Metrolinx System Review Panel (SRP) Terms of Reference (ToR)

MX-SEA-TOR-001

Revision 01
April 2025

Authorization

Prepared by:

Digitally signed by Amanda Floyd
Date: 2025.04.08 14:36:19 -04'00'

Amanda Floyd
Senior Manager, Systems Engineering Assurance and SRP Chair

Reviewed by:

Calin Albisoru
Digitally signed by Calin Albisoru
Date: 2025.04.09 14:56:22 -04'00'

Calin Albisoru
Director, Systems Engineering Assurance

Reviewed by:

Chun Ho Lau
Digitally signed by Chun Ho Lau
Date: 2025.04.09 15:40:59 -04'00'

Ho Lau
VP, Engineering Management Services

Approved by:

Fay Pittman
Fay Pittman
2025.04.11 11:59:05 -04'00'

Fay Pittman
Chief Engineer

Revision	Purpose of Submittal	Date (DD/MM/YYYY)	Comments
00	Approved	02/06/2023	This is the first edition of MX-SEA-TOR-001
01	Approved	15/04/2025	Updated to reflect lessons learned and current practice

Contents

Appendices

Tables

Documents

TABLE 0-1 SUPPORTING DOCUMENTS

Reference*	Document Title	Relation
CSA R114:22	Canadian Method for Risk Evaluation and Assessment for Railway Systems	Canadian Standard
BS EN 50126-1	Railway Applications. The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) Part 1: Generic RAMS Process	International Standard
BS EN 50126-2	Railway Applications. The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) Part 2: Systems Approach to Safety	International Standard
BS EN 50128	Railway applications – Communication, signaling, and processing systems – Software for railway control and protection systems	International Standard
BS EN 50129	Railway applications - Communication, signalling and processing systems - Safety related electronic systems for signalling	International Standard
ISO 15288	Systems and software engineering – System life cycle processes	International Standard
April 5, 2023	Metrolinx Safety Certification Committee Terms of Reference	Related ToR

*Note: latest version shall apply unless otherwise specified contractually.

Acronyms and Abbreviations

TABLE 0-2 Acronyms & Abbreviations

Acronym	Full Name
AIP	Approval in Principle
CMREA	Canadian Method for Risk Evaluation and Assessment
CPG	Capital Projects Group
CTC	Consent to Construct
CTD	Consent to Design
CTO	Consent to Operate
CTRS	Consent to Revenue Service
CTT	Consent to Test
ISA	Independent Safety Assessor
MSCC	Metrolinx Safety Certification Committee
RAM	Reliability, Availability, and Maintainability
RAMS	Reliability, Availability, Maintainability, and Safety
SME	Subject Matter Expert
SRP	System Review Panel
SSRP	System Safety Review Panel
VP	Vice President

1. System Review Panel Terms of Reference

1.1 Preamble

1.1.1 Metrolinx System Review Panels (SRP) are established under the authority of the Metrolinx Safety Certification Committee (MSCC).

1.1.2 The following constitutes the Terms of Reference (ToR) of the Metrolinx System Review Panel(s).

1.1.3 This ToR defines the purpose, composition, and responsibilities of the SRP, as well as define key decision gates, meeting procedural matters, and the requirements for individual panel Mandates. Each SRP establishes a separate Mandate in accordance with Section 1.11 to detail the scope of projects under review and the specific application of these ToR to that scope.

1.1.4 For the purposes of this document, both the Metrolinx System Review Panels and the Project or Program specific Metrolinx System Safety Review Panels are referred to using the acronym "SRP", as these Terms of Reference are applicable to both. Refer to Section 1.10 of this ToR for details on the allocation of projects to different SRPs.

1.2 Purpose

1.2.1 The System Review Panel is a group of technical subject matter experts that reviews project materials on behalf of the MSCC and endorses forward recommended submissions for approval by the MSCC. The MSCC is accountable to ensure that any proposed, significant change to transportation infrastructure or operations, that may affect the safety or protection of the public, personnel, property or the environment is designed and eventually constructed and commissioned to operate safely; and relies on the review and endorsement from the SRP to provide confidence that the assets are acceptable.

