DILLON CONSULTING

CORPORATION OF THE TOWN OF TECUMSEH

2020 Bridge and Culvert Needs Study

Structures with Spans > 3.0 m

March 2021 – 20-2645

March 30, 2021

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Attention: Mr. Phil Bartnik, P.Eng.
Director Public Works and Environmental Services

Town of Tecumseh
2020 Bridge and Culvert Needs Study
Structures with Spans > 3.0 m

Dear Mr. Bartnik:

Dillon is pleased to submit a pdf copy of the 2020 Bridge and Culvert Needs Study Report for Structures with Spans > 3.0 m to the Town of Tecumseh.

Should you have any questions or concerns, please contact us for discussion.

Sincerely,

DILLON CONSULTING LIMITED

Wayne Ormshaw, P.Eng.
Project Manager

WAO:jw
Enclosure

Our file: 20-2645

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Executive Summary

A Bridge and Culvert Needs Study was carried out in 2020 by Dillon Consulting Limited (Dillon) for 18 bridge and culvert structures with spans greater than 3.0 metres, including two pedestrian bridges, located in the Town of Tecumseh (the Town). This report summarizes the findings of the study and identifies the required improvements to structures which are currently deficient or are likely to become deficient within a ten year period from the time of this report.

Two (2) of the 18 structures investigated were identified with significant deficiencies, and rehabilitation of the structures within five years is recommended. The structures are listed below and this information is also summarized in **Appendices B** and **C**.

- Structure No. 1028 – East Townline Drain at St. Thomas Street Bridge
- Structure No. 1029 – East Townline Drain at Little River Road Bridge.

Temporary repairs on Structure No. 1028 and 1029, consisting of large steel plates placed on the top slab above the soffit deterioration were carried out in July 2016. Improvements on Manning Road (Phase 2) scheduled for 2021 will remove Structures No. 1028 and 1029 with an enclosed storm water drain and therefore the cost estimates of replacement for these two structures are not included herein.

The total estimated capital needs allocation over the ten year study period (to 2030) is **$300,000**. This cost estimate excludes H.S.T. and routine maintenance items, and includes an allowance for contingency and engineering. This figure also excludes the costs associated with the improvements on Manning Road (Phase 2), as mentioned above. The Town should consider the needs of the road network when determining priorities for the structures. By combining road and structure works, there may be opportunities for additional cost savings and a reduction in public traffic disruptions. These estimated costs are in 2021 Canadian dollars without allowance for inflation, and are based on visual observations during the study. The recommendations may not necessarily include every improvement possible for each structure. The final estimated costs for structure rehabilitation or replacement will vary on the results of detailed investigations, and/or changes to the proposed scope of work during detailed design.

In this study, the Bridge Condition Index (BCI) was calculated for each structure and compared to the BCI of previous studies (2003 to 2018). This comparison is provided in **Appendix D**. The average BCI value calculated for 2020 is **78.4**, which is slightly higher than the BCI value of **77.0** that was calculated for the 2018 study. The increase in BCI can be attributed to the completed rehabilitation of three structures, namely No. 1004, 1013 and 1014, since the timing of the previous report.

It should additionally be noted that the planned structure removal of No.'s 1028 and 1029 from the Town's asset list will further theoretically increase the average BCI to **80.9**. In recent years, these two structures have been maintained with an economical short-term holding strategy and therefore have negatively influenced the recent average BCI values. For the purposes of this report, the true BCI average (78.4) has been carried, however this is not entirely reflective of the Town's efforts in capital expenditures towards their structure assets.

1.0 Background, Purpose, and Methodology

1.1 Background and Purpose

Dillon Consulting Limited (Dillon) was retained by the Corporation of the Town of Tecumseh (the Town) in March 2020, to conduct a needs study for the Town's current inventory of eighteen bridge and culvert structures greater than 3m in span. The general scope of work for this study is as follows:

- Review of previous 'Town of Tecumseh – 2018 Bridge and Culvert Needs Study' report, recent updates to structures, existing reports and drawings readily available, including past capital spending information provided by the Town since the 2018 report
- Perform a visual site inspection of the accessible portions of the Town's eighteen bridge and culvert structures with spans greater than 3.0 m
- Where accessible, take approximate site measurements and update previous records of structural defects, deficiencies, and maintenance needs
- Update the overall and detailed maps of the Town showing the location and ID of each structure
- Update the Ontario Structure Inspection Manual (OSIM) inspection reports of the previous 2018 Bridge and Culvert Needs Study, prepared by Dillon
- Complete the Bridge Condition Index (BCI) for each structure with a graphical comparison with the previous studies (2003 to 2018)
- Prioritization of structures requiring capital works based on current BCI values and site observation as well as any future planning of the Town
- Prepare a preliminary opinion of probable cost of construction for improving and maintaining the structure inventory over a ten year period (2021 to 2030) from the time of this report.

1.2 Methodology

1.2.1 Structure Inspection

The general methodology used for conducting the visual review of the structures is as follows:

- Visually inspect or hammer sound accessible concrete elements from ground level and/or from the water level, where use of hip waders is deemed safe and practical
- Visually inspect the condition of the structural steel elements, where applicable
- Compile a digital photo inventory of the observed condition for each structure
- Record general defects for each element inspected, under the following general classifications:
    - Material defects, such as concrete delamination, spalling, cracking, scaling, etc., as applicable
    - Performance deficiencies, such as observed settlements or load carrying capabilities
    - Maintenance needs, such as minor concrete repairs, cleaning deck drains, removing debris, asphalt repairs, embankment repairs, installing/replacing signage, etc. **Note:** Repair Costs for these items have not been included. It is assumed that these items are included in the Town's routine maintenance budget.

1.2.2 Definition of Bridge and Culvert

The definition of bridges and culverts, for the purpose of this study, has been taken from the CAN/CSA S6-19 Canadian Highway Bridge Design Code (CHBDC), and is summarized below:

Bridge – A structure which provides a roadway or a walkway for the passage of vehicles, pedestrians, or cyclists across an obstruction, gap or facility, and is greater than three metres in span.

Culvert – A structure that forms an opening through soil.

* Only structures with spans in excess of 3m were considered part of this study.

1.2.3 Structure Inventory and Classification

The eighteen (18) structures located in the Town, and included in this study, were classified as a Bridge or Culvert according to CSA S6-19, as stated above. The structures were inventoried and appraised according to the Ontario Structure Inspection Manual (OSIM), recent field investigations, and discussions with the Town. Each structure was allocated an identification number by the Town for inventory purposes.

General information relating to each of the structures included in this study is summarized in **Table 1**. An aerial map, showing the approximate structure locations is included in **Appendix A**.

Table 1: Inventory of Bridges and Culverts

Structure ID	Structure Location	Structure Type	Year of Construction	Year of Last Major Rehab
1002	Pike Creek at Twelfth Concession Road	Concrete Rigid Frame (Bridge)	1961	2016
1003	Pike Creek at Twelfth Concession Road	Concrete Slab on Steel Girder (Bridge)	1965	2013
1004	Sullivan Drain at Twelfth Concession Road	Concrete Non-Rigid Frame (Bridge)	1965	2019
1005	Pike Creek at Baseline Road	Concrete Slab on Steel Girder (Bridge)	1955	2013
1006	Sullivan Creek at Baseline Road	Concrete Rigid Frame (Culvert)	2015	--
1009	Pike Creek at Malden Road	Concrete Rigid Frame (Culvert)	2007	--
1010	West Townline Drain at Malden Road	Corrugated Steel Pipe Arch (Culvert)	1995	--
1011	Malden Road Drain at South Talbot Road	Concrete Rigid Frame (Culvert)	2007	--
1013	Merrick Drain at Eighth Concession Road	Concrete Non-Rigid Frame (Bridge)	1965	2020
1014	Colchester Townline Drain at Sixth Concession Road	Concrete Non-Rigid Frame (Culvert)	1955	2019
1015	Merrick Creek Drain at Sixth Concession Road	Concrete Rigid Frame (Culvert)	2007	--
1016	Collins Drain at Outer Drive	Concrete Rigid/Non-Rigid Frame (Culvert)	1975	2005
1021	Pike Creek at Twelfth Concession Road	Corrugated Steel Pipe Arch (Culvert)	1965	--
1028	East Townline Drain at St. Thomas Street Bridge	Concrete Rigid Frame (Culvert)	1975	--
1029	East Townline Drain at Little River Road Bridge	Concrete Rigid Frame (Culvert)	1975	--
2001	Colchester Townline Drain at Eighth Concession Road	Corrugated Steel Pipe Arch (Culvert)	2012	--
1	Lakewood Park over Lakewood Park Channel	Bowstring Pratt Truss (Bridge)	2016	--
2	Pike Creek at Malden Road	Pratt Truss (Bridge)	2015	--

1.2.4 Visual Site Inspection

Visual inspection of the eighteen (18) bridge and culvert structures was performed in accordance with the OSIM to update the inspection forms for the Town, as part of their strategy to maintain a safe bridge inventory. Measurements collected during the 2018 study were verified and updated, where applicable. The field inspections included a review for material defects and performance deficiencies, as per the OSIM. Structure maintenance needs were identified in the inspection forms and included in the comments associated with recommended works in the summary of construction needs and probable cost tables in **Appendix B**.

Comments on the condition of each element, recommended rehabilitation work, timing for recommended work, and photo logs were recorded and included on the inspection forms (see **Appendix C**). A list of elements, common to most structure types included in this study is summarized in **Table 2**.

Table 2: OSIM Element List

Element Group	Element Name	Units
Decks	Wearing Surface	Sq.m.
	Deck Top	Sq.m.
	Soffit – Thin Slab	Sq.m.
	Soffit – Thick Slab	Sq.m.
	Soffit – Inside Boxes	Sq.m.
	Drainage System	Each
Joints	Seals/Sealants	Each
	Concrete End Dams	Sq.m.
	Armouring/Retaining Devices	m.
Sidewalks/Curbs	Sidewalks and Medians	Sq.m.
	Curbs	Sq.m.
Barriers	Barrier/Parapet Walls	Sq.m.
	Railing Systems	m.
	Posts	Each
	Hand Railings	m.
Beams/MLE's	Girders	Sq.m.
	Floor Beams	Sq.m.
	Stringers	Each
	Inside Boxes (sides and bottom)	Sq.m.
	Diaphragms	Each (Sq. m. if concrete)

Element Group	Element Name	Units
Coatings	Structural Steel	Sq.m.
	Railing Systems/Hand Railings	Sq.m.
Abutments	Abutment Walls	Sq.m.
	Ballast Walls	Sq.m.
	Wingwalls	Sq.m.
	Bearings	Each
Piers	Shafts/Columns/Pile Bents	Sq.m.
	Caps	Sq.m.
	Bearings	Each
Retaining Walls	Walls	Sq.m.
	Barrier Systems on Walls	Sq.m.
Culverts	Inlet Components	Sq.m.
	Outlet Components	Sq.m.
	Barrels	Sq.m.
Foundations	Foundation (below ground level)	N/A
Embankments and Streams	Streams and Waterways	All
	Embankments	Each
	Slope Protection	Each
Signs	Signs	Each
Approaches	Wearing Surface	Sq.m.
	Approach Slabs	Sq.m.
	Drainage System	All
	Curb/Gutters	m.
	Sidewalk and Curb	Sq.m.

A limited visual inspection was performed for elements (or parts of elements) which could not be readily accessed during the inspection. This typically includes soffits, deck tops (below a wearing surface), and interior portions of main longitudinal elements (i.e., inside structure with high water level). The elements which received a limited inspection are noted on the OSIM inspection forms. Where inspection of a particular element was limited, the quantity and condition of that element, as observed during the 2018 inspection, was visually verified and carried forward.

Deck Top

The deck top surface of most bridges was rated based on the condition of the asphalt wearing surface directly above, in accordance with OSIM. The presence of bottom-up defects (defects which start on the underside of the asphalt and propagate upwards) suggests the possibility of a defect in the deck top.

Many of the Town's roads are low class bituminous (tar and chip) surfaces, which may not accurately reflect the condition of the deck top as the new road surface might obscure any defects. The condition of structures on these roads was therefore rated based on both the age of the structure and the presence of any bottom-up asphalt defects observed in the road surface and visual observation (or previous visual observations, if the asphalt surface was recently replaced).

Approach Slabs

Approach slabs were assumed to be present on some structures which typically require them according to the Canadian Highway Bridge Design Code (CAN/CSA S6-19). An approach slab length of 6.0 meters at each abutment was assumed, as the actual length could not be visually confirmed in the field.

1.2.5 Condition of Elements and Defects

The bridge and culvert structures were appraised on an element-by-element basis. The condition of each element is rated as **Excellent**, **Good**, **Fair** or **Poor**. The condition of the elements and defects was recorded according to OSIM. Any structure is rated deficient if the condition of any of the elements that make up the structure has recommended work.

1.2.6 Timing of Needs

Recommended work and timing for the recommended work, are noted for each element in the inspection forms (see **Appendix C**). Timing for the recommended work was recorded as **< 1 Year, 1** to **5 Years**, **6** to **10 Years**, or **None**, with the following outlining the scope of each timing window:

< 1 Year	A structure need that is required with some degree of urgency, but can still be addressed within one year, unless specifically addressed as an immediate concern. In some cases, it may be possible for the Town to complete these items as part of their regular maintenance. Where the apparent safety of the public is at risk due to an impending failure of the structure, such as notification shall be given for recommended closure of the roadway until repair or replacement can be undertaken.
1 to **5 Years**	A structure need that should be addressed within a period of 1 to 5 years from the time of this report. In some cases, it may be possible for the Town to complete these items as part of their regular maintenance.
6 to **10 Years**	A structure need that is not of any immediate concern but will likely develop further deficiencies that should be addressed within a period of up to 10 years from the time of this report. In some cases, it may be possible for the Town to complete these items as part of their regular maintenance.
None	The structure displays no major deficiencies, and no work is required other than routine maintenance

1.2.7 Additional Investigations

Additional investigations are warranted based on the need for more detailed information and recommended were based on engineering judgement for each site. These specialized investigations or surveys should normally be completed within a 2 year timeframe.

For structures that have suggested additional investigations, the recommended rehabilitation measures and costs should be re-assessed upon the result of the investigations.

1.2.8 Material Condition Survey

A number of material condition survey types may be warranted based on the results of the visual inspection. One or more of the following surveys are typically recommended in OSIM, when deemed necessary:

- **A detailed deck condition survey** is recommended for bridges showing significant asphalt defects (such as severe alligator or map cracking), or significant soffit deterioration. These defects suggest that the deck top may also have deficiencies that are not visible, due to the asphalt wearing surface
- **A half-cell survey** is normally warranted in the OSIM due to the presence of bottom-up asphalt defects. However, the survey could still be warranted if the asphalt wearing surface was recently replaced (eliminating the bottom-up asphalt defects) and concrete deterioration of the soffit is still observed due to past leakage through the deck. The asphalt may have been replaced a reasonably short time ago in some cases, and it is suspected that not enough time has passed to allow for the formation of new bottom-up asphalt defects
- **A substructure condition survey** is recommended for bridges that have a significant amount of concrete in poor condition and require delineation of delaminated areas, areas of high corrosion potential, and the testing of concrete core samples. It is likely that these structures may require rehabilitation or replacement as a result of further investigation.

It may also recommended in some cases that the asphalt wearing surface and bridge deck waterproofing be replaced in order to access the bridge deck, where deterioration is suspected but could not be verified visually.

1.2.9 Benchmark Probable Construction Costs

Benchmark probable costs for bridge and culvert improvements from the Ministry of Transportation Ontario (MTO) Highway Costing System (HiCo) were used to establish probable costs of construction for each structure. A summary of these unit costs are provided in **Table 3**. In addition to the MTO HiCo unit costs, the following information was also used as reference:

- Ministry of Transportation Ontario 2016 Parametric Estimating Guide
- 2018 Bridge and Culvert Needs Study for the Town
- Recent locally tendered bridge and culvert rehabilitation and replacement projects with similar construction scope.

An allowance for engineering and contingency has also been included. The contingency value was assumed to be approximately 30% of the estimated probable cost of construction for major rehabilitation and replacement projects.

Table 3: Bridge and Culvert Benchmark Probable Costs of Construction

Category	Description	Units	Unit Cost
Asphalt Paving and Waterproofing	Removal of asphalt pavement from concrete surfaces	m^2	$35.00
	Concrete deck waterproofing	m^2	$50.00
	Asphalt pavement	tonne	$350.00
Concrete Repairs **(See Notes)**	Crack Injection	m	$350.00
	Concrete patch repairs – Type A	m^2	$600.00
	Concrete patch repairs – Type B	m^2	$2,000.00
	Concrete patch repairs – Type C	m^2	$1,600.00
Full Replacement	CSP Pipe Culvert – Low fill	m	$7,500.00
	CSP Pipe Culvert – High fill	m	$12,000.00
Deck Drains	Removal and replacement of deck drains	each	$2,500.00
Expansion Joint	Full depth concrete removal Reinforcing steel bar	m	$5,000.00
	Deck joint assemblies, installation		
+/-3m High Gabion Basket Retaining Wall	Earth excavation – grading	m^2	$1,500
	Gabions		
	Granular Fill		
New Barrier on Bridge Deck	Concrete removal – full depth	m	$2,500.00
	Reinforcing steel (black) bar		
	Concrete in structure		
	Concrete in parapet wall Parapet wall railing		
Erosion Protection	Earth excavation – grading	m^2	$150.00
	Geotextile		
	Rip rap, hand laid		
Clean and Coat Structural Steel	Coating existing structural steel Environmental protection during coating operations	m^2	$500.00

Category	Description	Units	Unit Cost
Jacking and Bearing Replacement	Jacking of superstructure	each	$8,500.00
	Bearings		
Investigations	Roadside Review (Not Including Design)	L.S	$5,000.00
	Hydrology Study and Hydraulic Analysis	L.S.	$10,000.00
	Structural Condition Assessment & Renewal Options Report	L.S.	$30,000.00
	Monitoring of Deformations, and Settlements	L.S.	$7,500.00
	Half-Cell Survey	L.S.	$12,000.00

Notes:

- Unit rates have been taken from the averages of recently closed tenders Contract Administered by Dillon within the Windsor/Essex and Chatham/Kent area, including for inflation where appropriate
- When completing the cost estimates, a number of assumptions were made (e.g. asphalt thickness, concrete repair depths, etc.) in order to simplify quantity calculations. Detailed measurements, including destructive testing where necessary, should be completed during detailed design to estimate probable construction costs
- Unit prices vary according to the amount and extent of work performed on a structure at one time. It is anticipated that unit prices will be higher for small quantity work items
- Prices do not allow for costs associated with mobilization, demobilization, bonds, insurance, roadside safety, or other costs related to performing and executing capital work
- Definitions of concrete patch repairs are as follows:
  - **Type A**: Concrete removals that typically apply to the top surface of decks, including removals over round voids in post tensioned structures, sidewalks, curbs, culvert tunnel floor slabs, and the top and inside faces of concrete barrier walls and parapet walls
  - **Type B**: Concrete removals that typically apply to deck soffit and fascia of bridge decks, soffit of the top slab of culverts and tunnels, girders, diaphragms, outside face of concrete barrier walls and parapet walls
  - **Type C**: Concrete removals other than the ones specified for Concrete Removals – Partial Depth, Type A and Type B, and typically apply to abutments, wingwalls, pier columns and caps, bearing seats, retaining walls, vertical walls of culverts and tunnels
- Asphalt replacement or repair costs have only been included where structural rehabilitation is recommended. For all other cases, it has been assumed that deteriorated asphalt will be repaired or replaced under the Town's road maintenance program
- Unit prices **do not** include HST.

1.2.10 Bridge Condition Index (BCI) Comparison and Bridge Spending

The Bridge Condition Index (BCI) was developed by the MTO as a means of consolidating inspection information, and overall structure condition, into a single value. The BCI is calculated using asset management principals and is based upon the remaining economic worth of the structure. The value takes into consideration that the structure composed of a number of distinct elements that begin at a certain condition from the point of construction or rehabilitation, and that deteriorate over time.

The index is a planning tool that can be used to assist the Town in scheduling improvements. The BCI is the ratio of the current approximate value of a structure, to its estimated replacement cost, and should not be used to rate or indicate the safety of a structure, or individual element.

The BCI is organized into ranges of **0** to **100**, where **100** would represent a newly constructed structure, free of any repair needs. A BCI rating of **70** to **100** would be considered in '**good**' condition, a rating of **60** to **70** would be considered in '**fair**' condition, and a structure with a BCI rating less than **60** is considered in '**poor**' condition. It is recommended that the Town strive to maintain an aggregate BCI rating of a minimum of **70** for their infrastructure portfolio.

The current (2020) BCI was calculated for each of the 18 structures included in this study. An average BCI of **78.4** was calculated – an increase in overall condition from the BCI value of **77.0** that was calculated for the 2018 study. The current BCI indicates the Town is maintaining their infrastructure portfolio in good condition and recent spending on bridge repairs has increased the BCI average from 66.0 in 2003, to 78.4 in 2020. Current BCI values for each structure were compared to the BCI values from the previous five (5) Needs Study Reports. These comparisons are summarized in Appendix D.

The increase in BCI can be attributed to the completed rehabilitation of three structures, namely No. 1004, 1013 and 1014, since the timing of the previous report. It should additionally be noted that the planned structure removal of No.'s 1028 and 1029 from the Town's asset list will further theoretically increase the average BCI to **80.9**. In recent years, these two structures have been maintained with an economical short-term holding strategy and therefore have negatively influenced the recent average BCI values. For the purposes of this report, the true BCI average (78.4) has been carried, however this is not entirely reflective of the Town's efforts in capital expenditures towards their structure assets.

2.0 Discussion of Findings and Capital Needs

The following sections provide a discussion of unique, significant findings with respect to the overall bridges and culverts within the Town road network, and for specific structures. They are ordered based on the priority of the work required to be undertaken. Further details, recommendations and probable costs of construction can be found in **Appendix B**.

2.1 Specific Structures: Less than One Year (Immediate) Capital Needs

No structures were identified in this study with deficiencies and capital needs that should be addressed immediately (within less than one year) other than routine maintenance and roadside safety items (see **Appendix B – Comments**).

2.2 Specific Structures: One to Five Year Capital Needs

A total of two (2) structures were identified with deficiencies that should be addressed within the next one to five years from the time of this report, other than routine maintenance (see **Appendix B – Comments**). The structure(s) are presented below.

2.2.1 Structure No. 1028 over East Townline Drain at St. Thomas Street

This structure was built in 1975, and is a 4.8 m span cast-in-place concrete rigid frame culvert with open footings. To our knowledge, there have not been any major rehabilitations completed to this structure. The current BCI for this structure is 57.6.

Narrow to wide cracks with efflorescence staining were observed throughout the culvert barrel. Approximately seven (7) locations of very severe delamination and very severe spalling with exposed and severely corroded reinforcing steel were observed in the culvert barrel soffit.

Figure 1: Asphalt over steel plate repair on deck top (left), typ. soffit deterioration (right)

In July 2016, temporary repairs were completed by removing the asphalt wearing surface and placing a steel plate on the top of deck over the deteriorated soffit sections and re-paving the repaired areas.

This repair was performed in anticipation that the structure will be fully replaced with a storm water sewer as part of the improvements on Manning Road (Phase 2) project in 2021.

Figure 2: Photos from temporary repairs (2016) construction

Until the structure is replaced, Dillon recommends a monitoring program that consists of biannual inspections (two-times per year). The program should monitor the extents of the soffit deterioration to ensure the temporary repairs remain satisfactory. Additional temporary works may be warranted based on the results of the inspections and will be recommended to the Town upon the completion of each biannual investigation.

2.2.2 Structure No. 1029 over East Townline Drain at Little River

This structure was built in 1975, and is a 4.8 m span cast-in-place concrete rigid frame culvert with open footings. To our knowledge, there have not been any major rehabilitations completed to this structure. The current BCI for this structure is 58.9.

Narrow to wide cracks with efflorescence staining were observed throughout the culvert barrel. Approximately four locations of severe to very severe delamination and very severe spalling with exposed and severely corroded reinforcing steel were observed in the culvert barrel soffit.

Figure 3: Asphalt over steel plate repair on deck top (left), typ. soffit deterioration (right)

In July 2016, temporary repairs were completed by removing the asphalt wearing surface and placing a steel plate on the top of deck over the deteriorated soffit sections and re-paving the repaired areas. This repair was performed in anticipation that the structure will be fully replaced with a storm water sewer as part of the improvements on Manning Road (Phase 2) project in 2021.

Figure 4: Temporary repair construction (2016)

Until the structure is replaced, Dillon recommends a monitoring program that consists of biannual inspections (two-times per year). The program should monitor the extents of the soffit deterioration to ensure the temporary repairs remain satisfactory. Additional temporary works may be warranted based on the results of the inspections and will be recommended to the Town upon the completion of each biannual investigation.

2.3 Specific Structures: Six to Ten Year Capital Needs

One (1) structure was identified in this study with deficiencies and capital needs that should be addressed in the six to ten year time frame other than routine maintenance (see **Appendix B – Comments**). The structure(s) are presented below.

