THE TOWNSHIP OF NORTH DUNDAS

DRAFT BRIDGE MANAGEMENT STUDY REPORT
18 BRIDGES / 31 CULVERTS

March 2023

Report Submitted By:

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1.0 INTRODUCTION

The Township of North Dundas (herein referred to as the Township) has retained HP Engineering to perform inspections and develop a bridge management study for 49 structures owned and maintained by the Township.

Each structure in the Township's inventory was visually inspected using the Ministry of Transportation of Ontario's (MTO) Structure Inspection Manual. The data for each structure present visual observations, suggested rehabilitation, further required investigation and budget cost information. Refer to the appendices for individual inspection sheets for bridge and culvert type structures.

The following report summarizes the suggested rehabilitation / replacement costs, engineering investigation costs and replacement values for each structure based on benchmark budget costs.

Appendix A presents summary tables for all structures. The structures are listed in numerical order of structure number, and the rehabilitation / replacement costs (determined from benchmark budget costs) for each structure are based on priority (i.e. Within 1 year, 1-5 Years, 6-10 Years).

2.0 STRUCTURE INSPECTIONS

A total of 49 structures owned and maintained by the Township were visually inspected in accordance with the MTO Structure Inspection Manual. The inspections were performed during the spring and summer of 2021.

For each structure, components were screened for visual signs of deterioration. The components were then given a rating (in MDW) using the MTO extent and severity method, whereby the components are proportioned (in units of m^2, %, m, etc.) based on their observed conditions (excellent, good, fair, poor). This provides quantitative data as to the extent of the observed deterioration for each component. Explanatory statements accompany each of the components' ratings where deemed applicable by the inspector.

MDW entries also provide information regarding suggested engineering investigation and repairs and associated budgetary estimates of expected costs. Suggested engineering investigations are subdivided based on time of need. Repairs and associated budgetary estimates are subdivided based on time of need. The basis of selection for budget costs is further discussed in Section 3.0 of this report.

Photographs of each inspected structure are included with the inspection sheets including a minimum of 2 photographs for each structure (approach and elevation). Additional photographs depicting the details of the structure, observed defects or deterioration have also been included.

3.0 DETERMINATION OF COSTS

3.1 Repair, Rehabilitation and Replacement

Given the cursory information obtained during the visual inspections and without the benefit of detailed design information, it is impractical to develop detailed cost estimates for each structure. For these reasons, benchmark budget costs were developed for categories of repair, rehabilitation and replacement. Traditionally, benchmark costs do not necessarily provide accurate costs for individual repairs / replacement, but have proven to provide sufficient accuracy for global budgeting purposes when dealing with a large number of structures.

For the purpose of this study, benchmark costs for the rehabilitation and replacement of structures are based on maintaining the existing width, length and alignment of each structure. However, the costs to replace the existing structures with structures meeting current geometric standards are included for comparison. For this purpose, an overall roadway width of 10 metres was used for both bridge and culvert type structures. More accurate costs for each structure would be provided upon further engineering study and design based on exact repair, rehabilitation and replacement needs (including change in geometry). The following benchmark costs have been established for this study following the requirements of the inspection forms.

Bridge and Culvert Replacement Costs

Budget costs for the replacement of bridges are usually based on the deck surface area of individual structures (m^2). Therefore, benchmark replacement costs for this study were determined using the following unit costs including approaches, administration and design costs, based on the spans of individual bridges and taking into account approach roadway costs (which do not vary with bridge span). In addition, the varying widths of bridges were taken into account to provide more realistic unit costs and to avoid large discrepancies in the replacement cost between bridges of different lengths, but similar surface areas.

Total Bridge Replacement Unit Costs		
Bridge Length (m)	**Width (m)**	**Unit Replacement Cost ($/m^2)**
3-10	<10 m	$10,000.00
	≥10 m	$9,500.00
10-20	<10 m	$9,500.00
	≥10 m	$8,500.00
20-30	<10 m	$8,500.00
	≥10 m	$7,500.00
>30	<10 m	$7,500.00
	≥10 m	$6,500.00

In the case of culvert type structures, the plan area (or deck surface area) used in the calculation was ('length of spans' + 1 m) x ('width of roadway' + 1 m). The purpose of using the Total Bridge Replacement Unit Costs table for culvert type structures is to normalize the replacement cost figures. Although culverts are generally less expensive to construct than bridges, it is generally accepted that the expected life span is approximately 50% of a bridge. It is valid therefore, on a life cycle cost basis, to utilize the Total Bridge Replacement Unit Costs table for all structures, whether they are bridges or culverts.

Bridge Repair / Rehabilitation Costs

For budgeting purposes, costs for the rehabilitation of bridges are typically expressed as a percentage of the total replacement costs. Rehabilitation costs for this study are separated into four categories as presented in the table below (including administration and design costs).

Bridge Rehabilitation Costs		
Category		**% of Replacement Cost**
1.	Major Bridge Rehabilitation	50-60
2.	Minor Bridge Rehabilitation	25-50
3.	Major Item Repair	5-25
4.	Minor Item Repair	5 or less

Culvert Repair / Rehabilitation Costs

It is generally not practical to undertake major rehabilitation work to culvert crossings where significant deterioration or deficiencies exist in the metal liner (barrel). Culvert replacement is normally planned in these circumstances. Repair work identified generally included repairs to the inlet and outlet structures such as headwalls, cut-off walls, retaining walls, restoration of backfill, slope protection at the culvert ends and installation / upgrading of guiderail. In the case of concrete barrels, some repair work to the barrels may be included if the opening is large enough to permit construction access.

Approach Roadway Repair / Rehabilitation Costs

For this study, approaches are considered to be 30m of roadway from the centre of each individual culvert (60 m total per culvert) and 6m of roadway from the end of the deck for each individual bridge (12m total per bridge). Repair / rehabilitation costs for approach roadways have been separated into three categories as presented in the table below (including administration and design costs).

Separate costs for Approach Roadway Repair / Rehabilitation have been included for Bridge Rehabilitation. For structure replacement costs and repairs, the approach roadway repair / rehabilitation costs have been included in the recommended work costs if applicable.

Approach Roadway Repair/Rehabilitation Costs		
Category		**Cost**
1.	Capital Projects (Partial / Complete Paving, Guiderail)	$40,000.00
2.	Minor Repairs / Maintenance (Crack Sealing, Surface Sealing, Guiderail Repairs)	$15,000.00
3.	Crack Sealing Only	$8,000.00

Construction Detour Costs

Several alternatives exist to maintain the flow of traffic when a bridge or culvert undergoes major rehabilitation or replacement. These include the construction of a detour structure adjacent to the existing structure, a detour route around (avoiding) the structure, and the staging of the construction to allow traffic on the structure during construction. The construction of a detour structure is the most costly option and is usually recommended only when the other options are not possible. The detour route is the least expensive option, but is often not practical due to the length of the detour route and the inconvenience to residents near the structure. The most frequently recommended option is the staging of rehabilitation work to allow the passage of traffic.

Since most bridge projects would consist of rehabilitation and not replacement, the staging of work would be the most frequently used option to maintain traffic during construction. Therefore, the benchmark costs for detours are based on staging of the work as per the following. These costs are based on additional costs incurred from staging of the work during construction (extra effort, time). Traffic control costs would be separate from detour costs and are presented later in this section.

Detour During Construction Costs		
Category		**Cost**
1.	Detour - Minor Rehabilitation / Major Rehabilitation of Bridges Less than 10m Long / Culvert Replacement	$35,000.00
2.	Detour - Major Rehabilitation / Bridge Replacement	$100,000.00

Traffic Control Costs

In addition to performing the work in stages to accommodate traffic, the safety of traffic passing on the bridge or over the culvert during construction must also be ensured. The costs of traffic control during staged projects would be as follows:

Traffic Control Costs		
Category		**Cost**
1.	Traffic Control- Minor Rehabilitation	$35,000.00
2.	Traffic Control - Major Rehabilitation	$60,000.00

Utilities / Right of Way Costs

Most bridge or culvert rehabilitation / replacement projects do not require substantial expenses for the installation or modification of existing utilities. Similarly, most of these projects do not require an increase in right of way. Therefore, specific benchmark budget costs for these items were not developed.

Environmental Study Costs

Since bridge or culvert replacements / rehabilitations typically do not involve a change in alignment or a reduction in clearances under the structure, these projects usually fall under the Schedule A or A+ Environmental Assessment for Ontario Highways. This type of environmental assessment does not require detailed environmental and mitigation plans, but typically requires written application with, and permission from, the appropriate environmental agencies (Ontario Ministry of Natural Resources, Ontario Ministry of the Environment, Local Conservation Authorities (Permit To Take Water)). Therefore, the benchmark budget cost for environmental study would be as follows (based on the requirement of Schedule A or A+ Environmental Assessment):

Environmental Study Costs		
Category		**Cost**
1.	Bridge / Culvert Replacement, Minor and Major Rehabilitation	$10,000.00

Other Costs

Any other costs not specified in the above (site specific requirements) are deemed to be covered in the total benchmark costs. Therefore, no specific amount for other work is specified in this report.

Contingency Costs

The benchmark costs used for budgeting purposes are based only on information obtained from visual inspections. Because of this, contingency allowances are already built into the benchmark costs. Therefore, specific amounts for contingencies will not be included in this report.

Recommended Replacement Costs

For the purposes of this report, when a structure (bridge or culvert) replacement has been recommended, all associated costs (approaches, detours, traffic control, utilities, right of way, environmental studies and contingency) have been included in the replacement cost provided in the 'Repair and Rehabilitation Required' table on the inspection forms.

3.2 Engineering Investigation

Further engineering investigation is recommended for several of the bridges and culverts as indicated on individual inspection forms. Benchmark budget costs for engineering investigation work are presented in the table below:

Engineering Investigation			
Category		**Type of Structure**	**Cost**
1.	Detailed Inspection / Rehabilitation Study - Full Bridge	Truss	$25,000.00
		Others	$20,000.00
		Traffic Barrier Only *	$5,000.00
2.	Detailed Deck Condition Survey	Exposed Deck	$10,000.00
		Asphalt Paved Deck	$15,000.00
		Concrete Culvert with Height of Fill Less than 500 mm **	$5,000.00
3.	Structure Evaluation	Truss	$15,000.00
		Others	$10,000.00
4.	Underwater Investigation	All Bridges	$10,000.00

* Requirements for traffic barriers on bridges and culverts were determined using the Canadian Highway Bridge Design Code, MTO Standards and good engineering practice. The evaluation of existing traffic barriers was based on assumed values of AADT and good engineering practice. For structures with existing approach guiderail, a review of the required approach / leaving end length of guiderail and end treatments (as per the MTO's Roadside Safety Manual) was not carried out.

** Deck condition survey on concrete culvert includes cores with no corrosion potential survey. Deck condition surveys on concrete culverts with a height of fill greater than 500 mm are not practical.

The benchmark budget costs for a Structure Evaluation and Detailed Deck Condition Survey would be reduced to 50% of that shown in the table above when any one these are performed simultaneously with a Detailed Inspection / Rehabilitation Study.
Other investigations such as fatigue and seismic investigations would be included with the Detailed Inspection and Structure Evaluation (respectively), if deemed necessary by the engineer. Detailed coating condition surveys are typically only required where a failure of coating systems have occurred other than normal deterioration. A DART (Deck Assessment by Radar Technology) survey is not a commonly used investigation method. Detailed deck condition surveys are the most commonly used method of deck inspection. Therefore, individual costs for the various types of investigation described above are not provided.

4.0 BRIDGE CONDITION (BCI)

Bridge Condition Index (BCI) values were derived using MTO's standard methods as outlined in their document entitled '*Bridge Condition Index, an Overall Measure of Bridge Condition*' (July 2009). Based on this document, we utilize an excel spreadsheet (developed based on the parameters outlined in the

document) that, after inputting the inspection data for each element (condition ratings), automatically calculates the BCI value.
With the calculated BCI values for each structure, an *overall* picture of the general condition of the Township's structures inventory as a whole can then be presented by summarizing BCI ranges (good, fair, poor) and counting the overall percentage of structures in each category. This is the methodology that the MTO currently utilizes and it is generally an effective tool to determine where the Township stands in terms of the overall condition and maintenance needs for their structure inventory. This information can be used to compare the overall condition of various structures, to assist in prioritizing structures for future rehabilitation and assist in the funding application process.
The BCI ranges that are normally included in this summary table are as follows:

- Good (BCI Range 70-100); for this range, maintenance is not usually required with the next five years.
- Fair (BCI Range 60-70); for this range, maintenance work is usually required / scheduled within the next five years. Carrying out work within this timeframe (next five years) is typically considered the ideal time to get the most out of bridge spending.
- Poor (BCI Less than 60); for this range, maintenance work is usually required / schedule with the next year.

For the Township's inventory (20 structures total), the current summary of BCI ranges is presented as follows (individual structure BCI values are presented in the tables in ***Appendix A*** and ***Appendix E***):

BCI Range	***Number of Structures in Range***	***% of Structures in Range***
70-100	14 (bridges), 15 (culverts) = 29 total	59.2
60-70	1 (bridges), 9 (culverts) = 10 total	20.4
Less than 60	2 (bridges), 6 (culverts) = 8 total	16.3
Not Inspected	1 (bridge), 1 (culvert) = 2 total	4.1

5.0 ROUTINE MAINTENANCE

As part of the Township's overall bridge management program, a program of routine maintenance should be implemented and up-kept for all structures. Maintaining this program will assist in minimizing the potential for premature deterioration of structural elements; and, when combined with a program of bridge rehabilitation, will assist in maximizing the useful service life of the Township's structure inventory.

Overall routine maintenance needs will vary depending on the type of structure, location, traffic volumes, winter maintenance procedures (sanding vs. salting, etc.), size of the structure, vintage and previous maintenance / rehabilitation carried out on the structure in the past. The following presents a general summary of routine maintenance operations that are considered applicable for the structures present within the Township's inventory:

- Periodic bridge cleaning; this would include power-washing of all components exposed to roadway traffic and areas where debris accumulation is prevalent. This would include asphalt wearing surfaces, expansion joint gaps, edges of roadway, bearing seats, truss bottom chords, etc. Typically this operation would be carried out on an annual basis, most likely each spring after winter sanding / salting operations have ceased; however, in some cases (i.e. gravel approach roadways, etc.), an increase in the number of cleanings per year may be required.

- Concrete spot repairs; this would generally include localized patching of small concrete spalls and delaminations located in areas within the roadway splash zones (top of deck, curbs, expansion joint block-outs, etc.). Completing these repairs will assist in preventing accelerated deterioration of concrete in these areas by reducing the ingress of chlorides, etc. There is no specific timing for these types of repairs and they are generally performed on an as-needed basis.
- Steel spot repairs / spot coating; this would generally include localized touch-ups to steel coatings located in areas within the roadway splash zones (truss bottom chords, exterior floor beams / stringers, etc.) as well as localized spot repairs in areas of appreciable section loss / corrosion. There is no specific timing for these types of repairs and they are generally performed on an as-needed basis.

- Clearing of debris in waterway; this would include clearing of trapped debris in the vicinity of the structure (upstream / downstream). This operation would typically be carried out on an annual basis, after the spring run-off period.

- Asphalt surface repairs / rout and seal; this would include cold patch asphalt repairs, routing and sealing of wide cracks in asphalt. This operation would typically be carried out an annual basis, after winter clearing operations have ceased.

- Re-grading of approach roadways (gravel roadway surfaces); this would include placing and grading fresh granular material on roadway surfaces. The timing of this work would depend on the overall volume and type of traffic typically traversing the roadway (truck haul route, summer cottage traffic route, etc.). Typically this work would be carried out on an annual or bi-annual basis.

- Bridge deck drainage; this would include maintaining existing deck drains free of debris and maintaining them in an un-plugged condition. This operation would typically be carried out an annual basis, after winter clearing operations have ceased.

- Clearing of debris / vegetation from approach guiderail; this would involve removing debris and vegetation from in front of approach guiderail. Although this is mainly a safety measure (to ensure proper performance of the guiderail), it also assists in prolonging the lifespan of the guiderail (accumulation of debris can accelerate rot on wooden posts, corrosion on steel guiderail, etc.).

- Surface sealing of exposed concrete surfaces; this would include cleaning and applying a concrete sealer on concrete surfaces exposed within the splash zone (exposed concrete decks, curbs, sidewalks and barrier walls); this operation is not typically required on an annual basis and would typically be completed in 3-5 year intervals. Sealing concrete surfaces periodically assists in minimizing the migration of chlorides into the concrete.

6.0 ASSET MANAGEMENT STRATEGY

As previously mentioned, all structures were visited and inspected in conformance with the requirements of the Ontario Structure Inspection Manual (2020 Revision). Based on the results of the inspections, repair / rehabilitation needs and budgetary costs for these were identified. In addition, additional engineering inspections and studies were also recommended.

Although OSIM inspections (generally performed every 2 years) are a useful screening tool to identify upcoming bridge maintenance needs and costs, these inspections solely rely on visual evidence of

deterioration and do not take into account the age (life cycles) of individual structures, nor do they take into account the potential for hidden deterioration (which could be revealed with further investigations such as detailed bridge condition surveys, rehabilitation studies, etc.).

In order to provide the Township with a more useful planning tool for structure rehabilitation / replacement, all of the information gathered from the OSIM inspections was summarized in an asset information summary table. The information presented in the tables is described in the following section, the information for bridges and culverts are presented separately.

Asset Management Summary

This set of tables presents basic asset information for the structures such as structure name, type of structure and basic geometry. The replacement value for each structure (based on current and widened geometry, in the case where the width of the existing structures are deficient) is also provided. These values are presented in 2022 dollars. The BCI calculated by HP Engineering for each structure is also provided.

A 10-year asset management plan for the structures was also developed as part of this assignment. The year-by-year plan takes into consideration the age of the structure and its known (major) rehabilitation history. The plan assumes a distribution of the replacements and major/minor rehabilitations per year over the next 10 years. For this plan it has been assumed, for smaller structures, that additional work (i.e., joint replacements, paving, overlays, barrier upgrades etc.) would be completed in addition to defects noted in the OSIM inspection. The costs given are shown in 2022 dollars and have not been adjusted for inflation. It should be noted that cost estimates prepared for the Township are opinions of probable costs attained for the expected construction work. It is not a prediction of the lowest tender price. Tender prices will be influenced by many factors such as the tenders' method of pricing and/or interpretation of their probable level of effort, current and pending projects by others and level of competitiveness in the market at the time of tender, availability of labour and materials, etc., which are not within our control, knowledge, and/or ability to predict. This schedule should be reviewed and adjusted as required by the Township based on budget availability. This schedule may also be adjusted or augmented based on the results of further Engineering Investigations (detailed condition surveys, rehabilitation studies, etc.) and future OSIM inspections.

It is noted that the asset management information as discussed above (and presented in ***Appendix A***) was developed based on the current information available for the structures, the current (2022) OSIM inspections and based on the overall assumptions presented above.

7.0 DISCUSSION

This Bridge Management Asset Study was developed to provide the Township of North Dundas with the necessary information required to budget projects and set priorities for future bridge and culvert rehabilitation / replacement programs.

Replacement, rehabilitation and engineering investigation budget costs were provided for 49 of the Township's structure based on visual biennial inspections performed by HP Engineering (during the spring and summer of 2022).

The costs for individual structures are presented in the Bridge and Culvert OSIM Inspection Reports, these cost values were based on benchmark costs developed for this study. These should be used for

budgeting purposes only. More accurate cost estimates for each structure's needs would be provided based on more detailed scopes of work developed during the design engineering stages.

The estimated replacement value of the Township's bridge and culvert inventory (based on 49 structures in the inventory) is approximately ***38.79 million dollars***. The estimated value of all the bridges and culverts (based on 49 structures in the inventory) if reconstructed to current geometric standards would be approximately ***45.96 million dollars***.

Immediate repair / rehabilitation costs for the 49 structures inspected are estimated to be a total of approximately ***611 thousand dollars*** broken down as ***48*** and ***563 thousand dollars*** for bridges and culverts respectively. Similarly, the longer-term repair / rehabilitation costs (1-5 years) for the 49 structures inspected are estimated to be a total of approximately ***5.58 million dollars*** broken down as ***1.62*** and ***3.96 million dollars*** for bridges and culverts, respectively. The longer-term repair / rehabilitation costs in the 6-10 year range for the 49 structures inspected are estimated to be a total of approximately ***0.881 million dollars*** broken down as ***225*** and ***655 thousand dollars*** for bridges and culverts, respectively

The costs associated with recommended further Engineering Investigations for the 49 structures inspected was estimated to be a total of approximately ***545 thousand dollars*** broken down as ***235*** and ***310 thousand dollars*** for bridges and culverts respectively.

Respectfully Submitted,

April 17th , 2023

HP ENGINEERINC INC.

Tashi Dwivedi, P.Eng.
Principal

APPENDIX A

ASSET MANAGEMENT SUMMARY

APPENDIX A-1

BRIDGES
(18 STRUCTURES)

Appendix A-1 : Asset Information Summary - Bridges

Site No	Bridge Name	Inspected By	Inspection Year	Northing	Easting	Location	Bridge Type	Year Built (Age)	Year of Last Rehab	Number of Spans	Total Length (Parallel to Roadway) (m)	Width (Perpendicular to roadway) (m)	Roadway Width (m)	Existing Surface Area (m^2)	Replacement Cost - Existing Geometry ($000)	Replacement Cost - Current Geometric Standards ($000)	BCI	Benchmark Budget Costs			
																		Rehabilitation Costs ($000)			Engineering Investigation Costs ($000)
																		< 1 year	1-5 Years	6-10 Years	Normal
BRH001	Belmeade Rd & South Castor Creek Bridge	HP Engineering Inc	2022	45.1253948	-75.4990661	5.0km West of County Rd 31	Slab on Concrete Box Girders	1981	N/A	1	12.20	10.50	7.00	128	1,089	1,400	70		70		15
BRH002	Belmeade Rd & South Castor Creek Bridge	HP Engineering Inc	2022	45.1366902	-75.4657242	2.1km West of County Rd 31	Slab on Concrete Box Girders	1981	2018	1	17.40	10.50	7.30	183	1,553	1,952	73		70		15
BRH003	Ormond Bridge	HP Engineering Inc	2022	45.1653584	-75.3556303	0.2km West of Bisson Road	Reinforced Concrete Solid Slab	1979	N/A	3	32.30	9.10	7.50	294	2,204	2,435	73		36		15
BRH004	Cayer Rd & Annable Creek MD Bridge (Active Co	HP Engineering Inc	2022						2005												
BRH005	Liscumb Rd & Annable MD Bridge	HP Engineering Inc	2022	45.10424	-75.3622	0.35km West of County Rd 3	Concrete Rigid Frame		2001	1	5.30	6.40	4.60	34	339	594	65		135		
BRH006	Development Rd & North Branch of South Nation R	HP Engineering Inc	2022	45.044685	-75.449811	1.2km North of Van Camp Road	Slab on Steel I-Girders		2003	1	25.90	9.60	8.00	249	2,113	2,253	71			226	20
BRH007	Levere Rd & North Branch South Nation River Bric	HP Engineering Inc	2022	45.0456626	-75.4447956	0.4 km East of Development Road	Slab on Concrete Box Girders		2021	1	14.70	8.50	7.00	125	1,187	1,437	73		21		15
BRH008	Van Camp Rd & North Branch South Nation River	HP Engineering Inc	2022	45.03686	-75.4361	0.5km east of Development Road	Slab on Concrete Box Girders	1979	1990	1	14.70	9.00	6.00	132	1,257	1,624	73				15
BRH009	Cameron Rd & Near Boundary Rd Bridge	HP Engineering Inc	2022	44.995	-75.51611	50m East of Boundary Rd	Slab on Steel I-Girders		2018	1	11.50	6.00	10.40	69	656	656	58		479		35
BRH010	Cameron Rd & North Branch South Nation River M	HP Engineering Inc	2022	45.03032	-75.41273	1.5km West of County Road 3	Slab on CPCI Girders		N/A	1	18.30	9.00	7.30	165	1,565	1,820	75				
BRH011	Nation Valley Rd & South Nation River Bridge	HP Engineering Inc	2022	45.0681762	-75.2806069	70m South of River Rd	Slab on CPCI Girders	1980	N/A	3	69.10	9.20	7.30	636	4,768	5,345	73		114		20
BRH012	Nation Valley Rd & Barkley Creek Bridge	HP Engineering Inc	2022	45.0666325	-75.2830706	5.0 km West of County Rd 43	Concrete Rigid Frame CIP T-Beam		N/A	1	7.00	6.00	4.80	42	420	745	41		560		20
BRH013	Timmins Rd & North Branch South Nation river Bri	HP Engineering Inc	2022	45.02092	-75.38608	0.8km South of County Rd 3	Slab on Concrete Box Girders	1987	2006	1	20.80	10.10	9.00	210	1,576	1,799	72		43		15
BRH014	Bridge St & South Nation River Bridge	HP Engineering Inc	2022	44.98924	-75.45054	0.3km North of Sandt Road Road	Slab on Concrete Box Girders	1977	N/A	1	30.20	7.00	4.90	211	1,586	2,231	73		84		15
BRH015	Limerick Rd & McMillan Rd Bridge	HP Engineering Inc	2022	45.0798707	-75.2027987	0.8km East of County Rd 8	Concrete Rigid Frame - Arch		N/A	1	14.00	8.50	7.00	119	1,131	1,369	71	48			5
BRH016	West Bridge	HP Engineering Inc	2022	44.95978	-75.47725	0.1km South of Nation River Road	Slab on CPCI Girders	1981	2017	1	32.20	9.70	8.50	312	2,343	2,344	75				15
BRH017	Bigford Bridge	HP Engineering Inc	2022	45.00415	-75.36276	0.2km North of County Road 5	Solid Slab	1983	N/A	1	12.20	10.50	7.00	128	1,089	1,400	74		9		15
BRT001	Chesterville Dam Structure Pedestrian Bridge	HP Engineering Inc	2022	45.1012649	-75.2259991	30m South of Water St.	Pedestrian bridge (Solid Concrete Slab)		N/A	6	42.00	4.00	4.00	168	1,260	2,730	75				
TOTALS															**26,134**	**32,133**		**48**	**1,618**	**226**	**235**

NOTES:

1. BCI as calculated by HP Engineering.

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APPENDIX A-2

CULVERTS
(31 STRUCTURES)

Appendix A-2 : Asset Information Summary - Culverts

Culvert No.	Culvert Name	Inspected By	Inspection Year	Northing	Easting	Location	Culvert Type	Year Built (Age)	Year of Last Rehab	Number of Barrels	Total Length (Parallel to Roadway) (m)	Width (Perpendicular to roadway) (m)	Roadway Width (m)	Existing Surface Area (m^2)	Replacement Cost - Existing Geometry ($000)	Replacement Cost - Current Geometric Standards ($000)	BCI	Benchmark Budget Costs			
																		Rehabilitation Costs ($000)			Engineering Investigation Costs ($000)
																		< 1 Year	1-5 Years	6-10 Years	Normal
CUC001	Cayer Rd & McLean MD Culvert	HP Engineering Inc.	2022	45.13701	-75.378067	0.5km South of County Rd 13	Precast Concrete Box Culvert			1	3.00	11.70	6.40	35	281	330	70		85		
CUC002	Cayer Rd & Cinnamon MD Culvert	HP Engineering Inc.	2022	45.12935	-75.37231	1.3km South of County Rd 13	Concrete Rigid Frame (Open Footing)			1	6.10	19.50	6.00	119	952	586	74				
CUC003	Thompson Rd & Black Creek MD Culvert	HP Engineering Inc.	2022	45.15021	-75.31702	Intersection of Thompson Rd and Steen Rd	Precast Concrete Box Culvert			1	3.60	15.90	6.00	57	458	380	74		48		5.0
CUC004	Cayer Rd & Castor Extension MD Culvert	HP Engineering Inc.	2022	45.1211	-75.36599	2.4km South of County Rd 13	2-Cell Precast Concrete Box Culvert			2	8.50	18.00	6.00	153	1,224	784	74				
CUC005	Kerrs Ridge Rd & Castor Extension MD Culvert	HP Engineering Inc.	2022	45.08721	-75.4293937	0.6km North of Spruit Rd	Precast Concrete Box Culvert			1	3.40	14.50	4.50	49	394	363	71		10		
CUC006	Winchester Main St & Henderson Creek MD Culvert	HP Engineering Inc.	2022	45.09537	-75.3471575	0.3km East of Ottawa St.	Concrete Rigid Frame (Open Footing)			1	15.30	15.30	9.80	234	1,522	1,165	59	83	28		5.0
CUC007	Guy Rd & East Justus MD Culvert	HP Engineering Inc.	2022	45.05029	-75.35644	2.5km West of County Rd 31	Cast-in-place Concrete box culvert			1	4.20	12.80	6.00	54	430	429	74	48			???
CUC008	Nation Valley Rd & Servage MD Culvert	HP Engineering Inc.	2022	45.07586	-75.26137	60m West of Forward Rd	Concrete Rigid Frame (Open Footing)			1	3.50	7.50	4.60	26	210	371	43		295		20.0
CUC009	Nation River Rd & Eager MD Culvert	HP Engineering Inc.	2022	44.96921	-75.47351	1.0 km East of Wallace Road	Precast Concrete Box Culvert			1	3.00	17.40	5.80	52	418	330	74	48		5	5.0
CUS001	Marionville Rd & Lough MD Culvert	HP Engineering Inc.	2022	45.16386	-75.396942	0.4km East of Rodney Ln	CSP Arch Culvert			1	3.20	28.70	6.00	92	551	347	75	48			5.0
CUS002	Carruthers Rd & Muffat Creek MD Culvert	HP Engineering Inc.	2022	45.19173	-75.2836435	0.85km East of County Rd 7	SPCSP Arch Culvert			1	3.70	15.30	5.80	57	226	388	67	48			5.0
CUS003	Allen Rd & Allen Creek MD Culvert	HP Engineering Inc.	2022	45.08615	-75.55013	0.5km South of French Settlement Road	Corrugated Steel Pipe Arch Culvert			1	3.10	18.30	5.50	57	227	338	75	48			5.0
CUS004	Jennings Rd & Castor Extension MD Culvert	HP Engineering Inc.	2022	45.1004	-75.42241	2.2km North of Spruit Rd	SPCSP Arch Culvert			1	4.60	13.70	5.70	63	252	462	66		337		22.5
CUS005	Kerrs Ridge Rd Allowance & Castor Extension MD C	HP Engineering Inc.	2022	45.09437	-75.42706	0.6km Wset of Jennings Road	SPCSP Arch Culvert			1	4.00	15.00	5.00	60	240	413	64			325	22.5
CUS006	Spruit Rd & Castor Extension MD Culvert	HP Engineering Inc.	2022	45.07952	-75.4313356	0.45km West of Riddell Rd	SPCSP Arch Culvert			1	3.00	13.70	4.00	41	206	330	59		291		20.0
CUS007	(Could not locate structure)																				
CUS008	Liscumb Rd & Tighe MD Culvert	HP Engineering Inc.	2022	45.10355	-75.3634268	0.6km West of County Rd 3	SPCSP Arch Culvert			1	4.50	15.30	10.00	69	241	454	70	48			5.0
CUS009	Boyne Rd & Kittle Creek MD Culvert	HP Engineering Inc.	2022	45.12667	-75.261989	1.2km East of Kittle Rd	2-Cell CSP Round Culvert			2	3.00	18.30	8.40	55	220	330	75	48			5.0
CUS010	Development Rd CPR Railway Culvert	HP Engineering Inc.	2022	45.04777	-75.45206	1.0km South of County Rd 43, South of CPR Rail tracks	3-Cell CSP Round Culvert			3	4.50	20.40	6.40	92	367	454	41		452		22.5
CUS011	Kittle Rd & Kittle Creek MD Culvert	HP Engineering Inc.	2022	45.11716	-75.25508	1.3km West of County Rd 7	2-Cell CSP Round Culvert			2	3.00	12.20	6.00	37	146	330	69	48			5.0
CUS012	Finch Winchester Boundary Rd & Stoney Creek MD C	HP Engineering Inc.	2022	45.16392	-75.19492	0.4 km South of County Rd 9	CSP Round Culvert			1	3.00	18.30	4.60	55	220	330	64	48			5.0
CUS013	Van Camp Rd & North Branch South Nation River MI	HP Engineering Inc.	2022	45.01981	-75.48735	0.25km West of County Road 1	2-Cell SPCSP Culvert			2	12.60	23.50	6.40	296	1,036	972	73			18	2.5
CUS014	River Rd & Kittle Creek MD Culvert	HP Engineering Inc.	2022	45.10072	-75.250827	0.2km South of County Rd 43	CSP Horizontal Ellipse Culvert			1	3.90	25.30	6.00	99	395	404	62		452		22.5
CUS015	Guy Rd & Mullin MD Culvert	HP Engineering Inc.	2022	45.04362	-75.3733288	0.5km East of Browns Lane	SPCSP Arch Culvert			1	3.30	16.80	5.80	55	222	355	73			307	20.0
CUS016	Pemberton & Mulin Rd MD Culvert	HP Engineering Inc.	2022	45.04404	-75.3422	0.45km South of Hogaboam road	SPCSP Arch Culvert			1	4.80	17.50	5.80	84	336	479	63		421		20.0
CUS017	Nation Valley Rd & Dillabough Creek MD Culvert	HP Engineering Inc.	2022	45.08187	-75.2464547	2.4km West of County Rd 43	SPCSP Arch Culvert			1	3.30	17.40	6.40	57	230	355	75	48			5.0
CUS018	Webb Rd & Whittaker MD Culvert	HP Engineering Inc.	2022	45.05621	-75.2979	1.1 km North of Nesbitt Rd	4-Cell CSP Round Culvert			4	3.20	7.00	5.50	22	157	347	47		252		20.0
CUS019	Hollister Rd & Moffat Creek MD Culvert	HP Engineering Inc.	2022	45.04743	-75.31713	0.5 km South of River Rd	2-Cell CSP Culvert			2	3.00	26.50	10.70	80	278	330	60		363		20.0
CUS020	Hollister Rd Equalizer Culvert	HP Engineering Inc.	2022	45.04564	-75.3137318	0.9 km South of River Rd	2-Cell CSP Round Culvert			2	3.20	26.50	10.70	85	297	347	60		382		20.0
CUS021	Nesbitt Rd & Whittaker MD Culvert	HP Engineering Inc.	2022	45.04451	-75.2987	0.6 km East of County Rd 31	Super Cor Culvert			1	10.00	13.00	8.50	130	455	787	75				
CUS022	Nesbitt Rd & Barkley Creek MD Culvert	HP Engineering Inc.	2022	45.05131	-75.28076	0.3 km West of Shay Rd	SPCSP Arch Culvert			1	5.50	21.00	7.00	116	462	536	65		547		22.5
TOTALS															**12,651**	**13,823**		**563**	**3,963**	**655**	**310.0**

NOTES:

1. BCI as calculated by HP Engineering.

HP Engineering Inc.
2039 Robertson Road, Suite 400, Ottawa, Ontario, K2H 8R2
Telephone: 613-695-3737 - Fax: 613-680-3636

APPENDIX B-1

BRIDGES
(18 STRUCTURES)

Appendix B-1: Summary of Recommended Works - Bridges

Structure #	Structure Name	BCI	Timeframe	Recommended Work	Estimated Budget			Investigations	Cost
					Construction Cost	Associated Cost	Total Estimated Cost		
BRH001	Belmeade Rd & South Castor Creek Bridge	70	1-5 years	Replace Joint Amouring and Seals	$70,000.00		$70,000.00	Deck Condition Survey	$15,000.00
BRH002	Belmeade Rd & South Castor Creek Bridge	73	1-5 years	Replace Joint Amouring and Seals	$70,000.00		$70,000.00	Deck Condition Survey	$15,000.00
BRH003	Ormond Bridge	73	1-5 years	Concrete Repairs (Deck Top, Soffit)	$35,500.00		$35,500.00	Deck Condition Survey	$15,000.00
BRH004	Cayer Rd & Annable Creek MD Bridge (Active Construction)						$0.00		
BRH005	Liscumb Rd & Annable MD Bridge	65	1-5 years	Concrete Repairs (Soffit), Repave wearing surface	$60,000.00	$35,000.00	$95,000.00		
BRH006	Development Rd & North Branch of South Nation River MD Bridge	71	6-10 years	Repave wearing surface, Replace joint seals and Barrier, Concrete Repairs (Abutment walls)	$273,500.00	$35,000.00	$308,500.00	Rehabilitation/ Replacement study	$20,000.00
BRH007	Levere Rd & North Branch South Nation River Bridge	73	1-5 years	Concrete Repairs (Deck top, Soffit)	$21,000.00		$21,000.00	Deck Condition Survey	$15,000.00
BRH008	Van Camp Rd & North Branch South Nation River Bridge	73					$0.00	Deck Condition Survey	$15,000.00
BRH009	Cameron Rd & Near Boundary Rd Bridge	58	1-5 years	Major Rehabilitation	$393,600.00	$85,000.00	$478,600.00	Rehabilitation/ Replacement study	$20,000.00
BRH010	Cameron Rd & North Branch South Nation River MD Bridge	75							
BRH011	Nation Valley Rd & South Nation River Bridge	73	1-5 years	Concrete Repairs (Overhangs, Girders), Replacement of Joint selas	$125,000.00	$35,000.00	$160,000.00	Rehabilitation/ Replacement study	$20,000.00
BRH012	Nation Valley Rd & Barkley Creek Bridge	41	1-5 years	Structure Replacement	$450,000.00	$110,000.00	$560,000.00	Rehabilitation/ Replacement study	$20,000.00
BRH013	Timmins Rd & North Branch South Nation river Bridge	72	1-5 years	Concrete Repairs (Soffit, Wingwalls), Replace Joint seal	$42,500.00		$42,500.00	Deck Condition Survey	$15,000.00
BRH014	Bridge St & South Nation River Bridge	73	1-5 years	Concrete Repairs (Barrier walls, Concrete curb, Abutment walls), Replace Joint seals	$83,500.00		$83,500.00	Deck Condition Survey	$15,000.00
BRH015	Limerick Rd & McMillan Rd Bridge	71	<1 year	Install Code compliant approach barrier and end treatments	$48,000.00		$48,000.00	Rehabilitation/ Replacement study for Barrier Only	$5,000.00
BRH016	West Bridge	75					$0.00	Deck Condition Survey	$15,000.00
BRH017	Bigford Bridge	74	1-5 years	Concrete Repairs (Deck Top)	$8,500.00		$8,500.00	Deck Condition Survey	$15,000.00
BRT001	Chesterville Dam Structure Pedestrian Bridge	75					$0.00		

APPENDIX B-2

CULVERTS
(31 STRUCTURES)

Appendix B-2: Summary of Recommended Works - Culverts

Structure #	Structure Name	BCI	Timeframe	Recommended Work	Estimated Budget			Investigations	Cost
					Construction Cost	Associated Cost	Total Estimated Cost		
CUC001	Cayer Rd & McLean MD Culvert	70	1-5 years	Repave and waterproofing of deck, Concrete Repairs	$ 50,000.00	$ 35,000.00	$ 85,000.00		
CUC002	Cayer Rd & Cinnamon MD Culvert	74							
CUC003	Thompson Rd & Black Creek MD Culvert	74	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUC004	Cayer Rd & Castor Extension MD Culvert	74							
CUC005	Kerrs Ridge Rd & Castor Extension MD Culvert	71	1-5 years	Concrete Repairs (barrel)	$ 10,000.00		$ 10,000.00		
CUC006	Winchester Main St & Henderson Creek MD Culvert	59	1-5 years	Install code compliant Barriers and End Treatments (<1 year) , Concrete Repairs (Barrel)	$ 75,500.00	$ 35,000.00	$ 110,500.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUC007	Guy Rd & East Justus MD Culvert	74	<1 year	Install code compliant approach Barrier	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUC008	Nation Valley Rd & Servage MD Culvert	43	1-5 years	Structure Replacement	$ 210,000.00	$ 85,000.00	$ 295,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUC009	Nation River Rd & Eager MD Culvert	74	6-10 years	Install code compliant Approach Barrier (<1 year), Concrete Repairs (barrel)	$ 53,000.00		$ 53,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS001	Marionville Rd & Lough MD Culvert	75	<1 year	Install code compliant barrier on North side, End treatment on South barrier	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS002	Carruthers Rd & Muffat Creek MD Culvert	67	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS003	Allen Rd & Allen Creek MD Culvert	75	<1 year	Install code compliant approach Barrier	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS004	Jennings Rd & Castor Extension MD Culvert	66	1-5 years	Structure Replacement	$ 252,000.00	$ 85,000.00	$ 337,000.00	Rehabilitation/ Replacement study, Monitoring Deformation	$ 22,500.00
CUS005	Kerrs Ridge Rd Allowance & Castor Extension MD Culvert	64	6-10 years	Structure Replacement	$ 240,000.00	$ 85,000.00	$ 325,000.00	Rehabilitation/ Replacement study, Monitoring Deformation	$ 22,500.00
CUS006	Spruit Rd & Castor Extension MD Culvert	59	1-5 years	Structure Replacement	$ 206,000.00	$ 85,000.00	$ 291,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS007	(Could not locate structure)								
CUS008	Liscumb Rd & Tighe MD Culvert	70	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS009	Boyne Rd & Kittle Creek MD Culvert	75	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS010	Development Rd CPR Railway Culvert	41	<1 year	Structure Replacement	$ 367,000.00	$ 85,000.00	$ 452,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS011	Kittle Rd & Kittle Creek MD Culvert	69	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS012	Finch Winchester Boundary Rd & Stoney Creek MD Culvert	64	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS013	Van Camp Rd & North Branch South Nation River MD Culvert	73	6-10 years	Concrete Repairs (barrel)	$ 18,000.00		$ 18,000.00	Monitoring Crack width	$ 2,500.00
CUS014	River Rd & Kittle Creek MD Culvert	62	1-5 years	Structure Replacement	$ 367,000.00	$ 85,000.00	$ 452,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS015	Guy Rd & Mullin MD Culvert	73	6-10 years	Structure Replacement	$ 222,000.00	$ 85,000.00	$ 307,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS016	Pemberton & Mulin Rd MD Culvert	63	1-5 years	Structure Replacement	$ 336,000.00	$ 85,000.00	$ 421,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS017	Nation Valley Rd & Dillabough Creek MD Culvert	75	<1 year	Install code compliant Barriers and End Treatments	$ 48,000.00		$ 48,000.00	Rehabilitation / Replacement study for barrier only	$ 5,000.00
CUS018	Webb Rd & Whittaker MD Culvert	47	1-5 years	Structure Replacement	$ 167,000.00	$ 85,000.00	$ 252,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS019	Hollister Rd & Moffat Creek MD Culvert	60	1-5 years	Structure Replacement	$ 278,000.00	$ 85,000.00	$ 363,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS020	Hollister Rd Equalizer Culvert	60	1-5 years	Structure Replacement	$ 297,000.00	$ 85,000.00	$ 382,000.00	Rehabilitation/ Replacement study	$ 20,000.00
CUS021	Nesbitt Rd & Whittaker MD Culvert	75							
CUS022	Nesbitt Rd & Barkley Creek MD Culvert	65	1-5 years	Structure Replacement	$ 462,000.00	$ 85,000.00	$ 547,000.00	Rehabilitation/ Replacement study, Monitoring crack width	$ 22,500.00

APPENDIX C-1

BRIDGES
(18 STRUCTURES)

Appendix C-1: Summary of Maintenance Needs -Bridges

1-5 years

Structure No.	Structure Name	Approach Barrier	Approach Curb	Approach Wearing Surface	Accessories	Barrier	Barrier Post	Concrete End Dams	Joints	Sidewalk / Curb	Deck Wearing Surface	Deck Top	Deck Drains	Soffit	Beams/MLEs	Diaphragm	Wingwall	Abutment Wall	Bearings	Piers	Retaining Walls	Embankments	Streams	Slope Protection
BRH001	Belmeade Rd & South Castor Creek Bridge	Install Delineators		Surface Repairs		Replace Posts												Concret Repairs						
BRH002	Belmeade Rd & South Castor Creek Bridge			Surface Repairs	Replace hazard signs					Concrete Repairs														
BRH003	Ormond Bridge			Surface Repairs		Barrier Repairs			Clean Joints			Surface Repairs		Concrete Repairs				Remove Graffiti		Concrete Repairs, Cleaning				
BRH004	Cayer Rd & Annable Creek MD Bridge (Active Construction)																							
BRH005	Liscumb Rd & Annable MD Bridge						Repair Posts							Concrete Repairs				Concrete Repairs						
BRH006	Development Rd & North Branch of South Nation River MD Bridge											Bridge Cleaning	Clean Drains											
BRH007	Levere Rd & North Branch South Nation River Bridge							Concrete Repairs						Concrete Repairs				Concrete Repairs, Cleaning						
BRH008	Van Camp Rd & North Branch South Nation River Bridge	Barrier Repairs		Rout & Seal		Barrier Repairs						Concrete Repairs		Concrete Repairs										
BRH009	Cameron Rd & Near Boundary Rd Bridge																					Erosion Control		
BRH010	Cameron Rd & North Branch South Nation River MD Bridge			Surface Repairs		Concrete Repairs							Clean Drains					Concrete Repairs						
BRH011	Nation Valley Rd & South Nation River Bridge			Surface Repairs			Concrete Repairs		Clean Joints						Concrete Repairs	Concrete Repairs								
BRH012	Nation Valley Rd & Barkley Creek Bridge																							
BRH013	Timmins Rd & North Branch South Nation river Bridge	Barrier Repairs		Surface Repairs		Barrier Repairs																		
BRH014	Bridge St & South Nation River Bridge					Replace End Cap		Concrete Repairs			Surface Repairs							Concrete Repairs						
BRH015	Limerick Rd & McMillan Rd Bridge			Rout & Seal		Coating repairs	Concrete Repairs					Bridge Cleaning		Concrete Repairs				Concrete Repairs			Concrete Repairs			
BRH016	West Bridge			Surface Repairs							Surface Repairs			Concrete Repairs				Concrete Repairs						
BRH017	Bigford Bridge	Barrier Repairs		Surface Repairs			Concrete Repairs							Bridge Cleaning				Bridge Cleaning						
BRT001	Chesterville Dam Structure Pedestrian Bridge			Regrade Approaches	Replace Bollard Bolts				Clean Joints															

APPENDIX C-2

CULVERTS
(31 STRUCTURES)

Appendix C-2: Summary of Maintenance Needs - Culverts

1-5 years												
Structure No.	Structure Name	Approach Barrier	Approach Curb and Gutter	Approach Wearing Surface	Signs	Barriers	Sidewalk/curbs	Inlet	Outlet	Barrel	Embankment	Stream
CUC001	Cayer Rd & McLean MD Culvert											
CUC002	Cayer Rd & Cinnamon MD Culvert			Rout & Seal						Concrete Repairs		
CUC003	Thompson Rd & Black Creek MD Culvert											
CUC004	Cayer Rd & Castor Extension MD Culvert			Rout & Seal						Concrete Repairs		Remove Obstruction
CUC005	Kerrs Ridge Rd & Castor Extension MD Culvert								Concrete Repairs			
CUC006	Winchester Main St & Henderson Creek MD Culvert			Rout & Seal								
CUC007	Guy Rd & East Justus MD Culvert			Surface Repairs						Concrete Repairs		Remove Obstruction
CUC008	Nation Valley Rd & Servage MD Culvert										Erosion Control	
CUC009	Nation River Rd & Eager MD Culvert			Surface Repairs				Concrete Repairs				
CUS001	Marionville Rd & Lough MD Culvert			Surface Repairs	Install Hazard Signs					Steel Repairs		
CUS002	Carruthers Rd & Muffat Creek MD Culvert			Rout & Seal						Replace nuts	Erosion Control	
CUS003	Allen Rd & Allen Creek MD Culvert			Surface Repairs								
CUS004	Jennings Rd & Castor Extension MD Culvert											
CUS005	Kerrs Ridge Rd Allowance & Castor Extension MD Culvert			Regrade Approaches								Remove Obstruction
CUS006	Spruit Rd & Castor Extension MD Culvert										Erosion Control	
CUS007	(Could not locate structure)											
CUS008	Liscumb Rd & Tighe MD Culvert										Erosion Control	Remove Obstruction
CUS009	Boyne Rd & Kittle Creek MD Culvert			Rout & Seal, Regrade Shoulders								
CUS010	Development Rd CPR Railway Culvert										Remove Debris	
CUS011	Kittle Rd & Kittle Creek MD Culvert			Rout & Seal						Remove Debris		Remove Debris
CUS012	Finch Winchester Boundary Rd & Stoney Creek MD Culvert									Steel Repairs	Erosion Control	
CUS013	Van Camp Rd & North Branch South Nation River MD Culvert							Concrete Repairs	Concrete Repairs		Erosion Control	Remove Obstruction
CUS014	River Rd & Kittle Creek MD Culvert										Tree Removal	Erosion Control
CUS015	Guy Rd & Mullin MD Culvert			Surface Repairs								
CUS016	Pemberton & Mulin Rd MD Culvert											
CUS017	Nation Valley Rd & Dillabough Creek MD Culvert											
CUS018	Webb Rd & Whittaker MD Culvert											
CUS019	Hollister Rd & Moffat Creek MD Culvert											Clear Vegetation
CUS020	Hollister Rd Equalizer Culvert											
CUS021	Nesbitt Rd & Whittaker MD Culvert			Rout & Seal	Install Hazard Signs							
CUS022	Nesbitt Rd & Barkley Creek MD Culvert											Clear Vegetation

APPENDIX D

BCI SUMMARY

Appendix D: BCI Summary

Bridges				Culverts			
No #	BCI	No #	BCI	No #	BCI	No #	BCI
BRH001	70			CUC001	70		
BRH002	73			CUC002	74		
BRH003	73			CUC003	74		
BRH004				CUC004	74		
BRH005	65			CUC005	71		
BRH006	71			CUC006	59		
BRH007	73			CUC007	74		
BRH008	73			CUC008	43		
BRH009	58			CUC009	74		
BRH010	75			CUS001	75		
BRH011	73			CUS002	67		
BRH012	41			CUS003	75		
BRH013	72			CUS004	66		
BRH014	73			CUS005	64		
BRH015	71			CUS006	59		
BRH016	75			CUS007			
BRH017	74			CUS008	70		
BRT001	75			CUS009	75		
				CUS010	41		
				CUS011	69		
				CUS012	64		
				CUS013	73		
				CUS014	62		
				CUS015	73		
				CUS016	63		
				CUS017	75		
				CUS018	47		
				CUS019	60		
				CUS020	60		
				CUS021	75		
				CUS022	65		

