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402.0 ASSET PRESERVATION

402.1 INTRODUCTION

402.1.1 General

This Section defines the scope and level of service requirements for the preservation and rehabilitation activities required pursuant to this Project Agreement. The objectives are to:

- a) Ensuring safety of the Infrastructure is a continual focus;
- b) Achieve defined service levels;
- c) Limit asset consumption;
- d) Achieve Design Life expectations; and
- e) Provide sound Asset Management to maintain long-term structural integrity.

402.1.2 Asset Preservation Scope

The scope includes the provision of all products and services associated with the planning, management and delivery of rehabilitation activities. The asset preservation process is described as follows:

- a) Ministry specifies annual Asset Preservation Performance Measures (APPM’s);
- b) Project Co develops an Asset Management strategy that delivers the required annual Performance Measures within its Asset Management Plan;
- c) Project Co implements the Asset Management strategy through planned maintenance and rehabilitation activities;
- d) Project Co annually monitors asset condition and reports achievement; and
- e) Project Co adjusts Asset Management strategy accordingly.

402.1.3 Outcome Objectives

Project Co is required to develop and implement an Asset Management Plan that limits the extent of asset consumption, of the individual assets, by maintaining structural integrity annually during the Operational Term. Table 402-1 defines the key outcome objectives required from Project Co’s Asset Management Plan.

Table 402-1: Asset Preservation Outcome Objectives

Category	Item	Outcome Objectives
Highway Running Surfaces	a. Paved Travel Lanes	<ul style="list-style-type: none"> • Ensure paved travel lanes are safe (free of hazards) and available. • Ensure access at all times for all legal and permitted vehicles. • Minimize traffic delays.

Category	Item	Outcome Objectives
		<ul style="list-style-type: none"> • Provide 2-way, 2-lane and 4-lane access at all times. • Provide acceptable riding comfort for users of the Bypass Infrastructure.
	b. Paved Shoulders	Ensure shoulders are safe and available.
	c. Paved Medians	Ensure medians are fully functional, tidy and free-draining.
	d. Paved Entrance/Exit Ramps	Ensure entrance / exit ramps are safe and available.
	e. Management	<ul style="list-style-type: none"> • Ensure inspection, condition survey and updating of the Saskatchewan Pavement Preservation Database is complete and accurate. • Ensure programming of physical OM&R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.
Bridges	a. Structure Condition and Function	<ul style="list-style-type: none"> • Ensure that design levels are maintained so that the passage of allowable and permitted commercial vehicles is not restricted. • Ensure all bridges remain safe and functional at all times for the travelling public.
	b. Side Protection (Barriers)	Ensure that side protection has adequate strength and is appropriately positioned to provide safe access over the bridge throughout the Operational Term.
	c. Structure Risk	Manage the probability and consequence of failure throughout the Operational Term.
	d. Physical Environment	Maintain or enhance the waterway and fisheries features at each bridge site throughout the Operational Term,
	e. Management	<ul style="list-style-type: none"> • Ensure inspection, condition survey and updating of the Saskatchewan Bridge Management System occurs and is complete and accurate. • Ensure programming of physical OM&R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.
Major Culverts (≥ 3.0m ø)	a. Structure Condition and Function	<ul style="list-style-type: none"> • Ensure there are no load limitations, either in terms of weight or speed, which compromise the passage of legal heavy commercial vehicles. • Ensure all major culverts remain safe and functional at all times.

Category	Item	Outcome Objectives
	b. Structure Risk	Manage the probability and consequence of failure throughout the Operational Term.
	c. Physical Environment	Maintain or enhance the waterway/fisheries features and requirements as existing or set in current permits at each major culvert site throughout the Operational Term.
	d. Management	<ul style="list-style-type: none"> • Ensure inspection, condition survey and updating of the Saskatchewan Bridge Management System is complete and accurate • Ensure programming of physical OM&R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.
Major Retaining Walls (> 2.0m high)	a. Structure Condition and Function	<ul style="list-style-type: none"> • Ensure that there are no impediments to the passage of legal heavy commercial vehicles. • Ensure walls remain safe and functional at all times.
	b. Management	<ul style="list-style-type: none"> • Ensure inspection, condition survey and updating of the Saskatchewan Bridge Management System is complete and accurate. • Ensure programming of physical OM&R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.
Major Sign Structures	a. Structure Condition and Function	Ensure major overhead sign structures remain safe and functional throughout the Operational Term.
	b. Structure Risk	Manage the probability and consequence of failure throughout the Operational Term.
	c. Physical Environment	Maintain or enhance the features and requirements as existing or set in current permits at site throughout the Operational Term.
	d. Management	<ul style="list-style-type: none"> • Ensure inspection, condition survey and updating of the Saskatchewan Bridge Management System is complete and accurate. • Ensure programming of physical OM& R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.
Drainage Infrastructure	a. On Highway - this subset includes curbs and gutters, catch basins/sumps and the grates.	To minimize the encroachment of surface water (flowing or ponding) on the Highway Running Surface ensuring road user safety is not compromised.

Category	Item	Outcome Objectives
	b. Adjacent Highway - this subset includes drainage ditches (lined and unlined), spillways, flumes and all applicable drains.	To minimize the encroachment of surface water collected from the Bypass Infrastructure and adjacent ground onto the Highway Running Surface and ensure that the Bypass Infrastructure and users of the Bypass Infrastructure are not at risk from scour and/or slope failures. The assets in this subset may require additional capacity to accommodate ice, snow and debris accumulation from natural and snow plough processes being Project Co's responsibility.
	c. Under Highway - This subset includes culverts less than 3.0 m in diameter, horizontal drains, and subsoil systems (pipes or filter layers) to control groundwater.	To convey surface and ground water under the Bypass Infrastructure without putting the Bypass Infrastructure and users of the Bypass Infrastructure at risk and to meet environmental requirements. The assets in this subset may need to include additional capacity for ice, snow and debris loadings and this is Project Co's responsibility.
	d. Management	<ul style="list-style-type: none"> • Ensure Drainage Infrastructure inspection, condition survey and updating of the inventory is complete and accurate. • Ensure programming of physical OM&R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.
Electrical Infrastructure	a. General	<ul style="list-style-type: none"> • Attain 100% compliance with provincial and federal electrical safety standards. • Ensure a safe, efficient and fully functional electrical system.
	b. Lighting	Achieve, as a minimum, the provincial standards and be consistent with the provincial highway network.
	c. Signs	<ul style="list-style-type: none"> • Ensure safe, efficient and fully functional signs. • Ensure signs are up-to-date and display accurate messages.
	d. Traffic Signals	Ensure traffic signals are functional and serviceable.
	e. Asset Inventory	Maintain an up-to-date electrical asset inventory.
	f. Management	<ul style="list-style-type: none"> • Ensure programming of physical OM&R Work is complete and based upon long term focus.

