

**MILL ROAD CULVERT**

Site Number 010065

**MILL ROAD (CONCESSION 2), WOODHOUSE**

0.85km E of County Road 5

**Ontario Structure Inspection Manual - Inspection Form**

**Site Number:**

Inventory Data:			
Structure Name	<input type="text" value="Mill Road Culvert, Lot 14 Concession 2"/>		
Main Hwy/Road #	<input type="text" value="CON 2 WOODHOUSE"/>	<input checked="" type="checkbox"/> On <input type="checkbox"/> Under	Crossing Type: <input type="checkbox"/> Rail <input type="checkbox"/> Road <input type="checkbox"/> Navig. Water <input type="checkbox"/> Ped. <input type="checkbox"/> Other <input checked="" type="checkbox"/> Non-Navig. Water
Hwy/Road Name	<input type="text" value="MILL ROAD (CONCESSION 2), WOODHOUSE"/>		
Structure Location	<input type="text" value="0.85km E of County Road 5"/>		
Latitude	<input n"="" type="text" value="42d 48' 02"/>	Longitude	<input type="text" value="80d 11' 17" w"=""/>
Owner(s)	<input type="text" value="Norfolk County"/>	Heritage Designation:	<input checked="" type="checkbox"/> Not Cons. <input type="checkbox"/> Cons./not App. <input type="checkbox"/> List/not Design. <input type="checkbox"/> Design. & List <input type="checkbox"/> Design./not List
MTO Region	<input type="text" value="30"/> Southwestern	Road Class:	<input type="checkbox"/> Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input checked="" type="checkbox"/> Local
MTO District	<input type="text" value="31"/> London / Stratford	Posted Speed	<input type="text" value="80"/> No. of Lanes <input type="text" value="2"/>
Old County	<input type="text" value="20"/> Norfolk	AADT	<input type="text" value="172"/> % Trucks <input type="text"/>
Geographic Twp.	<input type="text" value="215"/> Woodhouse	Inspection Route Sequence	<input type="text"/>
Structure Type	<input type="text" value="10"/> Arch Culvert	Interchange Number	<input type="text"/>
Total Deck Length	<input type="text" value="5.5"/> (m)	Interchange Structure Number	<input type="text"/>
Overall Str. Width	<input type="text" value="5.1"/> (m)	Min. Vertical Clearance	<input type="text" value="2.1"/> (m)
Total Deck Area	<input type="text" value="28.1"/> (m <sup>2</sup> )	Special Route	<input type="checkbox"/> Truck <input type="checkbox"/> Emergency <input type="checkbox"/> School <input type="checkbox"/> Bicycle
Roadway Width	<input type="text" value="4.5"/> (m)	Detour Length Around Bridge	<input type="text" value="8"/> (km)
Skew Angle	<input type="text" value="30"/> (Degrees)	Direction of Structure	<input type="text" value="East / West"/>
No. of Spans	<input type="text" value="1"/>	Fill on Structure	<input type="text" value="0"/> (m)
Span Length	<input type="text" value="6"/> (m)		

Historical Data:			
Year Built	<input type="text" value="2011"/>	Year of Last Major Rehab.	<input type="text"/>
Last OSIM Inspection	<input type="text" value="May 27, 2014"/>	Last Evaluation	<input type="text"/>
Last Enhanced OSIM Inspection	<input type="text"/>	Current Load Limit	<input type="text" value="/ /"/> (tonnes)
Enhanced Access Equipment (ladder, boat, lift, etc.)	<input type="text"/>	Load Limit By-Law #	<input type="text"/>
Last Underwater Inspection	<input type="text"/>	By-Law Expiry Date	<input type="text"/>
Last Condition Survey	<input type="text"/>		
Rehab History:	(Date/description)		

**Ontario Structure Inspection Manual - Inspection Form**

**Site Number:**

Field Inspection Information:		
Date of Inspection:	July 20, 2016	Type of Inspection: <input checked="" type="checkbox"/> OSIM <input type="checkbox"/> Enhanced OSIM
Inspector:	Ben Buchwald M.Eng., EIT, G. Douglas Vallee Ltd.	
Others in Party:	N/A	
Access Equipment Used:	Hammer, Binoculars, Measuring Tape, Camera, etc.	
Weather:	Sunny	
Temperature:	26 °C	

