Biennial Inspection Report

Mississauga Road Over Loyalist Creek Culvert

Asset ID: 017000

June 26, 2025

Loc: 4821306N 17608963E



Prepared By: Engineered Management Systems Inc.

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MISSISSAUGA

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Limitations

Data presented in this report reflects our assessment of value, condition, needs and their associated cost as per the date of inspection.

Recommendations and cost estimates are 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 Canadian Highway Bridge Design Code.

Urgencies

Throughout this report the reader will see reference to the term "Urgencies". These are 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 included as a requirement of the OSIM guidelines. We also apply a similar evaluation called Remaining Service Life. It adds flexiblity providing more than one time frame depending on the agency's in-house capabilities to carry out basic maintenance of their inventory. RSL's should not dictate the management process but should be heeded as points beyond which certain issues must be addressed during scheduling.

Respectfully Submitted:



engineered management systems inc.



Structure Summary

017000 - Mississauga Road Over Loyalist Creek Culvert





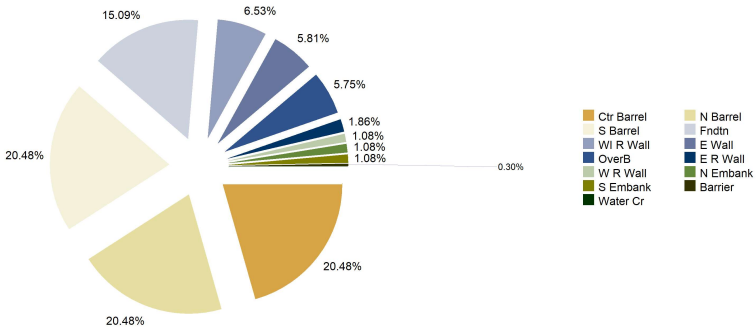


Type	PC_Culvert	Replacement Cost	$1,670,000
Year Built	1987	Rehabilitative Needs	$297,000
Last Rehabilitated	N/A	NASVI	82.2
Last Inspection	Jun 26, 2025	DCI	1
GPS East	17608963	AADT	10900
GPS North	4821306	BCI	63
Number of Spans	3	BSI	57

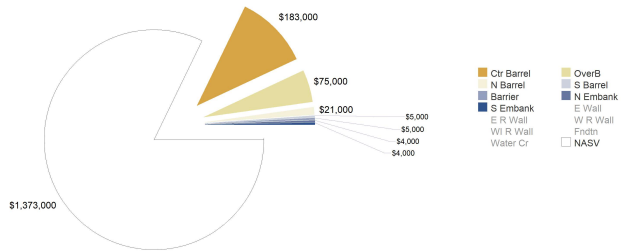
Location:
Mississauga Road 1km South of Dundas Street West

The major concerns at this site are severe to very severe spalling and delamination of the deck underside posing an overhead safety hazard and wet areas and heavy leakage present on the interior surface accelerating concrete deterioration (in the past few years it has been an increase of the heavy leakage and waterproofing is required). The overburden is less than 80cm and the deck should be treated similar to a bridge deck (repair of the interior surface is required). Besides waterproofing we suggested at this time partial repair of the top surface of the deck (approximated surface); however, even an additional concrete slab cast over the existing deck may be necessary. Also of concern is the east fence exhibiting collision damage which may pose a safety hazard. We noted medium aggradation along the south end and through the south cell. Heavy vegetation around the structure should be removed.

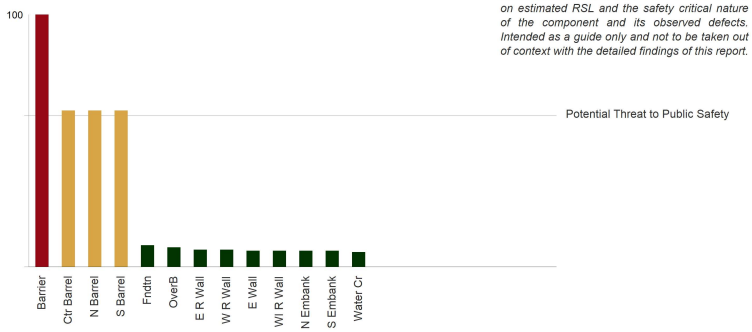
Distribution of $1,670,000 Replacement Value



Distribution of $297,000 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	148 / 364
Rehabilitative Needs	68 / 364
NASVI	286 / 364
Est. 10 Year Deferral Cost	19 / 364
AADT	145 / 364







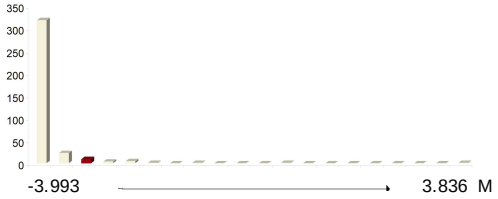




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1. Narrative

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 2023. The inspection was carried out on Thursday, June 26, 2025 by Mugurel Serban under the direction of M. Wallrap P. Eng. At the time of inspection it was overcast with temperatures between 15 and 20 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 Mississauga Road Over Loyalist Creek culvert was built in 1987. The structure has a South-North orientation and is located on Mississauga Road 1 km South of Dundas Street West in the City of Mississauga. This Pre-Cast Concrete Culvert carries 2 lanes of predominantly vehicular traffic across the Loyalist Creek in 3 continuous spans with a total crossing length of 12.9m and a maximum clearance of 2.2m. The deck has a travel width of 10m and an overall width of 24.3m.

With an AADT of 10,900 the crossing is heavily used with truck volumes accounting for 10 to 25% of the total traffic. The speed limit at this location is 50 km/hr. There is no load limit posted at this site. There is no record of rehabilitation for this structure. This is not considered a heritage structure. The total estimated replacement value is $1,670,000.

