DRAFT WORK PLAN –

Regulatory Monitor and Compliance Officer –

Ottawa Light Rail Transit

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For City of Ottawa

SAB Vanguard Consulting Inc.

8/29/2018

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1. Background:

This document is a draft multi-year work plan for monitoring Regulatory compliance relating to safety and security for the Ottawa Light Rail Transit system. The document has been prepared by the 'Light Rail Regulatory Monitor and Compliance Officer' (i.e. 'Compliance Officer') for the City of Ottawa.

Below is relevant background information:

On July 14, 2011, Ottawa City Council approved the implementation plan for the Ottawa Light Rail Transit (OLRT) project which is considered in law to be a federal rail transportation undertaking.

Since federal legislation and Regulations were not developed for application to municipal light rail systems, the City of Ottawa was provided with the authority to regulate its light rail transit system. This was formalized with a **Delegation Agreement** between the Minister of Transport and the City of Ottawa on October 1, 2011, which provides authority to the City to regulate any matters covered by Part III and IV of the *Canada Transportation Act* as well as the *Railway Safety Act*. This delegated authority applies only to the Confederation Line and does not extend to other OC Transpo operations (i.e. Trillium Line, Bus, Para).

In accordance with the Delegation Agreement, and By-Law No. 2015 – 301, the position of 'Light Rail Regulatory Monitor and Compliance Officer' (i.e. 'Compliance Officer') was created to monitor and report on compliance with the Ottawa Light Rail Transit (OLRT) Regulations (i.e. City Regulations); the duties and responsibilities of this position are shown in Annex A. The Compliance Officer is independent of the Transportation Services Department and reports directly to the City Manager and City Council.

The Compliance Officer is tasked with specific responsibilities as follows:

1. Development of a **multi-year work plan** for monitoring compliance with the City Regulations as it relates to the safety and security of the system. The work plan is to detail the approach for the selection of Regulations, Rules, and procedures to be monitored, the overall methodology to undertake monitoring and reporting, the specific Regulatory areas to be monitored, and the timeframes for undertaking the work.
2. Prepare an **Annual Compliance Report** that will describe the specific areas of the regulatory framework that were reviewed during the past year; report on the work that was undertaken to verify compliance in these areas; identify areas where compliance with Regulations has been fully achieved; and report on areas where compliance has not been fully achieved. Based on an expected revenue service date of November 2018, the first Annual Compliance Report will be available the first quarter of 2020.
3. **Quarterly monitoring** and reporting of any potential regulatory compliance gaps to the City Manager, in order for City staff to correct any compliance deficiencies.

This draft multi-year work plan is submitted to meet the recommended timeline for submission three months prior to revenue service, which is expected to be in November 2018. Since some of the City Regulations are currently in development, updates of this work plan will be prepared as additional and revised Regulations are provided.

This report encompasses comments received from the City Manager and relevant staff. The next step consists of submitting this report to the Ottawa City Council.

2. Scope:

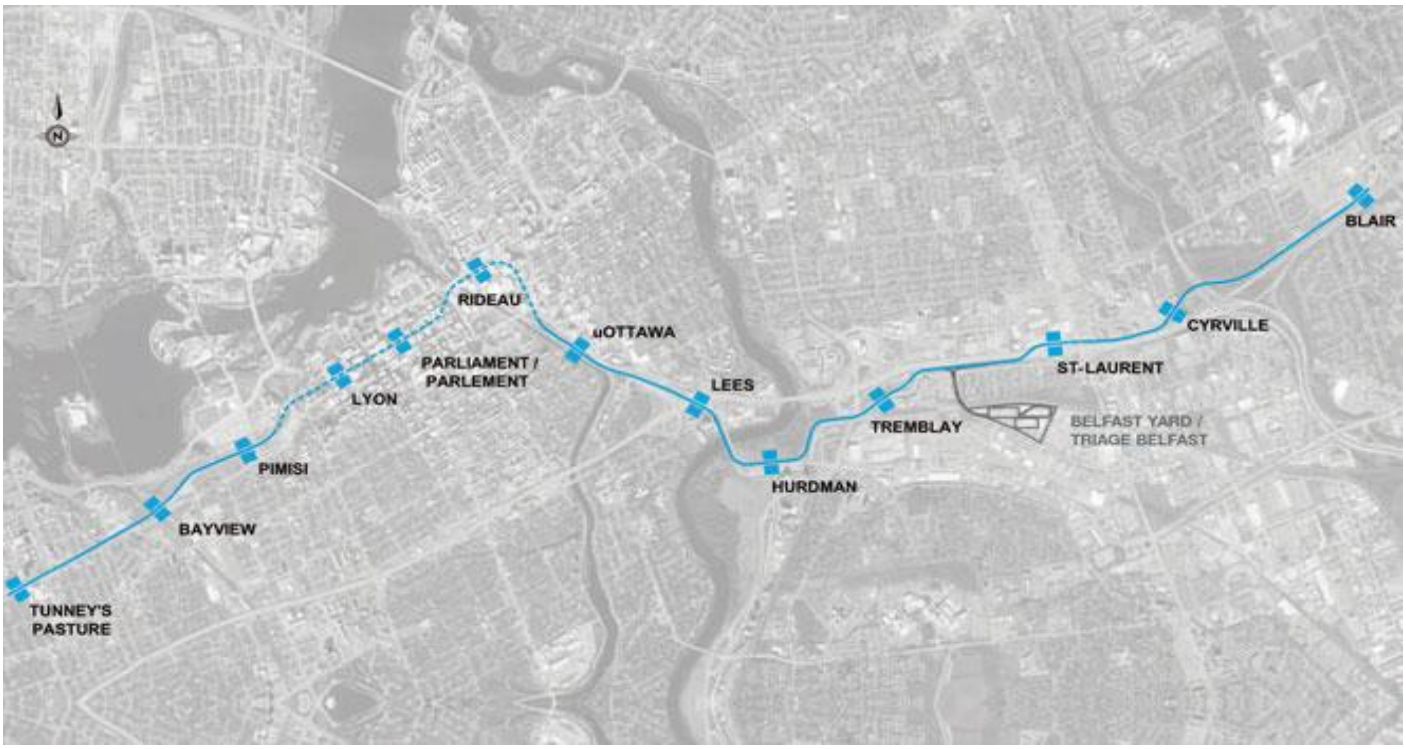
In accordance with the Delegation Agreement referenced in Section 1, and the report submitted to City Council in September 2015, the duties and responsibilities of the Compliance Officer are described in Annex A.

In summary, and with supplemental clarification, the scope and responsibilities consist of the following:

- Regulatory compliance monitoring for the Confederation Line.
- The compliance monitoring primarily relates to safety and security Regulations adopted by the City through bylaw or by other means, including standards and requirements imposed by contract.
- The scope and format of the Annual Compliance Reports prepared by the Compliance Officer will be aligned in respect of Regulatory compliance matters with the independent tri-annual safety and security audit reports the City is required to file with Transport Canada pursuant to the Delegation Agreement.
- On specific request, provide input to and consult with City personnel in respect of particular matters relating to the City Regulations.
- This mandate covers the Confederation Line exclusively (refer to Figure 1 below) and any expansions or extensions to this transit system or other light rail systems. This mandate does not cover commuter rail operations such as the Capital / Trillium railway, bus transit operations, or Para Transpo operations.
- The Compliance Officer has no duty or authority to assess the adequacy, sufficiency, or effectiveness of the City Regulations.

Further information on the scope / responsibilities of the Compliance Officer is shown in Annex B.

Figure 1 - Map of Confederation Line:



3. Timeline:

In consideration of the Confederation Line revenue service date planned for November 2018, the Compliance Officer is carrying out his work according to the following phases:

Phase 1:

Phase 1 consists of activities starting with the Compliance Officer's commencement date (March 2, 2018) leading up to revenue service. In this phase, the Compliance Officer performs the following broad activities:

- Familiarization / Orientation:
  - This includes meetings and discussions with City personnel to understand the organization as well as roles and responsibilities, and obtaining information relevant to the City Regulations, processes, operation, rolling stock, equipment, track and infrastructure.
  - Field visits to provide an overview of Confederation Line rolling stock, equipment, track, infrastructure and operations.
- Review City Regulations:
  - This consists of obtaining City Regulations, including Regulations prepared by their contractors such as RTG / RTM, and reviewing such Regulations as described in Section 2, with the objective to obtain a general understanding of their content for purposes of developing a Regulatory monitoring plan.
- Develop Draft Multi-Year Work Plan:
  - This consists of several activities including:
    - ✓ Development of an approach for the selection of Regulations, rules and procedures to be monitored.
    - ✓ Development of an overall methodology to undertake monitoring and reporting, including specific areas to be monitored and timeframes for undertaking the work.
    - ✓ Submission of the draft work plan to the City Manager and other relevant City personnel three (3) months prior to revenue service.
    - ✓ Update draft work plan on the basis of comments received, and present the updated draft work plan to City council.
- Initiate development of specific processes and documents for performing monitoring activities:
  - During Phase 1, the development of various documents and processes is initiated to carry out monitoring activities in a structured and consistent manner. Examples include the development of interview guides for specific elements to be monitored (e.g. Safety Management Systems), checklists for recording results of field reviews, and documents to collect records and data in a complete and consistent manner. It is to be noted that this development effort will start with the submission of the draft work plan and continue into Phase 2 as monitoring activities are performed and refined.

It is to be noted that City Regulations (refer to Annex E) are in-progress and have been provided to the Compliance Officer progressively since commencement of his activities in March 2018. Hence, this timeline is based on a draft work plan which is developed progressively with available Regulations using a risk-based approach. Work plan updates will be prepared as new and revised City Regulations are made available.

The timeline for Phase 1 is summarized in **Figure 2** below:

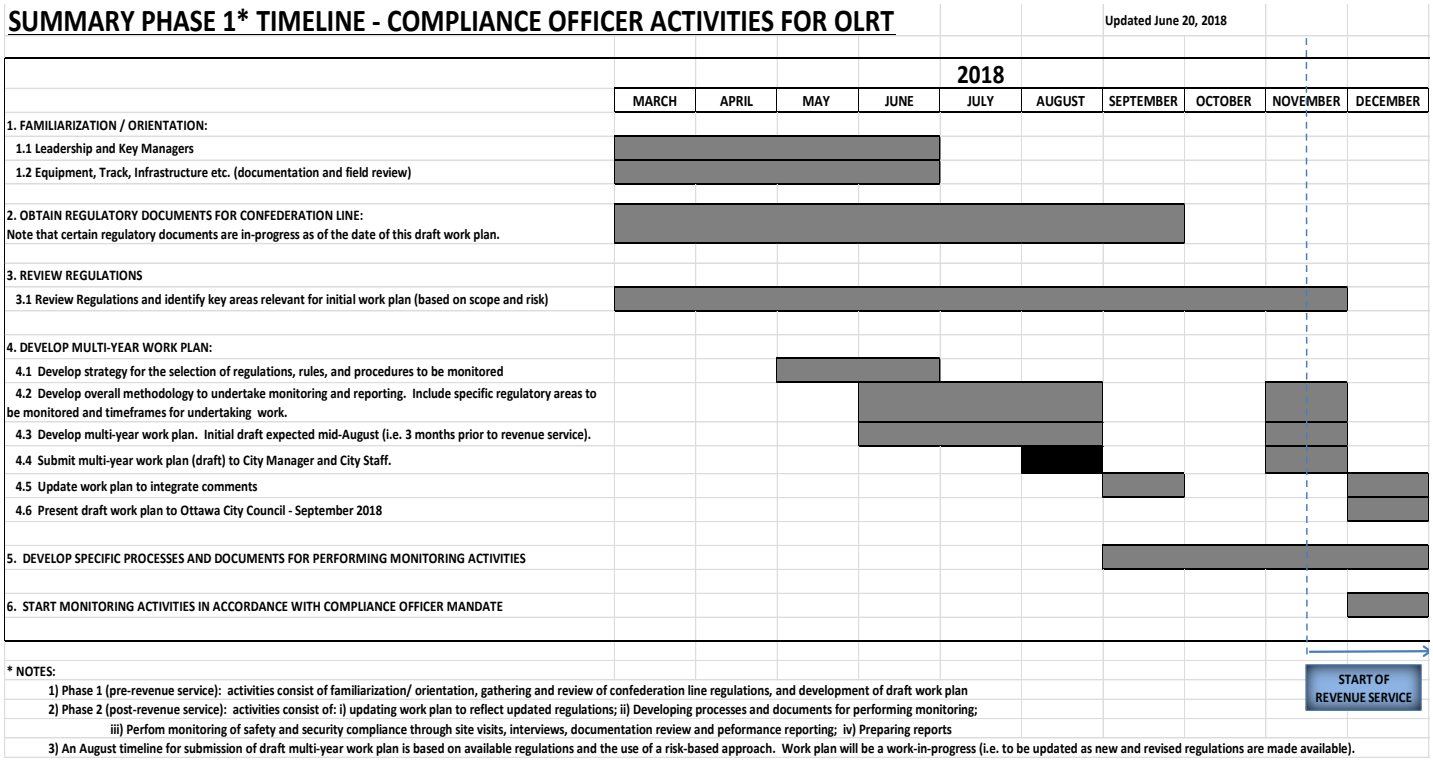


Figure 2 – Summary Phase 1 Timeline

It is to be noted that the Timeline will be updated if there are changes to the revenue service date.

Phase 2:

Phase 2 will consist of activities post-revenue service, expected to start in November 2018.

This will consist of the following broad activities:

- Updating work plan on the basis of:
  - New and revised City Regulations received from the City
  - The development and update of specific documents and processes which will be used for carrying out monitoring activities
  - Any further comments received from City Council, the City Manager or City staff.
- Performing monitoring activities in accordance with the work plan.
- Preparing reports for quarterly and annual monitoring activities.

4. Approach for Selection of Regulations to be Monitored:

The approach used for the selection of Regulations to be monitored consists of the following elements:

1. Review City Regulations to understand their content as well as how they relate to operations, rolling stock, track and infrastructure.
2. Familiarization with Confederation Line processes, operation, rolling stock and infrastructure.
3. Assess compliance-criticality of City Regulations using a risk-based approach. This part entails 2 parts:
    a. Perform research on commuter rail hazards and accident / incident causation, to obtain insights on potential sources of hazards and risk.
    b. Perform a high level risk assessment to help prioritize Regulations to be monitored.
4. Develop a specific monitoring plan identifying Regulations to monitor, as well as the methodology and frequency for each Regulation to be monitored.

The above noted approach is used to produce a schedule of monitoring activities which prioritize Regulations with the highest risk potential, while ensuring that a broad perspective is maintained by encompassing all key City Regulations in the monitoring plan, including those that entail lower risk levels.

Further detail is provided in the following sub-Sections.

4.1 Overview of Potential Hazards and Risks:

Risks to safety and security can result from multiple sources, each with their respective potential probability (i.e. likelihood) and consequence.

Sub-Section 4.2 presents research performed on potential hazards and accident / incident causes, which are categorized as follows:

HAZARD TYPE
HUMAN FACTORS
TRACK / INFRASTRUCTURE
ROLLING STOCK RELATED
ENVIRONMENTAL AND OTHER
SECURITY RELATED

Figure 3 – Hazard Categories

We provide below a summary description of these 'hazard types' to offer perspective on the different issues which can potentially result in an occurrence:

- **Human Factors** (reference 1): this category encompasses actions and behaviors by employees, contractors and other personnel involved directly or indirectly in the operation and supporting activities. This includes a wide range of potential issues such as deliberate and situational non-compliances, as well as inadvertent failures such as action errors (e.g. mental slip, memory lapse, operation application error) and thinking errors (e.g. rules based, knowledge based). Further, this category encompasses factors such as medical issues, fatigue, as well as drugs and alcohol which can have an impact on safety and compliance. Due to the number of employees and contractors involved in commuter operations, as well as the large number of actions and decisions typically made by each person, the category of human factors is typically associated with the greatest number of occurrences and requires substantial effort and sustained monitoring to mitigate risk; this notion is corroborated in the research presented in the next sub-Section.
- **Track and infrastructure**: this category encompasses a broad range of assets such as rail, ties, switches, catenary systems (i.e. OCS), overpasses / underpasses, culverts, tunnels, ventilation, retaining walls, facilities etc. Consideration is given to the large number of such assets, their decentralized nature, and the effects of wear and tear. Further, it is recognized that track / infrastructure occurrences can result not only from material failures related to defects or stress / fatigue, but also from failures in process, technology, activities performed by people, or extreme environmental conditions.
- **Rolling Stock Related**: this category encompasses light rail vehicles (LRV) and their components, as well as other vehicles used for supporting operations. Safety issues can occur on the multitude of LRV components, including the effects of wear and tear on components such as wheels, axles, bearings, brake systems, power / electrical systems, bogies, couplings, door systems and structural components. Similarly to track and infrastructure, it is recognized that rolling stock occurrences can result not only from material failures related to defects or stress / fatigue, but also from failures in process, technology, activities performed by people, or extreme environmental conditions.
- **Environmental / Other**: this category encompasses three broad areas as follows:
    - The effects of extreme environmental conditions such as such as storms, lightning, heavy rain or freezing rain, extreme temperatures etc.
    - The potential for earthquakes, geotechnical issues, flooding etc.
    - 'Other' issues, which would not fit within the previous categories, such as the dependence on external supply of electricity, data flow for information technologies etc.
- **Security Related**: For purposes of distinction, security matters are separated in two broad categories:
    - **Voluntary terrorist or criminal acts** committed by people aiming to cause harm, such as bombing, armed attack, arson, cyber-attacks etc. Such occurrences are

expected to be low in terms of frequency but could potentially have high consequences.

- **Localized issues** relating typically to passengers / public, such as trespassing incidents or suicides, as well as minor security-related occurrences such as vandalism, unauthorized access, or incidents involving facilities or rolling stock (e.g. LRV doors, guideways, platforms, tunnels). Considering the nature of the operation and the interface with the public, it is expected that most security-related issues will be 'localized issues'.

Sub-Section 4.2 presents a summary of the research performed relative to commuter rail hazards and accident / incident causation, while sub-Sections 4.3 and 4.4 explain how this information is used in conjunction with risk management principles to guide the development of the Regulatory monitoring methodology for the Confederation Line.

4.2 Summary of Research on Accident / Incident Causation and Risk:

Accident / incident causation is a key input in developing the Regulatory monitoring work plan because this provides insights on potential hazards and risks, thereby allowing for the pinpointed monitoring of Regulations which have the greatest impact on safety and security.

This research effort showed that although there is a great deal of information available on accident / incident causation and risk analysis for freight and passenger railways, such information is scarcer for commuter rail systems similar to the Confederation Line. Nonetheless, a fair amount of pertinent material was obtained for commuter rail, as well as other similar rail operations, providing relevant information on risk and accident / incident causation, as presented in Annex C.

Annex C presents research which covers commuter rail, urban transit systems and passenger rail. As mentioned earlier, it is recognized that this material may not be fully applicable to the Confederation Line because of its unique characteristics (this is further discussed in Section 4.3). Nonetheless, much of the research provided in Annex C reflects common issues faced by commuter rail and urban transit systems, and contains sufficient detail to make deductions on expected hazards for the Confederation Line; as an example, any parts of research findings containing crossing accidents, can be disregarded because the Confederation Line has no grade crossings on its routes. As such, this research material is deemed to be valuable in the elaboration of a Regulatory monitoring approach because it provides insights on potential hazards and risks, while recognizing that it is not intended to be used for accurate predictive purposes.

