



BURNSIDE

2017 Municipal Bridge Inspection Report

**Township of Severn
1024 Hurlwood Lane
P.O. Box 159
Orillia ON L3V 6J3**

**R.J. Burnside & Associates Limited
3 Ronell Crescent
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**October 18, 2017
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Record of Revisions

Revision	Date	Description
-	August 24, 2017	DRAFT for Client Review
-	September 18, 2017	Final Report
1	October 18, 2017	Final Report – Revision No. 1

R.J. Burnside & Associates Limited

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Executive Summary

R.J. Burnside & Associates Limited (Burnside) was engaged by the Township of Severn to undertake the inspection of 39 municipal bridge and culvert structures. The visual inspections were carried out on an element by element basis in accordance with the Ministry of Transportation – Ontario Structure Inspection Manual (OSIM). The inspections were completed under the direction of a Professional Engineer to assess their condition and identify any material defects, performance deficiencies, maintenance needs, additional studies and/or repairs/rehabilitation work required on a structure by structure basis.

Following the field inspections, recommendations were made based on the data collected and the review of the previous Inspection Reports. Depending on the condition of each structure, the remedial needs have been provided in three classifications; routine maintenance, additional investigations and repairs and rehabilitations (Capital Works).

The routine maintenance work often requires a minimal scope of work, and in most cases can be carried out by township staff. It is anticipated that all maintenance needs identified can be addressed within the Township's routine maintenance program and will be completed within the calendar year of receiving this Report. The total estimated value of the work to be completed by the Township is **\$108,750.00**. We recommend that a general allowance to complete the works described above be included in the Township's annual road budget.

Additional studies, investigations and monitoring programs, as summarized in the table below, are recommended to structures currently demonstrating severe material defects or performance deficiencies which may necessitate an inspector to require more detailed information. These investigations have been identified based on a "normal" or "urgent" priority.

Additional Investigations

Structure No./Name	Additional Investigation	Reasoning	Estimated Cost
B-04	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
B-13	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
B-14	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
B-15	Detailed Deck Condition Survey	Confirm the condition of the deck concrete and analyze if rehabilitation is viable.	\$10,000.00
B-23	Structure Evaluation	Determine if a further load reduction is required until replacement	\$10,000.00
B-27	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
B-28	Structure Evaluation	Determine if a further load reduction is required until replacement	\$10,000.00
C-33	Monitoring Crack Widths	Determine if deficiencies are progressing	\$2,500.00
C-37	Monitoring Crack Widths	Determine if deficiencies are progressing	\$2,500.00
Total			\$80,000.00

The capital works needs include any repair, rehabilitation or replacement work which would typically be completed by a Township-hired Contractor, to assist in extending the service life of a structure and increasing the Bridge Condition Index (BCI). In accordance with the OSIM, the capital works required are based on a priority of six to ten years, one to five years, within one year, and urgent and have been estimated as follows:

Capital Works Costs and Timeframes

Time Frame	Capital Cost
< 1 year	\$3,074,000.00
1 – 5 years	\$5,308,500.00
6 – 10 years	\$5,760,500.00
TOTAL	\$14,143,000.00

It should be noted that these costs include recommended replacement costs for structures in need.

The roadside safety needs include a general allowance for guide rail and/or end treatments at all bridge locations as required. The total estimated cost for roadside safety is **\$1,227,000.00**.

Taking into consideration the structures calculated BCI's, several structures have been identified for replacement or rehabilitation. Within the next year, one (1) structure has been identified as requiring rehabilitation and three (3) structures have been identified for replacement. Within the next 1 to 5 years, eight (8) structures have been identified as requiring rehabilitation and one (1) structure has been identified for replacement.

It should be noted that all of the aforementioned estimated costs throughout this summary and the Report do not include property acquisition costs, road work beyond the wingwalls, and HST.

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been engaged by the Township of Severn to undertake the inspection of 39 municipal road bridge and culvert structures over the span of 3.0 m. The inspections have been completed in accordance with the Ministry of Transportation – Ontario Structure Inspection Manual (OSIM). Inspection of the Township's bridges and culverts are required every two years, and are to be performed under the direction of a Professional Engineer, to assess the condition and identify any additional studies or repairs required. A map showing the location of all structures has been provided in Appendix C.

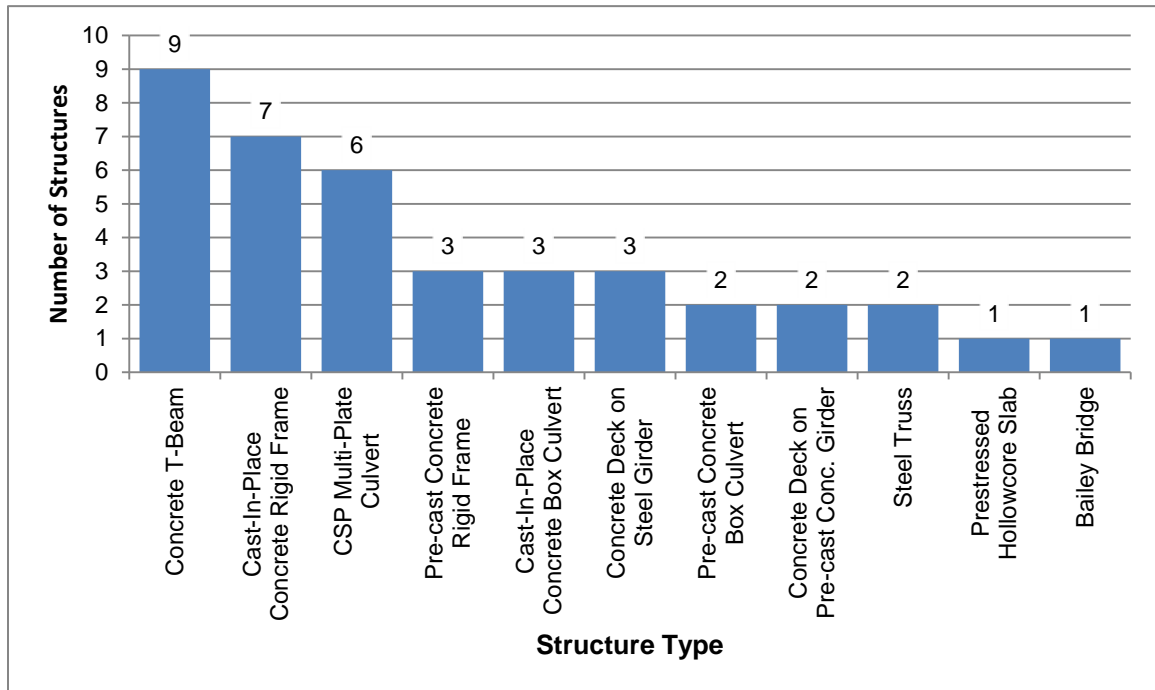
Burnside staff conducted a detailed element by element visual assessment of each bridge/culvert in order to identify any material defects, performance deficiencies and maintenance needs on a structure by structure basis. All data collected has been documented on the OSIM forms and provided in digital format in Appendix D. In addition, a brief written overview has been provided to clarify the OSIM data.

2.0 Inspection Observations and Recommendations

The following observations and recommendations were made during our recent inspection of the Township's structures. These inspections, along with a review of the previous Reports have contributed to the recommendations provided.

The Township of Severn has an inventory of 39 structures, which is comprised of a variety of structure types. Figure 1 below summarizes the number and types of structures within the inventory.

Figure 1 **Types of Structures**



Depending on the condition of each structure, some level of remedial action is usually required. The recommendations for remedial work are provided in three classifications, routine maintenance, additional investigations, and repair, rehabilitation or replacement. The condition of the roadside safety measures at each site is also reviewed as part of the visual inspection of each bridge and culvert.

2.1 **Routine Maintenance**

Routine maintenance needs often require minimal effort to extend the service life of the structure. In most cases, routine maintenance can be undertaken by Township staff or locally contracted out. It is desirable to ensure that all maintenance needs identified at each structure be completed within the calendar year of receiving this Report.

Common structure defects were noted, to varying degrees, at most of the structures inspected. These common defects include:

- Minor erosion of slopes on culvert embankments and adjacent to bridge wingwalls.
- Excessive sand/granular material on deck surface due to winter maintenance or vehicle tracking.
- Clogged deck drains or lack of drainage.
- Erosion of stream banks at the water level.

- Debris collection and heavy vegetation at culvert and bridge openings.
- Minor asphalt defects (potholes, cracking).
- Lack of, damaged or improperly installed hazard warning signs.

These general defects can be addressed within the Township's routine maintenance program and these issues can be added to the Township's in-house road and structure inspection routine.

Routine bridge sweeping, washing of decks, drains, joints, bearing seat areas and girders will improve a structures service life. Removal or trimming of vegetation and addressing minor erosion concerns regularly will pre-empt more serious issues.

The total estimated value of the work to be completed by the Township is approximately **\$108,750.00**. We recommend that a general allowance to complete the works described above be included in the Township's annual road maintenance budget.

A summary of maintenance needs is provided in Appendix B, along with estimated costs to complete the work.

2.2 Additional Studies/Investigations

As per the OSIM, additional investigations or surveys may be required to further assess the condition of certain elements that may not be fully determined by a visual inspection. In many cases, where a major rehabilitation of a structure is required or planned, the completion of additional studies or investigations will assist in developing appropriate rehabilitation programs. Studies or investigations may also be required where performance deficiencies are suspected. Typical investigations that may be required include:

- Deck Condition Surveys.
- Structure Evaluations (Load Capacity).
- Monitoring of deformations, settlements and movement.
- Monitoring crack widths.

A summary of the additional investigations recommended for the Township are summarized in Table 1 below:

Table 1 Additional Investigations

Structure No./Name	Additional Investigation	Reasoning	Estimated Cost
B-04	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
B-13	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
B-14	Detailed Deck Condition Survey	Confirm condition of the deck and that rehabilitation is viable.	\$10,000.00
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B-28	Structure Evaluation	Determine if a further load reduction is required until replacement.	\$10,000.00
C-33	Monitoring Crack Widths	Determine if deficiencies are progressing.	\$2,500.00
C-37	Monitoring Crack Widths	Determine if deficiencies are progressing.	\$2,500.00
Total			\$80,000.00

A summary of recommended studies and costs is also included in Appendix B.

2.3 Roadside Safety

During our inspections, Burnside makes note of the condition and effectiveness of roadside safety measures on the approaches to the structures. Where no roadside safety systems are present, Burnside has a responsibility to identify that there should be consideration given to installing roadside safety systems, i.e., guide rail and end treatments.

Roadside safety system requirements are set out in the MTO – Roadside Safety Manual, which is a guideline provided to be used as a risk assessment tool in establishing the need, type and extent of roadside safety measures.

As is discussed in more detail in the Manual, risk management is critical in assessing the need for roadside safety installations. At some structures, and on some roadways, the

installation of guide rail systems may be seen as more of a hazard than not having a system. This may be a result of a reduction in road platform width, the ability to remove snow effectively, and the space available to place and anchor end treatments. In addition, local use of a roadway by farm equipment and the location of driveway and field entrances around structures should also be considered in determining the need and effectiveness of guide rail systems.

For the purpose of this Report, where a high level review indicated that guide rail or guiderail components would be required (apparent substandard length of need, substandard end treatments, rigid barriers on the structure, small clear zone between the edge of road and edge of structure, etc.) a general allowance for a typical guide rail system installation has been provided, however, site specific and detailed assessments of need at each structure is not included in this Report. Where the need for a guiderail system was not evident based on high level review, an allowance for an investigation into the need for guiderail was provided. The total estimated cost relating to guide rail installation or investigation is **\$1,227,000.00**.

Where recommendations have been made for installation or corrective measures, Burnside has identified that the work is to be completed within 1-5 years. However, as each site has unique characteristics relating to the requirements of guiderail, Burnside also recommends that a further investigation and risk analysis of each of the identified sites be completed by the Township within one year to classify the structures as high, medium, or low priority for guide rail installation or improvements. The study may also outline a timeline for guide rail upgrades based on annual guide rail budget.

2.4 Repair, Rehabilitation or Replacement

Recommended repair, rehabilitation or replacement work is provided on the OSIM form for each bridge and culvert. The recommended work is indicated for each element and outlines the priority and estimated construction cost. The priorities for the specified rehabilitation or replacement plans are typically identified on the OSIM forms as six to ten years, one to five years, within one year, and urgent.

The costs associated with the recommended work are based on the measured quantities of fair and poor element conditions, and unit costs for similar and recent works. In many instances, where only minor works are required, the costs for mobilization, site access and/or waterway control items (as required) are difficult to assess and may skew the costs of small-scale works. This work is often best completed by grouping similar efforts together.

For repair programs that require a number of prolonged on-site activities, we have assigned a variable general cost that may range from \$20,000.00 to \$100,000.00, to address some of the mobilization, insurance, bonding and related costs of being on-site.

Where the recommended work is the replacement of the structure, these general costs are assumed to be included in the overall replacement cost.

Construction cost estimates do not include property acquisition, extensive roadworks, or utility relocation or support as may be required during construction.

The total estimated cost for the capital works for all 39 structures within the Township, (including rehabilitation/repair and replacement costs) has been estimated as follows:

Table 2 Capital Works Costs and Timeframes

Time Frame	Capital Cost
< 1 year	\$3,074,000.00
1 – 5 years	\$5,308,500.00
6 – 10 years	\$5,760,500.00
TOTAL	\$14,143,000.00

The total, 10-year estimated capital costs, which includes the above as well as all other maintenance, additional investigation and roadside safety recommendations for structures that are not recommended for replacement or rehabilitation within the next 10 years, is \$14,827,250.00. It should be noted that all costs are based on 2017 prices and do not account for inflation. A summary of the capital works needs can be found in Appendix B.

It may not be feasible to complete all of the capital works requirements over the next 10 years, as listed in the Table above. The Township may look into deferring some of the rehabilitation work and plan for replacements based on the structure type and location. On low volume roads (less than 200 vehicles per day) the Township of Severn could explore alternative replacement options, such as replacing the existing bridge with single-lane prefabricated structures, where possible. A recommended 10 year Capital Plan has been provided in Section 5.0 below.

3.0 Bridge Condition Index

The Bridge Condition Index (BCI) for each structure has been determined based on the Ministry of Transportation Ontario (MTO) methodology followed in the MTO Document, MTO Bridge Condition index and Overall Measure of Bridge Condition, July 2009.

A new structure would have a BCI value of 100 and the value will decline over time. Monitoring the rate of decline in the BCI and comparing this with an anticipated rate of decline will provide the Township with valuable, long-term planning and asset management information. The reduction in BCI, in theory, is a function of many factors, including traffic volume, truck use, use of de-icing chemicals, exposure to the elements

and the type of structure. Each bridge will decline at its own rate, but it is reasonable to expect that the decline begins slowly and accelerates as the structure gets older.

In addition, determining an individual BCI value at any point in time will allow the Township to make estimates of expected remaining service life and or establish target BCI criteria for major rehabilitations or replacements.

