Stantec Consulting Ltd.
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Winnipeg MB R3B 2B9

March 4, 2022

Project/File: 113733881

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 Briddge Inspections 2021 Summary Letter

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 December 14 & 15, 2021. 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, a number of maintenance items are recommended to improve the level of safety of the structures and maintain their current structural capacity and functionality. The maintenance items are accompanied by a recommended timing which can be used to develop maintenance and repair programs. 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, or contractor capacity.

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

Howey Bay Road Bridge

1. Replace the missing approach post blocking on the SW side. (<1 year)
2. Repair missing asphalt on the SE approach encroaching the travel lanes (<1 year)
3. Repair approach roadway embankment at the SE corner of the bridge due to the loss of material that is encroaching the roadway and becoming a hazard for vehicles. (<1 year)
4. Replace a section of flexbeam railing on the north side between deck post 3 and northwest approach post 1. (<1 year)
5. Repair the gabion baskets along SU1 and SU2. (<1 year)
6. 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)

Reference: Howey Bay Road Bridge and Forestry Road Culvert - OSIM Briddge Inspections 2021 Summary Letter

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

- The steel girders have areas of severe corrosion with section loss. The bottom flanges beside the bearings have up to 4mm remaining thickness at SU1 and 9mm at SU2. Approximate original thickness is 12mm measured nearer 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, it appears the substructure has moved slightly since the previous inspection in 2019 and we recommend this monitoring continues during future inspections.
- The reasoning for the current 5 tonne load limit posting is unknown.

Based on the condition of the girders and the movement of the abutment Stantec recommends replacing the bridge with a new structure in approximately 1-5 years with a lifespan of 75 years. An example of a new structure would be a new 12.0m long by 7.2m wide concrete channel girder bridge with an estimated cost of $734,400.

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

Forestry Road Culvert

1. Rehabilitate the concrete footing that currently has extensive erosion and exposed rebar under the waterline (1-5 years)

Due to limited access, an underwater investigation of the concrete footing was completed in 2017. It is recommended that another underwater investigation be completed to monitor the extent and rate of concrete footing deterioration until the repair is completed. Underwater investigation should compare and contrast to the investigation completed in 2017.

The attached inspection reports further detail the inspection findings.

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
Forestry Road Culvert Inspection Report

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	2019	**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	<1 Year	m^2	1	$ 300	$ 300
Embankment - Repair	<1 Year	LS	1	$ 10,000	$ 10,000
Gabion Basket - Repair	<1 Year	LS	1	$ 1,500	$ 1,500
Barriers - Approach Post blocking - Replace	<1 Year	Each	1	$ 250	$ 250
Barriers - Railing System - Replace	<1 Year	m	4	$ 650	$ 2,600
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	$ 8,500	$ 734,400
				Subtotal	$ 759,050
				Regional Factor	1.5
				Total Estimated Cost	$ 1,138,600

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

Field Inspection Information:	
Date of Inspection:	December 14, 2021
Inspector:	Angela Kasdorf, C.E.T., Stantec Consulting Ltd.
Others in Party:	Vince Friesen, Tech., Stantec Consulting Ltd.
Equipment Used:	Standard
Weather:	Clear
Temperature:	-1°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 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 5 years due to low load posting, abutment movements, steel girder deterioration and lack of proper deck joint assemblies. Bridge replacement recommendation and timing to be reassessed during next inspection.
Recommend conducting next OSIM inspection during summer months when the wearing surface and embankments are not covered by snow / ice.

Next Detailed Visual Inspection:	2023

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 BridgeBearing 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:	**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:	Benign ☐ Moderate ☐ Severe ☑		Limited Inspection ☑		Snow / Ice		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	m^2	0.00	103.06	0.00	0.54	08	12

Comments:
Light ravelling typical. East approach on South side has embankment loss with missing asphalt (0.6x0.9) encroaching the travel lane.

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☑ Urgent ☐
Repair asphalt on SE corner in conjunction with SE embankment repair.

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:	Benign ☑ Moderate ☐ Severe ☐		Limited Inspection ☑		Covered by Debris		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	m^2	0.00	14.94	0.30	4.45	00	00

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

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:	Benign ☐ Moderate ☑ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	m^2	0.00	11.20	0.00	0.02	00	00

Comments:
Light scaling typical. Isolated hairline cracks and 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. m^2). Percentage should not be used.

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:	Benign ☐ Moderate ☑ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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:	Benign ☐ Moderate ☑ Severe ☐		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	Each	0	0	8	0	00	00

Comments:
Bearings have typical medium corrosion on steel plate and medium bulging of the neoprene pad.

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:	Benign ☐ Moderate ☐ Severe ☑		Limited Inspection ☐				
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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. m^2). 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 Data:	Units	Exc.	Good	Fair	Poor*		
	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 ~12mm)

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 Data:	Units	Exc.	Good	Fair	Poor*		
	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 Data:	Units	Exc.	Good	Fair	Poor*		
	m	31.80	0.80	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. m^2). 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 Data:	Units	Exc.	Good	Fair	Poor*		
	Each	0	8	0	0	00	00

Comments:
Light corrosion typical.

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:	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 Data:	Units	Exc.	Good	Fair	Poor*		
	Each	0	0	4	8	01	09

Comments:
Light weathering typical. Medium to severe checks/splits. SW: Post 3, 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 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. m^2). 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 Data:	Units	Exc.	Good	Fair	Poor*		
	m	39.60	0.80	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 Data:	Units	Exc.	Good	Fair	Poor*		
	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 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. m^2). Percentage should not be used.

Element Data

Element Group:	**Decks**		Length:			6.40	
Element Name:	**Wearing Surface**		Width:			7.40	
Location:			Height:			0.10	
Material:	Asphalt		Count			n/a	
Element Type:			Total Quantity:			47.36	
Environment:	Benign ☐ Moderate ☐ Severe ☑		Limited Inspection ☑			Snow / Ice	
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	m^2	0.00	47.36	0.00	0.00	00	00

Comments:
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 Data:	Units	Exc.	Good	Fair	Poor*		
	m^2	0.00	48.64	0.00	0.00	00	00

Comments:
Exposed deck top has light scaling typical.

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 Data:	Units	Exc.	Good	Fair	Poor*		
	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. m^2). 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:						Perform. Deficiencies	Maint. Needs
Condition Data: Units		Exc.	Good	Fair	Poor*		
m^2		0.00	38.47	0.27	9.90	01	08

Comments:
Light scaling typical. Light to severe honeycombing. Rust staining at the abutments. Typical delaminations and spalls with exposed corroded reinforcement at the abutments. Full depth section loss at SU1 between G1/G2 (~0.6x0.2) 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:						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. m^2). 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 0.10m. Clearance is 2.40m. Stream flows from south to north. Slight scour at upstream of structure.

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 ☑		Snow		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All			All		15	18

Comments:
Limited inspection due to snow on the embankments, exposed areas of the embankments appear to have no observed defects. 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 observed.