Section 1 of Annex C offers perspective by providing accident / incident statistics compiled by Canada's Transportation Safety Board for GO Transit commuter trains and the AMT Montreal commuter rail division.

This data shows that main track and non-main track derailments are rare for these operations, and that the most frequent occurrences relate to the following:

1. Crossing accidents (note: as mentioned earlier, it is recognized that such occurrences would not apply to the Confederation Line since there are no grade crossings on its routes).
2. Trespasser accidents (note: it is recognized that many such events will be mitigated by fencing in the Confederation Line which will prevent access to the right of way).
3. 'Movement exceeds limits of authority' (note: it is recognized that many such events will be mitigated by the Confederation Line communications based train control (CBTC)).
4. 'Other reportable incidents': these represent diverse causes which are infrequent.

This data supports the notion that the Confederation Line will have a high level of rail safety, since 3 of these 4 top occurrence types will be inherently mitigated.

The report referenced in Section 2 of Annex C compares urban rail accidents / incidents versus passenger rail, and mentions the following:

> *"A comparative analysis of accident types showed that for urban railway accidents, accidents were mostly caused by passenger-driven mistakes such as falls, collisions, and becoming stuck between train and platform, whereas conventional railway accidents mostly occurred in relation to external factors such as jumping in front of oncoming trains, falling on tracks, and being on or near tracks. This gap can be explained by the operational differences between conventional railways and urban railways."*

This research also mentions that:

> *"For conventional railways, 80% of all accidents occurred on the platform, followed by escalators (9%), tracks (6%), and stairs (3%). Urban railway accidents, on the other hand, instead of mainly occurring in one area, had a similar level of frequency in various locations such as trains (28%), stairs (24%), escalators (20%), and platforms (16%). A similar rate of occurrence in multiple locations can be explained by the fact that urban railway has a higher user density, leading to passenger-passenger interaction as well as passenger-facility collisions."*

This research provides valuable insights by highlighting how urban rail incident causation differs from passenger railways.

The report referenced in Section 3 - Annex C reviews rail safety and security causes for passenger and freight railways. Again, given the unique characteristics of the Confederation Line, this information is provided for purposes of offering insight rather than extrapolating accurate expectations for causation.

This research mentions the following with respect to accident causation:

> *"For rail freight, the dominant type of accident is a derailment, and the dominant cause is a track defect. For passenger rail, the dominant type of accident is "other" and the dominant cause is "miscellaneous" yielding little insight into the key factors*

involved. Human errors are cited as the primary cause in 34 percent of rail freight accidents and 19 percent of passenger rail accidents."

With respect to security, this same report mentions the following:

"This database catalogs terrorist attacks worldwide, including events dating back to the 1920s ... The majority of terrorist incidents on rail systems are bombings with conventional bombs, but other tactics have also been successfully employed".

The report referenced in Section 4 of Annex C reviews hazards and incident causes for rapid rail transit, with the following comment:

" ... generally, rail rapid transit hazards occur because of three elements: (1) Human: operators and passengers; (2) System: material, equipment, tools, and safety facility; (3) Environment: temperature, humidity, ventilation, lights, and noise (natural environment and artificial environment) in the working place".

This research goes on to highlight the importance of human factors in accident causation:

"If we analyze specifically the causes that lead to system and environmentally unsafe conditions, we find that almost all defects come from human errors in design, installation, operation, treatment, and uses. After a series of researches on accident causation models, Reason (1995) proposed a system approach to analysis organizational error, and the main focus is upon the human contribution within these broader systems."

Consequently, this research emphasizes the importance of maintaining a broad perspective on causation and risk mitigation:

"Though human error could be regarded as the major cause of rail rapid transit accidents … all factors must be considered".

With respect to Human Factors, Section 5 of Annex C provides relevant research on this significant accident / incident causation category and mentions the following:

"Human factors are the leading cause of incidents and accidents in commuter rail operators. Over the period 2002-2011, 38% of all such cases involved human factors."

As discussed earlier, human factors encompass many elements, of which a significant one is fatigue. Section 6 of Annex C contains research prepared by RSSB (Railway Safety and Standards Board) in the UK, which reviews this matter in detail and concludes that:

- "Fatigue presents a serious risk to operations in the rail industry…"
- " … analysis identified fatigue as a factor in 21% of the incidents…"
- "Home life related fatigue was the most cited reason for the fatigue (40%) followed by work-related fatigue (38%). Train drivers were most affected by work-related fatigue rather than home-life related fatigue".

To provide broader perspective, Section 7 of Annex C refers to a report which studied some of world's leading metros (subways) and commuter railways using data for high severity accident / incidents to identify key focus areas (precursors), summarized as follows*:*

"Human performance (operator and maintainer), technical failures, passenger actions, fires; malicious / illegal action and management action".

The notion being that focus on these 6 areas, in terms of process, prevention and monitoring, would have a beneficial impact on the reduction of such high severity events.

In summary, this research provides insight which supports the following approach and focus in the development of a monitoring methodology:

- **Risk-Based Monitoring**: Certain categories of hazards will be associated with a higher risk potential – such Regulations will be pinpointed for active monitoring. However, the overall monitoring approach will remain broad to ensure that all key City Regulations are monitored over time, including those that entail lower risk levels.
- **Human Factors:** Regulations relating to Human Factors will be a monitoring priority. This includes Regulations such as "Rail Operating Rules", "Hours of Service", fatigue management, medical rules as well as training and field monitoring processes.
- **Localized Security Issues**: As outlined in Sections 4.1 and 4.2, localized security issues are expected to be an ongoing issue due to the nature of the operation and the high volume of passengers. Passenger actions / behaviors could give rise to a wide range of issues such as tampering with LRV doors, unauthorized access to guideways, platforms, tunnels, as well as vandalism. This will therefore be a monitoring focus.
- **Track and Rolling Stock Regulations:** City Regulations relating to track, infrastructure and rolling stock inspections / maintenance are key to safe operations and will be an important part of the monitoring plan. This is essential considering the decentralized operation, the frequency of service, the effects of wear / tear and environmental conditions.
- **Management Systems / Processes:** Management Systems are fundamental to ensure that processes and procedures are implemented to outline clear roles / responsibilities to support safe and secure operations, while managing risk, reinforcing prevention, as well as addressing and learning from incidents and near misses. Examples include 'Safety Management Systems' and associated procedures (e.g. risk assessment, accident investigation and development of preventive actions), as well as 'Security Management Systems'.
- **Employee Readiness for Operational Exceptions:** Although much of the Confederation Line operation will be automated, employees will be required to follow specific procedures and take certain actions when operational exceptions occur. This will include processes such as "LRV door faults", "Track Obstructions", "Working on the Confederation Line", as well as emergency planning and procedures which need to be followed when critical systems such as CBTC are temporarily not functional. It will be important to monitor relevant training, field activities and other processes which provide employees with an adequate level of understanding and competence to deal with such situations.

- **Planned and Emergent Focus:** Upon the inception of revenue service, the work plan will prioritize the monitoring of specific Regulations based on the current understanding of risk. However, the monitoring focus may require adjustments based on operational experience, which may bring to light specific issues which require additional risk mitigation. This work plan will be supportive of risk mitigation efforts by fine-tuning the monitoring focus.

4.3 Risk Mitigation Considerations for Confederation Line:

As mentioned in Section 4.2, it is expected that the Confederation Line will inherently have a high level of rail safety because of a number of characteristics, such as those described below:

- The Confederation Line makes use of proven technologies, rolling stock and features, such as:
  - **Thales Communication Based Train Control (CBTC)** - *"The Thales CBTC system is proven worldwide on over 55 projects and operates on over 1,300 km of track in major urban centers around the world carrying an estimated 3 billion passengers annually" (reference 2).*
  - **Alstom Citadis Light Rail Vehicles** – *"As of 2017, over 2,300 Citadis units have been sold and 1,800 tramways are in revenue service throughout the world, with operations in all six inhabited continents" (reference 3).*
  - There are various systems designed to strengthen safety and security, such as:
    - *Guideway intrusion detection system (GIDS)* which uses laser-based technology to detect when intruders attempt to enter the guideway off the end of a station platform or at tunnel portals. This will have the capability to apply emergency brakes on trains when necessary.
    - In addition to CBTC controls, light rail vehicles are equipped with a driver vigilance system to protect against situations where an operator may become fatigued, distracted, or immobilized.
- As compared to freight or passenger railways, which often use shared tracks, the Confederation Line is designed with an exclusive right of way, as well as automatic train control and monitoring systems. The exclusive right of way will limit risk in a number of manners, such as:
  - Wear and tear on the track / infrastructure will be more predictable, as compared to shared tracks which are subject to high tonnage and in-train forces associated with freight trains.
  - Risk and severity will be reduced (as compared to shared tracks) since the potential for accidents resulting from protrusion or interference from other train types on adjacent tracks will be eliminated.
  - Risks associated to freight trains, such as the transportation of dangerous goods, will not be present.
- The right-of-way (ROW) is secured by a chain-link fence to prevent access.

- As mentioned earlier, the Confederation Line is built with no level grade crossings on the mainline route, which will eliminate a significant source of risk encountered by many rail passenger and commuter operations.
- The planned operating speed of 80 km/h is moderate, thereby limiting risk. There are several studies which show that accident severity increases with higher operating speeds (reference 4).
- The City of Ottawa has allocated significant resources and expertise, while engaging its contractors, to ensure that City Regulations developed and adopted (e.g. inspection / maintenance procedures etc.) are customized for the Confederation Line and that there is a high degree of readiness for implementation. This includes substantial testing and validation prior to revenue service (reference 5).

4.4 Principles Used for Development of Monitoring Methodology:

Basic risk mitigation principles require that the monitoring effort, in terms of frequency and level of detail, should increase as a function of risk which is typically assessed in terms of the potential likelihood and consequence of a hazard. Therefore, in this work plan, the monitoring effort is increased as a function of risk, as outlined in Figure 4 below:

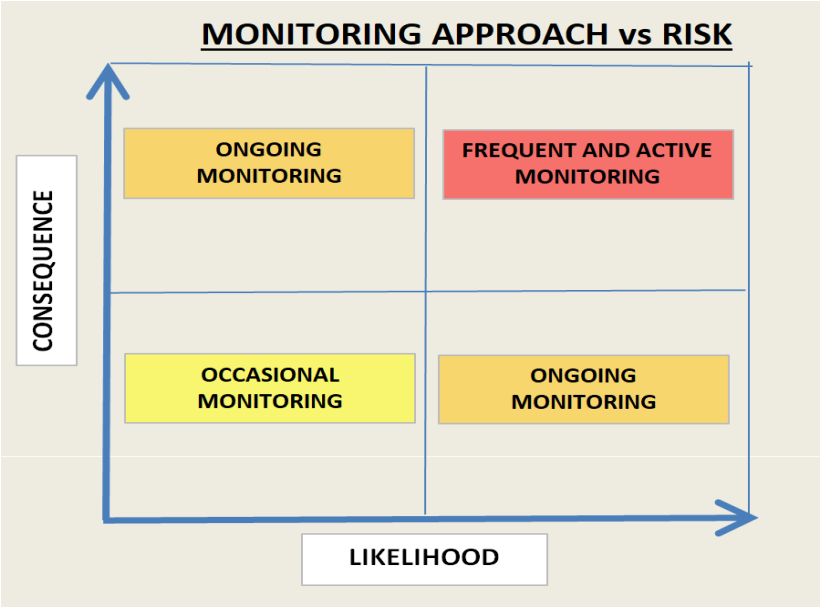


Figure 4 - Monitoring Approach versus Risk

The development of the Regulatory monitoring approach utilizes the above principle, as well as the information on potential hazards and risk provided in the previous sub-Sections.

For purposes of practicality, a high level view of potential hazards and their respective risk is used for guiding the development of the Regulatory monitoring approach. It is to be noted that a detailed risk assessment was not carried out since the Compliance Officer mandate is focused primarily on the development of an effective compliance monitoring methodology, rather than performing a detailed risk assessment which would require substantial effort.

Consistent with these principles, as well as consideration for the operating environment, Figure 5 (below) outlines the risk potential for the hazard categories identified earlier.

RISK POTENTIAL OF HAZARD TYPES

HAZARD TYPE	LIKELIHOOD (1-3; 1= HIGHEST)	CONSEQUENCE (1-3)	RISK POTENTIAL (1-3)
HUMAN FACTORS	1	1-3	1-3
TRACK / INFRASTRUCTURE	2	1-3	2-3
ROLLING STOCK RELATED	3	1-3	3
ENVIRONMENTAL AND OTHER	2	1-3	2-3
SECURITY RELATED	1	1-3	1-3

Figure 5 –Various Hazard Types and their Risk Potential

Information on the elements which make up this table is provided below:

- The 'hazard type' is presented in five broad categories, as outlined in sub-Section 4.1, for purposes of brevity and simplicity. Each hazard type represents a spectrum of issues which can potentially result in an occurrence.
- The 'likelihood' column, or the relative probability of an occurrence, is a function of the frequency of acts, conditions, process failures or organizational factors (reference 6) which can potentially result in a non-compliance, a threat to safety / security, a near-miss, or an incident / accident. This is guided by the research effort in sub-Section 4.2.
- The 'consequence' column represents the magnitude of the potential impact or loss which can result from an occurrence. The range shown ('1-3', where '1' is the highest and '3' the lowest) is a simplified representation to reflect the possibility that an occurrence can result in widely varying consequences depending on the particulars of circumstances and conditions.
- The 'risk potential' column represents an estimate of the relative risk level, based on the combination of 'likelihood' and potential 'consequence' of an occurrence. As discussed earlier, the categories of 'Human Factors' and 'Localized Security Issues' are expected to entail the highest relative risk and will therefore have the most active monitoring.

As outlined in the previous sub-Sections, the above information is used as a key input to prioritize Regulations with the highest risk potential, while ensuring that a broad perspective is maintained by encompassing all key City Regulations, including those that entail lower risk levels.

5. Methodology to Undertake Monitoring:

In accordance with the duties and responsibilities outlined in Annex A, the Compliance Officer will perform site visits, interviews with City staff and contractors, and review relevant documentation, records, and performance reporting. Typical tasks encompassed in monitoring activities include:

- Reviewing Regulations, policies and procedures
- Conducting interviews and meetings with field staff and senior management
- Conducting field observations of operations, maintenance and/or safety management activities
- Reviewing technical submissions
- Analyzing data and performance records
- Assessing compliance with Regulations
- Providing timely and accurate advice to staff to consider improvements to the Regulations and/or to the implementation and enforcement of Regulations when required
- Monitoring implementation of staff recommended improvements, developments and new initiatives in respect to the City Regulations.

The previous Section describes key principles and information used to guide the selection and prioritization of Regulations to be monitored. In addition to this information, selection of the appropriate monitoring approach requires knowledge of the Regulations, the potential challenges of maintaining compliance over time, and an understanding of how compliance can be verified objectively and subjectively. Therefore, the following elements are considered in the development of the monitoring methodology:

5.1 Monitoring Techniques:

Monitoring techniques can include quantitative and qualitative methods such as the following:

1. Interviews
2. Field Observations
3. Data Collection and analysis
4. Review of records, documents and other objective information

Since each of the above monitoring techniques has its respective strengths and limitations, some are best suited to specific Regulations, while others may require a combination thereof.

As an example, the monitoring of training compliance may require the following:

- An initial review of training material to confirm that the required content is encompassed.
- A review of records to confirm that new employees have received the required qualification training.

- A review of records to confirm that active employees have received re-qualification training at the time intervals specified by Regulations.
- A review of management activities and records related to compliance monitoring.
- A field review, including observations and discussions, to confirm that employees have their rules qualification card and medical fitness card, and are working in compliance with applicable Regulations.

In most cases, the monitoring plan uses a combination of monitoring techniques for each Regulation to be monitored, thereby providing a more complete and objective picture of compliance results.

Additionally, specific monitoring procedures and processes are to be developed for certain Regulations, based on the monitoring complexity, in order to achieve structured and consistent monitoring. This effort is shown as step 5 of the Timeline in Section 3 of this report. As an example, questionnaires will be developed for interviews relating to Safety Management Systems, while checklists will be developed for field observations. It is also the intent to update monitoring procedures and to enhance them on the basis of lessons learnt, opportunities and changes to Regulations.

5.2 Time Frames, Frequency and Duration:

Time frames for initial and consequent monitoring of specific Regulations will be guided by the following principles:

- A **risk-based approach** on the basis of the principles reviewed in Section 4 of this report, such as the likelihood and potential consequence of an incident resulting from a hazard / non-compliance. As an example, Regulations involving the potential for higher risk levels will require more frequent and active monitoring.
- **Anticipated hazards and causation** of accidents / incidents. This means that one of the considerations in establishing the monitoring frequency for a specific Regulation will be based on its possible relationship with the anticipated risk of hazards and accident / incident causes related to non-compliance. The material reviewed in Section 4 of this report is used as a guide.
- **Consideration for the nature of the Regulation and the required actions to maintain compliance, as well as the potential variation of compliance over time**. Consideration is given to each key Regulation with respect to the above factors. As an example, training requires an initial qualification for each employee, as well as re-qualifications at specified time intervals. As well, work / rest rules require training, ongoing compliance by each employee and monitoring by management. As a further example, medical fitness for duty is established through an initial assessment during the hiring process, as well as consequent medical assessments to identify changes such as emergent medical conditions which need to be detected on a timely basis; as an example, conditions such as sleep apnea or diabetes may not be an issue when an employee is hired but can emerge as issues many years afterwards.

The time frame, frequency and duration of monitoring activities will be aligned with the above principles, as well as the Compliance Officer mandate to perform quarterly monitoring / reporting, and to submit annual compliance reports. This means that the Compliance Officer activities will be performed in a manner which target specific Regulations through detailed monitoring processes and frequencies using risk-based principles as well as anticipated causation and the potential variation of compliance over time, while reporting will be based on requirements in the Compliance Officer mandate.

6. Regulations to be Monitored and Draft Monitoring Plan:

On the basis of the principles outlined in the previous Sections, a draft work plan of monitoring activities has been developed in tabular format as shown in Annex D.

This table has been developed through a review of Regulations provided to the Compliance Officer (Annex F) and covers the Regulatory areas identified in the scope / responsibilities of the Compliance Officer, as described in Section 2 and Annex B of this report. As explained earlier, this table will be a work-in-progress as City Regulations continue to evolve, with more Regulations and updates expected to be provided to the Compliance Officer over the next months.

This table includes the following details:

- Identifies the specific Regulation to be monitored, including the Regulatory document and Section
- Includes a summary description of the Regulation and the parts to be monitored
- Description of monitoring approach
- Time frame for monitoring: i) Starting date; ii) Frequency of monitoring
- Classification of monitoring activities in the areas of 'Field Review', 'Interviews / Meetings', and / or 'Documents / Data'

As mentioned in Section 5.1, specific monitoring procedures and processes will be developed progressively for certain Regulations, based on the monitoring complexity, in order to achieve structured and consistent monitoring.

The Compliance Officer will work closely with City staff, specifically OC Transpo staff, to set up procedures and protocols, aligned with City resources, to meet the expected target dates of the Monitoring Plan. This will also include working collaboratively to develop a comprehensive roles and responsibility matrix together with a fulsome schedule that is aligned with the Monitoring Plan.

