SUBJECT: Replacement of Street Sweepers (PW05095a) - (City Wide)
Public Works, Infrastructure, and Environment Committee
Outstanding Business Item “U”

RECOMMENDATIONS:

(a) That the City of Hamilton award an order for seven new street sweepers and one used street sweeper to The Equipment Specialist Inc. at a total cost of $2,035,655.25 to replace eight existing street sweepers that are no longer economical or efficient to operate, with sources of funding from approved 2004 Capital Budget Cost Centre 58550 - 4940451100 in the amount of $1,029,503.00 and from approved 2005 Capital Budget Cost Centre 58550 - 4940551100 in the amount of $1,006,152.25.

(b) That Item U “Cooperative RFP with Toronto for street sweepers” be removed from the Public Works, Infrastructure, and Environment Committee Outstanding Business List.
EXECUTIVE SUMMARY:

Following previous reports to Council on this subject, a recommendation is made to replace eight street sweepers and award the order to the single proponent responding to a joint Request For Proposal (RFP) issued as a cooperative purchasing effort by the City of Toronto.

The City of Toronto required the proponent to submit a sample machine for testing that was monitored by ETV Canada (ETV stands for Environmental Technology Verification). The machine passed all the required tests.

While the original plan was to replace six street sweepers, two additional units are needed to replace sweepers that have failed to meet operational requirements. One unit is planned for replacement in the 2006 capital request but can be funded from existing funds approved in the 2005 capital request. The second unit can be paid for from the existing approved budget. One of the units is a demonstration model with equipment specifications identical to a sweeper purchased by the City in 2002. The specifications for the seven new units have been modified to match this and reduce the overall cost for this purchase by $290,363.50 including taxes.

BACKGROUND:

Following recommendations made to Council by the Director of Audit in Report CM02010 in March 2003, this report is being provided in advance of awarding an order for the provision of new street sweepers.

Report PW05095 was presented to Committee of the Whole in July 2005 and recommended that staff proceed with participation in a cooperative Request For Proposal (RFP) to be issued by the City of Toronto for street sweepers specifying regenerative air technology. Regenerative air technology is recommended as the most effective way to remove fine particulate matter from our road surfaces, based on experience and testing. The Medical Officer of Health issued an Information Update in November 2005 identifying concerns about particulate matter pollution. Clean Air Hamilton has also reported that fine particulate matter is a significant risk to public health. Our road surfaces are a primary source of this pollutant. Addressing this issue continues the progress being made following Council’s approval of the Green Fleet Implementation Plan in June 2005.

The City of Toronto established the Clean Roads to Clean Air Program in 2002 to develop a plan to reduce fine particulate matter pollution created by road sweeping. Toronto staff was aware that Hamilton had previously purchased regenerative air sweepers and following several meetings, the recommendation to proceed with a joint RFP was presented to Hamilton City Council in Report PW05095.

The RFP was issued by the City of Toronto on August 17, 2005 for an estimated 14 sweepers for Toronto and six sweepers for Hamilton. A single response was received from The Equipment Specialist Inc., 495 Woodward Avenue, Hamilton, offering the Tymco DST-6 regenerative air sweeper. The City of Hamilton purchased one of these units in 2002 and has been satisfied with its performance.
ANALYSIS/RATIONALE:

The City of Toronto’s RFP required the proponent to submit a machine for a test procedure to measure its ability to clean fine particulate matter from road surfaces, a critical air quality and public health issue. This testing was witnessed by ETV Canada and their verification entity, the Prairie Agricultural Machinery Institute and their report confirms the scientific validity of the test procedure. The City of Hamilton was represented by Public Works staff at this testing. The test results were finalized and are presented in Appendix A. The Tymco DST-6 passed this test.

The City of Toronto also required operational demonstrations including cleaning roads of large debris, leaves, and mud as well as operations in wet conditions and for manoeuvrability around parked cars on city streets. A dustless demonstration was also required, where the machine was operated without the use of the gutter broom, which would permit sweeping to continue during smog alerts. Additional issues considered included maintenance and operating costs, downtime, parts, labour costs, fuel consumption and operator evaluation of machine characteristics such as visibility, noise, safety features, daily maintenance, and cab ergonomics. The scores were finalized and are presented in Appendix B. The Tymco DST-6 passed these tests.

