



Metrolinx

Preliminary Railway Level System

Definition: Product Description

MX-SEA-PD-104

Revision 00

Date: April 2023

Preliminary Railway Level System Definition: Product Description

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Amendment Record

Revision	Date (DD/MM/YYYY)	Description of changes

Preface

This is the first edition of the Metrolinx Preliminary Railway Level System Definition Product Description (MX-SEA-PD-104). It forms part of a suite of guidance documents that describe the procedures to be followed to comply with Metrolinx's Reliability, Availability, Maintainability and Safety (RAMS) requirements.

The purpose of this document is to describe the Preliminary Railway Level System Definition documentation that project proponents may need to consider when they are undertaking a technical change to the railway system or modifying a maintenance regime or undertaking an operational change to the railway system.

Suggestions for revision or improvements can be sent to the Metrolinx Systems Engineering Assurance office at Engineering.Assurance@metrolinx.com. The Director of the Systems Engineering Assurance office authorizes the changes. Include a description of the proposed change, background of the application and any other useful rationale or justification. Be sure to include your name, company affiliation (if applicable), e-mail address, and phone number.

April 2023

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Documents

Table 1 Supporting Documents

Document Number	Document Title	Relation
BS EN 50126-1:2017	Railway Applications - The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) (PHASE 1: Adoption of European Standard EN 50126-1:2017)	Parent Standard
MX-SEA-STD-100	RAMS Process Standard	Related Standard
MX-SEA-GDC-104	Preliminary Railway Level System Definition Guidance	Guidance
MX-SEA-TPL-104	Preliminary Railway Level System Definition Template	Template
MX-SEA-PD-105	Preliminary System Definition	Related Product
MX-SEA-PD-106	System Definition	Related Product
TBD	System Safety Plan	Related Product
MX-SEA-PD-119	RAM Plan	Related Product
MXSD-SSA-L1-STD-0001	Railway Risk Assessment Standard	Supporting Standard
MX-SSA-002	Significance Tool: Guidance	Supporting Guidance
ISO 9001:2015	Quality management systems – Requirements	Supporting Standard
MX-SEA-TOR-001	Metrolinx System Review Panel (SRP) Terms of Reference (ToR)	Review Panel ToR
April 5, 2023	Metrolinx Safety Certification Committee (SSC) Terms of Reference (ToR)	Certification Committee ToR

Acronyms and Abbreviations

Table 2 Acronyms and Abbreviations

Abbreviation	Full Name
AFP	Alternative Finance and Procurement
AIP	Approval In Principle
CMREA	Canadian Method for Risk Evaluation and Assessment for Railway Systems
ISA	Independent Safety Assessor
PDD	Process Description Document
PFD	Process Flow Diagram
RACI	Responsible, Accountable, Consulted and Informed
RAM	Reliability, Availability and Maintainability
RAMS	Reliability, Availability, Maintainability and Safety
SCC	Safety Certification Committee
SRP	System Review Panel
ToR	Terms of Reference

Definitions

Table 3 Definitions

Term	Definition	Source
Asset Owner	Groups and individuals that are responsible for asset ownership, asset maintenance, inventory management, document control, asset handover and reliability engineering	MX-ALM-STD-001
Availability	Ability of an item to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided.	BS EN 50126:2017
Maintainability	Ability to be retained in, or restored to, a state to perform as required, under given conditions of use and maintenance.	BS EN 50126:2017
Project Company	<p>The private sector entity which enters into the Project Agreement with Infrastructure Ontario and Lands Corporation and Metrolinx to design, build and where applicable, finance, operate or maintain a Project.</p> <p>The special-purpose entity which has entered into a Project Agreement with the Contracting Authority.</p>	CKH-QMA-FRM-003
Project Management	<p>Appointed by Metrolinx as its representative and is responsible for the delivery of the Project within the prescribed Schedule and budget.</p> <p>Metrolinx employees fulfilling the role of the Project Manager may also be considered the Cost Centre Manager, if this person is also delegated signing authority in accordance with the Metrolinx Corporate Administrative Manual, Administrative Management, Approval Authorization Controls and Designations.</p> <p>It is noted that non-Metrolinx employees fulfilling the role of the Project Manager are not considered Cost Centre Managers. In such cases refer to approved Project Chart of Accounts for the Program for the designated Cost Centre Manager.</p>	CKH-QMA-FRM-003