7. Reporting:

Reporting will be produced quarterly and annually as outlined in the next sub-Sections, in accordance with the Compliance Officer Duties and Responsibilities:

7.1 Annual Compliance Report:

The Annual Compliance Report will include the following:

- Description of the specific Regulations that were reviewed during the past year
- Report on the work that was undertaken to verify compliance in these areas
- Identify areas where compliance with Regulations has been fully achieved
- Report on areas where compliance has not been fully achieved
- In the event that non-compliances were identified, details will be provided on the remedial actions taken by the City Manager's Office

The Annual Compliance Report will also include any revisions to the multi-year work plan.

A draft annual compliance report will first be submitted to the City Manager and affected persons. The report will then be updated on the basis of comments and actions taken, after which it will be submitted annually to the City's Transit Commission and City Council.

The following timelines will be used for Annual Compliance Report:

- Draft annual report will be submitted to the City Manager and other stakeholders for comment within 30 days following the end of December of each year.
- A period of 30 days will be provided for review and comment.
- The annual report will be finalized, on the basis of comments received, within 15 days following the receipt of comments.
- Once finalized, the annual compliance report will be submitted to the City's Transit Commission and City Council.

Annual Report Structure:

The annual report will be structured as follows:

1. Executive Summary
2. Table of Contents
3. Introduction: this will include a high level background, scope, and methodology
4. Regulations monitored during the past year: this Section will detail specific Regulations monitored, how they were monitored and when
5. Compliance results: this will consist of a listing and commentary of Regulations which were found to be fully compliant, partially compliant and not compliant
6. Actions taken by City Manager's Office for Regulations found to be partially compliant or non-compliant
7. Work plan update – including an overview of changes made
8. Monitoring focus for coming year

9. Summary
10. Exhibits.

As noted in Section 2 of this report, the scope and format of the Annual Compliance Reports prepared by the Compliance Officer will be aligned, to the extent possible, in respect of Regulatory compliance matters with the independent tri-annual safety and security audit reports the City is required to file with Transport Canada pursuant to the Delegation Agreement.

7.2 Quarterly Reporting:

During each quarter, the Compliance Officer will perform ongoing Regulatory monitoring activities in accordance with the work plan.

The Compliance Officer will maintain records of monitoring activities and findings, which will be used to prepare a quarterly monitoring summary to be provided to the City Manager for review 30 days following the close of each quarter.

The format of the quarterly monitoring summary will consist of the following information which will be used consequently in the preparation of the annual compliance report:

1. Introduction
2. Monitoring period
3. Monitoring Activities: specific Regulations monitored (including how and when they were monitored)
4. Findings: identification of Regulations found to be compliant, partially compliant and non-compliant. For Regulations where both compliance and non-compliance were identified, details will be provided on the numbers of each, including dates
5. Summary.

7.3 Approach used by Compliance Officer:

In the performance of his duties, the Compliance Officer will use the following approach:

- Use a consistent monitoring approach by following the procedures and processes developed (refer to Section 5.1).
- In the interest of safety and security, communicate with the General Manager of Transportation Services and departmental management at the earliest opportunity in the event that a significant non-compliance is observed with the potential for immediate harm or major consequences.
- Work with OC Transpo staff to develop an annual monitoring schedule which considers City resources, while meeting expected target dates of the Monitoring Plan.

Context / Disclaimers

This report, including any enclosures and attachments, has been prepared for the exclusive use of the City of Ottawa solely for the purpose for which it is provided under the Terms of the Contract executed March 2, 2018 between SAB Vanguard Consulting Inc. and the City of Ottawa.

Any use, decisions or actions taken as a result of this work shall be the responsibility of the parties directly involved in the decisions or actions.

References

Reference 1:

'Human Error' - James Reason
Cambridge University Press, 1990

Reference 2:

Document from Thales on CBTC
https://www.thalesgroup.com/sites/default/files/asset/document/Ottawa%20LRT%20PR%20draft_190213_Final.pdf

Reference 3:

Document from Alstom on Citadis LRV
http://www.alstom.com/products-services/product-catalogue/rail-systems/trains/products/citadis/

Reference 4:

1) "Causal Analysis of Passenger Train Accidents on Shared-Use Rail Corridors", Barkan et al, 2013
2) "Analysis of Canadian Train Derailments from 2001-2014", Leishman, 2014
3) "Impact Force Evaluation of Derailment Containment Wall for High-speed trains through collision Simulation", Bae et al, 2018

Reference 5:

https://www.cbc.ca/news/canada/ottawa/lrt-confederation-test-automated-system-1.4603033
https://www.ottawamatters.com/local-news/city-growing-confident-about-lrt-deadline-as-test-results-come-in-945177
https://www.alstom.com/press-releases-news/2016/12/alstoms-citadis-spirit-begins-train-dynamic-testing-in-ottawa
https://www.ligneconfederationline.ca/news/construction-update-184/

Reference 6:

1) *'Managing the risks of organizational accidents' – James Reason – 1997*
   Published December 15th 1997 by Ashgate Publishing
2) *'Guide to Investigating Organizational and Management Factors' – Transportation Safety Board (TSB)*

Reference 7 (Annex C):

Transportation Safety Board of Canada (TSB) - Federally Regulated railway accidents and incidents by train operator, 2005-2014.
http://www.bst-tsb.gc.ca/eng/stats/rail/r13d0054/r13d0054.asp

Reference 8 (Annex C):

A Factor Analysis of Urban Railway Casualty Accidents and Establishment of Preventive Response Systems
Kim, Hyun juª, et al
2016 11th International Conference of The International Institute for Infrastructure Resilience and Reconstruction (I3R2) : Complex Disasters and Disaster Risk Management

Reference 9 (Annex C):

Improving the Safety and Security of Freight and Passenger Rail in Pennsylvania
David S. Ortiz, Brian A. Weatherford,
Michael D. Greenberg, Lisa Ecola

Reference 10 (Annex C):

HAZARDS IDENTIFICATION MODEL FOR RAIL RAPID TRANSIT ACCIDENTS
Lung-Chuang Wang*
Journal of Marine Science and Technology, Vol. 12, No. 2, pp. 78-85 (2004)

Reference 11 (Annex C):

Reducing Major Rule Violations in Commuter Rail Operations: Distraction and Its Mitigation with Sustained Attention Training'
George Elsmore – GE-Safety Associates, et al.
U.S. Department of Transportation - Federal Railroad Administration Office of Railroad Policy and Development - Office of Research and Development

Reference 12 (Annex C):

Reducing Major Rule Violations in Commuter Rail Operations: The Role of Distraction and Attentional Errors'
Raja Parasuraman, George Mason University; George Elsmore, Veolia TransDev Inc. et al.
PROCEEDINGS of the HUMAN FACTORS and ERGONOMICS SOCIETY 56th ANNUAL MEETING – 2012

Reference 13 (Annex C):

Fatigue and its Contribution to Railway Incidents" Feb 2015 – RSSB
N. Bowler, Human Factors Specialist, RSSB, Huw Gibson, Senior Human Factors Specialist, RSSB

Reference 14 (Annex C):

Metro railway safety: An analysis of accident precursors" - 2012
Miltos Kyriakidis, Robin Hirsch, Arnab Majumdar !
Centre for Transport Studies, Department of Civil and Environmental Engineering, Imperial College London, London SW7 2AZ, United Kingdom

ANNEXES

ANNEX A

Compliance Officer Duties and Responsibilities *

SCHEDULE "A"

STATEMENT OF DUTIES AND RESPONSIBILITIES

The Light Rail Regulatory Monitor and Compliance Officer ("Compliance Officer") is responsible for reviewing, investigating, monitoring and reporting on compliance with the Ottawa Light Rail Transit (OLRT) regulations.

The Compliance Officer will be independent of the Transportation Services Department and will report directly to the City Manager and City Council.

The Compliance Officer will be responsible for the development of a multi-year workplan for monitoring compliance with the OLRT regulations as it relates to the safety and security of the system. The workplan will detail the strategy for the selection of regulations, rules, and procedures to be monitored, the overall methodology to undertake monitoring and reporting, the specific regulatory areas to be monitored, and the timeframes for undertaking the work. The multi-year workplan will be submitted to both the Transit Commission and Ottawa City Council. Prior to developing the multi-year workplan, the Compliance Officer will be required to review and understand the City's comprehensive regulatory framework.

The role is expected to involve monitoring regulatory compliance through site visits, interviews with City staff and contractors, and review of relevant documentation, records, and performance reporting. These tasks are expected to include but not be limited to:

- Reviewing regulations, policies and procedures;
- Conducting interviews and meetings with field staff and senior management;
- Conducting field observations of operations, maintenance and/or safety management activities;
- Reviewing technical submissions;
- Analyzing data and performance records;
- Assessing compliance with regulations;
- Providing timely and accurate advice to staff to consider improvements to the regulations and/or to the implementation and enforcement of regulations when required; and,
- Monitoring implementation of staff recommended improvements, developments and new initiatives in respect to the OLRT Regulations.

The Compliance Officer will prepare an Annual Compliance Report that will describe the specific areas of the regulatory framework that were reviewed during the past year; report on the work that was undertaken to verify compliance in these areas; identify areas where compliance with Regulations has been fully achieved; and report on areas where compliance has not been fully achieved. The Annual Compliance Report will also include any revisions to the multi-year workplan.

After preparing a draft of the report and taking input from the City Manager and affected persons as determined necessary, the Annual Compliance Report will be submitted annually to the City's Transit Commission and City Council. The City Manager will prepare a Management Response Companion Report that will be considered by Transit Commission and Council alongside the Annual Compliance Report.

The Compliance Officer will also be responsible for quarterly monitoring and reporting of any potential regulatory compliance gaps to the City Manager, in order for City staff to correct any compliance deficiencies.

*** Excerpt from Contract signed between the City of Ottawa and SAB Vanguard Consulting Inc. on March 2nd, 2018.**

ANNEX B

Additional Information on Compliance Officer Scope and Responsibilities

This Annex supplements Section 2 and Annex A of this report, and is intended to provide further information / clarification on the Compliance Officer Scope and Responsibilities.

Applicable Regulations:

The mandate is restricted to monitoring compliance with the City Regulations adopted by the City, and therefore for clarity **excludes**:

1. The *Canada Labour Code*
2. *On Board Trains Occupational Health and Safety Regulations*
3. Parts of the *Canada Transportation Act* which are not relevant to this scope, such as *Part II ('Air Transportation')*, or *Part V ('Transportation of Persons with Disabilities')* which Transport Canada will continue to Regulate
4. Any other Federal or Provincial Regulations applicable to Confederation Line

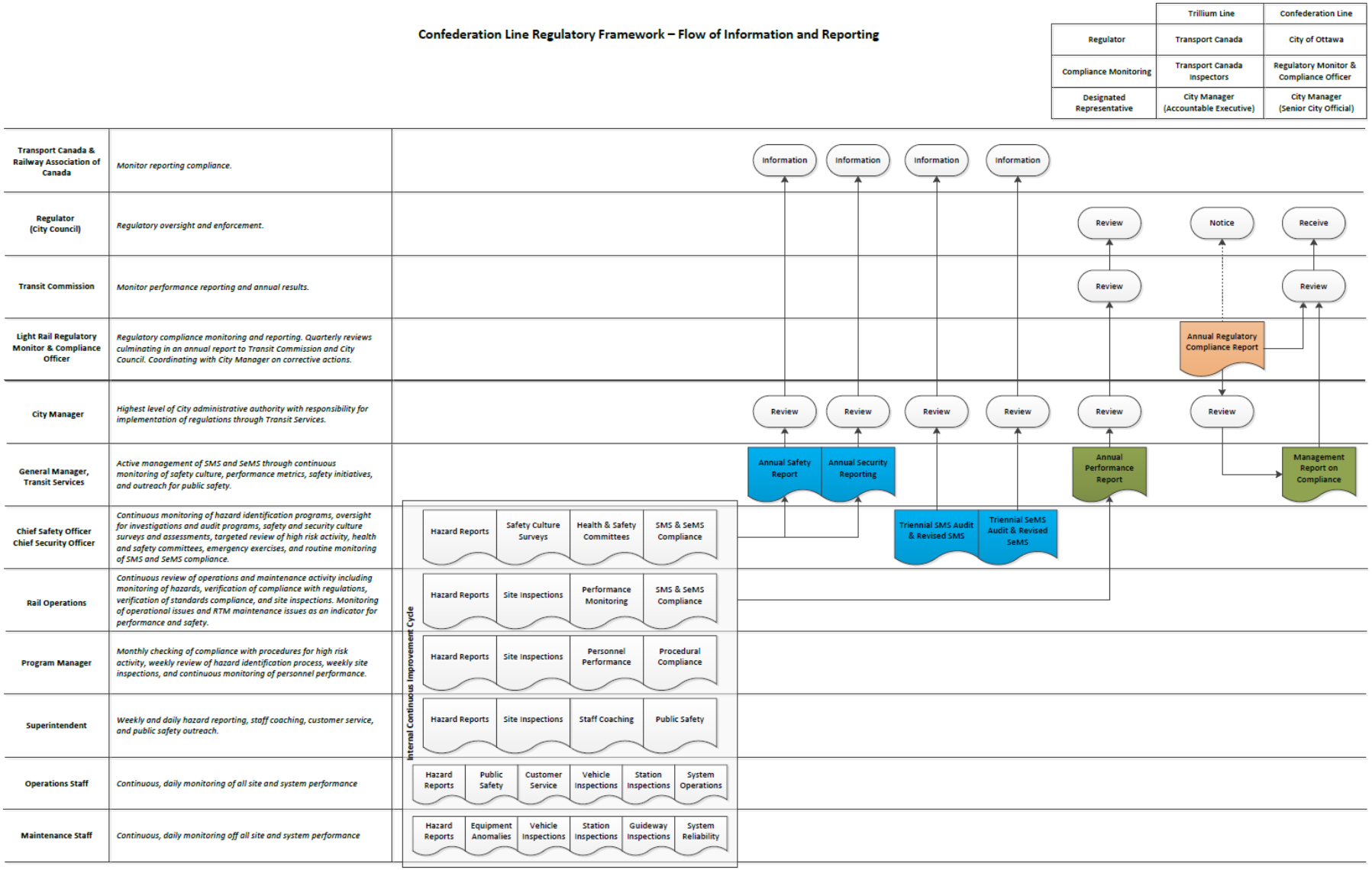
Approach for Review of Regulations and Development of Work Plan:

The following information explains the approach and context:

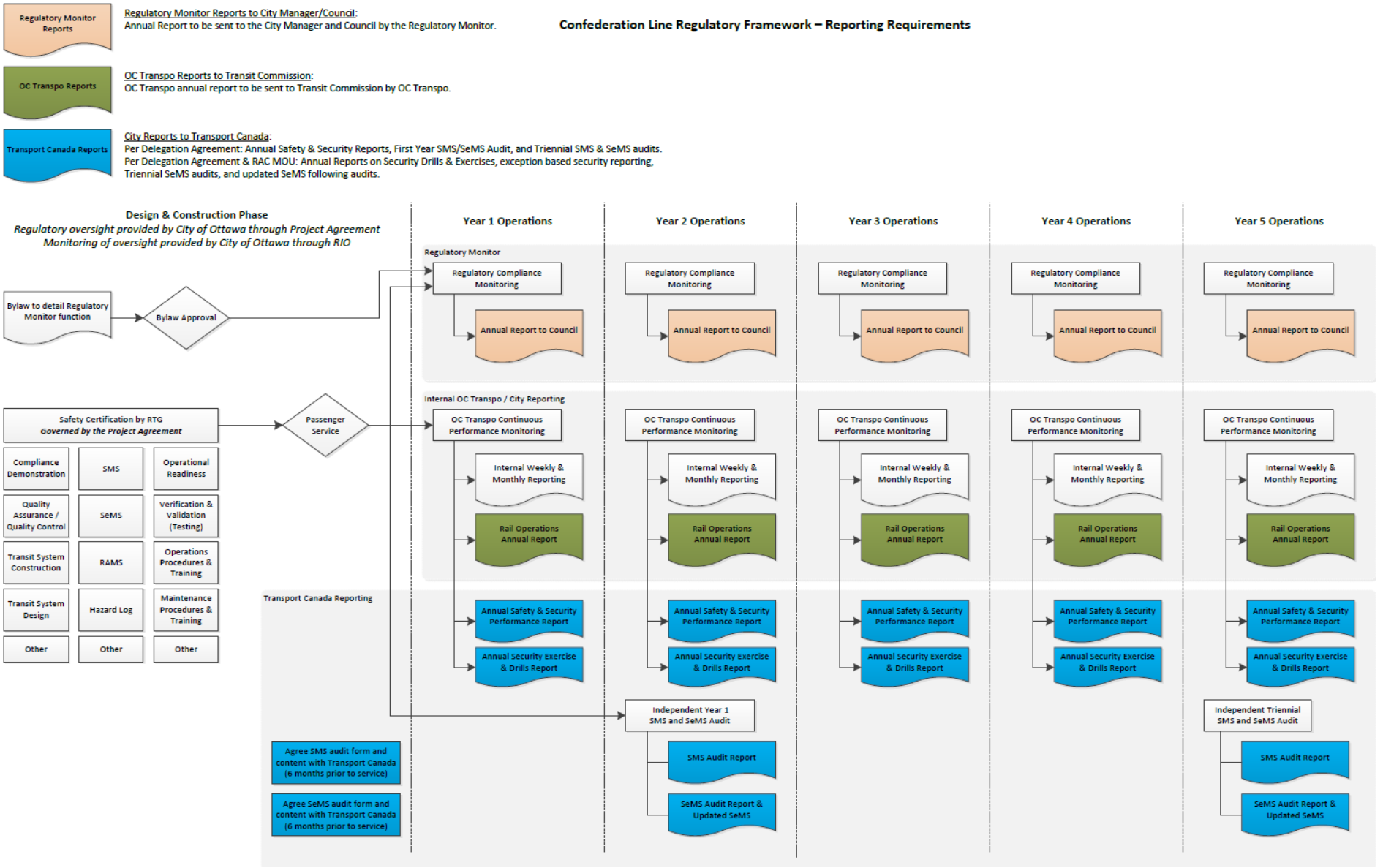
- The Compliance Officer will review City Regulations only for purposes of developing a Regulatory compliance work plan. The Compliance Officer is not required to review the City Regulations to assess or evaluate their adequacy or effectiveness.
- City Regulations have been partially developed and adopted and will continue to be developed and provided to the Compliance Officer progressively. This draft work plan has been developed on the basis of the available Regulations (refer to Annex E). Updates to the work plan will be developed expediently as new City Regulations and revisions are made available.
- As described in Annex A, the Compliance Officer will monitor Regulatory compliance *"through site visits, interviews with City staff and contractors, and review of relevant documentation, records, and performance reporting."* Such activities will consist of limited samples of site visits, interviews and documentation, records, and performance reporting, and will not represent an exhaustive review, assessment or audit.

The following figures provide a broad overview of 'information flow' and 'reporting requirements' as provided to the Compliance Officer:

Flow of Information:



Reporting Requirements:



ANNEX C

Research on Accident / Incident Causation and Risk

In support of Section 4 of this report, this Annex provides information gathered relative to potential accident / incident causes and risk factors relevant for commuter rail.

This research effort showed that although there is a great deal of information available on accident / incident causation and risk analysis for freight and passenger railways, such information is scarcer for commuter rail systems such as to the Confederation Line. Nonetheless, a fair amount of pertinent material was obtained for commuter rail, as well as other similar rail operations, providing relevant information on risk and accident / incident causation.

