Asset Data and Information Standards

MX-ALM-STD-001

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Metrolinx Asset Data Information Standard

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Preface

This is the first revision to Metrolinx's Asset Data and Information Standards which was originally approved in April of 2019. The original version focused on a subset of Asset Data and Information that Infor was tracking at that point; primarily corridor maintenance assets. This revision corrects some aspects attributed to those asset classes as well as broadens the scope to a much more fulsome perspective. Inventory Management, Document Control and Reliability Engineering were consulted to provide additional standards that weren't included the original version.

This document was developed by The Asset Lifecycle Management Office, Capital Projects Group, Metrolinx.

These standards apply to all Metrolinx-owned assets, regardless of the commercial arrangement for design, build, operate, or maintaining assets. Groups and individuals that are responsible for asset ownership, asset maintenance, inventory management, document control, asset handover and reliability engineering need to implement the standards.

Suggestions for revision or improvements can be sent to the Metrolinx Asset Lifecycle Management Office, Attention: Director of Asset Lifecycle Management. The Director of Asset Lifecycle Management ultimately authorizes the changes. A description of the proposed change shall be included along with information on the background of the application and any other useful rationale or justification. Proposals for revisions or improvements shall also include your name, e-mail address, and phone number.

October 2020

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Documents

TABLE 0-1 REFERENCES

Reference	Title
CKH QMA-FRM-003	Capital Projects Group Terms Glossary
MX-ALM-STD-002	Rail Corridor Asset Information Data Dictionary
MX-ALM-STD-003	Facilities Asset Information Data Dictionary
MX-AM-Policy	Metrolinx Asset Management Policy
RAMS-1	Capital Projects Group FRACAS Process
RAMS-4	Capital Projects Group RCA Process

Acronyms and Abbreviations

TABLE 0-2 ACRONYMS AND ABBREVIATIONS

Acronym and Abbreviation	Full Name
AIS	Asset Information Systems
AM	Asset Management
AMS	Asset Management System
CPG	Capital Projects Group
CME	Corridor Maintenance and Expansion
EDRMS	Enterprise Document and Records Management Solution
EGIS	Enterprise Geographical Information System
EMMS	Enterprise Maintenance Management System
FRACAS	Failure Reporting, Analysis and Corrective Action System
MTBF	Mean Time Between Failure
MTTR	Mean Time To Restore
OEM	Original Equipment Manufacturer
RAMS	Reliability, Availability, Maintainability and Safety
RCA	Root Cause Analysis

Definitions

TABLE 0-3 DEFINITIONS

Term	Definition
Asset Class Teams	Metrolinx business units who have been designated as being accountable for the completeness and accuracy of information about a given class of assets.
Asset Hierarchy	Hierarchical grouping of Metrolinx assets organized within parent-child relationships.
Asset Information	Combined set of data (physical asset data, location and spatial links, work management, performance, condition, and cost data, etc.) and documents (drawings, manuals, etc.) required to support the management of Metrolinx Assets over the whole life cycle. Asset Information is monitored and controlled in Metrolinx Asset Information Systems.
Asset Information Systems (AIS)	The suite of systems used to manage Metrolinx asset information throughout their life cycle, including EMMS, EGIS and EDRMS.
Assets	Any physical or tangible item that has potential or actual value to Metrolinx (excluding intellectual property, inventory to be sold, human resources, and financial instruments), as well as IT systems and software.
Cores	Parts in inventory that can be reused or remanufactured. They have a core value, which may be referred to as a core price or charge and can be returned to a supplier or manufacturer for a credit.
Electronic Document and Records Management System (EDRMS)	This system is used to manage all Metrolinx documents and records, including all asset-related documentation.
Enterprise Geographical Information System (EGIS)	This system is used to geo-locate assets, whether linear (for example, track) or discrete (for example, bus maintenance facilities, HVAC units, and related items).
Enterprise Maintenance Management System (EMMS)	 This system is used to capture the asset registry, hierarchy, classification and meta-data, condition ratings, warranty information, meters, parts used in the maintenance of assets and work history (preventative and corrective). Beyond its function as an enterprise asset registry, other key capabilities include: Preventative Maintenance Work Planning and Scheduling Corrective Work Planning and Scheduling Work Order Estimates and Actuals Materials and Inventory Management
FRACAS	A closed-loop system in which asset failures are formally reported, analysis is performed to the extent that the failure cause is understood, and positive corrective actions are