Category	Item	Outcome Objectives
		<ul style="list-style-type: none"> • Ensure best practices and continual improvements are applied.
ITS Infrastructure	a. General	<ul style="list-style-type: none"> • Attain full compliance with provincial ITS standards including the National Transportation Communications for ITS Protocol (NTCIP) • Attain full compliance with provincial and federal safety standards • Ensure safe, efficient and fully functional ITS • Continually strive to minimize energy consumption • Ensure ongoing operation and maintenance of all ITS components except ITS hardware in the DMC. • Ensure that the structures (poles, foundations for signal controller cabinets, bracing for VMS, etc.) are safe and functional throughout the Operational Term. • Ensure Good Industry Practice and continual improvements are applied
	b. RWIS	<ul style="list-style-type: none"> • Ensure that the local and environmental measurement devices at the RWIS station are functional and transmitting to the data management centre • Ensure that the devices are serviceable
	c. Smart Traffic Signals	<ul style="list-style-type: none"> • Ensure that the smart traffic signal controllers at the Pilot Butte Access Road interchange and at the Highway 46/Highway 364 intersection are functional and transmitting to the data management centre • Ensure CCTV cameras at the interchange are properly functioning and transmitting images of the operation
	d. CCTV Cameras	<ul style="list-style-type: none"> • Ensure the temporary and permanent CCTV cameras deployed at interchanges and the RWIS station are functional and serviceable.
	e. Variable Message Signs (VMS)	<ul style="list-style-type: none"> • Ensure VMS are readable by the drivers and display the message transmitted • Maintain compatibility with NTCIP for the VMS • Ensure VMS and the modems are properly sending and receiving data
	f. Traffic Data Counters (TDC)	<ul style="list-style-type: none"> • Ensure Traffic Data Counters are functional and serviceable and provide the required data •

Category	Item	Outcome Objectives
	g. Communications Subsystem	<ul style="list-style-type: none"> • Ensure communications subsystem provides connectivity to all ITS components • Ensure that the wireless receiver is functional and receives / sends data within the correct thresholds for speed and accuracy
	h. Data Management Centre	<ul style="list-style-type: none"> • Ensure that the data management centre is receiving the data from the ITS field devices in the correct format and within the required thresholds for accuracy and latency • Ensure that the 2 separate facility locations that together comprise the DMC are transmitting over the virtual private network (VPN) • Ensure that the data management facility, including the hardware and software, at 1 Research Drive is functional and serviced • Ensure that the operational facility at 1855 Victoria Avenue with the operator work stations are functional and serviceable
	i. Vehicle Inspection Systems	<ul style="list-style-type: none"> • Ensure that the pre-screening stations for commercial vehicle enforcement are functional and serviceable • Pre-screening stations shall be transmitting to the data management centre specifically the work stations
	j. Asset Inventory	<ul style="list-style-type: none"> • Maintain an up-to-date ITS asset inventory
	k. Management	<ul style="list-style-type: none"> • Ensure programming of physical OM&R Work is complete and based upon long term focus. • Ensure best practices and continual improvements are applied.

402.2 REPORTING REQUIREMENTS

This section describes the plans and reports that are required by the Ministry.

The general purpose of the plans is for Project Co. to provide documentation that demonstrates to the Ministry an understanding of the Asset Management requirements and to present an Asset Management strategy that is based upon rationalized knowledge of asset condition and performance.

The general purpose of the reports is for Project Co to regularly provide information to the Ministry for their corporate Asset Management information systems.

402.2.1 Plans and Reports Schedule

Table 402-2 provides a summarized schedule of the plans and reports required from Project Co.

Table 402-2: Schedule of Deliverable Plans and Reports - Response Time Measures

Performance Measure	Deliverable Name	Specification Reference	Due Date	Review Procedure
PR1	Asset Management Plan for Existing Bypass Infrastructure During Construction Activities	402.2.3	60 days prior to start date of Operational Term	Yes
PR2	Asset Management Plan for Existing Bypass Infrastructure and New Bypass Infrastructure (including initial 5 year Rehabilitation schedule)	402.2.3	60 days prior to Substantial Completion Date	Yes
PR3	Asset Management Plan Updates (including updated 5 year Rehabilitation schedule)	402.2.3	January 30 annually	Yes
PR4	Annual APPM Achievement Report	402.2.5	November 30 annually	Yes
PR5	Pavement Condition Data	402.2.4	November 30 annually (data delivered not more than 1 month following survey)	Yes
PR6	Structures Condition Data	402.2.4	November 30 annually	Yes
PR7	Additional Structures Inspection Report	402.3.2	As required within 7 days of incident	Yes
PR8	Drainage Infrastructure Condition Data	402.2.4	November 30 annually	Yes

Performance Measure	Deliverable Name	Specification Reference	Due Date	Review Procedure
PR9	ITS Condition Report	402.2.5	November 30 annually	Yes
PR10	Other Asset Inventory Data	402.2.4	November 30 annually	Yes

The documents above that are indicated to be subjected to Schedule 9 – Review Procedure shall be submitted to the Ministry in accordance with the Review Procedure, as the case may be.

402.2.2 File Formats

Unless specified otherwise, electronic files shall be compatible with the most recent version of either Microsoft Office or Adobe Acrobat Reader. All supplied electronic files shall be on CD, DVD or USB 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 supply to the Ministry.

402.2.3 Asset Management Plan

Project Co shall provide to the Ministry a written plan (the “**Asset Management Plan**”) which describes the procedures for achieving the specified Performance Measures delivered for the entire Bypass Infrastructure during the Operational Term.

An initial Asset Management Plan is required for all Existing Bypass Infrastructure that is to be maintained during the Construction Activities. A subsequent Asset Management Plan will be prepared prior to Substantial Completion that encompasses both the Existing Bypass Infrastructure and New Bypass Infrastructure.

The Asset Management Plan and all updates shall, as a minimum:

- a) Provide a description of and the manner in which the overall performance management reporting will be achieved;
- b) Be aligned with scope of operation, maintenance and rehabilitation obligations within this Project Agreement;
- c) Relate to other obligations and plans related to the OM&R Work such as environmental, traffic and the IMS Manual;
- d) Identify the Intervention Criteria for each Asset Preservation Performance Measures (APPM) as well as the requirements set out in Section 500 to this Schedule 15-3 – OM&R and Handback;
- e) Describe the approach for asset condition inspection;
- f) Describe the approach for assessing the manner in which the APPMs will be achieved;
- g) Identify the deterioration rate and factors affecting the APPMs;

- h) Describe the process for Rehabilitation work identification, programming and prioritization in terms of developing the Asset Management Plan and the 5 year rehabilitation schedule addressing any APPM non-compliance;
- i) Identify and describe the Asset Management approach in respect to integrating and aligning routine maintenance activities and rehabilitation work;
- j) Identify any areas of risk and describe mitigation measures;
- k) Describe the approach for completing the annual work schedule including the resources employed, plant, materials and facilities associated therewith and in delivering any other physical OM&R Work including labour, plant, materials and facilities;
- l) Describe any processes and innovations to improve performance including the performance reporting process;
- m) Provide an indication of the expected condition performance of the asset over the remainder of the Operational 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, handback and target condition of the asset group; and
- n) Include a 5 year rehabilitation schedule consisting of a rolling, forward OM&R Work program that describes the planned preventative maintenance and rehabilitation OM&R Work (excluding minor Routine Maintenance) that Project Co is planning to undertake over following 5 year period, and providing specific details regarding planned rehabilitation OM&R Work including but not limited to:
 - Both the annual and quarterly for planned rehabilitation OM&R Work within the first 2 years, and only the year thereafter;
 - Advanced technical evaluations completed;
 - Field investigations completed;
 - Updated rehabilitation treatment; and
 - Design documentation;

It is recognized that, in respect of the 5 year rehabilitation schedule:

- Under a performance based contract, Project Co has the right to alter the schedule, so long as performance is achieved;
- Project Co is required to model and schedule work for a period longer than the 5 year period, but is required to only publish the schedule in respect of the first 5 years;
- The timing of projects in the future is less certain than those in the current year; and
- Significant variations from the 5 year rehabilitation schedule and between successive schedules will be seen as indicative of the lack of Project Co's Asset Management expertise.

