

December 22, 2023

Project/File: 113733924

Todd Olson, Infrastructure Development Coordinator

Municipality of Red Lake
2 Fifth Street, P.O. Box 1000
Balmertown, ON P0V 1C0

Dear Todd Olson, Infrastructure Development Coordinator,

**Reference: Howey Bay Road Bridge and Forestry Road Culvert - OSIM Bridge Inspections 2023
Summary Letter**

Introduction

As requested by the Municipality of Red Lake Ontario, Stantec Consulting Ltd. (Stantec) completed a visual inspection of the Howey Bay Road Bridge and the Forestry Road Culvert. On November 22 and 23, 2023, Angela Kasdorf, C.E.T. and Vince Friesen, Tech. of Stantec conducted the detailed visual inspections in accordance with the Ontario Structure Inspection Manual (OSIM) standards.

The notes and recommendations of the in-depth inspection are included in the attached inspection reports. The reports include a condition inspection for each accessible element, photographs of key members, and a summary of recommended improvements, including level of priority and estimated repair cost.

Based on the observations made during the inspections, the structures have exhibited continuous, and progressive deterioration as compared to the previous inspections performed in 2019 and 2021. With previous recommendations not having been addressed, the structures continue to degrade and therefore increase the costs of repair over time, while potentially reducing their ability to resist applied loads either from vehicular traffic, or dead and transient loads.

Review of previous summary letters and inspection reports will show a progression of defect severity and increasing maintenance or replacement costs. Accordingly, the results of the 2023 inspections will show similar defects and recommendations, however conditions in certain elements were observed to have deteriorated more significantly, and may be progressing at faster rates than previously observed.

The maintenance, rehabilitation or replacement recommendations are intended to improve the safety of the structures, and maintain their current structural capacity and functionality. These recommendations include an estimated timeframe which can be used to develop maintenance and repair programs depending on the level of urgency indicated in the detailed inspection report. Note that the costs associated with each maintenance item is an opinion of probable cost and should be considered a Preliminary Estimate – Class C. Cost estimates of this level are considered to have an accuracy of +35% to -20% and do not include factors such as risk to the contractor, future market conditions, contractor capacity or fees for professional engineering.

The intent of this letter is to provide a general summary of the key recommendations and observations.

Reference: Howey Bay Road Bridge and Forestry Road Culvert - OSIM Bridge Inspections 2023 Summary Letter

Howey Bay Road Bridge Inspection

1. Replace the missing approach post blocking on the SW side (<1 year)
2. Repair missing asphalt on the NE, SE and SW approach corners encroaching the travel lanes (<1 year)
3. Repair approach roadway embankment at the NE, SE and SW corners of the bridge due to the loss of material that is encroaching the roadway and becoming a hazard for vehicles (Urgent)
4. Replace a section of flexbeam railing on the north side between deck post 3 and northwest approach post 1 (<1 year)
5. Replace barrier posts 1 and 4 on north and south sides of the bridge (1-5 years)
6. Repair the gabion baskets along SU1 and SU2. (<1 year)
7. The deck soffit at SU1 between G1/G2 appears to be temporarily repaired with foam to support the wearing surface. Recommend removing temporary repair and replacing with structural concrete (<1 year)

The Howey Bay Road Bridge continues to deteriorate as observed during this most recent inspection and is summarized below:

- The steel girders exhibit signs of ongoing severe corrosion with section loss. The bottom flanges beside the bearings have up to 6 mm remaining thickness at SU1 and 11 mm at SU2. Approximate original thickness is 14 mm measured nearer to midspan where there is only light corrosion.
- Rotation of the abutments is causing gaps at the missing deck joint locations and causing spalls in the ballast walls from the girder bottom flanges. Comparing deck measurements, the substructure has not exhibited movement since the previous inspection in 2021 however, Stantec recommends this monitoring continue during future inspections.
- The deck soffit has 22% of its total area rated in poor condition. The majority of which is observed adjacent to the abutments and may be caused by leakage through improper deck joint assemblies. According to the Ontario Structural Rehabilitation Manual (OSRM) a surface deterioration survey should be performed and also include a delamination survey if more than 10% (or 10 m²) is exhibiting deterioration and it is anticipated that major concrete repairs will be required.
- The reasoning for the current 5 tonne load limit posting is unknown.

Based on the continued deterioration of the girders and concrete deck soffit, deterioration of the footings, reduced load capacity, and movement of the abutments, Stantec recommends replacing the bridge with a new structure in approximately 1-2 years with the new structure having an estimated service life of 75 years. Although the detailed inspection report indicates 1-5 Years, this is a typical convention used in OSIM reports, and therefore is narrowed down in this letter for clarification. Prior to replacement, initial investigations are recommended to be undertaken during the 2024 construction season and should include tasks such as topographic survey, channel bathymetry, geotechnical drilling as well as hydraulic and hydrologic studies.

A determination of the exact replacement crossing in the absence of such investigations cannot be made at this time. However, for the purpose of budgetary estimates, a new similarly sized structure would be a 12.0 m long by 7.2 m wide concrete channel girder bridge with an estimated cost of \$777,600.

The maintenance items listed above should maintain the bridge's functionality until the bridge is replaced. Maintenance items, rehabilitation, and replacement timing will need to be reassessed during the next OSIM inspection.

Reference: Howey Bay Road Bridge and Forestry Road Culvert - OSIM Bridge Inspections 2023 Summary Letter

Forestry Road Culvert Inspection

1. Rehabilitate the concrete footing that currently has extensive and progressing erosion along with exposed corroded rebar under the waterline (<1 year)
2. Add slope protection to the northwest embankment toe (<1 year)

Due to limited access, an underwater investigation of the concrete footing was completed in 2017. It is recommended that another underwater investigation be completed as well as a substructure condition survey to determine the extent and rate of concrete footing deterioration as the 2023 inspection has indicated significant progression from previous years. The purpose of these investigations is to allow for more detailed measurements to be made which can support accurate quantities and mechanisms for rehabilitation (which is recommended in less than one year). The underwater investigation should compare and contrast its findings to those of the investigation completed in 2017.

Due to the size of the concrete footings in the culvert, it is anticipated that this rehabilitation work will require effective pre-construction planning including channel isolation, supplementary culverts or diversion pumping, as well as regulatory approval from authorities such as Fisheries and Oceans Canada (DFO) and Transport Canada (TC).

The attached inspection reports further detail the inspection findings.

Bridge Condition Index (BCI)

A Bridge Condition Index (BCI) value for each structure was to be calculated in accordance with the Ontario Ministry of Transportation Engineering Standards Branch July 30, 2009 manual: *Bridge Condition Index (BCI) – An Overall Measure of Bridge Condition*.