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 comprising the structure can be found in the detailed forms in Section 7.7 - Element Data.

The Mississauga Road Over Loyalist Creek culvert is comprised of the following components:

1.3.1 Over Burden

The soil over burden has an estimated mass of 690 tonnes. The estimated remaining service life in its current condition is at least 20 years. No significant defects were noted, however, the entire component is recommended to undergo ancillary replacement during the next major rehabilitation.

1.3.2 End Wall

No significant defects were noted.

1. Narrative (cont.)

1.3.3 Centre Barrel

The precast concrete barrel has an estimated mass of 153 tonnes. An estimated 10% of the steel railing barrier exhibits severe deterioration. Maintenance work is required immediately to extend the service life of the barrel. There is no estimated service life remaining in its current condition.

The interior surface has an area of 197 square metres. An estimated 15 square metres exhibit heavy moisture penetration although no immediate rehabilitative action is required.

The exterior surface has an area of 435 square metres. The entire element exhibits heavy moisture penetration requiring waterproofing installation.

The interior surface (damaged area) has an area of 197 square metres. An estimated 1 square metre exhibit very severe spalling requiring deep repair.

The exterior surface (top) has an area of 435 square metres. A significant portion of the element exhibits heavy contamination requiring deep repair.

The interior surface (damaged) has an area of 197 square metres. An estimated 3 square metres exhibit very severe delamination requiring deep repair.

1.3.4 North Barrel

The precast concrete barrel has an estimated mass of 153 tonnes. An estimated 4% of the steel railing barrier exhibits severe deterioration. Maintenance work is required immediately to extend the service life of the barrel. There is no estimated service life remaining in its current condition.

The interior surface (damaged) has an area of 197 square metres. An estimated 3 square metres exhibit very severe delamination requiring deep repair.

An estimated 15 square metres exhibit heavy moisture penetration although no immediate rehabilitative action is required.

An estimated 1 square metre exhibit very severe spalling requiring deep repair.

1.3.5 South Barrel

The precast concrete barrel has an estimated mass of 153 tonnes. An estimated 1% of the steel railing barrier exhibits severe deterioration. Maintenance work is required immediately to extend the service life of the barrel. There is no estimated service life remaining in its current condition.

The interior surface (damaged) has an area of 197 square metres. An estimated 1 square metre exhibit very severe delamination requiring deep repair.

An estimated 10 square metres exhibit heavy moisture penetration although no immediate rehabilitative action is required.

1.3.6 Barrier

An estimated 10% of the steel railing barrier exhibits severe deterioration. Maintenance work is required immediately to extend the service life of the barrier. There is no estimated service life remaining in its current condition. The entire component is recommended to undergo ancillary replacement during the next major rehabilitation.

The railing system has a length of 49.6 metres. A significant portion of the element exhibits severe collision damage.

1. Narrative (cont.)

1.3.7 East Retaining Wall

The gabions gravity retaining wall has an estimated mass of 197 tonnes. An estimated 25% of the steel railing barrier exhibits slight bulging although no immediate rehabilitative action is required. The estimated remaining service life in its current condition is 15 years.

The vertical surface has an area of 87.5 square metres. A significant portion of the element exhibits light settlement although no immediate rehabilitative action is required.

1.3.8 West Retaining Wall

The gabions north gravity retaining wall has an estimated mass of 96.1 tonnes. An estimated 50% of the steel railing barrier exhibits slight bulging although no immediate rehabilitative action is required. The estimated remaining service life in its current condition is 15 years.

The north vertical surface has an area of 42.7 square metres. Most of the element exhibits light settlement although no immediate rehabilitative action is required.

1.3.9 West Intermediate Retaining Wall

No significant defects were noted.

1.3.10 North Embankment

No significant defects were noted.

1.3.11 South Embankment

No significant defects were noted.

1.3.12 Foundation

No significant defects were noted.

1.3.13 Watercourse

The natural bottom has a surface area of 270 square metres. A significant portion of the element exhibits medium aggradation although no immediate rehabilitative action is required.

The uncontrolled upstream section has a surface area of 61 square metres. A significant portion of the element exhibits medium aggradation although no immediate rehabilitative action is required.

The uncontrolled downstream section has a surface area of 61 square metres. A significant portion of the element exhibits medium aggradation although no immediate rehabilitative action is required.

1. Narrative (cont.)

1.4 Conclusions and Further Investigation

Overall the structure is in fair condition with a Net Asset Salvage Value Index (NASVI) of 82.2. The calculated Bridge Condition Index (BCI) is 63 and the Bridge Sufficiency Index (BSI) is 57. For more information on how these indices are calculated please refer to the glossary at the end of this report. The major concerns at this site are severe to very severe spalling and delamination of the deck underside posing an overhead safety hazard and wet areas and heavy leakage present on the interior surface accelerating concrete deterioration (in the past few years it has been an increase of the heavy leakage and waterproofing is required). The overburden is less than 80cm and the deck should be treated similar to a bridge deck (repair of the interior surface is required). Besides waterproofing we suggested at this time partial repair of the top surface of the deck (approximated surface); however, even an additional concrete slab cast over the existing deck may be necessary. Also of concern is the east fence exhibiting collision damage which may pose a safety hazard. We noted medium aggradation along the south end and through the south cell. Heavy vegetation around the structure should be removed.

