

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

Date: November 3, 2023

To: Toronto Transit Commission Audit and Risk Management Committee

From: Auditor General

Wards: All

SUMMARY

The Auditor General's 2022 Work Plan included an operational audit of the Toronto Transit Commission's (TTC's) streetcar operations and services.

The Streetcar Infrastructure – Overhead Operations section (Overhead Operations), the area of focus in this audit, is responsible for the capital construction and installation (State of Good Repair program), as well as ongoing maintenance and repairs of the Overhead Contact System and electrical components of the electrical track switches.

The Overhead Contact System is an electrically powered suspension system that provides 600 volts of direct current electricity to power the streetcar vehicles. Therefore, the Overhead Contact System is critical to streetcar operations as asset failures can result in service disruptions and delays, and can also pose public safety risk.

Overhead Operations has a preventative and corrective maintenance program. The program includes performing regular 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. Both preventative inspections and corrective maintenance and repairs can help reduce the risk of asset failures, leading to increased public safety and service reliability.

Our report draws attention to opportunities for the Toronto Transit Commission to strengthen its streetcar overhead maintenance and repair program, by:

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

B. Performing and Documenting Preventative Inspections in a Consistent Manner

- C. Strengthening Corrective Maintenance and Repairs
- D. Leveraging Technology to Improve Streetcar Overhead Operations
- E. Enhancing Data Collection and Performance Reporting

RECOMMENDATIONS

The Auditor General recommends that:

1. The Board request the Chief Executive Officer, Toronto Transit Commission, to support continuous improvement and increase streetcar service reliability by:
 - a. Reassessing and strengthening existing policies and procedures in Streetcar Overhead Operations to provide more criteria and clarity on the nature and extent of the root cause analysis and investigation required for service delays;
 - b. Determining the root causes for those delays that require investigation according to the policy, in order to prevent the same issues from recurring; and
 - c. Developing and implementing a process in Streetcar Overhead Operations to ensure compliance with the policies and procedures regarding root cause analyses and investigations of service delays.
2. The Board request the Chief Executive Officer, Toronto Transit Commission, to improve communication and information sharing across relevant streetcar and other departments, in order to support continuous improvements and reduce the number of fail-to-operate switch emergency calls. Information collection and sharing across these departments should include:
 - a. Collecting and tracking appropriate and relevant data regarding fail-to-operate switch emergency calls, including but not limited to switch IDs, number of calls, and their results; and
 - b. Using the data collected to perform root cause analyses and investigations with the goal of reducing the number of fail-to-operate switch emergency calls.
3. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop and use a centralized database of Overhead Operations' assets across departments (Streetcar Infrastructure, Transit Control, Streetcar Transportation) to ensure Streetcar Overhead Operations is using an accurate and complete asset database, including a centralized switch inventory, to inform their operational decision-making and optimize their resource allocation.

4. The Board request the Chief Executive Officer, Toronto Transit Commission, to implement policies and procedures in Streetcar Overhead Operations, including oversight and monitoring policies and procedures, to ensure the assets in the Maintenance Schedule are always accurate and complete, and that any required asset changes, additions, and/or removals are made to the Maintenance Schedule on a timely basis.

5. The Board request the Chief Executive Officer, Toronto Transit Commission, to implement policies and procedures in Streetcar Overhead Operations to ensure all completed work orders are recorded on the Maintenance Schedule, in order to plan, manage, and schedule preventative inspections in an efficient manner that optimizes the use of time and resources.

6. The Board request the Chief Executive Officer, Toronto Transit Commission, to review, update, and approve all maintenance and inspection policies, procedures, and manuals in Streetcar Overhead Operations to ensure they are accurate, complete, and relevant, and provide training to staff on them.

7. The Board request the Chief Executive Officer, Toronto Transit Commission, to:

a. Review and update the annual preventative inspection targets in Streetcar Overhead Operations on both an annual and as-needed basis; and

b. Establish policies and procedures to provide clear guidance in Streetcar Overhead Operations on which source data and information is needed for the reassessment.

8. The Board request the Chief Executive Officer, Toronto Transit Commission, to establish and implement standard time expectations for common preventative inspections in Streetcar Overhead Operations and incorporate them into the employee performance evaluation.

9. The Board request the Chief Executive Officer, Toronto Transit Commission, to install and enable GPS on Streetcar Overhead Operations' non-revenue vehicles to effectively monitor and assess performance.

10. The Board request the Chief Executive Officer, Toronto Transit Commission, to:

a. Ensure policies, procedures and manuals in Streetcar Overhead Operations provide clear directions as to how preventative inspections' activity tasks, results, and observations should be performed (including the measurement method) and documented; and

b. Develop and implement an oversight process in Streetcar Overhead Operations (e.g., quality assurance audit program, spot checks, increased supervision) to ensure the accuracy, completeness, and reliability of the documented work orders and consistency of the work performed.

11. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop and implement formalized processes in Streetcar Overhead Operations to:

- a. Ensure preventative inspections comply with annual inspection targets; and
- b. Ensure preventative inspections are scheduled and completed in accordance with Overhead Operations' specified time intervals.

12. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop and implement policies and procedures in Streetcar Overhead Operations to:

- a. Provide clear expectations and training as to how crews should communicate and document preventative inspections that are only partially completed; and
- b. Track and ensure partially completed inspections are appropriately rescheduled to be fully completed.

13. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop and implement policies and procedures for Streetcar Overhead Operations' preventative and corrective maintenance program, which includes but is not limited to providing:

- a. A set of criteria for each asset type to determine if corrective maintenance and repair work orders need to be generated, based on risks and implications;
- b. Clear timing expectations for reviewing completed preventative inspections and generating any necessary corrective maintenance work orders; and
- c. Clear criteria and timing expectations for the prioritization and completion of corrective maintenance work orders, based on risks and implications.

14. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop and implement in Streetcar Overhead Operations:

- a. Standard Operating Procedures that outline the steps to be taken to ensure the measuring tools used by crews during inspections (e.g., calipers) are in good working order; and
- b. An oversight process to monitor and ensure compliance with the Standard Operating Procedures.

15. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop a comprehensive Maximo implementation plan to ensure Maximo is implemented as both an enterprise asset management system and workflow process management system for Streetcar Overhead Operations. This implementation plan should include, but not be limited to:

- a. Detailed implementation target dates and timelines; and

b. Implementation of Maximo Anywhere to all crews, not just emergency crews.

16. The Board request the Chief Executive Officer, Toronto Transit Commission, to provide appropriate Maximo training to responsible frontline crews/technicians/staff and management in order to fully leverage existing Maximo technology for Streetcar Overhead Operations.

17. The Board request the Chief Executive Officer, Toronto Transit Commission, to review and update Streetcar Overhead Operations' asset inventory and job plans/activity tasks in Maximo to ensure they are complete, accurate, and up-to-date, in order to support the planning and completion of repair and maintenance work.

18. The Board request the Chief Executive Officer, Toronto Transit Commission, to develop and implement a process in Streetcar Overhead Operations using Maximo to track the real-time status of work orders to support ongoing work order management and supervision.

19. The Board request the Chief Executive Officer, Toronto Transit Commission, to leverage Maximo to collect and track observations from Streetcar Overhead Operations' assets inspections, and information about maintenance and repairs activities, that can be used for data mining and trend analysis to support Key Performance Indicator reporting and inform decision-making.

20. The Board request the Chief Executive Officer, Toronto Transit Commission, to improve the Key Performance Indicator reporting for Streetcar Overhead Operations by:

a. Establishing clearly defined, appropriate, outcome-focused Key Performance Indicators and targets;

b. Developing short- and long-term strategies to meet these targets;

c. Regularly reassessing to determine whether Key Performance Indicators and targets need to be revised; and

d. Retaining supporting data and verifying the accuracy of data used for Key Performance Indicator reporting, ongoing oversight, and management decision-making.

21. The Board forward this report to City Council for information through the City's Audit Committee.

FINANCIAL IMPACT

Based on the work performed with the information we could obtain, it is our view that the TTC's current work processes resulted in estimated inefficiencies of 2,469 labour hours in 2022 that could have been avoided or better used. By addressing the recommendations in this report, the TTC will be able to improve the efficiency and effectiveness of its streetcar overhead maintenance and repair program, by

strengthening their asset and workflow management, leveraging technology, and enhancing their policies and procedures. The resulting financial implications of any anticipated efficiencies from implementing the recommendations in this report is not determinable at this time.

DECISION HISTORY

The Auditor General's 2022 Work Plan included an operational audit of the Toronto Transit Commission's streetcar operations and services.

This report highlights the results of our audit of the Toronto Transit Commission's streetcar overhead asset operations, including an examination of its streetcar overhead maintenance and repair program and activities.

COMMENTS

A high-level summary of the key audit findings is provided in the two-page Audit at-a-Glance.

The attached audit report provides the TTC Audit and Risk Management Committee, and the TTC Board with the detailed audit results and recommendations together with management's response. Management has agreed to all 20 recommendations.

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SIGNATURE

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ATTACHMENTS

Attachment 1: Audit of the Toronto Transit Commission's Streetcar Overhead Assets: Strengthening the Maintenance and Repair Program to Minimize Asset Failures and Service Delays