Note: SRP is not a design review body; evidence of a completed design review relevant to the project stage is a prerequisite to the review by SRP.

1.2.2 The SRP reviews project materials throughout the project lifecycle progressively at key stages from concept design through to entry into revenue service.

1.2.3 The SRP process shall be applied for any proposed change to Metrolinx transportation network assets that may affect the safety of the public or personnel, or the protection of property or the environment.

Note: The SRP process is applicable for projects that are assessed as CMREA significant and non-significant, though an Independent Safety Assessment and the associated reports are not required for non-significant projects as per the CMREA standard.

1.3 Authority

1.3.1 The SRP ToR are established through the authority of the MSCC. In fulfilling its mandate, the SRP has the authority to:

1) retain advisors, consultants, or experts it deems necessary, including Independent Safety Assessors accredited by the Standards Council of Canada; and

2) seek any additional information or investigation it requires from an officer or employee of Metrolinx, a proponent making a submission for safety certification/safety authorization, or other relevant stakeholders.

1.3.2 The SRP does not have the authority to approve or withhold approval for any decision that rests with the MSCC unless specifically delegated.

1.4 Membership

1.4.1 **Composition** – The SRP shall be comprised of:

1) the SRP Chair (non-voting);

2) the SRP Panel Members - Professional Heads or Heads of Disciplines / Specialists/Subject Matter Experts (SMEs) required based on the system(s) under consideration (refer to 1.4.4 for a list of common discipline representation), one of whom may be appointed Deputy SRP Chair (voting)

Note: The SRP Panel Members will typically appoint a regular Deputy Panel Member(s) who may vote on the SRP Panel Member's behalf when the SRP Panel Member is not available to attend an SRP meeting. SRP Panel Members may also be supported by non-voting SME Reviewers as needed at the discretion of the SRP Panel Member.

3) the SRP Secretary (non-voting).

1.4.2 **Competence** – Members that constitute the SRP shall have the appropriate competence and level of authority required to be able to fulfil their requirements as an SRP Panel Member, notwithstanding the expectation of continuous improvement of their individual and collective knowledge regarding the activities of Metrolinx and the regulatory context in which it operates. As part of the competence requirements, the quorate SRP shall:

1) have a detailed understanding of the *CSA R114:22– Canadian Method for Risk Evaluation and Assessment for Railway Systems* (CMREA) including determination of significance, EN 50126-1, EN 50126-2, and all codes and standards relevant to the System(s) under review (i.e. AREMA, OBC, EN 50128, EN 50129, etc.);

2) have a thorough understanding of the system(s) that are the subject of the SRP;

3) have experience in hazard identification processes;

4) have experience in risk management, including risk evaluation and assessment and specifying safety requirements to mitigate risk;

5) be skilled at integrating information from various domain experts to identify system hazards and interfacing risks;

6) understand risk acceptance criteria and be able to choose the appropriate level of risk to demonstrate the safety of the system(s);

7) basic knowledge and understanding of safety engineering, designing systems to prevent accidents and injuries (safe, reliable, maintainable and fit for purpose); and

8) understand Project Lifecycle and Reliability, Availability, Maintainability and Safety (RAMS).

1.4.3 **Chairs** – The SRP Chair is accountable to the Metrolinx Chief Engineer. The Metrolinx Chief Engineer shall approve the SRP Chair. When approving an SRP Chair, the Metrolinx Chief Engineer shall determine whether the proposed SRP Chair is deemed competent to undertake the role. Any SRP Chair external to Metrolinx Asset Management & Maintenance (AMM) shall have appropriate appointment approval from the Chief Engineer, using the form in Appendix A.1. In the absence of the SRP Chair, an Acting SRP Chair, deemed competent by the Metrolinx Chief Engineer, may be appointed, with approval by the Metrolinx Chief

Engineer. As determined at the discretion of the Metrolinx Chief Engineer, the SRP Chair shall:

1) have experience in interpreting legal and technical requirements and assessing compliance with such requirements;
2) be able to effectively assess other people's competence in system safety management;
3) have an understanding of the system(s) that are the focus of the SRP;
4) be broadly conversant in the subjects to be reviewed by the SRP;
5) be a staff member of Metrolinx; and
6) have experience chairing formal meetings.

