

AUDIT AT A GLANCE

Audit of the Toronto Transit Commission's Streetcar Overhead Assets: Strengthening the Maintenance and Repair Program to Minimize Asset Failures and Service Delays

WHY THIS AUDIT MATTERS

Toronto Transit Commission (TTC) provides public transit services in the city of Toronto. The TTC streetcar network served 38 million streetcar boardings from January 1 to July 31, 2023. An effective streetcar overhead maintenance and repair program plays a vital role in preventing unexpected asset failures and service delays. In turn, it also helps to minimize public safety risk from exposure to the 600 volts of direct current live wires that make up the electrical overhead contact system that powers the streetcars.

BY THE NUMBERS *(all figures are for TTC Streetcar Overhead Operations in 2022)*

- **106** full-time equivalent employees
- **\$15.6 million** – operating and capital expenses
- **101 intersections and loops across 180 km** of overhead contact system on TTC's streetcar system
- **695 vs. 956** – TTC's preventative inspections work orders (per TTC records)¹ versus TTC's annual preventative inspection target
- **58%** of sampled preventative inspections with issues had no corrective maintenance performed
- **469** – corrective maintenance work orders (per TTC records)²
- **507** – emergency maintenance and repair incidents (per TTC records)¹

WHAT WE FOUND

A. Minimize Asset Failures through Effective Preventative Inspections and Corrective Maintenance, and Investigations into Emergency Maintenance Incidents

- Untimely, missed, or incomplete preventative inspections and corrective maintenance work may have contributed to some service delays in 2022.
- Root cause investigations were not completed for all asset failures and service delays - this is critical to prevent similar asset failures in the future and increase the effectiveness of the maintenance program.

B. Perform and Document Preventative Inspections in a Consistent Manner

- The maintenance schedule was incomplete with inspections manually tracked, increasing the risk of missed preventative inspections.
- Annual preventative inspection targets were not met, and inspections were not completed at specified time intervals.
- A lack of formalized maintenance and inspection manuals and oversight process led to variability in the performance and documentation of preventative inspections.

C. Strengthen Corrective Maintenance and Repairs

- TTC has not established policies, procedures, and criteria for performing and reviewing preventative inspections to identify and prioritize corrective maintenance and repairs.
- Corrective maintenance work performed took an average time of 5 weeks (general expectation target was 2-4 weeks) to complete after issues were identified.

D. Leverage Technology to Improve Streetcar Overhead Operations

- TTC is underutilizing Maximo, an asset and workflow management system implemented by TTC in the early 2000s, resulting in a primarily manual and paper-driven process.
- Optimizing Maximo's capabilities will reduce inefficient manual processes, improve monitoring of work orders, and facilitate data collection and analytics that will support TTC's continuous improvement initiatives.

E. Enhance Data Collection and Performance Reporting to Improve Streetcar Overhead Operations

- TTC can benefit from more outcome-focused key performance indicators (KPIs) that assess the timeliness and quality of maintenance services, as well as ensuring KPIs and targets are clearly defined, with accurate and complete supporting data.

HOW RECOMMENDATIONS WILL BENEFIT THE CITY

Implementing the 20 recommendations contained in this report will help the TTC improve the efficiency and effectiveness of its streetcar overhead maintenance and repair program, by strengthening their asset and workflow management processes, leveraging technology, and enhancing their policies and procedures.

In particular, the recommendations identify opportunities for:

- better planning, scheduling, and tracking of the preventative inspections and corrective maintenance to optimize the use of available resources;
- strengthening policies and procedures that provide clear guidance and expectations to staff and crews to improve consistency;
- improving performance monitoring and reporting, as well as the effectiveness of the maintenance and repair program as a whole; and
- leveraging technologies and enhancing the way data is captured and utilized to improve decision-making abilities and continuous improvement initiatives.