The Canadian Highway Bridge Design Code has a target service life of approximately 75 years, but it is recognized that maintenance, repair, and rehabilitations will be required along the way to reach or exceed this target.

As indicated, the BCI for a structure can range from 0 to 100 and a municipal bridge and culvert infrastructure can be organized into several ranges.

Good – BCI Range 70 to 100

A bridge with a BCI greater than 70 is generally considered to be in good to excellent condition, and repair or rehabilitation work is not usually required within the next five years. Routine maintenance, such as sweeping, cleaning and washing are still recommended.

Fair – BCI Range 50 to 70

A bridge with a BCI between 50 and 70 is generally considered to be in good to fair condition. Repair or rehabilitation work recommended is ideally scheduled to be completed within the next five years. This is the ideal time to schedule major bridge repairs for larger and/or critical structures from an economic perspective. The most effective improvement in a structure's service life can be achieved by completing repairs while in this range.

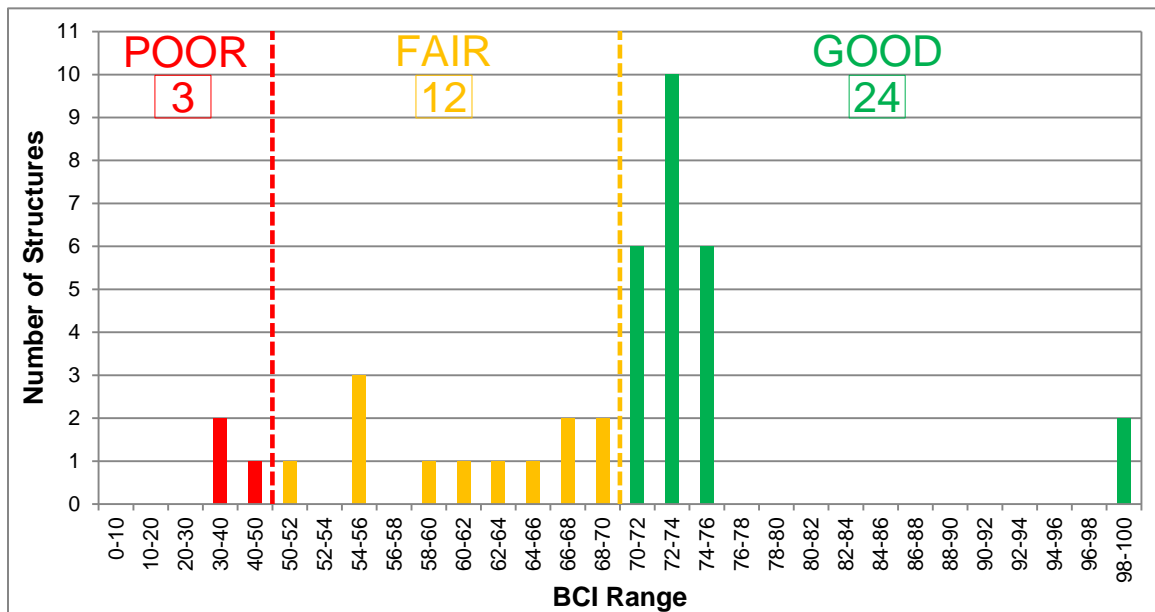
Poor – BCI Less than 50

A bridge with a BCI rating of less than 50 is generally considered poor with lower numbers representing structures nearing the end of their service life. The repair or rehabilitation of these structures is ideally best scheduled to be completed within approximately one year. However, if it is determined that the replacement of the structure would be a more viable, practical or economical solution than repairing the structure, the structure can be identified for continued monitoring and scheduled for replacement within a one to ten year range. The lower the BCI the more of a priority, within the one to ten year range, the replacement becomes.

4.0 Structure Inventory Trends

Based on the biennial inspection of each structure, the Bridge Condition Index (BCI) is calculated for each structure. The Bridge Condition Index Distribution graph, shown in Figure 2 below, provides a summary of the current state of the Township's structures.

Figure 2 Bridge Condition Index Distribution (2017)



Currently, approximately 62% of the Township's structures are within the "good" range, with 30% of the structures classified as "fair" and 8% classified as "poor", as illustrated in Figure 2 above. Of interest, the MTO has established a goal to have 85% of their structures in "good" condition (BCI \geq 70) by the year 2021, and to maintain that condition moving forward by addressing rehabilitations and replacements as necessary. Burnside recognizes that the above goal was not established by the Township, but it is noted that, based on the current state of the inspected structures, the Township does not currently meet a standard comparable to the MTO's established goal and it would be required that nine (9) or more structures be rehabilitated or replaced within the next 4 years in order for their bridge assets to meet such a goal.

However, the Township has been working to improve the overall state of their bridge asset inventory by recently completing the following Capital Works Projects:

- Bridge 18 – Laughlin Falls Road Bridge 18 Reconstruction (2017)
- Bridge 3 – Town Line Bridge Replacement (2016)
- Culvert 20 – Taylor Line Culvert Replacement (2010)

It is also noted that the Township of Severn has scheduled the Fairgrounds Road and Uthoff Line Culvert for replacement in 2017 and 2018.

Continued maintenance and completion of rehabilitative or replacement works as recommended in this Report will help to continue this trend of overall improvement of the Township's bridge assets.

The MTO has also developed theoretical deterioration curves which can be used as a backdrop to estimate the remaining service life of a structure before replacement, or to establish a time frame for future rehabilitations.

For the purposes of this Report, culverts and bridges less than 6.0 m in span are assumed not to have a rehabilitation cycle. These structures will be monitored and planned for replacement when their BCI drops below a lower limit of 40. However, even though our recommendation is to replace a structure, the costs to repair identified defects are included on the OSIM forms should the Township wish to repair these structures.

For structures with spans greater than 6.0 m, it has been assumed that a structure will be rehabilitated once (or twice depending on the size and type of structure) during its lifetime. The rehabilitations are scheduled when the structures reach a target BCI of 60. However, for certain larger, more significant bridges, rehabilitation options may still be viable for BCI's lower than 60, but these will be considered on a site by site basis.

The estimated time until replacement or rehabilitation is required has been provided and the costs for all works required in the next ten years are identified.

5.0 Prioritization and Recommended Work

As an initial measure for prioritizing any required work, the structures have been ranked using their BCI values. A summary of the structures, in ascending order of BCI, along with their associated preliminary construction costs has been included in Appendix B. Two separate summary tables have been created to identify replacement and rehabilitation priority structures.

It should be noted that although the BCI is a good measure of the overall condition of the bridge, and therefore relative construction need, other factors are often considered when programming and prioritizing bridge work. Other factors that may be considered include:

- Traffic volume and number of trucks that regularly use the road.
- Load capacity restrictions at the site.
- Geometric restrictions (alignment or width).
- Pedestrian or cycling requirements.
- History of accidents or traffic conflicts.
- History of flooding or ice problems.
- Area growth and development.
- In conjunction with already-planned road improvements.

The prioritized Capital Works Plan and associated construction costs can be used for estimating future capital budgets. The budgets and rehabilitation work plans have been provided for the Township's highest priority structures. The structures provided below have been identified as the top priority structures requiring rehabilitation work or replacement. The Township may elect to modify or alter the Plan below based upon budgets, resources, and available funding.

Table 3 Ten-Year Capital Works Plan

Year	Structure Design and Planning	Design and Planning Costs	Structure Capital Works	Capital Works Costs	Total Annual Bridge Budget
2018	B16 – Irish Line	\$100,000.00	C37 – Fairgrounds Road	\$700,000.00	\$800,000.00
2019	B23 – Jeremy Road	\$75,000.00	B16 – Irish Line	\$630,000.00	\$705,000.00
2020	C08 – Wainman Line	\$110,000.00	B23 – Jeremy Road	\$450,000.00	\$560,000.00
2021			C09 – Uthhoff Line *	\$700,000.00	\$700,000.00
2022	B21 – Foxmead Road B35 – Town Line	\$65,000.00	C08 – Wainman Line	\$2,500,000.00	\$2,565,000.00
2023	B04 – Bond Road	\$65,000.00	B21 – Foxmead Road B35 – Town Line	\$470,000.00	\$535,000.00
2024	B27 – Maple Valley	\$75,000.00	B04 – Bond Road	\$365,000.00	\$440,000.00
2025	C31 – Burnside Line	\$35,000.00	B27 – Maple Valley	\$450,000.00	\$485,000.00
2026	B13 – Hampshire Mills Road	\$50,000.00	C31 – Burnside Line	\$250,000.00	\$300,000.00
2027			B13 – Hampshire Mills Road	\$260,000.00	\$260,000.00

* Uthhoff Line Culvert capital works is being deferred to 2021 as additional investigations are currently underway by C.C. Tatham & Associates to investigate rehabilitation options. Timeline and scope of work are to be confirmed based on recommendations provided by additional investigations.

C37 Fairgrounds Road – Project to be re-tendered for construction in 2018.

B16 Irish Line – Given the high replacement value (>\$5,000,000) for this structure and the severe corrosion and section loss of the steel piles, it is recommended that a rehabilitation of the Irish Line be completed within 2 years to prevent further degradation. It is recommended to encapsulate the exposed and corroding piles, as well as replace barriers and complete required repair work noted in the inspection report.

B23 Jeremy Road – Replacement with a conventional bridge would be approximately \$1,200,000, however given that the structure is on a low volume road (< 200 vehicles per day), alternative replacement structures such as prefabricated superstructures should be considered to reduce costs.

C09 Uthhoff Line – The overall condition state of the structure has identified that the culvert should be considered for replacement within 1 year. However, the timeline and proposed work to be completed at the site shall be confirmed by the additional studies and investigations currently being carried out by the Township of Severn.

C08 Wainman Line – The cost for conventional replacement has been provided in the table above, however it is recommended that a conceptual feasibility study be completed prior to completing the repair/replacements. The study may identify more feasible repair options.

B21 Foxmead Road – Minor repair (approximately \$200,000). This Project could be used as a ‘filler’ based on actual costs of tendered work in preceding years.

B35 Town Line – Currently identified to rehabilitate, but may be more desirable to replace as part of any Town Line road reconstruction works.

B04 Bond Road – Rehabilitation planned to extend the service life of the structure.

B27 Maple Valley – Replacement with a conventional bridge would be approximately \$1,200,000, however, given that the structure is on a low volume road (< 200 vehicles per day), alternative replacement structures such as prefabricated superstructures should be considered to reduce costs.

C31 Burnside Line – Rehabilitation planned to extend the service life of the structure.

B13 Hampshire Mills Road – While this structure is located on a low-volume road, Township staff has noted that this section of roadway overtops annually during the spring freshet. Structures with low vulnerability to damage from flooding should only be considered at this site. As such, rehabilitation of the existing bridge has been recommended at this time.

6.0 Summary

The 2017 OSIM Inspections were carried out by Burnside on behalf of the Township of Severn to identify the current condition of all the structures within the Township's inventory. The Summary Reports provided in Appendix A summarize the maintenance needs, additional investigations and capital works requirements for each structure. The Capital Works for each structure has been given a priority of six to ten years, one to five years, within one year and urgent, based on the current BCI.

We trust the Summary Report provides all the information that you require at this time. If you have any questions or comments, please do not hesitate to contact us.



BURNSIDE

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Appendix A

Summary Reports

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1.1 Bridge No. 3

Structure Number	B03
Road Name:	Townline
Location:	Lot 4 Conc XIV - 1.6km S of Warminster
Structure Type:	Prestressed Hollowcore Slab
Number of Spans:	1
Span Lengths:	12 m
Overall Structure Width:	10 m
Roadway Width:	9 m
Year of Construction:	2016
Current Load Limit:	N/A
2017 Bridge Condition Index	99.9



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Handrail Maintenance	Install missing bolts / tighten bolts in handrail	\$0.00
Bridge Cleaning	Routine deck sweeping	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A	N/A	N/A	\$0.00
Total			\$0.00

Additional Comments

Bridge 3 was newly constructed in 2016 and is generally in excellent condition. Missing bolts in the railing were noted during the inspection and it is recommended that this deficiency be repaired by the Contractor during the Warranty Period. Based on the current BCI of 99.9, no work is recommended at this time. The Township should complete routine maintenance of the structure to help maximize the service life of the new structure.

1.2 Bridge No. 4

Structure Number	B04
Road Name:	Bond Road
Location:	Lot 9, Conc XIV, Washago, 0.10 km E of Highway 11
Structure Type:	Cast-In-Place Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	14.2 m
Overall Structure Width:	12.1 m
Roadway Width:	9.2 m
Year of Construction:	1960
Current Load Limit:	N/A
2017 Bridge Condition Index	68.1



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface, Flush Deck Drains	\$1,000.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Other	Remove trees from behind abutment walls	\$500.00
Total		\$2,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Detailed Deck Condition Survey	Normal	\$15,000.00
Total		\$15,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to posts, deck top, sidewalk		1 to 5 years	\$35,000.00
Type B concrete repairs to soffit		1 to 5 years	\$17,500.00
Install erosion protection		1 to 5 years	\$10,000.00
Waterproof and Pave		1 to 5 years	\$35,000.00
Replace Barrier system		1 to 5 years	\$55,000.00
Replace Deck Drains		1 to 5 years	\$25,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$120,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$47,000.00
Total			\$359,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 4 is generally in good to fair condition but is demonstrating signs of concrete deterioration, erosion and a barrier system that does not meet current standards. Based on the current BCI of 68.1, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. It is recommended that a detailed deck condition survey be completed to confirm the extent of deck defects noted and determine whether rehabilitation is a viable option. Concrete repairs, waterproofing and paving, barrier replacement and erosion protection should be included in the rehabilitation project within approximately 4 years. Consideration should also be given to installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.3 Bridge No. 5 (The Rick Hansen Bridge)

Structure Number	B05
Road Name:	Sturgeon Bay Road
Location:	0.03 km W of Coldwater Road, Coldwater
Structure Type:	TS - Cast-In-Place Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	15.2 m
Overall Structure Width:	14.2 m
Roadway Width:	10.4 m
Year of Construction:	1982
Current Load Limit:	N/A
2017 Bridge Condition Index	74.2



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Handrail Maintenance	Replace missing end caps on handrail	\$500.00
Rout and Seal	Rout and seal cracks in asphalt	\$1,000.00
Deck Drainage	Flush deck drains	\$500.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$3,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top, sidewalk		6 to 10 years	\$5,000.00
Type B concrete repairs to soffit		6 to 10 years	\$1,500.00
Type C concrete repairs to abutment walls		6 to 10 years	\$4,000.00
Waterproof and Pave		6 to 10 years	\$30,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Detours	Staged Construction for waterproof and paving, deck top repairs	6 to 10 years	\$40,000.00
Other	Engineering Fees (Assumed as ~15% of total cost)	6 to 10 years	\$22,000.00
Total			\$167,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for guide rail	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Bridge 5 is generally in good condition but is demonstrating signs of bottom up defects in the asphalt wearing surface and localized concrete defects. Based on the current BCI of 74.2, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs and waterproofing and paving should be included in the rehabilitation project within approximately 7 years. In the interim, it is recommended that the above noted maintenance items be complete and an investigation for the need of a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic be considered.

