Asset Assessment 2023 – Asset Condition and Maintenance Assessments

Annex A
Appendix 2
Asset Condition and Maintenance Assessment Detail

PCA's asset condition assessment process is defined by the Agency's Recapitalization Management Process Operations Manual 1994 (RMP), with modifications as described in this appendix. Data is managed using the Agency's asset information management system (Maximo). A data collection template incorporating the minimum condition assessment metrics and procedures identified in this appendix will be provided to the successful Proponent(s), complete with training and instructions for use.

1 Condition Rating Methodology

A general overview of the methodology for condition assessment is presented by asset category as follows:

1.1 Buildings, Fortifications, Marine Assets, Grounds, Other Structures and Vessels, Presentations, and Utilities

The condition ratings assigned to assets within these categories are the result of inspections conducted by assessing each asset component in compliance with the standards defined in the RMP Manual. Condition ratings for various components of the asset are based on the degree of deterioration of each component and a letter rating (A, B, C, or D) is assigned to that component. The overall condition rating (OAC) is a compilation of all the components, with particular emphasis placed on the components that make up the envelope of the asset (e.g. foundation, structure, roof, siding, windows, and doors).

1.2 Roadways

For roadways, OAC is determined through the assessment of the wearing surface, as the prime component of the roadway, or considering risks inherent to various features along the roadway, using one of the following methods[1]:

1.2.1 Where Pavement Condition Index (PCI) is available

- PCI is the measure by which PCA determines OAC, correlating pavement condition index (PCI) results to OAC ratings.
- As PCI is determined for segments of a roadway, a weighted average PCI is calculated for the entire length of the asset to get the overall PCI rating. For each segment, the weighted PCI value is determined by multiplying the PCI reading for the segment by the length of the segment. The weighted PCI values are summed for all segments and the result is divided by the total length of the roadway, thus providing the average PCI value for the entire linear

[1] Detailed in Parks Canada Pavement Management System, to be provided to successful Proponent.

asset. The condition rating is then determined by correlating the average PCI against OAC ratings.

Pavement Condition Index (PCI)	OAC Rating
PCI ≥ 68	A – Good
60 ≤ PCI < 68	B – Fair
55 ≤ PCI < 60	C – Poor
PCI < 55	D - Very Poor

1.2.2 Where Pavement Condition Index (PCI) is not available, the RMP method is used:

Component Condition – Bituminous Pavement	OAC Rating
Some loss of aggregate with localized cracking and minor distortions. Riding quality is good.	A – Good
From 15% to 20% of the section length exhibits areas of cracking and distortion, with localized areas of break-up in wheel paths or along edge of roadway. Aggregate loss may be frequent, and localized base distortion may be evident in many areas. Riding quality is fair.	B - Fair
More than 20% of the section length exhibits areas of cracking, distortion and break-up. Evidence of water ponding in wheel paths. Riding quality is poor.	C - Poor
Component Condition – Gravel Roads	OAC Rating
Some localized soft spots with heaving during spring. Some loss of fines.	A – Good
Less than 20% of the section length exhibits soft spots and areas of heaving during spring. Barely sufficient gravel for grading.	B - Fair
Between 20% and 40% of the section length exhibits soft spots or frost boils. Little or no surface gravel.	C - Poor
More than 40% of the section length exhibits soft spots or frost boils. Little or no surface gravel.	D - Very Poor

To address risks associated with rock / soil slopes and retaining walls, significant H&S problems related to these roadway features may override the wearing surface OAC Rating.

Observation – Rock Faces	OAC Rating
All signs indicate the rock face is stable.	A – Good
A large mass of rock with bedding planes inclined towards the road, with a height above road of less than 5m. Fractured rocks with evidence of minor falls, with fragments of less than 1 m3. Wide ditches.	B – Fair
A large mass of rock with bedding planes inclined towards the road, with a height above road of more than 5m. Fractured rocks with evidence of minor falls, with fragments of more than 1 m3. Narrow ditches.	C – Poor
Evidence of movement with deep-seated slope failures.	D - Very Poor

1.3 Bridges

For vehicular bridges, OAC is determined using the Bridge Inspection Manual (BIM) produced by PSPC. The rating system set out in the BIM considers both material and performance defects for all components of a bridge and assigns a rating between 1 and 6.

