

Subject: Trillium Stage 2 – Independent Peer Review

File Number: ACS2023-TSD-RC-008

Report to Light Rail Sub-Committee on 26 May 2023

Submitted on May 16, 2023 by Renée Amilcar, General Manager, Transit Services Department

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Ward: Citywide

Objet : Étape 2 de la Ligne Trillium – Examen par des pairs

Dossier : ACS2023-TSD-RC-008

Rapport au Sous-comité du train léger

le 26 mai 2023

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REPORT RECOMMENDATION(S)

That the Light Rail Sub-Committee receive this report for information.

RECOMMANDATION(S) DU RAPPORT

Que le Sous-comité du train léger prenne connaissance du présent rapport à titre d'information.

EXECUTIVE SUMMARY

On January 26, 2022, City Council directed the Director of Rail Construction to undertake a third-party peer review of the Stage 2 Trillium Line Project to evaluate all aspects of the project, including design, construction, commissioning, training, operational readiness, and maintenance activities. The main objectives of this review are twofold: first, to analyze and validate the strategies and methodologies used by TransitNEXT, and second, to identify any potential issues or challenges that may arise at the start of revenue service.

Following a public procurement process, SYSTRA Canada Inc., in partnership with RATP Dev Canada, was selected to undertake a comprehensive review and analysis of the Stage 2 Trillium Line Project in May 2022. These two firms provide complementary strengths and a broad depth of experience to ensure that the Trillium Line peer review is thorough and reflective of the current state of industry practice worldwide.

SYSTRA Group is a world-leading engineering and consulting firm, while RATP Group is the world's third largest public transport entity, provides operations and maintenance services on 30 light rail lines, and has active transit operations in 14 countries. Recently, these firms completed a similar peer review of the ARTM Blue Line Extension in Montreal.

The Stage 2 Trillium Line Peer Review Final Report highlights that both TransitNEXT and the City of Ottawa were receptive to discussion regarding the project's progress and challenges. According to the report, the process followed by TransitNEXT and their team is consistent with international standards and appropriate for delivering the Trillium Line project. The report also concluded that the project management practices are sufficient and that appropriate tools are in place to maintain control of the project's progress and to address potential risks.

The Peer Review Final Report made 47 recommendations. The City of Ottawa and TransitNEXT have formulated and implemented a comprehensive response and action plan to address all 47 recommendations, as detailed in this report.

The recommendations are categorized into five groups: Project Management, Rail Infrastructure, Rail Systems, Operations and Maintenance, and Safety.

To provide further context, it is important to note that the Stage 2 Trillium Line Peer Review was conducted while the project was ongoing. As a result, several identified issues were addressed progressively by the City of Ottawa and TransitNEXT. Any

remaining issues have either been addressed or have a plan in place to be addressed. The comprehensive response and action plan implemented by the City of Ottawa and TransitNEXT demonstrate their commitment to ensuring that the Trillium Line project is delivered successfully and meets the highest standards of safety and quality.

Project Management:

The peer review identified three recommendations related to the management of the Stage 2 Trillium Line Project. The City of Ottawa and TransitNEXT have implemented all three recommendations.

Rail Infrastructure:

The peer review identified five recommendations related to rail infrastructure, including additional design verification, design documentation, work methods, and standard operating procedures. The City of Ottawa and TransitNEXT have addressed three of the five items and have plans in place to address the remaining two.

Rail Systems:

The peer review outlined 20 recommendations related to the rail system being delivered as follows:

Six recommendations specify additional testing for the rolling stock. All tests have either been completed or are planned to be completed prior to substantial completion of the Trillium Line system.

Six recommendations for additional testing. This is to ensure a comprehensive testing and commissioning (T&C) program are developed and executed. As the project has progressed, the City of Ottawa and TransitNEXT have developed the T&C program to address all recommendations.

Finally, there are eight recommendations related to specific detailed technical requirements and specifications. The City and TransitNEXT have addressed each of the recommendations in accordance with the applicable standard, Project Agreement or industry best practice and as verified by the City's third-party engineering consultants.

Operations and Maintenance:

The peer review identified nine recommendations related to operations and maintenance of the system. The recommendations deal with various operating parameters and requirements, additional operational scenario testing, and specific

maintenance related obligations. The City and TransitNEXT have addressed or have a plan to address the technical recommendations with at least two recommendations residing with the City for future decisions.

Safety Processes:

The peer review outlined 10 recommendations to improve the safety review processes and safety documentation for the project. These recommendations have been addressed through updated documentation, and where a different approach has been taken, the City's approach to the application of the standards have been reviewed and validated by the City's Independent Safety Auditor. For clarity, the City's Independent Safety Auditor is SENER.

Conclusion:

The Stage 2 Trillium Line Project has undergone a comprehensive peer review process, which has identified specific issues and recommendations for improvement in various areas. All recommendations have been addressed by the City of Ottawa and TransitNEXT. The strategies and methodologies to address the recommendations employed by TransitNEXT have satisfied the City of Ottawa and in many cases have been validated by the City's third-party engineering consultants and Independent Safety Auditor.

Overall, the City of Ottawa and TransitNEXT are committed to delivering a safe, reliable, and efficient rail system that meets the needs of our customers, community and stakeholders. We will continue to work closely with our partners and stakeholders to ensure that the Stage 2 Trillium Line Project is a success.

BACKGROUND

The O-Train Stage 1 Line 1 is a 12.5-kilometre twin-track electric light rail transit (LRT) system operating as an east-west transit route through the city of Ottawa from Blair Station to Tunney's Pasture Station. The line commenced service in September 2019.