The 5 year rehabilitation schedule shall be of the following format for linear assets (such as shoulders, traffic lanes and medians):

- The plan should be produced to clearly identify the start and end locations and cross-sectional position of all OM&R Work. Where OM&R Work is to be undertaken on only part of the cross section (i.e. shoulders, or 1 lane) then the plan should be formatted to clearly indicate this;
- Indicate the timing and nature of the OM&R Work to be undertaken; and
- Have some indication (code or otherwise) of the level of certainty on the OM&R Work occurring.

The 5 year rehabilitation schedule shall be of the following format for point assets (such as bridges):

- Assets should be grouped firstly on asset type, then by location along the highway;
- Indicate the timing and nature of the OM&R Work to be undertaken; and
- Have some indication (code or otherwise) of the level of certainty on the OM&R Work occurring.

402.2.4 Asset Inventory and Condition Data

Project Co is responsible for collecting asset inventory and pavement / structure condition data for the purposes of Asset Management and for measuring performance achievement. The requirements for such data are detailed in Table 402-3 and are to be delivered in accordance with Table 402-2 (Schedule of Deliverable Plans and Reports - Response Time Measures).

Table 402-3: Asset Inventory and Condition Data

Asset Group	Provincial System	Data Delivery Requirements
Highway Running Surfaces (Including paved travel lanes, shoulders, medians and entrance / exit ramps)	<ul style="list-style-type: none"> • Saskatchewan Pavement Preservation Database 	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Ministry file specifications. • Electronic condition data is to be delivered in a format suitable for electronic importing directly into the relevant provincial corporate system.
Bridge Structures: a) Bridges b) Major Retaining Walls c) Major Culverts	<ul style="list-style-type: none"> • Saskatchewan Bridge Management System • Culvert database • Saskatchewan Sign Database 	<ul style="list-style-type: none"> • All condition data collection and reporting on an annual basis in accordance with Ministry file specifications.

Asset Group	Provincial System	Data Delivery Requirements
d) Major Sign Structures	<ul style="list-style-type: none"> No corporate system for major retaining walls 	<ul style="list-style-type: none"> Electronic condition data is to be delivered in a format suitable for electronic importing directly into the relevant provincial corporate system.
Drainage Infrastructure (Including minor culverts, curb and gutter, catch basins, flumes and manholes)	<ul style="list-style-type: none"> No corporate system 	<ul style="list-style-type: none"> Maintenance inspection reports from Section 401 to this Schedule 15-3 – OM&R and Handback
Electrical Infrastructure (Including street lighting, traffic signals and control boxes)	<ul style="list-style-type: none"> No corporate system 	<ul style="list-style-type: none"> Maintenance inspection reports from Section 401 to this Schedule 15-3 – OM&R and Handback
ITS Infrastructure	<ul style="list-style-type: none"> No corporate system 	<ul style="list-style-type: none"> Maintenance inspection reports from Section 401 to this Schedule 15-3 – OM&R and Handback.
Other Minor Assets (Including signs, fences, retaining walls < 2m, noise barrier, gates, guardrail and reflectors, and lineal safety features)	<ul style="list-style-type: none"> Saskatchewan Sign Database Pavement Line Marking Database No corporate systems for other minor assets 	<ul style="list-style-type: none"> Maintenance inspection reports from Section 401 to this Schedule 15-3 – OM&R and Handback. Electronic condition data is to be delivered in a format suitable for electronic importing directly into the relevant provincial corporate system.

402.2.5 Annual APPM Achievement Report

The Annual Asset Preservation Performance Measures (APPM) Achievement Report documents the routine maintenance, preventative maintenance and rehabilitation work completed in the previous year, reports the results from asset condition surveys and provides a summary of achievement compared to the APPM requirements.

The Annual APPM Achievement Report shall include the following as a minimum:

- a) An annual summary of the preceding year’s completed preventative and routine maintenance and rehabilitation OM&R Work performed:

- Maintenance services performed should be allocated among the work activity classifications included within Section 401 to this Schedule 15-3 – OM&R and Handback.
 - Rehabilitation services performed should be allocated among the work activity classifications included within this Schedule 15-3 – OM&R and Handback; and
- b) Analysis and presentation of the results from the annual data collection program for the Asset Preservation Performance Measures for all assets as defined in this Section.

402.3 ASSET PRESERVATION PERFORMANCE MEASURES

Asset Preservation Performance Measures reflect the overall condition of the assets of the maintained corridor. Project Co shall comply with these measures at all times throughout the Operational Term. Table 402-4 provides the major categories and sub-categories for the APPMs.

Table 402-4: Asset Preservation Performance Measures

Asset Category	References
a) Highway Running Surfaces	402.3.1
b) Structures	402.3.2
c) Drainage Infrastructure	402.3.3
d) Electrical Infrastructure	402.3.4
e) ITS Infrastructure	402.3.5
f) Other Minor Assets	402.3.6

The APPMs are based on current levels of service established by the Ministry, as determined from road asset condition assessments, performance monitoring, delivery methodologies, and management functions within infrastructure management systems.

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) Asset Preservation Performance Measure;
- c) Minimum Condition;
- d) Maximum Response Time; and
- e) notes, consisting of the basis of the asset data collection.

402.3.1 Highway Running Surfaces

402.3.1.1 General

Consistent with a multiple performance measure approach, standards and Performance Measures are set to ensure the application of sound asset preservation practices. Given that Highway Running Surfaces have a relatively short-term life cycle, then measures are targeted to ensure:

- a) access and functionality;
- b) structurally sound and safe asset condition; and
- c) no or limited consumption, over time, of the pavement assets.

The APPMs specified herein, provide the outcome emphasis required and focus on 4 key measures:

- a) roughness;
- b) rutting;
- c) Surface Defects; and
- d) Skid Resistance.

These measures effectively represent investigation levels for monitoring, maintaining, and reporting asset performance. Asset condition data obtained from annual pavement condition inspections provides the basis for the performance criteria. The measures are to be used in conjunction with the pavement deficiency inspections described in Section 401 of Schedule 15-3 to assess rehabilitation needs for both asphalt and Portland cement concrete pavements.

The APPMs are applied to the following Highway Running Surfaces:

- a) Paved travel lanes (main lanes and service roads);
- b) Paved entrance / exit ramps;
- c) Paved shoulders; and
- d) Paved medians.

The Highway Running Surface Asset Management cycle includes:

- a) Inspection at the specified interval;
- b) Rating the condition of the surfaces;
- c) Programming treatments;
- d) Undertaking physical remedial OM&R Work;
- e) Inventory updating; and
- f) Reporting achievements.

These phases are fundamental to maintaining the asset and are consistent with the Province-wide approach that is required.

Project Co’s delivery of services shall be based upon:

- a) Emphasis on the availability of safe driving conditions across a range of relevant condition measures;
- b) Outcome based specifications with Project Co given the latitude for treatment selection to control/correct defective condition as per the material requirements defined in Section 401 to this Schedule 15-3 – OM&R and Handback;
- c) A life cycle approach to maintenance and rehabilitation shall be applied and in conformance with the Performance Measures as set;
- d) Emphasis on program delivery of confirming condition within the prescribed standards and Performance Measures set on an ongoing basis;
- e) A mechanism for the Ministry to correct default if Project Co fails to meet the condition criteria on an ongoing basis; and
- f) That there is a quality management process compliant to the IMS Manual underpinning the delivery of services.