Parks Canada has adopted the following mapping of BIM to OAC to be consistent with the rest of Parks Canada's asset portfolio:

Bridge Inspection Manual Rating	OAC Rating
BIM = 6	A – Good
BIM = 4 or 5	B – Fair
BIM = 2 or 3	C – Poor
BIM = 1	D - Very Poor

For trail or pedestrian bridges, OAC is based on the guidance provided in the BIM.

2 Current Replacement Value

2.1 Definition

- Current Replacement Value (CRV) refers to the total estimated cost in current year dollars to replace or reconstruct an existing asset, rounded off to the nearest thousand and expressed in thousands of dollars. It is usually considered a Class 'D' estimate or better.

- For contemporary assets, CRV is the total estimated cost to replace or reconstruct an existing asset with a contemporary equivalent, according to applicable codes and standards. It includes all costs to complete the work on site (e.g. mobilization and removals) in current year dollars, including architectural and engineering design and supervision costs. It does not include new initiatives or expansion of the existing components or assets.

- For heritage built assets, CRV is the total estimated cost to reconstruct or replace the existing asset with a replica that conforms to the shape, material, and appearance of a specific period. It includes all costs to complete the work on site, including architectural and engineering costs. It does not include new initiatives or expansion of the existing components or assets.

2.2 Cost Estimate Accuracy[2]

- An Indicative estimate corresponds to a Class 'D' estimate (i.e. an order-of-magnitude estimate, a rough cost projection used for budget planning purposes in the early stages of concept development of a project), and is considered to be accurate within 20 – 30%, depending on project complexity.

- A Substantive estimate corresponds to a Class 'B' estimate (i.e. one of high quality and reliability, based on detailed system and component design, work plans and drawings for construction or installation), and is considered to be accurate within 10 – 15%, depending on project complexity.

2.3 Methodology

CRV is recorded in Maximo in '2023 $K' and is determined using one of the methods described below.

2.3.1 Analytical Estimation

- CRV is determined by using construction cost estimating tools such as RSMeans[3], taking into consideration local or regional costs for estimating construction materials, equipment rental,

[2] As defined by Parks Canada Project Management Standard, 2016.

[3] RSMeans is a cost-estimating service offering annually updated construction cost information to build complete estimates, find and validate construction costs, compare local costs against national averages, or determine conceptual estimates for a variety of project types.

and labour. This method is mostly used for contemporary generic assets and can be extrapolated to assets that are non-generic, such as picnic shelters, toilet buildings, barns, etc. This method may be complemented with the use of current detailed inspection reports, contractor estimates, local knowledge and expert judgement.

- Where detailed inspection data is available, CRV is based on type and quantity of construction material multiplied by unit costs.

- This method corresponds to a Substantive estimate.

2.3.2 Example: Campground Kitchen Shelter

Shelter Area = 2,816 ft^2 (261.6 m^2) = 66’ X 44’ (20.1 x 13.4 m)

Component	**Calculation**	**Estimate**
Excavation	(261.6 m^2 x 0.6 m) x \$11.65/m^2	\$1,829
Backfill	(261.6 m^2 x 0.6 m) x \$4.80/m^2	\$753
Piles	18’’ (457 mm) dia. – 14 x 1.8 m x \$147.60/lm	\$3,720
	20’’ (508 mm) dia. – 14 x 1.8 m x \$180.40/lm	\$4,546
	Rebar	\$4,000
Slab	Grade Beam 216’ (65.8 m) x 221.73/lm	\$14,590
	66’ (20.1 m) x 44’ (13.4 m) x \$66.03/m^2	\$17,275
Columns	14 x (9.5 x 0.67 x 8) = 712’ (217 m) x \$8.20/lm	\$1,780
Bracing	6 x (11.2 x 0.5 x 10) = 336’ (102.4 m) x \$8.20/lm	\$840
	7 x (10.67 x 0.5 x 12) = 448’ (136.6 m) x \$8.20/lm	\$1,120
Beams	14 x (24.4 x 0.5 x 14) = 2,391.2’ (728.8 m) x \$10.17/lm	\$7,410
Connections		\$10,000
Roof Deck	(1.054 x 2,816 ft^2) = 2,968 ft^2 (275.7 m^2) x \$126.97/m^2	\$35,005
Roofing	(1.054 x 2,816 ft^2) = 2,968 ft^2 (275.7 m^2) x \$71.23/m^2	\$19,638
Block Walls	159.1’ (48.5 m) x 6.67 (2.0 m) x \$134.50/m^2	\$13,047
Cap	159.1’ (48.5 m) x \$29.52/lm	\$1,432
Slab Topping	2816 ft^2 (261.6 m^2) x \$23.46/m^2	\$6,136
Chimney	2 x 18’ (5.5 m) x \$173.84/lm	\$1,912
Stoves		\$5,000
	Sub-total	\$150,033
	Contingency @ 1.15	\$172,538

