

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 04



Photo 7 Collision damage noted on steel beam at north barrier



Photo 8 Moderate corrosion noted along bottom of barrel

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 04



Photo 9 Typical view of interior barrel looking south



Photo 10 Accumulation of branches noted at south end of culvert.

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 04

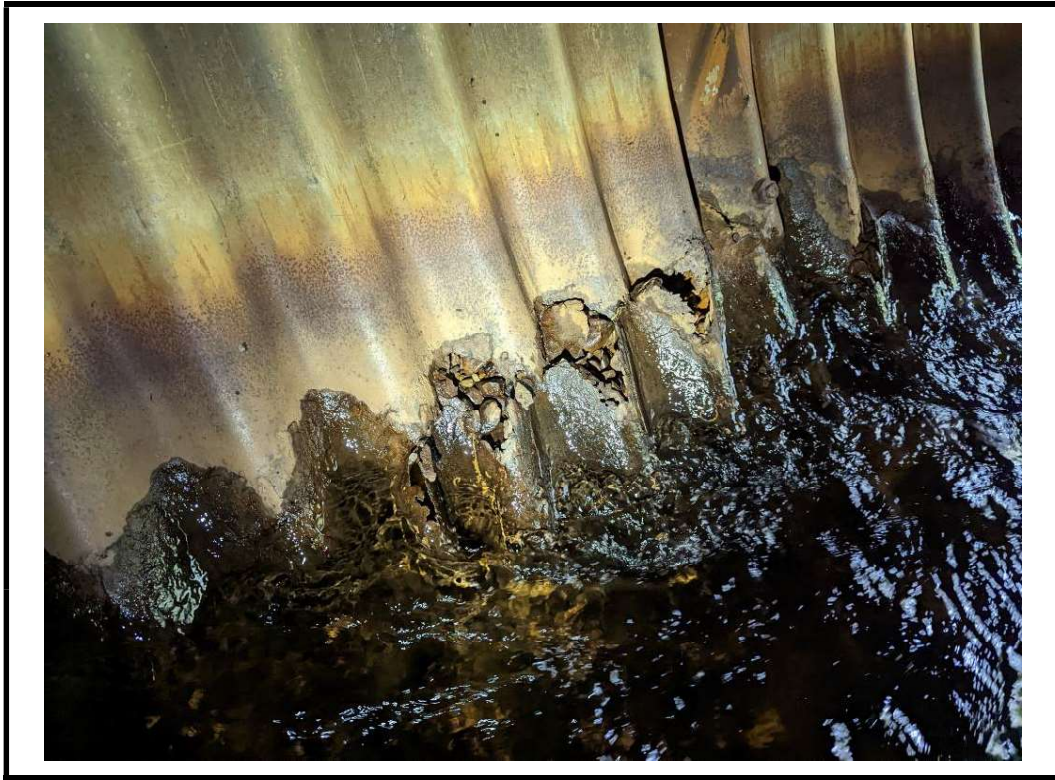


Photo 11 Localized perforation at bottom of barrel, near north end of barrel

Structure Condition Summary Form

Structure Name Boundry Road Culvert
Structure Number 05
Date of Inspection June 03, 2022
Project No. 22035
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	372.00	0.00	372.00	0.00	0.00	2232	1674	75	00	00
Culvert	Barrel	Sq.m	350.00	112.16	0.00	92.16	20.00	0.00	39256	26992	69	00	00

41488 28666

Bridge Condition Index (BCI)

69

I_t

0

Importance Factor for Traffic

I_c

0

Importance Factor for Economic Impacts

I_w

0

Importance Factor for Bridge Width

I_p

0

Importance Factor for Bridge Profile or Alignment

Bridge Sufficiency Index (BSI)

69

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 05

INVENTORY DATA:			
Structure Name	<u>Boundary Road Culvert</u>		
Main Hwy/Road #	<u> </u> On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>Boundary Road</u>		
Structure Location	<u>1.3 km west of boundary road (3.5 km south of grand desert rd)</u>		
Latitude	<u>46° 11' 36.6" N</u>	Longitude	<u>79° 1' 46.9" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>50 km/h</u> No. of Lanes <u>1</u>
Old County	<u>Nipissing</u>	AADT	<u> </u> % Trucks <u> </u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> Bicycle <input type="checkbox"/>
Structure Type	<u>Circular CSP</u>	Detour Length Around Structure	<u> </u> (km)
Total Deck Length	<u>1.5</u> (m)	Fill on Structure	<u>0.6</u> (m)
Overall Str. Width	<u>11.9</u> (m)	Skew Angle	<u>0</u> (Degrees)
Total Deck Area	<u>17.85</u> (m ²)	Direction of Structure	<u>E-W</u>
Roadway Width	<u>6.2</u> (m)	No. of Spans	<u>2</u> (m)
Span Lengths	<u>1.5, 1.5</u> (m)		

HISTORICAL DATA			
Year Built	<u>1980 (est)</u>	Last Biennial Inspection	<u>August 7, 2020</u>
Current Load Limit	<u> </u> (tonnes)	Last Bridge Master Inspection	<u> </u>
Load Limit By-Law #	<u> </u>	Last Evaluation	<u> </u>
By-Law Expiry Date	<u> </u>	Last Underwater Inspection	<u> </u>
Min. Vertical Clearance	<u> </u> (m)	Last Condition Survey	<u> </u>
Rehabilitation History: (Date / Description)			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 05

FIELD INSPECTION INFORMATION	
Date of Inspection:	June 03, 2022
Inspector:	Tashi Dwivedi, P.Eng., HP Engineering
Others in Party:	Nicholas Brown, HP Engineering
Equipment Used:	Digital camera, measuring tape, hammer
Weather:	Sunny
Temperature:	21 °C

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:		X		\$ 5,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ 5,000.00

Special Notes:

Rehabilitation/replacement study is for traffic barrier only.
 No barrier was present at the time of inspection; a code compliant barrier with end treatments should be installed.
 Beaver dam observed at inlets of east barrel and local moderate corrosion noted below waterline. Vegetation at upstream and some rocks at outlet causing minor flow obstruction.

Next Detailed Inspection:

June 2024

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 & rotation) | 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 of 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 Other |
| 06 Bridge bearing maintenance | 12 Bridge surface repair | |

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 05

ELEMENT DATA						
Element Group:	Approaches			Length:	-	
Element Name:	Barrier			Width:	-	
Location:	NE, NW, SE, & SW of Structure			Height:	-	
Material:	None			Count:	-	
Element Type:	None			Total Quantity:	-	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	-	-	-	-	-
Comments: No barrier was present at the time of inspection; a code compliant barrier should be installed.						
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Approaches			Length:	30 m	
Element Name:	Wearing Surface			Width:	6.2 m	
Location:	East & West of Structure			Height:	-	
Material:	Gravel			Count:	2	
Element Type:	Wearing Surface			Total Quantity:	372 m ²	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	372	-	-	-	-
Comments: Generally in good condition with some loose gravel noted.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Culvert			Length:	11.9 m	
Element Name:	Barrel			Width:	1.5 m	
Location:	Below Roadway			Height:	1.5 m	
Material:	Corrugated Steel			Count:	2	
Element Type:	Corrugated Steel Pipe			Total Quantity:	112.16 m ²	
Environment:	Benign			Not Inspected:	<input type="checkbox"/>	
Protection System	Hot-Dip Galvanized				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	92.16	20	-	-	-
Comments: Light corrosion at and below water line. Light rust stains on a few joints. Beaver dam observed at inlets of east barrel and local moderate corrosion noted below waterline.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 05

Element Group:	Foundations	Length:	-
Element Name:	Foundations (below ground level)	Width:	-
Location:	Below Structure	Height:	-
Material:	Unknown	Count:	-
Element Type:	Unknown	Total Quantity:	-
Environment:	Benign	Not Inspected:	<input type="checkbox"/>
Protection System	Unknown		
Units	Excellent	Good	Fair
N/A	-	-	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: No evidence of instability.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

