

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)

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MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 13

INVENTORY DATA:			
Structure Name	<u>Trunk 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>Trunk Road</u>		
Structure Location	<u>200m west of McNutt Road , Lot 31, Con 9 Bonfield Ontario over Sharpes Creek</u>		
Latitude	<u>46° 16' 5" N</u>	Longitude	<u>79° 2' 51" 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>-</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>2</u> (m)
Overall Str. Width	<u>21.3</u> (m)	Skew Angle	<u>33.5</u> (Degrees)
Total Deck Area	<u>196</u> (m ²)	Direction of Structure	<u>East/West</u>
Roadway Width	<u>8.3</u> (m)	No. of Spans	<u>2</u> (m)
Span Lengths	<u>4.6, 4.6</u> (m)		

HISTORICAL DATA			
Year Built	<u>2017</u>	Last Biennial Inspection	<u>August 6, 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) Structure replaced in 2017.			

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 13

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:	Partly Cloudy
Temperature:	24 °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 culvert barrier.
 Install code complaint traffic barrier including code compliant end treatments. Patched potholes and moderate to severe ravelling noted on approach wearing surface. Broken post noted on north barrier and loose cable observed on both barriers.
 Beaver dam observed at south end of east barrel.
 Barrel is generally in good condition.

Next Detailed Inspection:	June 2024
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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 of ACR steel) |
| 06 Bridge bearing maintenance | 12 Bridge surface repair | 18 Other |

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 13

ELEMENT DATA							
Element Group:	Approaches			Length:	28 m		
Element Name:	Barrier			Width:	-		
Location:	North & South Sides of Structure			Height:	0.75 m		
Material:	Steel			Count:	2		
Element Type:	Three Steel Cables on Wood Posts			Total Quantity:	56 m		
Environment:	Moderate			Not Inspected:	<input type="checkbox"/>		
Protection System	Hot-Dipped Galvanized				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
m	-	50	6	-	08	18	
Comments:	Generally in fair condition. Posts are weathered with some checks. Existing approach barrier is substandard, and a code compliant barrier should be installed. Some damaged posts noted. Some new post observed at the time of inspection. Broken post noted on north barrier and loose cable observed on both barriers.						
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:	8.3 m		
Location:	East & West of Structure			Height:	-		
Material:	Surface Treatment			Count:	2		
Element Type:	Wearing Surface			Total Quantity:	498 m ²		
Environment:	Severe			Not Inspected:	<input type="checkbox"/>		
Protection System	None				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
m ²	-	96	398	2	09	-	
Comments:	Patched potholes and moderate ravelling observed on wearing surface. Small potholes forming in wearing surface at east approach. Heavy washout noted at southwest corner.						
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent	<input type="checkbox"/>

Element Group:	Culvert			Length:	21.3 m		
Element Name:	Barrel			Width:	4.6 m		
Location:	Below Roadway			Height:	2.7 m		
Material:	Corrugated Steel			Count:	2		
Element Type:	Structural Plate CSP			Total Quantity:	335.12 m ²		
Environment:	Benign			Not Inspected:	<input type="checkbox"/>		
Protection System	Polymer Coating				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
m ²	-	335.12	-	-	-	-	
Comments:	Barrels are generally in good condition. Beaver dam observed at south end 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

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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 checked="" type="checkbox"/>
Protection System	Unknown		
Units	Excellent	Good	Fair
N/A	-	-	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: No visible evidence of foundation instability noted 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:	Retaining Walls	Length:	4.5m
Element Name:	Walls	Width:	0.75 m
Location:	NE, NW, SE & SW of Structure	Height:	1.5 m
Material:	Pre-cast Concrete Block	Count:	4
Element Type:	Pre-cast Block Retaining Wall	Total Quantity:	27 m ²
Environment:	Moderate	Not Inspected:	<input checked="" type="checkbox"/>
Protection System	Unknown		
Units	Excellent	Good	Fair
m ²	-	27	-
Performance Deficiencies			
-			
Maintenance Needs			
-			
Comments: Retaining walls are generally in good condition.			
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	Concrete Walls		
Units	Excellent	Good	Fair
each	-	3	-
Performance Deficiencies			
-			
Maintenance Needs			
13			
Comments: Moderate to steep slope, well vegetated and appear stable. Light erosion noted at the northwest embankment. Severe erosion observed at southwest corner.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

