



BURNSIDE

2023 OSIM Bridge Inspections Report

**Town of Grand Valley
5 Main Street North
Grand Valley, ON L9W 5S6**



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**Town of Grand Valley
5 Main Street North
Grand Valley, ON L9W 5S6**

**R.J. Burnside & Associates Limited
15 Townline
Orangeville ON L9W 3R4 Canada**

**October 2023
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R.J. Burnside & Associates Limited

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053109.
2023

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was engaged by the Town of Grand Valley to undertake the inspection of 17 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 Town staff. The items included in the maintenance needs include recurring items that should be completed each year, i.e., cleaning winter sand/salt off bridge decks, and one-time costs such as placing rip-rap in washouts on slopes adjacent to bridge wingwalls. The total estimated value of the work to be completed by the Town is **\$41,500.00**. We recommend that a general allowance to complete the works described above be included in the Town'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
07	Structure evaluation	Determine options and load limit requirements (if existing drawings are available)	\$15,000.00
14	Monitor crack widths	Determine whether the crack is actively progressing due to movement of the structure	\$0.00
15	Detailed deck condition survey	Determine extent of deck repairs (complete prior to rehabilitation)	\$35,000.00
Total			\$50,000.00

The Capital Works needs include any repair, rehabilitation or replacement work which would typically be completed by a Town 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	-
1 – 5 years	\$3,941,500.00
6 – 10 years	\$1,508,000.00
TOTAL	\$5,449,500.00

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

Taking into consideration the structures calculated BCI's, several structures have been identified for replacement or rehabilitation. Within the next 1 to 5 years, two (2) structures have been identified as requiring replacement and one (1) structure has been identified for rehabilitation. Within the next 6 to 10 years, one (1) structure has been identified for replacement.

Current roadside safety needs include costs for new/replacement guide rail and/or end treatments at structure locations as required or an investigation where the need for a guide rail system was not evident based on high level review. The total estimated cost for current roadside safety needs is **\$292,500.00**.

It should be noted that all of the aforementioned estimated costs throughout this summary and the report do not include property acquisition costs, utility relocation costs or engineering fees associated with road work beyond the wingwalls, unless specifically identified within the individual OSIM forms. All costs are also exclusive of HST.

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been engaged by the Town of Grand Valley to undertake the inspection of 17 road bridge and culvert structures over the span of 3.0 m.

It is noted that all costs referenced within this report are based on the year of most recent inspection and do not account for changes in unit costs (due to inflation, material availability, labour rates, etc.).

The inspections have been completed in accordance with the Ministry of Transportation - Ontario Structure Inspection Manual (OSIM). Inspection of the Town's bridges and culverts are required every two years as per Ontario Regulation 104/97 which states: *"The structural integrity, safety and condition of every bridge shall be determined through the performance of at least one inspection in every second calendar year under the direction of a professional engineer and in accordance with the Ontario Structure Inspection Manual."* These inspections assess the condition of the structure and identify any additional studies or repairs required. A map showing the location of all structures has been provided in Appendix C.

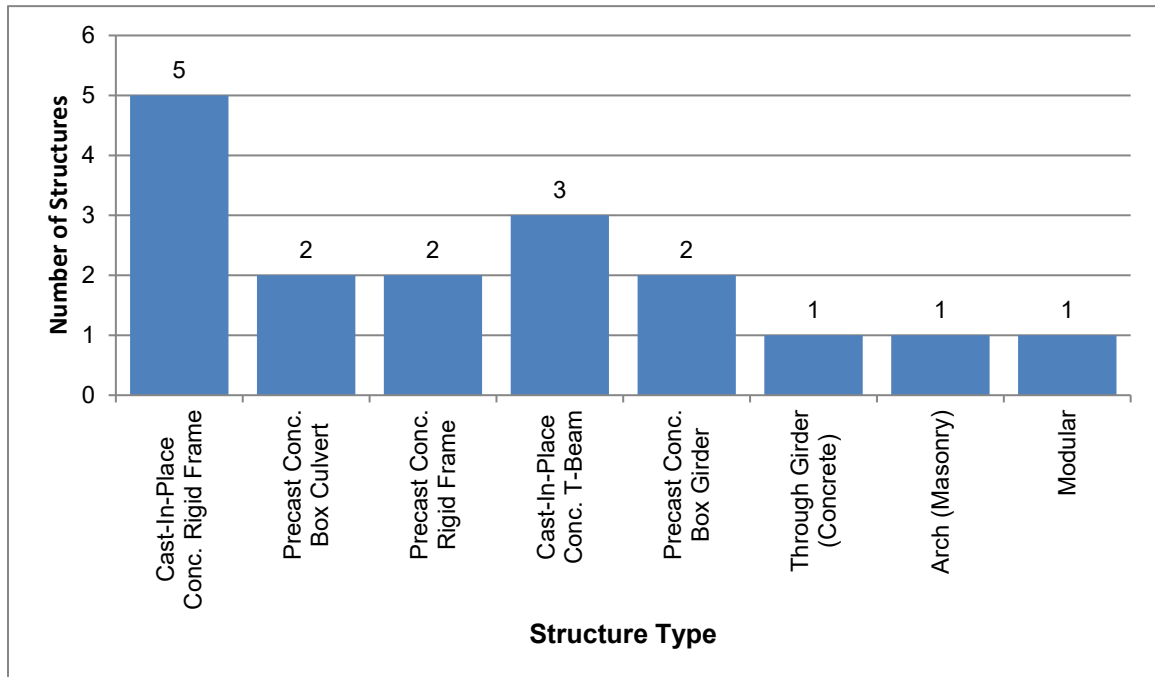
Burnside staff conducted a detailed element by element visual assessment of each bridge/culvert in order to identify any material defects, performance deficiencies and maintenance needs on a structure by structure basis. All data collected has been documented on the OSIM forms and provided in digital format in Appendix E. 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 Town's structures. These inspections, along with a review of the previous reports have contributed to the recommendations provided.

The Town of Grand Valley has an inventory of 17 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.

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 Town 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.
- Lack of, damaged or non-code-conforming guide rail.
- Minor asphalt defects (potholes, cracking).
- Lack of or missing hazard warning signs.