The total cost of the testing was $76,000, including construction of the test facility, equipment, staff time and the independent review by ETV Canada and the Prairie Agricultural Machinery Institute. Environment Canada contributed $15,000 to the cost of the independent review. The remaining cost was shared by the City of Toronto (70%) and the City of Hamilton (30)% in proportion to the number of sweepers each city required.

The RFP specified that the City of Hamilton required an estimated six units. Since the RFP was issued, the Operations & Maintenance Division and the Fleet & Facilities Division have concluded that the performance of two other sweepers has failed to meet the department’s requirements due to numerous breakdowns and excessive waiting time for parts. A recommendation is being made to replace these units now and award an order for two additional units to the proponent for a total of eight units.

ALTERNATIVES FOR CONSIDERATION:

The City of Toronto specified that the hopper of the sweeper, where the debris is collected and carried, should be made of stainless steel. This is a desirable feature where the planned life of the unit is extended beyond eight years. A painted hopper surface will begin to corrode due to water and the abrasion caused by debris after about eight years. We plan to replace sweepers at eight years and do not require stainless steel hoppers. It has been our experience that the high operating speed of the sweeper engine and the sweeper’s work environment limits economical service life to eight years. Other components including the truck commonly wear out at this age, making replacement of the whole unit the most economical decision. By deleting this specification, and modifying certain other specifications to match the Tymco DST-6 purchased by the City of Hamilton in 2002, the proponent is able to reduce the bid price by $36,070 for each unit and deliver the units one month sooner. The total cost reduction for seven units is $290,363.50 including taxes or approximately the equivalent of one additional sweeper at no cost. This amendment to the specification is in keeping with the provisions in the RFP issued. The RFP stated (in part) “that the City shall have
the right to negotiate on such matter(s) as it chooses with a Preferred Proponent” and that “during negotiations, the scope of the services may be refined”.

The RFP specified that the City of Hamilton requires an estimated six sweepers to replace equipment already approved in the 2004 and 2005 capital budgets. Two other sweepers have experienced an extraordinary amount of downtime and put delivery of the road sweeping program at risk. Life to date costs for each of these units has exceeded $100,000, compared to $65,000 for the Tymco DST-6 sweeper bought at the same time. The warranty on the two sweepers has expired and despite efforts made by the dealer, no successful resolution to the excessive repairs has been obtained. Continuing to pay the excessive maintenance and filling in the service gaps by using contractors is not cost-effective. It is our recommendation that one of these be substituted for the sweeper already identified in the 2006 capital budget for replacement. The other sweeper should be replaced using the savings from the change in specifications deleting the requirement for a stainless steel hopper.

As an alternative to buying all new sweepers at a cost of $257,376 each, the vendor is offering a 2003 Tymco DST-6 at a price of $227,125, a discount of 11.75%. This is the same unit that was used for testing in Toronto in September and October 2005, so we have data on the machine’s performance. The specifications are identical to the Tymco DST-6 purchased by the City of Hamilton in 2002. The unit can be delivered immediately which would improve our spring cleanup capability. The used machine has been inspected and is acceptable to both the Operations & Maintenance Division and the Fleet & Facilities Division and includes a warranty.

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

Financial

Table 1 lists the sweepers that were included in the 2004 and 2005 capital budgets for vehicle replacement. The proposed replacement for 2006 is included in this table. Their budgeted replacement cost is also shown.

<table>
<thead>
<tr>
<th>Replacement Year</th>
<th>Sweeper Description</th>
<th>Budgeted Replacement Cost Including taxes</th>
<th>Actual Replacement Cost</th>
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<tbody>
<tr>
<td>2004</td>
<td>1996 Athey Unit 109571</td>
<td>$285,000</td>
<td>$257,376</td>
</tr>
<tr>
<td>2004</td>
<td>1996 Athey Unit 109572</td>
<td>$285,000</td>
<td>$257,376</td>
</tr>
<tr>
<td>2004</td>
<td>1989 Elgin Unit 140315</td>
<td>$285,200</td>
<td>$257,376</td>
</tr>
<tr>
<td>2004</td>
<td>1993 Athey Unit 200340</td>
<td>$285,000</td>
<td>$257,376</td>
</tr>
<tr>
<td>2005</td>
<td>1997 Johnston Unit 109562</td>
<td>$222,600</td>
<td>$257,376</td>
</tr>
<tr>
<td>2005</td>
<td>1989 FMC Unit 110320</td>
<td>$285,200</td>
<td>$257,376</td>
</tr>
<tr>
<td>2006 (use 2005 budget)</td>
<td>1995 Johnston Unit 124024 scheduled, replace 2002 Tennant</td>
<td>$280,000</td>
<td>$257,376</td>
</tr>
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</table>