The original O-Train Line 2 system began operations in October 2001 as an 8-kilometre diesel light rail service with five stations. The system used three Bombardier Talent diesel multiple-unit vehicles and provided service every 15 minutes. In March 2015, the City upgraded the system with the construction of new rail sidings and platforms, track and signal upgrades, and six Alstom LINT DMU vehicles. The project also included an upgrade to the centralized traffic control.

In May 2020, Line 2 closed to customers for construction of the Stage 2 project south extension, approved by Council on March 6, 2019.

Through a competitive procurement, TransitNEXT, a wholly owned subsidiary of SNC-Lavalin, was the successful proponent for the design, build, finance and maintain contract for the Trillium Line Extension.

The Stage 2 Project south extension is a 12-kilometre extension to the existing single-track, diesel-powered, north-south line from its present southern terminus at Greenboro Station to Limebank Station. The project also includes a new 4-kilometre line connecting a new South Keys Station to the Ottawa Macdonald-Cartier International Airport. The system will continue to use a strategy of passing sidings and coordinated passing movements to complement additional twin track provided in a number of places.

On January 26, 2022, Council approved Motion 62/28, directing the Director of Rail Construction to undertake a third-party peer review of the strategy for design, construction, commissioning, and maintenance of the Trillium Line by TransitNEXT to identify potential challenges caused by design, construction, commissioning, training, and/or organizational design that could be remediated before the rail line is completed.

Following a competitive procurement process, SYSTRA Canada Inc. and RATP Dev Canada were selected to undertake a comprehensive review and analysis of the Stage 2 Trillium Line Project in May 2022. SYSTRA Canada Inc. is a global transportation consulting and engineering firm with over 60 years of experience. They provide services from advising city authorities on transportation strategy to managing transportation projects to ensure efficient modern energy transition. SYSTRA Canada's Transit Division offers innovative passenger transportation solutions.

RATP Group is a leading provider of operations and maintenance services for urban and regional transportation. With over 120 years of experience, RATP has designed, built, operated, and modernized urban rail systems in 14 countries. RATP Dev Canada, is currently involved in major rail transit procurements in Canada. Both SYSTRA and RATP have worked on notable projects such as the ARTM Blue Line Extension Peer Review in Montreal, the Lusail Light Rail Transit in Doha, and the Al Sufouh Tramway System Project in Dubai.

The peer review conducted by SYSTRA Canada Inc. and RATP Dev Canada had two primary objectives:

1. To analyze and validate the strategies and methodologies employed by TransitNEXT for design, construction, testing and commissioning, training, operations, and maintenance; and
2. To identify any potential issues or challenges that may arise at the start of revenue service.

In May 2022, the peer review commenced. The peer review process involved a thorough review of documentation, a series of interviews and workshops with the TransitNEXT team, and site visits to various project locations, such as the Main Server Room, the Test Lab, the Main Control Centre, the MSF, and Walkley Station.

Based on the initial documentation review, the interviews and workshops, various additional documents and details were requested by the peer review team. Between May 2022 and February 2023 as the project progressed, new or updated documentation was submitted by TransitNEXT and was provided to the peer reviewers for their review. Several rounds of productive discussions were held with TransitNEXT, SYSTRA Canada Inc. and RATP Dev Canada teams to develop a mutual understanding of the strategies employed by TransitNEXT for design, construction, testing and commissioning, training, operations, and maintenance.

In February 2023, the Peer Review Final Report was released after the final review and received feedback from the City and TransitNEXT. The report presents an impartial and expert third-party view on the risks linked to the project delivery and suggests a series of recommendations to minimize these risks.

DISCUSSION

The Stage 2 Trillium Line Peer Review Final Report highlights that both TransitNEXT and the City of Ottawa were receptive to discussion regarding the project's progress and challenges. According to the report, the process followed by TransitNEXT and their team is consistent with international standards and appropriate for delivering a project of the scale and scope of the Trillium Line. The report also concluded that the project management practices are sufficient, and the appropriate tools are in place to maintain control of the project's progress and address potential risks.

The report also identified several opportunities to strengthen the delivery of the project, safety processes, and the delivery of service during the operations and maintenance phase. Based on these opportunities, 47 recommendations were made by SYSTRA Canada Inc. and RATP Dev Canada. The recommendations range from documentation

improvements to additional tests to increased validation of works in the field. The City of Ottawa and TransitNEXT have formulated and implemented a comprehensive action plan to address all 47 recommendations.

For discussion in the body this report, the recommendations are categorized into five groups: Project Management, Rail Infrastructure, Rail Systems, Operations and Maintenance, and Safety Processes.

Table 1: Description of the five categorized recommendations:

Category	Sub-category	Description
Project Management	PM.xx	Project Management
	TRA.xx	Training
Rail Infrastructure	TRK.xx	Trackwork
	TVS.xx	Tunnel Ventilation System
	CON.xx	Construction control
Rail Systems	RS.xx	Rolling Stock
	TCS.xx	Train Control System
	COM.xx	Communication and SCADA Systems
	SEM.xx	System Engineering Management
	TC.xx	Test & Commissioning
Operations and Maintenance	OPS.xx	Operations
	MAI.xx	Maintenance
Safety Processes	SA.xx	System Assurance

The following sections provide the City of Ottawa and TransitNEXT's response and action plan to each recommendation identified in the peer review final report.