Element Group:	Embankment and Streams	Length:	-
Element Name:	Embankments	Width:	-
Location:	NE, NW, SE, & SW of Structure	Height:	-
Material:	Native	Count:	4
Element Type:	Embankment	Total Quantity:	4
Environment:	Benign	Not Inspected:	<input type="checkbox"/>
Protection System	None		
Units	Excellent	Good	Fair
Each	-	4	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: Moderate slope, well vegetated and stable. Small rocks present at embankments and between the two barrels.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

Element Group:	Embankment and Streams	Length:	-
Element Name:	Streams and Waterways	Width:	-
Location:	Under Structure	Height:	-
Material:	Native	Count:	-
Element Type:	Stream	Total Quantity:	All
Environment:	Benign	Not Inspected:	<input type="checkbox"/>
Protection System	None		
Units	Excellent	Good	Fair
All	-	All	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: Moderate to high volume and high flow from south to north. Vegetation at upstream and some rocks at outlet causing minor flow obstruction. Beaver dam noted at south side of east barrel.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 05

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 – 10 Years	1 - 5 Years	< 1 year	
Barrier	Install code compliant barrier			X	\$ 57,000.00
Total Cost					\$ 57,000.00

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		
Traffic Control		
Utilities		
Right of Way		
Environmental Study		
Other		
Contingencies		
Total Cost		\$