TABLE 0-3 DEFINITIONS

Term	Definition
	identified, implemented, and validated to prevent further recurrence of the failure.
Line Replaceable Unit (LRU)	An item which is removed and replaced at an operating location in a relatively short time in order to restore the system to an operational ready condition.
MTBF	Mean Time Between Failures, the predicted elapsed time between failures of an asset, during normal system operation.
MTTR	Mean Time To Restore, the average time required to restore a failed component or device. Expressed mathematically, it is the total corrective maintenance time for failures divided by the total number of corrective maintenance actions for failures during a given period of time.
RCA	A systematic approach for identifying and addressing the root cause of asset failures and non-compliance with RAMS targets.
Regular Parts	Parts that are purchased to support repairs and maintenance on assets or in Operations.
Serialized Parts	A physical occurrence of a standard item that is given a unique lifetime serial number. This enables tracking the individual item throughout its lifetime.
Stock	Inventory on hand. Typically stored in controlled rooms and replenished based on min/max or on demand.
Tools	A device that aids in performing maintenance.

For a list of other terms and definitions, please refer to the *Capital Projects Group (CPG) Terms Glossary (CKH-QMA-FRM-003)*.

1. Introduction

1.1 Purpose

- 1.1.1 The purpose of this document is to define standards for Metrolinx Asset Information.
- 1.1.2 As mandated by the Metrolinx Asset Management Policy, "Metrolinx shall be a knowledgeable owner and maintain up-to-date information and data on assets agnostic of insourcing/outsourcing arrangements". Asset Information for all Metrolinx owned assets must adhere to the same standards. Consistency and accuracy in defining, capturing and maintaining asset data and information ensures it can be easily retrieved and utilized for decision-making and reporting purposes across the enterprise, in particular asset reliability analysis and asset investment planning.
- 1.1.3 These standards apply to all Metrolinx-owned assets, regardless of the commercial arrangement for design, build, operate, or maintaining assets.

1.2 Scope

- 1.2.1 The scope of Asset Information to which this standard applies includes:
 - 1) Asset registry information, including:
 - 1. Asset identification and description
 - 2. Asset classification
 - 3. Asset hierarchical groupings
 - 4. Asset condition/performance
 - 5. Asset criticality
 - 6. Asset failure modes by asset class
 - 7. Asset meters
 - 8. Asset warranties
 - 9. Asset parts/bill of materials
 - 10. Asset replacement value
 - 2) Asset maintenance information, including:
 - 1. Work order types
 - 2. Preventative maintenance work orders
 - 3. Corrective maintenance work orders
 - 3) Asset geospatial information
 - 4) Asset documentation attributes

1.3 Asset Information Systems

- 1.3.1 Metrolinx Asset Information Systems are the suite of systems used to manage Metrolinx asset information throughout their life cycle.
- 1.3.2 In accordance with the Metrolinx Asset Management Policy, all Metrolinx Asset data must be captured and maintained in Metrolinx Asset Information Systems.
- 1.3.3 Metrolinx Asset Information Systems include:
 - 1) Enterprise Maintenance Management System (EMMS)
 - 2) Electronic Document and Records Management System (EDRMS)
 - 3) Enterprise Geographical Information System (EGIS)
- 1.3.4 These Asset Information Systems are highly integrated. They enable business users to view asset details, their condition, location, work history and all associated documents in a single source of truth. All data within or that feeds the Asset Information Systems is owned by Metrolinx.

2. Asset Information Governance

2.1 Asset Information Responsibilities

2.1.1 **Asset Lifecycle Management Team** - This team is responsible for the governance of Metrolinx Asset Information. As part of that mandate, this function develops and maintains:

- 1) Asset Data and Information Standards;
- 2) Enhancements to Asset Information Systems, interfacing with the Business Technology team;
- 3) Asset Information Handover Specifications, which can be leveraged for project contracts; and
- 4) Supporting tools and templates.
- 2.1.2 Asset Class Teams Each team is responsible for:
 - 1) Identifying and maintaining required asset-related data and documentation for their asset classes;
 - 2) Validating Asset Information provided as an output from projects or maintenance work;
 - 3) Ensuring Asset Information in Asset Information Systems is complete, accurate, current, and in compliance with these standards; and
 - 4) Ensuring the data dictionary has the latest list of values corresponding to the Asset Information Systems.
- 2.1.3 Engineering Reliability and Performance Team This team is responsible for:
 - Ensuring that process and definitions outlined in the standard are in line with BS EN 50126-1:2017 "Railway applications - The specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS)";

- 2) Maintaining a set of internal standards and processes to ensure a consistent and integrated asset performance management through use of asset data and information;
- 3) Building the consistency around maintenance information provided for all asset classes to allow for efficient RAMS evaluation and analysis of all Metrolinx assets; and
- 4) Validating that the standard has all the fields and capabilities to house RAMS-related information and data for all Metrolinx assets.

