

Appendix A

Asset Preservation

Region
Stage 1 Light Rail Transit Project

Appendix A
Asset Preservation

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APPENDIX A ASSET PRESERVATION

1 Introduction

This Appendix outlines the minimum requirements for the System Asset Preservation activities required pursuant to this Project Agreement. The presentation of the specific requirements within this Appendix shall not be construed to limit or modify in any way Project Co's responsibility to provide a holistic, comprehensive, and fully functional solution to the Systems Asset Preservation. Project Co is solely responsible for meeting the performance outcomes and objectives outlined in this Appendix as well as those included in Schedule 15-3 which includes:

- (i) Achieving defined service levels;
- (ii) Ensuring safety of the System is a continual and ongoing focus;
- (iii) Achieving Design Life expectations; and
- (iv) Providing a sound Asset Management Plan to maintain long-term serviceability and structural integrity of the System.

2 Scope

(a) Project Co is solely responsible for the provision of products and services associated with the planning, management and delivery of the System asset preservation activities to meet the Project Agreement requirements and in accordance with Good Industry Practice. The System asset preservation process is described as follows:

- (i) Project Co shall develop an Asset Management Plan that meets the Project Agreement requirements and delivers the required System availability and performance;
- (ii) Project Co shall implement the Asset Management Plan;
- (iii) Project Co shall continually monitor the System condition and reports achievements; and
- (iv) Project Co shall adjust the Asset Management Plan, as required, to achieve the desired outcomes.

3 References

- (i) Reference Documents are noted elsewhere in this Project Agreement.

4 Performance Outcomes

(a) General

- (i) Project Co shall develop and implement an Asset Management Plan that limits the extent of consumption of individual asset categories comprising the System by maintaining and preserving the performance and operational integrity and safety on an ongoing basis throughout the Maintenance and Rehabilitation Services Term.
- (ii) Details of routine maintenance requirements applicable to the System and their relevant Outcome Target indicators and consequences of Non-conformance are noted in Section 15-3 – Maintenance Performance Requirements) to this Schedule, and the Expiry Date Requirements are noted in Appendix B to this Schedule and are not repeated here. Project Co's Asset Management Plan shall address those requirements and the key outcome objectives described in these Appendices. The subsequent sections provide the key outcome objectives for the asset categories.

(b) Guideway Elements

TABLE 4.1 Guideway Elements	
Item	Outcome Objectives
a. Civil / Drainage / Utilities	<ul style="list-style-type: none"> • Ensure that track sub-base, grading, and drainage provide a high quality track foundation • Convey surface and groundwater within and across the ROW in compliance with environmental requirements • Ensure that Region patrons and infrastructure are not at risk from flood, groundwater, scour and/or drainage system failures • Ensure that all surfaces remain free draining without ponding • Ensure utilities crossing or occupying the ROW are properly protected/isolated to provide their intended public service and do not pose a safety hazard to the System and its occupants
b. Track / Trackwork	<ul style="list-style-type: none"> • Provide high quality track and special trackwork within specified tolerances to the design geometry • Provide a high ride comfort to Region (“Region”) passengers • Minimize track generated noise and vibration to within acceptable levels • Minimize wear and tear to vehicles, rail and other track components through active management of rail to wheel interface • Minimize the probability and consequence of train derailments
c. LRT Grade Separations/Bridges	<ul style="list-style-type: none"> • Ensure that all LRT Bridges remain safe and functional at all times • Ensure that track/guardrail fastening systems, OCS foundations/attachments, walkways, platform/canopies and other elements attached to, or supported by bridges remain in good condition providing their intended function • Ensure there are no load limitations or speed reductions to Region operation • Ensure that there are no hazards to undergrade roadways, walkways, trails, or other facilities
d. Non LRT Bridges	<ul style="list-style-type: none"> • Ensure that there are no load limitations to Road Bridges so that passage of legal vehicles is maintained in accordance with local and provincial requirements • Ensure all Bridges including for Roadways, Multi-use Trails, and Pedestrian facilities remain safe and functional at all times • Ensure that barriers and other protective elements minimizing contact to the OCS system by overhead users are appropriately positioned and maintained • Ensure that OCS attachments and electrical isolation elements are well maintained and provide the intended protection to structures and the public

TABLE 4.1 Guideway Elements	
Item	Outcome Objectives
e. Retaining Walls	<ul style="list-style-type: none"> • Ensure Retaining walls remain safe and functional at all times • Ensure that there are no impediments to the passage of Region vehicles adjacent to retaining walls • Ensure that there are no impediments to the passage of roadway vehicles or other users adjacent to retaining walls on facilities crossing or paralleling the Region ROW • Ensure that retaining wall drainage systems are functional and well maintained
f. Management	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Manage the probability and consequence of system failures throughout the Region, and develop recovery and reactivation plans • Ensure inspections, condition surveys and documentation are carried out according to Asset Management Plan requirements • Ensure programming of the Maintenance Services is complete, performed with sufficient lead time, and based upon a long-term focus • Ensure Good Industry Practice and continual improvements are applied to Maintenance Services

(c) Systems Elements

TABLE 4.2 Systems Elements	
Item	Outcome Objectives
a. Traction Power System	<ul style="list-style-type: none"> • Ensure a safe, efficient and reliable traction power system • Ensure that traction power substations, substation feeders, and traction power distribution systems are well maintained, updated as necessary to support the required Region operation without degradation in train performance

TABLE 4.2 Systems Elements	
Item	Outcome Objectives
b. Overhead Catenary System	<ul style="list-style-type: none"> • Ensure that the OCS, including poles, foundations, messenger and contact wires and all associated hardware are properly maintained and in good condition • Ensure safe and reliable Region operations by maintaining optimal OCS alignment under varied temperature conditions • Ensure that contact wire wear is properly monitored and that replacement, as necessary, is programmed and staged well in advance to support ongoing operations during replacement and minimize the potential for reaching OCS conditions that impede or slow Region operations
c. Corrosion Control	<ul style="list-style-type: none"> • Ensure a safe and fully functional corrosion control system. • Ensure that the system and all associated infrastructure including electrical isolation of track and other components are maintained to minimize stray current and corrosion in accordance with the design and construction requirements of Schedule 15.
d. Train Control / Signal System	<ul style="list-style-type: none"> • Ensure a safe, efficient, and reliable train control system • Ensure the safe and reliable operation of the transit management system and crossing protection systems. • Ensure that the system provides for fail safe operations and complies with applicable regulatory requirements and the approved System Safety Management System • Ensure that the system is fully functional at all times and supports the required Region operations and system capacity Region/throughput requirements • Ensure that the train control system is refined and updated as may be necessary in keeping with life cycle considerations, wear and tear, technological advancements, component obsolescence, equipment suppliers and industry requirements
e. Communications	<ul style="list-style-type: none"> • Ensure safe, efficient and fully functional communication system • Ensure that communication system reliably supports all intended functions including provision of passenger information, as well as all control and monitoring interfaces among train control, power, security, and other systems, and for management and communication among operating and maintenance staff. • Ensure that communication system components are updated, or replaced, as may be necessary in keeping with life cycle considerations, technological advancements, equipment suppliers and industry requirements

TABLE 4.2 Systems Elements	
Item	Outcome Objectives
f. Management	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Manage the probability and consequence of system failures throughout the Region, and develop a recovery and reactivation plans • Ensure inspections, testing, condition surveys, certifications and documentation are carried out according to Asset Management Plan requirements • Ensure programming of the Maintenance Services is complete and based upon long-term focus • Ensure Good Industry Practice and continual improvements are applied to Maintenance Services

(d) LRT Stops

TABLE 4.3 Stations	
Item	Performance Outcomes
a. Fixed Facilities including Platforms, Ramps, Stairs, Walkways, Bridges, Canopies	<ul style="list-style-type: none"> • Ensure that all fixed facilities remain structurally sound, safe and available for patrons • Ensure that the condition of the fixed facilities including all surfaces and finishes are well maintained, facilitate effective custodial maintenance and provide a high quality and comfortable passenger environment • Ensure that all fixed facilities comply with applicable codes and regulations for safety and accessibility
b. Passenger Amenities / Station Furniture / Signs & Graphics	<ul style="list-style-type: none"> • Provide a high quality, comfortable, and safe passenger environment • Ensure all components are well maintained, functional, and updated, • Ensure all signage and other graphics are clear, provide their intended function, and are updated, as may be necessary due to physical or operational modifications of the system
c. Lighting, Electrical & Mechanical Equipment, and Janitorial Facilities	<ul style="list-style-type: none"> • Provide a high quality, comfortable and safe passenger environment • Ensure all lighting and equipment is well maintained and functional • Ensure facilities support serviceability of each LRT Stop • Ensure compliance with all applicable codes and regulations