1.4.4 **Discipline Representation** – The SRP Panel Members shall adequately cover all technical, operational, maintenance and safety disciplines required to undertake the review activities. Heads of Disciplines may elect to delegate their SRP membership authority to a representative employed by Metrolinx within the discipline department or have appropriate delegated authority. An SRP Panel Member may represent one or more disciplines as long as the competence criteria are met. Such disciplines may include:

1) safety;
2) train control, signals and communications;
3) track;
4) electrification;
5) civil infrastructure;
6) fleet;
7) maintenance;
8) operations;
9) systems engineering;
10) information technology; and
11) security (cyber and physical)

1.5 Meetings and Procedural Matters

1.5.1 **First Panel Meeting Procedure** – At the first meeting, the SRP Panel Members shall collectively agree upon the SRP Mandate (refer to Section 1.11 for details) for approval by the Chief Engineer.

1.5.2 **Frequency of Meetings** – The SRP shall meet at a regular time each month, unless otherwise agreed by the SRP and documented in the SRP Mandate (refer to Section 1.9 for detail). All SRP Panel Members or delegates are expected to be available for each meeting and actively participate when required by the subject matter. A meeting may be held remotely as required to enable all SRP Panel Members to communicate adequately with each other during the meeting. Additional meetings may be scheduled by the SRP as warranted. In the event that the volume of material overwhelms the SRP such that SRP is not able to adequately fulfill the mandate, the SRP Chair shall notify the Chief Engineer.

1.5.3 **Functions of SRP Meetings** –The SRP meeting functions in one of two ways:

1) a regular progress update and review of draft submission material for information and project guidance from the SRP, referred to as "Consultation Meetings"; or

2) a formal submission for decision for the SRP to vote on the endorsement of the submission(s) to the MSCC.

Individual SRP meetings may include multiple functions on one agenda for different projects within the SRP Mandate.

The MSCC may require specific representation at SRP meetings reviewing formal submissions for decision. Any such requirements shall be documented in the SRP Mandate.

1.5.4 **Agenda and Meeting Materials** – A written agenda for each SRP meeting, together with any related materials, shall be distributed to the SRP Panel Members by the SRP Secretary at least five (5) working days in advance of the meeting date. The agenda shall include time for a review of the Action Log from prior meetings.

1.5.5 **Submissions for Review by SRP** – Submissions for review by the SRP must be received by the SRP Secretary a minimum of 10 working days prior to the SRP meeting to allow pre-review and distribution. The SRP Chair may use their discretion to amend the minimum number of days required for the submission of large and/or complex submissions. The SRP Secretary will communicate the amended deadlines to the submitters and the SRP Panel Members. The submission shall consist of:

1) a brief project overview, including what the project is asking from SRP and their recommendation ("CPG Recommendation Report" or "Engineering & Safety Assurance Case" (ESAC);

2) an Independent Safety Assessor (ISA) report for the submission (as applicable in accordance with CMREA);

3) the submission material in accordance with the Project Agreement, or as otherwise specified (i.e. SRP Memorandum for Legacy Projects Deliverables); and

4) any other relevant supporting documentation.

1.5.6 **Quorum** – The presence of four or more SRP Panel Members fulfilling the competence requirements as per 1.4.2, at least one of whom shall be SRP Chair, constitutes quorum for an SRP meeting.

1.5.7 **Consensus and Voting** – To the extent that decisions may be rendered by the SRP, the SRP shall strive to achieve consensus at the meeting of all voting SRP Panel Members. For the purposes of these ToR, consensus includes an attempt to resolve all objections and the identification of conditions to which any agreement would be subject to.

Should a resolution within the SRP meeting not be possible, then dedicated meetings involving the project and appropriate SRP Panel Members may be required, with written submission by the objecting SRP Panel Member(s) of the issue and the rationale for all objections as an input to the dedicated meetings. The conclusion of these sessions shall be referred back to a quorate session of the SRP for consideration.

Any matter for which consensus cannot be achieved, following any necessary dedicated meeting(s), shall be escalated to the disputing SRP Panel Members' VPs. If consensus decision cannot be reached at the VP level, this matter shall be escalated to the Metrolinx VP Engineering Management Systems and the Metrolinx Chief Engineer for final SRP endorsement decision.