Project Management (PM & TRA):

PM.01

Recommendation:

We recommend the City and TransitNEXT to “draw a line in the sand” and openly create a new baseline of the project including new schedule, new monthly report with shared explicit KPIs and potentially some recommendation of this report. There must be an agreement that the claim from both parties of what conducted to this new baseline will be treated by a different team than the one delivering the new baseline project and it will not interfere with the progress.

Response:

A new schedule baseline (PBS-3) has been agreed upon with TransitNEXT following discussions in Q4 2022 and Q1 2023. The City and TransitNext are collaborating towards completion of the project by early October and the inputs to this program have been agreed upon at a high level. Daily site visits and weekly meetings with TNEXT are used to track and monitor progress towards completion.

PM.02

Recommendation:

The lessons learned of the previous and similar project or product should be integrated in the engineering development of the mass transit system. A lessons-learned document relating to the project, system or product should document the lessons learned used for the benefit of the current project.

Response:

The City of Ottawa undertook a detailed review of Trillium Line operations and maintenance from 2001 through 2018 as part of the procurement process to identify a series of improvements to be applied to the expanded system. Specified safety improvements in the contract requirements included the addition of an updated train control system, grade separation of the Ellwood diamond, tunnel ventilation system and fire safety upgrades to the Dow's Lake tunnel, and improved platform extenders along the full length of platform to reduce the gap. Further, the City of Ottawa specified a vehicle type with additional doors to reduce dwell times, required replacement of the existing maintenance facility, added redundant platforms at the end of the line, and increased siding lengths to minimize, and in some cases eliminate, the impact of passing movements.

The City of Ottawa has taken significant steps to apply lessons learned from the Stage 1 project and ensure their integration into the planning, procurement, and delivery of the Stage 2 project. A total of 24 audits and independent studies have been conducted, resulting in the implementation of recommendations and findings in various areas such as procurement requirements, governance and oversight. Additionally, the updated Project Agreements include explicit requirements for systems integration, trial running criteria, maintenance requirements, governance, and oversight.

The City of Ottawa continues to prioritize the implementation of lessons learned as the Stage 2 project progresses. City staff members are consistently applying the knowledge gained from previous experiences to improve the OLRT1 operations and the

development of the Stage 2 project. As we move forward with the Stage 2 project, the City team remains committed to integrating any further lessons learned into the planning, procurement and delivery process.

At the closeout phase of the Stage 2 project, the City of Ottawa will compile all the lessons learned from the Stage 1 and Stage 2 projects. The aim is to provide a comprehensive approach that incorporates all valuable insights and information gained throughout the projects. The compilation of lessons learned will be available for future reference, ensuring that the valuable knowledge gained from these projects is preserved and can be accessed when needed.

TRA.01

Recommendation:

We recommend that the City and TransitNext quickly reach an agreement on the training schedule and content to avoid delay on the revenue service date.

Response:

The City and TransitNEXT continue to work collaboratively on the Trillium Line training program, which includes an Integrated Training Plan that defines roles and responsibilities for each party, and an integrated schedule for the completion of the required training which comprehensively tracks training progress.

Rail Infrastructure (TRK, TVS & CON):

TRK.02

Recommendation:

Check during the construction of the direct fixation (DF) tracks that the different surveys mentioned in the work-method statement are carried out, as planned.

Confirm the mechanical tests performed on the fasteners of the DF tracks have been done in extreme positions (with maximum shimming) and will not imply any restriction of any kind.

Response:

The City requested the DF construction methodology documentation from TransitNEXT and they provided the requested documentation.

The City has reviewed the Direct Fixation Track Installation Work Method Statement and determined that it addresses the recommendation regarding surveying and shimming. Survey controls are implemented at the start, during, and end of the DF construction.

The Work Method Statement indicates that unrestrained, restrained and torque tests will be completed to control production quality.

The DF fastening system is provided with train loading as a requirement. The testing procedures proposed by TransitNEXT are in accordance with standard industry practice and related to the installation work and those testing procedures (such as the unrestrained, restrained and torque tests) are not impacted by maximizing shims.

TRK.03

Recommendation:

Confirm the diamond crossover at Limebank Station has been considered in the rail-structure interaction analysis, and the girder is fixed in the abutment zone to restrain movements.

Response:

The City obtained confirmation from TransitNEXT that the girder bearings are fixed bearings in the abutment. Since the Limebank bridge is a ballasted bridge, a typical rail-structure interaction analysis is not applicable. Due to the presence of ballast, the thermal stresses from the rails are transferred to the ballast instead of directly on the bridge deck. The thermal expansion/contraction of the rails is not expected to impact the bridge performance.

TVS.01

Recommendation:

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.

Response:

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.

TransitNEXT will review and update all necessary reports and documents then provide to the City.

TVS.02

Recommendation:

We recommend performing an analysis to ensure that the tunnel temperature never reaches trains HVAC tripping temperature.

Response:

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.

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.

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.

The City will complete a technical summary of the issue at hand for the project records.

CON.01

Recommendation:

TransitNEXT should develop a method to verify after pouring the adequate positioning and concrete coverage of the structure reinforcement steel.

Response:

Note: The recommendation refers to the placement of the reinforcing steel (rebar) within the concrete. Typically, there should be roughly 40 millimetres between the reinforcing steel and the surface of the concrete.

