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DATE: September 30, 2024
30 septembre 2024

FILE NUMBER: ACS2024-TSD-GEN-0002

SUBJECT: Transit Services Department's approach to Safety Management for the vehicle/track interface on Line 1 both at Revenue Service and during operations.

PURPOSE

The purpose of this memorandum is to report to Transit Commission and respond to Councillor Hill's inquiry on Transit Services Department's approach to maintain and oversee the vehicle/track interface on O-Train Line 1 (the Confederation Line) both at Revenue Service and during operations authority.

BACKGROUND

At the joint meeting of the Transit Commission and the Light Rail Sub-Committee, on May 31, 2024, Councillor Hill provided a direction to staff:

- That staff be directed to provide an update to the Transit Commission, by end of Q3 2024, on the City's Transit Services Department's approach to Safety Management for the vehicle/track interface on Line 1 both at Revenue Service and during operations.

In response to this request, OC Transpo provides the following discussion broken down into two key sections; Safety validation at time of revenue service availability in September 2019 and the safety assurance program adhered to since that time. We will also discuss other tools employed by OC Transpo in our management of safety on Line 1.

At the time that O-Train Line 1 commenced Revenue Service in late 2019, Rideau Transit Group submitted an Engineering Safety and Assurance Case (ESAC) that validated that the rail systems, including vehicles, were safe for passenger service. Based on the review of this document by TUV Canada, the Independent Safety Auditor, they were able to confirm that the safety requirements of the project had been met. Simultaneously, the Safety Management System (SMS) of OC Transpo was updated to include all necessary project-specific standard operating procedures, hazard logs and other key documents and processes from the Confederation Line design build project archives. etc.

DISCUSSION

The Hazard Analysis work carried out by OLRTC as part of their design process following EN 50126 included the Track Sub-System Hazard Analysis (SSHA) with the risks specific to track infrastructure summarised in the Track Safety Justification Report. The Hazard

ID # *TRK-H-02 - Improper rail/wheel interface* is the most relevant in the current discussion. The Hazard Analysis completed for TRK-H-02 in the Track Safety Justification Report lists design mitigations, as well as operational procedures, maintenance, and monitoring mitigations that prevent an improper wheel/rail interface. The conclusion of the hazard analysis was as follows:

> "*Based upon the detailed review of the evidence presented, it is considered that this hazard has been reduced to an acceptable level and the infrastructure is acceptable for operation of live services."*

The final conclusion of the Track Safety Justification Report indicated that the "*Ottawa Confederation Line Phase 1 Track is considered to be acceptably safe and suitable for the onset of Revenue Service*".

The above-mentioned documents formed pieces of the overarching assurance structure set out in the Engineering Safety and Assurance Case (ESAC). In line with accepted assurance methodologies and best practice, the ESAC had two key arguments used to assure entry into service operations: Product (Technical / Engineering Evidence) and Process (Process Evidence). Evidence provided assured the Independent Safety Auditor of the technical integrity of the product, process, and system as it related to the Confederation Line Phase 1 operations. The pillars under each argument were evaluated using a risk-based assurance approach by the Independent Safety Auditor allowing them to conclude that "*Confederation Line Phase 1 is 'Fit for Operation'*". It is important to note that this safety case was reviewed and agreed upon by the City, and the Independent Safety Auditor.

In order to meet the requirements of the Transport Canada Delegation Agreement, the Confederation Line regulatory regime requires a certain level of formal documentation as well as some level of independent regulatory oversight and administration. In other words, the Transport Canada Delegation Agreement would not permit OC Transpo to entirely regulate itself.

This separate oversight and administration role has been delegated by City Council to the City Manager who is supported by the Regulatory Monitor and Compliance Officer as well as various personnel in the City Manager's Office, , Legal Services, and periodically other City employees and independent contractors, consultants and advisors as required from time to time.

OC Transpo adheres to the adopted LRT Regulations, which include regulations relating to rail safety and security plans, programs, practices, standards, procedures, and other

requirements. The *Confederation Line Designated Regulations (CLR)* document continues to act as a regulatory document for the purpose of further affirming, clarifying, and formalizing the regulatory regime for the Confederation Line.
OC Transpo's safety approach and program mechanisms largely fall under the Safety Management System (SMS) program umbrella. This system provides a framework for managing the safety risk associated with day-to-day railway operations. The SMS, adopted by all railways in various forms, complements existing federal regulations which include the *Railway Safety Act* requirements, operating rules, and engineering standards in the industry. The SMS leverages industry wide best practices. Within the SMS, specific programs, as outlined below, have been incorporated to support the safety management and oversight of O-Train Line 1 relating to vehicle and track infrastructure.

OC Transpo's SMS document addresses how safety processes are integrated into transit operations and are constantly evolving to ensure that initiatives, directives, process, and information is current. Specifically, the SMS:

- Describes the safety program at an organization-wide level;
- Provides written documentation demonstrating OC Transpo's commitment to safety;
- Provides a process for monitoring conformance and compliance with regulations and implemented processes;
- Describes the risk management process including the risk assessment process and rail hazard management process;
- Provides an outline for the oversight processes used to monitor activities performed on the Confederation Line;
- Identifies the relationships and responsibilities within OC Transpo and other organizations and agencies that have an impact on safe operations; and,
- Mandates OC Transpo to address safety concerns that have been identified.