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 ☑		Snow		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All				All	08,15	13

Comments:
Limited inspection due to snow, assume concrete footing is still undermining on the SE corner by 0.40 m as noted in previous inspection.
Loss of roadway material encroaching the roadway with severe loss at SE. Supporting material loss around barrier approach posts.

Recommended Work: None ☐ 6-10 Years ☐ 1-5 Years ☐ <1 Year ☑ Urgent ☐
Repair loss of material at SE corner at approaches.

* A quantity must be estimated using the appropriate unit (e.g. m^2). 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 Data:	Units	Exc.	Good	Fair	Poor*			
							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. Compared with previous inspection there is very slight movement. 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 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. m^2). Percentage should not be used.

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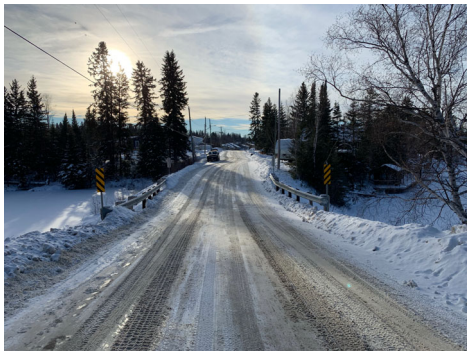
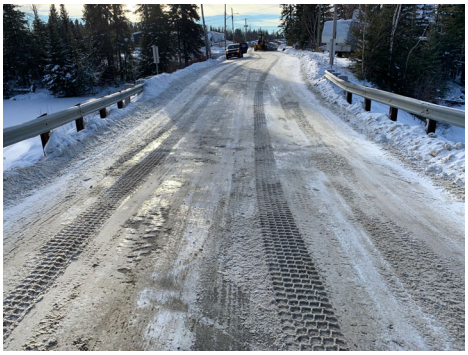
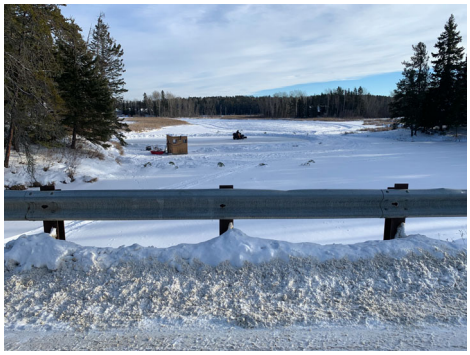
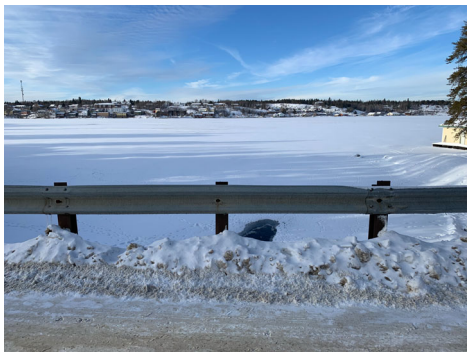
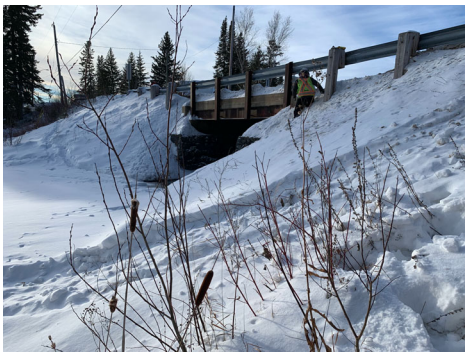
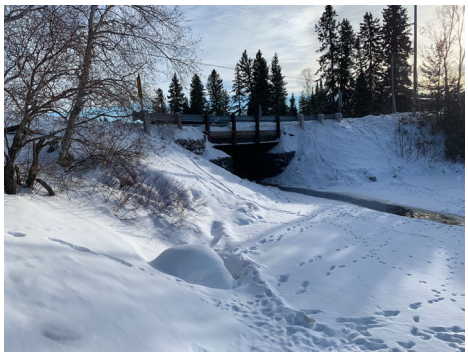

Looking West towards SU1.

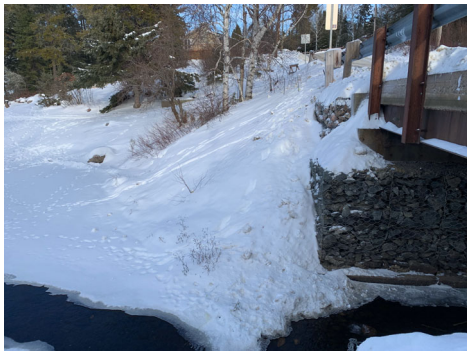

Typical Wearing Surface.

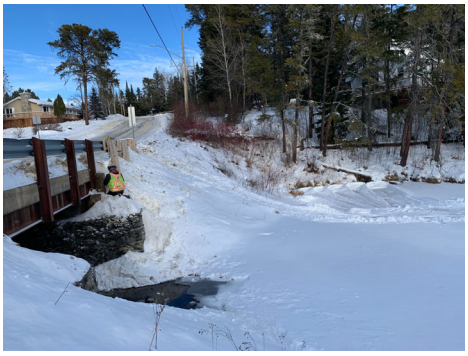

Upstream looking South.

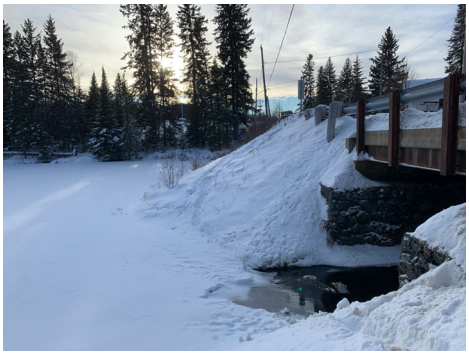

Downstream looking North.


South elevation.


North elevation.


NE embankment.


SE embankment.


SW embankment.

