MUNICIPALITY OF KINCARDINE

BRIDGE INSPECTION REPORT

2021

BMROSS
engineering better communities

MUNICIPALITY OF KINCARDINE

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2021

October 22, 2021

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File No. 96038

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

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1.0 INTRODUCTION

Bridges are an important and sometimes expensive component within a road network system. The purpose of a bridge inspection report is to not only identify safety concerns and structural deficiencies but to help prioritize improvements in an effort to minimize the costs to maintain the bridges. Bridges are defined as structures with a span of 3.0 m or more. In the case of barrel culverts, the span is measured normal to the stream. BMROSS completed inspections of 83 structures (81 bridges and 2 small span culverts) in the Municipality of Kincardine in 2021. Structure 2139 has been removed since our last review and Structure 2640 has been added. This report includes a summary of our observations, some general recommendations, and a suggested priority list of the needs to help maintain the bridges within the Municipality.

The roadway structures were last inspected in 2019. OSIM reports were generated for each roadway structure by our office in 2017. The pedestrian bridges were last inspected by our office in 2020, but OSIM reports were not prepared. OSIM reports have been generated for each structure (roadway and pedestrian) as part of this round of inspections.

It should be noted that there was deep water at Structure 2103, 2117, 2120, 2124, 2608, 2609, 2613, 2615, 2632, 2638. As such review of these structures was limited to what could be observed above water level or felt with a probe. In some cases, the water is deep due to the nature of the stream and site, but it is possible that there are dams downstream of the structure.

This report includes a summary of our observations, some general recommendations, and a suggested priority list of the needs to help maintain the bridges within the Municipality.

Appendices A and E list an inventory of the structures reviewed. Appendix C contains a map showing locations of the structures that were reviewed.

Details related to pedestrian bridges are included under Part 8.0 of this report.

2.0 SCOPE OF THE WORK

This study is to help the Municipality prioritize the structural improvements, address identified safety concerns in a cost-effective way, and help predict future costs. It is understood that some of this information will be incorporated into an overall asset management plan by the Municipality.

In general, the assessment process is divided into the following major components:

1. Prepare an inventory of the bridges using information supplied by the Municipality.

2. The inspections are completed in general accordance with the Ontario Structural Inspection Manual (OSIM) procedures. This includes a review the bridges looking for safety or structural deficiencies, taking measurements and assigning condition ratings of the key bridge elements to develop a Bridge Condition Index (BCI) as per the OSIM. Photographs were taken of all sites and of some defects to better illustrate the condition of the bridges.

3. Develop a probable cost estimate to address the recommended maintenance tasks and structural rehabilitation recommendations identified for each structure. These are divided into tasks required in the short term, within less than 5 years, and anticipated within the next 6 to 10-year period.

4. Identify a list of recommended additional investigation work, if warranted, to further evaluate the condition of the structures.

5. Incorporate the information gathered into a needs report that provides general comments about the condition of the structures, provide a priority list of the recommended needs and maintenance work with probable cost estimates.

Note: Although a projection of future needs up to 10 years in the future is provided, the Municipality is still required to have biennial inspections completed under the direction of a Professional Engineer; as other safety concerns may develop over time, or the integrity of the structures may deteriorate quicker than anticipated.

The site inspections of the were completed between June 23, 2021 and September 1, 2021 by Ryan Munn, P. Eng., and Dan Austin CET. The report and recommended priority list were reviewed by Ken Logtenberg, P. Eng.

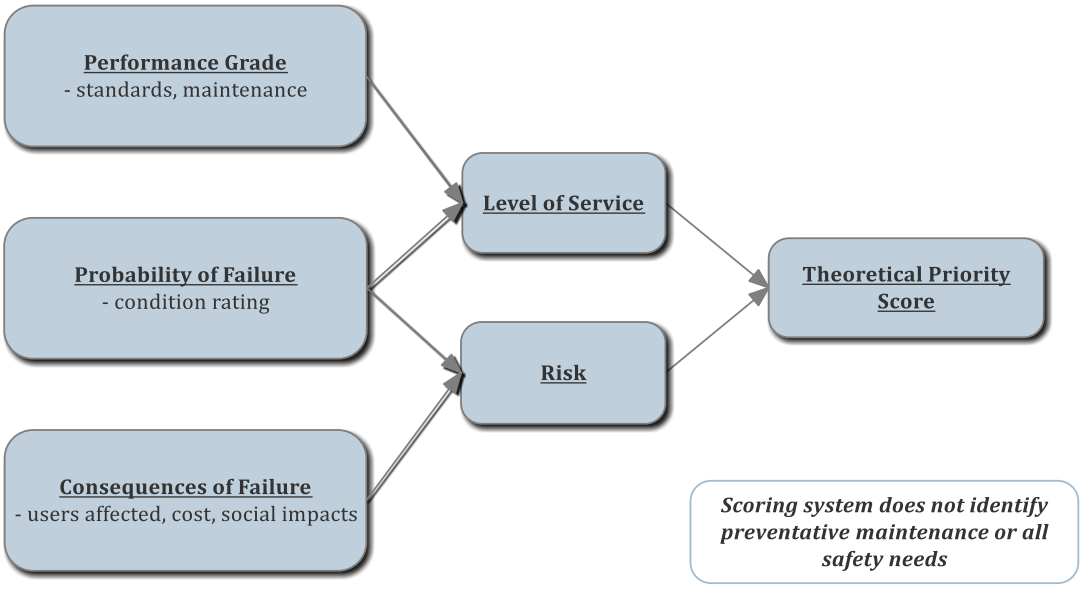
3.0 METHODOLOGY TO PRIORITIZE IMPROVEMENTS

When prioritizing the recommended capital improvements for a Bridge Needs Assessment or Asset Management Plan, we believe there are generally three key factors that should be taken into consideration; the probability of failure, the consequence of failure and the performance grade. While these factors can include many components, the **probability of failure** factor is generally represented by the condition rating or age of asset. The **consequence of failure** is a

score based on the number of users affected if the asset cannot be used safely or other social impacts and the cost of the asset. The **performance grade** should incorporate the relative maintenance requirements of the asset and a comparison of how the asset was built versus the appropriate design standard for that particular asset. In a simplified way these components were used as illustrated in Figure 1 to develop a theoretical priority score for the improvements.

BMROSS has developed a scoring system to help prioritize the improvement needs as per the relationship shown in Figure 1 and as a starting point have implemented a suggested scoring and weighing system. For this study, the width of the bridge or culvert and the presence or lack of a load limit was used to calculate a performance grade for each road section. If the Municipality desires, in the future, other characteristics could be used to further refine this scoring system. If the width of the structure was, in our opinion, appropriate for a two-lane road a score of 1 was applied. If the width was somewhat narrow to accommodate two lanes of traffic, a score of 3 was applied and if the bridge was only suitable for a single lane of traffic, a score of 5 was applied. Similarly, the good score of 1 was assigned if the structure does not have a load limit and a score of 5 was assigned if there is a current or pending load limit. The average of the structure width and load limit score was used in the evaluation.

Figure 1
Relationship between Data Collected and Calculated Theoretical Priority Scores



The BCI value calculated as per the OSIM format was used to determine the probability of failure score. Structures with BCI scores below 40 were assigned a score of 5 and structures with a BCI score above 85 were assigned scores of 1. Between those values the score changes by one unit as the BCI score increases by 15 points. Meanwhile, the consequence of failure value has been calculated based on the assumed or supplied traffic volumes on each road section. A score of 1 means it has an average annual daily traffic value of less than 50 and a road with greater

than a 1000 vehicles per day would have a score of 5. A table showing how the scores were assigned is provided in Appendix D.

The scores assigned for the three key factors were added together as illustrated in the figure to determine the theoretical level of service score, risk score and priority for improvement score for each asset. Although these are just relative numbers, Municipalities may choose to define a targeted average level of service or risk value for their bridges system using these values. They can also monitor and track these average scores over time for future comparison purposes. The theoretical priority score for each asset is the combined score of the level of service factor and the risk factor. Defining the desired level of service or acceptable levels of risk are beyond the scope of this study, so only the priority score has been presented and used.

The theoretical priority scoring system has been used as a guide to help prioritize improvement work on the assets however there are other factors that should be taken into account when prioritizing the road improvements. Factors including preventative maintenance activities, scheduling tasks to coincide with integrated assets within the same area, addressing specific safety concerns, financial and timing restraints and other activities taking place within the vicinity must be considered by Municipal staff. It is impossible to take into account all of these other factors in a simplified scoring system. For this reason, the theoretical score of highest priorities established on an individual asset basis is only used as a guide and the priority list provided in this report is, in the opinion of the inspecting engineer, the best sequence to incorporate the identified preventative maintenance and the specific safety concerns. Note, as the condition of the structures may deteriorate differently than anticipated over time and we are not aware of the other activities taking place in your Municipality or other financial obligations of the Municipality. Adjustments to the sequence of the improvements may need to be made overtime by the Municipality.