TABLE 4.3 Stations	
Item	Performance Outcomes
d. Management	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Manage the probability and consequence of system failures throughout the Region, and develop a recovery and reactivation plans • Ensure inspections, condition surveys and documentation are carried out according to Asset Management Plan requirements • Ensure programming of the Maintenance Services is complete and based upon long-term focus • Ensure Good Industry Practice and continual improvements are applied to Maintenance Services

(e) Operations, Maintenance and Storage Facility (OMSF)

TABLE 4.4 Operations, Maintenance and Storage Facility (OMSF)	
Item	Outcome Objectives
a. LRV Maintenance Shop	<ul style="list-style-type: none"> • Ensure that all fixed facilities and systems (HVAC, etc.) are safe, well maintained and fully functional • Ensure the maintenance shop complies with all applicable regulatory requirements • Ensure that the facility continues to support ongoing vehicle maintenance requirements • Provide for updates to employee facilities, as may be warranted to maintain an effective and serviceable environment
b. MOW Facility/Area	<ul style="list-style-type: none"> • Ensure the facility and systems are safe, well maintained and fully functional • Ensure facility supports ongoing MOW activities • Adequately provides for storage of MOW materials and equipment
c. Shop and MOW Equipment	<ul style="list-style-type: none"> • Ensure that LRV Shop and MOW equipment is well maintained, fully functional and safe for use • Supports all necessary maintenance and rehabilitation functions • Ensure that upgrades are made as may be necessary or appropriate due to wear out or obsolescence.

TABLE 4.4 Operations, Maintenance and Storage Facility (OMSF)	
Item	Outcome Objectives
d. LRV Storage Area / Yard Tracks	<ul style="list-style-type: none"> • Ensure that the LRV Storage area/building and other yard tracks and facilities are safe, well maintained and fully functional • Ensure that there is no degradation in train speeds or flexibility of train movements • Ensure adequate storage capacity is maintained for ongoing fleet requirements
e. Operations Crew Facility	<ul style="list-style-type: none"> • Ensure facility and systems are safe for use and well maintained • Ensure that facility supports the activities and functions of train operations • Provide for updates, as may be warranted to maintain an effective and serviceable staff environment
f. Central Control Facility	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Ensure that facility supports the activities and functions of train operations • Provide updates to computer systems and display equipment to ensure a state of the art and serviceable system
g. Management	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Manage the probability and consequence of system failures throughout the Region, and develop a recovery and reactivation plans • Ensure inspections, condition surveys and documentation are carried out according to Asset Management Plan requirements • Ensure programming of the Maintenance Services is complete and based upon long-term focus • Ensure Good Industry Practice and continual improvements are applied to Maintenance Services

(f) Other Infrastructure

TABLE 4.5 Other Infrastructure	
Item	Outcome Objectives
a. General	<ul style="list-style-type: none"> • Ensure that all infrastructure and components are well maintained and in a state of good repair • Attain full compliance with municipal, provincial, and federal safety standards • Ensure safe, efficient, and fully functional systems and Infrastructure • Ensure ongoing maintenance can be effectively and efficiently performed • Minimize the potential for chronic reliability issues
b. Management	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Manage the probability and consequence of system failures throughout the Region, and develop a recovery and reactivation plans • Ensure inspections, condition surveys and documentation are carried out according to Asset Management Plan requirements • Ensure programming of the Maintenance Services is complete and based upon long-term focus • Ensure Good Industry Practice and continual improvements are applied to Maintenance Services

(g) Revenue Service Vehicles

TABLE 4.6 Revenue Service Vehicles	
Item	Outcome Objectives
a. General	<ul style="list-style-type: none"> • Ensure that Revenue Service Vehicles are safe, fully functional, and serviceable throughout Maintenance Term • Sustain high levels of in-service reliability • Ensure compliance with all applicable standards and regulations

TABLE 4.6 Revenue Service Vehicles	
Item	Outcome Objectives
b. Interior	<ul style="list-style-type: none"> • Ensure interior components are safe, comfortable, and of high quality for passenger use • Ensure that interior remains serviceable and can be maintained effectively and efficiently • Ensure HVAC systems continue to meet the design requirements for a comfortable passenger environment • Provide for updates, to interior components (such as seats, flooring, finishes, etc.) and systems (HVAC, passenger information, etc.), as may be necessary due to wear out and obsolescence
c. Exterior	<ul style="list-style-type: none"> • Ensure vehicle exterior remains appealing, structurally sound, free of rust/corrosion and other defects/deformities • Ensure vehicle exterior remains serviceable and are cleaned and maintained in a cost effective and efficient manner
d. Doors	<ul style="list-style-type: none"> • Ensure safe, fully functional and serviceable doors that can be effectively maintained • Provide for a high level of reliability to meet the operational service requirements
e. Onboard Control Systems / ATO	<ul style="list-style-type: none"> • Ensure onboard train control systems are fully functional, support the required operational service requirements and ensure safe operations • Ensure that onboard train control systems are refined and updated as may be necessary in keeping with life cycle considerations, technological advancements, equipment suppliers and industry requirements
f. Propulsion	<ul style="list-style-type: none"> • Ensure propulsion system is highly reliable and is maintained effectively and efficiently • Minimize degradation in vehicle performance and ensure full compliance with operational service requirements
g. Suspension/Bogies/ Articulation	<ul style="list-style-type: none"> • Ensure that these elements are safe and reliable • Provide for a high level of passenger comfort and minimize wear and tear on LRV and track
h. Braking	<ul style="list-style-type: none"> • Ensure that braking system including all associated components are safe, highly reliable, and can be effectively and efficiently maintained • Ensure that vehicle performance requirements continue to be met

TABLE 4.6 Revenue Service Vehicles	
Item	Outcome Objectives
i. Management	<ul style="list-style-type: none"> • Meet the design requirements noted in this Project Agreement • Manage the probability and consequence of system failures throughout the Region, and develop a recovery and reactivation plans • Ensure inspections, condition surveys and documentation are carried out according to Asset Management Plan requirements • Ensure programming of the Maintenance Services is complete and based upon long-term focus • Ensure Good Industry Practice and continual improvements are applied to Maintenance Services

(h) Non-Revenue Service Vehicles

TABLE 4.7 Non-Revenue Service Vehicles	
Item	Outcome Objectives
a. General	<ul style="list-style-type: none"> • Ensure that Non-Revenue Service Vehicles are safe, fully functional, and serviceable throughout Maintenance Term • Sustain high levels of in-service reliability • Ensure compliance with all applicable standards and regulations

5 Documentation and Reporting

(a) General Requirements

- (i) This Article describes the plans and reports that Project Co is required to submit to the Region. The general purpose of the plans and the reports are for Project Co to provide documentation that demonstrates to the Region:
 - A. An understanding of the Asset Management requirements;
 - B. An Asset Management strategy that is based upon rationalized knowledge of System asset inventory, condition, and performance;
 - C. Logical and up-to-date reporting on the condition of System assets;
 - D. Asset preservation and rehabilitation work undertaken during the previous 12 months and work planned for the upcoming 12 months;
 - E. Long-term asset preservation strategy and plans;
 - F. A robust and up-to-date Quality Management System and reporting;

- G. Compliance with environmental requirements and permitting;
 - H. Reporting of results of meeting the Asset Preservation Performance Measures, which would include compliance and non-compliance reporting; and
 - I. Compliance with this Project Agreement.
- (ii) The system developed by Project Co shall be dynamic, easily auditable by the Region, and kept up-to-date so that Project Co can regularly and readily provide information to the Region.
- (b) Plans and Reports
- (i) Table 5.1 provides a summarized schedule of the plans and reports required for submission by Project Co to the Region for review and input.
 - (ii) Project Co shall be assigned a Failure Points for each instance of failing to provide the Region with any plan or report listed below in Table 5.1, in compliance with the requirements for such plan or report as set out in this Appendix A and outlined in Schedule 20 – Payment Mechanism, by the relevant Due Date.