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Site No.: 13

Element Group:	Embankment and Streams	Length:	-			
Element Name:	Slope Protection	Width:	-			
Location:	NE, NW, SE & SW of Structure	Height:	-			
Material:	Rock	Count:	-			
Element Type:	Rock Slope Protection	Total Quantity:	4			
Environment:	Moderate	Not Inspected:	<input type="checkbox"/>			
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
each	-	4	-	-	-	-
Comments: Slope protection on embankments and over culvert is generally in good condition.						
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:	Below Barrels	Height:	-			
Material:	Native	Count:	-			
Element Type:	Streams	Total Quantity:	-			
Environment:	Benign	Not Inspected:	<input type="checkbox"/>			
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
%	-	100	-	-	-	18
Comments: Moderate volume and moderate flow from south to north. Beaver dam observed at south end 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

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REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approaches	Install approach guiderail			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.: 13



Photo 1 Structure from east approach

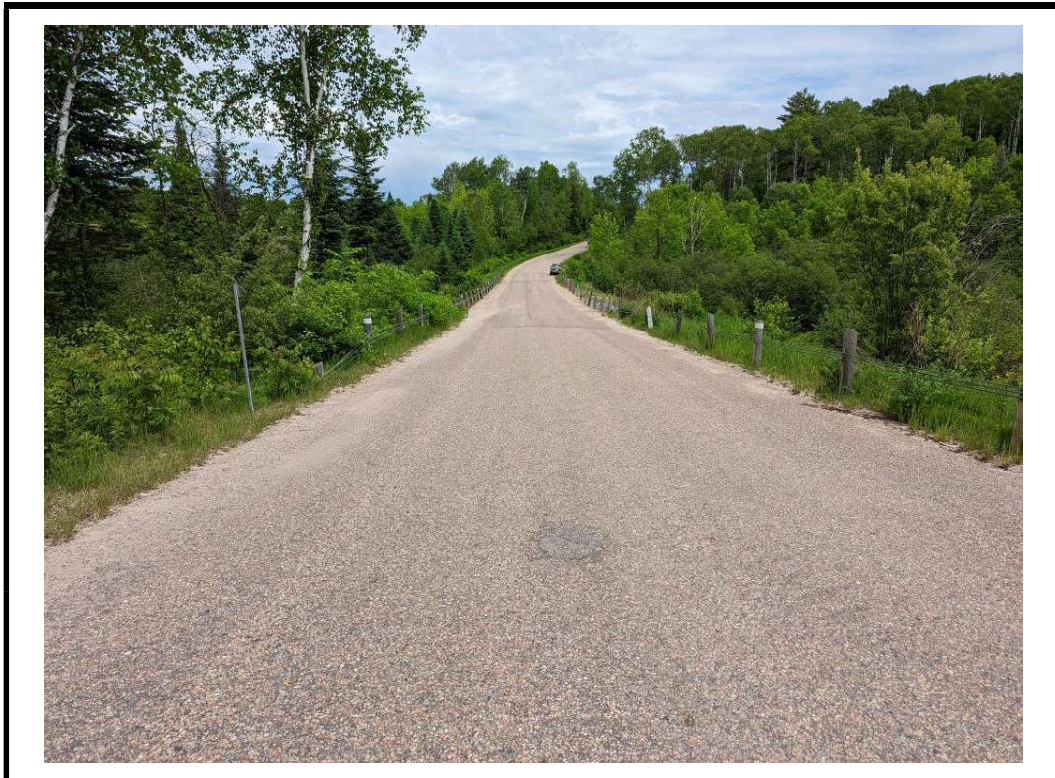


Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 13



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.: 13



Photo 5 North elevation



Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

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Photo 7 Broken post observed in north barrier