2.3.1 Structure No. 1016 over Collins Drain at Outer Drive

This structure was constructed in 1975, and is a 3.1 m span cast-in-place concrete non-rigid frame culvert with open footings. In 2005, the original structure was repaired and cast-in-place concrete rigid frame culvert extensions were constructed on each side of the existing culvert as part of Highway 3 and Highway 401 road improvements. To our knowledge, no waterproofing membrane was placed on the original culvert deck top during the 2005 rehabilitation.

The current BCI for this structure is 75.0. However, this BCI rating is misleading because it does not evaluate the condition of the new and original sections independently, thus not accurately depicting the condition of the original culvert section in its current state of deterioration.

In the original culvert section, medium to wide cracks with active efflorescence and a single discrete severe delamination were observed on the barrel soffit. The barrel walls were noted to have light scaling and footing scour throughout, however, the scour has not lead to undermining of the footings and is not considered to be in need of any repairs. The scour should be monitored as part of the biennial inspection. Two (2) wide cracks were observed in the new footing jacket. In the new culvert extensions, no deterioration was observed. Excessive vegetation growth was noted in the waterway to the north of the structure and object markers were noted to be missing at two (2) corners of the approaches.

Figure 5: Culvert barrel (left), typ. soffit deterioration (right)

The proposed scope of rehabilitation includes: installation of new or replacement of waterproofing, concrete patch repairs and crack injection to the original culvert structure. Additional site works include: asphalt removal and replacement, excavations, backfilling steel beam guiderail post repair; routine maintenance on the north embankments and waterway; and add missing signs.

2.4 Roadside Safety

A detailed roadside safety review was conducted in 2015 by Dillon for the bridges and culverts in the Town of Tecumseh entitled "2015 Bridge Roadside Safety Review Report". Potential roadside safety deficiencies were identified and preferred solutions were provided based on the 1993 Ministry of Transportation, Ontario (MTO) Roadside Safety Manual.

This report was updated by Dillon in 2019, entitled "Roadside Safety Improvement Cost-Benefit Analysis". The memo includes updated recommendations based the 2017 MTO Roadside Design Manual, which replaced the 1993 MTO Roadside Safety Manual. A summary of roadside safety improvements for each structure in this study is located in **Appendix B**.

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3.0 Program of Work

3.1 Program of Work

A two year program to accommodate investigations, planning, environmental assessments, engineering, property acquisition and utility relocation (if, and when, required) – is recommended as follows, for any major bridge or culvert construction project.

First Year: Preliminary Design, Legal Surveys, Land Acquisition and Utility Relocation

Second Year: Detailed Design and Construction

3.2 Recommended Structure Improvement

Based on the results of the study, it is recommended that the Town allocate an estimated budget of **$300,000** to address the improvement needs of the bridges and culverts during the ten year study period. Of this total, the Town is **not expected** to incur any spending over the next five years to address the current improvement needs of their structure assets. However, the recommended structure work for the 6 to 10 year time frame may be advanced for earlier completion if the proposed works are deemed to be beneficial for the life-cycle costs of the structure.

The final estimated costs for a structure will vary based on a detailed assessment, results of various investigations, or changes to the proposed scope of work during detailed design. The needs of the road network should also be taken into consideration by the Town when determining priorities for the structures. Combining road and structure works provides opportunities for additional cost savings, and can reduce disruptions to the public caused by construction. It should be noted that costs for routine maintenance needs have not been included in these cost estimates, as well as the costs associated with the removal of Structures 1028 and 1029. **Table 4** presents a summary of the Town's bridge and culvert needs, in 2021 Canadian dollars.

Table 4: Bridge and Culvert Construction Needs Summary

Timing for Recommended Work		Amount (CAD)
1 – 5	Years	$0
6 – 10	Years	$300,000
	Total	$300,000

Appendix B provides a detailed summary of the bridge and culvert appraisals, recommended items, timing, and estimated costs. For complete comments, estimated repair quantities, recommended work items, and timing, refer to the inspection forms and photos in **Appendix C**.

3.3 Further Recommendations

3.3.1 Structure No. 1021 over Pike Creek at Twelfth Concession Road

This structure is located on a previously closed section of road which is now maintained by Friends of Pike Creek in conjunction with the Town. The trail is assumed to be used primarily by pedestrians as well as agricultural equipment and maintenance vehicles.

It was noted that this structure presently has a limited amount of fill over the corrugated steel pipe arch which may be limiting the performance of the culvert. Maintenance should be performed to provide additional fill. The height of fill to be added shall be determined by a professional engineering review.

In addition to the maintenance described above, object markers or a suitable alternative should be provided at the structure approaches to warn users of the steep embankments at the structure.

The costs of the above works has not been included in the capital needs estimate provided herein, as maintenance expenses are assumed to be covered in the Town's maintenance budget.

3.4 Study Updating

The basic information assembled in this study, particularly with respect to inventory and construction needs, is subject to continual change. To ensure the reliability of the base data, a system of **biennial** updating should include the following:

- An updating of the OSIM inspection forms for structures which were improved
- Identification of new deficiencies which have not been apparent and the provisions of estimated costs for improvements required to address those deficiencies.

The study content can remain in effective for up to ten years provided implementation of the biennial update procedures is followed.

4.0 Closure

We trust that this report is sufficient for your requirements at this time; however, please do not hesitate to contact us for any questions or clarifications regarding this report.

DILLON CONSULTING LIMITED
WINDSOR, ONTARIO

Report prepared by:

Wayne Ormshaw, P.Eng.
Project Manager

Jeremy Wammes, E.I.T.

5.0 References

Robitaille, P. (Jan. 2019). 2018 Bridge and Culvert Needs Study, (17-6817). Dillon Consulting Limited.

Van Haren, M. P. (Nov. 2015) 2015 Bridge Roadside Safety Review, (15-2321). Dillon Consulting Limited.

Robitaille, P. (Oct. 2016). 2016 Bridge and Culvert Needs Study, (15-2978). Dillon Consulting Limited.

Policy, Planning & Standard Division. (Oct. 2000), (Revised: Nov. 2003, Apr. 2008). Ontario Structure Inspection Manual (OSIM). Ontario Ministry of Transportation.

Ontario Ministry of Transportation (MTO)'s Parametric Estimating Guide (PEG), 2016.

Appendix A
Location Plan

Appendix B

Summary of Construction Needs and Probable Costs

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Appendix C
OSIM Inspection Forms and Photos

DILLON CONSULTING

Appendix D
BCI Comparisons

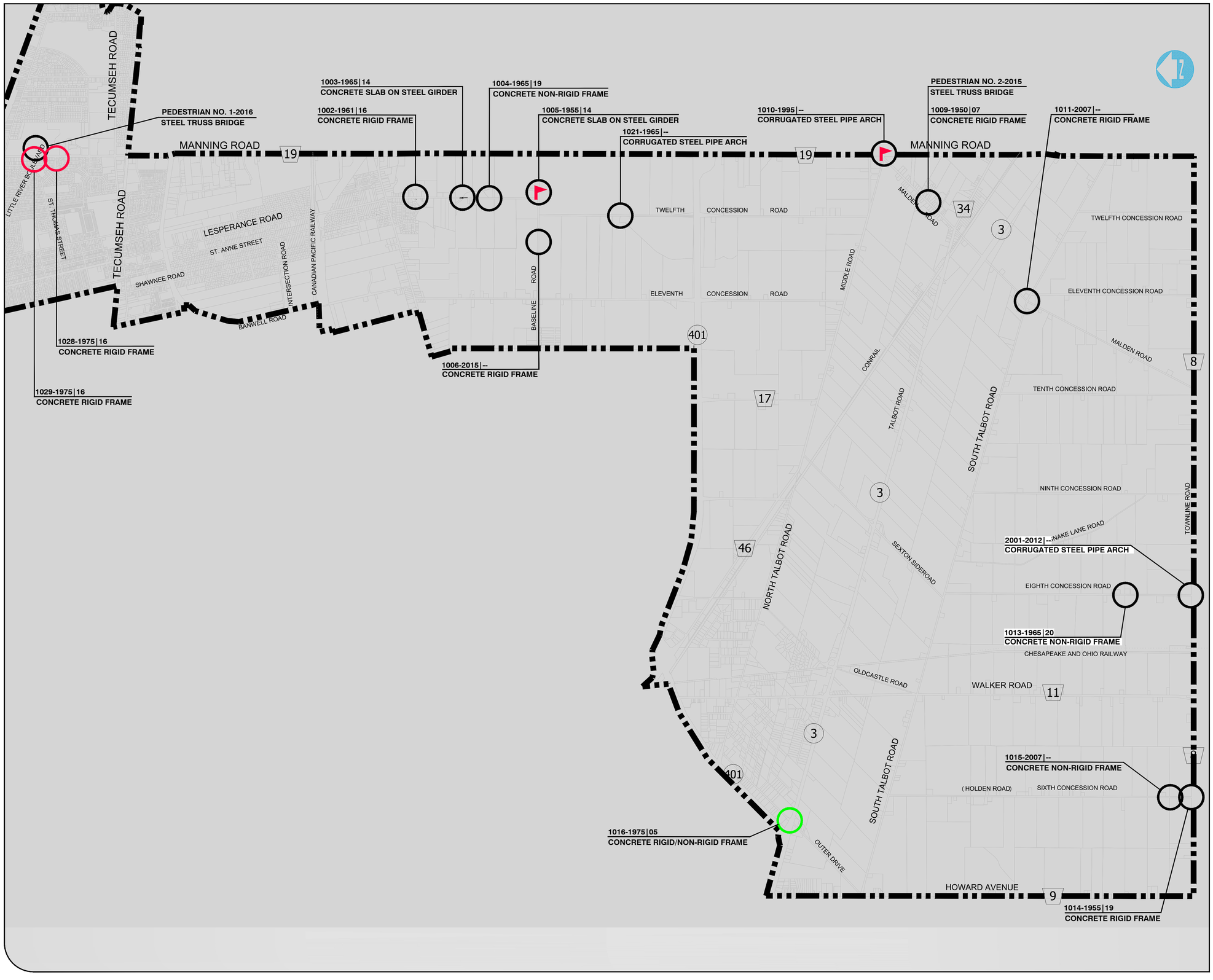
Table D.1: Summary of BCI between 2003 and 2018

Structure ID	BCI 2003	BCI 2008	BCI 2014	BCI 2016	BCI 2018	BCI 2020
1002	73.9	73.4	61.5	85.8	83.0	80.5
1003	66.8	63.0	97.7	92.6	82.3	79.8
1004	74.1	74.1	71.8	70.1	70.3	83.6
1005	59.8	55.4	88.9	86.0	85.1	82.4
1006	68.1	68.2	42.6	100.0	95.7	92.6
1009	42.0	98.8	97.4	97.1	85.0	81.4
1010	73.2	71.7	71.1	70.4	72.3	70.3
1011	58.8	100.0	92.5	91.7	90.4	86.1
1013	74.9	71.2	60.6	58.8	58.7	80.5
1014	65.9	65.1	56.4	53.5	53.3	77.7
1015	53.5	100.0	99.4	96.4	84.6	82.4
1016	71.3	88.7	87.5	77.5	76.7	75.0
1021	75.0	75.0	68.9	67.4	68.1	66.2
1028	73.8	70.1	67.3	63.6	59.2	57.6
1029	74.1	72.7	67.9	64.8	60.4	58.9
2001	50.1	68.6	67.4	79.2	76.3	73.1
1	--	--	--	--	92.1	91.5
2	--	--	--	--	92.5	91.7
BCI_{avg}	66.0	76.0	74.9	78.4	77.0	78.4

Notes:

- Structure 1009, 1011 and 1015 were fully replaced in 2007. Structure 1006 was fully replaced in 2015
- A major rehabilitation of Structures 1003 and 1005 was completed in 2014. The scope of work included: superstructure replacement and concrete patch repairs to the substructure.
- A major rehabilitation of Structure 1002 was completed in 2016. The scope of working included: concrete repairs to deck soffit, abutments and wingwalls, concrete deck overlay.
- A major rehabilitation of Structure 1004 was completed in 2019. The scope of work included: concrete patch repairs, new deck overlay, precast retaining walls, new asphalt and waterproofing.
- A major rehabilitation of Structure 1014 was completed in 2019. The scope of work included: partial full-depth deck replacement, precast retaining walls, new asphalt and waterproofing.
- A major rehabilitation of Structure 1013 was completed in 2020. The scope of work included: concrete patch repairs, full-depth deck repairs, new asphalt and waterproofing.
- Removal of Structures 1028 and 1029 is scheduled for 2021 during the improvements on Manning Road (Phase 2).

Appendix E
Historic Bridge Spending (2003 – 2020)



TOWN OF TECUMSEH

2020 Bridge and Culvert Needs Study
Structures with Spans > 3.0 m

LOCATION PLAN

TIME FRAMES / RECOMMENDED WORK

- NO RECOMMENDED WORK
- 1 TO 5 YEARS REHAB OR REPLACE
- 6 TO 10 YEARS REHAB OR REPLACE
- ROADSIDE SAFETY CONCERN

STRUCTURE NUMBER

0000-0000|00
XXXXXXXXXX

- YEAR CONSTRUCTED
- YEAR OF REHABILITATION
- STRUCTURE TYPE

SCALE 1:50,000

0 250 500 1000m

E N S W

MAP/DRAWING INFORMATION
THIS DRAWING IS FOR INFORMATION PURPOSE ONLY.
IT INDICATES APPROXIMATE LOCATIONS FOR THE INSPECTED BRIDGES AND SHOULD BE SURVEYED FOR EXACT LOCATIONS.

CREATED BY: JBP
CHECKED BY: WAO
DESIGNED BY: JW

File Location:
c:\pw working directory\projects 2020\33jbp\dms49281\20-2645-02-fig.dwg
March, 25, 2021 12:31 PM

DILLON CONSULTING

PROJECT: 20-2645
STATUS: FINAL
DATE: FEBRUARY 2021

Summary of Construction Needs and Probable Costs

Structure ID	Structure Location	Structure Type	2020 BCI	Total Deck Length (m)	Span Length (m)	Overall Structure Width (m)	Road Width (m)	Year of Construction	Year of Last Rehabilitation	Comments (Including Routine Maintenance and Roadside Safety Needs)	Capital Needs/Construction Costs			Date of Last Inspection
											Items	Timing of Recommended Work Item	Estimated Construction Costs	
1002	Pike Creek at Twelfth Concession Road	Concrete Rigid Frame (Bridge)	80.5	17.3	15.8	9.8	8.5	1961	2016	Wet staining and efflorescence was observed on the soffit. Medium spalling was observed on the SW parapet wall due to a vehicle impact. Medium honeycombing was observed adjacent to the wall drains on the north abutment wall in addition to light honeycombing throughout both walls. The northeast wingwall was observed with medium map cracking and a discrete location of medium spalling. The southwest wingwall was observed to have a medium vertical crack extending into the backside of the parapet wall. The granular base supporting the curb NW curb slab has eroded away, exposing the underside of the concrete curb. Hairline to narrow cracks were observed on curbs and parapet walls. Recommended work includes routine maintenance including erosion control of the northwest SBEAT slab. **Roadside Safety:** No improvements necessary. Improvements were included in the most recent rehabilitation.	**No work is necessary**			30-Jul-20
1003	Pike Creek at Twelfth Concession Road	Concrete Slab on Steel Girder (Bridge)	79.8	16.3	15.7	8.6	8.0	1965	2013	The deck and approach wearing surfaces were observed with narrow longitudinal cracking along the centreline of the road and two locations of narrow transverse cracks in the southbound traffic lane. The approach wearing surface has settled at both bridge ends and medium to light alligator cracks were observed. The west fascia has a narrow longitudinal crack extending the full bridge length with discrete locations of active wet staining and efflorescence. Debris build up was noted in the deck drains and expansion joint strip seals. Hairline map cracking was observed throughout the parapet walls in addition to light spalling on the northeast corner. Medium corrosion was observed at the bearing shoe plates. Both abutment walls had medium cracking with active wet staining and efflorescence. Recommended maintenance includes: bearing shoe plates should be wire-brushed, primed and coated; and routine bridge cleaning including cleaning of the deck joints and drains. **Roadside Safety:** No improvements necessary. Improvements were included in the most recent rehabilitation.	**No work is necessary**			30-Jul-20
1004	Sullivan Drain at Twelfth Concession Road	Concrete Non-Rigid Frame (Bridge)	83.6	7.5	6.8	9.3	7.0	1965	2019	Hairline longitudinal crack noted on the soffit extending from concrete patch repair. Light scour noted at abutment footings, however footings are not being undermined. **Roadside Safety:** No improvements necessary. (Wa-33 were installed during recent rehabiliation per Dillon 2018 Roadside Safety Improvements Memo recommendation)	**No work is necessary**			30-Jul-20
1005	Pike Creek at Baseline Road	Concrete Slab on Steel Girder (Bridge)	82.4	15.3	15.0	8.6	8.0	1955	2013	The wearing surfaces were observed with medium to wide cracks in addition to settlement on the southeast approach. Both fascias were observed with hairline to narrow cracks extending the full bridge span with discrete wet areas and efflorescence staining. Hairline cracking was seen throughout the soffit. The joints were noted to have light corrosion staining and wear from winter maintenance, and additionally were filled with debris. The northwest parapet end wall was observed with light spalling in addition to the light honeycombing and hairline cracking throughout both walls. Collision damage was seen on the southwest guide railing system in addition to a missing offset block. The south corner of the west abutment had rust staining and light honeycombing at the joint between the new and old concrete. Both ballast walls had vertical hairline to narrow cracks in discrete locations. The southwest wingwall was observed with light spalling, narrow map cracking, and light honeycombing at the joint between the new and old concrete. The northwest wingwall has light honeycombing. Multiple anchor rods were observed to be misaligned in the longitudinal direction. Insufficient erosion protection was observed at the southeast, southwest, and northwest embankments, causing rotation of guide rail posts as well as undermining of asphalt at the southwest corner and the northeast corner SBEAT. Recommended maintenance includes routine bridge cleaning of the joints and drains; repair or replace damaged guiderail; install erosion protection improvements; and crack sealing of the wearing surface. **Roadside Safety:** Extend the SBGR at the eastbound approach to relocate the steel beam energy attenuating terminal (SBEAT) away from utility poles. (Refer to Dillon 2015 Bridge Roadside Safety Review Report)	**No work is necessary**			30-Jul-20
1006	Sullivan Creek at Baseline Road	Concrete Rigid Frame (Culvert)	92.6	5.9	5.2	19.8	9.3	2015	N/A	Six (6) locations of light spalling and delamination were observed on the culvert barrel soffit between the joints of the precast units. Thirteen (13) light spalls were observed at the south headwall. The precast concrete block wingwalls were observed with light to severe scaling on the top faces. A full lane width, medium transverse crack was observed in the E.B.L. of the east approach. Hairline cracks were seen in discrete locations along the curb and gutter. **Roadside Safety:** No improvements necessary. Improvements were included in the structure replacement.	**No work is necessary**			30-Jul-20
1009	Pike Creek at Malden Road	Concrete Rigid Frame (Culvert)	81.4	5.5	4.8	13.0	7.3	2007	N/A	The deck wearing surface was observed with repaired/sealed cracks. One (1) severe transverse crack extending the entire width of the road was observed at approximately midspan. One localized area of impact damage was noted on the guide rail at the west shoulder. The east barrier system was observed with several posts exhibiting settlement and rotation on the east side and two (2) bent posts on the west side. Additionally, the guiderail was missing end treatments. Both fascia were observed with a number of hairline cracks showing evidence of rust staining. The northwest and southwest wingwalls were each observed with one (1) hairline crack. Two (2) ruptures were seen in the gabion basket retaining walls at the southeast embankment. The northeast embankment rip-rap was in poor condition. Similarly to the deck wearing surface, the approach wearing surfaces have a number of repaired/sealed cracks and isolated, medium transverse cracking in both lanes. Recommended maintenance includes; repair settled and tilted barrier posts and upgrade the erosion protection at the embankment(s); crack repair on the headwalls; install bridge object marker signs; and rout and seal the approach wearing surfaces. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2015 Bridge Roadside Safety Review Report)	**No work is necessary**			31-Jul-20

Summary of Construction Needs and Probable Costs

Structure ID	Structure Location	Structure Type	2020 BCI	Total Deck Length (m)	Span Length (m)	Overall Structure Width (m)	Road Width (m)	Year of Construction	Year of Last Rehabilitation	Comments (Including Routine Maintenance and Roadside Safety Needs)	Capital Needs/Construction Costs			Date of Last Inspection
											Items	Timing of Recommended Work Item	Estimated Construction Costs	
1010	West Townline Drain at Malden Road	Corrugated Steel Pipe Arch (Culvert)	70.3	4.8	4.8	25.2	9.6	1995	N/A	Severe transverse cracks and medium to severe map cracks were observed in the asphalt wearing surface at the joint between the asphalt over the culvert and at both approaches. Settlement was noted at the south side of the east approach. A number of offset blocks were loose and the guide rail was not in contract with the clip angle at the end treatment. The retaining walls had severe scaling, very severe honeycombing, and light isolated spalls. Light corrosion was observed on the culvert barrel at the spring line as well as light to medium corrosion of the bolts at the plate joints. Severe corrosion was noted below the inlet pipes. One (1) rupture of the north outlet gabion baskets was observed. No object marker signs were present at the site. Past inspection noted concerns with rotation of retaining wall, no significant changes were observed during this inspection. **(Note: The retaining wall is part of the drain which is attributed to the County Road. However, it was addressed since it is located in the vicinity of the bridge.)** Recommended maintenance includes; crack sealing of the wearing surfaces; replacement or repair sections of steel beam guiderail; install object markers at end treatments of guiderails. **Roadside Safety:** Maintain and extend steel beam guide rail (SBGR). (Refer to Dillon 2018 Roadside Safety Improvements Memo)	**No work is necessary**			31-Jul-20
1011	South Talbot Drain at Malden Road	Concrete Rigid Frame (Culvert)	86.1	4.3	3.7	39.5	16.0	2007	N/A	Light to medium progressive edge cracking was observed in the asphalt wearing surface. The culvert barrel soffit had one (1) full width hairline crack with efflorescence. The vertical walls of the barrel had two (2) hairline cracks with efflorescence. The east approach wearing surface had severe map and transverse cracking and the west approach wearing surface had very severe transverse cracking and severe map cracking. Recommended maintenance includes; crack sealing of the wearing surfaces; and seal concrete cracks in the culvert barrel. **Note** this is a confined space and requires trained personnel or a camera inspection to gather future information. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2015 Bridge Roadside Safety Review Report)	**No work is necessary**			31-Jul-20
1013	Merrick Drain at Eighth Concession Road	Concrete Non-Rigid Frame (Bridge)	80.5	4.2	3.6	9.2	6.3	1965	2020	Light scaling was noted on the west curb and both abutment walls had isolated light scaling. There is one (1) medium crack at the junction of the SE wingwall and abutment wall. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2018 Roadside Safety Improvements Memo)	**No work is necessary**			09-Oct-20
1014	Colchester Townline Drain at Sixth Concession Road	Concrete Non-Rigid Frame (Culvert)	77.7	4.2	3.7	15.3	8.5	1955	2019	Light honeycombing was observed throughout the vertical walls of the barrel. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2018 Roadside Safety Improvements Memo)	**No work is necessary**			31-Jul-20
1015	Merrick Creek Drain at Sixth Concession Road	Concrete Rigid Frame (Culvert)	82.4	6.3	5.5	15.0	6.5	2007	N/A	Severe alligator cracking and light to medium progressive edge cracking was observed throughout the entire wearing surface. The culvert walls had light honeycombing and isolated hairline to narrow cracking with efflorescence extending from the inlet pipes. One (1) hairline crack with efflorescence was observed on the northwest wingwall and one (1) hairline crack was observed on the northeast wingwall. Debris build up was seen in the stream near the culvert inlet. Severe erosion of the shoulder was observed at the edge of the southeast wingwall. The northeast embankment had a severe slope and its filtercloth was exposed. The northeast and southeast rip-rap embankments were noted to be unstable. Prior to replacing or performing maintenance on the existing wearing surface, consideration should be made to investigate the underlying pavement issues by removal of wearing surface and base materials at the structure. Recommended maintenance includes; clearing of the stream and embankments; and repair erosion on the southeast shoulder. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2015 Bridge Roadside Safety Review Report)	**No work is necessary**			31-Jul-20
1016	Collins Drain at Outer Drive	Concrete Rigid/Non-Rigid Frame (Culvert)	75.0	3.6	3.1	40.4	23.6	1975	2005	One (1) wood post was damaged and disconnected from the east guardrail. Seven (7) wide to medium cracks were observed on the barrel soffit showing active signs of efflorescence as well as severe delamination on the original section of the soffit. Four (4) of these cracks were noted to be sealed from previous works. The barrel walls were noted to have light scaling and light scour at the footings, however footings are not being undermined. The north barrel wall had two (2) injected, wide cracks and one light delamination. Minor debris buildup and excessive vegetation growth was seen in the waterway to the north of the structure. Hazard marker signs seem to be missing on the northeast and southeast corners. Recommended work includes major rehabilitation in the next six (6) to ten (10) years. The scope of rehabilitation includes: instalation or replacement of waterproofing, concrete patch repairs and crack injection to the original culvert structure. Additional maintenance includes barrier post repair; routine maintenance on the north embankments and waterway; and add missing signs. Crack widths should also be monitored. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2015 Bridge Roadside Safety Review Report)	**Rehabilitation Needs**			31-Jul-20
											Engineering (Design, Tender, Environmental Applications, CA, and CO)	6-10 Years	$ 60,000.00	
											Mobilization, Traffic Signage, and Traffic Control		$ 25,000.00	
											Removal of Asphalt and Waterproofing		$ 20,000.00	
											Excavation and Backfill of Structure		$ 20,000.00	
											Concrete repairs (patches and crack sealing)		$ 80,000.00	
											Asphalt replacement		$ 40,000.00	
											Deck waterproofing		$ 10,000.00	
											Construction Contingency		$ 35,000.00	
											Environmental Control		$ 10,000.00	
												Total	**$ 300,000.00**	