1.4.1 Rehabilitative

The following summarizes the rehabilitative needs of the structure:

Over Burden
Ancillary Reinstallation

South Barrel - Interior Surface - (Damaged)
Deep Repair

North Barrel - Interior Surface - (Damaged)
Deep Repair

North Barrel - Interior Surface - (Damaged Area)
Deep Repair

Centre Barrel - Exterior Surface
Apply Waterproofing

Centre Barrel - Interior Surface - (Damaged Area)
Deep Repair

Centre Barrel - Exterior Surface - (Top)
Deep Repair

Centre Barrel - Interior Surface - (Damaged)
Deep Repair

Barrier
Ancillary Replacement

South Embankment - Slope Protection
Ancillary Restoration

North Embankment - Slope Protection
Ancillary Restoration

1. Narrative (cont.)

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.

South Barrel - Interior Surface
Remove Loose Concrete

North Barrel - Interior Surface
Remove Loose Concrete

Centre Barrel - Interior Surface
Remove Loose Concrete

Barrier - Railing System
Repair

Watercourse - Bottom
Clear Aggradation

Watercourse - Upstream Section
Clear Aggradation

Watercourse - Downstream Section
Clear Aggradation

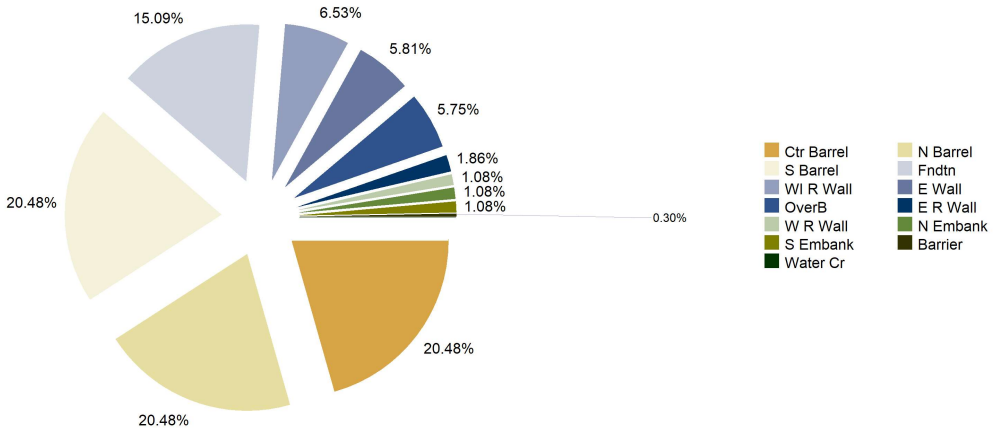
1.4.4 Further Investigation

The next biennial inspection should be scheduled no later than June, 2027. No further investigation is recommended at this time.

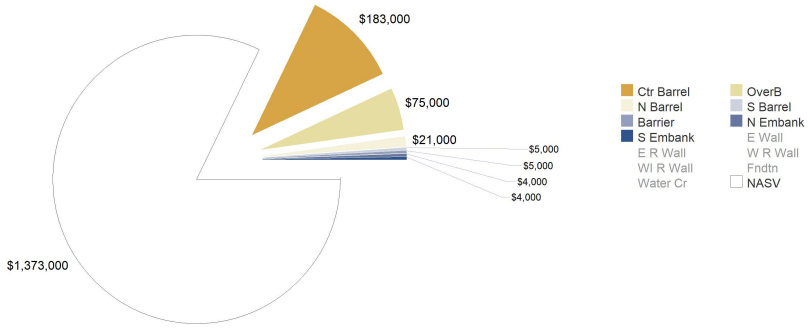
1. Narrative (cont.)

1.5 Statistical Summary

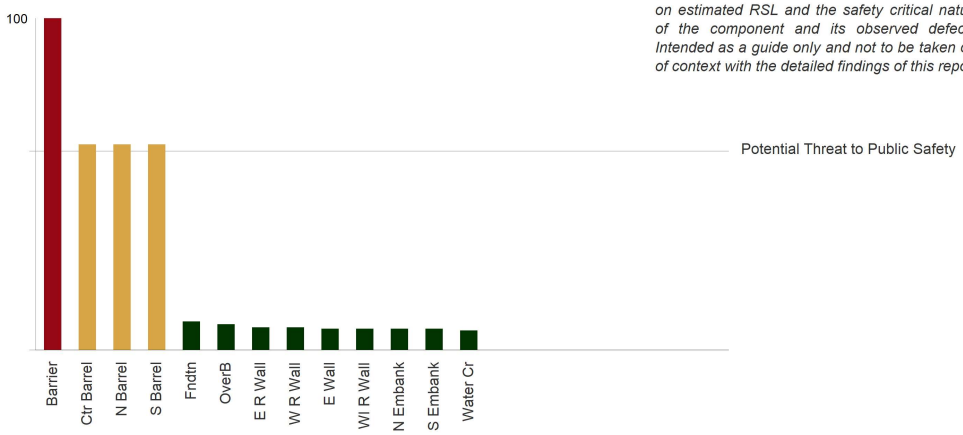
Distribution of $1,670,000 Replacement Value



Distribution of $297,000 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 Assuming all Maintenance Work is Completed						
	Replacement	1	2	Maint.	Pre-Emp	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
Over Burden	$96,000	20	20					$75,000		
End Wall	$97,000	20	20							
Centre Barrel	$342,000	0	2	$1,771				$183,000		
North Barrel	$342,000	0	5	$1,771				$21,000		
South Barrel	$342,000	0	10	$1,771				$5,000		
Barrier	$5,000	0	20	$300				$5,000		
East Retaining Wall	$31,000	15	15							
West Retaining Wall	$18,000	15	15							
West Intermediate Retaining Wall	$109,000	20	20							
North Embankment	$18,000	20	20					$4,000		
South Embankment	$18,000	20	20					$4,000		
Foundation	$252,000	20	20							
Watercourse		10	10	$2,939						
Totals and Minimums	$1,670,000	0	2	$8,552	$0	$0	$0	$297,000	$0	$0