Photo 8 Moderate raveling, patched potholes noted in east approach wearing surface

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 13



Photo 9 Interior of east culvert barrel looking south



Photo 10 Typical west culvert barrel looking north

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 13



Photo 11 Heavy washout noted at southwest corner over structure



Photo 12 Typical pre-cast concrete block retaining wall at southwest corner of culvert

Structure Condition Summary Form

Structure Name Trout Pond Road Culvert
Structure Number 14
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	396.00	0.00	380.00	16.00	1.00	2376	1748	74	00	12
Culvert	Barrel	Sq.m	350.00	57.69	0.00	2.69	30.00	25.00	20192	4906	24	01	00

22568 6655

Bridge Condition Index (BCI)

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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)

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MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 14

INVENTORY DATA:			
Structure Name	<u>Trout Pond 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>Trout Pond Road</u>		
Structure Location	<u>400m North of Development Road, Lot 21, Con 7 Bonfield Ontario over Blueseal Creek</u>		
Latitude	<u>46° 14' 24" N</u>	Longitude	<u>79° 5' 29" 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>Horizontal Ellipse CSP</u>	Detour Length Around Structure	<u>-</u> (km)
Total Deck Length	<u>2.4</u> (m)	Fill on Structure	<u>0.1</u> (m)
Overall Str. Width	<u>8.7</u> (m)	Skew Angle	<u>10</u> (Degrees)
Total Deck Area	<u>20.9</u> (m ²)	Direction of Structure	<u>E-W</u>
Roadway Width	<u>6.6</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>2.4</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.: 14

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:	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 traffic barrier and structure. Monitoring of barrel deformation is recommended.
 No traffic barrier observed at structure. Code complaint approach barrier should be installed.
 Severe corrosion and perforations observed in barrel and efflorescence noted at bolts and seams.
 Posts installed around structure at west in an effort to restrict erosion.
 It is recommended that the culvert barrel be replaced in 1-5 years.

Next Detailed Inspection:	June 2024
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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.: 14

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	-	-	-	-	08	-
Comments: No approach barrier observed at time of inspection. A code compliant 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:	6.6 m	
Location:	North & South of Structure			Height:	-	
Material:	Gravel			Count:	2	
Element Type:	Gravel Wearing Surface			Total Quantity:	396 m ²	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	380	16	1	-	12
Comments: Generally in good condition with loose gravel observed on edges approach roadway. Washout observed at east and west sides of wearing surface near culvert.						
None <input type="checkbox"/> 1 – 5 years <input checked="" type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Culvert			Length:	8.7 m	
Element Name:	Barrel			Width:	2.4 m	
Location:	Below Roadway			Height:	1.8 m	
Material:	Corrugated Steel			Count:	1	
Element Type:	Structural Plate CSP			Total Quantity:	57.69 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	-	2.69	30	25	01	-
Comments: Severe corrosion and perforations at and below water line with the bottom of the barrel having partially separated from the structure. Efflorescence at seams and a dent was noted at inlet (west). Debris build up observed in structure. Barrel is deformed. It is recommended that the structure be replaced from 1 – 5 years. A piece of CSP from a different structure was found in the barrel, obstructing flow. Dents noted at west end of barrel. Monitoring of barrel deformation is recommended.						
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.: 14

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:	■	
Protection System	Unknown					Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor			
N/A	-	-	-	-	-	-	
Comments:	Barrel appears deformed; deformation may be a result of foundation settlement / movement. No signs of structure settlement from top of roadway.						
None	■	1 – 5 years	□	< 1 year	□	Urgent	□

Element Group:	Embankment and Streams				Length:	-	
Element Name:	Streams and Waterways				Width:	-	
Location:	Below Structure				Height:	-	
Material:	Native				Count:	-	
Element Type:	Stream				Total Quantity:	All	
Environment:	Benign				Not Inspected:	□	
Protection System	None					Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor			
All	-	-	All	-	-	18 - Remove Channel Blockage	
Comments:	Low volume and moderate flow from west to east with trees and debris located in barrel.						
None	□	1 – 5 years	□	< 1 year	■	Urgent	□