The following are excerpts of relevant reports and data obtained through this research effort:

1) TSB Occurrence Statistics for 'GO Transit' and 'Agence Metropolitaine De Transport': (Reference 7)

GO Transit commuter rail and the Montreal commuter rail division of the AMT report commuter rail safety occurrences to the Transportation Safety Board which compiles statistics as shown in the tables below providing 10 years of data. This is shown only for reference purposes because it is recognized that there are differences relative to the Confederation Line:

The most frequent occurrences identified in these tables are as follows:

- Trespasser accidents
- Crossing accidents
- 'Movement exceeds limits of authority'
- 'Other reportable incidents'

Occurrences and casualties involving GO TRANSIT trains*, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Accidents	**5**	**7**	**5**	**14**	**10**	**6**	**5**	**3**	**3**	**3**
Main-track collisions	0	0	0	0	0	0	0	0	0	0
Main-track derailments - 1-2 cars**	0	0	0	0	0	1	0	0	0	0
Main-Track Train Derailments - 3-5 cars	0	0	0	0	0	0	0	0	0	0
Main-Track Train Derailments - 6 or more cars	0	0	0	0	0	0	0	0	0	0
Crossing accidents	0	1	0	2	0	0	2	0	3	1
Non-main-track collisions	0	0	0	0	0	0	0	0	0	0
Non-main-track derailments - 1-2 cars (a)**	0	0	1	1	1	0	0	0	0	0
Non-Main-Track Train Derailments - 3-5 cars (a)	0	0	0	0	0	0	0	0	0	0
Non-Main-Track Train Derailments - 6 or more cars (a)	0	0	0	0	0	0	0	0	0	0
Collisions/Derailments involving track units	0	0	0	0	0	0	0	0	0	0
Employee/Passenger accidents	0	1	0	0	0	0	0	0	0	0
Trespasser accidents	5	5	4	9	9	5	3	3	0	1
Fires/Explosions	0	0	0	0	0	0	0	0	0	1
Other accident types	0	0	0	2	0	0	0	0	0	0
Reportable incidents	**5**	**4**	**2**	**4**	**0**	**1**	**1**	**2**	**0**	**0**
Dangerous goods leaker***	0	0	0	0	0	0	0	0	0	0
Main-track switch in abnormal position	0	0	0	0	0	0	0	0	0	0
Movement exceeds limits of authority	2	3	2	4	0	1	1	2	0	0
Runaway rolling stock	0	0	0	0	0	0	0	0	0	0
Other reportable incidents	3	1	0	0	0	0	0	0	0	0
Main-track accidents (b)	**0**	**1**	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**1**
Accidents involving dangerous goods	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Main-track derailments	0	0	0	0	0	0	0	0	0	0
Crossing accidents	0	0	0	0	0	0	0	0	0	0
Non-main-track collisions	0	0	0	0	0	0	0	0	0	0
Non-main-track derailments	0	0	0	0	0	0	0	0	0	0
Other accident types	0	0	0	0	0	0	0	0	0	0
Accidents with a dangerous goods release	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Accidents Involving Runaway Rolling Stock	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fatalities for reportable occurrences	**6**	**7**	**2**	**9**	**6**	**4**	**1**	**3**	**0**	**2**
Crossing accidents	0	2	0	0	0	0	0	0	0	1
Trespasser accidents	6	5	2	9	6	4	1	3	0	1
Other occurrence types	0	0	0	0	0	0	0	0	0	0
Serious injuries for reportable occurrences	**0**	**0**	**2**	**0**	**1**	**1**	**2**	**0**	**0**	**0**
Crossing accidents	0	0	0	0	0	0	0	0	0	0
Trespasser accidents	0	0	2	0	1	1	2	0	0	0
Other occurrence types	0	0	0	0	0	0	0	0	0	0

Data extracted November 24, 2016.

Federally regulated railway occurrences.

a. Data from 2005 to 2007 have been adjusted in light of clarifications to industry of TSB's reporting requirements.
b. Accidents which occurred on main-track or spurs, excluding crossing and trespasser accidents.
c. Main-track train-miles are estimated (Source: Transport Canada).

* Trains are any type of rolling stock such as, but not limited to, freight, passenger, locomotive, track unit, or cut of cars.

** New TSB regulations came into effect on July 1, 2014. Under the new reporting requirements all derailments are reportable.

*** Under the new reporting requirements the minimum reporting threshold for incidents (200 litres) involving the release of low vapour pressure flammable liquids has been harmonized with Part 8 of the Transportation of Dangerous Goods Regulations.

Occurrences and casualties involving AGENCE MÉTROPOLITAINE DE TRANSPORT trains*, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Accidents	**2**	**3**	**2**	**0**	**2**	**7**	**8**	**6**	**4**	**4**
Main-track collisions	0	0	0	0	0	0	0	0	0	0
Main-track derailments - 1-2 cars**	0	0	0	0	0	0	0	0	1	0
Main-Track Train Derailments - 3-5 cars	0	0	0	0	0	0	0	0	0	0
Main-Track Train Derailments - 6 or more cars	0	0	0	0	0	0	0	0	0	0
Crossing accidents	0	0	0	0	0	2	1	4	1	3
Non-main-track collisions	0	0	0	0	0	1	0	0	0	0
Non-main-track derailments - 1-2 cars (a)**	0	0	0	0	0	1	0	0	0	0
Non-Main-Track Train Derailments - 3-5 cars (a)	0	0	0	0	0	0	0	0	0	0
Non-Main-Track Train Derailments - 6 or more cars (a)	0	0	0	0	0	0	0	0	0	0
Collisions/Derailments involving track units	0	0	0	0	0	0	0	0	0	0
Employee/Passenger accidents	0	0	0	0	0	0	2	0	0	0
Trespasser accidents	2	3	2	0	2	3	4	1	1	1
Fires/Explosions	0	0	0	0	0	0	0	0	0	0
Other accident types	0	0	0	0	0	0	1	1	1	0
Reportable incidents	**0**	**0**	**0**	**0**	**0**	**3**	**6**	**4**	**0**	**0**
Dangerous goods leaker***	0	0	0	0	0	0	0	0	0	0
Main-track switch in abnormal position	0	0	0	0	0	0	0	0	0	0
Movement exceeds limits of authority	0	0	0	0	0	1	5	3	0	0
Runaway rolling stock	0	0	0	0	0	0	0	0	0	0
Other reportable incidents	0	0	0	0	0	2	1	1	0	0
Main-track accidents (b)	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**	**2**	**0**
Accidents involving dangerous goods	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Main-track derailments	0	0	0	0	0	0	0	0	0	0
Crossing accidents	0	0	0	0	0	0	0	0	0	0
Non-main-track collisions	0	0	0	0	0	0	0	0	0	0
Non-main-track derailments	0	0	0	0	0	0	0	0	0	0
Other accident types	0	0	0	0	0	0	0	0	0	0
Accidents with a dangerous goods release	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Accidents Involving Runaway Rolling Stock	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fatalities for reportable occurrences	**2**	**2**	**2**	**0**	**2**	**3**	**3**	**1**	**0**	**2**
Crossing accidents	0	0	0	0	0	1	0	0	0	1
Trespasser accidents	2	2	2	0	2	2	3	1	0	1
Other occurrence types	0	0	0	0	0	0	0	0	0	0
Serious injuries for reportable occurrences	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**0**
Crossing accidents	0	0	0	0	0	0	0	1	0	0
Trespasser accidents	0	1	0	0	0	1	1	0	1	0
Other occurrence types	0	0	0	0	0	0	0	0	0	0

Data extracted November 24, 2016.

Federally regulated railway occurrences.

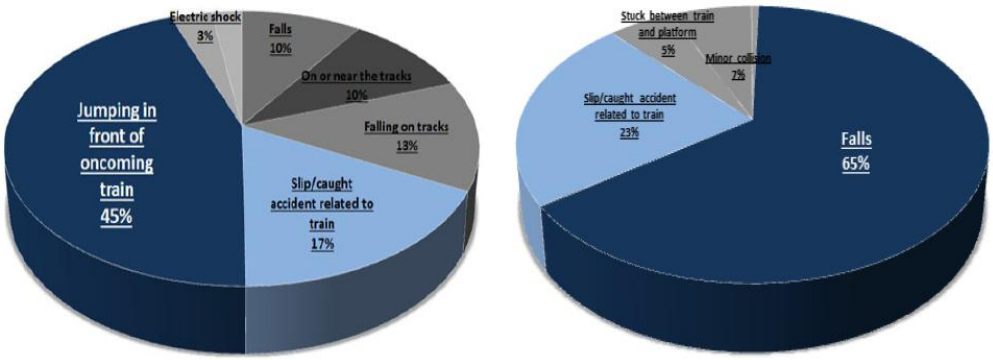
a. Data from 2005 to 2007 have been adjusted in light of clarifications to industry of TSB's reporting requirements.
b. Accidents which occurred on main-track or spurs, excluding crossing and trespasser accidents.
c. Main-track train-miles are estimated (Source: Transport Canada).

* Trains are any type of rolling stock such as, but not limited to, freight, passenger, locomotive, track unit, or cut of cars.

2) 'A Factor Analysis of Urban Railway Casualty Accidents and Establishment of Preventive Response Systems' (Reference 8)

Kim, Hyun ju[a], et al
2016 11th International Conference of The International Institute for Infrastructure Resilience and Reconstruction (I3R2) : Complex Disasters and Disaster Risk Management

P 133: "A comparative analysis of accident types showed that for urban railway accidents, accidents were mostly caused by passenger-driven mistakes such as falls, collisions, and becoming stuck between train and platform, whereas conventional railway accidents mostly occurred in relation to external factors such as jumping in front of oncoming trains, falling on tracks, and being on or near tracks. This gap can be explained by the operational differences between conventional railways and urban railways."



Analysis of different types of conventional railway accident characteristics

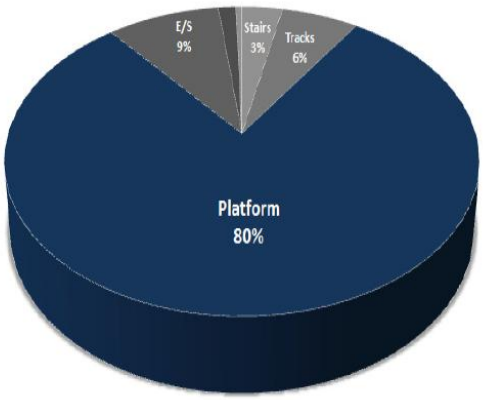
Analysis of different types of urban railway accident characteristics

Figure 1. Analysis of railway accident characteristics according to accident types

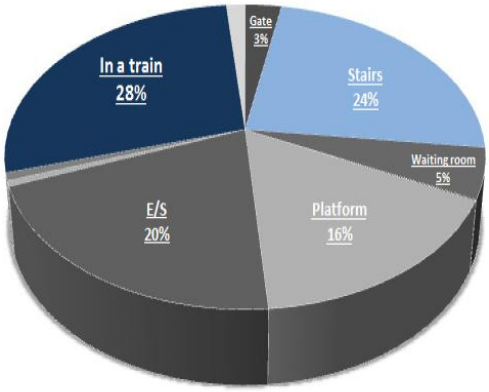
Table 3. Results of characteristic analysis of railway safety accidents according to causes of accident

Category	Trapped in E/V	Caught in E/V, E/S	Falls	On or near the tracks	Falling on tracks	Slip/caught accident related to train	Stuck between train and platform	Jumping in front of oncoming train	Electric shock	Minor collision	Others	Total
Urban Railway	0.0%	0.5%	64.5%	0.0%	0.1%	22.7%	5.3%	0.0%	0.0%	6.6%	0.1%	100.0%
Conventional Railway	0.0%	0.0%	9.6%	10.0%	12.9%	17.2%	0.0%	44.5%	3.3%	0.0%	2.4%	100.0%

P. 135: "For conventional railways, 80% of all accidents occurred on the platform, followed by escalators (9%), tracks (6%), and stairs (3%). Urban railway accidents, on the other hand, instead of mainly occurring in one area, had a similar level of frequency in various locations such as trains (28%), stairs (24%), escalators (20%), and platforms (16%). A similar rate of occurrence in multiple locations can be explained by the fact that urban railway has a higher user density, leading to passenger-passenger collisions as well as passenger-facility collisions."



Analysis of conventional railway accident characteristics



Analysis of urban railway accident characteristics

Figure 4. Analysis of railway accident characteristics according to accident location

3) 'Improving the Safety and Security of Freight and Passenger Rail in Pennsylvania'
(Reference 9)

David S. Ortiz, Brian A. Weatherford,
Michael D. Greenberg, Lisa Ecola

Page 41 (rail safety):

"The frequencies of the types and principal causes of train accidents and incidents in Pennsylvania for freight and passenger rail are shown in Table 4.11. For rail freight, the dominant type of accident is a derailment, and the dominant cause is a track defect. For passenger rail, the dominant type of accident is "other," and the dominant cause is "miscellaneous," yielding little insight into the key factors involved. Human errors are cited as the primary cause in 34 percent of rail freight accidents and 19 percent of passenger rail accidents."

Table 4.11
Types of Train Accidents and Incidents in Pennsylvania and Major Causes, 1998–2007

	Freight Railroads[a]			AMTRAK, SEPTA, NJT		
Type of Accident/Incident	Number	Percent	U.S. Percent	Number	Percent	U.S. Percent
Collision	57	7	7	25	12	6
Derailment	691	79	74	64	29	35
Other	122	14	18	128	59	59
Principal cause						
Human error	292	34	39	42	19	27
Track	353	41	35	52	24	31
Motive power/equipment	93	11	12	50	23	23
Signal	23	3	2	15	7	1
Miscellaneous	109	13	13	58	27	18

SOURCE: Federal Railroad Administration, Office of Safety Analysis, 2008.

[a] Freight railroads include switching railroads.

Page 30 (security):

The Terrorist Threat to Passenger Rail and Rail Freight

Wilson et al. (2007) use the RAND–MIPT database of terrorist incidents to determine the prevalence of types of attacks (e.g., bombings and attacks with small-arms fire) on passengers and components of railroad infrastructure (e.g., trains, stations, bridges). This database catalogs terrorist attacks worldwide, including events dating back to the 1920s. The incidents include attacks on both rail freight and passenger rail systems. Tables 4.2 and 4.3, from Wilson et al. (2007), describe the tactics used by terrorists to attack rail systems and the types of weapons employed in such attacks. While the majority of terrorist attacks on rail systems in the RAND–MIPT database are against passenger rail systems, a small subset are against rail freight.1 We regard the threat assessment presented in Wilson et al. (2007) to be valid for both rail freight and passenger rail systems. The majority of terrorist incidents on rail systems are bombings with conventional bombs, but other tactics have also been successfully employed.

Table 4.2
Terrorist Tactics in Rail Incidents Since the 1920s, Worldwide

Tactic	Number	Percent
Bombing	708	80
Armed attack	55	6
Sabotage	49	6
Arson	29	3
Unconventional attack	24	3
Unknown	9	1
Logistics activity (nonattack)	5	1
Kidnapping	3	0
Barricade or hostage	2	0
Hijacking	2	0
Total	886	100

SOURCE: Wilson et al., 2007, p. 9.

NOTE: Sabotage is willful damaging of railroad infrastructure, such as removing tie bars to create a track hazard. Logistics activity consists of incidents in which terrorists used or targeted a train, but an attack did not occur.

4) 'HAZARDS IDENTIFICATION MODEL FOR RAIL RAPID TRANSIT ACCIDENTS'

(Reference 10)

Lung-Chuang Wang*

Journal of Marine Science and Technology, Vol. 12, No. 2, pp. 78-85 (2004)

Page 78:

'In comparison with the other transportation modes, rail rapid transit already enjoys a higher degree of safety as it is designed with the exclusive right of way and the automatic train control and monitoring systems. Nevertheless, rail rapid transit systems are not free from serious accidents, which often led to human injuries and facility damages. The planning of accident prevention and emergency measures, therefore, are still important issues of the rail rapid transit operations. '

'The hazards identified in rail rapid transit are different with other transportation modes for two reasons. First, the rail rapid transit is operating under a highly isolated and controlled environment, so the effect of external factors has been reduced considerably. Under the circumstance, the designing and management of the system are the major source of hazards and play critical roles for safety. Second, the rail rapid transit safety features enable the automatic monitoring systems to eliminate the exposure of hazards immediately once the hazards are identified. While the hazards keep on exposing, the automatic monitoring system itself must be defective and could be regarded as another factors of hazards'

Page 79:

Generally, rail rapid transit hazards occur because of three elements: (1) Human: operators and passengers; (2) System: material, equipment, tools, and safety facility; (3) Environment: temperature, humidity, ventilation, lights, and noises (natural environment and artificial environment) in the working place

Table 1. List of major transit accident types and possible causes

Types	Possible Causes
Fire	Arson, failure of electrical equipment, brakes operation, storage of inflammable material, derailing, the strike of lightening
Flood	Poor design or failure of the drainage system
Collisions	(1) Violation of stop signs by the driver (intrusion). (2) Failure of the ATC system. (3) Signal errors. (4) Breakdown or mishandling of the split switch.
Derailment	(1) Incomplete release of hand brake. (2) Inadequate geometric design. (3) Excessive rocking of the trains (4) Speeding at the turn. (5) Damage of the bearing and wheel. (6) Rail deformation.
Door Accident	Jammed by the door or the uncontrolled opening of the door.
Breakdowns of power supply system	Failure of the power supply or emergency power supply facilities, overload, mishandling, or struck by lightening.
Intrusion	Animals or people could be found intruding the track on the level ground or the station.
Gap fall	Inadequate design of the platform or station
Scraped by the train	Mindless passenger or lack of proper signs on the platform
Natural Disaster	Earthquakes, lightening, storms, or heat waves
Others	Criminal Acts, suicide, crowding, etc.

* Induced from NTSB (1972-1981); San Francisco BART (1985-1988); and Wang (1993).

Page 80:

If we analyze specifically about the causes that lead to system and environmental unsafe conditions, we find that almost all defects come from human errors in design, installation, operation, treatment, and uses. Hollnagel (1993) reveal that the estimated involvement of human error in the breakdown of

hazardous technologies increased fourfold between the 1960s and the 1990s, from minima of around 20% to maxima of more than 80%.
After a series of researches on accident causation model, Reason (1995) proposed a system approach to analysis organizational error, and the main focus is upon the human contribution within these broader systems domains.

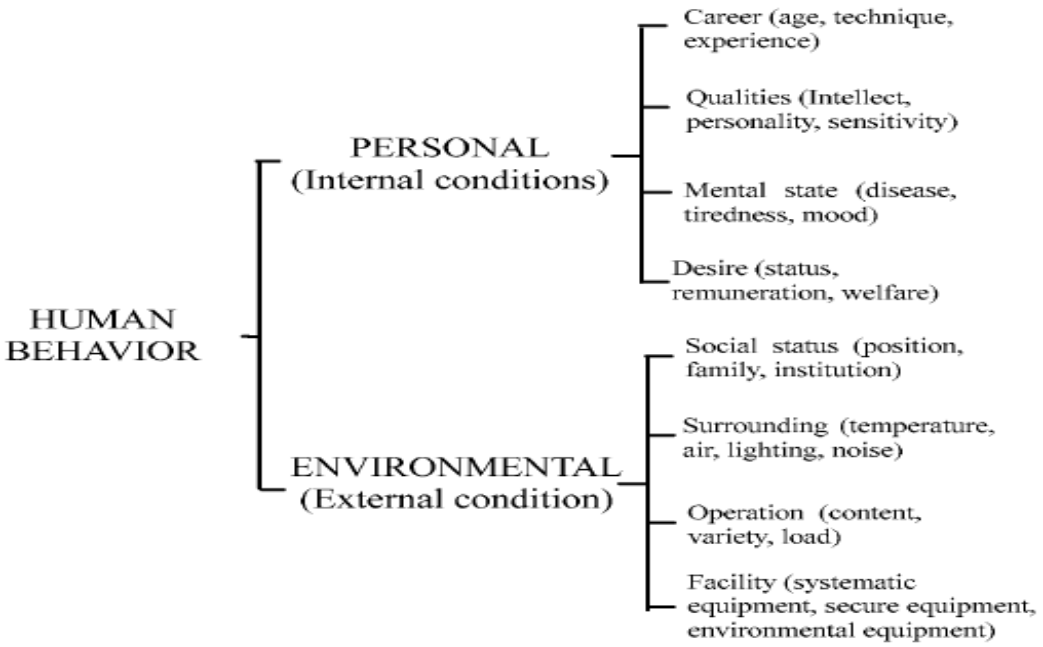


Fig. 1. Main factors affecting human behavior in rail rapid transit hazards.

