



**Office of the Auditor General: Audit of Light Rail
Transit Planning and Change Management –
Final Report, Tabled at Audit Committee – June
22, 2017**



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Acknowledgments

The team responsible for this audit, comprised of Ted Pender, Austin Jenkins and Dana Mersich, under the supervision of Ken Hughes and the direction of Ed Miner, would like to thank those individuals who contributed to this project, and particularly, those who provided insights and comments as part of this audit.

Original signed by:

Auditor General

Purpose

This provides a report for the Audit of Light Rail Transit Planning and Change Management. This audit examined the operational plans, risk and change management processes for the City's transition from operating a primarily bus system to operating a combined bus and rail network. It is intended to give City Council assurance that these processes and structures are in place and working effectively to achieve a successful transition in 2018. This audit is not to provide assurance that the Light Rail Transit (LRT) system will be completed on schedule. Rather, is the City doing what it should, as of when we conducted our audit work, to have a smooth transition when the builder does turn over a functioning LRT system.

Introduction

The LRT project is a key part of the Transportation Master Plan and aims to make it more attractive and easier for residents and visitors to move through the city of Ottawa using public transit. Phase 1 of Ottawa's LRT system is called the Confederation Line. This \$2.1 billion project includes financial contributions from the provincial and federal governments.

During our initial audit fieldwork in May and June 2016, we observed that several key elements of the plans and the risk mitigation strategy were scheduled to be further developed/elaborated later in 2016 and early 2017. Consequently, it was not possible to conclude on the audit objective at that time. The statuses of all the items that we reviewed in 2016, including those items scheduled to be delivered at a later date, we reported in our 2016 included in our Audit of Light Rail Transit Planning and Change Management – Interim Report. The interim report was received by Audit Committee on December 1, 2016 and approved by Council on December 14, 2016.

We completed the second and final phase of audit fieldwork in March 2017 in order to verify that key outstanding items have been completed as called for in plans.

As with the initial audit fieldwork, the audit team included a Subject Matter Expert (SME) in order to better understand the risk associated with this transition. He has 40 years of experience in bus and rail public transit operations, including being responsible for the operation and maintenance of three North American light rail systems.

Audit objectives and criteria

The primary objective of the audit is to ensure that the City is prepared to successfully transition from operating a primarily bus system to operating the combined bus and rail network.

The following audit objectives were arrived at during the planning phase of the audit:

1. Assess the completeness of City plans to transition from operating the bus network to operating the combined bus and rail network.
2. Assess the effectiveness of the governance structure to identify and manage critical risks related to achieving planned targets and successful transition.
3. Assess whether the key elements related to system acceptance are consistently understood.

The audit criteria have been organized according to lines of enquiry and, taken together, address the entirety of the stated audit objectives. Refer to Appendix A for the identification of audit criteria.

Audit observations

The following findings relate to planning and change management conditions from the time the initial phase of audit fieldwork in May and June 2016 to the time of the second phase of audit fieldwork in February and March 2017.

Subsequent to the initial phase of audit fieldwork, on June 8, 2016, a large sinkhole opened above an LRT construction site on Rideau Street. The sinkhole formed over a vein of sand, silt and fractured rock and covered the 25 metre width of Rideau Street from approximately 208 metres east of Colonel By Drive and continued east over a 20 metre, length measured at ground surface, wide and 40 metres long¹. Management indicated that based on the schedule and pre-sinkhole pace of construction, this incident caused a delay of approximately five months in the tunnel construction timeline. However, with the support of the City, the contractor Rideau Transit Group (RTG), marshaled sufficient resources and intensified the schedule to put the projected delivery schedule back on track.

¹ Measurements taken from the Final Draft Revision 2 of the Investigation dated Dec 22, 2016

While the sinkhole disruption appeared to be well managed and the necessary adjustments were made, an important consequence of the delay is that the allowance for any additional slippage in the construction timeline has been eliminated. Therefore, should something happen to cause another unanticipated time delay, there will be very little buffer time to work with. This could create a risk that the operating group will be required to adjust its planned testing and transition time in order to meet the Revenue Service Availability date.