Additional Investigation Required:	Priority		
	None	Normal	Urgent
Material Condition Survey			
<input checked="" type="checkbox"/> Detailed Deck Condition Survey:	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Non-destructive Delamination Survey of Asphalt-Covered Deck:	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Concrete Substructure Condition Survey:	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Detailed Coating Condition Survey:	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Detailed Timber Investigation	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Post-Tensioned Strand Investigation	<input checked="" type="checkbox"/>		
Underwater Investigation:	<input checked="" type="checkbox"/>		
Fatigue Investigation:	<input checked="" type="checkbox"/>		
Seismic Investigation:	<input checked="" type="checkbox"/>		
Structure Evaluation:	<input checked="" type="checkbox"/>		
Monitoring			
<input checked="" type="checkbox"/> Monitoring of Deformations, Settlements and Movements:	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/> Monitoring Crack Widths:	<input checked="" type="checkbox"/>		
Investigation Notes:			

Overall Structure Notes:	
Recommended Work on Structure:	<input type="checkbox"/> None <input type="checkbox"/> Minor Rehab. <input type="checkbox"/> Replace <input checked="" type="checkbox"/> Maintenance <input type="checkbox"/> Major Rehab.
Timing of Recommended Work:	<input type="checkbox"/> 1 to 5 years <input type="checkbox"/> 6 to 10 years
Overall Comments:	Structure replaced with precast box culvert in 2011.
Date of next Inspection:	July 20, 2018

**Suspected Performance Deficiencies**

- |  |   |                                     |
|--|---|-------------------------------------|
| <b>01</b> Load carrying capacity                           | <b>07</b> Bearing not uniformly loaded/unstable | <b>12</b> Slippery surfaces         |
| <b>02</b> Excessive deformations (deflections & rotations) | <b>08</b> Jammed expansion joint                | <b>13</b> Flooding/channel blockage |
| <b>03</b> Continuing settlement                            | <b>09</b> Pedestrian/vehicular hazard           | <b>14</b> Undermining of foundation |
| <b>04</b> Continuing movements                             | <b>10</b> Rough riding surface                  | <b>15</b> Unstable embankments      |
| <b>05</b> Seized bearings                                  | <b>11</b> Deck drainage                         | <b>16</b> Other                     |

**Maintenance Needs**

- |   |  |   |
|---|--|---|
| <b>01</b> Lift and swing bridge maintenance | <b>07</b> Repair to structural steel   | <b>13</b> Erosion control at bridges            |
| <b>02</b> Bridge cleaning                   | <b>08</b> Repair of bridge concrete    | <b>14</b> Concrete sealing                      |
| <b>03</b> Bridge handrail maintenance       | <b>09</b> Repair of bridge timber      | <b>15</b> Rout and seal                         |
| <b>04</b> Painting steel bridge structures  | <b>10</b> Bailey bridges - maintenance | <b>16</b> Bridge deck drainage                  |
| <b>05</b> Bridge deck joint repair          | <b>11</b> Animal/pest control          | <b>17</b> Scaling (Loose concrete or ACR steel) |
| <b>06</b> Bridge bearing maintenance        | <b>12</b> Bridge surface repair        | <b>18</b> Other                                 |

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Rehabilitation Required:		Element	Priority				Estimated Construction Cost
Rehab	Replace		Urgent	Within 1 yr	1-5 yrs	6-10 yrs	
		Wearing Surface (Approaches)					
		Railing System					
		Barrels					
		Inlet Components					
		Outlet Components					
		Embankments					
		Foundation (below ground level)					
		Sign					
Total Cost							\$0

Associated Work:	Comments	Estimated Construction Cost
Additional Investigations		
Traffic Management		
Utilities		
Road Allowance		
Environmental Assessment		
Engineering		
Other		
Contingencies		
Total Cost		\$0

Justification:	
Notes:	Construction Cost: \$0 Associated Work Cost: \$0 <hr/> TOTAL Estimated Cost: \$0