Total Estimated Rehabilitative Cost:	$297,000
Contingency:	$0
Provisional Allowance:	$0
Total Potential Project Cost:	$297,000

3. Element Summary

		RSL		Urgency of Rehabilitative Needs Assuming all Maintenance Work is Completed						
	Focus	1	2	Maint.	Pre-Emp.	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
Over Burden	All	20	20					$75,000		
End Wall	All	20	20							
Inlet	All	20	20							
Outlet	All	20	20							
South Barrel	All	0	10							
Interior Surface	Damaged	0	10	$1,771				$5,000		
Interior Surface	All	10	10							
North Barrel	All	0	5							
Interior Surface	Damaged	0	5	$1,771				$16,000		
Interior Surface	All	10	10							
Interior Surface	Damaged Area	1	5					$5,000		
Centre Barrel	All	0	2							
Interior Surface	All	10	10							
Exterior Surface	All	2	2					$88,000		
Interior Surface	Damaged Area	1	5					$5,000		
Exterior Surface	Top	2	2					$74,000		
Interior Surface	Damaged	0	5	$1,771				$16,000		
Barrier	All	0	20					$5,000		
Railing System	All	0	20	$300						
East Retaining Wall	All	15	15							
Vertical Surface	All	15	15							
West Retaining Wall - North	All	15	15							
North Vertical Surface	All	15	15							
West Intermediate Retaining Wall - South	All	20	20							
South Vertical Surface	All	20	20							
South Embankment	All	20	20							
Slope Protection	All	20	20					$4,000		
North Embankment	All	20	20							
Slope Protection	All	20	20					$4,000		
Foundation	All	20	20							

3. Element Summary (cont.)

		RSL		Urgency of Rehabilitative Needs Assuming all Maintenance Work is Completed						
	Focus	1	2	Maint.	Pre-Emp.	Urgent	< 1 year	1 - 5years	6 - 10 years	None\>10 yrs
Watercourse	All	10	10							
Bottom	All	10	10	$2,023						
Upstream Section	All	15	15	$458						
Downstream Section	All	15	15	$458						
Totals and Minimums		0	2	$8,552	$0	$0	$0	$297,000	$0	$0

Total Estimated Rehabilitative Cost:	$297,000
Contingency:	$0
Provisional Allowance:	$0
Total Potential Project Cost:	$297,000

4. Critical Maintenance Summary

South Barrel - Interior Surface - Damaged

Observed Defect: Very Severe Delamination
Suggested Maintenance: Remove Loose Concrete Service Life Recovery: 10 Yrs
Element Comment: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck).




North Barrel - Interior Surface - Damaged

Observed Defect: Very Severe Delamination
Suggested Maintenance: Remove Loose Concrete Service Life Recovery: 5 Yrs
Element Comment: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck).



North Barrel - Interior Surface - Damaged Area

Observed Defect: Very Severe Spalling
Suggested Maintenance: Monitor Service Life Recovery: 4 Yrs
Element Comment: We noted isolated very severe spalling of the deck underside resulting in loss of section.



Centre Barrel - Interior Surface - Damaged Area

Observed Defect: Very Severe Spalling
Suggested Maintenance: Monitor Service Life Recovery: 4 Yrs
Element Comment: We noted isolated very severe spalling of the deck underside resulting in loss of section.



4. Critical Maintenance Summary (cont.)

Centre Barrel - Interior Surface - Damaged

Observed Defect: Very Severe Delamination
Suggested Maintenance: Remove Loose Concrete Service Life Recovery: 5 Yrs
Element Comment: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck).




Barrier - Railing System

Observed Defect: Severe Collision Damage
Suggested Maintenance: Repair Service Life Recovery: 20 Yrs
Element Comment: The east fence exhibits collision damage and may pose a safety hazard.




5. General Maintenance Summary

Watercourse - Bottom

Observed Defect: Medium Aggradation
Suggested Maintenance: Clear Aggradation
Element Comment: We noted medium aggradation inside the south cell.





Watercourse - Upstream Section

Observed Defect: Medium Aggradation
Suggested Maintenance: Clear Aggradation
Element Comment: We noted medium aggradation along the south end.




Watercourse - Downstream Section

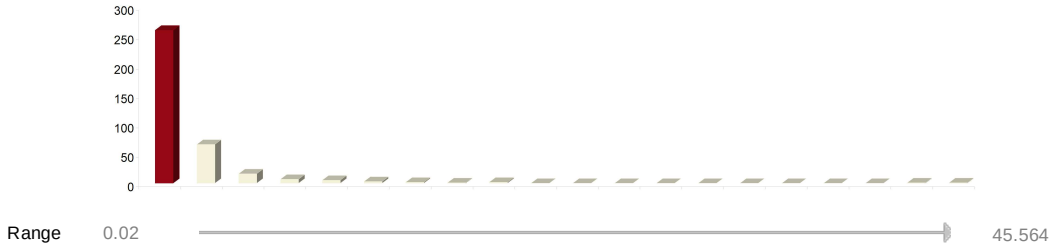
Observed Defect: Medium Aggradation
Suggested Maintenance: Clear Aggradation
Element Comment: We noted medium aggradation along the south end.