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 05



Photo 1 Structure from east approach

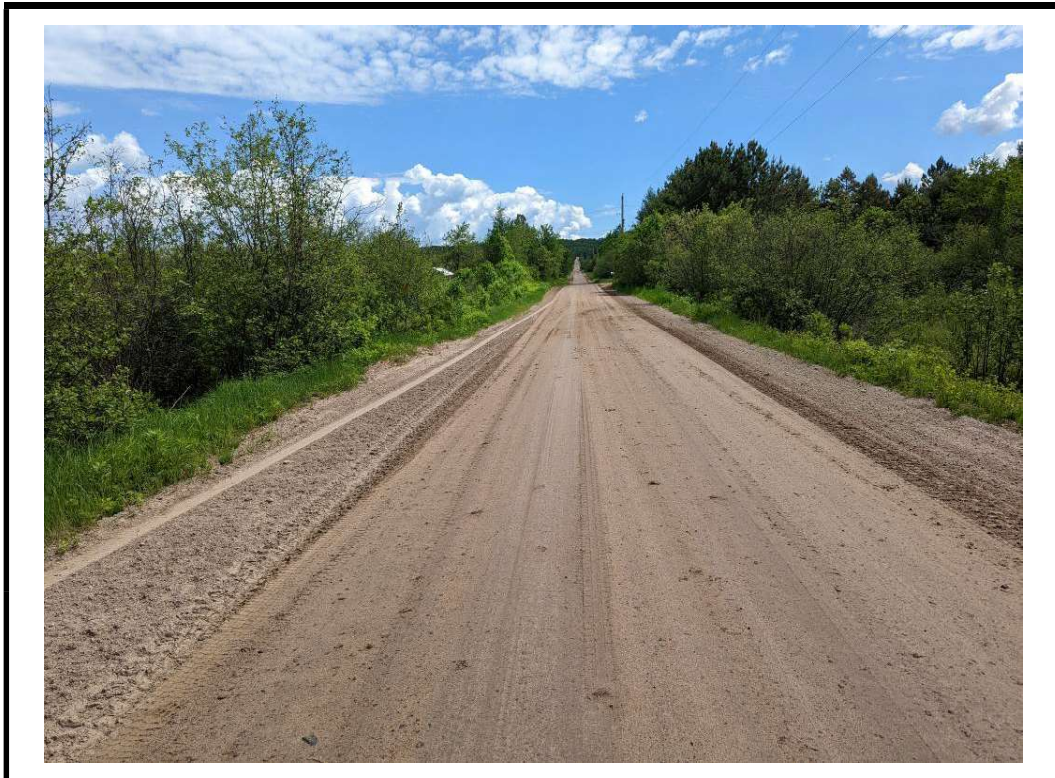


Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 05



Photo 3 East approach from centre of structure

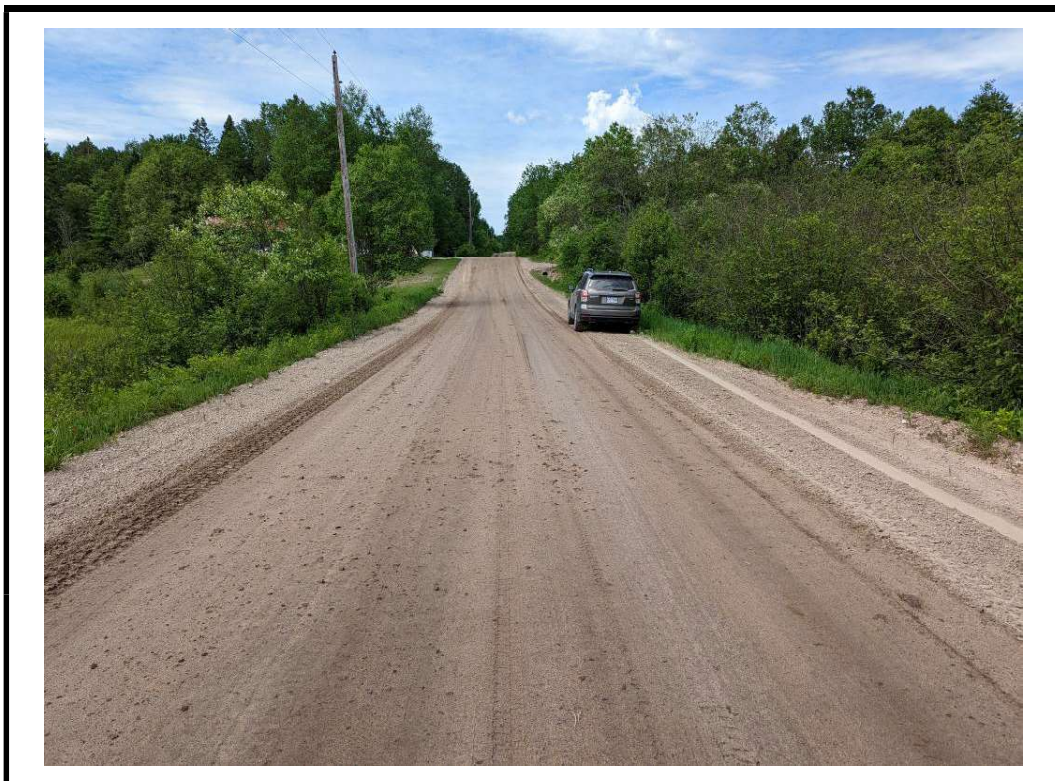


Photo 4 West approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 05



Photo 5 North elevation



Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 05



Photo 7 Typical view of east interior barrel looking south



Photo 8 Light to moderate corrosion noted below waterline

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 05



Photo 9 Beaver dam observed at south end of east barrel

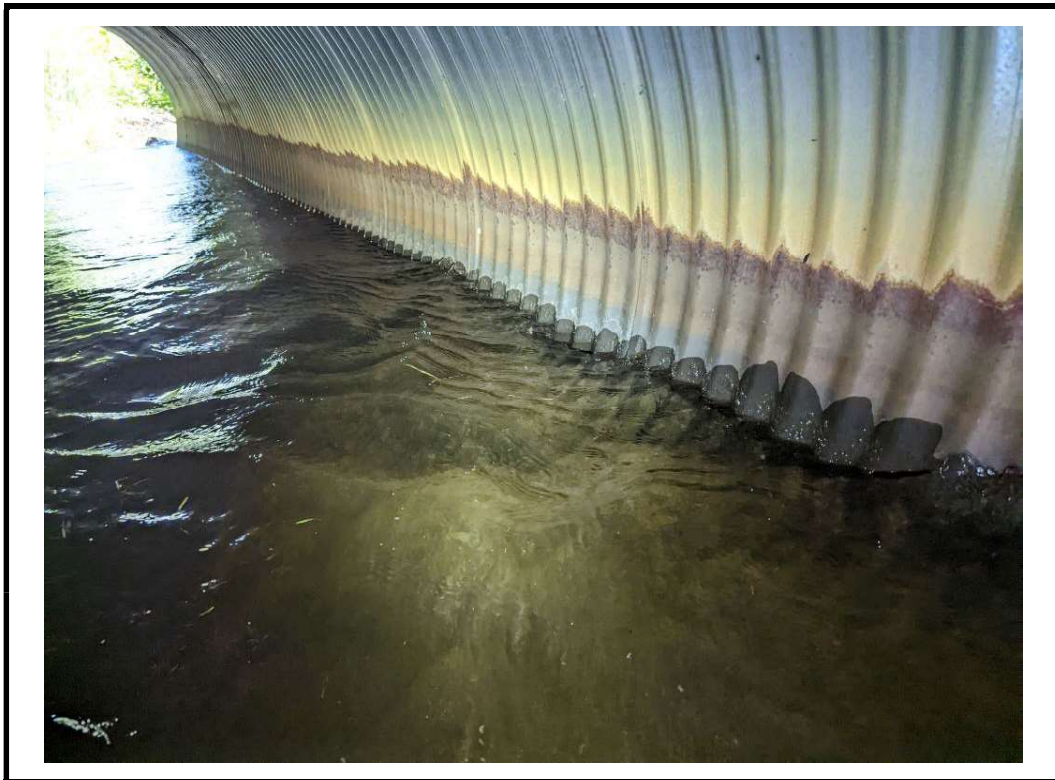


Photo 10 Localized moderate corrosion noted above waterline.

Structure Condition Summary Form

Structure Name Boxwell Road Culvert
Structure Number 06
Date of Inspection June 03, 2022
Project No. 22035
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	420.00	0.00	420.00	0.00	0.00	2520	1890	75	00	00
Culvert	Barrel	Sq.m	350.00	129.84	0.00	0.00	64.92	64.92	45444	9089	20	01	00
	Inlet Components	Sq.m	350.00	4.00	0.00	2.50	1.00	0.50	1400	796	57	00	08

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Bridge Condition Index (BCI) 24

- I_t 0 Importance Factor for Traffic
- I_c 0 Importance Factor for Economic Impacts
- I_w 0 Importance Factor for Bridge Width
- I_p 0 Importance Factor for Bridge Profile or Alignment

Bridge Sufficiency Index (BSI) 24

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 06

INVENTORY DATA:			
Structure Name	<u>Boxwell Road Culvert</u>		
Main Hwy/Road #	<u> </u> On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>Boxwell Road</u>		
Structure Location	<u>500 m west of farmers line , Lot 29, Con 4 Bonfield Ontario over Sparks Creek</u>		
Latitude	<u>46° 13' 52.0" N</u>	Longitude	<u>79° 2' 11.3" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>50 km/h</u> No. of Lanes <u>2</u>
Old County	<u>Nipissing</u>	AADT	<u> </u> % Trucks <u> </u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> Bicycle <input type="checkbox"/>
Structure Type	<u>Horizontal Ellipse CSP</u>	Detour Length Around Structure	<u> </u> (km)
Total Deck Length	<u>4.6</u> (m)	Fill on Structure	<u>0.3 - 0.6</u> (m)
Overall Str. Width	<u>14.1</u> (m)	Skew Angle	<u>0</u> (Degrees)
Total Deck Area	<u> </u> (m ²)	Direction of Structure	<u>N-S</u>
Roadway Width	<u>7.0</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>4.6</u> (m)		

HISTORICAL DATA			
Year Built	<u>1970 (est)</u>	Last Biennial Inspection	<u>August 7, 2020</u>
Current Load Limit	<u> </u> (tonnes)	Last Bridge Master Inspection	<u> </u>
Load Limit By-Law #	<u> </u>	Last Evaluation	<u> </u>
By-Law Expiry Date	<u> </u>	Last Underwater Inspection	<u> </u>
Min. Vertical Clearance	<u> </u> (m)	Last Condition Survey	<u> </u>
Rehabilitation History: (Date / Description)			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 06

FIELD INSPECTION INFORMATION	
Date of Inspection:	June 03, 2022
Inspector:	Tashi Dwivedi, P.Eng., HP Engineering
Others in Party:	Sagar Chhayani, HP Engineering
Equipment Used:	Digital camera, measuring tape, hammer
Weather:	Sunny
Temperature:	22 °C

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:		X		\$ 20,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ 20,000.00

Special Notes:

Rehabilitation/replacement study is for culvert barrel and barrier.
 No approach barrier presents at structure. A code compliant approach barrier and end treatment should be installed.
 Culvert Barrel has splitting at bolt locations and localized deformations; it is recommended that the barrel be replaced in 1 – 5 years. Light to localized moderate corrosion form middle of barrel to below waterline. It is recommended to monitor the barrel movement.

Next Detailed Inspection:

June 2024

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 & rotation) | 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 of 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 Other |
| 06 Bridge bearing maintenance | 12 Bridge surface repair | |

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 06

ELEMENT DATA						
Element Group:	Approaches			Length:	-	
Element Name:	Barrier			Width:	-	
Location:	-			Height:	-	
Material:	-			Count:	-	
Element Type:	-			Total Quantity:	-	
Environment:	-			Not Inspected:	<input type="checkbox"/>	
Protection System	-				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m	-	-	-	-	08	-
Comments: No barrier present at the time of the inspection. It is recommended that a code compliant barrier be installed.						
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Approaches			Length:	30 m	
Element Name:	Wearing Surface			Width:	7 m	
Location:	East & West of Structure			Height:	-	
Material:	Gravel			Count:	2	
Element Type:	Wearing Surface			Total Quantity:	420 m ²	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	-				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	420	-	-	-	-
Comments: Generally in good condition with loose gravel accumulated at the edges of wearing surface.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Culvert			Length:	-	
Element Name:	Inlet Components			Width:	-	
Location:	South of Structure			Height:	-	
Material:	Concrete			Count:	-	
Element Type:	Cast-in-Place Concrete			Total Quantity:	4 m ²	
Environment:	Moderate			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	2.5	1	0.5	-	08
Comments: Visible portion is in good condition with moderate scaling and small spalls. Fence attached to either side of south end of culvert.						
None <input type="checkbox"/> 1 – 5 years <input checked="" type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 06

Element Group:	Culvert	Length:	14.1 m			
Element Name:	Barrel	Width:	4.6 m			
Location:	Below Roadway	Height:	3.5 m			
Material:	Corrugated Steel	Count:	1			
Element Type:	Structural Plate CSP	Total Quantity:	129.84 m ²			
Environment:	Benign	Not Inspected:	<input type="checkbox"/>			
Protection System	Hot-Dip Galvanized				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	-	64.92	64.92	01	-
Comments:	Light to localized moderate corrosion from middle of barrel to below waterline. Salt stains at bolts and seams throughout. Minor deflection also observed along with splitting along 2/3 bolt line at east side of barrel. It is recommended that barrel be replaced in 1 – 5 years. It is recommended to monitor the barrel movement.					
	None <input type="checkbox"/>	1 – 5 years <input checked="" type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

