TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL REHABILITATION/REPLACEMENT NEEDS

February 2024

ELLIS Engineering Inc.
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TOWN OF NIAGARA-ON-THE-LAKE

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PHOTOGRAPH ON TITLE PAGE: LINE 1 ROAD – B15

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February 15, 2024

Town of Niagara-on-the-Lake
1593 Four Mile Creek Road
P.O. Box 100
Virgil, ON
L0S 1T0

Attention: **Mike Komljenovic, Engineering Supervisor**

Reference: **2023 Municipal Bridge Appraisal – Rehabilitation/Replacement Needs**
ELLIS Engineering Inc. File No.: 1140

We are pleased to submit one copy of the 2023 Municipal Bridge Appraisal, Rehabilitation/Replacement Needs, which contains inspection reports for 57 of the Town of Niagara-on-the-Lake's bridge, culvert, and pedestrian structures with spans over 3 metres.

A universal serial bus (USB) has been included, which contains all files relating to the Town's structures, including the corresponding Bridge Management Database (file titled *NOTL Bridge Inspections 2023.mdb*), a Microsoft Streets and Trips map file (file titled *NOTL 2023 Inspection Map.est*) containing the location of all the Town's structures, PDF files of each individual structure assessment report, as well as all original inspection photographs.

The Town will require the use of Microsoft Access 2007 to use the databases and Microsoft Streets and Trips to view the location map files.

This submission also includes a file geodatabase, titled *Town of Niagara-on-the-Lake 2023 Structure Inspections*. This file geodatabase contains 58 data points representing the 57 inspected bridge, culvert, and pedestrian structures. Attached to each of these 58 data points are the individual PDF inspection reports for each structure inspected in 2023.

All of the inspections were completed by Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc. The file geodatabase was created by Emma Stephenson. Duane VanGeest, P.Eng. and Arih Struger-Kalkman, P.Eng., reviewed the reports, including recommendations and cost estimates based on the deficiencies at each structure, as well as the data included in the file geodatabase.

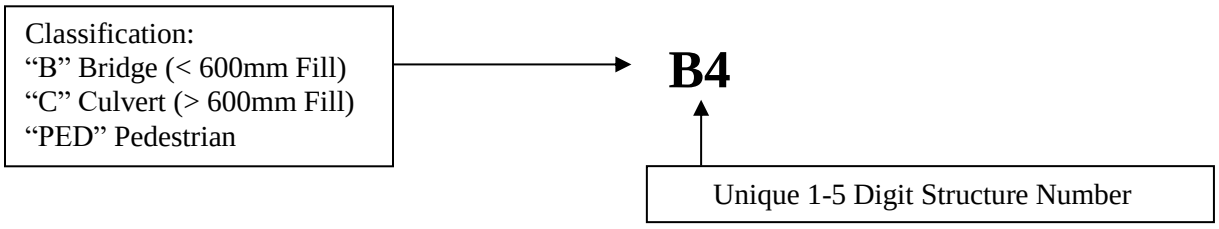
... /2

Classification:

All structures have been classified as either "Bridge", "Culvert", or "Pedestrian" type structures. The Bridge and Culvert classifications are according to the criteria contained in the Municipal Bridge and Culvert Appraisal Manuals. The definition is as follows:

"In general, bridges transfer all live loads through a superstructure to a substructure and foundations, and culverts transfer all live loads through fill. Box or open type structures with a span of 3m and greater, and have less than 600mm of cover shall be appraised as a bridge, and those with more than 600mm of cover shall be appraised as a culvert".

Corrugated Steel Pipe (CSP) and Soil Steel Multi Plate (SSMP), Corrugated Plastic Pipe (CPP), and Concrete Pipe (CP) type structures are always classified as culverts, regardless of fill. Structures are numbered according to the following scheme:



The biennial inspection interval for 'Structures' may be increased to four years, according to the criteria contained in the Ontario Structure Inspection Manual (OSIM), if the following criterion is met:

"For culverts with 3m to 6m spans and retaining walls, the inspection interval can be increased to four years if the culvert or retaining wall is in good condition and the engineer believes that the culvert or retaining wall condition will not change significantly before the next inspection."

The following structures were inspected in 2023 and do not require another structural inspection until 2027:

- Structure No. C19, Nassau Road Culvert
- Structure No. C2011, Queenston Road
- Structure No. C2051, Concession 6 Road
- Structure No. C2129, Line 2 Road

The following structure was inspected in 2021 and does not require another structural inspection until 2025:

- Structure No. B2067, Concession 3 Road (Driveway)

Priority Ranking and Bridge Condition Index (BCI):

Each structure has been given a priority ranking. The priority ranking summary spreadsheets of the Rehabilitation/Replacement Needs have been prioritized according to the following categories:

- NOW,
- 1 – 5 Years,
- 6 – 10 Years, and
- Adequate.

In addition to the priority rankings, the structures are classified with a General Overall Condition rating and a corresponding Bridge Condition Index (BCI) value. The categories summarized in Table 1, below, were used to classify the structures.

Table 1: Structure Condition Classification and Corresponding BCI Values

Condition	BCI Range	Description
Very Good	80 – 100	Overall, the components of the structure are in very good condition. Generally, the structure has been constructed within the last 10 years and does not require any work within the next 10 years.
Good	70 – 79	Overall, the components of the structure are in good condition. Generally, the structure is adequate or requires only minor maintenance within the next 10 years.
Fair	60 – 69	Overall, the components of the structure are in fair condition. Generally, the structure requires major rehabilitation or replacement within the next 10 years, or requires Condition Survey (C/S) Load Capacity Evaluation (LCE) or Rehabilitation/Replacement Analysis (RRA).
Poor	0 – 59	Overall, the components of the structure are in poor condition. Generally, the structure requires replacement within the next 5 years.

Structure Type:

Each of the structures inspected have been classified by structure type. Structure types include Corrugated Steel Pipe (CSP), Pony Truss (PT), Rigid Frame Box (RB), Reinforced Concrete Slab (RCS), Rigid Frame (RF), Slab on Steel Girder (SOSG), and Soil Steel Multi-Plate (SSMP).

Structures that are not identified as one of the aforementioned structure types or consist of multiple structure types are classified as OTHER. The exact structure description for structures identified as OTHER has been included in the database.

Figure 1, on the following page, shows the structure classification by number of structures under each type and as a percentage of the total structures inspected.

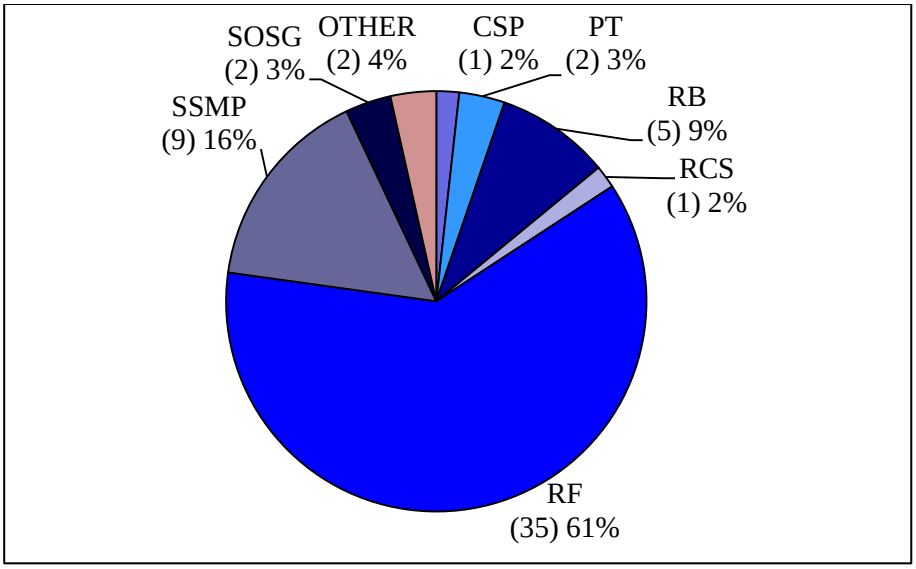


Figure 1: Percentage of Structures Classified by Structure Type

Bridge Management Database:

There are a total of 58 records in the 2023 database for 57 structures. There is one structure with two records for rehabilitation/replacement needs in different time frames.

All structure inspection information has been entered into a Bridge Management Database. Through the structure database, inspection reports and photographs can be sorted and viewed electronically and any additional hard copies can be printed directly from the database.

All Rehabilitation/Replacement Needs reports contained in the ring binder are sorted numerically by Structure ID Number. The various printed spreadsheets list the structures by structure number, within their respective categories (NOW, 1-5 Years, 6-10 Years, and Adequate).

Changes and Updates to Database:

No structures were added, removed, renamed, or reclassified since the 2021 Appraisal.

Structure Ownership:

Table 2, below, identifies one structure within the 2023 Bridge Management Database, which should be reviewed to determine ownership.

Table 2: Structure to be Reviewed for Ownership

ID Number	Structure Name	Additional Notes
B2060	Warner Road	We recommend that the Town review the ownership of the structure as it is also inspected by the City of Niagara Falls.

Priority Structures to Review:

The five structures that have been categorized as a priority for the Town to review have been listed in Table 3, below and on the following page.

Table 3: Structures Listed as Priority to Review

ID Number	Structure Name	Recommendation
B4	South Shore Lane	We recommend that the following rehabilitation work be completed NOW: excavate behind the east and west abutments, fill the voids behind the abutments, construct new ballast walls, seal the cracks in the concrete deck, replace the damaged timber posts, and re-tension the cable guiderail. Alternatively, we recommend that the Town review replacing the bridge NOW to eliminate the width and load limit deficiencies.
B21	Line 5 Road (Field Entrance)	We recommend closing the structure (with barricades or by removal) or replacing the structure NOW.
B23	Concession 3 Road (Field Entrance)	We recommend removing or replacing the structure NOW.
B2037	Line 8 Road	We recommend placing fill behind the southeast wingwall and filling the void below the southeast wingwall NOW. We also recommend placing riprap along the east and west footings and in front of the southeast wingwall NOW to prevent further erosion. We recommend replacing the portion of guiderail and timber posts over the structure NOW.
C17	Line 2 Road	We recommend replacing the structure NOW. We also recommend monitoring the structure and roadway every 6 months and after large storm events for signs of failure (settlements, loss of fill, deformations, etc.).

Note: These structures have been marked using a yellow triangle on the Microsoft Streets and Trips and ArcGIS location maps.

Next Inspection:

In the 2023 assessment, 56 of the Town's Bridge and Culvert structures were inspected. The 2023 assessment identified 53 bridge and culvert structures to be inspected in 2025 and four culvert structures that do not require inspection until 2027. A summary of the inspection dates and the next inspection dates is included in the Structure Summary List.

Estimated Costs for Repair:

The estimated rehabilitation and replacement construction costs, presented herein, have been calculated based on preliminary engineering assumptions. The accuracy of the cost estimates is within an approximated range of plus or minus 20%. A breakdown of estimated costs for individual structure rehabilitation needs is provided with no allowance for contingencies.

In some cases, the installation of steel beam guide rail has been included as an optional recommendation. The installation of steel beam guide rail, for these cases, will depend on the Town's Roadside Safety Policy related to each site. Generally, road works have not been recommended unless directly related to the rehabilitation of the structure.

Roadside Safety Barriers:

We identified 22 of the Town's structures that have recommendations related to Roadside Safety Barriers. We recommend that the Town review the structures listed in Tables 4A, below, and 4B, on the following page, along with the Geometric Design Guide for Canadian Roads and the Town of Niagara-On-The-Lake's Roadside Safety Policy to determine if upgrades, repairs, and/or new roadside safety barriers are required. If so, we recommend that the Town proceed with the recommendations provided accordingly and in the suggested time frame.