TABLE 5.1 Schedule of Deliverable Reports and Records – Response Time Measures				
Performance Measure	Deliverable Name	Specification Reference	Due Date	Submitted under the Schedule 10
PREP1	Initial Asset Management Plan (including initial five (5)-year asset preservation schedule)	5.0(d)	60 days prior to Substantial Completion	Yes
PREP2	Asset Management Plan Updates (including updated five (5)-year asset preservation schedule, and As-Built Drawings)	5.0(d)	December 31 annually (updated annually)	Yes
PREP3	Annual APPM Achievement Report	5.0(e)	November 30 annually (updated annually)	Yes
PREP4	Structures Condition Data	5.0(f), 6.0(c)	September 30 annually (updated annual data delivered not more than 60 days following inspection)	Yes
PREP5	Track Condition Data	5.0(g), 6.0(h)	September 30 annually (updated annually)	Yes
PREP6	Vehicles and Systems Data	5.0(h), 6.0(e)	September 30 annually (updated annually)	Yes

TABLE 5.1				
Schedule of Deliverable Reports and Records – Response Time Measures				
Performance Measure	Deliverable Name	Specification Reference	Due Date	Submitted under the Schedule 10
PREP7	Facilities Condition Data	5.0(i), 6.0(f)	September 30 annually (updated annually)	Yes
PREP8	Other Asset Classes Condition Data	5.0(j), 6.0(g)	September 30 annually (updated annually)	Yes
PREP9	System Asset Inventory	5.0(k)	September 30 annually (updated annual data delivered not more than 60 days following survey)	Yes
PREP10	As Built Drawings	5.0(l)	September 30 annually (updated annual data delivered not more than 60 days following survey)	Yes

(iii) The documents noted above shall include the submission of relevant reports in Schedule 15-3 and 15-4, which shall be submitted in accordance with the Schedule 10.

(c) File Formats

(i) Unless specified otherwise, electronic files shall be compatible with the most recent version of Microsoft Office and be editable. All supplied electronic files shall be on CD or DVD and be clearly labelled as to the content. Storage media shall be scanned for viruses (using an industry recognized product with appropriate updates) prior to submission to the Region. In addition, all electronic files shall be made available on a secured web based website managed by Project Co.

(d) Asset Management Plan

(i) Purpose

A. Project Co shall provide to the Region a written plan (the “Asset Management Plan”), which describes the procedures for achieving the specified Performance Measures (see Article 5.5 of this Appendix) to be attained during the Maintenance and Rehabilitation Term.

(ii) Details

A. The initial Asset Management Plan and all subsequent annual updates to the plan must, as a minimum:

1. Address all System;
2. Include a description of and the manner in which the overall performance management reporting will be achieved;
3. Be aligned with the scope of obligations under Section 15-3 and 15-4 and Appendices A and B of the Maintenance Specifications (Operations

- Requirements, Maintenance and Rehabilitation Requirement, Asset Preservation, and the Expiry Date Requirements);
4. Meet the quality management and environmental management requirements in this Project Agreement;
 5. Be consistent with other obligations in this Project Agreement;
 6. Identify the intervention criteria for each APPM as well as achieve the requirements set out in Appendix B, the Expiry Date Requirements to this Schedule;
 7. Describe the approach for Infrastructure condition inspection;
 8. Describe the approach for assessing the manner in which the APPMs will be achieved;
 9. Identify the deterioration rate and factors affecting the APPMs;
 10. Describe the process for asset preservation work identification, programming and prioritization in terms of developing the Asset Management Plan and the five-year asset preservation schedule, and addressing any APPM non-compliance;
 11. Identify and describe the Asset Management approach with respect to integrating and aligning routine maintenance activities (as described in Schedule 15-3) and asset preservation work;
 12. Identify any areas of risk and describe mitigation measures;
 13. Describe the approach for completing the annual Maintenance Services schedule including the resources employed, plant, materials, and facilities associated therewith;
 14. Describe any processes and innovations to improve performance and performance reporting process;
 15. Provide an indication of the expected condition performance of the asset over the remainder of the Maintenance Term and how Project Co is ensuring full contractual compliance will be achieved, including providing details of the method used to establish the predicted condition (it is anticipated that some form of asset performance modelling will be required) and in graphical format, the current, worst case, the Expiry Date hand back and target condition of the Infrastructure; and
 16. Include a five-year asset preservation schedule consisting of a rolling, forward Maintenance Services program that describes the planned preventative maintenance and asset preservation works (excluding minor routine maintenance) that Project Co is planning to undertake over the following five (5)-year period, and provide specific details regarding planned asset preservation works including but not limited to:
 - I. planned asset preservation works for both the year and each quarter within the first two years, and only for the year thereafter;
 - II. advanced technical evaluations completed;
 - III. field investigations completed;
 - IV. updated asset preservation treatment; and

- V. design documentation:
- In respect of preparation of the five-year asset preservation schedule:
 - It is recognized that the timing of rehabilitation and other projects and activities in the future is less certain than those in the current year; and
 - Project Co has the right to perform activities that deviate from the schedule, so long as performance of the System meets Project Agreement requirements.
 - The five-year asset preservation schedule shall be in the following format:
 - For linear Infrastructure (track, special trackwork, OCS, etc.):
 - The plan should be produced to clearly identify the start and end locations and cross-sectional position of all Maintenance Services. Where Maintenance Services is to be undertaken on only part of the cross section then the plan should be formatted to clearly indicate this;
 - Indicate the timing and nature of the Maintenance Services to be undertaken; and
 - Have some indication (code or otherwise) of the level of the priority of the Maintenance Services.
 - For point Infrastructure (such as Bridges, Stations, Facilities, Sewers, etc.):
 - Infrastructure should be grouped firstly by type, then by location along the Region;
 - Indicate the timing and nature of the Maintenance Services to be undertaken; and
 - Have some indication (code or otherwise) of the level of priority and certainty of the Maintenance Services occurring.
 - For Vehicles and Equipment (such as LRVs, Non-Revenue vehicles, etc.):
 - Vehicles and equipment should be grouped firstly by type, then by the identification number of each particular vehicle/asset
 - Indicate the timing and nature of the Maintenance Services to be undertaken; and
 - Have some indication (code or otherwise) of the level of priority and certainty of the Maintenance Services occurring.

- B. All plans shall address the operational impact and mitigation measures;
 - C. Include Project Co’s, Maintenance and Rehabilitation Quality Management Plan and provide a description of the process for reporting of audits and Nonconformity Reports in accordance with Schedule 11 – Quality Management;
 - D. Include Project Co’s reporting for its environmental management activities;
 - E. Provide an update on the status of Project permitting.
- (e) Annual Asset Preservation and Performance Measures (APPM) Achievement Report
- (i) Purpose
 - A. The Annual APPM Achievement Report documents the routine maintenance, preventative maintenance, rehabilitation, and asset preservation work completed in the previous year; reports the results from Infrastructure condition and inventory surveys and provides a summary of achievement compared to the APPM requirements; and outlines activities anticipated in the coming year.
 - (ii) Details
 - A. The Annual APPM Achievement Report must include the following as a minimum:
 1. An annual summary of the Maintenance Services (including routine, preventive, and corrective maintenance, rehabilitation and asset preservation activities) performed in the preceding year;
 2. Methodologies for calculating the Asset Preservation Performance Measures;
 3. Analysis and presentation of the results from the annual data collection program for the Asset Preservation Performance Measures for all System assets as defined in the Asset Management Plan;
 4. Reporting of the results of surveys; and
 5. Reports of the compliance and non-compliances with the APPM, and corrective actions.
- (f) Structure Condition Data
- (i) Project Co is responsible for collecting, maintaining, reporting, and updating Structures Condition data for the purposes of Asset Management and for evaluating the APPM achievements. The requirements for such data are detailed in Table 5.2.

TABLE 5.2	
Asset Class Condition Group	Condition Data Delivery Requirements
Structures – Grade Crossings, Bridges, Recreational Trail Bridges, Retaining Walls, and Structural Culverts	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Project Co is to provide to the Region a condition data information system (to be agreed between the Region and Project Co) for delivering condition information for Structures • Project Co is to provide to the Region all asset condition inspection reports in a digital “pdf” format. • Project Co is to provide to the Region all asset condition

TABLE 5.2	
Asset Class Condition Group	Condition Data Delivery Requirements
	assessments in a digital “pdf” and Microsoft Excel format. <ul style="list-style-type: none"> • Project Co is to provide to the Region all drawings in a digital “pdf” and a “to be determined” format as well as printed / plotted hardcopy.

(g) Track Condition Data

- (i) Project Co is responsible for collecting, maintaining, reporting, and updating Track Condition data for the purposes of Asset Management and for evaluating the APPM achievements. The requirements for such data are detailed in Table 5.3.