Reliability	Ability to perform as required, without failure, for a given time interval, under given conditions.	BS EN 50126:2017
Safety	Freedom from unacceptable risk that related to human health or to the environment	BS EN 50126:2017
Subsystem	Part of a system, which is itself a system	BS EN 50126:2017
System	Set of interrelated elements considered in a defined context as a whole and separated from their environment	BS EN 50126:2017

1 Preliminary Railway Level System Definition

1.1 Purpose

- 1.1.1 The Preliminary Railway Level System Definition captures the high-level scope of the planned changes to the railway and identifies all works associated with the defined scope that may involve significant risk under the Canadian Method for Risk Evaluation and Assessment for Railway Systems (CMREA).
- 1.1.2 Each of the individual changes shall require a Preliminary System Definition (ref. MX-SEA-STD-105) which details the change and is used to decide if the change is significant. This railway level document records a summary of all the changes proposed and considers whether they may interact, particularly whether non-significant projects combine into a significant change.
- 1.1.3 This railway level document considers the additionality of the proposed changes to ensure the cumulative change is assessed correctly in the whole railway context, and particularly whether non-significant projects combine into a significant change.
- 1.1.4 It is produced at Phase 1 (Concept) by Metrolinx. The Preliminary Railway Level System Definition may form part of the bid submission for Alternative Finance and Procurement (AFP) design/build contracts. The document is reviewed by both the Metrolinx Independent Safety Assessor (ISA) and the project ISA, as applicable.
- 1.1.5 As this document is produced at an early stage of the project it also records any uncertainties or assumptions and how they may impact on the project.

1.2 Applicability

- 1.2.1 This product is mandatory for any project that undertakes a technical change to the railway system (i.e., introduction of a new subsystem, renewal of an existing subsystem, a modification to an existing subsystem, or introduction of a new or modified maintenance regime) or undertakes an operational change to the railway system.
- 1.2.2 This product is not applicable for established routine maintenance activities including like-for-like replacement of components.

1.3 Supporting Material

- 1.3.1 The Preliminary Railway Level System Definition template is located in MX-SEA-TPL-104.
- 1.3.2 Guidance on completing the Preliminary Railway Level System Definition is located in MX-SEA-GDC-104.

1.4 Products

- 1.4.1 The Preliminary Railway Level System Definition is a product of the System Assurance process. Guidance on this process is available via MX-SEA-STD-100.

1.5 Key Responsibilities

- 1.5.1 The Project Company is responsible for the production of the Preliminary Railway Level System Definition. Preparation of the Preliminary Railway Level System Definition may be delegated, however the Project Company is responsible for its content and quality.
- 1.5.2 The Project Company is the organization that is responsible for the contracted scope of work at the time of development.
- 1.5.3 The System Review Panel (SRP) has delegated authority from the Safety Certification Committee (SCC) and is responsible for endorsing the Preliminary Railway Level System Definition. The System Review Panel ensures that the Preliminary Railway Level System Definition is compliant with the project requirements, applicable legislation, and national, industry, and Metrolinx standards. The SRP may also identify uncertainties, issues, and assumptions that may arise as the project progresses that should be addressed.
- 1.5.4 The Project Management may be performed by Metrolinx or may be contracted, for example in a Design/Build, whereby Metrolinx Project Management would ensure contract provisions for the Preliminary Railway Level System Definition are met and would not develop the Preliminary Railway Level System Definition.
- 1.5.5 Some of the Asset Owner obligations and responsibilities may be transferred through contracting, whereby the contract contains Reliability, Availability, Maintainability and Safety (RAMS) and operating requirements. The Metrolinx Asset Owner would participate in endorsing the Preliminary Railway Level System Definition whereas a contracted party responsible for RAMS would develop the Preliminary Railway Level System Definition as directed by the Project Management.
- 1.5.6 The full Responsible, Accountable, Consulted, and Informed (RACI) information that sets out the interaction between all stakeholders involved in the production and endorsement of the Preliminary Railway Level System Definition is available in MX-SEA-STD-100.

