Biennial Bridge Inspection Report

Niska Road Over Speed River Bridge No. 00001

April 14, 2014

Prepared By: Engineered Management Systems Inc.

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IMPORTANT

Limitations

Data presented in this report is essentially a snapshot of value, condition, needs and their associated cost as per the date of inspection. Replacement costs, remaining service life assessments, condition Indices and AADT projections continually change over time. Continued deterioration, inflation and, to a lesser extent, increasing traffic volumes, create a dynamic environment that must be effectively modeled before any long range planning is possible.

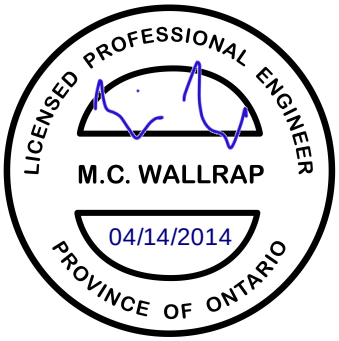
Recommendations and cost estimates (when provided) put forward are strictly preliminary. They are based on a visual "from the ground" assessment and are intended for budgetary and planning purposes only. A far more detailed and exhaustive analysis should be provided during detailed design that addresses all deficencies AND full compliance with the CHBDC.

Urgencies

Throughout this report the reader will see reference to the term "Urgencies". These are essentially time frames that the inspector must attempt to predict, on-site, on an element-by-element basis, as to how long the recommended work can wait to be addressed before it becomes critical.

Urgencies are essentially included as a requirment of the OSIM guidelines. We apply a similar evaluation called Remaining Service Life. It is a more flexible system as it provides, in many cases, more than one time frame depending on the agency's in-house capabilities to carry out basic maintenance of their inventory. RSL's do NOT drive the management process nor do they participate in optimization except as fail safe points beyond which certain issues must be addressed during scheduling.

Respectfully Submitted:



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Structure Summary

00001 - Niska Road Over Speed River

Type	Truss	Replacement Cost	$1,168,950
Year Built	1974	Rehabilitative Needs	$1,020,000
Last Rehabilitated	N/A	Condition Index	12.7
		Est. 10 Yr. Deferral Cost	$229,694
GPS East	17560310	AADT	3700
GPS North	4816872		

Location :

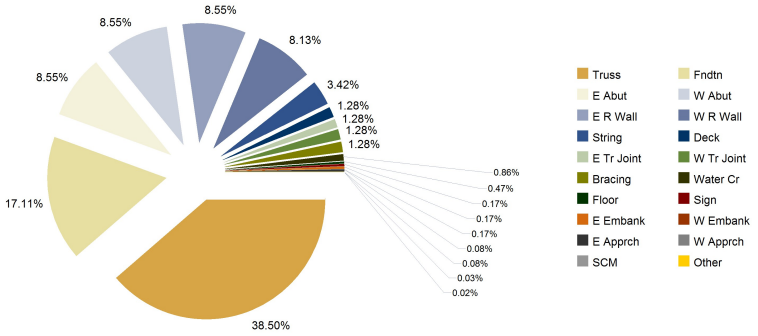
Niska Road

0.64km West of Pioneer Trail

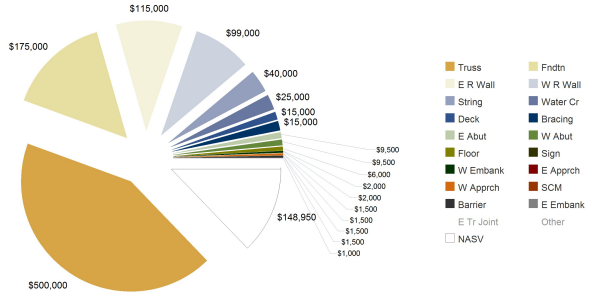
General Comments :

The major concerns at this site are structural inadequacy of structure, water encroaching against abutments, road constriction, structural inadequacy of barriers, absence of a pedestrian access, absence of a traffic barrier, progressive undermining of the northwest retaining wall, severe failure of the northwest embankment, partial failure of northeast embankment, structural inadequacy of signage, severe corrosion of the bearing plates, isolated severe corrosion of the bottom chords at the ends and west end verticals, partial poor condition and progressive deterioration of the bearing seats and progressive deterioration of the masonry retaining walls.

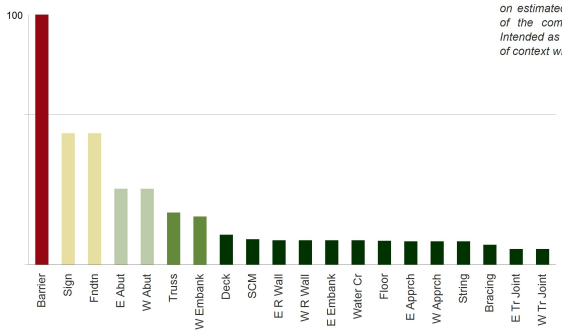
Distribution of $1,168,950 Replacement Value



Distribution of $1,020,000 Rehabilitation Cost



Safety Risk



Risk assessed on a scale of 0 to 100 based on estimated RSL and the safety critical nature of the component and its observed defects. Intended as a guide only and not to be taken out of context with the detailed findings of this report.

Network Comparison

Replacement Value	21 / 69
Rehabilitative Needs	6 / 69
Condition Index	62 / 69
Est. 10 Year Deferral Cost	10 / 69
AADT	20 / 69

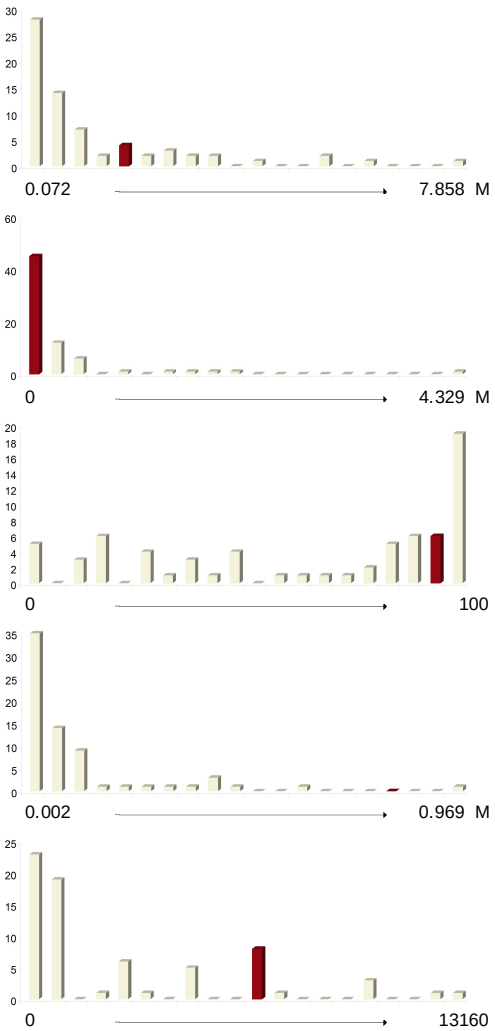


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Table of Contents (cont.)

1. Narrative

1.1 Introduction

The inspection summarized in this report was undertaken in compliance with the requirements of the Public Transportation and Highway Improvement Act, Ontario Regulation 104/97. The last known detailed visual inspection of this structure took place in 2012. The inspection was carried out on Monday, April 14, 2014 by Lin Yu under the direction of M. Wallrap P. Eng. At the time of inspection it was sunny with temperatures between 5 and 10 degrees celsius. This report meets or exceeds all requirements for detailed visual surveys as set out in the Ontario Structure Inspection Manual 2000, rev. 2003, 2008.

1.2 General Information

The Niska Road Over Speed River bridge was built in 1974. The structure has a West-East orientation and is located on Niska Road 0.64 km West of Pioneer Trail in the City of Guelph. This Truss bridge carries 1 lane of vehicular traffic across the Speed River in 1 continuous span with a crossing length of 24.6m and a maximum clearance of 2.7m. The deck has a travel width of 3.44m and an overall width of 5.5m.

With an AADT of 3,700 the crossing is lightly used with truck volumes accounting for less than 10% of the total traffic. The speed limit at this location is 50 km/hr. There is a posted load limit of 5tonnesThere is no record of rehabilitation for this structure. This is not considered a heritage structure. The total estimated replacement value is $1,168,950.

1.3 Observations

Each component is presented along with a discussion of any elements within that component that exhibit notable deterioration and/or a low estimated remaining service life. Thorough documentation of every element in the structure can be found in the detailed forms in Section 6.7 - Element Data.

The Niska Road Over Speed River bridge is comprised of the following components:

1.3.1 East Approach

The asphalt approach has an estimated mass of 5.81 tonnes. . The estimated remaining service life in its current condition is 10 years. No significant defects were noted, however, the entire component will undergo ancillary replacement.

1.3.2 West Approach

The asphalt approach has an estimated mass of 5.81 tonnes. . The estimated remaining service life in its current condition is 10 years. No significant defects were noted, however, the entire component will undergo ancillary replacement.

1.3.3 Deck

The timber deck has an estimated mass of 8 tonnes. An estimated 5% of the element exhibits severe general deterioration. The estimated remaining service life in its current condition is 10 years. The entire component will undergo ancillary replacement.

The top surface has a surface area of 84.6 square metres. Approximately 10% of the element exhibits severe checking.

1.3.4 East Transverse Joint

No significant defects were noted.