4.0 GENERAL COMMENTS

4.1 Load Limits

The following structures are posted with load limits:

- Structure 2104– 15 tonnes
- Structure 2121 – 25 tonnes
- Structure 2128 – 10 tonnes

It is our opinion that the load limit posting for 2104 can remain for the next two years. The condition of the structures should be reviewed at that time.

It is our opinion that the load limit posting for 2128 can remain for the next two years. The condition of the structures should be reviewed at that time. The Municipality should be prepared to close Structure 2128 in two years if the condition worsens.

It is our opinion that the load limit posting for structure 2121 should be reduced to 20 tonnes for the next two years. The condition of the structure should be reviewed at that time. It is not common to load post rigid frame bridges; however, the deck is in poor condition over a significant area, and the area of deterioration appears to be growing. Also, the condition of the wingwall at the southeast corner of the bridge appears to be worsening. No analysis was completed as it is not practical without design drawings.

Load posting signage is required on each side of the structure and at each approach intersection (generally four signs per structure).

4.2 Guiderail

Recommendations to replace bridge railings or guiderails on the approaches to bridges has only been included for a few structures in the list of improvements but may also be warranted at other locations not included in the list. Provincial regulations dictate that guiderail is to be installed where warranted in conformance with the *Roadside Safety Manual* of the Ministry of Transportation. The warrants include the need for steel beam guiderail on the approaches to all bridges that have railings. It will also include the need for cable guiderail for most culverts with fill as all of these represent roadside hazards.

Most municipalities find that the guiderail needs are overwhelming in cost and the addition of guiderail to existing structures is usually left until the structure is replaced or rehabilitated. Regardless, the regulations apply to all roadside hazards for all public roads. Consideration should especially be given to structures on roads that are now paved where most of their service life has been as a gravel road. The change to hard surface tends to increase the volume and the velocity of traffic, which increases the probability and consequence of an errant vehicle at any bridge site. Generally, an additional $35,000 + HST should be budgeted for new steel beam guiderail, channel, and end treatments. At some locations, additional fill may be required to widen the road to allow for placement of guiderail.

Consideration should also be given to sites of poor horizontal alignment or steep fills. The budget figures given do not include the cost of approach guiderail except where listed.

4.3 Single Lane Bridges

Bridges that have a width less than 6.0 m between curbs or railings should be posted as single lane crossings. The deficient width means that repairs to these structures should be given a lower priority with a view to replacing the bridges at the end of their service life rather than extending their service life. Structure 2121, 2136, 2602 and 2615 are single lane bridges.

A number of structures in the Municipality have widths between 6.0 m and 7.0 m between curbs or railings. These are considered two lane bridges. It is assumed that these structures have value to the Municipality despite their relatively narrow width, and in some cases, repairs have been recommended.

4.4 Waterproofing

In the 1970s, the MTO had a policy of leaving concrete bridge decks exposed so that the deterioration could be monitored. Experience has shown that this visibility has not been worth the deterioration caused by de-icing salts. The MTO now recommends that all concrete decks on paved roads be protected with waterproofing and paving. In the MTO's Structural Financial Analysis Manual, they suggest that the service life of the waterproofing is about 30 years.

At the time of rehabilitation, the deck can be inspected and repaired, if necessary. Some bridges may not be able to accommodate the extra weight of the pavement and an engineer should be consulted before adding new pavement on a bridge deck.

4.5 Routine Maintenance

Bridges require periodic maintenance by staff or contractors. Beam bridges and trusses require bearing seats to be cleaned about once every 2 to 5 years, depending on the site. Expansion joint seals should be cleaned by pressure washer annually, usually in the spring or early summer.

Open footing culverts should be reviewed for erosion of the footings and rip rap should be placed to prevent failure by undermining. Brush and logs should be cleared from under structures or at entrances. Debris jams can cause failure of the entire structure by wash-out during flood events.

4.6 Footing Struts for Open Footing Culverts

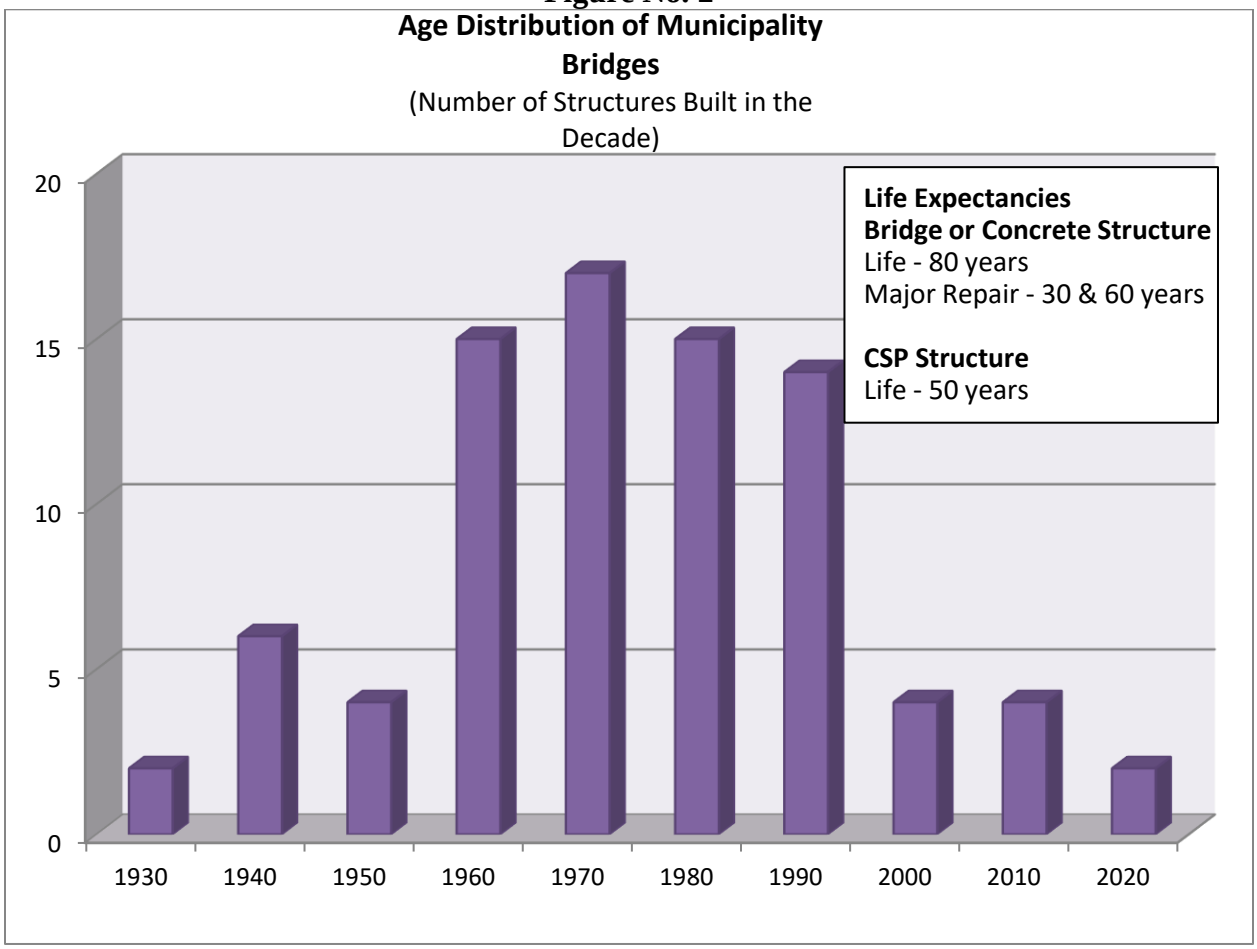
Within the Municipality, cracks were observed between the top slab and the top of the abutment wall at some of the articulated frame concrete culverts. This can indicate that the abutment walls are rotating due to inward movement of the footings. This behavior is more concerning at structures where the concrete footings are exposed due to scour or drain lowering. Where both the cracking and the drain lowering exist, we have typically recommended that concrete footing struts be installed between the footings to resist their inward motion.

5.0 SUMMARY OF BRIDGE DATA COLLECTED

5.1 Age of Bridges

The Ontario Ministry of Transportation's *Structural Financial Manual* from 1993 suggests that the average service life of a bridge in Ontario is about 50 years. Other references and the new Bridge Code suggest bridges should provide a service life of 75 years. It is our opinion that rural bridges in this part of Ontario can be expected to provide a service life of about 80 years if properly maintained and repaired. Eighty-three structures were reviewed (81 bridges and 2 small span structures). On average, the Municipality should be replacing five structures in any 5-year period to avoid a concentrated replacement program in the future. Five structures were identified as requiring replacement in the next 5 years, and seven structures were identified as requiring replacement in the 6 to 10-year period. Figure No. 2 shows an age distribution of the structures in the Municipality based on documented and estimated dates of construction.