Table 1 - Vehicle Replacement Budget for Sweepers
The actual cost of replacing the eight sweepers is $16,254 less than the amounts budgeted in the 2004, 2005 and 2006 Vehicle Replacement Plans. The 2006 capital budget request will be reduced by $280,000 as the planned sweeper replacement has been effected in this purchase.

Legal
N/A

Staffing
N/A

**POLICIES AFFECTING PROPOSAL:**

Purchasing Policy #12 - Cooperative Purchasing permits the City of Hamilton to participate with other government agencies or public authorities in cooperative acquisition ventures for goods when it is in the best interest of the City to do so.

**RELEVANT CONSULTATION:**

**City of Hamilton Departments:**
Public Works created a Sweeper Specification Review Committee in response to a recommendation made by the Director of Audit in 2003. The Committee included Sweeper Operators, Mechanics, Specification Planners, Supervisors and Managers including the Purchasing section. City of Toronto staff attended several of this Committee’s meetings to share information and experience. The Committee also worked with Planning and Economic Development, Long Range Planning Division, to address air quality and triple bottom line issues.

**External:**
Clean Air Hamilton
City of Toronto - Transportation Services Division, Technical Services Division, Fleet Services Division, Purchasing and Materials Management Division
Environment Canada, Environmental Protection Branch, Ontario Region
ETV Canada Inc.

Dr. Brian McCarr, Chair of Clean Air Hamilton offered these comments concerning this report in an e-mail to staff on November 16, 2005:

“The issue of the reduction of ambient air particulate through the implementation of effective street sweeping technologies has been an important issue for CAH since the original HAQI report was presented in October 1997. The Road Dust Study of 1999 along Burlington Street and
the more recent Rotek Study on Strathearn Ave. are ample evidence of CAH concern and activity in this area.

CAH has recommended on more than one occasion that the City purchase street sweepers that have the greatest demonstrated ability to remove fine particulate materials from roadways. I wholly support any staff initiative to purchase the best available street sweeping technology that will give the best performance in collecting material from roads and the best performance in reducing ambient levels of dust due to the re-entrainment of road dust.

This staff report gets my strongest support. I know that it will also get strong support from the citizens of Hamilton, given their increasing concerns about air quality and health impacts. The citizens of Hamilton will gladly pay extra for the added value that the best street sweepers will bring to the environment of Hamilton.”

A meeting with Environment Canada was facilitated by Councillor Brian McHattie to discuss the street sweeping strategy. Environment Canada provided funding in the amount of $15,000.00 to ETV Canada to cover part of the cost of monitoring and reporting observations of the City of Toronto’s test protocol. Environment Canada’s contribution has been acknowledged by staff.

**CITY STRATEGIC COMMITMENT:**

By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community.

**Community Well-Being is enhanced.** ☑ Yes □ No
By using the technology most effective at controlling fine particulate matter from our roadways, the City of Hamilton is responding to a concern for the damage to human health caused by inhaling these pollutants. Particulate matter is also a component of smog which in turn has further health impacts. Community well being is enhanced through the maintenance of our roadways in a clean condition.

**Environmental Well-Being is enhanced.** ☑ Yes □ No
Human health and safety are protected by limiting particulate matter emissions, which also protects air quality and water quality.

**Economic Well-Being is enhanced.** ☑ Yes □ No
Hamilton’s high-quality environmental amenities are maintained and enhanced. Improving air quality can help attract investment to the community by making Hamilton a more desirable place to live and work.

**Does the option you are recommending create value across all three bottom lines?**
☑ Yes □ No
By purchasing regenerative air sweepers tested to the most rigourous protocol yet created, the City of Hamilton continues to effectively use a triple bottom line approach to the issue of street sweeping.