Looking ahead, the City's Safety Assurance will be guided by the existing Safety Management System (SMS) processes and industry standards including *CSA R114:22, Canadian method for risk evaluation and assessment for railway systems.*

As per the Delegation Agreement, an annual report on safety/security is prepared for Transport Canada. Additionally, audits of the *Safety Management System* (SMS) and *Security Management System* (SeMS) are completed every three (3) years, with the next audits being completed later this year in Q4 2024.

Confederation Line Safety Management Committee
In line with the SMS, the Confederation Line Safety Committee provides a forum to

continuously improve safe operations on the Confederation Line. The committee includes representation from OC Transpo and the long-term maintenance contractor, Rideau Transit Group (RTG) and Rideau Transit Maintenance (RTM). The committee provides an opportunity for parties to discuss the safety and security of operations and maintenance activities relating to the Confederation Line. At every meeting there is a review of recent safety occurrences and an ongoing discussion of risk/hazard management.

Regulatory Monitor and Compliance Officer Monitoring (RMCO)

As part of their role, the Regulatory Monitor and Compliance Officer (RMCO) monitors regulatory compliance for safety and security during operations and maintenance. The RMCO, hired in 2018, started the monitoring in 2019 after the start of revenue service. The RMCO conducts ongoing monitoring, field observations of operations, maintenance and/or safety/security management activities related to the Confederation Line. When non-compliance/non-conformance findings have been identified, the RMCO will issue their findings, and the City will follow up to ensure corrective actions are developed and implemented both internally with OC Transpo staff and other departments if necessary, and externally with its Contractor RTG.

The RMCO has a singular focus on the Confederation Line and provides updates to the City Manager on a quarterly basis. Additionally, the RMCO prepares an annual compliance report which is presented to the City's Transit Commission and Council. RMCO monitoring represents one of several layers of oversight in the City's Regulatory Regime for the Confederation Line.

OC Transpo's Line 1 Oversight Plan

The Line 1 Oversight Plan was developed using industry best practices and standards, and with input from industry expertise in transit management, oversight, safety, quality, and operations. The scope of the Oversight Plan was determined by referencing the LRT Regulations, the Project Agreement and OC Transpo's own plans and procedures. There are two main focuses of oversight being performed to assure compliance with the LRT Regulations, the requirements specified in the Project Agreement, and OC Transpo requirements. OC Transpo's Rail Systems and Regulatory Compliance, Quality Control and Assurance teams provide oversight of the maintenance contractor, as well as internal oversight of OC Transpo, where applicable.

The Line 1 Oversight Plan includes the inspection, document review, monitoring, and auditing of the Contractor's performance of the services, operation and maintenance of Line 1 as defined in the Project Agreement, as well as OC Transpo's own compliance. The scope of the oversight plan includes safety and security, all infrastructure, systems, track, vehicles, and services included in the Project Agreement and regulatory framework.

Specific to track, OC Transpo's Rail Systems group performs mainline inspections, as well as reviews of the maintainer's track inspection documentation, detailing track equipment, geometry surveys, special trackwork, and other components. OC Transpo also engages industry subject matter experts to assist in the performance of track-specific audits. Any issues or deficiencies identified through any of the above noted inspection methods are brought to the attention of the maintainer and discussed in regular meetings or working groups.

Any identified non-compliances result in a corrective action report (CAR) which is issued to the relevant party for resolution within a specified timeframe.

In addition to the performance of oversight, OC Transpo also collaborates with the maintainer on the review and implementation of infrastructure enhancements through the Change Control Board process. Several updates designed to improve system reliability and performance have already been implemented through this process, including but not limited to changes to the restraining rail, top of rail lubrication, and the hub nut pinning program.

OC Transpo and RTM also rely on recommendations from Alstom, the vehicle maintainer, to make modifications or updates to operations and maintenance procedures based on current conditions. These recommendations come in the form of Safety Notes, which are reviewed and updated on a regular basis by Alstom. A recent example of the implementation of these Safety Notes was the addition of Temporary Speed Restrictions (TSRs) at specific locations across the mainline, in response to the axle bearing issue identified on the Confederation Line light-rail vehicle (LRV) fleet. The TSRs were implemented as a means to reduce dynamic loading on the vehicles, a proactive measure while the nut pinning program continues.

OC Transpo continues to work with RTM and Alstom on research and test programs to obtain more data about the wheel/rail interface that can help inform future changes and improvements to the system. Alstom has completed a fourth round of instrumented bogie testing to validate the improvements that the newly introduced top of rail lubrication system brings to both the ride quality, and dynamic performance of the LRV. Testing at the National Research Council (NRC) concluded that a vibration signature could be detected on a worn cartridge bearing assembly and the next step is to determine how a vibration device and system can be utilized for a full fleet deployment. This is in addition to previous testing and reports completed by both Alstom and the NRC. While research continues on several fronts, the Confederation Line fleet is still subject to a stringent maintenance and inspection regime, including checks and measurements of the new pinned axle hubs. Additional measurements were added to the regime through Alstom's Safety Notes, increasing the frequency of inspections while the work on the axle bearing issue continues.

Conclusion

There are several other programs, practices and reports that support the SMS and OC Transpo's processes to ensure safe operation of the entire transit network. The SMS continues to serve as OC Transpo's commitment to the ongoing development and continuous improvement of transit's safety environment. Safety improvements as supported through a focused approach to linking the key safety elements of hazard identification, reporting processes, data collection and analysis, and recommended corrective actions. In leveraging the programs that fall within this safety framework, OC Transpo continues to manage the safe operation and maintenance of the City's public transit system.

For additional information on the vehicle/track interface and safety management system as referenced, please contact Richard Holder or Duane Duquette.

Respectfully,

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