Table 4A: Potential Upgrade, Repair, or Installation of Roadside Safety Barriers

ID Number	Structure Name	Recommendation	Priority Rating	Cost
B4	South Shore Lane	Replace the damaged timber posts, and re-tension the cable guiderail.	NOW	$11,500
B9	Line 4 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B11	Line 3 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B12	Line 2 Road	Review if steel beam guiderails are required.	NOW	$69,000
B13	Line 1 Road	Repair the guiderail at the southwest corner.	NOW	$8,000
B14	Line 1 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,500
B19	Line 5 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B2023	Line 3 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B2027	Townline Road (Grantham Road)	Replace the damaged end treatment at the northwest corner.	NOW	$18,000
B2037	Line 8 Road	Replace the portion of guiderail and timber posts over the structure.	NOW	$11,500
B2038	Line 8 Road	Replace the steel beam guiderail.	1 – 5 Years	$69,000
B2091	Line 7 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B2101	Line 6 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B2102	Line 6 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000

Note Costs include estimates for engineering.

Table 4B: Potential Upgrade, Repair, or Installation of Roadside Safety Barriers

ID Number	Structure Name	Recommendation	Priority Rating	Cost
B2114	Line 4 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
B2115	Line 4 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
C3	McNab Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
C18	Line 1 Road	Replace the steel beam guiderail timber posts.	NOW	$15,000
C19	Nassau Road Culvert	Re-attach the southeast leaving end treatment.	NOW	$2,000
C2006	Church Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
C2124	Line 2 Road	Review Roadside Safety Policy to determine if steel beam guiderails are required to provide traffic protection over the structure.	NOW	$69,000
C85305	East and West Line	Review Roadside Safety Policy to determine if it is required to raise the north guiderail.	NOW	$23,000
			Total Cost for Tables 4A and 4B:	**$1,124,500**

Note Costs include estimates for engineering.

Summary of Structure Conditions:

Figure 2, below, shows the number and percentage of the structures in each General Overall Condition category.

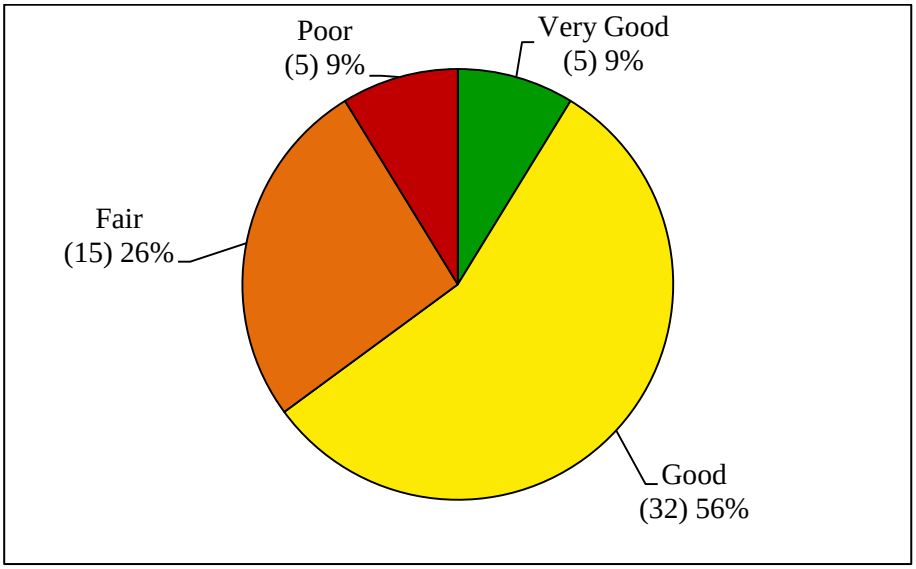


Figure 2: Percentage of Structures Classified by General Overall Condition

The structure general overall conditions are summarized in Table 5 and Figure 3, on the following page.

Table 5: Summary of General Overall Condition

		General Overall Condition									
		Very Good		**Good**		**Fair**		**Poor**		**Total**	
Priority Rating	**Adequate**	4	(7%)	10	(18%)	3	(5%)	0	(0%)	**17**	**(30%)**
	6–10 Years	0	(0%)	0	(0%)	2	(4%)	0	(0%)	**2**	**(4%)**
	1–5 Years	0	(0%)	7	(12%)	5	(9%)	2	(4%)	**14**	**(25%)**
	NOW	1	(2%)	15	(26%)	5	(9%)	3	(5%)	**24**	**(42%)**
	Total	**5**	**(9%)**	**32**	**(56%)**	**15**	**(26%)**	**5**	**(9%)**	**57**	**(100%)**

Notes: Costs include estimates for engineering.
Percentages (%) are rounded to the nearest percent.
There are a total of 58 records in the database for 57 structures. There is one structure that has two records for different time frames (e.g. NOW and 1-5 Years). Only the record with the most significant recommendation (e.g. RSL in 1-5 Years) is included in Table 5.

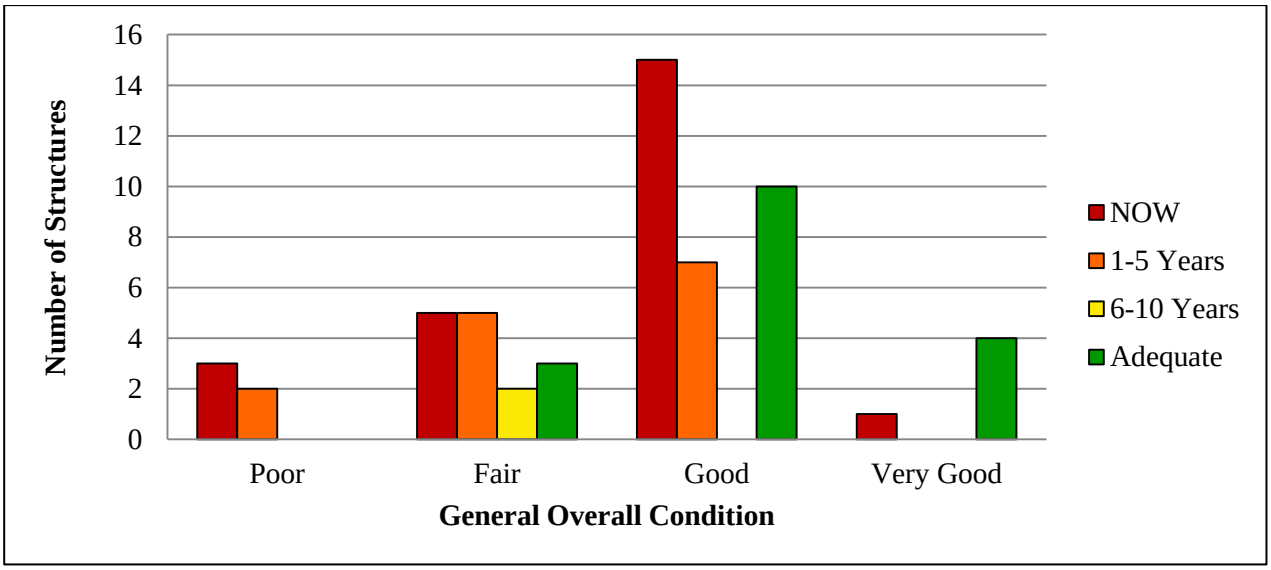


Figure 3: Number of Structures for Each General Overall Condition Category by Priority Rating

Table 6, below, and Figure 4, on the following page, summarizes the relationship between the Priority Ratings of the structures inspected in 2023 relative to the estimated cost range for the Rehabilitation/Replacement Needs.

Table 6: Summary of Priority Rating and Cost

Priority Rating	**Total**	**% of Total**	**2023 Estimated Cost**	**Number of Structures in the Cost Range**		
				$0 - $49,999	**$50,000 - $249,999**	**$250,000 +**
Adequate	**17**	**29%**	$0	-	-	-
6–10 Years	**2**	**3%**	$1,035,000	0	0	2
1–5 Years	**14**	**24%**	$2,770,000	4	7	3
NOW	**25**	**43%**	$3,173,500	6	16	3
Total	**58**	**100%**	**$6,978,500**	**10**	**23**	**8**

Notes: Costs include estimates for engineering.
Percentages (%) are rounded to the nearest percent.
There are a total of 58 records in the database for 57 structures. There is one structure that has two records for different time frames (e.g. NOW and 1-5 Years). All records are included in Table 6.

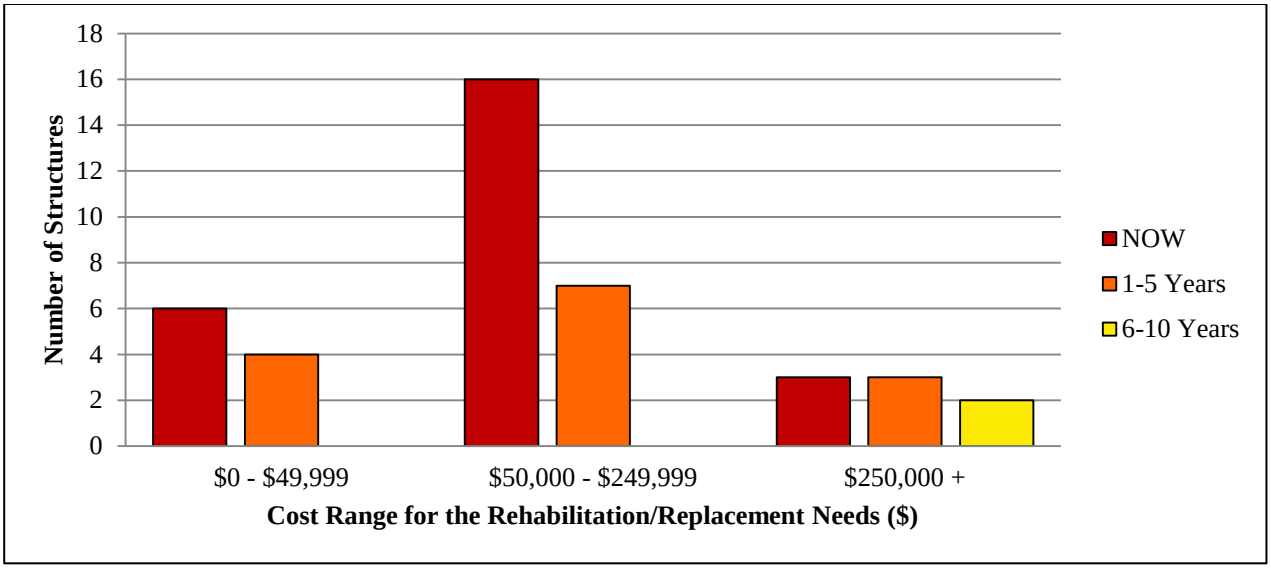


Figure 4: Number of Structures in the Rehabilitation/Replacement Cost Range by Priority Rating

Table 7, below, summarizes the change in cost from the 2021 assessment to the 2023 assessment for structures in each Priority Rating.

Table 7: Summary of Change in Cost from 2021 Inspections to 2023 Inspections

Priority Rating	2021 Cost	2023 Cost	Additional Notes
Adequate	$0	$0	None.
6–10 Years	$1,782,500	$1,035,000	+ Increases in construction costs. - Structure ID: C18 moved to 1-5 Years.
1–5 Years	$2,144,000	$2,770,000	+ Increases in construction costs. + Structure ID: C18 moved from 6-10 Years. + New recommendation for Structure ID: C85310. - Structure ID: B2027 and C17 moved to NOW.
NOW	$2,140,500	$3,173,500	+ Increases in construction costs. + Structure ID: B2027 and C17 moved from 1-5 Years.
Total:	**$6,067,000**	**$6,978,500**	**Approximate 15% increase in cost.**

Note: Costs include estimates for engineering.

Table 7, above, indicates an increase of $911,500 in total Rehabilitation Replacement Needs cost for structures from 2021 to 2023 (approximate 15% increase) due to increases in construction costs and a new rehabilitation recommendation for Structure ID C85310.