Though the human error could be regarded as the major cause of rail rapid transit accident, the human behaviors also result from the transit equipment, facilities, and the other environmental factors … That is why all the factors must be considered altogether; otherwise, it would be difficult to find out real hazards and prevent unsafe behavior from happening recurrently.

5 A) 'Reducing Major Rule Violations in Commuter Rail Operations - Distraction and Its Mitigation with Sustained Attention Training'

(Reference 11)

George Elsmore – GE-Safety Associates, et al.

U.S. Department of Transportation - Federal Railroad Administration Office of Railroad Policy and Development - Office of Research and Development

Page 1:

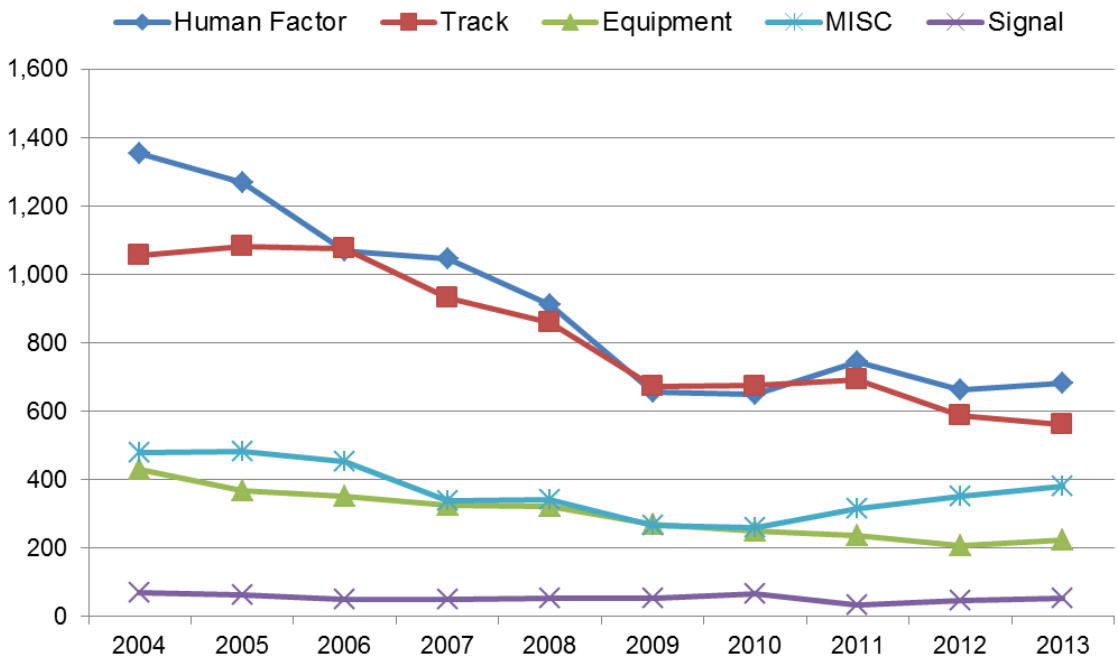
"Commuter rail accidents demonstrate the need to better understand how operator distraction affects rail safety. Veolia Transportation Services conducted two experiments in the Cab Technology Integration Laboratory (CTIL) using animated operating scenarios that were designed to simulate elements of distraction. In Study I, operational scenarios varied in task load, from baseline to low, and then to high load. The scenarios created operator distraction in locomotive engineers by means of task-load variation, which impacted both locomotive engineer performance and mental workload. Study II examined the ability of 3 hours of Sustained Attention Training (SAT) to mitigate distraction in a group of engineers. There were no statistically significant effects of SAT on any measure. However, there were trends indicating that SAT increased locomotive operator rule compliance compared to a control group that received no training. That these effects of SAT, though not statistically significant, were found consistently in the low task load condition, suggests that errors under this condition may reflect periodic lapses in attention associated with mind wandering or mental rumination. Future studies on mitigating distraction would be warranted with a larger sample of locomotive engineers and longer duration SAT."

Page 4:

Human factors are the leading cause of incidents and accidents in U.S. rail operations *(Figure 2 and Figure 3). Over the period 2004-2013, 38% of all such cases involved human factors. This figure is similar to that reported in other transportation domains, such as commercial aviation. Failures of attention are a leading contributor within the human factors category [7].*

Human factors system analyses of rail operations suggest an alternative explanation: that a combination of equipment, operator, and environmental factors affect safety compliance [3]. From this perspective, a common set of circumstances are associated with an operator's loss of attentional resources, confirmation bias, or inattentional blindness, which are characteristic of normal human behavior:

- *Attentional resources: People have a finite capacity for attention; consequently, if the resources available for a primary task are depleted, e.g., by multitasking or fatigue, performance of the primary task will suffer [4].*
- *Confirmation bias: The natural human tendency to focus on specific signs that confirm an initial idea or decision, rather than all relevant sources of information [5].*
- *Inattentional blindness: The finding that humans are not consciously aware of all the objects that are present in a visual scene, and can miss even salient objects if their attention is diverted elsewhere [6]. Each of these phenomena can compromise human operator performance, with the ultimate result being an error or rule violation, that could, depending on other factors, result in an accident or near miss.*


Human Factor
Track
Equipment
MISC
Signal
1,600
1,400
1,200
1,000
800
600
400
200
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013

5 B) 'Reducing Major Rule Violations in Commuter Rail Operations - The Role of Distraction and Attentional Errors':

(Reference 12)

Raja Parasuraman, George Mason University; George Elsmore, Veolia TransDev Inc. et al.

PROCEEDINGS of the HUMAN FACTORS and ERGONOMICS SOCIETY 56th ANNUAL MTG– 2012

Page 1:

"Recent accidents in commuter rail operations and analyses of rule violations have highlighted the need for better understanding of the contributory role of distraction and attentional errors. Distracted driving has thoroughly been studied in recent years, but distraction during rail operations has been less extensively examined..."

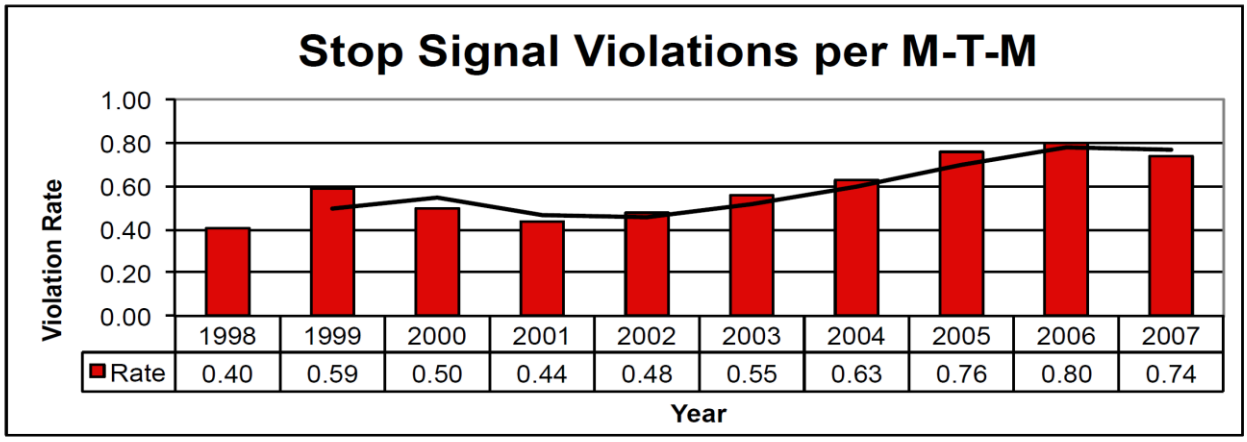


Figure 1. Stop signal violations per million track miles (M-T-M) in US rail operations, 1998-2007.

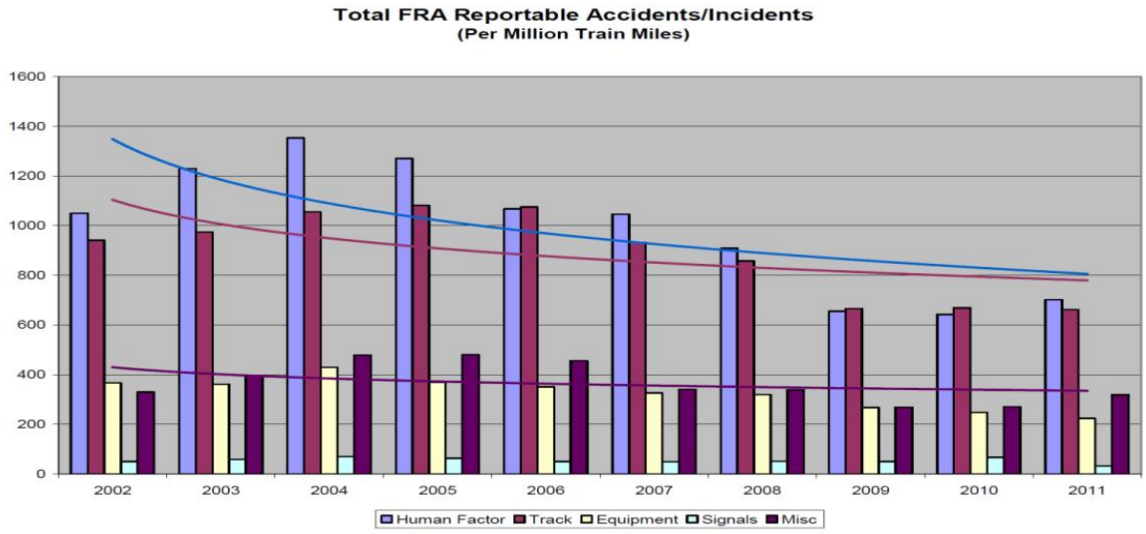


Figure 2. Average proportions of causal factors in accidents and incidents in US rail operations, 2002-2011.

"As Figure 2 indicates, **human factors are the leading cause of incidents / accidents in commuter rail operators. Over the period 2002-2011, 38% of all such cases involved human factors** ... ".

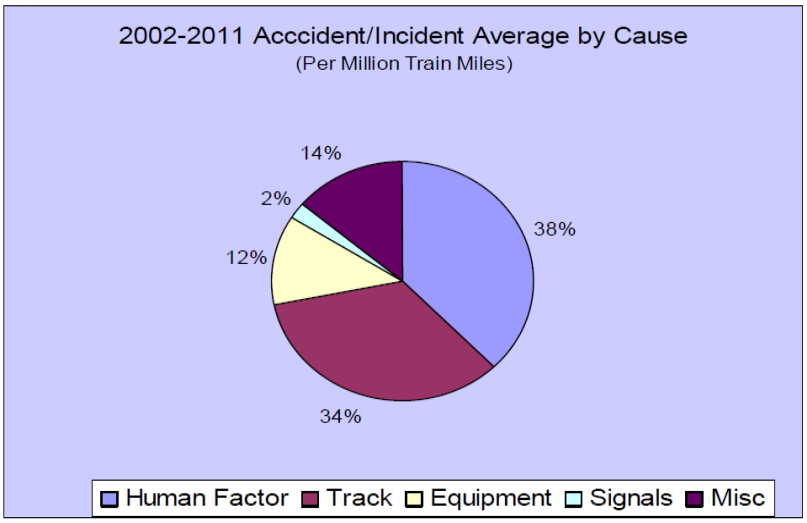


Figure 3. Total reportable Accidents/Incidents in US rail operations, 2002-2011

6) 'Fatigue and its Contribution to Railway Incidents' Feb 2015 – RSSB

(Reference 13)

Nic Bowler, Human Factors Specialist, RSSB, Huw Gibson, Senior Human Factors Specialist, RSSB

"Fatigue presents a serious risk to operations in the rail industry …
the results have provided a new insight into the prevalence of fatigue in rail incidents and established a good basis for fatigue analysis. For the incident sample, the results showed that:

- *IFCS analysis identified fatigue as a factor in 21% of the incidents; however, the relevant check box in SMIS was only marked for 1% of incidents.*
- *Home life related fatigue was the most cited reason for the fatigue (40%) followed by work-related fatigue (38%).Train drivers were most affected by work-related fatigue rather than home-life related fatigue.*

Of the 246 incidents available for analysis 21 % were found to have fatigue as a factor in one of the following categories and the data are presented in Table 3.

Table 3 - Incident level breakdown of fatigue-related incidents by incident factor type

Factor type	Definition	% of incident sample with fatigue as a factor
Causal or contributory factor	The event occurred, or the likelihood of the event occurring was increased because of fatigue.	6%
Performanc e shaping factor	A factor that is not identified as causal or contributory in the incident report and is not a human error or management failure, but fatigue is identified from the report as negatively influencing the event. For example, a driver identifies that they had some home-life related fatigue, but neither the individual nor the investigation identify this as causal or contributory to the incident.	15%
Percentage of fatigue-related incidents in full sample		21%

Figure 2 - Factor level overview of 10 incident factor contributions to sample data - Further breakdown of 'Personal' (1185 incident factors from sample of 246 incidents)

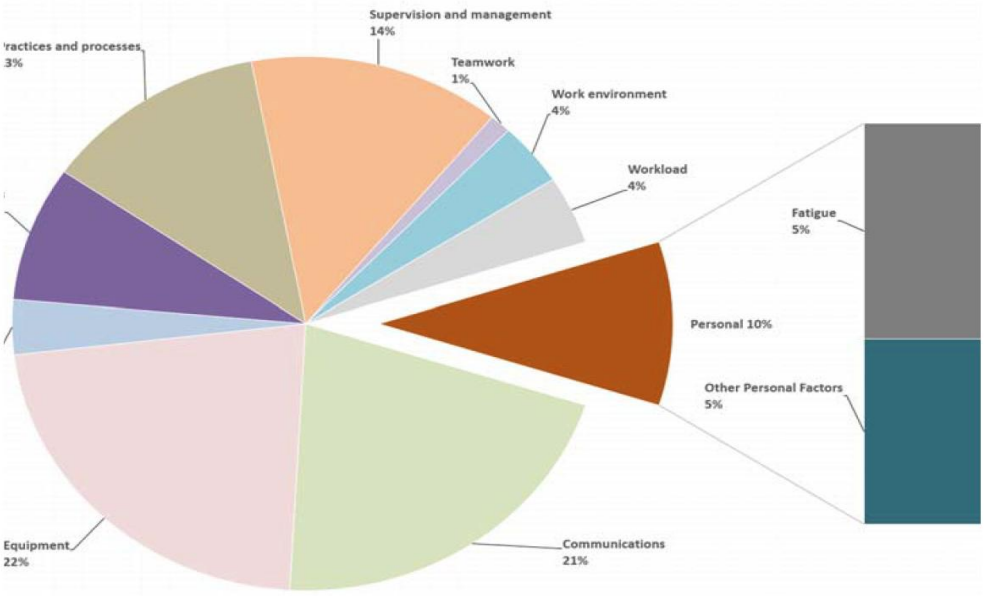


Table 4 summarises the type of incident in which fatigue was identified as a factor. Figure 3 identifies the role which fatigue was related to.

Figure 3 - Breakdown of incidents by job role

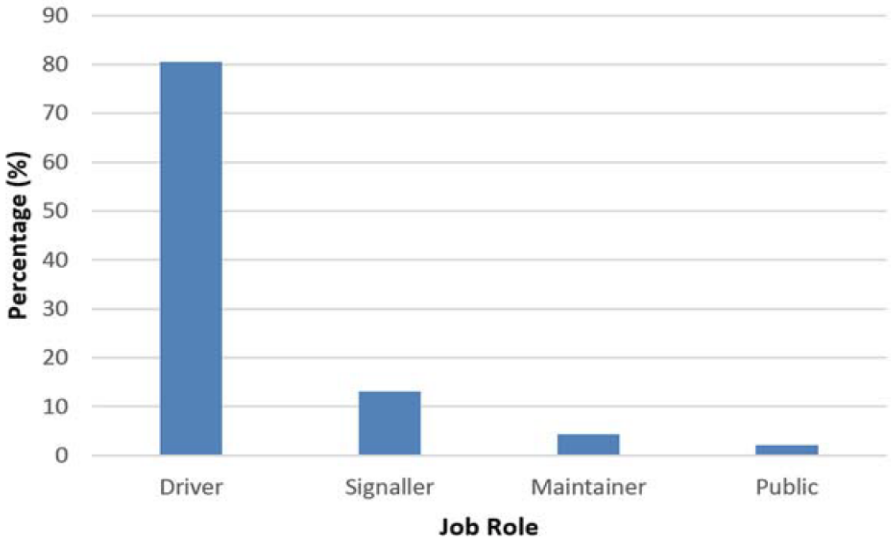
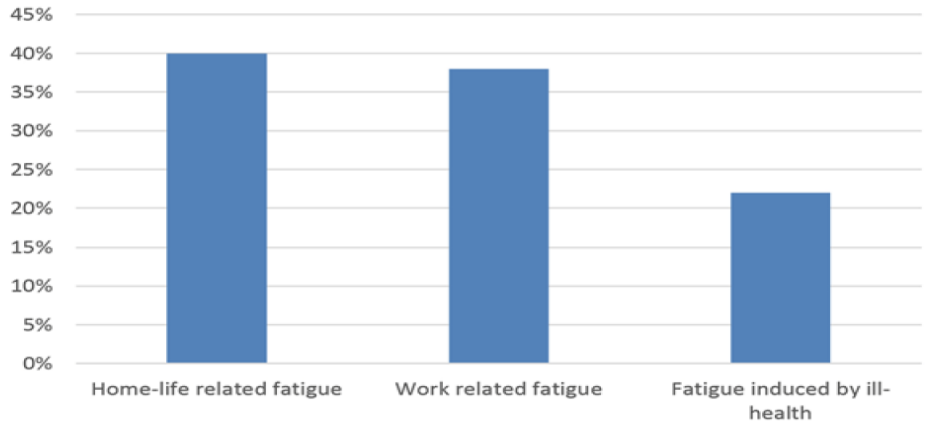


Figure 4 - Breakdown of fatigue source for all fatigue-related incidents (n=54)



7) 'Metro railway safety: An analysis of accident precursors' - 2012

(Reference 14)

Miltos Kyriakidis, Robin Hirsch, Arnab Majumdar !

Centre for Transport Studies, Department of Civil and Environmental Engineering, Imperial College London, London SW7 2AZ, United Kingdom

"This paper outlines the results of precursor analysis from 18 CoMET and Nova railways, all but two of which are metro (subway) operations1, the other two being commuter railways...

The paper analyses precursors, top events, injuries and deaths as well as safety maturity and their relationships both to each other and to incidents and accidents for the set of the major global metro railways.