402.3.1.2 Asset Condition Data Collection

Project Co is responsible for collecting annual pavement condition data for the purposes of Asset Management and measuring performance achievement.

There are 2 types of pavement condition inspections as indicated in Table 402-5.

Table 402-5: Highway Running Surfaces Inspection Types

Type	Description	Maximum Inspection Frequencies
Maintenance Inspections	Focus on ensuring paved highway surfaces are safe, smooth, stable, sealed and refer to Section 401 to this Schedule 15-3 – OM&R and Handback.	Refer to the response times in Section 401 to this Schedule 15 – 3 – OM&R and Handback.
Annual Inspections	Focus on a detailed assessment of condition and developing an annual Rehabilitation Strategy (including preventative maintenance).	Annually prior to September 30

The Annual Inspections for Roughness, Rutting, and Surface Defects are required to be conducted in accordance with Ministry’s specifications. Skid Resistance testing is required to be completed on a project specific basis according to ASTM standards. Project Co is required to participate in the annual Ministry calibration training session for Surface Defect ratings.

All collected data shall be provided to the Ministry for input into the Saskatchewan Preservation Database as per the prescribed Ministry specified data file formats.

Surface deterioration for Portland cement concrete pavements is required to be monitored and assessed based on annual surface condition rating surveys conducted in accordance with Section 401 of Schedule 15-3.

402.3.1.3 Performance Measures

Project Co is required to comply with the measure criteria including, Minimum Condition and Maximum Response Times set out in Tables 402-6 to 402-11 in accordance with this Section. Project Co is required to maintain the pavements at these condition levels throughout the Operational Term.

The APPMs presented are in addition to the operational condition requirements as set by Section 401 to this Schedule 15-3 – OM&R and Handback.

Project Co shall demonstrate through its IMS the process to achieve the specified outcome.

The measures generally use high speed data results, which are reported at 50 m intervals along the paved travel lane. While these provide an indication of measured condition, field condition verification is required to confirm the condition indicated prior to rehabilitation work selection. Where the high speed data condition indication is not reflected on the pavement travel lane, Project Co shall provide evidence (i.e. more accurate data collection, pavement engineering analyses, etc.) that the required condition has been achieved.

Table 402-6: Paved Travel Lanes and Entrance / Exit Ramps - Roughness APPM

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS1	For paved travel lanes where greater than 40% of a Rating Section exceeds an IRI value of 2.5 and in the case of paved entrance / exit ramps where greater than 40% of a Rating Section exceeds an IRI value of 3.0	Confirm that high speed data reflects actual site conditions.	30 days
		Where Roughness is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	12 months

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS2	For paved travel lanes where Roughness exceeds an IRI value of 3.0 over any 50 m length of paved surface travel lane and in the case of paved entrance / exit ramps where Roughness exceeds an IRI value of 3.5 over any 50m length.	Confirm that high speed data reflects actual site conditions.	30 days
		Where Roughness is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	12 months
Notes	<ul style="list-style-type: none"> • Longitudinal profile Roughness measurements, expressed as International Roughness Index (IRI) determined in accordance with ASTM E1926. • Longitudinal profile Roughness measurements collected continuously using a laser based Class 1 inertial profiler as defined by ASTM E950, or better and AASHTO M 328-10. • IRI data collected according to the Ministry’s survey specifications for field data collection system, data verification procedures and data file format. • IRI data collected and reported for <u>each</u> wheel-path at 50 m intervals based on the averaged readings over the preceding 50 m segment. • Rating Sections are defined as 1.0 km maximum continuous segments of paved surface for each travel lane, in each direction and each entrance / exit ramp. • The limiting IRI values will apply to the average value determined for each consecutive 1 km Rating Section of each lane for RS1. • All average IRI values collected to the nearest 0.01 mm/m and reported to the nearest 0.1 mm/m value. • Concrete bridge deck wearing surfaces and other ancillary concrete surfaces, which are fixed/ rigid components and approach slabs are excluded from the assessment of APPM compliance. 		

Table 402-7: Paved Travel Lanes and Entrance / Exit Ramps - Rutting APPM

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS3	Where greater than 40% of a Rating Section exceeds an average rut depth of 10 mm.	Confirm that high speed data reflects actual site conditions;	30 days
		Where Rutting is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	12 months
RS4	Where Rutting exceeds a value of 20 mm within an individual wheel-path over any 50 m length of paved surface traffic lane and entrance / exit ramp.	Confirm that high speed data reflects actual site conditions;	30 days
		Where Rutting is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	by October 31 in the year measured
Notes	<ul style="list-style-type: none"> • Transverse profile measurements, expressed as calculated rut depth in millimetres for each wheel path determined in accordance with ASTM E1703/E1703M. • Rutting data collected according to the Ministry’s survey specifications for field data collection system, data verification procedures and data file format. • Measurements of localized areas can be collected using a 1.8 m straight edge in accordance with ASTM E1703/E1703M. Rutting data collected and reported for each wheel-path at 50 m intervals based on the averaged readings over the preceding 50 m segment. • Rating Sections are defined as 1.0 km maximum continuous segments of paved surface for each travel lane, in each direction and each entrance / exit ramp. • The limiting Rutting values will apply to the average value determined for each consecutive 1 km Rating Section of each lane for RS3. • All average rut values shall be rounded down to the nearest mm and reported as an integer value. 		

Table 402-8: Paved Travel Lanes and Entrance / Exit Ramps - Surface Defects APPM

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS5	Where the Seal Score equals to or exceeds a value of 3 over any asphalt surfaced Rating Section.	Confirm that the Seal Score reflects actual site conditions;	30 days
		Where the Seal Score is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	12 months
Notes	<ul style="list-style-type: none"> • Surface defects measurements, as per the <i>AM4300.7 Road Defect Assessment Technical Manual (2014)</i> and <i>2013 Defect Assessment Quick Reference Guide</i>. • The Seal Score is a composite index ranging from 0 (excellent condition) to 5 (very poor condition) that is calculated according to the Ministry Seal Score algorithm. • The Seal Score index is calculated from Surface Defect scores measured for block cracking, transverse cracking, secondary transverse cracking, meandering cracking, centerline cracking, pickouts, local failures, stripping/segregation, bleeding and delamination. 		
Notes	<ul style="list-style-type: none"> • The Seal Score for the Rating Section is the average value calculated from the measurements determined at the 3 stopping points for each surface defect type. • Rating Sections are defined as 1.0 km maximum continuous segments of paved surface for each travel lane, in each direction and each entrance / exit Ramp. 		

Table 402-9: Paved Shoulder – Surface Defects APPM

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS6	Where the Shoulder Score equals or exceeds a value of 3 over any asphalt surfaced Rating Section.	Confirm that the Shoulder Score reflects actual site conditions;	30 days
		Where the Shoulder Score is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	12 months
Notes	<p>Surface defects measurements, as per the <i>AM4300.7 Road Defect Assessment Technical Manual (2014)</i> and <i>2013 Defect Assessment Quick Reference Guide</i>.</p> <ul style="list-style-type: none"> • The Shoulder Score is calculated from averaging the measurements determined at the 3 stopping points for the shoulder surface defect. 		