1. Narrative (cont.)

1.3.5 West Transverse Joint

No significant defects were noted.

1.3.6 Sidewalk/Curb/Median

The timber south sidewalk/curb/median has an estimated mass of 0.5 tonnes. An estimated 15% of the element exhibits medium general deterioration. The estimated remaining service life in its current condition is 10 years. The entire component will undergo ancillary replacement.

The north curb has a surface area of 18.6 square metres. A significant portion of the element exhibits medium checking.

1.3.7 Barrier

The timber barrier has an estimated mass of 0.2 tonnes. The element is structurally inadequate. Maintenance work is required immediately to extend the service life of the element. There is no estimated service life remaining in its current condition. The entire component will undergo ancillary replacement.

1.3.8 Signage

There are 6 aluminum signage. The element is structurally inadequate. Maintenance work is required to extend the service life of the element. The estimated remaining service life in its current condition is 1 year. The entire component will undergo ancillary replacement.

1.3.9 Truss

The steel truss have an estimated mass of 25 tonnes. An estimated 2% of the element exhibits severe general deterioration. Maintenance work is required to extend the service life of the element. The estimated remaining service life in its current condition is 5 years. The entire component will undergo ancillary replacement.

The bottom chords have a surface area of 78.1 square metres. Less than 5% of the element exhibits severe corrosion.

The top chords have a surface area of 80.5 square metres. Approximately 10% of the element exhibits light corrosion.

The verticals have a surface area of 38.4 square metres. Less than 5% of the element exhibits severe corrosion.

1.3.10 Floor Beams

The timber floor beams have an estimated mass of 4.4 tonnes. An estimated 5% of the element exhibits light general deterioration. The estimated remaining service life in its current condition is 20 years. The entire component will undergo ancillary replacement.

The floor beam ends have a surface area of 11.25 square metres. Approximately 10% of the element exhibits light corrosion.

The intermediate floor beams have a surface area of 62 square metres. Approximately 10% of the element exhibits light corrosion.

1. Narrative (cont.)

1.3.11 Stringers

The steel stringers have an estimated mass of 4.5 tonnes. An estimated 8% of the element exhibits medium general deterioration. The estimated remaining service life in its current condition is 10 years. The entire component will undergo ancillary replacement.

The middle stringers have a surface area of 146.4 square metres. Approximately 10% of the element exhibits medium corrosion.

1.3.12 Bracing

The steel bracing has an estimated mass of 1 tonne. . The estimated remaining service life in its current condition is 15 years. No significant defects were noted, however, the entire component will undergo ancillary replacement.

1.3.13 East Abutment

The masonry abutment has an estimated mass of 46 tonnes. An estimated 20% of the element exhibits severe general deterioration. The estimated remaining service life in its current condition is 2 years.

The lower abutment wall has a surface area of 1.5 square metres. The entire element exhibits severe splitting and replacement is warranted.

There are 2 plate bearings. Most of the elements exhibit severe corrosion and replacement is warranted.

There are 2 ledge type bearing seats. A significant portion of the elements exhibit severe disintegration requiring loaded deep repair.

The abutment wall has a surface area of 11.5 square metres. Approximately 10% of the element exhibits severe loss of mortar and replacement is warranted.

1.3.14 West Abutment

The masonry abutment has an estimated mass of 46 tonnes. An estimated 20% of the element exhibits severe general deterioration. The estimated remaining service life in its current condition is 2 years.

The lower abutment wall has a surface area of 0.5 square metres. The entire element exhibits severe splitting and replacement is warranted.

There are 2 plate bearings. Most of the elements exhibit severe corrosion and replacement is warranted.

There are 2 ledge type bearing seats. A significant portion of the elements exhibit severe disintegration requiring loaded deep repair.

The abutment wall has a surface area of 12.5 square metres. Approximately 10% of the element exhibits severe loss of mortar and replacement is warranted.

The ballast wall has a surface area of 3 square metres. A significant portion of the element exhibits very severe splitting requiring timber replacement.

1. Narrative (cont.)

1.3.15 East Retaining Wall

The masonry south gravity retaining wall has an estimated mass of 33.41 tonnes. An estimated 40% of the element exhibits severe general deterioration. The estimated remaining service life in its current condition is 5 years. The entire component will undergo ancillary replacement.

The south vertical surface has a surface area of 17.4 square metres. Much of the element exhibits severe loss of mortar.

The masonry north gravity retaining wall has an estimated mass of 36.72 tonnes. An estimated 5% of the element exhibits severe general deterioration. The estimated remaining service life in its current condition is 10 years. The entire component will undergo ancillary replacement.

The north vertical surface has a surface area of 25.5 square metres. Approximately 10% of the element exhibits severe loss of mortar.

1.3.16 West Retaining Wall

The mass concrete north gravity retaining wall has an estimated mass of 18.29 tonnes. An estimated 20% of the element exhibits medium general deterioration. The estimated remaining service life in its current condition is 10 years. The entire component will undergo ancillary replacement.

The vertical surface has a surface area of 14 square metres. The entire element exhibits medium loss of mortar.

The masonry south gravity retaining wall has an estimated mass of 26.88 tonnes. An estimated 5% of the element exhibits medium general deterioration. The estimated remaining service life in its current condition is 5 years. The entire component will undergo ancillary replacement.

The south vertical surface has a surface area of 14 square metres. Approximately 10% of the element exhibits severe loss of stone.

The masonry north gravity retaining wall has an estimated mass of 26.88 tonnes. The entire element exhibits medium general deterioration. The estimated remaining service life in its current condition is 5 years. The entire component will undergo ancillary replacement.

The north vertical surface has a surface area of 12.7 square metres. A significant portion of the element exhibits light settlement.

1.3.17 East Embankment

The soil embankment has a surface area of 45 square metres. An estimated 20% of the element exhibits severe general deterioration. The estimated remaining service life in its current condition is 5 years.

The slope protection has a surface area of 45 square metres. A significant portion of the element exhibits partial failure requiring restoration.

1.3.18 West Embankment

The soil embankment has a surface area of 45 square metres. An estimated 40% of the element exhibits severe general deterioration and replacement is warranted. The estimated remaining service life in its current condition is 1 year.

The slope protection has a surface area of 45 square metres. Much of the element exhibits partial failure.

1. Narrative (cont.)

1.3.19 Foundation

The steel piles foundation has an effective surface area of 65 square metres. An estimated 20% of the element exhibits severe erosion requiring reinstallation. The estimated remaining service life in its current condition is 1 year.

The steel piles north foundation has an effective surface area of 11.5 square metres. An estimated 20% of the element exhibits very severe erosion requiring reinstallation. The estimated remaining service life in its current condition is 1 year.

1.3.20 Watercourse

The natural bottom has a surface area of 120.54 square metres. A significant portion of the element exhibits medium degradation although no immediate rehabilitative action is required.

The uncontrolled upstream section has a surface area of 60.27 square metres. A significant portion of the element exhibits severe misalignment requiring redirection.

1.4 Conclusions and Further Investigation

Overall the structure is in poor condition with an aggregate condition index of 12.7. The major concerns at this site are structural inadequacy of structure, water encroaching against abutments, road constriction, structural inadequacy of barriers, absence of a pedestrian access, absence of a traffic barrier, progressive undermining of the northwest retaining wall, severe failure of the northwest embankment, partial failure of northeast embankment, structural inadequacy of signage, severe corrosion of the bearing plates, isolated severe corrosion of the bottom chords at the ends and west end verticals, partial poor condition and progressive deterioration of the bearing seats and progressive deterioration of the masonry retaining walls.

1.4.1 Rehabilitative

The following summarizes the rehabilitative needs of the structure:

West Approach
Ancillary Replacement

East Approach
Ancillary Replacement

Deck
Ancillary Replacement

Sidewalk/Curb/Median - South
Ancillary Replacement

Barrier
Ancillary Replacement

Signage
Ancillary Replacement

Truss
Ancillary Replacement

1. Narrative (cont.)

Floor Beams
Ancillary Replacement

Stringers
Ancillary Replacement

Bracing
Ancillary Replacement

West Abutment - Bottom Abutment Wall
Replacement

East Abutment - Bottom Abutment Wall
Replacement

West Abutment - Bearings
Replacement

East Abutment - Bearings
Replacement

West Abutment - Bearing Seats
Loaded Deep Repair

East Abutment - Bearing Seats
Loaded Deep Repair

West Abutment - Abutment Wall
Replacement

East Abutment - Abutment Wall
Replacement

West Abutment - Ballast Wall
Timber Replacement

West Retaining Wall - North
Ancillary Replacement

East Retaining Wall - South
Ancillary Replacement

West Retaining Wall - South
Ancillary Replacement

East Retaining Wall - North
Ancillary Replacement

West Retaining Wall - North
Ancillary Replacement

1. Narrative (cont.)

West Embankment
Replacement

East Embankment - Slope Protection
Restoration

Foundation
Reinstallation

Foundation - North
Reinstallation

Watercourse - Upstream Section
Redirection

1.4.2 Pre-Emptive

No pre-emptive measures are currently recommended or required.

1.4.3 Maintenance

On-going maintenance procedures should be part of an annual regimen. Often these operations can be carried out by municipal staff however cost estimates have been provided in cases where it may be contracted out.