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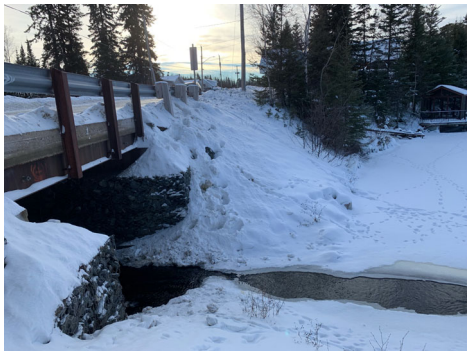
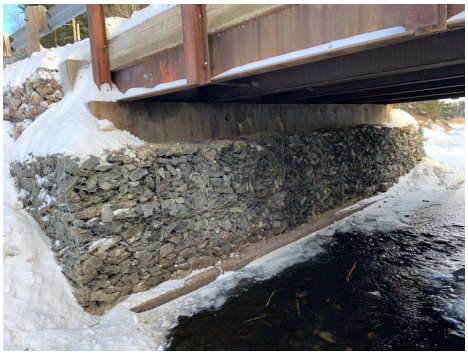
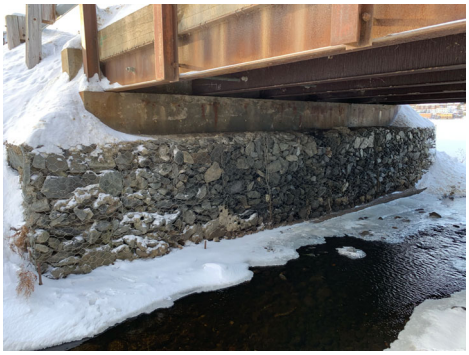


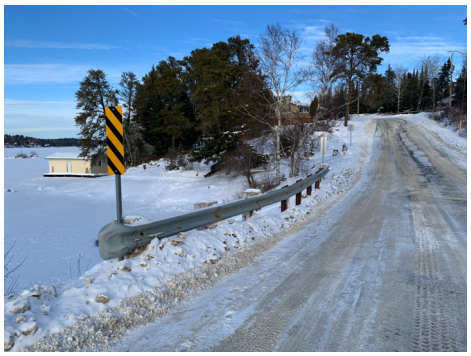
NW embankment.



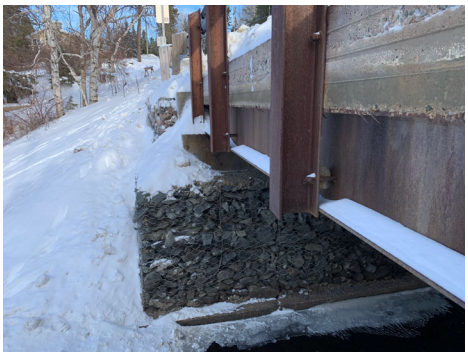
SU1 East abutment



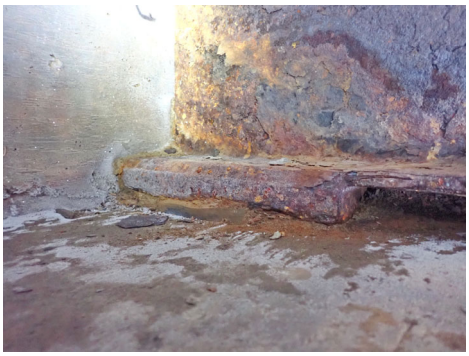
SU2 West abutment.



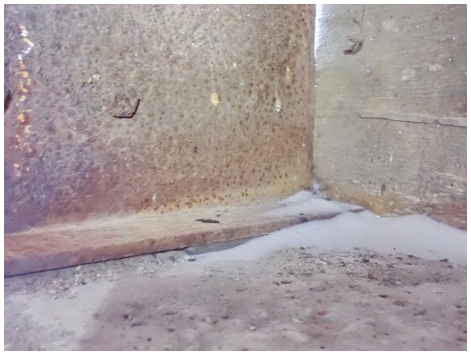
Typical North railing.



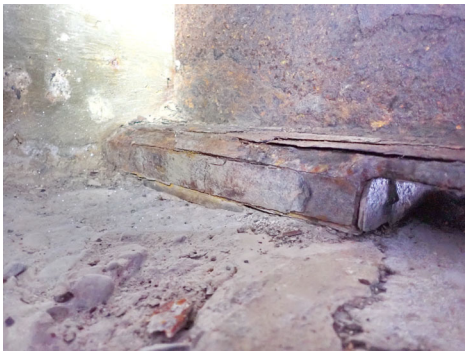
Typical North posts.



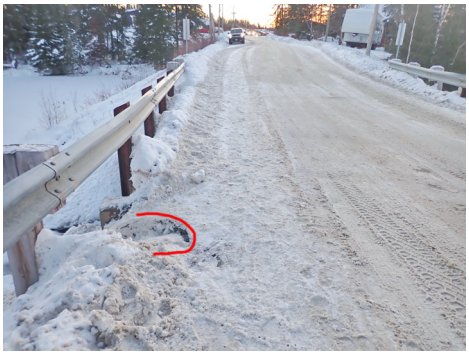
Typical interior bearing - SU1.



Typical exterior bearing - SU2.



Typical interior bearing - SU2.



Approaches - Wearing surface - SE.
Note: Missing asphalt encroaching travel lane.

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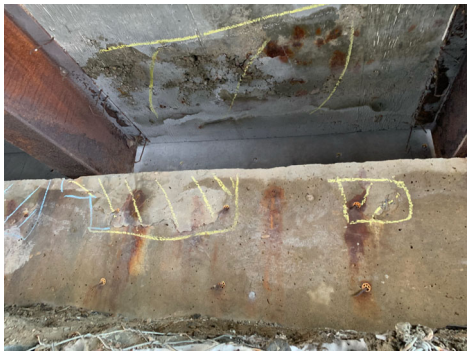
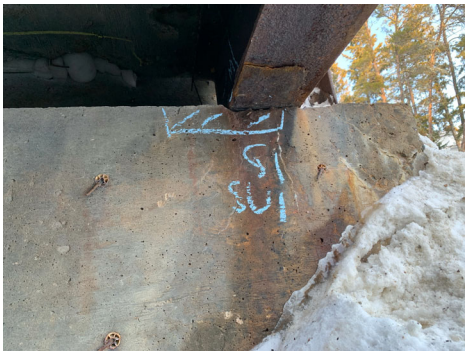
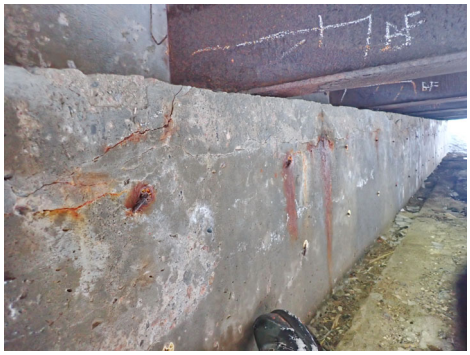


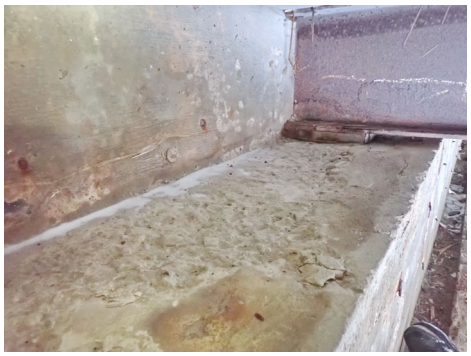
SU1 Abutment wall. Note: Typical delamination and rust staining.