6. Ranking Summary

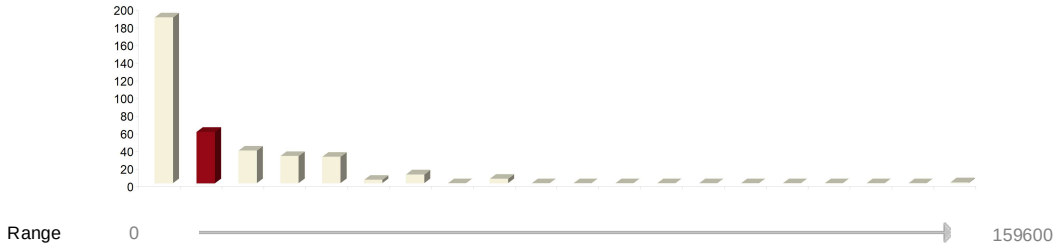
Replacement Value (millions)

This Structure: $1,670,000 Rank: 148 / 364



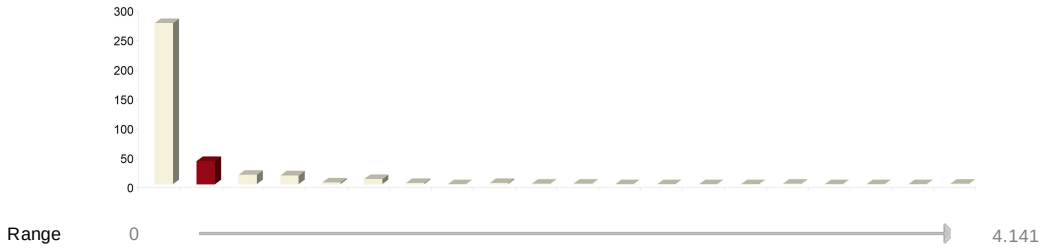
AADT

This Structure: 10900 Rank: 145 / 364



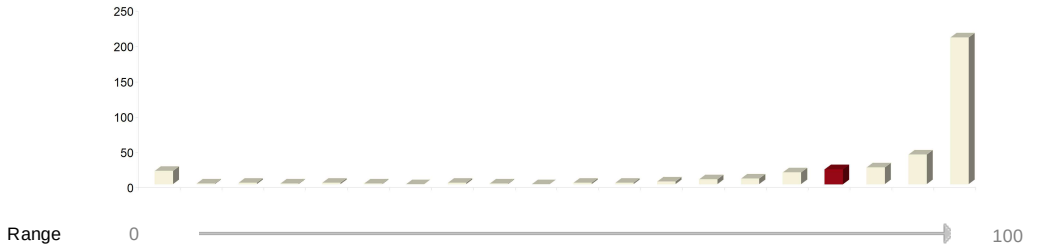
Rehabilitative Needs (millions)

This Structure: $297,000 Rank: 68 / 364



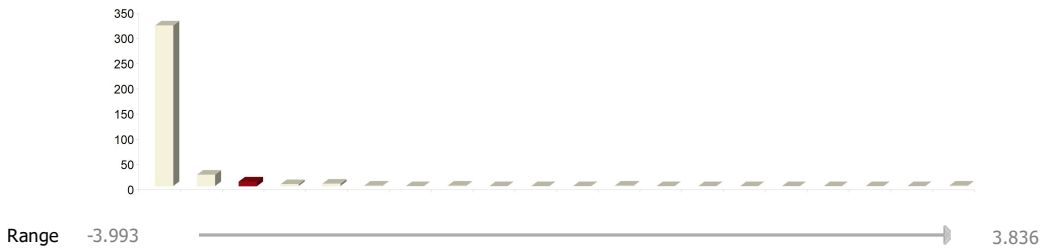
Condition Index

This Structure: 82.2 Rank: 286 / 364



Est. 10 Year Deferral Cost (millions)

This Structure: Rank: 19 / 364



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.

7. OSIM Reporting

7.1 Inventory Data

Structure Name	Mississauga Road Over Loyalist Creek		Site Number	017000	
Main Hwy/Road #	Unknown On ☑ Under ☐		Crossing Type:	Navigable Water ☐ Non-Navig. Water ☑	
Hwy/Road Name	Mississauga Road			Rail ☐ Road ☐ Ped. ☐ Other ☐	
Structure Location	NA Park - NA				
Latitude	4821306		Longitude	17608963	
Owner(s)	City of Mississauga		Heritage Designation:	Not Cons. ☑ Cons./Not App. ☐ List/Not Desig. ☐ Desig./Not List ☐ Desig. & List ☐	
MTO Region	Central		Road Class:	Freeway ☐ Arterial ☐ Collector ☑ Local ☐	
MTO District	Central		Posted Speed	50	No. of Lanes 2
Old County	Unknown		AADT	10900	No. of Trucks 10
Geographic Twp.	City of Mississauga		Inspection Route Sequence	Unknown	
Structure Type	Culvert		Interchange Number	Unknown	
Total Deck Length	12.9	(m)	Interchange Structure Number	Unknown	
Overall Str. Width	24.3	(m)	Minimum Vertical Clearance	2	(m)
Total Deck Area	313.47	(sq.m)	Special Routes:	Transit ☑ Truck ☐ School ☐ Bicycle ☐	
			Special Routes Details:	None	
Roadway Width	10	(m)	Detour Length Around Bridge	3	(km)
Skew Angle	0	(Degrees)	Direction of Structure	South-North	
No. of Spans	3		Fill on Structure	0.8	(m)
Span Lengths	3.7, 3.7, 3.7				(m)

7.2 Historical Data

Year Built	1987	Year of Last Major Rehab.	1987
Last OSIM Inspection	2023	Last Evaluation	Unknown
Last Enhanced OSIM Inspection	Unknown	Current Load Limit	None (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	None		

