line, relocation and modification of control panel support for enhanced personnel safety and additional operational programming of chemical feed system related to polymer and dechlorination of treated water.

This second amendment is now required for further additional work items that were not in the original scope of the contract and cannot be accommodated within the revised contract value. These include additional work for the incorporation of sodium bisulphite system (SBS) for dechlorination, diversion chamber modification work and additional work for plant roadway. The following summarizes these major additional work items:

1. Incorporation of Sodium Bisulphite System (SBS) for Dechlorination

The City currently uses sulphur dioxide (SO₂) to dechlorinate excess chlorine residual in the filtered water at the R. C. Harris Water Treatment Plant. As part of the RMF project, the existing SO₂ system was to be extended to dechlorinate the waste stream from the new residue management facility prior to lake discharge.

The existing SO₂ system is complex and requires increased safety awareness and handling/operations in that SO₂ is stored as a pressurized liquid in one tonne cylinders and is converted to gas through evaporators and applied as a solution (i.e. liquid) at the point of application.

In October 2004, subsequent to the RMF contract award, as part of plant optimization initiatives, a three month trial was initiated to determine if an alternate dechlorination system employing simpler equipment was available, while being safer and easier to handle from an overall operational and maintenance aspect. The trial results indicated that liquid SBS is a suitable dechlorination agent for this facility. The liquid SBS offers effective dechlorination system which is easier to operate than the more complex SO₂ liquid-gas-liquid conversion system. Overall, the SBS system is safer than the existing SO₂ system.

The process to feed SBS into the process stream is similar to other plant chemicals such as fluoride and ammonia, and is far simpler than that of SO₂. The results of the trial, completed in 2004, indicated that SBS is a suitable dechlorination agent for use at the R.C. Harris Water Treatment Plant, and in April 2006, the Certificate of Approval from the Ministry of Environment was amended to replace SO₂ with SBS.

The base construction contract for RMF included five chemical storage rooms. Two of these rooms are utilized as part of the base contract with a provision for the other three storage rooms for future use. One of these additional storage rooms is suitable to house SBS storage tanks for both the water treatment and residue treatment streams.

The cost for the additional work to provide SBS storage tanks and replace the SO₂ system, for the RMF, with SBS is in the amount of \$657,460.41 exclusive of GST for the above additional work (\$696,908.03 inclusive of GST).

2. Additional Work for the Diversion Chamber

The base scope of the contract included construction of a new underground diversion chamber to intercept the plant process treatment waste stream and divert it to the RMF for treatment. The diversion chamber was to be constructed between the existing Filter Building and the existing Chemical Building.

The original design of the RMF project was based on the 70 plus year old record drawings of the existing facility at the time of design. The record drawings indicated that the existing 1.37 metre diameter plant drain line was encased in concrete along with two 2.1 metre diameter existing raw water feed lines. These existing concrete encased lines are required to be maintained fully operational during construction to maintain the plant in service for the production of potable water.

During the course of construction, during initial excavation work for the new diversion chamber, numerous unanticipated site conditions were discovered. These include:

- existing concrete encasement enclosing the plant drain line and the raw water lines was much larger than indicated in the record drawing information. The record drawings indicated the concrete encasement to be 6 metres at the top and tapering underneath the existing raw water lines to 2 metres at the bottom. The concrete encasement encountered during construction was rectangular in shape, approximately 6 metres wide by 5.5 metres deep and also incorporated an unanticipated fourth line – the 600 mm diameter backwash feed line – within the encasement. The additional backwash feed line and the larger concrete encasement directly interfered with the proposed location of the new diversion chamber;
- existing chemical feed pipes encased in large concrete encasements were also unexpectedly found to be routed crossing the location of the proposed new

diversion chamber. These chemical feed pipes were not shown on the record drawings;

- existing electrical power lines and water service lines were also found in the field and interfered with the diversion chamber. These services were not shown on the record drawings;
- during excavation work for the new diversion chamber, the structural foundation for the existing Filter Building entrance landing and stairs, located in the vicinity of the new diversion chamber, was unexpectedly found to be in a deteriorated condition and needed to be rehabilitated and re-supported.

In addition, based on recent improved flow monitoring and instrumentation initiated by plant staff, it was determined that the plant drain flows were higher than the design flows identified to be used in the design of the RMF. Accordingly, changes to the design were required to accommodate the increased flows.