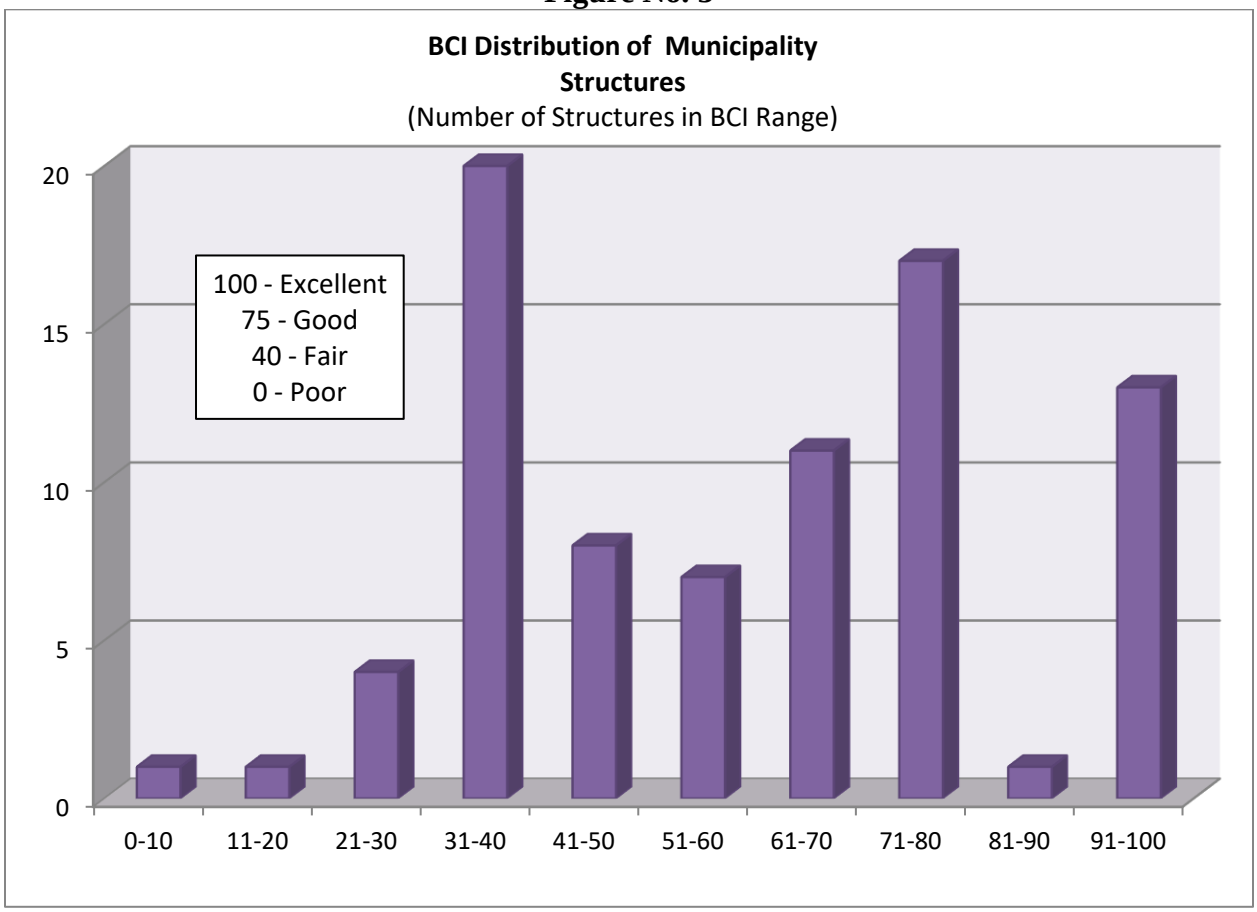
Figure No. 2



5.2 Bridge Condition Index

Figure 3 provides a breakdown of the Bridge Condition Index (BCI) range for the Municipality's bridges. The Ontario Ministry of Transportation's Bridge Condition Index information from 2009 indicates that the BCI is a measure of the overall structural condition of the bridge. The score is developed with a weighted average of the condition ratings for the individual components assessed. Generally, a structure with a BCI greater than 90 would be considered to be in excellent condition, 70 to 89 in good condition, 40 to 69 in fair condition and below 40 in poor condition.

Figure No. 3



6.0 RECOMMENDED WORK

The list of recommended repairs and structure replacement type improvements has been assembled in Tables 1 to 3. Tables 1 and 2 include the higher priority tasks recommended for completion within the next 5 years and Table 3 has tasks recommended for completion in the 6 to 10-year period. The needs have been prioritized based on the opinion of the Engineer. The tables have been formatted to include traffic volumes and work in the tables has been grouped into replacements and repairs as requested by the Municipality. This priority list is only a recommended sequence and the ultimate decision on the order of repairs or replacement should be made by the Municipality.

Another influence on the priority list may be the Municipality's schedule for road reconstruction or resurfacing. Priority may be shifted to those structures on roads scheduled to be resurfaced to allow for deck patching, waterproofing or other repairs that are best done ahead of road resurfacing.

Table 1
Suggested Priority List of Repair and Replacement Needs
Within 1 Year

Site Number	Location	Repair Description	Probable Cost	BCI
2104	Sideroad 10 (50-199)	Confirm signage at intersections and both sides of bridge, and provide signage as required	$1,000	15
2121	Concession 5 (200-499)	New 20 tonne load posting signage	$1,000	21
2128	Sideroad 20 (0-49)	Confirm signage at intersections and both sides of bridge, and provide signage as required	$1,000	16
		TOTAL	**$3,000 + HST**	

Table 2
Suggested Priority List of Repair and Replacement Needs
1 to 5 Year Period

Site Number	Location (Traffic Count)	Repair Description	Probable Cost	BCI	Priority Score
Replacement					
2121	Concession 5 (200-499)	Replace structure including $1,150,000 allowance for road work	$3,095,000	21	17
2638	Concession 10 (50-199)	Replace culvert	$278,000	0	13
2207	Kincardine Ave. (>1000)	Replace culvert, including new retaining walls and protection of utilities	$603,000	44	14
2128	Sideroad 20 (0-49)	Replace structure including $550,000 allowance for road work	$2,675,500	16	14
2136	Sideroad 5 (0-49)	Replace culvert	$398,000	24	13
Repairs					
2204	Durham Street	Patch repair abutments and extend deck drains	$132,000	72	9
2621	Sideroad 15 (0-49)	Reinforce beams	$139,000	38	13
2117	North Line Extension	Erosion Protection	$60,000	38	12

Site Number	Location (Traffic Count)	Repair Description	Probable Cost	BCI	Priority Score
2625	Concession 10 (50-199)	Erosion protection	$40,000	40	11
2601	Albert Road (500-999)	Deck overlay, waterproof and pave	$180,000	60	11
2138	Victoria St. (50-199)	Replace curbs and replace railings	$298,000	56	10
2132	Concession 9 (50-199)	Replace railings, patch repair, waterproof, and pave	$395,000	37	13
2123	Sideroad 30 (50-199)	Replace railings, patch repair deck	$185,000	38	13
2627	Sideroad J/1 (0-49)	Erosion protection	$20,000	74	6
2116	North Line (200-499)	Waterproof and pave	$91,000	75	8
2622	Concession 10 (50-199)	Patch repair railings	$31,000	72	7
2619	Concession 8	Guiderail and shoulder improvements	$89,000	38	13
2113	Sideroad 20 (50-199)	Guiderail repairs	$5,000	39	13
2626	Concession 12	Guiderail repairs	$10,000	30	13
2629	Sideroad 10	Guiderail repairs	$10,000	40	10
2119	Concession 5	Guiderail Repairs	$11,000	75	8
2631	Glen Cumming Road	Guiderail repairs	$8,000	75	6
		TOTAL	**$8,753,500 +HST**		

Table 3
Suggested Priority List of Repair and Replacement Needs
6 to 10 Year Period

Site Number	Location (Traffic Count)	Repair Description	Probable Cost	BCI	Priority Score
Replacement					
2104	Sideroad 10 (50-199)	Replace culvert	$481,000	29	15
2623	Concession 10 (50-199)	Replace culvert	$591,000	34	13
2111	North Line (200-499)	Replace culvert	$466,000	36	14
2624	Concession 10	Replace Culvert	$619,000	38	13

Site Number	Location (Traffic Count)	Repair Description	Probable Cost	BCI	Priority Score
2630	Concession 12	Replace Culvert	$619,000	34	13
2110	Kincardine-Kinloss Road	Replace culvert	$509,000	31	13
2603	Albert Road (500-999)	Replace culvert	$571,000	34	15
Repairs					
2106	Sideroad 25 (50-199)	Erosion protection for south abutment and gabion walls	$78,000	81	7
2115	North Line (200-499)	Replace expansion joints, patch repair, waterproof and pave, and construct approach slabs	$293,000	94	6
2127	Concession 7 (200-499)	Patch repair deck, waterproof and pave, replace railings	$411,000	44	12
2610	Sideroad 30 (0-49)	Patch repair deck, waterproof and pave, replace railings	$378,000	38	13
2133	Sideroad 15 (50-199)	Patch repair culvert	$139,000	44	11
2620	Concession 10 (50-199)	Patch repair deck, waterproof and pave, replace railings	$376,000	69	9
2120	Sideroad 10 (50-199)	Replace railings, patch repair deck, erosion protection	$332,000	58	9
2137	Upper Lorne Beach Road (50-199)	Waterproof, and pave	$101,000	71	7
		TOTAL	**$5,964,000 +HST**		

Culvert replacement costs are based on replacement with a pre-cast concrete structure, road widening, guiderail, and in some cases retaining walls. Options are available to reduce costs but provide a lower level of service.