Element Group:	Foundations	Length:	-			
Element Name:	Foundations (below ground level)	Width:	-			
Location:	Below Structure	Height:	-			
Material:	Unknown	Count:	-			
Element Type:	Unknown	Total Quantity:	-			
Environment:	Benign	Not Inspected:	<input type="checkbox"/>			
Protection System	Unknown				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
N/A	-	-	-	-	-	-
Comments:	Possible instability suspected due to splitting and deflection of barrel.					
	None <input checked="" type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

Element Group:	Embankment and Streams	Length:	-			
Element Name:	Embankments	Width:	-			
Location:	NE, NW, SE, & SW of Structure	Height:	-			
Material:	Native	Count:	-			
Element Type:	Embankment	Total Quantity:	4			
Environment:	Benign	Not Inspected:	<input type="checkbox"/>			
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
Each	-	4	-	-	-	-
Comments:	Embankments noted moderately sloped, well vegetated and appear stable at the time of inspection.					
	None <input checked="" type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 06

Element Group:	Embankment and Streams			Length:	-	
Element Name:	Streams and Waterways			Width:	-	
Location:	Under Roadway			Height:	-	
Material:	Native			Count:	-	
Element Type:	Streams			Total Quantity:	All	
Environment:	Benign			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
All	-	-	All	-	-	18
Comments: Moderate volume and flow from south to north. Dam in centre of barrel to be removed.						
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 06

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approaches	Install a code compliant barrier			X	\$ -
Barrel	Replace Culvert Barrel		X		\$ 358,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
Total Cost					\$ 358,000.00

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		\$ 100,000.00
Traffic Control		\$ 60,000.00
Utilities		
Right of Way		
Environmental Study		\$ 10,000.00
Other		
Contingencies		
Total Cost		\$ 170,000.00