APPENDIX E

10 YEAR ASSET MANAGEMENT PLAN

Appendix E- 10 Year Asset Management Plan

	Recommended Work					Further Investigations			
Year	Structure #	Structure Name	Type	Structure Description	Cost Esimate	Type	Structure #	Structure Name	Cost Esimate
2023	CUS010	Development Rd CPR Railway Culvert	Replacement	3-Cell CSP Round Culvert	$ 452,000.00	Rehabilitation/ Replacement study	CUS004	Jennings Rd & Castor Extension MD Culvert	$ 20,000.00
	CUS018	Webb Rd & Whittaker MD Culvert	Replacement	4-Cell CSP Round Culvert	$ 252,000.00	Rehabilitation/ Replacement study	BRH012	Nation Valley Rd & Barkley Creek Bridge	$ 20,000.00
	CUS004	Jennings Rd & Castor Extension MD Culvert	Design & Tender		$ 40,000.00	Rehabilitation/ Replacement study	BRH006	Development Rd & North Branch of South Nation River MD Bridge	$ 20,000.00
	BRH012	Nation Valley Rd & Barkley Creek Bridge	Design & Tender		$ 50,000.00	Rehabilitation/ Replacement study	CUC008	Liscumb Rd & Tighe MD Culvert	$ 20,000.00
				Total	**$ 794,000.00**			**Total**	**$ 80,000.00**
2024	CUS004	Jennings Rd & Castor Extension MD Culvert	Replacement	SPCSP Arch Culvert	$ 337,000.00	Deck Condition Surveys	BRH013, BRH002, BRH003, BRH007, BRH014, BRH017, BRH016, BRH001, BRH008	Multiple Structures	$ 90,000.00
	BRH012	Nation Valley Rd & Barkley Creek Bridge	Replacement	Concrete Rigid Frame CIP T-Beam	$ 560,000.00	Rehabilitation/ Replacement study	BRH011	Nation Valley Rd & South Nation River Bridge	$ 20,000.00
		Guiderail Contract	Design & Tender	CUC006, CUS012, CUS002, CUS011, CUS008, CUC003, CUC009, CUS009, CUS001, CUS003, CUS017	$ 60,000.00				
		Misc. Bridge Repairs	Design & Tender	BRH006, BRH013, BRH011, BRH002, BRH003, BRH007, BRH014, BRH017	$ 50,000.00				
				Total	**$ 1,007,000.00**			**Total**	**$ 110,000.00**
2025		Guiderail Contract	Design & Tender	CUC006, CUS012, CUS002, CUS011, CUS008, CUC003, CUC009, CUS009, CUS001, CUS003, CUS017	$ 528,000.00	Rehabilitation/ Replacement study	CUS020	Hollister Rd Equalizer Culvert	$ 20,000.00
		Misc. Bridge Repairs	Rehabilitation	BRH006, BRH013, BRH011, BRH002, BRH003, BRH007, BRH014, BRH017	$ 729,500.00	Rehabilitation/ Replacement study	CUS019	Hollister Rd & Moffat Creek MD Culvert	$ 20,000.00
	CUS020	Hollister Rd Equalizer Culvert	Design & Tender		$ 40,000.00	Rehabilitation/ Replacement study	CUS005	Kerrs Ridge Rd Allowance & Castor Extension MD Culve	$ 20,000.00
	CUS019	Hollister Rd & Moffat Creek MD Culvert	Design & Tender		$ 40,000.00				
				Total	**$ 1,337,500.00**			**Total**	**$ 60,000.00**
2026	CUS020	Hollister Rd Equalizer Culvert	Replacement	2-Cell CSP Round Culvert	$ 382,000.00	Rehabilitation/ Replacement study	BRH009	Cameron Rd & Near Boundary Rd Bridge	$ 20,000.00
	CUS019	Hollister Rd & Moffat Creek MD Culvert	Replacement	2-Cell CSP Culvert	$ 363,000.00	Rehabilitation/ Replacement study	CUS006	Spruit Rd & Castor Extension MD Culvert	$ 20,000.00
	BRH009	Cameron Rd & Near Boundary Rd Bridge	Design & Tender		$ 40,000.00	Rehabilitation/ Replacement study	CUS022	Nesbitt Rd & Barkley Creek MD Culvert	$ 20,000.00
	CUS006	Spruit Rd & Castor Extension MD Culvert	Design & Tender		$ 40,000.00	Rehabilitation/ Replacement study	CUS014	River Rd & Kittle Creek MD Culvert	$ 20,000.00
				Total	**$ 825,000.00**			**Total**	**$ 80,000.00**
2027	BRH009	Cameron Rd & Near Boundary Rd Bridge	Major Rehabilitation	Slab on Steel I-Girders	$ 480,000.00	Rehabilitation/ Replacement study	CUS016	Guy Rd & Mullin MD Culvert	$ 20,000.00
	CUS006	Spruit Rd & Castor Extension MD Culvert	Replacement	SPCSP Arch Culvert	$ 291,000.00	Rehabilitation/ Replacement study	CUS004	Jennings Rd & Castor Extension MD Culvert	$ 20,000.00
	CUS022	Nesbitt Rd & Barkley Creek MD Culvert	Design & Tender		$ 40,000.00	Rehabilitation/ Replacement study	CUS015	Guy Rd & Mullin MD Culvert	$ 20,000.00
	CUC008	Liscumb Rd & Tighe MD Culvert	Design & Tender		$ 50,000.00				
				Total	**$ 861,000.00**			**Total**	**$ 60,000.00**
2028	CUS022	Nesbitt Rd & Barkley Creek MD Culvert	Replacement	SPCSP Arch Culvert	$ 547,000.00				
	CUC008	Liscumb Rd & Tighe MD Culvert	Replacement	Concrete Rigid Frame (Open Footing)	$ 295,000.00				
	CUS016	Guy Rd & Mullin MD Culvert	Design & Tender		$ 40,000.00				
	BRH001	Belmeade Rd & South Castor Creek Bridge	Design & Tender		$ 50,000.00				
				Total	**$ 932,000.00**			**Total**	**$ -**
2029	CUS016	Guy Rd & Mullin MD Culvert	Replacement	SPCSP Arch Culvert	$ 421,000.00				
	BRH001	Belmeade Rd & South Castor Creek Bridge	Minor Rehabilitation	Slab on Concrete Box Girders	$ 560,000.00				
	CUS005	Kerrs Ridge Rd Allowance & Castor Extension MD Culvert	Design & Tender		$ 40,000.00				
	CUS014	River Rd & Kittle Creek MD Culvert	Design & Tender		$ 40,000.00				
				Total	**$ 1,061,000.00**			**Total**	**$ -**
2030	CUS005	Kerrs Ridge Rd Allowance & Castor Extension MD Culvert	Replacement	SPCSP Arch Culvert	$ 325,000.00				
	CUS014	River Rd & Kittle Creek MD Culvert	Replacement	CSP Horizontal Ellipse Culvert	$ 452,000.00				
	CUS015	Guy Rd & Mullin MD Culvert	Design & Tender		$ 40,000.00				
		Misc. Culvert Repairs	Design & Tender	CUC006, CUC005, CUS013	$ 40,000.00				
				Total	**$ 857,000.00**			**Total**	**$ -**
2031	CUS015	Guy Rd & Mullin MD Culvert	Replacement	SPCSP Arch Culvert	$ 307,000.00				
		Misc. Culvert Repairs	Rehabilitation	CUC006, CUC005, CUS013	$ 138,500.00				
	BRH005	Liscumb Rd & Annable MD Bridge	Design & Tender		$ 50,000.00				
				Total	**$ 495,500.00**			**Total**	**$ -**
2032	BRH005	Liscumb Rd & Annable MD Bridge	Minor Rehabilitation	Concrete Rigid Frame	$ 237,000.00				
				Total	**$ 237,000.00**			**Total**	**$ -**

ATTACHMENT 1

OSIM INSPECTION REPORTS & BCI FORMS

BRIDGES

Inventory Data:

Structure Name	Belmade Rd & South Castor Creek Bridge								
Main Hwy/Road #	Belmade Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	5.0km West of County Rd 31								
Latitude	45.1253948		Longitude	-75.4990661					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	360		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Concrete Box Girders		Interchange Number						
Total Deck Length	12.2 m		Interchange Structure Number						
Overall Str. Width	10.5 m		Min. Vertical Clearance		m				
Total Deck Area	128.1 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	7.0 m		Detour Length Around Bridge		km				
Skew Angle	20 Degrees		Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Span Lengths	12.2 m								

Historical Data:

Year Built	1981	Year of Last Major Rehab.	
Last OSIM Inspection	October 8, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.63		
OSIM		2022	70.00		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Partly Cloudy					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:	Deck Condition Survey Recommended Based on Age of Structure				

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good to fair condition. Failure of east expansion joint was noted with damage to the surrounding concrete on the fascia. Impact damage at NE barrier, pothole in west approach, spalls noted in barrier posts, Scaling and spalls noted on curbs, map cracking on soffit.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 73.7, SE: 36, SW: 70.4, NW: 36.2					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	216.3					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				212.3			4			
Comments:	Generally in good condition. Delineators missing at all four corners. Impact damage noted at northeast										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	18 - (Other)					
		1-5 years		6-10 years	X	Urgent		1 year		2 years	
					Install delineators at all corners						

Element Group:	Approaches				Length:	12.2					
Element Name:	Curb and Gutters				Width:						
Location:	NE, SE, NW & SW of Structure				Height:	0.3					
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Concrete Curb & Gutters				Total Quantity:	48.0					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				48.8						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	7					
Location:	East and West Side of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Surface Treatment				Total Quantity:	84.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				76.4	5.0		2.5			
Comments:	Evidence of localized settlement and edge alligator cracking was noted on both west and east asphalt surface treatments. Pothole noted on West approach										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	15					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Repair asphalt surface treatment and patch pothole						

Element Group:	Joints				Length:	9.2					
Element Name:	Armouring/Retaining Devices				Width:						
Location:	East Side of Structure				Height:						
Material:	Other				Count (items):						
Element Type:	Expansion Joint Armouring				Total Quantity:	9.2					m
Environment:	Severe				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m							9.2			
Comments:	Structure lacks expansion joint on west deck end. East expansion joint has been partially paved over and inspection was restricted. Minor corrosion was noted on expansion joint armouring over safety curb. Severe disintegration was noted on fascia adjacent to the expansion joint which could be result of leakage from expansion joint. Leaking failure and deformation at northeast.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	1.6					
Element Name:	Posts				Width:	0.4					
Location:	NE, NW, SE & SW of Structure				Height:	1					
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Reinforced concrete End Posts				Total Quantity:	15.36					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				15.16	0.2					
Comments:	Generally in good condition with some light spalls at bases of west posts.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	23					
Element Name:	Railing System				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	3 Rail Metal Railing on Steel Posts				Total Quantity:	46					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m				46						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers			Length:					
Element Name:	Posts			Width:					
Location:	North and South Sides of Structure			Height:					
Material:	Steel			Count (items):	22				
Element Type:	Steel Posts			Total Quantity:	22				Each
Environment:	Severe			Limited Inspection					
Protection System:	Hot Dip Galvanizing								Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*		
	Each			21			1		
Comments:	Generally in good condition. Disconnected and damaged barrier post at northeast								
Recommended Work:		Rehab		Replace	**Maintenance Needs:**		18		
		1-5 years		6-10 years	X	Urgent		1 year	2 years
					Replace barrier post				

Element Group:	Sidewalk/Curbs			Length:	26.2				
Element Name:	Curbs			Width:	1.0				
Location:	North South Sides of Structure			Height:	0.25				
Material:	Cast-In-Place Concrete			Count (items):	2				
Element Type:	Reinforced Concrete Curbs			Total Quantity:	65.5				m^2
Environment:	Severe			Limited Inspection					
Protection System:	None								Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*		
	m^2			51.9	12.4		1.2		
Comments:	Minor abrasions and medium to wide cracks were noted. Scaling and spalling at southwest curb flare present. Narrow-medium cracks notes with possible alkali-aggregate reaction.								
Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	2 years

Element Group:	Decks			Length:	12.2				
Element Name:	Wearing Surface			Width:	7				
Location:	Top of Deck			Height:					
Material:	Asphalt			Count (items):					
Element Type:	Asphalt Surface Treatment			Total Quantity:	85.4				m^2
Environment:	Severe			Limited Inspection					
Protection System:	None								Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*		
	m^2			81.8	2.4		1.2		
Comments:	Narrow to medium map cracking and edge cracking were noted. Bridge deck has been covered by asphalt surface treatment layer with no waterproofing layer which could have adverse impact on superstructure in long-term. Ponding was noted along all sides (Exposed deck with no drains)								
Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	2 years

Element Group:	Decks				Length:	17.4					
Element Name:	Deck Top				Width:	10.5					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	182.7					m^2
Environment:	Moderate				Limited Inspection	X					
Protection System:	Asphalt Surface Treatment									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				181.2	1.0		0.5			
Comments:	Previous inspection notes localized spall on the exposed surface of deck - not observed at the time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	9.4					
Element Name:	Soffit - Thin Slab				Width:	1.55					
Location:	North and South Sides of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	29.14					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				8.74	11.66		8.74			
Comments:	Evidence of severe disintegration was noted on south fascia adjacent to expansion joint. Evidence of localized spalls was noted on soffit exterior. Wide map cracking along southwest half of soffit and most of north side.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repair to soffit exterior adjacent to expansion joint											

Element Group:	Decks				Length:	2.0					
Element Name:	Soffit - Thin Slab				Width:	9.6					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	1					
Element Type:	Soffit - End				Total Quantity:	19.2					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				17.4	1.2		0.6			
Comments:	Wide cracks and efflorescence was noted on east bridge end adjacent to expansion joint										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	9.4					
Element Name:	Soffit - Thin Slab				Width:	9.6					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	90.2					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				90.2						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	East and West Abutment Walls				Height:						
Material:	Plastic				Count (items):	16					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	16					Each
Environment:	Benign				Limited Inspection			X			
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				16						
Comments:	Generally in good condition, limited access to bearing pads, condition is based on accessible bearing pads										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	9.6					
Location:	East and West Abutment Walls				Height:	0.9					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	17.3					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				17.3						
Comments:	Ballast walls were inaccessible for inspection due to box girders. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	9.6					
Location:	East and West Underside of Structure				Height:	3.2					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	61.4					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				49.40	10		2			
Comments:	Generally in good to fair condition with narrow AAR cracking throughout. Wide vertical crack at full height on east and west side.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:	7.0					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	1.5					
Material:	Cast-in-place Concrete				Count (items):	4.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	42.0					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				29.4	12.6					
Comments:	Generally in good to fair condition with medium map cracking throughout.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection			X			
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:					
Element Name:	Embankments				Width:					
Location:	NE, SE, NW & SW Side of Structure				Height:					
Material:	Native Material				Count (items):	4				
Element Type:	Embankment				Total Quantity:					Each
Environment:	Moderate				Limited Inspection					
Protection System:	Vegetation									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	Each			4.00						
Comments:	Embankments are moderately sloped and well vegetated.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:					
Element Name:	Streams and Waterways				Width:					
Location:	Below Structure				Height:					
Material:	Native				Count (items):	All				
Element Type:	Stream				Total Quantity:	All				N/A
Environment:	Benign				Limited Inspection					
Protection System:	None									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	N/A			All						
Comments:	Low volume and moderate flow with no obstructions noted.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Armouring Joint	Replace armouring joint and seal		X		$ 60,000.00
Deck Soffit/Fascia	Localized Concrete Repair associated with Joint deficiency		X		$ 10,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 75,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

BELMADE RD. & SOUTH CASTOR CREEK BRIDGE **SITE PHOTOGRAPHS** **Site No.:BRH001**

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

BELMADE RD. & SOUTH CASTOR CREEK BRIDGE **SITE PHOTOGRAPHS** **Site No.:BRH001**

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Alligator cracking in west approach wearing surface

Photo 8 Pothole in west approach

Photo 9 Spall on northeast barrier curb

Photo 10 Impact damage at northeast approach barrier

Photo 11 Spall at east joint and deck

Photo 12 Disconnected and damaged barrier post

Photo 13 Spall and efflorescence at southeast joint and deck fascia

Photo 14 Wide vertical crack in east abutment wall with possible AAR

Photo 15 Evidence of joint failure at east abutment wall

Photo 16 Scaling on deck barrier curb

Photo 17 Scaling on curb and damage at northeast joint

Structure Condition Summary Form

Structure Name Belmade Rd & South Castor Creek Bridge
Structure Number BRH001
Date of Inspection December 8, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Abutment	Abutment Walls	Sq.m	900.00	61.4		49.4	10	2	55260	36945	67	00	00
	Ballast Walls	Sq.m	350.00	17.3		17.3			6055	4541	75	00	00
	Bearings	Each	1000.00	16		16			16000	12000	75	00	00
	Wingwalls	Sq.m	350.00	42		29.4	12.6		14700	9482	65	00	00
Approaches	Curb and Gutters	m	25.00	48.8		48.8			1220	915	75	00	00
	Barrier	m	0.00	216.3		212.3		4	0	0		00	18
	Wearing Surface	Sq.m	6.00	83.9		76.4	5	2.5	503	356	71	00	15
Barriers	Posts (Concrete)	Sq.m	200.00	13.56		13.36	0.2		2712	2020	74	00	00
	Posts (Steel)	Each	200.00	22		21		1	4400	3150	72	00	00
	Railing Systems	m	200.00	46		46			9200	6900	75	00	00
Decks	Deck Top-Thin Slab	Sq.m	120.00	182.7		181.2	1	0.5	21924	16356	75	00	00
	Soffit- Thin Slab	Sq.m	120.00	138.54		116.34	12.86	9.34	16625	11088	67	00	00
	Wearing Surface	Sq.m	25.00	85.4		81.8	2.4	1.2	2135	1558	73	00	00
Embankments and	Embankments	Each	0.00	4		4			0	0		00	00
Joints	Armouring / Retaining Devices	m	1.00	9.2				9.2	9	0		00	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	65.5		51.9	12.4	1.2	2620	1755	67	00	00
									153363	**107066**			

Conditon Index **70**

Inventory Data:

Structure Name	Belmade Rd & South Castor River Bridge								
Main Hwy/Road #	Belmade Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	2.1km West of County Rd 31								
Latitude	45.1366902		Longitude	-75.4657242					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	360		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Concrete Box Girders		Interchange Number						
Total Deck Length	17.4 m		Interchange Structure Number						
Overall Str. Width	10.5 m		Min. Vertical Clearance		m				
Total Deck Area	182.7 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	7.3 m		Detour Length Around Bridge		km				
Skew Angle	0 Degrees		Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Span Lengths	16.6 m								

Historical Data:

Year Built	1981	Year of Last Major Rehab.	
Last OSIM Inspection	October 8, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	73.36		
OSIM		2022	73.00		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Partly Cloudy					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:	Deck Condition Survey Recommended Based on Age of Structure				

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good to fair condition. Failure of east expansion joint was noted with damage to the surrounding concrete on the fascia. Wide cracks on concrete barrier posts/walls. Cracks present at northwest wingwall. Aggradation and vegetation growth along sides of approach wearing surface.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (Attachments and Signs)			Length:							
Element Name:	Signs			Width:							
Location:	NE and SW Side of structure			Height:							
Material:	Steel			Count (items):	2						
Element Type:	Hazard Markers			Total Quantity:	2.0						Each
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	Each				2						
Comments:	Approaches to the structure are missing hazard markers on northwest and southeast sides. Hazard markers on both sides (northeast & southwest) have been tilted and damaged.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 18 - (Other)						
		1-5 years		6-10 years	X	Urgent		1 year		2 years	
					Replace and install hazard markers at all four quadrants						

Element Group:	Approaches			Length:	NE: 74, SE: 35.4, SW: 74.7, NW: 36.3						
Element Name:	Barriers			Width:							
Location:	NE, SE, NW & SW of Structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)			Total Quantity:	220.4						m
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m		220.4								
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches			Length:	12						
Element Name:	Curb and Gutters			Width:							
Location:	NE, NW, SW & SE Side of Structure			Height:	0.3						
Material:	Cast-in-Place Concrete			Count (items):	4						
Element Type:	Concrete Curb & Gutters			Total Quantity:	48.0						m
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m		48								
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	6.0					
Element Name:	Wearing Surface				Width:	7.3					
Location:	East and West Sides of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Surface Treatment				Total Quantity:	87.6					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				79.70	5		2.6			
Comments:	Evidence of localized settlement was noted on both west and east asphalt surface treatments. Longitudinal alligator cracking at sides and transverse alligator cracking at west joint.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**			12		
			1-5 years		6-10 years		Urgent	X	1 year		2 years
						Repair asphalt surface treatment on approaches. Route and seat cracks					

Element Group:	Joints				Length:	10.5					
Element Name:	Other				Width:						
Location:	East Side of Structure				Height:						
Material:	Other				Count (items):						
Element Type:	Expansion Joints				Total Quantity:	10.5					m^2
Environment:	Severe				Limited Inspection	X					
Protection System:	Asphalt Wearing Surface										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2							10.5			
Comments:	Structure lacks expansion joint on west deck end. East expansion joint has been paved over and inspection was restricted. East expansion joint over safety curbs has been covered with steel plate. Severe disintegration was noted on fascia adjacent to the expansion joint which could be result of leakage from expansion joint.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
		X	1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Barriers				Length:	1.6					
Element Name:	Posts				Width:	0.4					
Location:	NE, NW, SW & SE Side of Structure				Height:	1.0					
Material:	Cast-in-place concrete				Count (items):	4					
Element Type:	Reingforced Concrete End Posts				Total Quantity:	15.36					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				13.1	7		3			
Comments:	Wide cracks, medium to severe delamination, and spall was noted. Possible AAR with efflorescence.										
Recommended Work:		X	Rehab		Replace	**Maintenance Needs:**					
		X	1-5 years		6-10 years		Urgent		1 year		2 years
Repair concrete end posts/walls											

Element Group:	Barriers					Length:					
Element Name:	Railing Systems					Width:					
Location:	North and South of Structure					Height:					
Material:	Steel					Count (items):	22				
Element Type:	Steel Posts					Total Quantity:	22				Each
Environment:	Severe					Limited Inspection					
Protection System:	Hot Dip Galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				22						
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Sidewalk/Curbs					Length:	27.4				
Element Name:	Curbs					Width:	1.0				
Location:	North South Sides of Structure					Height:	0.25				
Material:	Cast-In-Place Concrete					Count (items):	2				
Element Type:	Reinforced Concrete Curbs					Total Quantity:	68.5				m^2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				64.9	2.4		1.2			
Comments:	Minor scaling and abrasions due to snow plow machines noted. Localized spall and abrasion. Medium spall at northeast joint.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	8				
		1-5 years		6-10 years			Urgent		1 year	X	2 years
						Concrete repairs					

Element Group:	Decks					Length:	17.4				
Element Name:	Wearing Surface					Width:	7.3				
Location:	Top of Deck					Height:					
Material:	Asphalt					Count (items):					
Element Type:	Asphalt Surface Treatment					Total Quantity:	127.0				m^2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				116.8	10.0		0.2			
Comments:	Generally in good condition. Surface treatment does not cover full width of deck and is not waterproofed which may have adverse impact on superstructure in long term.										
Recommended Work:		Rehab	X	Replace		**Maintenance Needs:**					
	X	1-5 years		6-10 years			Urgent		1 year		2 years
Waterproof and repave											

Element Group:	Decks				Length:	17.4					
Element Name:	Deck Top - Thin slab				Width:	10.5					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	182.7					m^2
Environment:	Severe				Limited Inspection	X					
Protection System:	Asphalt Surface Treatment									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			182.7	10.0		0.2				
Comments:	light Scaling, ponding, and light raveling noted in exposed portion of deck.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	14.6					
Element Name:	Soffit - Thin Slab				Width:	1.55					
Location:	North and South Sides of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	45.3					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			42.00	2.00		1.20				
Comments:	Severe disintegration was noted on south fascia adjacent to expansion joint. Localized spalls was noted on soffit exterior. AAR noted near concret barrier										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repair to soffit exterior adjacent to expansion joint											

Element Group:	Decks				Length:	2.0					
Element Name:	Soffit - Thin Slab				Width:	9.6					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	1					
Element Type:	Soffit - End				Total Quantity:	19.2					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			19.2	0.2		0.1				
Comments:	Generally in good condition (box girders) with small spalls on south fascia										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	14.6					
Element Name:	Soffit - Thin Slab				Width:	9.6					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	140.2					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				140.2	0		0			
Comments:	Generally in good condition (box girders) with small spall at center										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	East and West Abutment Walls				Height:						
Material:	Plastic				Count (items):	16					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	16					Each
Environment:	Benign				Limited Inspection			X			
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each				16						
Comments:	Generally in good condition, limited access to bearing pads, condition is based on accessible bearing pads										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	9.6					
Location:	East and West Abutment Walls				Height:	0.9					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	17.3					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				17.3						
Comments:	Ballast walls were inaccessible for inspection due to box girders. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	9.6					
Location:	East and West Underside of Structure				Height:	3.2					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	61.4					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				57.00	3		1			
Comments:	Generally in good to fair condition with narrow AAR crackig throughout. Wide vertical crack at full height on east and west side.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repairs on abutment walls											

Element Group:	Abutments				Length:	5.0					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	1.5					
Material:	Cast-in-place Concrete				Count (items):	4.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	30.0					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				26.5	2.5		1			
Comments:	Evidence of wide map cracking was noted at northeast and northwest										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repairs to wingwalls											

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection			X			
Protection System:	Unknown										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						0
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	6					
Element Type:	Embankment				Total Quantity:	6					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	Each				4.00						
Comments:	Embankments are moderately sloped and well vegetated.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	N/A				All						
Comments:	Low volume and low flow from south to north with no flow obstructions noted. Meander present downstream (north)										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Armouring Joint	Replace armouring joint and seal		X		$ 60,000.00
Deck Soffit/Fascia	Localized Concrete Repair associated with Joint deficiency		X		$ 10,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 60,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

BELMADE RD & SOUTH CASTOR RIVER BRIDGE **SITE PHOTOGRAPHS** **Site No.:BRH002**

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Pothole, patch, and crack at southwest approach wearing surface

Photo 8 Vegetation and aggradation at southwest approach (typical)

Photo 9 Spall on northwest barrier curb at transition

Photo 10 Wide AAR cracking at northwest barrier end wall

Photo 11 Spall at northeast barrier curb near joint

Photo 12 Wide crack at northeast barrier end wall

Photo 13 Spall at southeast joint and deck fascia

Photo 14 Exposed concrete deck top beside surface treatment

Photo 15 Evidence of leaking and joint failure at east abutment wall

Photo 16 Small spall on south box girder side (named as soffit in report)

Photo 17 Cracks in northwest abutment wall

Photo 18 Crack in west abutment wall

Structure Condition Summary Form

Structure Name	Belmade Rd & South Castor River Bridge
Structure Number	BRH002
Date of Inspection	December 8, 2022
Consultant	HP Engineering Inc.
Contract Number	22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Abutment	Abutment Walls	Sq.m	900.00	61		57	3	1	54900	39555	72	00	00
	Ballast Walls	Sq.m	350.00	17.3		17.3			6055	4541	75	00	00
	Bearings	Each	1000.00	16		16			16000	12000	75	00	00
	Wingwalls	Sq.m	350.00	30		26.5	2.5	1	10500	7306	70	00	00
Accessories	Signs	Each	0.00	2				2	0	0		00	18
Approaches	Curb and Gutters	m	25.00	48		48			1200	900	75	00	00
	Barrier	m	0.00	220.4		220.4			0	0		00	00
	Wearing Surface	Sq.m	6.00	87.3		79.7	5	2.6	524	371	71	00	12
Barriers	Posts (Concrete)	Each	200.00	15.36		13.1	7	3	3072	2525	82	00	00
	Posts (Steel)	Each	200.00	22		22			4400	3300	75	00	00
Decks	Deck Top-Thin Slab	Sq.m	120.00	192.9		182.7	10	0.2	23148	16923	73	00	00
	Soffit- Thin Slab	Sq.m	120.00	204.9		201.4	2.2	1.3	24588	18232	74	00	00
	Wearing Surface	Sq.m	25.00	127		116.8	10	0.2	3175	2290	72	00	00
Embankments and Streams	Embankments	Each	0.00	4		4			0	0		00	00
	Streams and Waterways	All	0.00	1		1			0	0		00	00
Foundations	Foundations (below ground level)	N/A	0.00	1		1			0	0		00	00
Joints	Armouring / Retaining Devices	m	1.00	10.5				10.5	11	0		00	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	68.5		64.9	2.4	1.2	2740	1985	72	00	08
									150312	**109928**			

Conditon Index **73**

Inventory Data:

Structure Name	Ormond Bridge								
Main Hwy/Road #	Ormond Road		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.2km West of Bisson Road								
Latitude	45.1653584		Longitude	-75.3556303					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	40		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Reinforced Concrete Sold Slab		Interchange Number						
Total Deck Length	32.3 m		Interchange Structure Number						
Overall Str. Width	9.1 m		Min. Vertical Clearance		m				
Total Deck Area	293.9 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	7.5 m		Detour Length Around Bridge		km				
Skew Angle	30 Degrees		Direction of Structure	East/West					
No. of Spans	3		Fill on Structure		m				
Span Lengths	9.4,12.7,9.4 m								

Historical Data:

Year Built	1979	Year of Last Major Rehab.	
Last OSIM Inspection	October 10, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	72.99		
OSIM		2022	73		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00
Investigation Notes:	Deck Condition Survey Recommended Based on Age of Structure				

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	New end treatments installed since previous inspection. Settlement of the approaches noted at both ends of structure with large potholes also noted. Collision damabe noted on south deck barrier. Localised spall noted on both deck top and deck soffit. Medium vertical cracks on abutment walls.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 20.9, SE: 17.1, SW: 17.1, NW: 20.9					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	76.0					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			76							
Comments:	New end treatments installed since previous inspection. Approach barrier is generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	7.5					
Location:	East and West Side of Structure				Height:						
Material:	Gravel				Count (items):	2					
Element Type:	Gravel Wearing Surface				Total Quantity:	90.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			75	10.0		5.0			9	
Comments:	Large potholes noted on approach wearing surface. Settlement noted noted at ends of approach at interface with deck.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	12				
			1-5 years		6-10 years		Urgent		1 year	X	2 years
						Patch potholes					

Element Group:	Joints				Length:	10.5					
Element Name:	Armouring/Retaining Devices				Width:						
Location:	East & West Side of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Expansion Joint Armouring				Total Quantity:	42					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			41.3	0.7						
Comments:	Light to medium rust and some abrasions noted on joint armouring. Expansion joints were covered by debris.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	2				
			1-5 years		6-10 years		Urgent		1 year	X	2 years
						Clear debris					

Element Group:	Joints				Length:	10.5					
Element Name:	Concrete End Dams				Width:	0.35					
Location:	East & West Ends of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Concrete End Dams				Total Quantity:	7.35					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				6.35		0.5		0.5		
Comments:	Light to medium scaling, some small spalls and some abrasions noted on the concrete end dams.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Concrete Repairs						

Element Group:	Joints				Length:	10.5					
Element Name:	Seals/Sealants				Width:						
Location:	East & West side of Structure				Height:						
Material:	Rubber				Count (items):	2					
Element Type:	Strip Seal				Total Quantity:	2					each
Environment:	Severe				Limited Inspection	X					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	each				2						
Comments:	Expansion joints appear to be in good condition. Seals are covered with debris.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**	2					
	X	1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Clear debris						

Element Group:	Barriers				Length:	0.9					
Element Name:	Barrier/Parapet Walls				Width:	0.3					
Location:	NE, NW, SE & SW of Structure				Height:	0.9					
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Reinforced concrete End Posts				Total Quantity:	8.3					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				8.3						
Comments:	Light scaling noted on concrete end post.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers					Length:	38.4					
Element Name:	Railing System					Width:						
Location:	North and South Sides of Structure					Height:						
Material:	Steel					Count (items):	2					
Element Type:	Steel Flex Beam					Total Quantity:	76.8					m
Environment:	Severe					Limited Inspection						
Protection System:	Hot Dip Galvanizing											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	m				65.8		8		3			
Comments:	Light corrosion and abrasions noted on flex beam. Collision damage noted on south barrier.											
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						3	
		1-5 years		6-10 years		Urgent		1 year	X	2 years		
					Replace damaged Sections							

Element Group:	Barriers					Length:						
Element Name:	Posts					Width:						
Location:	North and South Sides of Structure					Height:						
Material:	Cast-in-Place Concrete					Count (items):	20					
Element Type:	Reinforced Concrete Posts					Total Quantity:	20					Each
Environment:	Severe					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	Each				20							
Comments:	Generally in good condition with some rotated spacers noted on posts.											
Recommended Work:		Rehab		Replace	**Maintenance Needs:**							
		1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Coating					Length:						
Element Name:	Railing Systems/Hand Railings					Width:						
Location:	On Bridge Railing					Height:						
Material:	Other					Count (items):						
Element Type:	Hot Dip Galvanizing					Total Quantity:	76.8					m
Environment:	Severe					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	m				76.8							
Comments:	Coating is generally in good condition.											
Recommended Work:		Rehab		Replace	**Maintenance Needs:**							
		1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Decks				Length:	32.3					
Element Name:	Deck Top (Exposed)				Width:	9.1					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top (Exposed)				Total Quantity:	293.93	m^2				
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				276.33	9.6		8.0			
Comments:	Light scaling, wide longitudinal and transverse cracks and localized spall noted on concrete deck top. Gravel and debris build up noted at edges of deck top.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	2					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Clean Debris						

Element Group:	Decks				Length:	2					
Element Name:	Soffit - Thin Slab (End)				Width:	11.5					
Location:	East & West Underside of Structure of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Soffit - End				Total Quantity:	46.0	m^2				
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				46.00						
Comments:	End portion of soffit appears to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	28.3					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	1.5					
Location:	North and South Side of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	84.9	m^2				
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				83.9	0.5		0.5			
Comments:	Small spall noted on north side of exterior soffit. Overall generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Concrete Repairs						

Element Group:	Decks				Length:	27.5					
Element Name:	Soffit - Thin Slab (Interior)				Width:	7.1					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	195.25					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				178.07		9.4		7.8		
Comments:	Wide map cracks noted throughout soffit, with localized spall noted on midspan of interior soffit. Barn swallow nests observed at time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	On East and West Abutment Walls				Height:						
Material:	Plastic				Count (items):	2					
Element Type:	Elastomeric Bearing Pads - Polystyrene				Total Quantity:	2					Each
Environment:	Benign				Limited Inspection		X				
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	Each				2						
Comments:	Bearings appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	9.1					
Location:	East and West Underside of Structure				Height:	0.5					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	9.1					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				9.1						
Comments:	Ballast walls were inaccessible for inspection due to end portion of deck. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	9.1					
Location:	East and West Underside of Structure				Height:	2					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	36.4					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m^2			32.20	4.2						
Comments:	Generally in good condiiton with medium vertical cracks and narrow map cracks noted throughout. Graffiti noted on abutment wall surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**				2		
		1-5 years		6-10 years		Urgent		1 year	X		2 years
					Clean graffiti						

Element Group:	Abutments				Length:	3.05					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	1.2					
Material:	Cast-in-place Concrete				Count (items):	4.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	14.6					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m^2			14.6							
Comments:	Generally in good to fair condition with medium map cracking throughout.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year			2 years

Element Group:	Piers				Length:	0.50					
Element Name:	Shafts/Columns/Piles Bents				Width:	10.6					
Location:	Underside of Structure				Height:	4.8					
Material:	Cast-in-place Concrete				Count (items):	2.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	213.12					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m^2			209.52	2.4		1.2				
Comments:	Wide vertical crack noted on pier shaft. Graffiti also noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**				8 & 2		
		1-5 years		6-10 years		Urgent		1 year	X		2 years
					Concrete Repairs, and clean graffiti						

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	N/A			All							0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			4.00							
Comments:	Embankments are moderately sloped, well vegetated and appear to be stable. Evidence of a person living under the bridge.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	N/A			All							
Comments:	High volume and low flow from south to north with no flow obstructions noted at time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Deck Top	Concrete Repairs		X		$ 16,000.00
Deck Soffit	Concrete Repairs		X		$ 19,500.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 35,500.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 New end treatments at west end of structure

Photo 8 Large potholes and settlement noted on east approach

Photo 9 Abrasions noted on strip seal on east expansion joint

Photo 10 Collision damage on southwest corner of deck barrier

Photo 11 Abrasions and scaling on exposed concrete deck top.

Photo 12 Localized spalls on interior soffit

Photo 13 Typical view of south exterior soffit

Photo 14 Typical view of northeast wingwall

Photo 15 East underside of structure

Photo 16 Graffiti on west face of pier

Structure Condition Summary Form

Structure Name Ormond Bridge
Structure Number BRH003
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	76.00	0.00	76.00	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	6.00	90.00	0.00	75.00	10.00	5.00	540	362	67	09	12
Barriers	Barrier/ Parapet Walls	Sq.m	100.00	8.30	0.00	8.30	0.00	0.00	830	623	75	00	00
	Railing Systems	m	200.00	76.80	0.00	65.80	8.00	3.00	15360	10510	68	00	03
	Posts (Steel/Concrete)	Each	200.00	20.00	0.00	20.00	0.00	0.00	4000	3000	75	00	00
	Armouring / Retaining Devices	m	1.00	42.00	0.00	41.30	0.70	0.00	42	31	74	00	00
Joints	Concrete End Dams	Sq.m	2100.00	7.35	0.00	6.35	0.50	0.50	15435	10421	68	00	08
	Seals/ Sealants	Each	0.00	2.00	0.00	2.00	0.00	0.00	0	0		00	00
Decks	Deck Top - Thin Slab	Sq.m	120.00	293.93	0.00	276.33	9.60	8.00	35272	25331	72	00	12
	Soffit - Thin Slab	Sq.m	120.00	326.15	0.00	307.95	9.90	8.30	39138	28191	72	00	00
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	76.80	0.00	76.80	0.00	0.00	9600	7200	75	00	00
	Wingwalls - Gabion Baskets	Each	300.00	14.60	0.00	14.60	0.00	0.00	4380	3285	75	00	00
Abutment	Ballast Walls	Sq.m	350.00	9.10	0.00	9.10	0.00	0.00	3185	2389	75	00	00
	Bearings	Each	1000.00	2.00	0.00	2.00	0.00	0.00	2000	1500	75	00	00
	Abutment Walls	Sq.m	900.00	36.40	0.00	32.20	4.20	0.00	32760	23247	71	01	08
Piers	Shafts/ Columns/ Pier Bents	Sq.m	900.00	213.12	0.00	209.52	2.40	1.20	191808	142290	74	00	08 &02
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									354350	**258378**			

Bridge Condition Index (BCI) **73**

Inventory Data:

Structure Name	Liscumb Rd & Annable MD Bridge								
Main Hwy/Road #	Liscumb Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.35km West of County Rd 3								
Latitude	45.10424		Longitude	-75.3622					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	438		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Concrete Rigid Frame		Interchange Number						
Total Deck Length	5.3 m		Interchange Structure Number						
Overall Str. Width	6.4 m		Min. Vertical Clearance		m				
Total Deck Area	33.9 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	4.6 m		Detour Length Around Bridge		km				
Skew Angle	30 Degrees		Direction of Structure	East/West					
No. of Spans	1.0		Fill on Structure		m				
Culvert Length	m								
Span Lengths	5.3 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	68.57		
OSIM		2022	65.46		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	5˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study		X			
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good to fair condition. Guide rail appears to have been replaced since last inspection. Repave asphalt wearing surface in 1-5 years - potholes, patches, rutting, ponding, and wide cracks noted. Repairs required at concrete soffit. Light abrasions on structure guide rail. Scaling present on exterior soffit. Spall, scaling, ECR, and damp stains noted on interior soffit. Light scaling and scour noted on abutment walls							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (attachments and signs)				Length:						
Element Name:	Signs				Width:						
Location:	NE, NW, SE, SW Side of structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Hazard Markers				Total Quantity:	4.0					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	NW & SW: 15.3m, SE:16.5, NE: 15.9					
Element Name:	Barriers				Width:						
Location:	NE, NW, SE, SW Sides of structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts				Total Quantity:	63.00					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot dip galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				63.00						
Comments:	Appears to have been replaced since last inspection										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	4.6					
Location:	East and West Side of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt wearing surface				Total Quantity:	55.20					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				29.20	13.00		13.00			
Comments:	Wide transverse cracks, rutting, ponding, potholes, and previous patches noted										
Recommended Work:		Rehab	x	Replace		**Maintenance Needs:**					
	x	1-5 years		6-10 years		Urgent		1 year		2 years	
Repave approach wearing surface											

Element Group:	Barriers			Length:	10.7						
Element Name:	Railing Systems			Width:							
Location:	North and South Side of Structure			Height:							
Material:	Steel			Count (items):	2						
Element Type:	Steel Flex Beam			Total Quantity:	21.4					m	
Environment:	Severe			Limited Inspection							
Protection System:	Hot dip galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			18.40	3.00						
Comments:	Generally in good condition with light abrasions noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers			Length:							
Element Name:	Posts			Width:							
Location:	North and South Sides of Structure			Height:							
Material:	Steel			Count (items):	10						
Element Type:	Steel Posts			Total Quantity:	10.00					Eah	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	Each			9.00			1.0				
Comments:	Generally in good condition with collision damage noted										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	18					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Repair bridge post						

Element Group:	Coating			Length:							
Element Name:	Railing Systems/ Hand railings			Width:							
Location:	On bridge railing			Height:							
Material:	Other			Count (items):							
Element Type:	Coating - Hot dip galvanizing			Total Quantity:	21.40					m	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			21.40							
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks					Length:	5.3				
Element Name:	Wearing Surface					Width:	4.6				
Location:	Top of deck					Height:					
Material:	Asphalt					Count (items):					
Element Type:	Asphalt Wearing Surface					Total Quantity:	24.38				m2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				9.75	9.75		4.88			
Comments:	Wide transverse cracks, rutting, ponding, potholes, and previous patches noted										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	X	1-5 years		6-10 years			Urgent		1 year		2 years
Repave asphalt wearing surface											

Element Group:	Decks					Length:	5.3				
Element Name:	Deck Top - Thick Slab					Width:	6.4				
Location:	Below Roadway					Height:					
Material:	Cast-in-place concrete					Count (items):					
Element Type:	Reiforced concrete deck top					Total Quantity:	33.92				m2
Environment:	Moderate					Limited Inspection		X			
Protection System:	Asphalt wearing surface										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				29.92	4.00					
Comments:	Condition of the deck is assumed based on the condition of asphalt wearing surface and soffit.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks					Length:	5.3				
Element Name:	Soffit - Thick Slab					Width:	1.6				
Location:	North and South Side of Structure					Height:					
Material:	Cast-in-place concrete					Count (items):	2				
Element Type:	Soffit - Exterior					Total Quantity:	16.96				m2
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				8.48	8.48					
Comments:	Moderate to severe scaling present throughout the exterior soffit.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**		8			
		1-5 years		6-10 years			Urgent	x	1 year		2 years
						Concrete repairs					

Element Group:	Decks				Length:	5.3					
Element Name:	Soffit - Thick Slab				Width:	4.4					
Location:	Underside of structure				Height:						
Material:	Cast-in-place concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	23.32					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				16.32	3.50		3.50			
Comments:	Small spall with ECR noted. Light to moderate scaling and wet stains present near exterior soffit.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**			8			
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Concrete repairs						

Element Group:	Abutments				Length:						
Element Name:	Abutment walls				Width:	6.4					
Location:	East and West Underside of Structure				Height:	1.5					
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Reinforced concrete walls				Total Quantity:	19.2					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				14.20	4.00		1			
Comments:	Wet stains, moderate scour at waterline, and light scaling present throughout.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**			8			
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
					Concrete repairs						

Element Group:	Abutments				Length:	2.7					
Element Name:	Wingwalls				Width:						
Location:	NE, NW, SE & SW of Structure				Height:	1.5					
Material:	Cast-in-place concrete				Count (items):	4					
Element Type:	Reinforced concrete walls				Total Quantity:	16.2					m2
Environment:	moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				16.2	2					
Comments:	Generally in good condition with light scaling										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below abutment walls and wingwalls				Height:						
Material:	Unknown				Count (items):	All					
Element Type:	Unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SE & SW Sides of structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Embankment				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				3	1					
Comments:	Embankments are moderately sloped, well vegetated, and stable, with some loss of fill at the southeast										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and streams				Length:						
Element Name:	Slope Protection				Width:						
Location:	NE, NW, SE & SW Sides of structure				Height:						
Material:	Vegetation				Count (items):	4					
Element Type:	Slope Protection				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				3	1					
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and streams					Length:					
Element Name:	Streams and waterways					Width:					
Location:	Below Structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams and waterways					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	Low volume and low flow from north to south with no visible obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Wearing Surfaces	Repave asphalt		X		$ 50,000.00
Soffit	Concrete Repairs		X		$ 10,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 60,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ 35,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Structure and approach barrier and end treatment (typical)

Photo 8 Transverse cracks, patched potholes, and raveling on wearing surface

Photo 9 Potholes, ponding, and cracks in asphalt wearing surface

Photo 10 Light abrasions on guide rail posts

Photo 11 Disconnected/rotated barrier post and loss of fill at the southeast

Photo 12 Scaling on deck soffit exterior/fascia (typ.)

Photo 13 Small spall with ECR on the deck soffit

Photo 14 Scaling and wet stains on deck soffit

Photo 15 Scaling, wet stains, and light scour on abutment walls

Photo 16 Scaling and wet stains on deck soffit

Photo 17 Scaling on wingwalls

Structure Condition Summary Form

Structure Name Nation Valley Rd & Barkley Creek Bridge
Structure Number BRH005
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	63.00		63.00			0	0		00	00
	Wearing Surface	Sq.m	6.00	55.20		29.20	13.00	13.00	331	163	49	00	00
Accessories	Signs	Each	0.00	4.00		4.00			0	0		00	00
Barriers	Railing Systems	m	200.00	21.40		18.40	3.00		4280	3000	70	00	00
	Posts (Steel/Concrete)	Each	200.00	10.00		9.00		1.00	2000	1350	68	00	18
	Wearing Surface	Sq.m	25.00	24.38		9.75	9.75	4.88	610	280	46	00	00
Decks	Deck Top - Thick Slab	Sq.m	350.00	33.92		29.92	4.00		11872	8414	71	00	00
	Soffit - Thick Slab	Sq.m	350.00	40.28		24.80	11.98	3.50	14098	8187	58	00	08
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	21.40		21.40			2675	2006	75	00	00
Abutment	Wingwalls	Sq.m	350.00	18.20		16.20	2.00		6370	4533	71	00	00
	Abutment Walls	Sq.m	900.00	19.20		14.20	4.00	1.00	17280	11025	64	00	08
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		3.00	1.00		0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		3.00	1.00		0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									59516	**38958**			

Bridge Condition Index (BCI) **65.46**

Inventory Data:

Structure Name	Development Rd & North Branch of South Nation River MD Bridge								
Main Hwy/Road #	Development Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	1.2km North of Van Camp Road								
Latitude	45.044685		Longitude	-75.449811					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	399		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Steel I Girders		Interchange Number						
Total Deck Length	25.9 m		Interchange Structure Number						
Overall Str. Width	9.6 m		Min. Vertical Clearance		m				
Total Deck Area	248.6 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	8.0 m		Detour Length Around Bridge		km				
Skew Angle	57.2 Degrees		Direction of Structure	North/South					
No. of Spans	1		Fill on Structure		m				
Span Lengths	23.9 / 12.2 m								

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	October 8, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	71.53		
OSIM		2022	71.00		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 20,000.00
Material Condition Survey					
	Detailed Deck Condition Survey:		x		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 35,000.00
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.	X	Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years	X	6 to 10 years		
Overall Comments:	Structure is in generally good to localized fair/poor condition. Jammed joint seals observed on both sides of deck. Wide pattern cracks, potholes and settlement noted on both approaches. Existing deck barrier does not confirm to current standards and should be replaced. Spall with exposed corroded reinforcement on south abutment wall below bearing pad.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 92.3, SE: 27.5, SW: 18.0, NW: 67.5					
Element Name:	Development Rd & North Branch of South Nation R				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	205.3				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m			198.3	5	2					
Comments:	New approach barrier installed since previous inspection. Collision damage noted on northeast barrier. Moderate to severe rot noted on existing timber posts.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	3					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Repair damage section						

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	8					
Location:	North & South of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Surface Treatment				Total Quantity:	96.0				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2					96.0				9	
Comments:	Wide map cracking, wide transverse cracks, large potholes and some settlement of approaches noted on both approaches. Some previous patches also observed.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Joints				Length:	14.6					
Element Name:	Concrete End Dams				Width:	0.25					
Location:	North & South Ends of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Concrete End Dams				Total Quantity:	7.3				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m				4.1	3.2					
Comments:	Medium to severe abrasions and scaling noted on concrete end dams.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
					Install supports.						

Element Group:	Joints				Length:	14.6					
Element Name:	Seals/Sealants				Width:						
Location:	North & South Sides of Structure				Height:						
Material:	Plastic				Count (items):	2					
Element Type:	Strip Seal				Total Quantity:	29.2					m
Environment:	Severe				Limited Inspection	X					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m							29.2			7
Comments:	There is a missing portion of seal at the south side of structure. Expansion joint seals are jammed. Debris buildup noted along seals.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
					Install supports.						