Bridge replacement costs are based on new integral abutment bridges, roadwork, and guiderail. Options are available to reduce costs but provide a lower level of service.

Please note that the probable cost of repairs has been calculated based on 2021 construction costs. Appropriate inflation factors should be applied for other years. The costs in Tables 1 and 2 include engineering, design, administration, and a 10% contingency. It is becoming increasingly difficult to provide a budget price for projects as the industry demand fluctuates. It is recommended that an updated estimate be obtained when the preliminary designs are prepared. As mentioned previously, efficiency can be gained by grouping like projects together to keep costs down.

To aid in long-term budgeting we have included repairs and replacements which have been identified for the 6 to 10-year period in Table 3. Probable costs for these structures are based on 2021 prices and 2021 quantities. It is expected that quantities for repairs will increase over time and the extent of deterioration should be re-evaluated with future bridge inspections, and when the preliminary designs are prepared. It may be determined then that the condition of the structure has deteriorated more or less than anticipated and the recommended method of repair may have to be changed.

To complete all the work recommended within the next 5 years would cost on average about $1,751,300 + HST per year over 5 years and within the 10-year period would be about $1,472,050 + HST per year over 10 years, not considering any new or emerging deficiencies. Please note that a significant proportion of the above noted costs relates to replacement of Structure 2121 and Structure 2128 ($5,770,500 + HST). If this amount exceeds the Municipality's budget, it may be possible to address some of the short fall with money from grants, addressing the safety concerns with temporary repairs instead of replacements or by delaying the work. If the work is delayed, it is possible that costs will increase, and that load limits or bridge closures may be recommended in the future.

8.0 PEDESTRIAN BRIDGES

In addition to the roadway bridges, 26 pedestrian bridges in Kincardine were reviewed. A map of the bridge locations is provided in Appendix C. OSIM reports were generated for each structure.

It is understood that structure P13, P15, and P16 are removed in the fall of each year. They are in good condition, but their support conditions should be reviewed and monitored regularly. It should be noted that their railings don't meet code requirements for opening size & height.

The beams used for structure P12, P20, P21, and P23 are logs spanning from bank to bank. They are sagged, and it may be impractical to show that they can resist the pedestrian loading defined in the bridge code. An allowance has been included below to reinforce these structures. However, replacement may be more cost effective.

Table 4
Suggested Priority List for Pedestrian Bridges
1 to 5 Year Period

Site Number	Location	Repair Description	Probable Cost
P1	Yellow Trail	Cut back vegetation	$3,000
P2	Green Trail	Cover plates for gaps between each span	$3,000

Site Number	Location	Repair Description	Probable Cost
P6	Blue Trail	Remove debris from channel	$3,000
P7	Blue Trail	Erosion protection	$7,000
P8	Blue Trail	Erosion protection	$20,000
P10	Yellow Trail	Replace deteriorated deck boards, reinforce railings	$5,000
P11	Green Trail	Reinforce railings, review, and adjust posts	$5,000
P12	Green Trail	Reinforce structure and railings, erosion protection.	$20,000
P19	Blue Trail	Re-align / re-set deck and abutments Reinforce railing	$10,000
P20	Blue Trail	Reinforce structure and railings	$15,000
P21	Blue Trail	Reinforce structure and railings, erosion protection	$20,000
P23	Blue Trail	Reinforce structure and railings	$15,000
		TOTAL	**$126,000 +HST**

The railings for several structures don't meet code requirements for opening size, height and possibly resistance. These structures include: P8, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P25, P26. Repairs are recommended for some bridge railings, typically when repairs to other members are recommended. The Municipality should consider if railings can be reinforced to be in closer compliance with code requirements. P3 is an example of what may be achievable.

9.0 FURTHER INSPECTIONS

Provincial regulations require all bridges with spans greater than 3 m to be reviewed every two years under the supervision of a Professional Engineer. The structures should be reviewed in 2023.

All of which is respectfully submitted.

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
R. J. Munn, P. Eng.

Per _____
Ken D. Logtenberg, P. Eng.

