

Trillium Line Peer Review Action Tracker

Reference	Title	Recommendation	Action	Status	Action Update
TVS.01	Tunnel Ventilation documentation	A detailed design review of all Tunnel Ventilation documentation should be conducted to correct any inconsistency and/or discrepancy and ensure that the correct design will be implemented in accordance with the PA requirements.	<p>Based on the recommendation, the City has requested TransitNEXT review the documentation and correct any inconsistencies and/or discrepancies to ensure that implementation and design are aligned.</p> <p>TransitNEXT will review and update all necessary reports and documents then provide to the City.</p>	Ongoing	The testing and commissioning process, along with final compliance verification, is currently in progress. The necessary documentation will be submitted as the project advances. This documentation will undergo a thorough review to ensure that all requirements outlined in the Project Agreement have been met and validated through testing.
TVS.02	Tunnel Temperature & Trains HVAC	We recommend performing an analysis to ensure that the tunnel temperature never reaches trains HVAC tripping temperature.	<p>The recommendation refers to a situation where if the train is idling in the tunnel, the heat that the train would give off would not increase the temperature within the tunnel to such a point that the train's cooling equipment (HVAC equipment) would shut off.</p> <p>To address this recommendation, The City and TransitNEXT have incorporated design elements into the tunnel to address emergencies that are more stringent. For example, design elements have been incorporated into the tunnel to address an emergency where the train becomes disabled and catches fire.</p> <p>Emergency mitigation measures for the tunnel include jet fans, dry fire lines, emergency walkways and emergency staircases. For instance, if the tunnel temperature was to trigger the HVAC system on the train, and the HVAC system was to fail, mitigation measures would include the jet fans activating to reduce the temperature in the tunnel and/or the passengers and operator would exit the train, walk down the emergency walkway and up the staircase at either end of the tunnel.</p> <p>The City will complete a technical summary of the issue at hand for the project records.</p>	Ongoing	Testing and Commissioning for the Tunnel Ventilation System are still ongoing, and the City is committed to completing a technical report to address this recommendation for the project records before its completion.
RS.01	Interiors & Exterior Noise Tests	For both types of vehicles, we recommend that the vehicles' interior and exterior noise tests are performed as soon as a track length allows to safely reach 85 km/h and brake afterwards to measure the interior noise as well as exterior wayside noise 25 m from the train as required by the PA Schedule 15-2 Part 8, Section 1.8 (a) & (b).	The City and TransitNEXT intend to fully comply with the Project Agreement in respect of acoustic performance testing. Interior and exterior noise testing shall be performed on the Stadler FLIRT vehicle. The Alstom LINT vehicle is a pre-existing vehicle owned by the City and previously used for service on the Trillium Line. The City is satisfied with the acoustic performance of the Alstom LINT vehicle as the acoustics qualifications for the Alstom LINT were conducted during its original delivery as part of a separate contract.	Ongoing	The plans are in place to initiate both interior and exterior noise tests on the Stadler FLIRT vehicle. The testing was conducted in late August 2023. However, it is anticipated that the results will not be available for several weeks following the test. Stadler has engaged a third-party acoustics expert to conduct this assessment, ensuring the integrity and accuracy of the results.
TCS.01	Train Control System Test (GEBR Test)	We recommend that the GEBR test be added in the site test procedures according to the condition required by IEEE1474.1 chapter 6.1.2.1.	<p>The City of Ottawa notes that the IEEE 1474.1 does not apply to the specific signal system being used but acknowledges the general requirement to validate the guaranteed emergency brake rate (GEBR). Stadler has submitted a test procedure with the intent to quantify GEBR. The City and TransitNEXT are coordinating to complete the test procedure which identifies testing with degraded modes.</p> <p>Additionally, vehicle GEBR forms part of a larger integrated approach with the Signaling and Train Control System. This approach is captured in the Safe Braking Model documentation which addresses brake rates, application, and response times among various other parameters.</p>	Ongoing	The brake testing has been successfully completed. However, it is noted that a formal report quantifying the results is pending receipt. Further updates on this matter will be communicated once the report is available.