7. OSIM Reporting (cont.)

7.3 Scheduled Improvements

Regional Priority Number

Programmed Work Year

Nature of Program Work

7.4 Appraisal Indices

	Comments
Fatigue	
Seismic	
Scour	
Flood	
Geometrics	
Barrier	
Curb	
Load Capacity	

7. OSIM Reporting (cont.)

7.5 Field Inspection Information

Date of Inspection	June-26-25	Type of Inspection	☑ OSIM ☐ Enhanced OSIM
Inspector	Mugurel Serban		
Others in Party	None		
All Equipment Used	, Camera, GPS		
Weather	Overcast		
Temperature	15 to 20 C		

7.6 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 June, 2027 **Total Est. Cost**

The major concerns at this site are severe to very severe spalling and delamination of the deck underside posing an overhead safety hazard and wet areas and heavy leakage present on the interior surface accelerating concrete deterioration (in the past few years it has been an increase of the heavy leakage and waterproofing is required). The overburden is less than 80cm and the deck should be treated similar to a bridge deck (repair of the interior surface is required). Besides waterproofing we suggested at this time partial repair of the top surface of the deck (approximated surface); however, even an additional concrete slab cast over the existing deck may be necessary. Also of concern is the east fence exhibiting collision damage which may pose a safety hazard. We noted medium aggradation along the south end and through the south cell. Heavy vegetation around the structure should be removed.

Suspected Performance Deficiencies

00	None	Load carrying	05	Seized bearings	Bearing not	11	Drainage	Slippery
01	capacity		06	uniformly loaded/unstable		12	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	
			10	Surface ponding		16	Other	

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	Baileybridges - Maintenance	16	Bridge Deck Drainage		
05	Bridge Deck Joint Repair	11	Animal/Pest Control	17	Remove Loose OverHead Material	Other	

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

7. OSIM Reporting (cont.)

7.7 Element Data

7.7.1 Over Burden - Over Burden

Element Group:	Over Burden	Length:	12.9
Element Name:	Over Burden	Width:	24.3
Location:	Single Element	Height:	0.8
Material:	Soil	Count:	1
Element Type:	Primary Element	Total Quantity:	1
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	N/A	0	1	0	0	00	00

Comments: Previously mentioned issue has been addressed.

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

Recommended Work : Ancillary Reinstallation



Top Side.



West End.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.2 End Wall - End Wall

Element Group:	End Wall	Length:	N/A
Element Name:	End Wall	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Cast-In-Place Concrete	Count:	N/A
Element Type:	Primary Element	Total Quantity:	68.4
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	68.4	0	0	00	00

Comments: None.

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

Recommended Work : None



East Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.3 End Wall - Inlet

Element Group:	End Wall	Length:	N/A
Element Name:	Inlet	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Cast-In-Place Concrete	Count:	1
Element Type:	Any	Total Quantity:	28.5
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	28.5	0	0	00	00

Comments: None.

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

Recommended Work : None



West Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.4 End Wall - Outlet

Element Group:	End Wall	Length:	N/A
Element Name:	Outlet	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Cast-In-Place Concrete	Count:	1
Element Type:	Any	Total Quantity:	28.5
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	28.5	0	0	00	00

Comments: None.

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

Recommended Work : None



East Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.5 South Barrel - Barrel

Element Group:	South Barrel	Length:	N/A
Element Name:	Barrel	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Precast Concrete	Count:	N/A
Element Type:	Primary Element	Total Quantity:	152.7
Environment:	Moderate	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	120.63	30.54	1.53	16	08

Comments: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck) and wet areas and heavy leakage between the precast concrete sections.

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

Recommended Work : Defer to Element Level



West Elevation.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.6 South Barrel - Interior Surface

Element Group:	South Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	155.47	39.36	1.97	16	08

Comments: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck).

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

Recommended Work : Deep Repair



Underside Surface. Showing isolated very severe delamination.



Underside Surface. Showing very severe delamination.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.7 South Barrel - Interior Surface

Element Group:	South Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	127.92	59.04	9.84	00	08

Comments: We noted wet areas and heavy leakage between the precast concrete sections.

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

Recommended Work : None



Interior Surface. Showing leakage. 2023



Interior View.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.8 North Barrel - Barrel

Element Group:	North Barrel	Length:	N/A
Element Name:	Barrel	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Precast Concrete	Count:	N/A
Element Type:	Primary Element	Total Quantity:	152.7
Environment:	Moderate	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	108.42	38.17	6.11	16	08

Comments: We noted isolated severe to very severe spalling and delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck) and wet areas and heavy leakage between the precast concrete sections.

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

Recommended Work : Defer to Element Level



East Elevation.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.9 North Barrel - Interior Surface

Element Group:	North Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	139.73	53.14	3.94	16	08

Comments: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck).

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

Recommended Work : Deep Repair



Underside Surface. Showing very severe delamination.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.10 North Barrel - Interior Surface

Element Group:	North Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	104.3	76.75	15.74	00	08

Comments: We noted wet areas and heavy leakage between the precast concrete sections.

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

Recommended Work : None



Underside Surface. Showing heavy leakage. 2023



Interior View. Showing heavy leakage.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.11 North Barrel - Interior Surface

Element Group:	North Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	155.47	39.36	1.97	16	08

Comments: We noted isolated very severe spalling of the deck underside resulting in loss of section.

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

Recommended Work : Deep Repair



Underside Surface. Showing very severe spalling.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.12 Centre Barrel - Barrel

Element Group:	Centre Barrel	Length:	N/A
Element Name:	Barrel	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Precast Concrete	Count:	N/A
Element Type:	Primary Element	Total Quantity:	152.7
Environment:	Moderate	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	99.26	38.17	15.27	16	08

Comments: We noted isolated severe to very severe spalling and delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck) and wet areas and heavy leakage between the precast concrete sections.