The table below provides BCI ranges that generally give a good indication to the overall condition of the structure; however, it is important to note that a critical defect may still exist even though the bridge may have a relatively high BCI. Defects that may cause a safety concern for the public or a poor condition that could cause a sudden structural failure would not necessarily be accounted for in this BCI calculation.

The BCI manual states, “The BCI is calculated using asset management principals based on the remaining economic worth of the bridge. It is based on the premise that a bridge starts at a new condition and deteriorates to a lower condition with time. It uses actual inspection data from the various bridge elements and as the elements deteriorate, they have a lower economic value. Essentially, the BCI is a weighted average of all elements (since all elements are not of equal value to the bridge) and all Condition States (since each condition state represents a certain degree of loss of value of the element). The BCI begins at 100 when the bridge is in new condition and theoretically becomes 0 as all elements become fully in Poor condition. Practically, it is impossible for the BCI to fall to 0 since the entire bridge does not become poor before rehabilitation work is performed.”

The BCI number range correlates with the overall bridge condition. The ranges are listed in Table 1 below.

Table 1 - BCI Range Description

BCI Number Range	Bridge Condition
100	Excellent (like new)
≥ 70 to <100	Good
≥60 to <70	Fair
<60	Poor

Reference: Howey Bay Road Bridge and Forestry Road Culvert - OSIM Bridge Inspections 2023 Summary Letter

Table 2 provides a summary of the BCI calculated for each structure. Each individual BCI calculation sheet can be found attached to this letter.

Table 2 - Structure BCI Values

Structure	BCI
Howey Bay Bridge	64.04
Forestry Road Culvert	70.55

According to the BCI calculations, Howey Bay Bridge has transitioned from the low end of the Good range and into the low end of Fair as of the 2023 inspection. The Forestry Road Culvert remains at the low end of the Good condition range.

Closure

Stantec was pleased to assist the Municipality of Red Lake with these inspections. If you have any questions regarding the reports, please feel free to contact the undersigned.

Regards,

Eric Tranquada B.Env.D., P.Eng.
Bridge Engineer
Phone: (204) 478-8986
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Attachment: Howey Bay Bridge Inspection Report
BCI for Howey Bay Bridge
Forestry Road Culvert Inspection Report
BCI for Forestry Road Culvert

Structure Inspection Manual - Inspection Form

Site Number: Bridge

Inventory Data:

Structure Name	Howey Bay Road Bridge			Water Shed	N/A		
Main Hwy/Road #	N/A	On ☒	Under ☐	Crossing Type:	☐ Navig. Water	☐ Non-Navig. Water	
					☐ Rail	☒ Road	☐ Ped. ☐ Other
Hwy/Road Name	Howey Bay Road						
Structure Location	N/A						
Latitude	N 51° 01' 14"		Longitude	W 93° 48' 47"			
Owner(s)	Municipality of Red Lake		Heritage Destination:	☐ Not Cons. ☐ Cons./not App. ☐ List/not Desig. ☐ Desig./not List ☐ Desig. & List			
MTO Region	Northwestern		Road Class:	☐ Freeway	☐ Arterial	☐ Collector	☐ Local
Municipality	Red Lake		Posted Speed	40	No. of Lanes	2	
MTO District	Kenora		AADT	N/A	% Trucks	N/A	
Legal Description	N/A		Inspection Route Sequence	N/A			
Structure Type	Steel Girder		Interchange Number	N/A			
Total Deck Length	6.40	(m)	Interchange Structure Number	N/A			
Overall Str. Width	8.50	(m)	Min. Vertical Clearance	N/A		(m)	
Total Deck Area	48.64	(sq.m)	Special Routes:	☐ Transit	☐ Truck	☐ School	☐ Bicycle
Roadway Width	7.40	(m)	Detour Length	N/A		(km)	
Skew Angle	0	(Degrees)	Direction of Structure	E - W			
No. of Spans	1		Fill on Structure	N/A		(m)	
Span Lengths	5.90			(m)			

Historical Data:

Year Built	Unknown	Last Evaluation	None
Last OSIM Inspection	2021	Current Load Limit	5 (tonnes)
Last Enhanced OSIM Inspection	Unknown	Load Limit By-Law #	
Last Condition Survey	None	By-Law Expiry Date	
Last Underwater Inspection	None		

Rehab History:

Year	Description of Work
2016	Replaced Gabion baskets on embankments with riprap

Scheduled Improvements:					
Recommended Maintenance	Priority	Unit	Estimated Quantity	Avg. Unit Cost	Estimated Cost
Approach Wearing Surface - Asphalt Repair	Urgent	m ²	5	\$ 300	\$ 1,500
Embankment - Repair	Urgent	LS	1	\$ 15,000	\$ 15,000
Gabion Basket - Repair	<1 Year	LS	1	\$ 3,000	\$ 3,000
Barriers - Approach Post blocking - Replace	<1 Year	Each	1	\$ 300	\$ 300
Barriers - Railing System - Replace	<1 Year	m	4	\$ 700	\$ 2,800
Barriers - Deck Posts - Replace	1-5 Years	Each	4	\$ 2,000	\$ 8,000
Deck Soffit - Concrete Repair	<1 Year	m ²	2.0	\$ 5,000	\$ 10,000
Replace PPCC Girder Bridge	1-5 Years	m ²	86.4	\$ 9,000	\$ 777,600
				Subtotal	\$ 818,200
				Regional Factor	1.5
				Total Estimated Cost	\$ 1,227,300

Appraisal Indices:		Comments
Fatigue		
Seismic		
Scour		
Flood		
Geometrics		
Barrier		
Curb		
Load Capacity		

Field Inspection Information:	
Date of Inspection:	November 22, 2023
Inspector:	Angela Kasdorf, C.E.T., Stantec Consulting Ltd.
Others in Party:	Vince Friesen, Tech., Stantec Consulting Ltd.
Equipment Used:	Standard
Weather:	Clear
Temperature:	-3°C

Additional Investigations Required:	Priority		
	None	Normal	Urgent
Detailed Deck Condition Survey:		X	
Non-destructive Delamination Survey of Asphalt-Covered Deck:	X		
Concrete Substructure Condition Survey:	X		
Detailed Coating Condition Survey:	X		
Detailed Timber Investigation:	X		
Post-Tensioned Strand Investigation:	X		
Underwater Investigation:	X		
Fatigue Investigation:	X		
Seismic Investigation:	X		
Structure Evaluation:	X		
Monitoring of Deformations, Settlements and Movements:		X	
Monitor Crack Widths:	X		
Special Notes: Recommend deck condition survey due to >10% deterioration of deck soffit. Recommend monitoring movement at SU1 and SU2 abutments by continuing to take gap measurements (refer to photos for gap measurement location). Municipality should give consideration to funding a bridge replacement in 1 to 2 years due to low load posting, abutment movements, footing spalls, steel girder and soffit deterioration and lack of proper deck joint assemblies. Recommend conducting next OSIM inspection during summer months when the wearing surface and embankments are not covered by snow / ice.			
Next Detailed Visual Inspection:	2025		