West Transverse Joint
Power Washing

East Transverse Joint
Power Washing

Barrier
Minor Repair, Removal or Installation

Signage
Minor Repair, Removal or Installation

Truss - Bottom Chords
Minor Repair, Removal or Installation

Truss - Verticals
Minor Repair, Removal or Installation

West Abutment - Ballast Wall
Minor Repair, Removal or Installation

Foundation
Scour Protection

Foundation - North
Scour Protection

1. Narrative (cont.)

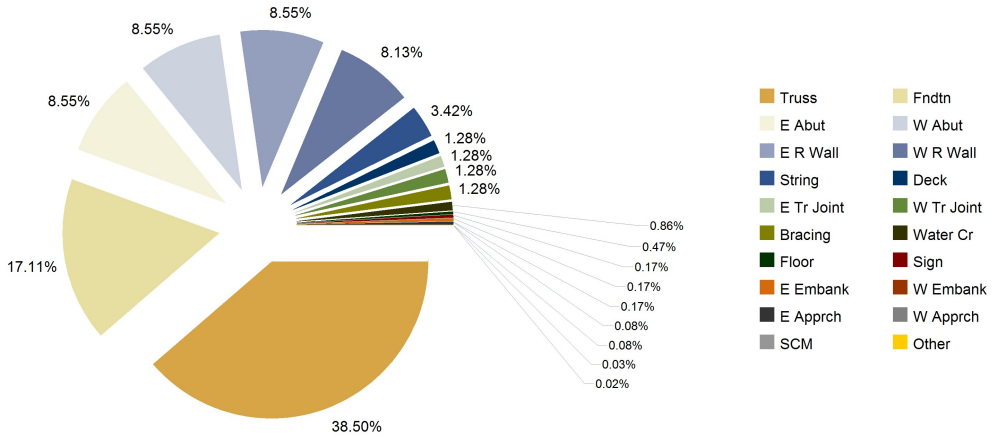
1.4.4 Further Investigation

The next biennial inspection should be scheduled no later than April, 2016. In addition, a monitoring program for deformations, settlements & movements should be carried out immediately.

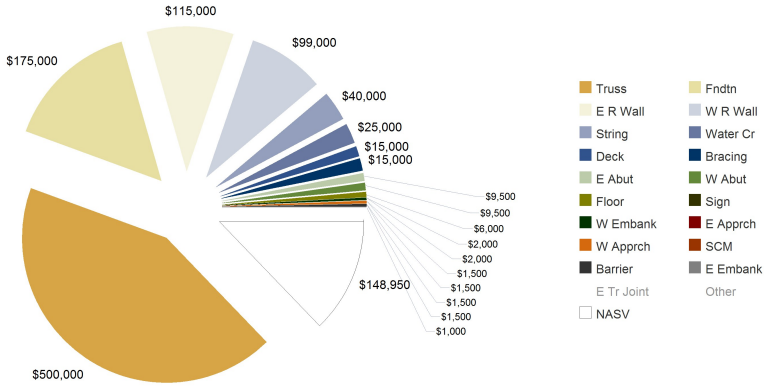
1. Narrative (cont.)

1.5 Statistical Summary

Distribution of $1,168,950 Replacement Value

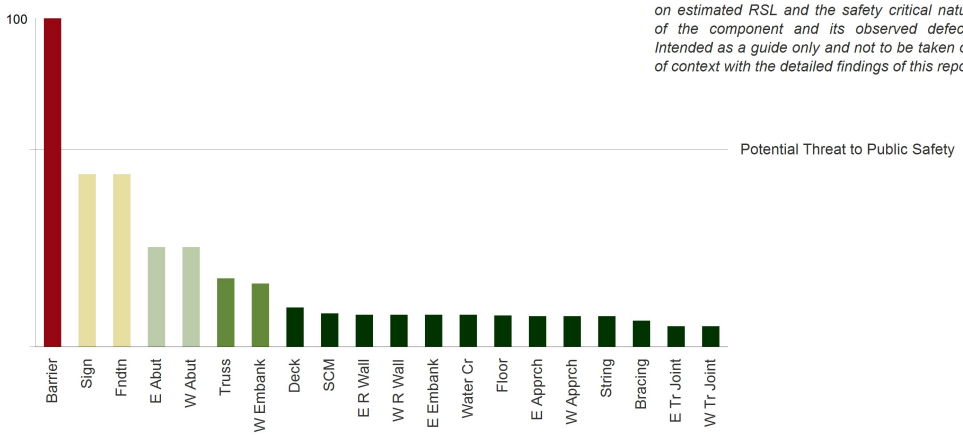


Distribution of $1,020,000 Rehabilitation Cost



Safety Risk

Risk assessed on a scale of 0 to 100 based on estimated RSL and the safety critical nature of the component and its observed defects. Intended as a guide only and not to be taken out of context with the detailed findings of this report.



2. Component Summary

		RSL		Urgency of Rehabilitative Needs						
	Replacement	1	2	Maint.	Pre-Emp	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
East Approach	$950	10	10						$1,500	
West Approach	$950	10	10						$1,500	
Deck	$15,000	10	10						$15,000	
East Transverse Joint	$15,000	15	15	$300						
West Transverse Joint	$15,000	15	15	$300						
Sidewalk/Curb/Median	$300	10	10						$1,500	
Barrier	$250	0	10	$300		$1,500				
Signage	$2,000	1	10	$300			$2,000			
Truss	$450,000	5	10	$910				$500,000		
Floor Beams	$5,500	20	20							$6,000
Stringers	$40,000	10	10						$40,000	
Bracing	$15,000	15	15							$15,000
East Abutment	$100,000	2	2					$9,500		
West Abutment	$100,000	2	2	$300				$9,500		
East Retaining Wall	$100,000	5	5					$115,000		
West Retaining Wall	$95,000	5	5					$99,000		
East Embankment	$2,000	5	5					$1,000		
West Embankment	$2,000	1	1				$2,000			
Foundation	$200,000	1	1	$666			$175,000			
Watercourse	$10,000	1	1				$25,000			
Totals and Minimums	$1,168,950	0	1	$3,076	$0	$1,500	$204,000	$734,000	$59,500	$21,000

Total Estimated Rehabilitative Cost:	$1,020,000
Contingency:	$0
Provisional Allowance:	$0
Total Potential Project Cost:	$1,020,000

3. Element Summary

		RSL		Urgency of Rehabilitative Needs						
	Focus	1	2	Maint.	Pre-Emp.	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
West Approach	All	10	10						$1,500	
East Approach	All	10	10						$1,500	
Slab	All	15	15							
Slab	All	15	15							
Wearing Surface	All	10	10							
Wearing Surface	All	10	10							
Deck	All	10	10						$15,000	
Soffit Ends	Both	10	10							
Interior Soffit	Interior	10	10							
Top Surface	All	10	10							
West Transverse Joint	All	15	15	$300						
East Transverse Joint	All	15	15	$300						
Sidewalk/Curb/Median - South	All	10	10						$1,500	
North Curb	All	10	10							
Barrier	All	0	10	$300		$1,500				
Signage	All	1	10	$300			$2,000			
Truss	All	5	10					$500,000		
Bottom Chords	Bottom	5	10	$610						
Diagonals	All	20	20							
Top Chords	Top	15	15							
Connections	All	15	15							
Verticals	All	5	10	$300						
Floor Beams	All	20	20							$6,000
Floor Beam Ends	End	20	20							
Intermediate Floor Beams	Interior	20	20							
Stringers	All	10	10						$40,000	
Middle Stringers	Interior	10	10							
Bracing	All	15	15							$15,000
East End Bracing	End	15	15							
Intermediate Bracing	All	15	15							

3. Element Summary (cont.)

		RSL		Urgency of Rehabilitative Needs						
	Focus	1	2	Maint.	Pre-Emp.	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
West End Bracing	End	15	15							
West Abutment	All	2	2							
East Abutment	All	2	2							
Bottom Abutment Wall	All	5	5					$1,000		
Bottom Abutment Wall	All	5	5					$3,500		
Bearings	All	2	2					$2,500		
Bearings	All	2	2					$2,500		
Bearing Seats	All	5	5					$2,500		
Bearing Seats	All	5	5					$2,500		
Abutment Wall	All	5	5					$2,000		
Abutment Wall	All	5	5					$1,000		
Ballast Wall	All	5	5	$300				$1,500		
Ballast Wall	All	10	10							
West Retaining Wall - North	Exterior	10	10						$9,000	
Vertical Surface	All	10	10							
East Retaining Wall - South	All	5	5					$55,000		
West Retaining Wall - South	All	5	5					$45,000		
South Vertical Surface	All	5	5							
South Vertical Surface	All	5	5							
East Retaining Wall - North	All	10	10						$60,000	
West Retaining Wall - North	All	5	5					$45,000		
North Vertical Surface	All	10	10							
North Vertical Surface	All	5	5							
West Embankment	All	1	1				$2,000			
East Embankment	All	5	5							
Slope Protection	All	1	1							
Slope Protection	All	5	5					$1,000		
Foundation	All	1	1	$366			$150,000			
Foundation - North	West	1	1	$300			$25,000			
Watercourse	All	1	1							

3. Element Summary (cont.)

		RSL		Urgency of Rehabilitative Needs						
	Focus	1	2	Maint.	Pre-Emp.	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
Bottom	All	5	5							
Downstream Section	All	20	20							
Upstream Section	All	1	1				$25,000			
Totals and Minimums		0	1	$3,076	$0	$1,500	$204,000	$665,000	$128,500	$21,000