Location factor @1.15	$198,419
CRV	**$ 198 K**

2.3.3 Analogous Estimation

- CRV is determined by using known CRV values of similar assets of comparable size (obtained through analytical estimation), or using unit costs from projects of similar nature completed recently, complemented by expert judgement. This method corresponds to an Indicative estimate.

3 Deferred Work

3.1 Definition

Deferred Work (DW) is a standard industry-based metric used to indicate the existing but unfulfilled requirement for maintenance and recapitalization[4] of a given asset (Termium, 2013). It is usually considered an Indicative estimate or better[5], of the total cost of maintenance and recapitalization work that was not performed when it should have been (or scheduled to be) and which, therefore, is put off or delayed for a future period (FASAB, 2012).

The estimate of DW is determined following an inspection of an asset, and is based on work urgently required to maintain or return the asset to a good condition. It includes all overdue repairs and preventative maintenance and component recapitalization work that negatively impacts the integrity of the asset (e.g. risk to asset), health and safety of users, or level of service.

The estimate of DW is expressed in current thousands of dollars, and rounded off to the nearest thousand. It includes all costs to complete the work on site in current year dollars, including any indirect costs such as architectural and engineering design, when required.

3.2 Methodology

The process of calculating DW starts with the inspection of an asset, identification of deferred work and estimation. DW is presented in '2023 $K' and is determined using one of the methods described below:

3.2.1 Analytical Estimation

- DW is estimated for each asset by totalling deferred maintenance and recapitalization costs related to each of the asset's components.

[4] Recapitalization is intended to repair component deterioration and does not include 'major recapitalization' such as remove or reconstruction of the asset or investment to increase the life span of the original asset.

[5] Refer to Section 2.2Cost Estimate Accuracy.

- For contemporary buildings, grounds and roads, it is determined by using construction cost estimating tools such as RSMeans, taking into consideration local or regional costs for estimating construction materials, equipment rental, and labour, complemented by current detailed inspection reports, contractor estimates and local knowledge.

For heritage buildings it is determined by using construction cost estimates to reconstruct or replace components of the existing asset with replicas that conform to the shape, material, and appearance of a specific period.

- This method corresponds to a Substantive estimate.

3.2.2 Analogous Estimation

- DW is estimated by using known project estimates or construction costs for similar work (obtained through actual work or analytical estimation) on similar assets.
- This method corresponds to an Indicative estimate.

3.3 Limitations

- DW estimates are limited to the maintenance and recapitalization backlog of major components. They do not include design deficiencies, capacity constraints, or the ability of an asset to serve its current versus its original intended purpose.

3.4 References

- Termium, 2013: TERMIUM Plus®, the Government of Canada's terminology and linguistic data bank, Public Works and Government Services Canada, 2013 http://termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&index=ent&srchtxt=ACCUMULATED%20DEFERRED%20MAINTENANCE

- FASAB, 2012: Handbook of Federal Accounting Standards and Other Pronouncements, as Amended; US Federal Accounting Standards Advisory Board (US FASAB), 2012 http://files.fasab.gov/pdffiles/2012_fasab_handbook.pdf

3.5 Examples of Deferred Work Calculation

Example 1 - Divide Creek Cabin in Banff NP – Deferred Maintenance Calculation 2008
Cabin Area = 358 ft^2 = 23.6' X 15.22'