The 27 precursors analysed, for the period 2002–2009, fall into ***six categories: human performance; technical failures; passengers: fires; malicious action and management action****.*

6.1. Accident precursor monitoring – action to reduce risk

6.1.1. Human performance

A better safety culture with a greater level of commitment to and involvement in safety by all personnel (including managers) is appropriate for reducing precursors caused by failures in human performance. However, according to the metros' explanations mentioned in Section 5.1.1, better operating procedures, training and controls are more significant than changes in attitude.

6.1.2. Technical failures

The largest number of precursors (though not the largest number of injuries) is related to different technical failures. This is best addressed through good systems engineering, effective root cause analysis and a commitment to continuous reliability improvement. This category decreases in importance progressively as a result of consistent management attention.

6.1.3. Passenger actions

While technical failures contribute the largest number of precursors, it is passenger actions that cause the largest number of injuries and deaths. Passengers themselves are the main source of risk, top events and injuries – often due to unwise or careless behaviour. As already mentioned, major improvements in safety have been be achieved by equipment such as

platform screen doors, additional lifts (elevators) so vulnerable people do not need to use escalators, and guide rails down the centre of wide stairs.

Yellow lines set back from the edge of platforms and yellow markings on escalators have also helped. Better design and management of passenger flows significantly reduce risk. But on a daily level, the largest single element in the solution is better communication with passengers, by oral public announcements, posters, passenger information systems and assistance from platform or station staff.

6.1.4. Malicious and illegal action

Malicious and illegal action is a cause of relatively few incidents. A good ticketing system with effective barriers can prevent those without valid tickets from travelling and has been shown to reduce crime substantially. Similarly, good quality close circuit television (CCTV) equipment can play a critical role in apprehending miscreants as well as a significant one in reducing vandalism and antisocial behaviour. More, better-trained station personnel, especially security staff and police, are needed to support these systems but cannot achieve such results without them.

6.1.5. Fire

Fire can be reduced by a better safety culture, but the most fundamental reduction is achieved by removing all flammable materials from trains and stations and following this up by good housekeeping and contractor management in clearing away any flammable materials brought in by passengers.

6.1.6. Management action

There is no substitute for good management action in investing in a safer environment and putting safety first – even if it involves closing a station in which a suspect package has been left until the package has been investigated. Equally, good management action also involves not tolerating long closures of selected exits at stations, which might make evacuation more difficult in the event of a fire or security incident. The effects of good management action are of course felt in other precursor areas through management's willingness to invest in equipment, apply safety procedures and other measures to reduce risk. In each case, the explanations for improvements are due partly to positive management actions to reduce problems with human actions, to implement better systems engineering, to introduce more station personnel or equipment and to enforce better levels of housekeeping and contractor management. In some cases, this will involve a prioritisation of budgets to apply the resources required.

ANNEX D – Draft Regulatory Monitoring Plan

The following tables of City Regulatory monitoring activities are described in Section 5 of this draft work plan. Please refer to the separate PDF file for a clearer view of these tables.

The Compliance Officer will work closely with OC Transpo staff to set up procedures and protocols, aligned with City resources, to meet the expected target dates of the Monitoring Plan. This will also include working collaboratively to develop a comprehensive roles and responsibilities matrix together with a fulsome schedule that is aligned with the Monitoring Plan.

MONITORING PLAN FOR CITY REGULATIONS - DRAFT

REGULATORY AREA	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM
CITY REGULATORY DOCUMENT	**SMS MANUAL OCT-S230-03-PROG**	**SMS MANUAL OCT-S230-03-PROG**	**SMS MANUAL OCT-S230-03-PROG**
CITY REGULATION SECTION	Safety Goals, Targets and Initiatives	Safety Goals, Targets and Initiatives	Safety Policy
PART / NUMBER	1.2 and Appendix D	1.2 and Appendix D	1.3 and Appendix D
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	**Starting in 2018** .... The Chief Safety Officer will lead the setting of OC Transpo's annual organization-wide **safety goals. Objectives, targets and initiatives** will be established, in **consultation** with employees, Policy and Workplace Health and Safety Committees, branch managers and the Departmental Leadership Team. Annual goals, targets and initiatives will be developed **first quarter of each year**, and documented as part of the SMS annual reporting and update process (section 3.3 SMS Reports and Audits).	Safety goals, targets and initiatives will be **communicated to employees following the SMS communication process described in section 4.2** Communication and Participation.	In 2018, OC Transpo will be developing an organization-wide **Safety Policy**, in collaboration with the Workplace Health and Safety Committees and Policy Health and Safety Committee.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	1) Interviews / meetings with Chief Safety Officer and staff to confirm that Objectives, targets and initiatives are developed first quarter. 2) Confirm that consultation process performed; 3) Review field and documentation for objective evidence of dissemination.	1) Interviews / meetings to confirm communication / participation carried out as per 4.2; 2) Review field and documentation for objective evidence	1) Interviews / meetings to confirm that Safety Policy is developed; verify that consultation was performed. 2) Review field and documentation for objective evidence
FREQUENCY	Annually	Every 2 years	Annually
STARTING DATE	Within 90 days after OLRT service	First year of operation	Within 90 days after OLRT service
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

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REGULATORY AREA	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM
CITY REGULATORY DOCUMENT	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG
CITY REGULATION SECTION	Safety Policy Annual Review	Reporting and Addressing Hazards & Safety Concerns	Reporting and Investigating Occurrences *
PART / NUMBER	1.3 and Appendix D	2.3 and Appendix D	2.4 and Appendix D part 7
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Each year thereafter, OC Transpo will conduct a **Safety Policy Review**…..The Chief Safety Officer keeps records of the factors considered, the results of the annual review of the Safety Policy, and the date that the review took place.	The procedure for reporting and addressing hazards and safety concerns, including contraventions of regulations or safety procedures, is summarized in Figure 2-2. Reported **hazard and safety concerns are recorded in appropriate logs** for tracking of the resolution and to support analysis of trends over time. **In 2017, OC Transpo will be developing a more consistent,** organization-wide methodology to document and manage hazards and risks as well as monitoring remedial actions for all modes	Procedure for Reporting and Investigating Occurrences. ….summarized in Figure 2-3 and described in the Accident and Incident Investigation and Reporting Standard Operating Procedure (OCT-S221-00-SOP). For all occurrences, the Transit Services Occurrence Report form must be completed and submitted (as indicated on the form) within 24 hours. The Occurrence Report form is signed by the Supervisor and kept on file.
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	1	1
MONITORING APPROACH	Through interviews and objective evidence (records and field), verify that annual review is performed	Through interviews / meetings and objective evidence (records and field), verify that process is disseminated, understood and applied	Through interviews / meetings and objective evidence (records and field), verify that process is disseminated, understood and applied
FREQUENCY	Every 2 years	Annually	Annually
STARTING DATE	2020	Within 90 days after OLRT service	Within 90 days after OLRT service
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM
CITY REGULATORY DOCUMENT	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG
CITY REGULATION SECTION	Risk Assessment	Risk Assessment	Compliance with Regulations, Rules and Other Instruments
PART / NUMBER	2.5 and Appendix D	Appdx D part 6.2	3.1
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The O-Train Confederation Line **risk assessment process is described in Appendix D**. Risk assessment is particularly important when **planning and implementing changes**, such as: changes to operations or maintenance plans or procedures; changes in staffing levels or safety duties; changes to vehicles or equipment; and/or changes to facilities and infrastructure. Appdx D part 6 RTM is expected to follow the City's Enhanced Risk Management process as outlined.	Appdx D part : 6.2 Conditions that Trigger a Risk Assessment	Branches are responsible for monitoring and ensuring conformance and compliance with regulations, rules, standards and orders. The manner in which the branches monitor conformance and compliance include but are not limited to the following: Maintaining records of compliance..... Also refer to "Rule and Safety Compliance Program"
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	Through interviews / meetings and objective evidence (records and field), verify that process is disseminated, understood and applied. This would include existing managers / employees as well as those who start work after service inception .	Through interviews / meetings and objective evidence (records), verify that OC Transpo and RTM have performed risk assessments when required by regulatory criteria and have followed process for risk assessments including development and follow-up of mitigation actions.	Through interviews / meetings and objective evidence (records and field), verify that process is disseminated. Understand each branch coonformance and compliance process; verify that such activities are carried out as per "Rule and Safety Compliance Program"
FREQUENCY	Every 2 years	Annually	Annually
STARTING DATE	Within 90 days after OLRT service	First year of operation	First year of operation
FIELD REVIEW		X	X
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM
CITY REGULATORY DOCUMENT	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG
CITY REGULATION SECTION	Safety Data Collection and Analysis	Performance Indicators	SMS Annual Reports
PART / NUMBER	3.2	3.2	3.3
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Safety Data Collection and Analysis: OC Transpo maintains and analyzes safety-related data from all aspects of the organization to identify and assess risks, and to evaluate safety performance. The types of data collected include the following: Hazards and safety concerns; Accident/incident reports and investigations	Performance Indicators. OC Transpo monitors safety performance using a set of performance indicators that capture safety activities and outcomes by mode, and for the organization as a whole. The indicators include both "lagging" indicators that measure outcomes related to safety, as well as "leading" indicators that measure safety inputs linked to the achievement of safety goals. Annually, the Chief Safety Officer will conduct a formal review of safety data, with a focus on performance indicators.	The Chief Safety Officer is responsible for ensuring the completion of the following reports and audits: 1) OC Transpo SMS Annual Reports. 2) Internal SMS audits as required by the Railway Safety Management System Regulations, 2015, in 2018 and every three years thereafter; and, 3) Independent SMS audits as required by the Delegation Agreement for the Confederation Line, in 2019 and every 3 years thereafter. SMS Annual Reports will be prepared and SMS audits conducted in the first quarter of the year. Each year, the Chief Safety Officer will lead the preparation of an SMS Annual Report that documents safety activities and performance during the previous year.
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	1
MONITORING APPROACH	Through interviews / meetings and objective evidence, verify that process is disseminated, understood and applied ; this includes the review of "analysis of safety-related data from all aspects of the organization to identify and assess risks, and to evaluate safety performance."	Through interviews / meetings and objective evidence, verify that performance indicators are used and that annual review is carried out	Through interviews / meetings and objective evidence, verify that SMS Annual Reports, internal SMS audits, and independent SMS audits are performed.
FREQUENCY	Every 2 years	Every 2 years	Every 2 years
STARTING DATE	First year of operation	First year of operation	First year of operation
FIELD REVIEW			X
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM
CITY REGULATORY DOCUMENT	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG
CITY REGULATION SECTION	Fatigue Management Plan *	Fitness for Duty *	Training *
PART / NUMBER	3.5	3.5	4.1
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The Fatigue Management Plan is communicated to all impacted employees using the SMS communication processes described in section 4.2, in Appendix D	Employees in Safety Critical Positions for the O-Train Trillium Line and Confederation Line are also required to undergo medical fitness for duty assessments prior to beginning work in these positions and periodically thereafter.	Position-Specific Safety Training. All new employees are required to complete City of Ottawa general safety awareness training. Appendix G provides an overview of the safety-related training modules that OC Transpo employees in different positions are required to complete
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Through interviews / meetings and objective evidence (records and field), verify that Fatigue Management Plan is disseminated, understood and applied	Through interviews and objective evidence (records), verify Fitness for Duty assessments performed as well as follow-up	Through interviews and objective evidence (records), verify that training is delivered as per Appendix.
FREQUENCY	Annually	Annually	Every 2 years
STARTING DATE	First year of operation	Within 90 days after OLRT service	First year of operation
FIELD REVIEW	X		
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM	SAFETY MANAGEMENT SYSTEM
CITY REGULATORY DOCUMENT	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG	SMS MANUAL OCT-S230-03-PROG
CITY REGULATION SECTION	Training *	Communication and Participation	Communication and Participation
PART / NUMBER	4.1	4.2	4.2
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	There are other situations where additional training is required. These include instances where: Operators have been away from work for longer than 90 days; or, safety investigation recommends training as part of a remedial action	Communicating SMS to Employees. There are certain components of SMS that must be communicated to all employees. These include the following: OC Transpo's Safety Policy; OC Transpo goals, targets and safety initiatives; and, Policy and procedures to report safety hazards, contraventions / occurrences	Employee Participation Plan. OC Transpo involves employees in the development and revision of safety policies, procedures, programs and processes….. as per list
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	2
MONITORING APPROACH	Through review of records identifying employees absent 90+days, verify that training is delivered.	Through interviews and objective evidence (records), verify that SMS elements communicated.	Through interviews and objective evidence (records), verify that employee participation as per SMS 4.2.
FREQUENCY	Every 2 years	Every 2 years	Every 2 years
STARTING DATE	First year of operation	2020	2020
FIELD REVIEW			
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SAFETY MANAGEMENT SYSTEM		
CITY REGULATORY DOCUMENT	SMS MANUAL OCT-S230-03-PROG		
CITY REGULATION SECTION	Communication and Participation		
PART / NUMBER	4.2		
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Each year, the Chief Safety Officer will lead the development of an annual safety communication program		
MONITORING PRIORITY (1-3, 1 HIGHEST)	2		
MONITORING APPROACH	Through interviews and objective evidence (records), verify that communication plan developed and implemented		
FREQUENCY	Every 2 years		
STARTING DATE	2020		
FIELD REVIEW			
INTERVIEWS / MEETINGS	X		
DOCUMENTS/ DATA	X		
Note: '*' indicates document not available or to be updated			Sheet 7 of 38

REGULATORY AREA	SECURITY	SECURITY	SECURITY
CITY REGULATORY DOCUMENT	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)
CITY REGULATION SECTION	1.4 Plan Management	2.2 Policy Review Process	4.2 Security Statistics
PART / NUMBER	1.4	2.2	4.2
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	….a general review will be conducted at least annually, with a full systematic review based on a comprehensive Threat-Vulnerability Risk Assessment conducted every three years	The Chief Special Constable is responsible for ensuring a review of the Security Management Policy on an annual basis to ensure it continues to reflect OC Transpo's structure, operations, security philosophy, security programs, and security risk environment.	The Special Constable Unit is responsible for maintaining a database and collecting statistics on security incidents.
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	1
MONITORING APPROACH	1) Interview / meetings to verify if general review has been completed; 2) Review documentation as objective evidence	1) Interview / meetings to verify if general review has been completed; 2) Review documentation as objective evidence	1) Interview / meetings to request statistics; 2) Review statistics for trends
FREQUENCY	Every 2 years	Every 2 years	Annually
STARTING DATE	First year of operation	First year of operation	Within 90 days after OLRT service
FIELD REVIEW			
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SECURITY	SECURITY	SECURITY
CITY REGULATORY DOCUMENT	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)
CITY REGULATION SECTION	5.5 Director, Transit Operations; 5.6 Chief Safety Officer	8.2 Training and Awareness Plans – Basic principles	8.3 All Employees and Contractors, 8.3.1 All Employees and Contractors; 8.5 On-Board Training, 8.8 Record Keeping
PART / NUMBER	5.5, 5.6	8.2	8.3, 8.5, 8.8
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Director - Transit Operations and Chief Safety Officer…. responsible for: Ensuring security audits and risk assessments are performed when required; Ensuring SeMS annual reports are completed with appropriate stakeholder consultation; etc. The Chief Safety Officer, in addition to the responsibilities of an employee, supervisor, and manager, is responsible for: Managing the Transit Services Emergency Management Plan; etc.	OC Transpo is committed to ensuring that all individuals involved in the planning, management or enforcement of security shall receive training as necessary to ensure that employees are sufficiently knowledgeable to carry out their security responsibilities.	8.3.1 ..basic security management system awareness training provided to employees …". 8.5.1 Light Rail Operators and Electric Rail Operators, 8.5.2 Transit Operations Supervisory Positions….Training requirements
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	1	1
MONITORING APPROACH	1) Interview / meetings to verify if responsibilities under 5.5 and 5.6 are understood and carried out 2) Review objective evidence of security Audits, risk assessments, Emergency Management Plan etc.	1) Request Training Records to assess if training delivered. 2) Identify personnel hired in past year and verify if security training delivered	1) Request Training Records for employee groups identified in this section to assess if training delivered. 2) Identify personnel hired in past year and verify if security training delivered
FREQUENCY	Every 2 years	Every 2 years	Every 2 years
STARTING DATE	2020	First year of operation	First year of operation
FIELD REVIEW			
INTERVIEWS / MEETINGS	X		
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SECURITY	SECURITY	SECURITY
CITY REGULATORY DOCUMENT	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)	SECURITY MANAGEMENT SYSTEM (OCT-S230-04-PGM)
CITY REGULATION SECTION	9.4 Program Schedule	10.2 SeMS Evaluation Program Description and Schedule	10.2 SeMS Evaluation Program Description and Schedule
PART / NUMBER	9.4, 9.5	10.2	10.2
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	...Drills, exercises and audits of the SeMS will be conducted in a manner that ensures the emergency management components have been fully exercised every three calendar years. The Minister of Transport is to be advised in advance of pre-planned drills and/or exercises. All drills and exercises will be reviewed and documented. Documentation will include an assessment of its usefulness, lessons learned, and changes required (if any).	The Chief Special Constable is responsible for ensuring an annual report is prepared, setting out the results of monitoring and/or evaluation activities, any deficiencies found, recommendations for corrective action, and any new trends or concerns that may require risk mitigation measures.	...audit of the SeMS, related to the security of the Confederation Line is conducted one year after the Confederation Line's initial operation and every three years thereafter…. A copy of the SeMS Audit is submitted to Minister of Transport within 60 days of each SeMS audit; and A copy of the SeMS Corrective Action Plan is submitted to the Minister of Transport within 90 days of each SeMS audit.
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	2
MONITORING APPROACH	1) Request records of drills, exercises and audits of SeMS, Notifications to Minister of Transport; 2) Request documentation on lessons learned etc as per 9.4, 9.5	1) Interview / meeting with Chief Special Constable/ staff to verify if audit and annual report has been completed; 2) Review documentation as objective evidence	1) Interview / meeting with Chief Special Constable/ staff to verify if audit and filings have been completed; 2) Review documentation as objective evidence
FREQUENCY	Every 2 years	Every 2 years	Every 2 years
STARTING DATE	First year of operation	2020	2020
FIELD REVIEW			
INTERVIEWS / MEETINGS		X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	SECURITY	SECURITY	
CITY REGULATORY DOCUMENT	RESPONDING TO TRESPASSERS ON THE CONFEDERATION LINE (OTRC-S200-33-WI)	WORK INSTRUCTIONS / PROCEDURES FOR EMERGENCIES AND OPERATIONAL EXCEPTIONS *	
CITY REGULATION SECTION	The purpose of this Work Instruction is to establish a consistent method for the removal of trespassers on the Confederation Line.	19 Work Instructions / procedures covering issues such as Fire, Smoke, Medical Emergencies, Suicides, Bomb threats etc.	
PART / NUMBER	Sections 2 and 3		
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Specific responsibilities are identified for Main Lne Controller, Maintenance Controller and Electric Rail Operator.	Each Work Instruction identifies specific responsibilities and procedures for specific positions.	
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	1	
MONITORING APPROACH	1) Interview / meeting with appropriate security and safety staff to understand how Work Instruction is disseminated; 2) Review documentation as objective evidence to confirm training delivered, competence developed; 3) Review documentation / records to assess whether procedures were properly applied in the field.	1) Interview / meeting with appropriate security and safety staff to understand how Work Instructions are disseminated; 2) Review documentation as objective evidence to confirm training delivered, competence developed in the field; 3) Review sample documentation / records to assess whether specific procedures were properly applied in the field. Select different work instructions to be reviewed each year.	
FREQUENCY	Every 2 years	Annually	
STARTING DATE	First year of operation	First year of operation	
FIELD REVIEW			
INTERVIEWS / MEETINGS	X	X	
DOCUMENTS/ DATA	X	X	