Total Estimated Rehabilitative Cost:	$1,020,000
Contingency:	$0
Provisional Allowance:	$0
Total Potential Project Cost:	$1,020,000

4. Maintenance Summary

Barrier

Observed Defect: Structural Inadequacy

Suggested Maintenance: Minor Repair, Removal or Installation

Signage

Observed Defect: Structural Inadequacy

Suggested Maintenance: Minor Repair, Removal or Installation


Truss - Bottom Chords - Bottom

Observed Defect: Severe Corrosion

Suggested Maintenance: Minor Repair, Removal or Installation



Truss - Verticals

Observed Defect: Severe Corrosion

Suggested Maintenance: Minor Repair, Removal or Installation



4. Maintenance Summary (cont.)

West Abutment - Ballast Wall

Observed Defect: Very Severe Splitting

Suggested Maintenance: Minor Repair, Removal or Installation

Foundation

Observed Defect: Severe Erosion

Suggested Maintenance: Scour Protection

Foundation - North - West

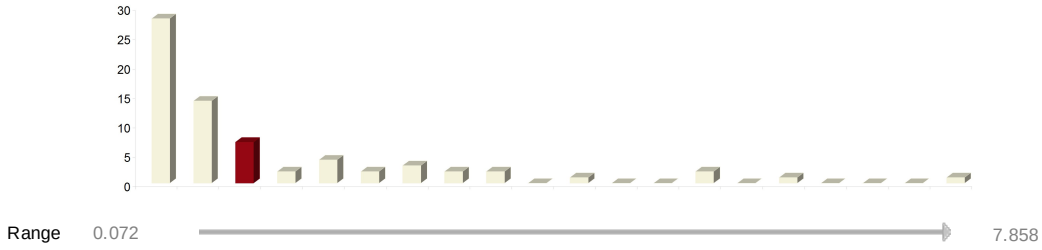
Observed Defect: Very Severe Erosion

Suggested Maintenance: Scour Protection

5. Ranking Summary

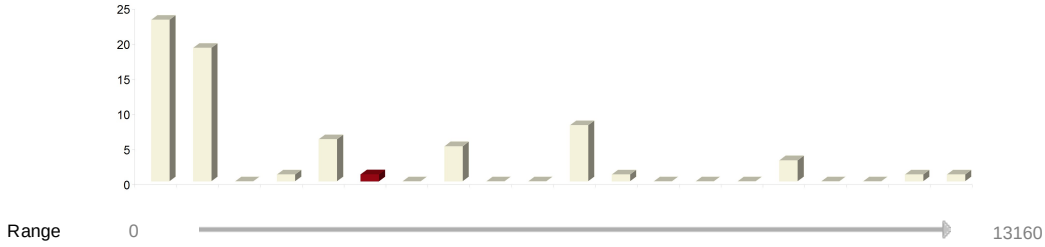
Replacement Value (millions)

This Structure: $1,168,950 Rank: 21 / 69



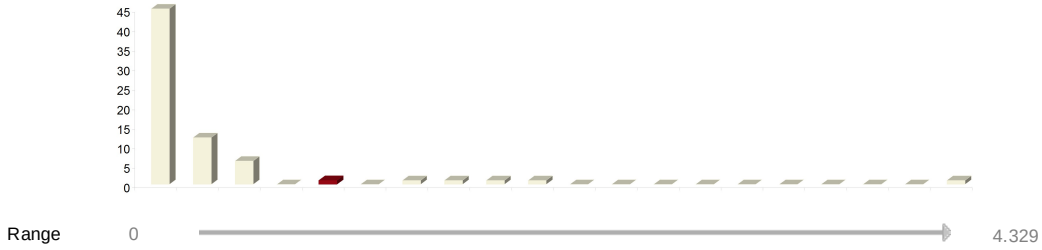
AADT

This Structure: 3700 Rank: 20 / 69



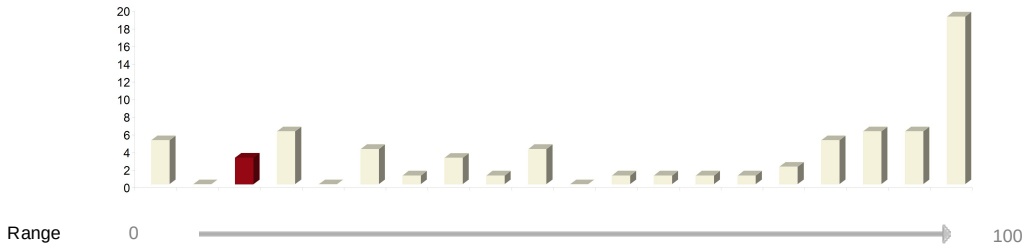
Rehabilitative Needs (millions)

This Structure: $1,020,000 Rank: 6 / 69



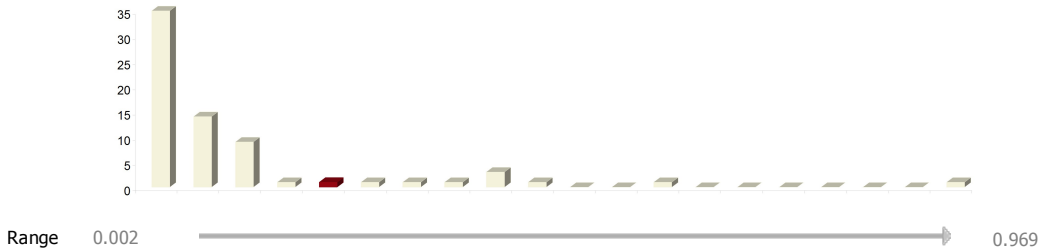
Condition Index

This Structure: 12.7 Rank: 62 / 69



Est. 10 Year Deferral Cost (millions)

This Structure: $229,694 Rank: 10 / 69



Notes:

Data calculated at time of inspection.

Rankings are higest in category.

Histograms illustrate distribution of all structures in inventory from the low to high ranges indicated.

Vertical axis = number of structures.

Red columns represent category in which this structure resides.

6. OSIM Reporting

6.1 Inventory Data

Structure Name	Niska Road Over Speed River			Site Number	00001
Main Hwy/Road #	N/A	On ☑ Under ☐	Crossing Type:	Navigable Water ☑	Non-Navig. Water ☐
Hwy/Road Name	Niska Road			Rail ☐ Road ☐ Ped. ☐	Other ☐
Structure Location	NA Park - NA				
Latitude	4816872		Longitude	17560310	
Owner(s)	City of Guelph		Heritage Designation:	Not Cons. ☑ Cons./Not App. ☐ List/Not Desig. ☐	Desig./Not List ☐ Desig. & List ☐
MTO Region	SouthWestern		Road Class:	Freeway ☐ Arterial ☐ Collector ☐	Local ☑
MTO District	London/Stratford		Posted Speed	50	No. of Lanes 1
Old County	Wellington		AADT	3700	No. of Trucks 7
Geographic Twp.	City of Guelph		Inspection Route Sequence	Unknown	
Structure Type	Truss		Interchange Number	Unknown	
Total Deck Length	24.6	(m)	Interchange Structure Number	Unknown	
Overall Str. Width	5.5	(m)	Minimum Vertical Clearance	0	(m)
Total Deck Area	135.3	(sq.m)	Special Routes:	Transit ☑ Truck ☐ School ☐	Bicycle ☐
Roadway Width	3.44	(m)	Detour Length Around Bridge	5	(km)
Skew Angle	0	(Degrees)	Direction of Structure	West-East	
No. of Spans	1		Fill on Structure	0	(m)
Span Lengths	24.6				(m)

6.2 Historical Data

Year Built	1974	Year of Last Major Rehab.	
Last OSIM Inspection	2012	Last Evaluation	Unknown
Last Enhanced OSIM Inspection	Unknown	Current Load Limit	5 (tonnes)
Enhanced Access Equipment			
Last Underwater Inspection	Unknown	Load Limit By-Law #	Not Applicable/Unknown
Last Condition Survey	Unknown	By-Law Expiry Date	Not Applicable/Unknown
Rehabilitation History	1974 - Bridge collapsed on September 23 and was replaced with aBailey Bridge loaned from MTO in October 1974. 1996- Stringers and timber deck replaced. 2003 - Raker Bolts, timber wearing surface, transoms, sway bracing replaced - Partial replacement of timber curb		

6. OSIM Reporting (cont.)

6.3 Scheduled Improvements

Regional Priority Number

Programmed Work Year

Nature of Program Work

6.4 Appraisal Indices

	Comments
Fatigue	
Seismic	
Scour	
Flood	
Geometrics	
Barrier	
Curb	
Load Capacity	

6. OSIM Reporting (cont.)

6.5 Field Inspection Information

Date of Inspection	April-14-14	Type of Inspection	☑ OSIM ☐ Enhanced OSIM
Inspector	Lin Yu		
Others in Party	None		
All Equipment Used	Hammer, Camera		
Weather	Sunny		
Temperature	5 to 10 C		

6.6 Additional Investigations Required

	None	Normal	Urgent	Est. Cost
Detailed Deck Condition Survey	X			
Non-Destructive Delamination Survey of Asphalt Covered Deck	X			
Concrete Substructure Condition Survey	X			
Detailed Coating Condition Survey	X			
Detailed Timber Investigation	X			
Post-Tensioned Strand Investigation	X			
Underwater Investigation	X			
Fatigue Investigation	X			
Seismic Investigation	X			
Structure Evaluation	X			
Monitoring of Deformations, Settlements and Movements			X	
Other* None	X			
Next Detailed Visual Inspection April, 2016			Total Est. Cost	

The major concerns at this site are structural inadequacy of structure, water encroaching against abutments, road constriction, structural inadequacy of barriers, absence of a pedestrian access, absence of a traffic barrier, progressive undermining of the northwest retaining wall, severe failure of the northwest embankment, partial failure of northeast embankment, structural inadequacy of signage, severe corrosion of the bearing plates, isolated severe corrosion of the bottom chords at the ends and west end verticals, partial poor condition and progressive deterioration of the bearing seats and progressive deterioration of the masonry retaining walls.