These general defects can be addressed within the Town’s routine maintenance program and these issues can be added to the Town’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 Town is approximately **\$41,500.00**. We recommend that a general allowance to complete the works described above be included in the Town’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 Town are summarized in Table 1 below:

Table 1: Additional Investigations

Structure No./Name	Additional Investigation	Reasoning	Estimated Cost
07	Structure Evaluation	Determine options and load limit requirements (if existing drawings are available)	\$15,000.00
14	Monitor crack widths	Determine whether the crack is actively progressing due to movement of the structure	\$0.00
15	Detailed deck condition survey	Determine extent of deck repairs (complete prior to rehabilitation)	\$35,000.00
Total			\$50,000.00

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. Section 4.2.2.1 from the MTO - Roadside Design Manual states *that guide rail systems must be offset a minimum of 4.25 m from the roadway centerline, to provide clearance to snowplowing operations*. 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.

In consideration of the above, costs to install guide rail on narrow Town roads with a platform width of 8.0 m or narrower have not been included in this report under the rehabilitation plan, unless bridge/road widening to 8.5 m or wider has been recommended as part of the rehabilitation plan. Installation of steel beam guide rail for replacement options is included within the replacement cost estimate.

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 **\$292,500.00**.

Where recommendations have been made for installation or corrective measures, Burnside has identified that the work is to be completed within one to five 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 Town 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.

2.3.1 Pedestrian and Inspector Safety

During inspections, Burnside makes note of the condition and effectiveness of the pedestrian barricades installed at bridges and culverts. MTO Bulletin, BO2020-03 Guards on Structures, was issued on April 7, 2020 and provides recommendations for the installation of guards on culvert ends and retaining walls for the safety of the public and inspectors.

The bulletin recommends that where an area is accessible to the public and an exposed height of greater than 0.6 m is present, a guard meeting the Ontario Building Code requirements shall be installed to protect the public from fall hazards. Additionally, in areas not accessible to the public and where exposed heights greater than 2.4 m are present, a guard shall be installed on culvert ends, or on top of retaining walls to protect inspectors from fall hazards.

It is further noted in the bulletin that a fall hazard risk assessment is to be completed and the need for guards determined by the MTO, or the Owner as appropriate. Installation of guards is recommended to be included as part of any major capital program, and in unique situations may be completed as a standalone installation if warranted.

Burnside has identified locations that could be considered high risk for pedestrians where the lack of guards, or poor condition of existing guards exist. Costs for replacement / installation of guards have been included in the recommended work programs.

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 \$40,000.00 to \$125,000.00, 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, utilities relocation or support, or engineering fees associated for the works beyond the structure limits, unless specifically identified within the individual OSIM forms.

The total estimated cost for the capital works for all 17 structures within the Town, (including rehabilitation/repair and replacement costs) has been estimated as follows:

Table 2: Capital Works Costs and Timeframes

Time Frame	Capital Cost
< 1 year	-
1 – 5 years	\$3,941,500.00
6 – 10 years	\$1,508,000.00
TOTAL	\$5,449,500.00

The total, 10-Year estimated capital costs, which includes the above as well as all other associated costs including maintenance, additional investigations, and roadside protection costs, is \$5,833,500.00. It should be noted that all costs are based on 2023 prices and do not account for inflation. A summary of the capital works needs can be found in Appendix B.

2.5 Load Postings and Recommendations

Load postings may be recommended for structures based on age, condition, noted performance deficiencies or based on the findings of a structural evaluation. A summary of the load postings for the Town’s inventory is provided in Table 3 below.

Table 3: Load Postings

Structure No.	Load Posting (tonnes)	Recommendations
07	To be determined	If the structure is not replaced in the near future, it is recommended that a load limit should be determined based on condition of structure and vehicle weights used at time of design of this bridge.

During the 2023 inspections, Bridge 07, located on Sideroad 24-25, was noted to be in fair to poor condition with severe deterioration to the deck. If this structure is not replaced in the near future, given the condition of the deck, it is recommended that a structure evaluation be completed (if existing drawings are available) to determine the required load posting.

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 Town 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 Town 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 Town's structures, and Figure 3 shows the historical trend of the state of the structures over past inspections where BCI information was available.

Figure 2: Bridge Condition Index Distribution (2023)