1.4 Bridge No. 6

Structure Number	B06
Road Name:	Muskoka Street
Location:	Lot 11, Conc XV, Washago, 0.10 km S of Coopers Falls Road
Structure Type:	Steel Girder with Concrete Deck
Number of Spans:	1
Span Lengths:	18 m
Overall Structure Width:	9.4 m
Roadway Width:	8.4 m
Year of Construction:	2000
Current Load Limit:	N/A
2017 Bridge Condition Index	74



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface	\$1,000.00
Rout and Seal	Repairs required to Deck Wearing Surface	\$1,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to barrier/parapet walls interior, deck top		N/A	\$2,000.00
Type C concrete repairs to wingwalls		N/A	\$13,500.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$65,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$10,000.00
Total			\$105,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 6, which was noted to have had a previous superstructure replacement, is generally in good condition but is demonstrating signs of some minor localized concrete deficiencies. Based on the current BCI of 74.0, the size of the structure, and given the structure has already undergone a major rehabilitation, an additional rehabilitation is not recommended and replacement should be considered as the BCI approaches 40, in approximately 23 years at a cost of \$1,100,000. In the interim, consideration should also be given to replacing the steel beam guide rail system, end treatments and structure connections, as the current guide rail does not appear to meet current standards based on the length and buried end treatments.

1.5 Bridge No. 7

Structure Number	B07
Road Name:	Bayou Road
Location:	Lot 3, Conc IX, 0,10 km N of Westchore Cres
Structure Type:	Precast Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	10 m
Overall Structure Width:	6.9 m
Roadway Width:	4.7 m
Year of Construction:	1990
Current Load Limit:	N/A
2017 Bridge Condition Index	74.6



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Handrail Maintenance	Replace missing end cap on handrail	\$500.00
Erosion Control	Repairs required to Embankments,	\$2,500.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$4,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to barrier/parapet walls interior, curbs, sidewalk,		6 to 10 years	\$1,000.00
Type C concrete repairs to abutment walls,		6 to 10 years	\$1,500.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$10,000.00
Total			\$92,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 7 is generally in good condition but is demonstrating signs of localized concrete defects and the guide rail system on the approaches does not meet current standards. Based on the current BCI of 74.6, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs and erosion protection should be included in the rehabilitation project within approximately 9 years. However, given the narrow, sub-standard driving platform width, consideration may be given to forgoing the rehabilitation and scheduling the replacement of the structure within 19 years at a price of approximately \$750,000. It is recommended that the guide rail system be replaced with steel beam guide rail system complete with end treatments and structure connections to help protect oncoming traffic.

1.6 Bridge No. 10

Structure Number	B10
Road Name:	Woodrow Road
Location:	Lots 20/21, Conc XI, 0.20 km W of Highway 12
Structure Type:	Cast-In-Place Concrete T-Beam
Number of Spans:	3
Span Lengths:	3.75, 6.4, 3.75 m
Overall Structure Width:	5.6 m
Roadway Width:	4.6 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	70.7



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Rout and Seal	Repairs required to Deck Wearing Surface	\$500.00
Other	Remove debris from watercourse	\$1,000.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs		1 to 5 years	\$5,000.00
Type B concrete repairs to Girders, soffit		1 to 5 years	\$25,000.00
Type C concrete repairs to abutment walls, p. caps, p. piles		1 to 5 years	\$6,000.00
Waterproof and Pave		1 to 5 years	\$20,000.00
Add slope stabilization/Scour protection		1 to 5 years	\$40,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$65,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$27,500.00
Total			\$203,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install steel beam energy attenuating terminal systems at guiderail ends	1 to 5 years	\$20,000.00
Total			\$20,000.00

Additional Comments

Bridge 10 is generally in good condition but is demonstrating signs of concrete deterioration on the girders and soffit. Based on the current BCI of 70.7, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving and erosion protection should be included in the rehabilitation project within approximately 5 years. However, given the narrow, sub-standard driving platform width, consideration may be given to forgoing the rehabilitation and scheduling the replacement of the structure within 15 years at a price of approximately \$1,200,000. Consideration should also be given to repairing the steel beam guide rail system to help protect oncoming traffic.

1.7 Bridge No. 11

Structure Number	B11
Road Name:	Reinbird Street
Location:	0.01 km W of River Street
Structure Type:	Bailey Bridge
Number of Spans:	1
Span Lengths:	14.6 m
Overall Structure Width:	3.8 m
Roadway Width:	3.55 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	55.2



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Timber Repair	Replace curb connections	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type C concrete repairs to abutment walls, wingwalls		N/A	\$40,000.00
Recoating of Structural Steel (Full length) - Offsite galvanizing		N/A	\$20,000.00
Replace damaged/poor condition floor beams, bracings, top chord members		N/A	\$120,000.00
Add slope stabilization		N/A	\$8,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$120,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$55,000.00
Total			\$378,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for guide rail system	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Bridge 11 is generally in fair to poor condition and is demonstrating signs of severe section loss on the floor beams and stringers and concrete deterioration on the substructure. Based on the current BCI of 55.2, the structure has surpassed the typical threshold of being considered economically repairable and therefore the structure should be planned to be replaced within approximately 8 years, as the BCI approaches 40. Alternatively, a study into the economical feasibility of repairing the structure versus replacing it may be completed to determine the best course of action, however, given the narrow platform of this structure, replacement is likely the most desirable solution. If a rehabilitation is elected, a large number of the structural steel elements will need replacement and all the steel should be recoated. Rehabilitation should be completed within the next 1-2 years if elected. The estimated replacement cost of this structure is approximately \$1,200,000. Given that this structure is the only watercourse crossing providing access to several residences, it is intended that a replacement structure would be constructed adjacent to the existing structure. Consideration should also be given to investigating the need for installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic. It is also recommended that a structure evaluation be completed to determine whether a load limit is required based on the severe section loss at critical points of the structural members.

1.8 Bridge No. 12

Structure Number	B12
Road Name:	Mill Street, Coldwater
Location:	0.02 km W of Coldwater Road
Structure Type:	Concrete Deck on Steel Truss
Number of Spans:	1
Span Lengths:	19.5 m
Overall Structure Width:	6.7 m
Roadway Width:	4.9 m
Year of Construction:	1980
Current Load Limit:	N/A
2017 Bridge Condition Index	73.9



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type C concrete repairs to wall		6 to 10 years	\$16,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$15,000.00
Total			\$111,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for steel beam guide rail	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Bridge 12 is generally in good condition with only concrete deterioration noted on the old abutments, which now act as a retaining wall and do not support the superstructure. Based on the current BCI of 73.9, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs to the old abutments should be included in the rehabilitation project within approximately 7 years. Consideration should be given to investigating the need for installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.9 Bridge No. 13

Structure Number	B13
Road Name:	Hampshire Mills Line
Location:	2.3 km N of Cambrian Road
Structure Type:	CIP Concrete on T-Beam
Number of Spans:	3
Span Lengths:	2.9, 7.6, 2.9 m
Overall Structure Width:	4.9 m
Roadway Width:	4.2 m
Year of Construction:	1930
Current Load Limit:	14 tonnes
2017 Bridge Condition Index	66.2



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Detailed Deck Condition Survey	Normal	\$10,000.00
Total		\$10,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to curbs		1 to 5 years	\$12,000.00
Type B concrete repairs to Girders, soffit		1 to 5 years	\$45,000.00
Type C concrete repairs to abutment walls, shaft/bents		1 to 5 years	\$10,000.00
Add slope stabilization		1 to 5 years	\$15,000.00
Replace Barriers		1 to 5 years	\$45,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$65,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$40,000.00
Total			\$247,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 13 is generally in good to fair condition but is demonstrating signs of localized severe concrete deterioration on the fascia, soffit, girders and substructure. Based on the current BCI of 66.2, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. It is recommended that a detailed deck condition survey be completed to confirm the extent of defects in the deck and girders and confirm that a rehabilitation is a viable option. Concrete repairs, barrier replacement and erosion protection should be included in the rehabilitation project within approximately 3 years. However, given the narrow, sub-standard driving platform width and load posting, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 13 years at a price of approximately \$1,200,000. Consideration should also be given to installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.10 Bridge No. 14

Structure Number	B14
Road Name:	Uhthoff Line
Location:	0.4 km S of Foxmead Road
Structure Type:	CIP Concrete
Number of Spans:	1
Span Lengths:	7.6 m
Overall Structure Width:	5.5 m
Roadway Width:	4.7 m
Year of Construction:	1940
Current Load Limit:	N/A
2017 Bridge Condition Index	64.4



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top	\$1,000.00
Hazard Signs	Mount hazard warning signs on posts	\$500.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Detailed Deck Condition Survey	Normal	\$10,000.00
Total		\$10,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs		1 to 5 years	\$5,000.00
Type B concrete repairs to Girders, soffit		1 to 5 years	\$22,500.00
Type C concrete repairs to abutment walls		1 to 5 years	\$1,500.00
Waterproof and Pave		1 to 5 years	\$20,000.00
Replace barriers		1 to 5 years	\$40,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$65,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$34,000.00
Total			\$203,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 14 is generally in fair condition and has an exposed concrete deck, is demonstrating signs of concrete deterioration on the girders and soffits and has a barrier that does not meet current codes. Based on the current BCI of 64.4, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. It is recommended that a detailed deck condition survey be completed to confirm the extent of the deck and girder defects and determine whether rehabilitation is a viable option. Concrete repairs, waterproofing and paving and barrier replacement should be included in the rehabilitation project within approximately 2 years. However, given the narrow, sub-standard driving platform width, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 12 years at a price of \$600,000. Consideration should also be given to installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.11 Bridge No. 15

Structure Number	B15
Road Name:	Lawson Line
Location:	1.5 km S of Kinnear Sideroad
Structure Type:	CIP Concrete on Steel Girder
Number of Spans:	1
Span Lengths:	34.5 m
Overall Structure Width:	6.2 m
Roadway Width:	5.1 m
Year of Construction:	1980
Current Load Limit:	N/A
2017 Bridge Condition Index	74



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Routine sweeping of Deck Top	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Detailed Deck Condition Survey	Normal	\$10,000.00
Total		\$10,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		6 to 10 years	\$2,000.00
Type B concrete repairs to soffit		6 to 10 years	\$10,000.00
Type C concrete repairs to abutment walls		6 to 10 years	\$1,000.00
Steel repairs to girders - ends, diaphragms - end		6 to 10 years	\$3,000.00
Waterproof and Pave deck		6 to 10 years	\$25,000.00
Convert to semi-integral configuration		6 to 10 years	\$150,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$40,000.00
Total			\$311,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Additional Comments

Structure 15 is generally in good condition with localized concrete damage on the fascia and corrosion and minor section loss to the girder ends at the leaking expansion joint location. Based on the current BCI of 74, a major rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving of the deck to prolong the life of deck concrete and elimination of the expansion joints by conversion to semi-integral to prevent salt laden water from reaching the girder ends and causing further section loss are recommended to be completed within approximately 7 years. It is recommended that a detailed deck condition survey be completed prior to undertaking any rehabilitation work to confirm the condition of the deck concrete. Alternatively, if the Township believes the narrow platform is sub-standard, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 17 years at a price of \$2,700,000.

1.12 Bridge No. 16 - Black River Bridge

Structure Number	B16
Road Name:	Irish Line
Location:	0.1 km S of Ellis Road
Structure Type:	Precast Concrete CPCI Girder
Number of Spans:	3
Span Lengths:	12.8,13.1, 12.8 m
Overall Structure Width:	10.3 m
Roadway Width:	8.5 m
Year of Construction:	1961
Current Load Limit:	N/A
2017 Bridge Condition Index	70.4



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface	\$1,000.00
Deck Drainage	Flush deck drains	\$1,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs		1 to 5 years	\$9,000.00
Type C concrete repairs to abutment walls		1 to 5 years	\$1,500.00
Replace Barrier Railing System		1 to 5 years	\$80,000.00
Waterproof and Pave		1 to 5 years	\$65,000.00
Replace Expansion joints		1 to 5 years	\$100,000.00
Add slope stabilization		1 to 5 years	\$15,000.00
Replace bearings		1 to 5 years	\$125,000.00
Encase exposed corroded piles at abutment		1 to 5 years	\$25,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$140,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineer Fees (Assumed as ~15% of total costs)	1 to 5 years	\$100,000.00
Total			\$675,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 16 is generally in good to fair condition but is demonstrating signs of severe corrosion and section loss on the exposed piles at the north abutment, has a sub-standard barrier railing, leaking expansion joints, corroded bearing plates and localized concrete deterioration. Based on the current BCI of 70.4, a major rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving, barrier replacement, bearing replacement, expansion joint replacement and encasement of the exposed corroded piles at the north abutments should be included in the rehabilitation project. Although BCI related trends indicate a 5 year timeline, it is recommended that rehabilitation be completed within 2 years due to the potential of the noted defects to accelerate deterioration and the potential for loss of backfill material from behind the abutments. Consideration should also be given to replacing the steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.13 Bridge No. 17

Structure Number	B17
Road Name:	Lovering Line
Location:	0.1 km S of Upper Big Chute Road
Structure Type:	Steel Through Truss / T-Beams
Number of Spans:	3
Span Lengths:	4.4, 18.3, 4.4 m
Overall Structure Width:	4.8 m
Roadway Width:	4.3 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	71.8



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Other	Reverse lap direction of guide rail panels on west	\$2,500.00
Total		\$2,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top,		N/A	\$1,000.00
Type B concrete repairs to soffit,		N/A	\$1,000.00
Type C concrete repairs to p. caps,		N/A	\$25,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$65,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$17,000.00
Total			\$124,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install proper guiderail to thrie beam transitions	1 to 5 years	\$4,000.00
Total			\$4,000.00

Additional Comments

Structure 17, which was rehabilitated in 2011, is generally in good condition with only minor deficiencies noted at this time. Based on the current BCI of 71.8 and the size of the structure, an additional minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs should be included in the rehabilitation project within approximately 16 years. However, given the narrow, sub-standard driving platform width, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 27 years at a price of approximately \$2,300,000.

1.14 Bridge No. 18

Structure Number	B18
Road Name:	Laughlin Falls Road
Location:	1.3 km E of Taylor Line
Structure Type:	Concrete Slab on Steel Girder
Number of Spans:	1
Span Lengths:	18 m
Overall Structure Width:	5.75 m
Roadway Width:	5 m
Year of Construction:	2017
Current Load Limit:	N/A
2017 Bridge Condition Index	100



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A	N/A	N/A	\$0.00
Total			\$0.00

Additional Comments

Bridge 18 was recently replaced and is in excellent condition. No work is required at this time but it is recommended that routine maintenance work including cleaning of the deck and girder flanges be completed to help maximize the service life of the structure.