**Do the options you are recommending make Hamilton a City of choice for high performance public servants?**
☑ Yes □ No
The recommendation continues to make Hamilton a City of choice for high performing public servants. The maintenance and safety of our roads should demonstrate excellence in the area of service delivery through a high quality, well equipped workforce that takes pride in their efforts and in the community where they live. The implementation of a maintenance program based on cost-efficiency and job excellence makes the purchase of proper equipment necessary.
PM10 and PM2.5 Street Sweeper Efficiency Test Summary
38 % of the total score

<table>
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<tr>
<th>Sweeper Company's Name</th>
<th>Tymco</th>
<th>Tymco</th>
<th>Tymco</th>
<th>Average of 2005 Regenerative-Air (All 3 Test Dates) (20 minute)</th>
<th>Average of 2004 Regenerative-Air (All 3 Test Dates) (20 minute)</th>
<th>Established Threshold Values (15 minute)</th>
</tr>
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<tbody>
<tr>
<td>Sweeper Model</td>
<td>DST-6</td>
<td>DST-6</td>
<td>DST-6</td>
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<tr>
<td>Street Sweeper Technology</td>
<td>Reg-Air</td>
<td>Reg-Air</td>
<td>Reg-Air</td>
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<tr>
<th>PM10 Criteria</th>
<th>Unit</th>
<th>Avg. of All Monitors</th>
<th>Avg. of All Monitors</th>
<th>Avg. of All Monitors</th>
<th>Removal Efficiency</th>
<th>% Sidewalk Efficiency</th>
<th>Air Contamination PM_{10} Maximum Concentration [mg/m^3]/kg</th>
<th>Air Contamination PM_{10} Total Concentration [mg/m^3]/kg</th>
<th>Air Contamination PM_{2,5} Maximum Concentration [mg/m^3]/kg</th>
<th>Air Contamination PM_{2,5} Total Concentration [mg/m^3]/kg</th>
<th>Established Threshold Values (15 minute)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>91.57%</td>
<td>0.15%</td>
<td>0.01</td>
<td>5.45</td>
<td>0.00</td>
<td>2.31</td>
<td>&gt;90.00%</td>
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<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>89.80%</td>
<td>0.12%</td>
<td>0.01</td>
<td>4.97</td>
<td>0.00</td>
<td>2.24</td>
<td>&lt;0.08%</td>
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<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>91.87%</td>
<td>0.09%</td>
<td>0.02</td>
<td>7.29</td>
<td>0.01</td>
<td>2.67</td>
<td>&lt;10.00%</td>
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<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>91.08%</td>
<td>0.12%</td>
<td>0.01</td>
<td>5.90</td>
<td>0.01</td>
<td>2.40</td>
<td>&lt;5.00%</td>
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<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>Avg. of All Monitors</td>
<td>90.31%</td>
<td>0.07%</td>
<td>0.03</td>
<td>13.02</td>
<td>0.01</td>
<td>5.17</td>
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Operational On-Street Evaluation Summary
18 % of the total score

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<tr>
<th>Operational Requirements</th>
<th>Pick-up Efficiency (%)</th>
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<tbody>
<tr>
<td>Maneuverability</td>
<td>35.82</td>
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<tr>
<td>Pick-up Large Debris</td>
<td>93.22</td>
</tr>
<tr>
<td>Leaf Removal</td>
<td>96.96</td>
</tr>
<tr>
<td>Heavy Silt Loading</td>
<td>98.29</td>
</tr>
<tr>
<td>Sweeping During Wet Conditions</td>
<td>89.20</td>
</tr>
<tr>
<td>Dustless Sweeping (without gutter brooms)</td>
<td>87.08</td>
</tr>
</tbody>
</table>

*[(lowest quantity achieved by any Proponent divided by the quantity achieved by each individual Proponent) x maximum score per criteria]
E-mail: vstevan@toronto.ca

Ms. Vesna Stevanovic-Briatico  
Transportation Coordinator City of Toronto  
22nd Floor East Tower, City Hall  
100 Queen Street  
Toronto, ON

Dear Ms. Stevanovic-Briatico:

Subject: Street Sweeper Test Review And Witnessing Synopsis

Environmental Technology Verification Canada (ETV) was contracted by the City of Toronto and the City of Hamilton to provide independent review of their PM 10 and PM2.5 Street Sweeper Efficiency Test Protocol and witness the testing of a Tymco DST -6 street sweeper. ETV subcontracted PAMI to act as its verification entity. The Prairie Agricultural Machinery Institute (P AMI) is an independent research, development, and test agency established in 1975 by the Province of Saskatchewan. P AMI has 40 staff lead by engineers that conduct about 50 testing projects annually. P AMI has experience and credentials in street sweeper testing including approval by the California South Coast Air Quality Management District to test to their Rule 1186.