TABLE 5.3	
Asset Class Condition Group	Condition Data Delivery Requirements
Mainline Track, Special Trackwork, Turnouts, Crossovers, Yard Leads, Yard Track	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Project Co is to provide to the Region a condition data information system (to be agreed between the Region and Project Co) for delivering condition information for Track

(h) Vehicles and Systems Condition Data

- (i) Project Co is responsible for collecting, maintaining, reporting, and updating Vehicles and Systems Condition data for the purposes of Asset Management and for evaluating the APPM achievements. The requirements for such data are detailed in Table 5.4.

TABLE 5.4	
Asset Class Condition Group	Condition Data Delivery Requirements
Vehicles, includes vehicles and maintenance of way equipment	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Project Co is to provide to the Region a condition data information system (to be agreed between the Region and Project Co) for delivering condition information for Vehicles
Systems Components, includes, Communication Systems, Traction Power, Signals and Train Controls, Corrosion Control	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Project Co is to provide to the Region a condition data information system (to be agreed between the Region and Project Co) for delivering condition information for Systems Components

(i) Facility Condition Data

- (i) Project Co is responsible for collecting, maintaining, reporting, and updating Facilities Condition data for the purposes of Asset Management and for evaluating the APPM achievements. The requirements for such data are detailed in Table 5.5.

TABLE 5.5	
Asset Class Condition Group	Condition Data Delivery Requirements
Facilities , includes Maintenance and Storage Facility and Stations	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Project Co is to provide to the Region a condition data information system (to be agreed between the Region and Project Co) for delivering condition information for Facilities

(j) Other Asset Classes Condition Data

- (i) Project Co is responsible for collecting, maintaining, reporting and updating condition data for the purposes of proper asset management and for ensuring adequate serviceability. The requirements for such data are detailed in Table 5.6.

TABLE 5.6	
Asset Class Condition Group	Condition Data Delivery Requirements
Other Structures —Retaining walls, Culverts (Span less than 3.0 m) and Noise Barriers	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Maintenance inspection reports
Drainage and Sedimentation Control Structures —including curb and gutters, catch basins, ditch inlets, gutter outlets, grates, storm sewers with utility holes and outlet structures, and pump stations.	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Maintenance inspection reports
Signs —including all regulatory, warning, guide, informational, advisory, construction and maintenance and route markers	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Maintenance inspection reports
Electrical Components —including lighting, signals and control boxes, and electrical components associated with fire, life, and safety equipment.	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Maintenance inspection reports

TABLE 5.6	
Asset Class Condition Group	Condition Data Delivery Requirements
Mechanical Components —including systems for drainage, pumps, fire, life and safety	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Maintenance inspection reports
Recreational Trails and Sidewalks (excluding Recreational Trail Bridges)	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Table 5.1 • Maintenance inspection reports

(k) System Inventory Data

- (i) The electronic Infrastructure inventory records of Project Co shall be accurate and up-to-date. Project Co is responsible for collecting and maintaining the data.
- (ii) Project Co shall assign each asset a unique number, and name the asset consistent with the terminology used in Schedule 15-2, or reference documents, or Good Industry Practice or as agreed to by the Region.

(l) As Built Drawings (Record Drawings)

- (i) Project Co is responsible for the production of As Built Drawings including all shop fabrication drawings. The production of the drawings shall generally take the form of the design drawings with addendums showing changes and signed by a Professional Engineer, where applicable. These are to be submitted, as applicable, with the annual Asset Management Plans noted in Table 5.1 of this Appendix.

6 Asset Preservation Performance Measures (APPMs)

(a) General

- (i) APPMs reflect the condition in which Project Co shall maintain the System. Project Co must comply with these measures at all times throughout the Maintenance Term. Schedule 15-3 outlines routine maintenance requirements of which are not repeated here. An integral part of the Asset Preservation is gathering and maintaining reliable inventory and condition assessment data, which are Project Co’s responsibility.
- (ii) The Asset Preservation Performance Measures (APPMs) are based on the levels of service established by the Region, as determined from System condition assessments, performance monitoring, delivery methodologies, and management functions within Infrastructure management systems.
- (iii) APPMs have been developed for each Asset Category based on the specific requirements associated with each asset type. A standardized format for the measures has been adopted for consistency and presentation purposes. Elements of the measures include:
 - A. Feature;
 - B. Performance measures;
 - C. minimum condition;

- D. Maximum Response Time; and
 - E. The basis of measure and any associated response parameters required to be met.
- (iv) Project Co is responsible for the asset preservation of all Systems and ensuring that it is managed in a safe and operable condition and are preserved in accordance with the requirements of this Project Agreement and Good Industry Practice.
- (b) Performance Measures
- (i) Asset Preservation Performance Measures (APPM) provides the ability to monitor and maintain the desired System asset condition over the Maintenance Term. Project Co is required to report actual APPM achievement as part of the Annual Asset Preservation Performance Measure (APPM) Achievement Report. The achievements are measured in terms of meeting the requirements of the Asset Preservation Performance Measures and reporting requirements detailed in Schedule 15-3. Achieving the APPM noted in this Appendix includes meeting the operations and maintenance requirements noted in Appendix A of this Schedule.
 - (ii) Project Co must demonstrate through its Quality Management System the processes to achieve the APPM specified in this Appendix.
 - (iii) A summary of the Asset Preservation Performance Measure and the consequences of Non-conformity – with the requirements are noted in the following Table A.6.1. The composition of the APPMs is subject to review by the Region during the Maintenance Term.

TABLE 6.1 Asset Preservation Performance Measures		
Article Reference	Performance Requirement	APPM Measure Reference
5.0(d)	Initial Asset Management Plan	PREP1
5.0(d)	Asset Management Plan Updates	PREP2
5.0(e)	Annual APPM Achievement Report	PREP3
5.0(f)	Structures Condition Data	PREP4
5.0(g)	Track Condition Data	PREP5
5.0(h)	Vehicles and Systems Condition Data	PREP6
5.0(i)	Facilities Condition Data	PREP7
5.0(j)	Other Asset Classes and Condition Data	PREP8
5.0(k)	System Inventory	PREP9
5.0(l)	As Built Drawings	PREP10

(c) Structures

(i) General

- A. The APPM for Structures are targeted to ensure:
 - 1. Region user and structure safety;
 - 2. Structure functionality is at an acceptable level; and
 - 3. Structure asset consumption is limited.
- B. Using these factors as the basis, standards and performance measures are set to ensure sound Asset Management practices are applied for Structures.
- C. Elements of the Structures asset management cycle include:
 - 1. Inspection at the specified interval;
 - 2. Rating the condition of the Structure Components;
 - 3. Inventory updating;
 - 4. Programming correction of deficiencies;
 - 5. Undertaking maintenance and asset preservation works; and
 - 6. Reporting achievements.
- D. The delivery of services is based upon:
 - 1. Emphasis on Region's Operations and Structure safety for the Project;
 - 2. Outcome-based specifications with Project Co given the latitude for treatment selection to control/correct defective conditions as per the Project Agreement requirements;
 - 3. A life-cycle approach to maintenance and asset preservation in conformance with the performance measures;
 - 4. A preventative rather than reactive maintenance/repair strategy is encouraged to limit asset consumption with inspections recommended to facilitate this strategy;
 - 5. Emphasis on meeting the prescribed standards and APPMs on an ongoing basis;
 - 6. A mechanism for the Region to correct default if Project Co fails to meet the condition criteria on an ongoing basis;
 - 7. An effective Quality Management System; and
 - 8. Compliance with the Project Agreement requirements.
- E. Project Co has full responsibility for all the asset preservation activities, including Structure replacement, should that be required.
- F. Operational standards are detailed in Schedule 15-3 and Schedule 15-4.

(ii) Structural Inspections

- A. Structure inspection management involves field inspections that identify and monitor Structure condition. Any observed defects are to be addressed in relevant asset preservation strategies and subsequently programmed for asset preservation (including preventative maintenance and replacement). Project Co shall respond to and rectify any

urgent items identified during inspections. The asset preservation of all Structures includes performing Structural Inspections in accordance with OSIM and Province of Ontario practices, condition assessments, inventory updates, and reporting of structure condition achievements, as well as the identification of appropriate condition preservation and restoration strategies in accordance with the requirements set out in this Project Agreement. Project Co shall use Qualified Inspectors, defined as individuals with at least five (5) years of experience in structure inspections who maintain their knowledge of inspection through participation in biennial inspection courses offered by Ministry of Transportation of Ontario.