Summary of Construction Needs and Probable Costs

Structure ID	Structure Location	Structure Type	2020 BCI	Total Deck Length (m)	Span Length (m)	Overall Structure Width (m)	Road Width (m)	Year of Construction	Year of Last Rehabilitation	Comments (Including Routine Maintenance and Roadside Safety Needs)	Capital Needs/Construction Costs			Date of Last Inspection
											Items	Timing of Recommended Work Item	Estimated Construction Costs	
1021	Pike Creek at Twelfth Concession Road	Corrugated Steel Pipe Arch (Culvert)	66.2	6.5	6.5	11.8	3.7	1965	N/A	Minor deformations were observed in the culvert barrel as well as light corrosion above the springline. Approximately ten (10) bolts in the culvert section were missing at random locations. Minor erosion of the embankments and debris build up was seen in the waterway downstream. No object marker signs were present. Recommended maintenance includes; add additional fill height over structure (appropriate fill height shall be determined by engineering review); improve erosion control; and install object marker signs as the structure is still likely utilized by maintenance vehicles and agricultural equipment. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2015 Bridge Roadside Safety Review Report)	**No work is necessary**			30-Jul-20
1028	East Townline Drain at St. Thomas Street	Concrete Rigid Frame (Culvert)	57.6	5.4	4.8	30.5	20.0	1975	N/A	Asphalt wearing surface was noted to have several wide cracks. Narrow to wide cracks with efflorescence staining were observed throughout the culvert barrel. Approximately seven (7) locations of very severe delamination and very severe spalling with exposed and severely corroded reinforcing steel were observed in the culvert barrel soffit. Partial failure of slope protection at all embankments; curbs at the northeast and southeast were noted to have settled. Temporary repairs were completed in July 2016 as a holding strategy until the structure is replaced with a storm water sewer as part of the Manning Road Improvements project in 2021.	**Until this structure is replaced, Dillon recommends a monitoring program consisting of biannual inspections. The program will ensure the temporary repairs remain satisfactory until the structures are replaced.**			30-Jul-20
1029	East Townline Drain at Little River Road	Concrete Rigid Frame (Culvert)	58.9	5.4	4.8	30.5	20.6	1975	N/A	Asphalt wearing surface was noted to have several wide cracks. Narrow to wide cracks with efflorescence staining were observed throughout the culvert barrel. Approximately four (4) locations of very severe delamination and very severe spalling with exposed and severely corroded reinforcing steel were observed in the culvert barrel soffit. Partial failure of slope protection at all embankments; the northeast curb was noted to have settled and the southeast curb was noted to have failed. Temporary repairs were completed in July 2016 as a holding strategy until the structure is replaced with a storm water sewer as part of the Manning Road Improvements project in 2021.	**Until this structure is replaced, Dillon recommends a monitoring program consisting of biannual inspections. The program will ensure the temporary repairs remain satisfactory until the structures are replaced.**			30-Jul-20
2001	Colchester Townline Drain at Eighth Concession Road	Corrugated Steel Pipe Arch (Culvert)	73.1	3.1	3.1	25.5	11.0	2012	N/A	Asphalt wearing surface was observed with severe alligator and edge cracking over the bridge and at both approaches. Top of culvert apparrently sagging under roadway as well as localized deformations and leakage at culvert joints. Medium corrosion at springline and severe corrosion below inlet pipes Precast headwall blocks at inlet and outlet were noted to have cracked grout and seperation at the joints. Recommended maintenance includes: crack sealing or asphalt repaving; parging of the precast block joints. **Roadside Safety:** No improvements necessary. (Refer to Dillon 2018 Roadside Safety Improvements Memo)	**No work is necessary**			31-Jul-20
1	Lakewood Park Pedestrian Bridge	Steel Pedestrian Crossing	91.5	23.8	23.8	3.7	N/A	2016	N/A	Light corrosion was observed at the weld connections to stringers and wind bracing. Damage to the north railing system was noted. Recommended maintenance includes: wire brush and coat corroded welded connections and damaged railing.	**No work is necessary**			09-Oct-20
2	Malden Road Pedestrian Bridge	Steel Pedestrian Crossing	91.7	12.2	12.2	2.68	N/A	2015	N/A	Heavy debris build up was seen downstream. Minor settlement of precast retaining wall blocks at north embankment, as well as corrosion staining on top of blocks. Embankments were noted to have erosion and are potentially unstable, however is not a concern for the structure foundations. Recommended work and maintenance includes: provide erosion control; remove debris from waterway.	**No work is necessary**			09-Oct-20

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1002

Inventory Data:

Structure Name	Pike Creek at Twelfth Concession Road Bridge								
Main Hwy/Road #		On	x	Crossing	Navig. Water		Non-Navig.	x	Ped.	
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Twelfth Concession Road								
Structure Location	0.40 km South from County Road 42								
Latitude	42° 16' 32"	Longitude	-82° 52' 42"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:		Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local	x			
MTO District		Posted Speed	50	No. of Lanes	2				
Old County		AADT	650	% Trucks					
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Rigid Frame	Interchange Number							
Total Deck Length	17.3 m	Interchange Structure Number							
Overall Str. Width	9.8 m	Min. Vertical Clearance		m					
Total Deck Area	169.5 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	8.5 m	Detour Length Around Bridge	5.5 km						
Skew Angle	16 Degrees	Direction of Structure	N/S						
No. of Spans	1.0	Fill on Structure		m					
Span Lengths	Total = 15.8 (1) = 15.8; m								

Historical Data:

Year Built	1961	Year of Last Major Rehab.	2016
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Major rehabilitation completed in July 2016.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	x None	☐ Maintenance	☐ Minor Rehab.	☐ Replace	☐ Major Rehab.		
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years				
Overall Comments:							
Date of Next Inspection:	June, 2022						

Element Data

Element Group:	Decks		**Length:**	17.3 m		
Element Name:	Wearing Surface		**Width:**	8.0 m		
Location:			**Height:**	0.1 m		
Material:	Asphalt		**Count:**			
Element Type:			**Total Quantity:**	138.4 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	101.5	36.9	0.0	0.0	
Comments:						

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

Element Group:	Decks		**Length:**	17.3 m		
Element Name:	Deck Top		**Width:**	9.2 m		
Location:			**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:			**Total Quantity:**	159.2 Sq.m		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	116.7	42.4	0.0	0.0	

Comments:
2016 rehabilitation included concrete removals of the original deck surface and a reinforced concrete overlay with variable thickness and a new waterproofing system.

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

Element Group:	Decks		**Length:**	15.8 m		
Element Name:	Soffit - Thick Slab		**Width:**	9.2 m		
Location:			**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:			**Total Quantity:**	145.4 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	9.5	134.4	1.0	0.5	

Comments:
2016 rehabilitation: patch repairs to the soffit along the South abutment wall, and surrounding the intermediate deck drains at both E/W edges (exact patch repair sizes as per as-built drawings). **W Side**: Wet staining and efflorescence was observed in locations near the edge of the soffit and fascia (Est. 0.5 sq.m).

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

Element Data

Element Group:	Barriers		**Length:**	1.0 m		
Element Name:	Barrier/Parapet Walls - Exterior		**Width:**	0.3 m		
Location:	NE / SW corners		**Height:**	1.1 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	5.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	1.0	3.7	0.2	0.1	

Comments:
Added in 2016 rehabilitation. **SW Corner**: Medium spalling due to vehicular damage was observed (0.25x0.25m)

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

Element Group:	Barriers		**Length:**	2.2 m		
Element Name:	Barrier/Parapet Walls - Exterior		**Width:**	0.3 m		
Location:	NW / SE corners		**Height:**	1.1 m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	22.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	16.1	5.9	0.0	0.0	

Comments:
Added in 2016 rehabilitation.

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

Element Group:	Barriers		**Length:**	21.7 m		
Element Name:	Barrier/Parapet Walls - Interior		**Width:**	0.3 m		
Location:	East/West - Edges		**Height:**	0.475 m		
Material:	Concrete Parapet		**Count:**	2		
Element Type:	Parapet wall with Two Tube Railing		**Total Quantity:**	54.3 Sq.m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	10.9	43.4	0.0	0.0	

Comments:
Added in 2016 rehabilitation. Hairline/Narrow cracks throughout parapet.

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

Element Data

Element Group:	Barriers		**Length:**	21.7 m		
Element Name:	Barrier/Parapet Walls - Interior		**Width:**	0.3 m		
Location:	Interior (East/West)		**Height:**	0.9 m		
Material:	Steel Railing		**Count:**	2		
Element Type:	Parapet wall with Two Tube Railing		**Total Quantity:**	43.4 m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	8.6	34.8	0.0	0.0	

Comments:
Added in 2016 rehabilitation.

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

Element Group:	Barriers		**Length:**	75.0 m		
Element Name:	Railing System		**Width:**			
Location:	NE/SW corners		**Height:**			
Material:	Steel		**Count:**			
Element Type:	Guide rail		**Total Quantity:**	75.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	15.0	60.0	0.0	0.0	

Comments:
Added in 2016 rehabilitation.

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

Element Group:	Abutments		**Length:**	9.2 m		
Element Name:	Abutment Walls		**Width:**			
Location:	North/South		**Height:**	3.4 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	62.6 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	56.6	6.0	0.0	

Comments:
N Wall: Medium honeycombing observed near the abutment wall drains (2.0x1.0m). Light honeycombing observed throughout. **S Wall**: Light honeycombing observed throughout.

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

Element Data

Element Group:	Abutments		**Length:**	4.4 m		
Element Name:	Wingwalls		**Width:**	0.3 m		
Location:	All Four Quadrants		**Height:**	Var. m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	35.2 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	33.2	1.0	1.0	

Comments:
NE Corner: Medium map cracking was observed throughout. Discrete location of medium spalling was observed (0.5 sq.m) **SW Corner:** Medium vertical crack extending from wingwall into rear of parapet.

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

Element Group:	Embankment & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	0	

Comments:
New errosion protection is provided at both abutments

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:
Embankment slopes were modified and new gabion walls were added to provide more stability.
NW Corner: Granular supporting curb slab has eroded away, exposing the underside of the concrete curb.

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:	Hand Laid Rip-Rap, Gabion Baskets		**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	
Comments:						
Recommended Work:	☐ Rehab	☐ Replace	**Maintenance Needs:**			
	☐ 1-5 years	☐ 6-10 years	☐ Urgent	☐ 1 year	☐ 2 year	

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	4		
Element Type:	Hazard Marker Sign		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	
Comments:						
Recommended Work:	☐ Rehab	☐ Replace	**Maintenance Needs:**			
	☐ 1-5 years	☐ 6-10 years	☐ Urgent	☐ 1 year	☐ 2 year	

Element Group:	Approaches		**Length:**	29.0 m		
Element Name:	Wearing Surface		**Width:**	Var. m		
Location:	North/South		**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	406.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	297.7	108.3	0.0	0.0	
Comments: Lane width ranges from 4.0 m over the bridge to 3.0 m at the road						
Recommended Work:	☐ Rehab	☐ Replace	**Maintenance Needs:**			
	☐ 1-5 years	☐ 6-10 years	☐ Urgent	☐ 1 year	☐ 2 year	

Element Data

Element Group:	Approaches		**Length:**			
Element Name:	Drainage		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:	Cast-in-Place concrete		**Count:**	4		
Element Type:	Spillways		**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:

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

Element Group:	Approaches		**Length:**	Var. m		
Element Name:	Curb/gutters		**Width:**	0.3 m		
Location:	NE/SW corners		**Height:**	0.2 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	25.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	18.3	6.7	0.0	0.0	

Comments:
NE Corner: 13.0 m long. **SW Corner**: 12.0 m long.

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

Element Group:	Approaches		**Length:**	4.9 m		
Element Name:	Curb/gutters		**Width:**	1.2 m		
Location:	NW/SE corners		**Height:**			
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Concrete Pad for TL-2 and TL-3		**Total Quantity:**	9.8 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	4.2	5.6	0.0	0.0	

Comments:
Seventeen (17) hairline to narrow transverse cracks were observed on both curbs extending full depth of the curb. Pad is undermined at **NW** Corner.

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

Site Photos

Description
Overview of the bridge. (Looking South)

Description
Road view over the brige span. (Looking North)

Site Photos

Description
Road view at the north approach. (Looking North)

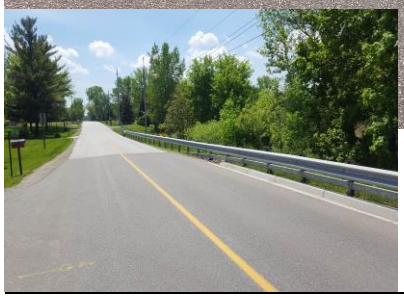
Description
Joint between the bridge deck and the north approach. (Looking East)

Site Photos

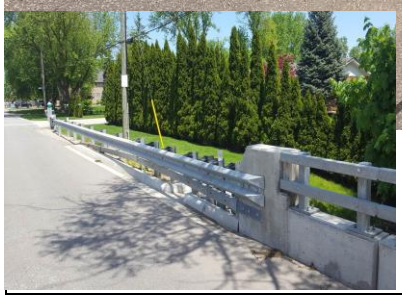
Description
End treatment at the northwest corner of the bridge.

Description
Concrete barrier wall at the northwest corner of the bridge.

Site Photos



Description
Guide rail at the south approach.



Description
Guide rail at the north approach.

Site Photos

Description
Parapet wall and barrier wall at the east edge of the bridge.

Description
Parapet wall and barrier wall at the east edge of the bridge.

Site Photos

Description
East elevation

Description
West elevation

Site Photos

Description
Erosion below curb slab at northwest wingwall

Description
North abutment wall

Site Photos

Medium honeycombing on north abutment wall

Description

South abutment wall

Site Photos

Description
Wet staining and efflorescence on west edge of soffit.

Northwest wingwall

Site Photos

Description
Northwest embankment

Description
Southwest embankment

Site Photos

Description
Waterway at the east side of the bridge

Description
Waterway at the west side of the bridge

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1003

Inventory Data:

Structure Name	Pike Creek at Twelfth Concession Bridge								
Main Hwy/Road #		On [x] Under [ ]	Crossing Type:	Navig. Water [ ] Rail [ ]		Non-Navig. [x] Road [ ]		Ped. [ ] Other [ ]	
Hwy/Road Name	Twelfth Concession Road								
Structure Location	1.00 km South from County Road 42								
Latitude	42° 16' 11"		Longitude	-82° 52' 43.8"					
Owners	Town of Tecumseh		Heritage Designation	Not Consid: [ ] Desig./not list [ ]		Cons/not App. [ ] Desig & List [ ]		List/n.d. [ ]	
MTO region			Road Class:	Freeway [ ] Collector [ ]		Arterial [ ] Local [x]			
MTO District			Posted Speed	50		No. of Lanes	2		
Old County			AADT	650		% Trucks			
Geographic Twp.	Tecumseh (form. Sandwich South)		Inspection Route Sequence						
Structure Type	Concrete Slab on Steel Girders		Interchange Number						
Total Deck Length	16.3 m		Interchange Structure Number						
Overall Str. Width	8.6 m		Min. Vertical Clearance		m				
Total Deck Area	140.2 sq. m		Special Routes:	Transit [ ] School [ ]		Truck [ ] Bicycle [ ]			
Roadway Width	8.0 m		Detour Length Around Bridge	5.5 km					
Skew Angle	20 Degrees		Direction of Structure	N/S					
No. of Spans	1.0		Fill on Structure		m				
Span Lengths	Total = 15.7 (1) = 15.7;				m				

Historical Data:

Year Built	1965	Year of Last Major Rehab.	2013
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Major rehabilitation completed in 2013, incl. new concrete deck, steel beams, parapet walls, bearings and guiderails.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	20.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	x	Maintenance	☐	Minor Rehab.	☐	Replace
				☐	Major Rehab.		
Timing of Recommended Work:		x	1 to 5 years	☐	6 to 10 years		
Overall Comments:	Bearing shoe plates should be wire-brushed, primed and coated. Regular maintenance is recommended for the waterway and cleaning of the joints.						
Date of Next Inspection:	June 2022						

Element Data

Element Group:	Decks		**Length:**	15.2 m			
Element Name:	Wearing Surface		**Width:**	8.0 m			
Location:			**Height:**				
Material:	Asphalt		**Count:**				
Element Type:			**Total Quantity:**	121.6 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	57.4	56.7	7.5	0.0		

Comments:
Narrow full length longitudinal crack was observed along the centreline of the road (15.2m). Several narrow isolated cracks noted. All cracks sealed. **S.B.L.**: Two (2) narrow transverse cracks observed (approximately 4m and 1m,

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

Element Group:	Decks		**Length:**	15.2 m			
Element Name:	Deck Top		**Width:**	8.6 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**				
Element Type:			**Total Quantity:**	130.6 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	69.7	61.0	0.0	0.0		

Comments:
Top of deck assumed based on the condition of the wearing surface of the deck.

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

Element Group:	Decks		**Length:**	13.8 m			
Element Name:	Soffit - Thin Slab - Exterior		**Width:**	0.9 m			
Location:	East/West Edge of Deck		**Height:**				
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:			**Total Quantity:**	24.8 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	13.2	8.6	2.0	1.0		

Comments:
W Fascia: Full length narrow longitundinal crack with discrete active wet areas and efflorescence (13.8x0.25m).

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

Element Data

Element Group:	Decks		**Length:**	13.8 m			
Element Name:	Soffit - Thin Slab - Interior		**Width:**	6.8 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**				
Element Type:			**Total Quantity:**	93.8 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	67.5	26.3	0.0	0.0		
Comments:							

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

Element Group:	Decks		**Length:**	1.0 m			
Element Name:	Soffit - Thin Slab - End		**Width:**	8.6 m			
Location:	North/South Abutment		**Height:**				
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:			**Total Quantity:**	17.2 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	9.2	8.0	0.0	0.0		
Comments:							

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

Element Group:	Decks		**Length:**				
Element Name:	Drainage		**Width:**				
Location:			**Height:**				
Material:	Steel		**Count:**	6			
Element Type:	Metal drain pipes		**Total Quantity:**	6 each			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	6	0	0		
Comments:							

Deck drain at midspan on west side has debris build up and causing partial clogging.

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

Element Data

Element Group:	Decks		**Length:**			
Element Name:	Drainage		**Width:**			
Location:			**Height:**			
Material:	PVC		**Count:**	4		
Element Type:	PVC drain pipes		**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:
Four (4) PVC of 2 inch diameter are located at the soffit corners

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

Element Group:	Joints		**Length:**	8.5 m		
Element Name:	Seals/Sealants		**Width:**			
Location:	North/South end of Deck		**Height:**			
Material:			**Count:**	2		
Element Type:	Strip Seal		**Total Quantity:**	2 each		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	0	

Comments:
Debris build up in the each strip seal.

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

Element Group:	Joints		**Length:**	8.5 m		
Element Name:	Concrete end dams		**Width:**	0.5 m		
Location:	North/South Abutments		**Height:**			
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	17.0 Sq.m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	17.0	0.0	0.0	

Comments:

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

Element Data

Element Group:	Joints		**Length:**	8.5 m		
Element Name:	Armouring/Retaining devices		**Width:**			
Location:	North/South Abutments		**Height:**			
Material:	Steel		**Count:**	4		
Element Type:			**Total Quantity:**	34.0 m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	34.0	0.0	0.0	
Comments:						

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

Element Group:	Barriers		**Length:**	1.0 m		
Element Name:	Parapet Walls - Exterior		**Width:**	0.25 m		
Location:	East/West Edge of Deck		**Height:**	0.8 m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:	Parapet Wall with Single railing		**Total Quantity:**	7.4 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	7.1	0.2	0.1	
Comments:						

Hairline map cracking was observed throughout. **NE Corner**: Light spalling was observed (0.15x0.15m).

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

Element Group:	Barriers		**Length:**	23.0 m		
Element Name:	Parapet Walls - Interior		**Width:**	0.25 m		
Location:	East/West Edge of Deck		**Height:**	0.8 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Parapet Wall with Single railing		**Total Quantity:**	85.1 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	45.4	39.7	0.0	0.0	
Comments:						

Hairline map cracking was observed throughout.

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

Element Data

Element Group:	Barriers		**Length:**	23.0		
Element Name:	Hand Railings		**Width:**			
Location:	East/West Edge of Deck		**Height:**			
Material:	Steel		**Count:**	2		
Element Type:	Single Rail		**Total Quantity:**	46.0 m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	46.0	0.0	0.0	

Comments:

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

Element Group:	Barriers		**Length:**	Varries		
Element Name:	Railing Systems		**Width:**			
Location:	NE / NW / SE		**Height:**			
Material:	Steel		**Count:**	3		
Element Type:	Single Rail (Steel Beam, and Post)		**Total Quantity:**	99.7 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	99.7	0.0	0.0	

Comments:
Quantities: NE: 23.7m, **NW:** 23.7m, **SE:** 52.3m.
Light corrosion on railing posts observed throughout.

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

Element Group:	Beams/MLE's		**Length:**	4.0 m		
Element Name:	Girders (End)		**Width:**	0.27 m		
Location:			**Height:**	0.75 m		
Material:	Steel		**Count:**	5		
Element Type:	I-type		**Total Quantity:**	46.2 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	24.6	21.6	0.0	0.0	

Comments:
Medium corrosion on shoe plates (typ.)