Suspected Performance Deficiencies

01	Load carrying capacity	06	Bearing not uniformly loaded/unstable	12	Slippery surfaces
02	Excessive deformations (deflections & rotations)	07	Jammed expansion joint	13	Flooding/channel blockage
03	Continuing settlement	08	Pedestrian/vehicular hazard	14	Undermining of foundation
04	Continuing movements	09	Rough riding surface	15	Unstable embankments
05	Seized bearings	10	Surface ponding	16	Other
		11	Deck drainage		

Maintenance Needs

00	None	06	Bridge Bearing Maintenance	12	Bridge Surface Repair
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	Other

* eg. monitoring crack widths, trip hazards, issues impacting pedestrian or vehicular control

6. OSIM Reporting (cont.)

6.7 Element Data

6.7.1 West Approach - Approach

Element Group:	West Approach	Length:	N/A
Element Name:	Approach	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Asphalt	Count:	N/A
Element Type:	Primary Element	Total Quantity:	5.81
Environment:	Severe	Limited Inspection	☐
Protection System:	Edge Sealing		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	5.81	0	0	00	00

Comments: None.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.2 East Approach - Approach

Element Group:	East Approach	Length:	N/A
Element Name:	Approach	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Asphalt	Count:	N/A
Element Type:	Primary Element	Total Quantity:	5.81
Environment:	Severe	Limited Inspection	☐
Protection System:	Edge Sealing		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	5.81	0	0	00	00

Comments: None.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.3 West Approach - Slab

Element Group:	West Approach	Length:	6
Element Name:	Slab	Width:	3.6
Location:	Single Element	Height:	0.12
Material:	Asphalt	Count:	1
Element Type:	Any	Total Quantity:	21.6
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	21.6	0	0	00	00

Comments: None.

Urgency :	None	6-10 years	1-5 years	< 1 year	Urgent
	☑	☐	☐	☐	☐

Recommended Work : See Primary Element

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.4 East Approach - Slab

Element Group:	East Approach	Length:	6
Element Name:	Slab	Width:	3.6
Location:	Single Element	Height:	0.12
Material:	Asphalt	Count:	1
Element Type:	Any	Total Quantity:	21.6
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	21.6	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.5 West Approach - Wearing Surface

Element Group:	West Approach	Length:	6
Element Name:	Wearing Surface	Width:	3.6
Location:	Single Element	Height:	0.15
Material:	Asphalt	Count:	1
Element Type:	Any	Total Quantity:	21.6
Environment:	Severe	Limited Inspection	☐
Protection System:	Edge Sealing		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	21.6	0	0	00	00

Comments: None.

Urgency :	None ☐	6-10 years ☑	1-5 years ☐	< 1 year ☐	Urgent ☐
Recommended Work :	See Primary Element				

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.6 East Approach - Wearing Surface

Element Group:	East Approach	Length:	6
Element Name:	Wearing Surface	Width:	3.6
Location:	Single Element	Height:	0.15
Material:	Asphalt	Count:	1
Element Type:	Any	Total Quantity:	21.6
Environment:	Severe	Limited Inspection	☐
Protection System:	Edge Sealing		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	21.6	0	0	00	00

Comments: None.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.7 Deck - Deck

Element Group:	Deck	Length:	N/A
Element Name:	Deck	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Timber	Count:	N/A
Element Type:	Primary Element	Total Quantity:	8
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	7.2	0.4	0.4	00	00

Comments: Isolated severe checking noted.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.8 Deck - Soffit Ends

Element Group:	Deck	Length:	2
Element Name:	Soffit Ends	Width:	3.44
Location:	Single Element	Height:	N/A
Material:	Timber	Count:	2
Element Type:	Any	Total Quantity:	13.8
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	13.8	0	0	00	00

Comments: None.

Urgency :	None ☐	6-10 years ☑	1-5 years ☐	< 1 year ☐	Urgent ☐
Recommended Work :	See Primary Element				

South End. Showing typical fair condition

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.9 Deck - Interior Soffit

Element Group:	Deck	Length:	20.6
Element Name:	Interior Soffit	Width:	2.24
Location:	Single Element	Height:	N/A
Material:	Timber	Count:	1
Element Type:	Any	Total Quantity:	46.1
Environment:	Moderate	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	46.1	0	0	00	00

Comments: Deck underside was not inspected due to water level in 2014.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.10 Deck - Top Surface

Element Group:	Deck	Length:	24.6
Element Name:	Top Surface	Width:	3.44
Location:	Single Element	Height:	0.14
Material:	Timber	Count:	1
Element Type:	Any	Total Quantity:	84.6
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	76.14	4.23	4.23	00	00

Comments: Isolated severe checking noted.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

.

Top Surface. Showing isolated severe deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.11 West Transverse Joint - Transverse Joint

Element Group:	West Transverse Joint	Length:	N/A
Element Name:	Transverse Joint	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Any	Count:	N/A
Element Type:	Open	Total Quantity:	5.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m	0	5.5	0	0	00	00

Comments: None.

Urgency :	None ☑	6-10 years ☐	1-5 years ☐	< 1 year ☐	Urgent ☐

Recommended Work : None

West View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.12 East Transverse Joint - Transverse Joint

Element Group:	East Transverse Joint	Length:	N/A
Element Name:	Transverse Joint	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Any	Count:	N/A
Element Type:	Open	Total Quantity:	5.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m	0	5.5	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : None

East View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.13 Sidewalk/Curb/Median - SouthSidewalk/Curb/Median

Element Group:	Sidewalk/Curb/Median	Length:	N/A
Element Name:	SouthSidewalk/Curb/Median	Width:	N/A
Location:	South	Height:	N/A
Material:	Timber	Count:	N/A
Element Type:	Primary Element	Total Quantity:	0.5
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	0.42	0.08	0	00	00

Comments: None.

Urgency :	None ☐	6-10 years ☑	1-5 years ☐	< 1 year ☐	Urgent ☐
Recommended Work :	Ancillary Replacement				

Overall Surface. Showing generally good condition

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.14 Sidewalk/Curb/Median - North Curb

Element Group:	Sidewalk/Curb/Median	Length:	24.6
Element Name:	North Curb	Width:	0.19
Location:	North	Height:	0.19
Material:	Timber	Count:	2
Element Type:	Any	Total Quantity:	18.6
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	15.81	2.79	0	00	00

Comments: None.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

North Surface. Showing generally fair condition

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.15 Barrier - Barrier

Element Group:	Barrier	Length:	N/A
Element Name:	Barrier	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Timber	Count:	N/A
Element Type:	Primary Element	Total Quantity:	0.2
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	0	0	0.2	16	17

Comments: There is no traffic barrier (only some timber railing was noted). Approach traffic barrier is present.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☑

Recommended Work : Ancillary Replacement

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.16 Signage - Signage

Element Group:	Signage	Length:	N/A
Element Name:	Signage	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Aluminum	Count:	6
Element Type:	Primary Element	Total Quantity:	6
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	0	6	0	16	17

Comments: Much suitable signage should be in place for this specific situation (narrow structure, one lane, speed limit signs are not present).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : Ancillary Replacement

.

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.17 Truss - Truss

Element Group:	Truss	Length:	N/A
Element Name:	Truss	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Steel	Count:	N/A
Element Type:	Primary Element	Total Quantity:	25
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

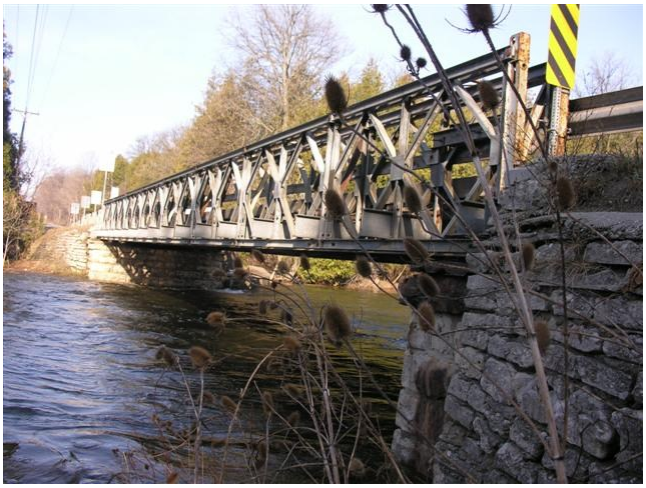
Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	23.25	1.25	0.5	00	00

Comments: The truss (bailey structure) is in good condition except for the west end verticals (exhibiting intermittent severe rust pack) and the bottom chords close to the bearing areas (exhibiting severe corrosion). Further deterioration of these elements may result in some marginal loss of strength and end panels may require replacement.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

North Side.



South Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.18 Truss - Bottom Chords

Element Group:	Truss	Length:	24.4
Element Name:	Bottom Chords	Width:	0.05
Location:	Single Element	Height:	0.1
Material:	Steel	Count:	8
Element Type:	Any	Total Quantity:	78.1
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	N/A	0	74.98	1.56	1.56	00	00

Comments: Isolated severe corrosion noted; however, progressive deterioration will result in loss of strength. The severe corrosion is concentrated at the ends close to the bearing plates.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

South Surface. Showing generally good condition

Underside Surface. Showing isolated severe corrosion.

Underside View. Showing isolated severe corrosion.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.19 Truss - Diagonals

Element Group:	Truss	Length:	1
Element Name:	Diagonals	Width:	0.1
Location:	Single Element	Height:	0.05
Material:	Steel	Count:	256
Element Type:	Any	Total Quantity:	105
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	105	0	0	00	00

Comments: None.

Urgency :	None ☑	6-10 years ☐	1-5 years ☐	< 1 year ☐	Urgent ☐
Recommended Work :	See Primary Element				

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.20 Truss - Top Chords

Element Group:	Truss	Length:	24.4
Element Name:	Top Chords	Width:	0.05
Location:	Single Element	Height:	0.1
Material:	Steel	Count:	8
Element Type:	Any	Total Quantity:	80.5
Environment:	Benign	Limited Inspection	☐
Protection System:	Epoxy Coating		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	80.5	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

North Surface. Showing generally moderate corrosion

South Surface. Showing widespread medium corrosion

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.21 Truss - Connections

Element Group:	Truss	Length:	N/A
Element Name:	Connections	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	High Strength Steel	Count:	190
Element Type:	Bolted	Total Quantity:	190
Environment:	Severe	Limited Inspection	☐
Protection System:	Galvanized Steel		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	190	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

North Side.

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.22 Truss - Verticals

Element Group:	Truss	Length:	1.55
Element Name:	Verticals	Width:	0.1
Location:	Single Element	Height:	0.05
Material:	Steel	Count:	96
Element Type:	Any	Total Quantity:	38.4
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	36.86	0.77	0.77	16	07

Comments: The west end verticals exhibits isolated severe rust pack (end panels may need to be replaced).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

.

West End.

West End. Showing isolated severe corrosion.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.23 Floor Beams - Floor Beams

Element Group:	Floor Beams	Length:	3.85
Element Name:	Floor Beams	Width:	0.12
Location:	Single Element	Height:	0.26
Material:	Timber	Count:	19
Element Type:	Primary Element	Total Quantity:	73.2
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	71	2.2	0	00	00

Comments: None.

Urgency :	None ☑	6-10 years ☐	1-5 years ☐	< 1 year ☐	Urgent ☐
Recommended Work :	Ancillary Replacement				

Overall .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.24 Floor Beams - Floor Beam Ends

Element Group:	Floor Beams	Length:	3.85
Element Name:	Floor Beam Ends	Width:	0.12
Location:	Single Element	Height:	0.26
Material:	Steel	Count:	2
Element Type:	Any	Total Quantity:	11.2
Environment:	Moderate	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	10.86	0.34	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

West End. Showing generally good condition

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.25 Floor Beams - Intermediate Floor Beams

Element Group:	Floor Beams	Length:	3.85
Element Name:	Intermediate Floor Beams	Width:	0.12
Location:	Single Element	Height:	0.26
Material:	Steel	Count:	17
Element Type:	Any	Total Quantity:	62
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	60.14	1.86	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.26 Stringers - Stringers

Element Group:	Stringers	Length:	24.4
Element Name:	Stringers	Width:	0.05
Location:	Single Element	Height:	0.1
Material:	Steel	Count:	15
Element Type:	Primary Element	Total Quantity:	15
Environment:	Moderate	Limited Inspection	☐
Protection System:	Galvanized Steel		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	13.65	1.35	0	00	00

Comments: Stringers exhibit medium corrosion on the top and bottom flange.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.27 Stringers - Middle Stringers

Element Group:	Stringers	Length:	24.4
Element Name:	Middle Stringers	Width:	0.05
Location:	Single Element	Height:	0.1
Material:	Steel	Count:	15
Element Type:	Any	Total Quantity:	15
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	13.35	1.65	0	00	00

Comments: Stringers exhibit medium corrosion on the top and bottom flange.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

Underside Surface. Showing isolated medium corrosion.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.28 Bracing - Bracing

Element Group:	Bracing	Length:	5.2
Element Name:	Bracing	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Steel	Count:	24
Element Type:	Primary Element	Total Quantity:	24
Environment:	Benign	Limited Inspection	☑
Protection System:	Galvanized Steel		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	24	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

Overall View .

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.29 Bracing - East End Bracing

Element Group:	Bracing	Length:	5.2
Element Name:	East End Bracing	Width:	0.05
Location:	East	Height:	0.1
Material:	Steel	Count:	2
Element Type:	Any	Total Quantity:	2
Environment:	Benign	Limited Inspection	☐
Protection System:	Galvanized Steel		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	2	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

East End.

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6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.30 Bracing - Intermediate Bracing

Element Group:	Bracing	Length:	5.2
Element Name:	Intermediate Bracing	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Steel	Count:	20
Element Type:	Any	Total Quantity:	20
Environment:	Benign	Limited Inspection	☑
Protection System:	Galvanized Steel		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	20	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

Underside Surface. Showing generally good condition

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.31 Bracing - West End Bracing

Element Group:	Bracing	Length:	5.2
Element Name:	West End Bracing	Width:	0.05
Location:	West	Height:	0.1
Material:	Steel	Count:	2
Element Type:	Any	Total Quantity:	2
Environment:	Benign	Limited Inspection	☐
Protection System:	Galvanized Steel		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	2	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

West End. Showing generally good condition

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.32 West Abutment - Abutment

Element Group:	West Abutment	Length:	N/A
Element Name:	Abutment	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Masonry	Count:	N/A
Element Type:	Primary Element	Total Quantity:	46
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	25.3	11.5	9.2	16	17

Comments: Bearing plates are affected by severe corrosion and the thin concrete layer intended probably as a bearing area is in partial poor condition and progressively deteriorates (this may eventually lead to slight superstructure settlement). Isolated medium to severe loss of mortar and splitting also noted along the bottom side of the abutment wall.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Defer to Element Level

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.33 East Abutment - Abutment

Element Group:	East Abutment	Length:	N/A
Element Name:	Abutment	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Masonry	Count:	N/A
Element Type:	Primary Element	Total Quantity:	46
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	25.3	11.5	9.2	16	17

Comments: Bearing plates are affected by severe corrosion and the thin concrete layer intended probably as a bearing area is in partial poor condition and progressively deteriorates (this may eventually lead to slight superstructure settlement). Isolated medium to severe loss of mortar and splitting also noted along the bottom side of the abutment wall.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Defer to Element Level

East Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.34 West Abutment - Bottom Abutment Wall

Element Group:	West Abutment	Length:	N/A
Element Name:	Bottom Abutment Wall	Width:	0.5
Location:	Bottom	Height:	1
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	0.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	0	0	0.5	00	17

Comments: Isolated severe splitting and spalling noted at the base.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Replacement

Bottom Surface. Showing isolated severe deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.35 East Abutment - Bottom Abutment Wall

Element Group:	East Abutment	Length:	N/A
Element Name:	Bottom Abutment Wall	Width:	1.5
Location:	Bottom	Height:	1
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	1.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	0	0	1.5	00	17

Comments: Isolated severe splitting and spalling noted at the base.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Replacement

East Surface. Showing isolated severe deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.36 West Abutment - Bearings

Element Group:	West Abutment	Length:	N/A
Element Name:	Bearings	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Any	Count:	2
Element Type:	Plate	Total Quantity:	2
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	0	1	1	05	17

Comments: Bearing plates are affected by severe corrosion (this may eventually result in slight settlement of the superstructure).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Replacement

Overall View . Showing severe corrosion.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.37 East Abutment - Bearings

Element Group:	East Abutment	Length:	N/A
Element Name:	Bearings	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Any	Count:	2
Element Type:	Plate	Total Quantity:	2
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	0	1	1	05	17

Comments: Bearing plates are affected by severe corrosion (this may eventually result in slight settlement of the superstructure).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Replacement

East Side. Showing severe corrosion.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.38 West Abutment - Bearing Seats

Element Group:	West Abutment	Length:	N/A
Element Name:	Bearing Seats	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Cast-In-Place Concrete	Count:	N/A
Element Type:	Ledge	Total Quantity:	2
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	count	0	1	0.6	0.4	03	17

Comments: Bearing plates were originally placed on a thin concrete layer, which is now in partially Poor condition, and slight settlements of the superstructure may be expected.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Loaded Deep Repair

Bottom Surface. Showing extensive severe corrosion.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.39 East Abutment - Bearing Seats

Element Group:	East Abutment	Length:	N/A
Element Name:	Bearing Seats	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Cast-In-Place Concrete	Count:	N/A
Element Type:	Ledge	Total Quantity:	2
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	count	0	1	0.6	0.4	03	17

Comments: Bearing plates were originally placed on a thin concrete layer, which is now in partial poor condition and slight settlements of the superstructure may be expected.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Loaded Deep Repair

East Side. Showing poor condition.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.40 West Abutment - Abutment Wall

Element Group:	West Abutment	Length:	N/A
Element Name:	Abutment Wall	Width:	5.9
Location:	Single Element	Height:	2.2
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	12.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	9	2.5	1	00	17

Comments: Isolated severe loss of mortar noted (especially along the base).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Replacement

Side.