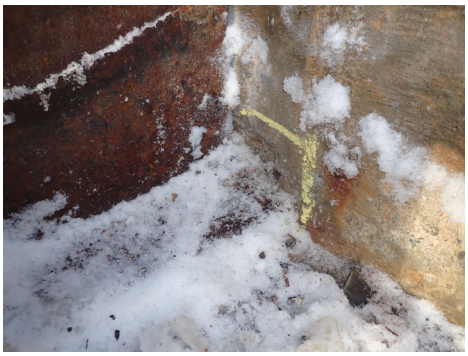
SU1 Abutment wall. Note: Spall below G1.



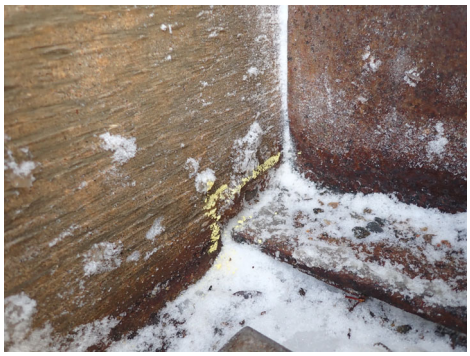
SU2 Abument wall. Note: Typical delamination and rust staining.



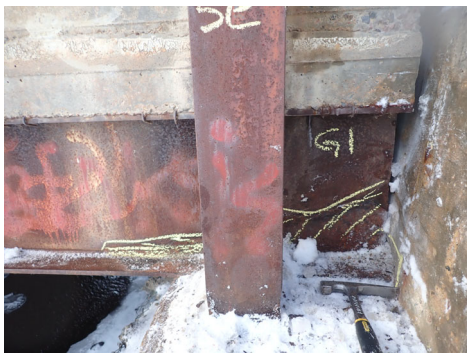
SU2 Abutment wall - between G1/G2. Note: Disintegration of bearing seat.



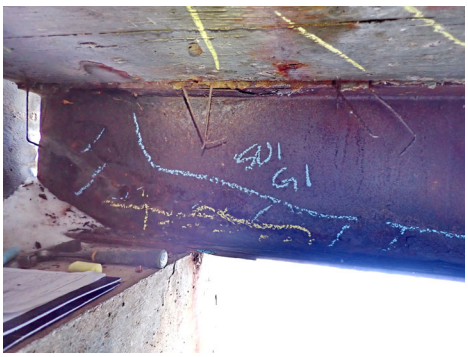
SU1 Ballast wall - SE. Note: Mechanical spall behind G1 bottom flange.



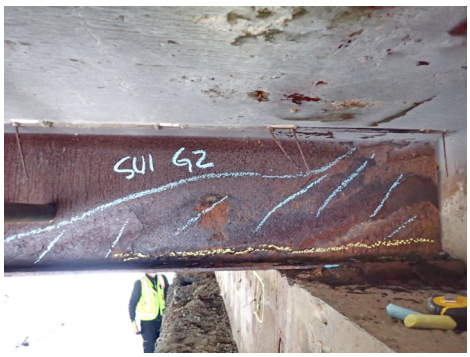
SU1 Ballast wall - NE. Note: Mechanical spall behind G6 bottom flange.



G1 @ SU1. Note: Medium corrosion on web.



G1 @ SU1. Note: Typical corrosion.



G2 @ SU1. Note: Typical corrosion.

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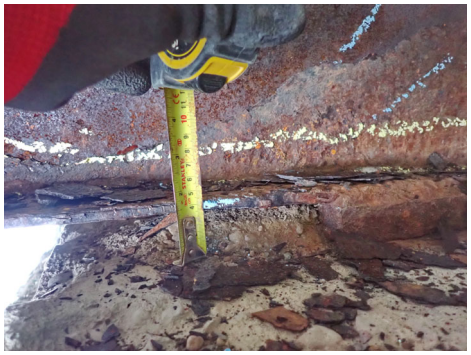
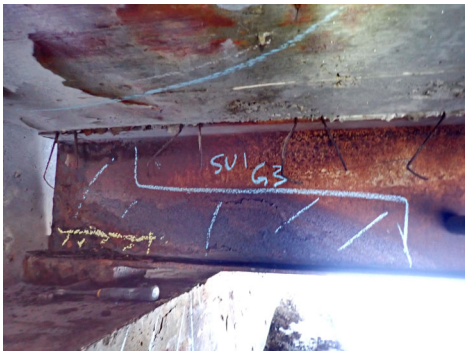
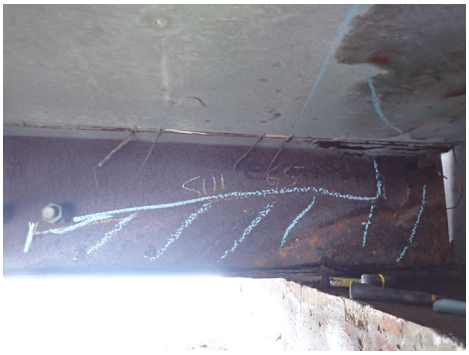


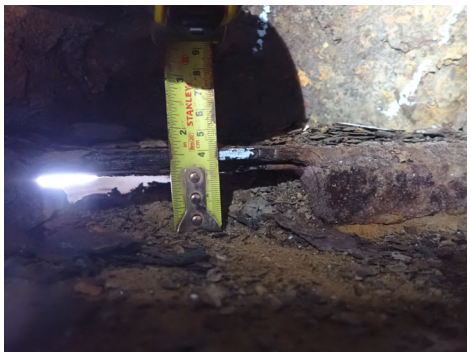
G2 @ SU1. Note: Severe section loss on the bottom flange.



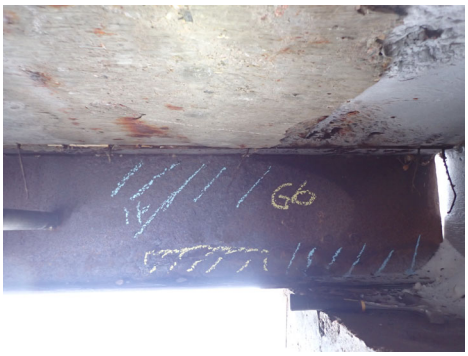
G3 @ SU1. Note: Typical corrosion.



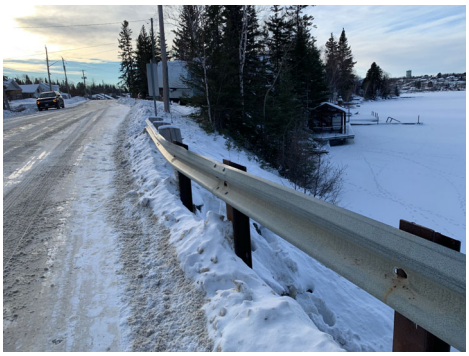
G5 @ SU1. Note: Typical corrosion.



G5 @ SU1. Note: Severe section loss on the bottom flange.