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**Element Data**

Element Group:		1600 Approaches				Length:		
Element Name:		1601 Wearing Surface (Approaches)				Width:		
Location:		North and South Ends				Height:		
Material:		2 Asphalt				Count:		2
Element Type:						Total Quantity:		2 Each
Environment:		Severe				Limited Inspection:		
Protection System:		Unknown				Perform. Deficiencies		
Condition Data:	Units	Exc.	Good	Fair	Poor			
	Each	2	0	0	0			
Comments:								
Recommended Work: Rehab <input type="checkbox"/> Replace <input type="checkbox"/>						Maintenance Needs:		
Timing: Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>						<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 2 year		

Element Group:		400 Barriers				Length:		46.8
Element Name:		402 Railing System				Width:		
Location:		East and West				Height:		
Material:						Count:		2
Element Type:		Steel Beam/Steel Post Guiderail				Total Quantity:		93.6 m
Environment:		Severe				Limited Inspection:		
Protection System:		Galvanized				Perform. Deficiencies		
Condition Data:	Units	Exc.	Good	Fair	Poor			
	m	93.6	0	0	0			
Comments:								
Recommended Work: Rehab <input type="checkbox"/> Replace <input type="checkbox"/>						Maintenance Needs:		
Timing: Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>						<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 2 year		

Element Group:		1200 Culverts				Length:		19.25
Element Name:		1203 Barrels				Width:		6
Location:		Inside				Height:		2.43
Material:		12 Precast Concrete				Count:		1
Element Type:						Total Quantity:		209.1 sq.m
Environment:		Moderate				Limited Inspection:		
Protection System:		Unknown				Perform. Deficiencies		
Condition Data:	Units	Exc.	Good	Fair	Poor			
	sq.m	0	188.2	20.9	0			
Comments: Parging failing at joints. Joints are stained and leaking.								
Recommended Work: Rehab <input type="checkbox"/> Replace <input type="checkbox"/>						Maintenance Needs: Other Maintenance - Parging		
Timing: Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>						<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input checked="" type="checkbox"/> 2 year		

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**Element Data**

Element Group:		1200 Culverts				Length:	6.7
Element Name:		1201 Inlet Components				Width:	0.4
Location:		East End				Height:	2.4
Material:		12 Precast Concrete				Count:	1
Element Type:						Total Quantity:	6.4 sq.m
Environment:		Moderate				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor		
	sq.m	0	6.4	0	0		
Comments: Impact damage on fascia due to construction							
Recommended Work: Rehab <input type="checkbox"/> Replace <input type="checkbox"/>				Maintenance Needs: Repair of Bridge Concrete			
Timing: Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input checked="" type="checkbox"/> 2 year			

Element Group:		1200 Culverts				Length:	6.7
Element Name:		1202 Outlet Components				Width:	0.4
Location:		West End				Height:	2.4
Material:		12 Precast Concrete				Count:	1
Element Type:						Total Quantity:	6.4 sq.m
Environment:		Moderate				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor		
	sq.m	0	6.4	0	0		
Comments: Impact damage on fascia due to construction							
Recommended Work: Rehab <input type="checkbox"/> Replace <input type="checkbox"/>				Maintenance Needs: Repair of Bridge Concrete			
Timing: Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input checked="" type="checkbox"/> 2 year			

Element Group:		1400 Embankments & Streams				Length:	
Element Name:		1402 Embankments				Width:	
Location:						Height:	
Material:						Count:	2
Element Type:						Total Quantity:	2 Each
Environment:		Benign				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor		
	Each	0	2	0	0		
Comments: Wall protection with rip rap and geotextile on the west end and gabion baskets/rip rap and geotextile on the east.							
Recommended Work: Rehab <input type="checkbox"/> Replace <input type="checkbox"/>				Maintenance Needs:			
Timing: Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>				<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 2 year			

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**Element Data**

Element Group:	1300 Foundations					Length:	19.25
Element Name:	1301 Foundation (below ground level)					Width:	
Location:						Height:	
Material:						Count:	2
Element Type:						Total Quantity:	38.5
Environment:						Limited Inspection:	<b>X</b>
Protection System:	Unknown					Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor		
Comments:	Box culvert.						
Recommended Work:						Maintenance Needs:	
Rehab <input type="checkbox"/> Replace <input type="checkbox"/> Timing:    Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>						<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 2 year	