Component	Detail	Calculation	Estimate (2008 $)
Rebuilding Foundation	Restoration Workshop Rate (2008) $101.50/$ft^2$	358 ft^2 X $101.50/$ft^2$	$36,400.
Log Replacement	3 logs to replace, cost based on Rest. Workshop Rate	3 logs X $6,000/log	$18,000.
Exterior Paint	3 days, 1 person to repaint cabin at a cost of $125./hr	1 day = $125./hr X 8hrs 3 days X $1000/day	$3,000.
Reroof Cabin	Restoration Workshop Rate (2008) $7.00/$ft^2$	358 ft^2 X $7.00/$ft^2$	$2,500.
Replace Door	1 day to remove old and replace (incl. material)		$1,000.
Replace Window	1 day to remove old, repair and replace (incl. material)		$1,000.
Replace Floor	1½ days, 2 persons to remove old and replace new (incl. material)		$3,000.
		Total	$64,900.

Example 2 - Marécage Bridge Km 38.8, La Mauricie NP – Deferred Maintenance Calculation 2012
Prepared by BPR Infrastructure Inc. – August 2012

Item	Quantity	Measuring Unit	Unit Price	Estimate (2012 $)
Vegetation removal	2	each	$350.	$700.
Slope stabilization & protection	1	global	$1,500.	$1,500.
Semi-rigid security railing system on wood post	60	m	$85.	$5,100.
Flat end and connections for railing system	4	Each	$450.	$1,800.
Parallel end device (type 2)	4	cm	$2,800.	$11,200.
Replacement of retainer	20	m	$750.	$15,000.
Concrete borders cast in place	60	m	$50.	$3,000.

Sealing pavement cracks	10	m	$50.	$500.
Corrosion removal & zinc base application	1	Global	$500.	$500.
Hunting-wheel repair	1	Global	$3,000.	$3,000.
			Sub-total	$42,300.
+ 25% Engineering, construction site supervision and unforeseen conditions				$10,575.
			Total	$52,875.

4 Schedule of Maintenance Requirements

The maintenance requirements of an asset include all the maintenance, repair and replacement activities for all of the asset's components, within a specified period, necessary to maximise service life and minimise service disruptions. The maintenance requirements may reference PCA's Maintenance Standards (1986), which will be made available to the successful proponent, as well as industry best practices and are based on reasonable estimates of component remaining service life.

The Maintenance Schedule identifies the most appropriate maintenance activity(ies) (e.g. reactive, routine, preventative, proactive) for each of the asset's components within a 20-year horizon, unless otherwise specified. The Maintenance Schedule includes:

- Recommended regular asset reviews and condition assessments;
- Mandatory code compliance inspections and testing;
- Deferred work, informed by condition assessments;
- Preventative maintenance activities, informed by condition assessments, manufacturer's recommendations and/or industry best practices;
- Predictive maintenance, informed by existing monitoring systems.

Notes:

- Maintenance activities that recur within the period of one year will be shown on a monthly basis. Longer term maintenance work will be shown with due dates over a 20-year time span if applicable.
- Unless otherwise noted, the Maintenance Schedule does not include Operational activities (see Definitions).

4.1 Definitions

4.1.1 Routine Maintenance and Repair

Maintenance typically refers to activities aimed at retaining an asset's functionality whereas repair typically refers to activities aimed at restoring an asset's functionality. Expenditures are incurred through actual work performed against an asset to keep it in an acceptable condition

and to preserve its ability to deliver a defined level of service over the asset's useful life. They include:

- Cyclical maintenance such as preventative maintenance, condition inspections and component replacements;
- Repairs or reactive/corrective maintenance such as replacement of damaged components so that the asset can be brought back to a normal operating condition;
- Catch-up maintenance to address deferred work;
- For heritage assets, maintenance and repairs includes conservation treatments related to restoration, preservation, rehabilitation or stabilization.

4.1.2 Reactive Maintenance

In a reactive maintenance regime, no actions are taken to maintain the component to meet its designed useful life, and maintenance work is not performed until the component fails. Reactive maintenance can be an appropriate strategy for small or non-critical components, components unlikely to fail, and redundant systems. Reactive maintenance is usually indicated as end of service life replacement based on estimated remaining useful service life informed by an asset condition assessment.

4.1.3 Preventative Maintenance

Preventative maintenance is regularly scheduled work based on a calendar, equipment runtime, or other time-based criteria. It includes repetitive activities such as assessments, lubrication, replacement of filters, belts and other parts with short lifespans. It is performed to help prevent the wear and tear or sudden failure of components and includes all the activities prescribed in an assets Inspection, Testing and Maintenance (ITM) Program.