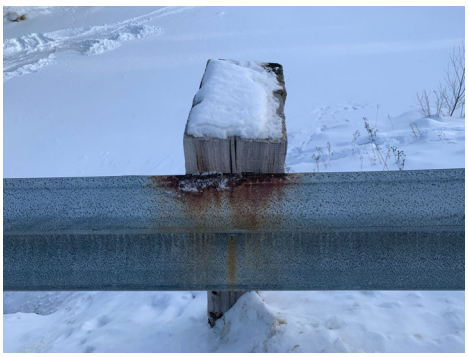


G6 @ SU1. Note: Medium to severe corrosion on web.

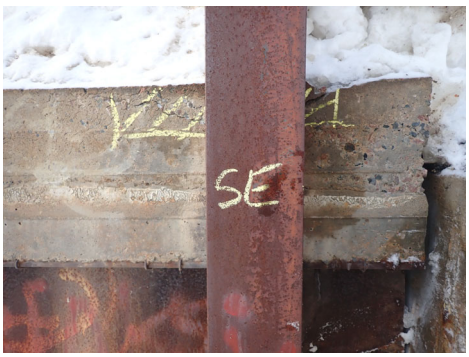


Railing - North. Note: Permanent deformation.

Approach Railing - SW. Note: Broken blocking at Post 4.



Coatings - Railing. Note: Typical rusting.



Deck Soffit - Exterior - SE side. Note: Spall behind post.

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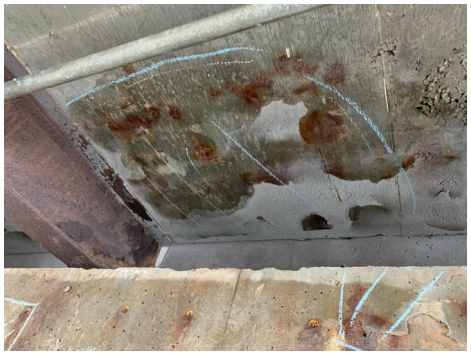
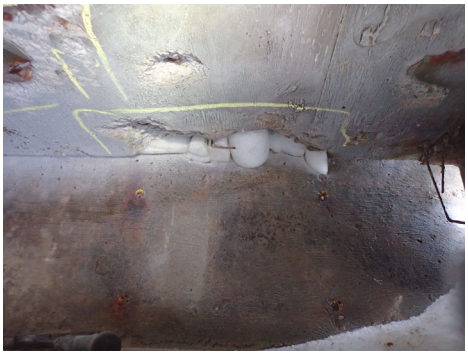
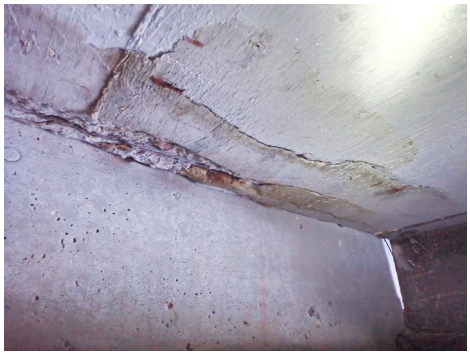


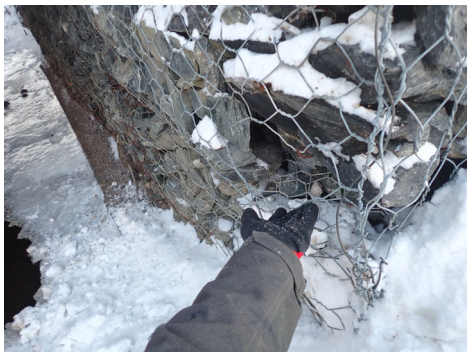
Deck Soffit - Interior - SU1. Note: Typical delamination.



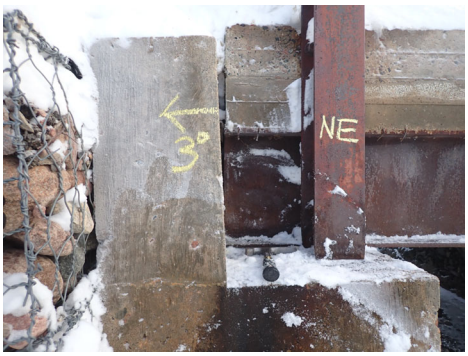
Deck Soffit - Interior - SU1 between G1/G2. Note: Spall and temporary repair.



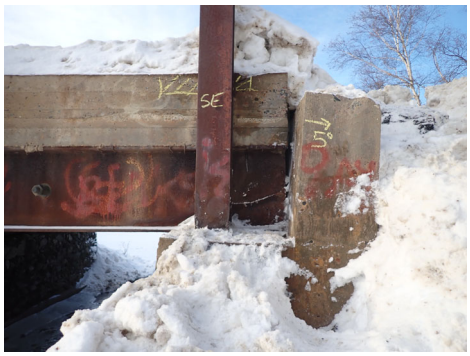
Deck Soffit - Interior - SU2 between G4/G5. Note: Typical delamination, spall, and exposed rebar.



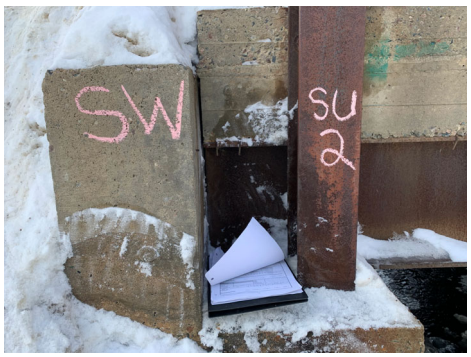
Slope Protection - SU2. Note: Typical hole in wires.



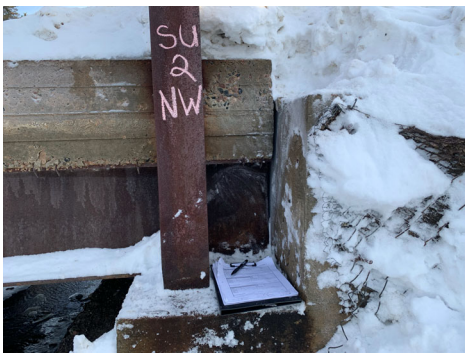
Foundation - NE. Note: Gap between deck top and ballast wall at SU1.



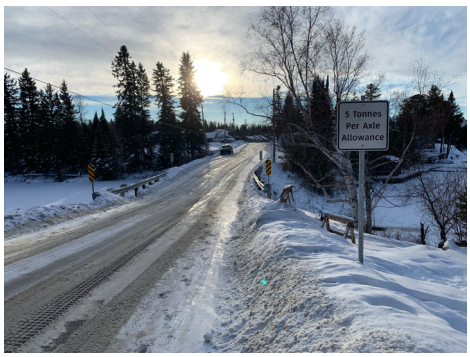
Foundation - SE. Note: Gap between deck top and ballast wall at SU1.



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



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



Typical Sign - NE.