As part of this escalation process, in the case where consensus cannot be reached on any safety-related items, the Contracting Authority (CA) Independent Safety Assessor (ISA) may be consulted and requested to produce an ISA opinion note to support the SRP endorsement decision.

The SRP endorsement report to MSCC will address the objections made and include the actual objection. The conclusion documented in the SRP report to MSCC will set out the rationale for the decision, including any remaining concerns and risks.

Any SRP Panel Member with objection(s) to a decision made at an SRP meeting may register their objection at the meeting, then support their objection(s) with a written submission outlining the issue and the rationale for their objection via e-mail to the SRP Secretary. The objection(s) will normally be addressed by the SRP Chair as part of the above activity. Objections will also be periodically reported to MSCC to confirm they have been addressed.

1.5.8 **Minutes and Action Log** – Minutes are only required for SRP meetings reviewing formal submissions for decision to SRP. An Action Log shall be maintained for both formal SRP meetings and SRP consultation meetings. The SRP Secretary shall document the minutes of the meeting, including an Action Log that documents any tasks, items for further review, requests for information, or report-back requirements. No later than five (5) business days after the SRP meeting, the minutes shall be distributed to the SRP Panel Members and the MSCC Secretary.

1.6 Duties and Responsibilities

1.6.1 **General -** The SRP shall:

1) assess and accept evidence which demonstrates the overall operational, environmental, and technical quality of the system(s) on behalf of the MSCC that will allow projects to progress through set endorsement gates during the project (see Section 1.8 for detail)

2) review, evaluate, accept and make recommendations on the system assurance submissions, considering their integration with the wider transportation network (including interfaces between heavy and light rail systems), in order to manage system and safety requirements, processes and risks;

3) provide endorsement of technical decisions that would result in new precedents for Metrolinx or changes to the current program and cost baseline;

4) make decisions within the delegated authority of the SRP as agreed with the MSCC;

5) manage the assurance reviews and endorsements for the portfolio of projects specified within the SRP Mandate, and monitor progress on submissions and actions to completion;

6) provide an escalation route to the MSCC; and

7) be accountable to those submitting to the SRP for objective and impartial conduct; clarity of process, decisions made and actions; and timely response.

1.6.2 **Non-Significant Projects** – If, either as a result of an audit by Metrolinx or a project's internal process, it becomes apparent that a project that had previously been categorised as 'non-Significant' becomes 'Significant', the SRP shall notify the proponent of the change to resubmit the Significance of Change Safety Assessment to the Metrolinx Safety and System Assurance department.

1.6.3 **Reporting Responsibilities** – In advance of a request for certification or approval from the MSCC, the SRP shall:

1) review all safety and system assurance documentation prepared by the proponent or applicant comprising the submission to the MSCC;

2) review all Independent Safety Assessor (ISA) reports accompanying the submission to the MSCC; and

3) make a recommendation to MSCC on certification or approval.

1.6.4 **Review of SRP Mandate** – The SRP shall review and assess the adequacy of the SRP Mandate annually, at a minimum.

1.6.5 **Self-assessment** – An evaluation of the SRP shall be conducted regularly, at a minimum annually, to review its performance for the purpose, among other things, of assessing its effectiveness, whether the panel has fulfilled the responsibilities and duties stated in these ToR, and the timeliness of decisions rendered by the SRP. Results of the SRP self-assessment shall be submitted to the MSCC.

1.6.6 **Inter Panel Reporting** – The SRP Chair shall bring any activities that overlap with the Mandate of any other SRP to the attention of the other SRP and to the Metrolinx VP Engineering Management Systems.

1.7 Duties and Responsibilities of SRP Panel Members

1.7.1 The SRP Chair shall submit regular reports, in accordance with the SRP Mandate, to the MSCC.

1.7.2 In the case that Heads of Disciplines have delegated their SRP membership to an individual outside of their department, the Heads of Disciplines, or delegate, shall be available to attend all SRP meetings and shall be in attendance for all SRP meetings where a formal submission for decision exceeds the authority of a delegated representative.

1.7.3 SRP Panel Members advise on the system and safety assurance approaches and proposed resolution of actions; however, the project is responsible for undertaking all evaluations and assurance activities.