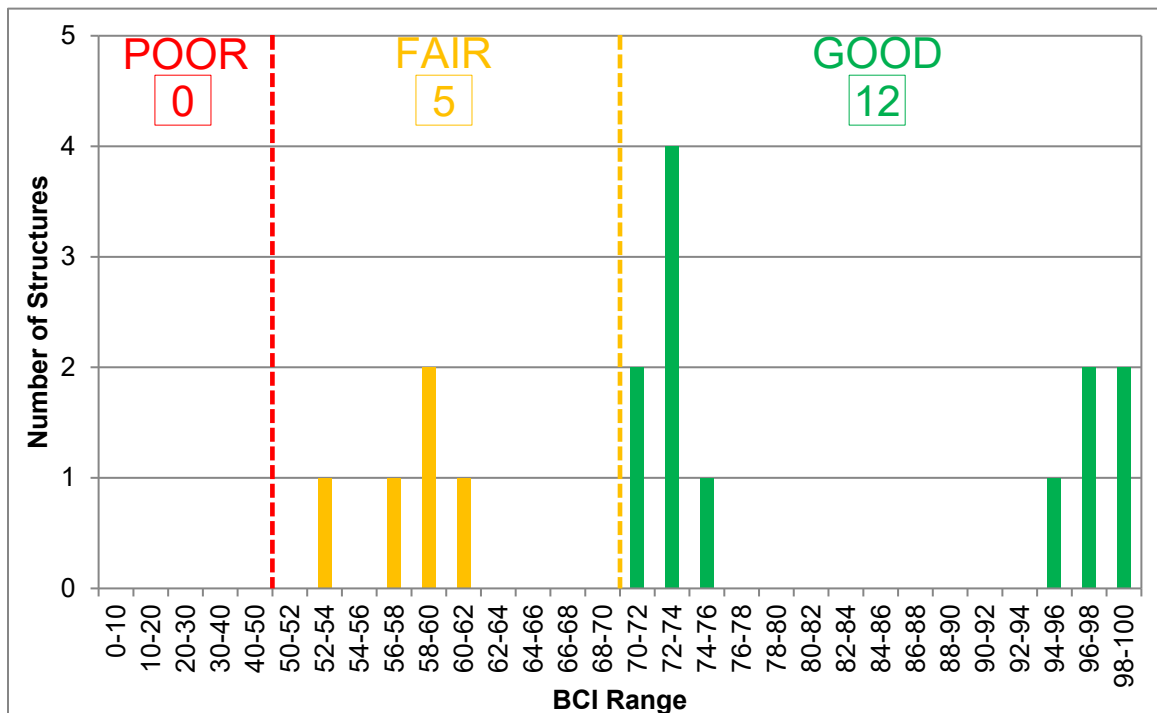
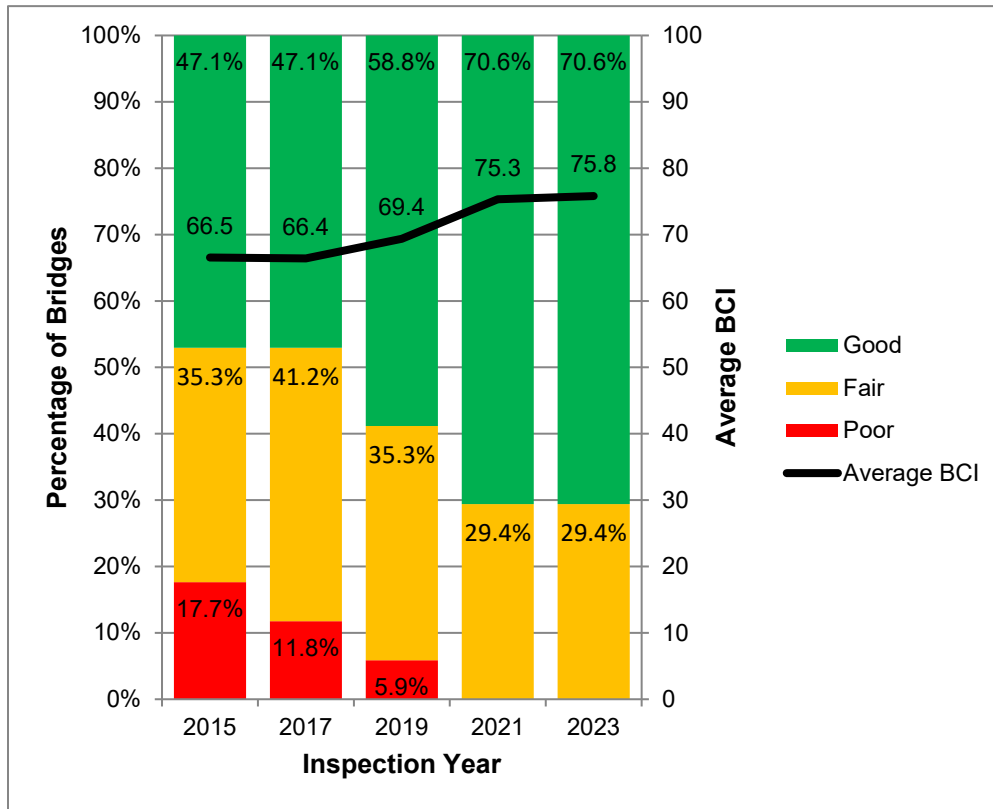


Figure 3: Bridge Condition Index Historical Trend



Currently, approximately 70.6% of the Municipality’s structures are within the “good” range, with 29.4% of the structures classified as “fair”, as illustrated in Figure 3 above. Of interest, the MTO has established a goal of maintaining 85% of their structures in “good” condition (BCI \geq 70) by addressing rehabilitations and replacements as necessary. Burnside recognizes that the above goal was not established by the Town, but it is noted that, based on the current state of the inspected structures, the Town is only slightly underperforming on the management of their bridge assets when compared to the MTO’s established goal.

The trend in Figure 3 identifies that the overall average BCI of the Town’s inventory has generally increased over the last 8 years due to recently completed capital works projects completed since the 2015 inspections, which include the following:

- Structure No. 17 – Sideroad 24-25, Replacement (2020);
- Structure No. 11 – Concession Road 2-3, Replacement (2019);
- Structure No. 01 – Sideroad 27-28, Replacement (2017); and
- Structure No. 16 – Upper Grand Trailway, Repair (2016).

Projects currently in preliminary stages of design include:

- Structure No. 10 – Sideroad 27-28, Replacement
(Scheduled for 2024, subject to funding).

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 Town'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. Burnside has adjusted the MTO theoretical deterioration curve to more accurately reflect the deterioration curve of the structures that are being inspected. It has been observed after inspecting structures for over ten years, that the structures are deteriorating slower than anticipated based on the MTO theoretical deterioration curve, and therefore the timeline for the rehabilitation/replacement of the structure has been adjusted to reflect this slower deterioration rate.

For the purposes of this report, culverts and bridges less than 4.5 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 Town wish to repair these structures.

For structures with spans greater than 4.5 m, it has been assumed that a structure will be rehabilitated once 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; and
- 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 Town's highest priority structures. The structures below have been identified as requiring rehabilitation work or replacement in the next ten years.

The structures in the 10-Year Capital Plan shown below in Table 4, have been ordered for rehabilitation or replacement based on their condition during the latest completed inspection, but also take into account additional factors through recent discussions with Town staff, such as low traffic volume roads, schedule reconstruction projects, close proximity of priority structures, etc. It is anticipated the Town will be required to budget approximately **\$400,000 to \$500,000 annually** for the proposed capital works on their bridge and culvert assets. This does not account for any funding assistance the Town is able to secure for these projects.

Costing breakdown for planning and engineering design has been provided in the 10-Year Capital Plan provided below. It should be noted that the priorities listed may change and will need to be re-assessed during each OSIM inspection cycle.