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

Recommended Work : Defer to Element Level



West Elevation.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.13 Centre Barrel - Interior Surface

Element Group:	Centre Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	110.21	70.85	15.74	00	08

Comments: We noted wet areas and heavy leakage between the precast concrete sections.

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

Recommended Work : None



Interior View . Showing leakage.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.14 Centre Barrel - Exterior Surface

Element Group:	Centre Barrel	Length:	12.9
Element Name:	Exterior Surface	Width:	24.3
Location:	Single Element	Height:	2.5
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	435
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	0	0	435	16	08

Comments: We noted heavy leakage accelerating concrete deterioration (exterior surface is calculated to cover waterproofing for all three cells). In the past few years it has been an increase of the heavy leakage and waterproofing is required.

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

Recommended Work : Apply Waterproofing



Interior Surface. Showing heavy leakage.



West Elevation.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.15 Centre Barrel - Interior Surface

Element Group:	Centre Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	145.63	49.2	1.97	16	08

Comments: We noted isolated very severe spalling of the deck underside resulting in loss of section.

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

Recommended Work : Deep Repair



Underside Surface. Showing very severe spalling.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.16 Centre Barrel - Exterior Surface

Element Group:	Centre Barrel	Length:	12.9
Element Name:	Exterior Surface	Width:	24.3
Location:	Single Element	Height:	2.5
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	435
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	217.5	108.75	108.75	00	08

Comments: Due to heavy leakage concrete deterioration accelerates (we noted severe to very severe spalling and delamination of the deck underside). Besides waterproofing we added partial repair of the top surface of the deck (approximated surface). The height of overburden is less than 0.8m and the deck should be treated similar to a bridge deck (an additional concrete slab may be required).

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

Recommended Work : Deep Repair



Top Side.



Underside Surface. Showing heavy leakage.



Underside Surface. Showing very severe delamination.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.17 Centre Barrel - Interior Surface

Element Group:	Centre Barrel	Length:	3.7
Element Name:	Interior Surface	Width:	24.3
Location:	Single Element	Height:	2.2
Material:	Precast Concrete	Count:	1
Element Type:	Any	Total Quantity:	196.8
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	139.73	53.14	3.94	16	08

Comments: We noted isolated severe to very severe delamination of the deck underside posing an overhead safety hazard (the overburden is less than 80cm and the deck should be treated similar to a bridge deck).

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

Recommended Work : Deep Repair



Underside Surface. Showing very severe delamination.



Underside Surface. Showing very severe delamination.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.18 Barrier - Barrier

Element Group:	Barrier	Length:	N/A
Element Name:	Barrier	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Steel	Count:	N/A
Element Type:	Railing	Total Quantity:	1
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	0.7	0.2	0.1	16	18

Comments: The east fence exhibits collision damage and may pose a safety hazard.

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

Recommended Work : Ancillary Replacement



East Side.



West Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.19 Barrier - Railing System

Element Group:	Barrier	Length:	24.8
Element Name:	Railing System	Width:	N/A
Location:	Single Element	Height:	1.3
Material:	Steel	Count:	2
Element Type:	Any	Total Quantity:	49.6
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m	0	34.72	9.92	4.96	16	03

Comments: The east fence exhibits collision damage and may pose a safety hazard.

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

Recommended Work : See Primary Element



East Side. Showing severe deterioration.



East Side. Showing severe deterioration.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.20 East Retaining Wall - Retaining Wall

Element Group:	East Retaining Wall	Length:	N/A
Element Name:	Retaining Wall	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Gabions	Count:	N/A
Element Type:	Gravity	Total Quantity:	196.875
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	196.88	0	0	00	00

Comments: We noted slight settlement and bulging of the northeast gabion.

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

Recommended Work : None



Southeast Side. 2023



Northeast Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.21 East Retaining Wall - Vertical Surface

Element Group:	East Retaining Wall	Length:	12.2
Element Name:	Vertical Surface	Width:	N/A
Location:	Single Element	Height:	3.5
Material:	Gabions	Count:	2
Element Type:	Any	Total Quantity:	87.5
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	87.5	0	0	00	00

Comments: We noted slight settlement and bulging of the northeast gabion.

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

Recommended Work : None



North Side. Showing light settlement.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.22 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:	Gabions	Count:	N/A
Element Type:	Gravity	Total Quantity:	96.075
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	96.08	0	0	00	00

Comments: We noted slight settlement and bulging of the northwest gabion. Inspection was limited due to heavy vegetation.

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

Recommended Work : None



Northwest Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.23 West Retaining Wall - North Vertical Surface

Element Group:	West Retaining Wall	Length:	12.2
Element Name:	North Vertical Surface	Width:	N/A
Location:	North	Height:	3.5
Material:	Gabions	Count:	1
Element Type:	Any	Total Quantity:	42.7
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	42.7	0	0	00	00

Comments: We noted slight settlement and bulging of the northwest gabion.

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

Recommended Work : None



Northwest Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.24 West Intermediate Retaining Wall - SouthRetaining Wall

Element Group:	West Intermediate Retaining Wall	Length:	N/A
Element Name:	SouthRetaining Wall	Width:	N/A
Location:	South	Height:	N/A
Material:	Composite	Count:	N/A
Element Type:	Gravity	Total Quantity:	57.6
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	tonnes	0	57.6	0	0	00	00

Comments: None.

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

Recommended Work : None



Southw est Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.25 West Intermediate Retaining Wall - South Vertical Surface

Element Group:	West Intermediate Retaining Wall	Length:	6
Element Name:	South Vertical Surface	Width:	N/A
Location:	South	Height:	3.2
Material:	Composite	Count:	1
Element Type:	Any	Total Quantity:	19.2
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	19.2	0	0	00	00

Comments: None.