Performance Measure	Intervention Criteria	Action	Maximum Response Time
	<ul style="list-style-type: none"> Rating Sections for shoulders are defined as 1.0 km maximum continuous segments of paved surface adjacent to each travel lane, in each direction and each entrance / exit Ramp. 		

Table 402-10: Paved Medians – Surface Defects APPM

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS7	Where the Seal Score equals to or exceeds a value of 3 over any asphalt surfaced Rating Section.	Confirm that the Seal Score reflects actual site conditions;	30 days
		Where the Seal Score is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	12 months
Notes	<ul style="list-style-type: none"> Surface defects measurements, as per the <i>AM4300.7 Road Defect Assessment Technical Manual (2014)</i> and <i>2013 Defect Assessment Quick Reference Guide</i>. The Seal Score is a composite index ranging from 0 (excellent condition) to 5 (very poor condition) that is calculated according to the Ministry Seal Score algorithm. The Seal Score index is calculated from Surface Defect Scores measured for block cracking, transverse cracking, secondary transverse cracking, meandering cracking, centerline cracking, pickouts, local failures, stripping/segregation, bleeding and delamination. The Seal Score for the Rating Section is calculated from averaging the measurements determined at the 3 stopping points for each surface defect type. Rating Sections for paved medians are defined as 1.0 km maximum continuous segments of paved surface between the opposing travel lanes. 		

Table 402-11: Paved Travel Lanes and Entrance / Exit Ramps - Friction APPM

Performance Measure	Intervention Criteria	Action	Maximum Response Time
RS8	Where the Skid Number is less than 30 (SN<30) when travelling at a standard test speed of 65 km/h over any length of paved surface traffic lane and entrance / exit ramp.	Confirm that data reflects actual site conditions;	30 days
		Where deficient skid resistance is confirmed, undertake rehabilitation OM&R Work to address non-compliance.	60 days
Notes	<ul style="list-style-type: none"> • Areas of pavement which exhibit a visual appearance of polishing, flushing or bleeding and/or which exhibit a higher than average incidence of accidents will be tested for skid resistance. This can be identified by either Project Co or the Ministry. • Friction measurements, expressed as calculated Skid Number determined in accordance with ASTM E274. • Friction testing is to be conducted using a ribbed tire as per ASTM E 501. 		

402.3.1.4 References and Clarifications

Section 401 as related to Highway Running Surfaces to this Schedule 15-3 – OM&R and Handback and the provisions of Section 200 and Section 300 of Schedule 15-2 – Design and Construction as related to structures apply in full to the requirements of this section.

Other specific references include:

- *Saskatchewan Pavement Preservation Database File Specification*
- *ASTM E1926 Standard Practice for Computing International Roughness Index of Roads from Longitudinal Profile Measurements*
- *ASTM E950 Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference*
- *AASHTO M 328-10 Standard Equipment Specification for Inertial Profiler*
- *ASTM E1703/E1703M Standard Test Method for Measuring Rut-Depth of Pavement Surfaces Using a Straightedge*
- *ASTM E274 Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire*
- *MHI High Speed Pavement Condition Survey Specifications (2014)*
- *AM4300.7 Road Defect Assessment Technical Manual (2014)*
- *MHI Defect Assessment Quick Reference Guide (2013)*

402.3.2 Structures

402.3.2.1 General

The APPMs for Structures are targeted to ensure:

- a) public and Structure safety;
- b) Structure functionality is at an acceptable level; and
- c) Structure asset consumption is limited.

Using these factors as the basis, standards and Performance Measures are set to ensure sound Asset Management practices are applied for:

- a) Bridges;
- b) major retaining walls;
- c) major culverts; and
- d) major sign structures.

Given that the Structures have a relatively long-term life cycle (greater than the Operational Term of this Project Agreement), it is recognized that some asset consumption may occur. It is also recognized that some components of the bridge structures have a relatively short-term life cycle and asset preservation practices will need to be applied not only to meet network serviceability but also to encourage good custodianship and limit asset consumption.

The APPMs developed specifically for structures are based upon the Ministry's bridge condition rating procedures and performance reporting. Asset condition data obtained from structure condition inspections provide the input to these measures.

The measures have been categorized into the following intervention types:

- a) limit asset consumption;
- b) serviceability; and
- c) reactive response.

These interventional types represent asset consumption progression and reflect the stages for monitoring, managing and reporting asset performance for structures to ensure that proactive Asset Management is undertaken.

The Structures Asset Management cycle is fundamental to maintaining structural integrity and consistency with the Province wide approach that is required. Elements of the cycle include:

- a) Inspection at the specified interval;
- b) Rating the condition of the structure components;
- c) Inventory updating;
- d) Programming correction of deficiency;

- e) Undertaking maintenance and rehabilitation OM&R Work; and
- f) Reporting achievements.

The delivery of services is based upon:

- a) Emphasis on public and Structure safety during the Operational Term;
- b) Outcome based specification with Project Co given the latitude for treatment selection to control/correct defective condition as per the material requirements defined in Section 401 to this Schedule 15-3 – OM&R and Handback;
- c) A life cycle approach to maintenance and rehabilitation in conformance with the Performance Measures set is encouraged;
- d) A preventative rather than reactive maintenance/repair strategy is encouraged to limit asset consumption with inspections recommended to facilitate this strategy;
- e) Emphasis on program delivery of confirming condition within the prescribed standards and Performance Measures set on an ongoing basis;
- f) There being a Professional Engineer with a Structures background nominated to take ownership for the structure assets and the structure management cycle;
- g) A mechanism for the Ministry to correct default if Project Co fails to meet the condition criteria on an ongoing basis; and
- h) An effective IMS.

Project Co has full responsibility for all the rehabilitation activities, including structure replacement should that be required.

Operational standards are detailed in Section 401 to this Schedule 15-3 – OM&R and Handback in terms of performance criteria expressed as either intervention levels or response times.

402.3.2.2 Asset Condition Data Collection

Structures inspection management involves field inspections which identify and monitor Structure condition. Any observed defects are addressed in relevant rehabilitation strategies and subsequently programmed for rehabilitation (including preventative maintenance and replacement). Project Co shall respond to and rectify any urgent items identified during inspections.

The program of structure inspections shall be managed by a suitably qualified Structural Engineer, who:

- a) Maintains overall management and technical supervision of the structure inspection and maintenance / rehabilitation program;
- b) Accepts responsibility for the technical competence of all personnel;
- c) Accepts responsibility for the structural safety of all structures; and
- d) Consults with specialist staff when necessary.

While the inspector is tasked with identifying defects, it is the Structural Engineer who is required to interpret the observations and implement appropriate structure rehabilitation strategies to meet the contract performance requirements.

In order to limit the risks to the structure and users of the Bypass Infrastructure, the acceptance of a higher Intervention Criteria (i.e. higher state of deterioration) will only occur if the Structural Engineer undertakes further investigations (such as non-destructive testing and evaluation) to clearly understand the structure condition. The extent of investigations and analyses is to increase in sophistication and completeness as higher intervention levels are decided. The Structural Engineer shall plan for this work accordingly. Specialist staff are to be engaged by Project Co where the defect or deterioration, requires competence outside of the core structures management team.

There are 3 types of structure inspections as indicated in Table 402-12.