Element Group:	Barriers				Length:	2.25					
Element Name:	Posts				Width:	0.35					
Location:	NE, NW, SE & SW of Structure				Height:	1.1					
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Reinforced concrete End Posts				Total Quantity:	22.95					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				22.49	0.5					8
Comments:	Light to medium scaling noted on concrete end walls. Existing barrier is not code compliant and should be replaced with code compliant barrier.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	35.1					
Element Name:	Railing System				Width:						
Location:	East & West Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Post and Panel Railing				Total Quantity:	70.2					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				69.5	0.7					8
Comments:	Light to medium rust noted throughout. Existing barrier is not code compliant and should be replaced with a code compliant barrier.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Sidewalk/Curbs				Length:	39.6					
Element Name:	Curbs				Width:	0.85					
Location:	East & West Sides of Structure				Height:	0.3					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Curbs				Total Quantity:	91.08					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				85.62	5.5					
Comments:	Light to medium scaling and abrasions due to snow plow machines noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:						
Element Name:	Drainage System				Width:						
Location:	East & West Side of Structure				Height:						
Material:	Steel				Count (items):	8					
Element Type:	Steel Drain Pipes				Total Quantity:	8.0					each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	each				8						
Comments:	Some light corrosion noted on darin pipes. Deck drains have been partially blocked by debris.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	2					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Decks				Length:	26.9					
Element Name:	Deck Top (Exposed)				Width:	9.6					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	248.6					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				243.7	5.0					
Comments:	Light to medium scaling and abrasions due to snow plow equipment noted. Spall ntoed at northeast corner of deck top. Debris build-up observed along edges.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	2					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Decks				Length:	2.0					
Element Name:	Soffit - Thin Slab (End)				Width:	8.4					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - End				Total Quantity:	33.6					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				33.6						
Comments:	End portion of soffit appears to be in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	21.9					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	1.05					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	46					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				46.0						
Comments:	Exterior soffit appears to be in generally good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	21.9					
Element Name:	Soffit - Thin Slab				Width:	7					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	1					
Element Type:	Soffit - Interior				Total Quantity:	153.3					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				153.3						
Comments:	Generally in good condition with some coating failure noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:	4					
Element Name:	Girders - End				Width:	0.4					
Location:	North & South Underside of Structure				Height:	1.1					
Material:	Steel				Count (items):	5					
Element Type:	Steel I Girders				Total Quantity:	68.3					m^2
Environment:	Benign				Limited Inspection						
Protection System:	Coating									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				67	1.3					
Comments:	Some peeling coating and light rust noted on end girders.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:	21.9					
Element Name:	Girders - Intermediate				Width:	0.4					
Location:	Underside of Deck				Height:	1.1					
Material:	Steel				Count (items):	5					
Element Type:	Steel I Girders				Total Quantity:	373.94					m^2
Environment:	Benign				Limited Inspection						
Protection System:	Coating									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				369.46	4.5					
Comments:	Some peeling coating and light rust noted on girders.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:						
Element Name:	Diaphragms - End				Width:						
Location:	North & South Underside of Structure				Height:						
Material:	Steel				Count (items):	8					
Element Type:	Steel I Diaphragms				Total Quantity:	8					each
Environment:	Benign				Limited Inspection						
Protection System:	Coating									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	each				8						
Comments:	End diaphragms are generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)			Length:							
Element Name:	Diaphragms - Intermediate			Width:							
Location:	Underside of Deck			Height:							
Material:	Steel			Count (items):	8						
Element Type:	Rectangular Diaphragms			Total Quantity:	8						Each
Environment:	Benign			Limited Inspection							
Protection System:	Coating										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			8							
Comments:	Some coating failure and light corrosion noted on interior diaphragms.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:							
Element Name:	Bearings			Width:							
Location:	North & South Abutment Walls			Height:							
Material:	Plastic			Count (items):	10						
Element Type:	Elastomeric Bearing Pads - Neoprene			Total Quantity:	10						Each
Environment:	Benign			Limited Inspection			X				
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			9	1						
Comments:	Damaged bearing pad noted on south wall. Likely from spall below bearing pad on concrete bearing seat.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:							
Element Name:	Ballast Walls			Width:	10.3						
Location:	East and West Underside of Structure			Height:	1						
Material:	Cast-In-Place Concrete			Count (items):	2						
Element Type:	Reinforced Concrete Walls			Total Quantity:	20.6						m^2
Environment:	Benign			Limited Inspection	X						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m^2			20.6							
Comments:	Limited inspection due to end diaphragms. Visible portions of ballast wall were in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	10.3					
Location:	East and West Underside of Structure				Height:	4.4					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	89.6					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			77.40	7.7		4.5				
Comments:	Wide vertical cracks noted on south abutment wall below girders. Medium vertical cracks noted on north wall. Spall with exposed corroded reinforcement below girder end on south wall.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:	6.9					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	4.5					
Material:	Cast-in-place Concrete				Count (items):	5.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	123.8					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			120.8	3.0						
Comments:	Map cracking and medium transverse cracks with some efflorescence staining noted on wingwalls.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	N/A			All						0	
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each				4.00						
Comments:	Embankments are steeply sloped, well vegetated and appear to be stable.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	moderate volume and moderate flow from west to east with no obstructions noted at time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approaches	Repave Asphalt Wearing Surface	X			$ 14,500.00
Seals/Sealants	Replace Joint Seals	X			$ 73,000.00
Barriers	Replace Barrier	X			$ 174,500.00
Abutment Wall	Concrete Repairs	X			$ 11,500.00
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 273,500.00

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ 35,000.00
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ 35,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Wide pattern cracks, potholes and asphalt patches on north approach

Photo 8 Collision damage on southwest guiderail

Photo 9 Missing portion of seal on north expansion joint

Photo 10 Scaling on top of west concrete curb

Photo 11 Elevation view of west deck barrier

Photo 12 Abrasions and small spall on exposed deck surface

Photo 13 Typical view of east exterior soffit

Photo 14 Typical view of interior soffit

Photo 15 Corrosion and coating failure on north end of interior girder

Photo 16 Light corrosion and coating failure on east exterior girder

Photo 17 Crack on northwest wingwall

Photo 18 Medium cracks with efflorescence on southeast wingwall

Photo 19 Delamination on south abutment wall below girder

Photo 20 North Underside of Structure

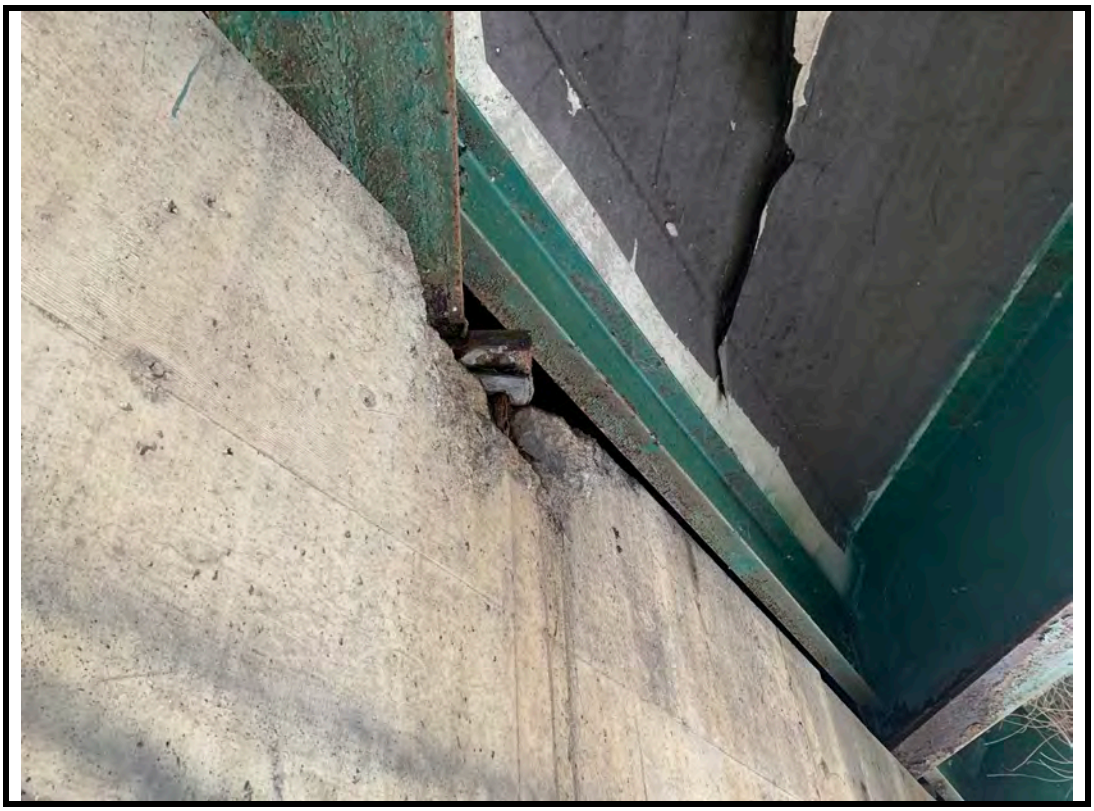

Photo 21 Spall below girder end on north abutment wall

Photo 22 Wide vertical crack on south abutment wall

Structure Condition Summary Form

Structure Name Development Rd North Branch of South Nation River MD Bridge
Structure Number BRH006
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	205.30	0.00	198.30	5.00	5.00	0	0		00	00
	Wearing Surface	Sq.m	6.00	96.00	0.00	0.00	0.00	96.00	576	0		09	00
Barriers	Railing Systems	m	200.00	70.20	0.00	69.50	0.70	0.00	14040	10481	75	08	00
	Posts (Steel/Concrete)	Each	200.00	22.95	0.00	22.49	0.50	0.00	4590	3414	74	08	00
Joints	Concrete End Dams	Sq.m	2100.00	7.30	0.00	0.00	4.10	3.20	15330	3444	22	00	00
	Seals/ Sealants	Each	0.00	29.20	0.00	0.00	0.00	29.20	0	0		07	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	91.08	0.00	85.62	5.50	0.00	3643	2657	73	00	00
	Drainage System	Each	0.00	8.00	0.00	8.00	0.00	0.00	0	0		00	02
Decks	Deck Top - Thin Slab	Sq.m	120.00	248.60	0.00	243.70	5.00	0.00	29832	22173	74	00	02
	Soffit - Thin Slab	Sq.m	120.00	232.90	0.00	232.90	0.00	0.00	27948	20961	75	00	00
Beams/ Main Longitudinal Elements	Girders -Steel	Sq.m	420.00	442.24	0.00	436.46	5.80	0.00	185741	138459	75	00	00
	Diaphrams - Steel, wood etc.	Each	0.00	16.00	0.00	16.00	0.00	0.00	0	0		00	00
Abutment	Wingwalls	Sq.m	350.00	123.80	0.00	120.80	3.00	0.00	43330	32130	74	00	00
	Ballast Walls	Sq.m	350.00	20.60	0.00	20.60	0.00	0.00	7210	5408	75	00	00
	Bearings	Each	1000.00	10.00	0.00	10.00	0.00	0.00	10000	7500	75	00	00
	Abutment Walls	Sq.m	900.00	89.60	0.00	77.40	7.70	4.50	80640	55017	68	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									422880	**301643**			

Bridge Condition Index (BCI) **71**

Inventory Data:

Structure Name	Levere Rd & North Branch South Nation River Bridge
Main Hwy/Road #	Levere Road
On Structure	X
Under Structure	
Structure Location	0.4 km East of Development Road
Latitude	45.0456626
Longitude	-75.4447956
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	Slab on Concrete Box Girders
Total Deck Length	14.7 m
Overall Str. Width	8.5 m
Total Deck Area	125.0 sq. m
Roadway Width	7.0 m
Skew Angle	Degrees
No. of Spans	1
Span Lengths	13.7 m

Services on structure: Navig. Water; Rail; Non-Navig.; Road: X; Ped.; Other

Services under structure: Navig. Water; Rail; Non-Navig.: X; Road; Ped.; Other

Heritage Designation: Not Consid.: X; Desig./not list; Cons/not App.; Desig. & List; List/n.d.

Road Class: Freeway; Collector; Arterial; Local: X

Posted Speed: 60 km/h

AADT: 72

No. of Lanes: 2

% Trucks

Inspection Route Sequence

Interchange Number

Interchange Structure Number

Min. Vertical Clearance m

Special Routes: Transit; School; Truck; Bicycle

Detour Length Around Bridge: 5.1 km

Direction of Structure: East/West

Fill on Structure m

Historical Data:

Year Built	
Last OSIM Inspection	October 8, 2020
Last Enhanced OSIM Inspection	
Enhanced Access Equipment (ladder, boat, lift, etc.)	
Last Underwater Inspection	
Last Condition Survey	
Year of Last Major Rehab.	
Last Evaluation	
Current Load Limit	tonnes
Load Limit By-Law #	
By-Law Expiry Date	

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	73.14		
OSIM		2022	73		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		x		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00

Investigation Notes: Deck condition survey recommended due to age of structure.

Overall Structure Notes:								
Work on Structure:		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally in good condition. Wearing surface has been repaved, and new approach barrier installed, since previous inspection. Evidence of leakage between centre box girders below centreline of deck at location of cold joint.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 15.24, SE: 7.62, SW: 15.24, NW: 7.62					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	76.2				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			76.2							
Comments:	Generally in good condition. New end treatments installed since previous inspection.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	7					
Location:	East and West Side of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Surface Treatment				Total Quantity:	84.0				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			84							
Comments:	Repaved since previous inspection. Wearing surface is generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Joints				Length:	8.5					
Element Name:	Concrete End Dam				Width:	0.3					
Location:	East & West Ends of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Concrete End Dam				Total Quantity:	5.1				m^2	
Environment:	Severe				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			4.6	0.3		0.2				
Comments:	Medium abrasions and scaling due to snow removal equipment noted on concrete end dams										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	8				
			1-5 years		6-10 years		Urgent	X	1 year		2 years
						Concrete Repairs					

Element Group:	Joints				Length:	8.5					
Element Name:	Seals/Sealants				Width:						
Location:	East & West Ends of Structure				Height:						
Material:	Plastic				Count (items):	2					
Element Type:	Strip Seal				Total Quantity:	17					m
Environment:	Severe				Limited Inspection	X					
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m			17							
Comments:	Seals appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	14.7					
Element Name:	Railing System				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Flex Beam				Total Quantity:	29.4					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m			29.4							
Comments:	Generally in good condition, with some light corrosion and minor abrasions noted on flex beam. New approach barrier installed since previous inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:						
Element Name:	Posts				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	26					
Element Type:	Steel HSS Posts				Total Quantity:	26					Each
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			26							
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	14.7					
Element Name:	Wearing Surface				Width:	7					
Location:	Top of Deck				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Surface Treatment				Total Quantity:	102.9 m^2					
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			102.9							
Comments:	Deck has been paved since previous inspection. Deck wearing surface appears to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	14.7					
Element Name:	Deck Top (Covered)				Width:	8.5					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	125 m^2					
Environment:	Moderate				Limited Inspection	X					
Protection System:	Asphalt Surface Treatment									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			102.50	15.00		7.50				
Comments:	Deck has been paved since previous inspection. Previous inspection noted cold joint, and delamination on exposed concrete deck surface, not seen in this inspection. Condition rating is based on previous condition rating. Evidence of leakage noted between centre box girders.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	2					
Element Name:	Soffit - Thin Slab (End)				Width:	9.4					
Location:	North and South Sides of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - End				Total Quantity:	37.4 m^2					
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			31.79	3.74		1.87				
Comments:	Evidence of leakage, efflorescence, and delaminations with corroded reinforcement present between box girders, reflecting leakage between joint in concrete deck.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 8						
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Concrete Repairs						

Element Group:	Decks				Length:	9.7					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	1.5					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	28.13					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			28.1							
Comments:	Exterior soffit appears to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years			6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	9.7					
Element Name:	Soffit - Thin Slab (Interior)				Width:	7.4					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	71.8					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			65.32	4.31		2.15				
Comments:	Evidence of leakage, efflorescence, and delaminations with corroded reinforcement present between box girders, reflecting leakage between joint in concrete deck.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	East and West Abutment Walls				Height:						
Material:	Plastic				Count (items):	14					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	14					Each
Environment:	Benign				Limited Inspection		X				
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	Each			14							
Comments:	Generally in good condition, limited access to bearing pads, condition is based on accessible bearing pads										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years			6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments					Length:					
Element Name:	Ballast Walls					Width:	8.2				
Location:	East and West Abutment Walls					Height:	0.9				
Material:	Cast-In-Place Concrete					Count (items):	2				
Element Type:	Reinforced Concrete Walls					Total Quantity:	14.8				m^2
Environment:	Benign					Limited Inspection	X				
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				14.8						
Comments:	Ballast walls were inaccessible for inspection due to box girders. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Abutment					Length:					
Element Name:	Abutment Walls					Width:	8.2				
Location:	East and West Underside of Structure					Height:	3.6				
Material:	Cast-in-Place Concrete					Count (items):	2				
Element Type:	Reinforced Concrete Walls					Total Quantity:	59				m^2
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				59.00						
Comments:	Generally in good condition with some salt staining at the top of the walls. Scaling on the west wall around drain outlets.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Abutments					Length:	4.8				
Element Name:	Wingwalls					Width:					
Location:	NE, SE, NW & SW OF Structure					Height:	1.5				
Material:	Cast-in-place Concrete					Count (items):	4.0				
Element Type:	Reinforced Concrete Walls					Total Quantity:	28.8				m^2
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				28.8						
Comments:	Generally in good condition with some narrow cracks noted on wingwalls.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Foundations			Length:						
Element Name:	Foundation (Below Ground Level)			Width:						
Location:	Below Abutment Walls and Wingwalls			Height:						
Material:	Unknown			Count (items):						
Element Type:	Unknown			Total Quantity:	All					
Environment:	Benign			Limited Inspection		X				
Protection System:	Unknown									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							0
Comments:	No visible evidence of foundation instability was noted during the inspection.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams			Length:						
Element Name:	Embankments			Width:						
Location:	NE, SE, NW & SW Side of Structure			Height:						
Material:	Native Material			Count (items):	4					
Element Type:	Embankment			Total Quantity:						Each
Environment:	Moderate			Limited Inspection						
Protection System:	Vegetation									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	Each		4.00							
Comments:	Embankments are steeply sloped, well vegetated and appear stable.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams			Length:						
Element Name:	Streams and Waterways			Width:						
Location:	Below Structure			Height:						
Material:	Native			Count (items):	All					
Element Type:	Stream			Total Quantity:	All					N/A
Environment:	Benign			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							
Comments:	Moderate volume and moderate flow from north to south with no obstructions noted at time of inspection.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Deck Top	Concrete Repairs		X		$ 15,000.00
Deck Soffit	Concrete Repairs		X		$ 6,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 21,000.00

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ -
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 East approach wearing surface

Photo 8 Seal at east end of structure

Photo 9 Abrasions on north deck barrier

Photo 10 New asphalt at west end of deck wearing surface

Photo 11 Efflorescence and evidence of leakage between box girders

Photo 12 View of north exterior girder

Photo 13 East underside of structure

Photo 14 Typical view of northwest wingwall

Photo 15 Scaling on north abutment wall

Photo 16 Staining at top of west abutment wall

Structure Condition Summary Form

Structure Name Levere Rd & North Branch South Nation River Bridge
Structure Number BRH007
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	76.20	0.00	76.20	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	6.00	84.00	0.00	84.00	0.00	0.00	504	378	75	00	
Barriers	Railing Systems	m	200.00	29.40	0.00	29.40	0.00	0.00	5880	4410	75	00	00
	Posts (Steel/Concrete)	Each	200.00	26.00	0.00	26.00	0.00	0.00	5200	3900	75	00	00
Joints	Concrete End Dams	Sq.m	2100.00	5.10	0.00	4.60	0.30	0.20	10710	7497	70	00	08
	Seals/ Sealants	Each	0.00	2.00	0.00	2.00	0.00	0.00	0	0		00	00
Decks	Wearing Surface	Sq.m	25.00	102.90	0.00	102.90	0.00	0.00	2573	1929	75	00	00
	Deck Top - Thin Slab	Sq.m	120.00	124.95	0.00	102.50	15.00	7.50	14994	9945	66	00	00
	Soffit - Thin Slab	Sq.m	120.00	137.33	0.00	125.21	8.02	4.02	16480	11654	71	00	00
	Wingwalls	Sq.m	350.00	28.80	0.00	28.80	0.00	0.00	10080	7560	75	00	00
Abutment	Ballast Walls	Sq.m	350.00	14.80	0.00	14.80	0.00	0.00	5180	3885	75	00	00
	Bearings	Each	1000.00	14.00	0.00	14.00	0.00	0.00	14000	10500	75	00	00
	Abutment Walls	Sq.m	900.00	59.00	0.00	59.00	0.00	0.00	53100	39825	75	01	08
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									138700	**101483**			

Bridge Condition Index (BCI) **73**

Inventory Data:

Structure Name	Van Camp Road & North Branch South Nation River Bridge								
Main Hwy/Road #	Belmade Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.5km east of Development Road								
Latitude	45.03686		Longitude	-75.4361					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	250		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Concrete Box Girders		Interchange Number						
Total Deck Length	14.7 m		Interchange Structure Number						
Overall Str. Width	9.0 m		Min. Vertical Clearance		m				
Total Deck Area	132.3 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	6.0 m		Detour Length Around Bridge		km				
Skew Angle	10 Degrees		Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Span Lengths	13.7 m								

Historical Data:

Year Built	1979	Year of Last Major Rehab.	
Last OSIM Inspection	October 9, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.63		
OSIM		2022	73		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	0˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00

Investigation Notes: Detailed Condition Survey is recommended due to age of structure

Overall Structure Notes:								
Recommended Work on	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. Wide cracks noted in west approach wearing surface at deck interface. New approach barrier end treatments installed since previous inspection. Collision damage noted on existing approach barrier. Spall with exposed corroded reinforcement on southeast corner.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches			Length:	NE: 30.5, SE: 24.8, SW: 28.6, NW: 24.8						
Element Name:	Barrier			Width:							
Location:	NE, SE, NW & SW of Structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)			Total Quantity:	108.7					m	
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m		90	11.5	7.2						
Comments:	New end treatments installed since previous inspection. Collision damage noted on existing guiderail.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	3					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Replace damaged barrier sections						

Element Group:	Approaches			Length:	6						
Element Name:	Wearing Surface			Width:	6						
Location:	East and West Side of Structure			Height:							
Material:	Asphalt			Count (items):	2						
Element Type:	Asphalt Surface Treatment			Total Quantity:	72.0					m^2	
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		71.5	0.5							
Comments:	Cracks and potholes forming at west approach at interface with deck. Minor settlement noted at both ends of deck. Previous patch repairs noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	
					Repair asphalt surface treatment and patch pothole						

Element Group:	Joints			Length:	9.2						
Element Name:	Other			Width:							
Location:	East & West Side of Structure			Height:							
Material:	Other			Count (items):							
Element Type:	Expansion Joint			Total Quantity:	9.2					m	
Environment:	Severe			Limited Inspection	X						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m		9.2								
Comments:	StrExpansion joinst have been paved over. Light corroion noted at visible portions of joints.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	
					Install supports.						

Element Group:	Barriers				Length:	24.7					
Element Name:	Railing System				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Flex Beam				Total Quantity:	49.4					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m			45.4	3.0	1.0					
Comments:	Collision damage noted on north railing. Corrosion noted on posts and dents noted throughout.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	3					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Repair damaged portions						

Element Group:	Barriers				Length:						
Element Name:	Posts				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	12					
Element Type:	Steel Posts				Total Quantity:	12					Each
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	Each			12							
Comments:	Light corrosion noted on the base plates of barrier posts.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	14.7					
Element Name:	Wearing Surface				Width:	6					
Location:	Top of Deck				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Surface Treatment				Total Quantity:	88.2					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			88.2							
Comments:	Light ravelling and light tire rutting noted throughout. Previous comments noted that no waterproofing has been placed below wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks			Length:	14.7						
Element Name:	Deck Top			Width:	9						
Location:	Top of Deck			Height:							
Material:	Cast-in-Place Concrete			Count (items):							
Element Type:	Deck Top			Total Quantity:	132.3	m^2					
Environment:	Moderate			Limited Inspection	X						
Protection System:	Asphalt Surface Treatment									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		131.9	0.3	0.1						
Comments:	Deck top is partially covered by asphalt wearing surface. Wide cracks at south end of deck where deck top is exposed.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**	12						
		1-5 years	6-10 years		Urgent		1 year	X	2 years		

Element Group:	Decks			Length:	2						
Element Name:	Soffit - Thin Slab (End)			Width:	10.4						
Location:	North and South Sides of Structure			Height:							
Material:	Precast Concrete			Count (items):	2						
Element Type:	Soffit - End			Total Quantity:	41.6	m^2					
Environment:	Moderate			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		41.60								
Comments:	End soffit appears to be in good condition.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**							
		1-5 years	6-10 years		Urgent		1 year		2 years		

Element Group:	Decks			Length:	10.7						
Element Name:	Soffit - Thin Slab (Exterior)			Width:	0.7						
Location:	East Underside of Structure			Height:							
Material:	Precast Concrete			Count (items):	2						
Element Type:	Soffit - Exterior			Total Quantity:	14.98	m^2					
Environment:	Benign			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		14.38	0.35	0.25						
Comments:	Cracks on north side of soffit. Severe spall with exposed corroded reinforcement and west stain noted on southeast corner. Spall at southwest corner and centre of exterior soffit.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**	8						
		1-5 years	6-10 years		Urgent		1 year	X	2 years		
				Concrete Repairs							

Element Group:	Decks			Length:	10.7						
Element Name:	Soffit - Thin Slab (Interior)			Width:	9						
Location:	Underside of Structure			Height:							
Material:	Precast Concrete			Count (items):	1						
Element Type:	Soffit - Interior			Total Quantity:	96.3						m^2
Environment:	Benign			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			96.3							
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:							
Element Name:	Bearings			Width:							
Location:	East and West Abutment Walls			Height:							
Material:	Plastic			Count (items):	14						
Element Type:	Elastomeric Bearing Pads - Neoprene			Total Quantity:	14						Each
Environment:	Benign			Limited Inspection			X				
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	Each			14							
Comments:	Generally in good condition, limited access to bearing pads, condition is based on accessible bearing pads										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:							
Element Name:	Ballast Walls			Width:	8.8						
Location:	East and West Underside of Structure			Height:	0.7						
Material:	Cast-In-Place Concrete			Count (items):	2						
Element Type:	Reinforced Concrete Walls			Total Quantity:	12.3						m^2
Environment:	Benign			Limited Inspection	X						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			12.3							
Comments:	Ballast walls were inaccessible for inspection due to box girders. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment			Length:						
Element Name:	Abutment Walls			Width:	8.8					
Location:	East and West Underside of Structure			Height:	2.8					
Material:	Cast-in-Place Concrete			Count (items):	2					
Element Type:	Reinforced Concrete Walls			Total Quantity:	49.3					m^2
Environment:	Benign			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	m^2		45.70	2.4	1.2					
Comments:	Generally in good condition with a wide vertical crack noted on abutment walls. Graffiti noted throughout.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:** 08, 02						
		1-5 years	6-10 years		Urgent		1 year	X	2 years	
				Concrete repairs, and clean structure						

Element Group:	Abutments			Length:	5.0					
Element Name:	Wingwalls			Width:						
Location:	NE, SE, NW & SW OF Structure			Height:	1.5					
Material:	Cast-in-place Concrete			Count (items):	4.0					
Element Type:	Reinforced Concrete Walls			Total Quantity:	30.0					m^2
Environment:	Moderate			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	m^2		30.0							
Comments:	Generally in good condition.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations			Length:						
Element Name:	Foundation (Below Ground Level)			Width:						
Location:	Below Abutment Walls and Wingwalls			Height:						
Material:	Unknown			Count (items):						
Element Type:	Unknown			Total Quantity:	All					
Environment:	Benign			Limited Inspection		X				
Protection System:	Unknown									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							0
Comments:	No visible evidence of foundation instability was noted during the inspection.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each					4					
Comments:	Embankments are moderately sloped, well vegetated with moderate erosion noted at all corners.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Moderate volume and moderate flow from sotuh to north with no obstructions noted at time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Collision damage on existing approach barrier at northeast corner of structure

Photo 8 Severe rot on timber posts at southeast approach barrier

Photo 9 Small potholes at south edge of east approach wearing surface

Photo 10 Light corrosion noted on visible portions of expansion joint

Photo 11 Elevation view of north barrier

Photo 12 Wide crack and small potholes at west end of deck, at joint location

Photo 13 Spall with exposed corroded reinforcement at southeast corner

Photo 14 Staining at edges of underside of structure

Photo 15 Typical view of west end of soffit

Photo 16 East Underside of Structure

Photo 17 Elevation view of northwest wingwall

Photo 18 Graffiti on east abutment wall

Photo 19 Moderate erosion at southeast embankment

Structure Condition Summary Form

Structure Name Van Camp Road North Branch South Nation River Bridge
Structure Number BRH008
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	108.70	0.00	90.00	11.50	7.20	0	0		00	03
	Wearing Surface	Sq.m	6.00	72.00	0.00	71.50	0.50	0.00	432	323	75	00	15
Barriers	Railing Systems	m	200.00	49.40	0.00	45.40	3.00	1.00	9880	7050	71	00	03
	Posts (Steel/Concrete)	Each	200.00	12.00	0.00	12.00	0.00	0.00	2400	1800	75	00	00
Joints	Armouring / Retaining Devices	m	1.00	9.20	0.00	9.20	0.00	0.00	9	7	75	00	00
	Wearing Surface	Sq.m	25.00	88.20	0.00	88.20	0.00	0.00	2205	1654	75	00	00
Decks	Deck Top - Thin Slab	Sq.m	120.00	132.30	0.00	131.90	0.30	0.10	15876	11885	75	00	12
	Soffit - Thin Slab	Sq.m	120.00	152.88	0.00	152.28	0.35	0.25	18346	13722	75	00	08
	Wingwalls	Sq.m	350.00	30.00	0.00	30.00	0.00	0.00	10500	7875	75	08	08
Abutment	Ballast Walls	Sq.m	350.00	12.30	0.00	12.30	0.00	0.00	4305	3229	75	00	00
	Bearings	Each	1000.00	14.00	0.00	14.00	0.00	0.00	14000	10500	75	00	00
	Abutment Walls	Sq.m	900.00	49.30	0.00	45.70	2.40	1.20	44370	31712	71	00	08
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	0.00	4.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									122323	**89756**			

Bridge Condition Index (BCI) **73**

Inventory Data:

Structure Name	Cameron Rd & Near Boundary Rd Bridge								
Main Hwy/Road #	Cameron Road		Services on Structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services Under Structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	50m East of Boundary Rd								
Latitude	44.995		Longitude	-75.51611					
Owner(s)	City of Brockville		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	60km/h		No. of Lanes	2		
Old County	SDG		AADT	205		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Steel I Girders		Interchange Number						
Total Deck Length	11.5 m		Interchange Structure Number						
Overall Str. Width	6.0 m		Min. Vertical Clearance		m				
Total Deck Area	69.0 sq. m		Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Roadway Width	10.4 m		Detour Length Around Bridge		km				
Skew Angle	20 Degrees		Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Span Lengths	10.70 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	61.23		
OSIM		2022	58		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	-2˚C					

Additional Investigations Required:	Priority			Estimated Cost
	None	Normal	Urgent	
Rehabilitation/Replacement Study:		x		$ 20,000.00
Material Condition Survey				
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				
Monitoring of Deformations, Settlements and Movements:	x			
Monitoring Crack Widths:	x			
			Total Cost	$ 20,000.00

Investigation Notes:

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.	X	Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Approach barrier has been replaced since previous inspection. Spalls with exposed corroded reinforcement and localized severe scaling noted throughout concrete elements. Rust, flaking, and minor sag noted at interior girders. Severe corrosion and section loss noted on steel diaphragms. Wide vertical cracks on abutments below girders and extend onto soffit.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE & SE: 30.48m , NW & SW: 13.3m					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts				Total Quantity:	87.6				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m				87.6						
Comments:	Barrier has been replaced since previous inspection. Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Approaches				Length:	6.0					
Element Name:	Wearing Surface				Width:	6.0					
Location:	East and West of Surface				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Wearing Surface				Total Quantity:	36.6				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				36.6						
Comments:	Light to medium ravelling and light tire rutting noted on wearing surface. Vegetation growth noted at edges.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Accessories				Length:						
Element Name:	Signs				Width:						
Location:	NE, NW, SE & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Hazard Signs				Total Quantity:	4.0				Each	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	Each					1					
Comments:	Hazard signs are generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	
						Install supports.					

Element Group:	Barrier				Length:	18.3					
Element Name:	Railing System				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Flex Beam on Steel Posts				Total Quantity:	36.6				m	
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			36.6						8	
Comments:	Barrier is generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barrier				Length:						
Element Name:	Posts				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	20					
Element Type:	Steel I Posts				Total Quantity:	20				Each	
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	Each			20	0						
Comments:	Posts are generally in good condition. Missing blot noted on north barrier post.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	11.5					
Element Name:	Wearing Surface				Width:	6.0					
Location:	Top of Deck				Height:						
Material:	Asphalt				Count (items):	1					
Element Type:	Asphalt Wearing Surface				Total Quantity:	69				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			67.6	1.4		0				
Comments:	Light to medium ravelling noted on wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	11.5					
Element Name:	Deck Top				Width:	6.00					
Location:	Top of Deck				Height:						
Material:	Cast-In-Place Concrete				Count (items):	1					
Element Type:	Thin Slab				Total Quantity:	69.0	m^2				
Environment:	Moderate				Limited Inspection	X					
Protection System:	Asphalt Wearing Surface									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			38	20.7	10.4					
Comments:	Limited inspection since being covered by asphalt. Rating is based on the condition of the wearing surface and soffit.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	11.5					
Element Name:	Soffit- Thick Slab (Exterior)				Width:	0.40					
Location:	North & South Edges of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Thin Slab				Total Quantity:	9.2	m^2				
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			2.30	4.60	2.30					
Comments:	Local spall noted on north exterior soffit. Localized moderate scaling noted throughout exterior soffit.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	11.5					
Element Name:	Soffit- Thick Slab (Interior)				Width:	5.00					
Location:	Underside of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	1					
Element Type:	Thick Slap				Total Quantity:	57.5	m^2				
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			19.60	20.70	17.30					
Comments:	Localized spall with exposed corroded reinforcement noted on interior portion of soffit. Large spall with exposed corroded reinforcement noted at soffit ends adjacent to ballast wall on west side of strucutre. Evidence of water leakage eg. Wet areas, efflorescence, rust stains and delaminations noted on interior soffit. Wide longitudinal cracks also noted.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements				Length:	11.5					
Element Name:	Girders				Width:	0.2					
Location:	Underside of Strucutre				Height:	0.46					
Material:	Cast-In-Place Concrete				Count (items):	5					
Element Type:	Steel I Girders				Total Quantity:	87.40				m^2	
Environment:	Benign				Limited Inspection						
Protection System:	Patina									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				56.9	18.0		12.5			
Comments:	Medium to severe flaking noted on interior girders. Medium rust and slight sag noted										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements				Length:						
Element Name:	Diaphragms				Width:						
Location:	North & South Underside of Structure				Height:						
Material:	Steel				Count (items):	12					
Element Type:	Tir Rod Diaphragms				Total Quantity:	12				each	
Environment:	Benign				Limited Inspection	X		Due to st			
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	each				5.0	3.0		4.0			
Comments:	Severe corrosion and section loss noted throughout diaphragms.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	6.0					
Location:	East & West Underside of Structure				Height:	0.48					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Wall				Total Quantity:	5.76				m^2	
Environment:	Benign				Limited Inspection	X		Due to structure height and diaphragms			
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				2.76	1.50		1.50			
Comments:	Condition rating based on visible portions of ballast walls. Wide vertical cracks extending from abutments and soffit ends noted.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:	3.4					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW of Structure				Height:	1.5					
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Wingwalls				Total Quantity:	20.4	m^2				
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				14.10	4.00		2.30			
Comments:	Spall with exposed corroded reinforcement noted on walls. Spall at southeast corner at abutment interface. Lcoalized severe honeycombing noted throughout. Stained medium pattern cracks.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Abutments walls				Width:	6.0					
Location:	East and West Underside of Structure				Height:	2.8					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Concrete Abutment walls				Total Quantity:	33.6	m^2				
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				23.6	6.0		4.0			
Comments:	Wide vertical crack noted on abutments below girders. Spall at top of southeast corner of abutments. Moderate to localized severe honeycombing noted on walls and severe scaling observed around drains.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundation				Length:						
Element Name:	Foundation (blow ground level)				Width:						
Location:	Blow Grade				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:					All	
Environment:	Benign				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	All				100%						
Comments:	No evidence of foundation instability at time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Nee**	0					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments & Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:						
Material:	Native Soil				Count (items):						
Element Type:	Embankment				Total Quantity:	4					
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2	2					
Comments:	Moderately sloped, well vegetated and stable embankments. Evidence of medium erosion on northeast and northwest embankment.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**		13				
		1-5 years		6-10 years		Urgent	X	1 year		2 years	

Element Group:	Embankments & Streams				Length:						
Element Name:	Streams & Waterways				Width:						
Location:	Under Structure				Height:						
Material:	Native				Count (items):						
Element Type:	Stream				Total Quantity:	All					
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	All				100%						0
Comments:	Low volume and flow from south to north, with no flow obstructions noted at time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
	Major Rehabilitation		x		$ 393,600.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 393,600.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Typical view of approach barrier end treatment, northwest corner shown

Photo 8 Vegetation growth at edges of roadway

Photo 9 Typical barrier elevation

Photo 10 Moderate ravelling on deck wearing surface

Photo 11 Large spall with ECR at west end of soffit

Photo 12 Moderate scaling on south exterior soffit

Photo 13 Rust stains efflorescence on interior soffit

Photo 14 Flaking on bottom flange of exterior girder

Photo 15 Corrosion on steel tie diaphragm

Photo 16 Spall and wide vertical crack below girder on west abutment wall

Photo 17 Severe honeycombing on northwest wingwall

Photo 18 East underside of structure

Structure Condition Summary Form

Structure Name Cameron Rd Near Boundary Rd Bridge
Structure Number BRH009
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	87.60	0.00	87.60	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	6.00	36.60	0.00	36.60	0.00	0.00	220	165	75	00	15
Barriers	Railing Systems	m	200.00	36.60	0.00	36.60	0.00	0.00	7320	5490	75	00	00
	Posts (Steel/Concrete)	Each	200.00	20.00	0.00	20.00	0.00	0.00	4000	3000	75	00	00
	Wearing Surface	Sq.m	25.00	69.00	0.00	67.60	1.40	0.00	1725	1282	74	00	00
Decks	Deck Top - Thin Slab	Sq.m	120.00	69.00	0.00	38.00	20.70	10.40	8280	4414	53	00	12
	Soffit - Thin Slab	Sq.m	120.00	66.70	0.00	21.90	25.30	19.60	8004	3185	40	00	00
Beams/ Main Longitudinal	Girders -Steel	Sq.m	420.00	87.40	0.00	56.90	18.00	12.50	36708	20948	57	00	00
Elements	Diaphrams - Steel, wood etc.	Each	0.00	12.00	0.00	5.00	3.00	4.00	0	0		00	00
	Wingwalls	Sq.m	350.00	20.40	0.00	14.10	4.00	2.30	7140	4261	60	08	08
Abutment	Ballast Walls	Sq.m	350.00	5.76	0.00	2.76	1.50	1.50	2016	935	46	00	00
	Abutment Walls	Sq.m	900.00	33.60	0.00	23.60	6.00	4.00	30240	18090	60	01	08
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	2.00	2.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									105653	**61768**			

Bridge Condition Index (BCI) **58**

Inventory Data:

Structure Name	Cameron Rd & North Branch of South Nation River MD Bridge							
Main Hwy/Road #	Cameron Road		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	1.5km West of County Road 3							
Latitude	4503032		Longitude	-75.41273				
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	205		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on CPCI Girders		Interchange Number						
Total Deck Length	18.3 m		Interchange Structure Number						
Overall Str. Width	9 m		Min. Vertical Clearance		m				
Total Deck Area	164.7 sq. m		Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Roadway Width	7.3 m		Detour Length Around Bridge		km				
Skew Angle	Degrees		Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Span Lengths	17 m								

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	October 9, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.95		
OSIM		2022	75		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu,					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	0˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ -
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on	X	None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure is in generally good condition. New approach barrier was installed since previous inspection. Spalls on exterior faces of barrier wall where the new approach barrier anchors were installed. Deck barrier arrangement is not code compliant and should be updated in the next rehabilitaiton.						
Date of Next Inspection:	December 2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE:32.4 , SE:167.6 , SW: 35.14, NW: 31.3					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	265.4				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m			265.4							
Comments:	New end treatments and approach barrier installed since previous inspection. New barrier appears to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	7.3					
Location:	East and West Side of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Surface Treatment				Total Quantity:	87.6				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m^2			78.6	5.0		4.0				
Comments:	Wide transverse cracks noted adjacent to ends of deck. Medium pattern cracks noted on east and west apporach.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 12						
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Repair asphalt surface treatment and patch pothole						

Element Group:	Approaches				Length:	6					
Element Name:	Approach Slab				Width:	7.3					
Location:	East & West of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Concrete Approach Slab				Total Quantity:	87.6				m	
Environment:	Moderate				Limited Inspection	X					
Protection System:	Approach Wearing Surface									Perform. Deficiencies	
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m			87.6							
Comments:	Approach slabs are assumed to be generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Accessories				Length:						
Element Name:	Utilities				Width:						
Location:	South side of Structure				Height:						
Material:	Steel				Count (items):	1					
Element Type:	Mounted Utility Pipe				Total Quantity:	1.0					each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	each				1.0						
Comments:	Generally in good condition.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Barriers				Length:	30					
Element Name:	Barrier/Parapet Walls				Width:	0.25					
Location:	North & South Sides of Structure				Height:	0.6					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Parapet Wall - Interior Face				Total Quantity:	51.00					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				49.5	1.0		0.5			
Comments:	Spalls, light to medium abrasions and light to moderate scaling noted on interior face. Small spalls with exposed corroded reinforcement due to low cover observed. Barrier arrangement is not code compliant and should be updated during next rehabilitation.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:** 8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years

Element Group:	Barriers				Length:	30					
Element Name:	Barrier/Parapet Walls				Width:						
Location:	North & South Sides of Structure				Height:	0.6					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Parapet Wall - Exterior Face				Total Quantity:	36					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				29	5.0		2.0			
Comments:	Spalls on exterior face of walls where the approach barrier anchors have been installed. Barrier arrangement is not code compliant and should be updated during next rehabilitation.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:** 8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years
					Concrete Repairs					

Element Group:	Barriers				Length:	28.6					
Element Name:	Hand Railings				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Double Pipe hand Railings				Total Quantity:	57.2					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				57	0.2					
Comments:	Generally in good condition with a localized dent and some minor rust noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Coating				Length:						
Element Name:	Railing System / Hand Railings				Width:						
Location:	On Hand Railings				Height:						
Material:	Other				Count (items):						
Element Type:	Hot Dip Galvanizing				Total Quantity:	81.7					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				81.7						
Comments:	Generally in good condition with some light rust noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Sidewalk/Curbs				Length:	30					
Element Name:	Curbs				Width:	0.15					
Location:	North South Sides of Structure				Height:	0.6					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Curbs				Total Quantity:	45					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				40.0	5.0					
Comments:	Light to moderate scaling, abrasions and some narrow to medium transverse cracks noted on curbs.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:						
Element Name:	Drainage System				Width:						
Location:	North & South Side of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel drain Pipes				Total Quantity:	4.0					each
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	each			4							
Comments:	Medium rust and some patina noted on downspouts of drain pipes. Deck drains were partially blocked by debris.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	2					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Clean debris						

Element Group:	Decks				Length:	18.3					
Element Name:	Wearing Surface				Width:	7.3					
Location:	Top of Deck				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Surface Treatment				Total Quantity:	133.59					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			131.59	2.0						
Comments:	Light ravelling and pattern cracks forming on deck wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	19.3					
Element Name:	Deck Top				Width:	9					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	164.7					m^2
Environment:	Moderate				Limited Inspection	X					
Protection System:	Asphalt Surface Treatment									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			164.7							
Comments:	Deck top is assumed to be in good condition due to condition of wearing surface and deck soffit.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	18.3					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	1.15					
Location:	North and South Sides of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	42.09 m^2					
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				42.09						
Comments:	Some staining noted on exterior soffit. Generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	18.3					
Element Name:	Soffit - Thin Slab				Width:	5.5					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	1					
Element Type:	Soffit - Interior				Total Quantity:	99.74 m^2					
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				98.7	1.0					
Comments:	Generally in good condition with some moderate honeycombing noted on interior soffit.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:	18.3					
Element Name:	Girders				Width:	0.46					
Location:	Underside of Structure				Height:	0.9					
Material:	Precast Concrete				Count (items):	5					
Element Type:	CPCI Girders				Total Quantity:	290.97 m^2					
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				290.97						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)			Length:	1.4						
Element Name:	Diaphragms			Width:	0.3						
Location:	East & West End of Structure			Height:	0.9						
Material:	Cast-In-Place Concrete			Count (items):	5						
Element Type:	Rectangular Diaphragm			Total Quantity:	14.7						m^2
Environment:	Benign			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			14.7							
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:							
Element Name:	Bearings			Width:							
Location:	East and West Abutment Walls			Height:							
Material:	Neoprene			Count (items):	10						
Element Type:	Elastomeric Bearing Pads - Neoprene			Total Quantity:	10						Each
Environment:	Benign			Limited Inspection			X				
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	Each			10							
Comments:	Generally in good condition, limited access to bearing pads, condition is based on accessible bearing pads										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:							
Element Name:	Ballast Walls			Width:	8.2						
Location:	East and West Underside of Structure			Height:	0.6						
Material:	Cast-In-Place Concrete			Count (items):	2						
Element Type:	Reinforced Concrete Walls			Total Quantity:	9.84						m^2
Environment:	Benign			Limited Inspection	X						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			9.84							
Comments:	Ballast walls were inaccessible for inspection due to end diaphragms. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	8.2					
Location:	East and West Underside of Structure				Height:	3					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	49.2					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m^2			47.70	1		0.5				
Comments:	Spall and delamintation noted at north end of west wall.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					8
		1-5 years		6-10 years		Urgent		1 year	X	2 years
Concrete Repairs										

Element Group:	Abutments				Length:	5.85				
Element Name:	Wingwalls				Width:					
Location:	NE, SE, NW & SW OF Structure				Height:	2.1				
Material:	Cast-in-place Concrete				Count (items):	4.0				
Element Type:	Reinforced Concrete Walls				Total Quantity:	49.14				m^2
Environment:	Moderate				Limited Inspection					
Protection System:	None									Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*			
	m^2			48.94	0.1		0.1			
Comments:	Generally in good condition with small localized spalls and some staining on wingwalls.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Foundations				Length:					
Element Name:	Foundation (Below Ground Level)				Width:					
Location:	Below Abutment Walls and Wingwalls				Height:					
Material:	Unknown				Count (items):					
Element Type:	Unknown				Total Quantity:	All				
Environment:	Benign				Limited Inspection		X			
Protection System:	Unknown									Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*			
	N/A			All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Rip-Rap										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each					4					
Comments:	Embankments are Steeply sloped, well vegetated with medium erosion ntoed at all corners of structure										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope Protection				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Stone Slope Protection				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each					4					
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Low volume and moderate flow from north to south with no obstructions noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 New end treatment at southeast corner

Photo 8 Medium pattern cracks on east approach wearing surface

Photo 9 Abrasions on south curb

Photo 10 Spall on south barrier wall

Photo 11 Spall on exterior of southwest end of barrier wall

Photo 12 Wide crack at west end of deck

Photo 13 Debris blocking deck drain

Photo 14 Typical view of south exterior soffit

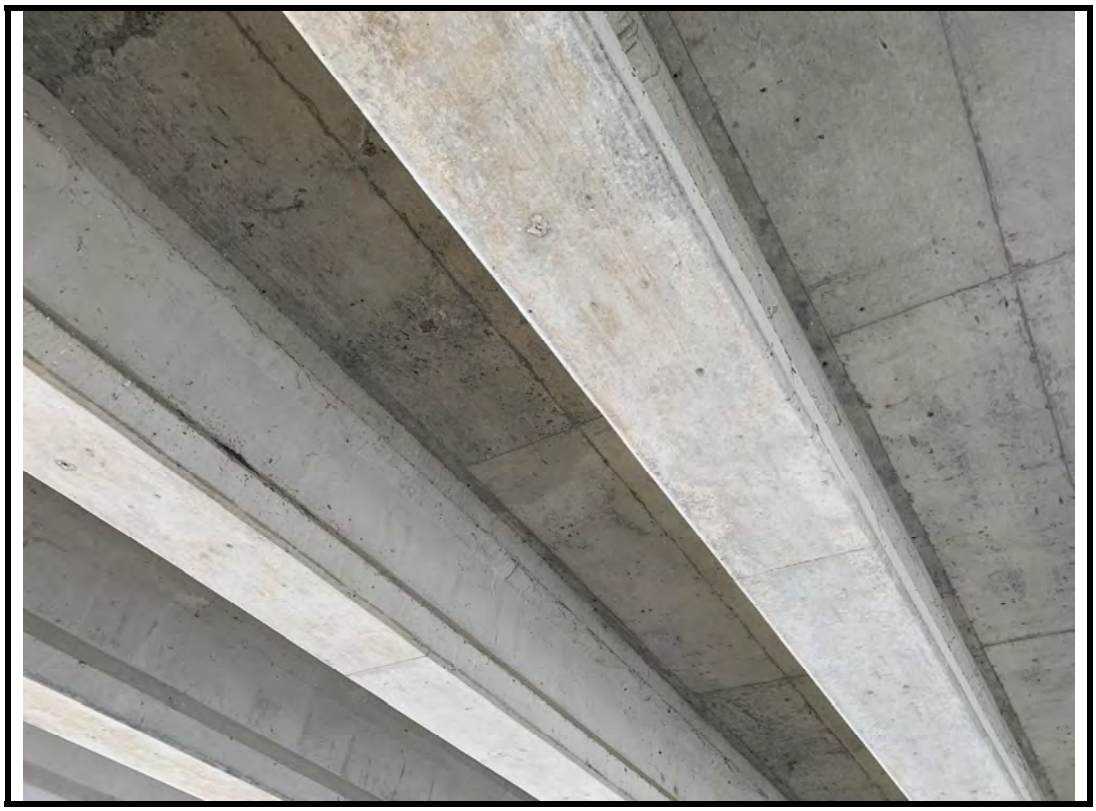

Photo 15 Typical view of interior soffit

Photo 16 View of interior girder

Photo 17 West underside of structure

Photo 18 Elevation view of southeast wingwall

Photo 19 Staining and delamination on north end of east abutment wall

Structure Condition Summary Form

Structure Name Cameron Rd North Branch of South nation River MD Bridge
Structure Number BRH010
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	212.30	0.00	212.30	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	6.00	87.60	0.00	78.60	5.00	4.00	526	366	70	00	12
	Approach Slabs	Sq.m	140.00	87.60	0.00	87.60	0.00	0.00	12264	9198	75	00	00
Accessories	Utilities	Each	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
Barriers	Barrier/ Parapet Walls (interior)	Sq.m	100.00	51.00	0.00	49.50	1.00	0.50	5100	3753	74	00	08
	Barrier/ Parapet Walls (exterior)	Sq.m	100.00	36.00	0.00	29.00	5.00	2.00	3600	2375	66	00	08
	Hand Railings	m	100.00	57.20	0.00	57.00	0.20	0.00	5720	4283	75	00	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	45.00	0.00	40.00	5.00	0.00	1800	1280	71	00	08
Decks	Drainage System	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	25.00	133.59	0.00	131.59	2.00	0.00	3340	2487	74	00	00
	Deck Top - Thin Slab	Sq.m	120.00	164.70	0.00	164.70	0.00	0.00	19764	14823	75	00	12
	Soffit - Thin Slab	Sq.m	120.00	141.83	0.00	140.83	1.00	0.00	17020	12723	75	00	00
Beams/ Main Longitudinal Elements	Girders	Sq.m	200.00	290.97	0.00	290.97	0.00	0.00	58194	43646	75	01	00
	Diaphrams - Concrete	Each	0.00	14.70	0.00	14.70	0.00	0.00	0	0		00	00
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	81.70	0.00	81.70	0.00	0.00	10213	7659	75	00	00
Abutment	Wingwalls	Sq.m	350.00	49.14	0.00	48.14	0.10	0.10	17199	12651	74	08	08
	Ballast Walls	Sq.m	350.00	9.84	0.00	9.84	0.00	0.00	3444	2583	75	00	00
	Bearings	Each	1000.00	10.00	0.00	10.00	0.00	0.00	10000	7500	75	00	00
	Abutment Walls	Sq.m	900.00	49.20	0.00	49.20	0.00	0.00	44280	33210	75	01	08
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	0.00	4.00	0.00	0	0		00	00
	Slope Protection	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									212462	**158536**			

Bridge Condition Index (BCI) **75**

Inventory Data:

Structure Name	Nation Valley Rd and South Nation Bridge								
Main Hwy/Road #	Nation Valley Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	70m South of River Rd								
Latitude	45.0681762		Longitude	-75.2806069					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	50 km/h		No. of Lanes	2		
Old County	SDG		AADT	117		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on CPCI Girders		Interchange Number						
Total Deck Length	69.1 m		Interchange Structure Number						
Overall Str. Width	9.2 m		Min. Vertical Clearance		m				
Total Deck Area	635.7 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	7.3 m		Detour Length Around Bridge		km				
Skew Angle	Degrees		Direction of Structure	North/South					
No. of Spans	3		Fill on Structure		m				
Culvert Length	m								
Span Lengths	21.3, 26.5, 21.3 m								

Historical Data:

Year Built	1980	Year of Last Major Rehab.	
Last OSIM Inspection		Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.44		
OSIM		2022	72.58		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	5˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good to localized fair/poor condition - abrasions and deformations noted on guide rail throughout. Small spalls and cracks on concrete barrier posts noted. Approach barrier has been recently replaced. Asphalt surface treatment partially covers both expansion joints, with debris noted in joint seals. abrasions and rust on joint armouring. pothole noted on north approach. Spalls, ECR, and wet stains noted along exterior soffit. Delamination noted on end diaphragms. Cracks, efflorescence, AAR, and spalls noted on abutment walls and wingwalls							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (Attachments and Signs)				Length:						
Element Name:	Utilities				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Steel				Count (items):	3					
Element Type:	Hazard Markers				Total Quantity:	3					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3.00						
Comments:	Generally in good condition										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	NE: 21, NW: 25, SE: 54, SW: 29.3					
Element Name:	Barriers				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Steel/Wood				Count (items):	4					
Element Type:	Steel Flex Beam on Wood Posts				Total Quantity:	129.60					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot dip galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				129.60						
Comments:	Approach barriers have been replaced since last inspection - all in generally good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:						
Element Name:	Barrier Posts - Timber				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Wood				Count (items):	14					
Element Type:	Timber Barrier posts				Total Quantity:	14.00					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2.00	12.00					
Comments:	Timber approach barrier posts are in generally fair condition, with rot, weathing, checks and splits throughout										
Recommended Work:			Rehab	x	Replace	**Maintenance Needs:**					
	x		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches			Length:	6						
Element Name:	Wearing Surface			Width:	7.3						
Location:	North and South approaches to structure			Height:							
Material:	Asphalt			Count (items):	2						
Element Type:	Asphalt surface treatment			Total Quantity:	87.6					m2	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m2		79.72	5.26	2.63						
Comments:	Medium settlement and pothole noted at the north approach										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	12					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Patch pothole						

Element Group:	Joints			Length:	9.2						
Element Name:	Armouring/retaining Devices			Width:							
Location:	North and south of structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Armouring/retaining Devices			Total Quantity:	36.80					m	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m		18.40	18.40							
Comments:	Light rust with abrasions and scores noted. North expansion joint is partially covered by asphalt, with signs of leaking and steel flaking. South expansion joint covered with asphalt.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	2					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Remove debris						

Element Group:	Joints			Length:	9.2						
Element Name:	Concrete End Dams			Width:	0.35						
Location:	North and South of structure			Height:							
Material:	Cast-in-place concrete			Count (items):	1						
Element Type:	Concrete End Dams			Total Quantity:	12.88					m2	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m2		6.88	6.00							
Comments:	Moderate abrasion and scaling noted, with some spalls. Both expansion joints are partially covered with asphalt.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Joints				Length:	9.2					
Element Name:	Seals/Sealants				Width:						
Location:	North Side of Structure				Height:						
Material:	Plastic				Count (items):						
Element Type:	Strip Seal				Total Quantity:	2					Each
Environment:					Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each							2.0			
Comments:	Both seals are filled with debris and are failing										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**		2				
	X	1-5 years		6-10 years		Urgent	X	1 year		2 years	
Replace expansion joints					Remove debris from expansion joints						