1.15 Bridge No. 19

Structure Number	B19
Road Name:	Kitchen Sideroad
Location:	1.4 km E of Church Line North
Structure Type:	CIP Concrete
Number of Spans:	1
Span Lengths:	7.9 m
Overall Structure Width:	4.85 m
Roadway Width:	4.05 m
Year of Construction:	1924
Current Load Limit:	13 tonnes
2017 Bridge Condition Index	50.8



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top	\$1,000.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		N/A	\$7,500.00
Type B concrete repairs to Girders, soffit		N/A	\$20,000.00
Type C concrete repairs to abutment walls		N/A	\$12,500.00
Replace Barrier system		N/A	\$25,000.00
Replace Retaining Walls		N/A	\$20,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$65,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total cost)	N/A	\$33,000.00
Total			\$198,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 19 is generally in fair to poor condition and has failing block retaining walls, a barrier railing that does not meet current standards and is demonstrating signs of concrete deterioration on the girders, soffit and abutment. Based on the current BCI of 50.8, the structure has surpassed the typical threshold of being considered economically repairable and therefore the structure should be planned to be replaced within approximately 5 years, as the BCI approaches 40. Alternatively, a study into the economic feasibility of repairing the structure versus replacing it may be completed to determine the best course of action given the location and low traffic volume. If a rehabilitation is elected, concrete repairs, barrier replacement, and retaining wall replacement should be completed within the next 1-2 years. The estimated replacement cost of this structure is \$750,000. Consideration should also be given to installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.16 Bridge No. 21

Structure Number	B21
Road Name:	Foxmead Road
Location:	0.2 km E of Uhthoff Line
Structure Type:	Precast Concrete Box
Number of Spans:	1
Span Lengths:	6.2 m
Overall Structure Width:	12.1 m
Roadway Width:	7 m
Year of Construction:	2000
Current Load Limit:	N/A
2017 Bridge Condition Index	73.1



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Waterproof and Repave Culvert, Repave approaches		1 to 5 years	\$30,000.00
Install Barrier System over structure		1 to 5 years	\$35,000.00
Construct Concrete Distribution Slab		1 to 5 years	\$15,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$40,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$20,000.00
Total			\$155,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 21 is generally in good condition but is demonstrating signs of active leakage through the joints between precast units at both the soffit and wall locations. In accordance with current codes, a concrete distribution slab should be constructed over the culvert to distribute loads amongst the precast units. Waterproofing and paving of the distribution slab will also help eliminate the active leakage through the soffit. Additionally, a barrier system over the structure and steel beam guide rail on approaches should be considered as adequate clear zone widths do not appear to be present between the travelled lane and the edge of culvert. Although the structure has a current BCI of 73.1, a minor rehabilitation consisting of the above mentioned work should be considered to be completed within the next two years to help to prevent the accelerated deterioration of the structure and prolong its service life.

1.17 Bridge No. 22

Structure Number	B22
Road Name:	Burnside Line
Location:	1.95 km S of Jeremy Road
Structure Type:	Open Footing CIP Concrete Box
Number of Spans:	1
Span Lengths:	4.9 m
Overall Structure Width:	12.1 m
Roadway Width:	6.7 m
Year of Construction:	1958
Current Load Limit:	N/A
2017 Bridge Condition Index	73.9



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type C concrete repairs to barrels,		N/A	\$5,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$20,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$11,500.00
Total			\$36,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail with long span treatment over culvert and end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 22 is generally in good condition but is demonstrating signs of localized concrete deficiencies in the barrel and does not have a barrier system or guide rail present to help protect oncoming traffic. Based on the current BCI of 73.9 and the span of 5.3m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 17 years at a cost of approximately \$550,000. In the interim, consideration should also be given to installing a steel beam guide rail system with a long span treatment over the structure and extruder end treatments to help protect oncoming traffic. The repairs listed above may be completed to help extend the lifespan of the structure.

1.18 Bridge No. 23

Structure Number	B23
Road Name:	Jeremy Road
Location:	0.2 km W of Carlyon Line
Structure Type:	CIP Concrete T-Beam
Number of Spans:	3
Span Lengths:	3.15, 6.9, 3.05 m
Overall Structure Width:	5.6 m
Roadway Width:	4.6 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	59.3



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top, Deck Drainage,	\$2,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Structure Evaluation	Normal	\$10,000.00
Total		\$10,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		N/A	\$5,000.00
Type B concrete repairs to Girders, soffit,		N/A	\$175,000.00
Type C concrete repairs to abutment walls, p. caps,		N/A	\$35,000.00
Waterproof and Pave structure		N/A	\$25,000.00
Install Retaining walls		N/A	\$30,000.00
Replace Barrier System		N/A	\$45,000.00
Install sheet piling behind abutments to prevent further backfill washout		N/A	\$20,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$70,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$75,000.00
Total			\$515,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 23 is generally in fair to poor condition and has very wide shear cracks in the main structural elements, concrete deterioration on the soffit and substructure, undermining of the abutment walls exposing piles and allowing washout of backfill material and a barrier system that does not meet current standards. Several performance deficiencies, including shear cracks noted on the bridge, are signs the structure is over stressed and no longer capable of carrying the normal loading of the bridge. Based on the shear cracks noted, and the girder BCI of 36.3 dictating the overall structure BCI, it is recommended that the structure be planned for replacement in 1-3 years.

1.19 Bridge No. 24

Structure Number	B24
Road Name:	Carlyon Line
Location:	Lot 19, Conc V/VI, 2.10 km N of Maple Valley Road
Structure Type:	Precast Concrete Box Girder
Number of Spans:	1
Span Lengths:	16.4 m
Overall Structure Width:	8.9 m
Roadway Width:	7.9 m
Year of Construction:	1980
Current Load Limit:	N/A
2017 Bridge Condition Index	72.8



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface, Deck Drainage	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to barrier/parapet walls interior, deck top, concrete end dams		6 to 10 years	\$10,000.00
Waterproof and Pave		6 to 10 years	\$30,000.00
Replace joints		6 to 10 years	\$50,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$33,000.00
Total			\$203,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 24 is generally in good condition but is demonstrating signs of leaking expansion joints, bottom up defects in the wearing surface and active leakage and efflorescence/stalactites between the girders indicating that salt laden water is penetrating through the concrete deck top. Based on the current BCI of 72.8, minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Localized concrete repairs, waterproofing and paving and expansion joint replacement should be included in the rehabilitation project within approximately 6 years. A vehicular hazard was noted due to the structure connection protruding from the concrete barrier and therefore consideration should also be given to installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.20 Bridge No. 25

Structure Number	B25
Road Name:	Carlyon Line
Location:	Lot 12, Conc V/VI, 0.50 km N of Cambrian Road
Structure Type:	Precast Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	10.5 m
Overall Structure Width:	9.2 m
Roadway Width:	8.4 m
Year of Construction:	1990
Current Load Limit:	N/A
2017 Bridge Condition Index	72.9



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		6 to 10 years	\$3,000.00
Type B concrete repairs to soffit		6 to 10 years	\$15,000.00
Waterproof and Pave Deck		6 to 10 years	\$15,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$25,000.00
Total			\$138,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 25 is generally in good condition but is demonstrating signs of moisture penetration through the joints between the precast culvert units indicating that there is egress of salt laden water through the concrete distribution slab, with no waterproofing evident on the deck. Based on the current BCI of 72.9, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving and extension of the steel beam guide rail and installation of proper end treatments to meet current standards should be included in the rehabilitation project within approximately 8 years.

1.21 Bridge No. 26

Structure Number	B26
Road Name:	Carlyon line
Location:	Lot 12, Conc V/VI, 0.90 km N of Cambrian Road
Structure Type:	Cast-In-Place Concrete Open Footing
Number of Spans:	1
Span Lengths:	4.3 m
Overall Structure Width:	9.3 m
Roadway Width:	6.2 m
Year of Construction:	1958
Current Load Limit:	N/A
2017 Bridge Condition Index	72.4



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type B concrete repairs to soffit		N/A	\$12,000.00
Type C concrete repairs to abutment walls, wingwalls		N/A	\$1,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$65,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$22,000.00
Total			\$115,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 26 is generally in good condition but is demonstrating signs of minor concrete defects on the soffit and has no barrier system present to protect oncoming traffic. Based on the current BCI of 72.4 and the span of 4.9m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 16 years at a cost of \$350,000. In the interim, consideration should be given to installing a steel beam guide rail system complete with a long span treatment over the structure and proper end treatments to help protect oncoming traffic. The repairs listed above may be completed to help extend the lifespan of the structure.

1.22 Bridge No. 27

Structure Number	B27
Road Name:	Maple Valley Road
Location:	Lot 15/16, Conc VI, 0.30 km W of Hampshire Mills Line
Structure Type:	Cast-In-Place Concrete T-Beam
Number of Spans:	3
Span Lengths:	3.85, 6.9, 3.65 m
Overall Structure Width:	4.9 m
Roadway Width:	4.1 m
Year of Construction:	1930
Current Load Limit:	14 tonnes
2017 Bridge Condition Index	63



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Detailed Deck Condition Survey	Normal	\$10,000.00
Total		\$10,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		1 to 5 years	\$2,000.00
Type B concrete repairs to Girders, soffit,		1 to 5 years	\$75,000.00
Type C concrete repairs to abutment walls, p. caps,		1 to 5 years	\$25,000.00
Waterproof structure and pave		1 to 5 years	\$25,000.00
Add retaining walls		1 to 5 years	\$40,000.00
Replace Barrier System		1 to 5 years	\$45,000.00
Install scour protection in front of abutment walls		1 to 5 years	\$10,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$65,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$52,000.00
Total			\$354,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 27 is generally in fair condition but is demonstrating signs of concrete deterioration on the girders and soffit, has a deteriorating barrier system that does not meet current standards and is beginning to show signs of scour at the abutment walls. Based on the current BCI of 63, a major rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. It is recommended that a detailed deck condition survey be completed to confirm the extents of the deck and girder defects and determine if rehabilitation is a viable option. Concrete repairs, waterproofing and paving, barrier replacement, retaining wall installation and scour protection should be included in the rehabilitation project within approximately 2 years. However, given the narrow, sub-standard driving platform width, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 12 years at a price of \$1,200,000. Consideration should also be given to installing a steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.23 Bridge No. 28

Structure Number	B28
Road Name:	Hampshire Mills Line
Location:	Lot 14, Conc VI/VII, 1.80 km N of Cambrian Road
Structure Type:	Cast-In-Place Concrete T-Beam
Number of Spans:	3
Span Lengths:	3.45, 7.45 m
Overall Structure Width:	4.9 m
Roadway Width:	4.1 m
Year of Construction:	1930
Current Load Limit:	14 tonnes
2017 Bridge Condition Index	54.2



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface	\$1,000.00
Hazard Signs	Mount hazard signs on posts at required height and distance from structure end	\$500.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Structure Evaluation	Normal	\$10,000.00
Total		\$10,000.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		N/A	\$25,000.00
Type B concrete repairs to Girders, soffit		N/A	\$90,000.00
Type C concrete repairs to abutment walls, p. caps		N/A	\$45,000.00
Install retaining walls		N/A	\$30,000.00
Replace Barrier System		N/A	\$45,000.00
Install scour protection along abutment walls		N/A	\$10,000.00
Waterproof and Pave		N/A	\$25,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$65,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$62,000.00
Total			\$412,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 28 is generally in fair to poor condition and is demonstrating signs of severe concrete deterioration on the girders, soffit, and substructure, has wide shear cracks noted on the main structural elements (girders), a deteriorating barrier that does not meet current standards and is beginning to show signs of undermining of the abutments. Based on the current BCI of 54.2, the structure has surpassed the typical threshold of being considered economically repairable and therefore the structure should be planned to be replaced within approximately 7 years, as the BCI approaches 40. Shear cracks are a sign that the structure is over stressed and a failure of the member has occurred. The structure is no longer a candidate for rehabilitation. The estimated replacement cost of this structure is \$1,200,000. A structure evaluation should be completed to determine if a further load reduction is required until replacement can be completed.

1.24 Bridge No. 29

Structure Number	B29
Road Name:	Cambrian Road
Location:	Lots 10/11, Conc V, 0.45 km W of Carlyon Line
Structure Type:	Precast Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	10.4 m
Overall Structure Width:	9.2 m
Roadway Width:	8.7 m
Year of Construction:	1980
Current Load Limit:	N/A
2017 Bridge Condition Index	71.5



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		6 to 10 years	\$3,000.00
Type C concrete repairs to abutment walls		6 to 10 years	\$1,000.00
Waterproof and Pave		6 to 10 years	\$15,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$22,500.00
Total			\$121,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail and end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 29 is generally in good condition but is demonstrating signs of moisture penetration through the joints between the precast culvert units indicating ingress of salt laden water through the concrete distribution slab with no waterproofing visible. Based on the current BCI of 71.5, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving and repair and extension of the steel beam guiderail system should be included in the rehabilitation project within approximately 6 years.

1.25 Bridge No. 32 (North River Bridge)

Structure Number	B32
Road Name:	Burnside Line
Location:	Lot 4, Conc IV/V, 0.40 km S of Warminster Road
Structure Type:	Cast-In-Place Concrete Open Footing
Number of Spans:	2
Span Lengths:	5.2, 5.2 m
Overall Structure Width:	11.1 m
Roadway Width:	9.2 m
Year of Construction:	1965
Current Load Limit:	N/A
2017 Bridge Condition Index	73.6



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Approach Wearing Surface, Deck Wearing Surface	\$1,000.00
Rout and Seal	Repairs required to Approach Wearing Surface, Deck Wearing Surface	\$1,500.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Other	Replace sealant in barrier/sidewalk joints	\$3,000.00
Total		\$6,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to end post, posts, deck top, curbs		6 to 10 years	\$11,000.00
Type B concrete repairs to soffit		6 to 10 years	\$3,000.00
Waterproof and Pave		6 to 10 years	\$30,000.00
Replace barriers		6 to 10 years	\$60,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$35,000.00
Total			\$219,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 32 is generally in good condition but is demonstrating signs of bottom up defects in the asphalt indicating potential deck top deficiencies and has a railing system that does not conform to current codes. Based on the current BCI of 73.6, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving and barrier replacement should be included in the rehabilitation project within approximately 7 years. Consideration should also be given to replacing the steel beam guide rail system, end treatments and structure connections to help protect oncoming traffic.

1.26 Bridge No. 34

Structure Number	B34
Road Name:	Wainman Line
Location:	Lots 20,21, Conc I/II, 3.10 km N of Foxmead Road
Structure Type:	Cast-In-Place Open Footing Box Structure
Number of Spans:	1
Span Lengths:	4.2 m
Overall Structure Width:	10 m
Roadway Width:	6.25 m
Year of Construction:	1959
Current Load Limit:	N/A
2017 Bridge Condition Index	74.8



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Trim vegetation on shoulders - hazard signs not clearly visible	\$250.00
Rout and Seal	Repairs required to Approach Wearing Surface	\$500.00
Total		\$750.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$5,000.00
Total			\$5,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, Long span treatment over structure and end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 34 is generally in good condition with only minor deficiencies noted and no repairs required at this time. Based on the current BCI of 74.8 and the span of 4.8m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 17 years at a cost of approximately \$450,000. In the interim, consideration should be given to completing the recommended maintenance work and installing a steel beam guide rail system with end treatments to help protect oncoming traffic.