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:06



Photo 1 Structure from east approach

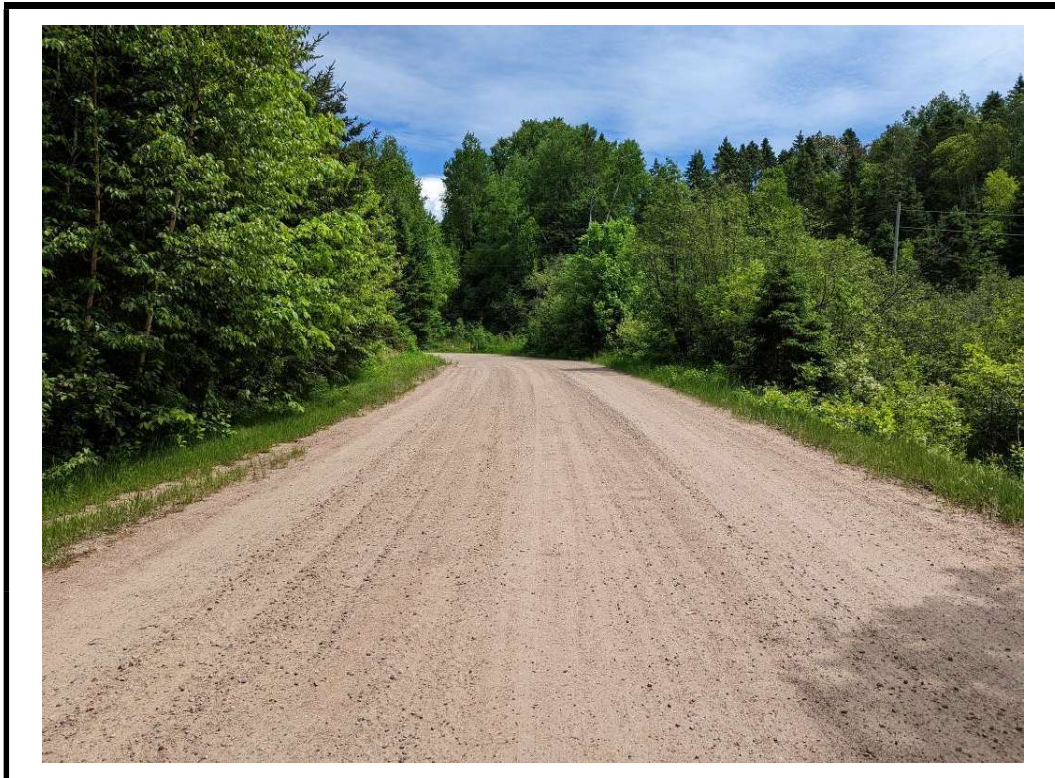


Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:06

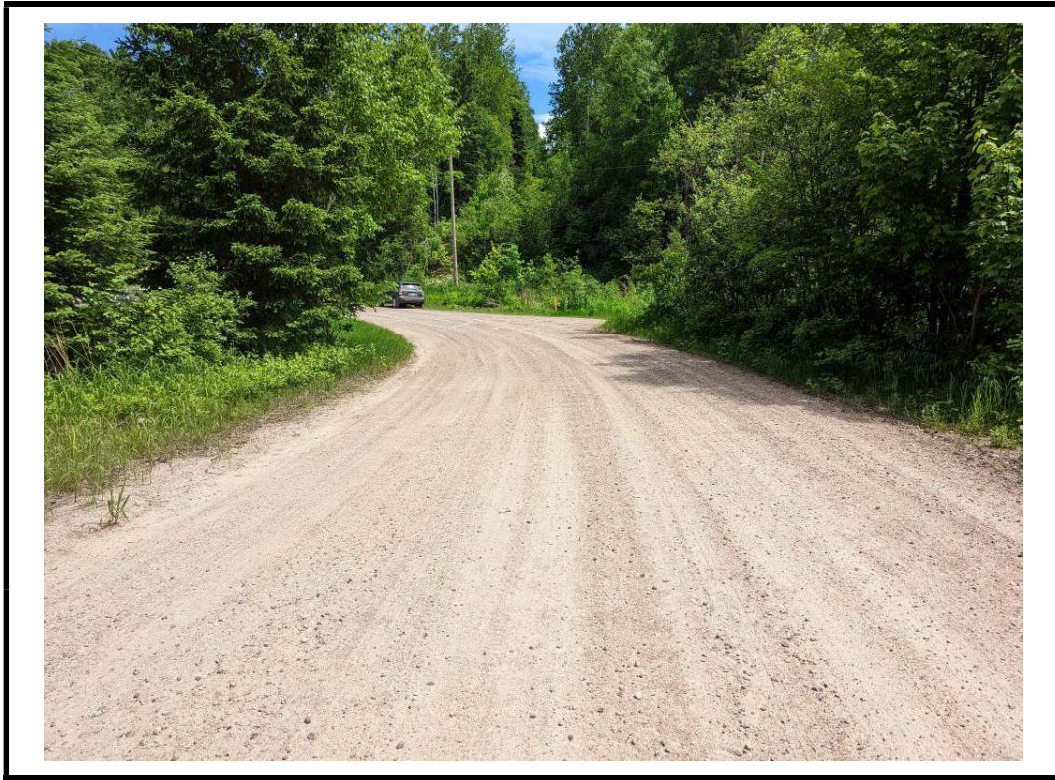


Photo 3 East approach from centre of structure

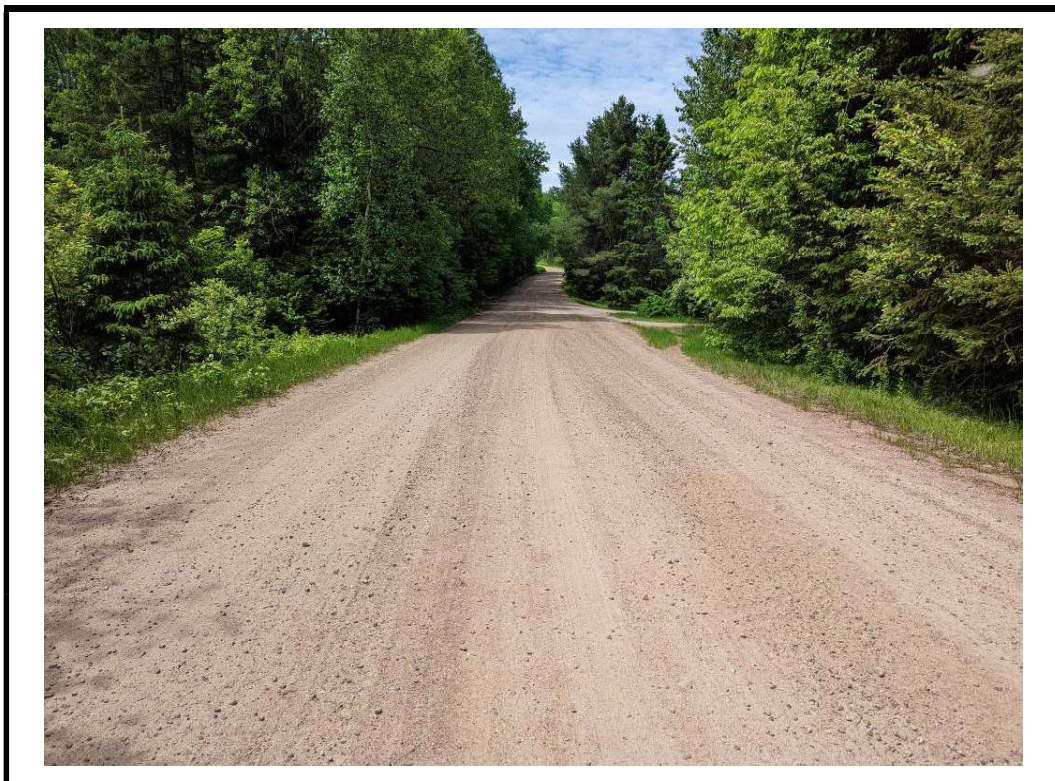


Photo 4 West approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:06



Photo 5 North elevation

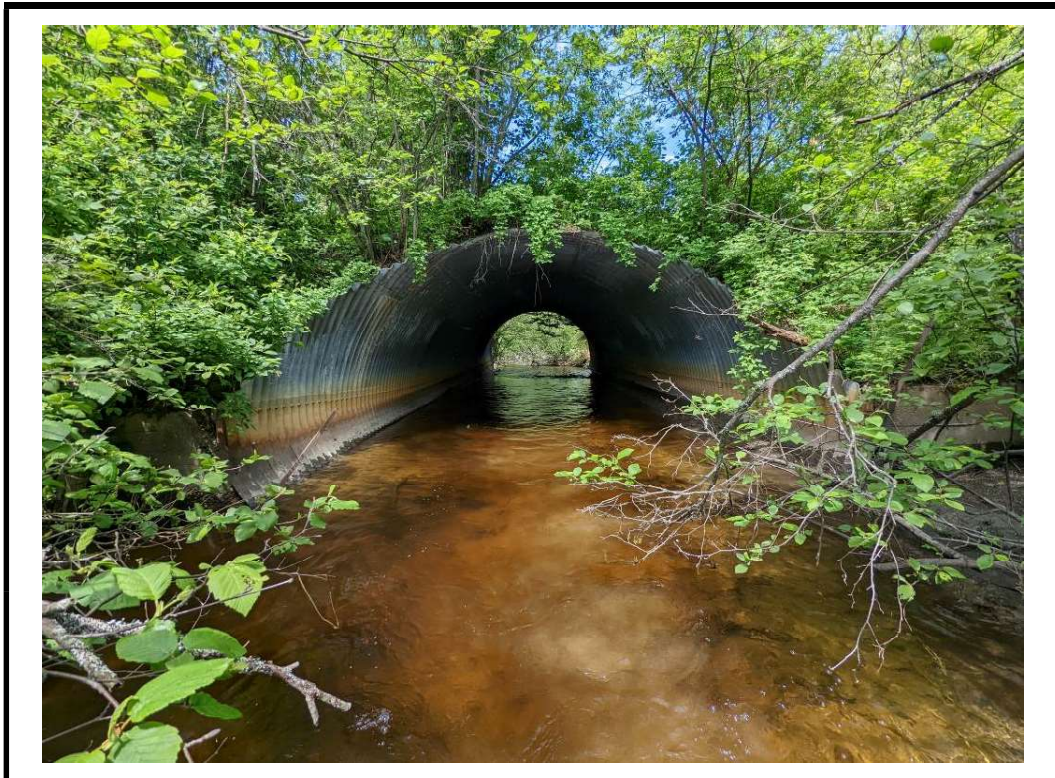


Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:06



Photo 7 Debris noted in middle of barrel obstructing stream flow

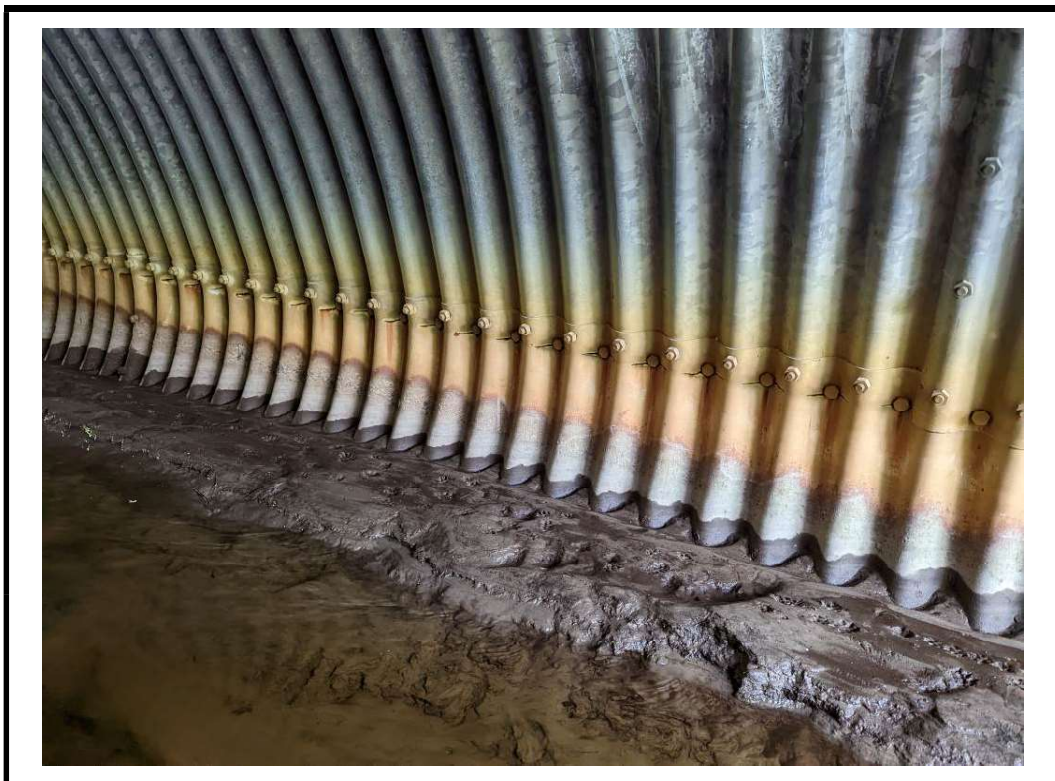


Photo 8 Light to localized moderate corrosion noted at and below waterline

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:06



Photo 9 Medium cracking noted along bolt line



Photo 10 Light to moderate scaling noted on concrete inlet at south end

Structure Condition Summary Form

Structure Name McNutt Road Culvert
Structure Number 09
Date of Inspection June 03, 2022
Project No. 22035
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	510.00	0.00	510.00	0.00	0.00	3060	2295	75	00	00
Culvert	Barrel	Sq.m	350.00	262.69	0.00	212.69	50.00	0.00	91942	62831	68	00	00