Suspected Performance Deficiencies

- | | | |
|--|---|-------------------------------------|
| 00 None | 06 Bearing not uniformly loaded/unstable | 12 Slippery surfaces |
| 01 Load carrying capacity | 07 Jammed expansion joint | 13 Flooding/channel blockage |
| 02 Excessive deformations (deflections & rotations) | 08 Pedestrian/vehicular hazard | 14 Undermining of foundation |
| 03 Continuing settlement | 09 Rough riding surface | 15 Unstable embankments |
| 04 Continuing movements | 10 Surface ponding | 16 Other |
| 05 Seized bearings | 11 Deck drainage | |

Maintenance Needs

- | | | |
|---|--|---|
| 01 Lift and Swing Bridge Maintenance | 07 Repair to Structural Steel | 13 Erosion Control at Bridges |
| 02 Bridge Cleaning | 08 Repair of Bridge Concrete | 14 Concrete Sealing |
| 03 Bridge Handrail Maintenance | 09 Repair of Bridge Timber | 15 Rout and Seal |
| 04 Painting Steel Bridge Structures | 10 Bailey bridges - Maintenance | 16 Bridge Deck Drainage |
| 05 Bridge Deck Joint Repair | 11 Animal/Pest Control | 17 Scaling (Loose Concrete or ACR Steel) |
| 06 Bridge Bearing Maintenance | 12 Bridge Surface Repair | 18 Other |

Element Data

Element Group:	Approaches	Length:	7.00			
Element Name:	Wearing Surfaces	Width:	7.40			
Location:		Height:	0.10			
Material:	Asphalt	Count	2			
Element Type:		Total Quantity:	103.60			
Environment:	Benig l ☐ Moderate ☐ Severe ☒	Limited Inspection ☒	Snow / Ice			
Protection System:					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*	
Data:	m ²	0.00	100.38	0.00	3.22	08 12

Comments:
 Snow and ice on shoulders. Light ravelling typical. East approach: Embankment erosion encroaching roadway on North side (up to 0.15m deep) and South side (up to 0.5m deep). West approach: Embankment erosion encroaching roadway on South side (up to 0.6m deep).

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☒
 Repair asphalt on NE, SE, and SW corners in conjunction with embankment repairs.

Element Group:	Abutments	Length:	n/a			
Element Name:	Abutment Walls	Width:	9.20			
Location:		Height:	1.07			
Material:	Cast-in-Place Concrete	Count	2			
Element Type:	Reinforced Concrete	Total Quantity:	19.69			
Environment:	Benig l ☒ Moderate ☐ Severe ☐	Limited Inspection ☐				
Protection System:					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*	
Data:	m ²	0.00	15.24	0.00	4.45	00 00

Comments:
 Light scaling typical. SU1: Delaminations and spalls with rust staining and efflorescence; mechanical spall under G1. SU2: Delamination with efflorescence; Disintegration on bearing seat between G1-G2.
 Concrete footing has light scaling scaling throughout with severe spalls and wide cracks.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Abutments	Length:	n/a			
Element Name:	Ballast Walls	Width:	9.20			
Location:		Height:	0.61			
Material:	Cast-in-Place Concrete	Count	2			
Element Type:	Reinforced Concrete	Total Quantity:	11.22			
Environment:	Benig l ☐ Moderate ☒ Severe ☐	Limited Inspection ☐				
Protection System:					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*	
Data:	m ²	0.00	11.20	0.00	0.02	00 00

Comments:
 Light scaling typical. Isolated hairline cracks and light pop-outs.
 SU1: Mechanical spall behind both G1 and G6 bottom flange.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Structure Inspection Manual - Inspection Form

Site Number: **Bridge**

Element Data

Element Group:	Abutments		Length:	n/a			
Element Name:	Bearings		Width:	n/a			
Location:	G1 / G6		Height:	n/a			
Material:	Neoprene		Count	4			
Element Type:	Elastomeric Pad		Total Quantity:	4			
Environment:	Benig ☐ Moderate ☒ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	Each	0	4	0	0	00	00

Comments:
Light bulging typical. Girder bottom flanges are very close to touching the abutment seat and SU1 G1 has caused a mechanical spall on the abument concrete under the girder.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Abutments		Length:	n/a			
Element Name:	Bearings		Width:	n/a			
Location:	G2 / G3 / G4 / G5		Height:	n/a			
Material:	Steel & Neoprene		Count	8			
Element Type:	Plate & Pad		Total Quantity:	8			
Environment:	Benig ☐ Moderate ☒ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	Each	0	0	8	0	00	00

Comments:
Medium corrosion on steel plates and medium bulging of the neoprene pad throughout.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Accessories		Length:	n/a			
Element Name:	Signs		Width:	n/a			
Location:			Height:	n/a			
Material:			Count	5			
Element Type:	Hazard Signs & Load Limit Sign		Total Quantity:	5			
Environment:	Benig ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	Each	5	0	0	0	00	00

Comments:
4 hazard markers located at bridge corners. 1 load limit sign located NE of structure. No observed defects.
A load limit sign is missing on the SW side of the structure, however the bridge is the only means of access to this side of the peninsula.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Beams / MLE's		Length:	6.40			
Element Name:	Girders		Width:	0.18			
Location:			Height:	0.41			
Material:	Steel		Count	6			
Element Type:	I Type		Total Quantity:	52.22			
Environment:	Benign ☐ Moderate ☒ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m ²	0.00	41.16	3.61	7.45	01	00

Comments:

Light corrosion typical. Medium corrosion at the ends throughout. SU1: Isolated area of severe corrosion on the web. Typical severe corrosion and section loss on bottom flanges up to 8mm at SU1 and 3mm at SU2. (Flange thickness should be ~14mm)

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☒ <1 Year ☐ Urgent ☐

Recommend replacing bridge.