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

Element Data

Element Group:	Beams/MLE's		**Length:**	11.7 m		
Element Name:	Girders (Middle)		**Width:**	0.27 m		
Location:			**Height:**	0.75 m		
Material:	Steel		**Count:**	5		
Element Type:	I-type		**Total Quantity:**	135.1 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	97.3	37.8	0.0	0.0	
Comments:						

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

Element Group:	Beams/MLE's		**Length:**	1.8 m		
Element Name:	Diaphragms		**Width:**	0.13 m		
Location:	North/South Abutment		**Height:**	0.35 m		
Material:	Galvanaized Steel		**Count:**	8		
Element Type:	I-type		**Total Quantity:**	8 each		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	8	0	0	
Comments:						

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

Element Group:	Beams/MLE's		**Length:**	1.7 m		
Element Name:	Diaphragms		**Width:**	0.08 m		
Location:	Intermediate		**Height:**	0.31 m		
Material:	Galvanaized Steel		**Count:**	8		
Element Type:	C-Channel		**Total Quantity:**	8 each		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	8	0	0	
Comments:						

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

Element Data

Element Group:	Coatings		**Length:**	2.0 m			
Element Name:	Structural Steel		**Width:**	0.27 m			
Location:	Girder End		**Height:**	0.75 m			
Material:			**Count:**	10			
Element Type:			**Total Quantity:**	46.2 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	22.3	21.6	2.3	0.0		

Comments:
No coating on shoe plates

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Wire brush, prime and coat shoe plates to reduce rate of corrosion				

Element Group:	Coatings		**Length:**	1.8 m			
Element Name:	Structural Steel		**Width:**	0.13 m			
Location:	End Diaphragm		**Height:**	0.35 m			
Material:	Galvanized Steel		**Count:**	8			
Element Type:			**Total Quantity:**	15.5 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	8.3	7.2	0.0	0.0		

Comments:

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

Element Group:	Abutments		**Length:**	8.5 m			
Element Name:	Abutment walls		**Width:**				
Location:	North/South Abutment		**Height:**	3.5 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Conventional closed		**Total Quantity:**	59.5 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	47.5	8.0	4.0		

Comments:
N Wall: A full height medium crack showing signs of active leaking and efflorescence was observed (4.0x0.5m).
S Wall: Narrow to medium crack showing signs of active leaking and efflorescence (4.0x0.5m)

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

Element Data

Element Group:	Abutments		**Length:**	8.5 m			
Element Name:	Ballast walls		**Width:**				
Location:	North/South Abutment		**Height:**	1.0 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Reinforced concrete		**Total Quantity:**	16.2 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	16.2	0.0	0.0		
Comments: Hairline cracks were observed throughout.							
Recommended Work:	Rehab	Replace	**Maintenance Needs:**				
	1-5 years	6-10 years	Urgent	1 year	2 year		

Element Group:	Abutments		**Length:**	4.4 m			
Element Name:	Wingwalls		**Width:**				
Location:	North/South Abutment		**Height:**	4.5 m			
Material:	Cast-In-place concrete		**Count:**	4			
Element Type:	Reinforced concrete		**Total Quantity:**	79.2 Sq.m			
Environment:	Benign		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	57.0	22.2	0.0	0.0		
Comments: Top of wingwalls reconstructed during 2013 rehab.							
Recommended Work:	Rehab	Replace	**Maintenance Needs:**				
	1-5 years	6-10 years	Urgent	1 year	2 year		

Element Group:	Abutments		**Length:**				
Element Name:	Bearings		**Width:**				
Location:	North/South Abutment		**Height:**				
Material:	Laminated Elastomeric Bearing		**Count:**	10			
Element Type:			**Total Quantity:**	10 each			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	10	0	0		
Comments: Medium corrosion on shoe plates (typ.)							
Recommended Work:	Rehab	Replace	**Maintenance Needs:**				
	1-5 years	6-10 years	Urgent	x 1 year	2 year		
			Wire brush, prime and coat shoe plates to reduce rate of corrosion				

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1	all	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	1	0	

Comments:
Stream alignment is shifted against south abutment.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	x 2 year
					Place scour protection along stream banks				

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4	each	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:			**Height:**			
Material:			**Count:**	3		
Element Type:	Hand laid riprap		**Total Quantity:**	3	each	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	3	0	0	

Comments:

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

Element Data

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	3		
Element Type:	Hazard Marker Signs		**Total Quantity:**	3	each	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	3	0	0	
Comments:						

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

Element Group:	Approaches		**Length:**	6.0	m	
Element Name:	Wearing surface		**Width:**	7.0	m	
Location:	North/South Approach		**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	84.0	Sq.m	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	83.0	1.0	0.0	
Comments:						

S Approach: Settlement with a medium crack of 3.5 m length was observed on the west side of the approach (3.5x0.25m). **N Approach**: Settlement with a light crack of 1.0 m length was observed on both sides of the approach 2x(1.0x0.25m)

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

Element Group:	Approaches		**Length:**	6.0	m	
Element Name:	Approach Slabs		**Width:**	7.0	m	
Location:	North/South Approach		**Height:**	0.25	m	
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	84.0	Sq.m	
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	84.0	0.0	0.0	
Comments:						

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

Element Data

Element Group:	Approaches		**Length:**	10.0 m		
Element Name:	Curb/Gutters		**Width:**	0.3 m		
Location:	NE / NW / SE		**Height:**	0.15 m		
Material:	Cast-in-place concrete		**Count:**	3		
Element Type:			**Total Quantity:**	30.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	30.0	0.0	0.0	
Comments:						

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

Site Photos

Description
Road over the bridge. (Looking North)

Description
Wearing surface at south approach

Site Photos

Description
Wearing surface at south approach. (Looking East)

Description
Wearing surface over the bridge. (Looking North)

Site Photos

Description
Expansion joint at the south bridge approach. (Looking East)

Description
Light spalling at northeast parapet end wall.

Site Photos

Description
Deck drainge, and East parapet wall. (Looking North)

Description
Railing system at southwest approach. (Looking North)

Site Photos

Description
Railing system and spillway at northwest curb.

Description
Missing bolt(s) for bottom of northwest guardrail.

Site Photos

Description
West deck fascia, stream, and embankments. (Looking East)

Description
East deck fascia, south abutment wall, stream, and embankments. (Looking South)

Site Photos

Description
Deck soffit, main girders, and diaphrams. (Looking South)

Description
End diaphrams at north abutment wall.

Site Photos

Description
Bearing seat at north abutment wall. (Looking East)

Description
Medium corrosion observed at bearing shoe plate (Typ.)

Site Photos

Description
Medium crack with active wet areas and efflorescence at North abutment wall.

Description
Medium crack with active wet ares and efflorescence at South abutment wall.

Site Photos

Description
Embankments and waterway at East side. (Looking East)

Description
Embankments and waterway at west side. (Looking South)

Site Photos

Description
Waterway at west side. (Looking West)

Description
Northeast embankments. (Looking North)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1004

Inventory Data:

Structure Name	Sullivan Drain at Twelfth Concession Bridge								
Main Hwy/Road #		On	x	Crossing	Navig. Water		Non-Navig.	x	Ped.	
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Twelfth Concession Road								
Structure Location	1.40 km South from County Road 42								
Latitude	42° 15' 59.3"	Longitude	-82° 52' 44.6"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:		Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local	x			
MTO District		Posted Speed	50	No. of Lanes	2				
Old County		AADT	650	% Trucks					
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Non-Rigid Frame	Interchange Number							
Total Deck Length	7.5 m	Interchange Structure Number							
Overall Str. Width	9.3 m	Min. Vertical Clearance		m					
Total Deck Area	69.8 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	7.0 m	Detour Length Around Bridge	5.5 km						
Skew Angle	36.0 Degrees	Direction of Structure	N/S						
No. of Spans	1.0	Fill on Structure	0.3 m						
Span Lengths	Total = 6.8 (1) = 6.8; m								

Historical Data:

Year Built	1965	Year of Last Major Rehab.	2019
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Structure was rehabilitated in Fall 2019. Work included: concrete patches, addition of precast block retaining walls to improve embankment slope, curb reconstruction, concrete deck overlay, new waterproofing and asphalt.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	☐ Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Structure rehabilitated in 2019.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks			**Length:**	7.5 m			
Element Name:	Wearing Surface			**Width:**	7.0 m			
Location:				**Height:**				
Material:	Asphalt			**Count:**				
Element Type:				**Total Quantity:**	52.5 Sq.m			
Environment:	Moderate			**Limited Inspection**				
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	**Sq.m** / m / each / % / all	49.0	3.5	0.0	0.0			
Comments: Repaved in 2019.								
Recommended Work:		Rehab	Replace	**Maintenance Needs:**				
		1-5 years	6-10 years		Urgent	1 year	2 year	

Element Group:	Decks			**Length:**	7.5 m			
Element Name:	Deck Top			**Width:**	8.6 m			
Location:				**Height:**				
Material:	Cast-in-place concrete			**Count:**				
Element Type:	Reinforced concrete			**Total Quantity:**	64.5 Sq.m			
Environment:	Moderate			**Limited Inspection**	x			
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	**Sq.m** / m / each / % / all	60.2	4.3	0.0	0.0			
Comments: Concrete deck overlay in 2019.								
Recommended Work:		Rehab	Replace	**Maintenance Needs:**				
		1-5 years	6-10 years		Urgent	1 year	2 year	

Element Group:	Decks			**Length:**	6.8 m			
Element Name:	Soffit - Thick slab			**Width:**	9.3 m			
Location:				**Height:**				
Material:	Cast-in-place concrete			**Count:**				
Element Type:	Reinforced concrete			**Total Quantity:**	63.2 Sq.m			
Environment:	Benign			**Limited Inspection**				
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	**Sq.m** / m / each / % / all	2.5	60.7	0.0	0.0			
Comments: Soffit patches in 2019. Hairline crack noted full span (N/S) extending from concrete patch.								
Recommended Work:		Rehab	Replace	**Maintenance Needs:**				
		1-5 years	6-10 years		Urgent	1 year	2 year	

Element Data

Element Group:	Abutments		**Length:**	9.3 m			
Element Name:	Abutment Walls		**Width:**				
Location:	North/South Abutment		**Height:**	3.5 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Reinforced concrete		**Total Quantity:**	64.2 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	64.2	0.0	0.0		

Comments:
Crack injection and parging in 2019. Light scour and concrete erosion at footings, however footings are not being undermined.

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

Element Group:	Abutments		**Length:**	4.6 m			
Element Name:	Wingwalls		**Width:**				
Location:			**Height:**	2.6 m			
Material:	Cast-in-place concrete		**Count:**	4			
Element Type:	Reinforced concrete		**Total Quantity:**	47.8 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	15.6	31.9	0.3	0.0		

Comments:
Precast block retaining walls installed in 2019.
NE Wall: Medium vertical crack of 2.0m long observed.

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

Element Group:	Sidewalks/Curbs		**Length:**	23.0 m			
Element Name:	Curbs		**Width:**	0.3 m			
Location:			**Height:**	0.4 m			
Material:	Cast-in-place concrete		**Count:**				
Element Type:			**Total Quantity:**	16.1 Sq.m			
Environment:	Severe		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	9.2	6.9	0.0	0.0		

Comments:
Curbs raised in 2019 to accommodate raise in asphalt (due to deck overlay).

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1	all	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	0	

Comments:
Consider drain & structure realignment during next structure replacement.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4	each	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:
Precast block retaining walls installed in 2019 to extend embankment slope. Steep slopes due to depth of drain.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:	Hand laid riprap		**Total Quantity:**	4	each	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	4	0	0	0	

Comments:

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

Element Data

Element Group:	Approaches		**Length:**			
Element Name:	Curb and Gutters - Spillways		**Width:**			
Location:	NE, SE, SW Quadrants		**Height:**			
Material:	Cast-in-Place Concrete		**Count:**	3		
Element Type:	Spillway		**Total Quantity:**	3 each		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	3	0	0	0	

Comments:
Spillways installed in 2019. Noted to be constructed too high.

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

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:	Hazard Marker Signs		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	3	1	0	0	

Comments:
3 new object markers installed in 2019. NW corner is original.

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

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing Surface		**Width:**	7.0 m		
Location:			**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	84.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	78.4	5.6	0.0	0.0	

Comments:
Repaved in 2019.

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

Site Photos

Description
Road over the bridge. (Looking North)

Description
Wearing surface over the bridge. (Looking North)

Site Photos

Description
Object marker and new raised curbs on West side (Looking South).

Description
Concrete spillway, precast block retaining wall and raised curb at southwest structure corner. (Looking North).

Site Photos

Description
East elevation. (Looking West)

Description
West elevation. (Looking North)

Site Photos

Description
Concrete soffit patch at East end of soffit.

Description
Concrete soffit patch at near West end of soffit.

Site Photos

Description
Crack repairs at North abutment.

Description
Scour and concrete erosion at South abutment footings (Typ.).

Site Photos

Description
New precast block retaining wall and slope protection at northeast embankment. (Looking West)

Description
New slope protection at southeast embankment. (Looking South)

Site Photos

Description
New precast block retaining wall and slope protection at southwest embankment. (Looking South)

Description
Waterway at west side. (Looking West)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1005

Inventory Data:

Structure Name	Pike Creek at Baseline Road Bridge								
Main Hwy/Road #		On	x	Crossing Type:	Navig. Water		Non-Navig.	x	Ped.
		Under			Rail		Road		Other
Hwy/Road Name	Baseline Road								
Structure Location	0.50 km West from Manning Road								
Latitude	42° 15' 37.1"			Longitude	-82° 52' 42.4"				
Owners	Town of Tecumseh			Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.
					Desig./not list		Desig & List		
MTO region				Road Class:	Freeway		Arterial		
					Collector	x	Local		
MTO District				Posted Speed	60		No. of Lanes	2	
Old County				AADT	1646		% Trucks		
Geographic Twp.	Tecumseh (form. Sandwich South)			Inspection Route Sequence					
Structure Type	Concrete Slab on Steel Girders			Interchange Number					
Total Deck Length	15.3 m			Interchange Structure Number					
Overall Str. Width	8.6 m			Min. Vertical Clearance		m			
Total Deck Area	131.6 sq. m			Special Routes:	Transit		Truck		
					School		Bicycle		
Roadway Width	8.0 m			Detour Length Around Bridge	7.8 km				
Skew Angle	15 Degrees			Direction of Structure	E/W				
No. of Spans	1.0			Fill on Structure		m			
Span Lengths	Total = 15.0 (1) = 15.0: m								

Historical Data:

Year Built	1955	Year of Last Major Rehab.	2014
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Major rehabilitation completed in 2014, including but not limited to new beams, deck and parapet walls.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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: South fascia should be monitored. A transverse narrow crack extends the entire fascia length with observed efflorescence and wet areas.			

Overall Structure Notes:				
Recommended Work on Structure:	☐ None	x Maintenance	☐ Minor Rehab. ☐ Major Rehab.	☐ Replace
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Erosion protection requires maintenance. Strip seal joints should be cleaned out as part of routine maitenance. Asphalt crack sealing. Guide rail repairs.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Deck		**Length:**	14.4 m		
Element Name:	Wearing Surface		**Width:**	8.0 m		
Location:			**Height:**			
Material:	Asphalt		**Count:**			
Element Type:			**Total Quantity:**	115.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	69.0	28.8	17.3	0.0	

Comments:
WBL: Light pitting of 15% of the asphalt surface and a medium longitudinal crack full length of structure.

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

Element Group:	Decks		**Length:**	14.4 m		
Element Name:	Deck Top		**Width:**	8.6 m		
Location:			**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:			**Total Quantity:**	123.7 Sq.m		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	74.2	49.5	0.0	0.0	

Comments:

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

Element Group:	Decks		**Length:**	13.0 m		
Element Name:	Soffit - Thin Slab - Exterior		**Width:**	0.9 m		
Location:			**Height:**			
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	23.4 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	14.0	3.8	4.0	1.5	

Comments:
N & S Fascia: Longitudinal hairline to narrow cracks extending approximately the full bridge span with discrete wet areas and efflorescence (N: 10m, S: 13m)

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

Element Data

Element Group:	Decks		**Length:**	13.0 m			
Element Name:	Soffit - Thin Slab - Interior		**Width:**	6.8 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**				
Element Type:			**Total Quantity:**	88.3 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	67.1	21.2	0.0	0.0		
Comments:							

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

Element Group:	Decks		**Length:**	1.0 m			
Element Name:	Soffit - Thin Slab - End		**Width:**	8.6 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:			**Total Quantity:**	17.2 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	10.3	6.9	0.0	0.0		
Comments:							

Hairline cracking was observed in various locations along the soffit.

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

Element Group:	Decks		**Length:**				
Element Name:	Drainage		**Width:**				
Location:			**Height:**				
Material:	Steel		**Count:**	6			
Element Type:	Metal drain pipes		**Total Quantity:**	6 each			
Environment:	Severe		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	6	0	0		
Comments:							

Four (4) additional PVC of 2 inch diameter are located at the soffit corners.

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

Element Data

Element Group:	Joints		**Length:**	8.3 m		
Element Name:	Seals/sealants		**Width:**			
Location:	East/West Abutment		**Height:**			
Material:			**Count:**	2		
Element Type:	Strip Seal		**Total Quantity:**	2 each		
Environment:	Severe		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	0	

Comments:
Strip seal joints were filled with debris (Typ. E & W Joint)

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			
		1-5 years		6-10 years		Urgent	x 1 year	2 year
					Bridge joint cleaning.			

Element Group:	Joints		**Length:**	8.3 m		
Element Name:	Concrete End Dams		**Width:**	0.5 m		
Location:	East/West Abutment		**Height:**			
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	16.5 Sq.m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	16.5	0.0	0.0	

Comments:
Light rust staining was observed throughout.

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

Element Group:	Joints		**Length:**	8.3 m		
Element Name:	Armouring/Retaining devices		**Width:**			
Location:	East/West Abutment		**Height:**			
Material:	Steel		**Count:**	4		
Element Type:			**Total Quantity:**	33.0 m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	33.0	0.0	0.0	

Comments:
Light scraping and coating removed from snow plows use.

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

Element Data

Element Group:	Barriers		**Length:**	1.0 m			
Element Name:	Parapet Walls - Ends		**Width:**	0.3 m			
Location:	Solid parapet at 4 corners		**Height:**	0.8 m			
Material:	Cast-in-place concrete		**Count:**	4			
Element Type:	Parapet Wall		**Total Quantity:**	7.4 Sq.m			
Environment:	Severe		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	7.1	0.2	0.1		

Comments:
SE Corner: Light honeycombing was observed throughout. **NW Corner**: Light spalling observed on the top of the parapet end wall (0.15x0.15m).

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

Element Group:	Barriers		**Length:**	23.0 m			
Element Name:	Parapet Walls - Interior		**Width:**	0.3 m			
Location:			**Height:**	0.8 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Parapet Wall with Single railing		**Total Quantity:**	85.1 Sq.m			
Environment:	Severe		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	85.1	0.0	0.0		

Comments:
N and S Edges: Hairline map cracking and light honeycombing was observed throughout the parapet walls.

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

Element Group:	Barriers		**Length:**	23.0 m			
Element Name:	Hand Railing		**Width:**	m			
Location:			**Height:**	m			
Material:	Steel		**Count:**	2			
Element Type:	Parapet Wall with Single Railing		**Total Quantity:**	46.0 m			
Environment:	Severe		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	46.0	0.0	0.0		

Comments:

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

Element Data

Element Group:	Barriers		**Length:**	120.6 m		
Element Name:	Railing Systems		**Width:**			
Location:	NW / SE / SW		**Height:**			
Material:	Steel		**Count:**			
Element Type:	Single Rail (Steel Beam, and Post)		**Total Quantity:**	120.6 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	72.4	44.2	0.0	4.0	

Comments:
SW Barrier: Collision damage was observed (4m). One (1) offset block missing. Slope erosion causing rotation of posts and potential performance concerns at all 4 corners (including SBEAT pad at NE corner).

Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**					
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Repair or replace damanged guiderail										

Element Group:	Beams/MLE's		**Length:**	4.0 m		
Element Name:	Girders - End		**Width:**	0.3 m		
Location:			**Height:**	0.8 m		
Material:	Weathering Steel		**Count:**	5		
Element Type:	I type		**Total Quantity:**	46.2 Sq.m		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	27.7	18.5	0.0	0.0	

Comments:

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

Element Group:	Beams/MLE's		**Length:**	11.5 m		
Element Name:	Girders - Middle		**Width:**	0.3 m		
Location:			**Height:**	0.8 m		
Material:	Weathering Steel		**Count:**	5		
Element Type:	I type		**Total Quantity:**	132.8 Sq.m		
Environment:	Benign		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	100.9	31.9	0.0	0.0	

Comments:

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

Element Data

Element Group:	Beams/MLE's		**Length:**	1.8 m				
Element Name:	Diaphragms - End		**Width:**	0.1 m				
Location:			**Height:**	0.4 m				
Material:	Galvanized Steel		**Count:**	8				
Element Type:	I-type		**Total Quantity:**	8 each				
Environment:	Moderate		**Limited Inspection**	x				
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	Sq.m / m / **each** / % / all	5	3	0	0			
Comments:								
Recommended Work:		Rehab	Replace	**Maintenance Needs:**				
		1-5 years	6-10 years	Urgent	1 year	2 year		

Element Group:	Beams/MLE's		**Length:**	1.7 m				
Element Name:	Diaphragms - Intermediate		**Width:**	0.1 m				
Location:			**Height:**	0.3 m				
Material:	Galvanized Steel		**Count:**	8				
Element Type:	I-type		**Total Quantity:**	8 each				
Environment:	Benign		**Limited Inspection**	x				
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	Sq.m / m / **each** / % / all	6	2	0	0			
Comments:								
Recommended Work:		Rehab	Replace	**Maintenance Needs:**				
		1-5 years	6-10 years	Urgent	1 year	2 year		

Element Group:	Coatings		**Length:**	2.0 m				
Element Name:	Structural		**Width:**	0.3 m				
Location:	Girder Ends		**Height:**	0.8 m				
Material:			**Count:**	10				
Element Type:			**Total Quantity:**	46.2 Sq.m				
Environment:	Moderate		**Limited Inspection**					
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	**Sq.m** / m / each / % / all	27.7	18.5	0.0	0.0			
Comments:								
Recommended Work:		Rehab	Replace	**Maintenance Needs:**				
		1-5 years	6-10 years	Urgent	1 year	2 year		

Element Data

Element Group:	Abutments		**Length:**			
Element Name:	Abutment Walls		**Width:**	8.6 m		
Location:	East/West Abutment		**Height:**	2.4 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Conventional closed		**Total Quantity:**	41.3 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	37.3	4.0	0.0	

Comments:
Exisiting four (4) all drains at each wall. **W Abutment**: North drain is covered with the drain embankment.
SW Corner: Rust stains and light honeycombing was observed at the joint between new and old concrete.

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

Element Group:	Abutments		**Length:**			
Element Name:	Ballast Walls		**Width:**	8.6 m		
Location:	East/West Abutment		**Height:**	0.8 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	13.8 Sq.m		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	8.3	4.7	0.8	0.0	

Comments:
E and W: Narrow to hairline vertical cracks observed throughout both ballast walls.

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

Element Group:	Abutments		**Length:**	Var. m		
Element Name:	Wingwalls		**Width:**			
Location:	East/West Abutment		**Height:**	3.2 m		
Material:	Cast-In-place concrete		**Count:**	4		
Element Type:	Reinforced concrete		**Total Quantity:**	60.2 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	54.7	5.0	0.5	

Comments:
Crack Quantity (Length): NE and NW ±4.40m, SE ±3.20m, and SW ±6.80m. **SW Corner**: Light spalling (0.5 sq.m), hairline to narrow map cracking (1.0 sq.m), and light honeycombing was observed at the joint between the new/old concrete.
NW Corner: light honeycombing was observed at the joint between the new/old concrete.

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

Element Data

Element Group:	Abutments		**Length:**			
Element Name:	Bearings		**Width:**			
Location:	East/West Abutment		**Height:**			
Material:	Laminated Elastomeric Bearing		**Count:**	10		
Element Type:			**Total Quantity:**	10 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	6	4	0	0	

Comments:
Multiple anchor rods were observed to be misaligned (non-vertical) in the longitudinal direction.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	0	1	

Comments:
Concrete debris in stream. Stream is out of alignment at the structure.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Remove debris in stream					

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants, 1 additional drain		**Height:**			
Material:			**Count:**	5		
Element Type:			**Total Quantity:**	5 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	3	0	

Comments:
SE, SW and NW Embankments: Insufficient erosion protection.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Install erosion protection.					

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:	Hand laid riprap		**Total Quantity:**	1 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	1	0	0	

Comments:
NE Embankment: Slope protection provided at the CSP outlet.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	x 2 year
					Consider erosion protection at all embankments.				

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	5		
Element Type:			**Total Quantity:**	5 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	5	0	0	

Comments:
Three (3) HAZARD MARKER Signs at 3 corners, SPEED LIMIT Sign at South West railing system, and CHECK BOARD Sign at the pole.

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

Element Group:	Approaches		**Length:**	10.0 m		
Element Name:	Curb/gutters		**Width:**	0.3 m		
Location:	NW / SE / SW		**Height:**	0.2 m		
Material:	Cast-in-place concrete		**Count:**	3		
Element Type:			**Total Quantity:**	30.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	18.0	12.0	0.0	0.0	

Comments:

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

Element Data

Element Group:	Approaches		**Length:**	6.0 m			
Element Name:	Wearing Surface		**Width:**	7.0 m			
Location:	East/West Approaches		**Height:**				
Material:	Asphalt		**Count:**	2			
Element Type:			**Total Quantity:**	84.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	50.4	26.6	7.0	0.0		

Comments:
East Approach: Medium transverse crack extends the full width and a medium to wide crack with settlement was observed on south side of the approach. **West Approach**: Medium transverse crack extends the full width.

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

Element Group:	Approaches		**Length:**	6.0 m			
Element Name:	Approaches Slabs		**Width:**	7.0 m			
Location:	East/West Approaches		**Height:**				
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:			**Total Quantity:**	84.0 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	50.4	33.6	0.0	0.0		

Comments:
East Approach: Narrow transverse crack extending to the full width and medium to severe crack with settlement on south side observed.

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

Site Photos

Description
Road over the bridge. (Looking East)

Description
Wearing surface over the bridge, curbs, railing system, and barriers at south edge

Site Photos

Description
Railing system at southeast curb.

Description
Barrier wall at bridge north edge. (Looking West)

Site Photos

Description
Expansion joint at east of the bridge. (Looking South)

Description
Deck drainge

Site Photos

Description
SBEAT at east approach. (Looking East)

Description
Railing system at southeast curb.

Site Photos

Description
Spall on northwest corner of parapet end wall (Looking North)

Description
North deck fascia, stream, and embankments (Looking West). Longitudinal cracks in fascia with active wet areas and efflorescence (typ.)

Site Photos

Description
South deck fascia, and deck drainage, (Looking North). Longitudinal cracks in fascia with active wet areas and efflorescence (typ.)

Description
Deck soffit, main girders, diaphrams, and deck drainage. (Looking West)

Site Photos

Description

Bearing seat at east abutment wall with typical bent anchor bolt.
(Looking South)

Description

Misaligned anchor rod at abutment bearings (typ.)