Element Group:	1500 Signs					Length:	
Element Name:	1501 Sign					Width:	
Location:	East and West End					Height:	
Material:	14 Steel					Count:	4
Element Type:						Total Quantity:	4 Each
Environment:	Severe					Limited Inspection:	
Protection System:	None					Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor		
Comments:	Each	4	0	0	0		
Hazard signs on attenuators.							
Recommended Work:						Maintenance Needs:	
Rehab <input type="checkbox"/> Replace <input type="checkbox"/> Timing:    Urgent <input type="checkbox"/> < 1yr <input type="checkbox"/> 1 - 5 yr <input type="checkbox"/> 6 - 10 yr <input type="checkbox"/>						<input type="checkbox"/> Urgent <input type="checkbox"/> 1 year <input type="checkbox"/> 2 year	





Figure 1 North Approach



Figure 2 South Approach





Figure 3 East Profile, Inlet



Figure 4 West Profile, Outlet





Figure 5 Upstream



Figure 6 Downstream





Figure 7 Barrel, Looking East



Figure 8 Barrel, Looking West



Figure 9 Small Impact Damage on East Fascia



Figure 10 Deterioration of Parging at Joints

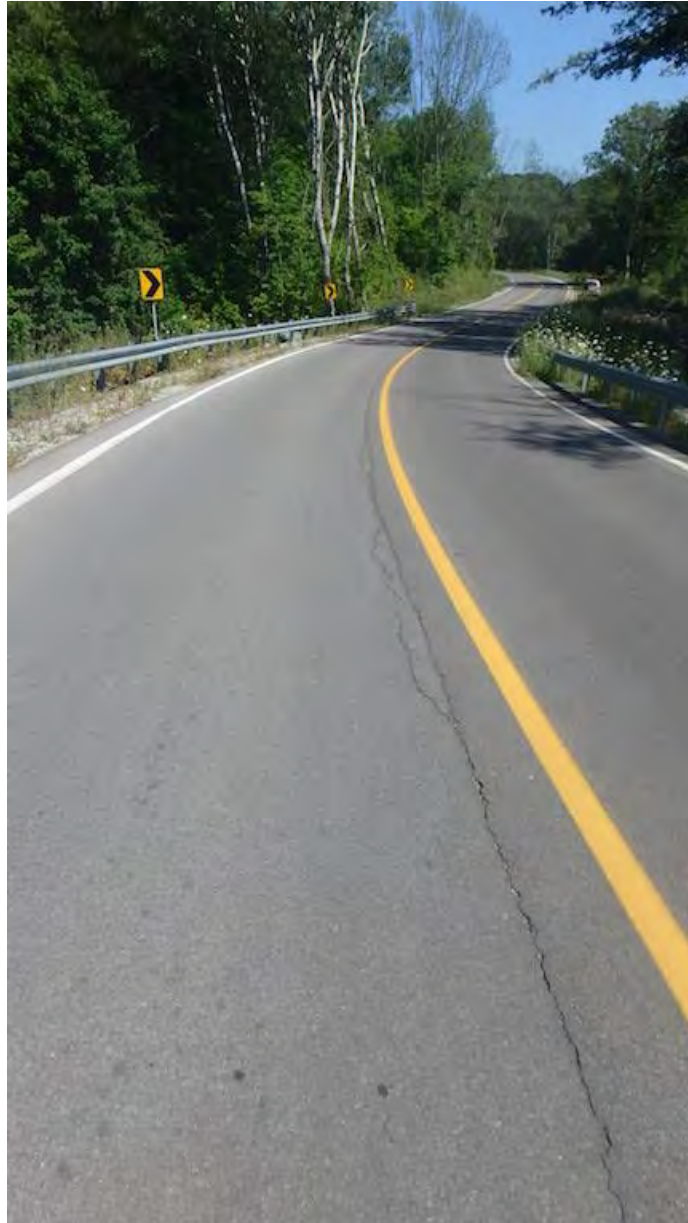


Figure 11 Longitudinal Crack in Wearing Surface at North Surface