Element Group:	Barriers				Length:	43.2					
Element Name:	Railing Systems				Width:						
Location:	East and West Sides of structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel flex beam on concrete posts				Total Quantity:	86.4					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot dip galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				66.4	20.0					
Comments:	Generally in good condition with light abrasion and deformation throuhgout										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:						
Element Name:	Posts				Width:						
Location:	East and West sides of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	66					
Element Type:	Reinforced concrete posts				Total Quantity:	66					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				55.5	10		0.5			
Comments:	Narrow cracks at railing with small spalls throughout. 3 medium spaklls @ railing connection at east barrier.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**		8				
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Repair concrete						

Element Group:	Barriers					Length:	0.5				
Element Name:	Posts					Width:	0.3				
Location:	East and West sides of structure					Height:	1.2				
Material:	Cast-in-place concrete					Count (items):	4				
Element Type:	Reinforced concrete end posts					Total Quantity:	6				m2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				5	1					
Comments:	Generally in good condition with light map cracking and small spall at northeast										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks					Length:	69.1				
Element Name:	Wearing surface					Width:	7.3				
Location:	Top of deck					Height:					
Material:	Asphalt					Count (items):					
Element Type:	Asphalt surface treatments					Total Quantity:	504.43				m2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				503.43	1.00					
Comments:	Loss of asphalt at south of deck										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks					Length:	69.1				
Element Name:	Deck top					Width:	9.2				
Location:	Top of deck					Height:					
Material:	cast-in-place concrete					Count (items):					
Element Type:	Deck top					Total Quantity:	635.7				m2
Environment:	severe					Limited Inspection	X				
Protection System:	Asphalt surface treatment										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				635.7						
Comments:	Deck top is in generally good condition and partially covered with asphalt surface treatment										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks					Length:	2				
Element Name:	Soffit - Thin slab					Width:	6.2				
Location:	North and south underside of structure					Height:					
Material:	Steel					Count (items):	2				
Element Type:	Soffit-End					Total Quantity:	24.6				m2
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				24.6						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks					Length:	69.1				
Element Name:	Soffit - Thin slab					Width:	0.9				
Location:	East and West underside of structure					Height:					
Material:	Cast-in-place concrete					Count (items):	2				
Element Type:	Soffit- Exterior					Total Quantity:	124.38				m2
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				96	19		9			
Comments:	Evidence of localized spalls and wet stains noted. Spall with exposed ECR noted, and severe spall and rust stain noted on fascia adjacent to expansion joint.										
Recommended Work:	X	Rehab		Replace		**Maintenance Needs:**					
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Repair concrete											

Element Group:	Decks					Length:	64.1				
Element Name:	Soffit - Thin slab					Width:	6.2				
Location:	Underside of structure					Height:					
Material:	Steel					Count (items):					
Element Type:	Soffit - Interior					Total Quantity:	397.4				m2
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				397.4						
Comments:	Generally in good condition. Bird nest was noted at the time of inspection										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:	4					
Element Name:	Girders				Width:	0.56					
Location:	North and South Underside of Structure				Height:	1.2					
Material:	Precast Concrete				Count (items):	4					
Element Type:	CPCA Girders (1200) - End				Total Quantity:	65.28					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				61.68	2.40		1.20			
Comments:	Delaminations noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**				8		
		1-5 years		6-10 years		Urgent		1 year	x	2 years	
					Concrete repairs to girders						

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:	64.1					
Element Name:	Girders				Width:	0.56					
Location:	Underside of structure				Height:	1.2					
Material:	Precast concrete				Count (items):	4					
Element Type:	CPCI Girders (1200) - Middle				Total Quantity:	1046.11					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				1046.1						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)				Length:	3					
Element Name:	Diaphragms				Width:	0.3					
Location:	North and South Underside of Structure				Height:	0.5					
Material:	Cast-in-place Concrete				Count (items):	6					
Element Type:	RC Rectangular Solid Diaphragms - End				Total Quantity:	23.4					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				20.34	2.04		1.02			
Comments:	Spall and delamination noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**				8		
		1-5 years		6-10 years		Urgent		1 year	x	2 years	

Element Group:	Beams/Main Longitudinal Elements (MLE's)					Length:	3				
Element Name:	Diaphragms					Width:	0.3				
Location:	On Pier Caps					Height:	0.5				
Material:	Cast-in-polace Concrete					Count (items):	6				
Element Type:	RC Rectangular Solid Diaphragms - - Intermediate					Total Quantity:	23.4				m2
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	m2				23.40						
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Abutments					Length:					
Element Name:	Bearings					Width:					
Location:	On North and South Abutment Walls					Height:					
Material:	Plastic					Count (items):	8				
Element Type:	Elastomeric Bearing Pads - Neoprene					Total Quantity:	8				Each
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	Each				7		1				
Comments:	Generally in good condition with crack in NE Bearing.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Abutments					Length:					
Element Name:	Ballast Walls					Width:	8.8				
Location:	On North and South Abutment Walls					Height:	1.2				
Material:	Cast-in-place Concrete					Count (items):	2				
Element Type:	Reinforced concrete walls					Total Quantity:	21.12				m2
Environment:	Benign					Limited Inspection	X				
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	m2				21.12						
Comments:	Access to ballast walls was limited due to end diaphragms. Condition state is based on the visible sections of the ballast walls - Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Abutments					Length:						
Element Name:	Abutment Walls					Width:	8.8					
Location:	North and South underside of structure					Height:	1					
Material:	Cast-in-place concrete					Count (items):	2					
Element Type:	Reinforced concrete walls					Total Quantity:	17.6					N/A
Environment:	Benign					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	N/A				14.00		2.40		1.20			
Comments:	Wide vertical crack noted, and wide map cracking and AAR noted throughout.											
Recommended Work:		X	Rehab		Replace	**Maintenance Needs:**						
		X	1-5 years		6-10 years		Urgent		1 year			2 years

Element Group:	Abutments					Length:	4.8					
Element Name:	Wingwalls					Width:						
Location:	NE, NW, SW, & SE Side of Structure					Height:	2					
Material:	Cast-in-place Concrete					Count (items):	4					
Element Type:	Reinforced concrete walls					Total Quantity:	38.4					m2
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	m2				26.40		6.00		6.00			
Comments:	Generally in good condition with efflorescence, medium transverse cracks, spall, and narrow-medium cracks.											
Recommended Work:		X	Rehab		Replace	**Maintenance Needs:**						
		X	1-5 years		6-10 years		Urgent		1 year			2 years

Element Group:	Piers					Length:						
Element Name:	Bearings					Width:						
Location:	On pier caps					Height:						
Material:	Plastic					Count (items):	8					
Element Type:	Elastomeric Bearing Pads - Neoprene					Total Quantity:	8					Each
Environment:	Benign					Limited Inspection	X					
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	Each				8							
Comments:	Access to pier bearings is limited.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year			2 years

Element Group:	Piers					Length:	8.8				
Element Name:	Caps					Width:	0.5				
Location:	Over Pier Shafts					Height:	0.7				
Material:	Cast-in-place Concrete					Count (items):	2				
Element Type:	Reinforced Concrete Pier Caps					Total Quantity:	43.64				m2
Environment:	Benign					Limited Inspection	X				
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	m2				43.64						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Piers					Length:	0.9				
Element Name:	Shafts/Columns/ Pile Bents					Width:	0.9				
Location:	Below Pier caps					Height:	4.5				
Material:	Steel					Count (items):	2				
Element Type:	Steel Fram Shafts					Total Quantity:	25.43				m2
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	m2				25.43						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Foundations					Length:					
Element Name:	Foundation (Below Ground Level)					Width:					
Location:	Below Abutment walls, wingwalls, and piers					Height:					
Material:	Unknown					Count (items):	All				
Element Type:	Unknown					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection	X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SE, SW of structure, and below abutmen				Height:						
Material:	Vegetation				Count (items):	6					
Element Type:	Embankment				Total Quantity:	6					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Rip-Rap										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				6.00						
Comments:	Embankments are moderately sloped, well vegetated, and stable										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope Protection				Width:						
Location:	NE, NW, SE, SW of structure, and below abutmen				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Slope Protection				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Generally in good condition										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and streams				Length:						
Element Name:	Streams and waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Streams and waterways				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Medoium volume and low flow from west to east with no flow obstructions noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Coating					Length:					
Element Name:	Railing Systems / Hand Railings					Width:					
Location:	On Bridge Railing					Height:					
Material:	Other					Count (items):					
Element Type:	Coating - Hot dip galvanizing					Total Quantity:	86.4				m
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				86.40						
Comments:	Generally in good condition										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Joints Seals	Replacement		X		$ 41,000.00
Overhangs	Concrete Repairs		X		$ 22,500.00
Girders	Concrete Repairs		X		$ 15,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 78,500.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ 35,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Abrasion and deformation on southeast approach barrier (typ.)

Photo 8 Spall on Northeast concrete end-post

Photo 9 Spall on concrete deck post (typ.)

Photo 10 Partially covered expansion joint at north (typ.)

Photo 11 Rust, abrasion on armouring (typ.). Debris and failing deck seal at North

Photo 12 Spalls on deck fascia/soffit at north expansion joint, with squished seal

Photo 13 Rot, checks and splits at southwest approach barrier post (typ.)

Photo 14 Delamination along west soffit overhang (typ.)

Photo 15 South pier cap, bridge soffit, and girders

Photo 16 Steel frame pier shaft at South end of bridge

Photo 17 Evidence of failure at the south expansion joint with spalls and stains

Photo 18 Cracks and delamination in south concrete girders and diaphragms

Photo 19 ECR and spalls at south girder ends and diaphragms

Photo 20 Spalls and ECR at northeast overhang (typ.)

Photo 21 Crack and Spall at northwest wingwall

Photo 22 Cracks on South abutment wall.

Structure Condition Summary Form

Structure Name Nation Valley Rd & South Nation River Bridge
Structure Number BRH011
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	129.60		129.60			0	0		00	00
	Wearing Surface	Sq.m	6.00	87.68		79.79	5.26	2.63	526	372	71	00	12
Accessories	Signs	Each	0.00	3.00		3.00			0	0		00	00
Barriers	Barrier/ Parapet Walls	Sq.m	100.00	6.00		5.00	1.00		600	415	69	00	00
	Railing Systems	m	200.00	86.40		66.40	20.00		17280	11560	67	00	00
	Railing Systems - Timber	m	100.00	14.00		2.00	12.00		1400	630	45	00	00
	Posts (Steel/Concrete)	Each	200.00	66.00		55.50	10.00	0.50	13200	9125	69	00	00
	Armouring / Retaining Devices	m	1.00	36.90		18.40	18.50		37	21	57	00	00
Joints	Concrete End Dams	Sq.m	2100.00	12.88		6.88	6.00		27048	15876	59	00	00
	Seals/ Sealants	Each	0.00	2.00				2.00	0	0		00	02
Decks	Wearing Surface	Sq.m	25.00	504.43		503.43	1.00		12611	9449	75	00	00
	Deck Top - Thin Slab	Sq.m	120.00	635.70		635.70			76284	57213	75	00	00
	Soffit - Thin Slab	Sq.m	120.00	546.00		518.00	19.00	9.00	65520	47532	73	00	00
Beams/ Main Longitudinal Elements	Girders	Sq.m	200.00	1,111.38		1,107.78	2.40	1.20	222276	166359	75	00	08
	Diaphrams - Concrete	Each	0.00	46.80		43.74	2.04	1.02	0	0		00	08
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	17.60		14.00	2.40	1.20	2200	1433	65	00	00
Abutment	Wingwalls	Sq.m	350.00	38.40		26.40	6.00	6.00	13440	7770	58	00	00
	Ballast Walls	Sq.m	350.00	21.12		21.12			7392	5544	75	00	00
	Bearings	Each	1000.00	8.00		7.00	1.00		8000	5650	71	00	00
	Abutment Walls	Sq.m	900.00	17.60		14.00	2.40	1.20	15840	10314	65	00	00
Piers	Bearings	Each	1000.00	8.00		8.00			8000	6000	75	00	00
	Caps	Sq.m	900.00	43.64		43.64			39276	29457	75	00	00
	Shafts/ Columns/ Pier Bents	Sq.m	900.00	25.43		25.43			22887	17165	75	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
Embankments and Streams	Embankments	Each	0.00	6.00		6.00			0	0		00	00
	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									553817	**401885**			

Bridge Condition Index (BCI) **72.57**

Inventory Data:

Structure Name	Nation Valley Rd and Barkley Creek Bridge								
Main Hwy/Road #	Nation Valley Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	5.0 km West of County Rd 43								
Latitude	45.0666325		Longitude	-75.2830706					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	50 km/h		No. of Lanes	2		
Old County	SDG		AADT	49		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Concrete Rigid Frame CIP - T-beam		Interchange Number						
Total Deck Length	7 m		Interchange Structure Number						
Overall Str. Width	6 m		Min. Vertical Clearance		m				
Total Deck Area	42.0 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	4.8 m		Detour Length Around Bridge		km				
Skew Angle	Degrees		Direction of Structure	East/West					
No. of Spans	1.0		Fill on Structure		m				
Culvert Length	m								
Span Lengths	7.0 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	44.32		
OSIM		2022	41.43		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	5˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on		None		Minor Rehab.		Major Rehab.	X Replace
Timing of Recommended Work:			x	1 to 5 years		6 to 10 years	
Overall Comments:	Replace structure in 1-5 years - Structure is in overall poor condition with cracks, efflorescence, spalls, and ECR on all concrete components. Rotation of abutment walls noted. Concrete barriers are detached and leaning outward.						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	4.8					
Location:	East and West approaches to structure				Height:						
Material:	Gravel				Count (items):	2					
Element Type:	Gravel Wearing Surface				Total Quantity:	57.6					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				57.60						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	1					
Element Name:	Railing Systems				Width:	0.3					
Location:	North and South Sides of Structure				Height:	0.4					
Material:	cast-in-place concrete				Count (items):	10					
Element Type:	Concrete Railing & posts				Total Quantity:	7.00					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2							7.00			
Comments:	Severe Spall, disintegration, ECR, and section loss was noted.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	0.3					
Element Name:	Posts				Width:	0.4					
Location:	North & South Side of Structure				Height:	1					
Material:	Cast-in-place Concrete				Count (items):	12					
Element Type:	Reinforced concrete Posts				Total Quantity:	12.00					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each							12.00			
Comments:	Severe Spall, disintegration, ECR, and section loss was noted.										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Sidewalks/Curbs					Length:	11				
Element Name:	Curbs					Width:	0.5				
Location:	North and South Side of Structure					Height:	0.2				
Material:	Cast-in-place concrete					Count (items):	2				
Element Type:	Reinforced concrete Safety Curb					Total Quantity:	15.4				m2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2					9.24		6.16			
Comments:	Generally in poor condition with severe disintegration noted throughout.										
Recommended Work:			Rehab	x	Replace	**Maintenance Needs:**					
	x		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks					Length:	7				
Element Name:	Wearing Surface					Width:	4.8				
Location:	Top of Deck					Height:					
Material:	Gravel					Count (items):					
Element Type:	Gravel Wearing Surface					Total Quantity:	33.60				m2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				29.60	4.00					
Comments:	Generally in good condition with loss of gravel at southwest and potholes forming.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks					Length:	7				
Element Name:	Deck Top - Thick Slab					Width:	6				
Location:	Top of Deck					Height:					
Material:	Cast-in-place Concrete					Count (items):					
Element Type:	Deck Top					Total Quantity:	42.00				m2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				21.25	12.77		7.98			
Comments:	Condition of the deck top is based on the condition of the soffit.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
	X		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	7.0					
Element Name:	Soffit - Thick Slab				Width:	1.6					
Location:	North and South Side of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	22.4					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				2.24	13.44		6.72			
Comments:	Delamination and wide cracks with efflorescence noted										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	7					
Element Name:	Soffit - Thick Slab				Width:	4					
Location:	Underside of structure				Height:						
Material:	Cast-in-place concrete				Count (items):						
Element Type:	Soffit-Interior				Total Quantity:	28					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				13.0	10.0		5.0			
Comments:	Delaminations, ECR, Efflorescence, active wet stains, and hairline cracks noted throughout.										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Abutment Walls				Width:	6.0					
Location:	East and West Underside of Structure				Height:	4.0					
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Reinforced concrete walls				Total Quantity:	48					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				7.40	30.00		10.60			
Comments:	Severe delamination and wide cracks with efflorescence noted.										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:	2.0					
Element Name:	Wingwalls				Width:						
Location:	NE,NW, SE, &SW Side of structure				Height:	1.3					
Material:	Cast-in-place concrete				Count (items):	4					
Element Type:	Reinforced concrete walls				Total Quantity:	10.4					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2					7.80		2.60			
Comments:	Outward rotation noted in walls, with severe delamination, disintegration, wide cracks, and efflorescence stains noted.										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground)				Width:						
Location:	Below abutment walls, wingwalls				Height:						
Material:	Unknown				Count (items):	All					
Element Type:	Unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection		x				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SE & SW of Structure				Height:						
Material:	Rockfill				Count (items):	4					
Element Type:	Embankments				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3	1					
Comments:	Embankments are moderately sloped, well vegetated, and stable. Minor erosion present at the southwest.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope Protection					Width:					
Location:	NE, NW, SE, SW of structure, and below abutmen					Height:					
Material:	Vegatation					Count (items):	4				
Element Type:	Slope Protection					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3.00	1.00					
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and streams					Length:					
Element Name:	Streams and waterways					Width:					
Location:	Below Structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams and waterways					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Low volume and medium flow from south to north with with some non-obstructive debris below bridge										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Structure	Replacement		X		$ 420,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 420,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			
Traffic Control			$ 60,000.00
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 110,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo3 Eastapproach from centre of structure

Photo4 West approach from centre of structure

Photo5 North elevation

Photo6 Southelevation

Photo 7 Deflection, section loss, spalls, ECR, and disintegration on north barrier (typ.)

Photo 8 Deformed hazard sign at southeast

Photo9 Rotated and spalled concrete retaining walls at the northeast (typ.)

Photo 10 Spallsand efflorescence at northeast deck fascia/wingwall

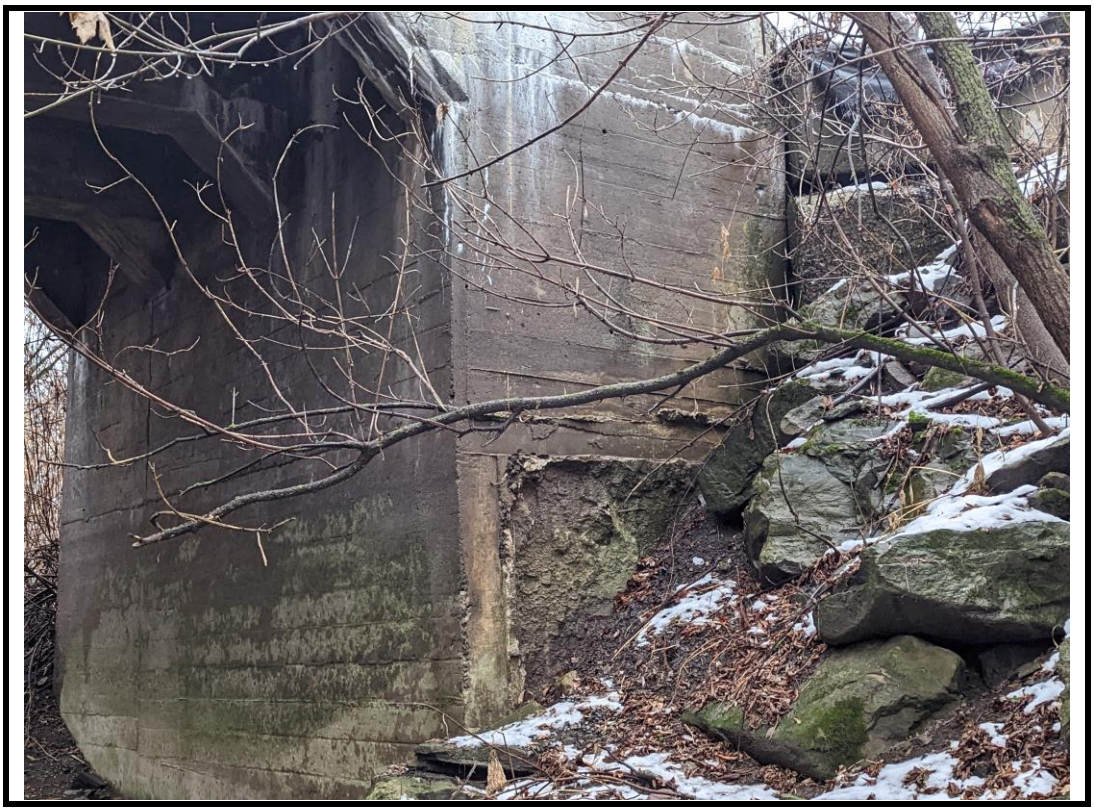

Photo 11 Spall at base of northwest wingwall

Photo 12 Efflorescence, damp stains, ECR, cracks, and scaling on girders and abutment

Photo 13 ECR, spalls, efflorescence, and cracks on soffit (typ.)

Photo 14 Cracks, scaling, spalls, and ECR on South fascia (typ.)

Structure Condition Summary Form

Structure Name Nation Valley Rd & Barkley Creek Bridge
Structure Number BRH012
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Approach Slabs	Sq.m	140.00	57.60		57.60			8064	6048	75	00	00
Barriers	Railing Systems	m	200.00	7.00				7.00	1400	0		00	00
	Posts (Steel/Concrete)	Each	200.00	12.00				12.00	2400	0		00	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	15.40			9.24	6.16	616	148	24	00	00
	Wearing Surface	Sq.m	25.00	33.60		29.60	4.00		840	595	71	00	00
Decks	Deck Top - Thick Slab	Sq.m	350.00	42.00		21.25	12.77	7.98	14700	7366	50	00	00
	Soffit - Thick Slab	Sq.m	350.00	50.40		15.24	23.44	11.72	17640	7282	41	00	00
Abutment	Wingwalls	Sq.m	350.00	10.40			7.80	2.60	3640	1092	30	00	00
	Abutment Walls	Sq.m	900.00	48.00		7.40	30.00	10.60	43200	15795	37	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		3.00	1.00		0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		3.00	1.00		0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									92500	**38326**			

Bridge Condition Index (BCI) **41.43**

Inventory Data:

Structure Name	Timmins Rd & North Branch South Nation River Bridge								
Main Hwy/Road #	Timmins Rd		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	0.8km South of County Rd 3								
Latitude	45.02092		Longitude	-75.38608					
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	75		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Concrete Box Girders		Interchange Number						
Total Deck Length	20.8 m		Interchange Structure Number						
Overall Str. Width	10.1 m		Min. Vertical Clearance		m				
Total Deck Area	210.08 sq. m		Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Roadway Width	9.0 m		Detour Length Around Bridge		km				
Skew Angle	19.3 Degrees		Direction of Structure	North/South					
No. of Spans	1		Fill on Structure		m				
Span Lengths	19.4 m								

Historical Data:

Year Built	1987	Year of Last Major Rehab.	
Last OSIM Inspection	October 9, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	72.44		
OSIM		2022	72		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashligh, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	0˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00
Investigation Notes:	Deck Condition Survey Recommended Based on Age of Structure				

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Puncture noted in seal, and evidence of leakage noted on substructure. Seals are damaged and should be replaced. Collision damage at southeast of barrier. Wide cracks noted on deck top. Severe spalls with exposed corroded reinforcement and disintegration on exterior soffit.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 22.86, SE: 19.05, SW: 22.86, NW: 19.05					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	83.82					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m			76.81		5		2			
Comments:	New end treatments installed since previous inspection. Collision damage noted on steel flex beam throughout. Rotated spacers throughout.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**		3			
			1-5 years		6-10 years		Urgent	X	1 year		2 years
						Repair damaged sections					

Element Group:	Approaches				Length:	6.0					
Element Name:	Wearing Surface				Width:	9.0					
Location:	North & South of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Surface Treatment				Total Quantity:	108.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			72.0		24.0		12.0			
Comments:	Large potholes on both approaches.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**		12			
			1-5 years		6-10 years		Urgent		1 year	X	2 years
						Repair asphalt surface treatment and patch pothole					

Element Group:	Joints				Length:	10.7					
Element Name:	Armouring/Retaining Devices				Width:						
Location:	North & South Ends of Structre				Height:						
Material:	Steel				Count (items):	6					
Element Type:	Armouring/Retaining Devices				Total Quantity:	64.2					m
Environment:	Severe				Limited Inspection	X	Due to Debris				
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m			59.9		4.3					
Comments:	Limited inspection due to debris. Light to medium corrosion noted on visible potions.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**		2			
			1-5 years		6-10 years		Urgent	x	1 year		2 years

Element Group:	Joints			Length:	10.7						
Element Name:	Concrete End Dams			Width:	0.4						
Location:	North & South Side of Structure			Height:							
Material:	Cast-in-Place Concrete			Count (items):	2						
Element Type:	Reinforced Concrete End Dams			Total Quantity:	8.56	m^2					
Environment:	Severe			Limited Inspection	X	Due to Debris					
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		7.06	1.5							
Comments:	Limited inspection due to debris. Medium scaling and abrasions noted on visible portions.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Joints			Length:							
Element Name:	Seals/Sealants			Width:							
Location:	North & South Ends of Structure			Height:							
Material:	Rubber			Count (items):	2						
Element Type:	Strip Seal			Total Quantity:	2	each					
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	each				2.0						
Comments:	Seal puncture noted on seal. Active leakage noted on soffit ends and abutments. Seals should be replaced.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers			Length:	28.7						
Element Name:	Railing System			Width:							
Location:	East & West Sides of Structure			Height:							
Material:	Steel			Count (items):	2						
Element Type:	Steel Flex Beam Raling			Total Quantity:	57.4	m					
Environment:	Severe			Limited Inspection							
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m		53.4	2	2						
Comments:	Generally in good condition with some collision damage noted at southeast corner.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	3					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Replace damaged sections						

Element Group:	Barriers				Length:						
Element Name:	Posts				Width:						
Location:	East & South Sides of Structure				Height:						
Material:	Timber				Count (items):	29					
Element Type:	Timber Posts				Total Quantity:	29					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	Each			24		5					
Comments:	Moderate splits and rot noted throughout posts. Missing spacer noted at southwest corner.										
Recommended Work:			Rehab	Replace		**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	20.8					
Element Name:	Deck Top - Exposed				Width:	10.1					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	210.08					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			197.48		8.4		4.2			
Comments:	Wide cracks, abrasions and light to moderate scaling noted on top of exposed deck top.										
Recommended Work:		X	Rehab	Replace		**Maintenance Needs:**					
		X	1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	2					
Element Name:	Soffit - Thin Slab (End)				Width:	11.7					
Location:	North and South Sides of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - End				Total Quantity:	23.4					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			23.40							
Comments:	Light map cracks and efflorescence noted on end soffit.										
Recommended Work:			Rehab	Replace		**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	16.8					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	2.1					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	70.56					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			59.5		7.4		3.7			
Comments:	Wide cracks, delaminations, severe spall and efflorescence staining noted on west fascia. Severe spall and disintegration with exposed corroded reinforcement noted on east fascia.										
Recommended Work:		X	Rehab		Replace	**Maintenance Needs:**					
		X	1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	16.8					
Element Name:	Soffit - Thin Slab (Interior)				Width:	9.6					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	161.28					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			161.28							
Comments:	Generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	North & South Abutment Walls				Height:						
Material:	Plastic				Count (items):	16					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	16					Each
Environment:	Benign				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	Each			16							
Comments:	Limited inspection of bearings. Condition rating based on condition of accesible bearing pads.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	9.6					
Location:	On Abutment Walls				Height:	0.7					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	13.44					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good		Fair		Poor*			Deficiencies
	m^2			13.44							
Comments:	Ballast walls were inaccessible for inspection due to box girders. Condition state is based on the visible sections of the ballast walls. Visible sections of the ballast walls were in good condition.										
Recommended Work:			Rehab		Replace		**Maintenance Needs:**				
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	9.6					
Location:	North & South Underside of Strucutre				Height:	1.52					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	29.18					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good		Fair		Poor*			Deficiencies
	m^2			29.18							
Comments:	Damp stains on top of abutment wall, evidence of leakage. Overall in good condition.										
Recommended Work:			Rehab		Replace		**Maintenance Needs:**				
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Abutments				Length:	4.0					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	1.5					
Material:	Cast-in-place Concrete				Count (items):	4.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	23.7					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good		Fair		Poor*			Deficiencies
	m^2			15.2		5.69		2.84			
Comments:	Wide cracks and efflorescence noted throughout wingwalls.										
Recommended Work:		X	Rehab		Replace		**Maintenance Needs:**				
		X	1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Foundations			Length:						
Element Name:	Foundation (Below Ground Level)			Width:						
Location:	Below Abutment Walls and Wingwalls			Height:						
Material:	Unknown			Count (items):						
Element Type:	Unknown			Total Quantity:	All					
Environment:	Benign			Limited Inspection		X				
Protection System:	Unknown									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							0
Comments:	No visible evidence of foundation instability was noted during the inspection.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent		1 year		2 years		

Element Group:	Embankments and Streams			Length:						
Element Name:	Embankments			Width:						
Location:	NE, SE, NW & SW of Structure			Height:						
Material:	Native Material			Count (items):	4					
Element Type:	Embankment			Total Quantity:						Each
Environment:	Moderate			Limited Inspection						
Protection System:	Vegetation									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	Each		4.00							
Comments:	Embankments are moderately sloped, well vegetated and appear to be stable.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent		1 year		2 years		

Element Group:	Embankments and Streams			Length:						
Element Name:	Streams and Waterways			Width:						
Location:	Below Structure			Height:						
Material:	Native			Count (items):	All					
Element Type:	Stream			Total Quantity:	All					N/A
Environment:	Benign			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							
Comments:	Medium volume and low flow from west to east with no flow obstructions noted at time of inspection. Severe meander noted both upstream and downstream of structure.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent		1 year		2 years		

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Seals	Replace Joint Seals		X		$ 25,500.00
Soffit - Exterior	Concrete Repairs		X		$ 9,500.00
Wingwalls	Concrete Repairs		X		$ 7,500.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 42,500.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 New end treatments installed on north approach

Photo 8 Collision damage at southwest end treatment

Photo 9 Large potholes on north approach

Photo 10 Damaged seal at north expansion joint

Photo 11 Typical elevation view of east deck barrier

Photo 12 Wide cracks and abrasions on deck top

Photo 13 Crack at southwest corner of exterior soffit

Photo 14 Spall with exposed corroded reinforcement on east facsia

Photo 15 Typical view of abutment bearings

Photo 16 Elevation view of northeast wingwall

Photo 17 Damp staining and evidence of leakage on south abutment wall

Photo 18 South Abutment Wall

Structure Condition Summary Form

Structure Name Timmins Rd & North Branch South Nation River Bridge
Structure Number BRH013
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	83.82	0.00	76.81	5.00	2.00	0	0		00	03
	Wearing Surface	Sq.m	6.00	108.00	0.00	72.00	24.00	12.00	648	382	59	00	12
Barriers	Railing Systems	m	200.00	57.40	0.00	53.40	2.00	2.00	11480	8170	71	00	03
	Posts - Timber	Each	50.00	29.00	0.00	24.00	5.00	0.00	1450	1000	69	00	00
	Armouring / Retaining Devices	m	1.00	64.20	0.00	59.90	4.30	0.00	64	47	73	00	00
Joints	Concrete End Dams	Sq.m	2100.00	8.56	0.00	7.06	1.50	0.00	17976	12380	69	00	00
	Seals/ Sealants	Each	0.00	2.00	0.00	0.00	0.00	2.00	0	0		00	00
Decks	Deck Top - Thin Slab	Sq.m	120.00	210.08	0.00	197.48	8.40	4.20	25210	18176	72	00	12
	Soffit - Thick Slab	Sq.m	350.00	255.24	0.00	244.18	7.40	3.70	89334	65133	73	00	00
	Wingwalls	Sq.m	350.00	23.70	0.00	15.20	5.69	2.84	8295	4787	58	00	00
Abutment	Ballast Walls	Sq.m	350.00	13.44	0.00	13.44	0.00	0.00	4704	3528	75	00	00
	Bearings	Each	1000.00	16.00	0.00	16.00	0.00	0.00	16000	12000	75	00	00
	Abutment Walls	Sq.m	900.00	29.18	0.00	29.18	0.00	0.00	26262	19697	75	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									201423	**145298**			

Bridge Condition Index (BCI) **72**

Inventory Data:

Structure Name	Bridge St & South Nation River Bridge								
Main Hwy/Road #	Bridge Street		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.3km North of Sandt Road Road								
Latitude	44.98924		Longitude	-75.45054					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	350		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on Concrete Box Girders		Interchange Number						
Total Deck Length	30.2 m		Interchange Structure Number						
Overall Str. Width	7 m		Min. Vertical Clearance		m				
Total Deck Area	211.4 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	4.9 m		Detour Length Around Bridge		km				
Skew Angle	Degrees		Direction of Structure	North/South					
No. of Spans	1		Fill on Structure		m				
Span Lengths	30.2 m								

Historical Data:

Year Built	1977	Year of Last Major Rehab.	
Last OSIM Inspection	October 9, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	72.75		
OSIM		2022	73		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Partly Cloudy					
Temperature:	0˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00
Investigation Notes:	Deck Condition Survey Recommended Based on Age of Structure				

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. Evdience of leaking at northeast corner of joint seal. Some damage noted on south seal. Spalls, delaminations, and abrasions throughout barrier walls. Underside of structure is generally in good condition. Some scaling noted around abutment wall drains.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 18.3, SE:15.3 , SW: 29.9, NW: 9.7					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	73.2					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m			73.2							
Comments:	Generally in good condition with some rust noted on steel flex beam.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Approaches				Length:	6.0					
Element Name:	Wearing Surface				Width:	4.9					
Location:	North & South of Strucutre				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Asphalt Wearing Surface				Total Quantity:	58.8					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			55.8		3.0					
Comments:	Wearing surface is generally in good condition with some light ravelling noted throughout and medium cracks at interface with deck.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Approaches				Length:	6					
Element Name:	Approach Slab				Width:	4.9					
Location:	North & South of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Approach Slabs				Total Quantity:	58.8					m
Environment:	Moderate				Limited Inspection	X					
Protection System:	Approach Wearing Surface									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m			58.8							
Comments:	Condition rating based on condition of wearing surface. Assumed to be in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Joints				Length:	4.9					
Element Name:	Armouring/Retaining Devices				Width:						
Location:	North & South Side of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Expansion Joint Armouring				Total Quantity:	19.6					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m			17.6	2						
Comments:	Light rust and abrasions noted on joint armouring.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Joints				Length:	4.9					
Element Name:	Concrete End Dams				Width:	0.25					
Location:	North & South Side of Structure				Height:						
Material:	Cast-in-Place Concrete				Count (items):	4					
Element Type:	Concrete End Dams				Total Quantity:	4.9					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m			4.72	0.12		0.06				
Comments:	Light abrasions, popouts and light scaling noted on concrete end dams.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 08						
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Joints				Length:	4.9					
Element Name:	Seals/Sealants				Width:						
Location:	North & South Side of Structure				Height:						
Material:	Neoprene				Count (items):	2					
Element Type:	Expansion Joint Seal				Total Quantity:	2					Each
Environment:	Severe				Limited Inspection	X	Due to Snow				
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each				1		1.0				
Comments:	Damage noted on south joint seal. Evidence of leakage noted at northeast corner. Seals also appear to be compressed.										
Recommended Work:		Rehab	X	eplace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers					Length:	42.4					
Element Name:	Barrier/Parapet Walls (Interior)					Width:	0.2					
Location:	East & West Side of Deck					Height:	0.9					
Material:	Cast-In-Place Concrete					Count (items):	2					
Element Type:	Reinforced Concrete Barrier Walls - Interior Fa					Total Quantity:	93.28					m^2
Environment:	Severe					Limited Inspection						
Protection System:	None											Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m^2				48.51		29.85		14.92			
Comments:	Medium to severe abrasions, light to severe scaling, spalls with exposed corroded reinforcement and delaminations noted on interior face of parapet wall.											
Recommended Work:	X	Rehab		Replace		**Maintenance Needs:**						
	X	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Barriers					Length:	42.4					
Element Name:	Barrier/Parapet Walls (Exterior)					Width:						
Location:	East & West Side of Deck					Height:	0.9					
Material:	Cast-In-Place Concrete					Count (items):	2					
Element Type:	Reinforced Concrete Barrier Walls - Exterior Fa					Total Quantity:	76.32					m^2
Environment:	Severe					Limited Inspection						
Protection System:	Hot Dip Galvanizing											Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m2				56.86		12.97		6.49			
Comments:	Delaminations and spalls with expsoed corroded reinforcement noted on exterior of east barrier wall.											
Recommended Work:	X	Rehab		Replace		**Maintenance Needs:**						
	X	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Barriers					Length:	40.9					
Element Name:	Hand Railings					Width:						
Location:	East & West Side of Deck					Height:	0.9					
Material:	Steel					Count (items):	2					
Element Type:	Steel Single Pipe Railing					Total Quantity:	81.8					m
Environment:	Severe					Limited Inspection						
Protection System:	Hot Dip Galvanizing											Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m				81.8							
Comments:	Generally in good condition with a missing end cap noted at southeast end of railing.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	3					
		1-5 years		6-10 years			Urgent		1 year	X	2 years	
						Replace missing end cap						

Element Group:	Sidewalk/Curbs				Length:	42.4						
Element Name:	Curbs				Width:	1.2						
Location:	East & West sides of Structure				Height:	0.2						
Material:	Cast-In-Place Concrete				Count (items):	1						
Element Type:	Reinforced Concrete Curbs				Total Quantity:	59.4					m^2	
Environment:	Severe				Limited Inspection							
Protection System:	None										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m^2				44.22		10.09		5.05			
Comments:	Medium to severe abrasions noted on vertical face of sidewalks due to snow plow equipment. Delaminations, spalls and asphalt patch noted on curb.											
Recommended Work:	X	Rehab		Replace		**Maintenance Needs:**						
	X	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Decks				Length:							
Element Name:	Drainage System				Width:							
Location:	East & West Sides of Deck				Height:							
Material:	Steel				Count (items):	6						
Element Type:	Steel Drain Pipes				Total Quantity:	6.0					each	
Environment:	Severe				Limited Inspection							
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	each				6							
Comments:	Generally in good condition.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Decks				Length:	30.2						
Element Name:	Wearing Surface				Width:	4.9						
Location:	Top of Deck				Height:							
Material:	Asphalt				Count (items):							
Element Type:	Asphalt Surface Treatment				Total Quantity:	148.0					m^2	
Environment:	Severe				Limited Inspection							
Protection System:	None										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m^2				137.77		5.77		4.44			
Comments:	Wide map cracks, and wide longitudinal and transverse cracks noted on surface.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	12					
		1-5 years		6-10 years			Urgent	X	1 year		2 years	

Element Group:	Decks				Length:	30.2					
Element Name:	Deck Top				Width:	7					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	211.4					m^2
Environment:	Moderate				Limited Inspection	X					
Protection System:	Asphalt Surface Treatment									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			211.4							
Comments:	Condition rating based on condition of deck wearing surface and deck soffit. Assumed to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	2					
Element Name:	Soffit - Thin Slab (End)				Width:	5.92					
Location:	North and South underside of structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - End				Total Quantity:	23.7					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			23.70							
Comments:	End portion of soffit appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	26.2					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	0.8					
Location:	East & West Sides of Strucutre				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	41.92					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			41.9							
Comments:	Exterior soffit appears to be in good condition with some staining noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	26.2					
Element Name:	Soffit - Thin Slab (Interior)				Width:	4.32					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	1					
Element Type:	Soffit - Interior				Total Quantity:	113.18					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			113.18							
Comments:	Interior soffit generally appears to be in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Beams/Main Longitudinal Elements MLE's				Length:	4					
Element Name:	Girders - (End)				Width:	0.58					
Location:	North & South Underside of Strucutre				Height:	1.4					
Material:	Precast Concrete				Count (items):	3					
Element Type:	CPCI Girders - End				Total Quantity:	54.48					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			54.48							
Comments:	End portions of girders appear to be in good condiiton. Two barn swallow nests noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Beams/Main Longitudinal Elements MLE's				Length:	26.2					
Element Name:	Girders - (Intermediate)				Width:	0.58					
Location:	Underside of Structure				Height:	1.4					
Material:	Precast Concrete				Count (items):	3					
Element Type:	CPCI Girders - Middle				Total Quantity:	356.84					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			356.84							
Comments:	Griders appear to be in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Beams/Main Longitudinal Elements MLE's				Length:	2.16					
Element Name:	Diaphragms - (End)				Width:	0.3					
Location:	North & South Underside of Strucutre				Height:	1.4					
Material:	Precast Concrete				Count (items):	4					
Element Type:	Rectangular Diaphragms				Total Quantity:	26.8	m^2				
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			26.8							
Comments:	Diaphragms appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Beams/Main Longitudinal Elements MLE's				Length:	2.16					
Element Name:	Diaphragms - (Intermediate)				Width:	0.26					
Location:	Underside of Deck				Height:	1.4					
Material:	Precast Concrete				Count (items):	3					
Element Type:	Rectangular Diaphragms - Intermediate				Total Quantity:	26.8	m^2				
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			26.8							
Comments:	Diaphragms appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	On North & South Abutment Walls				Height:						
Material:	Neoprene				Count (items):	6					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	6	Each				
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	Each			6							
Comments:	Bearings appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	7					
Location:	East and West underside of Structure				Height:	1					
Material:	Cast-In-Place Concrete				Count (items):	3					
Element Type:	Reinforced Concrete Walls				Total Quantity:	14					m^2
Environment:	Benign				Limited Inspection	X	Due to er				
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			14							
Comments:	Ballast walls were inaccessible for inspection due to end diaphragms. Evidence of leaking seals noted at northeast corner of walls.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	7					
Location:	North & South Underside of Structure				Height:	2.4					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	33.6					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			29.60	2.0		2.0				
Comments:	Generally in good condition with some scaling noted around drain.										
Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:	6.1					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	1.6					
Material:	Cast-in-place Concrete				Count (items):	4.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	39.0					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			39.0							
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3.00	1					
Comments:	Embankments are moderately sloped and well vegetated. Moderate erosion noted at northeast embankment.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	High volume and low flow from south to north with no flow obstructions noted. Evidence of medium to severe erosion noted along southeast portion of stream.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Joint Seals	Replace Joint Seals		X		$ 25,000.00
Barrier Walls	Concrete Repairs		X		$ 43,000.00
Concrete Curbs	Concrete Repairs		X		$ 10,500.00
Abutment Wall	Concrete Repairs		X		$ 5,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 83,500.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Light rust on southwest guiderail transition

Photo 8 Wide crack on south approach wearing surface

Photo 9 Damage on south joint seal

Photo 10 Spall on top face of concrete sidewalk

Photo 11 Spalls and disintegration noted on south end of east barrier wall

Photo 12 Wide longitudinal and transverse cracks on deck wearing surface

Photo 13 Typical view of west exterior soffit

Photo 14 Typical view of interior soffit

Photo 15 View of north end of interior girder

Photo 16 Typical view of end diaphragm

Photo 17 North Underside of Structure

Photo 18 Elevation view of northwest wingwall

Photo 19 Scaling and graffiti around drains on abutment wall

Photo 20 Typical view of north abutment wall

Photo 21 Damp stains and evidence of leaking seal on northeast corner of ballast wall

Structure Condition Summary Form

Structure Name Bridge St & South Nation River Bridge
Structure Number BRH014
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
	Barrier	m	0.00	73.20	0.00	73.20	0.00	0.00	0	0		00	00
Approaches	Wearing Surface	Sq.m	6.00	55.80	0.00	55.80	3.00	0.00	335	258	77	00	00
	Approach Slabs	Sq.m	140.00	55.80	0.00	55.80	0.00	0.00	7812	5859	75	00	00
	Barrier/ Parapet Walls (interior)	Sq.m	100.00	93.28	0.00	48.51	29.85	14.92	9328	4832	52	00	00
Barriers	Barrier/ Parapet Walls (exterior)	Sq.m	100.00	76.32	0.00	56.86	12.97	6.49	7632	4783	63	00	00
	Hand Railings	m	100.00	81.80	0.00	81.80	0.00	0.00	8180	6135	75	00	03
	Armouring / Retaining Devices	m	1.00	19.60	0.00	17.60	2.00	0.00	20	14	71	00	00
Joints	Concrete End Dams	Sq.m	2100.00	4.90	0.00	4.72	0.12	0.06	10290	7535	73	00	08
	Seals/ Sealants	Each	0.00	2.00	0.00	0.00	1.00	1.00	0	0		00	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	59.40	0.00	44.22	10.09	5.05	2376	1488	63	00	00
	Drainage System	Each	0.00	6.00	0.00	6.00	0.00	0.00	0	0		00	00
Decks	Wearing Surface	Sq.m	25.00	148.00	0.00	137.77	5.77	4.44	3700	2641	71	00	12
	Deck Top - Thin Slab	Sq.m	120.00	211.40	0.00	211.40	0.00	0.00	25368	19026	75	00	00
	Soffit - Thin Slab	Sq.m	120.00	178.80	0.00	178.80	0.00	0.00	21456	16092	75	00	00
Beams/ Main Longitudinal Elements	Girders	Sq.m	200.00	411.32	0.00	411.32	0.00	0.00	82264	61698	75	00	00
	Diaphrams - Concrete	Each	0.00	53.60	0.00	53.60	0.00	0.00	0	0		00	00
	Wingwalls	Sq.m	350.00	39.00	0.00	39.00	0.00	0.00	13650	10238	75	00	00
Abutment	Ballast Walls	Sq.m	350.00	14.00	0.00	14.00	0.00	0.00	4900	3675	75	00	00
	Bearings	Each	1000.00	6.00	0.00	6.00	0.00	0.00	6000	4500	75	00	00
	Abutment Walls	Sq.m	900.00	33.60	0.00	29.60	2.00	2.00	30240	20700	68	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	3.00	1.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									233550	**169474**			

Bridge Condition Index (BCI) **73**

Inventory Data:

Structure Name	Limerick Rd and McMillan Rd Bridge
Main Hwy/Road #	Limerick Rd
On Structure	X
Under Structure	
Structure Location	0.8km East of County Rd 8
Latitude	45.0798707
Longitude	-75.2027987
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	Concrete Rigid Frame - Arch
Total Deck Length	14 m
Overall Str. Width	8.5 m
Total Deck Area	119.0 sq. m
Roadway Width	7.0 m
Skew Angle	20 Degrees
No. of Spans	1
Span Lengths	12.8 m

Services on structure:	Navig. Water		Non-Navig.		Ped.	
	Rail		Road	X	Other	
Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
	Rail		Road		Other	
Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
	Desig./not list		Desig. & List			
Road Class:	Freeway		Arterial			
	Collector		Local	X		
Special Routes:	Transit		Truck			
	School		Bicycle			

Posted Speed	60 km/h
AADT	76
No. of Lanes	2
% Trucks	
Inspection Route Sequence	
Interchange Number	
Interchange Structure Number	
Min. Vertical Clearance	m
Detour Length Around Bridge	km
Direction of Structure	East/West
Fill on Structure	m

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.63		
OSIM		2022	71.00		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	11/25/2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Partly Cloudy / Rainy					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on		None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure is in generally good condition. Spalls and scaling noted on abutment walls, coating failure on structure barrier, honeycombing on abutment walls, light scaling throughout concrete components, damps stains noted at soffit adjacent to drains. No approach barriers present - A code compliant barrier and end-treatments should be installed at the approaches.						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches			Length:	6						
Element Name:	Wearing Surface			Width:	7						
Location:	East and West Side of Structure			Height:							
Material:	Asphalt			Count (items):	2						
Element Type:	Asphalt Surface Treatment			Total Quantity:	84.0					m^2	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		83.1	0.9							
Comments:	Generally in good condition. Light raveling was noted with a large pothole and washout at the southeast approach. No approach barrier - A code compliant barrier and end-treatments should be installed at the approaches										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	15					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Repair asphalt surface treatment and patch pothole						

Element Group:	Barriers			Length:	12.8						
Element Name:	Railing System			Width:							
Location:	North and South Sides of Structure			Height:							
Material:	Steel			Count (items):	2						
Element Type:	Steel post and panel railing			Total Quantity:	25.6					m	
Environment:	Severe			Limited Inspection							
Protection System:	Coating									Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m		20.6	5							
Comments:	Light to medium corrosion was noted on the barrier railings, with some coating failure noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers			Length:	0.6						
Element Name:	Barrier/Parapet Walls			Width:	0.3						
Location:	NE, NW, SW, & SE sides of structure			Height:	1						
Material:	Cast-in-place concrete			Count (items):	4						
Element Type:	Reinforced concrete end posts			Total Quantity:	6.24					m^2	
Environment:	Severe			Limited Inspection							
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		5.34	0.6	0.3						
Comments:	Localized spall with ECR was noted at the NW										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	15					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Concrete repairs to end posts						

Element Group:	Coating				Length:						
Element Name:	Railing systems / Hand railings				Width:						
Location:	On bridge railing				Height:						
Material:	Other				Count (items):						
Element Type:	Coating				Total Quantity:	25.6					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				14.90	7.1		3.6			
Comments:	Evidence of coating failure such as flaking and peeling was noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent	x	1 year		2 years
						Repair to bridge railing coating					

Element Group:	Sidewalks/Curbs				Length:	14					
Element Name:	Curbs				Width:	0.75					
Location:	North and South side of structure				Height:	0.3					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced concrete safety curb				Total Quantity:	29.4					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				28.2	1.2					
Comments:	Evidence of light to medium scaling was noted with spall at northeast.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:						
Element Name:	Drainage System				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Other				Count (items):	2					
Element Type:	Steel Drain Pipes				Total Quantity:	2					Each
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2						
Comments:	Deck drain downspouts lack extension beyond soffit.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	14					
Element Name:	Wearing surface				Width:	7					
Location:	Top of Deck				Height:	#REF!					
Material:	Asphalt				Count (items):						
Element Type:	Asphalt wearing surface				Total Quantity:	98				m2	
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m2				98			1			
Comments:	Generally in good condition with vegetation growth noted adjacent to bridge barriers.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	18				
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks				Length:	14					
Element Name:	Deck Top - Thick Slab				Width:	8.5					
Location:	Below Roadway				Height:						
Material:	Cast-in-place concrete				Count (items):						
Element Type:	Deck top				Total Quantity:	119				m^2	
Environment:	Moderate				Limited Inspection			x			
Protection System:	Asphalt Wearing Surface										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				119.0						
Comments:	Limited inspection - The condition of the deck is estimated based on the soffit and asphalt wearing surface overall condition - Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks				Length:	14					
Element Name:	Soffit - Thick Slab				Width:	1.7					
Location:	North and south side of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	47.6				m^2	
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				47.6						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks				Length:	14					
Element Name:	Soffit - Thick Slab				Width:	6.5					
Location:	Underside of Structure				Height:						
Material:	Cast-in-pace concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	91	m^2				
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			88.60	1.9	0.50					
Comments:	Moderate scaling and runoff infiltration noted adjacent to deck drain downspouts. Small spall with ECR noted at the west.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Concrete Repairs						

Element Group:	Abutments				Length:						
Element Name:	Abutment wall				Width:	9					
Location:	East and West underside of structure				Height:	3.2					
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Reinforced concrete walls				Total Quantity:	57.6	m^2				
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			47.23	6.91	3.46					
Comments:	Localized spall, ECR, efflorescence, and wide cracks noted on east abutment walls. Moderate to severe honeycombing noted at west. Wide map cracking and severe erosion along springline noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Concrete Repairs						

Element Group:	Retaining Walls				Length:	5.0					
Element Name:	Walls				Width:						
Location:	NE, NW, SE, SW side of sructure				Height:	2.75					
Material:	Cast-in-place concrete				Count (items):	4					
Element Type:	Reinforced concrete retaining walls				Total Quantity:	55	m^2				
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			45.1	6.6	3.3					
Comments:	Wide map cracking noted along springline.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Concrete Repairs						