Closing:

We thank you for giving us the opportunity to provide our services for this very interesting project. Should you have any questions concerning the report, please contact the undersigned.

Yours truly,
ELLIS Engineering Inc.

Arih Struger-Kalkman, M. Eng., P. Eng.
Project Manager

Emma Stephenson
Project Assistant

TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL REHABILITATION/REPLACEMENT NEEDS

RECOMMENDED WORK & STRUCTURE TYPE CODES

RECOMMENDED WORK TYPE CODES:

DCS	- DECK CONDITION SURVEY
RSP	- REHABILITATE SUPERSTRUCTURE
RSB	- REHABILITATE SUBSTRUCTURE
RIR	- RAILING IMPROVEMENT / REPLACEMENT
PWP	- PATCH WATERPROOF AND PAVE
WSR	- WEARING SURFACE REHABILITATION
C/S	- CONDITION SURVEY
RSL	- REPLACE SAME LOCATION
OWP	- OVERLAY WATERPROOF AND PAVE
TJR	- TRANSVERSE EXPANSION JOINT REPLACEMENT
CSS	- COAT STRUCTURAL STEEL
LCE	- LOAD CAPACITY EVALUATION
PDR	- PARTIAL DECK REPLACEMENT
RRA	- REHABILITATION/REPLACEMENT ANALYSIS
CDR	- COMPLETE DECK REPLACEMENT
SPI	- SCOUR PROTECTION IMPROVEMENT
MIS	- MISCELLANEOUS – OTHER WORK

STRUCTURE TYPE CODES:

RF	- RIGID FRAME
RB	- RIGID FRAME BOX
SOSG	- SLAB ON STEEL GIRDER
PT	- PONY TRUSS
CSP	- CORRUGATED STEEL PIPE
SSMP	- SOIL STEEL MULTI-PLATE
RCS	- REINFORCED CONCRETE SLAB
OTHER	- OTHER

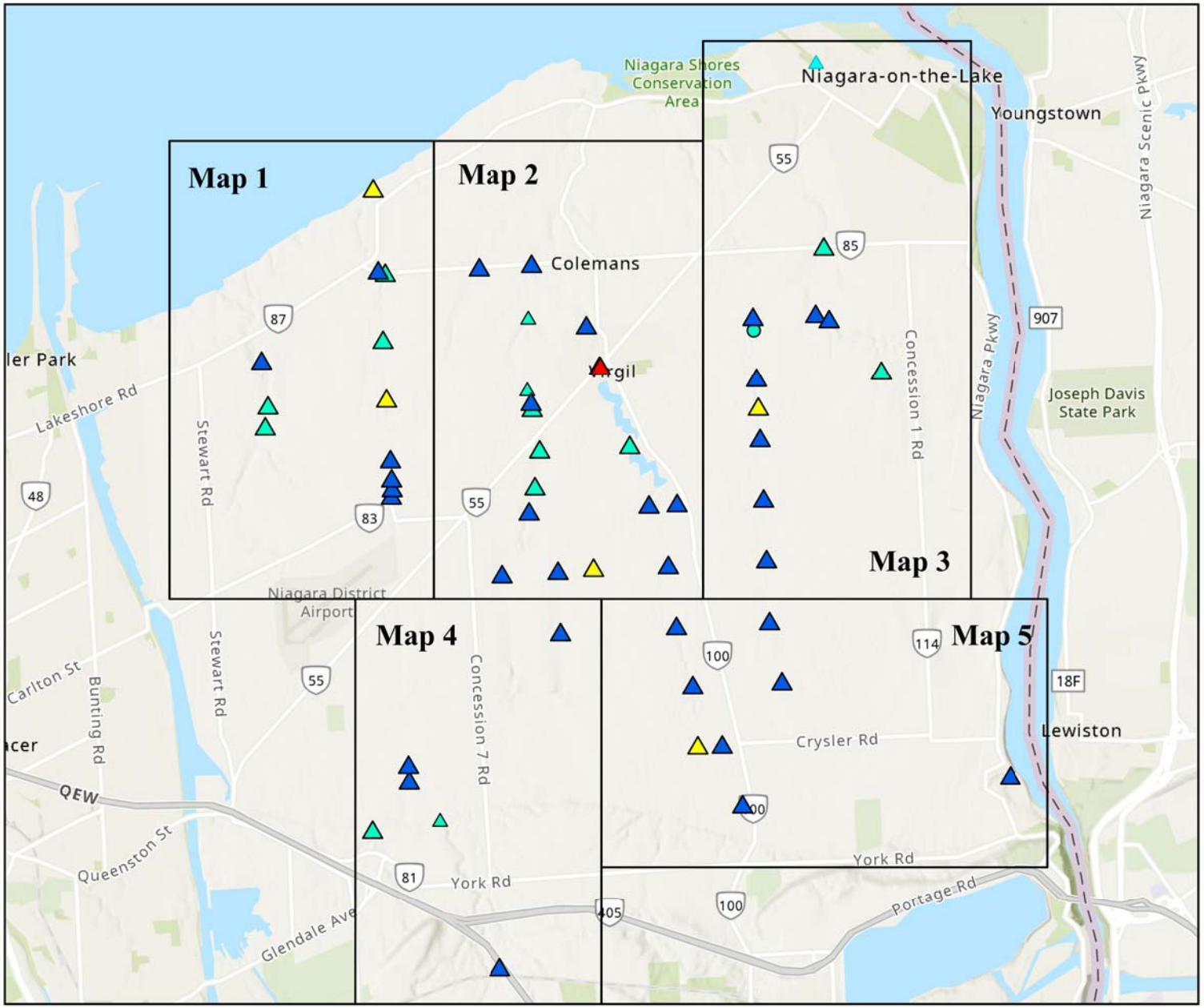
TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL
REHABILITATION/REPLACEMENT NEEDS

MICROSOFT STREETS & TRIPS: MAP LEGEND

Symbol	Shape Name	Structure Classification
	Large Dark Blue Triangle	Bridge inspected in 2023, next inspection in 2025.
	Large Light Blue Triangle	Culvert inspected in 2023, next inspection in 2025.
	Small Light Blue Triangle	Culvert inspected in 2023, next inspection in 2027.
	Small Light Blue Circle	Culvert inspected in 2021, next inspection in 2025.
	Large Red Triangle	Pedestrian bridge inspected in 2023, next inspection in 2025.
	Large Yellow Triangle	Priority structure inspected in 2023, next inspection 2025. To be reviewed by Town.

Town of Niagara-on-the-Lake
2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs
Location Plan



Legend

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- Small Light Blue Triangle: Culvert inspected in 2023, next inspection in 2027.

ELLIS Engineering Inc. has completed the 2023 Structure Inspections for the Town of Niagara-on-the-Lake.

The locations of all of the Town's bridges, culverts, and pedestrian structures with spans over 3 metres can be seen within the Location Plan.

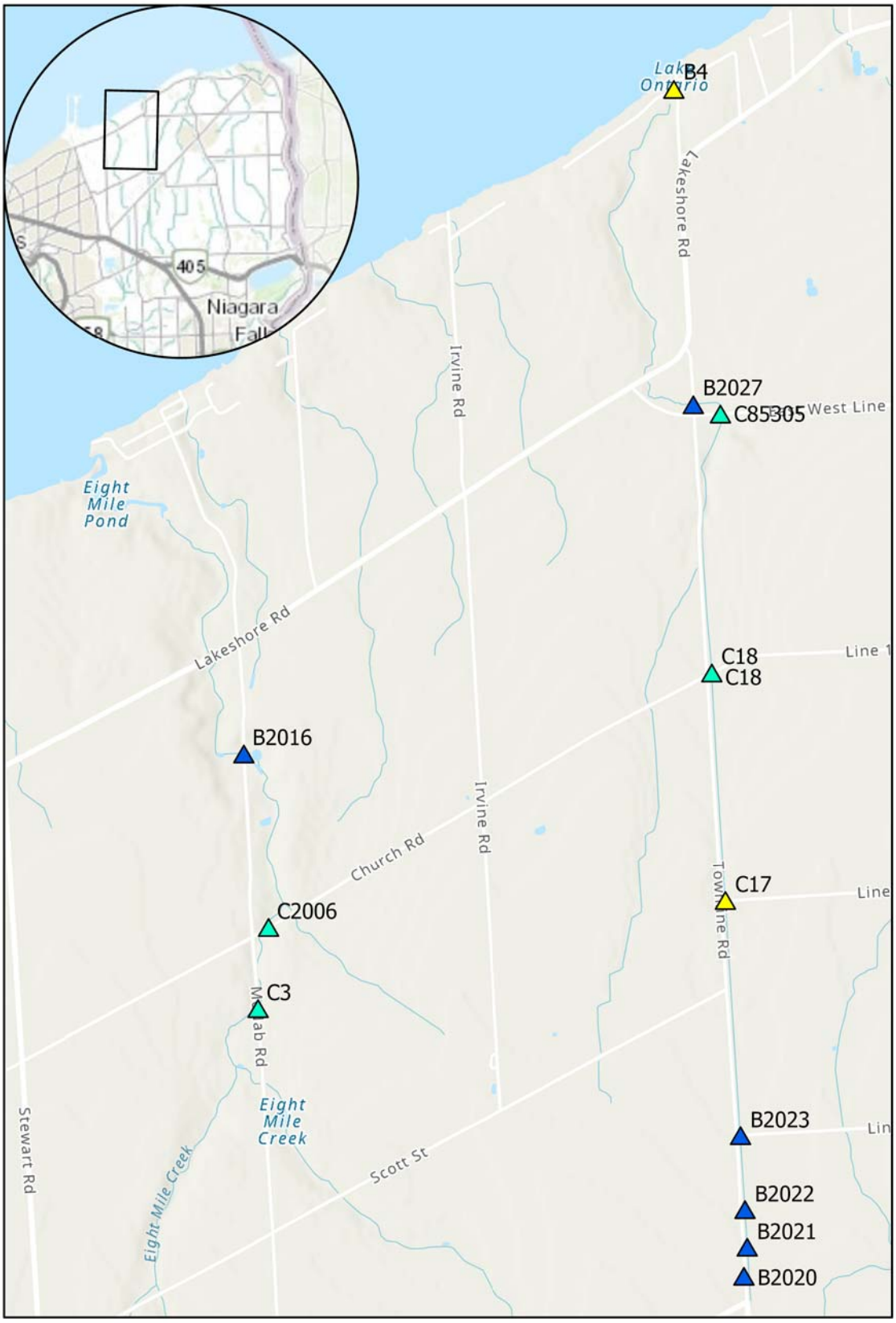
N

2 1 0 2 4 6 8 Kilometers

ELLIS Engineering Inc.