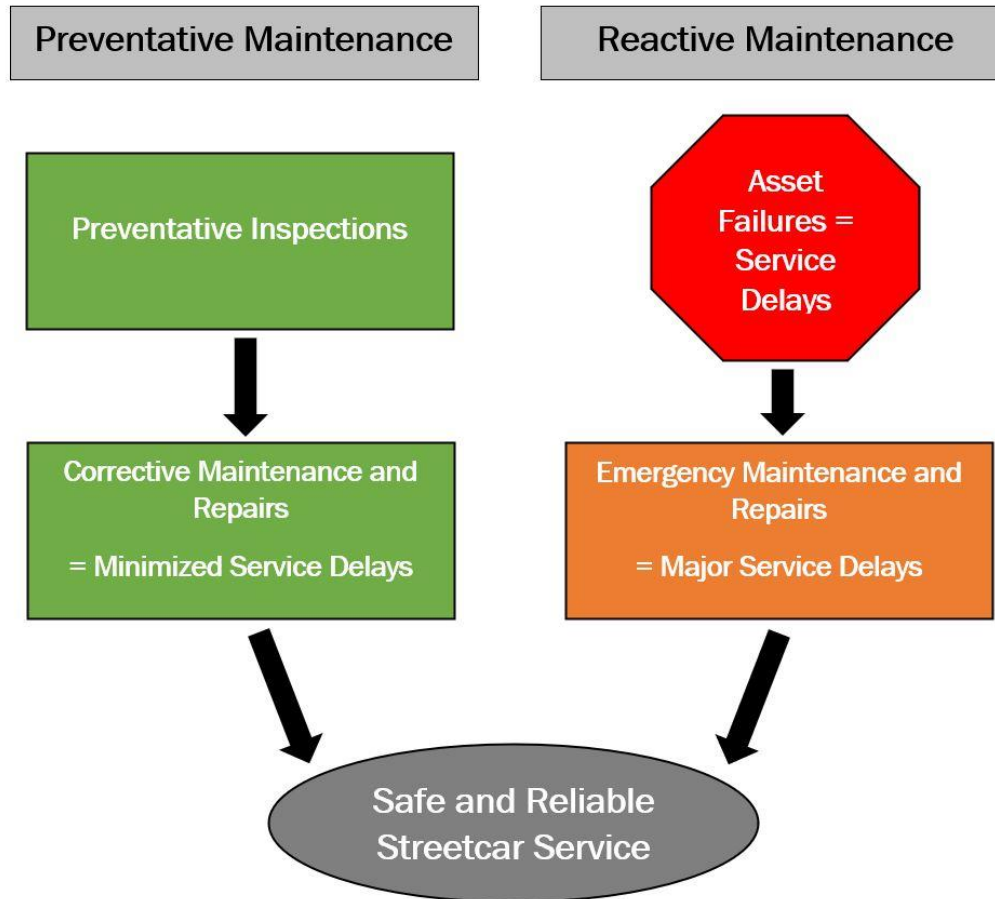
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BACKGROUND

Streetcar Overhead Operations is responsible for the maintenance and repair of the overhead contact system and electrical components of the track switches. The figure below shows that Streetcar Overhead Operations' activities are broken down into preventative maintenance and reactive maintenance, both of which are required to ensure safe and reliable streetcar services.

- Preventative Maintenance – Streetcar Overhead Operations performs regular preventative inspections of the Overhead Contact System to identify and perform corrective maintenance and repairs before there is a failure or breakdown of the Overhead Contact System or electrical switch system.
- Reactive Maintenance – Emergency maintenance and repairs occur after there is an unexpected malfunction, failure, or damage in the various asset components of the Overhead Contact System or electrical switch system. Sometimes these asset failures could have been prevented through preventative inspections and corrective maintenance and repairs, and at other times they are outside the control of the TTC (e.g., third-party truck travelling without storing its loader arms causing damages to the Overhead Contact System).



¹ We were unable to verify the accuracy and completeness of Streetcar Overhead Operations' performance reporting and confirm the number of preventative inspections and emergency maintenance and repair incidents because we noted differences between the performance reporting results and the supporting paper records. See detailed scope limitation on page 65 of the report.

² We were unable to verify the completeness of the number of corrective maintenance work orders due to limitations of the paper-based system used by Streetcar Overhead Operations. See detailed scope limitation on page 65 of report.