Trillium Line Peer Review Action Tracker

Reference	Title	Recommendation	Action	Status	Action Update
OPS.05	Additional Incident Simulations	To improve the accuracy of operating procedure and have a better understanding of the line operation robustness, we recommend making stochastic simulation with incidents closer to reality, for example: Doors technical issue at the station in the main line (train blocked 10 to 15 minutes) Passenger sick and unconscious in a train (20 minutes for waiting emergency services) Etc.	<p>For clarity, stochastic simulation is a type of mathematical modeling technique that incorporates randomness and uncertainty into the model. It uses various possible outcomes for various model inputs to generate the simulation results.</p> <p>The purpose of TransitNEXT's Operational Modeling Report is to demonstrate that the Trillium Line will operate per the requirements of the Project Agreement, including the prescribed train frequency headways. Operational modeling simulation is typically undertaken based on ideal operating scenarios, whereas stochastic simulation is a type of modeling that introduces randomness and uncertainty into the simulation. In the context of the Trillium Line Operational Modeling Report, stochastic simulation was undertaken by simulating numerous operating scenarios outside of 'normal' service, including dwell time and operator performance variability to validate that the system can continue to operate in abnormal conditions and to demonstrate that the system can recover.</p> <p>The City is satisfied with the stochastic simulation that has been completed by TransitNEXT in its Operational Modeling Report. Degraded mode scenarios were presented in the Operational Modelling Report and include track blockages on the mainline and departure delays from terminal stations. Trial Running will provide the opportunity to further test degraded operational scenarios, and an opportunity to validate the results of the stochastic simulation.</p>	Ongoing	The City acknowledges the importance of enhancing the accuracy of operating procedures and gaining a comprehensive understanding of lines' operational robustness. As noted in the action plan, the City is content with the stochastic simulation conducted by TransitNEXT as presented in the Operational Modeling Report. Further validation is currently being done during the ongoing dynamic signal and train control testing and commissioning and will be verified during the Trial Running phase. The Trial Running Phase will provide an opportunity to comprehensively verify the 12 minute headways and test degraded operational scenarios.
MAI.01	Maintenance Mobilization Plan	Given the shortage of qualified resources in Canada, we recommend that TNext produce a Maintenance mobilization plan with a clear schedule and KPIs to follow to anticipate any future issues.	<p>TransitNEXT has provided its proposed vehicle maintenance staffing count in the draft Maintenance & Rehabilitation (M&R) Plan. While the project faces the same challenges that are being experienced generally in the current economic climate with respect to acquiring and retaining staff at a reasonable cost, the City remains of the view that achieving the requisite level of qualified staffing for vehicle maintenance remains achievable. For example, TransitNEXT has hired seven former Alstom vehicle technicians who previously provided maintenance for the Trillium Line LINT DMUs to mitigate the risk in this regard.</p> <p>Further, issues such as M&R Staff and Equipment & Documentation Mobilization are being addressed by the City and TransitNEXT in bi-weekly Maintenance Committee meetings as well as a targeted Workshop between M&R and the City with the goal of ensuring maintenance readiness.</p>	Ongoing	TransitNext has provided the City with updates on the maintenance mobilization readiness as requested by the City. TransitNext has almost all staff recruited and ready to commence as needed. Many staff have previous experience with the Alstom vehicles or are coming from the TransitNext construction team. TransitNext continues to source and procure the necessary spare parts and equipment needed for effective maintenance of the system when it is launched. The City continues to have regular meetings with TransitNEXT on maintenance readiness which remains a standing item for the biweekly maintenance committee meeting and weekly Rail Activation Management Program meeting.
MAI.05	Maintenance Software	The City should ensure that the development of the maintenance software (Agility) is included in the schedule along with the training of the personnel. Clear milestone should be followed with KPI. As of today, there is no backup solution. As a consequence, we recommend that the City works with the different stakeholders (provider, construction teams, and final users) for a backup solution in the event that the CMMS system is not ready on time.	The City and TransitNEXT will utilize a Maintenance Management Performance Reporting System (MMPRS). Lessons learned from Line 1 have led to the City and TransitNEXT working collaboratively on the reporting system. A testing plan will be implemented prior to substantial completion and will be used during trial running to assess the system's readiness from operations. The City has regular meetings with TransitNEXT on MMPRS which remains a standing item for the biweekly maintenance committee meeting.	Ongoing	The City and TransitNext are finalizing the development of the Maintenance Management Performance Reporting System (MMPRS) which will be completed for Trial Running. There is a 4 - 6 week testing and validation program scheduled to start in October 2023. TransitNext is also developing a PowerBI backup solution to ensure the performance reporting component of the MMPRS is redundant. The City continues to have regular meetings with TransitNEXT on MMPRS which remains a standing item for the biweekly maintenance committee meeting and weekly Rail Activation Management Program meeting.