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below abutment walls, wingwalls				Height:						
Material:	Unknown				Count (items):	All					
Element Type:	Unknown				Total Quantity:	All					m^2
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted at the time of inspection										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SE, SW of structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Embankment				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3	1					
Comments:	Embankments are moderately sloped, well vegetated, and stable. Steep embankment with moderate erosion at southwest.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope Protection				Width:						
Location:	NE, NW, SE and SW side of structure				Height:						
Material:	Vegetation				Count (items):	4					
Element Type:	Slope Protection				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3	1					
Comments:	Generally in good condition with some erosion at the southwest embankment										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All				N/A	
Environment:	Benign				Limited Inspection	X					
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Medium volume and low flow from south to north with no visible flow obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approach Barrier	Install code-compliant approach barrier and end-treatment			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Spall at Northwest barrier end wall with ECR

Photo 8 Corrosion and coating failure at north barrier railing (typical)

Photo 9 Vegetation along north edge of asphalt over deck (typical)

Photo 10 Wet areas around drain downspouts on soffit

Photo 11 Spalls and honeycombing at springline along east abutment wall (typical)

Photo 12 Spalling on east curb

Structure Condition Summary Form

Structure Name Limerick Rd and McMillan Rd Bridge
Structure Number BRH015
Date of Inspection November 25, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Abutment	Abutment Walls	Sq.m	900.00	57.6		47.23	6.91	3.46	51840	34368	66	00	00
Approaches	Wearing Surface	Sq.m	6.00	84		83.1	0.9		504	376	75	00	00
Barriers	Barrier/ Parapet Walls	Sq.m	100.00	6.24		5.34	0.6	0.3	624	425	68	00	00
	Railing Systems	m	200.00	25.6		20.6	5		5120	3490	68	00	00
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	25.6		14.9	7.1	3.6	3200	1752	55	00	00
Decks	Deck Top-Thick Slab	Sq.m	350.00	119		119			41650	31238	75	00	00
	Drainage System	Each	0.00	2		2			0	0		00	00
	Soffit- Thick Slab	Sq.m	350.00	138.6		136.2	1.9	0.5	48510	36019	74	00	00
	Wearing Surface	Sq.m	25.00	99		98		1	2475	1838	74	00	00
Embankments and Streams	Embankments	Each	0.00	4		3	1		0	0		00	00
	Slope Protection	Each	0.00	4		3	1		0	0		00	00
	Streams and Waterways	All	0.00	1		1			0	0		00	00
Foundations	Foundations (below ground level)	N/A	0.00	1		1			0	0		00	00
Retaining Walls	Walls	Sq.m	350.00	55		45.1	6.6	3.3	19250	12763	66	00	00
Sidewalks/ Curbs	Curbs	Sq.m	40.00	29.4		28.2	1.2		1176	865	74	00	00
									174349	**123132**			

Conditon Index **71**

Inventory Data:

Structure Name	West Bridge								
Main Hwy/Road #	Wallace Road		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.1km South of Nation River Road								
Latitude	44.95978		Longitude	-75.47725					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	100		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Slab on CPCI Girders		Interchange Number						
Total Deck Length	32.2 m		Interchange Structure Number						
Overall Str. Width	9.7 m		Min. Vertical Clearance		m				
Total Deck Area	312.3 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	8.5 m		Detour Length Around Bridge		km				
Skew Angle	10 Degrees		Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Span Lengths	31.2 m								

Historical Data:

Year Built	1981	Year of Last Major Rehab.	
Last OSIM Inspection	October 9, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	74.9		
OSIM		2022	75		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	-2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00

Investigation Notes: Condition Survey recommended due to age of structure

Overall Structure Notes:							
Work on Structure:		None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure is generally in good condition. New end treatments have been installed since previous inspection. Small spalls and narrow cracks ntoed on ends of girders. Wide longitudinal crack observed at centreline of wearing surface.						
Date of Next Inspection:	december 2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	NE: 31.7, SE: 22.8, SW: 22.8, NW: 26.2					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	103.5				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m			99.4		4.1					
Comments:	New end treatments have been installed since previous inspection. New portions of guiderail are generally in good condition. Rust noted on steel flex beam. Light to medium rot noted on timber posts.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Approaches				Length:	6.00					
Element Name:	Wearing Surface				Width:	8.6					
Location:	East and West Side of Structure				Height:						
Material:	Asphalt				Count (items):	2					
Element Type:	Wearing Surface				Total Quantity:	103.2				m^2	
Environment:	Severe				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			103.2		0.0		0.0			
Comments:	Wide transverse cracks at the end of approach slabs. Potholes and wide cracks noted on wearing surface.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:** 12					
		1-5 years		6-10 years			Urgent		1 year	X	2 years
						Repair asphalt surface treatment and patch pothole					

Element Group:	Approaches				Length:	6.00					
Element Name:	Approach Slab				Width:	8.6					
Location:	East and West Side of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Concrete approach slab				Total Quantity:	103.2				m^2	
Environment:	moderate				Limited Inspection	X					
Protection System:	Wearing Surface									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			103.2							
Comments:											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Joints				Length:	10					
Element Name:	Armouring/Retaining Devices				Width:						
Location:	East & West Side of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Armouring/Retaining Devices				Total Quantity:	40					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good		Fair		Poor*			Deficiencies
	m			40							
Comments:	Light rust and abrasions noted on armouring.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Joints				Length:	10					
Element Name:	Concrete End Dams				Width:	0.3					
Location:	East & West Side of Structure				Height:						
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Concrete End Dams				Total Quantity:	12					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good		Fair		Poor*			Deficiencies
	m^2			12.0							
Comments:	Light abrasions and light scaling noted on end dams.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Joints				Length:	10					
Element Name:	Seals/Sealants				Width:						
Location:	East & West Side of Structure				Height:						
Material:	Plastic				Count (items):	2					
Element Type:	Strip Seal				Total Quantity:	2					each
Environment:	Severe				Limited Inspection	x	Due to sr				
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good		Fair		Poor*			Deficiencies
	each			2							
Comments:	Light rust and abrasions noted on armouring.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Barriers				Length:	43.2					
Element Name:	Railing System				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Steel/Wood				Count (items):	2					
Element Type:	Steel Flex Beam on Wood Posts				Total Quantity:	86.4					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m			84.4		2.0					
Comments:	Light corrosion noted on channel portion of railing. Localized dents also noted on flex beam.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Barriers				Length:						
Element Name:	Posts				Width:						
Location:	North and South Sides of Structure				Height:						
Material:	Wood				Count (items):	46					
Element Type:	Wood Posts				Total Quantity:	46					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	Each			40.0		6.0					
Comments:	Generally in good condition with some light to medium splits in posts and rotated spacers noted. Localized light corrosion on post base plates noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks				Length:	32.3					
Element Name:	Wearing Surface				Width:	8.5					
Location:	Top of Deck				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	274.6					m^2
Environment:	Severe				Limited Inspection	X	Due to snow				
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			261.7		8.6		4.3			
Comments:	Potholes forming along centreline. Wide longitudinal crack noted at centreline.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	12				
		1-5 years		6-10 years			Urgent	X	1 year		2 years

Element Group:	Decks				Length:	32.3					
Element Name:	Deck Top				Width:	9.7					
Location:	Top of Deck				Height:						
Material:	Cast-in-Place Concrete				Count (items):						
Element Type:	Deck Top				Total Quantity:	313.3					m^2
Environment:	Moderate				Limited Inspection	X					
Protection System:	Asphalt Wearing Surface									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			313.3							
Comments:	Condition rating based on condition of wearing surface and soffit.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Decks				Length:	2.0					
Element Name:	Soffit - Thin Slab (End)				Width:	8.2					
Location:	East & West Ends of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Ends				Total Quantity:	32.8					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			32.80							
Comments:	End portion of soffit appears to be generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Decks				Length:	28.2					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	0.65					
Location:	North & South Sides of Structure				Height:						
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Soffit - Thin Slab (Exterior)				Total Quantity:	36.7					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair	Poor*				Deficiencies	
	m^2			36.5	0.1	0.1					
Comments:	Small spall at southeast end of exterior soffit.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 08						
	1-5 years		6-10 years		Urgent		1 year	X	2 years		

Element Group:	Decks			Length:	28.2						
Element Name:	Soffit - Thin Slab			Width:	6.3						
Location:	Underside of Structure			Height:							
Material:	Cast-in-Place Concrete			Count (items):							
Element Type:	Soffit - Interior			Total Quantity:	177.7						m^2
Environment:	Benign			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		177.7								
Comments:	Generally in good condition										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**							
		1-5 years	6-10 years		Urgent		1 year		2 years		

Element Group:	Beams/Main Longitudinal Element (MLE's)			Length:	4.0						
Element Name:	Girders			Width:	0.6						
Location:	East & West Underside of Structure			Height:	1.4						
Material:	Precast Concrete			Count (items):	5						
Element Type:	CPCI Girders (1400) - End			Total Quantity:	90.8						m^2
Environment:	Benign			Limited Inspection			X				
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		90.6	0	0						
Comments:	Small spall noted on exterior of northeast girder. Spall with exposed corroded reinforcement on southwest exterior girder. Narrow map crack on exterior girder flange of southeast girder.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:** 08							
		1-5 years	6-10 years		Urgent		1 year	X	2 years		

Element Group:	Beams/Main Longitudinal Element (MLE's)			Length:	28.3						
Element Name:	Girders			Width:	0.6						
Location:	Underside of Structure			Height:	1.4						
Material:	Precast Concrete			Count (items):	5						
Element Type:	CPCI Girders (1400) - End			Total Quantity:	642.4						m^2
Environment:	Benign			Limited Inspection			X				
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies	
	m^2		642.4								
Comments:	Generally in good condition.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**							
		1-5 years	6-10 years		Urgent		1 year		2 years		

Element Group:	Beams/Main Longitudinal Element (MLE's)				Length:	1.5					
Element Name:	Diaphragms (End)				Width:	0.3					
Location:	East & West Underside of Structure				Height:	1.4					
Material:	Precast Concrete				Count (items):	8					
Element Type:	RC Rectangular Diaphragms				Total Quantity:	37.2					m^2
Environment:	Benign				Limited Inspection			X			
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			37.2							
Comments:	Generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Beams/Main Longitudinal Element (MLE's)				Length:	1.5					
Element Name:	Diaphragms (Middle)				Width:	0.3					
Location:	Underside of Structure				Height:	1.4					
Material:	Precast Concrete				Count (items):	8					
Element Type:	RC Rectangular Diaphragms - Intermediate				Total Quantity:	37.2					m^2
Environment:	Benign				Limited Inspection			X			
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	m^2			37.2							
Comments:	Generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	East and West Underside of Structure				Height:						
Material:	Plastic				Count (items):	10					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	10					Each
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good		Fair		Poor*		Deficiencies	
	Each			10							
Comments:	Bearings appear to be generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Abutments			Length:							
Element Name:	Ballast Walls			Width:	9.7						
Location:	East and West Underside of Structure			Height:	1.0						
Material:	Cast-In-Place Concrete			Count (items):	2						
Element Type:	Reinforced Concrete Walls			Total Quantity:	19.4	m^2					
Environment:	Benign			Limited Inspection	X						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		19.2	0.1	0.1						
Comments:	Limited inspection due to end diaphragms. Spall noted on west ballast wall at end of girder. Visible portions of ballast wall were generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Abutment			Length:							
Element Name:	Abutment Walls			Width:	9.7						
Location:	East and West Underside of Structure			Height:	2.1						
Material:	Cast-in-Place Concrete			Count (items):	2						
Element Type:	Reinforced Concrete Walls			Total Quantity:	40.7	m^2					
Environment:	Benign			Limited Inspection							
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		40.6	0.1							
Comments:	Graffiti on east wall. Localized moderate honeycombing noted on north corner of east wall.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments			Length:	5.5						
Element Name:	Wingwalls			Width:							
Location:	NE, SE, NW & SW OF Structure			Height:	1.5						
Material:	Cast-in-place Concrete			Count (items):	4.0						
Element Type:	Reinforced Concrete Walls			Total Quantity:	33.0	m^2					
Environment:	Moderate			Limited Inspection							
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		33.0	0.0							
Comments:	Generally in good condition with vegetation growing on northeast wall.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations			Length:						
Element Name:	Foundation (Below Ground Level)			Width:						
Location:	Below Abutment Walls and Wingwalls			Height:						
Material:	Unknown			Count (items):						
Element Type:	Unknown			Total Quantity:	All					
Environment:	Benign			Limited Inspection		X				
Protection System:	Unknown								Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*				Deficiencies	
	N/A		All						0	
Comments:	No visible evidence of foundation instability was noted during the inspection.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:					
Element Name:	Embankments				Width:					
Location:	NE, SE, NW & SW Side of Structure				Height:					
Material:	Native Material				Count (items):	4				
Element Type:	Embankment				Total Quantity:					Each
Environment:	Moderate				Limited Inspection					
Protection System:	Vegetation									Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*		
	Each			4.00						
Comments:	Embankments are moderately sloped and well vegetated.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:					
Element Name:	Streams and Waterways				Width:					
Location:	Below Structure				Height:					
Material:	Native				Count (items):	All				
Element Type:	Stream				Total Quantity:	All				N/A
Environment:	Benign				Limited Inspection					
Protection System:	None									Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*		
	N/A			All						
Comments:	Low volume and moderate flow from south to north with no obstructions noted.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ -
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 New end treatment at southeast corner

Photo 8 Wide crack at end of approach slab on east wearing surface

Photo 9 Abrasions on east joint armouring and scaling on concrete end dams

Photo 10 Typical elevation of deck barrier, north barrier shown

Photo 11 Wide longitudinal crack at centreline of deck wearing surface

Photo 12 Typical view of north exterior soffit

Photo 13 Typical view of interior soffit

Photo 14 Small spall at west end of south girder

Photo 15 Spall at east end of interior girder

Photo 16 Graffiti on east end diaphragm

Photo 17 Bearing at northwest corner of structure

Photo 18 Narrow cracks on northwest wingwall

Photo 19 Localized moderate honeycombing on east abutment wall

Structure Condition Summary Form

Structure Name West Bridge
Structure Number BRH016
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
	Barrier	m	0.00	103.50	0.00	99.40	4.10	0.00	0	0		00	00
Approaches	Wearing Surface	Sq.m	6.00	103.20	0.00	103.20	0.00	0.00	619	464	75	00	12
	Approach Slabs	Sq.m	140.00	103.20	0.00	103.20	0.00	0.00	14448	10836	75	00	00
Barriers	Railing Systems	m	200.00	86.40	0.00	84.40	2.00	0.00	17280	12820	74	00	00
	Posts - Timber	Each	50.00	46.00	0.00	40.00	6.00	0.00	2300	1620	70	00	00
	Armouring / Retaining Devices	m	1.00	40.00	0.00	40.00	0.00	0.00	40	30	75	00	00
Joints	Concrete End Dams	Sq.m	2100.00	12.00	0.00	12.00	0.00	0.00	25200	18900	75	00	00
	Seals/ Sealants	Each	0.00	2.00	0.00	2.00	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	25.00	274.60	0.00	261.70	8.60	4.30	6865	4993	73	00	12
Decks	Deck Top - Thin Slab	Sq.m	120.00	313.30	0.00	313.30	0.00	0.00	37596	28197	75	00	00
	Soffit - Thin Slab	Sq.m	120.00	247.20	0.00	247.00	0.10	0.10	29664	22235	75	00	08
Beams/ Main Longitudinal	Girders	Sq.m	200.00	733.20	0.00	733.00	0.10	0.10	146640	109958	75	00	08
Elements	Diaphrams - Concrete	Each	0.00	74.40	0.00	74.40	0.00	0.00	0	0		00	00
	Wingwalls	Sq.m	350.00	33.00	0.00	33.00	0.00	0.00	11550	8663	75	00	00
Abutment	Ballast Walls	Sq.m	350.00	19.40	0.00	19.20	0.10	0.10	6790	5054	74	00	08
	Bearings	Each	1000.00	10.00	0.00	10.00	0.00	0.00	10000	7500	75	00	00
	Abutment Walls	Sq.m	900.00	40.70	0.00	40.60	0.10	0.00	36630	27441	75	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									345622	**258711**			

Bridge Condition Index (BCI) **75**

Inventory Data:

Structure Name	Bigford Bridge								
Main Hwy/Road #	Kirkwood Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water	X	Non-Navig.		Ped.	
				Rail		Road		Other	
Structure Location	0.2km North of County Road 5								
Latitude	45.00415		Longitude	-75.36276					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	50		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Solid Slab		Interchange Number						
Total Deck Length	12.2 m		Interchange Structure Number						
Overall Str. Width	10.5 m		Min. Vertical Clearance		m				
Total Deck Area	128.1 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	7.0 m		Detour Length Around Bridge		km				
Skew Angle	20 Degrees		Direction of Structure	North/South					
No. of Spans	1		Fill on Structure		m				
Span Lengths	12.2 m								

Historical Data:

Year Built	1983	Year of Last Major Rehab.	
Last OSIM Inspection	October 9, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	73.23		
OSIM		2022	74		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	-1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	Detailed Deck Condition Survey:		X		$ 15,000.00
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 15,000.00
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good to condition. Wide transverse cracks noted on concrete deck top. With some small spalls noted on concrete posts. Graffiti noted on north underside of structure. Settlement of roadway noted on both approaches.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches			Length:	NE: 22.86, SE: 22.86, SW: 45.7, NW: 45.7						
Element Name:	Barrier			Width:							
Location:	NE, SE, NW & SW of Structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)			Total Quantity:	137.1					m	
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m		133.12	3	1						
Comments:	Generally in good condition. New end treatments installed since previous inspection. Minor to severe rot noted on existing timber posts. Collision damage noted on steel flex beam.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**	18 - (Other)						
		1-5 years	6-10 years	X	Urgent		1 year		2 years		
				Repair section with collision damage							

Element Group:	Approaches			Length:	6						
Element Name:	Wearing Surface			Width:	7.5						
Location:	North & South of Structure			Height:							
Material:	Asphalt			Count (items):	2						
Element Type:	Asphalt Surface Treatment			Total Quantity:	90.0					m^2	
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	m^2		80.1	5.4	4.5						9
Comments:	Settlement noted on both approaches . Some washout noted at edges of approaches.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**	12						
		1-5 years	6-10 years		Urgent		1 year	X	2 years		
				Repair asphalt surface treatment and patch pothole							

Element Group:	Accessories			Length:							
Element Name:	Signs			Width:							
Location:	NE, SE, NW & SW of Structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Steel hazard Signs			Total Quantity:	4.0					each	
Environment:	Severe			Limited Inspection							
Protection System:	Hot Dip Galvanized										Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*						
	each		4.0								
Comments:	Generally in good condition.										
Recommended Work:		Rehab	Replace	**Maintenance Needs:**							
		1-5 years	6-10 years		Urgent		1 year		2 years		

Element Group:	Joints				Length:	9.8					
Element Name:	Armouring/Retaining Devices				Width:						
Location:	North & South Ends of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Armouring/Retaining Devices				Total Quantity:	19.6					m
Environment:	Severe				Limited Inspection	X	Due to Debris				
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				19.4	0.2					
Comments:	Limited inspection due to debris. Some light to localized medium rust noted on visible portions of armouring.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	
						Install supports.					

Element Group:	Joints				Length:	9.8					
Element Name:	Concrete End Dams				Width:	0.35					
Location:	North & South Ends of Structure				Height:						
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Concrete End Dams				Total Quantity:	6.86					m^2
Environment:	Severe				Limited Inspection	X	Due to Debris				
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				6.72	0.14					
Comments:	Limited inspection due to debris. Light to medium abrasions and scaling noted on visible portions.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	
						Install supports.					

Element Group:	Joints				Length:						
Element Name:	Seals/Sealants				Width:						
Location:	North & South Ends of Structure				Height:						
Material:	Neoprene				Count (items):	2					
Element Type:	Strip Seal				Total Quantity:	2					each
Environment:	Severe				Limited Inspection	X					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				2						
Comments:	Limited inspection due to debris. No evidence of leakage noted at time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	
						Install supports.					

Element Group:	Barriers				Length:	0.4					
Element Name:	Barrier/Parapet Walls				Width:	0.4					
Location:	NE, NW, SE & SW of Structure				Height:	1.6					
Material:	Cast-In-Place Concrete				Count (items):	4					
Element Type:	Reinforced concrete End Posts				Total Quantity:	3.2					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				3.20						
Comments:	Generally in good condition with some pattern cracking noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	50					
Element Name:	Railing System				Width:						
Location:	East & West Sides of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Flex Beam				Total Quantity:	100					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m				100						
Comments:	Generally in good condition with some rotated spacers noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Barriers				Length:	0.3					
Element Name:	Posts				Width:	0.3					
Location:	East & West sides of Structure				Height:	1.03					
Material:	Cast-in-Place Concrete				Count (items):	52					
Element Type:	Concrete Barrier posts				Total Quantity:	52					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	Each				48		3		1		
Comments:	Small spalls, and pattern map cracks noted on concrete barrier posts.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	8				
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Coating				Length:							
Element Name:	Raling System/Hand Railings				Width:							
Location:	On Bridge Railing				Height:							
Material:	Other				Count (items):							
Element Type:	Hot Dip Galvanizing				Total Quantity:	100.0						m
Environment:	Severe				Limited Inspection							
Protection System:	None											Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m				100							
Comments:	Coating is generally in good condition.											
Recommended Work:			Rehab		Replace		**Maintenance Needs:**					
			1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks				Length:	43						
Element Name:	Deck Top (Exposed)				Width:	9.8						
Location:	Top of Deck				Height:							
Material:	Cast-in-Place Concrete				Count (items):							
Element Type:	Deck Top				Total Quantity:	421.4						m^2
Environment:	Severe				Limited Inspection	X						
Protection System:	None											Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m^2				408.76		8.43		4.21			
Comments:	Wide transverse cracks ntoed on deck surface. Debris accumulation throughout edges of deck.											
Recommended Work:		X	Rehab		Replace		**Maintenance Needs:**					
		X	1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Decks				Length:	2						
Element Name:	Soffit - Thin Slab (End)				Width:	11						
Location:	North and South Sides of Structure				Height:							
Material:	Cast-in-Place Concrete				Count (items):	2						
Element Type:	Soffit - End				Total Quantity:	44						m^2
Environment:	Benign				Limited Inspection							
Protection System:	None											Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*			
	m^2				44.00							
Comments:	Graffitit noted on north end of soffit. End of soffit appears to be in good condition.											
Recommended Work:			Rehab		Replace		**Maintenance Needs:**	2				
			1-5 years		6-10 years			Urgent		1 year	X	2 years

Element Group:	Decks				Length:	39.0					
Element Name:	Soffit - Thin Slab (Exterior)				Width:	1.6					
Location:	East Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	124.8					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				124.8						
Comments:	Exterior soffit generally appears to be in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	39					
Element Name:	Soffit - Thin Slab (Interior)				Width:	7.8					
Location:	Underside of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Soffit - Interior				Total Quantity:	304.2					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				304.2						
Comments:	Interior soffit appears to be in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Bearings				Width:						
Location:	On North & South Abutment Wall				Height:						
Material:	Neoprene				Count (items):	10					
Element Type:	Elastomeric Bearing Pads - Neoprene				Total Quantity:	10					Each
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				10						
Comments:	Bearing pads appear to be in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Ballast Walls				Width:	9.8					
Location:	North & South Underside of Structure				Height:	0.6					
Material:	Cast-In-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	11.76					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			11.76							
Comments:	Ballast walls were inaccessible for inspection due to concrete deck. Visible sections appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutment				Length:						
Element Name:	Abutment Walls				Width:	9.8					
Location:	North & South Underside of Structure				Height:	0.9					
Material:	Cast-in-Place Concrete				Count (items):	2					
Element Type:	Reinforced Concrete Walls				Total Quantity:	17.6					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			17.60							
Comments:	Graffiti on north abutment wall. Abutment walls appear to be in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	2					
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Abutments				Length:	3.5					
Element Name:	Wingwalls				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:	1.6					
Material:	Cast-in-place Concrete				Count (items):	4.0					
Element Type:	Reinforced Concrete Walls				Total Quantity:	22.4					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			22.4							
Comments:	Wingwalls are generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Piers				Length:						
Element Name:	Shafts/Columns/ Pile Bents				Width:	0.5					
Location:	Underside of Structure				Height:	4.2					
Material:	Steel				Count (items):	12.0					
Element Type:	Steel Circular Shafts				Total Quantity:	79.1					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	m^2				79.1						
Comments:	Pier shafts appear to be in good condition with some light staining noted on top of shafts.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Pier Shafts				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW, SW, S & N Side of Structure				Height:						
Material:	Native Material				Count (items):	6					
Element Type:	Embankment				Total Quantity:	6					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Rip-Rap Slope Protection										Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*		Deficiencies
	Each				6.00						
Comments:	Embankments are moderately sloped, well vegetated and appear to be stable.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:					
Element Name:	Slope Protection				Width:					
Location:	N, NE, SE, S, NW & SW Side of Structure				Height:					
Material:	Rip-Rap				Count (items):	5				
Element Type:	Stone Slope Protection				Total Quantity:	5				Each
Environment:	Moderate				Limited Inspection					
Protection System:	None									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	Each			5.00	1					
Comments:	Some loss of rip-rap material on north embankment.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:					
Element Name:	Streams and Waterways				Width:					
Location:	Below Structure				Height:					
Material:	Native				Count (items):	All				
Element Type:	Stream				Total Quantity:	All				N/A
Environment:	Benign				Limited Inspection					
Protection System:	None									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	N/A			All						
Comments:	High volume and low flow from west to east with no obstructions noted at time of inspection.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Deck Top (Exposed)	Concrete Repairs		X		$ 8,500.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 8,500.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Settlement and large potholes on north wearing surface

Photo 8 New end treatment at southwest corner

Photo 9 North expansion joint covered by debris

Photo 10 Typical elevation view of east barrier

Photo 11 Small spall on concrete barrier post

Photo 12 Wide transverse cracks and abrasions on deck top

Photo 13 Typical view of west exterior soffit

Photo 14 Typical view of east exterior soffit

Photo 15 View of interior soffit

Photo 16 Small spall on south side of interior soffit

Photo 17 Typical view of south bearing

Photo 18 South abutment wall

Photo 19 Graffiti on north underside of structure

Photo 20 Typical view of south pier shafts

Photo 21 Staining on top of pier shafts

Structure Condition Summary Form

Structure Name Bigford Bridge
Structure Number BRH017
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	137.10	0.00	133.12	3.00	1.00	0	0		00	18
	Wearing Surface	Sq.m	6.00	90.00	0.00	80.10	5.40	4.50	540	373	69	00	12
Barriers	Barrier/ Parapet Walls	Sq.m	100.00	3.20	0.00	3.20	0.00	0.00	320	240	75	00	00
	Railing Systems	m	200.00	100.00	0.00	100.00	0.00	0.00	20000	15000	75	00	00
	Posts (Steel/Concrete)	Each	200.00	52.00	0.00	48.00	3.00	1.00	10400	7440	72	00	08
	Armouring / Retaining Devices	m	1.00	19.60	0.00	19.40	0.20	0.00	20	15	75	00	00
Joints	Concrete End Dams	Sq.m	2100.00	6.86	0.00	6.72	0.14	0.00	14406	10702	74	00	00
	Seals/ Sealants	Each	0.00	2.00	0.00	2.00	0.00	0.00	0	0		00	00
Decks	Deck Top - Thick Slab	Sq.m	350.00	421.40	0.00	408.76	8.43	4.21	147490	108480	74	00	00
	Soffit - Thick Slab	Sq.m	350.00	473.00	0.00	473.00	0.00	0.00	165550	124163	75	00	00
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	100.00	0.00	100.00	0.00	0.00	12500	9375	75	00	00
	Wingwalls	Sq.m	350.00	17.60	0.00	17.60	0.00	0.00	6160	4620	75	08	08
Abutment	Ballast Walls	Sq.m	350.00	11.76	0.00	11.76	0.00	0.00	4116	3087	75	00	00
	Bearings	Each	1000.00	10.00	0.00	10.00	0.00	0.00	10000	7500	75	00	00
	Abutment Walls	Sq.m	900.00	17.60	0.00	17.60	0.00	0.00	15840	11880	75	01	08
Piers	Shafts/ Columns/ Pier Bents	Sq.m	900.00	79.10	0.00	79.10	0.00	0.00	71190	53393	75	00	00
	Embankments	Each	0.00	6.00	0.00	6.00	0.00	0.00	0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	6.00	0.00	5.00	1.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									478532	**356266**			

Bridge Condition Index (BCI) **74**

Inventory Data:

Structure Name	Chesterville Dam Structure Pedestrian Bridge								
Main Hwy/Road #		Services on structure:	Navig. Water		Non-Navig.		Ped.	X
On Structure	X		Rail		Road		Other	
Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
			Rail		Road		Other	
Structure Location	30m South of Water St.								
Latitude	45.1012649	Longitude	-75.2259991						
Owner(s)	Township of North Dundas	Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
			Desig./not list		Desig. & List			
MTO Region	40 - Eastern	Road Class:	Freeway		Arterial			
			Collector		Local	X		
MTO District	42 - Ottawa	Posted Speed			No. of Lanes	2		
Old County	SDG	AADT	N/A		% Trucks			
Geographic Twp.		Inspection Route Sequence						
Structure Type	Pedestrian Bridge (Solid Slab)	Interchange Number						
Total Deck Length	42 m	Interchange Structure Number						
Overall Str. Width	4 m	Min. Vertical Clearance		m				
Total Deck Area	168.0 sq. m	Special Routes:	Transit		Truck			
			School		Bicycle			
Roadway Width	4.0 m	Detour Length Around Bridge		km				
Skew Angle	Degrees	Direction of Structure	North/South					
No. of Spans	6	Fill on Structure		m				
Span Lengths	7.0 m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.81		
OSIM		2022	74.79		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection: Chesterville	11/25/2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Partly Cloudy / Rainy					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study					
Material Condition Survey					
	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 Investi	Pedestrian Bridge (Solid Slab)	x			
Fatigue Investigation:		x			
Seismic Investigation:		x			
Structure Evaluation:		x			
Monitoring					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	Structure is generally in good condition - Limited access to soffit and abutment walls, visible portions are in generally good condition with some map cracking and scaling on the east edge of top of deck. Approaches should be regraded. Corrosion noted on bollard base plates with missing bolts							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (Attachments and Signs)				Length:						
Element Name:	Other				Width:						
Location:	North and South side of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Bollard				Total Quantity:	2.0					Each
Environment:	Severe				Limited Inspection						
Protection System:	Coating										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each					2.0					
Comments:	Corrosion at baseplates with paint failure and missing bolts noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	18					
	1-5 years		6-10 years		Urgent	X	1 year		2 years		
					Replace missing bolts						

Element Group:	Approaches				Length:	20					
Element Name:	Barriers				Width:						
Location:	NE & SE sides of structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel post and panel railing				Total Quantity	40					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m				40						
Comments:	Generally in good condition with lght abrasion										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Approaches				Length:	6					
Element Name:	Wearing Surface				Width:	4					
Location:	North and South structure approaches				Height:						
Material:	Gravel				Count (items):	2					
Element Type:	Gravel wearing surface				Total Quantity:	48.00					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				48						
Comments:	Settlement of gravel +- 25mm below edge dams at deck ends										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	18					
	1-5 years		6-10 years		Urgent		1 year	X	2 years		
					Regrade						

Element Group:	Joints					Length:	10				
Element Name:	Armouring/Retaining Devices					Width:					
Location:	North and South Side of Structure					Height:					
Material:	Steel					Count (items):	4				
Element Type:	Armouring/Retaining Devices					Total Quantity:	40				m
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				38.00	2.0					
Comments:	Generally in good condition with light to medium corrosion noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Joints					Length:	10				
Element Name:	Concrete End Dams					Width:	0.35				
Location:	North and South sides of Structure					Height:					
Material:	Cast-In-Place Concrete					Count (items):	2				
Element Type:	Concrete End Dams					Total Quantity:	7				m^2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				6.8	0.2					
Comments:	Generally in good condition with some light spalling at approach end dams noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Joints					Length:	10				
Element Name:	Seals/Sealants					Width:					
Location:	North and South Side of Structure					Height:					
Material:	Plastic					Count (items):	2				
Element Type:	Strip Seal					Total Quantity:	2				Each
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2						
Comments:	Generally in good condition with some minor debris build up.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	02				
		1-5 years		6-10 years			Urgent		1 year	X	2 years
						Clean joint seal					

Element Group:	Barriers				Length:	42				
Element Name:	Railing Systems				Width:					
Location:	East and West sides of Structure				Height:					
Material:	Steel				Count (items):	2				
Element Type:	Steel post and panel railing				Total Quantity:	84				m
Environment:	Severe				Limited Inspection					
Protection System:	Hot dip galvanizing									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	m			83.6	0.2					
Comments:	Generally in good condition. Localized deformation on pickets (x2) and localized light corrosion on anchor bolts									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Coating				Length:					
Element Name:	Railing Systems				Width:					
Location:	Over bridge railings				Height:					
Material:	Other				Count (items):					
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	124				m
Environment:	Severe				Limited Inspection					
Protection System:	None									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	m			124.0						
Comments:	Generally in good condition									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	42				
Element Name:	Deck Top - Thick Slab				Width:	10				
Location:	Top of Deck				Height:					
Material:	Cast-in-place concrete				Count (items):					
Element Type:	Reinforced concrete deck top - exposed				Total Quantity:	420.0				m^2
Environment:	Severe				Limited Inspection		X			
Protection System:	None									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	m^2			420						
Comments:	Access to the west side of the bridge was limited due to dam structure. Limited inspection due to snow. Light scaling noted at chamfer on east edge of deck, with light map cracking present.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Decks				Length:	2					
Element Name:	Soffit - Thick Slab				Width:	11					
Location:	Norht and South underside of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Soffit-end				Total Quantity:	44					m^2
Environment:	Benign				Limited Inspection		X				
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			44.00							
Comments:	Limited inspection - No access. Condition of soffit is based on condition of top of deck - No visible defects noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	38					
Element Name:	Soffit - Thick Slab				Width:	1.5					
Location:	East and West side of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Soffit - Exterior				Total Quantity:	114					m^2
Environment:	Moderate				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			114.00							
Comments:	Limited inspection - No access. Condition of soffit is based on condition of top of deck - No visible defects noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Decks				Length:	38					
Element Name:	Soffit - Thick Slab				Width:	8					
Location:	Underside of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Soffit - Interior				Total Quantity:	304					m^2
Environment:	Benign				Limited Inspection	X					
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m^2			304.0							
Comments:	Limited inspection - No access. Condition of soffit is based on condition of top of deck - No visible defects noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Abutments				Length:						
Element Name:	Abutment walls				Width:	10					
Location:	North and South Underside of structure				Height:	3.5					
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Reinforced concrete walls				Total Quantity:	70					m^2
Environment:	Benign				Limited Inspection		X				
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				70						
Comments:	No access - Visible portions are in generally good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Abutments				Length:	10					
Element Name:	Wingwalls				Width:						
Location:	NE, NW, SE, SW of structure				Height:	3					
Material:	Cast-in-place concrete				Count (items):	4					
Element Type:	Reinforced concrete walls				Total Quantity:	120					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				108	12					
Comments:	Medium to light map cracking noted with efflorescence and graffiti noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Piers				Length:	0.6					
Element Name:	Shafts/columns/Pile bent				Width:	10					
Location:	Below abutment walls and wingwalls				Height:	3.5					
Material:	Unknown				Count (items):	5					
Element Type:	Unknown				Total Quantity:	371					m^2
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				371						
Comments:	No access - Visible portions are in generally good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Foundations				Length:					
Element Name:	Foundation (Below ground)				Width:					
Location:	Below abutment walls and wingwalls				Height:					
Material:	Unknown				Count (items):	All				
Element Type:	Unknown				Total Quantity:	All				N/A
Environment:	Benign				Limited Inspection	X				
Protection System:	Unknown									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	N/A			All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:					
Element Name:	Embankments				Width:					
Location:	NE, SE, NW, & SW of Structure				Height:					
Material:	Rip-Rap				Count (items):	4				
Element Type:	Embankment				Total Quantity:	4				Each
Environment:	Moderate				Limited Inspection					
Protection System:	Vegetation									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	Each			4.00						
Comments:	Embankments are moderately sloped, well vegetated and stable.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and streams				Length:					
Element Name:	Slope Protection				Width:					
Location:	NE, SE, NW, & SW of Structure				Height:					
Material:	Vegatation				Count (items):	4				
Element Type:	Slope Protection				Total Quantity:	4				Each
Environment:	Moderate				Limited Inspection					
Protection System:	None									Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies
	Each			4.00						
Comments:	Generally in good condition.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	High volume and high flow from west to east, with no flow obstructions noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 Channel and structure underside view from the Northeast

Photo 7 Corrosion and missing bolts at south bollard base (typica)

Photo 8 Barrier along east edge of deck

Photo 9 Perforation in deck barrier picket

Photo 10 Corrosion and debris at South deck joint (typical)

Photo 11 Abrasion at North end dam (Typical)

Photo 12 Map cracking on wingwalls (typical)

Structure Condition Summary Form

Structure Name Chesterville Dam Structure Pedestrian Bridge
Structure Number BRT001
Date of Inspection November 25, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Abutment	Abutment Walls	Sq.m	900.00	70		70			63000	47250	75	00	00
	Wingwalls	Sq.m	350.00	120		108	12		42000	30030	72	00	00
Accessories	Signs	Each	0.00	2			2		0	0		00	18
Approaches	Barrier	m	0.00	40		40			0	0		00	00
	Wearing Surface	Sq.m	6.00	48		48			288	216	75	00	18
Barriers	Railing Systems	m	200.00	83.8		83.6	0.2		16760	12556	75	00	00
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	124		124			15500	11625	75	00	00
Decks	Deck Top-Thick Slab	Sq.m	350.00	420		420			147000	110250	75	00	00
	Soffit- Thick Slab	Sq.m	350.00	462		462			161700	121275	75	00	00
Embankments and	Embankments	Each	0.00	4		4			0	0		00	00
Streams	Slope Protection	Each	0.00	4		4			0	0		00	00
	Streams and Waterways	All	0.00	1		1			0	0		00	00
Foundations	Foundations (below ground level)	N/A	0.00	1		1			0	0		00	00
Joints	Armouring / Retaining Devices	m	1.00	40		38	2		40	29	73	00	00
	Concrete End Dams	Sq.m	2100.00	7		6.8	0.2		14700	10878	74	00	00
	Seals/ Sealants	Each	0.00	2		2			0	0		00	02
Piers	Shafts/ Columns/ Pier Bents	Sq.m	900.00	371		371			333900	250425	75	00	00
									794888	**594534**			

Conditon Index **74.79**

ATTACHMENT 2

OSIM INSPECTION REPORTS & BCI FORMS

CULVERTS

Inventory Data:

Structure Name	Cayer Rd & McLean MD Culvert								
Main Hwy/Road #	Cayer Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.5km South of County Rd 13								
Latitude	45.137014		Longitude	-75.378067					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	668		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Precast Concrete Box Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.0	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	6.4	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	North/South					
No. of Spans	1		Fill on Structure	0.4	m				
Culvert Length	11.7	m							
Span Lengths	3.0	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	73.65		
OSIM		2022	70.45		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study		X			
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. Structure Barrier and End-treatments have been recently replaced. Cracks, potholes, and patches noted in asphalt wearing surface. Scaling and disintegration of the concrete block retaining walls noted. Leaking noted at joints in concrete culvert - deck should be waterproofed. Washout present at southeast and northeast embankments.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	34.15					
Element Name:	Barriers				Width:						
Location:	East and West Side of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	68.3					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			68.30							
Comments:	Guide rail and end treatments have been recently replaced and are in generally good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6.4					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	384.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			378.24	15.00						
Comments:	Sealed, wide transverse cracks noted. Longitudinal alligator cracking and some raveling present.										
Recommended Work:	x		Rehab		Replace	**Maintenance Needs:**					
	x		1-5 years		6-10 years		Urgent		1 year		2 years
Repave and waterproof deck											

Element Group:	Culverts				Length:	1.4					
Element Name:	Inlet Components				Width:	0.6					
Location:	West Side of Structure				Height:	2.4					
Material:	Precast Concrete				Count (items):	2					
Element Type:	Stacked Concrete block retaining walls				Total Quantity:	8.4					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			3.40	1.00		4.00				
Comments:	Severe disintegration noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Culverts					Length:	11.7					
Element Name:	Barrels					Width:	3					
Location:	Below Roadway					Height:	2.5					
Material:	Cast-in-place concrete					Count (items):	1					
Element Type:	RC Rigid Frame Barrel (Open footing)					Total Quantity:	128.7					m2
Environment:	Benign					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	m2				124.84		2.57		1.29			
Comments:	Evidence of active leaking was noted at first joint from west.											
Recommended Work:		X	Rehab		Replace	**Maintenance Needs:**						
		X	1-5 years		6-10 years		Urgent		1 year		2 years	
Waterproof deck along with repave												

Element Group:	Culverts					Length:	1.4					
Element Name:	Outlet Components					Width:	0.6					
Location:	East Side of Structure					Height:	2.4					
Material:	Precast Concrete					Count (items):	2					
Element Type:	Stacked Concrete block retaining walls					Total Quantity:	8.4					m2
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	m2				8.40		3.00		1.00			
Comments:	Evidence of active leaking was noted at first joint from west.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**			8			
			1-5 years		6-10 years		Urgent	X	1 year		2 years	
						Concrete repairs						

Element Group:	Foundations					Length:						
Element Name:	Foundation (Below Ground Level)					Width:						
Location:	Below Barrel					Height:						
Material:	Unknown					Count (items):						
Element Type:	Unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection	X					
Protection System:	Unknown											Perform.
Condition Data:	Units		Exc.		Good		Fair		Poor*			Deficiencies
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Rip-Rap					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2	2					
Comments:	Embankments are moderately sloped, well vegetated, and stable. Washouts present at northeast and southeast.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope Protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Vegetation					Count (items):	4				
Element Type:	Slope Protection					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each							4			
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Low volume and low flow from west to east with no visible obstruction noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Wearing Surface	Repave and waterproof deck		X		$ 40,000.00
Inlet Component	Concrete Repairs		x		$ 10,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 50,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ 35,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Longitudinal alligator cracks, with patches and raveling on wearing surface

Photo 8 Severe disintegration at southwest retaining wall

Photo 9 View through barrel and leaking at segment joints

Photo 10 Scaling/disintegration on northeast retaining wall

Structure Condition Summary Form

Structure Name Cayer Rd & McLean MD Culvert
Structure Number CUC001
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	68.30		68.30			0	0		00	00
	Wearing Surface	Sq.m	6.00	393.24		378.24	15.00		2359	1738	74	00	00
Culvert	Inlet Components	Sq.m	350.00	8.40		3.40	1.00	4.00	2940	1033	35	00	00
	Outlet Components	Sq.m	350.00	12.40		8.40	3.00	1.00	4340	2625	60	00	00
	Barrel	Sq.m	350.00	128.70		124.84	2.57	1.29	45045	33130	74	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
Embankments and Streams	Embankments	Each	0.00	4.00		4.00			0	0		00	00
	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									54684	38526			

Bridge Condition Index (BCI) **70.45**

Inventory Data:

Structure Name	Cayer Rd & Cinnamon MD Culvert								
Main Hwy/Road #	Cayer Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	1.3km South of County Rd 13								
Latitude	45.12935		Longitude	-75.37231					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	668		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Concrete Rigid frame		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	6.1	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	19.5	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	North/South					
No. of Spans	1		Fill on Structure	1.2	m				
Culvert Length	19.5	m							
Span Lengths	6.1	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.85		
OSIM		2022	74.21		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study		X			
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. Barriers and end-treatments have been recently replaced and are in generally good condition. Wide cracks and patches noted on asphalt wearing surface above structure. Some ponding present above the structure and around barrier posts. Light scaling throughout the barrel, with honeycombing and localized spalls at both ends of barrel.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Barriers				Length:	8.3					
Element Name:	Railing Systems				Width:						
Location:	East and West Side of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Flex Beam on Steel Posts				Total Quantity:	16.6					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			15.60	1.00						
Comments:	Guide rail and end treatments have been recently replaced and are in generally good condition. Some ponding is present around posts above structure.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	360.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			352.00	4.00		4.00				
Comments:	Wide transverse cracks, alligator cracks, and sealed cracks/patches noted on asphalt wearing surface, with some small-medium sized potholes.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	15					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Rout and seal asphalt wearing surface						

Element Group:	Culverts				Length:	19.5					
Element Name:	Barrels				Width:	6.1					
Location:	Below Roadway				Height:	2.8					
Material:	Cast-in-place concrete				Count (items):	1					
Element Type:	RC Rigid Frame Barrel (Open footing)				Total Quantity:	228.15					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			225.15	1.50		1.50				
Comments:	Honeycombing and localized spall present on both ends of barrel with light scaling throughout.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	8					
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
Concrete repairs					Concrete repairs to barrel						

Element Group:	Foundations					Length:						
Element Name:	Foundation (Below Ground Level)					Width:						
Location:	Below Barrel					Height:						
Material:	Unknown					Count (items):						
Element Type:	Unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection	X					
Protection System:	Unknown											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Gravel					Count (items):	4					
Element Type:	Embankment					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Vegetation / Gabion baskets											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Embankments are moderately sloped, well vegetated, and stable											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope Protection					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Vegetation / Gabion baskets					Count (items):	4					
Element Type:	Slope Protection					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each							4				
Comments:	Generally in good condition.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	No flow noted in barrel at the time of the inspection. Sediment accumulation noted within barrel.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Replaced barrier and end-treatment (typical)

Photo 8 Ponding at barrier posts above structure

Photo 9 Wide transverse crack in wearing surface above structure with scaling and patches

Photo 10 Spall/honeycombing at southeast of barrel

Photo 11 View through barrel from the East

Photo 12 Spalls and honeycombing at the northwest of barrel.