2.2 Requests for Revisions and Improvement

- 2.2.1 Request for revisions and improvement to the Standards provided in this document by Design Consultants, Contractors and any Customers shall be submitted in writing to the Metrolinx Asset Lifecycle Management team for review and consideration.
- 2.2.2 Revisions and improvements include: new asset classes/categories; changes to the asset hierarchy; new document content types; and changes to geo-spatial data structure and standards.

3. Asset Registry Information Standards

3.1 Asset Definition Standard

- 3.1.1 Metrolinx defines an asset to be
 - 1) A physical or tangible item that has potential or actual value to Metrolinx (excluding intellectual property, human resources, and financial instruments), including IT systems and software.
 - 2) AND one or more of the following are true
 - Asset requires a maintenance plan approved for its care
 - Asset requires tracking for reliability and performance benchmarking
 - Asset requires tracking by regulation or legislation, or legal/contractual or licensing requirements.
- 3.1.2 An Asset record shall be created and maintained in Metrolinx Asset Information Systems if it is either owned, operated, or maintained by Metrolinx.
- 3.1.3 An Asset shall be defined at the line replaceable unit (LRU) or at a level deemed appropriate by Asset Class Team.

3.2 Asset Hierarchy and Nomenclature Standards

- 3.2.1 All Metrolinx Assets and their hierarchical asset structure groupings shall be stored in Metrolinx's EMMS in accordance with these standards.
- 3.2.2 Compliance to Metrolinx Asset Hierarchy and Nomenclature standards is critical to ensure Asset Information across all Metrolinx asset classes are defined, captured and maintained with consistency.
- 3.2.3 The purpose of the Asset Hierarchy is to record assets into logical and functional groupings and sub-groupings.

3.2.4 The Metrolinx Asset Hierarchy consists of two types (1) the Functional Asset Hierarchy and (2) the Locational Asset Hierarchy.

3.3 Functional Asset Hierarchy

- 3.3.1 The Functional Asset Hierarchy defines the functional parent-child relationship from Systems to Positions to Assets.
- 3.3.2 The Functional Asset Hierarchy is used to help identify similar assets, to help segregate ownership and accountability for assets, and to roll up the cost of work orders performed against assets.
- 3.3.3 All Metrolinx Assets shall be incorporated into the Functional Asset Hierarchy (no orphan asset records).
- 3.3.4 Inter-relationships between Systems, Positions, Assets

Equipment Type	Code	Description and Standards
Systems	S	Description: Systems represent a logical grouping of assets, made up of one or more physical asset(s).
		Standards:
		Asset Systems:
		Can have one or more Asset Positions as children
		Can have one or more Asset Systems as children
		 Can have only one parent Asset System, or may be the top of the hierarchy (that is, have no parents)
Positions	Р	Description: Positions represent a logical asset. They are used to capture and retain asset history at a fixed location in the hierarchy, so even if a physical asset is moved or swapped out, the performance and cost history remains.
		Standards:
		Asset Positions:
		Can roll up to only one Asset System
		Can have only one physical asset as a child
Assets	A	Description: Assets are the physical components or equipment that meet the Asset Definition Standard in Section 2.1
		Standards:
		• Top level Assets can have any number of children level Assets.
		 The appropriate level of detail to which a parent physical asset should be broken down is specified in the Data Dictionary for each asset class.
		Assets can have a maximum of one parent Position

TABLE 3-1 INTER-RELATIONSHIPS BETWEEN SYSTEMS, POSITIONS, AND ASSETS

FIGURE 3-1 FUNCTIONAL ASSET HIERARCHY ILLUSTRATION



3.3.5 Functional Hierarchy Structures are defined in the Metrolinx Asset Information Data Dictionary (See Section 8).

3.4 Location Hierarchy

- 3.4.1 The Location Hierarchy defines the hierarchical location of a given Asset so that maintainers, owners, contractors can find assets in the field and cost rollup can be applied in an alternate way to the functional hierarchy.
- 3.4.2 The Location Hierarchy is one of the methods used to identify the geographical and physical location of Assets within the asset registry, independent of the functional hierarchy, GIS coordinates, mile markers and other means.
- 3.4.3 Assets may be assigned to a Location Hierarchy in addition to the Functional Asset Hierarchy.
- 3.4.4 All Assets in the Location Hierarchy shall be defined according the structure, conventions and master code sets contained in the Metrolinx Asset Information Data Dictionary (See Section 8). Locations are defined by Metrolinx.
- 3.4.5 Location Hierarchy Structures are defined in the Metrolinx Asset Information Data Dictionary (See Section 8).

3.5 Asset Classification

3.5.1 All Assets shall be assigned an Asset Class, and where required an Asset Category. The Asset Class Teams (e.g. Signals and Communications, Customer Stations) manage a set of Asset Classes.

