PORT ROYAL BRIDGE

Site Number 984202

42 FRONT ROAD, SOUTH WALSINGHAM

2.0 km W of Highway 59

Ontario Structure Inspection Manual - Inspection Form **Site Number:** 984202

Inventory Data:

Structure Name	Port Royal Bridge						
Main Hwy/Road #	LAKESHORE RD	[X] On [ ] Under	Crossing Type:	[ ] Rail [ ] Ped.	[ ] Road [ ] Other	[ ] Navig. Water [X] Non-Navig. Water	
Hwy/Road Name	42 FRONT ROAD, SOUTH WALSINGHAM						
Structure Location	2.0 km W of Highway 59						
Latitude	42d 35' 37" N		Longitude	80d 29' 09.5" W			
Owner(s)	Norfolk County		Heritage Designation:	[X] Not Cons. [ ] Cons./not App.	[ ] List/not Design. [ ] Desig./not List	[ ] Desig. & List	
MTO Region	30 Southwestern		Road Class:	[ ] Freeway	[ ] Arterial	[ ] Collector	[X] Local
MTO District	31 London / Stratford		Posted Speed	60	No. of Lanes	2	
Old County	20 Norfolk		AADT	3006	% Trucks		
Geographic Twp.	585 South Walsingham		Inspection Route Sequence				
Structure Type	6 I-Beam or Girders		Interchange Number				
Total Deck Length	45.4 (m)		Interchange Structure Number				
Overall Str. Width	11 (m)		Min. Vertical Clearance	(m)			
Total Deck Area	499.4 (m^2)		Special Route	[ ] Truck	[ ] Emergency	[X] School	[ ] Bicycle
Roadway Width	9 (m)		Detour Length Around Bridge	12 (km)			
Skew Angle	4 (Degrees)		Direction of Structure	East / West			
No. of Spans	3		Fill on Structure	0 (m)			
Span Length	2 @ 13.6, 1 @ 18.3 (m)						

Historical Data:

Year Built	1969	Year of Last Major Rehab.	1995
Last OSIM Inspection	June 10, 2014	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	/ / (tonnes)
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date/description)

Rehabilitated in 1995. Deck was repaired with non-expansion joints. Waterproofed and paved.

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Field Inspection Information:			
Date of Inspection:	May 7, 2016	Type of Inspection:	[X] OSIM [ ] Enhanced OSIM
Inspector:	Matt Alderson, G. Douglas Vallee Ltd.		
Others in Party:	Andrew Vallee		
Access Equipment Used:	Hammer, Binoculars, Measuring Tape, Camera, etc.		
Weather:	Sunny		
Temperature:	26 ^{o}C		

	Additional Investigation Required:	Priority		
		None	Normal	Urgent
	Material Condition Survey			
X	Detailed Deck Condition Survey:		X	
X	Non-destructive Delamination Survey of Asphalt-Covered Deck:	X		
X	Concrete Substructure Condition Survey:	X		
X	Detailed Coating Condition Survey:	X		
X	Detailed Timber Investigation	X		
X	Post-Tensioned Strand Investigation	X		
	Underwater Investigation:	X		
	Fatigue Investigation:	X		
	Seismic Investigation:	X		
	Structure Evaluation:	X		
	Monitoring			
X	Monitoring of Deformations, Settlements and Movements:	X		
X	Monitoring Crack Widths:	X		

Investigation Notes:
Special maintenance required to midspan North outside girder. Two areas needing repair on beam soffit. Curb and expansion joints need replacing. Repair to joints, East ad West ends of North girder at abutment bearing.

Overall Structure Notes:			
Recommended Work on Structure:	[ ] None	[ ] Minor Rehab.	[ ] Replace
	[ ] Maintenance	[X] Major Rehab.	
Timing of Recommended Work:	[ ] 1 to 5 years	[X] 6 to 10 years	
Overall Comments:	Repair girders, curbs, and fascia		
Date of next Inspection:	May 7, 2018		

Suspected Performance Deficiencies

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

Maintenance Needs

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

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Rehabilitation Required:		Element	Priority				Estimated Construction Cost
Rehab	Replace		Urgent	Within 1 yr	1-5 yrs	6-10 yrs	
X		Ballast Walls			**X**		
		Bearings					
		Abutment Walls					
		Wearing Surface (Approaches)					
X		Barrier/Parapet Walls			**X**		
		Railing System					
X		Diaphragms			**X**		
X		Girders			**X**		
X		Drainage			**X**		
X		Soffit Thin Slab				**X**	
X		Deck Top			**X**		
X		Wearing Surface			**X**		
		Streams and Waterways					
		Foundation (below ground level)					
X		Seals/Sealants			**X**		
		Caps					
X		Hand Railings			**X**		
		Sign					
X		Curbs			**X**		
		Structure Rehabilitation				**X**	$600,000
						Total Cost	$600,000

Associated Work:	Comments	Estimated Construction Cost
Additional Investigations	Deck Condition Study	$20,000
Traffic Management		
Utilities		$15,000
Road Allowance	Legal Survey	$4,000
Environmental Assessment		$1,000
Engineering		$67,500
Other	Material Testing QA	$15,000
Contingencies		
	Total Cost	$122,500

Justification:

Notes: Rehab estimate includes typical major rehab scope of work (overlay, waterproof, pave, etc.).