Table 4: 10-Year Capital Plan

Structure No./Name	Road Name	Recommended Work	Estimated Cost
2023			
10	Sideroad 27-28	Engineering – Design (in progress)	\$15,000
2024			
10	Sideroad 27-28	Construction – Replacement (pending available funding)	\$1,400,000
04	Sideroad 24-25	Engineering – Design and Permits (Rehabilitation)	\$30,000
2025			
07	Sideroad 24-25	Pre-engineering – Preliminary Engineering & Geotechnical Investigation	\$20,000
04	Sideroad 24-25	Construction – Rehabilitation	\$350,000
2026			
07	Sideroad 24-25	Engineering – Design and Permits (Replacement)	\$80,000
2027			
-	-	Build Up Bridge Reserves	-
2028			
07	Sideroad 24-25	Construction – Replacement	\$1,600,000
2029			
14	Sideroad 21-22	Engineering – Preliminary & Geotechnical Investigation	\$20,000
2030			
14	Sideroad 21-22	Engineering – Design and Permits (Replacement)	\$70,000
2031			
-	-	Build Up Bridge Reserves	-
2032			
14	Sideroad 21-22	Construction – Replacement	\$1,400,000
Total			\$4,985,000

* Note – Condition of Bridge 8 to be updated through biennial bridge inspection and priority of replacing this structure can be incorporated into the future plan according to the Town’s current needs at that time (i.e., traffic volumes, growth, etc.). Bridge 8 has been left off the 10-Year Plan for the time being taking budget constraints into consideration.

Cost estimates are in 2023 dollars (HST exclusive) and do not include utility relocation or property acquisition costs.

6.0 Summary

The 2023 OSIM inspections were carried out by Burnside on behalf of the Town of Grand Valley to identify the current condition of all the structures within the Town'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.

If a budget can be committed to the structures listed in the proposed 10-Year Capital Plan, this will allow the Town to focus more on maintaining their bridge and culvert assets, opposed to replacing structure, freeing up funds to be allocated to other Town projects. The Town can then focus on proactive bridge and culvert planning (i.e., rehabilitations) with minimal costs to help extend the service life of structures when timing is appropriate.

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.



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Appendix A

Summary Reports

1.1 Structure No. 01

<u>Structure Name:</u>	Bridge No. 1	2023 BCI =95.1
<u>Road Name:</u>	Sideroad 27-28	
<u>Location:</u>	0.3km South of Highway #89 (Concession XIV, Lot 27/28)	
<u>Structure Type:</u>	Modular	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 17.95 m
<u>Overall Structure Width:</u>	4.7 m	<u>Roadway Width:</u> 4.7 m
<u>Year of Construction:</u>	2017	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	30.1	40.1

Recommendation:	Forgo rehabilitation and replace structure in future (replacement timeline estimated to exceed 10 years).
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Justification:

Structure 01 was recently replaced in 2017 with a temporary, single lane, modular bridge and is generally in excellent condition.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Remove debris off bearing seats and clean deck top	\$1,500.00
Maintenance Needs Total		\$1,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
Rehabilitation Cost Subtotal		\$0.00

Estimate Value of Replacement Structure	Estimated Cost
	\$1,500,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$0.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$0.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	N/A	\$1,515,000.00
Roadside Protection:	N/A	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	N/A	\$126,000.00
Environmental Assessment:	N/A	\$60,000.00
Engineering Design:	N/A	\$126,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	N/A	\$76,000.00
Total Capital Work Cost	N/A	\$2,018,000.00

1.2 Structure No. 02

<u>Structure Name:</u>	Bridge No. 2	2023 BCI =75.04
<u>Road Name:</u>	Concession Rd. 12-13	
<u>Location:</u>	0.3km East of Sideroad 24-25 (Conc. XII/XIII, Lot 25)	
<u>Structure Type:</u>	Precast Concrete Box Girder	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 17 m
<u>Overall Structure Width:</u>	9.2 m	<u>Roadway Width:</u> 8 m
<u>Year of Construction:</u>	1996	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	15.0	25.0

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 02 is generally in good condition with only minor defects noted.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean expansion joints and deck top and remove trees around wingwalls	\$2,500.00
Maintenance Needs Total		\$2,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to deck top, concrete end dams,	N/A	\$2,500.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$6,000.00
Waterproof and pave	N/A	\$40,000.00
Modify Expansion Joints and Ballast Walls	N/A	\$100,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$273,500.00

Estimate Value of Replacement Structure	Estimated Cost
	\$1,500,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$288,500.00	\$1,515,000.00
Roadside Protection:	\$0.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$29,000.00	\$126,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$29,000.00	\$126,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$76,000.00
Total Capital Work Cost	\$364,000.00	\$1,968,000.00

1.3 Structure No. 03

<u>Structure Name:</u>	Bridge No. 3	2023 BCI =72.47
<u>Road Name:</u>	Sideroad 21-22	
<u>Location:</u>	1.0 km North of County Road 15 (Concession XII, Lot 21/22)	
<u>Structure Type:</u>	Cast-In-Place Conc. Rigid Frame	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 8.3 m (skew span 9.5 m) m
<u>Overall Structure Width:</u>	9.9 m	<u>Roadway Width:</u> 8 m
<u>Year of Construction:</u>	1970	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	12.5	22.5

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 03 is generally in good condition but is demonstrating signs of moisture penetration. A detailed deck condition survey was completed in 2020. After reviewing the results with the Town, it was determined the structure was a suitable candidate for rehabilitation to extend the service life. The structure and approaches were paved prior to the 2017 inspection but there was no evidence of waterproofing found in the cores.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface	\$1,000.00
Erosion Control	Install rock protection on embankments	\$5,000.00
Deck Drainage	Flush deck drains	\$500.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Maintenance Needs Total		\$7,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Install Guide Rail, end treatments and structure connections	\$95,000.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to end post, posts, deck top, curbs,	N/A	\$8,500.00
Type B concrete repairs to soffit,	N/A	\$12,500.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$1,500.00
Replace deck drains	N/A	\$10,000.00
Replace barrier system	N/A	\$60,000.00
Waterproof and pave	N/A	\$40,000.00
Install rock protection along abutments	N/A	\$5,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$262,500.00

Estimate Value of Replacement Structure	\$1,100,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$277,500.00	\$1,115,000.00
Roadside Protection:	\$95,000.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$28,000.00	\$106,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$28,000.00	\$106,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$56,000.00
Total Capital Work Cost	\$446,000.00	\$1,508,000.00

1.4 Structure No. 04

<u>Structure Name:</u>	Bridge No. 4	2023 BCI =71.07
<u>Road Name:</u>	Sideroad 24-25	
<u>Location:</u>	0.5 km South of County Road 15 (Concession X, Lot 24/25)	
<u>Structure Type:</u>	Cast-In-Place Conc. Rigid Frame	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 10.6 m (11.05 m skew span) m
<u>Overall Structure Width:</u>	9.8 m	<u>Roadway Width:</u> 8.6 m
<u>Year of Construction:</u>	1955	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	3.0	21.1

Recommendation:	Minor Rehabilitation is recommended within 3 years.
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Justification:

Structure 04 is generally in good condition but was noted to have poor concrete on the deck top. A detailed deck condition survey was completed in 2020. After reviewing the results with the Town, it was determined the structure was a suitable candidate for rehabilitation to extend the service life.