- 1) Asset Class are unique groupings of Assets where common life cycle decisions and activities are acted upon. All equipment within the same Asset Class share the same failure modes. The Asset Class informs definition of predictive and proactive tasks that are subsequently monitored, controlled and improved upon using the Enterprise Maintenance Management System.
- 2) Asset Category are subsets of an Asset Class that share the same predictive and proactive maintenance tasks and provide further differentiation within an Asset Class to enable more refined analysis of historic failure data.
- 3.5.2 The standard list of asset classes and their relevant categories are defined in the Metrolinx Asset Information Data Dictionary (See Section 8).

3.6 Asset Tagging

- 3.6.1 Assets in the field shall be identified by a physical barcode tags where required by the Asset Class Team to identify and locate assets in the field.
- 3.6.2 Asset Barcodes shall follow the following Barcode Naming Convention

[BU] - [ASSET ID]

Where

[BU] is the code corresponding to the business unit responsible for the Asset.

[ASSET ID] corresponds to the INFOR Generated Unique Asset ID.



- 3.6.3 The following physical properties shall be complied with for the Asset Tags:
 - 1) Apply the most appropriate tag material, examples include:

<u>Foiled Asset Labels</u>: Made from 100% anodized aluminum this makes the labels suitable for all textures of surfaces. Tags have a matte surface that cuts down on glare and enhances fast barcode scan rates. Suitable for laptops and certain types of machinery.

<u>Premium Polyester Asset Labels</u>: Can be safely used on fixtures, furniture, equipment, and even computers. For theft resistant options, the Tamper-Evident Polyester Asset Labels or the Destructible Vinyl Asset Labels is preferred.

<u>Metalphoto aluminum Asset Tags</u>: are the most durable tags, built to withstand impact, abrasion, UV light, heat, and chemicals. Suitable for machinery placed in harsh environments.

2) Asset Tag Dimensions - a common asset label dimensions in the field are 0.75" x 1.5" - however an Asset Class Team may decide on alternative dimensions to better fit their purpose.

3.7 Asset Registry Data

- 3.7.1 All Asset records shall have the following mandatory descriptive data elements recorded against them:
 - 1) Asset Status indicates whether the Asset is for example 'In Service' or 'Not In Service'
 - 2) Asset ID unique ID generated by the EMMS.
 - 3) Operational Status Indicates whether the Asset is for example 'Installed' or 'Decommissioned'.
 - 4) Manufacturer stores the manufacturer name of the Asset. Manufacturer names are standardized as a list of values and are defined in the Metrolinx Asset Information Data Dictionary (See Section 8).
 - 5) Model Stores the model name of the Asset, in the event there is no model name report as Not Available.
 - 6) Serial Number Stores the serial number of the asset.
 - 7) Commission Date Indicates date the asset was commissioned or put into service.
 - 8) Expected Service Life Indicates the anticipated life of the asset in years.
 - 9) Description Naming conventions for descriptions are managed by the Asset Class Team.
 - 10) Replacement Value and Year of Replacement Value Indicates the cost of replacing an existing asset with another asset having equivalent utility using current costs, standards and specifications for material, labour, engineering, installation and overhead. In most situations, it represents the cost of constructing or acquiring an asset that delivers the same utility or capacity (i.e., incorporates new technology), expressed in current dollars. The estimate shall be at minimum a Class Level 4 estimate based on AACE (Associated for the Advancement of Cost Engineering) International Guidelines.
- 3.7.2 All mandatory descriptive data element values shall comply with the code sets and values defined in the Metrolinx Asset Information Data Dictionary (See Section 8).

3.8 Asset Condition Ratings

- 3.8.1 Assets shall be assigned a standardized condition rating quantitatively on a five (5) point scale where required by the Asset Class Team (where a rating of 5 represents very good, similarly a rating of 1 represents a very poor condition).
- 3.8.2 In the absence of a quantitative condition rating table, the following qualitative assessment shall be assigned to the asset.

Rating	Definition
Very Good (Fit for the future)	As new condition. Operable and well-maintained. Asset likely to perform adequately with routine maintenance. No additional work required.
Good (Adequate for now)	Acceptable physical condition, showing minor wear. Deterioration has minimal impact in asset performance. Only minor maintenance work required.

TABLE 3-2 STANDARD CONDITION RATING TABLE

Fair (Requires attention)	Asset showing some wear. Minor components or isolated section of the asset need replacement or repair.
Poor (At risk)	Asset show considerable wear and deterioration. Minor and major components need repair or replacement.
Very Poor (Unfit for sustained service)	Asset unserviceable. Asset not fit for use.