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APPENDIX A
BRIDGE INVENTORY SUMMARY BY SITE NUMBER

Site Number	BMROSS Number	Structure Type	Structure Name	Road Name	Structure Location	Span Length (m)	Year Built	BCI	Probable Cost of 1-5 Year Recommended Work	Probable Cost of 6-10 Year Recommended Work
2101		Rigid Frame, Vertical Legs	Owen Davey Bridge	Sideroad 5S	30m South of South Line, over the Penetangore River	15.1	1990	73	$0	$0
2102	BR835	I-beam of Girders	Stewart Bridge	Sideroad 10	0.2 km South of South Line	29.1	2006	95	$0	$0
2103	BR062	Rectangular Culvert	Farrell Bridge	South Line	0.4 km East of Sideroad 10, over Penetangore River	12.2		50	$0	$0
2104	BR1039	Solid Slab		Sideroad 10	0.5 km North of South Line	4.5		29	$0	$481,000
2105		Rectangular Culvert	Anderson Bridge	Sideroad 10	0.2 km South of Highway 9	6.12		73	$0	$0
2106		Rigid Frame, Vertical Legs	Weir Sheane Bridge	Bervie Sideroad	50m South of Highway 9, Over the Penetangore River	9	1992	81	$0	$78,000
2107	BR1294	Rectangular Culvert		Sideroad 30	0.1 km North of Huron-Kincardine Rd	3.65		40	$0	$0
2108		CSP Round Culvert		Huron-Kincardine Rd	0.1 km West of Sideroad 30 South	3.3	2017	100	$0	$0
2109		CSP Round Culvert		Huron-Kincardine Rd	0.4 km East of Sideroad 30 South	3	2017	100	$0	$0
2110		Rectangular Culvert		Kincardine-Kinloss Rd	0.25 km South of North Line	3.55		31	$0	$509,000
2111		Arch Culvert		North Line	0.2 km West of Kincardine-Kinloss Rd.	3.8		36	$0	$466,000
2112	BR1421	Box Beams of Girders		Bervie Sideroad	0.8 km North of Highway 9	5.182	2021	100	$0	$0
2113		Solid Slab		Sideroad 20	20 m South of North Line	3.1		39	$5,000	$0
2114	BR1039	Rectangular Culvert		Sideroad 15	1.0 km North of Highway 9	3.7		66	$0	$0
2115		I-beam of Girders	Thompson Bridge	North Line	1.1 km West of Sideroad 10, North Penetangore River	31.3	1982	94	$0	$293,000
2116		Rigid Frame, Vertical Legs	Munro Bridge	North Line	1.0 km East of Highway 21, over Kincardine Creek	11	1987	75	$91,000	$0
2117		Rectangular Culvert		North Line Extension	0.1 km West of Highway 21	6.1		38	$60,000	$0
2118		Rectangular Culvert		Concession 5	0.9 km East of Highway 21	3.4		54	$0	$0
2119		Arch Culvert		Concession 5	0.3 km East of Sideroad 5, Over Kincardine Creek	8.1		75	$11,000	$0
2120		Rigid Frame, Vertical Legs	Manner's Bridge	Sideroad 10	0.6 km North of North Line, over North Penetangore River	10.8		58	$0	$332,000
2121	BR1048	Rigid Frame, Vertical Legs	Cambell Bridge	Concession 5	0.7 km East of Sideroad 10, over North Penetangore River	15.24		21	$3,095,000	$0
2122		Rectangular Culvert		Concession 5	0.6 km East of Sideroad 30	4.25		59	$0	$0
2123		Solid Slab		Sideroad 30	0.8 km South of Concession 7	5.5		38	$185,000	$0
2124		Rectangular Culvert		Concession 7	1.0 km West of Sideroad 30	6.4		50	$0	$0
2126		Rectangular Culvert		Sideroad 20	0.8 km North of Concession 9	5.5		96	$0	$0
2127	BR784	Rigid Frame, Vertical Legs	Stephenson Bridge	Concession 7	0.1 km East of Sideroad 20, over Penetangore River	12.2		44	$0	$411,000
2128	BR701/BR372	Arch Culvert	Shewfelt Bridge	Sideroad 20	0.3 km South of Concession 7, over North Penetangore River	11.4		16	$2,675,500	$0
2129	BR130	I-beam of Girders	Armow Bridge	Sideroad 15	1.0 km South of Concession 7, over North Penetangore River	31.9	1966	70	$0	$0
2130		I-beam of Girders	Matheson Bridge	Concession 7	0.15 km West of Sideroad 10, over Kincardine Creek	7.3		68	$0	$0
2131		Arch Culvert		Sideroad 10	0.15 km North of Concession 7, over Kincardine Creek	6.2		68	$0	$0
2132		Rigid Frame, Vertical Legs	White Bridge	Concession 9	0.35 km West of Sideroad 15	9.15		37	$395,000	$0
2133		Rectangular Culvert	McTeer Bridge	Sideroad 15	0.6 km North of Concession 9	6.15		44	$0	$139,000
2134		Rectangular Culvert		Sideroad 5	0.7 km North of Concession 9	3.65		43	$0	$0
2135	BR1359	Rectangular Culvert		Concession 11	1.0 km West of Sideroad 5	4		62	$0	$0
2136		Rectangular Culvert		Sideroad 5	0.4 km North of Concession 11	3.05	1934	24	$398,000	$0
2137		Rigid Frame, Vertical Legs	Collins Bridge	Upper Lorne Beach Road	0.5 km North of Lorne Beach Road, over Andrew Creek	9		71	$0	$101,000
2138		Solid Slab	Evans Bridge	Victoria Street	1.9 km South of Bruce Road 15, over Tiverton Creek	6.7		56	$298,000	$0
2201	BR236	I-beam of Girders	Queen Street Bridge (Floyd Wieck)	Queen Street	0.5 km North of St. Albert Street	74.7	1971	71	$0	$0
2202	BR544	Rigid Frame, Vertical Legs	Russel Street Bridge	Russel Street	0.2 km East of Olde Victoria Street	21.5	1962	65	$0	$0
2203	BR817	Round Culvert	Durham Street Culvert (West Structure)	Durham Street	50 m East of Olde Victoria Street	5.5	2004	100	$0	$0
2204	BR355	I-beam of Girders	Durham Street Bridge-East Structure	Durham Street	150 m East of River Lane	49.9	1975	72	$132,000	$0
2205		Rectangular Culvert	Broadway Street Culvert	Broadway Street	50 m East of Princes Street	5.5		66	$0	$0
2206	BR532	T-Beam	Broadway Street Bridge	Broadway Street	150 m East of North Street	45		41	$0	$0
2207	BR532	Rectangular Culvert		Kincardine Avenue	150 m East of Park Street	3.66		44	$603,000	$0
2208	BR700	I-beam of Girders	Buttery Bridge	South Line	0.5 km East of Highway 21, over the Penetangore River	20	2001	100	$0	$0
2209		Rectangular Culvert		Bruce Avenue	115 m East of Princes Street	5	2020	100	$0	$0
2210	BR870	I-beam of Girders	Huron Terrace Bridge	Huron Terrace	50 m South of Harbour Street	60.4	2009	100	$0	$0
2601	BR332	Rigid Frame, Vertical Legs		Albert Road	100 m South of Alma Street	9.15	1974	60	$180,000	$0
2602		Arch Culvert		Alma Street	50 m West of Albert Road	6		36	$0	$0
2603		CSP Arch Culvert		Albert Road	0.25 km South of Concession 2	6.2	1974	34	$0	$571,000
2604		Rectangular Culvert		Farrell Drive	0.5 km South of Bruce Road 20	3		75	$0	$0
2606		Arch Culvert		Sideroad J/1	0.9 km South of Bruce Road 20	5.05		47	$0	$0
2607	BR654	Rigid Frame, Vertical Legs	Pettigrew Bridge	Sideroad J/1	0.2 km South of Concession 2	9.6		53	$0	$0
2608		Rectangular Culvert		Concession 2	1.4 km East of Sideroad 20	6		100	$0	$0
2609		Rectangular Culvert		Sideroad 25	0.75 km North of Bruce Road 20	9	1992	75	$0	$0
2610		Rigid Frame, Vertical Legs		Sideroad 30	0.2 km South of Concession 6	12.2		38	$0	$378,000
2611		Rectangular Culvert		Concession 6	0.4 km East of Sideroad 30	9		100	$0	$0
2613		Rectangular Culvert		Concession 8	0.9 km West of Sideroad J/1	6.1		75	$0	$0
2614		Rectangular Culvert		Concession 8	0.7 km West of Sideroad J/1	6.05		75	$0	$0
2615	BR1257	Solid Slab		Sideroad J/1	0.25 km South of Concession 8	6.15		37	$0	$0
2616		Rectangular Culvert		Concession 8	1.1 km East of Highway 21	4.3		51	$0	$0
2617		Rectangular Culvert		Concession 8	Intersection of Concession 8 and Sideroad 20	4.9		73	$0	$0
2618		CSP Round Culvert		Sideroad 20	0.7 km North of Concession 8	6		64	$0	$0
2619		Arch Culvert		Concession 8	0.3 km West of Bruce Greenock Road	13.1		38	$89,000	$0
2620		Rigid Frame, Vertical Legs		Concession 10	1.8 km East of Sideroad 30	14.2		69	$0	$376,000

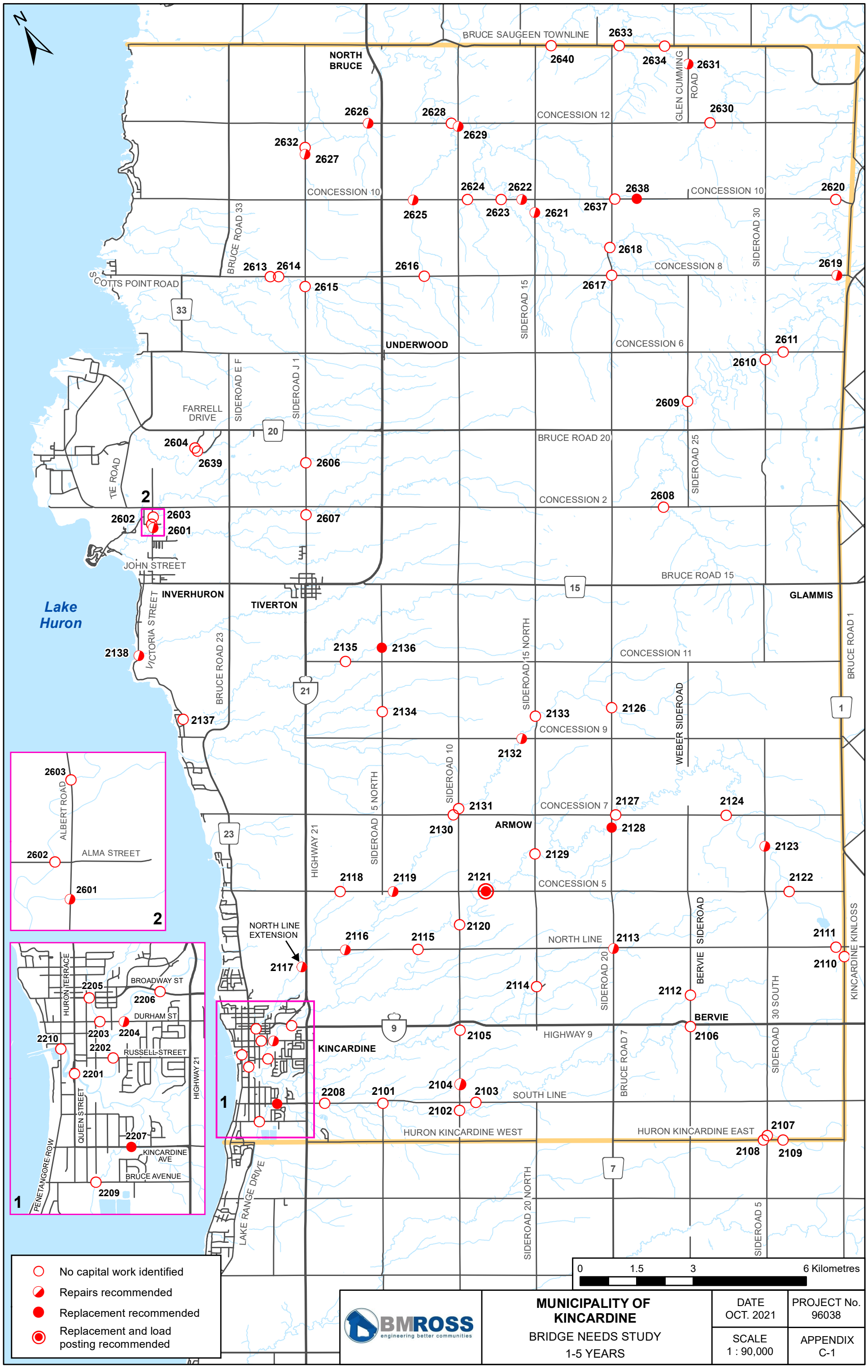
Site Number	BMROSS Number	Structure Type	Structure Name	Road Name	Structure Location	Span Length (m)	Year Built	BCI	Probable Cost of 1-5 Year Recommended Work	Probable Cost of 6-10 Year Recommended Work
2621		T-Beam		Sideroad 15	0.3 km South of Concession 10	7.3	1947	38	$139,000	$0
2622		Rigid Frame, Vertical Legs		Concession 10	0.3 km West of Sideroad 15	10.7		72	$31,000	$0
2623		Arch Culvert		Concession 10	0.9 km West of Sideroad 15	3.8		34	$0	$591,000
2624		Arch Culvert		Concession 10	0.25 km East of Sideroad 10	4.55		38	$0	$619,000
2625		Rectangular Culvert		Concession 10	0.8 km East of Highway 21	3.6		40	$40,000	$0
2626		Arch Culvert		Concession 12	0.3 km West Highway 21	4.3		30	$10,000	$0
2627		Rectangular Culvert		Sideroad J/1	0.8 km South of Concession 12	3.05		74	$20,000	$0
2628		Rigid Frame, Vertical Legs		Concession 12	0.15 km West of Sideroad 10	11		65	$0	$0
2629		Arch Culvert		Sideroad 10	0.1 km South of Concession 12	7.5		40	$10,000	$0
2630		Arch Culvert		Concession 12	0.6 km East of Glen Cummings Road	4.8		34	$0	$619,000
2631		CSP Arch Culvert		Glen Cumming Road	1.6 km North of Concession 12	5		75	$8,000	$0
2632		Solid Slab		Sideroad J/1	0.6 km South of Concession 12 (North of Structure 2627)	3.6		40	$0	$0
2633		Rectangular Culvert		Bruce-Saugeen Townline	0.2 km East of Sideroad 20	4.1		75	$0	$0
2634		Rigid Frame, Vertical Legs		Bruce-Saugeen Townline	0.5km East of Sideroad 15	3.3		64	$0	$0
2637	BR1121	CSP Round Culvert		Concession 10	0.1 km West of Sideroad 20	2.2	2014	100	$0	$0
2638		CSP Arch Culvert		Concession 10	0.6 km West of Sideroad 20	1.5		0	$278,000	$0
2639		Round Culvert		Farrell Drive	0.7 km South of Bruce Road 20	3.3		75	$0	$0
2640		Rectangular Culvert		Bruce-Saugeen Townline	0.5km East of Sideroad 15	3.3		40	$0	$0