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

Recommended Work : None



Southw est Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.26 South Embankment - Embankment

Element Group:	South Embankment	Length:	N/A
Element Name:	Embankment	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Soil	Count:	2
Element Type:	Primary Element	Total Quantity:	2
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

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

Comments: None.

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

Recommended Work : Defer to Element Level



Southwest Side. 2021



Southeast Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.27 South Embankment - Slope Protection

Element Group:	South Embankment	Length:	N/A
Element Name:	Slope Protection	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Foliation	Count:	2
Element Type:	Any	Total Quantity:	2
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

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

Comments: None.

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

Recommended Work : Ancillary Restoration



Southeast Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.28 North Embankment - Embankment

Element Group:	North Embankment	Length:	N/A
Element Name:	Embankment	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Soil	Count:	2
Element Type:	Primary Element	Total Quantity:	2
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

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

Comments: None.

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

Recommended Work : Defer to Element Level



Northeast Side. 2023



Northwest Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.29 North Embankment - Slope Protection

Element Group:	North Embankment	Length:	N/A
Element Name:	Slope Protection	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Foliation	Count:	2
Element Type:	Any	Total Quantity:	2
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

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

Comments: None.

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

Recommended Work : Ancillary Restoration



Northwest Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.30 Foundation - Foundation

Element Group:	Foundation	Length:	N/A
Element Name:	Foundation	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Compacted Fill	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	1	0	0	00	00

Comments: None.

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

Recommended Work : None



West Elevation.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.31 Watercourse - Watercourse

Element Group:	Watercourse	Length:	N/A
Element Name:	Watercourse	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	Any	Count:	3
Element Type:	Straight	Total Quantity:	3
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	all	0	2.1	0.9	0	13	02

Comments: We noted medium aggradation along the south end and through the south cell.

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

Recommended Work : None



Interior View .

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.32 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:	269.73
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	188.81	80.92	0	13	02

Comments: We noted medium aggradation inside the south cell.

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

Recommended Work : None



Interior View . 2021



North Side.



South Side. Showing debris accumulation.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.33 Watercourse - Upstream Section

Element Group:	Watercourse	Length:	N/A
Element Name:	Upstream Section	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	RipRap	Count:	N/A
Element Type:	Uncontrolled	Total Quantity:	61
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	48.8	12.2	0	00	02

Comments: We noted medium aggradation along the south end.

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

Recommended Work : None



West End. Showing debris accumulation.



West Side.

7. OSIM Reporting (cont.)

7.7 Element Data (cont.)

7.7.34 Watercourse - Downstream Section

Element Group:	Watercourse	Length:	N/A
Element Name:	Downstream Section	Width:	N/A
Location:	Single Element	Height:	N/A
Material:	RipRap	Count:	N/A
Element Type:	Uncontrolled	Total Quantity:	61
Environment:	Severe	Limited Inspection	☑
Protection System:	None		

Condition Data:	Units	Exc.	Good	Fair	Poor	Performance Deficiencies	Maintenance Needs
	m2	0	45.75	15.25	0	00	02

Comments: We noted medium aggradation along the south end.

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

Recommended Work : None



East Side. 2021



Southeast Side. Showing debris accumulation.

8. 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.

BCI

Bridge Condition Index (0-100). Developed by the Ministry of Transportation Ontario. The BCI attempts to represent an overall condition on a scale of 0 - 100 based on the limited information in a typical OSIM biennial inspection. Replacement costs and rehabilitative needs are calculated based on areas (instead of tonnages or volumes) and only include certain components which are weighted based on condition state. In many cases the BCI will differ substantially from the NASVI calculated in our reports. As an example, a structure that is approaching the end of its design service life and is obviously well beyond economic restoration will have a NASVI of 0. That's not to say it has to be replaced immediately, on the contrary, if the structure can safely carry load it should be kept in service as long as practical to allow other assets with more pressing concerns to be addressed. BCI, on the other hand, may be 60 in this case because 40% of the surface area of certain components are in poor or very poor condition. It does not in itself give an indication of the cost the agency should be prepared for when rehabilitation occurs.

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.

BSI

Bridge Sufficiency Index (0-100). The BSI is essentially a modification of the BCI to reflect functional obsolescence or perceived importance that would pose a significant negative impact if the structure were not in service. In both cases a reduction in BCI is the result making rehabilitation more urgent in a "Condition Index Prioritization" scheme.

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, metalizing, etc.

Component

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

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.

DCI

Deferral Cost Index (1-6). A measure of how the cost of a structures rehabilitation is likely to increase over time in increments of 5 and 10 years. A DCI of 1 is the most aggressive with significant increases expected over the short term (5 years or less). A DCI of 6 is the least aggressive with almost negligible cost escalation predicted over the next 10 years. Inflation is not considered as this applies to all structures more or less equally. Typically, DCI Prioritization is significantly more efficient than BCI Prioritization schemes.

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 at 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 component 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 Replacement 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 strategies will be revealed by the subsequent behaviour of the post-rehabilitation performance model.

Net Asset Salvage Value Index (NASVI)

Calculated as NASV / Replacement Value of the Asset. Expressed from 0 - 100 the NASVI gives an immediate indication of the remaining net worth of the asset.

Owner

An agency having jurisdiction and control over the bridge.

Performance Model

A plot of NASVI over time. The vertical scale represents the Index from 0 to 100, the horizontal scale represents time in years. The plot will reflect the 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 existing 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 immediate sense of how the bridge compares to the rest of the network based on various criteria.