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:	□	
Protection System	None					Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor			
each	-	-	2	2	-	13	
Comments:	Steep slope, well vegetated and some erosion noted on embankments. Posts installed around structure at west in an effort to restrict erosion.						
None	□	1 – 5 years	□	< 1 year	■	Urgent	□

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 14

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approaches	Install Code Compliant Approach Barrier			X	\$ -
Barrel	Replace barrel		X		\$ 207,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
Total Cost					\$ 207,000.00

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.: 14



Photo 1 Structure from north approach



Photo 2 Structure from south approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 14



Photo 3 North approach from centre of structure

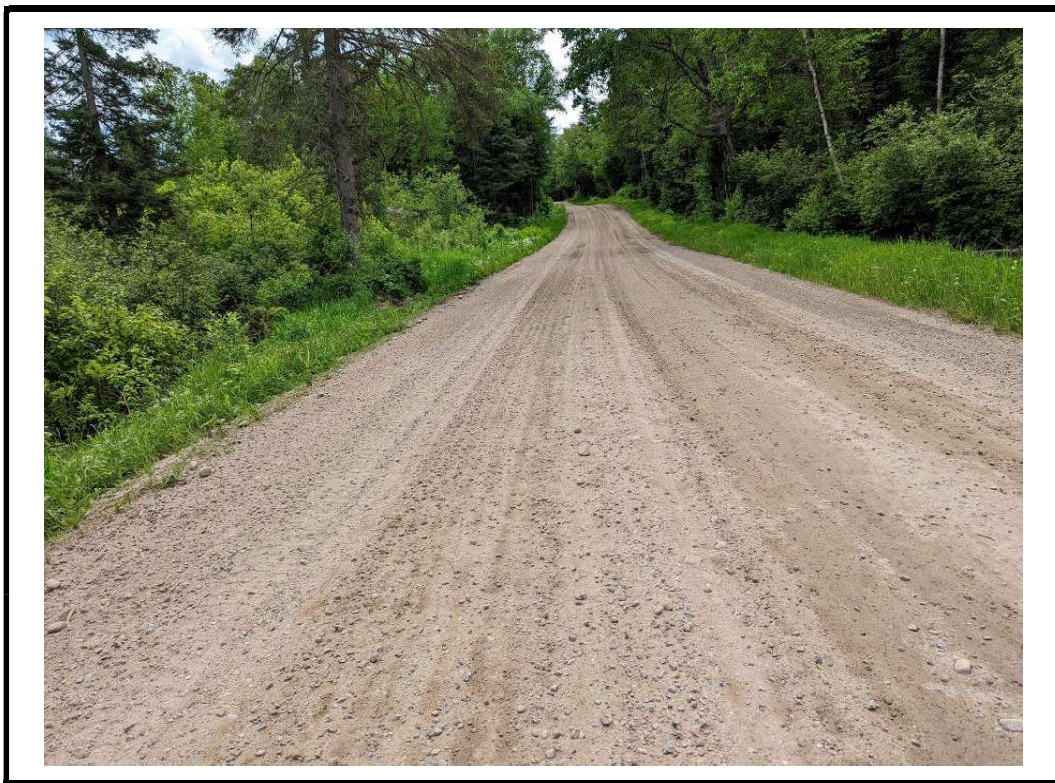


Photo 4 South approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 14



Photo 5 East elevation



Photo 6 West elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 14



Photo 7 Erosion of edge of shoulder at west end of structure



Photo 8 Dents noted at west end of barrel

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 14



Photo 9 Typical view of culvert barrel looking west



Photo 10 Efflorescence noted at seams and along boltline

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 14



Photo 11 Severe perforation noted at and below waterline



Photo 12 Damaged section of CSP in barrel, does not appear to be from this structure

Structure Condition Summary Form

Structure Name Development Road Culvert
Structure Number 15
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	408.00	0.00	386.00	20.00	2.00	2448	1785	73	00	00
Culvert	Barrel	Sq.m	350.00	200.94	0.00	200.94	0.00	0.00	70329	52747	75	00	00