1.7.4 SRP Panel Members, in exercising their powers and performing their duties, shall:

1) act honestly and in good faith with a view to protecting the safety of the public, workers, property and the environment;

2) prepare for, attend, and actively participate in SRP meetings;

3) perform their duties in a manner that public trust in the integrity, objectivity, and ethical conduct of decisions related to safety and decision of Metrolinx is conserved and enhanced;

4) advise the SRP of any perceived or actual conflicts of interest related to an agenda item, and withdraw from discussion of that particular agenda item where appropriate;

5) exercise care, diligence, and professional judgment that would be reasonably expected of an individual in comparable circumstances; and

6) comply with the SRP ToR and applicable SRP Mandate.

1.8 Submission Gate Endorsement

1.8.1 Formal submissions for decision to SRP will typically happen at key stages throughout the project life cycle, though this may vary depending on the stage of the project, and the project's contractual submission terms:

1) **Submission for Approval in Principle (AIP) Gate:** at this gate, SRP reviews assurance evidence based on the 10%/concept design for endorsement prior to the project commencing preliminary design work;

2) **Submission for Consent to Design (CTD) Gate:** at this gate, SRP reviews assurance evidence based on the 30%/preliminary design for endorsement prior to the project commencing detailed design work;

Note: Some contracts call the CTD submission gate "Safety Design Solution" (SDS)

3) **Submission for Consent to Construct (CTC) Gate:** For project delivery models with separate design and construction contracts, CTC will be broken into two phases as described below. For project delivery models with one contract covering design and construction, only "CTC Phase 2" is required, and may be referred to simply as "CTC".

   a. **CTC Phase 1** (Pre-IP Gate 3): at this gate, SRP reviews assurance evidence based on the 100%/IFT design for endorsement prior to awarding any contract to a construction contractor. This gate is not applicable if the design contract also includes construction.

   b. **CTC Phase 2** (Post-IP Gate 3): at this gate, SRP reviews assurance evidence based on the IFC design for endorsement prior to the project any construction work commencing. Projects will typically plan for multiple CTC Phase 2 gates to progress different phased packages of work.

4) **Submission for Consent to Test (CTT) Gate**: at this gate, SRP reviews assurance evidence based on changes to the design during construction as well as test plans for endorsement prior to any site testing (i.e. does not include FAT testing);

5) **Submission for Consent to Operate (CTO) Gate**: the CTO gate is only applicable to projects with a trial operation (also called revenue service demonstration period). At this gate, SRP reviews assurance evidence to confirm the system is acceptable for non-revenue service operation for endorsement prior to any trial operations; and

6) **Submission for Consent to Revenue Service (CTRS) Gate**: at this gate, SRP reviews assurance evidence based on as-built design and testing results, including any trial operation results as applicable, for endorsement prior to any revenue service operations and asset handover.

1.8.2 A separate Handover SRP Submission will be required for projects where asset handover does not align with any of the above gates. SRP endorsement for asset handover is provided to MSCC for information only; MSCC approval is not required for asset handover.

1.9 SRP Panel Member Changes & Additions

1.9.1 Changes and additions to SRP Panel Members voting representatives and delegates are to be made at the discretion of the SRP Chair to establish/maintain a competent panel for the system(s) under review. Voting SRP Panel Member representatives for any SRP endorsement decision are recorded in the SRP endorsement report to MSCC as well as the SRP meeting minutes.

1.9.2 Removals and additions to the required discipline representation composition of the SRP Panel Members must be documented in the SRP Mandate, which is approved by the Chief Engineer (see Section 1.11 for details on SRP Mandates).

1.9.3 Changes and additions to SRP Panel Members and/or representative disciplines shall be documented in monthly report to MSCC for information.

1.10 Establishing a New SRP

1.10.1 **Appointing an SRP Chair**: appointment of any new SRP Chair must be approved by the Chief Engineer. Appendix A.1 provides a template for submission to appoint a new SRP Chair.

1.10.2 **Establishing an Approved Mandate**: every SRP must have an approved SRP Mandate prior to receiving any submission for decision. The SRP Mandate must comply with Section 1.11. All SRP Mandates shall be submitted for acceptance by the AMM Systems Engineering Assurance (SEA) team and for approval by the Chief Engineer.