Element Group:	Beams / MLE's		Length:	1.50			
Element Name:	Diaphragms		Width:	0.05			
Location:			Height:	0.05			
Material:	Steel		Count	10			
Element Type:	Pipe		Total Quantity:	10			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:	Galvanizing					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	Each	10	0	0	0	00	00

Comments:

No observed defects.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Barriers		Length:	20.20			
Element Name:	Railing Systems		Width:	n/a			
Location:			Height:	0.90			
Material:	Steel		Count	2			
Element Type:	Flex Beam		Total Quantity:	40.40			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:	Galvanizing					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m	31.40	1.20	0.00	7.80	01	03

Comments:

Isolated light corrosion. Isolated permanent deformations. No other observed defects.

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☒ Urgent ☐

Replace section of north railing from deck Post 3 to west approach Post 1.

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Barriers		Length:	0.15				
Element Name:	Posts		Width:	0.20				
Location:	Deck Top		Height:	1.60				
Material:	Steel		Count	8				
Element Type:	Wide Flange		Total Quantity:	8				
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐					
Protection System:							Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*			
Data:	Each	0	4	2	2	01		03

Comments:

Light corrosion typical. Medium corrosion on Post 4 on North and South side. Severe corrosion with hole through web on bottom of Post 1 on North and South side.

Recommended Work:

None ☐6-10 Years ☐1-5 Years ☒<1 Year ☐Urgent ☐

Replace Post 1 and 4 on North and South sides.

Element Group:	Barriers		Length:	0.20				
Element Name:	Posts		Width:	0.20				
Location:	Approaches		Height:	1.10				
Material:	Wood		Count	12				
Element Type:	Rectangular Solid		Total Quantity:	12				
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐					
Protection System:	Green Treated						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*			
Data:	Each	0	0	1	11	01		09

Comments:

Light weathering typical. Medium to severe checks/splits. SW: Post 2 severe rot top 0.1m high. Post 3 section loss and rotated blocking; Post 4, missing blocking. NE: Post 1, non-standard sizing (0.1m L x 0.1m W). Bottoms of Post 1 at SW, SE, and NW are moving out due to loss of supporting embankment material.

Recommended Work:

None ☐6-10 Years ☐1-5 Years ☐<1 Year ☒Urgent ☐

Replace SW Post 4 blocking.

Element Group:			Length:					
Element Name:			Width:					
Location:			Height:					
Material:			Count					
Element Type:			Total Quantity:					
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection ☐					
Protection System:							Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*			
Data:								

Comments:

Recommended Work:

None ☐6-10 Years ☐1-5 Years ☐<1 Year ☐Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Coatings		Length:	n/a			
Element Name:	Railing Systems		Width:	n/a			
Location:			Height:	n/a			
Material:	Galvanizing		Count	n/a			
Element Type:	Hot Dip Galvanizing		Total Quantity:	40.40			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m	39.20	1.20	0.00	0.00	00	00

Comments:
Isolated category 2 rusting. No other observed defects.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Coatings		Length:	n/a			
Element Name:	Diaphragms		Width:	n/a			
Location:			Height:	n/a			
Material:	Galvanizing		Count	n/a			
Element Type:	Hot Dip Galvanizing		Total Quantity:	10			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	Each	10	0	0	0	00	00

Comments:
No observed defects.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:							

Comments:

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Decks	Length:	6.40				
Element Name:	Wearing Surface	Width:	6.60				
Location:		Height:	0.10				
Material:	Asphalt	Count	n/a				
Element Type:		Total Quantity:	42.24				
Environment:	Benign ☐ Moderate ☐ Severe ☒	Limited Inspection ☒	Snow / Ice				
Protection System:					Perform. Deficiencies	Maint. Needs	
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m ²	0.00	42.24	0.00	0.00	00	00

Comments:
Snow and ice on shoulders. Asphalt does not extend the full width of deck top. Light ravelling typical on exposed areas.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Decks	Length:	6.40				
Element Name:	Deck Top	Width:	7.60				
Location:		Height:	0.36				
Material:	Cast-in-Place Concrete	Count	n/a				
Element Type:		Total Quantity:	48.64				
Environment:	Benign ☐ Moderate ☒ Severe ☐	Limited Inspection ☒	Snow / Ice				
Protection System:					Perform. Deficiencies	Maint. Needs	
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m ²	0.00	48.64	0.00	0.00	00	00

Comments:
Exposed deck top has light scaling typical. Spall with exposed reinforcement at SE corner repaired with asphalt.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Decks	Length:	6.40				
Element Name:	Soffit	Width:	n/a				
Location:	Exterior	Height:	0.36				
Material:	Cast-in-Place Concrete	Count	2				
Element Type:		Total Quantity:	4.61				
Environment:	Benign ☐ Moderate ☒ Severe ☐	Limited Inspection ☐					
Protection System:					Perform. Deficiencies	Maint. Needs	
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m ²	0.00	4.21	0.30	0.10	00	00

Comments:
Light scaling typical. Medium scaling on north side. Delamination at post location on SE side.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Decks	Length:	6.40				
Element Name:	Soffit	Width:	7.60				
Location:	Interior	Height:	n/a				
Material:	Cast-in-Place Concrete	Count	n/a				
Element Type:		Total Quantity:	48.64				
Environment:	Benign ☐ Moderate ☒ Severe ☐ Limited Inspection ☐						
Protection System:							
Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
	m ²	0.00	37.92	0.00	10.72	01	08

Comments:

Light scaling typical. Light to severe honeycombing. Rust staining at the abutments. Typical severe delaminations and spalls with exposed corroded reinforcement at the abutments. Full depth section loss at SU1 between G1/G2 (~0.6 m x 0.2 m) temporarily repaired with foam to support wearing surface.

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☒ Urgent ☐

Repair spall at SU1 between G1/G2 with structural concrete.

Element Group:		Length:					
Element Name:		Width:					
Location:		Height:					
Material:		Count					
Element Type:		Total Quantity:					
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:							
Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs

Comments:

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:		Length:					
Element Name:		Width:					
Location:		Height:					
Material:		Count					
Element Type:		Total Quantity:					
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:							
Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs

Comments:

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Embankments & Streams		Length:	n/a			
Element Name:	Streams & Waterways		Width:	n/a			
Location:			Height:	n/a			
Material:			Count	n/a			
Element Type:	Straight		Total Quantity:	All			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☒ Ice			
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All		All			00	00

Comments:
Depth of water is 0.30m. Clearance is 2.30m. Stream flows from south to north. Slight scour at upstream of structure. Slight aggradation below bridge.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Embankments & Streams		Length:	n/a			
Element Name:	Slope Protection		Width:	n/a			
Location:			Height:	n/a			
Material:	Field Rock / Gabions		Count	n/a			
Element Type:	Rock Protection		Total Quantity:	All			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☐			
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All			All		15	18

Comments:
Gabion baskets in front of abutments have areas of light to severe corrosion with some section loss of the wire especially along the bottom of SU1 and SU2. No significant movement of gabions observed. Slight loss of riprap material on embankments.