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs
Created For: The Town of Niagara-on-the-Lake
Created By: ELLIS Engineering Inc.
Projection: NAD 83 UTM Zone 17N
Date Created: 2023-12-21

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs Location Plan - Map 1



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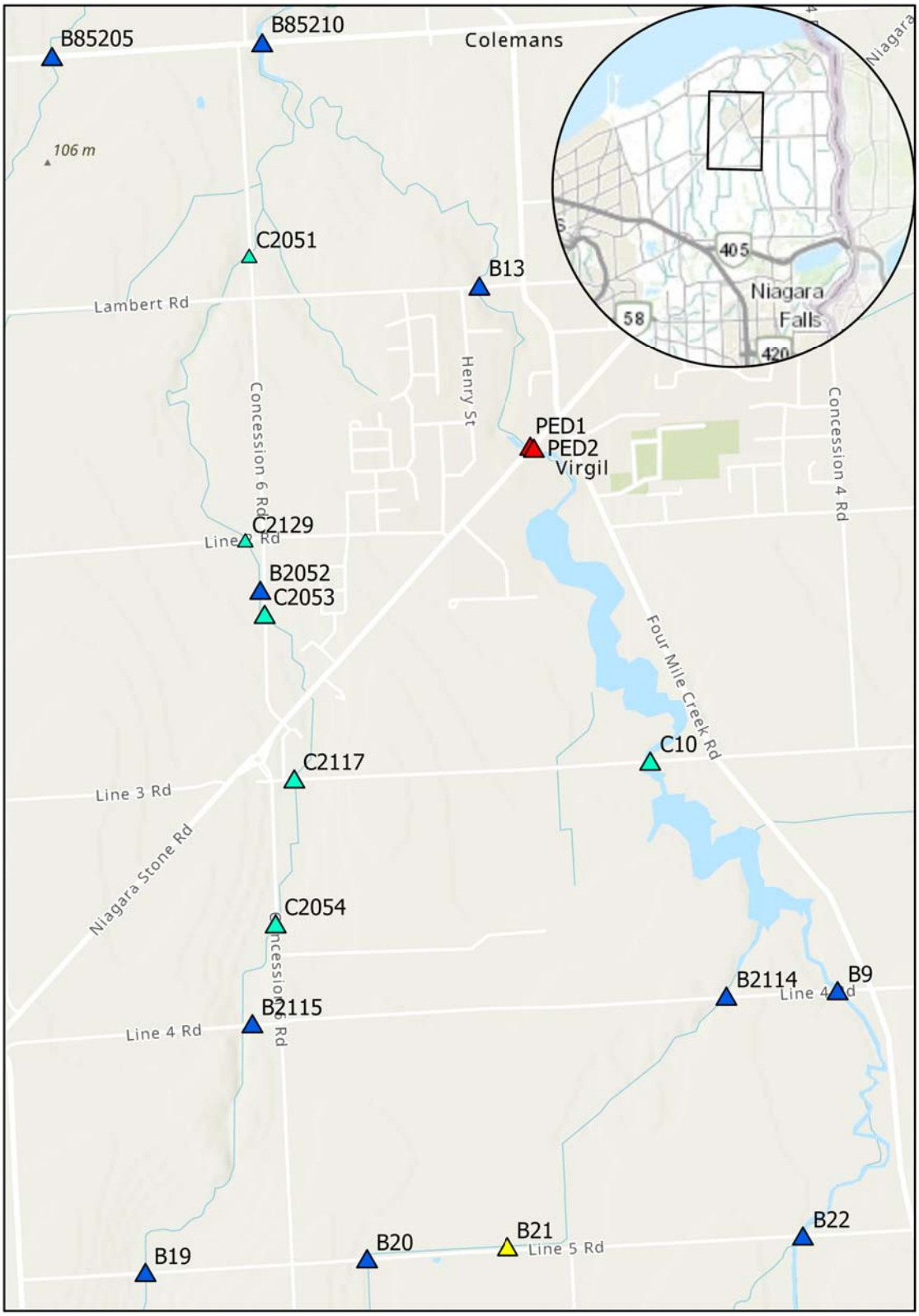
Kilometers

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal Rehabilitation/Replacement Needs - Location Plan - Map 1
Created For: The Town of Niagara-on-the-Lake
Created By: ELLIS Engineering Inc.
Projection: NAD 83 UTM Zone 17N
Date Created: 2023-12-21

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs Location Plan - Map 2



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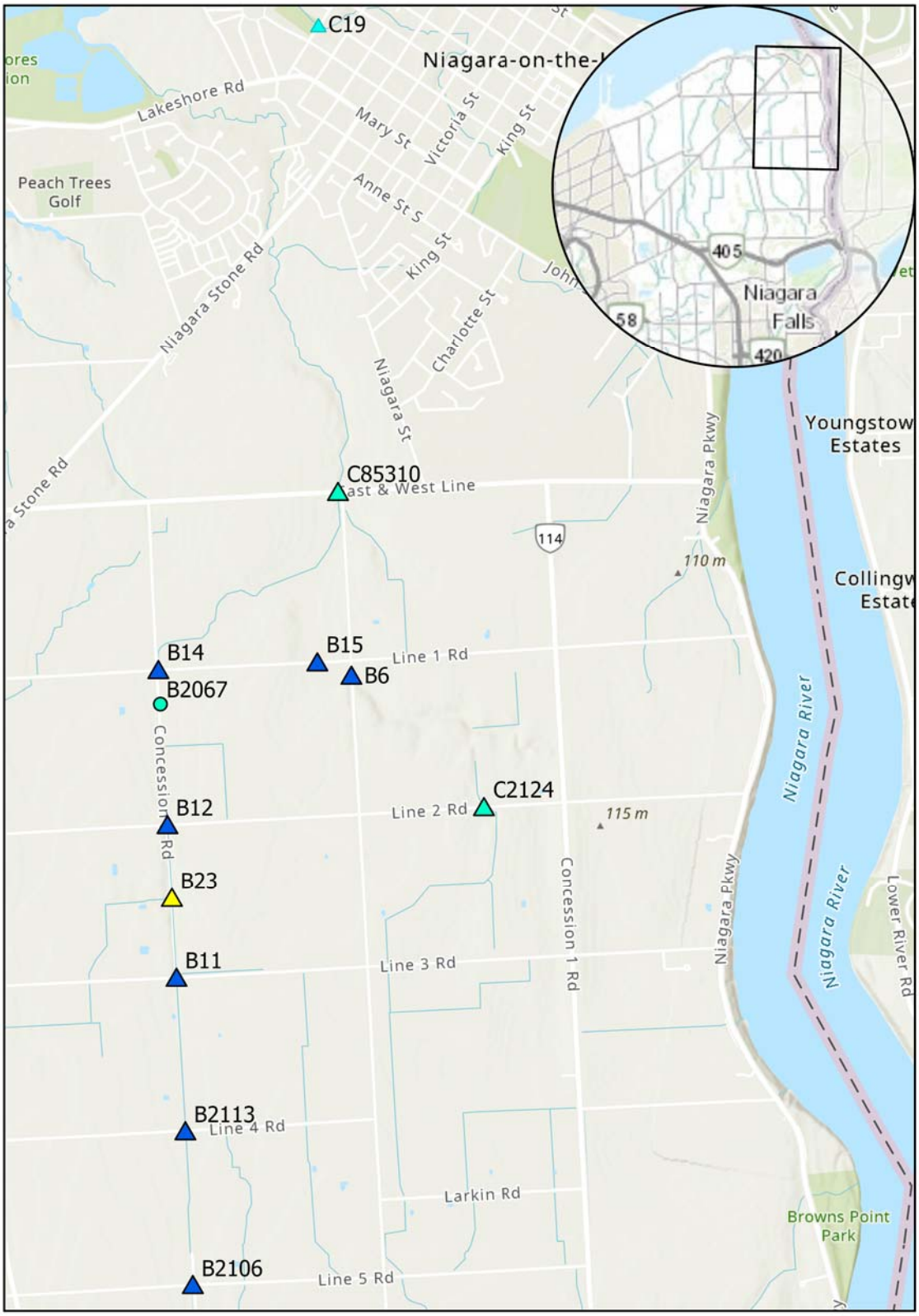
N

0 0 0 0 0 0 1 Kilometers

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal Rehabilitation/Replacement Needs - Location Plan - Map 2
Created For: The Town of Niagara-on-the-Lake
Created By: ELLIS Engineering Inc.
Projection: NAD 83 UTM Zone 17N
Date Created: 2023-12-21

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs Location Plan - Map 3



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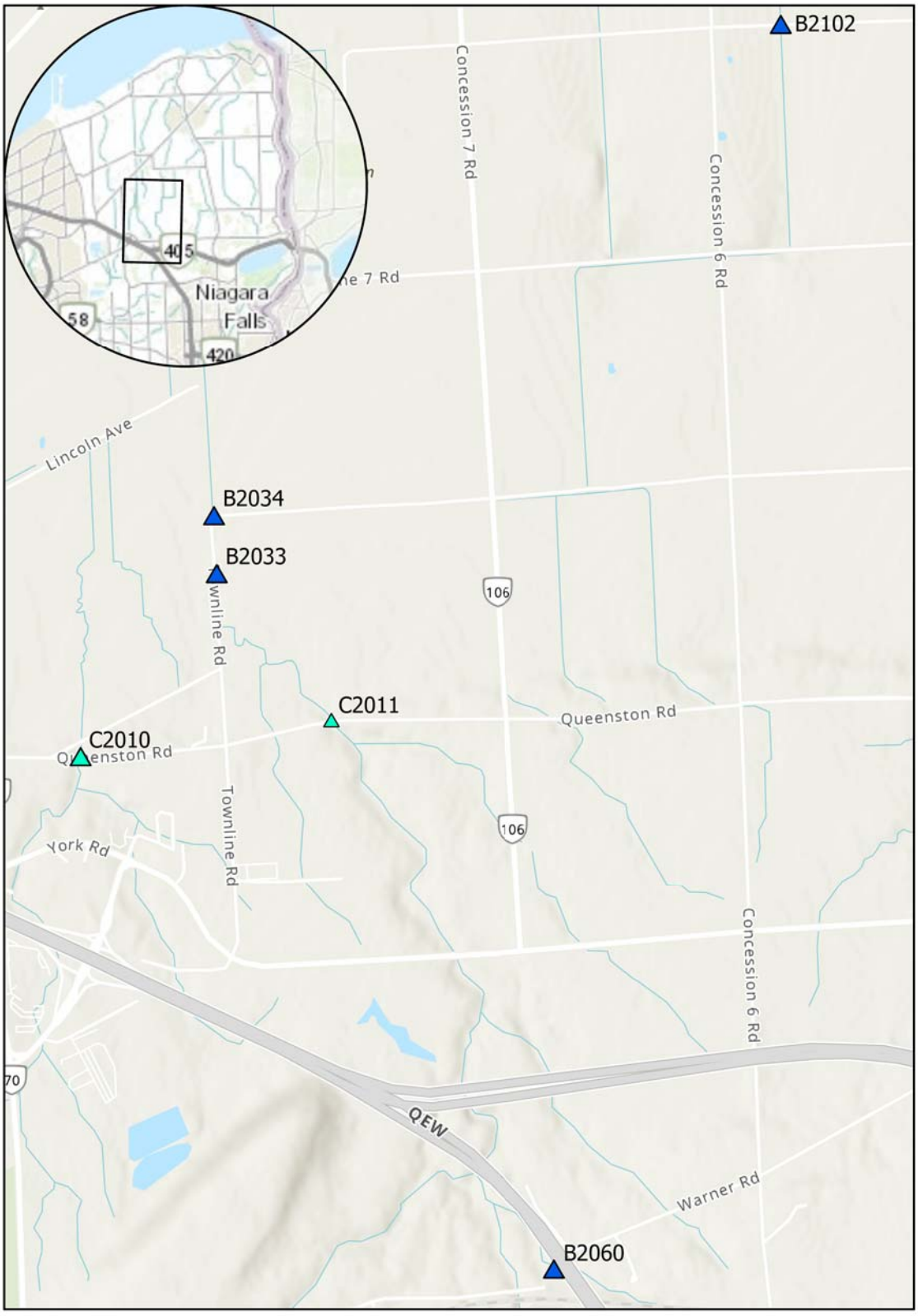
Kilometers

Town of Niagara-on-the-Lake: 2021 Municipal Bridge Appraisal Rehabilitation/Replacement Needs - Location Plan - Map 3
Created For: The Town of Niagara-on-the-Lake
Created By: ELLIS Engineering Inc.
Projection: NAD 83 UTM Zone 17N
Date Created: 2021-11-11