72777 **54532**

Bridge Condition Index (BCI)

75

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)

75

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 15

INVENTORY DATA:			
Structure Name	<u>Development 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>Development Road</u>		
Structure Location	<u>Lot 16, Con 6 Bonfield Ontario over Blueseal Creek, 300m east of Line 3 S.</u>		
Latitude	<u>46° 13' 52" N</u>	Longitude	<u>79° 6' 35" 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>80 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>3.55</u> (m)	Fill on Structure	<u>0.9</u> (m)
Overall Str. Width	<u>21.3</u> (m)	Skew Angle	<u>51.7</u> (Degrees)
Total Deck Area	<u>75.15</u> (m ²)	Direction of Structure	<u>N-S</u>
Roadway Width	<u>6.8</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>3.55</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.: 15

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:	23 °C

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
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:

Overall, structure is appeared to be generally in good condition.
 No approach barrier observed at time of inspection. Code compliant barrier including end treatments should be installed.
 Approach wearing surface at west appear to be paved. Surface treatment at east approach has medium to wide longitudinal cracks with patches throughout.
 Some small potholes forming at east side. Electric fence noted at inlet.

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.: 15

ELEMENT DATA						
Element Group:	Approaches			Length:	-	
Element Name:	Barrier			Width:	-	
Location:	NE, NW, SE & SW of Structure			Height:	-	
Material:	-			Count:	-	
Element Type:	-			Total Quantity:	-	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m	-	-	-	-	08	-
Comments: No approach barrier observed at time of inspection. A code compliant 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:	6.8 m	
Location:	East & West of Structure			Height:	-	
Material:	Gravel wearing surface			Count:	2	
Element Type:	Wearing Surface			Total Quantity:	408 m ²	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	386	20	2	-	-
Comments: Generally in good condition. Approach wearing surface at west appear to be paved. Surface treatment at east approach has medium to wide longitudinal cracks with patches throughout. Some small potholes forming at east side.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Culvert			Length:	21.3 m	
Element Name:	Barrel			Width:	3.55 m	
Location:	Below Roadway			Height:	2.4 m	
Material:	Corrugated Steel			Count:	1	
Element Type:	Structural Plate CSP			Total Quantity:	200.94 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	-	200.94	-	-	-	-
Comments: Culvert barrel appears to be generally in good condition. Electric fence noted at inlet.						
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.: 15

Element Group:	Foundations			Length:	-	
Element Name:	Foundations (below ground level)			Width:	-	
Location:	-			Height:	-	
Material:	Unknown			Count:	-	
Element Type:	Unknown			Total Quantity:	-	
Environment:	Benign			Not Inspected:	<input checked="" type="checkbox"/>	
Protection System	Unknown				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
N/A	-	-	-	-	-	-
Comments: No visible evidence of foundation instability noted 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:	Streams and Waterways			Width:	-	
Location:	Below Structure			Height:	-	
Material:	Native			Count:	-	
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: Moderate volume and low flow from south to north with some vegetation noted at upstream. Sediment buildup in the 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:	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	-	4	-	-	-	-
Comments: Moderately sloped, well vegetated and appear stable. Rock slope protection at all corners appears to be generally good condition.						
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.: 15

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approaches- Barrier	Install code compliant barrier and end treatments			X	\$ 48,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
Total Cost					\$ 48,000.00

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.: 15



Photo 1 Structure from east approach



Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 15



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.: 15



Photo 5 North elevation



Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 15



Photo 7 Medium to wide longitudinal cracks and patches noted at east approach



Photo 8 Typical view of culvert barrel looking south

Structure Condition Summary Form

Structure Name Development Road Culvert
Structure Number 16
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	396.00	0.00	331.00	60.00	5.00	2376	1634	69	00	12
Culvert	Barrel	Sq.m	350.00	289.44	0.00	169.44	100.00	20.00	101304	58478	58	01	18