Site Photos

Description
Wall drains at East abutment. (Looking South)

Description
East abutment wall drains

Site Photos

Description
Embankments northeast side. (Looking East)

Description
Embankments and waterway at south side. (Looking South)

Site Photos

Description
Waterway. (Looking South)

Description
Embankments and waterway. (Looking North)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1006

Inventory Data:

Structure Name	Sullivan Creek at Baseline Road Bridge								
Main Hwy/Road #		On	x	Crossing Type:	Navig. Water		Non-Navig.	x	Ped.
		Under			Rail		Road		Other
Hwy/Road Name	Baseline Road								
Structure Location	1.20 km West from Manning Road								
Latitude	42° 16' 38.2"	Longitude	-82° 53' 12.2"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector	x	Local				
MTO District		Posted Speed	60		No. of Lanes	2			
Old County		AADT	1700		% Trucks				
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Rigid Frame	Interchange Number							
Total Deck Length	5.9 m	Interchange Structure Number							
Overall Str. Width	19.8 m	Min. Vertical Clearance		m					
Total Deck Area	116.8 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	9.3 m	Detour Length Around Bridge	7.8 km						
Skew Angle	57 Degrees	Direction of Structure	E/W						
No. of Spans	1.0	Fill on Structure		m					
Span Lengths	Total = 5.2 (1) = 5.2; m								

Historical Data:

Year Built	2015	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Bridge was fully replaced in 2015

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	x None	☐ Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Light spall/delaminations noted at soffit of several precast unit joints.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	5.9 m			
Element Name:	Wearing surface		**Width:**	11.0 m			
Location:	Top of Deck		**Height:**				
Material:	Asphalt		**Count:**				
Element Type:			**Total Quantity:**	64.9 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	43.3	21.6	0.0	0.0		
Comments:							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year	2 year	

Element Group:	Barriers		**Length:**	7.0 m			
Element Name:	Railing System		**Width:**				
Location:			**Height:**	0.65 m			
Material:	Steel		**Count:**	2			
Element Type:	Box Beam Railing on Curb		**Total Quantity:**	14.0 m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / **m** / each / % / all	9.3	4.7	0.0	0.0		
Comments:							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year	2 year	

Element Group:	Barriers		**Length:**	Var. m			
Element Name:	Railing System		**Width:**				
Location:	All four quadrants		**Height:**				
Material:	Steel		**Count:**	4			
Element Type:	SBGR w/ Channel OPSD 912.130		**Total Quantity:**	34.2 m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / **m** / each / % / all	22.8	11.4	0.0	0.0		
Comments:							
NE: 7.6m, **NW**: 11.4m, **SE**: 7.6m, and **SW**: 7.6m. Erosion around posts at NW structure corner.							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year	2 year	

Element Data

Element Group:	Barriers		**Length:**	Var. m		
Element Name:	Railing System		**Width:**			
Location:	All four quadrants		**Height:**			
Material:	Steel		**Count:**	4		
Element Type:	SBGR w/eccentric loader end treat		**Total Quantity:**	95.1 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	63.4	31.7	0.0	0.0	
Comments: **NE**: 34.3m, **NW**: 15.2m, **SE**: 15.2m, and **SW**: 30.3m						
Recommended Work:	☐ Rehab	☐ Replace	**Maintenance Needs:**			
	☐ 1-5 years	☐ 6-10 years	☐ Urgent	☐ 1 year	☐ 2 year	

Element Group:	Culverts		**Length:**	5.2 m		
Element Name:	Barrels - Soffit		**Width:**	19.8 m		
Location:			**Height:**			
Material:	Precast concrete		**Count:**			
Element Type:			**Total Quantity:**	103.0 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	82.4	18.1	2.0	0.5	
Comments: Six (6) locations of light spalling or delamination observed at precast joints on soffit.						
Recommended Work:	☐ Rehab	☐ Replace	**Maintenance Needs:**			
	☐ 1-5 years	☐ 6-10 years	☐ Urgent	☐ 1 year	☐ 2 year	

Element Group:	Culverts		**Length:**	19.8 m		
Element Name:	Barrels - Vertical Walls		**Width:**			
Location:	East/West		**Height:**	2.8 m		
Material:	Precast concrete		**Count:**	2		
Element Type:	Legs of rigid Box		**Total Quantity:**	110.9 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	88.7	21.9	0.2	0.1	
Comments: Thirteen (13) light spalls (0.1 x 0.1m) noted at the south headwall.						
Recommended Work:	☐ Rehab	☐ Replace	**Maintenance Needs:**			
	☐ 1-5 years	☐ 6-10 years	☐ Urgent	☐ 1 year	☐ 2 year	

Element Data

Element Group:	Culverts		**Length:**	Var. m			
Element Name:	Inlet/Outlet Components - Wingwall		**Width:**				
Location:			**Height:**	3.0 m			
Material:	Precast Blocks (1.5*0.75*0.75)		**Count:**	4			
Element Type:	Reinforced concrete		**Total Quantity:**	108.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	72.0	33.0	2.0	1.0		

Comments:
NE and NW: 12.0m; and **SE and SW**: 6.0m. Light to very severe scaling observed at the top faces of the precast blocks.

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

Element Group:	Foundations		**Length:**	5.2 m			
Element Name:	Foundations (below grade level)		**Width:**	19.8 m			
Location:			**Height:**				
Material:	Precast concrete		**Count:**				
Element Type:	Bottom of rigid Box		**Total Quantity:**	103.0 Sq.m			
Environment:	Benign		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	82.4	20.6	0.0	0.0		

Comments:

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

Element Group:	Embankments & Streams		**Length:**				
Element Name:	Embankments		**Width:**				
Location:	All Four Quadrants		**Height:**				
Material:			**Count:**	4			
Element Type:			**Total Quantity:**	4 each			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	3	1	0	0		

Comments:

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 All		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	1	0	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	All four embankments		**Height:**			
Material:			**Count:**	4		
Element Type:	Hand laid riprap		**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	3	1	0	0	
Comments:						

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

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:	At Four corners of Guide rails		**Height:**			
Material:			**Count:**	4		
Element Type:	Hazard Marker Signs		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	
Comments:						

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

Element Data

Element Group:	Approaches		**Length:**	6.0 m			
Element Name:	Wearing surface		**Width:**	11.0 m			
Location:	East/West approaches		**Height:**				
Material:	Asphalt		**Count:**	2			
Element Type:			**Total Quantity:**	132.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	88.0	43.0	1.0	0.0		
Comments: **E Approach**: Medium transverse cracking observed in the E.B.L. (4x0.25m)							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	x 1 year		2 year
				Route and seal			

Element Group:	Approaches		**Length:**	6.0 m			
Element Name:	Approach slabs		**Width:**	11.0 m			
Location:	East/West approaches		**Height:**	0.25			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:			**Total Quantity:**	132.0 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	88.0	44.0	0.0	0.0		
Comments:							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year		2 year

Element Group:	Approaches		**Length:**				
Element Name:	Curb/Gutter		**Width:**				
Location:	All four Quadrants		**Height:**				
Material:	Cast-in-place concrete		**Count:**	4			
Element Type:	Spillways (Curb Outlets) OPSD 605.03		**Total Quantity:**	4 each			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	3	1	0	0		
Comments: Hairline cracking was observed throughout.							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year		2 year

Element Data

Element Group:	Approaches		**Length:**	Var. m		
Element Name:	Curb/Gutter		**Width:**			
Location:	All four Quadrants		**Height:**			
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:	Barrier Curbs OPSD 605.040		**Total Quantity:**	36.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	24.0	12.0	0.0	0.0	
Comments:						

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

Site Photos

Description
Road over the bridge. (Looking West)

Description
Wearing surface at west approach.

Site Photos

Description
Wearing surface over the bridge. (Looking East)

Description
Wearing surface over the bridge. (Looking South)

Site Photos

Description
Spillway at SW corner. (Looking South)

Description
South elevation. (Looking North)

Site Photos

Description
Discrete locations of light spalling at the south headwall.

Description
Structure barrel (Looking North).

Site Photos

Description
Existing concrete parging at precast unit joint.

Description
North embankments and waterway. (Looking North)

Site Photos

Description
Embankments and waterway. (Looking South)

Description
Embankments and retaining walls at north elevation. (Looking East)

Site Photos

Description

Embankments and retaining walls at north elevation. (Looking West)

Description

Embankments and retaining walls at south elevation. (Looking West)

Site Photos

Description
Embankments and retaining walls at south elevation. (Looking East)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1009

Inventory Data:

Structure Name	Pike Creek at Malden Road Culvert								
Main Hwy/Road #		On	x	Crossing Type:	Navig. Water		Non-Navig.	x	Ped.
		Under			Rail		Road		Other
Hwy/Road Name	Malden Road								
Structure Location	0.90 km South West from Manning Road								
Latitude	42° 12' 44.7"			Longitude	-82° 52' 59.1"				
Owners	Town of Tecumseh			Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.
					Desig./not list		Desig & List		
MTO region				Road Class:	Freeway		Arterial		
					Collector		Local	x	
MTO District				Posted Speed	50		No. of Lanes	2	
Old County				AADT	1115		% Trucks		
Geographic Twp.	Tecumseh (form. Sandwich South)			Inspection Route Sequence					
Structure Type	Concrete Rigid Frame			Interchange Number					
Total Deck Length	5.5 m			Interchange Structure Number					
Overall Str. Width	13.0 m			Min. Vertical Clearance		m			
Total Deck Area	70.9 sq. m			Special Routes:	Transit		Truck		
					School		Bicycle		
Roadway Width	7.3 m			Detour Length Around Bridge	4.0 km				
Skew Angle	0.0 Degrees			Direction of Structure	E/W				
No. of Spans	1.0			Fill on Structure	1.0 m				
Span Lengths	Total = 4.8 (1) = 4.8; m								

Historical Data:

Year Built	2007	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

The culvert was fully replaced in 2007

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	25.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	x Maintenance	☐ Minor Rehab.	☐ Replace	☐ Major Rehab.		
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years				
Overall Comments:	Culvert replaced in 2007. Routine maintenance includes: rout and seal asphalt cracks, improve embankment stability (additional rip rap, gabion repair), and guide rail repairs. Consider adding object markers to remaining 2 corners.						
Date of Next Inspection:	June 2022						

Element Data

Element Group:	Decks		**Length:**	5.5 m			
Element Name:	Wearing Surface		**Width:**	7.0 m			
Location:			**Height:**	0.1 m			
Material:	Asphalt		**Count:**				
Element Type:			**Total Quantity:**	38.2 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	31.2	3.5	3.5		

Comments:

Surface have number of repaired/sealed cracks in both logitudinal and transversal directions. **Midspan**: Severe transverse crack extending the entire width of the road (7x0.5m)

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

Element Group:	Barriers		**Length:**	23.0 m			
Element Name:	Railing Systems		**Width:**				
Location:	East/West Road Edge		**Height:**				
Material:	Steel		**Count:**	2			
Element Type:	Single Rail (Steel Beam, and Post)		**Total Quantity:**	46.0 m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / **m** / each / % / all	6.1	37.9	1.0	1.0		

Comments:

NW and SE Corners: Guiderails have protective end treatments. **W Edge**: Rail is bent at local area between two posts. **E Edge:** Rail is disconnected from offset block at SE corner.

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

Element Group:	Barriers		**Length:**	0.1 m			
Element Name:	Posts		**Width:**	0.2 m			
Location:	East/West Road Edge		**Height:**	0.8 m			
Material:	Steel		**Count:**	25			
Element Type:			**Total Quantity:**	25 each			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0.0	22.0	2.0	1.0		

Comments:

Wood offset blocks are used. **East Side**: Post settlement and rotation observed. Rail is disconnected from post at S corner. **West Side**: Two posts (2) are slightly bent. No guiderail end treatments were observed.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent	x	1 year		2 year
					Repair settled posts.					

Element Data

Element Group:	Culverts		**Length:**	4.8 m			
Element Name:	Barrels - Soffit		**Width:**	13.0 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**				
Element Type:	Reinforced concrete		**Total Quantity:**	62.4 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	30.0	32.4	0.0	0.0		
Comments:							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year	2 year	

Element Group:	Culverts		**Length:**	4.8 m			
Element Name:	Inlet / Outlet Components		**Width:**				
Location:	East/West Culvert Ends		**Height:**	1.0 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Reinforced concrete		**Total Quantity:**	9.6 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	1.3	8.3	0.0	0.0		
Comments:							
Both Fascia: Hairline cracks with staining extending to the top of the headwall observed throughout the fascia. Hairline cracks extending from haunches.							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year	2 year	

Element Group:	Culverts		**Length:**	13.0 m			
Element Name:	Barrels - Vertical Walls		**Width:**				
Location:	North/South		**Height:**	2.1 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Reinforced Concrete		**Total Quantity:**	54.6 Sq.m			
Environment:	Benign		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	26.2	28.4	0.0	0.0		
Comments:							
Recommended Work:		Rehab	Replace	**Maintenance Needs:**			
		1-5 years	6-10 years	Urgent	1 year	2 year	

Element Data

Element Group:	Culverts		**Length:**	3.0 m			
Element Name:	Inlet/Outlet Components - Wingwalls		**Width:**				
Location:			**Height:**	3.1 m			
Material:	Cast-in-place concrete		**Count:**	4			
Element Type:	Reinforced Concrete		**Total Quantity:**	37.2 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	5.0	32.2	0.0	0.0		

Comments:
NW: One (1) hairline crack was observed. **SW**: One (1) hairline crack was observed.

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

Element Group:	Retaining Walls		**Length:**	10.0 m			
Element Name:	Walls		**Width:**				
Location:	South-East Embankment		**Height:**	2.0 m			
Material:	Gabions		**Count:**	1			
Element Type:			**Total Quantity:**	20.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	2.7	17.1	0.1	0.1		

Comments:
Two (2) ruptures in the wire mesh were observed (0.25x0.25m each.)

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

Element Group:	Retaining Walls		**Length:**				
Element Name:	Walls		**Width:**				
Location:	North-West Embankment		**Height:**				
Material:	Concrete Blocks		**Count:**	6			
Element Type:			**Total Quantity:**	6 each			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	5	1	0		

Comments:
Differential settlement of block adjacent to structure, as well as corrosion staining.

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

Element Data

Element Group:	Embankment & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	2		
Element Type:			**Total Quantity:**	2	all	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	1	
Comments:						

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

Element Group:	Embankment & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:			**Height:**			
Material:			**Count:**	6		
Element Type:			**Total Quantity:**	6	each	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	2	0	
Comments:						

Existing gabion baskets are damaged at S corner of structure. All embankments at East (inlet) side noted to be unstable.

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

Element Group:	Embankment & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:	NE/SW Embankments		**Height:**			
Material:			**Count:**	2		
Element Type:	Hand Laid riprap		**Total Quantity:**	2	each	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	1	1	
Comments:						

NE: Poor rip-rap condition. Embankment slope at this propety corner should be pulled back.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Additional rip rap needed. Embankment works.					

Element Data

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:	NW/SE Barriers		**Height:**			
Material:			**Count:**	2		
Element Type:	Hazard Marker Sign		**Total Quantity:**	2	each	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	0	

Comments:
Missing bridge OBJECT MARKER Signs on NE and SW

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Install bridge object marker signs.					

Element Group:	Approaches		**Length:**	6.0	m	
Element Name:	Wearing surface		**Width:**	7.0	m	
Location:	North/South Approach		**Height:**	0.1	m	
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	84.0	Sq.m	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	75.5	5.0	3.5	

Comments:
Approaches have several repaired/sealed cracks in both logitudinal and transversal directions.
N Approach: Narrow to medium crack was observed in the N.B.L (3.0x2.5m).
S Approach: Medium transverse was observed in the S.B.L. (3.0x0.25m).

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

Site Photos

Description
Road over the bridge. (Looking North)

Description
Load limit and speed limit signs.

Site Photos

Description
Road at the north approach. (Looking West)

Description
Wearing surface over the bridge. New transverse crack. (Looking West)

Site Photos

Description
Guide rail end trreatment at the south-east corner.

Description
Guide rail end treatment at the south-west corner.

Site Photos

Description
East elevation.

Description
West elevation.

Site Photos

Description
Typical cracking with stain at the headwalls.

Description
Cracking with stain at the headwalls. (West elevation)

Site Photos

Description
Inside box. (Looking West)

Description
Pedestrian bridge at east elevation. (Looking South)

Site Photos

Description
Embankments, retaining elements at west elevation. (Looking North)

Description
Embankments, retaining elements at west elevation. (Looking South)

Site Photos

Description
Waterway at the east inlet. (Looking East)

Description
Waterway at outlet (west).

Site Photos

Description
C.S.P outlet, retaining structure, and pedestrian bridge and support, at west elevation. (Looking North)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1010

Inventory Data:

Structure Name	West Townline Drain at Malden Road Culvert								
Main Hwy/Road #		On	x	Crossing	Navig. Water		Non-Navig.	x	Ped.	
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Malden Road								
Structure Location	At intersection with Manning Road								
Latitude	42° 13' 3.7"	Longitude	-82° 52' 30.3"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial	x			
			Collector		Local				
MTO District		Posted Speed	80		No. of Lanes	2			
Old County		AADT	1115		% Trucks				
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Corrugated Steel Pipe Arch	Interchange Number							
Total Deck Length	4.8 m	Interchange Structure Number							
Overall Str. Width	25.2 m	Min. Vertical Clearance		m					
Total Deck Area	121.0 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	9.6 m	Detour Length Around Bridge	4.0 km						
Skew Angle	0.0 Degrees	Direction of Structure	E/W						
No. of Spans	1.0	Fill on Structure	2.0 m						
Span Lengths	Total = 4.8 (1) = 4.8; m								

Historical Data:

Year Built	1995	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	x Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Maintenance items include: crack sealing or repaving, repair of SBGR, and installation of object markers. Spending on this structure to be coordinated with the County of Essex.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	4.8 m			
Element Name:	Wearing surface		**Width:**	9.6 m			
Location:			**Height:**				
Material:	Asphalt		**Count:**				
Element Type:			**Total Quantity:**	46.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	43.0	3.0	0.0		

Comments:
Severe transverse cracks at the joint between the asphalt over the culvert and asphalt at both approaches (3 sq.m).

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Crack seal program.					

Element Group:	Barriers		**Length:**	83.6 m			
Element Name:	Railing Systems		**Width:**				
Location:	North/South Road Edge		**Height:**				
Material:	Steel		**Count:**				
Element Type:	Single Rail (Steel Beam,and W/S post		**Total Quantity:**	83.6 m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	76.0	7.6	0.0		

Comments:
N: Review height of guiderail for adequacy. Guide rail not contacting offset blocks in several locations.

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

Element Group:	Barriers		**Length:**				
Element Name:	Posts		**Width:**				
Location:	North/South Road Edge		**Height:**				
Material:	Wood/Steel		**Count:**	46			
Element Type:			**Total Quantity:**	46 each			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	21	20	5		

Comments:
A number of offset blocks are disconnected and guide rail not in contact with clip angle at end treament.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent	x	1 year		2 year
					Straighten posts and repair guiderail.					

Element Data

Element Group:	Retaining Walls		**Length:**	15.2 m			
Element Name:	Walls		**Width:**				
Location:	South-East Embankment		**Height:**	1.9 m			
Material:	Cast-in-place concrete		**Count:**	1			
Element Type:	Reinforced concrete		**Total Quantity:**	29.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	12.0	12.0	5.0		

Comments:
Severe scaling, light spalling and very severe honeycombing along bottom portion of wall. Possible undermining of footing from lowered drain should be reviewed. Particular attention should be drawn to wall for potential movements.

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

Element Group:	Culverts		**Length:**	25.2 m			
Element Name:	Barrels		**Width:**	4.8 m			
Location:	North/South		**Height:**	3.1 m			
Material:	Corrugated steel		**Count:**	1			
Element Type:	Pipe arch		**Total Quantity:**	294.5 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	278.8	14.7	1.0		

Comments:
Medium corrosion along spring line. Light to medium corrosion of bolts at plate joints. Severe corrosion below pipe inlets

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

Element Group:	Culverts		**Length:**	10.8 m			
Element Name:	Inlet Components		**Width:**				
Location:	South Inlet		**Height:**	3.0 m			
Material:	Gabions		**Count:**	1			
Element Type:			**Total Quantity:**	32.4 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	32.4	0.0	0.0		

Comments:

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

Element Data

Element Group:	Culverts		**Length:**	13.0 m		
Element Name:	Outlet Components		**Width:**			
Location:	North Outlet		**Height:**	4.0 m		
Material:	Gabions		**Count:**	1		
Element Type:			**Total Quantity:**	52.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	50.0	1.0	1.0	
Comments: One (1) rupture was observed on top of a gabion basket (0.25x0.25).						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	
Comments:						

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	NE / NW / SW Embankments		**Height:**			
Material:			**Count:**	3		
Element Type:	Hand laid riprap South west		**Total Quantity:**	3 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	1	

Comments:
NE: embankment observed to be close to edge of roadway.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	x 2 year
					Monitor NE embankment for stability.				

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	2		
Element Type:	Var.		**Total Quantity:**	2 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	0	

Comments:
No OBJECT MARKER Signs in present. STOP Sign, and LOAD LIMIT Sign exists. It has to be noted also that there are other signs on site such as CURVE Signs and CHECKBOARD Sign.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	2 year
					Install object markers at end treatments of guiderails.				

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing Surface		**Width:**	9.6 m		
Location:	East/West Approach		**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	115.2 sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	65.2	50.0	0.0	

Comments:
Medium to severe map cracking at both approaches. Settlement noted at SE structure corner.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Crack sealing or repave.				

Site Photos

Description
Road over the culvert (Looking East)

Description
Wide crack at joint between wearing surface over the culvert section and east approach slab.

Site Photos

Description
Wide transverse cracking at east approach slab. (Looking North)

Description
Wearing surface at west approach.

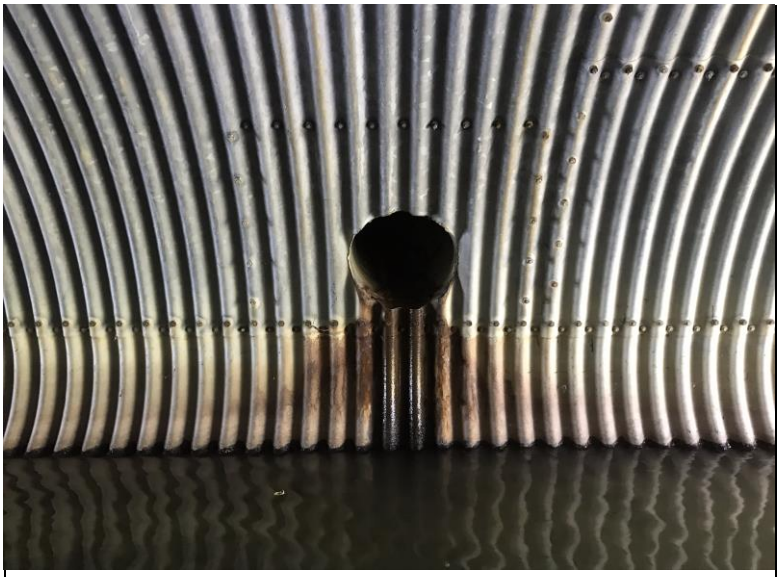
Site Photos

Description
Load limit sign and loose guide rails at the north-west end treatment.

Description
Loose guide rails at the south-west end treatment.

Site Photos

Description
North culvert barrel and gabion headwalls.



Description
Severe corrosion below inlet pipe at west wall.

Site Photos

Description
Rip-rap slope protection, and gabion basket wingwalls at south elevation. (Looking North)

Description
Gabion basket wingwalls at north elevation, (Looking South) (Picture from 2016)

Site Photos

Description
Retaining wall, gabion baskets, and culvert end at south elevation. (Looking East) **Note:** The retaining wall is part of the drain which is attributted to the county road. However, it was addressed since it is located in the vicinity of the bridge.

Description
Medium spalling at retaining wall bottom at south east embankment. Severe scaling, popouts and very severe honeycombing along the bottom portion of the wall.

Site Photos

Description
Waterway at South. (Looking SE)

Description
Waterway. (Looking North)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1011

Inventory Data:

Structure Name	Malden Road Drain at South Talbot Road Bridge								
Main Hwy/Road #		On	x	Crossing	Navig. Water		Non-Navig.	x	Ped.	
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Malden Road								
Structure Location	Crossing South Talbot at Malden Intersection								
Latitude	42° 12' 3.0"	Longitude	-82° 54' 0.3"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector	x	Local				
MTO District		Posted Speed	80		No. of Lanes	2			
Old County		AADT	319		% Trucks				
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Rigid Frame Box	Interchange Number							
Total Deck Length	4.3 m	Interchange Structure Number							
Overall Str. Width	39.5 m	Min. Vertical Clearance		m					
Total Deck Area	169.9 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	16.0 m	Detour Length Around Bridge	6.0 km						
Skew Angle	0.0 Degrees	Direction of Structure	N/S						
No. of Spans	1.0	Fill on Structure	< 0.3 m						
Span Lengths	Total = 3.7 (1) = 3.7; m								

Historical Data:

Year Built	2007	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Culvert replaced in 2007.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	28.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	x Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		☐ 1 to 5 years	x 6 to 10 years	
Overall Comments:	Structure interior only accessible from North end (confined space); camera inspection recommended. Maintenance should include sealing asphalt cracks as well as culvert interior cracks.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	4.3 m		
Element Name:	Wearing surface		**Width:**	16.0 m		
Location:	Top of Deck		**Height:**	0.1 m		
Material:	Asphalt		**Count:**			
Element Type:			**Total Quantity:**	68.8 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	63.8	5.0	0.0	
Comments:						

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

Element Group:	Culverts		**Length:**	3.7 m		
Element Name:	Barrels - Soffit		**Width:**	39.4 m		
Location:			**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:	Reinforced concrete		**Total Quantity:**	145.8 Sq.m		
Environment:	Benign		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	70.0	72.1	3.7	0.0	

Comments:
(From 2016): Hairline crack across the full width (3.7x0.25m) with efflorescence observed. Light honeycombing was observed throughout. The inside can be accessed only through the north opening as the south end is closed and intersects with HDPE culvert, this is considered a confined space and requires trained personnel for entry.