Table 402-12: Structure Inspection Types

Type	Description	Maximum Inspection Frequencies
Maintenance Inspections	Focus on road user safety and structure functionality, refer to Section 401 to this Schedule 15-3 – OM&R and Handback.	Refer to the response times Section 401 to this Schedule 15-3 – OM&R and Handback.
Detailed Biennial Inspections	Focus on a general assessment of condition and developing an annual rehabilitation strategy (including preventative Maintenance and replacement).	Once every 2 years
CSE Testing	Copper Sulfate Electrode (CSE) testing including chain drag testing on exposed concrete decks or decks with asphalt or other surfacing. Bridges with a waterproofing membrane shall have CSE reading taken from the top of the asphalt surface.	Once every 4 years starting at year 10
Additional Inspections	Focus on producing a comprehensive assessment of condition and if necessary undertaking physical testing in order to develop an appropriate rehabilitation strategy or repair OM&R Work under circumstances that affect the integrity of the Bypass Infrastructure which include, but are not limited to: accident or vehicle collision with a structure; unusual/severe weather conditions or natural disasters; and where a perceived problem exists.	As required

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.

Structure condition inspection is required to be undertaken using format and detail consistent with that specified in the Ontario Structure Inspection Manual (OSIM), Saskatchewan BAM 204 – Exception to OSIM and Section 401 to this Schedule 15-3 – OM&R and Handback. The inspection data is to be provided to the Ministry in a format acceptable for entry into the Saskatchewan Bridge Management System.

Detailed Biennial Inspections shall be completed by qualified inspectors who are:

- a) A registered Professional Engineer with the Province of Saskatchewan, have completed a recognized certified bridge inspection training course from another agency, and have experience with OSIM inspections in Saskatchewan or other jurisdictions; or
- b) Be an Engineering Technologist with a minimum of 5 years bridge inspection experience, have completed a recognized certified bridge inspection training course from another agency such as the Ontario Ministry of Transportation bridge inspection course, and have experience with OSIM inspections in Saskatchewan or other jurisdictions.

Inspection information is to be recorded on the Saskatchewan Bridge Management System forms with digital photographs taken as required to document condition states.

Project Co is required to retain files of structure inspection records and rehabilitation plans, so that a continuous history of each Structure is available throughout the Project Term. Files shall be transmitted to the Ministry on an annual basis. Project Co shall calculate the Bridge Condition Index in accordance with the defined procedures.

The Bridge Structural Engineer shall assess the structure functionality, risk and road user risks to determine an appropriate rehabilitation strategy.

402.3.2.3 Performance Measures

Project Co is required to comply with the performance measures, Intervention Criteria, actions, and maximum response times as set in Table 402-13.

The APPMs presented are in addition to the operational condition requirements as set by Section 401 to this Schedule 15-3 – OM&R and Handback.

Project Co shall demonstrate through their IMS, the process to achieve the specified outcomes.

The method for assessing the performance measure achievement is based on the definitions given in the OSIM.

The Minimum Condition criteria apply throughout the Operational Term.

The Intervention Criteria adopted also reinforce the 'whole of life' approach, encourage proactive preventative maintenance and rehabilitation strategies and require Project Co to monitor the management of the Structures assets.

Table 402-13: Structures APPM's

Performance Measure	Structure Type	Intervention Criteria	Action	Maximum Response Time
STR1	Bridges	Where the BCI is less than 70.	Undertake Structure rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR2	Bridges Critical Elements	Where more than 10% of any Critical Element has a condition state of poor.	Undertake Structure rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR3	Bridges Critical Elements	Where more than 30% of any Critical Element has a condition state of poor and fair combined.	Undertake Structure rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR4	Bridges Non-Critical Elements	Where more than 20% of any Non-Critical Element has a condition state of poor.	Develop a rehabilitation strategy or undertake rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR5	Bridges Non-Critical Elements	Where more than 50% of any Non-Critical Element has a condition state of poor and fair combined.	Develop a rehabilitation strategy or undertake rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months

Performance Measure	Structure Type	Intervention Criteria	Action	Maximum Response Time
STR6	Major Retaining Walls	Where the RCI is less than 70.	Undertake Structure rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR7	Major Retaining Walls	Where more than 10% of any element has a condition state of poor.	Develop a rehabilitation strategy or undertake rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR8	Major Culverts	Where the CCI is less than 70.	Undertake Structure rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR9	Major Culverts	Where more than 10% of any element has a condition state of poor.	Develop a rehabilitation strategy or undertake rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR10	Major Sign Structures	Where the OCI is less than 70.	Undertake Structure rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months
STR11	Major Sign Structures	Where more than 10% of any element has a condition state of poor.	Develop a rehabilitation strategy or undertake rehabilitation or repair OM&R Work to address deteriorations and defects.	12 months

Performance Measure	Structure Type	Intervention Criteria	Action	Maximum Response Time
STR12	All Structures	Additional inspection of the Bypass Infrastructure under circumstances that affect the integrity of Bypass Infrastructure or safety of users.	Undertake inspection and report inspection results to the Ministry.	7 days
Notes	<ul style="list-style-type: none"> • Critical Elements means Bridge elements that are considered critical and should not be allowed to deteriorate below a certain condition. This includes deck top, deck soffit, expansion joint, bearings, barriers, substructure and embankment, girders and slope protection. The remaining Bridge structure elements are categorized as non-critical elements. • Rehabilitation Strategy means the plan developed to ensure that the specified level of service is achieved that considers the management of risks associated with defects (including deterioration and damage), and may include ongoing monitoring, planned maintenance, rehabilitation and replacement. • During deck rehabilitation, should the membrane become damaged, it shall be repaired so that it functions as designed. • The Intervention Criteria requirement for exposed pilings and girders applies to any individual girder or piling. 			

402.3.2.4 References and Clarifications

Section 401 to this Schedule 15-3 – OM&R and Handback as related to bridges, major retaining walls, major culverts and major signs and the provisions of Section 200 and Section 300 to this Schedule 15-2 – Design and Construction as related to structures apply in full to the requirements of this section.

Other specific references include:

- Ontario Structures Inspection Manual (OSIM) User Guide;
- BAM 304 - Saskatchewan Modified Bridge Condition Index
- BAM 204 Saskatchewan Exceptions to OSIM (2014)
- BAM 701 Saskatchewan Large Culvert Guidelines (2014)
- BAM 702 Saskatchewan Retaining Walls (2014)

- BAM 703 Saskatchewan Overhead Sign Structures (2014)
- Saskatchewan MHI Bridge Management System Technical Requirements (2014)
- Saskatchewan MHI Bridge Management System Database Fields (2014)
- SAHT027FP – Bridge Inspection Module Configuration and User Documentation (2011)

402.3.3 Drainage Infrastructure

402.3.3.1 General

The APPMs for Drainage Infrastructure are targeted to ensure:

- a) public and Structure safety;
- b) functionality is at an acceptable level; and
- c) asset consumption is limited.

Using these objectives as the basis, standards and Performance Measures are set to ensure sound Asset Management practices are applied for:

- a) on roadway curb / Gutter;
- b) under roadway culverts; and
- c) adjacent roadway ditch / drainage structures.

While these assets have relatively low cost they provide the important function of reducing water and debris accumulation on the Bypass Infrastructure, thereby increasing safety and security for users.

The APPM methodology developed for Drainage Infrastructure generally follows the same methodology as that outlined for structures:

- a) inspection at the specified interval;
- b) rating the condition of the Structure and elements;
- c) programming correction of deficiency;
- d) undertaking remedial OM&R Work;
- e) inventory updating; and
- f) reporting achievements.