103680 **60112**

Bridge Condition Index (BCI) 58

- 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) 58

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

Site No.: 16

INVENTORY DATA:			
Structure Name	<u>Development 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>Development Road</u>		
Structure Location	<u>Lot 27, Con 7 Bonfield Ontario over Sharpes Creek, 600m east of Fichault Road</u>		
Latitude	<u>46° 14' 42" N</u>	Longitude	<u>79° 3' 27" 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>80 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>4.9</u> (m)	Fill on Structure	<u>1.5</u> (m)
Overall Str. Width	<u>22.5</u> (m)	Skew Angle	<u>0</u> (Degrees)
Total Deck Area	<u>110.25</u> (m ²)	Direction of Structure	<u>East/West</u>
Roadway Width	<u>6.6</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>4.9</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.: 16

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:	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 traffic barrier and structure
 No approach barrier observed at time of inspection. Code compliant barrier including end treatments should be installed. Efflorescence and salt stains observed at bolts and seams of culvert. Cracks at the bolt line above waterline on west side of culvert. Structure should be replaced in 1 - 5 years.

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.: 16

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

Element Group:	Approaches			Length:	30 m	
Element Name:	Wearing Surface			Width:	6.6 m	
Location:	East & West of Structure			Height:	-	
Material:	Surface Treatment			Count:	2	
Element Type:	Wearing Surface			Total Quantity:	396 m ²	
Environment:	Severe			Not Inspected:	<input type="checkbox"/>	
Protection System	None				Performance Deficiencies	Maintenance Needs
Units	Excellent	Good	Fair	Poor		
m ²	-	331	60	5	-	12
Comments: Narrow longitudinal cracks on north edge of the road to the west of the structure and moderate to severe ravelling noted on wearing surface. Numerous small potholes and edge deterioration noted on both approach wearing surfaces. Patched potholes noted throughout wearing surface.						
None <input type="checkbox"/> 1 – 5 years <input checked="" type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

Element Group:	Culvert			Length:	22.5 m	
Element Name:	Barrel			Width:	4.9 m	
Location:	Below Roadway			Height:	3.2 m	
Material:	Corrugated Steel			Count:	1	
Element Type:	Structural Plate CSP			Total Quantity:	289.44 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	-	169.44	100	20	01	18 – Install Bolts
Comments: Light corrosion at and below water line. Corrosion on exposed exterior steel and bolts on the south side with few missing bolts. Efflorescence and salt stains observed at bolts and seams of culvert. South side (inlet) is perched. Cracks at the bolt line above waterline on west side 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.: 16

Element Group:	Foundations			Length:	-		
Element Name:	Foundations (below ground level)			Width:	-		
Location:	-			Height:	-		
Material:	Unknown			Count:	-		
Element Type:	Unknown			Total Quantity:	-		
Environment:	Benign			Not Inspected:	<input checked="" type="checkbox"/>		
Protection System	Unknown				Performance Deficiencies	Maintenance Needs	
Units	Excellent	Good	Fair	Poor			
N/A	-	-	-	-	-	-	
Comments:	No visible evidence of foundation instability noted 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	-	4	-	-	-	-	
Comments:	Steep sloped, well vegetated, and stable. Fence tied to north end 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:	Streams and Waterways			Width:	-		
Location:	Below Barrel			Height:	-		
Material:	Native			Count:	-		
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	-	-	18 - Remove Obstruction	
Comments:	Low to medium volume and moderate flow from south to north through the barrel with rocks in the channel. Old bridge and large beaver dam located upstream causing a major flow obstruction.						
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.: 16

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	1 - 5 Years	< 1 year	Urgent	
Approaches	Install guiderail		X		
Barrel	Replace Structure	X			\$ 359,000.00
Total Cost					\$ 359,000.00