1.27 Bridge No. 35

Structure Number	B35
Road Name:	Town line
Location:	Lot 23, Conc XIV/I, 2.30 km N of Southorn Road
Structure Type:	Cast-In-Place Concrete T-Beam
Number of Spans:	1
Span Lengths:	7.85 m
Overall Structure Width:	6.5 m
Roadway Width:	5.5 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	60.8



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Streams and Waterways	\$1,000.00
Erosion Control	Repair washouts	\$1,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type B concrete repairs to Girders, soffit		Within 1 year	\$25,000.00
Type C concrete repairs to abutment walls, ballast walls, wingwalls		Within 1 year	\$30,000.00
Waterproof and Pave		Within 1 year	\$25,000.00
Install retaining walls		Within 1 year	\$30,000.00
Replace curbs and install barrier system		Within 1 year	\$40,000.00
General Items - Insurance, Mobilization, Access etc.		Within 1 year	\$65,000.00
Traffic Control		Within 1 year	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	Within 1 year	\$42,000.00
Total			\$272,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 35 is generally in fair condition but is demonstrating signs of localized concrete deterioration on many elements, especially on the exterior fascia and curb face, which has severe cracking, disintegration and separation. Based on the current BCI of 60.8, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, curb replacement, waterproofing and paving, and retaining wall installation should be included in the rehabilitation project within the next year. However, given the narrow, sub-standard driving platform width, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 10 years at a price of approximately \$600,000. Consideration should also be given to installing a barrier on the structure and steel beam guide rail system and end treatments to help protect oncoming traffic.

1.28 Bridge No. 36 (Marchmont Mill Bridge)

Structure Number	B36
Road Name:	Marchmont Road
Location:	Lot 2, Conc I, Marchmont, 0.55 km W of Wainman Line
Structure Type:	Precast Concrete Box Girders with Concrete Deck
Number of Spans:	1
Span Lengths:	11.4 m
Overall Structure Width:	6.4 m
Roadway Width:	4.7 m
Year of Construction:	1987
Current Load Limit:	N/A
2017 Bridge Condition Index	73.1



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Approach Wearing Surface, Deck Wearing Surface, Seals / Sealants	\$1,500.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		6 to 10 years	\$2,500.00
Type C concrete repairs to wingwalls		6 to 10 years	\$20,000.00
Waterproof and Pave		6 to 10 years	\$25,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Replace Expansion Joints		6 to 10 years	\$60,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$20,000.00
Total			\$207,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A	N/A	N/A	\$0.00
Total			\$0.00

Additional Comments

Bridge 36 is generally in good condition but is demonstrating signs of localized concrete deficiencies and deteriorating asphalt. Based on the current BCI of 73.2, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving, barrier replacement should be included in the rehabilitation project within approximately 7 years. However, given the narrow, sub-standard driving platform width, consideration should be given to forgoing the rehabilitation and scheduling the replacement of the structure within 17 years at a price of \$1,500,000.

1.29 Bridge No. 39

Structure Number	B39
Road Name:	Town Line
Location:	Lot 13, Conc XIV/I, 2.10 km S of Foxmead Road
Structure Type:	Cast-In-Place Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	5 m
Overall Structure Width:	9.5 m
Roadway Width:	6.5 m
Year of Construction:	1959
Current Load Limit:	N/A
2017 Bridge Condition Index	73.6



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Vegetation off curbs	\$1,000.00
Bridge Cleaning	Remove debris from watercourse	\$1,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Install Guide Rail, long span treatment over structure and end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 39 is generally in good condition with no major deficiencies needing repair. Based on the current BCI of 73.6 and the span of 5.6m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 17 years at a cost of \$450,000. Consideration should also be given to installing a steel beam guide rail system with a long span treatment spanning over the culvert and end treatments to help protect oncoming traffic.

1.30 Bridge No. 40 (North River Bridge)

Structure Number	B40
Road Name:	Taylor Line
Location:	Lot 5, Conc II/III, 1.08km S of Upper Big Chute Road
Structure Type:	Cast-In-Place Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	21.3 m
Overall Structure Width:	9.7 m
Roadway Width:	8.5 m
Year of Construction:	1970
Current Load Limit:	N/A
2017 Bridge Condition Index	71.3



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Deck Drainage	Flush Deck drains	\$1,000.00
Bridge Cleaning	Clean Deck Top	\$1,000.00
Total		\$2,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs		6 to 10 years	\$30,000.00
Type B concrete repairs to soffit		6 to 10 years	\$20,000.00
Waterproof and Pave		6 to 10 years	\$50,000.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Replace Barriers		6 to 10 years	\$70,000.00
Traffic Control		6 to 10 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$46,000.00
Total			\$296,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments and structure connections	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Bridge 40 is generally in good condition but is demonstrating signs of localized concrete defects. Based on the current BCI of 71.3, a minor rehabilitation should be considered as the BCI approaches 60. Concrete repairs, waterproofing and paving should be included in the rehabilitation project within approximately 6 years. Consideration should also be given to replacing the steel beam guide rail system, end treatments and structure connections as the current end treatments are substandard, there is no connection to the structure and the length of guiderail appears to be inadequate.

1.31 Bridge No. 41

Structure Number	B41
Road Name:	Unnamed Road
Location:	Lot 13, Conc IV, 0.30 km E of Upper Big Chute Road
Structure Type:	Cast-In-Place Concrete T-Beam
Number of Spans:	1
Span Lengths:	8.5 m
Overall Structure Width:	4.85 m
Roadway Width:	4.05 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	73.2



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top	\$1,000.00
Erosion Control	Install erosion protection	\$3,000.00
Total		\$4,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type B concrete repairs to Girders, soffit		6 to 10 years	\$3,000.00
Type C concrete repairs to abutment walls		6 to 10 years	\$1,500.00
General Items - Insurance, Mobilization, Access etc.		6 to 10 years	\$65,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	6 to 10 years	\$10,000.00
Total			\$79,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A	N/A	N/A	\$0.00
Total			\$0.00

Additional Comments

Bridge 41 is located on an un-named, no winter maintenance road and is generally in good condition but is demonstrating signs of localized minor concrete deficiencies and undermining of the abutment walls that may allow backfill material to wash out from behind the abutments. Based on the current BCI of 73.2, a minor rehabilitation should be considered as the BCI approaches 60 to ensure the structure does not deteriorate beyond repair. Localized concrete repairs and erosion protection installation should be included in the rehabilitation project within approximately 7 years. However, given the location of the structure and that it appears to service only one property (farm land), the Township should consider forgoing the rehabilitation, acquiring property and closing the structure when the condition decreases to the point of requiring replacement, which is estimated to be in approximately 17 years.

1.32 Culvert No. 8

Structure Number	C8
Road Name:	Wainman Line
Location:	Lot 1, Conc III/IV, 0.60 km N of Division Road West
Structure Type:	Cast-In-Place Concrete Rigid Frame
Number of Spans:	1
Span Lengths:	2.8 m
Overall Structure Width:	57 m
Roadway Width:	6.75 m
Year of Construction:	1930
Current Load Limit:	N/A
2017 Bridge Condition Index	49.5



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Curbs	\$1,000.00
Rout and Seal	Repairs required to Approach Wearing Surface, Deck Wearing Surface	\$500.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		N/A	\$80,000.00
Type C concrete repairs to barrels		N/A	\$425,000.00
Install erosion protection		N/A	\$10,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$150,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$110,000.00
Total			\$790,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Culvert 8 is generally in poor condition and is demonstrating signs of severe concrete deterioration and separation and settlement of the east end of the original section of the culvert. The flow rate of the watercourse through the culvert at the time of inspection was extremely high and therefore a limited inspection was completed and the condition of the barrel is assumed based on previous inspection which noted that the original concrete structure is in poor condition due to a 4.5 m length section at the east end of the structure being separated away from the original structure approximately 300mm and settled 250mm. Given this, it is recommended that a structure evaluation be completed to determine if the structure requires load posting until it can be replaced. There were also several concrete defects noted including severe scaling, staining and wide cracks throughout the length of the culvert. Based on the current BCI of 49.5, this structure has surpassed the threshold considered to be economically repairable and a rehabilitation is not recommended. Replacement of the structure is recommended within the next 5 years at a cost of approximately \$2,500,000.

1.33 Culvert No. 9

Structure Number	C09
Road Name:	Uhthoff Line
Location:	Lot 2, Conc III/IV, 2.10 km N of Division Road West
Structure Type:	CSP Arch Culvert
Number of Spans:	2
Span Lengths:	3.8, 3.8 m
Overall Structure Width:	18.3 m
Roadway Width:	7.1 m
Year of Construction:	1970
Current Load Limit:	N/A
2017 Bridge Condition Index	38.6



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A	N/A	N/A	\$0.00
Total			\$0.00

Additional Comments

Culvert 9 is generally in fair to poor condition with severe bolt hole cracking over a significant length of the culvert barrel, however no significant changes to the length of cracks were noted when compared to the marked limits from previous inspections. The structure has a current BCI of 38.6 and is being further investigated to determine if rehabilitation is achievable or if replacement is required. The timeline and the work proposed should be confirmed upon completion of the additional investigations being carried out. Consideration should be given to monitoring the crack widths until replacement or rehabilitation of the structure occurs.

1.34 Culvert No. 20

Structure Number	C20
Road Name:	Taylor Line
Location:	Lot 6, Conc II/III, 0.20 km S of Upper Big Chute Road
Structure Type:	CSP Pipe Culvert
Number of Spans:	1
Span Lengths:	3.8 m
Overall Structure Width:	17 m
Roadway Width:	7 m
Year of Construction:	2010
Current Load Limit:	N/A
2017 Bridge Condition Index	74.8



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Rout and Seal	Repairs required to Approach Wearing Surface	\$500.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for Guide Rail	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Culvert 20 is generally in good condition with no major deficiencies needing repair at this time. Based on the current BCI of 74.8 and the span of 3.8m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 18 years at a cost of approximately \$400,000. Consideration should be given to completing the recommended maintenance work and investigating the need for guide rail, as the clear zone on the east does not appear to be sufficient.

1.35 Culvert No. 30

Structure Number	C30
Road Name:	Division Road West
Location:	Lot 1, Conc IV, 0.10 km W of Burnside line
Structure Type:	CSP Arch Culvert
Number of Spans:	1
Span Lengths:	4 m
Overall Structure Width:	20.9 m
Roadway Width:	7.6 m
Year of Construction:	Unknown
Current Load Limit:	N/A
2017 Bridge Condition Index	67.6



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Remove built up debris from watercourse	\$1,000.00
Erosion Control	Repair washouts at guiderail posts and erosion of embankment	\$6,000.00
Retaining Wall	Replace retaining wall	\$40,000.00
Total		\$47,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
N/A	N/A	N/A	\$0.00
Total			\$0.00

Additional Comments

Culvert 30 is generally in good to fair condition but is demonstrating signs of erosion at the embankments and failing rock retaining walls. Based on the current BCI of 67.6, the span of 4.4m (less than 6m), and the structure type a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 14 years at a cost of approximately \$450,000. However, the Township should consider replacing the retaining wall as soon as possible to help prevent further failure of embankments.

1.36 Culvert No. 31

Structure Number	C31
Road Name:	Burnside Line
Location:	0.1 km N of Division Road West
Structure Type:	Cast-In-Place Open Footing Culvert
Number of Spans:	1
Span Lengths:	4.6 m
Overall Structure Width:	30.9 m
Roadway Width:	7.3 m
Year of Construction:	1960
Current Load Limit:	N/A
2017 Bridge Condition Index	68.5



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Remove trees overgrowing outlet	\$1,000.00
Rout and Seal	Repairs required to Approach Wearing Surface, Deck Wearing Surface	\$1,000.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$3,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Type A concrete repairs to deck top		1 to 5 years	\$2,000.00
Type C concrete repairs to barrels, inlet, outlet		1 to 5 years	\$85,000.00
Waterproof and Pave		1 to 5 years	\$25,000.00
General Items - Insurance, Mobilization, Access etc.		1 to 5 years	\$65,000.00
Traffic Control		1 to 5 years	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	1 to 5 years	\$35,000.00
Total			\$227,000.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Replace Guide Rail, end treatments	1 to 5 years	\$52,000.00
Total			\$52,000.00

Additional Comments

Structure C31 is generally in good to fair condition but is demonstrating signs of moisture penetration, concrete deterioration and has a guide rail system that does not meet current standards. Based on the current BCI of 68.5, a rehabilitation should be considered as the BCI approaches 60, within approximately 4 years, to ensure the structure does not deteriorate beyond repair. Concrete repairs, waterproofing and paving should be included in the rehabilitation project within approximately 4 years. Consideration should also be given to replacing the steel beam guide rail system, end treatments to help protect oncoming traffic.

1.37 Culvert No. 33

Structure Number	C33
Road Name:	Wainman Line
Location:	Lots 20/21, Conc I/II, 0.60km S of Mount Stephen Road
Structure Type:	CSP Arch Culvert
Number of Spans:	1
Span Lengths:	3.5 m
Overall Structure Width:	14.1 m
Roadway Width:	5.4 m
Year of Construction:	1970
Current Load Limit:	N/A
2017 Bridge Condition Index	55.7



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Rout and Seal	Repairs required to Approach Wearing Surface, Deck Wearing Surface,	\$500.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$1,500.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Monitoring Crack Widths	Normal	\$2,500.00
Total		\$2,500.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for Guide Rail	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Culvert 33 is generally in fair to poor condition and is demonstrating signs of severe corrosion, section loss and bolt hole cracking within the barrel. Based on the current BCI of 55.7 and the span of 3.5m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 8 years at a cost of \$350,000. Due to the water levels at the time of inspection, the previously noted deficiencies were not able to be viewed to determine if the corrosion or bolt hole cracking had progressed further. Further monitoring of the bolt hole cracking and corrosion is recommended to determine if the deficiencies are actively progressing and to determine whether there is a need to accelerate the suggested replacement timeline.

1.38 Culvert No. 37

Structure Number	C37
Road Name:	Fairgrounds Road
Location:	Lot 4, Conc II/III, 1.70 km N of Division Road West
Structure Type:	CSP Arch Culvert
Number of Spans:	2
Span Lengths:	3.7, 3.7 m
Overall Structure Width:	17 m
Roadway Width:	6.5 m
Year of Construction:	1970
Current Load Limit:	N/A
2017 Bridge Condition Index	38.1



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
Monitoring Crack Widths	Normal	\$2,500.00
Total		\$2,500.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
Reconstruct east cut-off wall		N/A	\$17,500.00
Bolt hole crack repairs		N/A	\$50,000.00
Repave		N/A	\$20,000.00
General Items - Insurance, Mobilization, Access etc.		N/A	\$65,000.00
Traffic Control		N/A	\$15,000.00
Other	Engineering Fees (Assumed as ~15% of total costs)	N/A	\$40,000.00
Total			\$207,500.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for Guide Rail	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Culvert 37 is generally in poor condition with bolt hole cracking noted throughout the barrel. Based on the defects noted throughout the culvert, the structure has been designated for replacement within one year at an estimated cost of \$800,000. It is noted that this structure is currently scheduled for replacement within the next year and is scheduled to be tendered in August, 2017. The Township should consult with the design engineer for a more detailed cost estimate.