Preventative maintenance includes the planned replacements of components informed by the following:

- Reliability of components (equipment failure is usually caused by its least reliable component), based on manufacturer's information and industry best practices;
- Equipment service records;
- The replacement of components at the end of their useful service life;
- Acquiring and maintaining inventories of least reliable components, critical components, and components scheduled for replacements;
- Replacing service-prone equipment with more reliable performers.

Preventive maintenance activities should be focused on components that are subject to wear, are consumable, have known failure patterns, or have manufacturer's recommendations requiring regular maintenance.

4.1.4 Predictive Maintenance

Predictive maintenance is work that is carried out based on the real-time condition of assets. Measurements are collected using monitoring equipment and software, or detailed investigations, to assess when maintenance work is required. For example, data may indicate that a regularly scheduled maintenance activity in the preventative maintenance program is not yet due because the asset is used infrequently.

Predictive maintenance activities should be focused on components with random failure patterns, critical function where failure is highly disruptive, components that are not subject to wear, and systems in which failure may be induced by incorrect preventative maintenance (e.g. over-lubrication).

4.2 Code Compliance Inspections and Testing

Mandatory code compliance inspections and testing are required to ensure safety and compliance with current acts, regulations, codes, policies and standards related to the management of real property, materiel, life safety and accessibility. A total of 237 individual inspection procedures are identified in Maximo, with frequencies ranging from weekly to once every 15 years, and are applicable to the following systems and components:

Asset Related Inspections
Bridges
Dams and Water Retaining Structures
Petroleum Storage Systems
Communication Towers
Potable Water Systems
Emergency Systems
Emergency Lighting and Exit Signs
Exit Doors
Emergency Generators
Smoke Alarms
Carbon Monoxide Alarms
Mechanical General
Boilers and Pressure Vessels
Halocarbons
Walk-in Refrigerators
Fume Hoods, Extraction Systems and Storage/Enclosure Ventilation Systems
Chimneys, Flues and Flue Pipes
Petroleum Storage
Aircraft Fuel Dispensers
Oil-Water Separators

Fire Protection Systems
Portable Fire Extinguishers
Fire Extinguishing Systems
Sprinkler Systems
Standpipes and Hoses
Hydrants and Private Mains
Fire Pumps
Water Storage Tanks
Blowout Panels

Health and Safety
Suspended Platforms
Roof Anchors
Emergency Showers and Eyewash Stations
Portable Gas Monitor
Self-Contained Breathing Apparatus
Ladders (Portable and Fixed)
Handicap Washroom Emergency Alarms
First Aid Kits
Buildings – Fire Drills
Buildings – Fire Safety Plans

Plumbing
Backflow Preventers
Elevating Devices
Lifts
Elevators and Dumbwaiters
Escalators and Moving Walkways
HVAC
Filters
Air Handling Units
Ductwork
Louvers and Screens
Carbon Monoxide Detectors

Smoke Control Systems (High Buildings)
Disconnects
Cooling Towers
Fire Dampers
Electrical Systems
Transformer Vaults
Sub-Stations
Lightning Protection Systems
Others
Incinerators
Overhead Powered Doors

4.2.1 Operational Activities

Operational activities are not included in the Maintenance Schedule. These include activities related to asset management that have a short term effect, and are repeated in order to provide a defined level of service. Operations costs and activities include, but are not limited to:

- Taxes, insurances, and utility charges such as electricity, gas, communications, potable water and wastewater;
- Janitorial services, cleaning, waste management and pest control;
- Charges related to traffic management such as traffic control and incident response, roadway clearing, grass cutting in the roadway right of way;
- Replacement of consumable items such as fuel, toilet paper, or chlorine.

4.3 Maintenance Costs

For each item identified in the 20-year maintenance schedule, an Indicative cost estimate to complete the maintenance work will be calculated (in 2023 $K). Where a predictive maintenance monitoring system is in use, the cost to monitor the system will be included, as well as typical preventative maintenance costs related to the asset being monitored.

The maintenance cost estimate for each asset will show the estimated maintenance cost per year, as well as a 20-year total.