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.: 16



Photo 1 Structure from east approach



Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 16

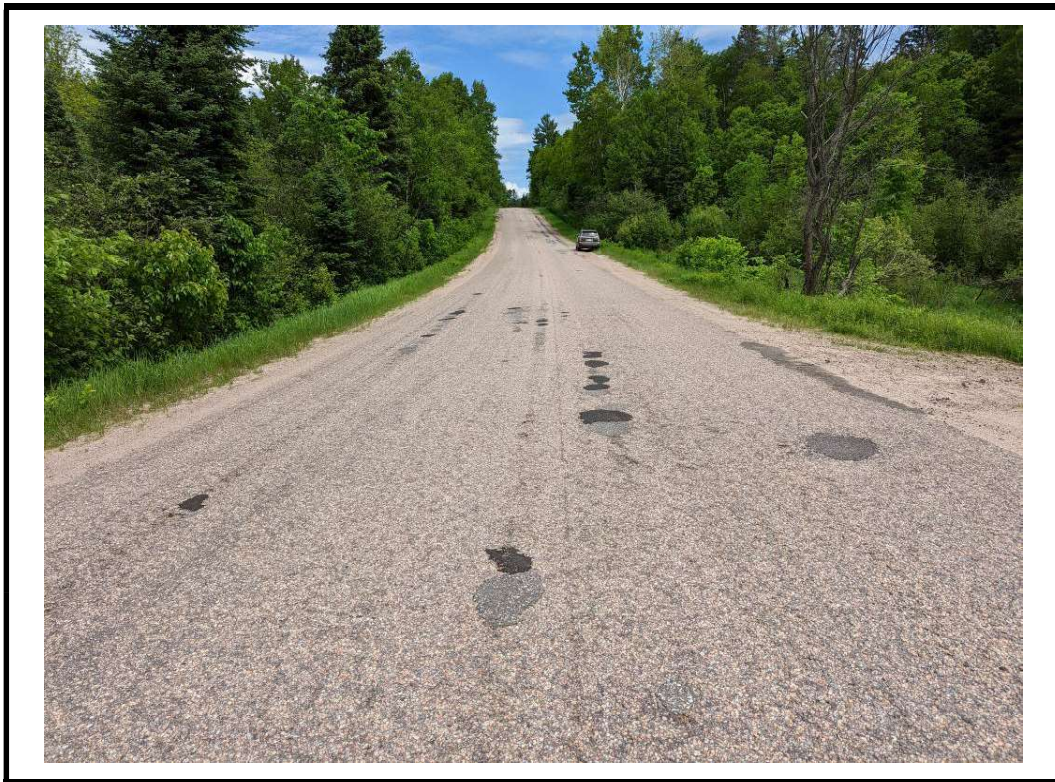


Photo 3 East approach from centre of structure



Photo 4 West approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 16



Photo 5 North elevation



Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 16