The City is of the view that the verification of concrete cover to the reinforcing steel, within a structure post-concrete placement, is neither consistent with industry standards nor required by Ontario Provincial Standards and Specifications. The City is satisfied that TransitNEXT is adhering to best practices and satisfying its obligations under the Project Agreement by having a Quality Verification Engineer (QVE) review the reinforcing steel installation prior to concrete placement and provide a Certificate of Conformance. This certificate is signed, sealed, and dated by a Professional engineer licensed in Ontario. Moreover, a post pour visual inspection of the concrete is completed as part of the inspection and test plans; if exposed reinforcing steel is identified, appropriate repairs are implemented. This methodology is described in both the Ontario Provincial Standards and Specifications (OPSS) and the Ottawa Municipal Standards and Specifications and used throughout the Province of Ontario in the construction of concrete structures.

Rail Systems (RS, TCS, COM, SEM & TC):

RS.01

Recommendation:

For both type of vehicles, we recommend that the vehicles' interior and exterior noise tests be 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 metres from the train as required by the PA Schedule 15-2 Part 8, Section 1.8 (a) & (b).

Response:

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.

RS.02

Recommendation:

For the Stadler vehicles, to simulate the accumulation of freezing rain up to three millimetres on the doors to ensure the door operators are properly sized to meet its life expectancy, as required by the PA, Schedule 15-2 Part 8, Section 1.18 (d)-(i).

Response:

Stadler has provided climate chamber test results that demonstrated the doors operate with a three millimetres thick layer of ice built up. Based on overall climate chamber test results, the City is satisfied that the door operator is a service proven design with a history of reliability and that it is suitable for operation in cold temperatures, as well as snow and ice storms.

RS.03

Recommendation:

To perform cold start tests of the vehicles (minimum temperature of cold room to meet the environmental conditions of the city of Ottawa) to simulate the vehicles parked overnight outside can start with no problem.

Response:

The City and TransitNEXT have completed the additional test as recommended and the City is satisfied with the result. A Stadler FLIRT vehicle was left off without power for several days to reach a cold soak temperature. Upon engine startup, recorded external temperatures were noted to be -27 Celcius. All diesel engines performed without issue.

RS.04

Recommendation:

The City should request TransitNEXT to confirm that Stadler is familiar with this test and whether the bogie rotational resistive test or bogie yaw resistance test/simulation have been performed.

Response:

Note: A train bogie is a chassis or framework that carries and supports the wheelsets of a railway vehicle.

Stadler has confirmed that safety against derailment of the vehicle has been demonstrated, which includes the bogie rotational test influence.

In the European standard EN 14363, the bogie rotational test is used in conjunction with the twist test as a methodology for the proof of safety against derailment.

In North America, the counterparts to these standards are the following:

1. APTA PR-M-S-014-06: "Wheel Load Equalization of Passenger Railroad Rolling Stock".
2. APTA PR-M-S-031-22: "Low-Speed Curving Performance of Railway Passenger Equipment".

The Wheel Load Equalization is the equivalent to the twist test and this test has been performed by Stadler. In addition to this, simulations were performed (as part of the Vehicle Dynamic test) for the determination of the overall vehicle dynamic behavior which included the influence of the bogie rotational resistance.

The City is satisfied that the above-mentioned elements address this point.

RS.07

Recommendation

The City to verify that the wheel compensation is well defined and understood to guarantee that the vehicle height is always within the expected platform height during all operating and passenger loading conditions.

Response:

Specific testing has been conducted to ensure the train has the ability to maintain the required vertical gaps at the platforms in all operating and passenger loading conditions based on the wheel compensation.

TCS.01

Recommendation:

We recommend that the guaranteed emergency brake rate (GEBR) test be added in the site test procedures according to the condition required by IEEE1474.1 chapter 6.1.2.1.

Response:

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.

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.

COM.01

Recommendation:

Identify an owner for the entire end system to produce System Documentation (e.g. Release notes).

Response:

TransitNEXT has generated a Configuration Management Plan indicating that Software and any associated Firmware Version Description Documents (VDDs), or equivalent, associated with each asset are included as minimum configuration baseline data.

TransitNEXT will be responsible for all Release Notes associated with the software/firmware changes on systems they deliver (Stadler/Alstom related systems, Mechanical Systems, Electrical Systems, system, and train control systems etc.).

The City will be responsible for all Release Notes associated with software/firmware systems on servers delivered as part of the City's Head-End scope (Passenger information screens, transit information screens, CCTV etc.).

COM.02

Recommendation:

Establish a test platform for the integration and validation of the System to avoid discovering the first integration issue on site.

Response:

Note: The Head End system, as mentioned in this report, refers to the central control and communication system that manages and monitors the operation of trains, stations, and other related equipment.

The City's Head End Testing and Commissioning plan has been developed and includes the identification of a dedicated Head-End platform for the Trillium Line and the City's Head-End Test Lab as a key asset to support early integration testing and mitigate Control Centre impacts during Testing and Commissioning. The Rail Construction Program has built out the test laboratory in a new space at 875 Belfast Rd. and it is being used to undertake commissioning of the head end systems provided by the City.

The TransitNEXT System Integration Test Plan includes the provision of a TransitNEXT Test Lab (currently located at the Walkley Yard). This lab has temporary wireless connection with the City's Test Lab and will allow for early integration activities/issue identification. End devices are brought into the TransitNEXT Lab station-by-station, and after initial testing/debugging, are issued to site for installation.

COM.03

Recommendation:

Produce a system validation test description document for the Head End System.