95002 65126

Bridge Condition Index (BCI)

69

I_t

0

Importance Factor for Traffic

I_c

0

Importance Factor for Economic Impacts

I_w

0

Importance Factor for Bridge Width

I_p

0

Importance Factor for Bridge Profile or Alignment

Bridge Sufficiency Index (BSI)

69

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 09

INVENTORY DATA:			
Structure Name	<u>McNutt Road Culvert</u>		
Main Hwy/Road #	<u> </u> On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>McNutt Road</u>		
Structure Location	<u>400 m north of development road, Lot 31, Con 7 Bonfield Ontario over Sharpes Creek</u>		
Latitude	<u>46° 15' 9.8" N</u>	Longitude	<u>79° 2' 31.1" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>50 km/h</u> No. of Lanes <u>2</u>
Old County	<u>Nipissing</u>	AADT	<u> </u> % Trucks <u> </u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> Bicycle <input type="checkbox"/>
Structure Type	<u>Horizontal Ellipse CSP</u>	Detour Length Around Structure	<u> </u> (km)
Total Deck Length	<u>3.6</u> (m)	Fill on Structure	<u>1.2</u> (m)
Overall Str. Width	<u>16.4</u> (m)	Skew Angle	<u>0</u> (Degrees)
Total Deck Area	<u>59.0</u> (m ²)	Direction of Structure	<u>North - South</u>
Roadway Width	<u>8.5</u> (m)	No. of Spans	<u>2</u> (m)
Span Lengths	<u>3.6, 3.6</u> (m)		

HISTORICAL DATA			
Year Built	<u>1989</u>	Last Biennial Inspection	<u>August 7, 2020</u>
Current Load Limit	<u> </u> (tonnes)	Last Bridge Master Inspection	<u> </u>
Load Limit By-Law #	<u> </u>	Last Evaluation	<u> </u>
By-Law Expiry Date	<u> </u>	Last Underwater Inspection	<u> </u>
Min. Vertical Clearance	<u> </u> (m)	Last Condition Survey	<u> </u>
Rehabilitation History: (Date / Description)			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 09

FIELD INSPECTION INFORMATION	
Date of Inspection:	<u>June 03, 2022</u>
Inspector:	<u>Tashi Dwivedi, P.Eng., HP Engineering</u>
Others in Party:	<u>Nicholas Brown, HP Engineering</u>
Equipment Used:	<u>Digital camera, measuring tape, hammer</u>
Weather:	<u>Partly Cloudy</u>
Temperature:	<u>23 °C</u>

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:		X		\$ 5,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ 5,000.00

Special Notes:

Rehabilitation/replacement study is for traffic barrier only.
 Barrier buried end treatments are substandard and should be replaced with code compliant end treatments.
 Limited inspection due to dams and fences installed at inlet. Light corrosion noted at and below water line at both barrels and some missing bolts. Beaver dam and fallen tree obstructing the waterway should be removed.

Next Detailed Inspection:	June 2024
---------------------------	-----------

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 & rotation) | 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 of 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 Other |
| 06 Bridge bearing maintenance | 12 Bridge surface repair | |

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 09

ELEMENT DATA							
Element Group:	Approaches			Length:	24 m		
Element Name:	Barrier			Width:	-		
Location:	NE, NW, SE, & SW of Structure			Height:	-		
Material:	Steel			Count:	2		
Element Type:	Steel Beam Guiderail on Wood Posts			Total Quantity:	48 m		
Environment:	Moderate			Not Inspected:	<input type="checkbox"/>		
Protection System	-				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
m	-	40	8	-	08	-	
Comments:	Wood posts are weathered with some checks and rot. Rating is based on condition only. Barrier buried end treatments are substandard and should be replaced with code compliant end treatments. Impact damage noted at southeast corner. Some rotated spacer observed on approach barrier.						
None	<input type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input checked="" type="checkbox"/>	Urgent	<input type="checkbox"/>

Element Group:	Approaches			Length:	30 m		
Element Name:	Wearing Surface			Width:	8.5 m		
Location:	North & South of Structure			Height:	-		
Material:	Gravel			Count:	2		
Element Type:	Wearing Surface			Total Quantity:	510 m ²		
Environment:	Severe			Not Inspected:	<input type="checkbox"/>		
Protection System	-				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
m ²	-	510	-	-	-	-	
Comments:	Generally in good condition with some loose gravel observed in wearing surface at approaches.						
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent	<input type="checkbox"/>

Element Group:	Culvert			Length:	16.4 m		
Element Name:	Barrel			Width:	3.6 m		
Location:	Below Roadway			Height:	3.2 m		
Material:	Corrugated Steel			Count:	2		
Element Type:	Structural Plate CSP			Total Quantity:	262.69 m ²		
Environment:	Benign			Not Inspected:	<input checked="" type="checkbox"/>		
Protection System	Hot-Dip Galvanized				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
m ²	-	212.69	50	-	-	-	
Comments:	Limited inspection due to dams and fences installed at inlet. Light corrosion noted at and below water line at both barrels and some missing bolts. Beaver dam at inlet of both barrels.						
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent	<input type="checkbox"/>

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 09

Element Group:	Foundations	Length:	-
Element Name:	Foundations (below ground level)	Width:	-
Location:	Below Barrels	Height:	-
Material:	Unknown	Count:	-
Element Type:	Unknown	Total Quantity:	-
Environment:	Benign	Not Inspected:	<input checked="" type="checkbox"/>
Protection System	-		
Units	Excellent	Good	Fair
N/A	-	-	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: No visible evidence of foundation instability observed at the time of inspection.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

Element Group:	Embankment and Streams	Length:	-
Element Name:	Embankments	Width:	-
Location:	NE, NW, SE, & SW of Structure	Height:	-
Material:	Native	Count:	4
Element Type:	Embankment	Total Quantity:	4
Environment:	Benign	Not Inspected:	<input type="checkbox"/>
Protection System	-		
Units	Excellent	Good	Fair
Each	-	4	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: Embankments are moderate to steeply sloped, heavily vegetated and appear stable.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

Element Group:	Embankment and Streams	Length:	-
Element Name:	Streams and Waterways	Width:	-
Location:	Under Roadway	Height:	-
Material:	Native	Count:	-
Element Type:	Stream	Total Quantity:	all
Environment:	Benign	Not Inspected:	<input type="checkbox"/>
Protection System	-		
Units	Excellent	Good	Fair
all	-	-	all
Performance Deficiencies			
-			
Maintenance Needs			
18 - Remove obstruction			
Comments: High volume and low flow from west to east. Beaver dam and fallen tree at inlet of both barrels.			
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 09

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approach Barrier	Install code compliant end treatments			X	\$ 24,000.00
Total Cost					\$ 24,000.00

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		
Traffic Control		
Utilities		
Right of Way		
Environmental Study		
Other		
Contingencies		
Total Cost		\$