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

Element Group:	Culverts		**Length:**	39.4 m		
Element Name:	Barrels - Vertical Walls		**Width:**			
Location:	East/West		**Height:**	2.6 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Reinforced concrete		**Total Quantity:**	204.9 Sq.m		
Environment:	Benign		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	98.3	101.3	5.2	0.0	

Comments:
(From 2016): E Wall:Two (2) hairline cracks showing signs of efflorescence staining, spaced approx. 2.0m was observed (2.6x0.25 each). Inspection limited due to high water level and confined space entry limitations. The south end of the culvert is closed and intersect with other HDPE culvert.

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:	NW / NE Embankments		**Height:**			
Material:	Gabions / Rip-Rap		**Count:**	2		
Element Type:			**Total Quantity:**	0.0 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0.0	2.0	0.0	0.0	

Comments:
NE: Hand laid rip-rap.
NW: Gabion baskets.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	0	

Comments:

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

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	4		
Element Type:	Var.		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:
Four different signs were located in the area around the bridge including: Stop Sign at intersection, HAZARD MARKER Sign at the NW edge of the gabion baskets,and SPEED LIMIT Sign (80km/h).

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

Element Data

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing surface		**Width:**	Var. m		
Location:	East/West Approaches		**Height:**	0.1 m		
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	75.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	35.0	30.0	10.0	

Comments:
E Approach: Severe map and transverse cracking was observed (approximately 20 sq.m). **W Approach**: Very severe transverse cracking and severe map cracking was observed (approximately 10 sq.m and 20 sq.m, respectively)

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Crack seal program.				

Site Photos

Description
Road over the bridge. (Looking West)

Description
Road over bridge deck. (Looking East)

Site Photos

Description
Wearing surface cracking at the east approach. (Looking South)

Description
Wearing surface cracking at the west approach, (Looking South)

Site Photos

Description
Southern closed end of bridge with waterproofing on the top. (Looking North)

Description
Waterproofing agent on the north top of deck showing signs of bubbling (Looking North)

Site Photos

Description
North Inlet of the bridge section with exposed waterproofing at the decktop. (Looking South)

Description
North end of box section of the bridge, looking south. Bend in box section located approximately below the road edge. (Picture from 2016) Structure barrel access is deemed Confined Space Entry.

Site Photos

Description

Two verticle cracks at the east abutment wall (Picture from 2016).

Structure barrel access is deemed Confined Space Entry.

Description

North waterway, embankments and slope protection at the north inlet of the bridge section (Looking North)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1013

Inventory Data:

Structure Name	Merrick Creek at Eighth Concession Road Bridge								
Main Hwy/Road #		On	x	Crossing	Navig. Water		Non-Navig.	x	Ped.	
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Eighth Concession Road								
Structure Location	1.60 km North from County Road 8								
Latitude	42° 11' 47.1"	Longitude	-82° 56' 56.8"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local	x			
MTO District		Posted Speed	Not posted		No. of Lanes	2			
Old County		AADT	426		% Trucks				
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Non-Rigid Frame	Interchange Number							
Total Deck Length	4.2 m	Interchange Structure Number							
Overall Str. Width	9.2 m	Min. Vertical Clearance		m					
Total Deck Area	38.6 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	6.3 m	Detour Length Around Bridge	10.0 km						
Skew Angle	0.0 Degrees	Direction of Structure	N/S						
No. of Spans	1.0	Fill on Structure	0.2 m						
Span Lengths	Total = 3.6 (1) = 3.6 m								

Historical Data:

Year Built	1965	Year of Last Major Rehab.	2020
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

2020 Rehab: Full depth concrete deck repairs, concrete overlay, waterproofing and asphalt, enclosed drain at SE wingwall.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	October 9, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	22.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	☐ Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Major rehab completed in 2020			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	4.2 m			
Element Name:	Wearing Surface		**Width:**	6.3 m			
Location:			**Height:**				
Material:	Tar and chip		**Count:**				
Element Type:			**Total Quantity:**	26.5 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	26.5	0.0	0.0	0.0		

Comments:
Repaved in 2020.

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

Element Group:	Decks		**Length:**	4.2 m			
Element Name:	Deck Top		**Width:**	9.2 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**				
Element Type:			**Total Quantity:**	38.6 Sq.m			
Environment:	Moderate		**Limited Inspection**	x			
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	38.6	0.0	0.0	0.0		

Comments:
Concrete overlay in 2020.

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

Element Group:	Decks		**Length:**	3.6 m			
Element Name:	Soffit - Thick Slab		**Width:**	9.2 m			
Location:			**Height:**				
Material:	Cast-in-place concrete		**Count:**				
Element Type:			**Total Quantity:**	33.1 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	4.3	28.8	0.0	0.0		

Comments:
Concrete repair in 2020.

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

Element Data

Element Group:	Sidewalks/Curbs		**Length:**	Var. m		
Element Name:	Curbs		**Width:**	0.3 m		
Location:	East/West Road Edges		**Height:**	0.3 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	9.3 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	4.6	4.7	0.0	0.0	

Comments:
E Curb: reconstructed in 2020. **W Curb:** light scaling observed.

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

Element Group:	Abutments		**Length:**	9.2 m		
Element Name:	Abutment Walls		**Width:**			
Location:	North/South		**Height:**	2.1 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	35.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	35.0	0.0	0.0	

Comments:
Light scaling observed on both walls.

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

Element Group:	Abutments		**Length:**	4.2 m		
Element Name:	Wingwalls		**Width:**			
Location:			**Height:**	2.8 m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	47.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	47.0	0.0	0.0	

Comments:
SE Wingwall: One (1) CSP pipe coming through the wingwall. Medium crack was observed at the junction of abutment wall.

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	1	0	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	4	0	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	NE / NW / SW Embankments		**Height:**			
Material:	Hand Laid Riprap		**Count:**	3		
Element Type:			**Total Quantity:**	3 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	3	0	0	0	
Comments:						

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

Element Data

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:	NW and SE Wingwalls		**Height:**			
Material:			**Count:**	4		
Element Type:	Hazard Marker Signs		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	2	2	0	0	

Comments:
Object markers added to 2 remaining corners in 2020.

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

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing Surface		**Width:**	6.3 m		
Location:			**Height:**			
Material:	Tar and chip		**Count:**	2		
Element Type:			**Total Quantity:**	75.6 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	75.6	0.0	0.0	0.0	

Comments:

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

Site Photos

Description
Road over structure. (Looking North)

Description
Curb, wingwall, shoulder and object marker at SW corner of structure. (Looking North)

Site Photos

Description
Wearing surface over the bridge. (Looking West)

Description
North approach. (Looking South)

Site Photos

Description
West elevation. (Looking East)

Description
East elevation, C.S.P outlet through SE wingwall (Looking South)

Site Photos

Description
Reconstructed curb at East side

Description
South abutment wall and wall drains.

Site Photos

Description
Full depth deck repair at soffit. Looking SW.

Description
Full depth deck repair at soffit. Looking West.

Site Photos

Description
East waterway, and slope protection rip-rap. Looking North.

Description
West watercourse (Looking West).

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1014

Inventory Data:

Structure Name	Townline Road Drain at Sixth Concession Road Culvert								
Main Hwy/Road #		On [x] Under [ ]	Crossing Type:	Navig. Water [ ] Rail [ ]		Non-Navig. [x] Road [ ]		Ped. [ ] Other [ ]	
Hwy/Road Name	Sixth Concession Road (Holden Road)								
Structure Location	At intersection with County Road 8								
Latitude	42° 11' 0.3"		Longitude	-82° 59' 1.1"					
Owners	Town of Tecumseh		Heritage Designation	Not Consid: [x] Desig./not list [ ]		Cons/not App. [ ] Desig & List [ ]		List/n.d. [ ]	
MTO region			Road Class:	Freeway [ ] Collector [ ]		Arterial [ ] Local [x]			
MTO District			Posted Speed	60		No. of Lanes	2		
Old County			AADT	500		% Trucks			
Geographic Twp.	Tecumseh (form. Sandwich South)		Inspection Route Sequence						
Structure Type	Concrete Non-Rigid Frame		Interchange Number						
Total Deck Length	4.2	m	Interchange Structure Number						
Overall Str. Width	15.3	m	Min. Vertical Clearance		m				
Total Deck Area	64.3	sq. m	Special Routes:	Transit [ ] School [ ]		Truck [ ] Bicycle [ ]			
Roadway Width	8.5	m	Detour Length Around Bridge	10.6	km				
Skew Angle	0.0	Degrees	Direction of Structure	N/S					
No. of Spans	1.0		Fill on Structure	0.6	m				
Span Lengths	Total = 3.7 (1) = 3.7;	m							

Historical Data:

Year Built	1955	Year of Last Major Rehab.	2019
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	5.0
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)

2019 Rehab: Remove and reconstruct 1.1m of deck at each extent (E/W), install new precast block retaining walls adjacent to new CIP corner strip, waterproof and pave.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	28.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	☐ Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Rehabilitated in 2019.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks	**Length:**	4.2 m		
Element Name:	Wearing Surface	**Width:**	8.5 m		
Location:		**Height:**			
Material:	Asphalt	**Count:**			
Element Type:		**Total Quantity:**	35.7 Sq.m		
Environment:	Moderate	**Limited Inspection**			
Protection System:					Perform.
Condition	Units / Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all — 33.3	2.4	0.0	0.0	

Comments:
Repaved in 2019.

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

Element Group:	Decks	**Length:**	3.7 m		
Element Name:	Deck Top	**Width:**	15.5 m		
Location:		**Height:**			
Material:	Cast-in-place concrete	**Count:**			
Element Type:		**Total Quantity:**	57.4 Sq.m		
Environment:	Benign	**Limited Inspection**			
Protection System:					Perform.
Condition	Units / Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all — 0.0	57.4	0.0	0.0	

Comments:
E/W deck extents (1.1m) replaced in 2019 with curb on top.

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

Element Group:	Decks	**Length:**	3.7 m		
Element Name:	Soffit	**Width:**	15.5 m		
Location:		**Height:**			
Material:	Cast-in-place concrete	**Count:**			
Element Type:		**Total Quantity:**	57.4 Sq.m		
Environment:	Benign	**Limited Inspection**			
Protection System:					Perform.
Condition	Units / Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all — 7.8	49.6	0.0	0.0	

Comments:
E/W deck extents (1.1m) replaced in 2019 with curb on top.

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

Element Data

Element Group:	Abutments		**Length:**	15.5 m		
Element Name:	Abutment Walls		**Width:**			
Location:	North/South Abutments		**Height:**	2.1 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	65.1 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	65.1	0.0	0.0	

Comments:
Light honeycomb throughout barrel walls.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	1	0	0	0	

Comments:

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	4	0	0	0	

Comments:
2019: New HDPE pipes at NE and NW embankments, precast block retaining walls and rip rap laid at all 4 corners. South embankments are steep due to proximity of CR-8.

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:	Hand-laid rip rap		**Total Quantity:**	4 Sq.m		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	4	0	0	0	
Comments:						

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

Element Group:	Retaining Walls		**Length:**	1.5 m		
Element Name:	Walls		**Width:**			
Location:	4 Quadrants		**Height:**	2.3 m		
Material:	Precast block		**Count:**	4		
Element Type:			**Total Quantity:**	13.8 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	12.9	0.9	0.0	0.0	
Comments:						

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

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing surface		**Width:**	8.5 m		
Location:	North/South Approaches		**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	102.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	95.2	6.8	0.0	0.0	
Comments:						
Repaved in 2019.						

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

Site Photos

Description
Road over the bridge. (Looking South)

Description
Wearing surface at south approach. (Looking West)

Site Photos

Description
Wearing surface at north approach. (Looking South)

Description
Wearing surface over the structure section. (Looking East)

Site Photos

Description
West elevation. (Looking NE)

Description
Deck soffit at the west end.

Site Photos

Description
East elevation. (Looking North)

Description
Deck soffit at the east end.

Site Photos

Description
Abutment wall and deck soffit inside the culvert section. (Looking North)

Description
Concrete patch near North abutment of soffit.

Site Photos

Description
New precast block retaining walls, rip rap and subdrains at embankments. (Typ.)

Description
Waterway east from the culvert.

Site Photos

Description
Waterway west from the culvert.

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1015

Inventory Data:

Structure Name	Merrick Creek Drain at Sixth Concession Road Culvert								
Main Hwy/Road #		On [x] Under [ ]	Crossing Type:	Navig. Water [ ] Rail [ ]		Non-Navig. [x] Road [ ]		Ped. [ ] Other [ ]	
Hwy/Road Name	Sixth Concession Road (Holden Road)								
Structure Location	0.25 km North from County Road 8								
Latitude	42° 11' 9.8"		Longitude	-82° 59' 0.4"					
Owners	Town of Tecumseh		Heritage Designation	Not Consid: [x] Desig./not list [ ]		Cons/not App. [ ] Desig & List [ ]		List/n.d. [ ]	
MTO region			Road Class:	Freeway [ ] Collector [ ]		Arterial [ ] Local [x]			
MTO District			Posted Speed	60		No. of Lanes	2		
Old County			AADT	500		% Trucks			
Geographic Twp.	Tecumseh (form. Sandwich South)		Inspection Route Sequence						
Structure Type	Concrete Rigid Frame		Interchange Number						
Total Deck Length	6.3 m		Interchange Structure Number						
Overall Str. Width	15.0 m		Min. Vertical Clearance		m				
Total Deck Area	94.5 sq. m		Special Routes:	Transit [ ] School [ ]		Truck [ ] Bicycle [ ]			
Roadway Width	6.5 m		Detour Length Around Bridge	10.6 km					
Skew Angle	0.0 Degrees		Direction of Structure	N/S					
No. of Spans	1.0		Fill on Structure	< 0.3 m					
Span Lengths	Total = 5.5 (1) = 5.5; m								

Historical Data:

Year Built	2007	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	5.0
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)

Bridge replaced in 2007

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	28 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	☐ None	x Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Maintenance is recommended for numerous cracks in the wearing surfaces of the deck top and approaches (or repavement program). Severe erosion was observed at SE shoulder.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	6.3 m		
Element Name:	Wearing surface		**Width:**	6.5 m		
Location:			**Height:**			
Material:	Asphalt (Tar and Chip)		**Count:**			
Element Type:			**Total Quantity:**	41.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	9.0	16.0	16.0	

Comments:
Deteriorated wearing surface condition is localized at the structure limits.Very severe alligator cracking starting at N&S aproaches and extending toward midspan. Light to severe edge cracking along E&W edges of pavement.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Wearing surface condition is localized at structure limits. Full replacement and pavement investigation is required to identify the underlying issue.				

Element Group:	Culverts		**Length:**	5.5 m		
Element Name:	Barrels - Soffit		**Width:**	15.0 m		
Location:			**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:			**Total Quantity:**	82.5 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	39.6	42.9	0.0	0.0	

Comments:

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

Element Group:	Culverts		**Length:**	15.0 m		
Element Name:	Barrels - Vertical Walls		**Width:**			
Location:	North/South		**Height:**	3.2 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Reinforced Concrete		**Total Quantity:**	94.5 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	45.4	43.7	3.6	1.8	

Comments:
N Wall: HDPE outlet with hairline cracking and efflorescence and a narrow vertical crack extending the full height of wall.
S Wall: 2 HDPE outlets with hairline cracking and minor honeycombing was observed. Corrosion staining below west pipe.

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

Element Data

Element Group:	Culverts		**Length:**	5.5 m		
Element Name:	Inlet/Outlet Components		**Width:**			
Location:	East/West Headwalls		**Height:**	0.6 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Reinforced concrete		**Total Quantity:**	6.6 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.9	5.7	0.0	0.0	

Comments:

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

Element Group:	Culverts		**Length:**	3.5 m		
Element Name:	Inlet/Outlet Components - Wingwalls		**Width:**	0.3 m		
Location:	North/South		**Height:**	3.8 m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	53.2 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	7.1	42.1	3.5	0.5	

Comments:
NW: Hairline crack with efflorescence (1.0m). Light spall at top of wall. **NE:** Hairline crack (2.0m).

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	2		
Element Type:			**Total Quantity:**	2 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	1	1	

Comments:
Debris build up in the waterway. Large tress and other vegatation at inlet end.

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:			**Height:**			
Material:			**Count:**	6		
Element Type:			**Total Quantity:**	6 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0.0	0.0	4.0	2.0	

Comments:
Additional embankments located at NE and SW corners. **SE**: Severe erosion of the shoulder at structure corner.
NE: Steep slope with filtercloth exposed.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:	Hand laid riprap		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	2	0	

Comments:
NE and **SE:** Unstable / steep rip-rap.

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

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:
Object markers at 4 corners.

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

Element Data

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing Surface		**Width:**	6.5 m		
Location:	North/South Approaches		**Height:**			
Material:	Asphalt (Tar and Chip)		**Count:**	2		
Element Type:			**Total Quantity:**	78.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	19.0	34.0	25.0	

Comments:

N Approach: Severe alligator and progressive edge cracking along west edge of pavement (7.0x1.0m). Severe alligator cracking starting at the structure edge and extending into the approach wearing surface (6.2x1.5m)

S Approach: Severe alligator cracking starting at the structure edge extending into the wearing surface (6.2x2.0m)

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Wearing surface condition is localized at structure limits. Full replacement and pavement investigation is required to identify the underlying issue.					

Site Photos

Description
Road over the bridge. (Looking North)

Description
Cracking of asphalt pavement at junction of deck top and south approach. (Looking East)

Site Photos

Description
Cracking of asphalt pavement at junction of deck top and north approach. (Looking South)

Description
Edge cracks at north approach. (Looking North)

Site Photos

Description
East elevation, wingwalls, abutment walls, and HDPE outlet. (Looking West) Vegetation and heavy debris blocking flow.

Description
Severe erosion of the shoulder at the south-east embankment.

Site Photos

Description
West elevation, wingwalls, abutment walls, and HDPE outlet. (Looking East)

Description
South abutment wall near west extent, HDPE outlet with corrosion staining beneath. (Looking South)

Site Photos

Description
North-west wingwall. Vertical crack with efflorescence staining.

Description
Waterway west from the bridge. (Looking West)

Site Photos

Description
Waterway east from the bridge. (Looking East)

Description
North-east embankment. (Looking North)

Site Photos

Description
Waterway and south-west embankment with some debris blocking the flow.

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1016

Inventory Data:

Structure Name	Collins Drain at Outer Drive Culvert									
Main Hwy/Road #	Outer Dr.	On		Crossing Type:	Navig. Water		Non-Navig.	x	Ped.	
		Under	x		Rail		Road		Other	
Hwy/Road Name	Outer Drive									
Structure Location	At transition from Outer Drive connector (North of Talbot Road) to Outer Drive									
Latitude	42° 13' 58.7"			Longitude	-82° 59' 3.8"					
Owners	Town of Tecumseh			Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.	
					Desig./not list		Desig & List			
MTO region				Road Class:	Freeway		Arterial			
					Collector	x	Local			
MTO District				Posted Speed	50		No. of Lanes	3		
Old County				AADT	3152		% Trucks			
Geographic Twp.	Tecumseh (form. Sandwich South)			Inspection Route Sequence						
Structure Type	Concrete Frame (Rigid/Non-Rigid)			Interchange Number						
Total Deck Length	3.6	m		Interchange Structure Number						
Overall Str. Width	40.4	m		Min. Vertical Clearance		m				
Total Deck Area	145.8	sq. m		Special Routes:	Transit		Truck	x		
					School		Bicycle			
Roadway Width	23.6	m		Detour Length Around Bridge	4.2	km				
Skew Angle	20.0	Degrees		Direction of Structure	N/S					
No. of Spans	1.0			Fill on Structure	1.1	m				
Span Lengths	Total = 3.1 (1) = 3.1;	m								

Historical Data:

Year Built	1975	Year of Last Major Rehab.	2005
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	5.0
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)

Repaired and extended in 2005 for the Hwy #3 and Hwy 401 improvements including jacketing of footings.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	25.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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:			
Monitoring Crack Widths:		x	

Investigation Notes:
Cracks at the deck soffit shall be moniotored for degredation.

Overall Structure Notes:				
Recommended Work on Structure:	☐ None	☐ Maintenance	☐ Minor Rehab.	☐ Replace
			x Major Rehab.	
Timing of Recommended Work:		☐ 1 to 5 years	x 6 to 10 years	
Overall Comments:	Recommended rehabilitation work includes: replacement of waterproofing, concrete patch repairs and crack injection to the original culvert structure.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	3.6 m		
Element Name:	Wearing surface		**Width:**	23.6 m		
Location:	Top of Deck		**Height:**			
Material:	Asphalt		**Count:**			
Element Type:			**Total Quantity:**	85.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	73.6	11.3	0.0	0.0	

Comments:
Road repaved in recent years.

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

Element Group:	Barriers		**Length:**	55.0 m		
Element Name:	Railing System		**Width:**			
Location:	West Road Edge		**Height:**			
Material:	Steel		**Count:**			
Element Type:	Single Rail (Steel Beam, and Post)		**Total Quantity:**	55.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	55.0	0.0	0.0	

Comments:

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

Element Group:	Barriers		**Length:**			
Element Name:	Posts		**Width:**			
Location:	West Road Edge		**Height:**			
Material:	Steel		**Count:**	27		
Element Type:			**Total Quantity:**	27 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	27	0	0	

Comments:
Eight (8) wood posts with wood offsets, fifteen (15) steel posts with wood offsets, and four (4) steel posts and plastic offsets are used.

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

Element Data

Element Group:	Barriers		**Length:**	75.0 m		
Element Name:	Railing System		**Width:**			
Location:	East Road Edge		**Height:**			
Material:	Steel		**Count:**			
Element Type:	Single Rail (Steel Beam, and Post)		**Total Quantity:**	75.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	75.0	0.0	0.0	
Comments:						

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

Element Group:	Barriers		**Length:**			
Element Name:	Posts		**Width:**			
Location:	East Road Edge		**Height:**			
Material:	Var.		**Count:**	39		
Element Type:			**Total Quantity:**	39 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	38	0	1	

Comments:
Eight (8) wood posts with wood offsets, twenty-four (24) steel posts with wood offsets, and seven (7) steel posts with plastic offsets are used. **NE Corner**: One (1) wood post was damaged and disconnected from the guardrail system.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years	x	Urgent		1 year		2 year
					Repair poor condition elements.					

Element Group:	Culverts		**Length:**	3.1 m		
Element Name:	Barrels - Soffit - New Section		**Width:**	Var. m		
Location:	East/West Ends		**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:	Rigid R.C frame		**Total Quantity:**	68.2 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	68.2	0.0	0.0	

Comments:
22.0m was extended to the old bridge section. **E End**: 14.3m and; **W End**: 7.7m.

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

Element Data

Element Group:	Culverts		**Length:**	3.1 m		
Element Name:	Barrels - Soffit - Original Section		**Width:**	18.5 m		
Location:	Intermediate section		**Height:**			
Material:	Cast-in-place concrete		**Count:**			
Element Type:	Non-Rigid R.C frame		**Total Quantity:**	57.4 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	24.7	21.8	10.9	

Comments:
Two (2) wide and (5) Med. Cracks observed in the soffit with efflorescence and/or corrosion staining. 4 cracks were sealed in previous works. **W End**: Severe delamination was observed on the original section across the soffit.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Monitor cracks. Concrete maintenance likely in 1-5 years					

Element Group:	Culverts		**Length:**	40.5 m		
Element Name:	Barrels - Vertical Walls		**Width:**			
Location:	North/South		**Height:**	2.0 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Reinforced concrete		**Total Quantity:**	162.0 Sq.m		
Environment:	Benign		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	64.8	93.2	2.0	2.0	

Comments:
Light scaling and light scour throughout, 2 wide cracks (injected) observed in wall. One (1) wide vertical crack was observed in the new footing jacket (0.8x0.25m). **N Wall:** Light delamination and 2 medium vertical cracks through jacketing observed.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			
		1-5 years		6-10 years		Urgent		1 year	x	2 year
					Monitor cracks. Concrete maintenance likely in 1-5 years					

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	1	0	

Comments:
Minor debris build up was observed in the waterway, excessive vegetation.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			
		1-5 years		6-10 years		Urgent	x	1 year		2 year
					Remove debris, and complete regular maintenace for the waterway.					