Construction Cost:	$600,000
Associated Work Cost:	$122,500
TOTAL Estimated Cost:	$722,500

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Element Data

Element Group:	900	Abutments				Length:	
Element Name:	902	Ballast Walls				Width:	2
Location:						Height:	1.12
Material:	4	Cast-in-place Concrete				Count:	12
Element Type:						Total Quantity:	26.9 sq.m
Environment:		Moderate				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	
Condition	Units	Exc.	Good	Fair	Poor		
Data:	sq.m	0	26	0	0.88		

Comments:
Crack in ballast wall at southwest corner

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [X] 6 - 10 yr [ ]

Maintenance Needs:
[ ] Urgent [ ] 1 year [ ] 2 year

Element Group:	900	Abutments				Length:	
Element Name:	904	Bearings				Width:	
Location:		Expansion Bearings Under I Beams				Height:	
Material:						Count:	8
Element Type:		Elastomeric Pad				Total Quantity:	8 Each
Environment:		Moderate				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	
Condition	Units	Exc.	Good	Fair	Poor		
Data:	Each	0	8	0	0		

Comments:
All bearing pads (100mm thick) visible on the abutment seats. Deterioration of concrete located at North abutment bearings.

Recommended Work: Rehab [ ] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [ ] 6 - 10 yr [ ]

Maintenance Needs:
[ ] Urgent [ ] 1 year [ ] 2 year

Element Group:	900	Abutments				Length:	
Element Name:	901	Abutment Walls				Width:	11
Location:		E & W				Height:	3
Material:	4	Cast-in-place Concrete				Count:	2
Element Type:						Total Quantity:	66 sq.m
Environment:		Benign				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	
Condition	Units	Exc.	Good	Fair	Poor		
Data:	sq.m	0	62	2	2		

Comments:
Repairs required on east abutment, north end due to delamination and spalling. Minor cracking and staining throughout. Spall with exposed rebar at southeast abutment.

Recommended Work: Rehab [ ] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [ ] 6 - 10 yr [ ]

Maintenance Needs: Repair of Bridge Concrete
[ ] Urgent [X] 1 year [ ] 2 year

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Element Data

Element Group:	1600	Approaches				Length:	
Element Name:	1601	Wearing Surface (Approaches)				Width:	
Location:		E & W				Height:	
Material:	2	Asphalt				Count:	1
Element Type:						Total Quantity:	1 Each
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	Each	0	0.9	0.1	0

Comments:
New asphalt surface in 2010. Paved over joints cracked. Deteriorating pot hole forming.

Recommended Work:	Rehab ☐	Replace ☐				Maintenance Needs:	Rout and Seal	
Timing:	Urgent ☐	< 1yr ☐	1 - 5 yr ☐	6 - 10 yr ☐		☐ Urgent	☒ 1 year	☐ 2 year

Element Group:	400	Barriers				Length:	45
Element Name:	401	Barrier/Parapet Walls				Width:	
Location:		N & S				Height:	0.8
Material:	4	Cast-in-place Concrete				Count:	2
Element Type:						Total Quantity:	72 sq.m
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	70	0	2

Comments:
Repair to north barrier and damaged posts two (2) recommended. North parapet has spall and deterioration at pier joints. One (1) railing post is disconnected, bolts sheared and a localized spall. One railing post damaged.

Recommended Work:	Rehab ☒	Replace ☐				Maintenance Needs:		
Timing:	Urgent ☐	< 1yr ☐	1 - 5 yr ☒	6 - 10 yr ☐		☐ Urgent	☐ 1 year	☐ 2 year

Element Group:	400	Barriers				Length:	
Element Name:	402	Railing System				Width:	
Location:		Approaches				Height:	
Material:						Count:	1
Element Type:		Steel Flex Beam on Wood Post				Total Quantity:	1 Each
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	Each	0	1	0	0

Comments:
Post "lumber"

Recommended Work:	Rehab ☐	Replace ☐				Maintenance Needs:		
Timing:	Urgent ☐	< 1yr ☐	1 - 5 yr ☐	6 - 10 yr ☐		☐ Urgent	☐ 1 year	☐ 2 year

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Element Data

Element Group:	500	Beams/MLE's				Length:	
Element Name:	505	Diaphragms				Width:	2
Location:		Between Beams				Height:	1.15
Material:	4	Cast-in-place Concrete				Count:	8
Element Type:						Total Quantity:	18.4 sq.m
Environment:		Benign				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	0	18.4	0

Comments:
Diaphragms on piers show some light cracks on each side of girders.