5 Code and Life Safety

PCA is required to manage its asset according to current acts, regulations, codes, policies and standards related to the management of real property, materiel, life safety and accessibility including but not limited to:

- Treasury Board of Canada Directive on the Management of Real Property (effective May 13, 2021)
- National Building Code of Canada (2020)

- National Fire Code of Canada (2020)
- National Plumbing Code of Canada (2020)
- Canada Labour Code, Part II (R.S.C., 1985, c. L-2)
- Canada Occupational Health and Safety Regulations (SOR/86-304)
- Canadian Electrical Code, Part I (CSA C22.1:21)

The list provided above comprises a summary of typical codes and standards that PCA's assets must adhere to. The Treasury Board of Canada Directive on the Management of Real Property should be consulted to verify current versions of mandatory instruments that apply to the Agency's assets. In the event of discrepancy between this list and the Treasury Board Directive, the Directive will take precedence.

Notes:

- Provincial and municipal codes related to building code and life safety do not apply to federally-owned assets and are outside of the scope of the condition assessments.
- Any improvements required to meet current codes will be considered to be capital costs, and will be tracked separately from maintenance costs in cost estimates prepared under this contract.
- The Maintenance Schedule only includes those Operational Improvements defined in *5.1 Code Review*.

5.1 Code Review

5.1.1 Deficiencies

Deficiencies include all issues identified during the performance of a code review for one or more of the listed mandatory policies. The code review will identify all deficiencies where the asset does not meet the current code in force on January 1, 2023 (without consideration of whether remediation will be addressed by PCA's Maintenance or Capital programs), and will be restricted to mandatory requirements of the applicable code(s). Additional discretionary considerations are beyond the scope of a code review and do not constitute deficiencies.

5.1.2 Operational Improvements

Deficiencies that can be addressed through regular maintenance and replacement of components, or small increases to the scope of maintenance projects that do not require the major reconfiguration of an asset's components will be identified. An itemized Indicative cost estimate for code and life safety improvements will be developed for each asset for which a code review was performed. Any recommended work that is not classified as maintenance and replacement will be tracked separately as a capital cost.

6 Climate Change Resiliency

Climate change resiliency refers to the capacity of a system to cope with climate change by responding to or reorganizing the system in ways that maintains its essential function, identity and structure. Building climate change resilience includes assessing and proactively anticipating, preventing, withstanding, responding to, and/or recovering from, climate change-related risks and impacts.

6.1 Climate Change Risk Assessment

Through analysis of assets' exposure to climate hazards, corresponding to the location and site characteristics of the asset condition assessment, identify each asset's exposure to a pre-defined list of predicted climate change hazards , to be provided to the successful Proponent(s). Climate hazards to be assessed include:

- Access/egress routes to site in relation to potential hazards;
- Proximity to forest and forest size/density;
- Overland flooding risk from rivers, creeks or lakes;
- Proximity to coast;
- Proximity to top or bottom of a steep slope with evidence of erosion (including a glacier or waterbody);
- Proximity to downstream side of glacier (exposure if ice breaks off or large release of ponded water);
- Type of permafrost coverage, if applicable;
- Resilience and redundancy in power supply for site;
- Presence and evidence of wooden electrical pole damage/cracking (drought, fire);
- Proximity of trees and power lines;
- Evidence of dead or unhealthy trees on site;
- Evidence of shoreline/bank or bridge abutment erosion;
- Evidence of algal blooms on a waterbody that is a drinking water source or provides recreational activities (extreme heat);
- Evidence of surface ponding and surface drainage/grading issues around building;
- Presence of basement with sump pump or electrical/mechanical systems;
- Evidence of water marks from flooding;
- Evidence of water damage or mold.

7 Climate Change Mitigation

Climate change mitigation refers to the practice of reducing and/or avoiding greenhouse gas (GHG) emissions, and removing greenhouse gases from the atmosphere. In PCA's built assets, climate change mitigations will mainly consist of improving energy efficiency and readying energy systems for carbon neutral implementation.

The condition assessment will include an audit of existing GHG-producing components for each asset assessed, as detailed below; a recommended strategy / measures to prepare for carbon neutral energy sources; and opportunities to reduce GHG emissions through regular maintenance and replacement of components, or small increases to the scope of maintenance projects that do not require the major reconfiguration of an asset's components will be identified. An itemized Indicative cost estimate for climate change mitigation improvements will be developed for each asset.