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL
CITY REGULATION SECTION	2.5 Qualification and Authorization * (Training / qualification criteria / requirements for operators / controlers not available yet)	2.5 Qualification and Authorization * (Training / qualification criteria / requirements for operators / controlers not available yet)	2.12.5 Work / Rest Rules
PART / NUMBER	2.5	2.5	2.12.5
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	"Employees working on Electric light rail must be both qualified and authorized to: () enter into and work within CBTC territory; () operate rolling Stock; () exercise the duties of a rail controller; () maintain and repair rolling stock, track work, infrastructure, or systems; () perform other tasks where qualification and authorization is required by applicable policy and procedures"		Employees in safety critical or safety sensitive roles must comply with all work/rest rules applicable to their duties and not work or accept work when such work would put them in violation of these rules.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Confirm that training material includes these elements - through interviews and review of training documents	Confirm that employees have been trained in Operating Rules and have been requalified according to specified timeframes (time frame TBD) - verification of training records. Include field sampling by requesting rules cards from employees.	Refer to line item on Hours of Service
FREQUENCY	Every 2 years	Annually	
STARTING DATE	First Year of Operation	Within 90 days of OLRT service	
FIELD REVIEW		X	
INTERVIEWS / MEETINGS	X		
DOCUMENTS/ DATA	X	X	

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL
CITY REGULATION SECTION	2.12.6 Medical Fitness *	2.14 Personal Electronic Devices	3 Safety Practices and Equipment
PART / NUMBER	2.12.6	2.14	3.1 - 3.4
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	All employees in safety critical and safety sensitive positions must maintain medical certification in accordance with Confederation Line practices. Employees must notify the rail superintendent between 2 and 3 months prior to the expiration of a required certificate.	The use of unauthorized personal electronic devices by electric rail operators while in the cab of a light rail vehicle is prohibited. Personal electronic devices in a light rail vehicle cab must be silenced and stowed.	Monitor compliance of key elements such as PPE (3.1), Vigilance Systems (3.3) and 'Locking of Rolling Stock' (3.4)
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Refer to line item on Fitness for Duty. Through interviews and objective evidence (records), verify Fitness for Duty assessments performed as well as follow-up	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable
FREQUENCY	Annually	Annually	Quarterly
STARTING DATE	First Year of Operation	Within 90 days after OLRT service	Within 90 days after OLRT service
FIELD REVIEW		X	X
INTERVIEWS / MEETINGS	X	X	
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL
CITY REGULATION SECTION	4 Radio Communication Rules	5 Procedural Rules	6 Signal and Signage
PART / NUMBER	4.1-4.14	5.1 - 5.6.4	6.1
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Radio Communication Rules as defined in section 4	Procedural Rules as defined in section 5	6.1 Knowledge of Signals and Signage: Employees qualified to access and work within CBTC territory must be capable of recognizing and understanding signals and signs that apply to their track and direction of travel.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	Confirm that training material includes these elements: through interviews and review of training documents
FREQUENCY	Annually	Annually	Annually
STARTING DATE	Within 90 days after OLRT service	First Year of Operation	First Year of Operation
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS			X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL
CITY REGULATION SECTION	6 Signal and Signage	7 Switches	8 Operating Rules
PART / NUMBER	6.1 - 6.8	7.1 - 7.5	8.1 - 8.9
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Signal and Signage Rules as defined in section 6	Switch Rules as defined in section 7	Operating Rules as defined in section 8
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First Year of Operation	First Year of Operation	First Year of Operation
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	**ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL**	**ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL**	**ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL**
CITY REGULATION SECTION	8.2 Items to be Accessible to Rollling Stock while on Duty	9 Train Specific Operating Rules	10 Track & Speed Restrictions
PART / NUMBER	8.2	9.1 - 9.15.5	
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Employees must have accessible items such as badge, card, Track Authority Forms, Watch, PPE, …..	Train Specific Operating Rules as defined in section 9	Track and Speed Restriction Rules as defined in section 10
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Field Observations with OLRT Officer where practicable	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First Year of Operation	First Year of Operation	First Year of Operation
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA		X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	ELECTRIC LIGHT RAIL OPERATING RULE BOOK - OTRC-S100-00-RUL	4.2.1.1 WORKING ON THE CONFEDERATION LINE PROCEDURES	4.2.1.1 WORKING ON THE CONFEDERATION LINE PROCEDURES
CITY REGULATION SECTION	11 Control Room Rules; 12 Maintenance of Way Manual Area Rules; 13 Working on the Confederation Line; 14 OCS Safety Rules; 15 Working Under or About Trains Outside of Shop Areas…	4.1 Qualification of Personnel	4.3 Minimum PPE Requirements
PART / NUMBER	11 - 15	Table 1	Table 2
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Rules as defined in section 11 - 15	Qualifications of Personnel: Personnel performing work on the Confederation Line must be qualified for the tasks and work that they will undertake or otherwise be escorted by qualified personnel. Apart from any technical qualifications that may apply, all personnel who will perform work on the Confederation Line must successfully complete initial general training as indicated in Table 1 as well as recurrent training at intervals not to exceed three years.	Minimum PPE Requirements: Personal Protective Equipment (PPE) is required when accessing various areas of the Confederation Line. The minimum PPE requirements by area are indicated in Table 2 below. In addition to the minimum requirements, personnel must wear task specific PPE that may be required for the work to be undertaken.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Monitor compliance through: i) Request records of proficiency tests / results and review through sampling; ii) Field observations where practicable	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable	Monitor compliance through: i) Review training material to verify if PPE is covered; 2) Request records of proficiency tests / results and review through sampling; ii) Field observations
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First Year of Operation	Within 90 days after OLRT service	Within 90 days after OLRT service
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS		X	
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	**4.2.1.1 WORKING ON THE CONFEDERATION LINE PROCEDURES**	**4.2.1.1 WORKING ON THE CONFEDERATION LINE PROCEDURES**	**4.2.2.4.5 LRV DOOR FAULT PROCEDURES**
CITY REGULATION SECTION	7.0 Authorizations to Perform Work on the Confederation Line		
PART / NUMBER	Table 5	7.3.5	
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	There are several means and methods of obtaining authorities to perform work on the Confederation Line, depending on the area involved and type of work to be performed. For purposes of defining the authorizations required, work is classified into four different categories as indicated in Table 5. With the exception of when performing work that is inconsequential to the operation of the system and that does not require access to CBTC territory or restricted areas, personnel must be authorized in accordance with Table 5 and work in accordance with the referenced procedures	Records of Authorities: In order to maintain records of all track authorities issued, rail controllers will log the issue and cancellation of all track authorities in the control room log, detailing the time of issue and cancellation, the track authority number, and the recipient. **Control room copies of Track Authority Forms will also be electronically filed and retained for a minimum period of 90 days**. Personnel in the field are only required to retain hard copies of Track Authority Forms when a discrepancy, incident, or accident occurs that is associated with the respective authority. In such cases, the associated Track Authority Form(s) must be surrendered to the recipient's direct supervisor for use in the investigation of the occurrence.	LRV door faults can be a common occurrence in day to day light rail transit operations. Doors are subject to frequent cycling and are prone to being blocked and obstructed by passengers. Environmental conditions such as snow, ice, and water can contribute to door problems. Passenger activations of emergency door release handles will periodically occur. **For these reasons, operations and maintenance personnel must be ready and prepared to deal with abnormal door situations as they arise.**
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	Monitor compliance through: i) Review training material to verify if authorizations are covered; 2) Request records of Authorizations and proficiency tests / results and review through sampling; ii) Field observations where practicable	Monitor compliance through: i) Request records of Authorizations to confirm that they are retained 90 days	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable
FREQUENCY	Annually	Every 2 years	Annually
STARTING DATE	First Year of Operation	First Year of Operation	First Year of Operation
FIELD REVIEW	X		X
INTERVIEWS / MEETINGS			X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	4.2.2.4.23 DRIVER VIGILANCE SYSTEM ACTIVATIONS	4.2.2.4.9 TRACK OBSTRUCTIONS	4.2.2.4.24 GUIDEWAY INTRUSION PROCEDURES
CITY REGULATION SECTION			
PART / NUMBER			
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Confederation Line LRVs are equipped with a driver vigilance system to protect against situations where an ERO may become fatigued, distracted, or immobilized. The vigilance system is provided to enhance the level of safety of Confederation Line train operations. There are 2 systems (i) alertness device in master controller handle; ii) alertness device in DAR). **Section 7 identifies procedures that must be followed.**	The Confederation Line operates on a guideway dedicated to light rail train operations. The right-of-way (ROW) is secured by chain link fence to prevent access. While obstructions should be uncommon, there is still potential for track obstructions. **The purpose of this Procedure is to set out the response procedures for electric rail operators, maintenance staff, and control room staff when track obstructions are observed or reported.**	The system is also equipped with a guideway intrusion detection system (GIDS) to detect when intruders attempt to enter the guideway off the end of a station platform or at tunnel portals. **This procedure explains the functionality of the guideway intrusion detection system and defines the procedures that will apply for various types of guideway intrusions as well as GIDS related false alarms and failures.**
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable
FREQUENCY	Annually	Every 2 years	Annually
STARTING DATE	First Year of Operation	First Year of Operation	First Year of Operation
FIELD REVIEW	X	X	X
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated **Sheet 19 of 38**

REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	OFF-GUIDEWAY PERMITS. OTRC-S200-14-WI	RULES DEVIATION PROCEDURE. OTRC-S200-20-WI	RESTRICTED AREA ACCESS CONTROL. OTRC-S200-19-WI
CITY REGULATION SECTION			
PART / NUMBER			
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The purpose of this work instruction is to establish a consistent method to apply for, implement and cancel Off-Guideway permits. Off Guideway Permits are used by OC, RTM and/or RTM contractors. The Off Guideway Permit Form is a written authorization to perform work on facilities or systems outside of CBTC territory that could have an impact on train operations or public use of the system.	The purpose of this work instruction is to establish a consistent method for performing tasks or operations that cannot be accomplished in full compliance with existing rules and procedures. Prior to deviating from current rules, the necessity for the deviation must be established, an evaluation of the associated hazards must be undertaken and measures to mitigate the hazard must be devised. The rule deviation must be approved by OC Transpo's Chief Safety Officer.	The purpose of this work instruction is to establish a consistent method for accessing and exiting restricted areas on the Confederation Line. Access to restricted areas is controlled with door locks supervised by the supervisory control and data acquisition (SCADA) system. Personnel intending to access restricted areas must be qualified and authorized to enter such areas. **Section 3 identifies procedure to follow.**
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	2
MONITORING APPROACH	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable	1) Interview / meeting with appropriate staff to understand how Procedure is disseminated and how competence is developed in field; 2) Review documentation as objective evidence to confirm training delivered, competence developed in field; include existing and new employees; 3) Review sample documentation / records, including proficiency tests, to assess compliance in field. 3) Field observations where practicable
FREQUENCY	Every 2 years	Every 2 years	Every 2 years
STARTING DATE	First Year of Operation	2020	2020
FIELD REVIEW	X	X	
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	**RULES AND SAFETY COMPLIANCE PROGRAM ***	**RULES AND SAFETY COMPLIANCE PROGRAM ***	**RULES AND SAFETY COMPLIANCE PROGRAM ***
CITY REGULATION SECTION			
PART / NUMBER			
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The monitoring of such behaviours is to be done at all times by Supervisors and Superintendents using **pre-set goals for each position**	Superintendents and Supervisors will be required to **perform train rides, safety/security inspections and proficiency observations in accordance with goals set for their respective positions**	**Employee orientation will occur with employees who are new to their position and with those returning from an absence exceeding a period of 3 months.** This will occur through a train ride and be documented using a prescribed checklist prior to the employee operating on their own
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	2
MONITORING APPROACH	i) Interviews / meetings to understand training in class / field; ii) Request specific targets for tests, train rides; iii) Request records of proficiency tests to verify if targets are met; iv) Request records to assess if appropriate follow-up is performed; v) Field observations where practicable	i) Request specific targets for tests, train rides; ii) Request records to verify if targets are met; iii) Request records to assess if appropriate follow-up is performed; iv) Field observations where practicable	Monitor compliance through: i) Request records of new employees and those returned after 3 months absence; ii) Request records of orientation / train ride to confirm done
FREQUENCY	Annually	Annually	Annually
STARTING DATE	Within 90 days after OLRT service	Within 90 days after OLRT service	First year of operation
FIELD REVIEW	X	X	
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	
CITY REGULATORY DOCUMENT	**RULES AND SAFETY COMPLIANCE PROGRAM ***	**RULES AND SAFETY COMPLIANCE PROGRAM ***	
CITY REGULATION SECTION			
PART / NUMBER			
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The **failure of any test is to be escalated to the program manager and a successful retest is to be completed within 7 days**.	An **analysis** of information collected through train rides, proficiency reports and safety/security inspections identifying trends and leading indicators is to be performed.	
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	
MONITORING APPROACH	Monitor compliance through: i) Request records of proficiency tests to identify failures; then verify if escalation process and retest done	Monitor compliance through: i) Request specific targets for analysis (who, how, how often…); ii) Request records of analysis to verify that it is done	
FREQUENCY	Annually	Annually	
STARTING DATE	First year of operation	First year of operation	
FIELD REVIEW			
INTERVIEWS / MEETINGS	X	X	
DOCUMENTS/ DATA	X	X	

Note: '*' indicates document not available or to be updated **Sheet 22 of 38**

REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	HOURS OF SERVICE * . OTRC-S102-00-SOP	HOURS OF SERVICE * . OTRC-S102-00-SOP	HOURS OF SERVICE * . OTRC-S102-00-SOP
CITY REGULATION SECTION	4. Introduction	6. Hours of Service Exemption	Key elements from 'Commercial Vehicle Drivers Hours of Service Regulations' - SOR/2005-313
PART / NUMBER	4	6	6
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Employees performing safety critical and safety sensitive duties on the Confederation Line must comply with the Commercial Drivers Hours of Service Regulations as set by the Government of Canada. Refer to http://laws-lois.justice.gc.ca/eng/regulations/SOR-2005-313/ for complete details regarding permissible working hours. ..**it is the electric rail operator's responsibility to ensure that they are not booked on work that will create a violation of the Confederation Line Hours of Service Rules.**	An exemption to these hours of service rules can be implemented to accommodate emergency situations and unforeseen adverse operating conditions. For trips that can normally be completed under normal circumstances, the exemption provides the operator with an extension of up to 2 hours for the driving, on-duty and elapsed time in the cycle. The operator is still required to take 8 consecutive hours of off-duty time.	**Mandatory Off Duty:** () No motor carrier shall request, require or allow a driver to drive and no driver shall drive after the driver has accumulated 13 hours of driving time in a day ; () at least 8 consecutive hours of off-duty time before driving again. **Daily Off Duty =** .. at least 10 hours off duty in a day. **Cycles** = at least 24 consecutive hours off duty in preceding 14 days. max. 70 hours on duty during in 7 day period. **Cycle reset** = min 36 hours off-duty.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	Refer to other relevant line items. i) Interviews / meetings to understand how employees are trained and how compliance is monitored; ii) Interview sample number of employees, crew callers and and responsible managers to verify if they are aware of hours of service requirements. iii) Understand process for logging employee work hours and flagging exemptions and non-compliances. Monitor compliance through sampling of records.	Monitor sampling of records where employee identified potential exemption and confirm that 2 hour max. rule is followed.	Monitor sampling of records to assess compliance to these criteria.
FREQUENCY	Annually	Annually	Annually
STARTING DATE	Within 90 days after OLRT service	First year of operation	Within 90 days after OLRT service
FIELD REVIEW	X		
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	
CITY REGULATORY DOCUMENT	HOURS OF SERVICE * . OTRC-S102-00-SOP	HOURS OF SERVICE * . OTRC-S102-00-SOP	
CITY REGULATION SECTION	Fatigue Management Plan for Operating Employees *	Medical Rules *	
PART / NUMBER			
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Not available	Not available	
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	
MONITORING APPROACH	TBD. Refer to other relevant line items	TBD. Refer to other relevant line items	
FREQUENCY	TBD	TBD	
STARTING DATE	Within 90 days after OLRT service	Within 90 days after OLRT service	
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA			