West Surface. Showing isolated severe deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.41 East Abutment - Abutment Wall

Element Group:	East Abutment	Length:	N/A
Element Name:	Abutment Wall	Width:	5.9
Location:	Single Element	Height:	2.2
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	11.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	8.86	2.07	0.57	00	17

Comments: Isolated severe loss of mortar noted (especially along the base).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Replacement

East Side. Showing isolated severe spalling.

Overall View.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.42 West Abutment - Ballast Wall

Element Group:	West Abutment	Length:	N/A
Element Name:	Ballast Wall	Width:	5.9
Location:	Single Element	Height:	0.5
Material:	Timber	Count:	1
Element Type:	Any	Total Quantity:	3
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	1.95	0.75	0.3	16	17

Comments: The west side exhibits severe deterioration.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Timber Replacement

Side. Showing severe deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.43 East Abutment - Ballast Wall

Element Group:	East Abutment	Length:	N/A
Element Name:	Ballast Wall	Width:	5.9
Location:	Single Element	Height:	0.5
Material:	Timber	Count:	1
Element Type:	Any	Total Quantity:	3
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	3	0	0	00	00

Comments: None.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Timber Replacement

East Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.44 West Retaining Wall - NorthRetaining Wall

Element Group:	West Retaining Wall	Length:	N/A
Element Name:	NorthRetaining Wall	Width:	N/A
Location:	North	Height:	N/A
Material:	Mass Concrete	Count:	N/A
Element Type:	Gravity	Total Quantity:	18.29
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	14.63	3.66	0	03	17

Comments: Continuing settlement expected due to undermining.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

Northwest Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.45 West Retaining Wall - Vertical Surface

Element Group:	West Retaining Wall	Length:	8
Element Name:	Vertical Surface	Width:	N/A
Location:	Single Element	Height:	1.75
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	14
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	0	14	0	16	17

Comments: None.

Urgency :	None ☐	6-10 years ☑	1-5 years ☐	< 1 year ☐	Urgent ☐
Recommended Work :	See Primary Element				

Northwest Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.46 East Retaining Wall - SouthRetaining Wall

Element Group:	East Retaining Wall	Length:	N/A
Element Name:	SouthRetaining Wall	Width:	N/A
Location:	South	Height:	N/A
Material:	Masonry	Count:	N/A
Element Type:	Gravity	Total Quantity:	33.41
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	18.38	9.69	5.35	16	17

Comments: There is severe loss of mortar; however, this does not appear to affect performance significantly.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.47 West Retaining Wall - SouthRetaining Wall

Element Group:	West Retaining Wall	Length:	N/A
Element Name:	SouthRetaining Wall	Width:	N/A
Location:	South	Height:	N/A
Material:	Masonry	Count:	N/A
Element Type:	Gravity	Total Quantity:	26.88
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	11.29	14.25	1.34	16	17

Comments: Some loss of wall at top and also loss of mortar noted.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.48 East Retaining Wall - South Vertical Surface

Element Group:	East Retaining Wall	Length:	8.7
Element Name:	South Vertical Surface	Width:	N/A
Location:	South	Height:	2
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	17.4
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	9.57	5.05	2.78	16	17

Comments: There is severe loss of mortar; however, this does not appear to affect performance significantly.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.49 West Retaining Wall - South Vertical Surface

Element Group:	West Retaining Wall	Length:	8
Element Name:	South Vertical Surface	Width:	N/A
Location:	South	Height:	1.75
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	14
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	5.88	7.42	0.7	16	17

Comments: Some loss of wall at top and also loss of mortar noted.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.50 East Retaining Wall - NorthRetaining Wall

Element Group:	East Retaining Wall	Length:	N/A
Element Name:	NorthRetaining Wall	Width:	N/A
Location:	North	Height:	N/A
Material:	Masonry	Count:	N/A
Element Type:	Gravity	Total Quantity:	36.72
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	23.87	11.02	1.84	00	17

Comments: There is loss of mortar at the base of the retaining wall.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : Ancillary Replacement

.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.51 West Retaining Wall - NorthRetaining Wall

Element Group:	West Retaining Wall	Length:	N/A
Element Name:	NorthRetaining Wall	Width:	N/A
Location:	North	Height:	N/A
Material:	Masonry	Count:	N/A
Element Type:	Gravity	Total Quantity:	26.88
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	0	26.88	0	16	17

Comments: Continuing settlement expected due to undermining.

Urgency :	None ☐	6-10 years ☐	1-5 years ☑	< 1 year ☐	Urgent ☐

Recommended Work : Ancillary Replacement

Northwest Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.52 East Retaining Wall - North Vertical Surface

Element Group:	East Retaining Wall	Length:	11.6
Element Name:	North Vertical Surface	Width:	N/A
Location:	North	Height:	2.2
Material:	Masonry	Count:	1
Element Type:	Any	Total Quantity:	25.5
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	14.54	9.69	1.27	03	17

Comments: There is loss of mortar at the base of the retaining wall.

Urgency : None ☐ 6-10 years ☑ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : See Primary Element

Side. Showing deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.53 West Retaining Wall - North Vertical Surface

Element Group:	West Retaining Wall	Length:	9.8
Element Name:	North Vertical Surface	Width:	N/A
Location:	North	Height:	1.3
Material:	Mass Concrete	Count:	1
Element Type:	Any	Total Quantity:	12.7
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	10.16	2.54	0	03	17

Comments: Continuing settlement expected due to undermining.

Urgency :	None ☐	6-10 years ☐	1-5 years ☑	< 1 year ☐	Urgent ☐
Recommended Work :	See Primary Element				

Northwest Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.54 West Embankment - Embankment

Element Group:	West Embankment	Length:	N/A
Element Name:	Embankment	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Soil	Count:	1
Element Type:	Primary Element	Total Quantity:	1
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	0.35	0.25	0.4	16	13

Comments: Northwest embankment has been almost entirely washed out by water flow and the substructure is now severely exposed which may eventually lead to substructure instability.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : Replacement

Overall View.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.55 East Embankment - Embankment

Element Group:	East Embankment	Length:	N/A
Element Name:	Embankment	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Soil	Count:	1
Element Type:	Primary Element	Total Quantity:	1
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	0.6	0.2	0.2	16	13

Comments: Partial failure noted along the northeast end.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Defer to Element Level

East Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.56 West Embankment - Slope Protection

Element Group:	West Embankment	Length:	N/A
Element Name:	Slope Protection	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Foliation	Count:	1
Element Type:	Any	Total Quantity:	1
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	0.35	0.25	0.4	16	13

Comments: Northwest embankment has been almost entirely washed out by water flow and the substructure is now severely exposed which may eventually lead to substructure instability.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : See Primary Element

Southwest Side.

West Surface. Showing extensive severe deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.57 East Embankment - Slope Protection

Element Group:	East Embankment	Length:	N/A
Element Name:	Slope Protection	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Foliation	Count:	1
Element Type:	Any	Total Quantity:	1
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	0.6	0.2	0.2	16	13

Comments: Partial failure noted along the northeast end.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : Restoration

East Side.

East Surface. Showing isolated severe failure.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.58 Foundation - Foundation

Element Group:	Foundation	Length:	N/A
Element Name:	Foundation	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Steel Piles	Count:	1
Element Type:	Primary Element	Total Quantity:	1
Environment:	Benign	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	0.8	0	0.2	00	00

Comments: The waterbed along the west abutment exhibits medium degradation and taking into account that water flow encroaches against the substructure/footing it may be further affected by high volume of water. The condition of foundation should be regularly checked and proper measures should be taken if necessary.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : Reinstallation


South View.


West Side.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.59 Foundation - NorthFoundation

Element Group:	Foundation	Length:	N/A
Element Name:	NorthFoundation	Width:	N/A
Location:	North	Height:	N/A
Material:	Steel Piles	Count:	1
Element Type:	Primary Element	Total Quantity:	1
Environment:	Benign	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	each	0	0.77	0.03	0.2	16	13

Comments: The foundation of the northwest retaining wall is being progressively undermined. The retaining wall may unstable during high volume water (in case of collapse the road system and the superstructure possibly may be severely affected). Further condition of the west foundation should be closely monitored.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : Reinstallation

Northwest Side.

Northwest Side. Showing deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.60 Watercourse - Watercourse

Element Group:	Watercourse	Length:	N/A
Element Name:	Watercourse	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Any	Count:	1
Element Type:	Straight	Total Quantity:	1
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	0.65	0.1	0.25	16	17

Comments: Current span opening is shorter than the watercourse width and, water encroaches against abutments as a result. The condition of the west abutment should be closely monitored as its stability may be affected by high volume of water.

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : Defer to Element Level

Overall View . Showing condition.

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6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.61 Watercourse - Bottom

Element Group:	Watercourse	Length:	N/A
Element Name:	Bottom	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Soil	Count:	N/A
Element Type:	Natural	Total Quantity:	120.54
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	96.43	24.11	0	16	13

Comments: Medium degradation observed along west abutment (northwest retaining wall may be undermined).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☑ < 1 year ☐ Urgent ☐

Recommended Work : None

.

West End. Showing medium deterioration.

6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.62 Watercourse - Downstream Section

Element Group:	Watercourse	Length:	N/A
Element Name:	Dow nstream Section	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Soil	Count:	N/A
Element Type:	Uncontrolled	Total Quantity:	60.27
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	60.27	0	0	00	00

Comments: None.