Structure Condition Summary Form

Structure Name Cayer Rd & Cinnamon MD Culvert
Structure Number CUC002
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	360.00		352.00	4.00	4.00	2160	1594	74	00	15
Barriers	Railing Systems	m	200.00	16.60		15.60	1.00		3320	2420	73	00	00
Culvert	Barrel	Sq.m	350.00	228.15		225.15	1.50	1.50	79853	59312	74	00	08
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									85333	63325			

Bridge Condition Index (BCI) **74.21**

Inventory Data:

Structure Name	Thompson Rd & Black Creek MD Culvert								
Main Hwy/Road #	Thompson Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	Intersection of Thompson Rd and Steen Rd								
Latitude	45.15021		Longitude	-75.31702					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	232		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Precast concrete Box culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.6m	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	6.0	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure	0.5m	m				
Culvert Length	15.9	m							
Span Lengths	3.6	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	75.00		
OSIM		2022	73.66		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on	X	None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure is in generally good condition. Light scaling along the bottom haunches of the box culvert, along both sides. Small spalls noted at inlet and outlet and a few on the barrel side walls. Evidence of leaking joint at second joint from the south. Gabion basket is leaning towards stream at the southwest. No guide rail present above the structure - A code compliant barrier and end-treatments should be installed above the structure. Rehabilitation study recommended for guide rail only.						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approach				Length:	60					
Element Name:	Wearing surface				Width:	6					
Location:	Over culvert				Height:						
Material:	Gravel				Count (items):						
Element Type:	Gravel Wearing Surface				Total Quantity:	360					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			360.00							
Comments:	Generally in good condition with no significant defects.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	15.9					
Element Name:	Barrels				Width:	3.6					
Location:	Below roadway				Height:	2.8					
Material:	Precast Concrete				Count (items):	1					
Element Type:	Precast Concrete Box Culvert				Total Quantity:	203.52					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			195.52	8.00						
Comments:	Generally in good condition. Small spalls noted at inlet, outlet and culvert side walls. Evidence of leaking seen at second joint from the south.Light scaling along bottom haunches on both sides of culvert.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Barrel				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection	X					
Protection System:	Unknown									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	N/A			All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Vegetation					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Gabion Baskets										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Embankments are moderately sloped, well vegetated, and stable										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope Protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Gabion Baskets					Count (items):	4				
Element Type:	Slope Protection					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4	1					
Comments:	Generally in good condition - Baskets at the southwest are leaning towards channel.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Low volume and low flow from south to north with no visible obstructions noted. Light debris present at north channel										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barriers	Install barriers and end-treatments			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Light scaling along bottom haunches of culvert (typical)

Photo 8 Leaking at second joint from the south

Photo 9 Light spalls on North end of culvert (typical throughout)

Photo 10 Southwest gabion wall leaning towards channel

Structure Condition Summary Form

Structure Name Thompson Rd & Black Creek MD Culvert
Structure Number CUC003
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Approach Slabs	Sq.m	140.00	0.00					0	0		00	00
Culvert	Barrel	Sq.m	350.00	203.52		195.52	8.00		71232	52444	74	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									73392	**54064**			

Bridge Condition Index (BCI) **73.66**

Inventory Data:

Structure Name	Cayer Rd & Castor Creek Extension MD Culvert								
Main Hwy/Road #	Cayer Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	2.4km South of County Rd 13								
Latitude	45.1211		Longitude	-75.36599					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	668		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	2-Cell Precast Concrete Box Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	8.5	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	6.0	m	Detour Length Around Bridge		km				
Skew Angle	30	Degrees	Direction of Structure	North/South					
No. of Spans	2		Fill on Structure	0.3	m				
Culvert Length	18	m							
Span Lengths	4.0, 4.0	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	73.99		
OSIM		2022	73.64		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study		X			
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. Edge and transverse alligator cracks, along with potholes noted in asphalt wearing surface. Barrier and end-treatments have been recently replaced. Scaling, spalls, ecr, and cracks noted on concrete barrels. Large obstructions at inlet of both barrels should be removed.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	42.7					
Element Name:	Barriers				Width:						
Location:	East & West Side of Structure				Height:						
Material:	Steel / Wood				Count (items):	2					
Element Type:	Steel Flex Beam on Wood Posts				Total Quantity:	85.4					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m				85.40						
Comments:	Guide rail and end treatments have been recently replaced.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	360.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				353.40	3.60		3.00			
Comments:	Edge cracking, medium potholes, and transverse alligator cracks present throughout.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:** 15					
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
						Rout and seal asphalt wearing surface					

Element Group:	Culverts				Length:	18.0					
Element Name:	Barrels				Width:	4					
Location:	Below Roadway				Height:	3.2					
Material:	Precast Concrete				Count (items):	2					
Element Type:	Precast Concrete Box culverts				Total Quantity:	374.4					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				364.40	6.00		4.00			
Comments:	Narrow to medium cracks noted on barrier walls. Spalls with ECR noted on top of deck ends at inlet and outlet. Light scaling present on vertical faces of barrel ends. Map cracking (AAR) noted on barrel walls. Second joint from the East is leaking.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:** 8					
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
Concrete repairs						Concrete repairs to barrel					

Element Group:	Foundations					Length:					
Element Name:	Foundation (Below Ground Level)					Width:					
Location:	Below Barrel					Height:					
Material:	Unknown					Count (items):					
Element Type:	Unknown					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection	X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Gravel					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Vegetation / Gabion baskets										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Embankments are moderately sloped, well vegetated, and stable										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope Protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Vegetation / Gabion baskets					Count (items):	4				
Element Type:	Slope Protection					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	Shallow, low volume and low flow from west to east with large channel obstructions at inlet.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			18			
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
					Remove obstruction						

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Recently installed guide rail and end-treatments

Photo 8 Medium pothole and transverse alligator cracks in approach wearing surface

Photo 9 Light spall on south wall of south barrel (typical)

Photo 10 Spall with damp stain on north barrel soffit (typical)

Photo 11 Spall with ECR at northeast barrel end

Photo 12 Scaling and cracks at west barrel ends (typical)

Photo 13 Leaking at second joint from East

Photo 14 Heavy/Large obstructions at culvert inlet

Structure Condition Summary Form

Structure Name Cayer Rd & Castor Extension MD Culvert
Structure Number CUC004
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	85.40		85.40			0	0		00	00
	Wearing Surface	Sq.m	6.00	360.00		353.40	3.60	3.00	2160	1599	74	00	15
Culvert	Barrel	Sq.m	350.00	374.40		364.40	6.00	4.00	131040	96495	74	00	08
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	18
									133200	98094			

Bridge Condition Index (BCI) **73.64**

Inventory Data:

Structure Name	Kerrs Ridge Rd Allowance & Castor Extension MD Culvert							
Main Hwy/Road #	Kerrs Road		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.6km Wset of Jennings Road							
Latitude	45.09437		Longitude	-75.42706				
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	49		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Structural Plate Corrugated Steel Pipe Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	4	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Culvert Length	15.0	m							
Roadway Width	5.0	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	East					
No. of Spans	1		Fill on Structure	0.8	m				
Span Lengths	4	m							

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 2, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	63.5		
OSIM		2022	63.50		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	3˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:				1 to 5 years	X	6 to 10 years		
Overall Comments:	Structure is generally in good to fair condition with minor to moderate sag noted in middle of barrel and cracks noted at several bolted connections. Evidence of leakage and efflroescence noted at waterline of west barrel wall. Severe settlement noted on approach wearing surface and no approach barrier observed.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:						
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:						m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m										
Comments:	No approach barrier observed at time of inspection. A code compliant approach barrier should be installed when structure is replaced.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	5					
Location:	East & West of Structure				Height:						
Material:	Gravel				Count (items):						
Element Type:	Gravel Wearing Surface				Total Quantity:	300.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				80.0		120.0		100.0		9 & 10
Comments:	Generally approach wearing surface is in fair to poor condition.Severe settlement noted on wearing surface with moderate to severe tire rutting and potholes also noted on wearing surface.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	18				
			1-5 years		6-10 years		Urgent	X	1 year		2 years
						Regrade gravel wearing surface					

Element Group:	Culverts				Length:	13.7					
Element Name:	Barrels				Width:	4.6					
Location:	Below Roadway				Height:	2.7					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	292.80					m
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m				213.74		49.78		29.28		
Comments:	Mild to medium sag noted at the middle of the barrel. Light corrosion noted along springline with some cracks noted at bolted connections. Evidence of leakage and efflorescence noted at waterline on west wall. Missing bolts observed throughout barrel.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
			1-5 years	X	6-10 years		Urgent		1 year		2 years

Element Group:	Coatings				Length:						
Element Name:	Structural Steel				Width:						
Location:	On Culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Coating - Hot Dip Galvanized				Total Quantity:	292.8					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				287.88	2.87		2.05			
Comments:	Minor coating loss noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Barrel				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Embankments are moderately sloped, well vegetated and appear stable.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Moderate volume and flow from north to south with obstructions noted at the south side of structure.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**		18			
			1-5 years		6-10 years		Urgent	X	1 year		2 years
Clear obstruction											

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
Culverts	Replace Structure	X			$ 240,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 240,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from East approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Severe settlement on east approach wearing surface

Photo 8 Interior of barrel from north side of structure

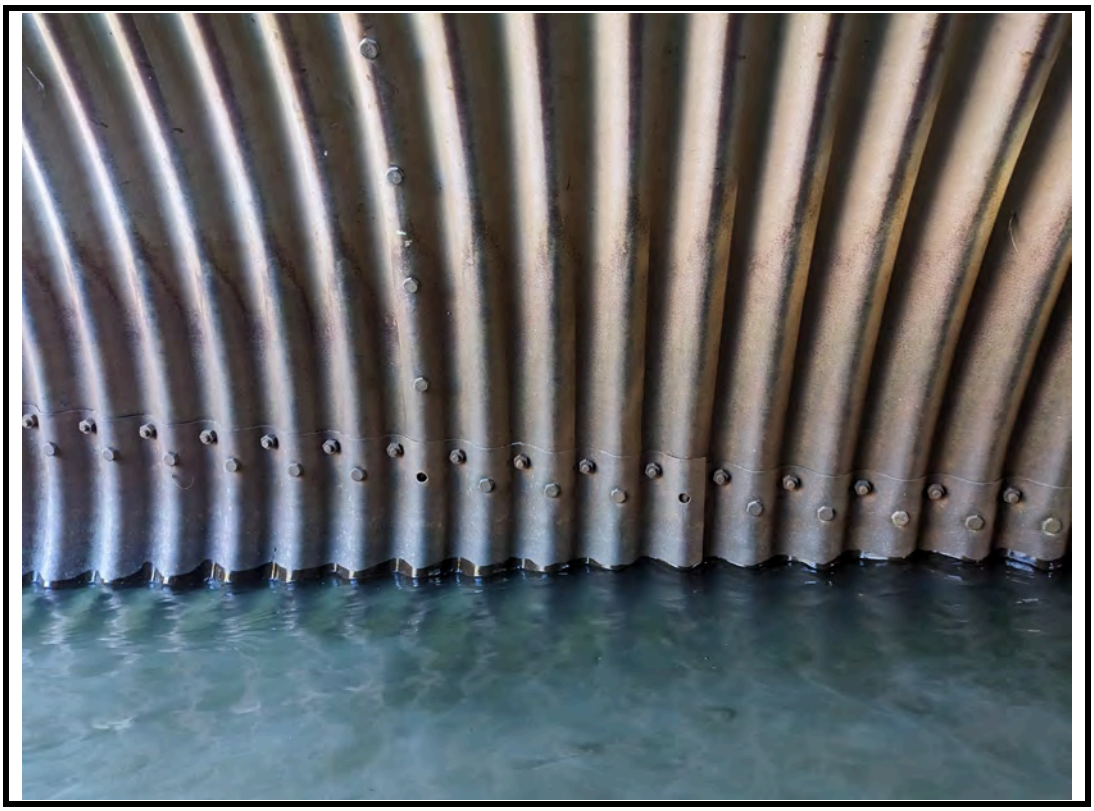

Photo 9 Light corrosion and missing bolt on east barrel wall

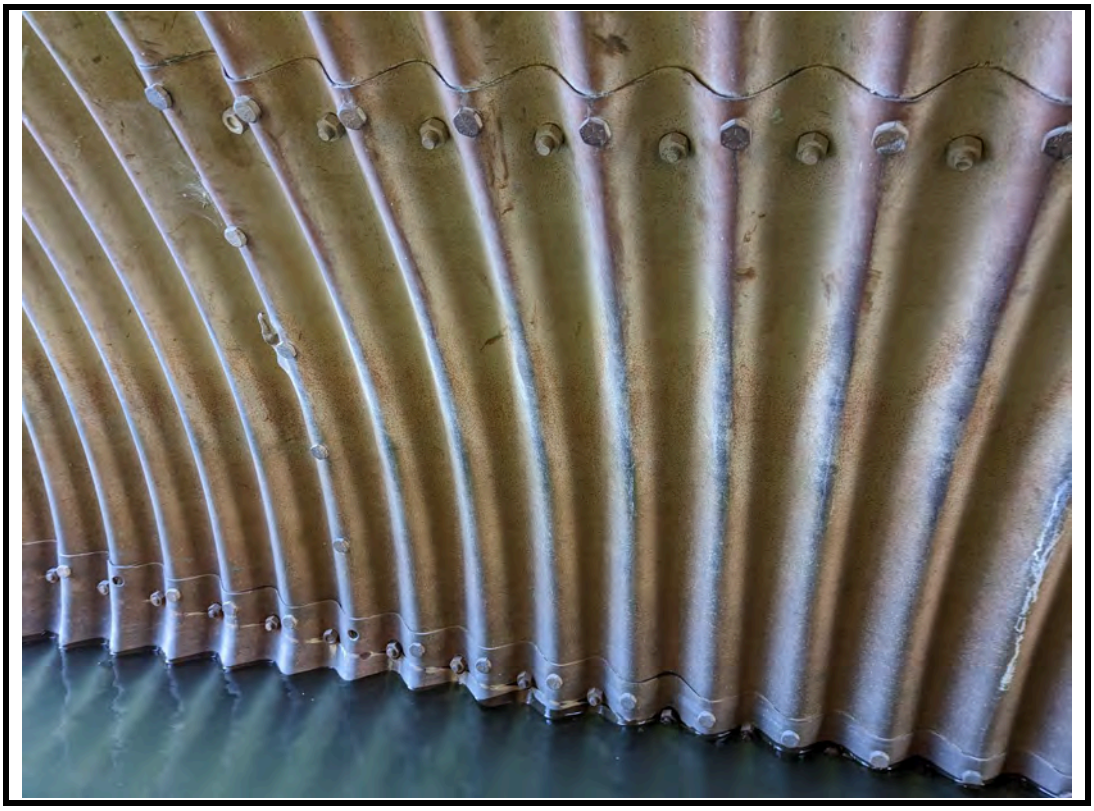

Photo 10 Cracks at bolt line at barrel wall

Photo 11 Evidence of leakage and efflorescence at bolt line on west barrel wall

Photo 12 Debris blocking south side of barrel

Structure Condition Summary Form

Structure Name Kerrs Ridge Rd Allowance & Castor Extension MD Culvert
Structure Number CUS005
Date of Inspection December 8, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	300.00	0.00	80.00	120.00	100.00	1800	648	36	9 & 10	18
Coatings	Structural steel	Sq.m	80.00	292.8	0	287.88	2.87	2.05	23424	17365	74	00	00
Culvert	Barrel	Sq.m	350.00	292.8	0	213.74	49.78	29.28	102480	63076	62	00	00
Embankments and	Embankments	Each	0.00	4	0	4	0	0	0	0		00	00
Streams	Streams and Waterways	All	0.00	1	0	1	0	0	0	0		00	18
									127704	**81089**			

Conditon Index **63.5**

Inventory Data:

Structure Name	Winchester Main St & henderson Creek MD Culvert								
Main Hwy/Road #	Main St. East		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	0.3km East of Ottawa St.								
Latitude	45.0953686		Longitude	-75.3471575					
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	50 km/h		No. of Lanes	2		
Old County	SDG		AADT	1810		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Concrete Rigid Frame (Open Footing)		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.1	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Roadway Width	9.8	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure		m				
Culvert Length	15.3	m							
Span Lengths	3.1	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	63.17		
OSIM		2022	58.96		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Minor rehabilitation in 1-5 years. Structure is in generally fair condition. Cracks noted in asphalt wearing surface. Barrier over structure is leaning outwards. Spalls, cracks, scour, and scaling noted throughout concrete culvert barrel and inlet components. A code-compliant barrier and end-treatments should be installed above the structure.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Barriers				Length:	5					
Element Name:	Railing Systems				Width:						
Location:	North & South side of structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel railing				Total Quantity:	10				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			5.00	5.00						
Comments:	Generally in good to fair condition - North barrier is leaning outwards. No approach barriers present - A code compliant barrier and end-treatments should be installed above structure.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approached				Length:	12					
Element Name:	Curb and Gutters				Width:						
Location:	North and South sides of structure				Height:						
Material:	Cast-in-place concrete				Count (items):	2					
Element Type:	Curb and Gutters				Total Quantity:	24				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			21.00	2.00		1.00				
Comments:	Medium scaling and wide cracks noted throughout.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	9.8					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	588.0				m2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			579.18	5.88		2.95				
Comments:	Wide map cracking was noted above the structure, with ponding observed at the north above the structure										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**		15				
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Rout and seal asphalt wearing surface						

Element Group:	Culverts				Length:						
Element Name:	Inlet Components				Width:						
Location:	Southeast Side of Structure				Height:						
Material:	Precast Concrete				Count (items):						
Element Type:	Stacked Concrete Block Retaining Wall				Total Quantity:	20.00					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				2.40	1.40		0.2			
Comments:	Light to medium erosion/degradation and moderate scaling noted										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repairs											

Element Group:	Culvert				Length:						
Element Name:	Inlet Components				Width:						
Location:	Southwest side of structure				Height:						
Material:	Cast-in-place Concrete				Count (items):						
Element Type:	Reinforced concrete wingwalls				Total Quantity:	4.80					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				3.20	1.20		0.40			
Comments:	Medium erosion/degradation and spalls noted throughout.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repairs											

Element Group:	Culverts				Length:	15.3					
Element Name:	Barrels				Width:	3.1					
Location:	Below Roadway				Height:	1.5					
Material:	Cast-in-place concrete				Count (items):	1					
Element Type:	Concrete Rigid Frame (Open footing)				Total Quantity:	93.33					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				58.33	24.00		11.00			
Comments:	Severe scaling, spalling, and scour noted throughout the culvert barrel. Severe localized scour noted at the southwest barrel wall near inlet retaining wall. Rust and corrosion stains noted at and around steel in barrel soffit.										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Concrete repairs											

Element Group:	Foundations					Length:						
Element Name:	Foundation (Below Ground Level)					Width:						
Location:	Below Barrel					Height:						
Material:	Unknown					Count (items):						
Element Type:	Unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection	X					
Protection System:	Unknown											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Vegetation					Count (items):	4					
Element Type:	Embankment					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Rip-Rap											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Embankments are moderately sloped, well vegetated, and stable											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope Protection					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Rip-Rap					Count (items):	4					
Element Type:	Slope Protection					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each							4				
Comments:	Rip-Rap material was not observed at the time of inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Streams					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	Low volume and low flow from south to north with no visible obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barrel	Concrete Repairs		X		$ 27,500.00
Barriers	Install barriers and end-treatments			x	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 75,500.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ 35,000.00
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ 35,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 North barrier railing leaning outwards

Photo 8 Scaling and cracks on southwest approach curb and gutter (typical)

Photo 9 Map cracking on west approach wearing surface

Photo 10 Scaling, degradation, and spalls on SW concrete retaining wall

Photo 11 Scaling on SE concrete block retaining wall

Photo 12 View through culvert barrel from the north side

Photo 13 Cracks, scaling, spalls, staining, and scour throughout culvert (typ.)

Photo 14 Rust and corrosion stains on soffit at section joints

Photo 15 Pipe outlet in East culvert side wall

Photo 16 CSP culvert in West culvert side wall

Structure Condition Summary Form

Structure Name Winchester Main St & Henderson Creek MD Culvert
Structure Number CUC006
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Curb and Gutters	m	25.00	24.00		21.00	2.00	1.00	600	414	69	00	00
	Wearing Surface	Sq.m	6.00	588.00		579.18	5.88	2.94	3528	2620	74	00	15
Barriers	Railing Systems	m	200.00	10.00		5.00	5.00		2000	1150	58	00	00
Culvert	Inlet Components	Sq.m	350.00	8.80		5.60	2.60	0.60	3080	1834	60	00	00
	Barrel	Sq.m	350.00	93.33		58.33	24.00	11.00	32666	18672	57	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
Embankments and Streams	Embankments	Each	0.00	4.00		4.00			0	0		00	00
	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									41874	**24690**			

Bridge Condition Index (BCI) **58.96**

Inventory Data:

Structure Name	Guy Rd & East Justus MD Culvert
Main Hwy/Road #	Guy Road
On Structure	X
Under Structure	
Structure Location	2.5km West of County Rd 31
Latitude	45.0502886
Longitude	-75.35644
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	Cast-in-Place Concrete Box Culvert
Total Deck Length	m
Overall Str. Width	4.2 m
Total Deck Area	sq. m
Culvert Length	12.8 m
Roadway Width	6.0 m
Skew Angle	Degrees
No. of Spans	1
Span Lengths	4.2 m

Services on structure:	Navig. Water		Non-Navig.		Ped.	
	Rail		Road	X	Other	
Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
	Rail		Road		Other	
Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
	Desig./not list		Desig. & List			
Road Class:	Freeway		Arterial			
	Collector		Local	X		
Special Routes:	Transit		Truck			
	School		Bicycle			

Posted Speed	60 km/h
AADT	152
Inspection Route Sequence	
Interchange Number	
Interchange Structure Number	
Min. Vertical Clearance	m
Detour Length Around Bridge	km
Direction of Structure	East/West
Fill on Structure	0.6 m

No. of Lanes	2		
% Trucks			

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 4, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	75		
OSIM		2022	74		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ -

Investigation Notes: Rehabilitation Study for Guiderail Only

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is overall in good condition. Wide crack on barrel wall near waterline, and some localized honeycombing also observed. No approach barrier observed at time of inspection. A code compliant barrier should be replaced.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:						
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:						m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m										8
Comments:	No approach barrier noted at time of inspection. A code compliant approach barrier should be installed.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
	X		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6					
Location:	East and West Side of Structure				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Surface Treatment				Total Quantity:	360.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				358.5		1.0		0.5		
Comments:	Light ravelling along wearing surface observed. Alligator cracks observed along both edges, and potholes noted on south edge of wearing surface.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	12				
			1-5 years		6-10 years		Urgent		1 year	X	2 years
						Repair asphalt surface treatment and patch pothole					

Element Group:	Culverts				Length:	12.8					
Element Name:	Barrels				Width:	4.2					
Location:	East Side of Structure				Height:	2.5					
Material:	Other				Count (items):						
Element Type:	Expansion Joint Armouring				Total Quantity:	171.52					m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m				169.02		2.0		0.5		
Comments:	Wide cracks noted near waterline on barrel wall. Localized honeycombing also noted on walls.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**	8				
	X		1-5 years		6-10 years		Urgent		1 year	X	2 years
						Concrete repairs					

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	N/A			All							0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			3.00	1						
Comments:	Embankments are moderately sloped, well vegetated with some moderate erosion noted on northwest corner.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	N/A				All						
Comments:	Low volume and low flow from north to south with debris blocking outlet of barrel.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**			18			
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Remove debris						

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approaches	Install Code Compliant Barrier			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 East approach from centre of structure

Photo 3 West approach from centre of structure

Photo 4 North elevation

Photo 5 South elevation

Photo 6 Potholes and alligator cracks on south edge of wearing surface

Photo 7 Typical view of east barrel wall

Photo 8 Honeycombing on east wall

Photo 9 Debris blocking outlet of structure

Structure Condition Summary Form

Structure Name Guy Rd & East Justus MD Culvert
Structure Number CUC007
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	360.00	0.00	358.50	1.00	0.50	2160	1616	75	00	12
Culvert	Barrel	Sq.m	350.00	171.52	0.00	169.02	2.00	0.50	60032	44648	74	00	08
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	3.00	1.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	0.00	1.00	0.00	0	0		00	00
									62192	**46263**			

Bridge Condition Index (BCI) **74**

Inventory Data:

Structure Name	Nation Valley Rd and Servage MD Culvert								
Main Hwy/Road #	Nation Valley Rd	Services on structure:	Navig. Water		Non-Navig.		Ped.		
	On Structure: X		Rail		Road	X	Other		
	Under Structure:	Services under structure:	Navig. Water		Non-Navig.	X	Ped.		
			Rail		Road		Other		
Structure Location	60m West of Forward Rd								
Latitude	45.07586	Longitude	-75.26137						
Owner(s)	Township of North Dundas	Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.		
			Desig./not list		Desig. & List				
MTO Region	40 - Eastern	Road Class:	Freeway		Arterial				
			Collector		Local	X			
MTO District	42 - Ottawa	Posted Speed	60 km/h		No. of Lanes	2			
Old County	SDG	AADT	117		% Trucks				
Geographic Twp.		Inspection Route Sequence							
Structure Type	Concrete Rigid Frame (Open Footing)	Interchange Number							
Total Deck Length	7.5 m	Interchange Structure Number							
Overall Str. Width	3.5 m	Min. Vertical Clearance		m					
Total Deck Area	26.3 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	4.6 m	Detour Length Around Bridge		km					
Skew Angle	Degrees	Direction of Structure	East/West						
No. of Spans	1	Fill on Structure	0.6 m						
Culvert Length	7.5 m								
Span Lengths	3.5 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	43.50		
OSIM		2022	42.65		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally fair to poor condition. Transverse and longitudinal cracks noted on the asphalt wearing surface above the structure. Cracks, spalls, delamination, ECR and efflorescence noted throughout the concrete culvert barrel. Erosion noted at all corners. No barrier present - A code compliant barrier and end treatments should be installed above the structure.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (Attachments and Signs)				Length:						
Element Name:	Utilities				Width:						
Location:	North Side of Structure				Height:						
Material:	Steel				Count (items):	1					
Element Type:	Utility Pipe				Total Quantity:	1					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			1.00							
Comments:	Generallu in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Accessories (Attachments and Signs)				Length:						
Element Name:	Utilities				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Steel				Count (items):	4					
Element Type:	Hazard Markers				Total Quantity:	4					Each
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			2.00	2.00						
Comments:	Outward rotation of hazard markers noted on the south side										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 18						
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
					Reinstall hazard markers						

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	4.6					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	276.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			271.00	5.00						
Comments:	Generally in good condition with medium longitudinal and transverse cracks. No barrier present - A code compliant barrier and end treatments should be installed above the structure.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:						
Element Name:	Inlet Components				Width:						
Location:	South Side of Structure				Height:						
Material:	Cast-in-place concrete				Count (items):						
Element Type:	Reinforced concrete headwall and retaining walls				Total Quantity:	20.00					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				4.80	9.80		5.4			
Comments:	Severe delamination and wide cracks noted with scaling and spalls throughout.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culvert				Length:	7.5					
Element Name:	Barrels				Width:	3.5					
Location:	Below Roadway				Height:	2.4					
Material:	Cast-in-place concrete				Count (items):	1					
Element Type:	Concrete rigid frame (Open footing)				Total Quantity:	88.50					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				35.40	26.55		26.55			
Comments:	Wide cracks, spalls, disintigration, and ECR noted at barrel ends. Severe degradation, wide cracks, and efflorescence noted on barrel walls, along with wide map cracking and honeycombing.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:						
Element Name:	Outlet Components				Width:						
Location:	North Side of Structure				Height:						
Material:	Cast-in-place concrete				Count (items):						
Element Type:	Reinforced concrete headwall and retaining walls				Total Quantity:	20					m2
Environment:	Moderate				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				6.8	8.8		4.4			
Comments:	Severe delamination and wide cracks noted throughout.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:					
Element Name:	Foundation (Below Ground Level)					Width:					
Location:	Below Barrel					Height:					
Material:	Unknown					Count (items):					
Element Type:	Unknown					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Gravel					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Rip-Rap										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				3			1			
Comments:	Minor washout at all four corners with severe washout at the northwest. Moderate vegetation present at all four embankments										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**		13			
		1-5 years		6-10 years			Urgent	X	1 year		2 years
						Erosion control					

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope Protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Rip-Rap					Count (items):	4				
Element Type:	Slope Protection					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each							4			
Comments:	Rip-Rap material was not observed at the time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	Low volume and low flow from south to north with no visible obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Structure	Replacement		X		$ 210,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 210,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Transverse crack in asphalt approach wearing surface above structure

Photo 8 Spalling, honeycombing, and efflorescence at north end of barrel (Typ.)

Photo 9 Cracks and efflorescence at north barrel, with spalls along deck

Photo 10 Scour/ severe scaling along concrete barrel walls (typ.)

Photo 11 Efflorescence and scaling on barrel soffit (typ.)

Photo 12 Severe scour/deterioration along barrel walls (typical)

Structure Condition Summary Form

Structure Name Nation Valley Rd & Servage MD Culvert
Structure Number CUC008
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	276.00		271.00	5.00		1656	1232	74	00	00
Accessories	Signs	Each	0.00	5.00		3.00	2.00		0	0		00	00
	Inlet Components	Sq.m	350.00	20.00		4.80	9.80	5.40	7000	2632	38	00	00
Culvert	Outlet Components	Sq.m	350.00	20.00		6.80	8.80	4.40	7000	3017	43	00	00
	Barrel	Sq.m	350.00	88.50		35.40	26.55	26.55	30975	13010	42	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		3.00		1.00	0	0		00	13
Embankments and Streams	Slope Protection	Each	0.00	4.00		3.00		1.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									46631	**19890**			

Bridge Condition Index (BCI) **42.65**

Inventory Data:

Structure Name	Nation River Rd & Eager MD Culvert
Main Hwy/Road #	Nation River Road
On Structure	X
Under Structure	
Structure Location	1.0 km East of Wallace Road
Latitude	44.96921
Longitude	-75.47351
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	PrecastConcrete Box Culvert
Total Deck Length	m
Overall Str. Width	3 m
Total Deck Area	17.4 sq. m
Roadway Width	5.8 m
Skew Angle	Degrees
No. of Spans	1
Span Lengths	3 m

Services on structure: Navig. Water; Rail; Non-Navig.; Road X; Ped.; Other

Services under structure: Navig. Water; Rail; Non-Navig. X; Road; Ped.; Other

Heritage Designation: Not Consid. X; Desig./not list; Cons/not App.; Desig. & List; List/n.d.

Road Class: Freeway; Collector; Arterial; Local X

Posted Speed: 60 km/h

No. of Lanes: 2

AADT: 316

% Trucks:

Inspection Route Sequence:

Interchange Number:

Interchange Structure Number:

Min. Vertical Clearance: m

Special Routes: Transit; School; Truck; Bicycle

Detour Length Around Bridge: km

Direction of Structure: North/South

Fill on Structure: 1.5 m

Historical Data:

Year Built	
Last OSIM Inspection	October 9, 2020
Last Enhanced OSIM Inspection	
Enhanced Access Equipment (ladder, boat, lift, etc.)	
Last Underwater Inspection	
Last Condition Survey	

Year of Last Major Rehab.	
Last Evaluation	
Current Load Limit	tonnes
Load Limit By-Law #	
By-Law Expiry Date	

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.63		
OSIM		2022	74		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	-1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 5,000.00
Material Condition Survey					
	Detailed Deck Condition Survey:				$ -
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 5,000.00

Investigation Notes: Rehabilitation/Replacement Study is for barrier only.

Overall Structure Notes:								
Work on Structure:		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. No approach barrier observed at time of inspection. A code compliant barrier should be installed. Honeycombing and disintegration noted on inlet and outlet components. Active leaking noted at joints in precast barrel segments.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches			Length:						
Element Name:	Barrier			Width:						
Location:	NE, SE, NW & SW of Structure			Height:						
Material:	Steel			Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)			Total Quantity:						m
Environment:	Severe			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	m									08
Comments:	No approach barrier installed at time of inspection. A code compliant barrier should be installed.									
Recommended Work:		Rehab	Replace		**Maintenance Needs:**					
	1-5 years	6-10 years			Urgent	1 year	2 years			

Element Group:	Approaches			Length:	60					
Element Name:	Wearing Surface			Width:	5.8					
Location:	North & South of Structure			Height:						
Material:	Asphalt			Count (items):						
Element Type:	Asphalt Surface Treatment			Total Quantity:	348.0					m^2
Environment:	Severe			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	m^2		316	22.0	10.0					
Comments:	North approach is generally in good condition. Moderate ravelling, potholes and patched potholes observed on south wearing surface.									
Recommended Work:		Rehab	Replace		**Maintenance Needs:** 12					
	1-5 years	6-10 years			Urgent	1 year	X	2 years		
					Repair asphalt surface treatment and patch pothole					

Element Group:	Accessories			Length:						
Element Name:	Signs			Width:						
Location:	NE, NW, SE & SW of Strucutre			Height:						
Material:	Steel			Count (items):	4					
Element Type:	Steel Hazard Signs			Total Quantity:	4					each
Environment:	Severe			Limited Inspection	X					
Protection System:	Hot Dip Galvanizing									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	each		3	1						
Comments:	Hazard signs are generally in good condition. Dents noted in northeast hazard sign.									
Recommended Work:		Rehab	Replace		**Maintenance Needs:**					
	1-5 years	6-10 years			Urgent	1 year	2 years			

Element Group:	Culverts				Length:	1.4					
Element Name:	Inlet Components				Width:	0.9					
Location:	West side of Structure				Height:	2.4					
Material:	Precast Concrete				Count (items):	2					
Element Type:	Stacked Concrete Block Retaining Walls				Total Quantity:	9.24					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			7.64		0.8		0.8			
Comments:	Disintegration noted at northwest corner of wall. Some disintegration also noted on the back of wall.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**	08				
		1-5 years		6-10 years			Urgent		1 year	X	2 years

Element Group:	Culverts				Length:	1.4					
Element Name:	Outlet Components				Width:	0.9					
Location:	East Side of Structure				Height:	2.4					
Material:	Precast Concrete				Count (items):	2					
Element Type:	Stacked Concrete Block Retaining Walls				Total Quantity:	9.24					m^2
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			7.24		2		2			
Comments:	Moderate to severe honeycombing noted on blocks. Disintegration noted throughout.										
Recommended Work:	X	Rehab		Replace		**Maintenance Needs:**					
		1-5 years	X	6-10 years			Urgent		1 year		2 years

Element Group:	Culverts				Length:	17.4					
Element Name:	Barrels				Width:	3					
Location:	Below Roadway				Height:	2.1					
Material:	Precast Concrete				Count (items):	1					
Element Type:	Precast Concrete box culvert				Total Quantity:	177.48					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*			
	m^2			177.48							
Comments:	Generally in good condition with active leaking noted at all joints between precast segments.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Foundations			Length:						
Element Name:	Foundation (Below Ground Level)			Width:						
Location:	Below Barrel			Height:						
Material:	Unknown			Count (items):						
Element Type:	Unknown			Total Quantity:	All					
Environment:	Benign			Limited Inspection		X				
Protection System:	Unknown									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							0
Comments:	No visible evidence of foundation instability was noted during the inspection.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent	1 year	2 years				

Element Group:	Embankments and Streams			Length:						
Element Name:	Embankments			Width:						
Location:	NE, SE, NW & SW Side of Structure			Height:						
Material:	Native Material			Count (items):	4					
Element Type:	Embankment			Total Quantity:	4					Each
Environment:	Moderate			Limited Inspection						
Protection System:	Vegetation									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	Each		4.00							
Comments:	Embankments are moderately sloped, well vegetated and appear to be stable.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent	1 year	2 years				

Element Group:	Embankments and Streams			Length:						
Element Name:	Streams and Waterways			Width:						
Location:	Below Structure			Height:						
Material:	Native			Count (items):	All					
Element Type:	Stream			Total Quantity:	All					N/A
Environment:	Benign			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	N/A		All							
Comments:	Moderate volume and high flow form west to east with no obstructions noted at time of inspection. Some minor erosion noted at outlet (east side) of barrel.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent	1 year	2 years				

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approach Barrier	Install code compliant approach barrier			X	$ 48,000.00
Outlet Components	Concrete Repairs	X			$ 5,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 53,000.00

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ -
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Potholes and patched potholes noted on south wearing surface

Photo 8 Disintegration on southeast block wall

Photo 9 Honeycombing at northwest block wall

Photo 10 Interior view of barrel from east end

Photo 11 Active leaking at precast barrel joints

Structure Condition Summary Form

Structure Name Nation River Rd & Eager MD Culvert
Structure Number CUC009
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	348.00	0.00	316.00	22.00	10.00	2088	1475	71	00	12
	Inlet Components	Sq.m	350.00	9.24	0.00	7.64	0.80	0.80	3234	2118	65	00	08
Culvert	Outlet Components	Sq.m	350.00	9.24	0.00	7.24	2.00	2.00	3234	2181	67	00	00
	Barrel	Sq.m	350.00	177.48	0.00	177.48	0.00	0.00	62118	46589	75	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									70674	**52361**			

Bridge Condition Index (BCI) **74**

Inventory Data:

Structure Name	Marionville Rd & Lough MD Culvert								
Main Hwy/Road #	Marionville Road		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.4km East of Rodney Ln								
Latitude	45.1638561		Longitude	-75.396942					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	200		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	CSP Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.2	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Culvert Length	28.7	m							
Roadway Width	6.0	m	Detour Length Around Bridge		km				
Skew Angle	45	Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure	1.5	m				
Span Lengths	3.2	m							

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	October 8, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	74.67		
OSIM		2022	74.80		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes: Rehabilitation/replacement study is for barrier only					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. Existing end treatments are not code compliant and should be repalced. A code compliant barrier should be installed on north edge of roadway. Minor separation between plates at crown and south end of barrel noted. Alligator cracks and medium ravelling noted on wearing surface.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	93.3					
Element Name:	Barrier				Width:						
Location:	SE & SW of Structure				Height:						
Material:	Steel				Count (items):	1					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:	93.3					m
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m				89.3	2		2		8	
Comments:	No approach barrier observed on the north side of roadway at time of inspection.Eccentric loader end treatments are not code compliant. A code compliant approach barrier on the north side of the roadway, and end treatments on existing barrier, should be installed. Collision damage noted on barrier.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
	X		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6					
Location:	East & West of Structure				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	360.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				342	12.0		6.0		0	
Comments:	Longitudinal aligator cracks, medium ravelling and cracking at edges noted throughout wearing surface. Patched potholes also observed.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					12
			1-5 years		6-10 years		Urgent		1 year	X	2 years
						Wearing Surface Repairs					

Element Group:	Accessories				Length:						
Element Name:	Signs				Width:						
Location:	SE & SW of Structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Hazard Markers				Total Quantity:	2.0					each
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	each				1	1.0					
Comments:	Hazard signs are generally in good condition, with some deflection noted on the southwest sign. Hazard signs should be installed on the north side of roadway.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					18
			1-5 years		6-10 years		Urgent	X	1 year		2 years
						Install hazard signs					

Element Group:	Culverts				Length:	28.7						
Element Name:	Barrels				Width:	3.2						
Location:	Below Roadway				Height:	2						
Material:	Corrugated Steel				Count (items):	1						
Element Type:	CSP Arch Culvert				Total Quantity:	380.40						m
Environment:	Benign				Limited Inspection							
Protection System:	Hot Dip Galvanizing										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	m				379.30	0.80		0.40				
Comments:	Minor separation noted between steel plates at crown of south end of barrel. Minor rust noted on exposed surface of barrel.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						7
		X	1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Foundations				Length:							
Element Name:	Foundation (Below Ground Level)				Width:							
Location:	Below Barrel				Height:							
Material:	Unknown				Count (items):							
Element Type:	Unknown				Total Quantity:	All						
Environment:	Benign				Limited Inspection			X				
Protection System:	Unknown										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	N/A				All						0	
Comments:	No visible evidence of foundation instability was noted during the inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:							
Element Name:	Embankments				Width:							
Location:	NE, SE, NW & SW Side of Structure				Height:							
Material:	Native Material				Count (items):	4						
Element Type:	Embankment				Total Quantity:							Each
Environment:	Moderate				Limited Inspection							
Protection System:	Slope Proteciton										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	Each				4.00							
Comments:	Embankments are moderately sloped, well vegetated and appear stable.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope Protection				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Stone Slope Protection				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each				4.00						
Comments:	Rip Rap is present on embankments.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Low volume and low flow from south to north with no evidence of obstructions noted.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barriers	Install Code Compliant Barrier on North Side of Roadway			X	$ 36,000.00
	Install Code Compliant End Treatments on South Barrier			X	$ 12,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Eccentric end loader at southwest corner of approach

Photo 8 Edge cracking on northwest edge of approach

Photo 9 Localized rust spots on exterior of barrel at south end

Photo 10 Interior of barrel from south end of barrel

Photo 11 Minor separation at plate connection at south end of barrel

Photo 12 Rip rap slope protection at southwest embankment

Structure Condition Summary Form

Structure Name Marionville Rd Lough MD Culvert
Structure Number CUS001
Date of Inspection December 8, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Accessories	Signs	Each	0.00	2	0	1	2	0	0	0		00	00
Approaches	Barrier	m	0.00	93.3	0	89.3	2	2	0	0		08	00
	Wearing Surface	Sq.m	6.00	360.00	0.00	342.00	12.00	6.00	2160	1568	73	00	12
Culvert	Barrel	Sq.m	350.00	380.4	0	379.3	0.8	0.4	133140	99678	75	00	07
Embankments and	Embankments	Each	0.00	4	0	4	0	0	0	0		00	00
Streams	Slope Protection	Each	0.00	4	0	4	0	0	0	0		00	00
	Streams and Waterways	All	0.00	1	0	1	0	0	0	0		00	00
									135300	**101246**			

Conditon Index **74.8**

Inventory Data:

Structure Name	Carruthers Rd & Muffat Creek MD Culvert								
Main Hwy/Road #	Belmade Rd		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	0.85km East of County Rd 7								
Latitude	45.1917335		Longitude	-75.2836435					
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	100		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	SPCSP Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.7	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Roadway Width	15.3	m	Detour Length Around Bridge		km				
Skew Angle	5.8	Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure	0.5	m				
Span Lengths	3.7	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	74.57		
OSIM		2022	67.02		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	3˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally good condition. No barrier present - A code compliant barrier and end-treatments should be installed above the structure. Cracks present in asphalt. Corrosion and galvanization failure below waterline. Minor erosion at embankments. Rout and seal cracks, replace missing nuts in barrel.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60						
Element Name:	Wearing Surface				Width:	5.8						
Location:	Over Culvert				Height:							
Material:	Asphalt				Count (items):							
Element Type:	Asphalt Wearing Surface				Total Quantity:	348.0					m2	
Environment:	Severe				Limited Inspection							
Protection System:	None										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*				
	m2				341.04	3		3				
Comments:	No guide rail present above structure - A code compliant barrier and end treatments should be installed above the structure. Wide and medium transverse cracks noted above structure. Light longitudinal cracks and light raveling noted.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**			15			
			1-5 years		6-10 years		Urgent		1 year	x	2 years	
						Rout and seal asphalt wearing surface						

Element Group:	Culverts				Length:	16.8						
Element Name:	Barrels				Width:	3.7						
Location:	Below Roadway				Height:	2.6						
Material:	Corrugated Steel				Count (items):	1						
Element Type:	SPCSP Arch Culvert				Total Quantity:	185.5					m2	
Environment:	Benign				Limited Inspection							
Protection System:	Hot Dip Galvanized										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*				
	m2				154.5	30.9						
Comments:	Evidence of localized dent was noted. Moderate corrosion at and below waterline. 4x missing nuts in the pipe arch walls. Minor sagging under roadway and minor deformation at south end.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**			18			
			1-5 years		6-10 years		Urgent	x	1 year		2 years	
						Replace missing nuts in barrel						

Element Group:	Coating				Length:							
Element Name:	Structural Steel				Width:							
Location:	On culvert barrel				Height:							
Material:	Other				Count (items):							
Element Type:	Structural steel coating				Total Quantity:	185.5					m2	
Environment:	Benign				Limited Inspection							
Protection System:	None										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*				
	m2				123.6	30.9		30.9				
Comments:	Generally in good condition. Galvanizing failure at bottom 1/3 of pipe.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (below ground level)				Width:						
Location:	Below barrel				Height:						
Material:	unknown				Count (items):						
Element Type:	unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection		x				
Protection System:	Unkown										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	N/A			All							
Comments:	Foundations are rated for performance only and not material condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SW & SE sides of structure				Height:						
Material:	Vegatation				Count (items):	4					
Element Type:	Embankments				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection	X					
Protection System:	Rip-Rap										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	Each			2	2.0						
Comments:	Embankments are moderately sloped with minor erosion at NW and NE corners										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	13					
		1-5 years		6-10 years		Urgent		1 year	x	2 years	
					Erosion control						

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope protection				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	Each			4	2						
Comments:	Generally in good condition. (Well vegetated) - rip-rap stone was missing at NW and NE corners										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Under structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All				N/A	
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	N/A				All						
Comments:	Medium volume and no flow with no visible flow obstruction noted										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barriers	Install code compliant approach barrier and end-treatments			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Transverse Crack in Approach Wearing Surface

Photo 8 Sagging in pipe arch below roadway

Photo 9 Loss of Rip-Rap at embankments (Typical)

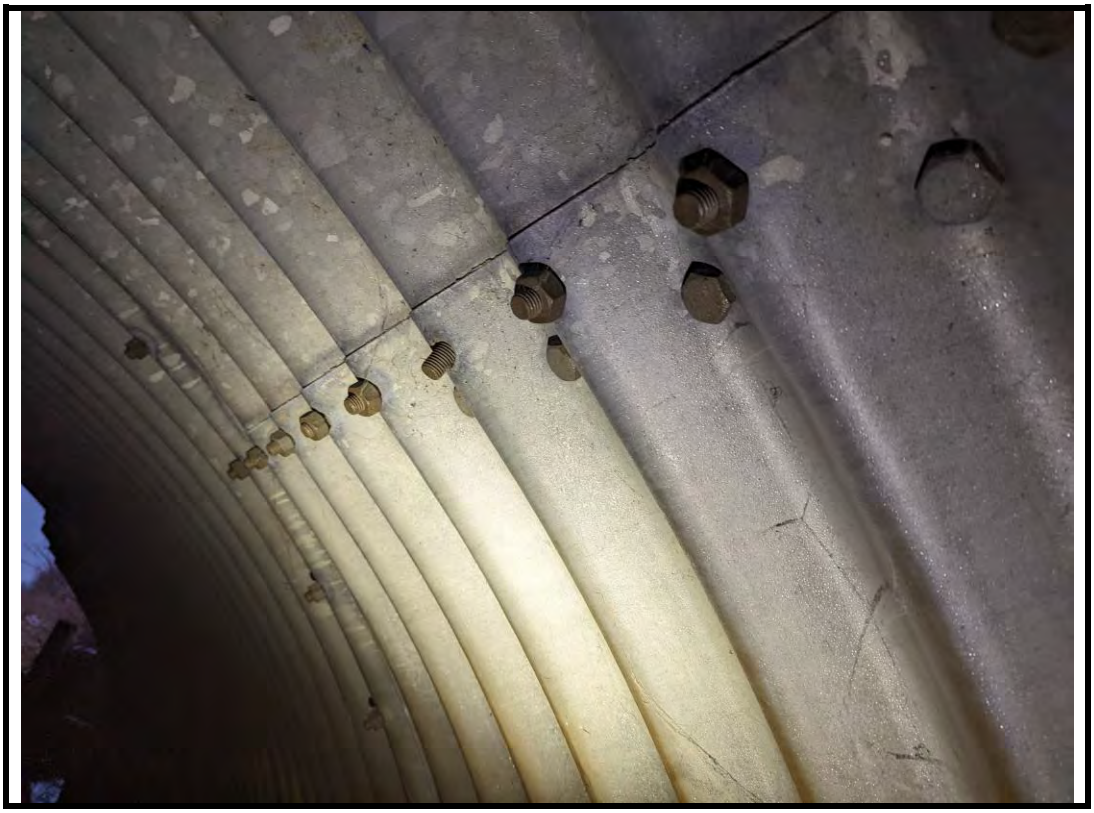

Photo 10 Missing nut in barrel (Typical)

Structure Condition Summary Form

Structure Name Carruthers Rd & Muffat Creek MD Culvert
Structure Number CUS002
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	348.00		341.04	3.48	3.48	2088	1543	74	00	15
Culvert	Barrel	Sq.m	350.00	185.40		154.50	30.90		64890	44882	69	00	00
Coatings	Structural steel	Sq.m	80.00	185.40		123.60	30.90	30.90	14832	8405	57	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		2.00	2.00		0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		2.00	2.00		0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									81810	54830			

Bridge Condition Index (BCI) **67.02**

Inventory Data:

Structure Name	Allen Road & Allen Creek MD Culvert								
Main Hwy/Road #	Allen Road		Services on Structure:	Navig. Water		Non-Navig. Water		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under Structure:	Navig. Water		Non-Navig. Water	X	Ped.	
				Rail		Road		Other	
Structure Location	0.5km South of French Settlement Road								
Latitude	45.08615		Longitude	-75.55013					
Owner/Custodian	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	88		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Corrugated Steel Pipe Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.10	m	Min. Vertical Clearance		m				
Total Deck Area	18.3	sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	5.5	m	Detour Length Around Bridge		km				
Skew Angle	5	Degrees	Direction of Structure	North/South					
No. of Spans	1		Fill on Structure	1.6	m				
Span Lengths	3.1	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.75		
OSIM		2022	75		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	-2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study:			X		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Cost	$ 5,000.00

Investigation Notes: Rehabilitation/Replacement Study is for approach barrier only

Overall Structure Notes:								
Recommended Work on Structure:		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:		None	X	1 to 5 years		6 to 10 years		
Overall Comments:	Overall barrel is in good to fair condition with some light corrosion noted at waterline and salt stains observed at bolt line udner roadway. Slight sag noted under roadway. No approach barrier observed at time of inspection. A code compliant barrier should be installed.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches			Length:	-					
Element Name:	Barrier			Width:						
Location:	NE, SE, NW & SW of Structure			Height:						
Material:	Steel			Count (items):						
Element Type:	Steel Flex Beam on Steel Posts			Total Quantity:					m	
Environment:	Severe			Limited Inspection						
Protection System:	None									Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*					
	m									8
Comments:	No approach barrier observed at time of inspection. A code compliant barrier should be installed.									
Recommended Work:	X	Rehab	Replace	**Maintenance Needs:**						
	X	1-5 years	6-10 years	Urgent	1 year	2 years				

Element Group:	Approaches			Length:	60					
Element Name:	Wearing Surface			Width:	5.5					
Location:	North & South of Structure			Height:						
Material:	Asphalt			Count (items):	1					
Element Type:	Asphalt Wearing Surface			Total Quantity:	330.0				m^2	
Environment:	Severe			Limited Inspection						
Protection System:	None									Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*					
	m^2		320	7	3					
Comments:	Light to medium ravelling and medium to severe section loss noted at edges of wearing surface.									
Recommended Work:		Rehab	Replace	**Maintenance Needs: 12**						
		1-5 years	6-10 years	Urgent	1 year	X	2 years			

Element Group:	Culverts			Length:	18.3					
Element Name:	Barrels			Width:	3.1					
Location:	Below Roadway			Height:	1.2					
Material:	Steel			Count (items):	1					
Element Type:	Corrugated Steel Arch Culvert			Total Quantity:	58.00				m^2	
Environment:	Benign			Limited Inspection	X	Due to w				
Protection System:	None									Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*					
	m^2		58.00							
Comments:	Limited inspection due to water level. Light corrosion noted at waterline and salt stains noted at bolt line under the road. Slight sag noted at middle of barrel. Missing bolt noted at west end of barrel.									
Recommended Work:		Rehab	Replace	**Maintenance Needs:**						
		1-5 years	6-10 years	Urgent	1 year	2 years				

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On Culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Coating - Hot Dip Galvanzing				Total Quantity:		58.00				m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				56.61		0.93		0.5		
Comments:	Generally in good condition with localized areas of coating failure noted.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Foundation				Length:						
Element Name:	Foundation (blow ground level)				Width:						
Location:	Blow Grade				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:						All
Environment:	Benign				Limited Inspection		X				
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	All				100%						
Comments:	No evidence of foundation instability at time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Nee**	0				
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments & Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW OF Structure				Height:						
Material:	Native Soil				Count (items):						
Element Type:	Embankment				Total Quantity:		4				
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	Each				4.0						
Comments:	Embankements are moderately sloped well vegetated and appear to be stable.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments & Streams			Length:						
Element Name:	Streams & Waterways			Width:						
Location:	Under Structure			Height:						
Material:	Native			Count (items):						
Element Type:	Stream			Total Quantity:	All					
Environment:	Moderate			Limited Inspection						
Protection System:	None									Perform. Deficiencies
Condition Data:	Units		Exc.	Good		Fair		Poor*		
	All			100%						0
Comments:	Medium volume and low flow from west to east with no flow obstructions noted at time of inspection.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
Approach Barrier	Install Code Compliant Approach Barrier			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ -
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Section loss at east edge of north wearing surface

Photo 8 Light corrosion at waterline at east end of barrel

Photo 9 Slight sag in barrel under road

Photo 10 Missing bolt at west end of barrel

Structure Condition Summary Form

Structure Name Allen RD & Allen Creek MD Culvert
Structure Number CUS003
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	330.00	0.00	320.00	7.00	3.00	1980	1457	74	00	12
Culvert	Barrel	Sq.m	350.00	58.00	0.00	58.00	0.00	0.00	20300	15225	75	00	00
Coatings	Structural steel	Sq.m	80.00	58.00	0.00	58.00	0.00	0.00	4640	3480	75	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									26920	**20162**			

Bridge Condition Index (BCI) **75**

Inventory Data:

Structure Name	Jennings Rd & Castor Extension MD Culvert								
Main Hwy/Road #	Jennings Rd		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	2.2km North of Spruit Rd								
Latitude	45.1004		Longitude	-75.42241					
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	50 km/h		No. of Lanes	2		
Old County	SDG		AADT	49		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Structural Plate Corrugated Steel Pipe Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	4.6	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Culvert Length	13.7	m							
Roadway Width	5.7	m	Detour Length Around Bridge		km				
Skew Angle	10	Degrees	Direction of Structure	North/South					
No. of Spans	1		Fill on Structure	0.8	m				
Span Lengths	4.6	m							

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	October 8, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	66.1		
OSIM		2022	66.00		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:		x		$ 2,500.00
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally fair to poor condition. No approach barrier observed at time of inspection. Severe sag noted below roadway, with deformation noted at northwest corner. Wide horizontal cracks at boltline at northeast corner of structure.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:						
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:						m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m										
Comments:	No approach barrier observed at time of inspection. A code compliant approach barrier should be installed when structure is replaced.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	5.7					
Location:	North & South of Structure				Height:						
Material:	Gravel				Count (items):						
Element Type:	Gravel Wearing Surface				Total Quantity:	342.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				300		42.0				9
Comments:	Moderate to severe tire rutting and potholes noted on wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	13.7					
Element Name:	Barrels				Width:	4.6					
Location:	Below Roadway				Height:	2.7					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	340.30					m
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m				272.24		34.03		34.03		1
Comments:	Light corrosion noted along springline of barrel. Severe sag noted below roadway with large deformation at northwest corner. Wide horizontal crack at bolt lines at northeast near waterline. .										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coatings				Length:						
Element Name:	Structural Steel				Width:						
Location:	On Culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Coating - Hot Dip Galvanized				Total Quantity:	340.3					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				337.85	1.43		1.02			
Comments:	Minor coating loss noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Barrel				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Embankments are moderately sloped, well vegetated and appear stable.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams			Length:							
Element Name:	Streams and Waterways			Width:							
Location:	Below Structure			Height:							
Material:	Native			Count (items):	All						
Element Type:	Stream			Total Quantity:	All					N/A	
Environment:	Benign			Limited Inspection							
Protection System:	None									Perform.	
Condition Data:	Units	Exc.	Good	Fair	Poor*	Deficiencies					
	N/A		All								
Comments:	Low volume and no flow with no obstructions noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Culverts	Replace Structure		X		$ 252,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 252,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Tire rutting and potholes on south approach wearing surface

Photo 8 Deformation at northwest corner of structure

Photo 9 Interior of barrel from east end of structure

Photo 10 Severe sag in middle of barrel

Photo 11 Wide horizontal cracks at bolt line at northeast corner of barrel

Structure Condition Summary Form

Structure Name Jennings Rd & Castor Extension MD Culvert
Structure Number CUS004
Date of Inspection December 8, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	342.00	0.00	300.00	42.00	0.00	2052	1451	71	00	00
Coatings	Structural steel	Sq.m	80.00	340.3	0	337.85	1.43	1.02	27224	20317	75	00	00
Culvert	Barrel	Sq.m	350.00	340.3	0	272.24	34.03	34.03	119105	76227	64	01	00
Embankments and	Embankments	Each	0.00	4	0	4	0	0	0	0		00	00
Streams	Streams and Waterways	All	0.00	1	0	1	0	0	0	0		00	00
									148381	**97995**			

Conditon Index **66.0**

Inventory Data:

Structure Name	Kerrs Ridge Rd Allowance & Castor Extension MD Culvert							
Main Hwy/Road #	Kerrs Road		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.6km Wset of Jennings Road							
Latitude	45.09437		Longitude	-75.42706				
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	49		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Structural Plate Corrugated Steel Pipe Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	4	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Culvert Length	15.0	m							
Roadway Width	5.0	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	East					
No. of Spans	1		Fill on Structure	0.8	m				
Span Lengths	4	m							

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 2, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	63.5		
OSIM		2022	63.50		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	3˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:		x		$ 2,500.00
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:				1 to 5 years	X	6 to 10 years		
Overall Comments:	Structure is generally in fair to poor condition with minor to moderate sag noted in middle of barrel and cracks noted at several bolted connections. Evidence of leakage and efflroescence noted at waterline of west barrel wall. Severe settlement noted on approach wearing surface and no approach barrier observed.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:						
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:						m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m										
Comments:	No approach barrier observed at time of inspection. A code compliant approach barrier should be installed when structure is replaced.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	5					
Location:	East & West of Structure				Height:						
Material:	Gravel				Count (items):						
Element Type:	Gravel Wearing Surface				Total Quantity:	300.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				80.0		120.0		100.0		9 & 10
Comments:	Generally approach wearing surface is in fair to poor condition.Severe settlement noted on wearing surface with moderate to severe tire rutting and potholes also noted on wearing surface.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	18				
			1-5 years		6-10 years		Urgent	X	1 year		2 years
						Regrade gravel wearing surface					