3.9 Asset Criticality

- 3.9.1 Criticality is a measure of the importance of an Asset to the delivery of Metrolinx's strategic objectives. It is the consequence/impact resulting from a functional failure of an Asset.
- 3.9.2 Assets shall be assigned a criticality rating on a five-point (5) scale, where a rating of five corresponds to highest impact and a rating of one being the lowest impact.
- 3.9.3 Criticality ratings are based on the Metrolinx Risk Scoring Criteria Impact table. For more info on criteria refer to the most updated Enterprise Risk Management framework. Should an Asset have multiple impact ratings (Ex. safety and operations); the most conservative (highest value) shall be used.

3.10 Asset Performance

- 3.10.1 All assets with a defined or assigned RAMS target(s) such as MTBF, MTTR and asset availability shall have this information captured in Asset Information Systems, ready to be used in asset performance monitoring and management processes such as FRACAS and RCA.
- 3.10.2 RAMS target(s) can be defined as part of the contractual obligations of an OEM/Supplier or can be assigned by the Asset Class Team and/or Engineering Reliability and Performance team as a performance goal in order to attain compliance with business objectives and customer level of service requirements.
- 3.10.3 RAMS target information shall also capture the source of the requirement if applicable, such as the contract number for contractually binding requirements.

3.11 Linear Asset

- 3.11.1 Linear Asset Classes shall be managed as linear assets including rail, ballast and ties.
- 3.11.2 All linear assets must contain from mileage to mileage (in an ascending order), and length data points for the segmentation.
- 3.11.3 Every linear asset shall be segmented as required by the Asset Class Team (mile-signal, signal-signal, or signal-mile etc.)

3.12 Custom Asset Fields

3.12.1 All asset classes have custom fields associated to the asset and shall be populated with the mandatory information applicable to the class.

3.12.2 All mandatory custom field data element values shall comply with the code sets and values defined in the Metrolinx Asset Information Data Dictionary (See Section 8).

3.13 Asset Meters

- 3.13.1 Meters are used to track asset utilization and predicting degradation of an asset over its lifecycle. Meter information shall be used to trigger preventative maintenance and updates to its condition rating. Examples of meters include odometer for a bus, fuel consumption for a generator, amperage reading for a switch, and runtime for a generator.
- 3.13.2 All Assets that have sensors or measuring devices shall either have a meter record associated with it or be integrated with the Asset Information Systems. Metrolinx shall own all data related to asset meters.
- 3.13.3 The Meters shall include the following attributes:
 - 1) Meter Unit ID Stores the ID associated to the Meter
 - 2) Organization
 - 3) Meter Reading Reading on the Meter
 - 4) UOM (Meter) Unit of Measure the Meter records
 - 5) Type of Meter

3.14 Asset Warranties and Attributes

- 3.14.1 All Assets and Systems that have warranty coverage in effect shall have a warranty record associated with it.
- 3.14.2 All Assets and Systems that have warranty coverage shall have the following mandatory data elements
 - 1) Date of Warranty Expiration
 - 2) Warranty Provider

4. Asset Maintenance Information Standards

4.1 Work Orders

- 4.1.1 Work Orders (WO) deal with authorization of maintenance work on assets that need to be assigned to a technician for completion.
- 4.1.2 Data collected through WOs enable reliability analysis and whole life cost analysis.
- 4.1.3 Work Orders fall into one of the following three types of maintenance:
 - 1) <u>Level 1 Maintenance (L1)</u> Maintenance that is planned and is aimed at preserving the condition and availability of an Asset including preventative maintenance activities and predictive maintenance activities.
 - 2) <u>Level 2 Maintenance (L2)</u> Maintenance that is reactive and carried out after fault/defect detection to effect restoration to repair/replace a failed Asset and to

restore the Asset to normal operating condition at a minimum in accordance with the applicable Maintenance Standards and the original equipment manufacturer recommendations.

- 3) <u>Level 3 Maintenance (L3)</u> The planned replacement or renewal of an Asset as identified in an Asset Management Plan.
- 4.1.4 Work orders shall be used to capture information for all levels of maintenance (L1, L2, L3).
- 4.1.5 Work orders shall be assigned to an Asset or System.
- 4.1.6 Work orders shall capture the Asset or System downtime if applicable: date/time the Asset or System equipment became unavailable, and the date/time the equipment was available to be returned to service.
- 4.1.7 All corrective and emergency work orders shall record the event ID from the Network Operations Control Centre linking the asset failure to operational impact
- 4.1.8 Work order activities shall record the actual labour hours, material costs, and technician trade tools.
- 4.1.9 All State of Good Repair work completed shall be captured in a work order.
- 4.1.10 Work Order Types help categorize a WO to enable reporting on the kind of work being performed. Every WO Type shall belong to one of the three levels of maintenance as illustrated in figure below.