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 09



Photo 1 Structure from north approach

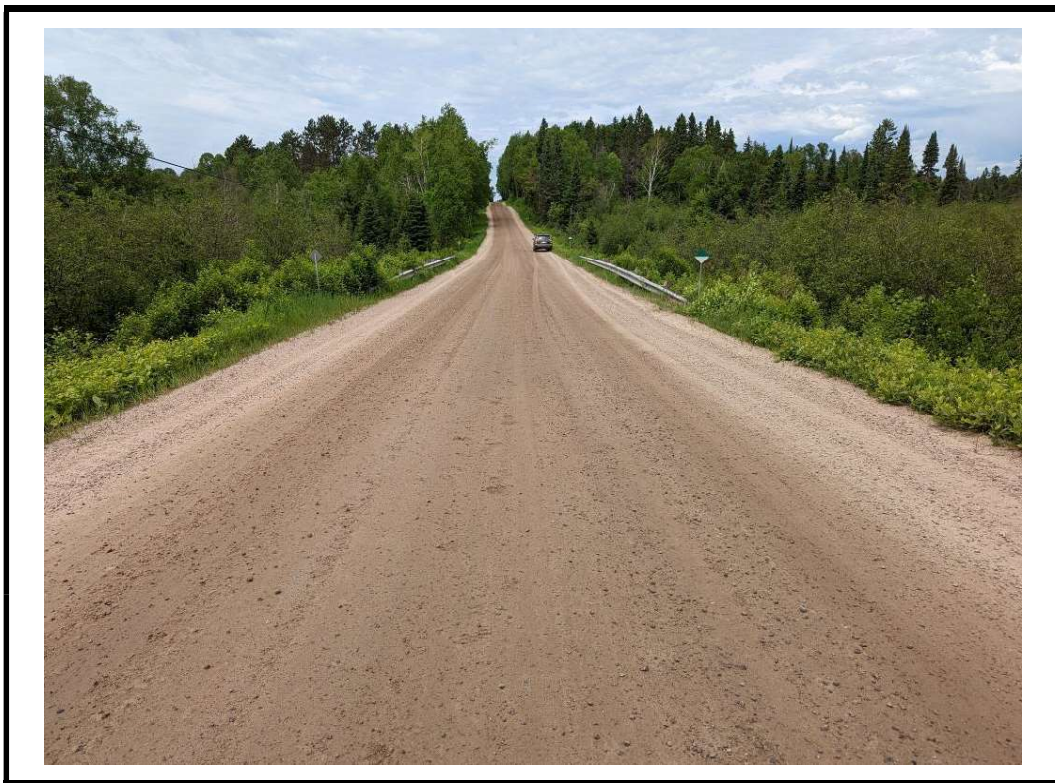


Photo 2 Structure from south approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 09



Photo 3 North approach from centre of structure

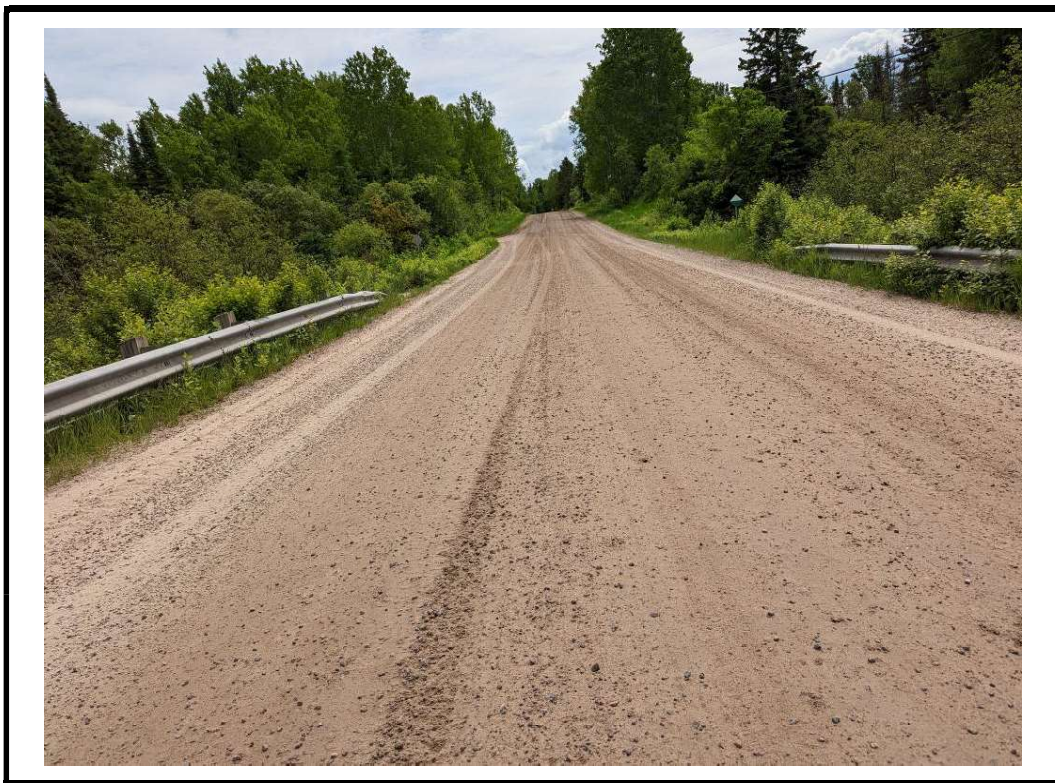


Photo 4 South approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 09



Photo 5 East elevation



Photo 6 West elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 09



Photo 7 Rot, splits and checks on timber barrier posts



Photo 8 Substandard buried end treatment at approach barrier

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 09



Photo 9 Gravel approach wearing surface



Photo 10 Obstruction at west end of north culvert.

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 09



Photo 11 Typical view of south culvert barrel looking west



Photo 12 Light corrosion noted at waterline in north culvert barrel (Typical)

Structure Condition Summary Form

Structure Name Grand Desert Road Culvert
Structure Number 11
Date of Inspection June 03, 2022
Project No. 22035
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	384.00	0.00	373.00	10.00	1.00	2304	1703	74	00	00
Culvert	Barrel	Sq.m	350.00	26.40	0.00	0.00	13.20	13.20	9240	1848	20	01	00

11544 **3551**

Bridge Condition Index (BCI) 31

- I_t 0 Importance Factor for Traffic
- I_c 0 Importance Factor for Economic Impacts
- I_w 0 Importance Factor for Bridge Width
- I_p 0 Importance Factor for Bridge Profile or Alignment

Bridge Sufficiency Index (BSI) 31

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 11

INVENTORY DATA:			
Structure Name	<u>Grand Desert Road Culvert</u>		
Main Hwy/Road #	<u> </u> On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>Grand Desert Road</u>		
Structure Location	<u>1.1km east of Bluesea Road, Lot 13, Con 5 Bonfield Ontario over Blueseal Creek</u>		
Latitude	<u>46° 12' 33" N</u>	Longitude	<u>79° 6' 56" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>40 km/h</u> No. of Lanes <u>2</u>
Old County	<u>Nipissing</u>	AADT	<u>-</u> % Trucks <u>-</u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> Bicycle <input type="checkbox"/>
Structure Type	<u>Twin Circular CSP</u>	Detour Length Around Structure	<u>-</u> (km)
Total Deck Length	<u>1.0</u> (m)	Fill on Structure	<u>±0.4</u> (m)
Overall Str. Width	<u>8.5</u> (m)	Skew Angle	<u>0</u> (Degrees)
Total Deck Area	<u>8.5</u> (m ²)	Direction of Structure	<u>East / West</u>
Roadway Width	<u>6.5</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>1.0</u> (m)		

HISTORICAL DATA			
Year Built	<u>-</u>	Last Biennial Inspection	<u>August 7, 2020</u>
Current Load Limit	<u> </u> (tonnes)	Last Bridge Master Inspection	<u> </u>
Load Limit By-Law #	<u> </u>	Last Evaluation	<u> </u>
By-Law Expiry Date	<u> </u>	Last Underwater Inspection	<u> </u>
Min. Vertical Clearance	<u> </u> (m)	Last Condition Survey	<u> </u>
Rehabilitation History: (Date / Description):			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 11

FIELD INSPECTION INFORMATION	
Date of Inspection:	<u>June 03, 2022</u>
Inspector:	<u>Tashi Dwivedi, P.Eng., HP Engineering</u>
Others in Party:	<u>Nicholas Brown, HP Engineering</u>
Equipment Used:	<u>Digital camera, measuring tape, hammer</u>
Weather:	<u>Sunny</u>
Temperature:	<u>20 °C</u>

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:		X		\$ 20,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ 20,000.00

Special Notes:

Rehabilitation/replacement study is recommended for the structure. Limited inspection of barrel due to barrel size. Moderate corrosion was observed at and below water line and dents at south and north ends of barrel were also observed. It is recommended that the structure be replaced in 1 - 5 years. Apparent deformation noted inside barrel. No barrier is present at the structure; it is recommended that code compliant barrier with end treatments be installed.