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☒ Urgent ☐
Repair wire on gabion baskets at the bottom of SU1 and SU2.

Element Group:	Embankments & Streams		Length:	n/a			
Element Name:	Embankments		Width:	n/a			
Location:			Height:	n/a			
Material:	Vegetation		Count	n/a			
Element Type:			Total Quantity:	All			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☐			
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All				All	08,15	13

Comments:
Erosion and loss of roadway material encroaching the roadway with severe loss at SW, SE, and NE corners of bridge. Erosion causing slight undermining of the NE gabions. Supporting material loss around barrier approach posts causing bottom of posts to slide outward.

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☒
Repair loss of material at SW, SE, and NE corners of bridge in conjunction with Approach Wearing Surface repair.

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Foundations		Length:	n/a			
Element Name:	Foundation		Width:	n/a			
Location:	Abutment @ SU1 and SU2		Height:	n/a			
Material:			Count	n/a			
Element Type:			Total Quantity:	n/a			
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:						04	
Comments:							
Bottom of SU1 and SU2 abutments are rotating in towards the stream. Gaps between top of ballast wall and end of deck top at SU1 are: NE @ 32mm, SE @ 38mm; at SU2 are: NW @ 20mm, SW @ 9mm. No movement since previous inspection. Continue to monitor potential movement at next inspection.							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:							
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:							
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

* A quantity must be estimated using the appropriate unit (e.g. m³). Percentage should not be used.

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Roadway looking West



Roadway looking East



Upstream looking South



Downstream looking North



South elevation



North elevation



NE embankment



SE embankment



NW embankment

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SW embankment



SU1 East abutment



SU2 West abutment



Typical wearing surface



South railing - Looking West



North railing - Looking West



Typical North posts



Typical exterior bearing - SU2.



Typical interior bearing - SU2.

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Typical Sign - NE.



Approach - Wearing surface - SE.
Note: Erosion trough encroaching roadway



Approach - Wearing surface - SE.
Note: Erosion trough encroaching roadway



Approach - Wearing surface - NE.
Note: Erosion starting to encroach roadway



Approach - Wearing surface - SW.
Note: Erosion trough encroaching roadway



SU1 Abutment Wall. Note: Typical delamination, efflorescence and rust staining.



SU1 Abutment Wall - Footing. Note: Typical crack and spalls.



SU1 Abutment Wall - Footing. Note: Wide crack.



SU2 Abutment wall - between G1/G2.
Note: Disintegration of bearing seat.

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SU2 Abutment wall - between G3/G4.
Note typical delamination, efflorescence and rust staining.



SU1 Ballast wall - at G1. Note:
Mechanical spall behind bottom flange.



SU1 Ballast wall - at G6. Note:
Mechanical spall behind bottom flange.



G1 at SU1. Note: Typical corrosion and
spall below girder.



G2 at SU1. Note: Typical corrosion.



G5 at SU1. Note: Typical corrosion.



G5 at SU1. Note: Typical corrosion.



G6 at SU1. Note: Typical corrosion.



G6 at SU1. Note: Typical corrosion.

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G6 at SU1. Note: Corrosion on web.



Railing Systems - NW. Note: Permanent deformation.



Posts - SW Approach - PT2. Note: Rot on top face.



Posts - SW Approach - PT3. Note: Rotated blocking and section loss on post.



Posts - SW Approach - PT4. Note: Missing timber blocking.



Posts - NW Approach - PT1. Note: Typical bottom of post is moving out due to loss of embankment material.



Posts - South PT1. Note: Corrosion hole through bottom of web.



Posts - North PT1. Note: Corrosion hole through bottom of web.



Coatings - Railing. Note: Typical rusting.

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Deck top - SE. Note: Spall repaired with asphalt.



Deck Soffit - Interior - SU1 between G1/G2. Note: Spall and temporary repair.



Deck Soffit - Interior - SU1 between G1/G2. Note: Spall with temporary repair, and delamination.



Deck Soffit - Interior - SU1 between G2/G3. Note: Typical honeycombing, delamination and rust staining.



Deck Soffit - Interior - SU1 between G3/G4. Note: Typical delamination and rust staining.



Deck Soffit - Interior - SU1 between G4/G5. Note: Typical delamination and rust staining.



Deck Soffit - Interior - SU1 between G5/G6. Note: Typical spalls with exposed rebar, delamination and rust



Deck Soffit - Interior - SU2 between G1/G2. Note: Typical spalls with exposed rebar, delamination and rust



Deck Soffit - Interior - SU2 between G2/G3. Note: Typical spalls, delamination and rust staining.

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Deck Soffit - Interior - SU2 between G3/G4. Note: Typical spalls with exposed rebar, delamination and rust



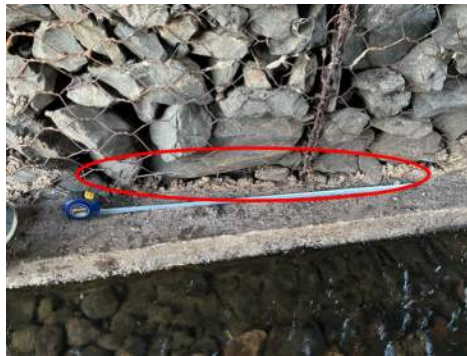
Deck Soffit - Interior - SU2 between G4/G5. Note: Typical spalls with exposed rebar, delamination and rust



Deck Soffit - Interior - SU2 between G5/G6. Note: Typical spalls with exposed rebar, delamination and rust



Embankments - NE. Note: Erosion under gabions.



Slope Protection - SU1. Note: Typical holes in gabion wires.



Slope Protection - SU1. Note: Typical holes in gabion wires.



Slope Protection - SU1. Note: Typical holes in gabion wires.



Slope Protection - SU2. Note: Typical holes in gabion wires.