Response:

The City's Head End Testing and Commissioning plan has been developed and issued to TransitNEXT. This includes the identification of the City's Test Lab as a key asset to support early integration testing and mitigate Control Centre impacts during Testing and Commissioning.

COM.04

Recommendation:

Produce a system integration and validation test description documents for the entire System.

Response:

TransitNEXT has developed and submitted a System Integration Test Plan. This plan identifies end-to-end system integration testing to be performed on the entire system using equipment provided by TransitNEXT and the City.

SEM.01

Recommendation:

All documents received from TransitNext subcontractors should be reviewed and signed by TransitNext. Documents from Alstom's Lint Vehicles should also be reviewed and approved for operability (Gauge, Platform length/height, Braking performance etc.) of the current vehicles on the extension lines.

Response:

Final Design documentation provided by TransitNEXT, which includes subcontractor documentation, is signed by TransitNEXT.

Alstom LINT vehicle performance has not been impacted by any vehicle modifications. Alstom LINT wheels remain the same and the rail gauge on the expanded Trillium Line remains the same. Alstom LINT braking performance has been considered in the track and signal and train control system requirements. Platform length and height have been designed to accommodate the Alstom LINT.

SEM.02

Recommendation:

We recommend putting in place a high-level configuration management plan as a guideline to be followed by all project actors and participants (including the scope under the City) in order to have a consistent holistic view of all configuration items including software, hardware and firm wares.

Response:

TransitNEXT has generated a high-level Configuration Management Plan. TransitNEXT has provided a Configuration Management Database template to the City for the City to provide configuration data (including hardware, firmware, and software detail) to TransitNEXT to allow for all configuration data to be stored in a single, holistic database.

SEM.03

Recommendation:

The definitions of what is a system, a sub-system, and an equipment from the mass transit system (Project) point of view should be stated and aligned with a System Breakdown Structure and a Functional Breakdown Structure, to get a common view between all the stakeholders and co-partners of the project.

Response:

Definitions and a system breakdown structure are not requirements of the Project Agreement; however, the TransitNEXT System Engineering Management Plan defines Railway Level, Systems Level, Primary Systems Level, and Sub-Systems Level.

TransitNEXT utilizes a format in which all project requirements are tracked by TransitNEXT in a requirements database in accordance with the Requirements Management Plan. Any systems or Sub-Systems contributing to fulfillment of each requirement are included. The specific function fulfilled by each Sub-System can be viewed via extracts from the requirements database. This provides the advantage of a common view between all the stakeholder and co-partners in the project.

SEM.04

Recommendation:

We recommend clarifying the list of actions to be taken into account in order to guarantee the clearance for future electrification of the line along with test procedure ensuring that actions have been completed.

Response:

The City of Ottawa is satisfied that TransitNEXT has met the requirements of the Project Agreement and taken appropriate steps to ensure a positive outcome with respect to the future electrification of the Trillium Line. This has been validated by the City's third-party engineering consultants.

SEM.05

Recommendation:

We recommend adding EN50500 standard and ICNIRP standard to the EMC Control Plan to guarantee that EMC/EMI impact on human health in railway environment is measured and within the standard specifications.

Response:

The EMC/EMI standards applicable pursuant to the Project Agreement are the EN 50121 series of EMC/EMI standards, the ICES standards, the Health Canada Safety Code 6 standard as well as the IEEE C95.1 and IEEE C95.6 standards. In addition, TransitNEXT has confirmed that it is also following the requirements and specification of the ICNIRP as well as the methodology stated in EN50500.

SEM.06

Recommendation:

The Basis of Design Corrosion control document should be updated to take into account the measure concerning corrosion control on the bridge including the track design.

Response:

The Trillium Line is a diesel rail line and as such does not have issues with stray current. In addition, the Project Agreement required that the ballast be non-conductive so that eventual electrification would not require the replacement of the ballast. Further, the currently proposed ballasted track and direct fixation track fastening systems are fully insulated to protect against stray current.

As a result, the City is of the view that a stray current analysis is not warranted at this time.

TC.01

Recommendation:

A clear in-factory integration plan should be put in place with an exhaustive list of tests to be performed in factory and clear criteria of success to reduce the number of issues to be discovered on site.

Response:

In response to this recommendation, the City and TransitNEXT established a procedure to replicate the field environment as well as the head-end environment to perform testing prior to all field devices being implemented in the field. This provides the opportunity to identify potential issues prior to the formal testing regime for most of the communication systems. The risk mitigation achieved by this approach exceeds that of the in-factory integration test recommended by Systra as the testing environment better represents the environment in which the equipment will operate.

TC.02

Recommendation:

TransitNext should build a comprehensive and integrated time schedule showing all the interdependencies and interfaces between systems and a clear way forward for the performance of End-to-End tests. This schedule should be coupled with a set of KPIs and a dashboard allowing to closely monitor on a weekly or biweekly basis at most the test progress for each discipline and identify the blocking points and escalate them for swift resolution.

Response:

TransitNEXT has generated a testing and commissioning schedule, which has been integrated with the broader project schedule. This has linked system testing with construction/implementation pre-requisites. The underlying testing and commissioning schedule includes milestones denoting key trigger points for subsequent tests.

A joint testing and commissioning meeting between the City and TransitNEXT is held weekly. Key stakeholders such as the Independent Certifier, Independent Safety Consultant, and System Integration Verifier are invited. At this meeting a 4-Week Look Ahead is presented to identify upcoming tests and blocking points. At the same meeting a test procedure tracker and report dashboard are presented to identify any documentation related roadblocks.