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

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Install Guide Rail, end treatments and structure connections	\$95,000.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs,	1 to 5 years	\$15,000.00
Type B concrete repairs to soffit,	1 to 5 years	\$20,000.00
Type C concrete repairs to abutment walls, wingwalls,	1 to 5 years	\$5,000.00
Replace deck drains	1 to 5 years	\$10,000.00
Replace barrier system	1 to 5 years	\$60,000.00
Waterproof and pave	1 to 5 years	\$40,000.00
General Items - Insurance, Mobilization, Access etc.	1 to 5 years	\$125,000.00
Rehabilitation Cost Subtotal		\$275,000.00

Estimate Value of Replacement Structure	\$900,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$290,000.00	\$915,000.00
Roadside Protection:	\$95,000.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$29,000.00	\$92,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$29,000.00	\$92,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$46,000.00
Total Capital Work Cost	\$460,500.00	\$1,270,000.00

1.5 Structure No. 05

<u>Structure Name:</u>	Bridge No. 5 (Hall Bridge)	2023 BCI =72.45
<u>Road Name:</u>	Sideroad 27-28	
<u>Location:</u>	Concession Road 8-9 (between east and west intersection)	
<u>Structure Type:</u>	Precast Concrete Box Girder	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 26.4 m (skew span 30.5 m) m
<u>Overall Structure Width:</u>	9.3 m	<u>Roadway Width:</u> 7.5 m
<u>Year of Construction:</u>	1979	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	12.5	22.5

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 05 is generally in good condition but is demonstrating signs of failing expansion joints and moisture penetration through the box girders.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top and Expansion Joints	\$1,500.00
Deck Joint Repair	Replace sealant in joints	\$5,000.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Maintenance Needs Total		\$7,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Investigate Need for Replacing with Longer Guide Rail	\$500.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to deck top, concrete end dams, curbs,	N/A	\$11,000.00
Type B concrete repairs to Girders, soffit,	N/A	\$2,500.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$10,000.00
Replace barrier system	N/A	\$10,000.00
Waterproof and pave	N/A	\$50,000.00
Replace expansion joint	N/A	\$80,000.00
Add slope stabilization	N/A	\$15,000.00
Extend deck drains	N/A	\$5,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$308,500.00

Estimate Value of Replacement Structure	\$2,600,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$323,500.00	\$2,615,000.00
Roadside Protection:	\$500.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$33,000.00	\$181,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$33,000.00	\$181,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$131,000.00
Total Capital Work Cost	\$407,500.00	\$3,233,000.00

1.6 Structure No. 06

<u>Structure Name:</u>	Bridge No. 6	2023 BCI =73.86
<u>Road Name:</u>	Concession Road 8-9	
<u>Location:</u>	0.4km east of Sideroad 24-25 (Conc. VII/IX, Lot 25)	
<u>Structure Type:</u>	Cast-In-Place Conc. Rigid Frame	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 8.0 m (skew span 9.2 m) m
<u>Overall Structure Width:</u>	8.9 m	<u>Roadway Width:</u> 6.7 m
<u>Year of Construction:</u>	1986	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	N/A	0.0

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 06 is generally in good condition with only minor concrete deficiencies noted.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Remove vegetation around wingwalls	\$1,500.00
Maintenance Needs Total		\$1,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Investigate Need for Replacing with Longer Guide Rail	\$500.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$6,000.00
Replace barrier system	N/A	\$30,000.00
Add slope stabilization	N/A	\$10,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$171,000.00

Estimate Value of Replacement Structure	\$800,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$186,000.00	\$815,000.00
Roadside Protection:	\$500.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$19,000.00	\$82,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$20,000.00	\$82,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$41,000.00
Total Capital Work Cost	\$243,000.00	\$1,145,000.00

1.7 Structure No. 07

<u>Structure Name:</u>	Bridge No. 7	2023 BCI =53.51
<u>Road Name:</u>	Sideroad 24-25	
<u>Location:</u>	0.3km south of Concession Road 8-9 (Conc. VIII, Lot 24/25)	
<u>Structure Type:</u>	Through Girder (Concrete)	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 15.15 m
<u>Overall Structure Width:</u>	6.5 m	<u>Roadway Width:</u> 4.9 m
<u>Year of Construction:</u>	1920	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	0.0	2.0

Recommendation:	Forgo rehabilitation and replace structure within 2 years.
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Justification:

Structure 07 is generally in fair to poor condition and is demonstrating signs of severe deterioration and moisture penetration on the deck soffit. The time for replacement is based on the element BCI of the deck.

Based on the condition of the deck, it is recommended that a structure evaluation be completed (if existing drawings are available) to determine if a load posting is required prior to the structure being replaced.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Wearing Surface, flush drains, and remove vegetation around Wingwalls,	\$2,000.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Maintenance Needs Total		\$3,000.00

Additional Investigations	Estimated Cost
Structure Evaluation,	\$15,000.00

Current Roadside Protection Needs	Estimated Cost
Consider installing steel beam guide rail during future replacement works	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs,	N/A	\$45,000.00
Type B concrete repairs to Girders, soffit,	N/A	\$90,000.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$50,000.00
Protect structural barriers	N/A	\$45,000.00
Replace deck drains	N/A	\$10,000.00
Waterproof and pave	N/A	\$25,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$390,000.00

Estimate Value of Replacement Structure	\$1,500,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$405,000.00	\$1,515,000.00
Roadside Protection:	\$0.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$41,000.00	\$126,000.00
Environmental Assessment:	\$2,500.00	\$15,000.00
Engineering Design:	\$41,000.00	\$126,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$76,000.00
Total Capital Work Cost	\$504,500.00	\$1,973,000.00