APPENDIX B
BRIDGE INVENTORY SUMMARY BY BCI

Site Number	BMROSS Number	Structure Type	Structure Name	Road Name	Structure Location	Span Length (m)	Year Built	BCI	Probable Cost of 1-5 Year Recommended Work	Probable Cost of 6-10 Year Recommended Work
2638		CSP Arch Culvert		Concession 10	0.6 km West of Sideroad 20	1.5		0	$278,000	$0
2128	BR701/BR372	Arch Culvert	Shewfelt Bridge	Sideroad 20	0.3 km South of Concession 7, over North Penetangore River	11.4		16	$2,675,500	$0
2121	BR1048	Rigid Frame, Vertical Legs	Cambell Bridge	Concession 5	0.7 km East of Sideroad 10, over North Penetangore River	15.24		21	$3,095,000	$0
2136		Rectangular Culvert		Sideroad 5	0.4 km North of Concession 11	3.05	1934	24	$398,000	$0
2104	BR1039	Solid Slab		Sideroad 10	0.5 km North of South Line	4.5		29	$0	$481,000
2626		Arch Culvert		Concession 12	0.3 km West Highway 21	4.3		30	$10,000	$0
2110		Rectangular Culvert		Kincardine-Kinloss Rd	0.25 km South of North Line	3.55		31	$0	$509,000
2603		CSP Arch Culvert		Albert Road	0.25 km South of Concession 2	6.2	1974	34	$0	$571,000
2623		Arch Culvert		Concession 10	0.9 km West of Sideroad 15	3.8		34	$0	$591,000
2630		Arch Culvert		Concession 12	0.6 km East of Glen Cummings Road	4.8		34	$0	$619,000
2111		Arch Culvert		North Line	0.2 km West of Kincardine-Kinloss Rd.	3.8		36	$0	$466,000
2602		Arch Culvert		Alma Street	50 m West of Albert Road	6		36	$0	$0
2132		Rigid Frame, Vertical Legs	White Bridge	Concession 9	0.35 km West of Sideroad 15	9.15		37	$395,000	$0
2615	BR1257	Solid Slab		Sideroad J/1	0.25 km South of Concession 8	6.15		37	$0	$0
2117		Rectangular Culvert		North Line Extension	0.1 km West of Highway 21	6.1		38	$60,000	$0
2123		Solid Slab		Sideroad 30	0.8 km South of Concession 7	5.5		38	$185,000	$0
2610		Rigid Frame, Vertical Legs		Sideroad 30	0.2 km South of Concession 6	12.2		38	$0	$378,000
2619		Arch Culvert		Concession 8	0.3 km West of Bruce Greenock Road	13.1		38	$89,000	$0
2621		T-Beam		Sideroad 15	0.3 km South of Concession 10	7.3	1947	38	$139,000	$0
2624		Arch Culvert		Concession 10	0.25 km East of Sideroad 10	4.55		38	$0	$619,000
2113		Solid Slab		Sideroad 20	20 m South of North Line	3.1		39	$5,000	$0
2107	BR1294	Rectangular Culvert		Sideroad 30	0.1 km North of Huron-Kincardine Rd	3.65		40	$0	$0
2625		Rectangular Culvert		Concession 10	0.8 km East of Highway 21	3.6		40	$40,000	$0
2629		Arch Culvert		Sideroad 10	0.1 km South of Concession 12	7.5		40	$10,000	$0
2632		Solid Slab		Sideroad J/1	0.6 km South of Concession 12 (North of Structure 2627)	3.6		40	$0	$0
2640		Rectangular Culvert		Bruce-Saugeen Townline	0.5km East of Sideroad 15	3.3		40	$0	$0
2206	BR532	T-Beam	Broadway Street Bridge	Broadway Street	150 m East of North Street	45		41	$0	$0
2134		Rectangular Culvert		Sideroad 5	0.7 km North of Concession 9	3.65		43	$0	$0
2127	BR784	Rigid Frame, Vertical Legs	Stephenson Bridge	Concession 7	0.1 km East of Sideroad 20, over Penetangore River	12.2		44	$0	$411,000
2133		Rectangular Culvert	McTeer Bridge	Sideroad 15	0.6 km North of Concession 9	6.15		44	$0	$139,000
2207	BR532	Rectangular Culvert		Kincardine Avenue	150 m East of Park Street	3.66		44	$603,000	$0
2606		Arch Culvert		Sideroad J/1	0.9 km South of Bruce Road 20	5.05		47	$0	$0
2103	BR062	Rectangular Culvert	Farrell Bridge	South Line	0.4 km East of Sideroad 10, over Penetangore River	12.2		50	$0	$0
2124		Rectangular Culvert		Concession 7	1.0 km West of Sideroad 30	6.4		50	$0	$0
2616		Rectangular Culvert		Concession 8	1.1 km East of Highway 21	4.3		51	$0	$0
2607	BR654	Rigid Frame, Vertical Legs	Pettigrew Bridge	Sideroad J/1	0.2 km South of Concession 2	9.6		53	$0	$0
2118		Rectangular Culvert		Concession 5	0.9 km East of Highway 21	3.4		54	$0	$0
2138		Solid Slab	Evans Bridge	Victoria Street	1.9 km South of Bruce Road 15, over Tiverton Creek	6.7		56	$298,000	$0
2120		Rigid Frame, Vertical Legs	Manner's Bridge	Sideroad 10	0.6 km North of North Line, over North Penetangore River	10.8		58	$0	$332,000
2122		Rectangular Culvert		Concession 5	0.6 km East of Sideroad 30	4.25		59	$0	$0
2601	BR332	Rigid Frame, Vertical Legs		Albert Road	100 m South of Alma Street	9.15	1974	60	$180,000	$0
2135	BR1359	Rectangular Culvert		Concession 11	1.0 km West of Sideroad 5	4		62	$0	$0
2618		CSP Round Culvert		Sideroad 20	0.7 km North of Concession 8	6		64	$0	$0
2634		Rigid Frame, Vertical Legs		Bruce-Saugeen Townline	0.5km East of Sideroad 15	3.3		64	$0	$0
2202	BR544	Rigid Frame, Vertical Legs	Russel Street Bridge	Russel Street	0.2 km East of Olde Victoria Street	21.5	1962	65	$0	$0
2628		Rigid Frame, Vertical Legs		Concession 12	0.15 km West of Sideroad 10	11		65	$0	$0
2114	BR1039	Rectangular Culvert		Sideroad 15	1.0 km North of Highway 9	3.7		66	$0	$0
2205		Rectangular Culvert	Broadway Street Culvert	Broadway Street	50 m East of Princes Street	5.5		66	$0	$0
2130		I-beam of Girders	Matheson Bridge	Concession 7	0.15 km West of Sideroad 10, over Kincardine Creek	7.3		68	$0	$0
2131		Arch Culvert		Sideroad 10	0.15 km North of Concession 7, over Kincardine Creek	6.2		68	$0	$0
2620		Rigid Frame, Vertical Legs		Concession 10	1.8 km East of Sideroad 30	14.2		69	$0	$376,000
2129	BR130	I-beam of Girders	Armow Bridge	Sideroad 15	1.0 km South of Concession 7, over North Penetangore River	31.9	1966	70	$0	$0
2137		Rigid Frame, Vertical Legs	Collins Bridge	Upper Lorne Beach Road	0.5 km North of Lorne Beach Road, over Andrew Creek	9		71	$0	$101,000
2201	BR236	I-beam of Girders	Queen Street Bridge (Floyd Wieck)	Queen Street	0.5 km North of St. Albert Street	74.7	1971	71	$0	$0
2204	BR355	I-beam of Girders	Durham Street Bridge-East Structure	Durham Street	150 m East of River Lane	49.9	1975	72	$132,000	$0
2622		Rigid Frame, Vertical Legs		Concession 10	0.3 km West of Sideroad 15	10.7		72	$31,000	$0
2101		Rigid Frame, Vertical Legs	Owen Davey Bridge	Sideroad 5S	30m South of South Line, over the Penetangore River	15.1	1990	73	$0	$0
2105		Rectangular Culvert	Anderson Bridge	Sideroad 10	0.2 km South of Highway 9	6.12		73	$0	$0
2617		Rectangular Culvert		Concession 8	Intersection of Concession 8 and Sideroad 20	4.9		73	$0	$0
2627		Rectangular Culvert		Sideroad J/1	0.8 km South of Concession 12	3.05		74	$20,000	$0
2116		Rigid Frame, Vertical Legs	Munro Bridge	North Line	1.0 km East of Highway 21, over Kincardine Creek	11	1987	75	$91,000	$0
2119		Arch Culvert		Concession 5	0.3 km East of Sideroad 5, Over Kincardine Creek	8.1		75	$11,000	$0
2604		Rectangular Culvert		Farrell Drive	0.5 km South of Bruce Road 20	3		75	$0	$0
2609		Rectangular Culvert		Sideroad 25	0.75 km North of Bruce Road 20	9	1992	75	$0	$0
2613		Rectangular Culvert		Concession 8	0.9 km West of Sideroad J/1	6.1		75	$0	$0
2614		Rectangular Culvert		Concession 8	0.7 km West of Sideroad J/1	6.05		75	$0	$0
2631		CSP Arch Culvert		Glen Cumming Road	1.6 km North of Concession 12	5		75	$8,000	$0