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:
Steep embankments. **W End**: 1.0m Dia. and 0.6m Dia. CSP drain into the embankment.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:	Hand laid Rip-Rap		**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:

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

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:	All four corners		**Height:**			
Material:			**Count:**	3		
Element Type:	Var.		**Total Quantity:**	3 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	3	0	0	

Comments:
Two (2) hazard marker signs and one (1) yield sign were observed to be in good condition. **NE and SE Corners**: no marker signs present.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent	x	1 year		2 year
Add object markers.										

Element Data

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing surface		**Width:**	23.6 m		
Location:	North/South Approach		**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	283.2 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform. Deficiencies
Condition	Units	Exc.	Good	Fair	Poor	
Data:	**Sq.m** / m / each / % / all	245.4	37.8	0.0	0.0	

Comments:
Road repaved in recent years.

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

Site Photos

Description
Road over the bridge. (Looking Southwest)

Description
North approach. (Looking Northeast)

Site Photos

Description
South approach. (Looking East)

Description
Centreline of the road wearing surface approximately at midpsan of the culvert.

Site Photos

Description
E.B.L wearing surface (Looking NE)

Description
Pavement joint on the deck and approach wearing surfaces. (Looking NE)

Site Photos

Description
Wearing surface over the structure deck (Looking SE)

Description
Settled, rotated post of railing system at the north-east corner, (Looking Northeast)

Site Photos

Description
Missing hazard marker sign at NE corner (Looking Southwest)

Description
East Elevation (Looking North).

Site Photos

Description
Inside the bridge, showing the non-rigid original section of the bridge with jacketed footings, as well as the new rigid frame section extention. (Looking Northwest)

Description
Typical delamination, cracking with staining at deck soffit within the original section of the bridge.

Site Photos

Description
Typical cracking with stain at deck soffit. (Looking Northwest)

Description
Cracks extending at from the deck soffit to the abutments at the north abutment wall.

Site Photos

Description
Waterway at west extent. (Looking West)

Description
Waterway at east extent. (Looking Southeast)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1021

Inventory Data:

Structure Name	Pike Creek at Twelfth Concession Road Culvert								
Main Hwy/Road #		On [x] Under [ ]	Crossing Type:	Navig. Water [ ] Rail [ ]		Non-Navig. [x] Road [ ]		Ped. [ ] Other [ ]	
Hwy/Road Name	Twelfth Concession Road (closed to traffic - walking path)								
Structure Location	Pike Creek at Twelfth Concession Road (South of Baseline Road in Pike Creek Park)								
Latitude	42° 15' 1.4"		Longitude	-82° 52' 58.7"					
Owners	Town of Tecumseh		Heritage Designation	Not Consid: [ ] Desig./not list [ ]		Cons/not App. [ ] Desig & List [ ]		List/n.d. [ ]	
MTO region			Road Class:	Freeway [ ] Collector [ ]		Arterial [ ] Local [x]			
MTO District			Posted Speed	N/A		No. of Lanes	1		
Old County			AADT	0		% Trucks			
Geographic Twp.	Tecumseh (form. Sandwich South)		Inspection Route Sequence						
Structure Type	Corrugated Steel Pipe Arch		Interchange Number						
Total Deck Length	6.5 m		Interchange Structure Number						
Overall Str. Width	11.8 m		Min. Vertical Clearance		m				
Total Deck Area	76.7 sq. m		Special Routes:	Transit [ ] School [ ]		Truck [ ] Bicycle [ ]			
Roadway Width	3.7 m		Detour Length Around Bridge	N/A km					
Skew Angle	0.0 Degrees		Direction of Structure	N/S					
No. of Spans	1.0		Fill on Structure	0.6 m					
Span Lengths	Total = 6.5 (1) = 6.5; m								

Historical Data:

Year Built	1965	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 31, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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:
Monitor the minor deformation of the CSP section.

Overall Structure Notes:				
Recommended Work on Structure:	☐ None	x Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Minor deformation was observed at the CSP section, number of missing bolts. Maintenance to improve the erosion protection is required for embankments. Install object markers.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	6.5 m		
Element Name:	Wearing surface		**Width:**	3.7 m		
Location:			**Height:**			
Material:	Compacted granular		**Count:**			
Element Type:			**Total Quantity:**	24.0 Sq.m		
Environment:	Severe		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	24.0	0.0	0.0	

Comments:
Compacted granular fill approximately 300mm thick. More fill required.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Refer to original design documents or engineering analysis for fill				

Element Group:	Culverts		**Length:**	6.5 m		
Element Name:	Barrels		**Width:**	11.8 m		
Location:			**Height:**	3.5 m		
Material:	Corrugated steel		**Count:**	1		
Element Type:	Pipe Arch		**Total Quantity:**	180.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	140.0	35.0	5.0	

Comments:
Minor buckling along fasteners at top of CSPA, minor dents and deformations also observed. Approximately ten (10) bolts were missing at random locations. Light corrosion above spring line. **S End:** Exposed bottom section was

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	2		
Element Type:			**Total Quantity:**	2 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	2	0	

Comments:
Minor erosion of downstream banks. Debris build up downstream.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent		1 year	x 2 year
					Improve erosion control.				

Element Data

Element Group:	Embankments & Streams		**Length:**				
Element Name:	Embankments		**Width:**				
Location:			**Height:**				
Material:			**Count:**	5			
Element Type:			**Total Quantity:**	5 each			
Environment:			**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	5	0		

Comments:
Steep embankments with signs of erosion. Large concrete pieces at each corner

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

Element Group:	Signs		**Length:**				
Element Name:	Signs		**Width:**				
Location:			**Height:**				
Material:			**Count:**	0			
Element Type:			**Total Quantity:**	0 each			
Environment:			**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	0	0		

Comments:
No sign present. Object marker signs should be installed as the path is still utilized by maintenance vehicles and farm equipment.

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

Site Photos

Description
Road over the bridge. (Looking North)

Description
Road over bridge, and east Outlet. (Looking South)

Site Photos

Description
West elevation. (Looking West)

Description
Bridge barrel. (Looking West)

Site Photos

Description
Bridge barrel. (Looking West)

Description
Missing bolts in CSP joints.

Site Photos

Description
North springline (Looking West)

Description
Minor deformation in structure barrel.

Site Photos

Description
Water flowing from south at east end. (Looking South)

Description
Water flowing towards north at east end. (Looking North)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1028

Inventory Data:

Structure Name	East Townline Drain at St. Thomas Street Bridge								
Main Hwy/Road #		On	x	Crossing Type:	Navig. Water		Non-Navig.	x	Ped.
		Under			Rail		Road		Other
Hwy/Road Name	St. Thomas Street								
Structure Location	At intersection with Manning Road								
Latitude	42° 19' 10.6"	Longitude	-82° 52' 7.9"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:		Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local	x			
MTO District		Posted Speed	40	No. of Lanes	2				
Old County		AADT	2000	% Trucks					
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Rigid Frame	Interchange Number							
Total Deck Length	5.4 m	Interchange Structure Number							
Overall Str. Width	30.5 m	Min. Vertical Clearance		m					
Total Deck Area	164.7 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	20.0 m	Detour Length Around Bridge	1.4 km						
Skew Angle	0.0 Degrees	Direction of Structure	E/W						
No. of Spans	1.0	Fill on Structure	0.6 m						
Span Lengths	Total = 4.8 (1) = 4.8; m								

Historical Data:

Year Built	1975	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

In July 2016, a 36x5100x2500 steel plate was added on the deck surface over top of the region of severe deterioration (based on soffit condition). It is understood this bridge is scheduled to be replaced with the 2nd phase of the Manning Road improvements in 2021.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	20 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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:
Deck suspect to deterioration due to condition of soffit below travelled roadway.

Overall Structure Notes:				
Recommended Work on Structure:	☐ None	☐ Minor Rehab.	☐ Major Rehab.	x Replace
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Replacement warranted. The Town of Tecumseh has scheduled this structure to be replaced by an enclosed storm water sewer within the second phase of the Manning Road improvements in 2021.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	5.4 m			
Element Name:	Wearing Surface		**Width:**	20.0 m			
Location:			**Height:**				
Material:	Asphalt		**Count:**				
Element Type:			**Total Quantity:**	108.0 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	76.0	16.0	16.0		

Comments:
Two wide transverse cracks over the culvert section and wide central crack extending from pavement joint to the east approach. New asphalt patch from 2016 steel plate rehab.

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

Element Group:	Decks		**Length:**	5.4 m					
Element Name:	Deck Top		**Width:**	30.5 m					
Location:	Top of Deck		**Height:**						
Material:	Cast-in-place concrete		**Count:**						
Element Type:			**Total Quantity:**	164.7 Sq.m					
Environment:	Moderate		**Limited Inspection**		x				
Protection System:								Perform.	
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies	
Data:	**Sq.m** / m / each / % / all	0.0	109.7	27.5	27.5				

Comments:
Deck is mostly unexposed and condition was assumed based on the soffit deterioration. Steel plate install in 2016 to assist in capacity.

Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Replace structure deck, new waterproofing.									

Element Group:	Decks		**Length:**	30.5 m					
Element Name:	Soffit - Thick Slab		**Width:**	4.8 m					
Location:	Interior		**Height:**						
Material:	Cast-in-place concrete		**Count:**						
Element Type:			**Total Quantity:**	146.4 Sq.m					
Environment:	Benign		**Limited Inspection**						
Protection System:								Perform.	
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies	
Data:	**Sq.m** / m / each / % / all	0.0	105.2	20.6	20.6				

Comments:
Several regions under roadway with very severe delamination/spalling, exposed reinforcing steel with moderate to very severe corrosion. Hairline to medium cracks with efflorescence staining throughout.

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

Element Data

Element Group:	Abutments		**Length:**	30.5 m		
Element Name:	Abutment walls		**Width:**			
Location:			**Height:**	1.7 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:	Legs of rigid frame		**Total Quantity:**	103.7 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	70.7	16.5	16.5	

Comments:
Narrow to wide cracks (some sealed) with efflorescence staining and discrete locations of severe to very severe delamination observed throughout.

Recommended Work:					**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Concrete repairs.									

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:			**Height:**			
Material:			**Count:**	4		
Element Type:	Bag Mortar		**Total Quantity:**	4 each		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	3	1	

Comments:
Partial collapse and loss of slope protection material at all embankments. Curb above slope protection at NE and SE embankments have settled/failed.

Recommended Work:					**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Repair slope protection.									

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:			**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	2	2	

Comments:
Steep embankment. South-west corner is unstable. South-east embankment is collapsing. Stability under vehicular surcharge is a concern.

Recommended Work:					**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Replace retaining wall at all corners.									

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	0	1	

Comments:
Vegetative growth in the stream causes waterway blockage during the spring and summer season.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Clear vegetation to improve hydraulics.				

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	2		
Element Type:			**Total Quantity:**	2 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	0	

Comments:
No Parking sign at manning road beside the north outlet of the bridge, and STOP Sign at the interseciton.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Install Object Marker signs to meet Ontario Traffic Manual.				

Element Group:	Approaches		**Length:**	31.9 m		
Element Name:	Curb and Gutters		**Width:**	0.5 m		
Location:			**Height:**	0.2 m		
Material:	Cast-in-place concrete		**Count:**			
Element Type:			**Total Quantity:**	31.9 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	0.0	14.9	5.5	11.5	

Comments:
Cracked curbs and settlement located along Manning Road.

Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year	2 year
Repair curbs. Roadside saftey concerns.									

Element Data

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing Surface		**Width:**	12.3 m		
Location:			**Height:**	0.1 m		
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	147.6 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	97.6	25.0	25.0	

Comments:
East: Wide central and diagonal cracks, medium transverse crack at edge of Manning Rd. Settlement at NE corner.
West: Wide transverse cracks/pavement joints.

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

Element Group:	Accessories		**Length:**			
Element Name:	Utilities		**Width:**			
Location:	North Outlet		**Height:**			
Material:	Aluminium		**Count:**	2		
Element Type:			**Total Quantity:**	2 each		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	2	0	0	

Comments:
Two pipes (2 in. dia.) hung along the soffit at the bridge north outlet.
Note: Water sampling station is located at the north side of the west approach.

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

Site Photos

Description
Road over the bridge. (Looking South)

Description
Wearing at west approach. (Looking South)

Site Photos

Description
Wearing at east approach. (Looking South)

Description
New asphalt patch over top of bridge from steel plate installed in July 2016. (Looking SE)

Site Photos

Description
Settlement of curb & gutter and asphalt at NE corner of the bridge, (Looking NE)

Description
Curbs and gutter settlement at the SE side of the bridge, (Looking East)

Site Photos

Description
North elevation

Description
South elevation, excessive vegetation.

Site Photos

Description
Abutment walls and soffit (looking South).

Description
Soffit deterioration. Very severe spall with exposed and severely corroded reinforcement, severe delamination in adjacent areas.

Site Photos

Description
Soffit deterioration. Very severe spall with exposed and severely corroded reinforcement, delamination in adjacent area. Medium vertical cracks (sealed) with efflorescence staining on abutment wall near soffit deterioration.

Description
Soffit deterioration. Severe spall with exposed and severely corroded reinforcement, delamination in adjacent area. Medium vertical cracks (sealed) with efflorescence staining on abutment wall near soffit deterioration.

Site Photos

Description
Mortar bags as retaining walls at the NE side.

Description
Excessive vegetation at SW embankment and waterway.

Site Photos

Description
Embankments and waterway at north side.

Description
Embankments and waterway at south side, excessive vegetation.

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1029

Inventory Data:

Structure Name	East Townline Drain at Little River Road Bridge								
Main Hwy/Road #		On	x	Crossing	Navig. Water		Non-Navig.	x	Ped.	
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Little River Road								
Structure Location	At intersection with Manning Road								
Latitude	42° 19' 19.3"	Longitude	-82° 52' 7.4"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:		Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local	x			
MTO District		Posted Speed	50	No. of Lanes	2				
Old County		AADT	2389	% Trucks					
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Concrete Rigid Frame	Interchange Number							
Total Deck Length	5.4 m	Interchange Structure Number							
Overall Str. Width	30.5 m	Min. Vertical Clearance		m					
Total Deck Area	164.7 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	20.6 m	Detour Length Around Bridge	0.8 km						
Skew Angle	0.0 Degrees	Direction of Structure	E/W						
No. of Spans	1.0	Fill on Structure	0.6 m						
Span Lengths	Total = 4.8 (1) = 4.8; m								

Historical Data:

Year Built	1975	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

In July 2016, a 36x5100x4000 steel plate was added on the deck surface over top of a region of severe deterioration (based on soffit condition). It is understood this bridge is scheduled to be replaced with the 2nd phase of the Manning Road improvements in 2021.

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, measuring tape, measuring wheel, hammer		
Weather:	Sunny		
Temperature:	24°C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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:
Deck suspect to deterioration due to condition of soffit below road. Roadside safety review.

Overall Structure Notes:								
Recommended Work on Structure:	☐ None	☐ Minor Rehab.	☐ Major Rehab.	x Replace
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Replacement warranted. The Town of Tecumseh has scheduled this structure to be replaced by storm water sewer within the second phase of the Manning Road improvements in 2021.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks			**Length:**	5.4 m			
Element Name:	Wearing Surface			**Width:**	20.6 m			
Location:	Top of Deck			**Height:**				
Material:	Asphalt			**Count:**				
Element Type:				**Total Quantity:**	111.3 Sq.m			
Environment:	Moderate			**Limited Inspection**				
Protection System:								Perform.
Condition	Units	Exc.	Good	Fair	Poor			Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	65.9	22.7	22.7			

Comments:
Two wide transverse cracks - one full length of deck, one partially repaired during previous 2016 steel plate installation.

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

Element Group:	Decks			**Length:**	5.4 m					
Element Name:	Deck Top			**Width:**	30.5 m					
Location:				**Height:**						
Material:	Cast-in-place concrete			**Count:**						
Element Type:				**Total Quantity:**	164.7 Sq.m					
Environment:	Moderate			**Limited Inspection**		x				
Protection System:										Perform.
Condition	Units	Exc.	Good	Fair	Poor					Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	109.7	27.5	27.5					

Comments:
Deck is mostly unexposed and condition was assumed based on the soffit deterioration. Steel plate installed in 2016.

Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**					
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Deck replacement warranted. Structure to be replaced in 2021.										

Element Group:	Decks			**Length:**	30.5 m					
Element Name:	Soffit - Thick Slab			**Width:**	4.8 m					
Location:	Underside of Deck			**Height:**						
Material:	Cast-in-place concrete			**Count:**						
Element Type:				**Total Quantity:**	146.4 Sq.m					
Environment:	Benign			**Limited Inspection**						
Protection System:										Perform.
Condition	Units	Exc.	Good	Fair	Poor					Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	98.6	23.9	23.9					

Comments:
Narrow to wide cracks with efflorescence staining throughout. Several areas under roadway with moderate to very severe spalling, exposed and very severely corroded reinforcing steel.

Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**					
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Deck replacement warranted. Structure to be replaced in 2021.										

Element Data

Element Group:	Abutments		**Length:**	30.5 m			
Element Name:	Abutment walls		**Width:**				
Location:	East/West Abutment		**Height:**	1.1 m			
Material:	Cast-in-place concrete		**Count:**	2			
Element Type:	Reinforced concrete		**Total Quantity:**	67.1 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	52.9	7.1	7.1		

Comments:
Narrow to wide cracks with efflorescence staining throughout, some previously repaired (sealed).

Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Seal cracks. Structure to be replaced in 2021.									

Element Group:	Embankments & Streams		**Length:**				
Element Name:	Slope Protection		**Width:**				
Location:	All four Quadrants		**Height:**				
Material:			**Count:**	4			
Element Type:	Bag mortar		**Total Quantity:**	4 each			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	3	1		

Comments:
Partial total collapse and loss of slope protection material at all embankments. Curb above slope protection at NE and SE have settled, sections of SE have failed.

Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Repair slope protection.									

Element Group:	Embankments & Streams		**Length:**				
Element Name:	Embankments		**Width:**				
Location:			**Height:**				
Material:			**Count:**	4			
Element Type:			**Total Quantity:**	4 each			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	3	1		

Comments:
Steep embankments. SE and NE corners are unstable and vehicular surcharge is a concern.

Recommended Work:		Rehab	x	Replace	**Maintenance Needs:**				
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Replace retaining wall at SE and NE corners.									

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1	all	
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	1	0	

Comments:
Vegetative growth in the stream causes water way blockage during the spring and summer season.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Clear vegetation if affecting hydraulics.				

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:	Stop Sign		**Total Quantity:**	1	each	
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	1	0	0	

Comments:
Stop sign at the intersection. No object markers present.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**				
		1-5 years		6-10 years		Urgent	x	1 year	2 year
					Install Object Marker signs to meet the Ontario Traffic Manual.				

Element Group:	Approaches		**Length:**	6.0	m	
Element Name:	Wearing Surface		**Width:**	12.4	m	
Location:	East/West Approaches		**Height:**	0.1	m	
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	148.8	Sq.m	
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	122.4	13.2	13.2	

Comments:
East: Two wide longitudinal cracks extend to Manning Rd (one partially repaired by 2016 rehab) Settlement at both corners.
West: Medium transverse crack along the road width. Light settlement at pavement joint.

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

Element Data

Element Group:	Approaches		**Length:**	31.0 m		
Element Name:	Curb and Gutters		**Width:**	0.45 m		
Location:	East/West Approaches		**Height:**	0.15 m		
Material:	Cast-in-place concrete		**Count:**			
Element Type:			**Total Quantity:**	31.0 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform. Deficiencies
Condition	Units	Exc.	Good	Fair	Poor	
Data:	Sq.m / **m** / each / % / all	0.0	14.0	5.0	12.0	

Comments:
Cracked curbs and settlement located along Manning Road. Curbs at SE have failed.

Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**					
	x	1-5 years		6-10 years		Urgent		1 year		2 year
Repair curbs for roadside safety.										

Site Photos

Description
Wearing at west approach. (Looking West) New asphalt patch on south side of road from steel plate install in July 2016.

Description
Wearing at east approach. (Looking North)

Site Photos

Description
Wearing surface over the culvert (Looking South)

Description
Curbs and gutter at north side of the bridge (Looking North)

Site Photos

Description
North elevation. Excessive vegetation.

Description
South elevation.

Site Photos

Description
Culvert soffit with very severe spalling and very severely corroded reinforcement. Severe delamination in surrounding regions. Medium vertical crack with efflorescence staining on abutment wall.

Description
Culvert soffit with very severe spalling and very severely corroded reinforcement. Very severe delamination in surrounding regions. Wide vertical crack with efflorescence staining on abutment wall. Steel plate placed on deck over this area in 2016.

Site Photos

Description
Medium cracking on soffit and abutment wall with efflorescence and corrosion staining. Area of severe delamination extending from crack.

Description
Very severe soffit spalling, reinforcement corrosion and delamination. A 36x5100x4000 steel plate was installed above this location in the 2016 rehabilitation.

Site Photos

Description
Mortar bags used as retaining walls at the NE side. Excessive vegetation in waterway.

Description
South-west embankment and retaining walls.

Site Photos

Description
Embankments and waterways at north side. Excessive vegetation.

Description
Embankments and waterways at south side.

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 2001

Inventory Data:

Structure Name	Townline Road Drain at Eighth Concession Road Bridge								
Main Hwy/Road #		On	x	Crossing Type:	Navig. Water		Non-Navig.	x	Ped.
		Under			Rail		Road		Other
Hwy/Road Name	Eighth Concession Road								
Structure Location	At intersection with County Road 8								
Latitude	42° 10' 56.3"	Longitude	-82° 57' 0.4"						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:	x	Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local	x			
MTO District		Posted Speed	Not Posted		No. of Lanes	2			
Old County		AADT	426		% Trucks				
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Corrugated Steel Pipe Arch	Interchange Number							
Total Deck Length	3.1 m	Interchange Structure Number							
Overall Str. Width	25.5 m	Min. Vertical Clearance		m					
Total Deck Area	79.1 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	11.0 m	Detour Length Around Bridge	9.3 km						
Skew Angle	0.0 Degrees	Direction of Structure	N/S						
No. of Spans	1.0	Fill on Structure	0.6 m						
Span Lengths	Total = 3.1 (1) = 3.1; m								

Historical Data:

Year Built	2012	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	
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)

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	25.0 °C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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:

Deformations and settlement of the CSP section should be monitored.

Overall Structure Notes:				
Recommended Work on Structure:	☐ None	x Maintenance	☐ Minor Rehab.	☐ Replace
			☐ Major Rehab.	
Timing of Recommended Work:		x 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Asphalt surface at structure requires maintenance or repaving. Spalling of grout around CSP at both the inlet and outlet should be repaired. Clear vegetation during summer months as necessary.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	3.1 m			
Element Name:	Wearing surface		**Width:**	11.0 m			
Location:	Top of Deck		**Height:**				
Material:	Asphalt		**Count:**				
Element Type:			**Total Quantity:**	34.1 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	31.1	3.0	0.0		

Comments:
W Side: Edge cracking (0.3 m x 5.5 m), sealed.
E Side: Medium to severe edge cracking was observed (1.5x2m).

Recommended Work:	x	Rehab		Replace	**Maintenance Needs:**					
		1-5 years	x	6-10 years		Urgent		1 year		2 year
Wearing surface condition over culvert is typical of surrounding asphalt on CR8 & 8th Concession. Asphalt resurfacing recommended with next road reconstruction project.										

Element Group:	Culverts		**Length:**	25.5 m			
Element Name:	Barrels		**Width:**	3.1 m			
Location:			**Height:**	1.8 m			
Material:	Corrugated steel		**Count:**	1			
Element Type:	Pipe Arch		**Total Quantity:**	200.0 Sq.m			
Environment:	Benign		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	28.0	147.0	15.0	10.0		

Comments:
Transverse culvert joints distorted and leaking, medium corrosion at springline, and severe corrosion below outlet pipes in barrel walls. Apparent sagging in top of culvert under roadway.

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

Element Group:	Culverts		**Length:**	8.7 m			
Element Name:	Inlet Component		**Width:**	2.4 m			
Location:	West Inlet		**Height:**				
Material:			**Count:**	1			
Element Type:	Pre-cast concrete blocks		**Total Quantity:**	20.9 Sq.m			
Environment:	Moderate		**Limited Inspection**				
Protection System:							Perform.
Condition	Units	Exc.	Good	Fair	Poor		Deficiencies
Data:	**Sq.m** / m / each / % / all	12.5	3.9	3.0	1.5		

Comments:
Severe spalling of grout was observed from the CSP inlet (3x0.25m). Joint separation of units and cracking of grout. Precast units appear to be rotating (in plan view).

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent	x	1 year		2 year
					Repair of grout.					