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs Location Plan - Map 4



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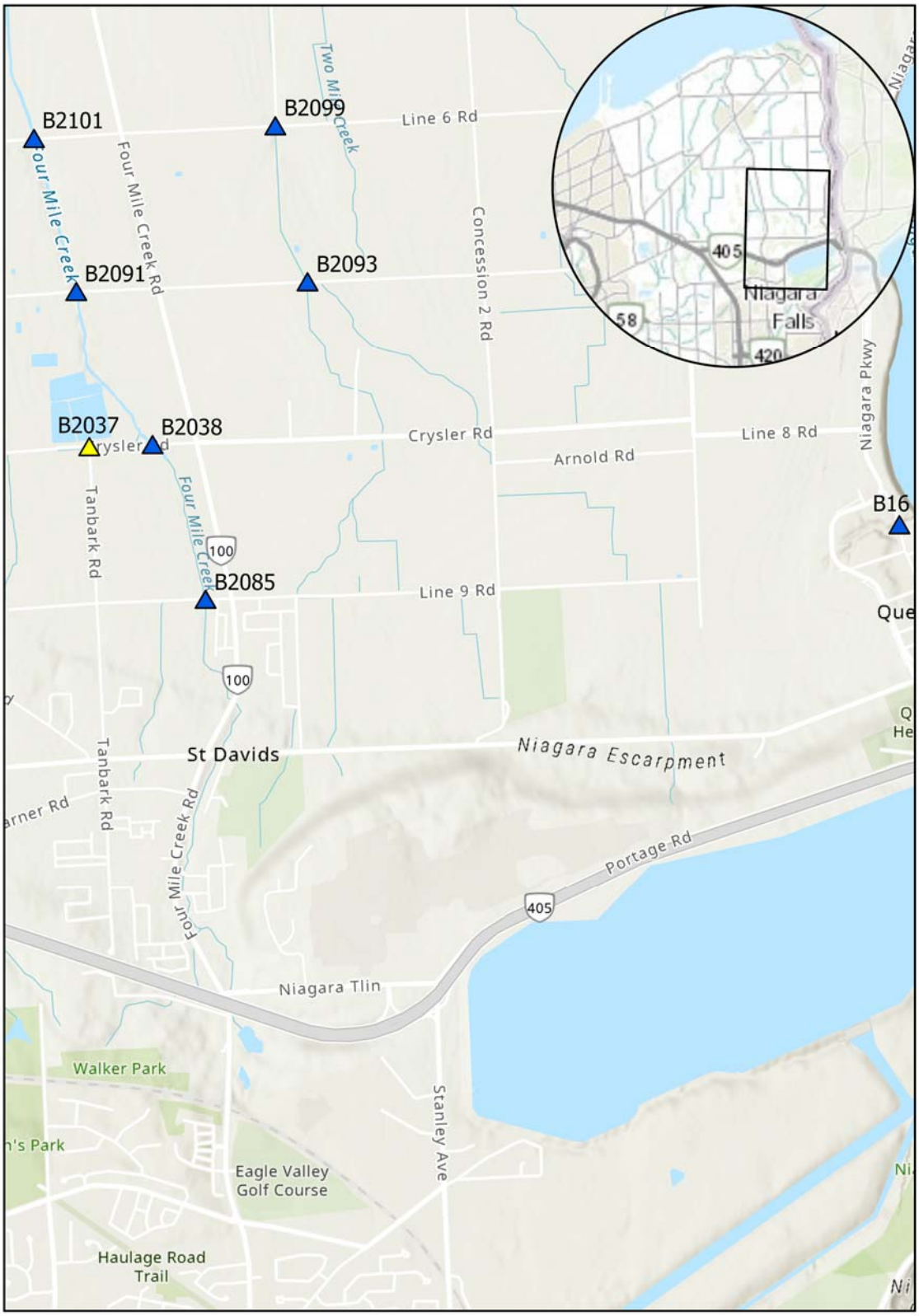
Kilometers

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal Rehabilitation/Replacement Needs - Location Plan - Map 4
Created For: The Town of Niagara-on-the-Lake
Created By: ELLIS Engineering Inc.
Projection: NAD 83 UTM Zone 17N
Date Created: 2023-12-21

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs Location Plan - Map 5



Legend

- Large Dark Blue Triangle: Bridge inspected in 2023, next inspection in 2025.
- Large Light Blue Triangle: Culvert inspected in 2023, next inspection in 2025.
- Large Yellow Triangle: Priority structure inspected in 2023, next inspection 2025. To be reviewed by Town.
- Small Light Blue Circle: Culvert inspected in 2021, next inspection in 2025.
- Large Red Triangle: Pedestrian bridge inspected in 2023, next inspection in 2025.
- Small Light Blue Triangle: Culvert inspected in 2023, next inspection in 2027.

N

0 0 0 0 1 1 1 Kilometers

Town of Niagara-on-the-Lake: 2023 Municipal Bridge Appraisal Rehabilitation/Replacement Needs - Location Plan - Map 5
Created For: The Town of Niagara-on-the-Lake
Created By: ELLIS Engineering Inc.
Projection: NAD 83 UTM Zone 17N
Date Created: 2021-12-21

TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL
REHABILITATION/REPLACEMENT NEEDS

STRUCTURE SUMMARY LIST

ID Number	Structure Name	Date of Inspection	Year of Next Inspection	Location	Location Map Number
B4	South Shore Lane	20-June-2023	2025	South Shore Lane, 0.01km west of Townline (Grantham) Road	1
B6	Concession 2 Road	11-July-2023	2025	Concession 2 Road, 0.05km south of Line 1 Road	3
B9	Line 4 Road	15-August-2023	2025	Line 4 Road, 0.12km west of 100 - Four Mile Creek Road	2
B11	Line 3 Road	11-July-2023	2025	Line 3 Road, 0.01km east of Concession 3 Road	3
B12	Line 2 Road	11-July-2023	2025	Line 2 Road, 0.01km east of Concession 3 Road	3
B13	Line 1 Road	11-July-2023	2025	Line 1 Road, 0.09km west of Four Mile Creek Road	2
B14	Line 1 Road	11-July-2023	2025	Line 1 Road, 0.01km east of Concession 2 Road	3
B15	Line 1 Road	11-July-2023	2025	Line 1 Road, 0.19km west of Concession 2 Road	3
B16	Queenston Street	11-July-2023	2025	Queenston Street, 0.25km south of Niagara River Park	5
B19	Line 5 Road	26-July-2023	2025	Line 5 Road, 0.43km east of Concession 7 Road	2
B20	Line 5 Road	15-August-2023	2025	Line 5 Road, 0.23km east of Concession 6 Road	2
B21	Line 5 Road	26-July-2023	2025	Line 5 Road, 0.73km east of Concession 6 Road	2
B22	Line 5 Road	15-August-2023	2025	Line 5 Road, 0.78km east of Concession 5 Road	2
B23	Concession 3 Road	11-July-2023	2025	Concession 3 Road, 0.30km south of Line 2 Road	3
B2016	McNab Road	20-June-2023	2025	McNab Road, 0.62km north of Church Road	1

TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL
REHABILITATION/REPLACEMENT NEEDS

STRUCTURE SUMMARY LIST

ID Number	Structure Name	Date of Inspection	Year of Next Inspection	Location	Location Map Number
B2020	Townline Road (Grantham Road)	20-June-2023	2025	Townline (Grantham) Road, 0.18km north of 83 Carlton Street	1
B2021	Townline Road (Grantham Road)	20-June-2023	2025	Townline (Grantham) Road, 0.25km north of Carlton Street	1
B2022	Townline Road (Grantham Road)	20-June-2023	2025	Townline (Grantham) Road, 0.32km north of Carlton Street	1
B2023	Line 3 Road	20-June-2023	2025	Line 3 Road, 0.01km east of Townline (Grantham) Road	1
B2027	Townline Road (Grantham Road)	20-June-2023	2025	Townline (Grantham) Road, 0.056km north of East and West Line	1
B2033	Townline Road (Grantham Road)	26-July-2023	2025	Townline (Grantham) Road, 0.3km north of Carlton Street	4
B2034	Line 8 Road	26-July-2023	2025	Line 8 Road, 0.01km east of Townline (Grantham) Road	4
B2037	Line 8 Road	15-August-2023	2025	Line 8 Road, 0.54km west of 100 - Four Mile Creek Road	5
B2038	Line 8 Road	15-August-2023	2025	Line 8 Road, 0.22km west of 100 - Four Mile Creek Road	5
B2052	Concession 6 Road	6-July-2023	2025	Concession 6 Road, 0.16km south of Line 2 Road	2
B2060	Warner Road	20-June-2023	2025	Warner Road, 0.68km east of Concession 6 Road	4
B2067	Concession 3 Road	1-September-2021	2025	Concession 3 Road, 0.50km south of Line 2 Road	3
B2085	Line 9 Road	15-August-2023	2025	Line 9 Road, 0.09km west of 100 - Four Mile Creek Road	5
B2091	Line 7 Road	15-August-2023	2025	Line 7 Road, 0.43km west of 100 - Four Mile Creek Road	5

TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL
REHABILITATION/REPLACEMENT NEEDS

STRUCTURE SUMMARY LIST

ID Number	Structure Name	Date of Inspection	Year of Next Inspection	Location	Location Map Number
B2093	Line 7 Road	26-July-2023	2025	Line 7 Road, 0.78km east of 100 - Four Mile Creek Road	5
B2099	Line 6 Road	26-July-2023	2025	Line 6 Road, 0.81km east of 100 - Four Mile Creek Road	5
B2101	Line 6 Road	26-July-2023	2025	Line 6 Road, 0.41km west of 100 - Four Mile Creek Road	5
B2102	Line 6 Road	15-August-2023	2025	Line 6 Road, 0.30km east of Concession 6 Road	4
B2106	Line 5 Road	26-July-2023	2025	Line 5 Road, 0.01km west of Concession 3 Road	3
B2113	Line 4 Road	15-August-2023	2025	Line 4 Road, 0.01km west of Concession 3 Road	3
B2114	Line 4 Road	15-August-2023	2025	Line 4 Road, 0.48km west of 100 - Four Mile Creek Road	2
B2115	Line 4 Road	15-August-2023	2025	Line 4 Road, 0.13km west of Concession 6 Road	2
B85205	East and West Line	6-July-2023	2025	East and West Line, 1.35km east of Townline (Grantham) Road	2
B85210	Four Mile Creek Bridge	6-July-2023	2025	East and West Line, 0.20km east of Concession 6 Road	2
C3	McNab Road	20-June-2023	2025	McNab Road, 028km south of Church Road	1
C10	Line 3 Road	6-July-2023	2025	Line 3 Road, 0.2km west of 100 - Four Mile Creek Road	2
C17	Line 2 Road	20-June-2023	2025	Line 2 Road, 0.01km east of Townline (Grantham) Road	1
C18	Line 1 Road	20-June-2023	2025	Line 1 Road, 0.01km east of Townline (Grantham) Road	1
C19	Nassau Road Culvert	11-July-2023	2027	Nassau Road, 0.1km west of William Street	3

TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL
REHABILITATION/REPLACEMENT NEEDS

STRUCTURE SUMMARY LIST

ID Number	Structure Name	Date of Inspection	Year of Next Inspection	Location	Location Map Number
C2006	Church Road	20-June-2023	2025	Church Road, 0.07km east of McNab Road	1
C2010	Queenston Road	26-July-2023	2025	Queenston Road, 0.14km east of Martin Road	4
C2011	Queenston Road	26-July-2023	2027	Queenston Road, 0.39km east of Townline (Grantham) Road	4
C2051	Concession 6 Road	6-July-2023	2027	Concession 6 Road, 0.09km north of Line 1 Road	2
C2053	Concession 6 Road	6-July-2023	2025	Concession 6 Road, 0.23km south of Line 2 Road	2
C2054	Concession 6 Road	15-August-2023	2025	Concession 6 Road, 0.42km south of Line 3 Road	2
C2117	Line 3 Road	6-July-2023	2025	Line 3 Road, 0.06km east of Concession 6 Road	2
C2124	Line 2 Road	11-July-2023	2025	Line 2 Road, 0.6km east of Concession 2 Road	3
C2129	Line 2 Road	6-July-2023	2027	Line 2 Road, 0.08km west of Concession 6 Road	2
C85305	East and West Line	6-July-2023	2025	East and West Line, 0.3km east of Townline (Grantham) Road	1
C85310	East and West Line	11-July-2023	2025	East and West Line, 0.01km west of Concession 2 Road	3
PED1	West Pedestrian Bridge Over 4 Mile Creek	6-July-2023	2025	Niagara Stone Road, 0.15km west of Four Mile Creek Road	2
PED2	East Pedestrian Bridge Over 4 Mile Creek	6-July-2023	2025	Niagara Stone Road, 0.15km west of Four Mile Creek Road	2