Key schedule adjustments that resulted from the sinkhole have impacted the way that the line is planned to be commissioned and in the training and certification of operational staff. Related activities that were previously planned to occur consecutively are now scheduled to take place concurrently. It is important to recognize that there is an established history of activating new rail lines in this manner and that this method can be very successful.

During the initial phase of the audit in 2016, Transportation Services department (formerly Transit Services department) management indicated that the action items would be embedded in their new Rail Activation Management Program (RAMP) which was to be launched in January 2017. The Transportation Services department has established the RAMP, which began operations in January 2017. The RAMP group members are tasked with identifying all of the relevant mission-critical elements, activities and responsibilities; their interrelationships and their interdependencies. The group is being led by an experienced transit professional who is responsible for keeping the project on target and for keeping key stakeholders aware of what is (or is not) happening as the project moves from construction to revenue service. The reporting structure, support, resources and membership of the group reflect a solid approach to the process of bringing the Confederation Line into revenue service. It was particularly noteworthy to the SME that the members of OC Transpo and O-Train Construction that we spoke with were of a single mind about getting the project accomplished successfully.

Audit objective #1

Assess the completeness of City plans to transition from operating the bus network to operating the combined bus and rail network.

Observations:

During this phase of audit fieldwork, we reassessed the status of each of the items below, none of which were completed as of our interim testing. As described below, we found that every item was now complete or was on schedule to be completed as expected. Outlined is each item, its expected timing as of our interim testing and our current observations and assessment:

- **The Terms of Reference and membership for the Integrated Closeout meeting group were expected to be finalized by the summer of 2016** – Target met: The Integrated Closeout meeting group is in place. The group’s formal Terms of Reference were approved at the October 12, 2016 meeting of the Project Close-out Requirements Working Group. Membership of the Project Close-out Requirements Working Group was not formally approved; however, a review of meeting attendees confirms that it consists of a core group that includes appropriate representation from Transportation Services department, RTG and the independent certifier. In addition, subject matter experts attend specific meetings as required.
- **The Integrated Closeout meeting group was scheduled to complete the Integrated Close-out Schedule Basis Chart by late 2016** – Target met: The Integrated Close-out Schedule Basis Chart, outlining in detail elements to be met prior to system acceptance, has been completed as expected. It was formally adopted at the October 12, 2016 meeting of the Project Close-out Requirements Working Group.
- **The Integrated Closeout meeting group was expected to bring the Go/No-Go list to the Executive Steering Committee for approval by December 2016** – Target met: The Go/No-Go list, enumerating the final requirements for Revenue Service Availability, was approved by the project’s Executive Steering Committee in September 2016.
- **The “18 Minus 18” communications program report was scheduled to be tabled at the Transit Commission meeting of February 2017** – Target adjusted with no overall impact: The report was scheduled to be tabled at the February 2017 Transit Commission meeting. During our audit work in February 2017, we

viewed the completed report, which was ready for tabling. However, the report was replaced on the agenda by a significant event, the LRT phase 2 approval. The report has been rescheduled for the April 2017 meeting. We expect no impact on the overall LRT readiness schedule as a consequence of this postponement.

- **OC Transpo was planning to brief all Councillors on the communication plan in early 2017** – Target adjusted with no overall impact: Briefings have been scheduled or are in the process of being scheduled with all Councillors during the week prior to the April Transit Commission meeting. OC Transpo plans to use a prepared presentation at each briefing and provide the Councillors with an information package. The presentation and packages were complete and observed during our February 2017 audit work.
- **The mitigation plan for a failure to meet the vehicle delivery date and overall project schedule was due in Q1 2017** – Target met: The plan to address vehicle delivery schedule concerns identified during the interim phase of audit work was completed as expected. It includes an updated vehicle production and delivery schedule from the contractor that incorporates the use of increased resources and meets the original targeted date for the completion of all vehicles. O-Train Construction (OTC, formerly known as the Rail Implementation Office) is closely and regularly monitoring adherence to this schedule through the Risk Register of the Monthly Works Report. OTC reviews this report on a monthly basis, and the most current report as of our February 2017 audit work indicates that the contractor is on or ahead of schedule.
- **The development of an overall delay strategy plan (operational, technical, communication) was due in Q2 2017**– Target met: The Confederation Line Delay Strategy identifies the overall delay strategy, including operational, technical and communication activities and was completed in January 2017. It specifically speaks to activities to monitor and maintain the schedule, approaches to managing delays and communication strategies. Challenges such as those related to the June 2016 sinkhole are addressed, as well as the protocol for implementing the Go/No-Go List.