As a result of the above unanticipated site conditions, additional work was required which extended the timeline for construction by approximately 14 months. The additional work required to modify the diversion chamber includes:

- additional field exploratory and investigative work to confirm the as built conditions and locations of buried existing structures and services in the vicinity of the new diversion chamber;
- reallocation and revised orientation as well as modified configuration including a deeper diversion chamber to accommodate the more restrictive space constraints due to the unanticipated existing additional pipes and services and larger concrete encasements. To further mitigate the footprint of the chamber to accommodate the space constraints due to the unanticipated site conditions, the access to the chamber was modified from an underground side access to surface access with submarine type watertight access door;
- modified diversion chamber overflow arrangement to accommodate the higher flows;
- extensive additional geotechnical investigation work to confirm the geotechnical requirements and constructability of the modified diversion chamber with respect to a) suitability of revised shoring and piling system to mitigate vibration during construction b) protection of the foundation of existing adjacent water retaining/chemical storage plant structures and services;
- installation of a more extensive and more complex shoring system and underpinning system to accommodate the deeper chamber to prevent undermining of existing adjacent buildings, structures, chemical storage tanks and services during construction of the chamber;
- modified piling system to support of the foundation of the new chamber;
- re-routing of unanticipated existing services and utilities where possible to avoid interferences with the new diversion chamber.

As a result of the above, Kenaidan is performing the additional work which extends the timeline for construction by an estimated additional 60 weeks. Currently, City staff are finalizing the actual costs for this additional work as well as time impacts. It is estimated at this time, that the cost for the above additional work, including time impact is \$1,500,000.00 exclusive of GST (\$1,590,000.00 inclusive of GST).

3. Additional Work for Plant Roadway

The R.C. Harris Water Treatment Plant property includes approximately 1,300 metres of roadway and 1,000 square metres of parking area. These roads were originally of concrete construction, but were paved over with asphalt in 1986. Plant roadways are critical for entrance and egress to and from the facility, particularly for deliveries of treatment chemicals and supplies, and access for emergency vehicles. Due to the heavy vehicles that traverse these roadways, these roads must be of robust construction and maintained in good condition.

The base scope of the Residue Management Facility (RMF) contract included the replacement of the existing plant roads impacted by the construction of the RMF; this included a replacement of approximately 350 metres of asphalt-surfaced roadway between the filter and service buildings which was demolished as part of the site excavation process. Work to be done under the contract includes the construction of new concrete roadways and curbs to match the area and gradient of the previously demolished roadways. Concrete is being used as a road surface to improve durability and return the facility to its original configuration in accordance with heritage conservation principles.

The existing asphalt-surfaced plant roadways and parking lot are over 20 years old, and much of it is showing signs of severe wear and tear due to the passage of heavy vehicles. These surfaces will inevitably have to be re-built in the near future. In order to minimize overall construction costs and reduce disruption to plant operations through loss of roadway access, it is recommended that approximately 600 metres of additional roadway and the parking area be replaced through the RMF contract; the contractor, Kenaidan Contracting Ltd., is mobilized on site and can carry out the work on cost effective basis with minimal additional disruption to plant operations.

The cost for the additional plant roadway construction and parking area is estimated to be in the amount of \$600,000.00 exclusive of GST for the above additional work (\$636,000.00 inclusive of GST).

Contract 47009953 for the construction of the Residue Management Facility at the R.C. Harris Water Treatment Plant with Kenaidan Contracting Ltd. was initially amended in August 2007 by an additional amount of \$500,000.00 (excluding GST) in accordance with the Financial Control Bylaw. Based on the above additional construction activities which are necessary for the effective operation of the R.C. Harris Water Treatment Plant, it is recommended that Contract 47009953 issued to Kenaidan Contracting Ltd for the construction of the Residue Management Facility at the R.C. Harris Water Treatment

Plant be amended by an additional amount of \$2,757,460.41 excluding GST (\$2,922,908.03 inclusive of GST). This amendment revises the current contract value with Kenaidan Contracting Ltd. from \$65,903,375.00 to \$68,826,283.03 with full GST. This additional amendment results in an overall 4.5% increase to the awarded value.

Requirement for Additional Professional Services from CH2M Hill Canada Limited (CH2M Hill):

Request for Proposal 9117-03-7211 was awarded for the general office administration and site supervision services during construction for the Residue Management Facility at the R.C. Harris Water Treatment Plant to CH2M Hill. CH2M Hill's proposal had identified an amount of \$9,500.00 per week excluding GST, for any additional general office administration and site supervision services during construction.

Based on the weekly rate of \$9,500.00 including disbursements but net of GST, the additional 60 weeks of construction results in an additional \$570,000.00 excluding GST (\$604,200.00 inclusive of GST) to accommodate CH2M Hill's additional time for engineering site supervision services.

Based on the above additional time for engineering site supervision services, it is recommended that Purchase Order 6015044 for contracted professional services with CH2M Hill Canada Limited for the provision of general office administration and site supervision services during construction be amended by \$570,000.00 excluding GST (\$604,200.00 inclusive of GST) This amendment revises the current contract value with CH2M Hill Canada Limited from \$1,917,708.89 to \$2,521,908.89 with full GST.

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