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Priority Ranking Summary: **MASTER**

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B11 Line 3 Road	Good	75	74	Unknown	RF	1	5.5	67	$92,500.00
Line 3 Road, 0.01km east of Concession 3 Road									
Recommendation									
RIR								SPI	
Replace missing hazard marker									
B12 Line 2 Road	Good	74	73	Unknown	RF	1	6.1	82	$98,000.00
Line 2 Road, 0.01km east of Concession 3 Road									
Recommendation									
RIR								SPI	
B13 Line 1 Road	Good	77	76	Unknown	RCS	1	12.2	172	$8,000.00
Line 1 Road, 0.09km west of Four Mile Creek Road									
Recommendation									
RIR									
B14 Line 1 Road	Good	77	76	Circa 1960	RF	1	6.3	113	$69,500.00
Line 1 Road, 0.01km east of Concession 2 Road									
Recommendation									
RIR									
MIS: Replace damaged hazard marker									
B15 Line 1 Road	Very Good	90	89	2019	RB	1	4.3	58	$0.00
Line 1 Road, 0.19km west of Concession 2 Road									
Recommendation									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B16 Queenston Street	Good	75	74	Unknown	SOSG	3	10.2, 10.2,10.2	264	$0.00
Queenston Street, 0.25km south of Niagara River Park									
Recommendation									
B19 Line 5 Road	Good	73	72	c.1950	RF	1	3.8	36	$98,000.00
Line 5 Road, 0.43km east of Concession 7 Road									
Recommendation									
RIR								SPI	
B20 Line 5 Road	Good	74	73	Unknown	RF	1	3.8	52	$29,000.00
Line 5 Road, 0.23km east of Concession 6 Road									
Recommendation									
								SPI	
B2016 McNab Road	Fair	69	68	Unknown	RF	1	4.9	58	$29,000.00
McNab Road, 0.62km north of Church Road									
Recommendation									
								SPI	
B2020 Townline Road (Grantham Road)	Fair	66	65	Unknown	SSMP	1	5.5	36	$0.00
Townline (Grantham) Road, 0.18km north of 83 Carlton Street									
Recommendation									
B2021 Townline Road (Grantham Road)	Fair	68	66	Unknown	SSMP	1	4.6	29	$3,000.00
Townline (Grantham) Road, 0.25km north of Carlton Street									
Recommendation									
MIS: Remove vegetation and fallen trees									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2022 Townline Road (Grantham Road)	Fair	68	66	Unknown	SSMP	1	5.5	36	$0.00
Townline (Grantham) Road, 0.32km north of Carlton Street									
Recommendation									
B2023 Line 3 Road	Good	71	70	Unknown	RF	1	4.6	40	$103,500.00
Line 3 Road, 0.01km east of Townline (Grantham) Road									
Recommendation									
RIR								SPI	
B2027 Townline Road (Grantham Road)	Good	70	70	Unknown	RF	1	3.7	38	$50,000.00
Townline (Grantham) Road, 0.056km north of East and West Line									
Recommendation									
RIR								SPI	
MIS: Remove vegetation and trees									
B2033 Townline Road (Grantham Road)	Fair	64	63	Unknown	SSMP	1	4.5	30	$57,500.00
Townline (Grantham) Road, 0.3km north of Carlton Street									
Recommendation									
MIS: Repair/replace headwalls and wingwalls									
B2034 Line 8 Road	Fair	67	65	Circa 1960	RF	1	4.9	44	$57,500.00
Line 8 Road, 0.01km east of Townline (Grantham) Road									
Recommendation									
								SPI	
MIS: Fill void under northeast corner of footing									
B2037 Line 8 Road	Fair	68	66	c.1970	RF	1	4.4	75	$63,500.00
Line 8 Road, 0.54km west of 100 - Four Mile Creek Road									
Recommendation									
RIR								SPI	
MIS: Place fill at southeast wingwall									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2038 Line 8 Road	Good	72	70	Unknown	RF	1	4.4	75	$103,500.00
Line 8 Road, 0.22km west of 100 - Four Mile Creek Road									
Recommendation									
RIR								SPI	
B2052 Concession 6 Road	Good	73	72	Unknown	RF	1	3.1	16	$0.00
Concession 6 Road, 0.16km south of Line 2 Road									
Recommendation									
B2060 Warner Road	Fair	69	68	Unknown	RF	1	3.1	29	$0.00
Warner Road, 0.68km east of Concession 6 Road									
Recommendation									
B2067 Concession 3 Road	Very Good	45	90	2021	CSP	1	2.8	22	$0.00
Concession 3 Road, 0.50km south of Line 2 Road									
Recommendation									
B2085 Line 9 Road	Fair	68	67	Circa 1960	RF	1	3.7	36	$34,500.00
Line 9 Road, 0.09km west of 100 - Four Mile Creek Road									
Recommendation									
								SPI	
B2091 Line 7 Road	Good	75	74	Unknown	RF	1	5.6	105	$103,500.00
Line 7 Road, 0.43km west of 100 - Four Mile Creek Road									
Recommendation									
RIR								SPI	

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2093 Line 7 Road Line 7 Road, 0.78km east of 100 - Four Mile Creek Road **Recommendation** RSL	Fair	65	64	Unknown	RF	1	4.3	39	$460,000.00
B2099 Line 6 Road Line 6 Road, 0.81km east of 100 - Four Mile Creek Road **Recommendation** SPI	Fair	70	69	Circa 1960	RF	1	4.3	93	$34,500.00
B21 Line 5 Road Line 5 Road, 0.73km east of Concession 6 Road **Recommendation** RSL	Poor	50	48	Unknown	OTHER	1	6.4	31	$345,000.00
B2101 Line 6 Road Line 6 Road, 0.41km west of 100 - Four Mile Creek Road **Recommendation** RIR SPI	Good	71	70	Circa 1960	RF	1	5.7	50	$92,000.00
B2102 Line 6 Road Line 6 Road, 0.30km east of Concession 6 Road **Recommendation** RIR SPI	Good	72	71	Unknown	RF	1	4.1	45	$92,000.00
B2106 Line 5 Road Line 5 Road, 0.01km west of Concession 3 Road **Recommendation** RSL	Fair	64	63	Unknown	RF	1	4.6	58	$575,000.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2113 Line 4 Road Line 4 Road, 0.01km west of Concession 3 Road **Recommendation** RSL	Poor	58	56	Unknown	RF	1	4.9	59	$575,000.00
B2114 Line 4 Road Line 4 Road, 0.48km west of 100 - Four Mile Creek Road **Recommendation** RIR	Good	73	72	Unknown	RF	1	4.3	35	$69,000.00
B2115 Line 4 Road Line 4 Road, 0.13km west of Concession 6 Road **Recommendation** RIR SPI	Good	71	70	Unknown	RF	1	3.7	36	$92,000.00
B22 Line 5 Road Line 5 Road, 0.78km east of Concession 5 Road **Recommendation** PWP SPI	Good	71	70	Unknown	RF	1	7.0	83	$161,000.00
B23 Concession 3 Road Concession 3 Road, 0.30km south of Line 2 Road **Recommendation** RSL	Poor	15	10	Unknown	OTHER	1	9.2	30	$402,500.00
B4 South Shore Lane South Shore Lane, 0.01km west of Townline (Grantham) Road **Recommendation** RSP RSB RIR MIS: Fill voids behind abutments	Fair	64	63	Unknown	SOSG	1	8.0	30	$241,500.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B6 Concession 2 Road Concession 2 Road, 0.05km south of Line 1 Road **Recommendation**	Very Good	89	88	2016	RB	1	4.4	53	$0.00
B85205 East and West Line East and West Line, 1.35km east of Townline (Grantham) Road **Recommendation**	Good	75	74	Unknown	RB	1	3.0	38	$0.00
B85210 Four Mile Creek Bridge East and West Line, 0.20km east of Concession 6 Road **Recommendation**	Good	77	76	Unknown	RF	1	15.2	175	$0.00
B9 Line 4 Road Line 4 Road, 0.12km west of 100 - Four Mile Creek Road **Recommendation** RIR	Good	72	71	Unknown	RF	1	7.0	91 SPI	$92,000.00
C10 Line 3 Road Line 3 Road, 0.2km west of 100 - Four Mile Creek Road **Recommendation**	Good	75	74	Unknown	SSMP	1	8.0	136	$0.00
C17 Line 2 Road Line 2 Road, 0.01km east of Townline (Grantham) Road **Recommendation** RSL MIS: Monitor structure & roadway	Poor	58	54	Unknown	SSMP	2	3.7, 3.7	120	$920,000.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C18 Line 1 Road (Record 1 of 2, NOW) Line 1 Road, 0.01km east of Townline (Grantham) Road **Recommendation** RIR	Poor	60	59	Unknown	SSMP	2	3.7, 3.7	141	$15,000.00
C18 Line 1 Road (Record 2 of 2, 1-5 Years) Line 1 Road, 0.01km east of Townline (Grantham) Road **Recommendation** RSL	Poor	60	59	Unknown	SSMP	2	3.7, 3.7	141	$920,000.00
C19 Nassau Road Culvert Nassau Road, 0.1km west of William Street **Recommendation** RIR	Very Good	86	85	2012	RB	1	3.1	60	$2,000.00
C2006 Church Road Church Road, 0.07km east of McNab Road **Recommendation** RIR	Good	71	70	Unknown	SSMP	1	4.2	114	$69,000.00
C2010 Queenston Road Queenston Road, 0.14km east of Martin Road **Recommendation** SPI	Good	73	72	Unknown	RF	1	3.7	120	$57,500.00
C2011 Queenston Road Queenston Road, 0.39km east of Townline (Grantham) Road **Recommendation**	Good	74	73	Unknown	RF	1	3.8	130	$0.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C2051 Concession 6 Road Concession 6 Road, 0.09km north of Line 1 Road **Recommendation**	Good	75	74	1970	RF	1	3.1	62	$0.00
C2053 Concession 6 Road Concession 6 Road, 0.23km south of Line 2 Road **Recommendation**	Very Good	90	89	2020	RB	1	3.5	44	$0.00
C2054 Concession 6 Road Concession 6 Road, 0.42km south of Line 3 Road **Recommendation**	Good	74	73	Unknown	RF	1	3.7	58	$34,500.00 SPI
C2117 Line 3 Road Line 3 Road, 0.06km east of Concession 6 Road **Recommendation**	Good	76	75	Unknown	RF	1	3.6	58	$34,500.00 SPI
C2124 Line 2 Road Line 2 Road, 0.6km east of Concession 2 Road **Recommendation** RIR	Good	72	71	1930	RF	1	3.0	48	$69,000.00
C2129 Line 2 Road Line 2 Road, 0.08km west of Concession 6 Road **Recommendation**	Good	70	70	1940	RF	1	3.1	41	$0.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C3 McNab Road	Fair	69	68	Unknown	SSMP	2	3.1, 3.1	106	$80,500.00
McNab Road, 028km south of Church Road									
Recommendation									
RIR								SPI	
C85305 East and West Line	Good	73	72	1960	RF	1	3.6	55	$57,500.00
East and West Line, 0.3km east of Townline (Grantham) Road									
Recommendation									
RIR								SPI	
C85310 East and West Line	Fair	68	67	1970	RF	1	8.0	146	$487,000.00
East and West Line, 0.01km west of Concession 2 Road									
Recommendation									
RSP RSB RIR PWP C/S								SPI	
MIS: Fill sinkhole									
PED1 West Pedestrian Bridge Over 4 Mile Creek	Good	74	73	1990	PT	1	31.0	73	$0.00
Niagara Stone Road, 0.15km west of Four Mile Creek Road									
Recommendation									
PED2 East Pedestrian Bridge Over 4 Mile Creek	Good	72	72	1990	PT	1	31.0	73	$0.00
Niagara Stone Road, 0.15km west of Four Mile Creek Road									
Recommendation									
								Total:	**$6,978,500.00**