Element Group:	Culverts				Length:	13.7					
Element Name:	Barrels				Width:	4.6					
Location:	Below Roadway				Height:	2.7					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	292.80					m
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m				213.74		49.78		29.28		
Comments:	Mild to medium sag noted at the middle of the barrel. Light corrosion noted along springline with some cracks noted at bolted connections. Evidence of leakage and efflorescence noted at waterline on west wall. Missing bolts observed throughout barrel.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
			1-5 years	X	6-10 years		Urgent		1 year		2 years

Element Group:	Coatings				Length:						
Element Name:	Structural Steel				Width:						
Location:	On Culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Coating - Hot Dip Galvanized				Total Quantity:	292.8					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				287.88	2.87		2.05			
Comments:	Minor coating loss noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Barrel				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Embankments are moderately sloped, well vegetated and appear stable.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Moderate volume and flow from north to south with obstructions noted at the south side of structure.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**		18			
			1-5 years		6-10 years		Urgent	X	1 year		2 years
Clear obstruction											

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
Culverts	Replace Structure	X			$ 240,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 240,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from East approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Severe settlement on east approach wearing surface

Photo 8 Interior of barrel from north side of structure

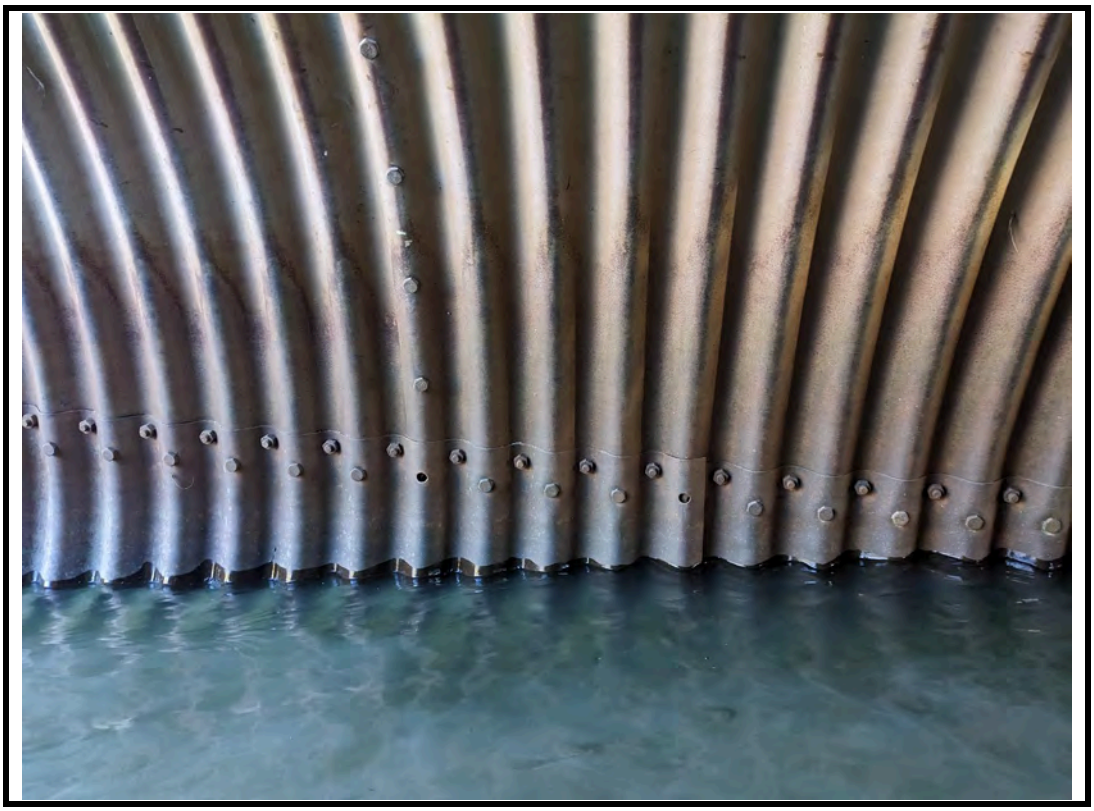

Photo 9 Light corrosion and missing bolt on east barrel wall

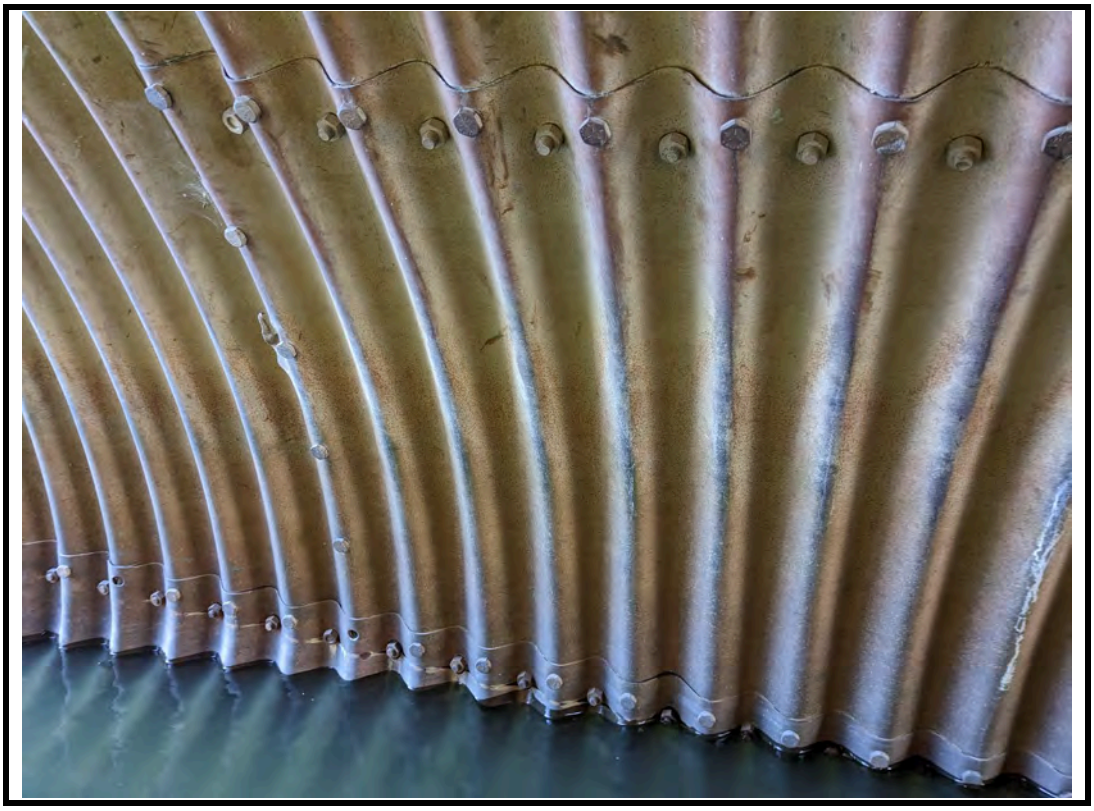

Photo 10 Cracks at bolt line at barrel wall

Photo 11 Evidence of leakage and efflorescence at bolt line on west barrel wall

Photo 12 Debris blocking south side of barrel

Structure Condition Summary Form

Structure Name Kerrs Ridge Rd Allowance & Castor Extension MD Culvert
Structure Number CUS005
Date of Inspection December 8, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	300.00	0.00	80.00	120.00	100.00	1800	648	36	9 & 10	18
Coatings	Structural steel	Sq.m	80.00	292.8	0	287.88	2.87	2.05	23424	17365	74	00	00
Culvert	Barrel	Sq.m	350.00	292.8	0	213.74	49.78	29.28	102480	63076	62	00	00
Embankments and	Embankments	Each	0.00	4	0	4	0	0	0	0		00	00
Streams	Streams and Waterways	All	0.00	1	0	1	0	0	0	0		00	18
									127704	**81089**			

Conditon Index **63.5**

Inventory Data:

Structure Name	Spruit Rd & Castor Extension MD Culvert							
Main Hwy/Road #	Spruit Road	Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure: X		Rail		Road	X	Other	
	Under Structure:	Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
			Rail		Road		Other	
Structure Location	0.45km West of Riddell Rd							
Latitude	45.0795168	Longitude	-75.4313356					
Owner(s)	Township of North Dundas	Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
			Desig./not list		Desig. & List			
MTO Region	40 - Eastern	Road Class:	Freeway		Arterial			
			Collector		Local	X		
MTO District	42 - Ottawa	Posted Speed	50 km/h		No. of Lanes	2		
Old County	SDG	AADT	49		% Trucks			
Geographic Twp.		Inspection Route Sequence						
Structure Type	Structural Plate Corrugated Steel Pipe Arch Culvert	Interchange Number						
Total Deck Length	m	Interchange Structure Number						
Overall Str. Width	3 m	Min. Vertical Clearance		m				
Total Deck Area	sq. m	Special Routes:	Transit		Truck			
			School		Bicycle			
Culvert Length	13.7 m							
Roadway Width	4.0 m	Detour Length Around Bridge		km				
Skew Angle	Degrees	Direction of Structure	East/West					
No. of Spans	1	Fill on Structure	0.7 m					
Span Lengths	3 m							

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 2, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	63.37		
OSIM		2022	59.30		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Avasar Pradaliya, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally fair condition. No approach barrier observed at time of inspection. Severe corrosion, perforations and strucutre separation noted at springline. Some leaks and missing bolts at plate connections.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:						
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:						m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m										
Comments:	No approach barrier observed at time of inspection. A code compliant approach barrier should be installed when structure is replaced.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
	X		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	4					
Location:	East & West of Structure				Height:						
Material:	Gravel				Count (items):						
Element Type:	Gravel Wearing Surface				Total Quantity:	240.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				240						9
Comments:	Wearing surface is generally in good condition.										
Recommended Work:			Rehab		Replace	**Maintenance Needs:**					
			1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Culverts				Length:	13.7					
Element Name:	Barrels				Width:	3					
Location:	Below Roadway				Height:	3					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	129.05					m
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanizing										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m				89.55		19.75		19.75		1
Comments:	Medum to severe corrosion, perforations and structural separation at springline. Missing bolts at the connection of the structural plates noted. Minor sagging noted at mid span. Evidence of leakage ntoed at plate overlaps.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
	X		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Coatings				Length:						
Element Name:	Structural Steel				Width:						
Location:	On Culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Coating - Hot Dip Galvanized				Total Quantity:	129.05					m^2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				97.79	16.26		15.00			
Comments:	Medium to severe coatin gloss noted throughout barrel.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Barrel				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection			X			
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2	2					
Comments:	Embankments are moderately sloped, and well vegetated. Washout noted at southwest embankment and erosion noted at stream bank at northwest embankment.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:					
Element Name:	Streams and Waterways				Width:					
Location:	Below Structure				Height:					
Material:	Native				Count (items):	All				
Element Type:	Stream				Total Quantity:	All				N/A
Environment:	Benign				Limited Inspection					
Protection System:	None									Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies
	N/A							All		15
Comments:	Medium volume and flow from south to north with no obstructions noted. Severe erosion noted at the northwest side of structure.									

Recommended Work:		Rehab		Replace	**Maintenance Needs:**		13			
		1-5 years		6-10 years		Urgent	X	1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Culverts	Replace Structure		X		$ 206,000.00
Approaches	Install Code Compliant approach barrier		X		$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 206,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Typical view of west approach wearing surface

Photo 8 Interior of barrel from north end

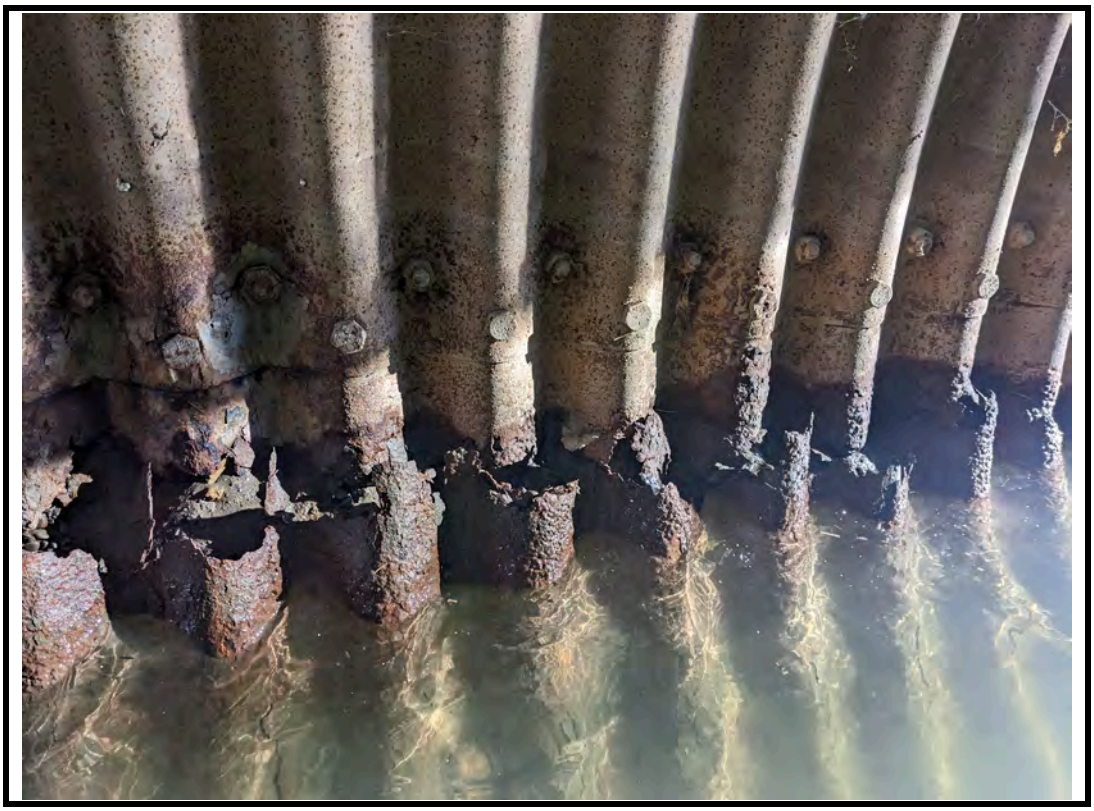

Photo 9 Perforation and separation on west barrel wall of structure

Photo 10 Leaking and missing bolts at plate connections

Photo 11 Erosion at northwest embankment

Photo 12 Erosion and washout noted on southwest embankment

Structure Condition Summary Form

Structure Name Spruit Rd & Castor Extension MD Culvert
Structure Number CUS006
Date of Inspection December 8, 2022
Consultant HP Engineering Inc.
Contract Number 22087 (HP)

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in excellent condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	240.00	0.00	240.00	0.00	0.00	1440	1080	75	00	00
Coatings	Structural steel	Sq.m	80.00	129.05	0	97.79	16.26	15	10324	6388	62	00	00
Culvert	Barrel	Sq.m	350.00	129.05	0	89.55	19.75	19.75	45168	26272	58	01	00
Embankments and	Embankments	Each	0.00	4	0	2	2	0	0	0		00	00
Streams	Streams and Waterways	All	0.00	1	0	0	0	1	0	0		00	13
									56932	**33740**			

Conditon Index **59.3**

Inventory Data:

Structure Name	Liscumb Rd & Tighe MD Culvert								
Main Hwy/Road #	Liscumb Rd	Services on structure:	Navig. Water		Non-Navig.		Ped.		
	On Structure: X		Rail		Road	X	Other		
	Under Structure:	Services under structure:	Navig. Water		Non-Navig.	X	Ped.		
			Rail		Road		Other		
Structure Location	0.6km West of County Rd 3								
Latitude	45.1035524	Longitude	-75.3634268						
Owner(s)	Township of North Dundas	Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.		
			Desig./not list		Desig. & List				
MTO Region	40 - Eastern	Road Class:	Freeway		Arterial				
			Collector		Local	X			
MTO District	42 - Ottawa	Posted Speed	60 km/h		No. of Lanes	2			
Old County	SDG	AADT	N/A		% Trucks				
Geographic Twp.		Inspection Route Sequence							
Structure Type	SPCSP Arch Culvert	Interchange Number							
Total Deck Length	m	Interchange Structure Number							
Overall Str. Width	4.5 m	Min. Vertical Clearance		m					
Total Deck Area	sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	10.0 m	Detour Length Around Bridge		km					
Skew Angle	0 Degrees	Direction of Structure	North/South						
No. of Spans	1	Fill on Structure	0.6 m						
Culvert Length	15.3 m								
Span Lengths	4.5 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	70.33		
OSIM		2022	70.25		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on	X	None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure is in generally good condition. No approach barrier present above structure - A code compliant barrier and end treatments should be installed above the structure. Corrosion along springline noted in barrel. Erosion of northeast embankment and washout of southeast embankment encroaching into stream.						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	10					
Location:	Over Culvert				Height:						
Material:	Gravel				Count (items):						
Element Type:	Gravel Wearing Surface				Total Quantity:	600.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			600.00							
Comments:	The approach wearing surface is generally in good condition. No barriers present - A code compliant barrier and end-treatments should be installed above the structure										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	15.3					
Element Name:	Barrels				Width:	4.5					
Location:	Below Roadway				Height:	2					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	137.70					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			117.60	20.00		0.1				
Comments:	Moderate corrosion noted along the springlines of culvert with deformation at the southwest end. Barrel appears too short.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	137.70					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			125.20	7.50		5.00				
Comments:	Light to moderatecoating loss noted along culvert side walls.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:					
Element Name:	Foundation (below ground level)					Width:					
Location:	Below barrel					Height:					
Material:	unknown					Count (items):					
Element Type:	unknown					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection		x			
Protection System:	Unkown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE sides of structure					Height:					
Material:	Vegetation					Count (items):	4				
Element Type:	Embankments					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2.0	2.0					
Comments:	Embankments are moderately sloped. Moderate erosion at the northeast. Washout present at the southeast encroaching into stream.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**		13			
		1-5 years		6-10 years			Urgent	x	1 year		2 years
						Erosion control at embankments					

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Vegetation					Count (items):	4				
Element Type:	Slope protection					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				2	2					
Comments:	Generally in good condition - See embankment condition notes										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	Medium volume and flow from west to east with no visible flow obstruction noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**		18				
		1-5 years		6-10 years		Urgent		1 year	x	2 years	
					Clear vegetation						

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barrier	Install barriers and end-treatments			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 View of channel west of structure (inlet)

Photo 8 View of channel east of structure (outlet)

Photo 9 View through pipe arch barrel from the west

Photo 10 Deformation at inlet on the southwest corner of structure

Photo 11 Erosion and encroachment into barrel at the northwest

Photo 12 Corrosion on pipe arch walls (typ.)

Structure Condition Summary Form

Structure Name Liscumb Rd Tighe MD Culvert
Structure Number CUS008
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	600.00		600.00			3600	2700	75	00	00
Culvert	Barrel	Sq.m	350.00	137.70		117.60	20.00	0.10	48195	33670	70	00	00
Coatings	Structural steel	Sq.m	80.00	137.70		125.20	7.50	5.00	11016	7752	70	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		2.00	2.00		0	0		00	13
Embankments and Streams	Slope Protection	Each	0.00	4.00		2.00	2.00		0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	18
									62811	**44122**			

Bridge Condition Index (BCI) **70.25**

Inventory Data:

Structure Name	Boyne Rd Kittle Creek MD Culvert								
Main Hwy/Road #	Boyne Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	1.2km East of Kittle Rd								
Latitude	45.1266729		Longitude	-75.261989					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	1000		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	2-cell CSP Round Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	18.3	m	Detour Length Around Bridge		km				
Skew Angle	8.4	Degrees	Direction of Structure	East/West					
No. of Spans	2		Fill on Structure	0.9	m				
Span Lengths	1.5, 1.5	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	74.71		
OSIM		2022	74.64		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	6˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:	Rehabilitation Study for Approach Barriers Only				$ 5,000.00

Overall Structure Notes:								
Recommended Work on	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	Structure is generally in good condition. Cracks noted in asphalt wearing surface above structure. Grade differential of +-50mm in granular shoulders. Deformation at midspan joint noted in east culvert with some light corrosion. Minor loss of rip rap noted at the south embankments. A code compliant barrier and end-treatments should be installed above the structure							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60						
Element Name:	Wearing Surface				Width:	8.4						
Location:	Over Culvert				Height:							
Material:	Asphalt				Count (items):							
Element Type:	Asphalt Wearing Surface				Total Quantity:	504.0					m2	
Environment:	Severe				Limited Inspection							
Protection System:	None										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*				
	m2				491.96	8.00		4.04				
Comments:	Severe transverse cracks above structure noted. Severe longitudinal edge crack noted at the Southwest. Grade difference of +-50mm noted at shoulders. No barriers present above structure - A code compliant barrier and end-treatments should be installed											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**	15, 18					
			1-5 years		6-10 years		Urgent		1 year	x	2 years	
						Rout and seal asphalt, regrade shoulders						

Element Group:	Culverts				Length:	18.3						
Element Name:	Barrels				Width:	1.5						
Location:	Below Roadway				Height:	1.5						
Material:	Corrugated Steel				Count (items):	2						
Element Type:	2-Cell CSP Round culverts				Total Quantity:	172.39					m2	
Environment:	Benign				Limited Inspection							
Protection System:	Hot Dip Galvanized										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*				
	m2				170.39	2.00						
Comments:	Minor sag and light to medium corrosion noted along springline. Minor deformation at east barrel. Center joint o east barrel is slightly misaligned with light to medium corrosion present.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:							
Element Name:	Structural Steel				Width:							
Location:	On culvert barrel				Height:							
Material:	Other				Count (items):							
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	172.4					m2	
Environment:	Benign				Limited Inspection							
Protection System:	None										Perform. Deficiencies	
Condition Data:	Units		Exc.		Good	Fair		Poor*				
	m2				172.4							
Comments:	Generally in good condition											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (below ground level)				Width:						
Location:	Below barrel				Height:						
Material:	unknown				Count (items):						
Element Type:	unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection		x				
Protection System:	Unkown										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SW & SE sides of structure				Height:						
Material:	Vegatation				Count (items):	4					
Element Type:	Embankments				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection						
Protection System:	Rip-Rap										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each				2	2.0					
Comments:	Embankments are moderately sloped, well-vegetated, and stable. light erosion present at southwest.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope protection				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	Each				4						
Comments:	Generally in good condition with minor loss of rip-rap at the south.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
	1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:	#REF!					
Element Name:	Streams and Waterways				Width:	#REF!					
Location:	Under structure				Height:	#REF!					
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Low volume and low flow from north to south with no visible flow obstruction noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barriers	Install code compliant barrier and end-treatments			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from East approach

Photo 2 Structure from West approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North Elevation

Photo 6 South Elevation

Photo 7 Transverse crack in asphalt approach wearing surface above structure

Photo 8 Longitudinal edge cracks and grade difference at shoulders

Photo 9 View through east barrel, looking south

Photo 10 Misalignment of joint in east barrel and localized corrosion

Photo 11 View through west barrel, looking north

Photo 12 Light loss of Rip Rap at southwest embankment

Structure Condition Summary Form

Structure Name Boyne Rd Kittle Creek MD Culvert
Structure Number CUS009
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	504.00		491.96	8.00	4.04	3024	2233	74	00	15
Culvert	Barrel	Sq.m	350.00	172.39		170.39	2.00		60337	45007	75	00	00
Coatings	Structural steel	Sq.m	80.00	172.40		172.40			13792	10344	75	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									77153	57584			

Bridge Condition Index (BCI) **74.64**

Inventory Data:

Structure Name	Development Rd & CPR Railway Culvert
Main Hwy/Road #	Development Road
On Structure	X
Under Structure	
Structure Location	1.0km South of County Rd 43, South of CPR Rail tracks
Latitude	45.047765
Longitude	-75.45206
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	3-Cell CSP Round Culvert
Total Deck Length	m
Overall Str. Width	4.5 m
Total Deck Area	20.4 sq. m
Roadway Width	6.4 m
Skew Angle	Degrees
No. of Spans	3
Span Lengths	1.5, 1.5, 1.5 m

Services on structure: Navig. Water; Rail; Non-Navig.; Road (X); Ped.; Other

Services under structure: Navig. Water; Rail; Non-Navig. (X); Road; Ped.; Other

Heritage Designation: Not Consid. (X); Desig./not list; Cons/not App.; Desig. & List; List/n.d.

Road Class: Freeway; Arterial; Collector; Local (X)

Posted Speed: 60 km/h

No. of Lanes: 2

AADT: 88

% Trucks:

Inspection Route Sequence:

Interchange Number:

Interchange Structure Number:

Min. Vertical Clearance: m

Special Routes: Transit; School; Truck; Bicycle

Detour Length Around Bridge: km

Direction of Structure: North/South

Fill on Structure: 1 m

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 2, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	48.75		
OSIM		2022	41		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera,chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	1˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study				X	$ 20,000.00
Material Condition Survey					
	Detailed Deck Condition Survey:				
	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					
	Monitoring of Deformations, Settlements and Movements:		X		$ 2,500.00
	Monitoring Crack Widths:	x			
				Total Costs	$ 22,500.00

Investigation Notes:

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally poor condition and should be replaced. Severe corrosion and perforations noted on bottom and along spring line of barrel. Severe sag underroadway in top barrel. Separation at midspan of north barrel, with fill entering the barrel.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:						
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)				Total Quantity:						m
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m										8
Comments:	No approach barrier observed at time of inspection. A code compliant barrier should be installed during structure replacement.										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
	X		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6.4					
Location:	Over Structure				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Surface Treatment				Total Quantity:	384.0					m^2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				337.92		30.72		15.36		
Comments:	Medum edge cracking, and potholes noted on wearing surface. Patched potholes noted and some minor settlement noted on both approaches.										
Recommended Work:		X	Rehab		Replace	**Maintenance Needs:**					
		X	1-5 years		6-10 years		Urgent		1 year		2 years
						Repair asphalt surface treatment and patch pothole					

Element Group:	Culverts				Length:	20.4					
Element Name:	Barrels				Width:	1.5					
Location:	Below Roadway				Height:	1.5					
Material:	Other				Count (items):	3					
Element Type:	Expansion Joint Armouring				Total Quantity:	288.25					m^2
Environment:	Severe				Limited Inspection	X					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	m^2				105.25		98		85.0		01 & 02 & 03
Comments:	Severe corrosion and perforations noted along bottom and springline of culvert. Severe dent noted at east ends of barrel. Severe sag ntoed under roaeway. Limited inspection of top barrel. Separation and partial collapse at midspan of north barrel with fill .										
Recommended Work:			Rehab	X	Replace	**Maintenance Needs:**					
		X	1-5 years		6-10 years		Urgent		1 year		2 years
						Install supports.					

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Hot Dip Galvanizing				Total Quantity:	288.25				m^2	
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				80.71	121.1		86.5			
Comments:	Severe coating loss noted throughout barrels.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection			X			
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each					4					
Comments:	Embankments are moderately sloped and well vegetated with erosion noted at all corners. Debris build-up noted at northeast embankment..										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**			18 - Clear Debris			
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						

Protection System:	None					Perform. Deficiencies
Condition Data:	Units	Exc.	Good	Fair	Poor*	
	N/A		All			
Comments:	Low volume and no flow with ice build-up noted in waterway.					

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approaches	Install Approach Barrier			X	$ -
Barrel	Replace Structure		X		$ 367,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 367,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Wide pattern cracks, asphalt patches and potholes on south wearing surface

Photo 8 Severe corrosion and perforations in south barrel

Photo 9 Interior of south barrel from west end

Photo 10 Large dents in east end of south barrel

Photo 11 Interior of middle barrel from east end of structure

Photo 12 Separation and partial collapse of north barrel

Photo 13 Separation of seam in north barrel

Structure Condition Summary Form

Structure Name Development Rd CPR Railway Culvert
Structure Number CUS010
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	384.00	0.00	337.52	30.72	15.36	2304	1593	69	00	15
Culvert	Barrel	Sq.m	350.00	288.25	0.00	105.25	98.00	85.00	100888	41348	41	01,02	00
Coatings	Structural steel	Sq.m	80.00	288.25	0.00	80.71	121.10	86.50	23060	8718	38	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	0.00	4.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									126252	**51658**			

Bridge Condition Index (BCI) **41**

Inventory Data:

Structure Name	Kittle Rd & Kittle Creek MD Culvert								
Main Hwy/Road #	Kittle Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	1.3km West of County Rd 7								
Latitude	45.11716		Longitude	-75.25508					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	68		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	2-cell CSP Round Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	12.2	m	Detour Length Around Bridge		km				
Skew Angle	6	Degrees	Direction of Structure	East/West					
No. of Spans	2		Fill on Structure	0.9	m				
Span Lengths	1.5, 1.5	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.71		
OSIM		2022	69.48		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	Structure is generally in good condition. Some debris noted within east pipe and east pipe inlet. Light corrosion noted along bottom third of pipe. Light scaling and potholes noted on the asphalt wearing surface. Debris and perforation noted in west barrel. No barrier present above structure - A code compliant barrier and end-treatments should be installed							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	360.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			349.20	7.20		3.60				
Comments:	Potholes noted along center of roadway with some light scaling noted throughout. No barrier present above structure - A code compliant barrier and end-treatments should be installed above the structure										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**		15				
		1-5 years		6-10 years		Urgent		1 year	x	2 years	
					Rout and seal asphalt wearing surface						

Element Group:	Culverts				Length:	12.2					
Element Name:	Barrels				Width:	1.5					
Location:	Below Roadway				Height:	1.5					
Material:	Corrugated Steel				Count (items):	2					
Element Type:	2-Cell CSP Round culverts				Total Quantity:	114.92					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			91.94	22.98						
Comments:	Light to medium corrosion noted along springline. Deformation/perforation noted in west barrel. Debris buildup in east pipe. Limited inspection due to sedimentation										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**		18				
		1-5 years		6-10 years		Urgent	X	1 year		2 years	
					Remove debris in pipes						

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	114.92					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			114.92							
Comments:	Generally in good condition with some light corrosion along the bottom third of pipe										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:						
Element Name:	Foundation (below ground level)					Width:						
Location:	Below barrel					Height:						
Material:	unknown					Count (items):						
Element Type:	unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection		x				
Protection System:	Unkown											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW & SE sides of structure					Height:						
Material:	Vegatation					Count (items):	4					
Element Type:	Embankments					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Rip-Rap											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Embankments are moderately sloped, well-vegetated, and stable.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope protection					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Rip-Rap					Count (items):	4					
Element Type:	Embankment					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Generally in good condition.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Streams and Waterways					Width:						
Location:	Under structure					Height:						
Material:	Native					Count (items):	All					
Element Type:	Stream					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*			Deficiencies
	N/A					All						
Comments:	Low volume and low flow from north to south. Obstruction/debris noted at east inlet.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**			18			
		1-5 years		6-10 years			Urgent	x	1 year		2 years	
						Remove debris						

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barriers	Install code compliant barrier and end-treatment			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ -
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Small potholes forming on asphalt wearing surface above structure

Photo 8 Corrosion and debris within east barrel

Photo 9 Debris buildup at east barrel inlet

Structure Condition Summary Form

Structure Name Kittle Rd & Kittle Creek MD Culvert
Structure Number CUS011
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	360.00		349.20	7.20	3.60	2160	1589	74	00	15
Culvert	Barrel	Sq.m	350.00	114.92		91.94	22.98		40222	27351	68	00	00
Coatings	Structural steel	Sq.m	80.00	114.92		114.92			9194	6895	75	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									51576	35835			

Bridge Condition Index (BCI) **69.48**

Inventory Data:

Structure Name	Finch Winchester Boundary Rd & Stoney Creek MD Culvert
Main Hwy/Road #	Finch Winchester Boundary Rd
On Structure	X
Under Structure	
Structure Location	0.4 km South of County Rd 9
Latitude	45.16392
Longitude	-75.19492
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	CSP Round Culvert
Total Deck Length	m
Overall Str. Width	3 m
Total Deck Area	sq. m
Roadway Width	4.6 m
Skew Angle	20 Degrees
No. of Spans	1
Span Lengths	3 m

Services on structure:	Navig. Water		Non-Navig.		Ped.	
	Rail		Road	X	Other	
Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
	Rail		Road		Other	
Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
	Desig./not list		Desig. & List			
Road Class:	Freeway		Arterial			
	Collector		Local	X		
Special Routes:	Transit		Truck			
	School		Bicycle			

Posted Speed	60 km/h
AADT	49
Inspection Route Sequence	
Interchange Number	
Interchange Structure Number	
Min. Vertical Clearance	m
Detour Length Around Bridge	km
Direction of Structure	North/South
Fill on Structure	0.4 m

No. of Lanes	2	% Trucks	

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.57		
OSIM		2022	64.00		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	3˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes: Rehabilitation/Replacement Study for Approach Barrier Only					

Overall Structure Notes:								
Recommended Work on		None	X	Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally fair condition. Repair culvert barrel in 1-5 years. Moderate corrosion noted along bottom of culvert barrel. Scour present at barrel ends. Cracks in barrel noted with some small perforations. No barriers present - A code compliant barrier and end-treatments should be installed.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	4.6					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	276.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m2			276							
Comments:	Generally in good condition with light potholes forming. No barriers present above structure - A code compliant barrier and end treatments should be installed above the structure.										
Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	18.3					
Element Name:	Barrels				Width:	3					
Location:	Below Roadway				Height:	3					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	CSP Round Culvert				Total Quantity:	172.4					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized									Perform. Deficiencies	
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m2			123.5	47.4		1.5				
Comments:	Moderate with localized severe corrosion along waterline noted with small perforations below waterline. Two cracks in barrel wall noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	7					
		1-5 years		6-10 years		Urgent		1 year	x	2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Hot dip galvanizing				Total Quantity:	172.4					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform. Deficiencies	
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	m2			120.7	28.7		28.7				
Comments:	Generally in fair condition, with 1/3 of the pipe coating failing.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (below ground level)				Width:						
Location:	Below barrel				Height:						
Material:	unknown				Count (items):						
Element Type:	unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection		x				
Protection System:	Unkown										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	N/A			All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instablility was noted at the time of inspection										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, NW, SW & SE sides of structure				Height:						
Material:	Vegatation				Count (items):	4					
Element Type:	Embankments				Total Quantity:	4					Each
Environment:	Moderate				Limited Inspection	X					
Protection System:	Rip-Rap										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	Each			3	1.0						
Comments:	Embankments are moderately sloped, well-vegetated, and stable. Evidence of overgrown vegetation was noted at the southwest embankment. Moderate erosion at southwest embankment										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 13						
		1-5 years		6-10 years		Urgent		1 year	x	2 years	

Element Group:	Embankments and Streams				Length:						
Element Name:	Slope protection				Width:						
Location:	NE, NW, SW & SE Side of Structure				Height:						
Material:	Rip-Rap				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.	Good	Fair		Poor*				
	Each			3	1						
Comments:	Generally in good condition with some overgrowth at the southwest embankment noted.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:							
Element Name:	Streams and Waterways					Width:							
Location:	Under structure					Height:							
Material:	Native					Count (items):	All						
Element Type:	Stream					Total Quantity:	All						N/A
Environment:	Benign					Limited Inspection							
Protection System:	None												
Condition Data:	Units		Exc.		Good	Fair		Poor*		Perform. Deficiencies			
	N/A				All								
Comments:	Medium volume and moderate flow from west to east with no visible flow obstruction noted. Evidence of severe scour and erosion on stream bed was noted at both east and west side of battel.												
Recommended Work:			Rehab		Replace	**Maintenance Needs:**							
			1-5 years		6-10 years		Urgent:	X	1 year		2 years		

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approach Barrier	Install Code Compliant Barrier and End Treatments			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Finch Winchester Boundary Rd & Stoney Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.: CUS012**

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Finch Winchester Boundary Rd & Stoney Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.: CUS012**

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Finch Winchester Boundary Rd & Stoney Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.: CUS012**

Photo 5 East elevation

Photo 6 West elevation

Finch Winchester Boundary Rd & Stoney Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.: CUS012**

Photo 7 View through pipe barrel from the West

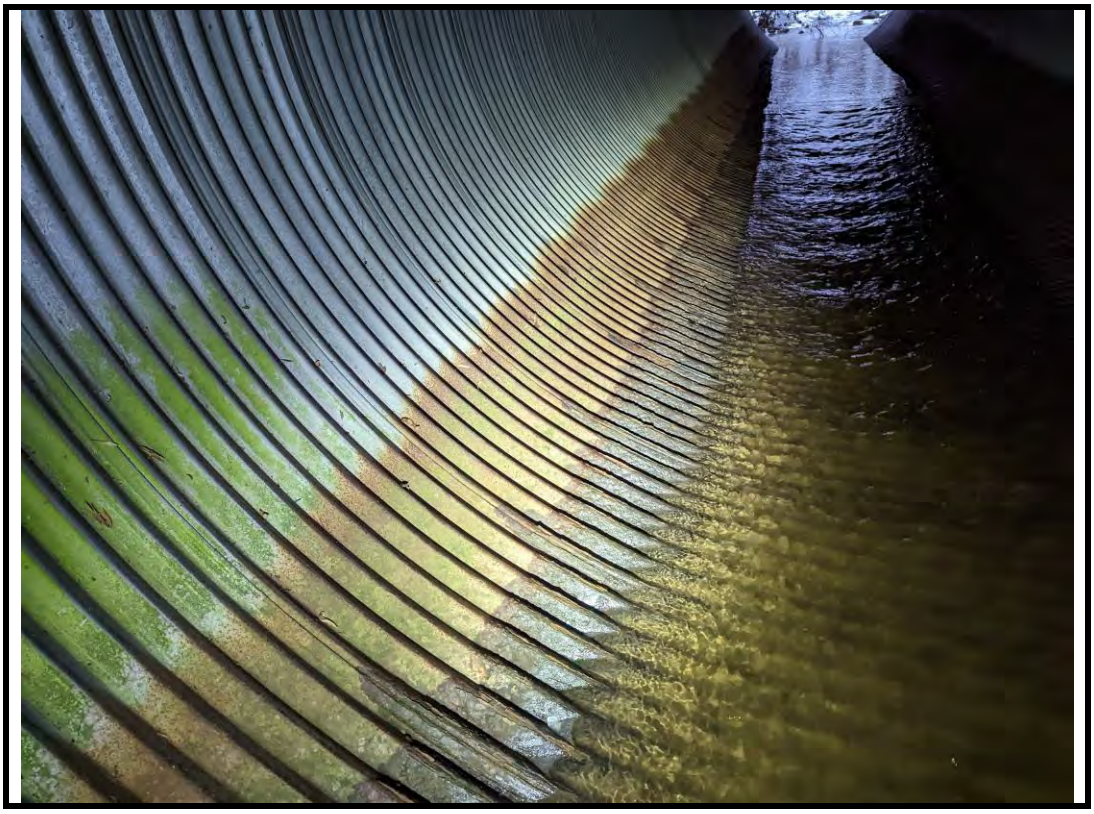

Photo 8 Corrosion along bottom of pipe

Finch Winchester Boundary Rd & Stoney Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.: CUS012**

Photo 9 Light deformation at east barrel end

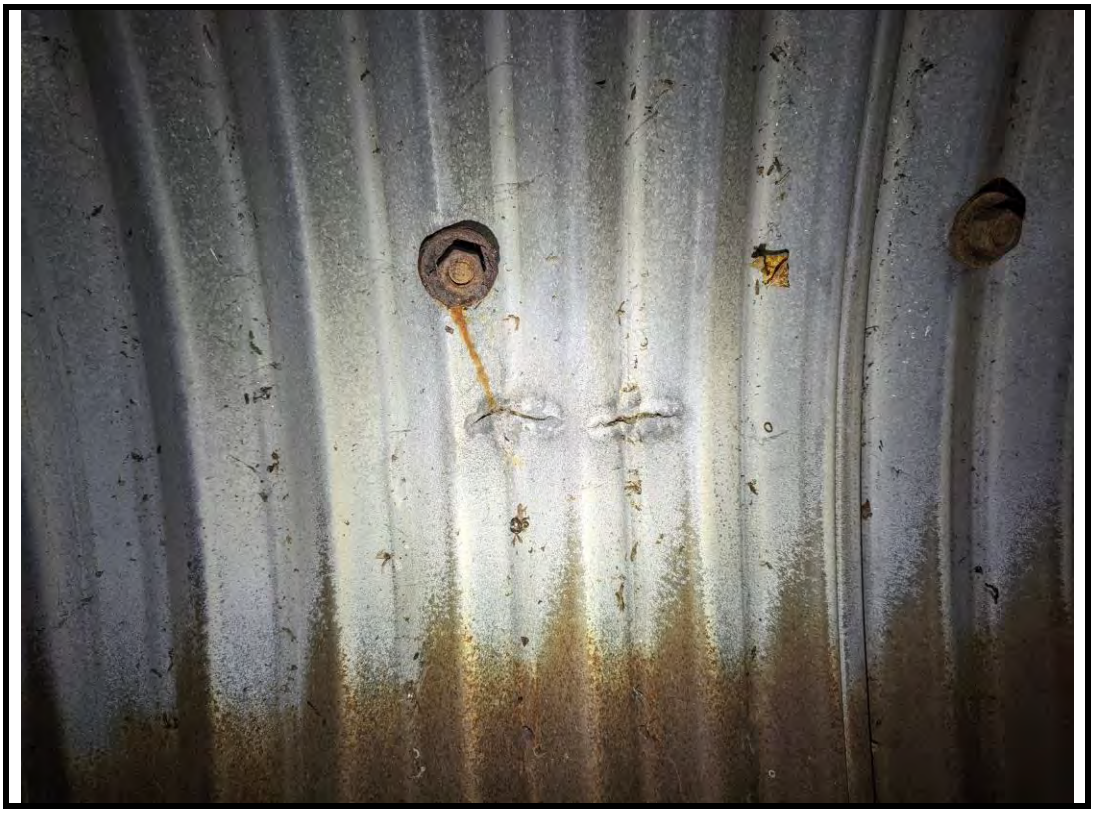

Photo 10 Perforations on barrel wall

Structure Condition Summary Form

Structure Name Finch Winchester Boundary Rd & Stoney Creek MD Culvert
Structure Number CUS012
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	276.00		275.00	1.00	0.00	1656	1240	75	00	00
Culvert	Barrel	Sq.m	350.00	173.89		125.00	47.39	1.50	60862	39447	65	00	07
Coatings	Structural steel	Sq.m	80.00	173.89		115.93	28.98	28.98	13911	7883	57	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		3.00	1.00		0	0		00	13
Embankments and Streams	Slope Protection	Each	0.00	4.00		3.00	1.00		0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									76429	48570			

Bridge Condition Index (BCI) **63.55**

Structure Condition Summary Form

Structure Name Van Camp Rd North Branch Soung Naiton River MD Culvert
Structure Number CUS013
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	169.50	0.00	169.50	0.00	0.00	0	0		00	00
	Wearing Surface	Sq.m	6.00	384.00	0.00	384.00	0.00	0.00	2304	1728	75	00	15
Culvert	Inlet Components	Sq.m	350.00	16.00	0.00	14.75	0.75	0.50	5600	3977	71	00	08
	Outlet Components	Sq.m	350.00	16.00	0.00	13.75	1.50	0.75	5600	3819	68	00	08
	Barrel	Sq.m	350.00	541.44	0.00	518.44	15.00	8.00	189504	138191	73	00	00
Coatings	Structural steel	Sq.m	80.00	541.40	0.00	519.78	10.83	10.83	43312	31533	73	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	0.00	1.00	0.00	0	0		00	18
									246320	**179248**			

Bridge Condition Index (BCI) **73**

Inventory Data:

Structure Name	Van Camp Rd North Branch South Nation River MD Culvert								
Main Hwy/Road #	Van Camp Rd		Services on Structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services Under Structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.25km West of County Road 1								
Latitude	45.01981		Longitude	-75.48735					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:		Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	49		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	2-Cell SPCSP Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	12.6	m	Min. Vertical Clearance		m				
Total Deck Area	23.5	sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	6.4	m	Detour Length Around Bridge		km				
Skew Angle	30	Degrees	Direction of Structure	East/West					
No. of Spans	2		Fill on Structure		m				
Span Lengths	5.4, 5.4	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	73.59		
OSIM		2022	73		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest, P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy					
Temperature:	-2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study:					
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:		X		$ 2,500.00
				Total Cost	$ 2,500.00
Investigation Notes Rehabilitation/Replacement Study is for					

Overall Structure Notes:								
Recommended Work on Structure:	X	None		Minor Rehab.		Major Rehab.		Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years		
Overall Comments:	New steel beam guiderail installed since previous inspection. Tree blocking channel at both east and west barrels. Some moderate corrosion noted at waterline in both barrels. Evidence of water leaking observed, recommend monitoring structure.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	169.5					
Element Name:	Barrier				Width:						
Location:	NE, SE, NW & SW of Structure				Height:						
Material:	Steel				Count (items):	1					
Element Type:	Steel Flex Beam on Steel Posts				Total Quantity:	169.5				m	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m				169.5					8	
Comments:	Steel beam guiderail was installed since previous inspection. Barrier is generally in good condition.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6.4					
Location:	East and West of Surface				Height:						
Material:	Asphalt				Count (items):	1					
Element Type:	Asphalt Wearing Surface				Total Quantity:	384.0				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				384						
Comments:	Moderate tire rutting and some rippling noted. Gravel accumulation observed at edges of wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	2.50					
Element Name:	Inlet Components				Width:	0.40					
Location:	South Side of Structure				Height:	1.70					
Material:	Cast-In-Place Concrete				Count (items):	1					
Element Type:	Reinforced Concrete Retaining Walls and Collar				Total Quantity:	16.00				m^2	
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m^2				14.75	0.75		0.50			
Comments:	Spall noted at southeast corner and wide crack observed aat southwest corner of inlet components.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 08						
		1-5 years		6-10 years		Urgent		1 year	X	2 years	

Element Group:	Culverts				Length:	23.50						
Element Name:	Barrels				Width:	5.40						
Location:	Below Roadway				Height:	3.20						
Material:	Cast-In-Place Concrete				Count (items):	2						
Element Type:	SPCSP Arch Culvert				Total Quantity:	541.44	m^2					
Environment:	Severe				Limited Inspection							
Protection System:	None										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	m^2				518.44	15.0		8.0				
Comments:	Evidence of leaking and salt stains noted at bolt lines in barrels. Light to moderate to corrosion with some flaking noted at waterline. Monitoring of barrels is recommended. Minor sag noted in west end of west barrel.											
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**							
	X	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Culverts				Length:	2.50						
Element Name:	Outlet Components				Width:	0.40						
Location:	North Side of Structure				Height:	1.70						
Material:	Cast-In-Place Concrete				Count (items):	1						
Element Type:	Reinforced Concrete Retaining Walls and Collar				Total Quantity:	16.0	m^2					
Environment:	Severe				Limited Inspection							
Protection System:	None										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	m^2				13.75	1.50		0.75				
Comments:	Cracks noted around both barrels with heavy efflorescence staining also observed. Map cracks with efflorescence and damp stains noted.											
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	08						
		1-5 years		6-10 years		Urgent		1 year	X	2 years		

Element Group:	Coatings				Length:							
Element Name:	Structural Steel				Width:							
Location:	On Culvert Barrel				Height:							
Material:	Coating				Count (items):							
Element Type:	Structural Steel Coating				Total Quantity:	541.4	m^2					
Environment:	Benign				Limited Inspection							
Protection System:	None										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	m^2				519.78	10.83		10.83				
Comments:	Some coating loss noted throughout barrel											
Recommended Work:		Rehab		Replace	**Maintenance Needs:**							
		1-5 years		6-10 years		Urgent		1 year	X	2 years		

Element Group:	Foundation			Length:						
Element Name:	Foundation (blow ground level)			Width:						
Location:	Below Barrels			Height:						
Material:	Unknown			Count (items):						
Element Type:	Unknown			Total Quantity:						All
Environment:	Benign			Limited Inspection	X					
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	All		100%							
Comments:	No evidence of foundation instability at time of inspection.									
Recommended Work:		Rehab		Replace	**Maintenance Ne**	0				
		1-5 years		6-10 years		Urgent		1 year		2 years

Element Group:	Embankments & Streams			Length:						
Element Name:	Embankments			Width:						
Location:	NE, SE, NW & SW OF Structure			Height:						
Material:	Native Soil			Count (items):						
Element Type:	Embankment			Total Quantity:	4					
Environment:	Moderate			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	Each		4							
Comments:	Washout noted around barrier posts at various locations. Some erosion noted over barrels on both sides of structures.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	13				
		1-5 years		6-10 years		Urgent	X	1 year		2 years

Element Group:	Embankments & Streams			Length:						
Element Name:	Streams & Waterways			Width:						
Location:	Under Structure			Height:						
Material:	Native			Count (items):						
Element Type:	Stream			Total Quantity:	All					
Environment:	Moderate			Limited Inspection						
Protection System:	None									Perform.
Condition Data:	Units	Exc.	Good	Fair	Poor*					Deficiencies
	All			All						0
Comments:	Moderate to high volume with moderate flow from south to north at time of inspection. Trees blocking both inlet of east barrel and outlet of west barrel.									
Recommended Work:		Rehab		Replace	**Maintenance Needs:**	18				
		1-5 years		6-10 years		Urgent	X	1 year		2 years
					Remove Channel Obstructions					

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
Barrels	Culvert Barrel Repairs	X			$ 18,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 18,000.00

Associated Work	Comments	Estimated Cost
Approaches		$ -
Detours		$ -
Traffic Control		$ -
Utilities		$ -
Right of Way		$ -
Environmental Study		$ -
Other		$ -
Contingencies		$ -
	Total cost:	$ -

Justification

SITE PHOTOGRAPHS

CULVERT **Van Camp Rd North Branch South Nation River MD Culvert** **Site No.: CUS013**

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Moderate tire rutting on east wearing surface

Photo 8 Typical view of south approach barrier

Photo 9 Wide crack at southwest corner of south concrete wall

Photo 10 Spall on north concrete wall

Photo 11 Interior of west barrel

Photo 12 Wet areas and evidence of leaking in west barrel

Photo 13 Interior view of east barrel from north end of structure

Inventory Data:

Structure Name	River Rd & Kittle Creek MD Culvert								
Main Hwy/Road #	River Rd	Services on structure:	Navig. Water		Non-Navig.		Ped.		
	On Structure: X		Rail		Road	X	Other		
	Under Structure:	Services under structure:	Navig. Water		Non-Navig.	X	Ped.		
			Rail		Road		Other		
Structure Location	0.2km South of County Rd 43								
Latitude	45.100715	Longitude	-75.250827						
Owner(s)	Township of North Dundas	Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.		
			Desig./not list		Desig. & List				
MTO Region	40 - Eastern	Road Class:	Freeway		Arterial				
			Collector		Local	X			
MTO District	42 - Ottawa	Posted Speed	80 km/h		No. of Lanes	2			
Old County	SDG	AADT	150		% Trucks				
Geographic Twp.		Inspection Route Sequence							
Structure Type	CSP Horizontal Ellipse Culvert	Interchange Number							
Total Deck Length	m	Interchange Structure Number							
Overall Str. Width	3.9 m	Min. Vertical Clearance		m					
Total Deck Area	sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	25.3 m	Detour Length Around Bridge		km					
Skew Angle	6 Degrees	Direction of Structure	East/West						
No. of Spans	1	Fill on Structure	0.8 m						
Span Lengths	3.9 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	61.93		
OSIM		2022	61.79		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:		x		$ 2,500.00
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Structure is in generally fair condition. Barrel is deformed and a separation and piping was noted at the south (outlet) end of culvert. Flow observed under pipe with erosion at both ends of pipe. South end of pipe is also perched. A code-compliant barrier should be installed above the structure							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	360.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			287.00	38.00		35.00				
Comments:	Moderate ravelling, moderate depression/settlement, and potholes noted. No barrier present - A code compliant barrier and end-treatment should be installed above the structure										
Recommended Work:	X	Rehab		Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Regrade and repave roadway above structure											

Element Group:	Culverts				Length:	25.3					
Element Name:	Barrels				Width:	3.9					
Location:	Below Roadway				Height:	2.8					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	2-Cell CSP Round culverts				Total Quantity:	170.00					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			109.80	44.20		16.0				
Comments:	South segment of pipe is separated at the joint, causing infiltration and undermining below the culvert. South segment is also perched.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Replace Structure											