The project consisted of three steps:

1. Review of the Test Protocol  
2. Witnessing of the two trial street sweeper test runs to the Protocol  
3. Witnessing of three actual test runs on a Tymco DST-6

Jim Wassermann, P.Eng. and Mark Marianchuk, P.Eng. performed the PAMI portion of the project. The project occurred at the City of Toronto yards (150 Disco Road) in-and-around Building 103. Test protocol review and trial runs occurred from September 21 to 23, 2005, and PM 10 and PM2.5 testing of the Tymco DST -6 sweeper occurred from September 27 to 30, 2005.

The test protocol review consisted of examining the test protocol documents, receiving explanation from Ms. Vesna Stevanovic-Briatico and Dr. Chris Morgan of the basis of the test protocol development, and observing trial testing of two existing City of Toronto street sweepers. Based on the review, it is the opinion of PAMI that the PMIO and PM2.5 Street Sweeper Efficiency Test Protocol developed by the City of Toronto meets their desired objectives and provides a fair and rigorous evaluation of a street sweeper's performance. The test protocol is much more comprehensive than previous street sweeper test standards such as California Rule 1186 or SAE 11702 Standard: Self-Propelled Sweepers Sweep-Ability Performance.
Secondly, based on witnessing of the City of Toronto procedures, equipment, and personnel during the trial runs, it is the opinion of P AMI that a capability to perform testing to their protocol and achieve suitable accuracy of test results was demonstrated.

Thirdly, the witnessing of street sweeper testing consisted of observing three sets of PMIO and PM2.5 efficiency tests on the Tymco DST-6 street sweeper. Based on witnessing of these tests, it is the opinion of P AMI that the tests were conducted with meticulous attention to detail according to the test protocol. Therefore, the test results produced by the City of Toronto staff would provide an accurate indication of the Tymco DST-6 PMIO and PM2.5 efficiency.

Overall, P AMI is of the opinion that the City of Toronto has developed a very thorough street sweeper test protocol and has properly executed the protocol, resulting in a comprehensive test of the Tymco DST-6 street sweeper.

Yours truly,

James Wassermann, P.Eng. Vice President Saskatchewan Operations

JW:ls
Dear Vesna

As per your request, this letter confirms ETV Canada's conclusions regarding the witnessing of the street sweeper testing undertaken by the City of Toronto in September 2005:

ETV Canada was contracted by the City of Toronto to provide third party assessment of the City of Toronto street sweeper testing.

ETV Canada and PAMI witnessed testing of the street sweepers at Disco Road Yard, Toronto on the following dates:

- September 21st City Street sweeper Dry run PM 10 test day 1
- September 22nd City Street sweeper Dry run PM 10 test day 2
- September 23rd City Street sweeper Dry run PM 10 half day and preparation for on-street testing

- September 27th Official PM 10 test of Tymco regenerative air street sweeper day 1
- September 28th Official PM 10 test of Tymco regenerative air street sweeper day 2
- September 29th Official PM 10 test of Tymco regenerative air street sweeper day 3
- September 30th Official PM 10 test of Tymco regenerative air street sweeper half day and dismantle facility

ETV Canada and P AMI observed testing to ascertain if it followed the City of Toronto March 23, 2005 "Toronto PMI 0 Street Sweeper Testing Protocol"

PAMI (Prairie Agricultural Machinery Institute) (as an approved ETV Canada verification entity) acted on behalf of ETV Canada as the technical expert witness to the City of Toronto Street Sweeper testing. They have prepared a draft report based on their witnessing of the City of Toronto Street Sweeper PM2.5 and PM10 testing.

ETV Canada also witnessed the PM2.5 and PM 10 testing of the street sweeper from Tymco, and has concluded that the street sweeper testing protocol was followed rigorously by City of Toronto.
It should be noted that this letter covers the review of the testing protocol and the witnessing of the PM2.5 and PM 10 testing. It does NOT pertain to the datasets obtained from the testing or conclusions on the data sets as neither ETV Canada nor PAMI were asked to review the complete datasets.

Regards

Andrew Houlson ETV Canada