7.1 Validation of Existing Assets GHG Profile

Audit of existing GHG emissions will include a listing of all components that produce GHG for each asset. This will only need to be done on easily accessible items that can reasonably be inspected during the overall asset inspection. This listing will include:

- Fuel Type consumed by the component heating sources, for both water and HVAC systems
- Major electrical loads from both components and moveable equipment with high energy requirements (i.e. compressors, pumps, etc.)
- A listing of Electrical Panels and their capacity and usage if available. If no unique identifier is visible on the panel, use the asset name and the floor that the panel is on.
- The size and type of renewable energy systems that are present at asset assessment site and directly powering the asset, either fully or partially.
- The existence of grid access, capacity / size of supply line, and how energy (gas, electricity, or both) is being metered to the asset.

8 Minimum Condition Assessment Metrics

Following the procedures detailed in Part B of the RMP Manual, the asset condition assessment program of work must include, at minimum, the metrics outlined below for each asset inspected. A data collection template, with descriptions of each field and instructions for use, will be provided to the successful Proponent(s).

Item No.	Metric	Description
General Asset Information		
.1	Park/site name	Name of national park or national historic site.
.2	Asset name (as recorded in Maximo)	Asset name to match list of assets / asset data provided by PCA.
.3	Asset category	Asset category as recorded in list of assets / asset data provided by PCA.[6]
.4	Asset type	Asset type as recorded in list of assets / asset data provided by PCA.[6]

[6] Refer to Annex A, Appendix 1 Parks Canada Agency Built Asset Categories

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Item No.	Metric	Description
.5	Asset # (Maximo ID number)	Unique number assigned to each asset for identification purposes.
.6	Latitude (Y)	For buildings this is typically the front right corner when facing the main entrance. For linear assets such as roads, the location taken will be the primary access point to the asset, and for non-linear assets the location will be either the access point (for large assets) or the approximate centre of the asset (for smaller assets).
.7	Longitude (X)	See above
.8	Assessment Date	Date that the physical assessment was completed.
.9	Assessor (Name of assessor)	Name of the person who conducted the assessment.
Component-Specific Data		
.10	Description (Component name)	Name of component assessed, based on pre-defined list of components in Maximo and modified as needed.
.11	Remarks	Notes regarding materials present in the component, manufacturer/model name, condition of component and noted deficiencies.
.12	Health & Safety Rating (H&S)	A, B, C, or D condition rating based on any potential threat the component poses to the safety and health of the user or employee in its existing condition.[7]
.13	Risk to Asset Rating (RTA)	A, B, C, or D condition rating based on the consequences to the rest of the asset or to adjacent assets if the condition of an asset or its components is not addressed.[7]
.14	Level of Service Rating (LOS)	A, B, C, or D condition rating based on the ability of an asset or its components to perform the role for which it was designed and to the level or quantity of use for which it was intended.[7]
.15	Urgency Rating (URG)	A, B, C, or D condition rating indicating the urgency of resolving the assessed condition for one or more of the other three criteria.[7]
.16	Year (installation/construction)	Estimated installation year of component, if known. Date of asset construction will be used from PCA data, if more detailed component information cannot be determined.
.17	Expected Service Life (years)	Typical service life of component in years, based on industry standards.
.18	Remaining Service Life (years)	Recommended number of years until replacement of the component, based on the condition of the component and feedback from site operators.
.19	Quantity	Number or quantity of component in linear meters, square meters, etc.

[7] Refer to Parks Canada Recapitalization Management Process Operations Manual 1994.