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 ☐ Non-Navig. Water ☐ Rail ☐ Road ☑ 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. ☐ 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	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	2019	**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	1-5 Years	LS	1	$ 230,000	$ 230,000
				Subtotal	$ 230,000
				Regional Factor	1.5
				Total Estimated Cost	$ 345,000

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

Field Inspection Information:	
Date of Inspection:	December 15, 2021
Inspector:	Angela Kasdorf, C.E.T., Stantec Consulting Ltd.
Others in Party:	Vince Friesen, Tech., Stantec Consulting Ltd.
Equipment Used:	Standard, Boat
Weather:	Sunny
Temperature:	-1°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.
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:	2023

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 BridgeBearing 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	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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	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. m^2). Percentage should not be used.

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 ☑		Snow		
Protection System:	Galvanizing					Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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 ☑		Snow		
Protection System:	Green Treated					Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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 ☑		Snow		
Protection System:	Galvanizing					Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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. m^2). 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	☑ Water Depth
Protection System:			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
	m^2	0.00	192.60	0.00	0.36	00	00

Comments:
Light scaling typical. Hairline to narrow vertical cracks on walls and transverse cracks on soffit. Isolated active wet area with hairline cracks on the soffit near the inlet (0.6x0.6).

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:			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
	m^2	0.00	2.58	0.00	0.56	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:			

Condition Data:	Units	Exc.	Good	Fair	Poor*	Perform. Deficiencies	Maint. Needs
	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. m^2). Percentage should not be used.

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		☑	Water	
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	m^2	0.00	55.48	4.02	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 ~450mm into south wall and up to ~400mm into north wall.

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	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. m^2). 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 ☑		Snow		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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 ☑		Snow		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	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 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. m^2). 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 ☑		Snow		
Protection System:							Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*			
	m^2	0.00	0.00	225.00	0.00		00	00

Comments:
Limited inspection. Previous reports indicate medium ravelling typical. Light to medium map cracking on approaches. Isolated medium transverse crack above culvert. Asphalt patches present.

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. m^2). 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 Data:	Units	Exc.	Good	Fair	Poor*		
	All		All			00	00

Comments:
Clearance is 2.05 m. Depth of water is 1.70 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	☑	Snow		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All	All				00	00

Comments:
No observed defects.

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

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	☑	Snow		
Protection System:						Perform. Deficiencies	Maint. Needs
Condition Data:	Units	Exc.	Good	Fair	Poor*		
	All	All				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. m^2). Percentage should not be used.

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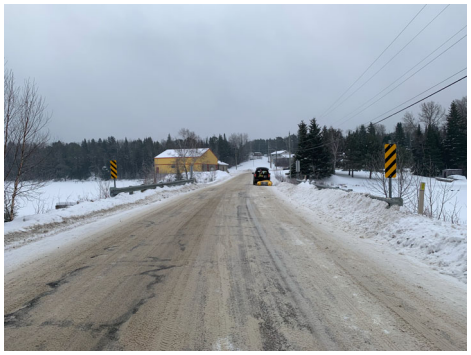
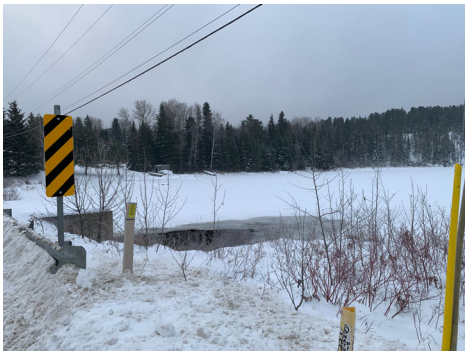
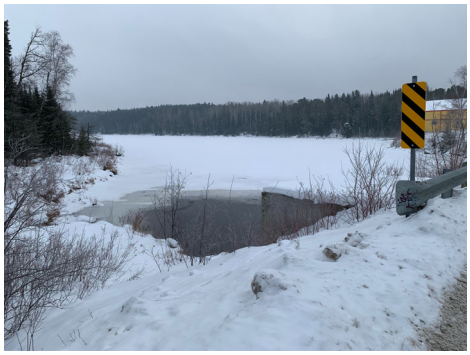
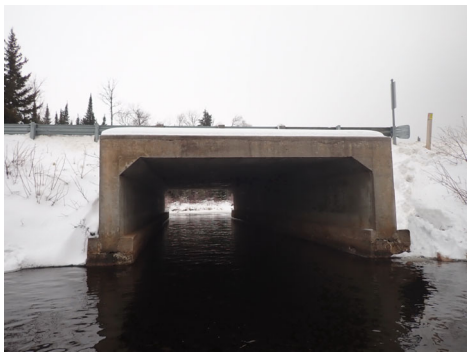
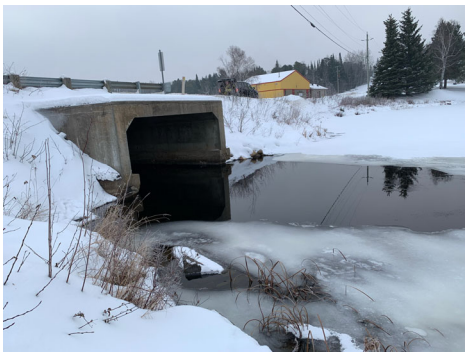
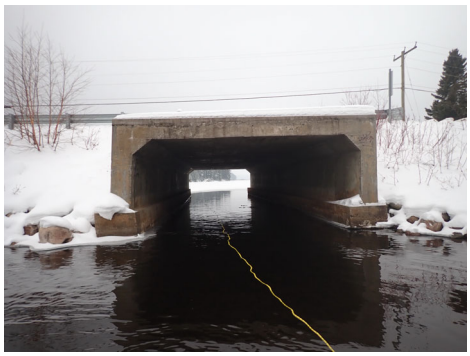

Looking South towards Barrel.

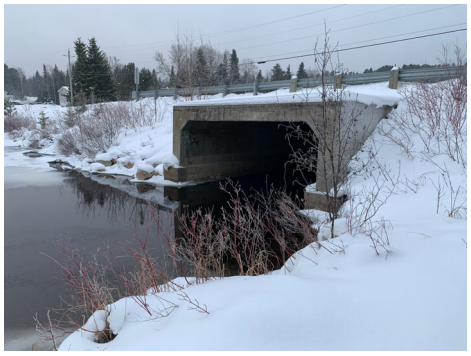

Upstream looking West.

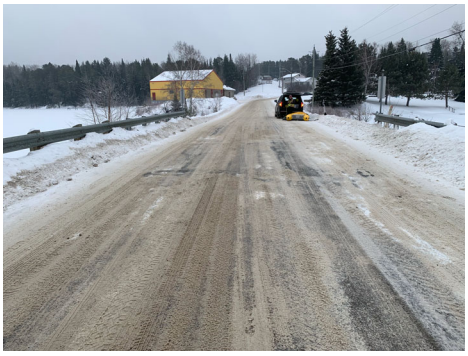

Downstream looking East

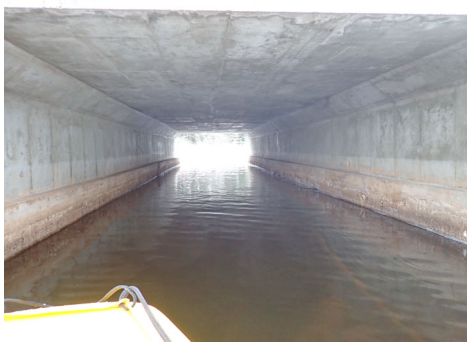

West elevation - Inlet


West elevation - Inlet.