1.39 Culvert No. 38

Structure Number	C38
Road Name:	Wainman Line
Location:	Lot 13, Conc I/II, 1.20 km N of Thornburn Road
Structure Type:	CSP Arch Culvert
Number of Spans:	1
Span Lengths:	3.3 m
Overall Structure Width:	16.6 m
Roadway Width:	7 m
Year of Construction:	1970
Current Load Limit:	N/A
2017 Bridge Condition Index	71.3



Routine Maintenance

Maintenance Need	Element and Comments	Estimated Cost
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Total		\$1,000.00

Additional Investigations

Additional Investigations Required	Priority	Estimated Cost
N/A	N/A	\$0.00
Total		\$0.00

Repair/Rehabilitation Work

Element	Rehabilitation Required	Priority	Estimated Cost
N/A		N/A	\$0.00
Total			\$0.00

Roadside Safety Costs

Element	Work Required	Priority	Estimated Cost
Approaches	Investigate need for Guide Rail	1 to 5 years	\$1,000.00
Total			\$1,000.00

Additional Comments

Culvert 38 is generally in good condition but is demonstrating signs of corrosion on the culvert invert and scour beginning to undermine the culvert. Based on the current BCI of 71.3 and the span of 3.3m (less than 6m), a rehabilitation is not recommended and replacement of the structure is recommended once the BCI reaches 40, in approximately 16 years at a cost of \$350,000. In the interim, it is recommended that the above noted maintenance items be completed.



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Appendix B

Structure Inventory and Cost Summaries

Township of Severn - STRUCTURE INVENTORY

Structure Number	Year Inspected	Structure Name	Road Name	Location	Structure Type	Span(s) (m)	Width (m)	Deck Area (m2)	Deterioration Curve	Recommended Replace/Rehabilitation	Bridge Condition Index
B03	2017	Bridge No. 3	Townline	Lot 4 Conc XIV - 1.6km S of Warminster	Prestressed Hollowcore Slab	12	10	150	BR-1	Rehabilitate	99.87
B04	2017	Bridge No. 4	Bond Road	Lot 9, Conc XIV, Washago, 0.10 km E of Highway 11	Cast-In-Place Concrete Rigid Frame	14.2	12.1	211.75	BR-1	Rehabilitate	68.13
B05	2017	Bridge No. 5	Sturgeon Bay Road	0.03 km W of Coldwater Road, Coldwater	TS - Cast-In-Place Concrete Rigid Frame	15.2	14.2	254.2	BR-1	Rehabilitate	74.20
B06	2017	Bridge No. 6	Muskoka Street	Lot 11, Conc XV, Washago, 0.10 km S of Coopers Falls Road	Steel Girder with Concrete Deck	18	9.4	178.8	BR-1	Rehabilitate	74.02
B07	2017	Bridge No. 7	Bayou Road	Lot 3, Conc IX, 0.10 km N of Westchore Cres	Precast Concrete Rigid Frame	10	6.9	74.52	BR-1	Rehabilitate	74.61
B10	2017	Bridge No. 10	Woodrow Road	Lots 20/21, Conc XI, 0.20 km W of Highway 12	Cast-In-Place Concrete T-Beam	3.75, 6.4, 3.75	5.6	84	BR-1	Rehabilitate	70.72
B11	2017	Bridge No. 11	Reinbird Street	0.01 km W of River Street	Bailey Bridge	14.6	3.8	57.8	BR-1	Replace	55.20
B12	2017	Bridge No. 12	Mill Street, Coldwater	0.02 km W of Coldwater Road	Concrete Deck on Steel Truss	19.5	6.7	134.7	BR-1	Rehabilitate	73.87
B13	2017	Bridge No. 13	Hampshire Mills Line	2.3 km N of Cambrian Road	CIP Concrete on T-Beam	2.9, 7.6, 2.9	4.9	75.5	BR-1	Rehabilitate	66.22
B14	2017	Bridge No. 14	Uthhoff Line	0.4 km S of Foxmead Road	CIP Concrete	7.6	5.5	46.2	BR-1	Rehabilitate	64.43
B15	2017	Bridge No. 15	Lawson Line	1.5 km S of Kinnear Sideroad	CIP Concrete on Steel Girder	34.5	6.2	217.6	BR-2	Rehabilitate	73.99
B16	2017	Bridge No. 16	Irish Line	0.1 km S of Ellis Road	Precast Concrete CPCI Girder	12.8,13.1, 12.8	10.3	406.9	BR-2	Rehabilitate	70.37
B17	2017	Bridge No. 17	Lovering Line	0.1 km S of Upper Big Chute Road	Steel Through Truss / T-Beams	4.4, 18.3, 4.4	4.8	143.5	BR-2	Rehabilitate	71.79
B18	2017	Bridge No. 18	Laughlin Falls Road	1.3 km E of Taylor Line	Concrete Slab on Steel Girder	18	5.75	108.23	BR	Replace	99.97
B19	2017	Bridge No. 19	Kitchen Sideroad	1.4 km E of Church Line North	CIP Concrete	7.9	4.85	41.2	BR-1	Replace	50.78
B21	2017	Bridge No. 21	Foxmead Road	0.2 km E of Uthhoff Line	Precast Concrete Box	6.2	12.1	79.9	BR-1	Rehabilitate	73.06
B22	2017	Bridge No. 22	Burnside Line	1.95 km S of Jeremy Road	Open Footing CIP Concrete Box	4.9	12.1	64.1	BR	Replace	73.88
B23	2017	Bridge No. 23	Jeremy Road	0.2 km W of Carlyon Line	CIP Concrete T-Beam	3.15, 6.9, 3.05	5.6	86.8	BR-1	Replace	59.25
B24	2017	Bridge No. 24	Carlyon Line	Lot 19, Conc V/VI, 2.10 km N of Maple Valley Road	Precast Concrete Box Girder	16.4	8.9	150.4	BR-1	Rehabilitate	72.84
B25	2017	Bridge No. 25	Carlyon Line	Lot 12, Conc V/VI, 0.50 km N of Cambrian Road	Precast Concrete Rigid Frame	10.5	9.2	102.1	BR-1	Rehabilitate	72.89
B26	2017	Bridge No. 26	Carlyon line	Lot 12, Conc V/VI, 0.90 km N of Cambrian Road	Cast-In-Place Concrete Open Footing	4.3	9.3	45.57	BR	Replace	72.37
B27	2017	Bridge No. 27	Maple Valley Road	Lot 15/16, Conc VI, 0.30 km W of Hampshire Mills Line	Cast-In-Place Concrete T-Beam	3.85, 6.9, 3.65	4.9	80.9	BR-1	Rehabilitate	63.03
B28	2017	Bridge No. 28	Hampshire Mills Line	Lot 14, Conc VI/VII, 1.80 km N of Cambrian Road	Cast-In-Place Concrete T-Beam	3.45, 7.45	4.9	80.36	BR-1	Replace	54.18
B29	2017	Bridge No. 29	Cambrian Road	Lots 10/11, Conc V, 0.45 km W of Carlyon Line	Precast Concrete Rigid Frame	10.4	9.2	101.2	BR-1	Rehabilitate	71.49
B32	2017	Bridge No. 32	Burnside Line	Lot 4, Conc IV/V, 0.40 km S of Warminster Road	Cast-In-Place Concrete Open Footing	5.2, 5.2	11.1	137.64	BR-1	Rehabilitate	73.59
B34	2017	Bridge No. 34	Wainman Line	Lots 20,21, Conc I/II, 3.10 km N of Foxmead Road	Cast-In-Place Open Footing Box Structure	4.2	10	48	BR	Replace	74.85
B35	2017	Bridge No. 35	Town line	Lot 23, Conc XIV/I, 2.30 km N of Southorn Road	Cast-In-Place Concrete T-Beam	7.85	6.5	55.9	BR-1	Rehabilitate	60.76
B36	2017	Bridge No. 36	Marchmont Road	Lot 2, Conc I, Marchmont, 0.55 km W of Wainman Line	Precast Concrete Box Girders with Concrete Deck	11.4	6.4	83.2	BR-1	Rehabilitate	73.11
B39	2017	Bridge No. 39	Town Line	Lot 13, Conc XIV/I, 2.10 km S of Foxmead Road	Cast-In-Place Concrete Rigid Frame	5	9.5	53.2	BR	Replace	73.63
B40	2017	Bridge No. 40	Taylor Line	Lot 5, Conc II/III, 1.08km S of Upper Big Chute Road	Cast-In-Place Concrete Rigid Frame	21.3	9.7	235.7	BR-2	Rehabilitate	71.34
B41	2017	Bridge No. 41	Unnamed Road	Lot 13, Conc IV, 0.30 km E of Upper Big Chute Road	Cast-In-Place Concrete T-Beam	8.5	4.85	45.1	BR-1	Rehabilitate	73.24
C08	2017	Culvert No. 8	Wainman Line	Lot 1, Conc III/IV, 0.60 km N of Division Road West	Cast-In-Place Concrete Rigid Frame	2.8	57	59.85	CC	Replace	49.48
C09	2017	Culvert No. 9	Uthhoff Line	Lot 2, Conc III/IV, 2.10 km N of Division Road West	CSP Arch Culvert	3.8, 3.8	18.3	161	CS	Replace	38.60
C20	2017	Culvert No. 20	Taylor Line	Lot 6, Conc II/III, 0.20 km S of Upper Big Chute Road	CSP Pipe Culvert	3.8	17	64.6	CS	Replace	74.79
C30	2017	Culvert No. 30	Division Road West	Lot 1, Conc IV, 0.10 km W of Burnside line	CSP Arch Culvert	4	20.9	92	CS	Replace	67.64
C31	2017	Culvert No. 31	Burnside Line	0.1 km N of Division Road West	Cast-In-Place Open Footing Culvert	4.6	30.9	140.4	BR-1	Rehabilitate	68.48
C33	2017	Culvert No. 33	Wainman Line	Lots 20/21, Conc I/II, 0.60km S of Mount Stephen Road	CSP Arch Culvert	3.5	14.1	49.35	CS	Replace	55.73
C37	2017	Culvert No. 37	Fairgrounds Road	Lot 4, Conc II/III, 1.70 km N of Division Road West	CSP Arch Culvert	3.7, 3.7	17	156.4	CS	Replace	38.11
C38	2017	Culvert No. 38	Wainman Line	Lot 13, Conc I/II, 1.20 km N of Thornburn Road	CSP Arch Culvert	3.3	16.6	54.78	CS	Replace	71.26