The required delivery of services is to be based upon:

- a) emphasis on public and Structure safety for the Operational Term;
- b) outcome based specification with Project Co given the latitude for treatment selection to control/correct defective condition as per the material requirements defined in Section 401 to this Schedule 15-3 – OM&R and Handback;

- c) a life cycle approach to maintenance and rehabilitation in conformance with the Performance Measures set is encouraged;
- d) a preventative rather than reactive maintenance/repair strategy is encouraged to limit asset consumption with inspections recommended to facilitate this strategy;
- e) emphasis on program delivery of confirming condition within the prescribed standards and Performance Measures set on an ongoing basis;
- f) a Professional Engineer who accepts ownership for the Drainage Infrastructure management cycle;
- g) a mechanism for the Ministry to correct default if Project Co fails to meet the condition criteria on an ongoing basis; and
- h) an IMS, which covers all delivery.

Project Co has full responsibility for all the rehabilitation activities, including Drainage Infrastructure replacement should that be required.

Operational standards are detailed in Section 401 to this Schedule 15-3 – OM&R and Handback in terms of performance criteria expressed as either intervention levels or response times.

402.3.3.2 Asset Condition Data Collection

Due to the large number of Drainage Infrastructure, it is expected their inspection will be undertaken by a number of staff. Some of these inspections will be non-structural, with a focus on maintaining waterway areas, but this asset category includes a range of significant structures that require appropriate structure Asset Management. Fundamental to this Asset Management process are structural inspections which provide a basis for assessing asset condition. The defects identified enable the development of an Asset Management strategy. Structure inspections are undertaken at various frequencies and to different standards, depending upon the type of inspection.

The program of Drainage Infrastructure structure inspections shall be managed by a suitably qualified Professional Engineer, who:

- a) Has the experience in Drainage Infrastructure design, construction, inspection, maintenance and rehabilitation;
- b) Maintains overall management and technical supervision of the Drainage Infrastructure inspection and maintenance / rehabilitation program;
- c) Accepts responsibility for the technical competence of all personnel involved with the management of the Drainage Infrastructure;
- d) Accepts responsibility for the safety of all Drainage Infrastructure; and
- e) Consults with specialist staff when necessary.

It is important to understand that while the inspector is tasked with identifying defects it is Project Co's Professional Engineer, who is required to interpret the observations and implement appropriate management strategies to satisfy the contract performance criteria.

As the Drainage Infrastructure deteriorates the intervention levels shall be sequentially triggered depending upon the Asset Management strategy implemented. In order to limit the risks to the Drainage Infrastructure and users of the Bypass Infrastructure, the acceptance of a higher Intervention Criteria (i.e. higher state of deterioration) will only occur if Project Co’s Professional Engineer undertakes further investigations (such as non-destructive testing and evaluation) to better understand the condition.

Specialist staff are to be engaged by Project Co where the defect or deterioration requires competence outside of the core Structures management team.

There are 3 types of Drainage Infrastructure inspections as indicated in Table 402-14.

Table 402-14: Drainage Infrastructure Inspection Types

Type	Description	Maximum Inspection Frequencies
Maintenance Inspections	Focus on road user safety and Drainage Infrastructure functionality, refer to Section 401 to this Schedule 15-3 – OM&R and Handback.	Refer to the response times in Section 401 to this Schedule 15-3 – OM&R and Handback.
Annual Inspections	Focus on a general assessment of condition and developing an annual Rehabilitation Strategy (including preventative Maintenance and replacement).	Annually
Detailed Inspections	Focus on producing a comprehensive assessment of condition and if necessary undertaking physical testing in order to develop an appropriate Rehabilitation program.	Once every 5 years

Drainage condition inspections for culverts are required to be undertaken using the format and details consistent with that specified in the Saskatchewan Culvert Inspection Training Manual (May, 2014 – note this document is in still in draft format and will be finalized with some expected revisions).

Drainage condition inspections for on roadway curb / gutter, adjacent roadway drainage ditches, spillways and flumes are required to be undertaken according to the visual rating methodology described in Table 402-15.

Table 402-15: Drainage Inspection Guidelines for Roadway Curb / Gutter, Adjacent Roadway Drainage Ditches, Spillways and Flumes

Level	Label	Description
1	Excellent	New or as good as new.
2	Good	Normal wear and tear requirement for repair or maintenance
3	Fair	Minor Defects present that is consistent with length of service, no repairs required.
4	Poor	Advances defect(s) - Requires maintenance / repair
5	Very Poor	Advances defect(s) - Requires immediate maintenance / repair
6	Unknown	Condition cannot be assessed.

Drainage infrastructure exhibiting significant deterioration, defects or damage are to be inspected more frequently with the intervals determined by Project Co's Professional Engineer.

Project Co's Professional Engineer shall assess the drainage Infrastructure functionality, risk and road user risks to determine an appropriate rehabilitation strategy.

402.3.3.3 Performance Measures

Project Co is required to comply with the performance measures, Intervention Criteria, actions, and maximum response times as set in Table 402-16.

The APPMs indicated are in addition to the operational condition requirements as set by Section 401 to this Schedule 15-3 – OM&R and Handback. Project Co shall demonstrate through their quality management system, the process to achieve the specified outcomes.

The methods for assessing or calculating the Performance Measures are based on the definitions in the Saskatchewan Culvert Inspection Training Manual and Table 402-15.

The Intervention Criteria for the culverts also reinforce the 'whole of life' approach, encourage proactive preventative maintenance strategies and require Project Co to monitor the condition performance of this asset type.

Table 402-16: Drainage Infrastructure APPM's

Performance Measure	Component	Intervention Criteria	Action	Maximum Response Time
DRI1	On Roadway Curb / Gutter	<ul style="list-style-type: none"> • Where more than 30% of the total length of curb and gutter has a condition state worse than fair. • Potential to affect Structure functionality and cause high risk to the curb or gutter. 	Undertake rehabilitation OM&R Work to address deterioration, defects or damage.	12 months
DRI2	On Roadway Curb / Gutter	<ul style="list-style-type: none"> • Where more than 30% of the total number of catch basins/manholes has a condition state worse than fair. • Potential to affect Structure functionality and cause high risk to the curb or gutter. 	Undertake rehabilitation OM&R Work to address deterioration, defects or damage.	12 months
DRI3	Culverts	<ul style="list-style-type: none"> • Where the condition state for a culvert is rated as Poor for any rating attribute. • Potential to cause high risk to the culvert. 	Undertake rehabilitation OM&R Work to address defects, damage and deterioration.	12 months
DRI4	Adjacent Roadway Drainage Ditches	<ul style="list-style-type: none"> • Where more than 5% of the total length of the drainage ditches has a condition state worse than fair. • Potential to cause high risk to the adjacent roadway drainage ditch. 	Undertake rehabilitation OM&R Work to address sedimentation, channel blockage, scour, bank or shoulder instability, vegetation growth or alignment.	12 months

Performance Measure	Component	Intervention Criteria	Action	Maximum Response Time
DRI5	Adjacent Roadway Spillways and Flumes	<ul style="list-style-type: none"> • Where more than 5% of the total length of spillways and flumes has a condition state worse than fair. • Potential to cause high risk to the adjacent spillways and flumes. 	Undertake rehabilitation OM&R Work to address sedimentation, detritus, scour, and bank or Structure instability, structure deterioration or ground movement and vegetation growth.	12 months

402.3.3.4 References and Clarifications

Section 401 to this Schedule 15-3 – OM&R and Handback as related to drainage Infrastructure and the provisions of Section 200 and Section 300 to this Schedule 15-3 – OM&R and Handback as related to drainage Infrastructure apply in full to the requirements of this section.