Element Data

Element Group:	Culverts		**Length:**	8.7 m		
Element Name:	Outlet Component		**Width:**	2.4 m		
Location:	East Outlet		**Height:**			
Material:			**Count:**	1		
Element Type:	Pre-cast concrete blocks		**Total Quantity:**	20.9 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	12.5	3.9	3.0	1.5	

Comments:
Severe spalling of grout was observed from the CSP inlet (3x0.25m). Joint separation of units and cracking of grout.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent	x	1 year		2 year
					Repair of grout.					

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	0	1	0	

Comments:
Excessive vegetation in waterway.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**					
		1-5 years		6-10 years		Urgent	x	1 year		2 year
					Clear vegetation as required.					

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	4	0	

Comments:
Steep vegetated embankments with rip-rap erosion protection at each corner. SE embankment in close proximity to CR-8 roadway.

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope Protection		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	

Comments:

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

Element Group:	Signs		**Length:**			
Element Name:	Signs		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:	Stop Sign		**Total Quantity:**	1 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	1	0	0	

Comments:
Sign located at the intersection at wood post.

Recommended Work:	Rehab	Replace	**Maintenance Needs:**		
	1-5 years	6-10 years	Urgent	x 1 year	2 year
			Install object markers or delineators to improve roadside safety at south corners.		

Element Group:	Approaches		**Length:**	6.0 m		
Element Name:	Wearing Surface		**Width:**	11.0 m		
Location:	North/South Approaches		**Height:**			
Material:	Asphalt		**Count:**	2		
Element Type:			**Total Quantity:**	132.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	49.0	58.0	25.0	

Comments:
N Approach: Medium to severe edge cracking and medium transverse joint crack extending entire road width (1.0x5.0m & 11.0x0.25).
S Approach: Medium to wide edge and alligator cracking, sealed (10.0x2.0m and 1.0x1.0m, respectively). Settlement at SE corner.

Recommended Work:	x Rehab	Replace	**Maintenance Needs:**		
	1-5 years	x 6-10 years	Urgent	1 year	2 year
Wearing surface condition over culvert is typical of surrounding asphalt on CR8 & 8th Concession. Asphalt resurfacing recommended with next road reconstruction project.					

Site Photos

Description
Road over the bridge. (Looking South)

Description
Wearing surface at north approach.

Site Photos

Description
Wearing surface at south approach. (Looking East)

Description
Alligator cracking of wearing surface at southeast corner (Looking West)

Site Photos

Description
Culvert barrel

Description
West Elevation (Looking North) Excessive vegetation

Site Photos

Description
East Elevation (Looking North) Excessive vegetation

Description
Headwall joint at East elevation. Signs of precast block movement.

Site Photos

Description
Waterway, embankments and vegetation (Looking East).

Site Photos

Description
Waterway, embankments and vegetation (Looking West).

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1

Inventory Data:

Structure Name	Lakewood Park Pedestrian Bridge								
Main Hwy/Road #		On		Crossing	Navig. Water		Non-Navig.		Ped.	x
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Manning Road (County Road 19) / Little River Blvd.								
Structure Location	Lakewood Park over Lakewood Park Channel								
Latitude	42° 19' 18.948" N	Longitude	82° 52' 3.252" W						
Owners	Town of Tecumseh	Heritage Designation	Not Consid:		Cons/not App.		List/n.d.		
			Desig./not list		Desig & List				
MTO region		Road Class:	Freeway		Arterial				
			Collector		Local				
MTO District		Posted Speed	n/a	No. of Lanes	n/a				
Old County		AADT	n/a	% Trucks	n/a				
Geographic Twp.	Tecumseh (form. Sandwich South)	Inspection Route Sequence							
Structure Type	Bowstring Pratt Truss	Interchange Number							
Total Deck Length	23.8 m	Interchange Structure Number							
Overall Str. Width	3.7 m	Min. Vertical Clearance		m					
Total Deck Area	88.1 sq. m	Special Routes:	Transit		Truck				
			School		Bicycle				
Roadway Width	N/A m	Detour Length Around Bridge	N/A km						
Skew Angle	0 Degrees	Direction of Structure	E/W						
No. of Spans	1.0	Fill on Structure	0 m						
Span Lengths	Total = 23.8 (1) = 23.8 m								

Historical Data:

Year Built	2016	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	8100.0 kg
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)

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24 ˚C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	x None	☐ Minor Rehab.	☐ Major Rehab.	☐ Replace
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years	
Overall Comments:	Maintenance: Wire brush and coat corroded welded connections and coating damage on North railing.			
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	23.5 m		
Element Name:	Deck top		**Width:**	3.0 m		
Location:	Top of Deck		**Height:**			
Material:	Wood Planks		**Count:**			
Element Type:			**Total Quantity:**	70.5 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	51.7	18.8	0.0	0.0	
Comments:						

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

Element Group:	Barriers		**Length:**			
Element Name:	Posts		**Width:**			
Location:	North/South edges		**Height:**			
Material:	Steel		**Count:**	22		
Element Type:			**Total Quantity:**	22 each		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	18	4	0	0	
Comments:						

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

Element Group:	Barriers		**Length:**	23.5		
Element Name:	Hand Railings		**Width:**			
Location:	North/South edges		**Height:**			
Material:	Steel		**Count:**	2.0		
Element Type:			**Total Quantity:**	47.0 m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	39.5	7.5	0.0	0.0	
Comments:						

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

Element Data

Element Group:	Beams/MLE's		**Length:**	3.5 m		
Element Name:	Floor Beams		**Width:**	51 mm		
Location:			**Height:**	152 mm		
Material:	Steel		**Count:**	12		
Element Type:	HSS 152 x 51 x 6.4		**Total Quantity:**	17.1 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	0.0	17.1	0.0	0.0	
Comments:						
Light corrosion was observed at weld connections to stringers and wind bracing.						

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			
		1-5 years		6-10 years		Urgent	X 1 year	2 year
					Wire brush and coat corroded welded connections			

Element Group:	Beams/MLE's		**Length:**	2.44 m		
Element Name:	Stringer		**Width:**	51 mm		
Location:			**Height:**	152 mm		
Material:	Steel		**Count:**	10		
Element Type:	HSS 152 x 51 x 6.4		**Total Quantity:**	100 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	73	27	0	0	
Comments:						

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

Element Group:	Trusses/Arches		**Length:**	23.5 m		
Element Name:	Top Chords		**Width:**	152 mm		
Location:	North/South Edges		**Height:**	152 mm		
Material:	Steel		**Count:**	2		
Element Type:	HSS 152 x 152 x 6.4		**Total Quantity:**	28.6 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	24.0	4.6	0.0	0.0	
Comments:						

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

Element Data

Element Group:	Trusses/Arches		**Length:**	23.5 m		
Element Name:	Bottom Chords		**Width:**	152 mm		
Location:	North/South Edges		**Height:**	152 mm		
Material:	Steel		**Count:**	2		
Element Type:	HSS 152 x 152 x 6.4		**Total Quantity:**	28.6 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	21.0	7.6	0.0	0.0	
Comments:						

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

Element Group:	Trusses/Arches		**Length:**	Varies m		
Element Name:	Verticals		**Width:**	51 mm		
Location:	North/South Edges		**Height:**	76 mm		
Material:	Steel		**Count:**	24		
Element Type:	HSS 76x51x4.8		**Total Quantity:**	10.5 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	7.7	2.8	0.0	0.0	
Comments:						

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

Element Group:	Trusses/Arches		**Length:**	Varies m		
Element Name:	Diagonals		**Width:**	51 mm		
Location:	North/South Edges		**Height:**	51 mm		
Material:	Steel		**Count:**	16		
Element Type:	HSS 51x51x4.8		**Total Quantity:**	10.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	7.3	2.7	0.0	0.0	
Comments:						

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

Element Data

Element Group:	Bracing		**Length:**	4.1 m		
Element Name:	Wind Bracing		**Width:**	51 m		
Location:	Underside of Deck		**Height:**	51 m		
Material:	Steel		**Count:**	10		
Element Type:	HSS 51 x 51 x 4.8		**Total Quantity:**	10 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	7	3	0	0	
Comments:						

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

Element Group:	Foundations		**Length:**			
Element Name:	Reinforced concrete caison		**Width:**	1.2 m		
Location:	East/West Ends		**Height:**	2.5 m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	4	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	0	
Comments:						

Stagnant water flow.

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

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 1

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	All Four Quadrants		**Height:**			
Material:			**Count:**	2		
Element Type:			**Total Quantity:**	2 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	2	0	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:			**Height:**			
Material:			**Count:**	2		
Element Type:	Hand laid riprap		**Total Quantity:**	2 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	2	0	0	0	
Comments:						

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

Element Group:	Approaches		**Length:**	3.7 m	8.1 m	
Element Name:	Approach Slabs		**Width:**	3.0 m		
Location:	East/West Approach		**Height:**	0.25 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	35.4 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	26.0	9.4	0.0	0.0	
Comments:						

E Approach: 3.0m x 8.1m; **W Approach**: 3.0m x 3.7m

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

Site Photos

Description
North Elevation (Looking Southeast)

Description
West approach slab (Looking East)

Site Photos

Description
Deck top (Looking East)

Description
Top chord, railing system, truss verticals and diagonals (Looking Northeast)

Site Photos

Description
Top chord, railing system, truss verticals and diagonals (Looking Southeast)

Description
Typical railing (Looking North)

Site Photos

Description
Coating damage to North railing.

Description
Underside of deck (Looking West)

Site Photos

Description
Typical corrosion at weld locations.

Description
Typical reinforced concete caisson and embankment.

Site Photos

Description
Bridge ID found on NE corner

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 2

Inventory Data:

Structure Name	Malden Road Pedestrian Bridge								
Main Hwy/Road #		On		Crossing	Navig. Water		Non-Navig.		Ped.	x
		Under		Type:	Rail		Road		Other	
Hwy/Road Name	Malden Road								
Structure Location	Over Pike Creek								
Latitude	42° 12' 46.368" N		Longitude	82° 53' 5.28" W					
Owners	Town of Tecumseh		Heritage Designation	Not Consid:		Cons/not App.		List/n.d.	
				Desig./not list		Desig & List			
MTO region			Road Class:	Freeway		Arterial			
				Collector		Local			
MTO District			Posted Speed	n/a		No. of Lanes	n/a		
Old County			AADT	n/a		% Trucks	n/a		
Geographic Twp.	Tecumseh (form. Sandwich South)		Inspection Route Sequence						
Structure Type	Pratt Truss		Interchange Number						
Total Deck Length	12.2 m		Interchange Structure Number						
Overall Str. Width	2.68 m		Min. Vertical Clearance		m				
Total Deck Area	32.7 sq. m		Special Routes:	Transit		Truck			
				School		Bicycle			
Roadway Width	N/A m		Detour Length Around Bridge	N/A km					
Skew Angle	0 Degrees		Direction of Structure	N/S					
No. of Spans	1.0		Fill on Structure	0 m					
Span Lengths	Total = 12.2 (1) = 12.2 m								

Historical Data:

Year Built	2015	Year of Last Major Rehab.	
Last OSIM Inspection	2018	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	N/A
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)

Scheduled Improvements:			
Regional Priority Number		Programmed Work Year	
Nature of Program Work:			

Appraisal Indices:		**Comments**
Fatigue	0.00	
Seismic	0.00	
Scour	0.00	
Flood	0.00	
Geometrics	0.00	
Barrier	0.00	
Curb	0.00	
Load Capacity	0.00	

Field Inspection Information:			
Date of Inspection:	July 30, 2020	Type of Inspection:	x OSIM ☐ Enhanced OSIM
Inspector:	Jeremy Wammes, E.I.T. (Dillon Consulting Limited)		
Others in Party:	Alessia Mussio, E.I.T. (Dillon Consulting Limited)		
Access Equipment Used:	Camera, Measuring tape, Measuring wheel, and Hammer		
Weather:	Sunny		
Temperature:	24.0 ˚C		

Additional Investigations Required:	Priority		
	None	Normal	Urgent
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 Structure:	x None	☐ Minor Rehab.	☐ Major Rehab.	☐ Replace
Timing of Recommended Work:		☐ 1 to 5 years	☐ 6 to 10 years	
Overall Comments:				
Date of Next Inspection:	June 2022			

Element Data

Element Group:	Decks		**Length:**	12.2 m		
Element Name:	Deck top		**Width:**	2.7 m		
Location:	Top of Deck		**Height:**			
Material:	Wood Planks		**Count:**			
Element Type:			**Total Quantity:**	32.9 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	21.9	11.0	0.0	0.0	
Comments:						

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

Element Group:	Barriers		**Length:**	12.2 m		
Element Name:	Hand Railings		**Width:**			
Location:	East/West edges		**Height:**			
Material:	Steel		**Count:**	2		
Element Type:			**Total Quantity:**	24.4 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	16.3	8.1	0.0	0.0	
Comments:						

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

Element Group:	Barriers		**Length:**	12.2 m		
Element Name:	Safety Railing		**Width:**			
Location:	East/West edges		**Height:**			
Material:	Steel		**Count:**	12.0		
Element Type:			**Total Quantity:**	146.4 m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / **m** / each / % / all	97.6	48.8	0.0	0.0	
Comments:						

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

Element Data

Element Group:	Beams/MLE's		**Length:**	2.7 m		
Element Name:	Floor Beams		**Width:**	51 mm		
Location:			**Height:**	152 mm		
Material:	Steel		**Count:**	11		
Element Type:	HSS 152 x 51 x 4.8		**Total Quantity:**	12.1 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	8.1	4.0	0.0	0.0	
Comments:						

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

Element Group:	Beams/MLE's		**Length:**	1.20 m		
Element Name:	Stringer		**Width:**	51 mm		
Location:			**Height:**	102 mm		
Material:	Steel		**Count:**	7		
Element Type:	HSS 102 x 51 x 4.8		**Total Quantity:**	70 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	47	23	0	0	
Comments:						

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

Element Group:	Trusses/Arches		**Length:**	12.2 m		
Element Name:	Top Chords		**Width:**	51 mm		
Location:	East/West Edges		**Height:**	76 mm		
Material:	Steel		**Count:**	2		
Element Type:	HSS 76 x 51 x 4.8		**Total Quantity:**	6.2 Sq.m		
Environment:	Benign		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	5.0	1.2	0.0	0.0	
Comments:						

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

Element Data

Element Group:	Trusses/Arches		**Length:**	12.2 m		
Element Name:	Bottom Chords		**Width:**	51 mm		
Location:	East/West Edges		**Height:**	76 mm		
Material:	Steel		**Count:**	2		
Element Type:	HSS 76 x 51 x 4.8		**Total Quantity:**	6.2 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	4.1	2.1	0.0	0.0	

Comments:
No coating on shoe plates.

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

Element Group:	Trusses/Arches		**Length:**	1.6 m		
Element Name:	Verticals		**Width:**	51 mm		
Location:	North/South Edges		**Height:**	76 mm		
Material:	Steel		**Count:**	22		
Element Type:	HSS 76x51x4.8		**Total Quantity:**	8.9 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	5.9	3.0	0.0	0.0	

Comments:

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

Element Group:	Trusses/Arches		**Length:**	1.9 m		
Element Name:	Diagonals		**Width:**	51 mm		
Location:	North/South Edges		**Height:**	51 mm		
Material:	Steel		**Count:**	20		
Element Type:	HSS 51x51x4.8		**Total Quantity:**	7.8 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	5.2	2.6	0.0	0.0	

Comments:

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

Element Data

Element Group:	Bracing		**Length:**	3.0 m		
Element Name:	Bracing		**Width:**	51 m		
Location:	Undeside of Deck		**Height:**	51 m		
Material:	Steel		**Count:**	10		
Element Type:	HSS 51 x 51 x 4.8		**Total Quantity:**	10 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	7	3	0	0	
Comments:						

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

Element Group:	Retaining Walls		**Length:**	1.5		
Element Name:	Concrete Retaining Blocks		**Width:**	0.8 m		
Location:	North Embankment		**Height:**	0.8 m		
Material:	Precast concrete		**Count:**	6		
Element Type:			**Total Quantity:**	6 each		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	3	3	0	0	
Comments:						

Minor settlement of block adjacent to bridge (south-most). Corrosion staining on top of blocks.

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

Element Group:	Foundations		**Length:**			
Element Name:	Reinforced concrete caison		**Width:**	0.9 m		
Location:	North/South Ends		**Height:**	2.5 m		
Material:	Cast-in-place concrete		**Count:**	4		
Element Type:			**Total Quantity:**	4 each		
Environment:	Moderate		**Limited Inspection**	x		
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	3	1	0	0	
Comments:						

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

Element Data

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Streams and Waterways		**Width:**			
Location:			**Height:**			
Material:			**Count:**	1		
Element Type:			**Total Quantity:**	1 all		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / each / % / **all**	0	1	0	0	
Comments:						

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Embankments		**Width:**			
Location:	North/South Embankment		**Height:**			
Material:			**Count:**	2		
Element Type:			**Total Quantity:**	2 each		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	1	1	0	
Comments:						

S Side: Erosion, steep embankment.

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

Element Group:	Embankments & Streams		**Length:**			
Element Name:	Slope protection		**Width:**			
Location:	North/South Embankment		**Height:**			
Material:			**Count:**	2		
Element Type:	Hand laid riprap		**Total Quantity:**	2 each		
Environment:			**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	Sq.m / m / **each** / % / all	0	0	2	0	
Comments:						

Unstable embankments.

Recommended Work:		Rehab		Replace	**Maintenance Needs:**			
		1-5 years		6-10 years		Urgent	1 year	x 2 year
					Install additional rip rap.			

Ontario Structure Inspection Manual - Inspection Form **Structure Number** 2

Element Data

Element Group:	Approaches		**Length:**	3.0 m		
Element Name:	Approach Slabs		**Width:**	3.0 m		
Location:	North/South Approach		**Height:**	0.25 m		
Material:	Cast-in-place concrete		**Count:**	2		
Element Type:			**Total Quantity:**	18.0 Sq.m		
Environment:	Moderate		**Limited Inspection**			
Protection System:						Perform.
Condition	Units	Exc.	Good	Fair	Poor	Deficiencies
Data:	**Sq.m** / m / each / % / all	12.0	6.0	0.0	0.0	
Comments:						

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

Site Photos

Description
East elevation (Looking Northwest)

Description
North approach slab (Looking South)

Site Photos

Description
Deck top (Looking South)

Description
Top chord, railing system, truss verticals and diagonals (Looking Southeast)

Site Photos

Description
Top chord, railing system, truss verticals and diagonals (Looking Southwest)

Description
Typical top chord, railing system, truss verticals and diagonals

Site Photos

Description
North approach (Looking SW)

Description
Underside of the deck (Looking South)

Site Photos

Description
Concrete caissons at North end

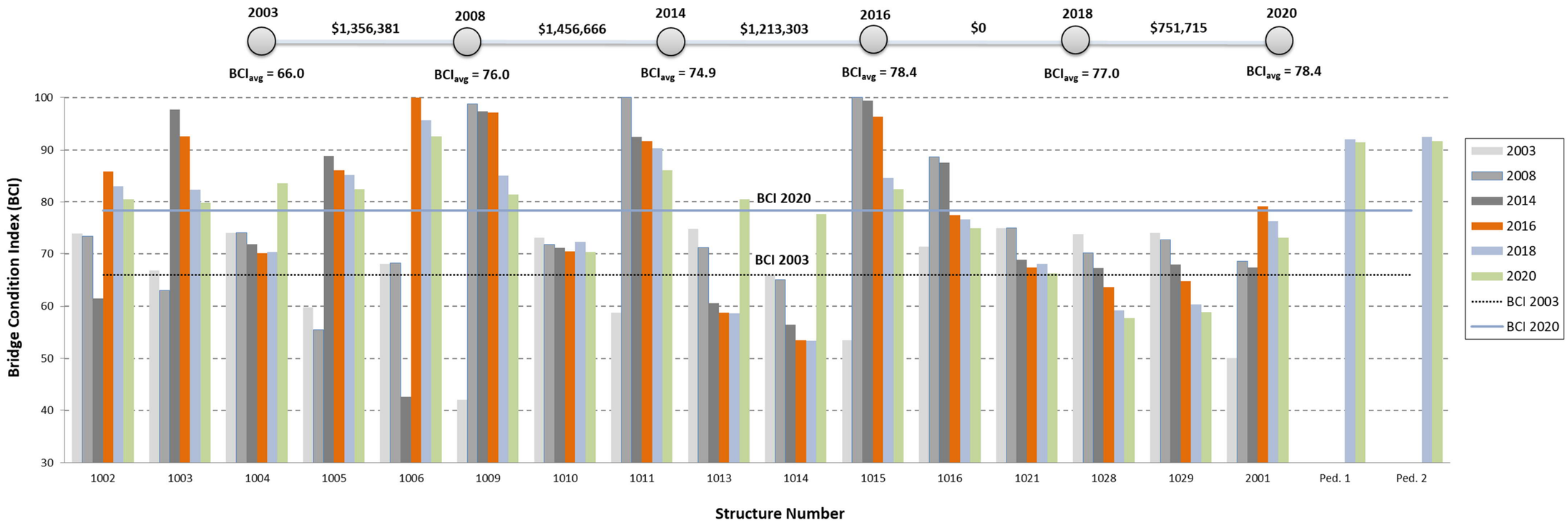
Description
CSP outlet (Looking North)

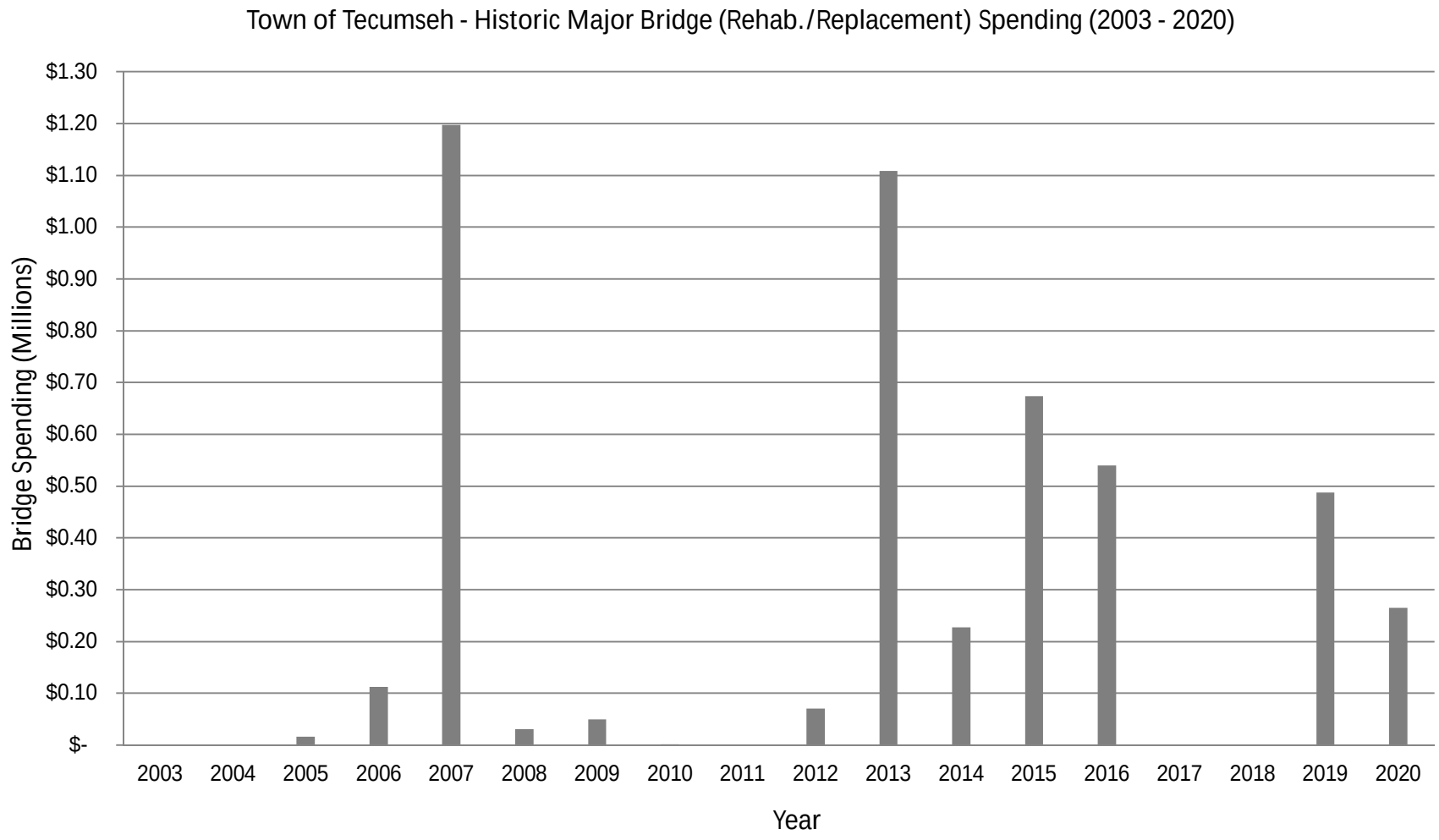
Site Photos

Description
West elevation

Description
Waterway downstream (Looking West)

Town of Tecumseh - BCI Trends





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