Township of Severn - CAPITAL WORKS BY BCI

Structure Number	Road Name	Deterioration Curve	Recommended Replace/Rehabilitation	Bridge Condition Index	Years to Rehab	Years to Replace	Current Rehabilitation Costs	Associated Work Costs	Roadside Protection Costs	Additional Investigation Costs	Maintenance Needs Costs	Capital Works Within 1 year	Capital Works 1 - 5 Years	Capital Works 6 - 10 Years	10-Year Estimated Capital Works Cost	Estimated Replacement Value
C37	Fairgrounds Road	CS	Replace	38.11	N/A	0.00	\$ 152,500.00	\$ 55,000.00	\$ 1,000.00	\$ 2,500.00	\$ -	\$ 800,000.00	\$ -	\$ -	\$ 802,500.00	\$ 800,000.00
C09	Uthhoff Line	CS	Replace	38.60	N/A	0.00	\$ -	\$ -	\$ -	\$ -	\$ 1,000.00	\$ 750,000.00	\$ -	\$ -	\$ 751,000.00	\$ 750,000.00
C08	Wainman Line	CC	Replace	49.48	N/A	4.74	\$ 665,000.00	\$ 125,000.00	\$ 52,000.00	\$ -	\$ 1,500.00	\$ -	\$ 2,500,000.00	\$ -	\$ 2,501,500.00	\$ 2,500,000.00
B19	Kitchen Sideroad	BR-1	Replace	50.78	0.00	5.39	\$ 150,000.00	\$ 48,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ 750,000.00	\$ 752,000.00	\$ 750,000.00
B28	Hampshire Mills Line	BR-1	Replace	54.18	0.00	7.09	\$ 335,000.00	\$ 77,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,500.00	\$ -	\$ -	\$ 1,200,000.00	\$ 1,211,500.00	\$ 1,200,000.00
B11	Reinbird Street	BR-1	Replace	55.20	0.00	7.60	\$ 308,000.00	\$ 70,000.00	\$ 1,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ 1,200,000.00	\$ 1,201,000.00	\$ 1,200,000.00
C33	Wainman Line	CS	Replace	55.73	N/A	7.86	\$ -	\$ -	\$ 1,000.00	\$ 2,500.00	\$ 1,500.00	\$ -	\$ -	\$ 350,000.00	\$ 354,000.00	\$ 350,000.00
B23	Jeremy Road	BR-1	Replace	59.25	0.00	1.00	\$ 405,000.00	\$ 110,000.00	\$ 52,000.00	\$ 10,000.00	\$ 2,000.00	\$ 1,200,000.00	\$ -	\$ -	\$ 1,212,000.00	\$ 1,200,000.00
B35	Town line	BR-1	Rehabilitate	60.76	0.38	10.38	\$ 215,000.00	\$ 57,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ 324,000.00	\$ -	\$ -	\$ 326,000.00	\$ 600,000.00
B27	Maple Valley Road	BR-1	Rehabilitate	63.03	1.51	11.51	\$ 287,000.00	\$ 67,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,000.00	\$ -	\$ 406,000.00	\$ -	\$ 417,000.00	\$ 1,200,000.00
B14	Uthhoff Line	BR-1	Rehabilitate	64.43	2.22	12.22	\$ 154,000.00	\$ 49,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,500.00	\$ -	\$ 255,000.00	\$ -	\$ 266,500.00	\$ 600,000.00
B13	Hampshire Mills Line	BR-1	Rehabilitate	66.22	3.11	13.11	\$ 192,000.00	\$ 55,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,000.00	\$ -	\$ 299,000.00	\$ -	\$ 310,000.00	\$ 1,200,000.00
C30	Division Road West	CS	Replace	67.64	N/A	13.82	\$ -	\$ -	\$ -	\$ -	\$ 47,000.00	\$ -	\$ -	\$ -	\$ 47,000.00	\$ 450,000.00
B04	Bond Road	BR-1	Rehabilitate	68.13	4.06	14.06	\$ 297,500.00	\$ 62,000.00	\$ 52,000.00	\$ 15,000.00	\$ 2,500.00	\$ -	\$ 411,500.00	\$ -	\$ 429,000.00	\$ 2,100,000.00
C31	Burnside Line	BR-1	Rehabilitate	68.48	4.24	14.24	\$ 177,000.00	\$ 50,000.00	\$ 52,000.00	\$ -	\$ 3,000.00	\$ -	\$ 279,000.00	\$ -	\$ 282,000.00	\$ 850,000.00
B16	Irish Line	BR-2	Rehabilitate	70.37	5.19	15.19	\$ 560,500.00	\$ 115,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ 727,500.00	\$ -	\$ 729,500.00	\$ 5,400,000.00
B10	Woodrow Road	BR-1	Rehabilitate	70.72	5.36	15.36	\$ 161,000.00	\$ 42,500.00	\$ 20,000.00	\$ -	\$ 1,500.00	\$ -	\$ 223,500.00	\$ -	\$ 225,000.00	\$ 1,200,000.00
C38	Wainman Line	CS	Replace	71.26	N/A	15.70	\$ -	\$ -	\$ 1,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ -	\$ 2,000.00	\$ 350,000.00
B40	Taylor Line	BR-2	Rehabilitate	71.34	5.67	15.67	\$ 235,000.00	\$ 61,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ 348,000.00	\$ 350,000.00	\$ 1,700,000.00
B29	Cambrian Road	BR-1	Rehabilitate	71.49	5.74	15.74	\$ 84,000.00	\$ 37,500.00	\$ 52,000.00	\$ -	\$ -	\$ -	\$ -	\$ 173,500.00	\$ 173,500.00	\$ 700,000.00
B17	Lovering Line	BR-2	Rehabilitate	71.79	15.62	27.29	\$ 92,000.00	\$ 32,000.00	\$ 4,000.00	\$ -	\$ 2,500.00	\$ -	\$ -	\$ -	\$ 130,500.00	\$ 2,300,000.00
B26	Carlyon line	BR	Replace	72.37	N/A	16.18	\$ 78,000.00	\$ 37,000.00	\$ 52,000.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 52,000.00	\$ 350,000.00
B24	Carlyon Line	BR-1	Rehabilitate	72.84	6.42	16.42	\$ 155,000.00	\$ 48,000.00	\$ 52,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ 255,000.00	\$ 256,000.00	\$ 1,200,000.00
B25	Carlyon Line	BR-1	Rehabilitate	72.89	7.94	17.94	\$ 98,000.00	\$ 40,000.00	\$ 52,000.00	\$ -	\$ -	\$ -	\$ -	\$ 190,000.00	\$ 190,000.00	\$ 650,000.00
B21	Foxmead Road	BR-1	Rehabilitate	73.06	2.00	22.28	\$ 120,000.00	\$ 35,000.00	\$ 52,000.00	\$ -	\$ 1,000.00	\$ -	\$ 207,000.00	\$ -	\$ 208,000.00	\$ 800,000.00
B36	Marchmont Road	BR-1	Rehabilitate	73.11	6.56	16.56	\$ 172,500.00	\$ 35,000.00	\$ -	\$ -	\$ 1,500.00	\$ -	\$ -	\$ 207,500.00	\$ 209,000.00	\$ 1,500,000.00
B41	Unnamed Road	BR-1	Rehabilitate	73.24	6.62	16.62	\$ 69,500.00	\$ 10,000.00	\$ -	\$ -	\$ 4,000.00	\$ -	\$ -	\$ 79,500.00	\$ 83,500.00	\$ 650,000.00
B32	Burnside Line	BR-1	Rehabilitate	73.59	6.80	16.80	\$ 169,000.00	\$ 50,000.00	\$ 52,000.00	\$ -	\$ 6,500.00	\$ -	\$ -	\$ 271,000.00	\$ 277,500.00	\$ 850,000.00
B39	Town Line	BR	Replace	73.63	N/A	16.82	\$ -	\$ -	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ -	\$ 54,000.00	\$ 450,000.00
B12	Mill Street, Coldwater	BR-1	Rehabilitate	73.87	6.93	16.93	\$ 81,000.00	\$ 30,000.00	\$ 1,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ 112,000.00	\$ 113,000.00	\$ 1,800,000.00
B22	Burnside Line	BR	Replace	73.88	N/A	16.94	\$ 25,000.00	\$ 11,500.00	\$ 52,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ -	\$ 53,000.00	\$ 550,000.00
B15	Lawson Line	BR-2	Rehabilitate	73.99	6.99	16.99	\$ 256,000.00	\$ 55,000.00	\$ -	\$ 10,000.00	\$ 1,000.00	\$ -	\$ -	\$ 311,000.00	\$ 322,000.00	\$ 2,700,000.00
B06	Muskoka Street	BR-1	Rehabilitate	74.02	12.52	22.76	\$ 80,500.00	\$ 25,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ -	\$ 159,500.00	\$ 1,100,000.00
B05	Sturgeon Bay Road	BR-1	Rehabilitate	74.20	7.10	17.10	\$ 105,500.00	\$ 62,000.00	\$ 1,000.00	\$ -	\$ 3,000.00	\$ -	\$ -	\$ 168,500.00	\$ 171,500.00	\$ 2,260,000.00
B07	Bayou Road	BR-1	Rehabilitate	74.61	8.80	18.80	\$ 67,500.00	\$ 25,000.00	\$ 52,000.00	\$ -	\$ 4,000.00	\$ -	\$ -	\$ 144,500.00	\$ 148,500.00	\$ 750,000.00
C20	Taylor Line	CS	Replace	74.79	N/A	17.66	\$ -	\$ -	\$ 1,000.00	\$ -	\$ 1,500.00	\$ -	\$ -	\$ -	\$ 2,500.00	\$ 400,000.00
B34	Wainman Line	BR	Replace	74.85	N/A	17.42	\$ -	\$ 5,000.00	\$ 52,000.00	\$ -	\$ 750.00	\$ -	\$ -	\$ -	\$ 52,750.00	\$ 450,000.00
B03	Townline	BR-1	Rehabilitate	99.87	31.93	75.00	\$ -	\$ -	\$ -	\$ -	\$ 1,000.00	\$ -	\$ -	\$ -	\$ 1,000.00	\$ 1,500,000.00
B18	Laughlin Falls Road	BR	Replace	99.97	N/A	42.48	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 650,000.00
Sub Totals							\$ 5,948,000.00	\$ 1,581,500.00	\$ 1,227,000.00	\$ 80,000.00	\$ 108,750.00	\$ 3,074,000.00	\$ 5,308,500.00	\$ 5,760,500.00	\$ 14,827,250.00	\$ 46,010,000.00

Township of Severn - REHABILITATION CAPITAL WORKS

Structure Number	Road Name	Deterioration Curve	Recommended Replace/Rehabilitation	Bridge Condition Index	Years to Rehab	Years to Replace	Current Rehabilitation Costs	Associated Work Costs	Roadside Protection Costs	Additional Investigation Costs	Maintenance Needs Costs	Capital Works Within 1 year	Capital Works 1 - 5 Years	Capital Works 6 - 10 Years	10-Year Estimated Capital Works Cost	Estimated Replacement Value
B35	Town line	BR-1	Rehabilitate	60.76	0.38	10.38	\$ 215,000.00	\$ 57,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ 324,000.00	\$ -	\$ -	\$ 326,000.00	\$ 600,000.00
B27	Maple Valley Road	BR-1	Rehabilitate	63.03	1.51	11.51	\$ 287,000.00	\$ 67,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,000.00	\$ -	\$ 406,000.00	\$ -	\$ 417,000.00	\$ 1,200,000.00
B21	Foxmead Road	BR-1	Rehabilitate	73.06	2.00	22.28	\$ 120,000.00	\$ 35,000.00	\$ 52,000.00	\$ -	\$ 1,000.00	\$ -	\$ 207,000.00	\$ -	\$ 208,000.00	\$ 800,000.00
B14	Uhthoff Line	BR-1	Rehabilitate	64.43	2.22	12.22	\$ 154,000.00	\$ 49,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,500.00	\$ -	\$ 255,000.00	\$ -	\$ 266,500.00	\$ 600,000.00
B13	Hampshire Mills Line	BR-1	Rehabilitate	66.22	3.11	13.11	\$ 192,000.00	\$ 55,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,000.00	\$ -	\$ 299,000.00	\$ -	\$ 310,000.00	\$ 1,200,000.00
B04	Bond Road	BR-1	Rehabilitate	68.13	4.06	14.06	\$ 297,500.00	\$ 62,000.00	\$ 52,000.00	\$ 15,000.00	\$ 2,500.00	\$ -	\$ 411,500.00	\$ -	\$ 429,000.00	\$ 2,100,000.00
C31	Burnside Line	BR-1	Rehabilitate	68.48	4.24	14.24	\$ 177,000.00	\$ 50,000.00	\$ 52,000.00	\$ -	\$ 3,000.00	\$ -	\$ 279,000.00	\$ -	\$ 282,000.00	\$ 850,000.00
B16	Irish Line	BR-2	Rehabilitate	70.37	5.19	15.19	\$ 560,500.00	\$ 115,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ 727,500.00	\$ -	\$ 729,500.00	\$ 5,400,000.00
B10	Woodrow Road	BR-1	Rehabilitate	70.72	5.36	15.36	\$ 161,000.00	\$ 42,500.00	\$ 20,000.00	\$ -	\$ 1,500.00	\$ -	\$ 223,500.00	\$ -	\$ 225,000.00	\$ 1,200,000.00
B40	Taylor Line	BR-2	Rehabilitate	71.34	5.67	15.67	\$ 235,000.00	\$ 61,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ 348,000.00	\$ 350,000.00	\$ 1,700,000.00
B29	Cambrian Road	BR-1	Rehabilitate	71.49	5.74	15.74	\$ 84,000.00	\$ 37,500.00	\$ 52,000.00	\$ -	\$ -	\$ -	\$ -	\$ 173,500.00	\$ 173,500.00	\$ 700,000.00
B24	Carlyon Line	BR-1	Rehabilitate	72.84	6.42	16.42	\$ 155,000.00	\$ 48,000.00	\$ 52,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ 255,000.00	\$ 256,000.00	\$ 1,200,000.00
B36	Marchmont Road	BR-1	Rehabilitate	73.11	6.56	16.56	\$ 172,500.00	\$ 35,000.00	\$ -	\$ -	\$ 1,500.00	\$ -	\$ -	\$ 207,500.00	\$ 209,000.00	\$ 1,500,000.00
B41	Unnamed Road	BR-1	Rehabilitate	73.24	6.62	16.62	\$ 69,500.00	\$ 10,000.00	\$ -	\$ -	\$ 4,000.00	\$ -	\$ -	\$ 79,500.00	\$ 83,500.00	\$ 650,000.00
B32	Burnside Line	BR-1	Rehabilitate	73.59	6.80	16.80	\$ 169,000.00	\$ 50,000.00	\$ 52,000.00	\$ -	\$ 6,500.00	\$ -	\$ -	\$ 271,000.00	\$ 277,500.00	\$ 850,000.00
B12	Mill Street, Coldwater	BR-1	Rehabilitate	73.87	6.93	16.93	\$ 81,000.00	\$ 30,000.00	\$ 1,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ 112,000.00	\$ 113,000.00	\$ 1,800,000.00
B15	Lawson Line	BR-2	Rehabilitate	73.99	6.99	16.99	\$ 256,000.00	\$ 55,000.00	\$ -	\$ 10,000.00	\$ 1,000.00	\$ -	\$ -	\$ 311,000.00	\$ 322,000.00	\$ 2,700,000.00
B05	Sturgeon Bay Road	BR-1	Rehabilitate	74.20	7.10	17.10	\$ 105,500.00	\$ 62,000.00	\$ 1,000.00	\$ -	\$ 3,000.00	\$ -	\$ -	\$ 168,500.00	\$ 171,500.00	\$ 2,260,000.00
B25	Carlyon Line	BR-1	Rehabilitate	72.89	7.94	17.94	\$ 98,000.00	\$ 40,000.00	\$ 52,000.00	\$ -	\$ -	\$ -	\$ -	\$ 190,000.00	\$ 190,000.00	\$ 650,000.00
B07	Bayou Road	BR-1	Rehabilitate	74.61	8.80	18.80	\$ 67,500.00	\$ 25,000.00	\$ 52,000.00	\$ -	\$ 4,000.00	\$ -	\$ -	\$ 144,500.00	\$ 148,500.00	\$ 750,000.00
B06	Muskoka Street	BR-1	Rehabilitate	74.02	12.52	22.76	\$ 80,500.00	\$ 25,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ -	\$ 159,500.00	\$ 1,100,000.00
B17	Lovering Line	BR-2	Rehabilitate	71.79	15.62	27.29	\$ 92,000.00	\$ 32,000.00	\$ 4,000.00	\$ -	\$ 2,500.00	\$ -	\$ -	\$ -	\$ 130,500.00	\$ 2,300,000.00
B03	Townline	BR-1	Rehabilitate	99.87	31.93	75.00	\$ -	\$ -	\$ -	\$ -	\$ 1,000.00	\$ -	\$ -	\$ -	\$ 1,000.00	\$ 1,500,000.00
Sub Totals							\$ 3,829,500.00	\$ 1,043,000.00	\$ 806,000.00	\$ 55,000.00	\$ 45,000.00	\$ 324,000.00	\$ 2,808,500.00	\$ 2,260,500.00	\$ 5,778,500.00	\$ 33,610,000.00