Site Number	BMROSS Number	Structure Type	Structure Name	Road Name	Structure Location	Span Length (m)	Year Built	BCI	Probable Cost of 1-5 Year Recommended Work	Probable Cost of 6-10 Year Recommended Work
2633		Rectangular Culvert		Bruce-Saugeen Townline	0.2 km East of Sideroad 20	4.1		75	$0	$0
2639		Round Culvert		Farrell Drive	0.7 km South of Bruce Road 20	3.3		75	$0	$0
2106		Rigid Frame, Vertical Legs	Weir Sheane Bridge	Bervie Sideroad	50m South of Highway 9, Over the Penetangore River	9	1992	81	$0	$78,000
2115		I-beam of Girders	Thompson Bridge	North Line	1.1 km West of Sideroad 10, North Penetangore River	31.3	1982	94	$0	$293,000
2102	BR835	I-beam of Girders	Stewart Bridge	Sideroad 10	0.2 km South of South Line	29.1	2006	95	$0	$0
2126		Rectangular Culvert		Sideroad 20	0.8 km North of Concession 9	5.5		96	$0	$0
2108		CSP Round Culvert		Huron-Kincardine Rd	0.1 km West of Sideroad 30 South	3.3	2017	100	$0	$0
2109		CSP Round Culvert		Huron-Kincardine Rd	0.4 km East of Sideroad 30 South	3	2017	100	$0	$0
2112	BR1421	Box Beams of Girders		Bervie Sideroad	0.8 km North of Highway 9	5.182	2021	100	$0	$0
2203	BR817	Round Culvert	Durham Street Culvert (West Structure)	Durham Street	50 m East of Olde Victoria Street	5.5	2004	100	$0	$0
2208	BR700	I-beam of Girders	Buttery Bridge	South Line	0.5 km East of Highway 21, over the Penetangore River	20	2001	100	$0	$0
2209		Rectangular Culvert		Bruce Avenue	115 m East of Princes Street	5	2020	100	$0	$0
2210	BR870	I-beam of Girders	Huron Terrace Bridge	Huron Terrace	50 m South of Harbour Street	60.4	2009	100	$0	$0
2608		Rectangular Culvert		Concession 2	1.4 km East of Sideroad 20	6		100	$0	$0
2611		Rectangular Culvert		Concession 6	0.4 km East of Sideroad 30	9		100	$0	$0
2637	BR1121	CSP Round Culvert		Concession 10	0.1 km West of Sideroad 20	2.2	2014	100	$0	$0