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [X] 6 - 10 yr [ ]
Maintenance Needs: [ ] Urgent [ ] 1 year [ ] 2 year

Element Group:	500	Beams/MLE's				Length:	45.5
Element Name:	501	Girders				Width:	0.65
Location:		Under Slab				Height:	1.15
Material:	12	Precast Concrete				Count:	4
Element Type:		I-type				Total Quantity:	136 sq.m
Environment:		Benign				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	128	2	6

Comments:
12 girders. North girder center span damaged in three (3) locations (spalled and exposed rebar). N girder at W span damaged. N girder at E span damaged. Damages appear u/n deck drains. Condition is worsening from 2012 (2014).

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [X] 6 - 10 yr [ ]
Maintenance Needs: [ ] Urgent [ ] 1 year [ ] 2 year

Element Group:	100	Decks				Length:	
Element Name:	106	Drainage				Width:	
Location:		Through Deck				Height:	
Material:	14	Steel				Count:	4
Element Type:		Metal Drain Pipes				Total Quantity:	4 Each
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	Each	0	3	0.5	0.5

Comments:
North side only. Minor rust at outlets. Extension required.

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [X] 6 - 10 yr [ ]
Maintenance Needs: [ ] Urgent [ ] 1 year [ ] 2 year

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Element Data

Element Group:	100	Decks				Length:	45.4
Element Name:	103	Soffit Thin Slab				Width:	11
Location:		On Top of Beams				Height:	
Material:	4	Cast-in-place Concrete				Count:	1
Element Type:		Waterproof and Paving with AC overlay				Total Quantity:	499.4 sq.m
Environment:		Moderate				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	497.4	2	0

Comments:
Deck rehabbed in 1995. Waterproofed and paved. Deck not visible from top. Efflorescence showing at localized areas on soffit.

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [ ] 6 - 10 yr [X]

Maintenance Needs:
[ ] Urgent [ ] 1 year [ ] 2 year

Element Group:	100	Decks				Length:	45
Element Name:	102	Deck Top				Width:	0.5
Location:		Fascia Below Parapet				Height:	0.5
Material:	4	Cast-in-place Concrete				Count:	1
Element Type:		Cast-in-place Concrete on Supports				Total Quantity:	11.3 sq.m
Environment:		Moderate				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	0	6.25	5

Comments:
Repair to fascia at NW end recommended. Delamination and cracking/spalling at localized areas on North fascia.

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [X] 6 - 10 yr [ ]

Maintenance Needs:
[ ] Urgent [ ] 1 year [ ] 2 year

Element Group:	100	Decks				Length:	45
Element Name:	101	Wearing Surface				Width:	10
Location:		Top of Deck				Height:	
Material:	2	Asphalt				Count:	1
Element Type:						Total Quantity:	450 sq.m
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	439	8	3

Comments:
Asphalt paved in 2010 over expansion joints deteriorating. Rout and Seal

Recommended Work: Rehab [X] Replace [ ]
Timing: Urgent [ ] < 1yr [ ] 1 - 5 yr [X] 6 - 10 yr [ ]

Maintenance Needs: Rout and Seal
[ ] Urgent [X] 1 year [ ] 2 year

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Element Data

Element Group:	1400	Embankments & Streams				Length:	
Element Name:	1401	Streams and Waterways				Width:	
Location:		Big Creek				Height:	
Material:						Count:	1
Element Type:						Total Quantity:	1 Each
Environment:						Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	Each	0	1	0	0

Comments:
Washout at NE wall.

Recommended Work: Rehab ☐ Replace ☐ Maintenance Needs:

Timing: Urgent ☐ < 1yr ☐ 1 - 5 yr ☐ 6 - 10 yr ☐ ☐ Urgent ☐ 1 year ☐ 2 year

Element Group:	1300	Foundations				Length:	
Element Name:	1301	Foundation (below ground level)				Width:	
Location:						Height:	
Material:						Count:	
Element Type:						Total Quantity:	m
Environment:						Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	m				

Comments:
Limited inspection. Not visible.