Township of Severn - REPLACEMENT CAPITAL WORKS

Structure Number	Road Name	Deterioration Curve	Recommended Replace/Rehabilitation	Bridge Condition Index	Years to Rehab	Years to Replace	Current Rehabilitation Costs	Associated Work Costs	Roadside Protection Costs	Additional Investigation Costs	Maintenance Needs Costs	Capital Works Within 1 year	Capital Works 1 - 5 Years	Capital Works 6 - 10 Years	10-Year Estimated Capital Works Cost	Estimated Replacement Value
C37	Fairgrounds Road	CS	Replace	38.11	N/A	0.00	\$ 152,500.00	\$ 55,000.00	\$ 1,000.00	\$ 2,500.00	\$ -	\$ 800,000.00	\$ -	\$ -	\$ 802,500.00	\$ 800,000.00
C09	Uhthoff Line	CS	Replace	38.60	N/A	0.00	\$ -	\$ -	\$ -	\$ -	\$ 1,000.00	\$ 750,000.00	\$ -	\$ -	\$ 751,000.00	\$ 750,000.00
B23	Jeremy Road	BR-1	Replace	59.25	0.00	1.00	\$ 405,000.00	\$ 110,000.00	\$ 52,000.00	\$ 10,000.00	\$ 2,000.00	\$ 1,200,000.00	\$ -	\$ -	\$ 1,212,000.00	\$ 1,200,000.00
C08	Wainman Line	CC	Replace	49.48	N/A	4.74	\$ 665,000.00	\$ 125,000.00	\$ 52,000.00	\$ -	\$ 1,500.00	\$ -	\$ 2,500,000.00	\$ -	\$ 2,501,500.00	\$ 2,500,000.00
B19	Kitchen Sideroad	BR-1	Replace	50.78	0.00	5.39	\$ 150,000.00	\$ 48,000.00	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ 750,000.00	\$ 752,000.00	\$ 750,000.00
B28	Hampshire Mills Line	BR-1	Replace	54.18	0.00	7.09	\$ 335,000.00	\$ 77,000.00	\$ 52,000.00	\$ 10,000.00	\$ 1,500.00	\$ -	\$ -	\$ 1,200,000.00	\$ 1,211,500.00	\$ 1,200,000.00
B11	Reinbird Street	BR-1	Replace	55.20	0.00	7.60	\$ 308,000.00	\$ 70,000.00	\$ 1,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ 1,200,000.00	\$ 1,201,000.00	\$ 1,200,000.00
C33	Wainman Line	CS	Replace	55.73	N/A	7.86	\$ -	\$ -	\$ 1,000.00	\$ 2,500.00	\$ 1,500.00	\$ -	\$ -	\$ 350,000.00	\$ 354,000.00	\$ 350,000.00
C30	Division Road West	CS	Replace	67.64	N/A	13.82	\$ -	\$ -	\$ -	\$ -	\$ 47,000.00	\$ -	\$ -	\$ -	\$ 47,000.00	\$ 450,000.00
C38	Wainman Line	CS	Replace	71.26	N/A	15.70	\$ -	\$ -	\$ 1,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ -	\$ 2,000.00	\$ 350,000.00
B26	Carlyon line	BR	Replace	72.37	N/A	16.18	\$ 78,000.00	\$ 37,000.00	\$ 52,000.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 52,000.00	\$ 350,000.00
B39	Town Line	BR	Replace	73.63	N/A	16.82	\$ -	\$ -	\$ 52,000.00	\$ -	\$ 2,000.00	\$ -	\$ -	\$ -	\$ 54,000.00	\$ 450,000.00
B22	Burnside Line	BR	Replace	73.88	N/A	16.94	\$ 25,000.00	\$ 11,500.00	\$ 52,000.00	\$ -	\$ 1,000.00	\$ -	\$ -	\$ -	\$ 53,000.00	\$ 550,000.00
B34	Wainman Line	BR	Replace	74.85	N/A	17.42	\$ -	\$ 5,000.00	\$ 52,000.00	\$ -	\$ 750.00	\$ -	\$ -	\$ -	\$ 52,750.00	\$ 450,000.00
C20	Taylor Line	CS	Replace	74.79	N/A	17.66	\$ -	\$ -	\$ 1,000.00	\$ -	\$ 1,500.00	\$ -	\$ -	\$ -	\$ 2,500.00	\$ 400,000.00
B18	Laughlin Falls Road	BR	Replace	99.97	N/A	42.48	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 650,000.00
Sub Totals							\$ 2,118,500.00	\$ 538,500.00	\$ 421,000.00	\$ 25,000.00	\$ 63,750.00	\$ 2,750,000.00	\$ 2,500,000.00	\$ 3,500,000.00	\$ 9,048,750.00	\$ 12,400,000.00

Township of Severn - MAINTENANCE NEEDS

Structure No.	Road Name	Maintenance Need	Estimated Maintenance Costs
B03	Townline	Handrail Maintenance, Bridge Cleaning	\$1,000.00
B04	Bond Road	Bridge Cleaning, Hazard Signs, Other	\$2,500.00
B05	Sturgeon Bay Road	Handrail Maintenance, Rout and Seal, Deck Drainage, Hazard Signs	\$3,000.00
B06	Muskoka Street	Bridge Cleaning, Rout and Seal	\$2,000.00
B07	Bayou Road	Handrail Maintenance, Erosion Control, Hazard Signs	\$4,000.00
B10	Woodrow Road	Rout and Seal, Other	\$1,500.00
B11	Reinbird Street	Timber Repair	\$1,000.00
B12	Mill Street, Coldwater	Bridge Cleaning	\$1,000.00
B13	Hampshire Mills Line	Bridge Cleaning	\$1,000.00
B14	Uhthoff Line	Bridge Cleaning, Hazard Signs	\$1,500.00
B15	Lawson Line	Bridge Cleaning	\$1,000.00
B16	Irish Line	Bridge Cleaning, Deck Drainage	\$2,000.00
B17	Lovering Line	Other	\$2,500.00
B19	Kitchen Sideroad	Bridge Cleaning, Hazard Signs	\$2,000.00
B21	Foxmead Road	Hazard Signs	\$1,000.00
B22	Burnside Line	Hazard Signs	\$1,000.00
B23	Jeremy Road	Bridge Cleaning	\$2,000.00
B24	Carlyon Line	Bridge Cleaning	\$1,000.00
B27	Maple Valley Road	Bridge Cleaning	\$1,000.00
B28	Hampshire Mills Line	Bridge Cleaning, Hazard Signs	\$1,500.00
B32	Burnside Line	Bridge Cleaning, Rout and Seal, Hazard Signs, Other	\$6,500.00
B34	Wainman Line	Bridge Cleaning, Rout and Seal	\$750.00
B35	Town line	Bridge Cleaning, Erosion Control	\$2,000.00
B36	Marchmont Road	Bridge Cleaning	\$1,500.00
B39	Town Line	Bridge Cleaning, Bridge Cleaning	\$2,000.00
B40	Taylor Line	Deck Drainage, Bridge Cleaning	\$2,000.00
B41	Unnamed Road	Bridge Cleaning, Erosion Control	\$4,000.00
C08	Wainman Line	Bridge Cleaning, Rout and Seal	\$1,500.00
C09	Uhthoff Line	Hazard Signs	\$1,000.00
C20	Taylor Line	Rout and Seal, Hazard Signs	\$1,500.00
C30	Division Road West	Bridge Cleaning, Erosion Control, Retaining Wall	\$47,000.00
C31	Burnside Line	Bridge Cleaning, Rout and Seal, Hazard Signs	\$3,000.00
C33	Wainman Line	Rout and Seal, Hazard Signs	\$1,500.00
C38	Wainman Line	Hazard Signs	\$1,000.00
Total			\$108,750.00

Township of Severn - ADDITIONAL INVESTIGATIONS REQUIRED

Priority	Structure Name	Road Name	Additional Investigations Required	Estimated Cost
Normal	B04	Bond Road	Detailed Deck Condition Survey,	\$15,000
Normal	B13	Hampshire Mills Line	Detailed Deck Condition Survey,	\$10,000
Normal	B14	Uhthoff Line	Detailed Deck Condition Survey,	\$10,000
Normal	B15	Lawson Line	Detailed Deck Condition Survey,	\$10,000
Normal	B23	Jeremy Road	Structure Evaluation,	\$10,000
Normal	B27	Maple Valley Road	Detailed Deck Condition Survey,	\$10,000
Normal	B28	Hampshire Mills Line	Structure Evaluation,	\$10,000
Normal	C33	Wainman Line	Monitoring Crack Widths,	\$2,500
Normal	C37	Fairgrounds Road	Monitoring Crack Widths,	\$2,500
Total				\$80,000.00

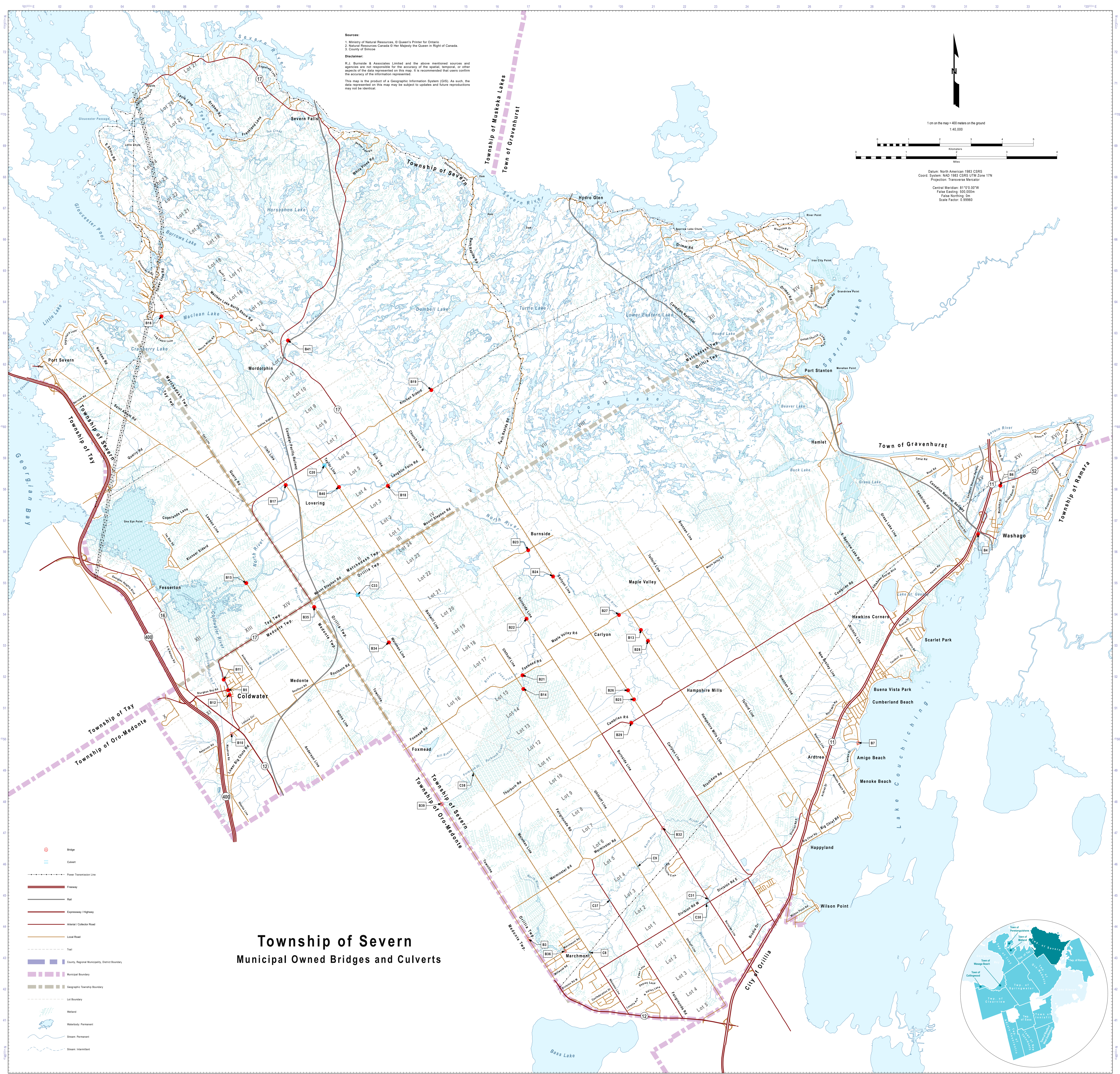


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[THE DIFFERENCE IS OUR PEOPLE]

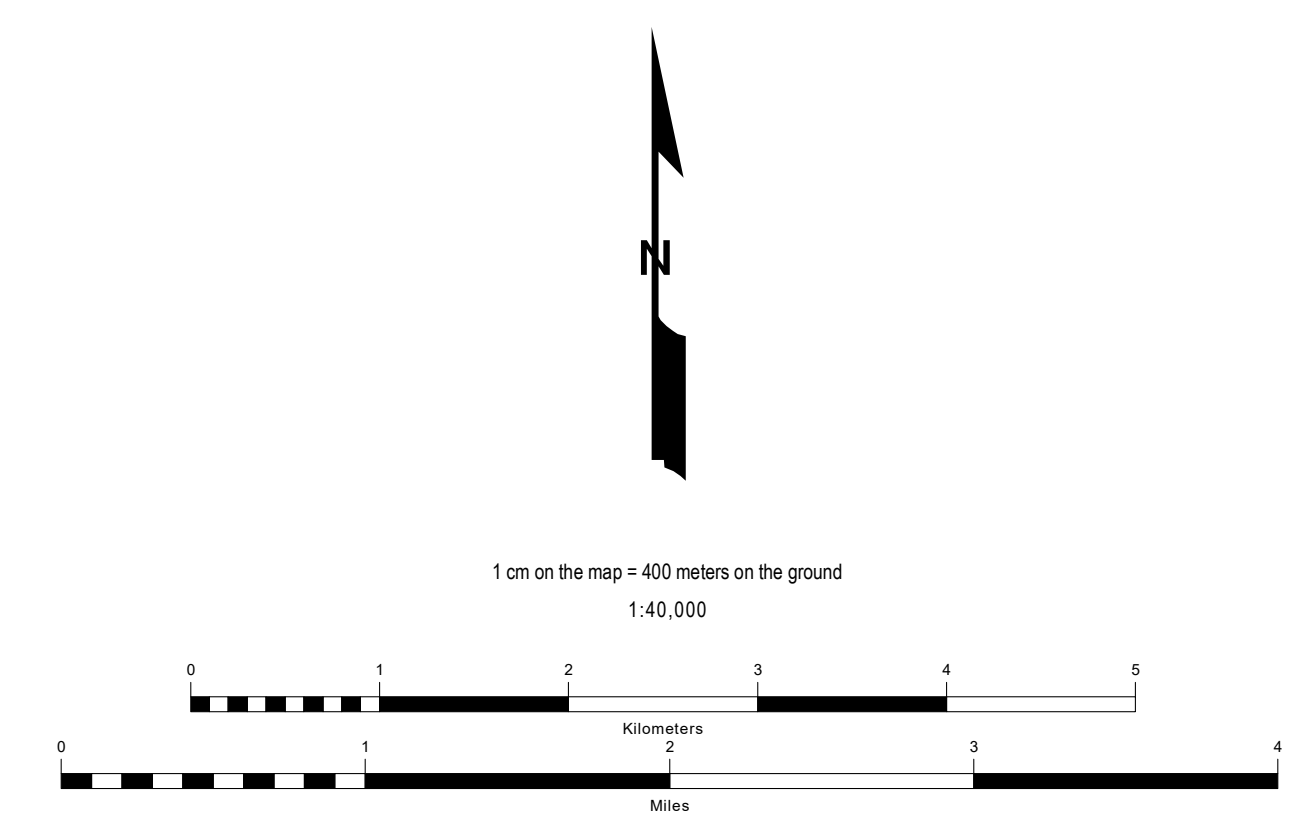
Appendix C

Structure Location Map



Sources:
 1. Ministry of Natural Resources, © Queen's Printer for Ontario
 2. Natural Resources Canada © Her Majesty the Queen in Right of Canada
 3. County of Simcoe

Disclaimer:
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 This map is the product of a Geographic Information System (GIS). As such, the data represented on this map may be subject to updates and future reproductions may not be identical.



Datum: North American 1983 CSRS
 Coord. System: NAD 1983 CSRS UTM Zone 17N
 Projection: Transverse Mercator
 Central Meridian: 81°0'0.00"W
 False Easting: 500,000m
 False Northing: 0m
 Scale Factor: 0.99960

- Bridge
- Culvert
- Power Transmission Line
- Freeway
- Rail
- Expressway/Highway
- Arterial/Collector Road
- Local Road
- Trail
- County, Regional Municipality, District Boundaries
- Municipal Boundary
- Geographic Township Boundary
- Lot Boundary
- Wetland
- Waterbody - Permanent
- Stream - Permanent
- Stream - Intermittent

Township of Severn
Municipal Owned Bridges and Culverts





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Appendix D

OSIM Forms and Photos