East elevation - Outlet.


East elevation - Outlet


Typical wearing surface.


Looking East into barrel from Inlet.

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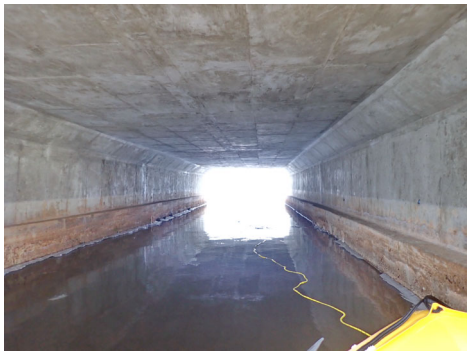
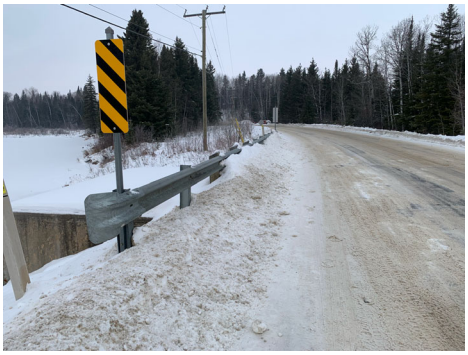
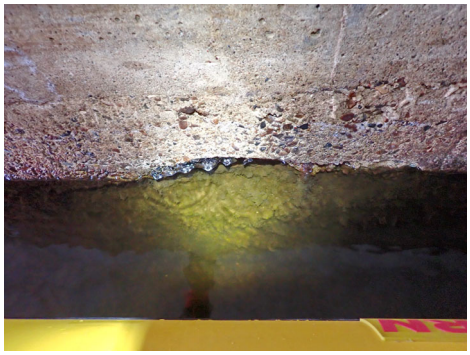


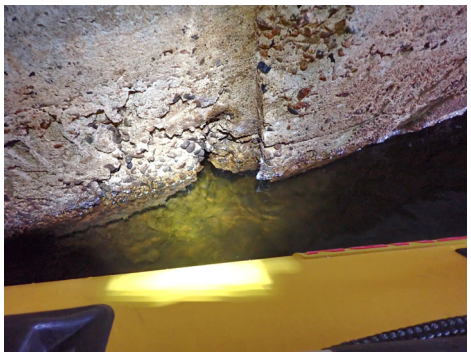
Looking West into barrel from Outlet.



Typical West railing.



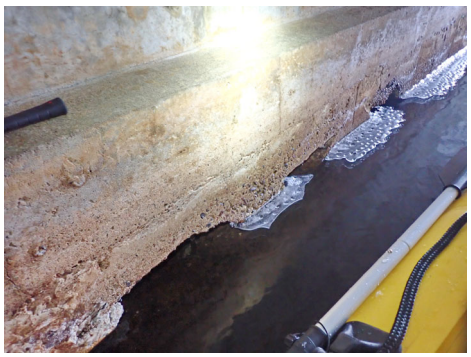
Culvert North Footing. Note: Disintegration and erosion of concrete footing with exposed rebar.



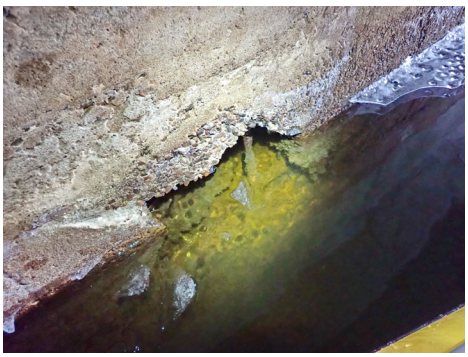
Culvert North Footing at midspan. Note: Disintegration (~400mm deep) of footing with exposed rebar.

Culvert North Footing. Note: Disintegration and erosion of footing with exposed rebar.

Culvert South Footing. Note: Disintegration and erosion of concrete footing with exposed rebar.



Culvert South Footing. Note: Disintegration and erosion of concrete footing with exposed rebar.



Culvert South Footing at midspan. Note: Disintegration (~450mm deep) of footing with exposed rebar.

Culvert South Footing. Note: Disintegration and erosion of concrete footing with exposed rebar.

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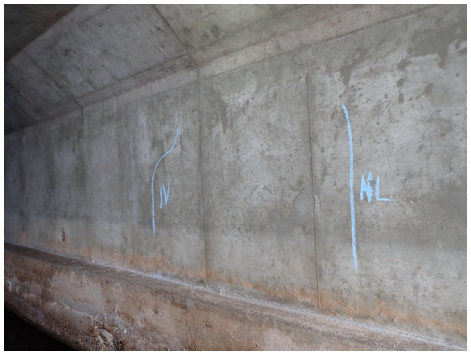
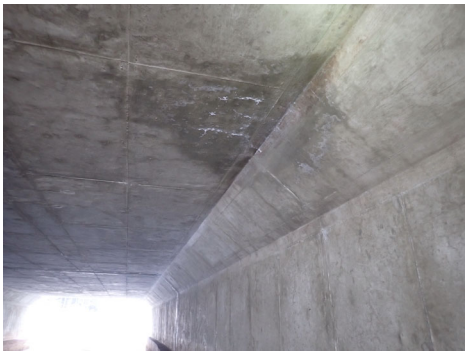
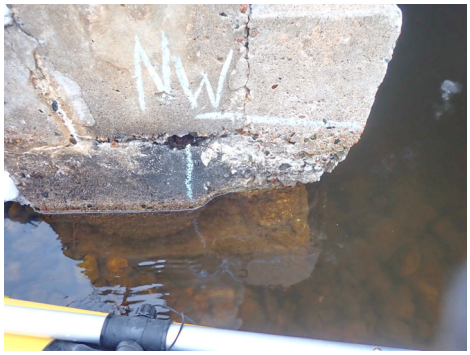
Forestry Road Culvert
2021-12-15



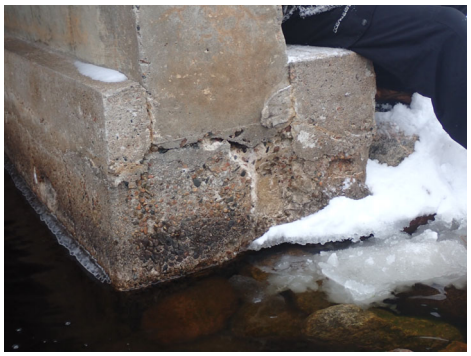
Culvert Barrel - South wall. Note typical vertical cracks.