1.8 Structure No. 08

<u>Structure Name:</u>	Bridge No. 8	2023 BCI =57.6
<u>Road Name:</u>	Concession Road 8-9	
<u>Location:</u>	0.3km west of Sideroad 24-25 (Conc. VIII/IX, Lot 24)	
<u>Structure Type:</u>	Cast-In-Place Concrete T-Beam	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 9.7 m
<u>Overall Structure Width:</u>	5.8 m	<u>Roadway Width:</u> 4.85 m
<u>Year of Construction:</u>	1950	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	N/A	10.8

Recommendation:	No Capital Works is estimated to be required within the next 10 years.
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Justification:

Structure 08 is generally in fair to poor condition and is demonstrating signs of severe concrete deterioration of the deck and girders. A detailed deck condition survey was completed in 2020. After reviewing the results with the Town, and considering the narrow platform width, it was determined that a rehabilitation was not a viable option and replacement was preferred.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean deck and remove vegetation around wingwalls	\$2,000.00
Hazard Signs	Install posts and raise hazard warning signs at structure	\$500.00
Maintenance Needs Total		\$2,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Investigate Need for Replacing with Longer Guide Rail	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to posts, deck top, curbs,	N/A	\$25,000.00
Type B concrete repairs to Girders, soffit,	N/A	\$35,000.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$25,000.00
Waterproof and Pave	N/A	\$30,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$240,000.00

Estimate Value of Replacement Structure	Estimated Cost
	\$900,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$255,000.00	\$915,000.00
Roadside Protection:	\$0.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$26,000.00	\$92,000.00
Environmental Assessment:	\$2,500.00	\$15,000.00
Engineering Design:	\$26,000.00	\$92,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$46,000.00
Total Capital Work Cost	\$324,500.00	\$1,275,000.00

1.9 Structure No. 09

<u>Structure Name:</u>	Bridge No. 9	2023 BCI =97.18
<u>Road Name:</u>	Concession Rd. 8-9	
<u>Location:</u>	0.7 km West of County Rd. 25 (Conc. VIII/IX, Lot 29)	
<u>Structure Type:</u>	Precast Concrete Rigid Frame	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 6.1 m
<u>Overall Structure Width:</u>	9.6 m	<u>Roadway Width:</u> 9 m
<u>Year of Construction:</u>	2013	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	32.2	42.2

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 09 was replaced in 2013 and is generally in excellent condition with only minor maintenance work recommended at this time.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Remove vegetation around curbs/guide rail	\$500.00
Handrail Maintenance	Tighten loose NE hand railing cap	\$250.00
Other	Tighten loose end treatment cables	\$250.00
Maintenance Needs Total		\$1,000.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Repair Guide Rail	\$6,500.00

Rehabilitation/Repair Required	Priority	Estimated Cost
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
Rehabilitation Cost Subtotal		\$0.00

Estimate Value of Replacement Structure	\$750,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$0.00	\$0.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$0.00	\$0.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	N/A	\$750,000.00
Roadside Protection:	N/A	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	N/A	\$75,000.00
Environmental Assessment:	N/A	\$10,000.00
Engineering Design:	N/A	\$75,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	N/A	\$38,000.00
Total Capital Work Cost	N/A	\$1,063,000.00

1.10 Structure No. 10

<u>Structure Name:</u>	Bridge No. 10	2023 BCI =59.21
<u>Road Name:</u>	Sideroad 27-28	
<u>Location:</u>	1.75km north of County Rd. 15 (Conc. XII, Lot 27/28)	
<u>Structure Type:</u>	Cast-In-Place Concrete T-Beam	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 9.8 m
<u>Overall Structure Width:</u>	5.8 m	<u>Roadway Width:</u> 4.9 m
<u>Year of Construction:</u>	1965	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	0.0	2.0

Recommendation:	Forgo rehabilitation and replace structure within 2 years.
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Justification:

Structure 10 is generally in fair to poor condition and is demonstrating signs of severe deterioration of the soffit and T-Beams (key structural elements). A detailed deck condition survey was completed in 2020. After reviewing the results with the Town and considering the narrow platform width, and collision history (i.e., NW barrier impact damage 2020) it was determined that a rehabilitation was not a viable option and replacement was preferred. Replacement of Structure 10 is tentatively scheduled for 2024 and is currently in design phase.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Drainage, Deck Wearing Surface,	\$1,000.00
Erosion Control	Repairs required to Embankments,	\$1,000.00
Hazard Signs	Install hazard warning signs at structure	\$1,000.00
Maintenance Needs Total		\$3,000.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Install Guide Rail, end treatments and structure connections	\$95,000.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to posts, deck top, curbs,	N/A	\$15,000.00
Type B concrete repairs to Girders, soffit,	N/A	\$80,000.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$22,500.00
Steel repairs to signs,	N/A	\$27,500.00
Waterproof and Pave	N/A	\$30,000.00
Add slope stabilization	N/A	\$36,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$336,000.00

Estimate Value of Replacement Structure	
	\$1,100,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$351,000.00	\$1,115,000.00
Roadside Protection:	\$95,000.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$36,000.00	\$106,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$36,000.00	\$106,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$56,000.00
Total Capital Work Cost	\$535,500.00	\$1,508,000.00

1.11 Structure No. 11

<u>Structure Name:</u>	Bridge No. 11	2023 BCI =99.68
<u>Road Name:</u>	Concession Road 2-3	
<u>Location:</u>	1 km East of Sideroad 24-25 (Conc. II/III, Lot 26)	
<u>Structure Type:</u>	Precast Concrete Rigid Frame	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 6 m
<u>Overall Structure Width:</u>	6.5 m	<u>Roadway Width:</u> 7 m
<u>Year of Construction:</u>	2019	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	34.7	44.7

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 11 was replaced in 2019 and is generally in excellent condition.