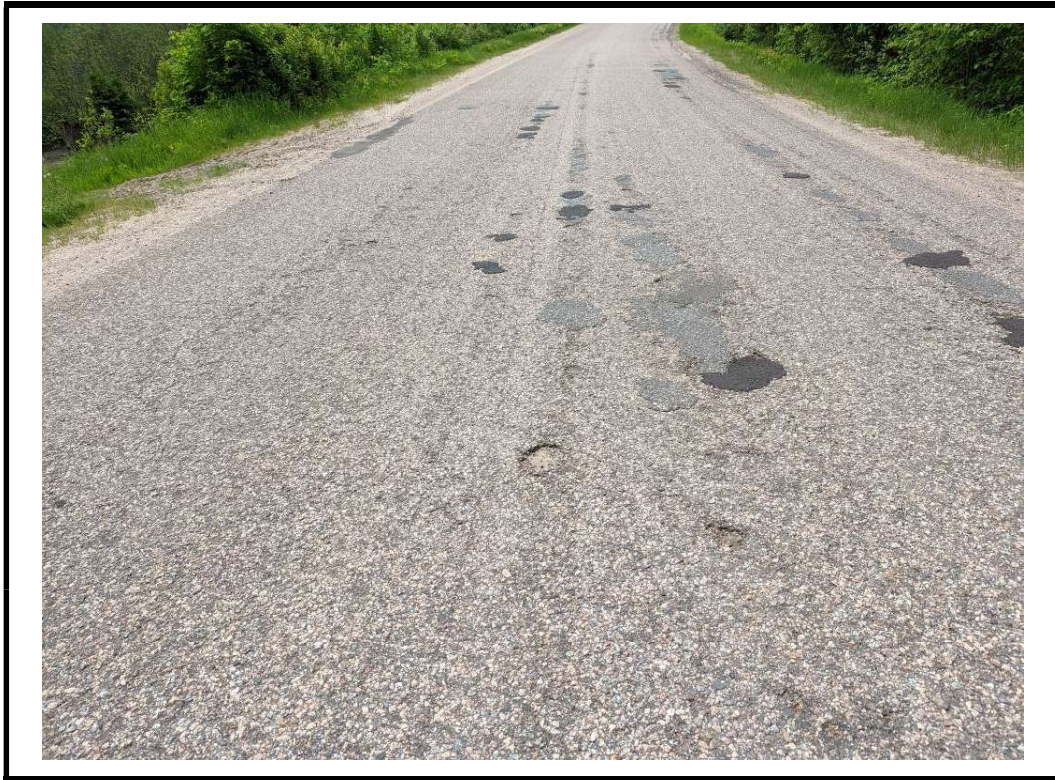


Photo 7 Previous patches, moderate raveling and potholes forming at west approach



Photo 8 Light to moderate corrosion noted at waterline

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 16

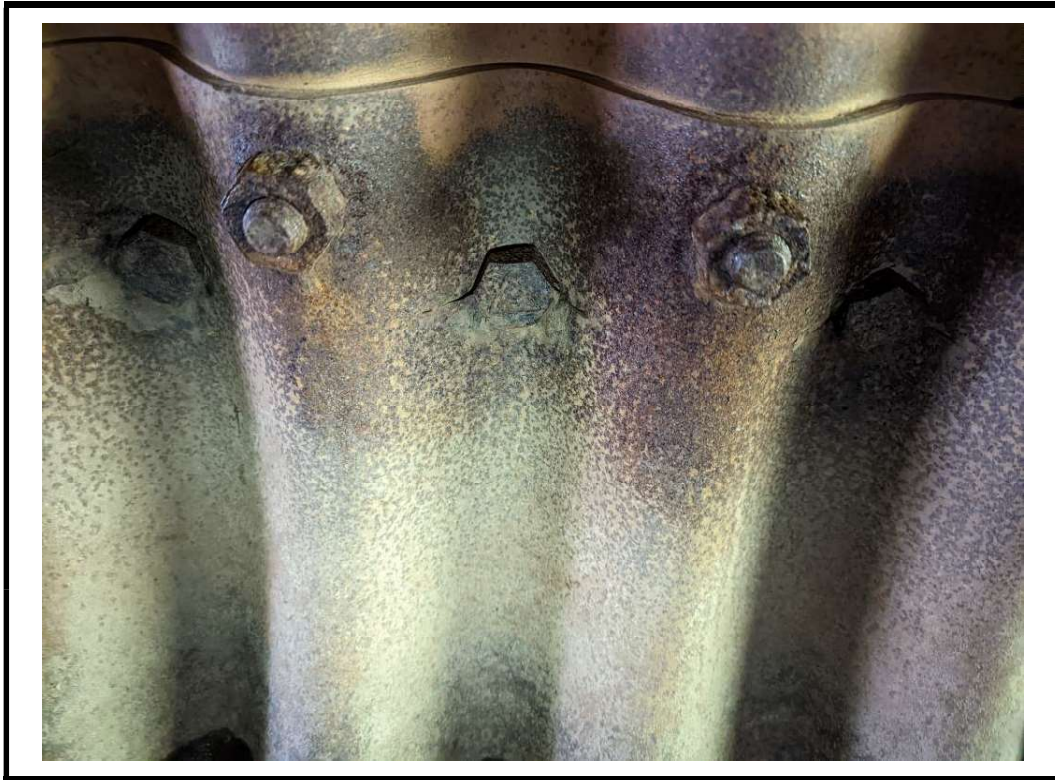


Photo 9 Cracks at bolt line at the west side of structure



Photo 10 Typical view of culvert barrel looking south