FIGURE 4-1 WORK ORDER TYPES



- 4.1.11 WO's shall capture the following mandatory data elements:
 - 1) Work Order Description General Description of the Work Order
 - 2) Asset Identifies the Asset ID
 - 3) Organization Business Unit Responsible for the WO
 - 4) Date Created Date and time the WO was created
 - 5) Date Started Date and time the WO was started by the technician
 - 6) Date Completed Date and time the WO was completed by the technician
 - 7) Department Asset Class team Responsible for the WO
 - 8) WO Type

Туре	Description	Definition
COR	Corrective Maintenance	Addresses broken or malfunctioning assets that do not need to be addressed immediately and is not considered an emergency.
EM	Emergency	Involves work that is required to respond to an emergency.
PL	Planned WO	Planned work to address refurbishments, replacements or modifications.
PM	Preventive Maintenance	Involves work that is a part of a planned schedule. Examples include inspection and testing. See section 3.2 PM Schedules.
ST	Standing WO	Includes work that is used to document regular activities and is not tied to any specific asset. These Work Orders can remain open for a long period of time, allowing users to book hours to the same Work Order for day-to- day tasks. Examples include cleaning, salting and snow removal.

TABLE 4-1 WORK ORDER TYPES

9) WO Priority - defines the urgency with which a WO should be treated. It helps to prioritize during scheduling.

Priority	Description	Applicability
P1	1 - Urgent	The highest priority, indicating that the WO should be prioritized first in the queue
P2	2 - High	Indicates that there is a high degree of urgency for the WO and it should take precedence over standard WOs.
Р3	3 - Medium	Default priority for a corrective WO
P4	4 - Low	Indicates that the issue is not urgent and should be dealt with after higher priority items.
P5	5 - Routine	Used for PM Work Order, planned Work Order and standing Work Order

TABLE 4-2 WORK ORDER PRIORITY

10) Work Order Status - defines the status of a work order.

User Code	Description
Assigned	The WO has been assigned to a technician by a supervisor.
Cancelled	The WO is cancelled
Closed	The work order has been completed and validated as closed by the Supervisor and maintenance planner.
Finished by Supervisor	Supervisor has completed review of the work order for data quality and accuracy.
In Progress	The technician has accepted the assigned WO and is in progress of working on it
On Hold	The WO is suspended. WOs in this status will require an On Hold Reason to specify why activity is paused.
Return to Technician	The supervisor has found a problem with the WO and is returning it to the technician for correction.
Work Completed	The technician has completed the WO and is submitting to the supervisor for review.

TABLE 4-3 WORK ORDER STATUS CODES

4.2 Preventative Maintenance Schedules

- 4.2.1 Preventative Maintenance (PM) Schedules shall be used to define preventative maintenance and/or inspections. A PM schedule shall generate periodic work orders to specified frequencies or meter readings. Assets or Systems shall be associated to the PM schedule to identify which assets the PM schedule shall apply.
- 4.2.2 All preventative maintenance schedules shall be created in the EMMS and shall include the following:
 - 1) PM Schedule [discipline]-[frequency code]-[tailored identification]
 - 2) Description (Free text)
 - 3) Schedule Type (Fixed, Variable, or Duplicate)

Where

Fixed: Each work order is generated on a set date, regardless of the completion date of previous work order. The work order cannot be generated until the previous one is completed.

Duplicate: Work orders generated based on the pre-defined sequence regardless of the status of the preceding work order. Multiple work orders can be open at the same time.

Variable: Each work order is generated depending on the completion date of the previous work order. The work order cannot be generated until the previous one has been completed.

- 4) Organization Responsible
- 5) Duration and Frequency
- 6) Release Window percentage of time elapsed between cycles that the next WO for that PM gets released.

- 7) Procedure Reference reference the task plan/work plan procedure to be utilized.
- 8) Reasoning/Justification documents why the task was created (predictive to prevent failure or regulatory requirement)

4.3 Corrective and Emergency Work Order Closing Codes

- 4.3.1 Every Corrective or Emergency work order shall be assigned the appropriate closing codes to capture the information to inform reliability analysis.
- 4.3.2 All Asset Classes shall have a set of defined closing codes that are specific to the Asset Class.
- 4.3.3 All closing codes shall be created in the EMMS using the code sets and values defined in the Metrolinx Asset Information Data Dictionary (see Section 8), including the following:
 - 1) Problem Code a unique identifier for the way the Physical Equipment fails to perform its intended function. For example: "leaking", "seized", or "excessive vibration"
 - 2) Failing Code a unique identifier that identifies the way the function failure occurred (failure mode).

