

# TORONTO TRANSIT COMMISSION REPORT NO.

**MEETING DATE:** February 18, 2009

**SUBJECT:** SCOPE CHANGE: INCLUSION OF T1 MOTOR CASTING  
REPLACEMENT IN T1 SUBWAY CAR OVERHAUL

## **ACTION ITEM**

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### **RECOMMENDATION**

It is recommended that the Commission approve:

- 1) Additional project approval in the amount of \$2,000,000.00, to cover unanticipated costs to replace T1 motor castings within TTC Project 4.16 – Subway Car Overhaul, bringing the current estimated final cost to \$47,017,000.00 and the required project approval to \$23,739,000.00;
- 2) Forwarding this report to the City of Toronto Council requesting additional budget and project cost approval in the amount of \$2,000,000.00 for City Project #CTT 051 – Subway Car Overhaul, bringing the total project cost approval to \$23,739,000.00; and
- 3) Authorization of eight additional capital workforce required for a period of twenty-four months that will be required to replace the T1 motor castings.

### **FUNDING**

Funds in the amount of \$45,017,000.00 were included in the TTC Capital Program in Program 4.16 Subway Car Overhaul, under T1 Subway Cars – 10 Year Overhaul as outlined on pages 1053-1055 of the TTC 2009-2013 Capital Program approved by City Council on December 10, 2008. However, no funds were provided for the replacement of T1 motor castings in the 2009-2013 TTC Capital Program.

Every effort will be made to accommodate this increase through under expenditures in other Capital Projects. These funds will be included in the proposed 2010 to 2014 Capital Program.

### **BACKGROUND**

During inspections late in 2007, a T1 traction motor was found with two of three mounting lugs broken. Subsequent fleet inspection found over 40 early production motors with fatigue cracks developing in the lugs; all motors with cracked lugs were immediately removed from service.

Cracks develop from a machining stress concentration on the top surface of the lug. As the lug is an integral part of the ductile iron cast motor housing, weld repair was not possible. A lug motor failure could allow a traction motor to drop to track level, potentially derailing a train.

Further investigation concluded that potentially all motor housings could eventually develop cracks and fail in fatigue. Consequently a decision was made to replace all motor housings. The OEM agreed to provide the housings and TTC would provide the labour for installation. However, the lead time to redesign the lug, develop pattern equipment and cast new housings meant replacement installations could not start until April 2009.

To safely allow T1 cars to continue in service until replacement of the motor housings, TTC Engineering worked with a specialist in Non Destructive Testing (NDT) techniques to develop a method of inspecting the motor lugs on the train and identifying lugs with a crack initiation.

This method utilizes an eddy current non destructive test technique. Since originally finding the broken lug, NDT specialists are being used and will continue to be used to inspect the entire T1 fleet every 90 days until new housings are installed. Cracks develop slowly, allowing for detection while they remain small and pose no risk of failure. Any motor with an indication of a crack is immediately removed from service.

Initially, Engineering Staff tried to design a safety restraint under the motor to prevent it from dropping to track level if the motor lugs failed. After determining that an effective restraint could not be developed (May 2008), it was decided that the motor castings would require replacement. Following discussions with the OEM, it was agreed that they would supply redesigned castings. An acceptable redesign was completed, and in September of 2008 a mutually agreeable production schedule was established, followed by a review of labour required to complete the project. However at the time that this course of action had been determined, the 2009 TTC workforce had already been established, and the relevant Capital documentation submitted for inclusion in the budgets going forward for approval.

## **DISCUSSION**

Under the current scope of the approved Capital Program 4.16 Subway Car Overhaul, 7339 T1 Subway Car Ten Year Overhaul, 74 Vehicles are scheduled for overhaul during each of the following three years. The scope of the motor overhaul must be increased to include the removal of the motor windings; washing, preparation and painting of the new castings and installation of the winding in the castings. In addition, motors already overhauled through the program in 2007 and 2008 must be reworked to include this additional scope.

This additional work will require eight positions at Rail Shops (four General Motor Repairpersons, two Vehicle Repairpersons, one Bench Fitter and one General Spray Painter)

at an estimated cost of \$1,781,000.00 inclusive of fringes, overheads, and wage increases as detailed below.

(\$000s)

	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>TOTAL</b>
Labour \$	662.0	897.1	221.9	1,781.0
Non Labour \$	71.0	95.3	23.3	189.6
Total	733.0	992.4	245.2	1,970.6*

\*Rounded to \$2,000K

**JUSTIFICATION**

The inclusion of the T1 motor casting replacement in the scope of the T1 Subway Car Overhaul is required to eliminate the risk of a mounting lug failure, which could result in a traction motor dropping to track level, potentially derailing a train.

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January 26, 2009  
6-367/79