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Priority Ranking Summary: **NOW**

ID Number and Structure Name / Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B11 Line 3 Road	Good	75	74	Unknown	RF	1	5.5	67	$92,500.00
Line 3 Road, 0.01km east of Concession 3 Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
Replace missing hazard marker									
B12 Line 2 Road	Good	74	73	Unknown	RF	1	6.1	82	$98,000.00
Line 2 Road, 0.01km east of Concession 3 Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
B13 Line 1 Road	Good	77	76	Unknown	RCS	1	12.2	172	$8,000.00
Line 1 Road, 0.09km west of Four Mile Creek Road									
Recommendation							**Implementation Ranking**		Medium
RIR									
B14 Line 1 Road	Good	77	76	Circa 1960	RF	1	6.3	113	$69,500.00
Line 1 Road, 0.01km east of Concession 2 Road									
Recommendation							**Implementation Ranking**		Medium
RIR									
MIS: Replace damaged hazard marker									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B19 Line 5 Road	Good	73	72	c.1950	RF	1	3.8	36	$98,000.00
Line 5 Road, 0.43km east of Concession 7 Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
B2016 McNab Road	Fair	69	68	Unknown	RF	1	4.9	58	$29,000.00
McNab Road, 0.62km north of Church Road									
Recommendation							**Implementation Ranking**		Medium
									SPI
B2021 Townline Road (Grantham Road)	Fair	68	66	Unknown	SSMP	1	4.6	29	$3,000.00
Townline (Grantham) Road, 0.25km north of Carlton Street									
Recommendation							**Implementation Ranking**		Low
MIS: Remove vegetation and fallen trees									
B2023 Line 3 Road	Good	71	70	Unknown	RF	1	4.6	40	$103,500.00
Line 3 Road, 0.01km east of Townline (Grantham) Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
B2027 Townline Road (Grantham Road)	Good	70	70	Unknown	RF	1	3.7	38	$50,000.00
Townline (Grantham) Road, 0.056km north of East and West Line									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
MIS: Remove vegetation and trees									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2034 Line 8 Road	Fair	67	65	Circa 1960	RF	1	4.9	44	$57,500.00
Line 8 Road, 0.01km east of Townline (Grantham) Road									
Recommendation							**Implementation Ranking**		Medium
									SPI
MIS: Fill void under northeast corner of footing									
B2037 Line 8 Road	Fair	68	66	c.1970	RF	1	4.4	75	$63,500.00
Line 8 Road, 0.54km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
MIS: Place fill at southeast wingwall									
B21 Line 5 Road	Poor	50	48	Unknown	OTHER	1	6.4	31	$345,000.00
Line 5 Road, 0.73km east of Concession 6 Road									
Recommendation							**Implementation Ranking**		Medium
	RSL								
B2101 Line 6 Road	Good	71	70	Circa 1960	RF	1	5.7	50	$92,000.00
Line 6 Road, 0.41km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
B2114 Line 4 Road	Good	73	72	Unknown	RF	1	4.3	35	$69,000.00
Line 4 Road, 0.48km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**		Medium
RIR									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2115 Line 4 Road	Good	71	70	Unknown	RF	1	3.7	36	$92,000.00
Line 4 Road, 0.13km west of Concession 6 Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
B23 Concession 3 Road	Poor	15	10	Unknown	OTHER	1	9.2	30	$402,500.00
Concession 3 Road, 0.30km south of Line 2 Road									
Recommendation							**Implementation Ranking**		High
RSL									
B4 South Shore Lane	Fair	64	63	Unknown	SOSG	1	8.0	30	$241,500.00
South Shore Lane, 0.01km west of Townline (Grantham) Road									
Recommendation							**Implementation Ranking**		Medium
RSP RSB RIR									
MIS: Fill voids behind abutments									
B9 Line 4 Road	Good	72	71	Unknown	RF	1	7.0	91	$92,000.00
Line 4 Road, 0.12km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**		Low
RIR									SPI
C17 Line 2 Road	Poor	58	54	Unknown	SSMP	2	3.7, 3.7	120	$920,000.00
Line 2 Road, 0.01km east of Townline (Grantham) Road									
Recommendation							**Implementation Ranking**		Medium
RSL									
MIS: Monitor structure & roadway									

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C18 Line 1 Road (Record 1 of 2, NOW) Line 1 Road, 0.01km east of Townline (Grantham) Road	Poor	60	59	Unknown	SSMP	2	3.7, 3.7	141	$15,000.00
Recommendation RIR							**Implementation Ranking**	Medium	
C19 Nassau Road Culvert Nassau Road, 0.1km west of William Street	Very Good	86	85	2012	RB	1	3.1	60	$2,000.00
Recommendation RIR							**Implementation Ranking**	Low	
C2006 Church Road Church Road, 0.07km east of McNab Road	Good	71	70	Unknown	SSMP	1	4.2	114	$69,000.00
Recommendation RIR							**Implementation Ranking**	Medium	
C2054 Concession 6 Road Concession 6 Road, 0.42km south of Line 3 Road	Good	74	73	Unknown	RF	1	3.7	58	$34,500.00
Recommendation							**Implementation Ranking**	Low SPI	
C2124 Line 2 Road Line 2 Road, 0.6km east of Concession 2 Road	Good	72	71	1930	RF	1	3.0	48	$69,000.00
Recommendation RIR							**Implementation Ranking**	Medium	

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C85305 East and West Line	Good	73	72	1960	RF	1	3.6	55	$57,500.00
East and West Line, 0.3km east of Townline (Grantham) Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI

Total: **$3,173,500.00**

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Priority Ranking Summary: **1-5 Years**

ID Number and Structure Name / Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B20 Line 5 Road	Good	74	73	Unknown	RF	1	3.8	52	$29,000.00
Line 5 Road, 0.23km east of Concession 6 Road									
Recommendation							**Implementation Ranking**	Low	
								SPI	
B2033 Townline Road (Grantham Road)	Fair	64	63	Unknown	SSMP	1	4.5	30	$57,500.00
Townline (Grantham) Road, 0.3km north of Carlton Street									
Recommendation							**Implementation Ranking**	Medium	
MIS: Repair/replace headwalls and wingwalls									
B2038 Line 8 Road	Good	72	70	Unknown	RF	1	4.4	75	$103,500.00
Line 8 Road, 0.22km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**	Medium	
RIR								SPI	
B2085 Line 9 Road	Fair	68	67	Circa 1960	RF	1	3.7	36	$34,500.00
Line 9 Road, 0.09km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**	Low	
								SPI	
B2091 Line 7 Road	Good	75	74	Unknown	RF	1	5.6	105	$103,500.00
Line 7 Road, 0.43km west of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**	Low	
RIR								SPI	

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2099 Line 6 Road	Fair	70	69	Circa 1960	RF	1	4.3	93	$34,500.00
Line 6 Road, 0.81km east of 100 - Four Mile Creek Road									
Recommendation							**Implementation Ranking**		Medium
									SPI
B2102 Line 6 Road	Good	72	71	Unknown	RF	1	4.1	45	$92,000.00
Line 6 Road, 0.30km east of Concession 6 Road									
Recommendation							**Implementation Ranking**		Medium
RIR									SPI
B2113 Line 4 Road	Poor	58	56	Unknown	RF	1	4.9	59	$575,000.00
Line 4 Road, 0.01km west of Concession 3 Road									
Recommendation							**Implementation Ranking**		Medium
RSL									
B22 Line 5 Road	Good	71	70	Unknown	RF	1	7.0	83	$161,000.00
Line 5 Road, 0.78km east of Concession 5 Road									
Recommendation							**Implementation Ranking**		Medium
PWP									SPI
C18 Line 1 Road (Record 2 of 2, 1-5 Years)	Poor	60	59	Unknown	SSMP	2	3.7, 3.7	141	$920,000.00
Line 1 Road, 0.01km east of Townline (Grantham) Road									
Recommendation							**Implementation Ranking**		Medium
RSL									
C2010 Queenston Road	Good	73	72	Unknown	RF	1	3.7	120	$57,500.00
Queenston Road, 0.14km east of Martin Road									
Recommendation							**Implementation Ranking**		Medium
									SPI

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C2117 Line 3 Road	Good	76	75	Unknown	RF	1	3.6	58	$34,500.00
Line 3 Road, 0.06km east of Concession 6 Road									
Recommendation							**Implementation Ranking**		Low
									SPI
C3 McNab Road	Fair	69	68	Unknown	SSMP	2	3.1, 3.1	106	$80,500.00
McNab Road, 028km south of Church Road									
Recommendation							**Implementation Ranking**		Low
RIR									SPI
C85310 East and West Line	Fair	68	67	1970	RF	1	8.0	146	$487,000.00
East and West Line, 0.01km west of Concession 2 Road									
Recommendation							**Implementation Ranking**		Medium
RSP RSB RIR PWP C/S									SPI
MIS: Fill sinkhole									
								Total:	**$2,770,000.00**

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Priority Ranking Summary: **6-10 Years**

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2093 Line 7 Road	Fair	65	64	Unknown	RF	1	4.3	39	$460,000.00
Line 7 Road, 0.78km east of 100 - Four Mile Creek Road									
Recommendation									
	RSL								
B2106 Line 5 Road	Fair	64	63	Unknown	RF	1	4.6	58	$575,000.00
Line 5 Road, 0.01km west of Concession 3 Road									
Recommendation									
	RSL								
								Total:	**$1,035,000.00**

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Priority Ranking Summary: **Adequate**

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B15 Line 1 Road Line 1 Road, 0.19km west of Concession 2 Road **Recommendation**	Very Good	90	89	2019	RB	1	4.3	58	$0.00
B16 Queenston Street Queenston Street, 0.25km south of Niagara River Park **Recommendation**	Good	75	74	Unknown	SOSG	3	10.2, 10.2,10.2	264	$0.00
B2020 Townline Road (Grantham Road) Townline (Grantham) Road, 0.18km north of 83 Carlton Street **Recommendation**	Fair	66	65	Unknown	SSMP	1	5.5	36	$0.00
B2022 Townline Road (Grantham Road) Townline (Grantham) Road, 0.32km north of Carlton Street **Recommendation**	Fair	68	66	Unknown	SSMP	1	5.5	36	$0.00
B2052 Concession 6 Road Concession 6 Road, 0.16km south of Line 2 Road **Recommendation**	Good	73	72	Unknown	RF	1	3.1	16	$0.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
B2060 Warner Road Warner Road, 0.68km east of Concession 6 Road **Recommendation**	Fair	69	68	Unknown	RF	1	3.1	29	$0.00
B2067 Concession 3 Road Concession 3 Road, 0.50km south of Line 2 Road **Recommendation**	Very Good	45	90	2021	CSP	1	2.8	22	$0.00
B6 Concession 2 Road Concession 2 Road, 0.05km south of Line 1 Road **Recommendation**	Very Good	89	88	2016	RB	1	4.4	53	$0.00
B85205 East and West Line East and West Line, 1.35km east of Townline (Grantham) Road **Recommendation**	Good	75	74	Unknown	RB	1	3.0	38	$0.00
B85210 Four Mile Creek Bridge East and West Line, 0.20km east of Concession 6 Road **Recommendation**	Good	77	76	Unknown	RF	1	15.2	175	$0.00
C10 Line 3 Road Line 3 Road, 0.2km west of 100 - Four Mile Creek Road **Recommendation**	Good	75	74	Unknown	SSMP	1	8.0	136	$0.00