TC.03

Recommendation:

TransitNext should provide a test plan to verify global system performance during wintertime.

Response:

The City is of the view that TransitNEXT Testing and Commissioning activities are meeting the Project Agreement requirements for the project. The testing activities for all Trillium systems have been developed to allow testing during any season and all equipment has been specified to be capable during very cold temperatures (-38 deg C). The vehicle testing has been conducted in a variety of weather conditions (including winter conditions) since the first vehicle arrived in October 2021. This includes the dynamic commissioning testing done to date in Ottawa, which has taken place during all

four seasons. Testing of the signaling system has also occurred during the winter. In addition to this, supplemental cold weather vehicle start-up verifications were also carried out during the very cold days in early February 2023.

In terms of a lookahead to a fall opening, the City of Ottawa has taken the decision to keep the R2 bus service in place through April 2024 to provide backup services for customers during the first winter of service on the expanded line. Any additional lessons learned from the first full winter of passenger service would then be completed in summer 2024.

TC.04

Recommendation:

TransitNext should have a set of minimum operating requirements derived from the 98.5 per cent performance requirement and revise their RAM analysis to allocate proper performance requirement to each of the systems, subsystems, functions, and equipment.

Response:

The City is satisfied that TransitNEXT's reliability, availability, maintainability, and safety (RAMS) Program Plan appropriately considers the breakdown of proper performance requirements at the systems level.

TransitNEXT's RAMS Demonstration Plan illustrates how the Service Reliability requirements will be achieved. The RAMS Program Plan and RAMS Prediction Report calculate the mean time between failures (MTBF) of components as well as the service availability. This calculation illustrates which systems will have an impact on the service reliability, which is shown within the RAMS Demonstration Plan and Failure Reporting, Analysis, and Corrective Action System Procedure, and will be measured within the RAMS Demonstration Report during and after Trial Running and during the maintenance period.

Operations and Maintenance (OPS & MAI):

OPS.01

Recommendation:

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 improvement is necessary to achieve 2048 PPHPD.

Response:

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.

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.

OPS.02

Recommendation:

The option to order an 8th Stadler train should seriously be considered to reduce the risk of degraded operations due to unplanned maintenance on the new Stadler trains.

Response:

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.

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.

OPS.03

Recommendation:

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.

Response:

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 trains speeds and acceleration curves, the single tracks 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.

OPS.04

Recommendation:

Use a turnaround time of at least five minutes at South Keys for the trains of the Airport Link.

Response:

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.

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.

OPS.05

Recommendation:

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 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.

Response:

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.

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.

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.

MAI.01

Recommendation:

Given the shortage of qualified resources in Canada, we recommend that TransitNext produce a Maintenance mobilization plan with a clear schedule and KPIs to follow to anticipate any future issues.

Response:

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.

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.

MAI.03

Recommendation:

The City should ensure that a dedicated maintenance schedule exists and is available to TransitNext, including all the major milestones in the deployment of the maintenance activities and that such schedule is integrated within the project schedule with clear milestones

Response:

The Project Agreement sets out the maintenance requirements of the Trillium Line System (e.g., systems, facilities, station, tunnel, structure, alignment etc.). TransitNEXT will reflect these requirements in its Maintenance and Rehabilitation Plan, due to the City 90 days before substantial completion.

MAI.05

Recommendation:

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.

Response:

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.

MAI.06

Recommendation:

TransitNext should prepare a holistic obsolescence management plan including policy and processes that should be followed by all their suppliers.

Response:

The obsolescence management of the equipment will be addressed by way of the Maintenance and Rehabilitation (M&R) Plan. Appropriate policies and procedures will be included to address end of sale and end of life cycles for equipment as well as general obsolescence. The M&R Plan will be submitted to the City 90 days before substantial completion.

Safety Processes (SA):

SA.01

Recommendation:

An overall review of the RAMS activities along the V-Model lifecycle should be executed to ensure that activities are performed at the correct phase of the project. TransitNext should also describe the way the RAMS findings are addresses in the design and maintenance.

Response:

The City is satisfied that TransitNEXT has effectively undertaken reliability, availability, maintainability, and safety (RAMS) activities appropriate for the V-Model project life cycle in the execution of the project. The City's view has been validated by the City's Independent Safety Auditor. For clarity, the City's Independent Safety Auditor is SENER.

SA.02

Recommendation:

TransitNext should revise the PHA to align with the terminology of EN 50126-2:2017 and have a complete review of all hazards and mitigation taking into account all scenarios, justifying downgrading of severity level, justifying non-assessment of certain equipment. If it is not done, it can conduct to a safety hazard not being mitigated. The hazard severity matrix, hazard probability matrix as well as the hazard criticality matrix should be presented in the Safety Assurance Plan rather than in the PHA report.

Response:

The City is satisfied that further updates to the Preliminary Hazard Assessment (PHA) are not required.

The PHA was a preliminary assessment from the early stages of the project. Since that time, PHA hazards were transferred to the Project Hazard Log and mitigations have been developed. Testing is currently underway to validate the mitigations identified. The Hazard Log is managed and updated throughout all project phases and has undergone several reviews by the City, OC Transpo, Independent Safety Auditor, and is subject to further scrutiny through the Hazard Transfer Process.

SA.03

Recommendation:

TransitNEXT should show the autonomy, authority, and independence as well as the management of the skills of the RAMS team. An update of the organization presented may be needed to comply with EN 50126-1:2017.