1.6 Competence

- 1.6.1 The Preliminary Railway Level System Definition shall be drafted by a person/people with competence in safety management and a technical understanding of the interactions of the railway system.

1.7 Structure

- 1.7.1 The structure of the Preliminary Railway Level System Definition is described in the Preliminary Railway Level System Definition Guidance document located in MX-SEA-GDC-104.
- 1.7.2 The document requires the following section titles:
 - a) Executive Summary;
 - b) Existing Railway;
 - c) Scope of the Works;

- 1) Project X;
- 2) Project X; and
- d) Significance.

1.8 Contents

- 1.8.1 The contents of the Preliminary Railway Level System Definition are described in the Preliminary Railway Level System Definition Guidance document located in MX-SEA-GDC-104.
- 1.8.2 As a minimum, it shall contain the following:
 - a) A comprehensive summary describing the program goals, the scope and functions of the system(s), the significance decision and justification and major risks and assumptions that need to be addressed in subsequent project phases;
 - b) an overview of the existing railway, including:
 - 1) geographical scope;
 - 2) technology; and
 - 3) key features;
 - c) Scope of Works section for each sub-project in the planned series of changes including consideration of all safety-related changes affecting the same part of the system since the last application of the risk management process;
 - d) each scope of works section shall include details of the significance decision for each proposed sub-project:
 - 1) reference to the appropriate Preliminary System Definition;
 - 2) summary of the change;
 - 3) failure consequence;
 - 4) novelty and complexity;
 - 5) monitoring and reversibility;
 - 6) additionality; and
 - 7) a conclusion summarizing the major risks, assumptions, and mitigations and a clear statement as to whether the change is significant or non-significant under CMREA with justification.
 - e) A significance the conclusions on whether the changes taken together at the program level are significant or non-significant under CMREA and the justification.

1.9 Quality Criteria

- 1.9.1 The Preliminary Railway Level System Definition shall contain sufficient information to effectively assess the significance of the change and record the significance decision, and shall contain sufficient detail to ensure that the Preliminary Railway Level System Definition

clearly shows the overall impact of the changes on the whole railway system, both from individual sub-projects and from the program level (all sub-projects taken together). All projects within scope of the Preliminary Railway Level System Definition shall be listed and included.

- 1.9.2 The quality management system used shall conform to ISO 9001 rules or equivalent rules accepted by the Metrolinx Project Delivery Team and be appropriate for the system under consideration.

1.10 Document Management

- 1.10.1 The Preliminary Railway Level System Definition is produced during Phase 1 (Concept) and relates directly to the System Definition at Phase 2 (System Definition).
- 1.10.2 Where there is more than one proposed project in a wider program of works that affect the overall railway system, the Preliminary Railway Level System Definition shall reference the Preliminary System Definition documents for the different sub-projects, also produced during Phase 1 (Concept).
- 1.10.3 In addition, the Preliminary Railway Level System Definition influences the Railway Level Safety Plan and RAM Plan which are delivered in parallel at Phase 2 (System Definition).
- 1.10.4 Table 4 provides an overview of the Preliminary Railway Level System Definition document phases.

Document	Phase
Preliminary Railway Level System Definition	1 - Concept

TABLE 4: DOCUMENT PHASES