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Item No.	Metric	Description
.20	Units	Units of measurement (e.g. each item, linear meters, square meters, etc.)
.21	Unit Cost	Estimated unit cost to replace the component with a contemporary equivalent (like-for-like), meeting applicable codes and standards.
.22	Deferred Work / Repairs	The estimated cost to repair any noted deficiencies and/or carry out maintenance work that is urgently required to maintain or return the asset to a good condition.
.23	Maintenance Type	The recommended maintenance type for the component (reactive, preventative or predictive), based on the component's size; importance to the health and safety, integrity and level of service of the asset; likelihood of failure; redundancy; rate of degradation; and manufacturer's recommendations.
Overall Condition Rating (OAC)		
.24	OAC Summary	For H&S, RTA, LOS, and URG, the asset OAC for each rating category will be equivalent to the lowest rating assigned to any component in the category.
.25	Asset OAC	The asset OAC will be equivalent to the lowest rating assigned in the H&S, RTA, and LOS categories of the OAC summary. Using professional judgement and expertise, this rating may be adjusted where a low rating for a minor component is exaggerating the OAC for an asset and the component does not pose a significant health and safety risk, risk of damage to the asset, or reduction in performance.
Current Replacement Value (CRV)		
.26	Assessed CRV	The sum of the quantity multiplied by the estimated unit cost for each component, or a lump sum cost where analogous estimation was used. CRV should be adjusted to account for remote location / difficulty of access, and must include architectural and engineering design costs, as well as a contingency appropriate to the level of accuracy achieved by the estimate. CRV is to be expressed in '2023 $K'.
Code Review		
.27	Deficiencies	Components of the asset that do not meet mandatory requirements of current building, fire, plumbing, occupational health and safety and/or electrical codes and standards that apply to the asset.
.28	Operational Improvements	Code-related deficiencies that can be addressed through regular maintenance and replacement of components, or small increases to the scope of maintenance projects that do

Item No.	Metric	Description
		not require the major reconfiguration of an asset's components.
.29	Confined Spaces	Identify any confined spaces found while assessing the asset
Climate Change Resiliency		
.30	Climate Hazard Exposure	Identify the exposure of the asset to climate hazards, using a list of hazards to be provided.
Climate Change Mitigation		
.31	Heating Source(s)	List all heating sources and their fuel types (listed at the component level if possible).
.32	Water Heating Source(s)	List all Water heating sources and their fuel types (listed at component level if possible).
.33	Electrical Panel Capacity	List all panels with capacities and amount of capacity being used for each, including the location of each panel. if the Asset has access to the grid or offline. If offline list fuel sources
.34	Major Electrical Equipment	Identify components and moveable equipment with significant electrical loads, including description, location, and electrical load of each item or system.
.35	Existing Renewable Energy Systems	Identify the type and size of renewable energy systems that are present at asset assessment site and directly powering the asset, either fully or partially.
.36	Grid Access	Identify the existence of grid access, capacity / size of supply line, and how energy (gas, electricity, or both) is being metered to the asset.
.37	Carbon Neutral Strategy	Modifications that can be made to the asset or components to prepare for carbon neutral energy sources.
.38	Operational Improvements	Opportunities to reduce GHG emissions through regular maintenance and replacement of components, or small increases to the scope of maintenance projects that do not require the major reconfiguration of an asset's components.

9 Estimated Costs

An Indicative cost estimate will be prepared for each asset assessed, which will include, at minimum, the items listed below. All estimated costs will be expressed in current thousands of dollars, and rounded off to the nearest thousand. Estimates will include all costs to complete the work on site using contracted external service providers, including any indirect costs such as architectural and engineering design, when required. Estimated costs will be determined using construction cost tools such as RSMeans, taking into consideration local or regional costs for estimating construction materials, equipment rental, and labour, complemented by current detailed inspection reports, contractor estimates and local knowledge.

Item No.	Item	Description
Maintenance Requirements		
.1	Deferred Work / Repairs	Maintenance and repair work urgently required to maintain or return the asset to a good condition.
.2	Preventative Maintenance	Scheduled maintenance activities over a 20-year period, including condition assessments, summarized as cost per year and total cost.
.3	Predictive Maintenance	Where a predictive maintenance monitoring system is in use, the cost to monitor the system will be included, as well as typical preventative maintenance costs related to the asset being monitored. Predictive maintenance costs will be summarized as cost per year and total cost.
Code Deficiencies		
.4	Operational Code Improvements	Code-related deficiencies that can be addressed through regular maintenance and replacement of components, or small increases to the scope of maintenance projects that do not require the major reconfiguration of an asset's components.
Climate Change Mitigation		
.5	Operational GHG Improvements	Opportunities to reduce GHG emissions through regular maintenance and replacement of components, or small increases to the scope of maintenance projects that do not require the major reconfiguration of an asset's components.