- B. The program of Structure inspections must be managed by a suitably qualified Structural Engineer, who:
1. Is a Professional Engineer with a background in inspection, design, and construction of bridges;
 2. Has extensive experience in supervising Structure design, evaluation, construction, inspection, maintenance, rehabilitation and asset preservation;
 3. Maintains overall management and technical supervision of the Structure inspection and Maintenance/asset preservation program;
 4. Accepts responsibility for the technical competence of all personnel involved in Structures inspection and reporting;
 5. Accepts responsibility for the structural safety of all Structures;
 6. Consults with other specialist professionals when necessary; and
- C. Has the overall responsibility for assessing the structure functionality/safety, Structure risks, and potential risks to Region users, and to determine an appropriate asset preservation strategy.
- D. There are three types of Structure inspections required as indicated in Table A.6.2.

Type	Description	Maximum Inspection Frequencies
Superficial (maintenance)	Focus on Region Passenger safety and Structure functionality; refer to Schedule 15-3	These are as part of routine Region management and operations.
Detailed	Focus on a general assessment of condition and developing an annual, five (5)-year and ten year asset preservation programs (including Preventative Maintenance and replacement)	Once every two (2) years
Condition Surveys	Focus on producing a comprehensive assessment of condition, including undertaking physical testing, in order to develop an appropriate asset preservation program (including preventative maintenance,	As required or if BCI is below 70

TABLE 6.2 Inspection Types		
Type	Description	Maximum Inspection Frequencies
	rehabilitation and replacement)	

- E. Structures exhibiting significant displacement, deterioration, defects or damage are required to be inspected and assessed more frequently with the intervals determined by the Structural Engineer to meet the performance requirements of this Project Agreement and Good Industry Practice.
 - F. Structure condition inspection is required to be undertaken using format and detail consistent with that specified in the Ontario Structure Inspection Manual (OSIM), the Structure Rehabilitation Manual, the Retaining Wall Inspection Guidelines (RWIG) and the Sign Support Inspection Guidelines (SSIG).
 - G. Project Co is required to retain files of Structure inspection records and asset preservation plans so that a continuous history of each Structure is available throughout the Maintenance Term.
 - H. Inspections of Structures shall commence following Substantial Completion and continue throughout the Maintenance Term.
- (iii) Key Performance Measures
- A. Project Co shall perform Structure inspections and calculate the BCI for all Structures at least once every two years, in accordance with the requirements of this Schedule. Project Co shall report on all BCI, BCI-C, BCI-RW and BCI-SS as indicated in this Schedule.
 - B. In addition, all inspections must identify undue movements, damages or deteriorations of key structural members, if any, which, in the opinion of the Structural Engineer, may cause instability of distress of individual structures and pose immediate danger to the public and the LRT system.
- (iv) Submissions to the Region
- A. Structure Condition Data
 - 1. Project Co shall submit to the Region as noted in Table 5.1 of this Appendix, by September 30 of each year in which measurements are taken in accordance with Article 5.1 of this Appendix, an updated copy of the following:
 - 1. All Inspections in electronic format;
 - 2. All the Inspection Reports in hard copy format; and
 - 3. All BCI, BCI-C, BCI-RW, and BCI-SS calculations and values.
 - 2. This information shall be submitted to the Region, in the format prescribed and/or referenced in this schedule.
 - B. System Inventory (for Structures)
 - 1. Project Co shall submit to the Region, before September 30 of each year, an updated copy of the following:

1. Structure inventory list; and
 2. List of Structures that may be structurally unstable, or deficient for load carrying capacity of the Region.
- C. Asset Management Plan (Initial and Updates)
1. Project Co shall submit to the Region its Asset Management Plan in accordance with Article 5.1 of this Appendix which at a minimum shall include: a copy of Project Co's list of structure asset preservation and repair accomplishments over the previous 12 months; Structure condition preservation and restoration strategies; annual plan for upcoming 12 months; achievements report based on previous plans; a copy of Project Co's structure asset preservation list and program for the next five (5) years.
- D. As Built Drawings—Structural drawings and As Built Drawings for the original construction, asset preservation, and repair work.
- (v) Additional Structure Inspections
- A. Project Co is required to undertake additional Structure inspection by a Qualified Inspector under the supervision of a Structural Engineer under the following circumstances which include, but not limited to:
 1. Accident or vehicle collision with a structure;
 2. Unusual/severe weather conditions or natural disasters;
 3. Where a perceived problem exists;
 4. Flooding/ice jams; and
 5. Vandalism or terrorism.
 - B. Project Co shall report the inspections and findings within seven days of a significant event potentially impacting structures' integrity and safety, which includes events noted above. Meeting the APPMs is in addition to the submission of complete and satisfactory inspection reports and findings following a significant event as described earlier.
- (vi) Asset Preservation Performance Measures
- A. Project Co is required to comply with APPMs as set forth below and further outlined in Schedule 20 – Payment Mechanism.
 - B. Project Co must demonstrate through its Quality Management System the process to achieve the specified outcomes.
 - C. The method for assessing the performance measure achievement is based on the definitions given in the Ontario Structure Inspection Manual.
 - D. The intervention criteria to be undertaken by Project Co to meet the APPMs also reinforce the 'whole of life' approach, encourage proactive preventative maintenance and asset preservation strategies and require Project Co to monitor the management of the Structures.

TABLE 6.3 Structures					
Asset Preservation Performance Measure	Structure Type	Intervention Criteria	Action	Maximum Response Time	Quality Failure
PSTR1	Bridges, Recreational Trail Bridges	<ul style="list-style-type: none"> • When BCI <70 • When 10% of any Key Structural Members is in Poor condition 	Undertake Structure Rehabilitation or repair works to address deterioration and defects	12 months	Refer to Schedule 20 – Payment Mechanism
PSTR2	Structural Culverts (including submerged Culverts)	<ul style="list-style-type: none"> • Structural Culverts with a BCI-C <70 	Undertake Structure Rehabilitation or repair works to address deterioration and defects	12 months	Refer to Schedule 20 – Payment Mechanism
PSTR3	Retaining Walls	<ul style="list-style-type: none"> • Retaining Walls with a BCI-RW <70 	Undertake Structure Rehabilitation or repair works to address deterioration and defects	12 months	Refer to Schedule 20 – Payment Mechanism

“Key Structural Members” means elements that are considered critical and should not be allowed to drop below a certain condition. This includes Deck top, Deck soffit, Expansion Joint, Bearings, Barriers, Substructure and Embankment, Girder and Coating.

Notwithstanding the above, if in the opinion of the Structural Engineer upon discovery of undue movements, damages or deterioration of key structural members that may cause structural instability or distress, the Project Co shall provide action plan within seven days to rectify the situation. This may include immediate temporary supports and longer term rehabilitation and repair works.

(d) Track

(i) General

A. The APPM are set to ensure the application of sound asset preservation practices. Asset Preservation Performance Measures are targeted to ensure:

1. Track Access and functionality;
 2. Structurally sound and safe track condition; and
 3. Limited consumption, over time, of the Track.
- B. The APPMs specified herein for track provide the outcome emphasis required and focus on four (4) key measures:
1. Track Alignment (Geometry);
 2. Rail Condition including Rail wear and Rail defects;
 3. Rail Structure; and
 4. Special Track work.
- C. Project Co is responsible for monitoring, maintaining, and reporting Infrastructure performance. The measures are consistent with regulatory requirements and industry standards. Asset condition and inventory data obtained from the required track inspections provides the basis for the APPM criteria.
- D. The APPMs are applied to the following Track Sections, which include:
1. Mainline track and special trackwork (crossovers) used for regularly scheduled revenue service;
 2. All special trackwork and crossovers used for revenue service;
 3. Tail tracks beyond terminal stations; and
 4. Yard lead tracks from the MSF up to, and including the mainline yard lead connections and associated crossovers
- E. The Track Asset Management cycle includes:
1. Inspection at the specified interval;
 2. Rating the condition of track and special trackwork;
 3. Programming treatments/rehabilitation;
 4. Undertaking physical remedial works;
 5. Inventory and condition updating; and
 6. Reporting achievements.
- F. These phases are fundamental to maintaining the Infrastructure and are consistent with industry practice and regulatory track safety requirements.
- G. Project Co's delivery of services must be based upon:
1. Emphasis on the availability of track and special trackwork across a range of relevant conditions;
 2. Outcome-based specifications, with Project Co given the latitude for treatment selection to control/correct defective conditions as per the material requirements defined in this Project Agreement;
 3. A life-cycle approach to maintenance and asset preservation that is in conformance with sound industry practices and with the APPMs;