Response:

The City is satisfied that TransitNEXT has demonstrated the autonomy, experience and qualifications of its reliability, availability, maintainability, and safety (RAMS) team as part of updates to its RAMS Program Plan. This has been validated by the City's Independent Safety Auditor.

SA.04

Recommendation:

RAMS terms like MTBF and MTBSAF or "Service Availability". "Availability" shall be defined and used consistently across all TransitNEXT documentation including their subcontractors' one to avoid misunderstanding. It should also be presented how the MTBSAF of each sub-system has been determined, with which reliability database or return of experience.

Response:

The City is satisfied that TransitNEXT has delivered the requested information through updates to its reliability, availability, maintainability, and safety (RAMS) Program Plan and RAMS Demonstration Plan which illustrates how the Service Reliability will be achieved in accordance with the Project Agreement.

The RAMS Program Plan and RAMS Prediction Report calculated the mean time between failure (MTBF) of components as well as the Service Availability. This calculation illustrates which systems will have an impact on the Service Reliability, which is shown within the RAMS Demonstration Plan and will be measured within the RAMS Demonstration Report during and after Trial Running. The City's view has been validated by the City's Independent Safety Auditor.

SA.05

Recommendation:

The reliability and availability formulae should be stated and tailored to the mission profile or working mode of each system/subsystem/equipment. The RAM apportionment should be performed down to the LRU and appear in the RAM apportionment report.

Response:

The City is satisfied that TransitNEXT has delivered the requested information through updates to its reliability, availability, maintainability, and safety (RAMS) Program Plan in accordance with the Project Agreement. The City's view has been validated by the City's Independent Safety Auditor.

SA.06

Recommendation:

TransitNEXT should conduct a common cause failure analysis into a specific report addressing the systematic failures to verify that events in a fault tree analysis are truly independent.

Response:

The City is of the view that the recommended common cause failure analysis addressing the systematic failures to verify that events in a fault tree analysis are truly independent has been satisfied by way of TransitNEXT's Safety Analyses. The stages of progression of the safety analyses provide the respective evidence of causal and common-cause analyses. Common cause has been considered in the failure mode, effects, and criticality analyses among redundant systems. The Safety Integrity Level (SIL) Demonstration Reports that will be assessed by an Independent SIL Assessor will reinforce the evidence of safety integrity (safety level). The City's view has been validated by the City's Independent Safety Auditor.

SA.07

Recommendation:

TransitNEXT should clarify the process for collecting and analyzing the field RAMS data by explaining which information will be collected, monitored, and how, and then detailing the process of analysis and action plan definition and implementation.

Response:

The City is satisfied that TransitNEXT has delivered the requested information through updates to its reliability, availability, maintainability, and safety (RAMS) Program Plan and RAMS Demonstration Plan in accordance with the Project Agreement. RAMS data will be collected and verified during Testing and Commissioning and Trial Running, which will provide evidence via the Engineering Safety Assurance Case (ESAC) that will validate the safety of the Trillium Line prior to revenue service beginning.

TransitNEXT has outlined how it will measure and monitor performance during operations in its Failure Reporting and Corrective Action System Program Plan (FRACAS). The City's view has been validated by the City's Independent Safety Auditor.

SA.08

Recommendation:

TransitNEXT should clarify the approach taken for the risk reduction for safety related risks and for the RAM related risks by referring to EN 50126:2017.

Response:

The City is satisfied that TransitNEXT has provided its approach for the risk reduction for safety related risks and for the reliability, availability, maintainability, and safety (RAMS) related risks through the development and submission of the System Safety Assurance Plan (SSAP). The City's view has been validated by the City's Independent Safety Auditor.

SA.09

Recommendation:

TransitNEXT should present in a specific document the gap analysis principle and process for reused products, already certified or not. As part of this document TransitNEXT should clarify how they manage the functional boundaries and functional interfaces between the original vehicle fleet and the vehicle fleet adapted/tailored to the project. Such recommendation is also applicable to the S&TCS which is not compliant with the PSOS requirements in terms of code compliance.

Response:

The City is satisfied that TransitNEXT has addressed this recommendation by outlining the approach for the Safety Recertification of the LINT in the submission of the Alstom

LINT Recertification Safety Case. The approach identified is fully aligned with the mutual recognition principles as described in EN 50126:2017. Functional boundaries and interfaces are described, and appropriate hazards are identified, mitigated and relevant safety requirements derived. This exercise was performed for all systems being integrated with the LINT, including the signaling system, and it considered the LINT being introduced into the modified operational environment. The Safety Case for the signaling and train control system has been updated and is following the EN 50126-1:2017 standard, which is now compliant to the Project Agreement.

SA.10

Recommendation:

TransitNEXT should provide a formal traceability between the CENELEC standards and their plans and other deliverables with the objective to demonstrating compliance. This is essential to provide confidence in both the process and the deliverables.

Response:

The City is of the view that a clause-by-clause compliance to CENELEC Standard EN 50126 is not required. The City is satisfied that TransitNEXT has demonstrated that it is following the processes defined in the Standard and TransitNEXT has been audited throughout the project lifecycle by an Independent Safety Auditor. To-date, no issue has been raised by these independent parties regarding TransitNEXT's application of the Standard.