Maintenance Need	Element and Comments	Estimated Cost
		\$0.00
		\$0.00
Maintenance Needs Total		\$0.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
Rehabilitation Cost Subtotal		\$0.00

Estimate Value of Replacement Structure	
	\$750,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$0.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$0.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	N/A	\$765,000.00
Roadside Protection:	N/A	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	N/A	\$77,000.00
Environmental Assessment:	N/A	\$10,000.00
Engineering Design:	N/A	\$77,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	N/A	\$39,000.00
Total Capital Work Cost	N/A	\$1,083,000.00

1.12 Structure No. 12

<u>Structure Name:</u>	Bridge No. 12	2023 BCI =70.9
<u>Road Name:</u>	Sideroad 27-28	
<u>Location:</u>	0.9km south of Concession Road 2-3 (Conc. II, Lot 27/28)	
<u>Structure Type:</u>	Cast-In-Place Conc. Rigid Frame	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 7.3 m
<u>Overall Structure Width:</u>	7.6 m	<u>Roadway Width:</u> 6 m
<u>Year of Construction:</u>	1966	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	10.9	20.9

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 12 is generally in good condition but is demonstrating signs of deterioration of the concrete curbs, barrier system and soffit. Fill has been placed over the structure to near the top of curb level and the structure may not have been designed to support such amount of fill. Given the narrow, sub-standard driving platform width, consideration may be given to forgoing the rehabilitation.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Curbs,	\$500.00
Hazard Signs	Raise hazard warning signs at structure	\$500.00
Maintenance Needs Total		\$1,000.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
Narrow structure - Install guide rail if structure widened during rehabilitation / replacement	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to end post, posts, deck top, curbs,	N/A	\$15,000.00
Type B concrete repairs to soffit,	N/A	\$10,000.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$5,000.00
Widen deck platform (cantilever)	N/A	\$50,000.00
Install side mounted barrier and approach guide rail	N/A	\$95,000.00
Waterproof and pave	N/A	\$30,000.00
Add slope stabilization	N/A	\$10,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$340,000.00

Estimate Value of Replacement Structure	Estimated Cost
	\$750,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$355,000.00	\$765,000.00
Roadside Protection:	\$0.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$36,000.00	\$77,000.00
Environmental Assessment:	\$2,500.00	\$15,000.00
Engineering Design:	\$36,000.00	\$77,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$39,000.00
Total Capital Work Cost	\$444,500.00	\$1,088,000.00

1.13 Structure No. 13

<u>Structure Name:</u>	Bridge No. 13	2023 BCI =97.36
<u>Road Name:</u>	Sideroad 21-22	
<u>Location:</u>	1.2km south of Concession Road 2-3	
<u>Structure Type:</u>	Precast Concrete Box Culvert	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 3.05 m
<u>Overall Structure Width:</u>	17.6 m	<u>Roadway Width:</u> 7 m
<u>Year of Construction:</u>	2011	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	N/A	42.4

Recommendation:	No Capital Works is estimated to be required within the next 10 years.
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Justification:

Structure 13 was replaced in 2011 and is generally in excellent condition with only minor maintenance recommended at this time.

Maintenance Need	Element and Comments	Estimated Cost
Erosion Control	Place erosion protection in NE ditch	\$1,000.00
Other	Tighten end treatment cables	\$500.00
Maintenance Needs Total		\$1,500.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
Rehabilitation Cost Subtotal		\$0.00

Estimate Value of Replacement Structure	Estimated Cost
	\$450,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$0.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$0.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	N/A	\$465,000.00
Roadside Protection:	N/A	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	N/A	\$47,000.00
Environmental Assessment:	N/A	\$10,000.00
Engineering Design:	N/A	\$47,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	N/A	\$24,000.00
Total Capital Work Cost	N/A	\$708,000.00

1.14 Structure No. 14

<u>Structure Name:</u>	Bridge No. 14	2023 BCI =61.01
<u>Road Name:</u>	Sideroad 21-22	
<u>Location:</u>	1.1km north of Concession Road 8-9 (Conc. IX, Lot 21/22)	
<u>Structure Type:</u>	Cast-In-Place Concrete T-Beam	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 9.2 m (10.6 m skew span) m
<u>Overall Structure Width:</u>	5.8 m	<u>Roadway Width:</u> 4.9 m
<u>Year of Construction:</u>	1970	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	0.0	6.0

Recommendation: Forgo rehabilitation and replace structure within 6 years.

Justification:

Structure 14 is generally in fair condition and is demonstrating signs of severe deterioration to the wingwalls, and moisture penetration through the exposed deck top. It is recommended that monitoring of the crack width noted on the abutment wall be considered to determine whether the crack is actively progressing due to movement of the structure.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck Top, Wingwalls, Embankments,	\$1,000.00
Erosion Control	Repairs required to Embankments,	\$1,000.00
Other	Repairs required to Streams and Waterways,	\$2,500.00
Maintenance Needs Total		\$4,500.00

Additional Investigations	Estimated Cost
Monitoring Crack Widths,	\$0.00

Current Roadside Protection Needs	Estimated Cost
Narrow structure - Install guide rail if structure widened during rehabilitation / replacement	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to deck top, curbs,	N/A	\$10,000.00
Type B concrete repairs to Girders, soffit,	N/A	\$30,000.00
Type C concrete repairs to abutment walls, wingwalls,	N/A	\$50,000.00
Widen deck platform (cantilever)	N/A	\$50,000.00
Install side mounted barrier and approach guide rail	N/A	\$95,000.00
Waterproof and pave	N/A	\$35,000.00
Add slope stabilization	N/A	\$10,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$405,000.00

Estimate Value of Replacement Structure	\$1,100,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$420,000.00	\$1,115,000.00
Roadside Protection:	\$0.00	\$95,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$42,000.00	\$106,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$42,000.00	\$106,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$56,000.00
Total Capital Work Cost	\$521,500.00	\$1,508,000.00

1.15 Structure No. 15

<u>Structure Name:</u>	Bridge No. 15	2023 BCI =72.74
<u>Road Name:</u>	Main Street South	
<u>Location:</u>	Main St. Just South of County Road 25	
<u>Structure Type:</u>	Cast-In-Place Conc. Rigid Frame	
<u>Number of Spans:</u>	3	<u>Span Lengths:</u> North 10.75; Middle 10.75; South 10.75 m
<u>Overall Structure Width:</u>	8.9 m	<u>Roadway Width:</u> 6.6 m
<u>Year of Construction:</u>	1994	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	12.7	22.7

Recommendation:	No Capital Works estimated to be required within 10 years. Future structure rehabilitation should be considered.
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Justification:

Structure 15 is generally in good condition but has demonstrated signs of bottom-up defects in the deck wearing surface, prior to repaving in 2018, indicating potential defects in the underlying concrete deck. Given that the bridge is a main connecting structure to the Town's north and south residents, staged construction costs of \$250,000 have been included in the cost estimates.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Clean Deck,	\$1,000.00
Handrail Maintenance	Replace missing fasteners	\$500.00
Maintenance Needs Total		\$1,500.00

Additional Investigations	Estimated Cost
Detailed Deck Condition Survey,	\$35,000.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Type A concrete repairs to approach curb/gutters, barrier/parapet walls interior, end post, deck top, concrete end dams, sidewalk,	N/A	\$45,000.00
Type B concrete repairs to barrier/parapet walls exterior, soffit,	N/A	\$15,000.00
Type C concrete repairs to abutment walls, wingwalls, shaft / bents,	N/A	\$25,000.00
Steel repairs to railing system,	N/A	\$15,000.00
Waterproof and pave	N/A	\$65,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$125,000.00
Rehabilitation Cost Subtotal		\$290,000.00

Estimate Value of Replacement Structure	\$2,900,000.00
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Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$305,000.00	\$2,915,000.00
Roadside Protection:	\$0.00	\$95,000.00
Staging Costs:	\$250,000.00	\$250,000.00
Construction Contingencies:	\$31,000.00	\$196,000.00
Environmental Assessment:	\$2,500.00	\$10,000.00
Engineering Design:	\$31,000.00	\$196,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$146,000.00
Total Capital Work Cost	\$634,500.00	\$3,828,000.00

1.16 Structure No. 16

<u>Structure Name:</u>	Bridge No. 16 (Boyne Creek Arch Culvert)	2023 BCI =59.83
<u>Road Name:</u>	Upper Grand Trailway	
<u>Location:</u>	Approximately 0.6 km east of CR25	
<u>Structure Type:</u>	Arch (Masonry)	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 3.6 m
<u>Overall Structure Width:</u>	19.5 m	<u>Roadway Width:</u> 3.3 m
<u>Year of Construction:</u>	1919	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	N/A	19.8

Recommendation:	No Capital Works is estimated to be required within the next 10 years.
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Justification:

Structure 16 is a brick arch structure located on an abandoned rail trail which has been converted to a pedestrian use trail. A minor rehabilitation was completed in 2016 which included placing wire mesh and applying a shotcrete lining to the barrel interior, which has created a limited inspection of previous brick defects noted. The structure was constructed over 100 years ago and is generally in fair to poor condition demonstrating signs of moisture within the newly applied shotcrete lining of the barrel. It is recommended that the NW embankment be stabilized, as the wingwall portion of the structure which supported the embankment has failed. The brick arch structure has probable heritage aspects and therefore replacement of the culvert may require design of an aesthetically sympathetic structure pending the findings of further heritage assessment investigations; however, the estimated replacement cost provided is for replacement with a CSP multi-plate culvert.

Maintenance Need	Element and Comments	Estimated Cost
Bridge Cleaning	Remove tree in close proximity to SW wingwall	\$1,000.00
Maintenance Needs Total		\$1,000.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
Install pedestrian barrier	N/A	\$10,000.00
Add slope stabilization	N/A	\$50,000.00
General Items - Insurance, Mobilization, Access etc.	N/A	\$50,000.00
Rehabilitation Cost Subtotal		\$110,000.00

Estimate Value of Replacement Structure	Estimated Cost
	\$650,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$15,000.00	\$15,000.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$15,000.00	\$15,000.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	\$125,000.00	\$665,000.00
Roadside Protection:	\$25,000.00	\$25,000.00
Staging Costs:	N/A	N/A
Construction Contingencies:	\$13,000.00	\$67,000.00
Environmental Assessment:	\$2,500.00	\$80,000.00
Engineering Design:	\$20,000.00	\$67,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	\$15,000.00	\$34,000.00
Total Capital Work Cost	\$200,500.00	\$958,000.00

1.17 Structure No. 17

<u>Structure Name:</u>	Bridge No. 17	2023 BCI =99.6
<u>Road Name:</u>	Sideroad 24-25	
<u>Location:</u>	Approximately 400m North of Concession 2-3	
<u>Structure Type:</u>	Precast Concrete Box Culvert	
<u>Number of Spans:</u>	1	<u>Span Lengths:</u> 3.658 m
<u>Overall Structure Width:</u>	17.107 m	<u>Roadway Width:</u> 8 m
<u>Year of Construction:</u>	2020	<u>Current Load Limit:</u>



	Rehabilitation	Replacement
Estimated Capital Works Timelines (Years):	N/A	44.6

Recommendation:	No Capital Works is estimated to be required within the next 10 years.
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Justification:

Structure 17 was recently replaced in 2020 and is generally in excellent condition.

Maintenance Need	Element and Comments	Estimated Cost
		\$0.00
		\$0.00
Maintenance Needs Total		\$0.00

Additional Investigations	Estimated Cost
	\$0.00

Current Roadside Protection Needs	Estimated Cost
	\$0.00

Rehabilitation/Repair Required	Priority	Estimated Cost
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
	N/A	\$0.00
Rehabilitation Cost Subtotal		\$0.00

Estimate Value of Replacement Structure	
	\$400,000.00

Associated Work	Rehabilitation	Replacement
Approaches -	\$0.00	\$0.00
Detours -	\$0.00	\$0.00
Traffic Control -	\$0.00	\$0.00
Utilities -	\$0.00	\$0.00
Right of Way -	\$0.00	\$0.00
Environmental -	\$0.00	\$0.00
Other -	\$0.00	\$0.00
Total Associated Work Cost	\$0.00	\$0.00

Total Capital Works Costs		
Cost	Rehabilitation	Replacement
Rehab / Replacement Works:	N/A	\$400,000.00
Roadside Protection:	N/A	\$95,000.00
Staging Costs:	N/A	\$250,000.00
Construction Contingencies:	N/A	\$40,000.00
Environmental Assessment:	N/A	\$10,000.00
Engineering Design:	N/A	\$40,000.00
Geotechnical Investigation:	N/A	\$20,000.00
Contract Administration:	N/A	\$20,000.00
Total Capital Work Cost	N/A	\$875,000.00