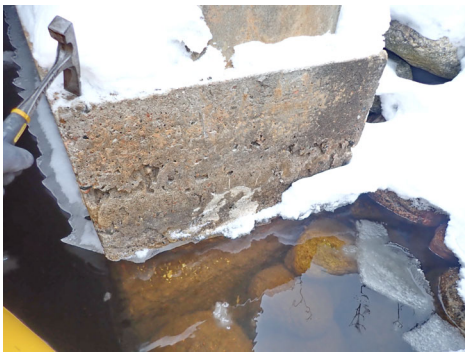
Culvert Soffit near Inlet. Note: Isolated active wet area with hairline cracks.



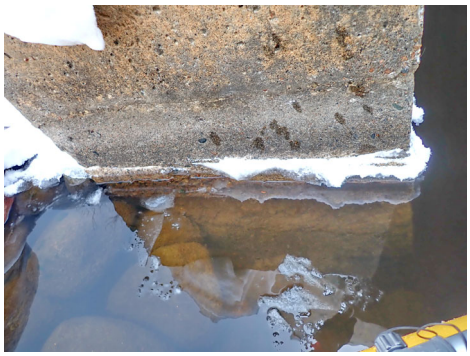
Inlet - NW corner. Note: Disintegration and erosion of concrete footing with exposed rebar.



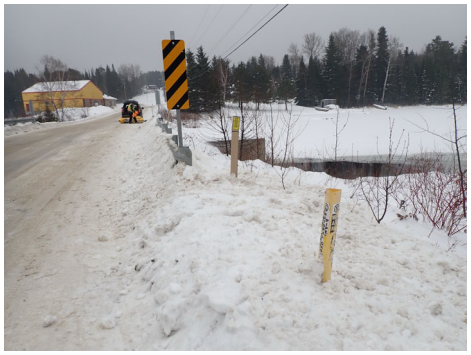
Inlet - SW corner. Note: Disintegration of footing



Outlet - NE corner. Note: Disintegration and erosion of concrete footing.



Outlet - SE corner. Note: Disintegration and erosion of concrete footing.



NW embankment. Note: Natural gas pipeline and cathodic protection markers.

Stantec

Memo

To:	Todd Olson, Infrastructure Development Coordinator Municipality of Red Lake 2 Fifth Street, P.O. Box 1000 Balmertown, ON P0V 1C0	From:	Eric Tranquada, B.Env.D., P.Eng. Bridge Engineer
Project/File:	113733881	Date:	April 4, 2022

Reference: Howey Bay Bridge and Forestry Road Culvert - OSIM Inspection 2021 - Bridge Condition Index

The Municipality of Red Lake (MU) retained Stantec Consulting Ltd. (Stantec) to undertake the detailed visual structural inspections of the Howey Bay Road Bridge and the Forestry Road Culvert in 2021.

A Bridge Condition Index (BCI) value for each structure was to be calculated as an add-on to that assignment. The BCI for each structure was 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 Bridge and Forestry Road Culvert - OSIM Inspection 2021 - Bridge Condition Index

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

Table 2 - Structure BCI Values

Structure	BCI
Howey Bay Bridge	71.18
Forestry Road Culvert	71.20

According to the BCI calculation both structures are in the lower portion of the "Good" condition range.

Further to the calculated BCI values, a Summary Letter was submitted under separate cover on March 4, 2022 to the MU for the detailed inspection of the two structures in 2021. This letter also included:

- OSIM inspection reports for each structure inspected
- Inspection photographic logs
- Maintenance recommendations and summary table with estimated maintenance costs

If you have any questions, please contact the undersigned.

Regards,

STANTEC CONSULTING LTD.

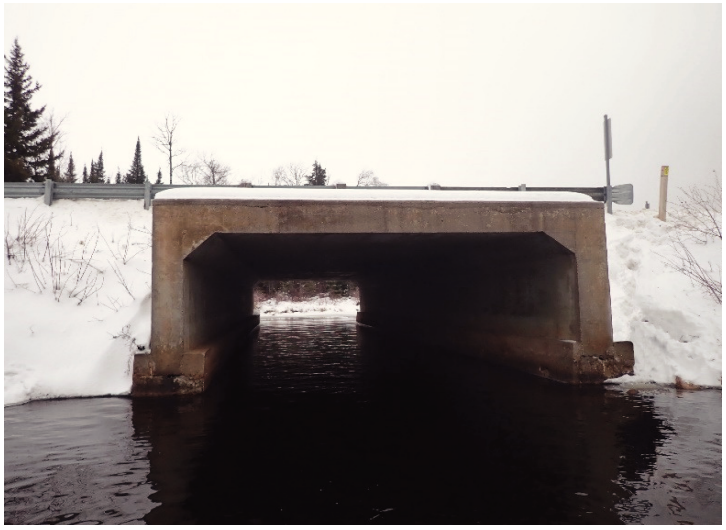
Eric Tranquada B.Env.D., P.Eng.
Bridge Engineer
Phone: (204) 478-8986
Mobile: 204-228-2574
Eric.Tranquada@stantec.com

Attachment: BCI for Howey Bay Bridge
BCI for Forestry Road Culvert

Structure Name:	Forestry Road Box Culvert	**Inspector:**	Angela Kasdorf, C.E.T.
Structure Type:	Concrete Box Culvert	**Others in Party:**	Vince Friesen
Year Built:	Unknown	**Inspection Date:**	December 15, 2021
Yr. of Last Rehab:	None	**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	192.60	0.00	0.36	50,557.5
	Inlet Components	3.14	Sq. m	350	1,099	0.00	2.58	0.00	0.56	677.3
	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	55.48	4.02	20.10	15,126.3
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	1	0	0	0	0.0
	Slope Protection	1	All	0	0	1	0	0	0	0.0
	Streams & Waterways	1	All	0	0	0	1	0	0	0.0

BCI = 71.20



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: December 14, 2021
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	103.06	0.00	0.54	463.8
Abutments	Abutment Walls	19.69	Sq. m	900	17,721	0.00	14.94	0.30	4.45	10,192.5
	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	8	0	0	0	8,000.0
Accessories	Signs	5	Each	0	0	5	0	0	0	0.0
Barriers	Posts (Approach - Wood)	8	Each	100	800	0	8	0	0	600.0
	Posts (Deck - Steel)	8	Each	200	1,600	0	8	0	0	1,200.0
	Railing Systems	40.40	m	200	8,080	31.80	0.80	0.00	7.80	6,480.0
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	39.60	0.80	0.00	0.00	5,025.0
Decks	Wearing Surface	47.36	Sq. m	25	1,184	0.00	47.36	0.00	0.00	888.0
	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	38.47	0.27	9.90	3,475.3
Embankments & Streams	Slope Protection	1	Each	0	0	0	0	1	0	0.0
	Streams and Waterways	1	All	0	0	0	1	0	0	0.0
	Embankments	1	Each	0	0	0	0	0	1	0.0

BCI = 71.18