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	170.00					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			168.00	1.0		1.0				
Comments:	Generally in good condition with some light localized coating failure at joints										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:					
Element Name:	Foundation (below ground level)					Width:					
Location:	Below barrel					Height:					
Material:	unknown					Count (items):					
Element Type:	unknown					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection		x			
Protection System:	Unkown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE sides of structure					Height:					
Material:	Vegatation					Count (items):	4				
Element Type:	Embankments					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Rip-Rap										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				1	3.0					
Comments:	Light to moderate erosion present at NW, SW, and SE embankments. Large fallen tree above structure at the North.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent	X	1 year		2 years
						Remove tree					

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Rip-Rap					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A					All					
Comments:	Low volume and low flow from north to south. Scour of embankment around pipe ends present. Flow under south segment of pipe										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**		13			
		1-5 years		6-10 years			Urgent	X	1 year		2 years
						Erosion control measures on stream bed					

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
	Replace Structure		X		$ 395,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 395,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Roadway depression above structure, potholes, and raveling

Photo 8 Typical scour / undermining of culvert (North inlet shown)

Photo 9 Deformation along top of pipe and light localized corrosion at joints

Photo 10 Separation of south barrel segment causing scour/piping

Photo 11 Undermining below south pipe segment

Photo 12 Corrosion along bottom of pipe and at joints

Structure Condition Summary Form

Structure Name River Rd & Kittle Creek MD Culvert
Structure Number CUS014
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	360.00		287.00	38.00	35.00	2160	1383	64	00	00
Culvert	Barrel	Sq.m	350.00	170.00		109.80	44.20	16.00	59500	35011	59	00	00
Coatings	Structural steel	Sq.m	80.00	170.00		168.00	1.00	1.00	13600	10112	74	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		1.00	3.00		0	0		00	18
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00			1.00		0	0		00	13
									75260	**46505**			

Bridge Condition Index (BCI) **61.79**

Inventory Data:

Structure Name	Guy Rd & Mullin MD Culvert								
Main Hwy/Road #	Guy Road		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	0.5km East of Browns Lane								
Latitude	45.0436194		Longitude	-75.3733288					
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	152		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	SPCSP Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.30	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Culvert Length	16.8	m							
Roadway Width	5.8	m	Detour Length Around Bridge		km				
Skew Angle	10	Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure	0.8	m				
Span Lengths	3.3	m							

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 2, 2020	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	73.32		
OSIM		2022	73		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 8, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 20,000.00
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:				1 to 5 years	X	6 to 10 years		
Overall Comments:	No approach barrier noted at time of inspection and a code compliant approach barrier should be installed. Potholes, moderate ravelling, alligator cracks and asphalt patches on wearing surface. Moderate corrosion with localized perforations on barrel. Evidence of leakage noted on east side of barrel with some sag also noted.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches					Length:					
Element Name:	Barrier					Width:					
Location:	NE, SE, NW & SW of Structure					Height:					
Material:	Steel					Count (items):					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)					Total Quantity:					m
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m										8
Comments:	No approach barrier noted at time of inspection. A code compliant approach barrier should be installed.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches					Length:	60				
Element Name:	Wearing Surface					Width:	5.8				
Location:	East and West Side of Structure					Height:					
Material:	Asphalt					Count (items):					
Element Type:	Asphalt Surface Treatment					Total Quantity:	348.0				m^2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				327	15.0		6.0			
Comments:	Potholes, alligator cracks, light to moderate ravelling and patched potholes noted on approach wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:** 12						
		1-5 years		6-10 years		Urgent		1 year	X	2 years	
					Repair asphalt surface treatment and patch pothole						

Element Group:	Culverts					Length:	16.8				
Element Name:	Barrels					Width:	3.3				
Location:	Below Roadway					Height:	2.2				
Material:	Corrugated Steel					Count (items):	1				
Element Type:	SPCSP Arch Culvert					Total Quantity:	157.89				m
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m				153.16	3.16		1.58			
Comments:	Medium corrosion and localized perforations noted along bottom of culvert. Deformation at north end of barrel. Evidence of leakage noted on east side of barrel.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
		1-5 years	X	6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steels				Width:						
Location:	On Barrel				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	157.89 m^2					
Environment:	Benign				Limited Inspection						
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				149.99	3.95		3.95			
Comments:	Coating loss noted on culvert barrel.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Foundations				Length:						
Element Name:	Foundation (Below Ground Level)				Width:						
Location:	Below Abutment Walls and Wingwalls				Height:						
Material:	Unknown				Count (items):						
Element Type:	Unknown				Total Quantity:	All					
Environment:	Benign				Limited Inspection		X				
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Embankments and Streams				Length:						
Element Name:	Embankments				Width:						
Location:	NE, SE, NW & SW Side of Structure				Height:						
Material:	Native Material				Count (items):	4					
Element Type:	Embankment				Total Quantity:						Each
Environment:	Moderate				Limited Inspection						
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Embankments are moderately sloped, well vegetated, and appear to be stable. Some erosion noted above the barrel.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
	1-5 years		6-10 years		Urgent		1 year		2 years		

Element Group:	Embankments and Streams				Length:						
Element Name:	Streams and Waterways				Width:						
Location:	Below Structure				Height:						
Material:	Native				Count (items):	All					
Element Type:	Stream				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good		Fair		Poor*		
	N/A				All						
Comments:	Medium volume and low flow with no obstructions noted at time of inspection.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approaches	Install code compliant approach barrier			X	$ -
Culvert	Replace Barrels	X			$ 222,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 222,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from east approach

Photo 2 East approach from centre of structure

Photo 3 West approach from centre of structure

Photo 4 North elevation

Photo 5 South elevation

Photo 6 Potholes, and alligator cracks on edge of east wearing surface

Photo 7 Interior view of barrel

Photo 8 Perforations at north end of barrel

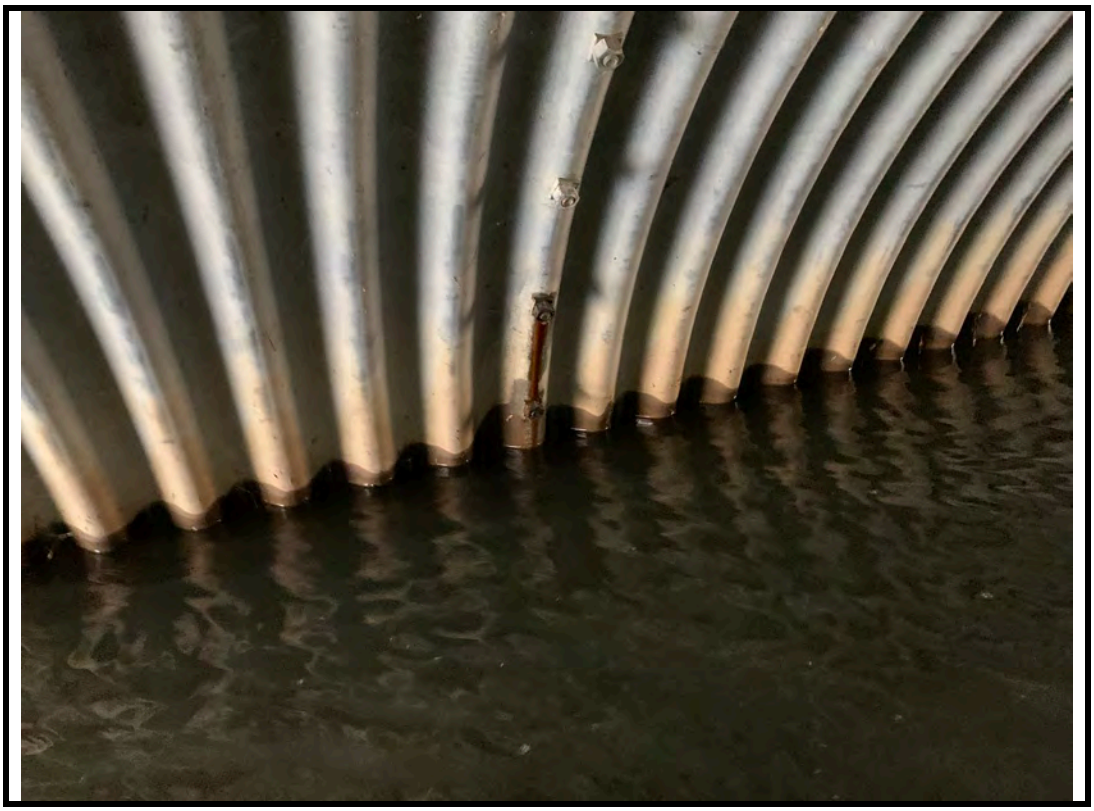

Photo 9 Evidence of leakage at east end of barrel

Structure Condition Summary Form

Structure Name Guy Rd & Mullin MD Culvert
Structure Number CUS015
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	348.00	0.00	327.00	15.00	6.00	2088	1508	72	00	12
Culvert	Barrel	Sq.m	350.00	157.89	0.00	153.15	3.16	1.58	55262	40644	74	00	00
Coatings	Structural steel	Sq.m	80.00	157.89	0.00	149.99	3.95	3.95	12631	9126	72	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									69981	**51278**			

Bridge Condition Index (BCI) **73**

Inventory Data:

Structure Name	Pemberton Rd & Mulin MD Culvert
Main Hwy/Road #	Pemberton Road
On Structure	X
Under Structure	
Structure Location	0.45km South of Hogaboam road
Latitude	45.04404
Longitude	-75.3422
Owner(s)	Township of North Dundas
MTO Region	40 - Eastern
MTO District	42 - Ottawa
Old County	SDG
Geographic Twp.	
Structure Type	SPCSP Arch Culvert
Total Deck Length	m
Overall Str. Width	4.80 m
Total Deck Area	sq. m
Culvert Length	17.5 m
Roadway Width	5.8 m
Skew Angle	30 Degrees
No. of Spans	1
Span Lengths	3 m

Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	Rail		*Road*	X	*Other*	
Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
	Rail		*Road*		*Other*	
Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
	Desig./not list		*Desig. & List*			
Road Class:	*Freeway*		*Arterial*			
	Collector		*Local*	X		
Special Routes:	*Transit*		*Truck*			
	School		*Bicycle*			

Posted Speed	60 km/h
AADT	115
Inspection Route Sequence	
Interchange Number	
Interchange Structure Number	
Min. Vertical Clearance	m
Detour Length Around Bridge	km
Direction of Structure	North/South
Fill on Structure	0.8 m

No. of Lanes	2	% Trucks	

Historical Data:

Year Built		Year of Last Major Rehab.	
Last OSIM Inspection	November 4, 2022	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	tonnes
Enhanced Access Equipment (ladder, boat, lift, etc.)		Load Limit By-Law #	
Last Underwater Inspection		By-Law Expiry Date	
Last Condition Survey			

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	62.97		
OSIM		2022	63		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	December 1, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Sarah Vandergeest P.Eng.					
Others in Party:	Adrian Hu					
Equipment Used:	Digital camera, flashlight, chest waders, and other equipment as required.					
Weather:	Sunny					
Temperature:	2˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
				Total Costs	$ 20,000.00

Investigation Notes:

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	No approach barrier noted at time of inspection. Code compliant barrier should be installed during replacement. Evidence of leaks noted at northwest corner of barrel. Minor sag noted in middle of barrel.							
Date of Next Inspection:	December 2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches					Length:					
Element Name:	Barrier					Width:					
Location:	NE, SE, NW & SW of Structure					Height:					
Material:	Steel					Count (items):					
Element Type:	Steel Flex Beam on Steel Posts (SBGR)					Total Quantity:					m
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m										8
Comments:	No approach barrier noted at time of inspection. A code compliant approach barrier should be installed.										
Recommended Work:		Rehab	X	Replace		**Maintenance Needs:**					
	X	1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Approaches					Length:	60				
Element Name:	Wearing Surface					Width:	5.8				
Location:	North and South Side of Structure					Height:					
Material:	Gravel					Count (items):					
Element Type:	Gravel Wearing Surface					Total Quantity:	348.0				m^2
Environment:	Severe					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m^2				338	10.0					
Comments:	Small potholes forming, moderate tire rutting and some rippling noted on wearing surface.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Culverts					Length:	17.5				
Element Name:	Barrels					Width:	4.8				
Location:	Below Roadway					Height:	3				
Material:	Corrugated Steel					Count (items):	1				
Element Type:	SPCSP Arch Culvert					Total Quantity:	199.15				m
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	m				152.35	26.89		19.92			
Comments:	Severe corrosion and perforations along springline noted in previous inspection, not observed. Severe corrosion and cracks noted at bolt lines. Minor sag note in middle of barrel. Missing bolts at southeast panels of barrel. Leaking noted at bolt line at northwest corner of barrel.										
Recommended Work:		Rehab	X	Replace		**Maintenance Needs:**					
	X	1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Coating					Length:					
Element Name:	Structural Steels					Width:					
Location:	On Barrel					Height:					
Material:	Unknown					Count (items):					
Element Type:	Unknown					Total Quantity:	199.15				m^2
Environment:	Benign					Limited Inspection					
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m^2				149.36	29.87		19.92			
Comments:	Moderate to severe coating loss noted on culvert barrel.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:					
Element Name:	Foundation (Below Ground Level)					Width:					
Location:	Below Abutment Walls and Wingwalls					Height:					
Material:	Unknown					Count (items):					
Element Type:	Unknown					Total Quantity:	All				
Environment:	Benign					Limited Inspection		X			
Protection System:	Unknown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						0
Comments:	No visible evidence of foundation instability was noted during the inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, SE, NW & SW Side of Structure					Height:					
Material:	Native Material					Count (items):	4				
Element Type:	Embankment					Total Quantity:					Each
Environment:	Moderate					Limited Inspection					
Protection System:	Vegetation										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4.00						
Comments:	Embankments are steeply sloped, well vegetated, and appear to be stable.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Below Structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.			Good	Fair		Poor*		
	N/A					All					
Comments:	Medium volume and low flow from east to west with no obstructions noted at time of inspection.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Approaches	Install code compliant approach barrier			X	$ -
Culvert	Replace Barrels		X		$ 336,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 336,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from south approach

Photo 2 North approach from centre of structure

Photo 3 South approach from centre of structure

Photo 4 East elevation

Photo 5 West elevation

Photo 6 Potholes forming on south wearing surface

Photo 7 Interior of barrel from west end

Photo 8 Evidence of leakage from bolt lines at northwest corner of barrel

Photo 9 Light corrosion and evidence of leakage on barrel wall

Photo 10 Some fill loss around barrel

Structure Condition Summary Form

Structure Name Pemberton Rd & Mulin MS Culvert
Structure Number CUS016
Date of Inspection December 1, 2022
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	348.00	0.00	338.00	10.00	0.00	2088	1545	74	00	15
Culvert	Barrel	Sq.m	350.00	199.15	0.00	152.35	26.89	19.92	69703	43756	63	00	00
Coatings	Structural steel	Sq.m	80.00	199.15	0.00	149.35	29.87	19.92	15932	9917	62	00	00
Embankments and Streams	Embankments	Each	0.00	4.00	0.00	4.00	0.00	0.00	0	0		00	00
	Streams and Waterways	All	0.00	1.00	0.00	1.00	0.00	0.00	0	0		00	00
									87723	**55218**			

Bridge Condition Index (BCI) **63**

Inventory Data:

Structure Name	Nation Valley Rd and Dillabough Creek MD Culvert								
Main Hwy/Road #	Nation Valley Rd		Services on structure:	*Navig. Water*		*Non-Navig.*		*Ped.*	
	On Structure	X		*Rail*		*Road*	X	*Other*	
	Under Structure		Services under structure:	*Navig. Water*		*Non-Navig.*	X	*Ped.*	
				Rail		*Road*		*Other*	
Structure Location	2.4km West of County Rd 43								
Latitude	45.0818683		Longitude	-75.2464547					
Owner(s)	Township of North Dundas		Heritage Designation	*Not Consid:*	X	*Cons/not App.*		*List/n.d.*	
				Desig./not list		*Desig. & List*			
MTO Region	40 - Eastern		Road Class:	*Freeway*		*Arterial*			
				Collector		*Local*	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	117		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	SPCSP Arch Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.3	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	*Transit*		*Truck*			
				School		*Bicycle*			
Roadway Width	6.4	m	Detour Length Around Bridge		km				
Skew Angle	5	Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure	0.4	m				
Culvert Length	17.4	m							
Span Lengths	3.3	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	**Contract**	**WP Number**	**Category**	**Funding**	**Comments**

Investigation History:					
Type	**BM Used**	**Date**	**BCI**	**Special Notes**	**BCI Justification**
OSIM		2020	28.13		
OSIM		2022	75		Structure Replaced

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			x		$ 5,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on	x	None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure has been replaced since last inspection with 3.3m wide x 2.3m high horizontal ellipsoid culvert, and is in generally good condition. Erosion noted at the northwest embankment, encroaching into culvert. Structure elements and quantities should be updated. A code compliant barrier and end-treatments should be installed above the structure						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	6.4					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	384.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			384.00							
Comments:	Asphalt wearing surface appears to have been replaced since last inspection and is in generally good condition. No barrier present - A code compliant barrier and end-treatment should be installed above the structure.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	17.4					
Element Name:	Barrels				Width:	3.3					
Location:	Below Roadway				Height:	2.1					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	91.87					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			91.87							
Comments:	Structure appears to have been replaced since last inspection and is in generally good condition. Structure data and geometry should be updated.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	91.87					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			91.87							
Comments:	Structure appears to have been replaced since last inspection and is in generally good condition. Structure data and geometry should be updated.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:						
Element Name:	Foundation (below ground level)					Width:						
Location:	Below barrel					Height:						
Material:	unknown					Count (items):						
Element Type:	unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection		x				
Protection System:	Unkown											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW & SE sides of structure					Height:						
Material:	Vegatation					Count (items):	4					
Element Type:	Embankments					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Rip-Rap											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each		3			1.0						
Comments:	Embankments are moderately sloped, well vegetated, and stable. Washout noted at northwest embankment encroaching into barrel.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope protection					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Rip-Rap					Count (items):	4					
Element Type:	Embankment					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each		3			1						
Comments:	Generally in good condition. Washout noted at northwest embankment encroaching into barrel.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.		Good	Fair		Poor*			
	N/A				All						
Comments:	Low volume and low flow from south to north with no visible obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barriers	Install code compliant barrier and end-treat			X	$ 48,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 48,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Nation Valley Rd & Dillabough Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.:CUS017**

Photo 1 Structure from east approach

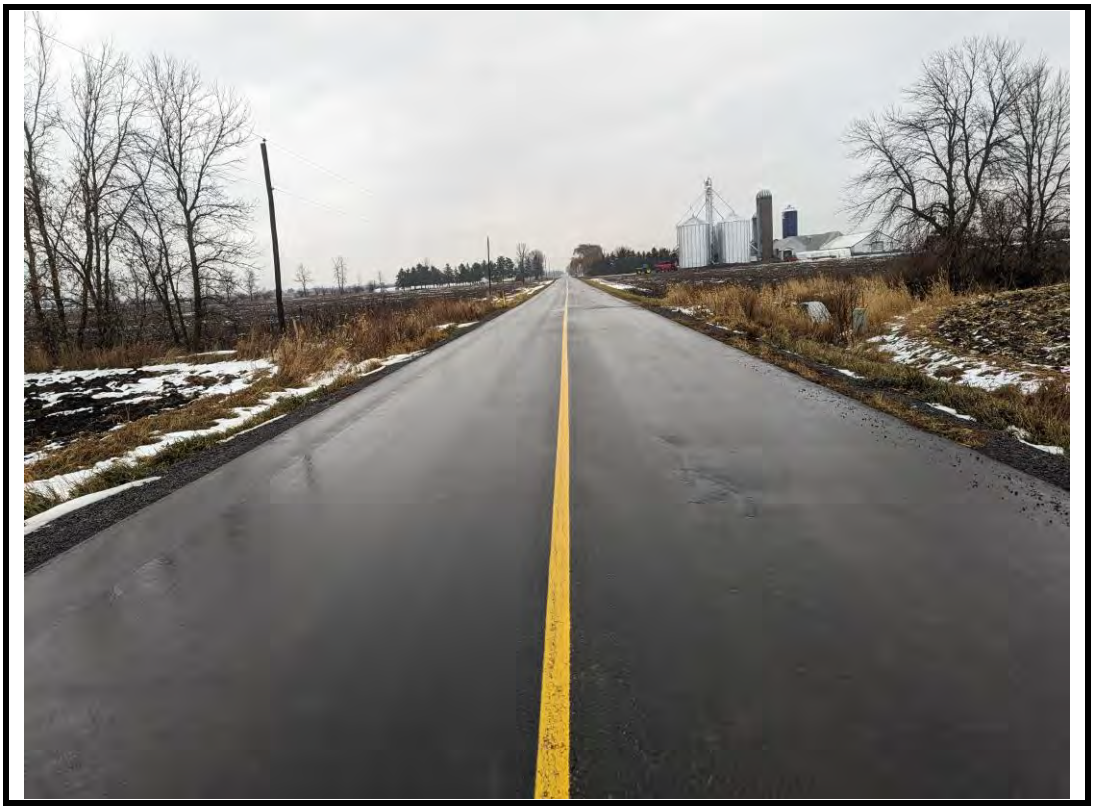

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 Typical view through culvert from the North

Photo 8 South culvert barrel end and encroachment of washout (inlet)

Structure Condition Summary Form

Structure Name Nation Valley Rd & Dillabough Creek MD Culvert
Structure Number CUS017
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	384.00		384.00			2304	1728	75	00	15
Culvert	Barrel	Sq.m	350.00	91.87		91.87			32155	24116	75	00	00
Coatings	Structural steel	Sq.m	80.00	91.87		91.87			7350	5512	75	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00	3.00		1.00		0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00	3.00		1.00		0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									41808	31356			

Bridge Condition Index (BCI) **75.00**

Inventory Data:

Structure Name	Webb Rd & Whittaker MD Culvert								
Main Hwy/Road #	Webb Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	1.1 km North of Nesbitt Rd								
Latitude	45.05621		Longitude	-75.2979					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	49		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	4-cell CSP Round culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.2	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	5.5	m	Detour Length Around Bridge		km				
Skew Angle	20	Degrees	Direction of Structure	North/South					
No. of Spans	4		Fill on Structure		m				
Culvert Length	7	m							
Span Lengths	0.8	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.66		
OSIM		2022	47.15		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:		x		$ 2,500.00
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Replace structure as soon as possible - Barrel ends heavily damaged and torn from impact at the west. Severe undermining and loss of fill throughout structure. Scaling and honeycombing present throuhgout concrete deck. No barrier present - A code compliant barrier and end treatments should be installed above the structure.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	8					
Element Name:	Wearing Surface				Width:	5.5					
Location:	Over Culvert				Height:						
Material:	Cast-in-place concrete				Count (items):						
Element Type:	Concrete riding surface				Total Quantity:	44.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				11.00			33.00			
Comments:	Light to medium scaling noted with void below north slab and extreme undermining. No barrier present - A code compliant barrier end end treatments should be installed above structure										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Urgent replacement of structure											

Element Group:	Culverts				Length:	7					
Element Name:	Barrels				Width:	0.8					
Location:	Below Roadway				Height:	0.8					
Material:	Corrugated Steel				Count (items):	4					
Element Type:	CSP round culvert				Total Quantity:	70.34					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				27.34	25.00		18.0			
Comments:	Localized rust and dent at the north was noted. Severe deformations noted at the west end. No fill is present for at least 50% of the width below deck.										
Recommended Work:		Rehab	X	Replace	**Maintenance Needs:**						
	X	1-5 years		6-10 years		Urgent		1 year		2 years	
Urgenr replacement of structure											

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	70.34					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				50.34	20.00					
Comments:	Generally in good condition with light corrosion										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:						
Element Name:	Foundation (below ground level)					Width:						
Location:	Below barrel					Height:						
Material:	unknown					Count (items):						
Element Type:	unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection		x				
Protection System:	Unkown										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW & SE sides of structure					Height:						
Material:	Vegatation					Count (items):	4					
Element Type:	Embankments					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Rip-Rap										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	Each				4							
Comments:	Embankments are moderately sloped, well vegetated, and stable.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope protection					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Rip-Rap					Count (items):	4					
Element Type:	Embankment					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	Each				4							
Comments:	Generally in good condition.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.			Good	Fair		Poor*		
	N/A					All					
Comments:	Moderate volume and low flow from west to east, with no visible obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Structure	Replace		X		$ 167,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 167,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 Severe undermining and loss of fill at North approach slab (1)

Photo 8 Severe undermining and loss of fill at North approach slab (2)

Photo 9 View of East barrel ends

Photo 10 Severe deformations on west ends of barrels, and scaling on concrete deck

Photo 11 Separation of barrels and voids in slab around barrels on west side

Photo 12 Severe scaling of concrete wingwalls and slab (typical)

Photo 13 Scaling along top of exposed concrete deck

Structure Condition Summary Form

Structure Name Webb Rd & Whittaker MD Culvert
Structure Number CUS018
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	44.00		11.00		33.00	264	50	19	00	15
Culvert	Barrel	Sq.m	350.00	70.34		27.34	25.00	18.00	24619	10677	43	00	00
Coatings	Structural steel	Sq.m	80.00	70.34		50.34	20.00		5627	3660	65	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									30510	14387			

Bridge Condition Index (BCI) **47.15**

Inventory Data:

Structure Name	Hollister Rd & Moffat Creek Culvert								
Main Hwy/Road #	County Rd 31		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.5 km South of River Rd								
Latitude	45.047427		Longitude	-75.31713					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	N/A		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	2-Cell CSP Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	10.7	m	Detour Length Around Bridge		km				
Skew Angle	0	Degrees	Direction of Structure	North/South					
No. of Spans	2		Fill on Structure	0.9	m				
Culvert Length	26.5	m							
Span Lengths	1.2, 1.8	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	61.04		
OSIM		2022	59.58		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on		None		Minor Rehab.		Major Rehab.	X Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years	
Overall Comments:	Replace structure in 1 to 5 years - Structure is generally in fair to poor condition. No barrier present on west side of structure- A code compliant barrier and end treatments should be installed above the structure. Sag and perforations noted in barrel, with cracks along boltlines. Heavy sediment build up noted in both culverts						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (Attachments and signs)				Length:						
Element Name:	Signs				Width:						
Location:	NE & SE Side of structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Hazard Markers				Total Quantity:	2.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				2.00						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	61					
Element Name:	Barriers				Width:						
Location:	East side of structure				Height:						
Material:	Steel				Count (items):	1					
Element Type:	Steel flex beam on steel posts (SBGR)				Total Quantity:	61.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				61.00						
Comments:	Generally in good condition - No barrier present on the west side of structure - A code compliant barrier and end-treatments should be installed on the west side										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	10.7					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	642.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				642.00						
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	26.5					
Element Name:	Barrels				Width:	1.8 (N), 1.2 (S)					
Location:	Below Roadway				Height:	1.8 (N), 1.2 (S)					
Material:	Corrugated Steel				Count (items):	2					
Element Type:	CSP Round Culvert				Total Quantity:	233.00					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				158.00	50.00		25.0			
Comments:	Minor to moderate sag and corrosion noted. Perforations in noted in both culverts along the waterline. Heavy sedimentation present in both barrels. Rust noted on the exterior of both barrel ends										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	
Replace Structure											

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	233.00					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	m2				153.00	45.00		35.00			
Comments:	Medium to severe coating loss noted along culvert side walls.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations				Length:						
Element Name:	Foundation (below ground level)				Width:						
Location:	Below barrel				Height:						
Material:	unknown				Count (items):						
Element Type:	unknown				Total Quantity:	All					N/A
Environment:	Benign				Limited Inspection		x				
Protection System:	Unkown									Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*		Deficiencies	
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE sides of structure					Height:					
Material:	Vegatation					Count (items):	4				
Element Type:	Embankments					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Rip-Rap										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Embankments are moderately sloped, well vegetated, and stable.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Rip-Rap					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Low volume and flow from west to east with no flow obstructions noted. Evidence of overgrown vegetation was noted at the east side of the barrels										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**		18			
		1-5 years		6-10 years			Urgent		1 year	x	2 years
						Clear vegetation					

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Pipe Arch	Repair		X		$ 278,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 278,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 East elevation

Photo 4 West elevation

Photo 5 View of east end of barrels from roadway

Photo 6 View of west end of barrels from the Southwest embankment

Photo 7 View through south barrel, looking west

Photo 8 View through north barrel, looking east

Photo 9 Perforation, corrosion, and sedimentation at midspan of South barrel

Photo 10 Perforations and corrosion at waterline in North barrel

Structure Condition Summary Form

Structure Name Hollister Rd & Moffat Creek MD Culvert
Structure Number CUS019
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	61.00		61.00			0	0		00	00
	Wearing Surface	Sq.m	6.00	642.00		642.00			3852	2889	75	00	15
Accessories	Signs	Each	0.00	2.00		2.00			0	0		00	00
Culvert	Barrel	Sq.m	350.00	233.00		158.00	50.00	25.00	81550	48475	59	00	00
Coatings	Structural steel	Sq.m	80.00	233.00		153.00	45.00	35.00	18640	10620	57	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									104042	61984			

Bridge Condition Index (BCI) **59.58**

Inventory Data:

Structure Name	Hollister Rd Equalizer Culvert								
Main Hwy/Road #	County Rd 31		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.9 km South of River Rd								
Latitude	45.0456418		Longitude	-75.3137318					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	80 km/h		No. of Lanes	2		
Old County	SDG		AADT	N/A		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	2-Cell CSP Round Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	3.2	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	10.7	m	Detour Length Around Bridge		km				
Skew Angle	20	Degrees	Direction of Structure	North/South					
No. of Spans	2		Fill on Structure	1	m				
Culvert Length	26.5	m							
Span Lengths	1.6, 1.6	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	59.57		
OSIM		2022	59.15		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:								
Recommended Work on		None		Minor Rehab.		Major Rehab.	X	Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years		
Overall Comments:	Repair structure in 1-5 years. Structure is in generally fair to poor condition with perforations along both barrels and medium to severe corrosion throughout. Minor sag visible through both barrels No barrier present - A code compliant barrier and end-treatments should be installed above the structure.							
Date of Next Inspection:	2024							

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	10.7					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	642.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				642.00						
Comments:	Generally in good condition - No barrier present - A code compliant barrier and end-treatments should be installed above the sturcture.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	26.5					
Element Name:	Barrels				Width:	1.6 (S), 1.6 (N)					
Location:	Below Roadway				Height:	1.6 (S), 1.6 (N)					
Material:	Corrugated Steel				Count (items):	2					
Element Type:	SPCSP Arch Culvert				Total Quantity:	266.30					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				175.30	60.00		31.0			
Comments:	Medium rust and localized dent was noted on exposed surface of the barrels. Medium to severe corrosion and perforations were noted along springline within both barrels. Minor sag visible from within barrels										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	266.30					m2
Environment:	Benign				Limited Inspection						
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	m2				188.30	44.00		34.00			
Comments:	Medium to severe coating loss noted along culvert side walls.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:					
Element Name:	Foundation (below ground level)					Width:					
Location:	Below barrel					Height:					
Material:	unknown					Count (items):					
Element Type:	unknown					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection		x			
Protection System:	Unkown										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	N/A				All						
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Embankments					Width:					
Location:	NE, NW, SW & SE sides of structure					Height:					
Material:	Vegatation					Count (items):	4				
Element Type:	Embankments					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	Rip-Rap										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Embankments are moderately sloped, well vegetated, and stable.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Slope protection					Width:					
Location:	NE, NW, SW & SE Side of Structure					Height:					
Material:	Rip-Rap					Count (items):	4				
Element Type:	Embankment					Total Quantity:	4				Each
Environment:	Moderate					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies
	Each				4						
Comments:	Generally in good condition.										
Recommended Work:		Rehab		Replace		**Maintenance Needs:**					
		1-5 years		6-10 years			Urgent		1 year		2 years

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform. Deficiencies
Condition Data:	Units		Exc.			Good	Fair		Poor*		
	N/A					All					
Comments:	Low volume and flow from west to east with no obstructions noted.										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year		2 years

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Barrel	Replace		x		$ 297,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 297,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Photo 1 Structure from north approach

Photo 2 Structure from south approach

Photo 3 North approach from centre of structure

Photo 4 South approach from centre of structure

Photo 5 East elevation

Photo 6 West elevation

Photo 7 View over culverts towards the East

Photo 8 Severe corrosion and perforation at waterline within South barrel (typ.)

Photo 9 View through south culvert barrel, looking West

Photo 10 View through north culvert barrel, looking East

Structure Condition Summary Form

Structure Name Hollister Rd Equalizer Culvert
Structure Number CUS020
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	642.00		642.00			3852	2889	75	00	15
Culvert	Barrel	Sq.m	350.00	266.30		175.30	60.00	31.00	93205	54416	58	00	00
Coatings	Structural steel	Sq.m	80.00	266.30		188.30	44.00	34.00	21304	12706	60	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									118361	**70011**			

Bridge Condition Index (BCI) **59.15**

Inventory Data:

Structure Name	Nesbitt Rd & Whittaker MD Culvert								
Main Hwy/Road #	Nesbitt Rd		Services on structure:	Navig. Water		Non-Navig.		Ped.	
	On Structure	X		Rail		Road	X	Other	
	Under Structure		Services under structure:	Navig. Water		Non-Navig.	X	Ped.	
				Rail		Road		Other	
Structure Location	0.6 km East of County Rd 31								
Latitude	45.04451		Longitude	-75.2987					
Owner(s)	Township of North Dundas		Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.	
				Desig./not list		Desig. & List			
MTO Region	40 - Eastern		Road Class:	Freeway		Arterial			
				Collector		Local	X		
MTO District	42 - Ottawa		Posted Speed	60 km/h		No. of Lanes	2		
Old County	SDG		AADT	153		% Trucks			
Geographic Twp.			Inspection Route Sequence						
Structure Type	Super Cor Culvert		Interchange Number						
Total Deck Length		m	Interchange Structure Number						
Overall Str. Width	10	m	Min. Vertical Clearance		m				
Total Deck Area		sq. m	Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	8.5	m	Detour Length Around Bridge		km				
Skew Angle		Degrees	Direction of Structure	East/West					
No. of Spans	1		Fill on Structure	0.8	m				
Culvert Length	13	m							
Span Lengths	10	m							

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	74.98		
OSIM		2022	74.50		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study		X			
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:	x			
	Monitoring Crack Widths:	x			
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on	x	None		Minor Rehab.		Major Rehab.	Replace
Timing of Recommended Work:				1 to 5 years		6 to 10 years	
Overall Comments:	Structure is in generally good condition with recently replaced barrier and end treatments above structure. Sedimentation buildup of sediment on stream bed within culvert possibly due to culvert misalignment with stream. Wide cracks noted in wearing surface above structure. Light corrosion and coating failure on east culvert wall along stip footing						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Accessories (attachments and signs)			Length:							
Element Name:	Signs			Width:							
Location:	NE, NW, SW, &SE Side of Structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Hazard Markers			Total Quantity:	4.0						Each
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	Each			2.00	2.00						
Comments:	Generally in good condition. 2x missing delineators										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**			18			
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
					Install missing delineators						

Element Group:	Approaches			Length:	35						
Element Name:	Barriers			Width:							
Location:	NE, NW, SW, &SE Side of Structure			Height:							
Material:	Steel			Count (items):	4						
Element Type:	Steel Flex Beam on Steel Posts (SBGR)			Total Quantity:	140.0						m
Environment:	Severe			Limited Inspection							
Protection System:	Hot Dip Galvanized										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m			140.00							
Comments:	SBGR has been raplaced and is in generally good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

`

Element Group:	Approaches			Length:	60						
Element Name:	Wearing Surface			Width:	8.5						
Location:	Over Culvert			Height:							
Material:	Asphalt			Count (items):							
Element Type:	Asphalt Wearing Surface			Total Quantity:	510.00						m2
Environment:	Severe			Limited Inspection							
Protection System:	None										Perform.
Condition Data:	Units		Exc.	Good	Fair		Poor*				Deficiencies
	m2			503.61	3.29		3.1				
Comments:	Wide transverse and longitudinal cracks noted in approach wearing surface.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**			15			
		1-5 years		6-10 years		Urgent	x	1 year		2 years	
					Rout and seal cracks						

Element Group:	Barriers				Length:	10					
Element Name:	Railing Systems				Width:						
Location:	North and South side of structure				Height:						
Material:	Steel				Count (items):	2					
Element Type:	Steel Thrie beam on Steel Posts				Total Quantity:	20.00					m
Environment:	Severe				Limited Inspection						
Protection System:	Hot dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m			20.00							
Comments:	Generally in good condition										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	25.0					
Element Name:	Barrels				Width:	3.4					
Location:	Below barrel				Height:	2.1					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	Super Cor Culvert				Total Quantity:	167.3					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanizing									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			167.30							
Comments:	Light corrosion noted along springline										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert Barrel				Height:						
Material:	Coating				Count (items):						
Element Type:	Hot Dip Galvanizing				Total Quantity:	167.3					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			152.3	15.0						
Comments:	Generally in good condition - light corrosion and coating loss noted on east wall along strip footing.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating					Length:						
Element Name:	Railing Systems/Hand Railings					Width:						
Location:	On Railing Systems					Height:						
Material:	Coating					Count (items):						
Element Type:	Hot Dip Galvanizing					Total Quantity:	20					Each
Environment:	Benign					Limited Inspection						
Protection System:	None										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	Each				20							
Comments:	Generally in good condition.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Foundations					Length:						
Element Name:	Foundation (Below Ground Level)					Width:						
Location:	Below Barrel					Height:						
Material:	Unknown					Count (items):	All					
Element Type:	Unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection		x				
Protection System:	Unknown										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	N/A				All							
Comments:	Foundations are rated for performance only and not material conditon. No visible evidence of foundation instability observed at the time of inspection. A wide vertical crack was noted on exposed footing.											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW, & SE Side of Structure					Height:						
Material:	Rip-Rap					Count (items):	4					
Element Type:	Embankments					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Vegatation										Perform.	
Condition Data:	Units		Exc.		Good	Fair		Poor*			Deficiencies	
	Each				4							
Comments:	Embankments are moderately sloped, well vegetated, and stable											
Recommended Work:		Rehab		Replace		**Maintenance Needs:**						
		1-5 years		6-10 years			Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope Protection					Width:						
Location:	NE, NW, SW, & SE Side of Structure					Height:						
Material:	Vegetation					Count (items):	4					
Element Type:	Slope Protection					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Generally in good condition.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Streams and Waterways					Width:						
Location:	Under Structure					Height:						
Material:	Native					Count (items):	All					
Element Type:	Streams					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	N/A				All							
Comments:	Evidence of misalignment with stream is present - sediment accumulation noted along stream bed.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**		18				
			1-5 years		6-10 years		Urgent		1 year	x	2 years	
						Remove sediment from stream bed and implement erosion control measures at stream banks						

Element Group:	Retaining Walls					Length:						
Element Name:	Walls					Width:						
Location:	North and South sides of structure					Height:						
Material:	Wire Mesh					Count (items):						
Element Type:	Wire Mesh MSE Retaining Walls					Total Quantity:	40					m2
Environment:	Moderate					Limited Inspection		x				
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	m2				All							
Comments:	MSE walls are in generally good condition											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6-10 Years	1-5 Years	< 1 Year	
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ -

Associated Work		Comments	Estimated Cost
Approaches			$ -
Detours			$ -
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ -
Other			$ -
Contingencies			$ -
		Total cost:	$ -

Justification

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 New approach guide rail and end treatments above structure (typ.)

Photo 8 Wide transverse crack in asphalt wearing surface above structure

Photo 9 Medium longitudinal crack and raveling in asphalt wearing surface

Photo 10 Coating failure within culvert along east strip footing

Photo 11 Sediment buildup within culvert along stream bed

Structure Condition Summary Form

Structure Name Nesbitt Rd & Whittaker MD Culvert
Structure Number CUS021
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Barrier	m	0.00	140.00		140.00			0	0		00	00
	Wearing Surface	Sq.m	6.00	510.00		503.61	3.29	3.10	3060	2274	74	00	15
Accessories	Signs	Each	0.00	4.00		2.00	2.00		0	0		00	00
Barriers	Railing Systems	m	200.00	20.00		20.00			4000	3000	75	00	00
Culvert	Barrel	Sq.m	350.00	167.30		167.30			58555	43916	75	00	00
Coatings	Railing Systems/ Hand Railing	Sq.m	125.00	20.00		20.00			2500	1875	75	00	00
	Structural steel	Sq.m	80.00	167.30		152.30	15.00		13384	9618	72	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
Retaining Walls	Walls	Sq.m	350.00	20.00		20.00			7000	5250	75	00	18
Embankments and Streams	Embankments	Each	0.00	4.00		4.00			0	0		00	00
	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									88499	**65933**			

Bridge Condition Index (BCI) **74.50**

Inventory Data:

Structure Name	Nesbitt Rd & Barkley Creek MD Culvert								
Main Hwy/Road #	Nesbitt Rd	Services on structure:	Navig. Water		Non-Navig.		Ped.		
	On Structure: X		Rail		Road	X	Other		
	Under Structure:	Services under structure:	Navig. Water		Non-Navig.	X	Ped.		
			Rail		Road		Other		
Structure Location	0.3 km West of Shay Rd								
Latitude	45.05131	Longitude	-75.28076						
Owner(s)	Township of North Dundas	Heritage Designation	Not Consid:	X	Cons/not App.		List/n.d.		
			Desig./not list		Desig. & List				
MTO Region	40 - Eastern	Road Class:	Freeway		Arterial				
			Collector		Local	X			
MTO District	42 - Ottawa	Posted Speed	60 km/h		No. of Lanes	2			
Old County	SDG	AADT	150		% Trucks				
Geographic Twp.		Inspection Route Sequence							
Structure Type	SPCSP Arch Culvert	Interchange Number							
Total Deck Length	m	Interchange Structure Number							
Overall Str. Width	5.5 m	Min. Vertical Clearance		m					
Total Deck Area	sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	7.0 m	Detour Length Around Bridge		km					
Skew Angle	20 Degrees	Direction of Structure	East/West						
No. of Spans	1	Fill on Structure	0.6 m						
Culvert Length	21 m								
Span Lengths	5.5 m								

Historical Data:

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

Rehab History: (Date / Description):

Work History:					
Year	Contract	WP Number	Category	Funding	Comments

Investigation History:					
Type	BM Used	Date	BCI	Special Notes	BCI Justification
OSIM		2020	65.91		
OSIM		2022	65.37		

Appraisal Indices:		Comments:
Fatigue:		
Seismic:		
Scour:		
Flood:		
Geometrics:		
Barrier:		
Curb:		
Load Capacity:		
Key Aspects:		

Field Inspection Information:						
Date of Inspection:	November 25, 2022	Type of Inspection:	X	OSIM		Enhanced OSIM
Inspector:	Tashi Dwivedi, P.Eng.					
Others in Party:	Adrian Hu, B.Eng., Nicholas Brown, B.Eng.					
Equipment Used:	Digital camera, chipping hammer, chain, measuring tape, caliper, chalk, marker, flashlight, chest waders, and other equipment as required.					
Weather:	Cloudy, Light rain					
Temperature:	4˚C					

Additional Investigations Required:		Priority			Estimated Cost
		None	Normal	Urgent	
Rehabilitation/Replacement Study			X		$ 20,000.00
Material Condition Survey					
	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					
	Monitoring of Deformations, Settlements and Movements:		x		$ 2,500.00
	Monitoring Crack Widths:		x		$ 2,500.00
Investigation Notes:					

Overall Structure Notes:							
Recommended Work on		None		Minor Rehab.		Major Rehab.	X Replace
Timing of Recommended Work:			X	1 to 5 years		6 to 10 years	
Overall Comments:	Monitor Crracks and Replace structure in 1 to 5 years - Structure is generally in fair condition. No barrier present - A code compliant barrier and end treatments should be installed above the structure. Sag and perforations noted in barrel, with cracks along boltlines.						
Date of Next Inspection:	2024						

Suspected Performance Deficiencies

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

Maintenance Needs

01 Lift and Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
Rehab History: (Date / Description)
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair of Bridge Concrete
09 Repair of Bridge Timber
10 Bailey bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Group:	Approaches				Length:	60					
Element Name:	Wearing Surface				Width:	7					
Location:	Over Culvert				Height:						
Material:	Asphalt				Count (items):						
Element Type:	Asphalt Wearing Surface				Total Quantity:	420.0					m2
Environment:	Severe				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			420.00							
Comments:	Asphalt wearing surface appears to have been repaved since last inspection and is in generally good condition. No barrier present - A code compliant barrier and end-treatment should be installed above the structure.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Culverts				Length:	21					
Element Name:	Barrels				Width:	5.5					
Location:	Below Roadway				Height:	3.2					
Material:	Corrugated Steel				Count (items):	1					
Element Type:	SPCSP Arch Culvert				Total Quantity:	317.10					m2
Environment:	Benign				Limited Inspection						
Protection System:	Hot Dip Galvanized									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			260.93	31.97		24.2				
Comments:	Minor to moderate sag and corrosion noted. Perforations noted in barrel and splits at boltline and waterline noted at the east (across 24 bolt holes) - Crack monitoring recommended.										
Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**						
	x	1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Coating				Length:						
Element Name:	Structural Steel				Width:						
Location:	On culvert barrel				Height:						
Material:	Other				Count (items):						
Element Type:	Coating - Hot dip galvanizing				Total Quantity:	317.10					m2
Environment:	Benign				Limited Inspection						
Protection System:	None									Perform.	
Condition Data:	Units		Exc.	Good	Fair		Poor*			Deficiencies	
	m2			242.58	42.81		31.71				
Comments:	Medium to severe coating loss noted along culvert side walls.										
Recommended Work:		Rehab		Replace	**Maintenance Needs:**						
		1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Foundations					Length:						
Element Name:	Foundation (below ground level)					Width:						
Location:	Below barrel					Height:						
Material:	unknown					Count (items):						
Element Type:	unknown					Total Quantity:	All					N/A
Environment:	Benign					Limited Inspection		x				
Protection System:	Unkown											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	N/A				All							
Comments:	Foundations are rated for performance only and not material condition. No visible evidence of foundation instability noted at the time of inspection.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Embankments					Width:						
Location:	NE, NW, SW & SE sides of structure					Height:						
Material:	Vegatation					Count (items):	4					
Element Type:	Embankments					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	Rip-Rap											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Embankments are moderately sloped, well vegetated, and stable.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:						
Element Name:	Slope protection					Width:						
Location:	NE, NW, SW & SE Side of Structure					Height:						
Material:	Rip-Rap					Count (items):	4					
Element Type:	Embankment					Total Quantity:	4					Each
Environment:	Moderate					Limited Inspection						
Protection System:	None											Perform.
Condition Data:	Units		Exc.		Good	Fair		Poor*				Deficiencies
	Each				4							
Comments:	Generally in good condition.											
Recommended Work:			Rehab		Replace	**Maintenance Needs:**						
			1-5 years		6-10 years		Urgent		1 year		2 years	

Element Group:	Embankments and Streams					Length:					
Element Name:	Streams and Waterways					Width:					
Location:	Under structure					Height:					
Material:	Native					Count (items):	All				
Element Type:	Stream					Total Quantity:	All				N/A
Environment:	Benign					Limited Inspection					
Protection System:	None										Perform.
Condition Data:	Units		Exc.			Good	Fair		Poor*		Deficiencies
	N/A					All					
Comments:	Low volume and flow from south to north. Vegetation encroaching at South (inlet)										

Recommended Work:		Rehab		Replace	**Maintenance Needs:**		18				
		1-5 years		6-10 years		Urgent		1 year	x	2 years	
					Clear vegetation						

Repair and Rehabilitation Required:		Priority			Estimated Cost
Element	**Repair and Rehabilitation Required**	**6-10 Years**	**1-5 Years**	**< 1 Year**	
Pipe Arch	Replace		X		$ 462,000.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
				Total Cost:	$ 462,000.00

Associated Work		Comments	Estimated Cost
Approaches			$ 40,000.00
Detours			$ 35,000.00
Traffic Control			$ -
Utilities			$ -
Right of Way			$ -
Environmental Study			$ 10,000.00
Other			$ -
Contingencies			$ -
		Total cost:	$ 85,000.00

Justification

Nesbitt Rd & Barkley Creek MD Culvert **SITE PHOTOGRAPHS** **Site No.:CUS022**

Photo 1 Structure from east approach

Photo 2 Structure from west approach

Photo 3 East approach from centre of structure

Photo 4 West approach from centre of structure

Photo 5 North elevation

Photo 6 South elevation

Photo 7 View of culvert sag from the North side

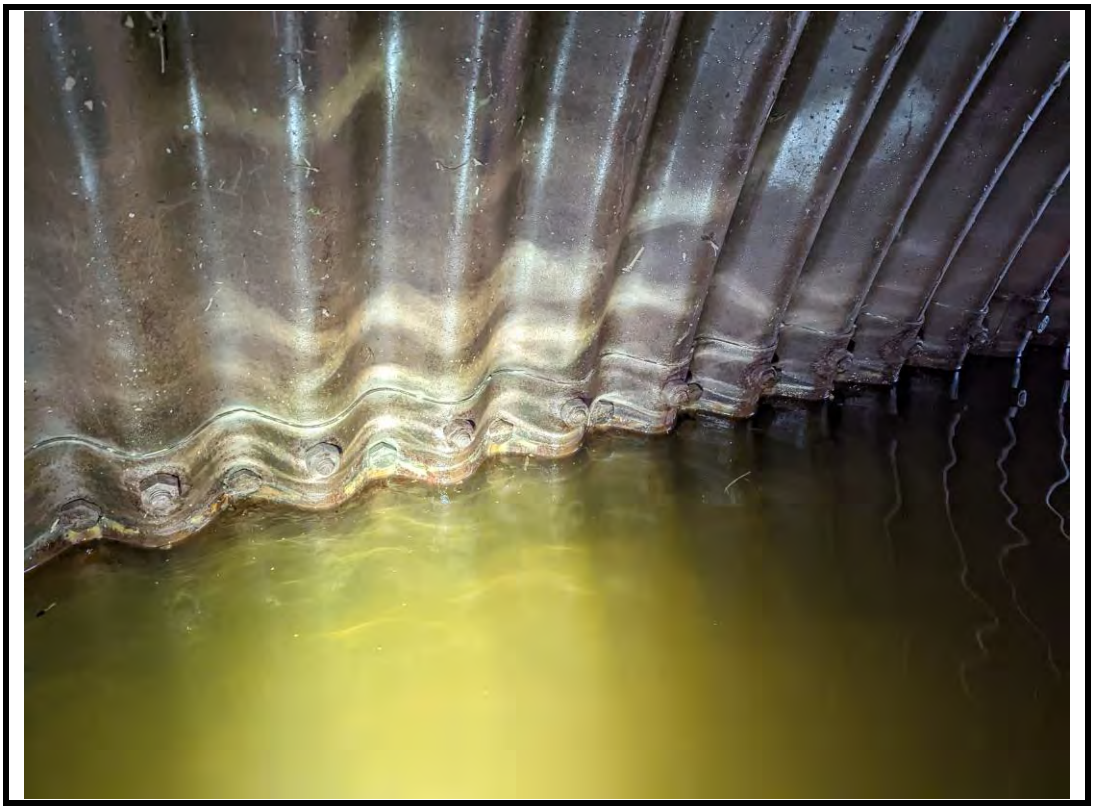

Photo 8 Section crack/splitting along boltline at East barrel wall, with coating loss

Photo 9 Corrosion and coating loss (typ.)

Structure Condition Summary Form

Structure Name Nesbitt Rd and Barkley Creek MD Culvert
Structure Number CUS022
Date of Inspection 2022/11/25
Project No. 22087
Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	420.00		420.00			2520	1890	75	00	15
Culvert	Barrel	Sq.m	350.00	317.10		260.93	31.97	24.20	110985	72970	66	00	00
Coatings	Structural steel	Sq.m	80.00	317.10		242.58	42.81	31.71	25368	15925	63	00	00
Foundations	Foundations (below ground level)	N/A	0.00	1.00		1.00			0	0		00	00
	Embankments	Each	0.00	4.00		4.00			0	0		00	00
Embankments and Streams	Slope Protection	Each	0.00	4.00		4.00			0	0		00	00
	Streams and Waterways	All	0.00	1.00		1.00			0	0		00	00
									138873	90785			

Bridge Condition Index (BCI) **65.37**