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS	PEOPLE / HUMAN FACTORS
CITY REGULATORY DOCUMENT	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***
CITY REGULATION SECTION	9. Training and Qualification of Personnel (RTM and Contractors)		
PART / NUMBER	9	9	9
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	In performing M&R services on the Confederation Line, RTM and its subcontractors will ensure that maintenance staff have appropriate backgrounds and are trained and certified to perform work in their functional areas. Those who are not fully certified will work towards certification under the direction of a certified employee.	In terms of general training, all technicians will be trained on the following: • Confederation Line Safety Management System; •Confederation Line Rail Operating Rules; •Working on the Confederation Line Procedures; •the use of specialized maintenance equipment; •and the use of the IT systems that are employed in supporting maintenance.	In terms of technical training, technicians will be provided vendor training with respect to maintenance of specialized systems for their functional scope. **This training will be completed prior to revenue service availability date with recurrent training on rules and procedures conducted every three years.**
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	1	1
MONITORING APPROACH	1) Request training records showing training provided and date by employee name. 2) Sampling of employee records to validate training compliance	1) Request training records showing training provided and date by employee name. 2) Sampling of employee records to validate training compliance	1) Request training records showing training provided and date by employee name. 2) Sampling of employee records to validate training compliance
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First year of operation	First year of operation	First year of operation
FIELD REVIEW			
INTERVIEWS / MEETINGS	X	X	X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***
CITY REGULATION SECTION	16.1.5 Preventive Inspection, Maintenance and Refurbishment *	16.1.5 Preventive Inspection, Maintenance and Refurbishment	16.1.2 Daily Interior Cleaning, Pre-Service Inspection and Testing, Train Washing
PART / NUMBER	16.1.5	16.1.5	16.1.2
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	**General Safety Inspection: At intervals of 12,500 running kilometers, LRVs will be scheduled for a general safety inspection.** This inspection will ....include: -Test of service brake control; -Test of emergency brake; -Test of electromagnetic brake; -Visual inspection of fire extinguishers and other safety devices. *** (Conflict with 4.7 part 8.1 - needs to be clarified)**	**Scheduled Preventive Maintenance:** Preventive maintenance on vehicle systems will be undertaken in accordance with defined schedules based on either time in service, distance travelled, or cycles completed in accordance with Alstom's preventive maintenance schedule in **Appendix A**	Interior cleaning and **pre-service inspection** activities will be defined in the Alstom LRV Pre-Service Procedure but will include… (see list)
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	1) Request records of cars and mileage to confirm general inspection performed for each car number; 2) Request list of defects found, priority and repairs performed including dates	1) Request records of cars and mileage to confirm preventive maintenance performed for each car number; 2) Request list of defects found, priority and repairs performed including dates	1) Request records of pre-service inspection performed for each car number and date; 2) Request list of defects found, priority and repairs performed including dates
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First year of operation	2020	First year of operation
FIELD REVIEW	X	X	
INTERVIEWS / MEETINGS	X	X	
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**4.7 LRV SAFETY AND INSPECTION RULES**	**4.7 LRV SAFETY AND INSPECTION RULES**
CITY REGULATION SECTION	16.1.6 Corrective Maintenance		
PART / NUMBER	16.1.6	4.3	7.2
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Corrective maintenance of the vehicles and vehicle components will be undertaken as required to ensure fleet availability. ….When a condition or component is found or reported as defective, a work order will be created and repairs scheduled.	4.3 Records of Qualified Persons. A list of qualified persons shall be maintained by the MC which will include: **Pre-Service Inspection and Testing (see complete list in Manual)**	7.2 Currency Period for a Pre-Service Inspection. a) The currency period for a Service Ready LRV, until placed in service, will be 72 hours from the date and time of completion of the pre-service inspection.
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	1	2
MONITORING APPROACH	1) Request list of defects found, priority and repairs performed including dates; 2) Review records to confirm process is followed and appropriate actions taken	Request list of qualified persons. Through interviews / meetings determine process to confirm that employees working have received training	Request list of pre-service inspection vs dates car put back in service to assess compliance
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First year of operation	Within 90 days after OLRT service	2020
FIELD REVIEW		X	
INTERVIEWS / MEETINGS		X	
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	**4.7 LRV SAFETY AND INSPECTION RULES**	**4.7 LRV SAFETY AND INSPECTION RULES**	**4.2.2.4.6 VEHICLE BRAKE SYSTEM FAILURES**
CITY REGULATION SECTION			4.6 Reporting Train Brake Faults and Failures
PART / NUMBER	8.1	10.1	4.6
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	8.1 General Safety Inspection. a) LRVs operating on the Confederation Line will be required to undergo a general **safety inspection at intervals of 25,000 running kilometers**. *** (Conflict with 16.1.5 - needs to be clarified)**	10.1 Requirement(Records). a) The MC shall maintain records of all LRV inspection, testing, maintenance and repair work. B) Such records shall be captured by work orders in an electronic CMMS.	Document is intended to highlight the response protocol for both Train Operations Control Center (TOCC) and Rideau Transit Maintenance which may be encountered on Citadis Spirit vehicles on the Confederation Line. 4.6 The core procedures for addressing in-service vehicle faults (including brake faults) are summarized in table
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	1
MONITORING APPROACH	see above	Review CMMS to assess completeness	1) Request training material to confirm this regulation is covered; 2) Request records showing training provided; 3) Request records of field occurrences to assess if procedures are followed
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First year of operation	First year of operation	Within 90 days after OLRT service
FIELD REVIEW			
INTERVIEWS / MEETINGS			X
DOCUMENTS/ DATA		X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	EQUIPMENT INSPECTION / MAINTENANCE	EQUIPMENT INSPECTION / MAINTENANCE	
CITY REGULATORY DOCUMENT	**4.2.2.4.3 LRV FAULTS AND VEHICLE MINIMUM OPERATING STANDARD**		
CITY REGULATION SECTION	5.1-5.6 Procedures for identifying, reporting and addressing faults		
PART / NUMBER	5.1-5.6	6	
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	This document sets out the standard operating procedures that are to be used in response to various vehicle fault conditions and includes the minimum operating standards for which LRVs may continue to run in service. 5.1 Determination of Fault. 5.2 Reporting Fault Conditions. 5.3 Open a Service Request. 5.4 Use of the VMOS (Vehicle Minimum Operating Standard). 5.5 Implementing the Response. 5.6 Planning the Repair.	6.0 Fault Conditions not defined in the VMOS: In the event of fault conditions that are not defined in the VMOS, the MC will conference with the RCS and HD to determine an appropriate response. Such conditions could include: 1. Dragging equipment or noises underneath the train with no fault detected. 2. Trains with reoccurring brake abnormalities that are not generating fault indications. 3. Trains involved in collisions or contact with debris	
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	
MONITORING APPROACH	1) Request training material to confirm this regulation is covered; 2) Request records showing training provided; 3) Request records of field occurrences to assess if procedures are followed	1) Request training material to confirm this regulation is covered; 2) Request records showing training provided; 3) Request records of field occurrences to assess if procedures are followed	
FREQUENCY	Annually	Annually	
STARTING DATE	First year of operation	First year of operation	
FIELD REVIEW			
INTERVIEWS / MEETINGS	X	X	
DOCUMENTS/ DATA	X	X	

Note: '*' indicates document not available or to be updated **Sheet 29 of 38**

REGULATORY AREA	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***
CITY REGULATION SECTION	16.2 Trackwork and Alignment Maintenance *	16.2 Trackwork and Alignment Maintenance *	16.2 Trackwork and Alignment Maintenance *
PART / NUMBER	16.2.1 *		
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The Confederation Line **track and alignment inspection regime** will be as indicated in the table below: (page 27 'Track Inspection Types and Frequencies')	Table: Trackwork and Alignment General Inspection: Twice weekly with at least two calendar days between inspections	Table: Track Geometry Measurement = Bi-Annually (conflict with 4.6.1 section 6.2.5) **- need to clarify ***
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	see below	1) Request records of inspections, date etc. to assess compliance.; 2) Request list of defects found, priority and repairs performed including dates, to assess compliance to section 7 of 4.6.1	1) Request records of inspections, date etc. to assess compliance.; 2) Request list of defects found, priority and repairs performed including dates, to assess compliance to section 7 of 4.6.1
FREQUENCY		Annually	Annually
STARTING DATE		Within 90 days after OLRT service	2020
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA		X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *
CITY REGULATION SECTION	16.2 Trackwork and Alignment Maintenance *	16.2 Trackwork and Alignment Maintenance *	16.2 Trackwork and Alignment Maintenance
PART / NUMBER			16.2.1
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Table: Rail Flaw Detection = Annually after the first three years of operation	Table: Cold Weather Inspection = During the first cold snap of the season (ambient air temperature has fallen below -10° C) and thereafter as required when the ambient air temperature is expected to fall below - 30° Celcius	**Switch Machine Maintenance: The switch machines will be tested monthly** as part of the special trackwork inspections and the total number of **cycles on these switch machines will be recorded** and monitored. Upon reaching 200,000 cycles, the switch machines will be swapped out for overhaul of the hydraulic systems to ensure reliability.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	2
MONITORING APPROACH	1) Request records of inspections, date etc. to assess compliance.; 2) Request list of defects found, priority and repairs performed including dates, to assess compliance to section 7 of 4.6.1	1) Request records of inspections, date etc. to assess compliance.; 2) Request list of defects found, priority and repairs performed including dates, to assess compliance to section 7 of 4.6.1	1) Request records of switch machine testing and number of cycles by switch ID.
FREQUENCY	Annually	Post winter	Annually
STARTING DATE	2020	First year of operation	Dependent on Cycling numbers
FIELD REVIEW			
INTERVIEWS / MEETINGS			X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	4.6.1 TRACK SAFETY AND INSPECTION RULES	4.6.1 TRACK SAFETY AND INSPECTION RULES	4.6.1 TRACK SAFETY AND INSPECTION RULES
CITY REGULATION SECTION	5. Qualified Persons	6. Inspection	6. Inspection
PART / NUMBER	5.4	6.1	6.2.1
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	5.4 Records of Qualified Persons: A list of qualified persons shall be maintained by the MC	6.1 Inspection Records: 1) All track inspection records shall be input and retained within a CMMS, with all details of the inspection including date, qualified person responsible for the inspection, tracks inspected, as well as all deviations or deficiencies noted recorded in the record.	6.2.1 Main Line Track Inspections; 1) Main line tracks shall be inspected twice weekly on foot or by riding over the track in a vehicle at a speed that allows detection of noncompliance with these rules.
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	1	1
MONITORING APPROACH	Request list of qualified persons. Through interviews / meetings determine process to confirm that employees working have received training	Review CMMS to assess completeness	1) Request records of inspections, date etc. to assess compliance.
FREQUENCY	Annually	Annually	Annually
STARTING DATE	Within 90 days after OLRT service	First year of operation	Within 90 days after OLRT service
FIELD REVIEW			
INTERVIEWS / MEETINGS	X		
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE	TRACK INSPECTION / MAINTENANCE
CITY REGULATORY DOCUMENT	**4.6.1 TRACK SAFETY AND INSPECTION RULES**	**4.6.1 TRACK SAFETY AND INSPECTION RULES**	**4.6.1 TRACK SAFETY AND INSPECTION RULES**
CITY REGULATION SECTION	6. Inspection	6. Inspection	7. Deficient Track Condition
PART / NUMBER	6.2.2	6.2.5 *	7.1
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	6.2.2 Yard Track Inspections. 1) Yard tracks shall be inspected once per month.	6.2.5 Track Geometry Inspection. 1) The geometry of mainline track shall be inspected and recorded annually by an automated track inspection or measurement vehicle - **need to clarify with 16.2.1***	2) When reporting a defect, all information, including track designation, line stationing, or other unique repeatable methodology as determined by the MC must be utilized. 3) A condition prioritization system shall be used by the MC. Any qualified person that knows or has notice that the track does not comply with these rules shall report the condition using the hierarchy and corrective actions indicated in the table below....
MONITORING PRIORITY (1-3, 1 HIGHEST)	3	1	1
MONITORING APPROACH	1) Request records of inspections, date etc. to assess compliance.; 2) Request list of defects found, priority and repairs performed including dates, to assess compliance to section 7 of 4.6.1	see above	Through interviews / meetings, understand process. Request information on prioritization process. Request records to monitor compliance
FREQUENCY	Every 2 years		Annually
STARTING DATE	2020		First year of operation
FIELD REVIEW			
INTERVIEWS / MEETINGS			X
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE
CITY REGULATORY DOCUMENT	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *
CITY REGULATION SECTION	16.3.1 Inspection and Maintenance of the Traction Power Substation Equipment	16.3.2 OCS Maintenance	16.4 Systems Maintenance
PART / NUMBER	16.3.1	16.3.2	16.4
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	Preventive maintenance of the TPS equipment will consist of systematic, condition-based, and predictive maintenance. The core maintenance strategy is indicated in the table below (subject to verification of supplier O&M manuals) …..Quarterly Inspection; Annual Inspection; Triennial Maintenance.	OCS Maintenance: The strategy for maintenance of the catenary subsystem will focus on preventive maintenance in order to keep the equipment in optimal condition and to minimize and mitigate failures or issues with the OCS. The Confederation Line OCS maintenance inspection regime will be as indicated in the table	Systems maintenance will consist of maintenance and rehabilitation of the following systems: •Communication Based Train Control (CBTC) •Supervisory Control and Data Acquisition (SCADA); •Closed circuit television (CCTV); •Passenger Announcement (PA); •Passenger Information Display System (PIDS); •Guideway Intrusion Detection System (GIDS); •Intrusion Access Control (IAC); •Communications Transmission System (CTS); •Telephony Systems
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	2
MONITORING APPROACH	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance
FREQUENCY	Every 2 years	Every 2 years	Annually
STARTING DATE	2020	2020	2020
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE
CITY REGULATORY DOCUMENT	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***	**MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 ***
CITY REGULATION SECTION	16.5 Tunnel Ventilation System Maintenance *	16.5 Tunnel Ventilation System Maintenance	16.6 Tunnel Equipment Maintenance
PART / NUMBER	16.5	16.5	16.6
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	16.5 Tunnel Ventilation System Maintenance; Maintenance of the tunnel ventilations systems will be performed by Alstom in accordance with the recommendations of the tunnel vent system O&M manuals **(yet to be released) ***	The tunnel vent shafts will be inspected monthly to ensure there is not a buildup of foreign matter or litter	Apart from the tunnel ventilation system, there will also be a requirement for maintenance of infrastructure and equipment specific to the running tunnel such as: •Drainage systems, including buried pipe, trenches, and sump pumps; •Tunnel lighting; •Dry standpipe fire suppression system (refer to section 16.9); •Walkways and handrails; •East portal slab heating system. Alstom will be responsible for this scope.
MONITORING PRIORITY (1-3, 1 HIGHEST)	2	2	1
MONITORING APPROACH	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance
FREQUENCY	Annually	Annually	Annually
STARTING DATE	First year of operation	First year of operation	First year of operation
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE
CITY REGULATORY DOCUMENT	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *
CITY REGULATION SECTION	16.7.2 Station Maintenance Area Responsibility Matrix	16.8.1 Elevator and Escalator Maintenance	16.9 Fire Detection and Alarm Systems
PART / NUMBER	16.7.2	16.8.1	16.9
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The City of Ottawa, Transit Services, and RTM have been meeting regularly over the last two years to develop a station maintenance area responsibility matrix. This matrix will provide further clarity to the PA in defining the responsibilities of the parties with respect to maintenance of the various station areas. These responsibilities are being allocated using the project agreement as a base, but also considering various practicalities and efficiencies of operations based on the multi-modal nature of several stations and the maintenance interfaces between Transit Services and RTM. The station maintenance area responsibility matrix is attached to this plan as Appendix F.	Elevator and escalator maintenance will consist of a series of quarterly, semi-annual, and annual inspection, testing, and servicing routines as detailed in Appendix G	The following table lists the expected maintenance intervals for the fire protection systems, but is subject to code and regulatory compliance review by the fire protection systems maintenance subcontractor…
MONITORING PRIORITY (1-3, 1 HIGHEST)	3	3	1
MONITORING APPROACH	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance
FREQUENCY	Every 2 years	Every 2 years	Annually
STARTING DATE	First year of operation	First year of operation	First year of operation
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA	X	X	X

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE	OTHER EQUIPMENT/ INFRASTRUCTURE
CITY REGULATORY DOCUMENT	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *
CITY REGULATION SECTION	16.10 Structures Maintenance	16.12 Winter Maintenance Operations	
PART / NUMBER	16.10	16.12	
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	The Confederation Line structures to be maintained by RTM are detailed in the Maintenance Responsibility Table in Schedule 15-3 of the PA and include designated: •Bridges, overpasses and underpasses; •Culverts, retaining walls, noise barriers; •Structural elements of tunnels and tunnel portals	With Ottawa's severe winter climate, special maintenance operations will be required to ensure continued service and PA compliance during the winter months. These operations will include the provision of seasonal staff, snow and ice clearing equipment, snow clearing subcontracts, and ongoing coordination with Transit Services. Prior to the onset of winter, all snow and ice clearing equipment will be serviced and tested, including: •Switch heaters and sensors; •Heated platforms at stations; •Heated slab at the east portal; •Heat tracing of various drainage elements at stations and at tunnel portals; •Snow clearing machinery and equipment ; •MSF Shop Air Curtains;	* Note that winter preparation plan is not available as of this date; needs to be verified versus 16.12
MONITORING PRIORITY (1-3, 1 HIGHEST)	1	2	
MONITORING APPROACH	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance	
FREQUENCY	Annually	Annually	
STARTING DATE	First year of operation	2019 (prior to winter)	
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA	X	X	

Note: '*' indicates document not available or to be updated

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REGULATORY AREA	OTHER EQUIPMENT/ INFRASTRUCTURE		
CITY REGULATORY DOCUMENT	MAINTENANCE AND REHABILITATION PLAN. RTM-18-0-0000-MPL-0005 *		
CITY REGULATION SECTION	16.13.1 MSF Security		
PART / NUMBER	16.13.1		
CITY REGULATION REQUIREMENT SUMMARY / EXCERPT	RTM is responsible for security of the MSF which, in accordance with the PA, encompasses the maintenance, operation and storage facility for the Vehicles and System and includes the Maintenance Building, Operations Crew Facility, Storage Yard and Vehicle Storage.		
MONITORING PRIORITY (1-3, 1 HIGHEST)	2		
MONITORING APPROACH	1) Request records of inspections and preventive maintenance actions taken, including date etc. to assess compliance		
FREQUENCY	Every 2 years		
STARTING DATE	2020		
FIELD REVIEW			
INTERVIEWS / MEETINGS			
DOCUMENTS/ DATA	X		

Note: '*' indicates document not available or to be updated **Sheet 38 of 38**

ANNEX E

Regulatory Documents Provided to Compliance Officer

The following table shows the City Regulatory documents provided to the Compliance Officer. These Regulatory documents form the basis for the draft work plan.

OLRT REGULATORY DOCUMENTS RECEIVED BY COMPLIANCE OFFICER – AUG 15, 2018

DOCUMENT NAME	DOCUMENT NUMBER	REVISION DATE
HOURS OF SERVICE	OTRC-S102-00-SOP	August 23, 2017
RULE AND SAFETY COMPLIANCE PROGRAM	N/A	June 15, 2018
4.2.1.1 WORKING ON THE CONFEDERATION LINE PROCEDURES	OLR-05-0-0000-RGL-1040211	April 8, 2016
4.2.2.4.5 LRV DOOR FAULT PROCEDURES	OLR-05-0-0000-RGL-104022405	April 18, 2017
4.2.2.4.23 DRIVER VIGILANCE SYSTEM ACTIVATIONS	OLR-05-0-0000-RGL-104022423	November 21, 2016
4.2.2.4.9 TRACK OBSTRUCTIONS	OLR-05-0-0000-RGL-104022409	November 14, 2016
4.2.2.4.24 GUIDEWAY INTRUSION PROCEDURES	OLR-05-0-0000-RGL-104022424	April 17, 2017
INTEGRATED HAZARD LOG (RISK REGISTER)	N/A	July 1, 2018
INITIAL MAINTENANCE AND REHABILITATION PLAN	RTM-18-0-0000-MPL-0005	August 26, 2016
4.6.1 TRACK SAFETY AND INSPECTION RULES	OLR-05-0-0000-RGL-104061000	April 17, 2017
ELECTRIC LIGHT RAIL OPERATING RULES	OTRC-S100-00-RUL	September 6, 2017
4.7 LRV SAFETY AND INSPECTION RULES	OLR-05-0-0000-RGL-104070000	June 29, 2017
RESPONDING TO TRESPASSERS ON THE CONFEDERATION LINE	OTRC-S200-33-WI	January 21, 2018
SAFETY MANAGEMENT SYSTEM	OCT-S230-03-PROG	April 21, 2017
SECURITY MANAGEMENT SYSTEM	OCT-S230-04-PROG	January 31, 2018
ELECTRIC RAIL CONTROLLER ROLES AND RESPONSIBILITIES	N/A	May 2, 2018
4.2.2.4.6 VEHICLE BRAKE SYSTEM FAILURES	OLR-05-0-0000-RGL-104022406	December 19, 2017
RULES DEVIATION PROCEDURE	OTRC-S200-20-WI	September 25, 2017
RESTRICTED AREA ACCESS CONTROL	OTRC-S200-19-WI	September 25, 2017
OFF-GUIDEWAY PERMITS	OTRC-S200-14-WI	September 25, 2017
4.2.2.4.3 LRV FAULTS AND VEHICLE MINIMUM OPERATING STANDARD	OLR-05-0-0000-RGL-104022403	July 15, 2016
EMERGENCY PROCEDURES (19 WORK INSTRUCTIONS)	Various	Various
SCHEDULE 15-3: MAINTENANCE AND REHABILITATION REQUIREMENTS	TOR01: 4757580: V32	N/A
SCHEDULE 15-3: APPENDIX B ASSET PRESERVATION	TOR01: 4757580: V32	N/A
SCHEDULE 15-4: REGULATORY STANDARDS	TOR01: 4931655: V3	N/A
SCHEDULE 15: APPENDIX A - STATIONS FUNCTIONAL PROGRAM	OTT01-5456565-V2	N/A
SCHEDULE 15: APPENDIX B - STATION ROOM DATA SHEETS	OTT01-5456575-V2	N/A
SCHEDULE 17: ENVIRONMENTAL OBLIGATIONS	TOR01: 4838637: V13	N/A
DELEGATION OF AUTHORITY - DOA	N/A	October 1, 2011