Based on the above-noted observations and those listed in the interim audit report, we have not identified any apparent gaps in the planning or communication processes.

Audit objective #2

Assess the effectiveness of the governance structure to identify and manage critical risks related to achieving planned targets and successful transition.

Observations:

During this phase of audit fieldwork, we reassessed the status of each of the items below, none of which were completed as of our interim testing. As described below, we found that every item was now complete or was on schedule to be completed as expected. Outlined is each item, its expected timing as of our interim testing and our current observations and assessment:

- **On an ongoing basis, OLRT planned to very closely monitor the vehicle delivery schedule and to request an additional recovery plan if slippage was observed** – Target met: A plan to address the vehicle delivery schedule concerns identified during the interim phase of audit was presented by RTG to the City Confederation Line Executive Steering Committee at the monthly meeting of May 19, 2016. This plan included an updated vehicle production and delivery schedule from the contractor. OTC reviews this report on a monthly basis, and the most current report indicates that the contractor is on or ahead of schedule as of March 2017.
- **A document that maps out the top 10 integration issues and overlays these expectations with the schedule was due in Q2 2016** – Target met: At the time of our audit fieldwork, ten system integration issues have been identified, and the associated activities and milestones for each issue have been overlaid for planning and monitoring purposes in the Top 10 System Integration Issues Tracking Sheet. Mitigation strategies for each issue are also included in the Tracking Sheet.
- **The RFP for the train simulator closes, and the training centre construction project is expected to go to tender in July 2016** – Target met: The train simulator RFP was issued, and the contracting process was completed in 2016. The Chief Safety Officer visited the manufacturing site in February 2017 and confirmed that the simulator is under construction and on schedule. The Training Centre also went to tender as scheduled. We toured the facility and found it to be substantially complete.

- **OC Transpo was scheduled to kick off its simulator and training facility project in August 2016** – Target met: As described above, the simulator and Training Centre facility are underway and on schedule.
- **The working group to address Thales CBTC integration was scheduled to begin activities in late 2016** – Target met: The Testing and Commissioning Working Group began its work on this task in autumn 2016. “Vehicle Integration with CBTC” has been identified specifically as an activity in the Integrated Close-Out Schedule plan, and there is a detailed Responsibility/Task Breakdown Sheet in order to monitor progress. Other key information such as project lead, scheduled deliverables and deadlines are also included.
- **Several significant items on the Maintenance and Storage Facility (MSF) construction were scheduled to be completed in late 2016** – Target adjusted with no overall impact: Of the 23 items that were on the list of MSF Deferred Works during our phase 1 work, as of May 2016, all are now complete. The commencement of the work related to LRT Stage 2 has resulted in changes to the original plans for the MSF, most significant being that it will be used for the construction of 34 additional vehicles. These changes do not however impact the ability of the MSF to be used for vehicle maintenance of the Stage 1 fleet, as initially planned. No delays are expected by Transportation Services department management related to achieving planned targets for the MSF construction and use.
- **Vehicle integration with CBTC was scheduled to commence in January 2017** – Target met: As described above, the Vehicle Integration working group began activities in autumn 2016. Though integration proper has not yet commenced in earnest, the first test report was received in February 2017. This timing is in accordance with the schedule of primary deliverables on the Vehicle Integration with CBTC Responsibility and Task Breakdown sheet. The System Acceptance Test is the next deliverable and Transportation Services department management informs us that they expect it to be received on schedule.
- **The “Mitigation Plan for failure to meet vehicle delivery and overall project schedule” was due in Q1 2017** – Target met: The recovery schedule and accompanying mitigation plan to address vehicle delivery schedule concerns identified during the interim phase of audit work has been completed as expected. It includes an updated vehicle production and delivery schedule from the contractor that incorporates the use of increased resources and meets the original

targeted date for the completion of all vehicles. OTC is closely and regularly monitoring adherence to this schedule through the Risk Register of the Monthly Works Report. OTC reviews this report on a monthly basis, and the most current report indicates that the contractor is on or ahead of schedule as of March 2017.