Note: problem codes are formally identified and documented using an equipment failure mode and effect analysis.

- 3) Cause Code identifies the general reason and root cause of the asset failure, such as "Insufficient Lubrication", "operator error" or "maintenance issue."
- 4) Action Code sometimes called "remedy codes," identifies the action that the maintenance technician took to rectify the equipment issue.

5. Inventory Management - Information Standard

5.1 Parts

- 5.1.1 Metrolinx defines a Part (or "SKU- Stock Keeping Unit") to be a material that does not meet the criteria for being an Asset but is required to maintain Assets.
- 5.1.2 Parts descriptions are user definable fields which provide details in managing the inventory.
- 5.1.3 The following naming convention (in accordance with UNSPSC United Nations standard products and service code) shall be used when describing the SKU:

FIGURE 5-1 METROLINX SKU DESCRIPTION NAMING CONVENTION



- 5.1.4 All Parts shall have the following mandatory data elements recorded against them:
 - 1) Part Number Metrolinx generated part number for the part
 - 2) Part Description Description of Part
 - 3) Part Class indicates whether the part is to be included in Item Master to be sent to Oracle EBS, or it is a part that is purchased as needed (e.g. Non-Inventory)
 - 4) Part Category indicates which category the part belongs to (Core, Serialized, Regular, or Tool)
 - 5) UOM Unit of Measure for the parts quantity
 - 6) Accounting Treatment: Indicates whether the part is expensed or inventory
 - 7) Tracking Method indicates the method used to track the part (Stock, Non-Stock, Expense)

5.2 Parts Tracked as Assets/Core/Serialized

- 5.2.1 A "REGULAR" part may be tracked as an Asset and included in the Functional Asset Hierarchy.
- 5.2.2 When item has a part category of "CORE" or "SERIALIZED", selecting Track by Core/Serialized indicates the items are not Assets and as such will not belong in the Functional Asset Hierarchy.
- 5.2.3 In order to receive and identify parts tracked as asset/core/serialized that are in stores, an asset record, core record, or serialized record shall first be created identifying the Part # and Bin # the asset is stored in.

5.3 Stores

- 5.3.1 Stores are storage where inventory is stored for issuing to various maintenance work requirements and all parts shall be assigned to a store.
- 5.3.2 Store Nomenclature for Fixed Stores shall be identified as follows: [Org Structure]-[Store Name]
- 5.3.3 All Stores at minimum shall have the following mandatory recorded data elements:

- 1) Store Code Unique identifier of the store
- 2) Description Gives the description of the store
- 3) Store Org Organisation or business unit to which the store belongs
- 4) Class List of Values used to specify a class to which the store belongs (Fixed, Roaming, and Third Party etc.)
- 5) Location List of values used to specify the location of the store within the organization/facility
- 6) Auto Requisition Status Based on stocking policies when generating a requisition to replenish stocked items the requisition will go through a technical approval. This will allow for adjustments made to the requisition prior to sending to Oracle EBS.
- 7) Delivery Location list of values used to identify location of delivery for the parts.

5.4 Bins

- 5.4.1 Bins are receptacles in a store for storing parts in a systematic way.
- 5.4.2 Bins shall be assigned to each store as required
- 5.4.3 Bin Unique Code Nomenclature shall be composed of the following: [Shelf No.][AISLE No.][Shelf Row No.][Shelf Column No.]
- 5.4.4 All Bins shall have the following data elements recorded against them
 - 1) Bin unique code
 - 2) Description General description
 - 3) Out of Service specify if the bin is out of service

5.5 Parts Stocks

- 5.5.1 All Stocks at minimum shall have the following mandatory data elements recorded against them
 - 1) Store Identify the store the part is to be stocked in
 - 2) Bin Identify the Bin where the item can be physically found in the Store
 - 3) Lot Specify the Lot ID for items tracked by either lots or as Serialized Parts. All other items use the default *

5.6 Supplier Parts Catalogues

- 5.6.1 All parts catalogues at minimum shall have the following mandatory data elements recorded against them
 - 1) Supplier Name of the supplier that carried the part
 - 2) Supplier Part part number that supplier uses
 - 3) Gross Price indicates the gross price of the part from the list price
 - 4) UOP Unit of Purchase, supplier's unit of measure.

