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## **2005 BUDGET BRIEFING NOTE - Light Emitting Diode (LED) City-Wide Conversion Program for Traffic Signal Lamps**

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### **Issue/Background:**

The LED Conversion Program, outlined in a report entitled Light Emitting Diode (LED) Conversion Program for Traffic Signal Lamps, was adopted by City Council at its meeting held on March 1, 2 and 3, 2004 (Clause 9 embodied in Report No. 2 of the Works Committee). The report identified the program scope as the conversion of 1920 signalized intersections over an eight-year period. In 2004, the Conversion Program included 110 signalized intersections, leaving 1810 for the remaining seven years of the Conversion Program or approximately 260 signalized intersections per year. The annual savings of the completed City-wide LED Conversion Program will be approximately \$2,050,000.00. Funds for the LED Conversion Program were identified in the Transportation Services Division's Ten Year Capital Works budget submission (2004-2013). Funds in the amount of \$1,000,000.00 to cover the first year cash flow requirement for the LED Conversion Program were approved in the Transportation Services Division's 2004 Capital Works budget. Funds in the amount of \$2,500,000.00 to cover the second year cash flow requirement for the LED Conversion Program have been identified in the Transportation Services Division's 2005 Capital Works submission.

The suggestion to accelerate the LED Conversion Program for completion in three years, or by the end of 2007, will demand approximately 603 signals to be converted each year. The accelerated program appears to be attractive in terms of achieving energy savings and the equivalent CO<sub>2</sub> reductions sooner, but it also results in a number of concerns from operations and logistics perspectives. The disadvantages and advantages of an accelerated LED Conversion Program are provided in the key issues listed below.

### **Key Issues:**

- Under the accelerated LED Conversion Program, the full annual savings of approximately \$2,050,000.00 would be achieved four years earlier.
- The full benefits of energy reductions and reducing the City's load demand, as well as the equivalent CO<sub>2</sub> reductions, would be achieved four years earlier.
- Additional funding is required to support an accelerated LED Conversion Program. Funds in the amount of \$2,500,000.00 have been identified in the Transportation Services Division's Capital Works Program for each remaining year of the program, with exception to the final year, which identifies \$1,700,000.00. Under the accelerated LED Conversion Program, for a three-year completion, the required funds are estimated at approximately \$5,500,000.00 per year.
- An accelerated LED Conversion Program does not provide a smooth transition to an LED Signal Lamp Replacement Program. Based on an eight year operating life, the three-year completion date results in a replacement program that creates the same awkward surge in maintenance. The replacement program would also need to be completed in three years for subsequent cycles. An eight-year program transitions smoothly into a continuous replacement cycle that involves replacing one eighth of the total number of LEDs each year.

- The Institute of Transportation Engineers is currently revising the standards for LED Vehicle Traffic Control Signal Heads and these new standards are to be released in 2005. It is anticipated that manufacturers will be given a one-year grace period to adjust to the new standard. Based on the timelines for Expressions of Interest, evaluations and Requests for Quotations plus delivery, supply will not likely be available until the end of 2007. Therefore, under an accelerated Conversion Program, all installed products will need to be in accordance with the existing standard. Significant changes in the new standard include luminous intensity levels and expanded viewing angles. These are important changes that experts in the industry recognize should be made after gaining years of experience with the LED Vehicle Traffic Control Signals under the existing standard.
- As technology improves in this area, new features are introduced that enhance the operation of LED traffic signal lamps. Manufacturers continue to improve their product lines with the leading edge LED lamps now providing intelligent LED capability, providing added energy savings, more reliable internal power supplies, and specification compliance indication. An accelerated LED Conversion Program would preclude the opportunity to take advantage of new technology improvements.
- Additional staff resources would need to be in place immediately to support an accelerated program for the following activities:
  - inventory assessment;
  - preparation of tenders;
  - establishing the energy load profiles;
  - preparing for material tracking;
  - monitoring contract progress; and
  - ensuring adjustment of the Toronto Hydro energy billings.
- In order for the entire LED Conversion Program to be successful, adjustment to Toronto Hydro billings is essential by establishing new load profiles. A meeting was held with TAF and Toronto Hydro to recognize and address these issues on April 7, 2004. The intent, through the support of TAF, was to encourage Toronto Hydro to advise on the issues of the energy billing requirements to adjust for the new loads. To date, there has been no reply from Toronto Hydro.
- The supply of LED signal lamps is a concern under the accelerated program. Quantities of each type and size of LED module displays will need to be determined for tendering purposes. The estimated total number of displays needed is in the area of 15,000 units. Typical delivery lead times are 8 to 10 weeks. Also, quantities ordered of this magnitude will have an enormous impact on operations should we have a premature failure issue of a particular display module, similar to the Region of York's experience with the green LED module. An eight-year Conversion Program, dealing with smaller quantities, provides more opportunity to implement an adequate quality control program.
- The conversion to LED traffic signal lamps is more involved than replacing incandescent signal lamps and issues will arise with the respect to compatibility of the existing traffic signal plant. The accelerated Conversion Program will produce an increased number of compatibility issues that impact other programs. This is particularly true for the City of Toronto, as compared to other municipalities in the Greater Toronto Area, given the age of the traffic control signal plant.

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**Circulated to:** Works Committee Members

**Date:** December 23, 2004