1.10.3 **Panel Member Representation**: the composition of the new SRP Panel Members shall be selected based on the System Definition documentation for the system(s) under review by the panel, ensuring appropriate SME discipline representation (recorded in the SRP Mandate) with appropriate authority to vote on the decisions brought to the new SRP.

1.11 SRP Mandate

1.11.1 The SRP Mandate shall include, as a minimum:

1) The objective(s) and scope of the SRP;
2) The portfolio of projects under review by the SRP;
3) The authority delegated by the MSCC, including any specific exclusions;
4) The composition of the panel, including details of SRP Panel Member discipline representation, Authority to Work arrangements, and any requirement for MSCC delegated representation;
5) The frequency and timing of the regular SRP meetings;
6) The arrangements for meeting minutes and record keeping;
7) The plan for regular reporting from the SRP Chair to the MSCC;
8) Any specific addendums and agreed variations to the SRP ToR; and
9) Reference to the appropriate SRP meeting minutes for the record of acceptance of the SRP Mandate by the SRP Panel Members.

1.11.2 All SRP Mandates, including revisions, shall be submitted for acceptance by the AMM SEA team and for approval by the Chief Engineer.

1.12 Allocation of Projects to Different SRPs

1.12.1 The SEA team is responsible for the integration and allocation of projects to all SRPs, facilitates the production of SRP Mandates, and consults with projects to confirm the allocation of projects, their boundaries, and interfaces. Allocation of projects to different SRPs will normally consider the profile of the integration risks presented by the themes of Technology, Geography and Operational changes and, where appropriate, the commercial or contractual arrangements.

1.12.2 The SEA team is responsible for managing the register of SRP Mandates and their approval status.

1.12.3 The Director of SEA, or delegate, chairs an SRP referred to as “the MX SRP” below:

1) The MX SRP is the default SRP for all projects should the allocation be disputed or require detailed consideration.

2) Projects that make network-wide alterations to operational practice and/or introduce new technology and working practices for Metrolinx-owned assets will normally be allocated to the MX SRP. This may be at a principle level with specific applications endorsed by project-specific SRPs.

1.12.4 The SEA team must be notified at SRP.Secretary@metrolinx.com of changes to the allocation of projects and may escalate any concerns to the MX SRP should the need arise.

1.12.5 All changes to the allocation of projects, including the establishment of new panels, shall be reported to the Metrolinx Safety Certification Committee.

Appendix A – Supporting Material

A.1 Approval of a Project or Program-specific SSRP Chair by the Chief Engineer

A.1.1 The attached Word document provides a template for nominating an SSRP Chair for approval by the Chief Engineer. Contact SRP.Secretary@metrolinx.com for a form reference number.

SSRP Chair Form Template 2025.docx

A.2 CPG Submission Recommendation Report

A.2.1 The attached Word document provides a template and high-level guidance for project CPG Submission Recommendation Reports to SRP.

CPG Submission Recommendation Report - April 2024.docx

A.3 SRP Report to MSCC (following submission for decision)

A.3.1 The attached Word document provides a template and high-level guidance for SRP Reports to MSCC endorsing forward a project submission for decision, to be customized as needed for projects based on contractual assurance process agreements and the conclusions of the SRP, including any conditions.

SRP Endorsement Report Template.dotx

Appendix B – Guidance on Typical Assurance Themes to Structure the Review by SRP

The following is intended as guidance for SRP Chairs and SRP Panel Members to consider in terms of scope of review and is not intended to replace any contractual requirements for scope of review by SRP. The applicability of these themes, in whole or in part, may vary depending on contractual requirements for SRP scope, where certain themes may be covered by different forums as an input to, or parallel process with, SRP. SRP Chairs and SRP Panel Members are encouraged to consider how these themes will be covered for the project(s)/program(s) under their scope of review, and to outline the arrangements to cover these assurance themes as part of the SRP objectives and scope documented in the SRP Mandate, per Section 1.11.