Trillium Line Peer Review Action Tracker

Reference	Title	Recommendation	Action	Status	Action Update
OPS.01	2048 Ridership Forecast	Review the analysis for the PPHPD forecasted in 2031 and 2048, taking into account the minimum headway and the actual train fleet to see if improvements are necessary to achieve 2048 PPHPD.	<p>The forecasted ridership outlined in Project Agreement remains a valid objective of 2048, however, various factors, including the recent COVID-19 pandemic, have caused current ridership levels to change. It is the City's view that analysis and validation of ridership will need to be reassessed once the system has opened to the public.</p> <p>As additional background on this point, infrastructure restrictions (various bridges, Dow's Lake tunnel, and the rock cut) create a requirement for single tracking in the northern section of the line and this single tracking requirement dictates the 12-minute headway. Operational testing later in the year will provide a good opportunity to reassess the upgrades that would be required in the future to reduce the headways and increase the capacity of the system.</p>	For Future Consideration	Testing to reassess potential upgrades for future capacity enhancements, including reductions in headways, is currently in progress. The operational testing phase, scheduled for completion later this year, will provide valuable insights to inform any necessary adjustments.
OPS.02	8th Stadler Train	The option to order an 8th Stadler train should seriously be considered to reduce the risk of degraded operations due to an unplanned maintenance on the new Stadler trains.	<p>While the addition of an eighth train to supplement the service would assist in achieving and maintaining the required level of service, the City is satisfied that the requisite level of service remains achievable using seven Stadler trains as required in the Project Agreement. To minimize the risk of service interruption, maintenance schedules are organized so that the trains are unlikely to require maintenance and inspection simultaneously. In the event that unexpected maintenance issues arise, the spare Alstom LINT fleet will be used as replacement trains.</p> <p>While the City has the option to buy an additional train to supplement the service, there are several factors to consider in determining whether the purchase is appropriate. Firstly, purchasing the extra train involves a minimum capital cost of \$18.5 million (vehicle price, additional project delivery oversight, additional train control equipment) as well as additional long term maintenance costs. Secondly, the procurement and delivery timeline for the train is estimated to take at least one year. As such, while the eighth train would increase redundancy and may improve fleet availability, acquiring the additional train is cost prohibitive and would require a significant investment of time. As additional background, the City has protected for electrification of the Trillium Line in order to further reduce our carbon footprint. Historically, the path to electrification has been envisioned to include the installation of an overhead catenary system on the line. The Stadler trains can be modified to integrate with an overhead network but there may be other options in the future including battery-based trains or a mixed system using batteries for portions of the line and overhead catenary elsewhere. The introduction of an eighth vehicle could in the future, be leveraged to trial an electric system.</p>	For Future Consideration	The potential acquisition of an additional train to enhance the service has been thoroughly reviewed, and will not be considered as part of Stage 2. Despite this, we remain dedicated to evaluating innovative solutions that align with our commitment to sustainable transportation.
OPS.03	Minimum Achievable Headway	Considering the ridership forecasted, simulate what is the minimum headway achievable on the line to have a comprehensive understanding of the margin available in case of disruption.	The Trillium Line Project Agreement anticipates a service headway of 12 minutes. The 12-minute headway will be confirmed during testing and commissioning and trial running. Headway times are coordinated to function in conjunction with allowable train speeds and acceleration curves, the single track sections using sidings, the Automatic Train Control System and the Signaling and Train Control Systems. When in operation, should the system face disruption (e.g., delay imposed on the system), it is intended that the system will recover by reducing the dwell times at terminal stations as opposed to reducing headway time.	For Future Consideration	Testing is currently underway to validate the 12-minute headway, with a focus on optimizing dwell times at terminal stations rather than altering headway times in the event of train delays.
OPS.04	South Keys Turnaround Time	Use a turnaround time of at least 5 minutes at South Key for the trains of the Airport Link.	<p>The Trillium Line Project Agreement anticipates achieving the required level of service with a turnaround time of three minutes at South Keys Station for Airport Link trains. The City is satisfied that that the TransitNEXT Operational Modelling Report has demonstrated that the system is able to run and maintain 12-minute headways with 3-minute dwell times at South Keys Siding and Airport Station, which will be validated during testing and commissioning and trial running.</p> <p>Although a 5-minute dwell time may provide an additional buffer for derogated operational scenarios, the increase in dwell time would have an operational impact on the mainline service and the ability to achieve a headway of 12-minutes. Due to the single-track sections on the Airport Link, increasing the dwell time would require the interaction between the two Airport Link trains to be reviewed to confirm the impact on the system as adding dwell time to one station may cause a delay for another train as it waits for the train to pass on the double track section.</p>	For Future Consideration	Testing is currently in progress to assess the operational feasibility of a 3-minute dwell time at South Keys Station for Airport Link trains.