4. Emphasis on meeting the prescribed standards and APPMs on an ongoing basis; and
 5. Quality management and environmental management processes underpinning the delivery of services.
- (ii) Infrastructure Condition Data Collection
- A. Project Co is responsible for collecting Track Condition data for the purposes of Asset Management and measuring performance achievement based on the requirements of Schedule 15-3 as well as Appendices A and B of this Schedule. The collection of Track condition data shall occur as part of Project Co's ongoing track inspection and monitoring activities as required by regulation, industry guidance, and as necessary for Project Co to execute its maintenance obligations as specified in Project Co's Maintenance Plans. Inspections to be used for data collection include weekly track inspections by qualified track inspectors, ultrasonic rail flaw detection, geometry inspections using an automated track inspection and measurement vehicle and special inspections including CWR inspections during extreme temperatures and temperature fluctuations; and other inspections precipitated due to events potentially resulting in damage to track.
- (iii) Asset Preservation Performance Measures
- A. Project Co is required to comply with the APPMs noted in Tables 6.4 A, B, C, and D of this Appendix and the following criteria:
 1. The combination of multiple single conditions requiring remedial actions occurring at the same point or over the same section as identified in the APPMs shall require a more immediate response; and
 2. All other regulatory or safety requirements applicable to track for the safe operation of Trains on the System.
 - B. Project Co must demonstrate through its Quality Management the process to achieve the specified outcome.

Table 6.4.A Track Geometry					
Asset Preservation Performance Measure	Intervention Criteria	Action	Maximum Response Time	Basis of Measure	Penalty
Geometry	Where any Track Geometry condition including gauge, horizontal alignment (line), track surface (vertical alignment, cross level, and superelevation):			Track Geometry measurements by automated geometry vehicle and manual field measurements	
	violates the APTA or Transport Canada standards (whichever is more stringent) for Class 4 track	Undertake asset preservation works to address non-compliance	3 months		Refer to Schedule 20 – Payment Mechanism
	violates the APTA or Transport Canada standards (whichever is more stringent) for Class 3 track	Undertake asset preservation works to address non-compliance	1 day		Refer to Schedule 20 – Payment Mechanism

Table 6.4.B
Rail Condition

Asset Preservation Performance Measure	Intervention Criteria	Action	Maximum Response Time	Basis of Measure	Penalty
Rail General	Where any Rail condition violates APTA or Transport Canada standards (whichever is more stringent) for Class 4 track	Undertake asset preservation works to address non-compliance.	Within 1 month	Rail inspection measurements from Geometry Vehicle, field measurements, or from ultrasonic rail inspection	Refer to Schedule 20 – Payment Mechanism
Rail Wear	Where <ul style="list-style-type: none"> • vertical running rail wear is greater than or equal to ½ inch, or • horizontal running rail (side) wear is greater than or equal to 3/8 inch, or • Guard rail or restraining rail side wear is greater than or equal to ¼ inch 	Monitor rail wear and program asset preservation works for rail replacement based on observed rail wear rates	Asset preservation activity plan within 1 month; implementation according to plan	Field measurements or automated measurements from appropriate inspection vehicle/equipment	Refer to Schedule 20 – Payment Mechanism

Table 6.4.B Rail Condition					
Asset Preservation Performance Measure	Intervention Criteria	Action	Maximum Response Time	Basis of Measure	Penalty
	Where <ul style="list-style-type: none"> • vertical running rail wear is greater than or equal to 5/8 inch, or • horizontal running rail (side) wear is greater than or equal to 5/8 inch, or • Guard rail or Restraining rail side wear is greater than or equal to 7/16 inch 	Undertake asset preservation works to address non-compliance	Immediately		Refer to Schedule 20 – Payment Mechanism
Rail Defects	Where track defects are identified in accordance with APTA Standards and/or Transport Canada Track Safety requirements	Perform immediate remedial actions as specified in the referenced standard. Perform asset preservation activities to fully remedy any temporary remedial actions	Immediate actions per standard. Full repair within 3 months or per the safety standard, whichever is less	Defect identification and measurement from field inspection or ultrasonic rail inspection	Refer to Schedule 20 – Payment Mechanism

Table 6.4.B Rail Condition					
Asset Preservation Performance Measure	Intervention Criteria	Action	Maximum Response Time	Basis of Measure	Penalty
Rail Corrugation	Where short wave rail corrugation exceeds 1/8 inch depth and/or rail corrugation results in track-based noise and / or vibration exceeding the limits established in the EPR	Perform asset preservation works to address non-compliance	1 month	Field measurements, Automatic rail inspection vehicle measurements, and noise and vibration measurements	Refer to Schedule 20 – Payment Mechanism

Table 6.4.C Track Structure					
Asset Preservation Performance Measure	Intervention Criteria	Action	Maximum Response Time	Basis of Measure	Penalty
General	Where any Track structure condition including ballast, ties, rail violate the APTA or Transport Canada Standards (whichever is more stringent) for Class 5 track	Undertake asset preservation works to address non-compliance.	6 month	Observations from field inspection or other automated vehicle-mounted inspection equipment	Refer to Schedule 20 – Payment Mechanism
	Where any Track structure condition including ballast, ties, rail violate the APTA or Transport Canada Standards (whichever is more stringent) for Class 4 track	Undertake asset preservation works to address non-compliance.	15 minutes	Observations from field inspection or other automated vehicle-mounted inspection equipment	Refer to Schedule 20 – Payment Mechanism

Table 6.4.D Special Trackwork					
Asset Preservation Performance Measure	Intervention Criteria	Action	Maximum Response Time	Basis of Measure	Penalty
General	Where any Special Trackwork condition including switches, frogs, restraining rail violate the APTA or Transport Canada Standards (whichever is more stringent) for Class 5 track	Undertake asset preservation works to address non-compliance.	6 month	Observations from field inspection or other automated vehicle-mounted inspection equipment	Refer to Schedule 20 – Payment Mechanism
	Where any Special Trackwork condition including switches, frogs, restraining rail violate the APTA or Transport Canada Standards (whichever is more stringent) for Class 4 track	Undertake asset preservation works to address non-compliance.	Immediately	Observations from field inspection or other automated vehicle-mounted inspection equipment	Refer to Schedule 20 – Payment Mechanism

(iv) References and Clarifications

- A. APTA standards as referenced in this Article refer to the “Standard for Rail Transit Track Inspection and Maintenance” (APTA ART-S-FS-002) as updated from time to time.
- B. Transport Canada Standards as referenced in this Article refer to “Rules Respecting Track Safety” (Transport Canada TC E-31) as updated from time to time.

- C. Schedule 15-3 and 15-4 (Operations Requirements and Maintenance and Rehabilitation Requirements) and the provisions of the Design and Construction Specifications (Schedule 15-2) related to Track apply in full to the requirements of this Appendix.
- (e) Vehicles and Systems
- (i) General
- A. Vehicles and Systems elements shall meet the provisions of the Design and Construction Specifications related to Vehicles and Systems as well as Appendix A and Appendix B to this Schedule. Systems elements as discussed in this Article include all systems related to the operation, control, and monitoring of the System including but not limited to traction power, OCS, Corrosion Control, Train Control/Signals, Crossing Protection Warning, SCADA and communication systems.
- B. Project Co is fully responsible for keeping all Vehicles and Systems assets safe, functional, reliable, and maintainable and to develop an asset preservation strategy (including preventative and corrective maintenance and replacement) based on continual monitoring and assessment of the condition, functionality and reliability of Vehicles and Systems Elements.
- C. Project Co is responsible for monitoring, maintaining, and reporting the performance of Vehicle and Systems Elements.
- D. The Asset Management cycle for Vehicles and Systems includes:
1. Inspection at appropriate intervals for each system and subsystem components according to regulatory requirements, industry standard or recommended practices, and as defined in Project Co's Maintenance and Rehabilitation Plan;
 2. Rating the condition of each Vehicle and System asset;
 3. Annual inspection, certification, and reporting of Systems related to EMI, EMC, and Corrosion Control are performing as designed;
 4. Programming treatments/rehabilitation;
 5. Undertaking remedial works;
 6. Inventory and condition updating; and
 7. Reporting achievements.
- E. Project Co's delivery of services must be based upon:
1. Emphasis on the availability of Vehicles and Systems across a range of physical and operating conditions to comply with the Operational Performance Requirements and in accordance with the requirements of Schedule 15-3;
 2. Outcome-based specification, with Project Co given the latitude for treatment selection to control/correct defective conditions as per the material requirements defined in this Project Agreement;
 3. A life-cycle approach to maintenance and asset preservation that is in conformance with sound industry practices;
 4. A preventative rather than a reactive maintenance/repair strategy to limit asset consumption with inspection and monitoring actions to facilitate this strategy; and