Other specific references include:

- Saskatchewan Culvert Inspection Training Manual – Draft (2014)

402.3.4 Electrical Infrastructure

402.3.4.1 General

Project Co shall assume responsibility, during the Operational Term, for managing the serviceability and maintenance aspects of the Electrical Infrastructure.

The electrical performance criteria are to be consistent with the standards and service levels as delivered to the provincial network.

Maintenance and asset management of the Electrical Infrastructure are to be related to Project Co’s IMS.

402.3.4.2 Asset Condition Data Collection

There are no requirements for the collection of asset condition data for Electrical Infrastructure.

402.3.4.3 Performance Measures

Project Co is required to comply with the performance measures and requirements as detailed for the Electrical Infrastructure in Section 401 to this Schedule 15-3 – OM&R and Handback.

Project Co is required to maintain the Electrical Infrastructure assets to achieve the desired levels of service and limit the extent of asset consumption over the Operational Term. The overriding requirement in terms of APPMs is for Project Co to achieve or exceed the Design Life expectations based on industry best practices and standards of the Electrical Infrastructure components.

Project Co shall demonstrate through their IMS, the process to achieve the specified outcomes.

402.3.4.4 References and Clarifications

Section 401 to this Schedule 15-3 – OM&R and Handback as related to Electrical Infrastructure and the provisions of Section 200 and Section 300 of Schedule 15-2 – Design and Construction as related to Electrical Infrastructure apply in full to the requirements of this section.

402.3.5 ITS Infrastructure

402.3.5.1 General

Project Co shall assume responsibility, during the Operational Term, for managing the serviceability and maintenance aspects of the field ITS Infrastructure. This includes:

- a) Field devices including poles, associated hardware such as cabinets, pedestals, electrical conduit, modems, power and communication;
- b) Wireless and fiber optic network interfaces; and
- c) Field and Data Management Centre (DMC) application software in terms of software updates, modifications or new versions.

For clarity, Project Co is not responsible for the ITS Infrastructure hardware in the DMC.

The ITS Infrastructure Asset Management cycle includes:

- a) inspection at the specified interval;
- b) rating the condition of the field ITS components;
- c) programming correction of deficiency;
- d) undertaking remedial OM&R Work;
- e) inventory updating; and
- f) reporting achievements.

The required delivery of services is to be based upon:

- a) emphasis on public and user mobility during the Operational Term;
- b) outcome based specification with Project Co given the latitude for treatment selection to control/correct defective condition as per the material requirements defined in Section 401 to this Schedule 15-3 – Technical Requirements, OM&R and Handback and Appendix F to Schedule 15-2 – Technical Requirements, Design;
- c) a life cycle approach to maintenance and rehabilitation in conformance with the Performance Measures set is encouraged;
- d) a preventative rather than reactive maintenance/repair strategy is encouraged to limit asset consumption with inspections recommended to facilitate this strategy;
- e) emphasis on program delivery of confirming condition within the prescribed standards and Performance Measures set on an ongoing basis;
- f) a mechanism for the Ministry to correct default if Project Co fails to meet the condition criteria on an ongoing basis; and
- g) a total quality management system, which covers all delivery.

Project Co has full responsibility for all the asset preservation activities, including equipment replacement and upgrading, should that be required. Maintenance and asset management of the ITS Infrastructure are to be related to Project Co's IMS.

402.3.5.2 Asset Condition Data Collection

Project Co is responsible for conducting an annual condition survey of the field ITS Infrastructure to obtain the current inventory and condition based on the rating methodology described in Table 402-17.

The assessment includes the field ITS Infrastructure devices, wireless and fiber network, associated structures (e.g. poles, foundations for signal controller cabinets, bracing for VMS, etc.) and application software. For clarity, the survey does not include the hardware in the DMC. The field ITS Infrastructure inventory will be categorized into major components and sub-components based on Good Industry Practice, with the condition assessment conducted for each subcomponent. The results from this survey will form part of the Annual Achievement Report.

402.3.5.3 Performance Measures

Project Co is required to comply with the performance measures, Intervention Criteria, actions, and maximum response times as set out in Table 402-17. The minimum condition criteria apply throughout the Operational Term.

The APPMs indicated are in addition to the operational condition requirements as set by Section 401 to this Schedule 15-3 – Technical Requirements, OM&R and Handback. Project Co shall demonstrate through their IMS, the process to achieve the specified outcomes.

The methods for assessing or calculating the Performance Measures are based on the definitions indicated in Table 402-17.

Project Co is required to maintain the field ITS Infrastructure assets to achieve the desired levels of service and limit the extent of asset consumption over the Operational Term. The overriding requirement in terms of APPMs is for Project Co to achieve or exceed the Design Life expectations based on industry best practices and standards of the field ITS Infrastructure components as indicated in Appendix F to Schedule 15-2, Technical Requirements, Design.

402.3.5.4 References and Clarifications

Section 401 to this Schedule 15-3 – OM&R and Handback as related to ITS Infrastructure and the provisions of Section 200 and Section 300 of Schedule 15-2 – Design and Construction as related to ITS Infrastructure apply in full to the requirements of this section.

402.3.6 Other Minor Assets

402.3.6.1 General

The APPMs for Other Minor Assets are targeted to ensure:

- a) Public and structure safety;
- b) Functionality is at an acceptable level; and
- c) Asset consumption is limited.

Using these objectives as the basis, standards and Performance Measures are set to ensure sound Asset Management practices for all other assets which are not Highway Running Surfaces, structures, drainage Infrastructure, electrical Infrastructure and ITS Infrastructure and include without limitation signs, fences, retaining walls < 2m, noise barrier, gates, guardrail, median barrier, reflectors, and lineal safety features.

402.3.6.2 Asset Condition Data Collection

Project Co is responsible for conducting a visual rating condition assessment of minor assets every 5 years to obtain the current inventory and condition based on the rating methodology described in Table 402-17.

402.3.6.3 Performance Measures

Project Co is required to comply with the performance measures, Intervention Criteria, actions, and maximum response times as set in Table 402-17. The minimum condition criteria apply throughout the Operational Term.

The APPMs indicated are in addition to the operational condition requirements as set by Section 401 to this Schedule 15-3 – OM&R and Handback. Project Co shall demonstrate through their IMS, the process to achieve the specified outcomes.

The methods for assessing or calculating the Performance Measures are based on the definitions indicated in Table 402-17.

The Intervention Criteria for the culverts also reinforce the 'whole of life' approach, encourage proactive preventative maintenance strategies and require Project Co to monitor the condition performance of this asset type.

Table 402-17: Other Minor Assets Condition Assessment and APPM's

Level	Label	Description	Maintenance or Rehabilitation	Response Time
1	Excellent	New or as good as new.	None	None
2	Good	Normal wear and tear requirement for repair or maintenance.	Minimal maintenance only	12 months
3	Fair	Minor Defects present, no repairs required.	Maintenance and rehabilitation	12 months
4	Poor	Advanced defect(s) present, requires maintenance / repair.	Maintenance and/or rehabilitation	3 months, with plan within 2 weeks
5	Very Poor	Advanced defect(s) present, requires immediate maintenance / repair.	Maintenance and/or rehabilitation	Immediate

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