B.1 System Safety Assurance Theme

B.1.1 This theme includes a review to confirm with the appropriate level for the lifecycle stage and in accordance with the requirements of the specific project's contract:

1) That there is evidence of a coherent integrated engineering and safety compliant design (i.e. ESAC report) being delivered through the whole project lifecycle.
2) That the system definition is appropriate and aligns with the project categorisation.
3) That the scope for the assessment, including systems, operations, and interfaces, has been adequately defined.
4) That all correct parties, stakeholders, and organizations have been involved in the process.
5) That all hazards have been identified by competent teams, controlled, and hazard transfers complete.
6) That Risk Assessments have been completed by competent teams, the correct principles applied and the extent of application sufficient.
7) That all Safety Requirements are clearly defined (unambiguous), controlled, validated, traceable, and closed appropriately with sufficient and traceable evidence.
8) That tests have demonstrated that product matches the specified requirements at each step.
9) That all required certification has been completed, signed, and approved.
10) That all residual issues have been captured and placed into a controlled process for closure.

B.2 Technical Assurance Theme

B.2.1 This theme includes a review to confirm by the appropriate level for the lifecycle stage and in accordance with the requirements of the specific project's contract:

1) That all design work, including implementation of requirements, hardware, software and data have been properly reviewed and approved.
2) That the required functions have been adequately described and criticality levels applied.
3) That the selected products meet the specified requirements and have been accepted for use.

4) That the appropriate safety analyses have been undertaken to assess the safety risk associated with the commissioning and to confirm that it is satisfactory.

5) That sufficient testing (including Factory Acceptance Tests and Integration Testing) has been successfully undertaken to confirm the system will function as required after installation.

6) That safety risk concerned with installation and commissioning is understood, with residual risk under adequate control.

7) That there are no concerns with respect to the competency of personnel undertaking all work, the quality and safety management processes followed, and appropriate record-keeping of the work undertaken.

B.3 Operations and Maintenance Assurance Theme

B.3.1 This theme includes a review to confirm by the appropriate level for the life-cycle stage and in accordance with the requirements of the specific project's contract:

1) That there is sufficient evidence to ensure that the integrated design will meet the transportation system operational performance and maintainability requirements.

2) That all operational arrangements are correctly documented and any temporary working arrangements agreed.

3) That all maintenance arrangements are correctly documented and any temporary working arrangements agreed.

4) That the required spares and/or technical support have been provided, and arrangements for access have been agreed upon.

5) That all training been completed to support operational use.

B.4 RAM Assurance Theme

B.4.1 This theme includes a review to confirm by the appropriate level for the life-cycle stage and in accordance with the requirements of the specific project's contract:

1) That there is sufficient evidence to ensure that the integrated design will meet the system(s) RAM requirements throughout the whole project lifecycle.

2) That tests demonstrate that the selected products meet the specifications and requirements at each step.

3) Has a formal FRACAS process been established, and accountabilities agreed.

B.5 Compatibility Assurance Theme

B.5.1 This theme includes a review to confirm by the appropriate level for the life-cycle stage and in accordance with the requirements of the specific project's contract:

1) That compatibility between the infrastructure(s) and the transportation vehicle(s) has been suitably demonstrated.

2) That compatibility with other transportation network infrastructure(s) has been suitably demonstrated.

3) That all correct stakeholders have been included in the process, including impacted 3rd parties (i.e. other impacted railway operators such as CN, CP, VIA, etc.).

4) That compatibility with other 3rd party equipment/neighbours has been suitably demonstrated.

B.6 Design Management Assurance Theme

B.6.1 This theme includes a review to confirm by the appropriate level for the life-cycle stage and in accordance with the requirements of the specific project's contract:

1) Requirements Management; that the requirements are clearly documented, tracked, traceable, and closed out as completed with agreement from the proponent.

2) Interface Management; that the interfaces are described clearly, with no scope gap for late changes, and managed through design completion and commissioning.

3) Engineering/Design Change Control; that all changes have been correctly managed, approval levels agreed and correctly applied, and change implementation monitored and aligned.

4) Configuration Management; that there are clear accessible records, with version, history, and rationale available to all and defining all changes precisely.

5) Verification & Validation; tests that demonstrate the system matches the requirements and specifications, completed as per plans with sufficient investigation of issues.

- End of Document -