Foundation - SE. Note: Gap between decktop and ballast wall at SU1

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Foundation - NE. Note: Gap between deck top and ballast wall at SU1



Foundation - SW. Note: Gap between deck top and ballast wall at SU2



Foundation - NW. Note: Gap between deck top ballast wall at SU2

Structure Name: Howey Bay Bridge
Structure Type: Steel Girder
Year Built: Unknown
Yr. of Last Rehab: 2021

Inspector: Angela Kasdorf, C.E.T.
Others in Party: Vince Friesen
Inspection Date: November 22, 2023
Type of Inspection: OSIM

Element Group	Element Description	Total Element Quantity (TEQ _i)	Unit	Unit Cost of Element (UC _i) (\$)	Total Equiv. Value (TEV _i) (\$)	Condition States				Current Element Value (CEV _i) (\$)
						Exc.	Good	Fair	Poor	
Approach	Wearing Surface	103.60	Sq. m	6	622	0.00	100.38	0.00	3.22	451.7
Abutments	Abutment Walls	19.69	Sq. m	900	17,721	0.00	15.24	0.00	4.45	10,287.0
	Ballast Walls	11.22	Sq. m	350	3,927	0.00	11.20	0.00	0.02	2,940.0
	Bearings (G1/G6)	4	Each	1,000	4,000	0	4	0	0	3,000.0
	Bearings (G2/G3/G4/G5)	8	Each	1,000	8,000	0	0	8	0	3,200.0
Accessories	Signs	5	Each	0	0	5	0	0	0	0.0
Barriers	Posts (Approach - Wood)	12	Each	100	1,200	0	0	1	11	40.0
	Posts (Deck - Steel)	8	Each	200	1,600	0	4	2	2	760.0
	Railing Systems	40.40	m	200	8,080	31.40	1.20	0.00	7.80	6,460.0
Beams/MLEs	Diaphragms	10	Each	0	0	10	0	0	0	0.0
	Girders	52.22	Sq. m	420	21,932	0.00	41.16	3.61	7.45	13,571.9
Coatings	Railing Systems	40.40	m	125	5,050	39.20	1.20	0.00	0.00	5,012.5
Decks	Wearing Surface	42.24	Sq. m	25	1,056	0.00	42.24	0.00	0.00	792.0
	Deck Top	48.64	Sq. m	120	5,837	0.00	48.64	0.00	0.00	4,377.6
	Soffit - Thin Slab (Exterior)	4.61	Sq. m	120	553	0.00	4.21	0.30	0.10	393.3
	Soffit - Thin Slab (Interior)	48.64	Sq. m	120	5,837	0.00	37.92	0.00	10.72	3,412.8
Embankments & Streams	Slope Protection	1	All	0	0	0	0	1	0	0.0
	Streams and Waterways	1	All	0	0	0	1	0	0	0.0
	Embankments	1	All	0	0	0	0	0	1	0.0

BCI = 64.04



Structure Inspection Manual - Inspection Form

Site Number: Culvert

Inventory Data:

Structure Name	Forestry Road Concrete Box Culvert			Water Shed	N/A		
Main Hwy/Road #	N/A	On ☒	Under ☐	Crossing Type:	Navig. Water ☐ Rail ☐ Road ☒	Non-Navig. Water ☐ Ped. ☐ Other ☐	
Hwy/Road Name	Forestry Road						
Structure Location	Skookum Bay						
Latitude	N 51° 01' 46"		Longitude	W 93° 50' 51"			
Owner(s)	Municipality of Red Lake		Heritage Destination:	Not Cons. ☐ ☐ ☐ Design/not List ☐ Design. & List ☐	Cons./not App. ☐ ☐ ☐ Design. & List ☐	St/not Desig. ☐ ☐ ☐	
MTO Region	Northwestern		Road Class:	Freeway ☐ Arterial ☐ Collector ☐ Local ☐			
Municipality	Red Lake		Posted Speed	40	No. of Lanes	2	
MTO District	Kenora		AADT	N/A	% Trucks	N/A	
Legal Description	N/A		Inspection Route Sequence	N/A			
Structure Type	Concrete Box Culvert		Interchange Number	N/A			
Total Deck Length	20.10	(m)	Interchange Structure Number	N/A			
Overall Str. Width	5.60	(m)	Min. Vertical Clearance	N/A	(m)		
Total Deck Area	N/A	(sq.m)	Special Routes:	Transit ☐ Truck ☐ School ☐ Bicycle ☐			
Roadway Width	7.50	(m)	Detour Length	N/A	(km)		
Skew Angle	0	(Degrees)	Direction of Structure	N - S			
No. of Spans	1		Fill on Structure	0.30	(m)		
Span Lengths	5.60 (m)						

Historical Data:

Year Built	Unknown	Last Evaluation	None
Last OSIM Inspection	2021	Current Load Limit	Unknown (tonnes)
Last Enhanced OSIM Inspection	Not Req'd	Load Limit By-Law #	
Last Condition Survey	None	By-Law Expiry Date	
Last Underwater Inspection	2017		

Rehab History:

Year	Description of Work
2016	Replaced barrier posts and railing systems
2016	Installed riprap at inlet and outlet
2016	Repaved deck wearing surface

Scheduled Improvements:					
GWAG	Priority	Unit	Estimated Quantity	Avg. Unit Cost	Estimated Cost
Culvert - Concrete Footing Rehabilitation	< 1 Year	LS	1	\$ 525,000	\$ 525,000
Embankments - Add slope protection	<1 Year	LS	1	\$ 3,000	\$ 3,000
				Subtotal	\$ 528,000
				Regional Factor	1.5
				Total Estimated Cost	\$ 792,000

Appraisal Indices:		Comments
Fatigue		
Seismic		
Scour		
Flood		
Geometrics		
Barrier		
Curb		
Load Capacity		

Field Inspection Information:	
Date of Inspection:	November 23, 2023
Inspector:	Angela Kasdorf, C.E.T., Stantec Consulting Ltd.
Others in Party:	Vince Friesen, Tech., Stantec Consulting Ltd.
Equipment Used:	Standard, Boat
Weather:	Clear, Windy
Temperature:	-14°C

Additional Investigations Required:	Priority		
	None	Normal	Urgent
Detailed Deck Condition Survey:	X		
Non-destructive Delamination Survey of Asphalt-Covered Deck:	X		
Substructure Condition Survey:		X	
Detailed Coating Condition Survey:	X		
Underwater Investigation:		X	
Fatigue Investigation:	X		
Structure Evaluation:	X		
Monitoring of Deformations, Settlements and Movements:	X		
Replace Structure:	X		
Rehabilitate Structure:	X		
Hydraulic Evaluation:	X		
Geotechnical Evaluation:	X		
Other:			
Special Notes: Cathodic protection test station marker for buried natural gas pipeline located on SW and NW embankments. Buried natural gas pipeline marker located on NW embankment. Recommend substructure condition survey due to extensive deterioration of the concrete footing. Underwater investigation of concrete footing completed in 2017; recommend conducting another underwater investigation to monitor extent and rate of concrete footing deterioration. Underwater investigation should compare and contrast to the investigation completed in 2017. Recommend conducting next OSIM inspection during summer months when the wearing surface and embankments are not covered by snow / ice.			
Next Detailed Visual Inspection:	2025		