APPENDIX C
MAP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NORTH BRUCE
2633
2640
2634
2631
GLEN CUMMING ROAD
2630
CONCESSION 12
2626
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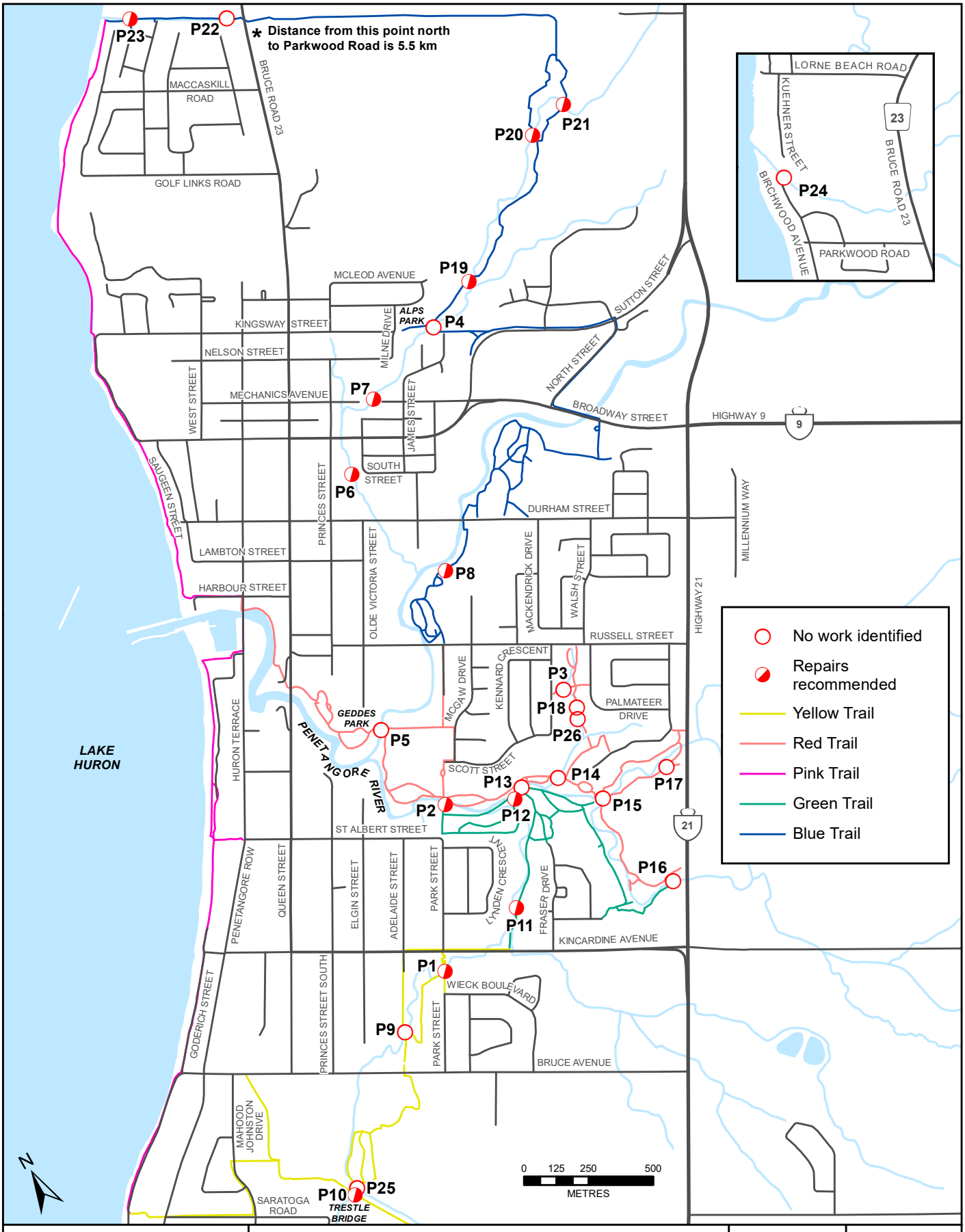
2629
2632
2627
CONCESSION 10
2624
2622
2638
CONCESSION 10
2620
2625
2623
2621
2637
BRUCE ROAD 33
SIDEROAD 30
2618
2613
2614
2616
CONCESSION 8
2619
SCOTTS POINT ROAD
2615
2617
33
SIDEROAD 15
UNDERWOOD
CONCESSION 6
2611
2610
FARRELL DRIVE
SIDEROAD E F
SIDEROAD J 1
2609
20
BRUCE ROAD 20
2604
2639
2606
SIDEROAD 25
TIE ROAD
2
CONCESSION 2
2608
2602
2603
2601
2607
JOHN STREET
BRUCE ROAD 15
15
INVERHURON
TIVERTON
GLAMMIS
Lake Huron
VICTORIA STREET
BRUCE ROAD 23
2135
2136
SIDEROAD 15 NORTH
CONCESSION 11
2138
21
BRUCE ROAD 1
2134
2133
2126
2137
CONCESSION 9
1
2132
WEBER SIDEROAD
2603
ALBERT ROAD
SIDEROAD 10
2131
CONCESSION 7
2127
2124
2602
ALMA STREET
2130
ARMOW
2128
23
HIGHWAY 21
SIDEROAD 5 NORTH
2129
2123
2601
2118
2119
2121
CONCESSION 5
2122
2
NORTH LINE EXTENSION
2120
2116
2115
NORTH LINE
2113
SIDEROAD 20
SIDEROAD
2111
2110
2117
2114
2112
BERVIE
KINCARDINE KINLOSS
HURON TERRACE
BROADWAY ST
2205
2206
DURHAM ST
9
2105
HIGHWAY 9
2106
BERVIE
SIDEROAD 30 SOUTH
2210
2203
2204
2202
RUSSELL STREET
KINCARDINE
BRUCE ROAD 7
2201
2208
2101
2104
2103
SOUTH LINE
QUEEN STREET
HIGHWAY 21
2102
2207
HURON KINCARDINE WEST
HURON KINCARDINE EAST
2107
KINCARDINE AVE
2108
2109
PENETANGORE ROW
BRUCE AVENUE
2209
1
7
LAKE RANGE DRIVE
SIDEROAD 20 NORTH
SIDEROAD 5
No capital work identified
Repairs recommended
Replacement recommended
Replacement and load posting recommended
0
1.5
3
6 Kilometres
BMROSS
engineering better communities
MUNICIPALITY OF KINCARDINE
BRIDGE NEEDS STUDY
1-5 YEARS
DATE
OCT. 2021
PROJECT No.
96038
SCALE
1 : 90,000
APPENDIX
C-1



BMROSS engineering better communities

MUNICIPALITY OF KINCARDINE

BRIDGE NEEDS STUDY

PEDESTRIAN BRIDGE LOCATIONS

DATE	PROJECT No.
OCT. 2021	96038
SCALE	APPENDIX
1 : 20,000	C-2

APPENDIX D
PRIORITY SCORE TABLE

Priority Score Calculation Factors for Bridges

Consequence of Failure:

Average Annual Daily Traffic (AADT)

Traffic Volume	Value
0-49	1
50-199	2
200-499	3
500-999	4
>1000	5

Performance Grade: (Load limit + Struture Type Width Value) / 2

When Traffic is Greater than 200 AADT

Load Limit

Posted	Value
No	1
Yes	5

Width Value if Bridge

Roadway Width (m)	Value
>= 7	1
6-6.9	3
< 6	5

OR

Width Value if Culvert

Overall Structure Width Criteria	Value
If the overall structure width > (10 m + (2 x Fill))	1
If the overall structure width < (10 m + (2 x Fill))	3
If the overall structure width > (7 m + (2 x Fill))	3
If the overall structure width < (7 m + (2 x Fill))	5

* Fill = Fill on structure (slope to road)

When Traffic is Less than 200 AADT

Load Limit

Posted	Value
No	1
Yes, >12	3
Yes, <12	5

Single Axle load limit assessed

Width Value if Bridge

Roadway Width (m)	Value
>= 7	1
6-6.9	1
< 6	3

OR

Width Value if Culvert

Overall Structure Width Criteria	Value
If the overall structure width > (10 m + (2 x Fill))	1
If the overall structure width < (10 m + (2 x Fill))	1
If the overall structure width > (7 m + (2 x Fill))	1
If the overall structure width < (7 m + (2 x Fill))	3

* Fill = Fill on structure (slope to road)

Probability of Failure:

BCI (Bridge Condition Index)

BCI	Value
85-100	1
70-84	2
55-69	3
40-54	4
< 40	5

Risk = Consequence of Failure + Probability of Failure

Priority Score = Risk + Level of Service

Level of Service = Performance Grade + Probability of Failure

APPENDIX E
PEDESTRIAN BRIDGE INVENTORY SUMMARY BY SITE NUMBER

Site Number	BMROSS Number	Structure Type	Structure Name	Road Name	Structure Location	Span Length (m)	Year Built	BCI	Probable Cost of 1-5 Year Recommended Work	Probable Cost of 6-10 Year Recommended Work
P1	BR1083	Half-Through Truss	Stonehaven Pedestrian Bridge	Yellow Trail	South of Kincardine Ave	45	2014	96	$3,000	$0
P2	BR906	Half-Through Truss	South Penetangore Bridge	Green Trail	Between St. Albert St and Scott St	75.05	2012	88	$3,000	$0
P3		I-beam of Girders		Red Trail	Between Scott Street and Palmateer Drive (Helliwell Park)	11.8		75	$0	$0
P4		Round Culvert		Blue Trail	Alps Park	2.4	2020	100	$0	$0
P5	BR804	Half-Through Truss	North Penetangore Bridge	Red Trail	Geddes Park	40.4	2007	78	$0	$0
P6	BR1258	I-beam of Girders		Blue Trail	Between Princess St. and William St.	52.2		40	$3,000	$0
P7		I-beam of Girders		Blue Trail	Mechanics Avenue	11.6		75	$7,000	$0
P8		I-beam of Girders		Blue Trail	Between Russell St. and Durham St.	7.3		62	$20,000	$0
P9		I-beam of Girders		Yellow Trail	Between Bruce Ave. and Kincardine Ave.	10.3		75	$0	$0
P10		I-beam of Girders		Yellow Trail	South of Bruce Ave.	11.36		40	$5,000	$0
P11		Box Beams of Girders		Green Trail	North of Kincardine Ave.	10		40	$5,000	$0
P12		Box Beams of Girders		Green Trail		7		5	$20,000	$0
P13		I-beam of Girders		Green Trail	Transition from Green to Red Trail	24.4		75	$0	$0
P14		I-beam of Girders		Red Trail		7.4		62	$0	$0
P15		I-beam of Girders		Red Trail		9		75	$0	$0
P16		I-beam of Girders		Red Trail	South End of Red Trail	15.25	2016	75	$0	$0
P17		I-beam of Girders		Red Trail	East End of Red Trail	4.98		40	$0	$0
P18		I-beam of Girders		Red Trail	North End of Red Trail	7		50	$0	$0
P19		I-beam of Girders		Blue Trail	89-North Line Extension	4.87		58	$10,000	$0
P20		Box Beams of Girders		Blue Trail	84-North Line Extension	11.2		33	$15,000	$0
P21		Box Beams of Girders		Blue Trail	95-North Line Extension	8		28	$20,000	$0
P22		Box Beams of Girders		Blue Trail	West of Road 23	4.9		62	$0	$0
P23		Box Beams of Girders		Blue Trail	West End of Blue Trail	7.8		28	$15,000	$0
P24		Half-Through Truss		Birchwood Ave. Trail		36.5		75	$0	$0
P25		I-beam of Girders		Yellow Trail	South of Bruce Ave.	4.4		66	$0	$0
P26		I-beam of Girders		Red Trail	North End of Red Trail	7		50	$0	$0