Next Detailed Inspection:	June 2024
---------------------------	-----------

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 & rotation) | 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 of 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 |

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 11

ELEMENT DATA						
Element Group:	Approaches			Length:	-	
Element Name:	Barriers			Width:	-	
Location:	NE, NW, SE & SW of Structure			Height:	-	
Material:	-			Count:	-	
Element Type:	-			Total Quantity:	-	
Environment:	-			Not Inspected:	<input type="checkbox"/>	
Protection System	-				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	-	-	-	08	-
Comments: No approach barrier observed at time of inspection. Code compliant traffic barrier including end treatments should be installed.						
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Approaches			Length:	30 m	
Element Name:	Wearing Surface			Width:	6.4 m	
Location:	East & West of Structure			Height:	-	
Material:	Gravel			Count:	2	
Element Type:	Wearing Surface			Total Quantity:	384 m ²	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	373	10	1	-	-
Comments: Generally in good condition with light tire rutting. Loose gravel noted at the edges. Medium potholes observed at west approach.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Culvert			Length:	8.4 m	
Element Name:	Barrel			Width:	1.0 m	
Location:	Below Roadway			Height:	1.0 m	
Material:	Corrugated Steel			Count:	1	
Element Type:	Corrugated Steel Pipe			Total Quantity:	26.4 m ²	
Environment:	Benign			Not Inspected:	<input checked="" type="checkbox"/>	
Protection System	Hot-Dip Galvanized				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	-	13.2	13.2	01	-
Comments: Limited inspection of barrel due to barrel size. Moderate corrosion was observed at and below water line and dents at south and north ends of barrel were also observed. It is recommended that the structure be replaced in 1 - 5 years. Apparent deformation noted inside barrel.						
None <input type="checkbox"/> 1 – 5 years <input checked="" type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 11

ELEMENT DATA						
Element Group:	Foundations			Length:	-	
Element Name:	Foundations (below ground level)			Width:	-	
Location:	Below Barrel			Height:	-	
Material:	Unknown			Count:	-	
Element Type:	Unknown			Total Quantity:	-	
Environment:	Benign			Not Inspected:	<input type="checkbox"/>	
Protection System	Unknown				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
N/A	-	-	-	-	-	-
Comments: No visible evidence of foundation instability observed at time of inspection.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Embankment and Streams			Length:	-	
Element Name:	Embankments			Width:	-	
Location:	NE, NW, SE & SW of Structure			Height:	-	
Material:	Native			Count:	4	
Element Type:	Embankment			Total Quantity:	4	
Environment:	Benign			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
each	-	1	2	1	-	13
Comments: Moderately sloped and well vegetated appear stable. Minor erosion noted at culvert ends.						
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Embankment and Streams			Length:	-	
Element Name:	Streams and Waterways			Width:	-	
Location:	NE, NW, SE & SW of Structure			Height:	-	
Material:	Native			Count:	1	
Element Type:	Stream			Total Quantity:	All	
Environment:	Benign			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
All	-	All	-	-	-	-
Comments: Low volume and flow from south to north with no visible obstruction noted in the stream at the time of inspection.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 11

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 – 10 Years	1 - 5 Years	< 1 year	
Approaches	Install code compliant guiderail			X	\$ -
Barrel	Replace barrel	X			\$ 120,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
Total Cost					\$ 120,000.00

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours	Culvert Replacement	\$ 100,000.00
Traffic Control	Culvert Replacement	\$ 60,000.00
Utilities		
Right of Way		
Environmental Study	Culvert Replacement	\$ 10,000.00
Other		
Contingencies		
Total Cost		\$ 170,000.00

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:11



Photo 1 Structure from east approach



Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:11



Photo 3 East approach from centre of structure



Photo 4 West approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:11



Photo 5 Heavy vegetation grown at north side of barrel



Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:11



Photo 7 Several small potholes on west approach



Photo 8 Minor erosion of embankment noted at south end of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.:11



Photo 9 Dents noted at south end of barrel

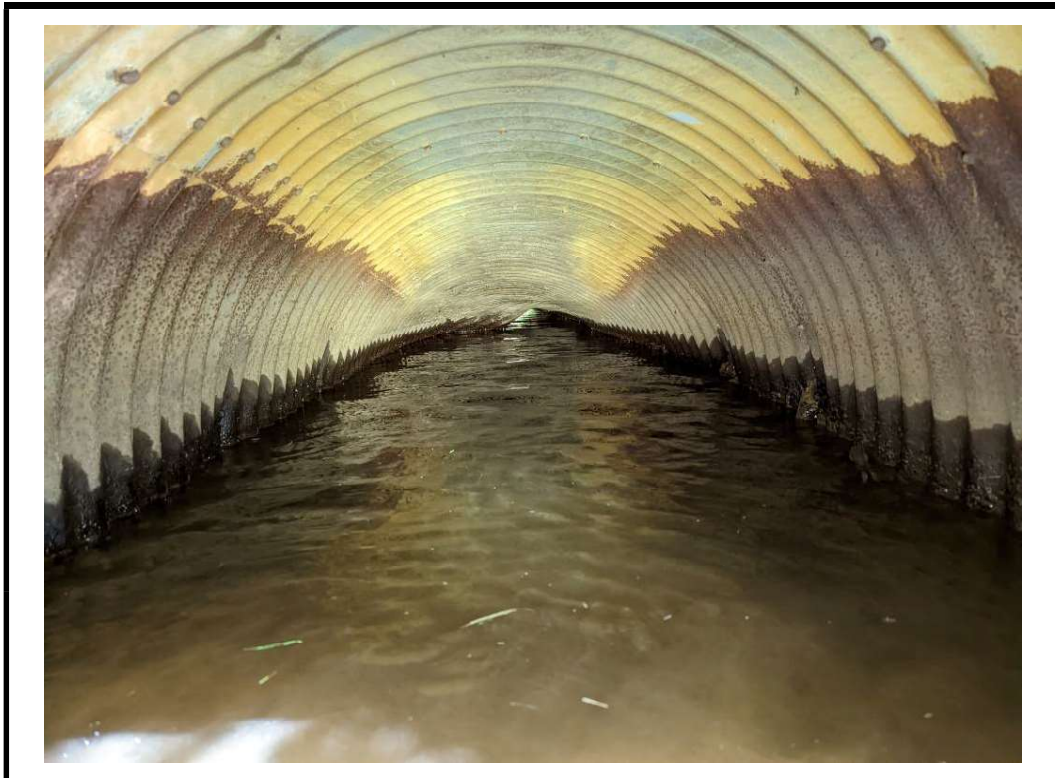


Photo 10 Apparent deformation noted inside barrel

Structure Condition Summary Form

Structure Name Trunk Road Culvert
Structure Number 13
Date of Inspection June 3, 2022
Project No. 22035
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	498.00	0.00	96.00	398.00	2.00	2988	1387	46	09	00
Culvert	Barrel	Sq.m	350.00	335.12	0.00	335.12	0.00	0.00	117292	87969	75	00	00
Retaining Walls	Walls	Sq.m	350.00	27.00	0.00	27.00	0.00	0.00	9450	7088	75	00	00
									129730	96444			

Bridge Condition Index (BCI)

74

I_t

0

Importance Factor for Traffic

I_c

0

Importance Factor for Economic Impacts

I_w

0

Importance Factor for Bridge Width

I_p

0

Importance Factor for Bridge Profile or Alignment

Bridge Sufficiency Index (BSI)

74