5.7 Parts Manufacturers

- 5.7.1 All Parts Manufacturers at minimum shall have the following mandatory data elements recorded against them
 - 1) Manufacturer identify manufacturer of the part
 - 2) Manufacturer part part number that manufacturer uses

5.8 Parts Prices

- 5.8.1 All Parts Prices at minimum shall have the following mandatory data elements recorded against them
 - 1) Organization specify the organization responsible for the part
 - 2) Price Type by default this is set to average purchase price of the part, for Dirty Cores the type must be standard price
 - 3) Price the actual price either standard or average

5.9 Parts Substitutes

- 5.9.1 All Parts Substitutes at minimum shall have the following mandatory data elements recorded against them
 - 1) Substitute Part specify the item that can act as part of the substitute
 - 2) Fully Compatible specify whether the item selected is fully compatible

6. Asset Geographical Information Standards

6.1.1 All assets have corresponding Geospatial Data which shall adhere to the following minimum standards:

Standard Type	Standard
Data Format	Geospatial information of Metrolinx Assets is stored in ESRI (Environmental Systems Research Institute) Geodatabase and data is to be supplied to Metrolinx as File Geodatabase(s).
Data Sets	The spatial information for each asset type should be delivered in the form of a simple feature class.
	Reach out to the Metrolinx GIS support team for the latest Geodatabase design document for details about datasets.
	It includes the data dictionary for all assets.
	Feature Dataset
	Feature Class Name
	Geometry Type
	Attribute Name, Types and Length

TABLE 6-1 MINIMUM STANDARD FOR GEOSPATIAL DATA

Standard Type	Standard
	• Domains
Vertical Reference Datum	If the collection of accurate elevation data is required as part of a project, it will be referenced to the Canadian Geodetic Vertical Datum (CGVD) 1928 Orthometric Elevation: CGVD1928:78 Adjustment
Connectivity	All linear features must be connected with end points coincident (for example, all track elements must be connected).
	Point features which split linear features should be linked and connected (for example, switch which splits 3 track segments).
	Point features which do not split linear features must not be connected to linear features (for example, signals features which are adjacent to track segments)
Accuracy	Sub meter accuracy is required for visible assets. 10 cm accuracy is required for buried assets.
Datum/Projection	All data must be submitted in NAD_1983_CSRS_MTM_10

TABLE 6-1 MINIMUM STANDARD FOR GEOSPATIAL DATA

7. Asset Document Information Standards

7.1 Metadata - Enterprise Documentation

- 7.1.1 Any asset-related documents required to operate and maintain an asset shall provide metadata and attributes in accordance with the requirements and standards of this section.
- 7.1.2 Asset-related documents include as-built drawings; record drawings; operations and maintenance manuals; maintenance procedures; troubleshooting manuals; reports (e.g. test/inspection); RAMS documents; configuration plans, illustrated parts catalogue (IPC), original equipment manufacturer documentation; warranty documents; shop drawings; Bill of Materials; etc.
- 7.1.3 Where noted predefined, the list of values is available in EDRMS and the Metrolinx Asset Information Data Dictionary (See Section 8).
- 7.1.4 The following metadata shall be required for all asset documentation produced for the Enterprise Digital Library.

Attribute	Standard
Primary Business Unit and Departments	Predefined
Project/Contract ID	Predefined

TABLE 7-1 METADATA - ENTERPRISE DIGITAL LIBRARY

Attribute	Standard
Content and Sub Content Types	Predefined
Reference ID	Not predefined - A unique identifier used to link linear assets in GIS and Infor EAM
Asset ID	Predefined Asset ID from EMMS with EDRMS Nomenclature [AST-[INFORID]-RCI]
GIS Object ID	Not predefined - Static Text - Nomenclature to Name Rail Assets
Asset Class Code	Not predefined - Static Text
Asset Class	Predefined
Shareable	Not predefined - dynamic. When set to True - indicated document shareable externally.
Track Number	Not predefined - dynamic. Indicated which physical rail line the document is associated with.

TABLE 7-1 METADATA – ENTERPRISE DIGITAL LIBRARY

7.2 CAD Documentation Attributes

7.2.1 If the Asset involves CAD drawings, the drawings shall adhere to latest version of CADD/BIM Standards Manual (CPG-DGN-PLN-084).

8. Metrolinx Asset Information Data Dictionary

- 8.1.1 The Metrolinx Asset Information Data Dictionary has the function of providing explicit standard list of asset class specific values and their definitions for the following:
 - 1) Organization and Department codes
 - 2) Overall asset hierarchy, location hierarchy and associated mnemonics
 - 3) All asset classes and their categories
 - 4) Asset descriptive data and their list of values
 - 5) Asset specific custom fields and list of values
 - 6) Work order classes, types and closing codes
 - 7) EDRMS Metadata requirements and list of values
- 8.1.2 The Metrolinx Asset Information Data Dictionary is managed in separate repositories respective to the organizational department as follows:
 - 1) MX-ALM-STD-002 is relevant for all Rail Corridor assets
 - 2) MX-ALM-STD-003 is relevant for all Facility assets