Recommended Work: Rehab ☐ Replace ☐ Maintenance Needs:

Timing: Urgent ☐ < 1yr ☐ 1 - 5 yr ☐ 6 - 10 yr ☐ ☐ Urgent ☐ 1 year ☐ 2 year

Element Group:	200	Joints				Length:	11
Element Name:	201	Seals/Sealants				Width:	
Location:		Expansion Joints at east and west ends.				Height:	
Material:	2	Asphalt				Count:	2
Element Type:		Paved Over				Total Quantity:	22 m
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	m	0	9	10	3

Comments:
Repairs required to curb face plate bolts and fascia at joints. Snow plow damage and spalls. Curb joint material missing in three (3) locations. Concrete severely deteriorating at various joints.

Recommended Work: Rehab ☒ Replace ☐ Maintenance Needs:

Timing: Urgent ☐ < 1yr ☐ 1 - 5 yr ☒ 6 - 10 yr ☐ ☐ Urgent ☐ 1 year ☐ 2 year

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Element Data

Element Group:	1000	Piers	Length:	
Element Name:	1002	Caps	Width:	
Location:		Under Beams	Height:	
Material:	4	Cast-in-place Concrete	Count:	8
Element Type:			Total Quantity:	8 Each
Environment:			Limited Inspection:	
Protection System:		Unknown	Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	Each	0	8	0	0

Comments:
Inspection includes piers. Seats not easily visible

Recommended Work: Rehab ☐ Replace ☐ Maintenance Needs:

Timing: Urgent ☐ < 1yr ☐ 1 - 5 yr ☐ 6 - 10 yr ☐ ☐ Urgent ☐ 1 year ☐ 2 year

Element Group:	400	Barriers	Length:	45
Element Name:	404	Hand Railings	Width:	
Location:		Top of Parapet	Height:	
Material:	14	Steel	Count:	2
Element Type:		Parapet Wall with Two (2) Rails	Total Quantity:	90 m
Environment:		Severe	Limited Inspection:	
Protection System:		Unknown	Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	m	0	0	88	2

Comments:
Two (2) cast-in posts on north rails need repair.

Recommended Work: Rehab [X] Replace ☐ Maintenance Needs:

Timing: Urgent ☐ < 1yr ☐ 1 - 5 yr [X] 6 - 10 yr ☐ ☐ Urgent ☐ 1 year ☐ 2 year

Element Group:	1500	Signs	Length:	
Element Name:	1501	Sign	Width:	
Location:			Height:	
Material:	14	Steel	Count:	4
Element Type:			Total Quantity:	4 Each
Environment:		Severe	Limited Inspection:	
Protection System:		Unknown	Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	Each	0	4	0	0

Comments:

Recommended Work: Rehab ☐ Replace ☐ Maintenance Needs:

Timing: Urgent ☐ < 1yr ☐ 1 - 5 yr ☐ 6 - 10 yr ☐ ☐ Urgent ☐ 1 year ☐ 2 year

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Element Data

Element Group:	300	Sidewalks/curbs				Length:	45
Element Name:	302	Curbs				Width:	0.8
Location:						Height:	0.2
Material:	4	Cast-in-place Concrete				Count:	2
Element Type:						Total Quantity:	14.4 sq.m
Environment:		Severe				Limited Inspection:	
Protection System:		Unknown				Perform. Deficiencies	

Condition Data:	Units	Exc.	Good	Fair	Poor
	sq.m	0	9.9	3	1.5

Comments:
Chipped and damaged areas six (6) to be repaired. Previous patches have failed.

Recommended Work:	Rehab [X]	Replace [ ]			Maintenance Needs:		
Timing:	Urgent [ ]	< 1yr [ ]	1 - 5 yr [X]	6 - 10 yr [ ]	[ ] Urgent	[ ] 1 year	[ ] 2 year

Figure 1 East Approach

Figure 2 West Approach

Figure 3 North Profile

Figure 4 Transverse Crack in West Approach

Figure 5 Upstream

Figure 6 Downstream

Figure 7 East Abutment

Figure 8 West Abutment

Figure 9 East Pier

Figure 10 West Pier

Figure 11 Large Spall on North Fascia

Figure 12 Spall on Girder at Northwest Bearing

Figure 13 Spall on South Fascia

Figure 14 Deck Drain Plugged

Figure 15 Deterioration on South Ballast

Figure 16 Deteriorated Gabion Baskets at East Abutment

Figure 17 Spall at Northeast Corner

Figure 18 Spalling at Southeast Pier Joint

Figure 19 Impact Damage to North Railing and Deterioration of Curb Patches

Figure 20 Impact Damage to North Railing Post

Figure 21 Impact Damage to Railing Post

Figure 22 Missing Endcap on North Railing

Figure 23 Spall with Exposed Rebar at Southeast

Figure 24 Spalling on North Fascia and Damage to Conduit

Figure 25 Exposed Rebar on Curb

Figure 26 Spalling at Southeast Joint in Curb

Figure 27 Crack in Wearing Surface at East Joint

Figure 28 Crack in Wearing Surface at West Joint