The City is satisfied that TransitNEXT has applied Case B of EN50126-2 Section 7.3 and has adhered to it throughout the project lifecycle as indicated by TransitNEXT's Verification and Validation Plan, which was agreed between TransitNEXT and Systra as being appropriate in the circumstances (where safety functions no higher than SIL2 is being achieved). The suppliers of the signaling system and the new vehicles that are dealing with systems and functions higher than Safety Integrity Level (SIL)2 with the respective interfaces have their own verification and validation processes in accordance with CENELEC. Regarding the verification and validation activities being described in one plan (TransitNEXT's Verification and Validation Plan), TransitNEXT has demonstrated that this approach is consistent with CENELEC EN 50126 Case B, and this approach has been reviewed by several parties who have found no issue with respect to the independence of verification and validation, including the City's Safety Team and the City's Independent Safety Auditor. The Standard explains (EN50126-1 Introduction) that the application of the standard can be tailored to the specific

requirements of the system under consideration. The Standard also recognizes (EN50126 -1 6.7.1) that verification activities support and provide input into the validation activities.

The City is satisfied that TransitNEXT's System Safety Assurance Plan describes the activities being undertaken for both verification and validation, demonstrates where the activities fit in the overall project lifecycle and demonstrates that the project meets the required levels of independence.

Conclusion:

The Stage 2 Trillium Line Project has undergone a comprehensive peer review process, which has identified specific issues and recommendations for improvement in various areas. All recommendations have been addressed by the City of Ottawa and TransitNEXT. The strategies and methodologies to address the recommendations employed by TransitNEXT have satisfied the City of Ottawa and, in many cases, have been reviewed and validated by the City's third-party engineering consultants and Independent Safety Auditor.

Overall, the City of Ottawa and TransitNEXT are committed to delivering a safe, reliable, and efficient rail system that meets the needs of our customers, community and stakeholders. TSD will continue to work closely with our partners and stakeholders to ensure that the Stage 2 Trillium Line Project is a success.

FINANCIAL IMPLICATIONS

There are no immediate financial implications in this report, but there could be financial implications for implementing the recommendations of the third-party peer review. The financial implications would be identified as part of the project or initiative's budget as they are brought to Committee and Council for consideration and approval.

LEGAL IMPLICATIONS

There are no legal impediments to receiving this report for information.

COMMENTS BY THE WARD COUNCILLOR(S)

This is a city-wide report.

ACCESSIBILITY IMPACTS

All components of the Stage 2 LRT project adhere to the *Accessibility for Ontarians with*

Disabilities Act (AODA).

Any policy or procedural development, as well as customer communications and public engagement identified in the report's recommendations will include the application of the City's Equity and Inclusion Lens. Staff will continue to engage persons with disabilities and accessibility stakeholders to ensure that their perspectives are considered and incorporated, and to promote inclusion.

Staff will also ensure that any applicable accessibility legislation, standards and guidelines are adhered to during the execution of the projects and initiatives identified in this report.

It should be noted that Dow's Lake Station has been upgraded to include redundant elevators. All locations with elevators include redundancy. Other features including TWSI, braille, etc. are included in the PA.

ASSET MANAGEMENT IMPLICATIONS

The construction of new assets adhered to applicable municipal, provincial, or federal standards. This ensures that the assets are built to meet quality and safety requirements, reducing potential risks and liabilities. Compliance with standards also promotes long-term sustainability and reliability.

Asset Management (AM) closely collaborated with relevant stakeholders such as the Resource Conservation Office (RCO) and the Technology and Innovation (TransitNext) department. This collaboration aimed to minimize the impact on existing assets as much as feasible. By involving RCO and TransitNext, potential conflicts or risks associated with the integration of new assets were addressed proactively.

The objective during the integration of new assets was to ensure there was no decrease in the service life, level of service, or disruption of service or maintainability for existing assets. This approach safeguards the performance and functionality of the city's infrastructure, avoiding any adverse effects on service delivery to residents and other stakeholders.

The implications of asset management on the city's financial resources were considered in collaboration with the Financial Services Unit (FSU). By involving FSU in the early draft stages of the report, financial constraints and opportunities were evaluated, aligning with the principles of prudent financial management and sustainability

RISK MANAGEMENT IMPLICATIONS

The risks associated with the Trillium Line Peer Review Report are being tracked and mitigated, as outlined in this report.

RURAL IMPLICATIONS

The City's transportation network, including light rail transit, is designed to provide options for all residents. Once completed, Stage 2 LRT will span from Trim Rd. to Moodie Dr. and south all the way to Riverside South. Rural residents will have access to Park and Ride lots at various stations which will allow them to easily use public transit.

TERM OF COUNCIL PRIORITIES

The 2019-2022 Term of Council Priorities include:

- This report supports the City's on-going commitment to financial sustainability and transparency.
- Integrated Transportation: Enable effective mobility through a sustainable, accessible, and connected city transportation system.
- Service Excellence Through Innovation: Deliver quality services that are innovative and continuously improve to meet the needs of individuals and communities.

SUPPORTING DOCUMENTATION

Document 1 - Trillium Stage 2 Peer Review Final report

DISPOSITION

The Stage 2 Trillium Line Project has undergone a comprehensive peer review process that has identified specific issues and recommendations for improvement. All recommendations have been closely reviewed, considered, and studied by the City of Ottawa and TransitNEXT. The strategies and methodologies to address the recommendations have been reviewed and validated by the City's third-party engineering consultants, and Independent Safety Auditor. The City and TransitNEXT are committed to delivering a safe, reliable, and efficient rail system that meets the needs of the community and stakeholders, and will continue to work closely with partners and stakeholders to ensure the project's success.

TSD will provide regular updates to Light Rail Sub-Committee and Council through the

construction and trial running.