Urgency : None ☑ 6-10 years ☐ 1-5 years ☐ < 1 year ☐ Urgent ☐

Recommended Work : None

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6. OSIM Reporting (cont.)

6.7 Element Data (cont.)

6.7.63 Watercourse - Upstream Section

Element Group:	Watercourse	Length:	N/A
Element Name:	Upstream Section	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Gravel	Count:	N/A
Element Type:	Uncontrolled	Total Quantity:	60.27
Environment:	Benign	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	45.2	0	15.07	16	17

Comments: The width of the watercourse is bigger than the span opening and water encroaches against the abutments as a result (west abutment much more exposed than east).

Urgency : None ☐ 6-10 years ☐ 1-5 years ☐ < 1 year ☑ Urgent ☐

Recommended Work : Redirection

North Side. Showing condition.

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7. Glossary

Abutment

A substructure unit which supports the end of the structure and retains the approach fill.

Asset

A collection of Components that are most economically and/or practically replaced, rehabilitated or maintained together under a single contract or initiative. The timing of such an initiative is weighed against the timing of treating other Assets.

Asset Value Contribution

The portion of the total replacement value attributable to a particular component.

Auxiliary Components

Any component which does not share in the load carrying capacity of the structure.

Benign

Not exposed. e.g. girders, pier caps (unless joints are leaking)

Bridge

A structure which provides a roadway or walkway for the passage of vehicles across an obstruction, gap or facility and which is greater than 3 m in span.

Chord

The upper and lower main longitudinal component in trusses or arches extending the full length of the structure.

Coating

The generic term for paint, lacquer, enamel, sealers, galvanizing, metallizing, etc.

Component

A major feature of an Asset that performs a particular function. Often in multiple occurrences.

Condition Index

See Net Asset Salvage Value (NASV).

Critical Quantity

The single quantity that defines the Element for costing purposes.

Culvert

Any bridge that is embedded in fill and is used to convey water, pedestrians or animals through it.

Deck Condition Survey

A detailed inspection of a concrete deck in accordance with The Structure Rehabilitation Manual.

Defect

An identifiable, unwanted condition that was not part of the original intent of design.

Detailed Visual Inspection

An element by element visual assessment of material defects, performance deficiencies and maintenance needs of a structure.

Deterioration

A defect that has occurred over a period of time.

Diagonals

Component which spans between the top and bottom chord of a truss or arch in a diagonal direction.

Distress

A defect produced by loading.

Element

A feature of a Component distinguished in terms of condition, material, base of measurement or unit cost of repair.

Engineer

A member or licensee of the Professional Engineers of Ontario.

Environment

An element's exposure to chloride contamination and freeze-thaw cycling

Estimated Remaining Service Life

The Remaining Service Life (RSL) is an estimate, in years, over which an element may remain in service without repair or replacement. It is assumed that the conditions to which the element has been exposed will not change significantly and is based solely on visual observation.

Estimated Remaining Service Life (ERSL)

This is an estimate, in years, as to how long an element can be expected to continue to perform satisfactorily without the predominant deficiency being addressed. In the case of a Primary Element, it is the time remaining before the element must be addressed ata Primary Element Level if nothing is done. It is based on judgment and experience and is tempered by the need to control liability of our clients. In cases where no physical testing results are available, ERSL's will tend to be more conservative. The ESRL assigned to a compoment represents the minimum ERSL assigned to any element comprising that component.

Evaluation

The determination of the load carrying capacity of structures in accordance with the requirements of the Ontario Highway Bridge Design Code or the Canadian Highway Bridge Design Code, when implemented.

Floor Beam

Transverse beams that span between trusses, arches or girders and transmit loads from the deck and stringers to the trusses, arches or girders.

Focus

At the element level, focus refers to the portion of the element in question. In most cases the focus is simply stated as "All" or, in other words, the entire element is being reported on under one designation. As elements deteriorate over time it is often desirable to differentiate between areas that are deteriorating more rapidly or differently. In other cases, elements are comprised of different materials and would be repaired differently as a result. These too should be separated and referred to by their focus. The focus of a primary element is always set to "All".

Highway

A common and public thoroughfare including street, avenue, parkway, driveway, square, place, bridge, designed and intended for, or used by, the general public for passage of vehicles, pedestrians or animals.

Lateral Bracing

Bracing which lies in the plane of the top or bottom chords or flanges and provides lateral stability and resistance to wind loads.

Maintenance

Any action which is aimed at preventing the development of defects or preventing deterioration of a structure or its components.

Masonry

Structure made up of natural stones separated by mortar joints, usually in uniform courses. Masonry in existing structures is usually in retaining walls, abutments, piers or arches.

Masonry Ashlar

Stone worked to a square shape or cut square with uniform coursing height and vertical joints staggered. The stone has a minimum course height of 200 mm set in joints with an average thickness of 10 mm or less.

Masonry Rubble

Stone masonry constructed with rough field stones or only roughly squared stones set in mortar joints with average thickness greater than 20 mm. Also any squared stone masonry in which the joints are greater than 20 mm, but less than 30 mm in thickness.

Masonry Squared Stone

Stone in natural bed thicknesses or roughly squared stones with course height less than 200 mm and joints greater than 10mm but not over 20mm.

Moderate

Exposed but element protected e.g. asphalt covered and waterproofed deck

Net Asset Salvage Value (NASV)

The current NASV of an asset is equal to its original dollar value minus the estimated cost of rehabilitating the asset back to its original condition. NASV changes continually with time, diminishing in step with the continued deterioration of the asset. It is important to recognize that whether a component such as a bridge deck is replaced or fully repaired it will still be reset to its full Asset Value Contribution. Recognition of the difference in longevity of the two startegies will be revealed by the subesquent behaviour of the post-rehabilitation performance curve. Expressed as a percentage it forms the rationale for the overall Condition Index of the asset.

Owner

An agency having jurisdiction and control over the bridge.

Performance Curve

A plot of Condition Index over time. The vertical scale represents Condition Index from 0 to 100, the horizontal scale represents time in years. The plot will reflect the Condition Index of the Asset since original construction to the present and from the present to the end of the analysis period. The impact of rehabilitative work (already carried out since construction as well as that planned for the future) will be reflected in the curve as will the anticipated subsequent performance of that Rehabilitation.

Person

An individual, board, commission, partnership or corporation, including a municipal corporation, and employees, agents, successors and assigns of any of them.

Plans

All drawings, descriptions and specifications, being parts of the contract, and all drawings and descriptions produced by the constructor for the erection of a bridge or structure, and all revisions thereto.

Portal Bracing

Overhead bracing at the ends of a through truss or arch and provides lateral stability and shear transfer between trusses.

Primary Components

The main load carrying components of the structure.

Primary Element

The elemental equivalent of the component it comprises. For example, an Abutment consists of the elements, Wngwalls, Abutment Wall, Ballast Wall, Bearings. It also has an element called "Abutment". This element is needed so that costing (which is carried out at the element level) can account for replacement of the entire component. This element is referred to as the Primary Element.

Rehabilitation

Any modification, alteration, retrofitting or improvement to a structure sub-system or to the structure which is aimed at correcting existing defects or deficiencies. May involve repair of exisiting elements or complete replacement.

Repair

Any modification, alteration, retrofitting or improvement to a component of the structure which is aimed at correcting existing defects or deficiencies.

Replacement Cost

Replacement Cost is the expenditure required to build, on a new site, or replace at an existing site, a bridge that meets all present and projected requirements of the site, community and current codes.

Replacement Value

Traditionally, Replacement Value refers to the cost in today's dollars for the identical replacement of an existing bridge. In other words, it is the value of the existing installation.

Retaining Wall

Any structure that holds back fill and is not connected to a bridge.

Secondary Components

Any component which helps to distribute loads to primary components, or carries wind loads, or stabilizes primary components.

Severe

Exposed and element not protected e.g. Exposed concrete deck, Barrier Wall

Sign Support

A metal, concrete or timber structure, including supporting brackets, service walks and mechanical devices where present, which support a luminaire, sign or traffic signal and which span or extend over a highway.

Span

The horizontal distance between adjacent supports of the superstructure of a bridge, or the longest horizontal dimension of the cross-section of a culvert or tunnel taken perpendicular to the walls.

Stringers

Stringers span between floor beams and provide the support for the deck above.

Structure

Bridge, culvert, tunnel, retaining wall or sign support.

Suspected Performance Deficiency

A Suspected Performance Deficiency should be recorded during an inspection, if an element's ability to perform its intended function is in question, and one or more performance defects exist.

Sway Bracing

Vertical bracing spanning between through trusses or arches, or outside of half-through trusses or arches and providing lateral stability and shear transfer between the trusses or arches.

Tunnel

Any bridge that is constructed through existing ground, and is used to convey highway or railway traffic through it.

Utility

Refers to a local utility such as hydro, gas, telephone etc. not part of the structure itself but rather utilizing it to provide passage. Typically carried between girders or hanging from the underside of the deck. Of significance only because the integrity of its connection to the structure impacts public safety.

Verticals

Components which span between the top and bottom chords of a truss or arch in the vertical direction.

Whisker Graphs

Simple frequency distribution charts that are intended, at a glance, to convey a comparative reference. They are shown on the Structure Summary to give the reader an immediatesense of how the bridge compares to the rest of the network based on various criteria.