Based on these observations and those listed in the interim audit report, we have not identified any apparent gaps in the effectiveness of the governance structure to identify and manage critical risks related to achieving planned targets and successful transition.

Audit objective #3

Assess whether the key elements related to system acceptance are consistently understood.

Observations:

During this phase of audit fieldwork, we reassessed the status of each of the items below, none of which were completed as of our interim testing. As described below, we found that every item was now complete or was on schedule to be completed as expected. Outlined is each item, its expected timing as of our interim testing and our current observations and assessment:

- **The Integrated Close-out Schedule detailing the seven elements which must be met prior to Acceptance including a detailed plan to address the sharing of the track by the T&C group and the Operator Training was expected to be delivered by the T&C Steering Committee in late 2016** – Target met: The Integrated Close-out Schedule Basis Chart which outlines the elements to be met prior to system acceptance is updated regularly, and its relevant elements are discussed at all Testing & Commissioning Steering Committee meetings. An agreement between OC Transpo and RTG specifying the plan to address the sharing of the track by T&C and Operators is being finalized. Transportation Services department management indicate that they expect it to be agreed to by all parties by March 31, 2017. The Test Commissioner, the individual with the authority to grant permission for track use, will be guided by this plan.
- **The Trial Running Test Plan was to be formally discussed and ultimately adopted at the Integrated Close-out meeting in late 2016** – Target adjusted with no overall impact: OC Transpo management indicated that the Trial Running evaluation process and scorecard was agreed to through discussions between OTC, OC Transpo and RTG on April 19, 2017. The audit team was provided with

a copy of the draft agreement. The formal agreement will be achieved through a submission to RTG by OTC. The response from RTG to OTC will formally confirm the agreement. This process is expected to be completed by the end of May 2017. As per the Project Agreement with RTG, this scorecard will ultimately be used by the Independent Certifier in his or her assessment of the readiness of the LRT for revenue service operation.

Based on the above-noted observations, we have not identified any apparent gaps in the consistency of the understanding of the key elements related to system acceptance.

Conclusion

We did not identify any areas of high risk or gaps related to the planning and change management of the LRT project. In the opinion of our SME, because Transportation Services department has an organizational understanding of the conditions that must be met before the rail line opens, further unexpected construction delays may push back the opening day for revenue service, but it will not have a negative effect on safety or operational readiness.

Management response

Transportation Services management agrees with the findings in the Auditor General's report, which confirm that the City continues to work towards a comprehensive and well-planned transition from a bus focused service to a multi-modal transit service.

Through the Ready for Rail Communication Campaign (formerly 18 Minus 18), Rail Activation Management Program (RAMP), Integrated Close-Out Schedule and other well-established working groups associated with the project, the Transportation Services department continues to closely monitor all aspects of the O-Train Confederation Line project to ensure a successful launch of safe and reliable service on the O-Train Confederation Line.

Appendix A: Audit objectives and criteria

Audit Objective #1: Assess the completeness of City plans to transition from operating the BRT network to operating the combined BRT/LRT network.	
1.1	Planning for On Track 2018 is comprehensive and sufficient.
1.2	The Communication Strategy is comprehensive and will enhance customer satisfaction.
1.3	A protocol exists to move the Revenue Service Availability date.
Audit Objective #2: Assess the effectiveness of the governance structure to identify and manage critical risks related to achieving planned targets and successful transition.	
2.1	Any delays in vehicle delivery will not impact the Revenue Service Availability date.
2.2	Any delays related to the training facility will not impact the Revenue Service Availability date.
2.3	Any delays related to Communication-Based Train Control system will not impact the Revenue Service Availability date.
2.4	Any delays related to the construction of the Maintenance and Storage Facility and Control Room will not impact the Revenue Service Availability date.
Audit Objective #3: Assess whether the key elements related to system acceptance are consistently understood.	
3.1	A common definition of the 12-day Trial Running period is being established.
3.2	A process for resolving disagreements related to “Minor Deficiencies” is in place.
3.3	The transfer of responsibilities at critical project junctures is clear.