Suspected Performance Deficiencies

- 00 None
- 01 Load carrying capacity
- 02 Excessive deformations (deflections & rotations)
- 03 Continuing settlement
- 04 Continuing movements
- 05 Seized bearings

- 06 Bearing not uniformly loaded/unstable
- 07 Jammed expansion joint
- 08 Pedestrian/vehicular hazard
- 09 Rough riding surface
- 10 Surface ponding
- 11 Deck drainage

- 12 Slippery surfaces
- 13 Flooding/channel blockage
- 14 Undermining of foundation
- 15 Unstable embankments
- 16 Other

Maintenance Needs

- 01 Lift and Swing Bridge Maintenance
- 02 Bridge Cleaning
- 03 Bridge Handrail Maintenance
- 04 Painting Steel Bridge Structures
- 05 Bridge Deck Joint Repair
- 06 Bridge Bearing Maintenance

- 07 Repair to Structural Steel
- 08 Repair of Bridge Concrete
- 09 Repair of Bridge Timber
- 10 Bailey bridges - Maintenance
- 11 Animal/Pest Control
- 12 Bridge Surface Repair

- 13 Erosion Control at Bridges
- 14 Concrete Sealing
- 15 Rout and Seal
- 16 Bridge Deck Drainage
- 17 Scaling (Loose Concrete or ACR Steel)
- 18 Other

Element Data

Element Group:	Accessories		Length:	n/a			
Element Name:	Signs		Width:	n/a			
Location:			Height:	n/a			
Material:	Steel / Aluminum		Count	4			
Element Type:	Hazard Markers		Total Quantity:	4			
Environment:	Benign ☐ Moderate ☐ Severe ☒ Limited Inspection ☐						
Protection System:							Perform. Deficiencies
Condition	Units	Exc.	Good	Fair	Poor*	Maint. Needs	
Data:	Each	4	0	0	0	00	00
Comments: No observed defects.							
Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:							Perform. Deficiencies
Condition	Units	Exc.	Good	Fair	Poor*	Maint. Needs	
Data:							
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:							Perform. Deficiencies
Condition	Units	Exc.	Good	Fair	Poor*	Maint. Needs	
Data:							
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

* A quantity must be estimated using the appropriate unit (e.g. m³). Percentage should not be used.

Structure Inspection Manual - Inspection Form

Site Number: **Culvert**

Element Data

Element Group:	Barriers		Length:	19.00			
Element Name:	Railing Systems		Width:	n/a			
Location:			Height:	0.90			
Material:	Steel		Count	2			
Element Type:	Flex Beam		Total Quantity:	38.00			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:	Galvanizing					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m	37.80	0.00	0.00	0.20	00	00

Comments:
West: Isolated permanent deformations.
No other observed defects.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Barriers		Length:	0.20			
Element Name:	Posts		Width:	0.20			
Location:			Height:	1.40			
Material:	Wood		Count	6			
Element Type:	Rectangular Solid		Total Quantity:	6			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:	Green Treated					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	Each	0	0	1	5	00	00

Comments:
Timber posts are located on top of culvert. Light weathering typical. Light to severe checks/splits.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Barriers		Length:	0.10			
Element Name:	Posts		Width:	0.15			
Location:			Height:	1.40			
Material:	Steel		Count	16			
Element Type:	Wide Flange		Total Quantity:	17.92			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:	Galvanizing					Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m ²	17.92	0.00	0.00	0.00	00	00

Comments:
No observed defects.

Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Culverts		Length:	20.10			
Element Name:	Barrels		Width:	5.60			
Location:			Height:	2.00			
Material:	Cast-in-Place Concrete		Count	1			
Element Type:	Box with Open Bottom		Total Quantity:	192.96			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☒			
Protection System:				Water Depth			
Condition	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
Data:	m ²	0.00	190.65	1.95	0.36	00	00

Comments:

Light scaling typical. Hairline narrow vertical cracks on all walls. Medium vertical cracks on south wall closer to inlet as well as at midspan north wall and soffit. Isolated active wet area with hairline cracks on the soffit near the inlet (0.6 m x 0.6 m).

Recommended Work:

None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Culverts		Length:	n/a			
Element Name:	Inlet Components		Width:	n/a			
Location:	West		Height:	n/a			
Material:	Cast-in-Place Concrete		Count	1			
Element Type:	Head Wall		Total Quantity:	3.14			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☐			
Protection System:				Perform. Deficiencies			
Condition	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
Data:	m ²	0.00	2.42	0.00	0.72	00	00

Comments:

Light scaling typical. Concrete erosion along footing at waterline. Disintegration at NW and SW corner of footing.

Recommended Work:

None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:	Culverts		Length:	n/a			
Element Name:	Outlet Components		Width:	n/a			
Location:	East		Height:	n/a			
Material:	Cast-in-Place Concrete		Count	1			
Element Type:	Head Wall		Total Quantity:	3.14			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☐			
Protection System:				Perform. Deficiencies			
Condition	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
Data:	m ²	0.00	2.74	0.00	0.40	00	00

Comments:

Light scaling typical. Disintegration at NE and SE corner of footing.

Recommended Work:

None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Structure Inspection Manual - Inspection Form

Site Number: **Culvert**

Element Data

Element Group:	Culverts		Length:	20.10			
Element Name:	Footing		Width:	n/a			
Location:			Height:	1.98			
Material:	Cast-in-Place Concrete		Count	2			
Element Type:			Total Quantity:	79.60			
Environment:	Benign ☒ Moderate ☐ Severe ☐		Limited Inspection	☒			
Protection System:				Water Depth			
Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
	m ²	0.00	51.46	8.04	20.10	01	08

Comments:

Light scaling typical. Medium to severe scaling and concrete erosion along waterline. Disintegration with exposed reinforcement along length of both footings below waterline up to ~450 mm into south wall and up to ~400 mm into north wall. Hairline to narrow crack extending from culvert into footing.

Recommended Work:

None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☒ Urgent ☐

Rehabilitate concrete footings.