5. Compliance with regulatory and safety requirements as applicable to Vehicles and Systems.
 - (ii) Vehicles and Systems Condition Data Collection and Reporting
 - A. Project Co is responsible for collecting Vehicle and Systems condition data for the purposes of Asset Management and measuring performance achievement based on the requirements of Appendices A and B of this Schedule. The collection of Vehicle and Systems condition data shall occur as part of Project Co's ongoing inspection, testing, and monitoring activities as required and specified for vehicle and systems assets and their subcomponents by regulation, industry standards and practices, and/or as necessary for Project Co to execute its maintenance obligations as specified in Project Co's maintenance plans.
 - B. Project Co shall utilize inspection, testing and monitoring data including, but not limited to, the information required for reporting per Appendix A to assess the condition of vehicle and systems assets and their subcomponents, to monitor trends, and proactively program asset management actions. Such data, trends, and programmed asset management activities shall be included in the annual reports as required in accordance with Article 5 of this Appendix.
 - (iii) Performance Measures
 - A. Project Co is required to comply with Design and Construction Specifications and Appendices A and B to this Schedule as relevant to Vehicles and Systems and meet the reporting requirements of this Appendix.
- (f) Facilities (LRT Stops / OMSF)
 - (i) General
 - A. Systems elements as discussed in this Article include those Facilities related to the operation, maintenance, and preservation of the Region System and include LRT Stops and the Operations, Maintenance and Storage Facility (OMSF).
 - B. Project Co is fully responsible for keeping all Facilities assets safe, functional, reliable, and maintainable and to develop an asset preservation strategy (including preventative maintenance and replacement) by focusing on general assessment of the condition of all Facility assets. The target condition for all Facility assets is a condition rating of "Good" or better, as defined in 6.5 below, at all times.
 - C. Project Co is responsible for monitoring, maintaining, and reporting Facilities assets performance.
 - (ii) The Facility Asset Management cycle includes:
 - A. Inspection at appropriate intervals for each Facility according to regulatory requirements, industry standard or recommended practices, as referenced in CSA S448.1 – Repair of Reinforced Concrete in Buildings, CSA S478 – Guideline on Durability in Buildings, CSA S413 – Parking Structures (as it may be applicable to building structures), the Ontario Structure Inspection Manual (OSIM), and MTO's Structure Rehabilitation Manual (as it may be applicable to building structures), and as defined in Project Co's Maintenance and Rehabilitation Plan;
 - B. Rating the condition of each Facility and Facility Elements (meaning those elements as defined in the National Institute of Standards Technology's "Uniform at II Elemental Classification of Building Specifications, Cost Estimating, and Cost Analysis");

- C. Programming treatments/rehabilitation;
 - D. Undertaking remedial works;
 - E. Inventory and condition updating; and
 - F. Reporting achievements.
- (iii) Project Co's delivery of services must be based upon:
- A. Emphasis on the availability of each Facility across a range of physical and operating conditions;
 - B. Outcome-based specifications, with Project Co given the latitude for treatment selection to control/correct defective conditions as per the material requirements defined in this Project Agreement;
 - C. A life-cycle approach to maintenance and asset preservation that is in conformance with good industry practices and with the APPMs;
 - D. Emphasis on meeting the prescribed standards and APPMs on an ongoing basis;
 - E. A mechanism for the Region to correct non-compliance if Project Co fails to meet the APPMs; and
 - F. Quality management and environmental management processes underpinning the delivery of services.
- (iv) Facilities Condition Data Collection
- A. Project Co is responsible for collecting Facilities condition data for the purposes of Asset Management and measuring performance achievement based on the requirements of Schedule 15-3, and Appendices A and B of this Schedule. The collection of Facilities condition data shall occur as part of Project Co's ongoing inspection, testing, and monitoring activities as required and specified for each Facility and/or Facility component by regulation, good industry standards and practices, and as necessary for Project Co to execute its maintenance obligations as specified in Project Co's maintenance plans.
 - B. Facilities Inspections
 - 1. Project Co shall use Qualified Inspectors, defined as individuals with at least five (5) years of experience in Facilities inspections.
 - C. The program of Facilities inspections must be managed by a suitably qualified Buildings Structural Engineer, who:
 - 1. Is a Professional Engineer with a background in inspection, design, construction, maintenance, and rehabilitation of buildings;
 - 2. Has extensive experience in supervising buildings design, construction, inspection, maintenance, and asset preservation;
 - 3. Maintains overall management and technical supervision of the buildings inspection and Maintenance/asset preservation program;
 - 4. Accepts responsibility for the technical competence of all personnel involved in Facilities inspection and reporting;
 - 5. Accepts responsibility for the structural safety of all buildings;

- 6. Has the overall responsibility for assessing the buildings functionality/safety, buildings risks, and potential risks to Region passengers, and to determine an appropriate asset preservation strategy.
- D. While the Qualified Inspector is tasked with identifying defects, it is the Buildings Structural Engineer who is required to interpret the observations and implement appropriate structure asset preservation strategies to meet the Project Agreement performance requirements.
- E. The types of buildings inspections required are as indicated in Table 6.5.

TABLE 6.5 Inspection Types		
Type	Description	Maximum Inspection Frequencies
Superficial (maintenance)	Focus on Region Passenger safety and Facilities functionality; refer to Schedule 15-3	These are as part of routine maintenance.
Detailed	Focus on a general assessment of condition and developing an annual, five (5)-year and ten-year asset preservation programs (including Preventative Maintenance and replacement)	Once every two (2) years
Condition Surveys	Focus on producing a comprehensive assessment of condition, including undertaking physical testing, in order to develop an appropriate asset preservation program (including preventative maintenance, rehabilitation and replacement)	As required by the Building Structural Engineer

- F. Facilities exhibiting significant displacement, deterioration, defects or damage are required to be inspected and assessed more frequently with the intervals determined by the Buildings Structural Engineer to meet the performance requirements of this Project Agreement and Good Industry Practice.
 - G. Facilities condition inspection is required to be undertaken using format and detail consistent with that specified reference documents. The inspection data is to be provided to the Region in a format acceptable and pursuant to Table 5.1.
 - H. Project Co is required to retain files of Facilities inspection records and asset preservation plans so that a continuous history of each Facility is available throughout the Project Term.
 - I. Inspections of Facilities shall commence following Substantial Completion.
- (v) Performance Measures
- A. Project Co shall utilize data from its routine inspections, testing and monitoring activities as described in this Article to prepare a condition assessment for each Facility according to the rating methodology in Table 6.5 for annual condition reporting. In addition, a five-year detailed rating condition assessment of each system shall be undertaken to obtain the current condition and inventory of each system and subsystem based on the

rating methodology described in Table 6.5. Non-Conformance applies to each system and subsystem component that does not meet the maximum response time noted below.

TABLE 6.6 Facilities Condition Rating			
Label	Description	Maintenance or Repair	Maximum Response Time
Excellent	New or as good as new, fully functional, high reliability, Facility components are fully supported	None	None
Good	Normal aging, fully functional, reliability meeting industry targets, Facilities are available and can be used, failures can be remedied with normal maintenance actions without significant disruption	Conduct Maintenance only	12 months
Fair	Substantial aging/wear approaching end of useful life, functional but reliability below minimum industry targets, diminishing or more costly maintenance of Facility components, requires more substantial maintenance and monitoring	Conduct Maintenance and undertake asset preservation work to correct deficiency up to and including replacement of component	12 months
Poor	Exceeds useful life, reliability well below acceptable industry targets, frequent systemic failures, Facility components unavailable, maintenance and monitoring efforts are excessive and disruptive to system operation and to other maintenance activities	Conduct Maintenance and undertake asset preservation work to correct deficiencies up to and including system or subsystem replacement	Three (3) months, with plan of action due within two (2) weeks

- B. Repairs and asset preservation are to be completed within the maximum response times in Table 6.6. Any safety hazards and/or conditions preventing the operation of the Region service shall be remedied immediately.