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection	☐			
Protection System:				Perform. Deficiencies			
Condition Data:	Units	Exc.	Good	Fair	Poor*	Maint. Needs	

Comments:

Recommended Work:

None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection	☐			
Protection System:				Perform. Deficiencies			
Condition Data:	Units	Exc.	Good	Fair	Poor*	Maint. Needs	

Comments:

Recommended Work:

None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Coatings		Length:	n/a			
Element Name:	Railing System		Width:	n/a			
Location:			Height:	n/a			
Material:	Galvanizing		Count	n/a			
Element Type:	Hot Dip Galvanizing		Total Quantity:	38.00			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m	38.00	0.00	0.00	0.00	00	00
Comments: No observed defects.							
Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:	Coatings		Length:	n/a			
Element Name:	Posts		Width:	n/a			
Location:			Height:	n/a			
Material:	Galvanizing		Count	n/a			
Element Type:	Hot Dip Galvanizing		Total Quantity:	17.92			
Environment:	Benign ☐ Moderate ☐ Severe ☒		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	m ²	17.92	0.00	0.00	0.00	00	00
Comments: No observed defects.							
Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:							
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Decks		Length:	15.00			
Element Name:	Wearing Surface		Width:	7.50			
Location:			Height:	0.05			
Material:	Asphalt		Count	2			
Element Type:			Total Quantity:	225.00			
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☒						
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units m ²	Exc. 0.00	Good 0.00	Fair 225.00	Poor* 0.00	00	00
Comments: Medium ravelling typical. Light to medium map cracking on approaches are patched. Isolated medium transverse crack above culvert. Asphalt patches present. Settlement at approaches causing slight bump onto culvert.							
Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:			Length:				
Element Name:			Width:				
Location:			Height:				
Material:			Count				
Element Type:			Total Quantity:				
Environment:	Benign ☐ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
Comments:							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

* A quantity must be estimated using the appropriate unit (e.g. m²). Percentage should not be used.

Element Data

Element Group:	Embankments & Streams	Length:	n/a				
Element Name:	Streams & Waterways	Width:	n/a				
Location:		Height:	n/a				
Material:		Count	n/a				
Element Type:	Straight	Total Quantity:	All				
Environment:	Benign ☒ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	All		All			00	00
Comments: Clearance is 2.00 m. Depth of water is 1.60 m. Streams flows from west to east. Isolated area of slight scour under the north wall (See 2017 underwater investigation video at 8:08 minutes).							
Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

Element Group:	Embankments & Streams	Length:	n/a				
Element Name:	Slope Protection	Width:	n/a				
Location:		Height:	n/a				
Material:	Field Stone	Count	n/a				
Element Type:	Rock Protection	Total Quantity:	All				
Environment:	Benign ☒ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	All		All			00	00
Comments: Slight loss of material at NW embankment toe.							
Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☒ Urgent ☐ Add slope protection to NW corner							

Element Group:	Embankments & Streams	Length:	n/a				
Element Name:	Embankments	Width:	n/a				
Location:		Height:	n/a				
Material:	Vegetation	Count	n/a				
Element Type:		Total Quantity:	All				
Environment:	Benign ☒ Moderate ☐ Severe ☐ Limited Inspection ☐						
Protection System:						Perform. Deficiencies	Maint. Needs
Condition	Units	Exc.	Good	Fair	Poor*		
Data:	All		All			00	00
Comments: Slight scour NW embankment toe.							
Recommended Work: None ☒ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☐ Urgent ☐							

* A quantity must be estimated using the appropriate unit (e.g. m³). Percentage should not be used.

2023 OSIM Visual Inspections Forestry Road Culvert 2023-11-23



Roadway looking South



Roadway looking North.



Upstream looking West



Downstream looking East



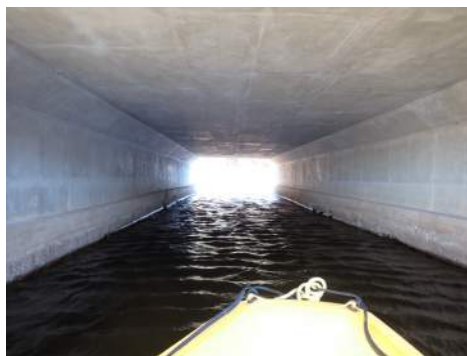
West elevation - Inlet



East elevation - Outlet



Typical wearing surface



Looking towards outlet from inlet



Looking towards inlet from outlet.

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Typical West railing.



Typical East Railing



Culvert - South wall. Note: Typical HL-N cracks.



Culvert - South wall. Note: HL-M vertical cracks near Inlet.



Culvert - North wall - mid-span. Note: Hairline to medium crack



Culvert soffit - mid-span. Note: Hairline to medium crack



Inlet - NW corner. Note: Disintegration of footing



Inlet - SW corner. Note: Disintegration of footing



Outlet - SE corner. Note: Disintegration of concrete footing below waterline.

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Outlet - NE corner. Note: Disintegration of concrete footing below waterline.



Footing - South wall near midspan. Note: Typical disintegration and exposed rebar



Footing - South wall. Note: Typical disintegration with exposed rebar.



Footing - South wall. Note: Hairline to narrow crack extending from culvert into footing.



Embankments - West elevation. Note: Slight scour of NW embankment toe.



NW Embankment. Note: Utility markers.

Structure Name: Forestry Road Box Culvert
Structure Type: Concrete Box Culvert
Year Built: Unknown
Yr. of Last Rehab: None

Inspector: Angela Kasdorf, C.E.T.
Others in Party: Vince Friesen
Inspection Date: November 23, 2023
Type of Inspection: OSIM

Element Group	Element Description	Total Element Quantity (TEQ _i)	Unit	Unit Cost of Element (UC _i) (\$)	Total Equiv. Value (TEV _i) (\$)	Condition States				Current Element Value (CEV _i) (\$)
						Exc.	Good	Fair	Poor	
Accessories	Signs	4	Each	0	0	4	0	0	0	0.0
Barriers	Posts (Wood)	6	Each	100	600	0	0	1	5	40.0
	Posts (Steel)	17.92	Sq. m	200	3,584	17.92	0.00	0.00	0.00	3,584.0
	Railing Systems	38.00	m	200	7,600	37.80	0.00	0.00	0.20	7,560.0
Culverts	Barrel	192.96	Sq. m	350	67,536	0.00	190.65	1.95	0.36	50,318.6
	Inlet Components	3.14	Sq. m	350	1,099	0.00	2.42	0.00	0.72	635.3
	Outlet Components	3.14	Sq. m	350	1,099	0.00	2.74	0.00	0.40	719.3
	Footing	79.60	Sq. m	350	27,860	0.00	51.46	8.04	20.10	14,633.9
Coatings	Railing Systems	38.00	m	125	4,750	38.00	0.00	0.00	0.00	4,750.0
Decks	Wearing Surface	225.00	Sq. m	25	5,625	0.00	0.00	225.00	0.00	2,250.0
Embankments & Streams	Embankments	1	All	0	0	0	1	0	0	0.0
	Slope Protection	1	All	0	0	0	1	0	0	0.0
	Streams & Waterways	1	All	0	0	0	1	0	0	0.0

BCI = 70.55