(g) Other Asset Class Condition Data

(i) General

- A. Drainage and sedimentation control structures, other than those defined as part of Structures, shall meet the provisions of the Design and Construction Specifications related to drainage and sedimentation control structures, and continually meet the requirements of Schedule 15.3. The drainage structures and sedimentation control structures are targeted to ensure:

- 1. System safety;

2. That functionality is at an acceptable level; and
 3. Asset consumption is limited.
- B. The drainage structures and sedimentation control structures Asset Management cycle includes, in addition to routine inspection and maintenance as addressed in Schedule 15-3:
1. Inspection ;
 2. Rating the condition of the structure and its elements;
 3. Programming correction of deficiency;
 4. Undertaking remedial works;
 5. Inventory updating; and
 6. Reporting achievements.
- C. The required delivery of services is to be based upon:
1. Emphasis on System safety;
 2. Outcome based specification with Project Co given the latitude for treatment selection to control/correct defective condition as per the requirements of this Project Agreement;
 3. A life-cycle approach to maintenance and asset preservation; and
 4. A preventative rather than reactive maintenance/repair strategy to limit asset consumption with inspections recommended facilitating this strategy.
- (ii) Other Asset Class Inspection Management
- A. In this Project Agreement the maximum duration between inspections for the drainage and sediment control structures is:
1. Superficial—refer to Schedule 15-3;
 2. Routine structure condition inspection—annual condition assessments focused on developing an annual asset preservation program; and
 3. Detailed structure condition assessment—five (5)-yearly detailed inspections focused on producing a comprehensive assessment of condition and if necessary undertaking physical testing in order to develop an appropriate asset preservation program.
- B. Structures exhibiting significant deterioration, defects, or damage are to be inspected more frequently with the intervals determined by experienced Professional Engineers.
- C. Project Co shall develop and report Culvert treatment recommendations based on the annual Culvert assessment findings.
- D. In general, the treatment recommendations for Culverts shall generally be developed and applied as follows (based on defined terms in the Culvert Assessment Guide):
1. An imminent danger of failure shall be replaced immediately;

2. A **Remaining Life or Material Rating** in either the Poor or Below Minimum Tolerable condition category at the time of construction shall be considered for replacement or lining;
 3. A **Shape Rating** in either the Poor or Below Minimum Tolerable condition category shall be considered for remedial action and only where the distortion to the shape of the Culvert is adversely affecting Region or there is a reasonable expectation the distortion will continue to progress and adversely affect road performance;
 4. A **CapaRegion Rating** in either the Poor or Below Minimum Tolerable condition category shall be considered for cleanout, ditching, or other remediation, and only when surface drainage is being adversely impacted;
 5. An **Invert, Scour, or Slope Erosion Rating** in either the Poor or Below Minimum Tolerable condition category shall be considered for remedial action, and only where there is a reasonable expectation that the condition may progress to undermining and failure of the Culvert invert, and adversely affect road performance;
 6. A **Settlement Rating** in either the Poor or Below Minimum Tolerable condition category should be identified for a Pavement engineering investigation.
- E. Each annual assessment shall be completed and a Culvert condition assessment report including general details, condition ratings, treatment recommendations and the treatment priorities for the recommended Culvert replacements shall be completed for each Culvert within the Lands, notwithstanding the Culverts which remain the Region’s responsibility as indicated in Schedule 15-3. The Culvert general details shall, at minimum, include the date of inspection, municipality, Asset Inventory number, location within the Lands, type, shape, length (m), size (mm) and fill (depth and type), condition ratings, treatment recommendation, treatment priority and accomplishment.

(iii) Culvert Assessment Guide

Remaining Life Span Rating Criteria	
Category	Description
Very Good (VG)	Has more than 15 years remaining in life
Good (G)	Has Between 10 to 15 years remaining
Fair (F)	Has between five (5) to 10 years remaining
Poor (P)	Has less than five (5) years remaining
Below Minimum Tolerable (BMT)	Has less than one (1) year remaining
Imminent Danger of Failure (IDF)	Failure is about to happen

Note:

Use an understanding of Culvert condition performance gained through years of engineering experience, or general maintenance activities, or equivalent, to determine the remaining life span of the Culvert and to

recognize if there is an imminent danger of failure.

(iv) Material Rating Criteria

Material Rating Criteria – Corrugated Metal Culverts	
Category	Description
Very Good	New condition, may also exhibit slight discoloration of surface, galvanizing partially gone along invert.
Good	Discoloration of surface, galvanizing completely gone along invert but no layers of rust. Minor pinholes in pipe material located at end of pipe but not located beneath Roadway.
Fair	Layers of rust forming. Sporadic pitting of invert, minor pinholes forming throughout pipe.
Poor	Heavy rust, thick scaling throughout pipe. Deep pitting, perforations throughout in invert.
Below Minimum Tolerable	Extensive heavy rust, extensive perforations throughout pipe. End sections corroded away. Bottom portion completely corroded exposing underlying granular. Partially to fully collapsed.

(v) Asset Preservation Performance Measure

- A. Project Co is required to comply with the Design and Construction Specifications and Appendices A and B to this Schedule as relevant to drainage and sedimentation control structures.

Table 6.7 Culverts					
Asset Preservation Performance Measure	Performance Measure	Intervention Criteria	Action	Maximum Response Time	Penalty*
PCUL1	Remaining Life Span Rating	Project Co fails to meet all requirements that are specified to be taken when Project Co Detects or was Made Aware of, an imminent danger of a Culvert failure	Immediate	24 hours	Refer to Schedule 20 – Payment Mechanism
PCUL2	Remaining Life Span Rating	Project Co fails to maintain a Non-Structural Culvert at a Remaining Life Span Rating of at least “Good” or better	Consider Asset Preservation or Replacement	12 months	Refer to Schedule 20 – Payment Mechanism

(h) Other Asset Classes

(i) General

- A. This Article relates to all other assets and asset classes for which specific APPMs have not been identified in the previous Articles.
- B. Project Co is fully responsible for keeping all System assets safe, clean, tidy, functional, and maintainable to develop an asset preservation strategy (including preventative maintenance and replacement) by focusing on general assessment of condition of all System assets. The target condition for all other assets is a condition rating of “Good” or better, as defined in 6.8.2 below, at all times.
- C. Routine maintenance and operation of the System are addressed in Schedule 15-3.

(ii) Performance Measures

- A. Project Co shall utilize data from its routine inspections, testing, and monitoring activities to prepare a condition assessment for asset according to the rating methodology in Table 6.8. Additionally, Project Co shall conduct a five-year detailed rating condition assessment of other assets and asset classes to obtain the current inventory and condition based on the rating methodology described in Table 6.8. Non-Conformance applies to

each asset component that requires Asset Preservation works due to one or more of the conditions below and for which the maximum response time is exceeded.

TABLE 6.8 Other Asset Classes Condition Rating			
Label	Description	Maintenance or Repair	Maximum Response Time
Excellent	New or as good as new	None	None
Good	Normal wear and tear, asset performs as intended, asset is maintainable using normal maintenance efforts and practices, no requirement for repair or replacement parts and services are readily available	Maintenance only	12 months
Fair	Minor defects present, asset performs as intended, increasing effort is required to maintain asset, no major repairs are imminent, parts and service availability is limited.	Maintenance and asset preservation	12 months
Poor	Advanced defect(s), asset performance frequently impaired or diminished, extensive maintenance, monitoring and/or frequent repairs are required, major repairs may be imminent, parts and/or services are unavailable	Maintenance and/or asset preservation	Three (3) months, with plan of action due within two (2) weeks
Very Poor	Advanced defect(s)—Requires immediate maintenance/repair. An imminent safety Hazard	Maintenance and/or asset preservation	Immediate

B. Repairs and asset preservation are to be completed within the maximum response times in Table 6.8. Any safety hazards and/or conditions preventing the operation of the Region shall be remedied immediately.

(iii) Performance Measures

A. In addition to the items noted in the above table, Project Co is required to comply with the measures, minimum condition and response times applicable to System as defined in this Schedule.

(i) Additional Inspection of the Region

(i) Project Co is required to undertake additional inspection of the System assets under circumstances that affect the integrity of System which include, but are not limited to:

1. Accident or LRV collision;

2. Vehicle collision with a structure;
 3. Unusual/severe weather conditions or natural disasters;
 4. Where a perceived problem exists; and
 5. Flooding/ice jams.
- (ii) Project Co shall undertake inspection and report the inspection results within seven (7) days of any significant natural event or other events impacting the integrity of System assets or the safety of the System and Passengers. The reporting format shall be consistent with the requirements of the Operation and Maintenance Performance Requirements. The APPM indicated is applicable to the submission of complete and satisfactory inspection report for each event.