ID Number and Structure Name Location	General Overall Condition	Previous BCI	Current BCI	Year Constructed	Structure Type	Number of Spans	Span	Deck Area (m2)	Estimated Cost
C2011 Queenston Road Queenston Road, 0.39km east of Townline (Grantham) Road **Recommendation**	Good	74	73	Unknown	RF	1	3.8	130	$0.00
C2051 Concession 6 Road Concession 6 Road, 0.09km north of Line 1 Road **Recommendation**	Good	75	74	1970	RF	1	3.1	62	$0.00
C2053 Concession 6 Road Concession 6 Road, 0.23km south of Line 2 Road **Recommendation**	Very Good	90	89	2020	RB	1	3.5	44	$0.00
C2129 Line 2 Road Line 2 Road, 0.08km west of Concession 6 Road **Recommendation**	Good	70	70	1940	RF	1	3.1	41	$0.00
PED1 West Pedestrian Bridge Over 4 Mile Creek Niagara Stone Road, 0.15km west of Four Mile Creek Road **Recommendation**	Good	74	73	1990	PT	1	31.0	73	$0.00
PED2 East Pedestrian Bridge Over 4 Mile Creek Niagara Stone Road, 0.15km west of Four Mile Creek Road **Recommendation**	Good	72	72	1990	PT	1	31.0	73	$0.00
								Total:	**$0.00**

TOWN OF NIAGARA-ON-THE-LAKE

2023 MUNICIPAL BRIDGE APPRAISAL
REHABILITATION/REPLACEMENT NEEDS

INDEX PAGE FOR INSPECTION REPORTS

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	South Shore Lane	**ID Number**	B4
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	South Shore Lane, 0.01km west of Townline (Grantham) Road	**Span Lengths (m)**	8.0
Structure Type	SOSG	**Deck Area (m2)**	30
Yr Constructed	Unknown	**Load Posting**	16, 30, 44 tonnes
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway on the west approach is in fair to poor condition with areas of settlement, asphalt patching, medium to severe alligator cracking, and extensive deterioration. The surface treated roadway on the east approach is in poor condition with settlement, patched potholes, and extensive deterioration. The structural steel and steel cable handrails are generally in good condition with looseness of the steel cables. The timber posts at the northwest and northeast corners have failed. The exposed concrete deck wearing surface is generally in good condition. There are diagonal hairline cracks in the deck. It appears that the surface of the deck is sloping towards the southwest corner. The deck soffit is covered with stay-in-place steel formwork and is generally in fair to good condition with localized light to medium corrosion, especially at the exterior girders, and isolated localized holes in the formwork.

The structural steel girders are generally in fair to good condition. The paint coating system on the steel girders has failed, especially on the exterior girders. There is medium corrosion and 20% section loss of the top flange at the exterior girder at the southwest corner. The steel diaphragms are generally in fair to good condition with light to medium surface corrosion where the coating system has failed. The ends of the girders and the end steel diaphragms are encased in concrete. The shim plates under all four girders on both abutments have been removed and replaced with concrete. The concrete abutments are in fair condition with medium scaling throughout. There is a wide vertical crack on the north and south ends of the west abutment. It appears that the west abutment slopes towards the south end; however, it may have been constructed this way. There is a large void behind the west abutment at the southwest corner (approximately 2m long, 0.6m wide, and 0.5m-1.0m deep). The void extends under a portion of the concrete encased diaphragm. The concrete wingwalls are in fair condition with medium scaling throughout and light to medium concrete scour at the waterline.

There is undermining of the southwest wingwall and south end of the west abutment. Armour stone and rip-rap erosion protection has been placed at this location. The gabion basket retaining wall at the northwest corner is in poor condition with split meshing and severe loss of stone. There is light to medium erosion at the northeast and southeast corners.

Recommendation

We recommend that the following rehabilitation work be completed NOW: excavate behind the east and west abutments, fill the voids behind the abutments, construct new ballast walls, seal the cracks in the concrete deck, replace the damaged timber posts, and re-tension the cable guiderail. Alternatively, we recommend that the Town review replacing the bridge NOW to eliminate the width and load limit deficiencies.

General Overall Condition	Fair	**Priority Rating**	NOW	**Current BCI**	63
Estimated Total Cost	$241,500.00	**Implementation Ranking**	Medium	**Previous BCI**	64

Structure Name South Shore Lane **ID Number** B4

Recommended Rehabilitation

RSP - Rehabilitate Superstructure

RSB - Rehabilitate Substructure

RIR - Railing Improvement/Replacement

MIS - Miscellaneous - Other Work

Fill voids behind abutments

Engineering Cost

Engineering - RSP, RSB, RIR, MIS		$31,500.00
		$0.00
	Sub Total	$31,500.00

Construction Cost

Fill Voids Behind Abutments - MIS		$50,000.00
Replace Timber Posts and Re-Tension Cables - RIR		$10,000.00
Rehabilitate Structure - RSP, RSB		$150,000.00
		$0.00
		$0.00
	Sub Total	$210,000.00
	Total	**$241,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0748-0855

Measurements Span = 8m, Width = 3.8m, Height = 1.9m, Fill = 0m

Additional Notes Rehabilitation Notes: c.2022 - The shim plates under all four girders on both abutments have been removed and replaced with concrete.

The structure is a single-lane bridge which provides access to local residential homes.

Access Requirements

South Shore Lane
B4

Photograph No. 1: 0766: Roadway over the structure looking east.

Photograph No. 2: 0771: South elevation.

South Shore Lane
B4

Photograph No. 3: 0788: Underside of the structure and east abutment looking east.

Photograph No. 4: 0778: Area of severe corrosion on west exterior girder.

Structure Name	Concession 2 Road	**ID Number**	B6
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Concession 2 Road, 0.05km south of Line 1 Road	**Span Lengths (m)**	4.4
Structure Type	RB	**Deck Area (m2)**	53
Yr Constructed	2016	**Load Posting**	None
Yr Rehabilitated	N/A	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is in good condition with light settlement in the asphalt shoulder at all four corners. There are transverse cracks at the extents of the structure. There is steel beam guiderail over the structure, which is in good condition. There are isolated areas of light corrosion of the guiderail post base plate bolts over the structure. There are extruders at the southeast, southwest, and northwest corners. There is light vehicular damage to the southeast corner of the guiderail. There is a private entrance rounding at the northeast corner. There is riprap at all four corners of the structure, providing erosion protection.

The pre-cast concrete box culvert units are in very good condition. There is a light spall on the soffit of the western most pre-cast unit. The cast-in-place concrete headwalls and wingwalls are in very good condition. There is a utility on the east fascia. There is a fish channel through the structure. There is a Bell box at the northeast corner of the structure which is uncovered and exposed.

Recommendation

None.

General Overall Condition	Very Good	**Priority Rating**	Adequate	**Current BCI**	88
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	89

Structure Name	Concession 2 Road	**ID Number**	B6

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0199-0285
Measurements	Span = 4.4m, Fill = 0m
Additional Notes	
Access Requirements	

Concession 2 Road
B6

Photograph No. 1: 0227: Roadway over the structure looking north.

Photograph No. 2: 0248: East elevation.

Concession 2 Road
B6

Photograph No. 3: 0285: West elevation.

Photograph No. 4: 0258: Underside of the structure looking west.

Structure Name	Line 4 Road	**ID Number**	B9
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 4 Road, 0.12km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	7.0
Structure Type	RF	**Deck Area (m2)**	91
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The gravel roadway over the structure is in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The vegetated roadway embankments are generally in good condition with light erosion at all four corners. There is erosion at the southwest and southeast corners. The exposed portions of the concrete deck top are in good condition with light scaling.

The concrete deck soffit is generally in good condition. There are several light spalls toward the north end and several light to medium spalls at the south end. Many of the spalls have exposed corroded reinforcing steel. There are two areas of medium to severe delamination at the south end of the soffit (approximately 1.5m² poor). There are areas of light honeycombing throughout the bridge deck soffit, especially at the north and south ends, as well as at the interface between the abutment sidewalls and the bridge deck soffit. The northwest fascia, deck soffit, and abutment sidewall exhibit cracking, efflorescent staining, and stalactites. The watercourse is unobstructed with no evidence of scour.

Recommendation

We recommend placing riprap slope protection at the embankments at all four corners of the structure NOW to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	71
Estimated Total Cost	$92,000.00	**Implementation Ranking**	Low	**Previous BCI**	72

Structure Name Line 4 Road **ID Number** B9

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$12,000.00
		$0.00
	Sub Total	$12,000.00

Construction Cost

Riprap Slope Protection - SPI		$20,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$80,000.00
	Total	**$92,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0659-0718

Measurements Span = 7.0m, Length = 13m, Height = 2,2m, Fill = 0.2m

Additional Notes

Access Requirements

Line 4 Road
B9

Photograph No. 1: 0662: Roadway over the structure looking west.

Photograph No. 2: 0674: South elevation.

Line 4 Road
B9

Photograph No. 3: 0679: Underside of the structure looking north.

Photograph No. 4: 0678: Area of delamination, exposed corroded reinforcing steel and efflorescent staining at the south end.

Structure Name	Line 3 Road	**ID Number**	B11
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 3 Road, 0.01km east of Concession 3 Road	**Span Lengths (m)**	5.5
Structure Type	RF	**Deck Area (m2)**	67
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure and on the approaches is generally in good condition with light settlement at both ends of the structure. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The vegetated roadway embankments are generally in good condition, however, there is medium erosion at the northwest, northeast, and southwest corners of the structure.

The exposed portions of the concrete deck top are in good condition with light scaling. The concrete deck soffit is in good condition. There are isolated areas of medium delamination at both ends of the soffit (1.25m² poor). The concrete abutments are generally in good condition with localized areas of light honeycombing on both abutment sidewalls and isolated areas of medium to severe honeycombing above the waterline (approximately 0.2m², poor).

Recommendation

We recommend placing riprap or slope protection at the embankments at all four corners of the structure NOW to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	74
Estimated Total Cost	$92,500.00	**Implementation Ranking**	Medium	**Previous BCI**	75

Structure Name Line 3 Road **ID Number** B11

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Replace missing hazard marker

Engineering Cost

Engineering - RIR, SPI	$12,000.00
	$0.00
Sub Total	$12,000.00

Construction Cost

Place Riprap Erosion Protection - SPI	$20,000.00
Install Steel Beam Guiderail - RIR	$60,000.00
Replace Missing Hazard Marker - MIS	$500.00
	$0.00
	$0.00
Sub Total	$80,500.00
Total	**$92,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0726-0786

Measurements Span = 5.5m, Length = 12.2m, Height = 2.8m, Fill = 0.1m

Additional Notes

Access Requirements

Line 3 Road
B11

Photograph No. 1: 0741: Roadway over the structure looking west.

Photograph No. 2: 0744: South elevation.

Line 3 Road
B11

Photograph No. 3: 0782: North elevation.

Photograph No. 4: 0748: Underside of the structure looking north.

Structure Name	Line 2 Road	**ID Number**	B12
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 2 Road, 0.01km east of Concession 3 Road	**Span Lengths (m)**	6.1
Structure Type	RF	**Deck Area (m2)**	82
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated approach roads are generally in good condition with light settlement noted adjacent to the structure and medium deterioration along the edges of the roadway. The surface treated roadway over the structure is in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners of the structure. The vegetated roadway embankments are generally in good condition with light erosion adjacent to the structure. Erosion was noted at all four corners.

The exposed portions of the concrete deck top are in good condition with light scaling. The concrete deck soffit is generally in good condition with a narrow transverse crack at the centre of the soffit, areas of light honeycombing and areas of water staining at the ends. The concrete abutments are generally in good condition. There is a wide vertical crack through each abutment with evidence of leakage and efflorescent staining through the bottom of each of the cracks. The west footing is exposed by approximately 200mm. There are concrete blocks underneath the structure that do not appear to be blocking the watercourse. There is an armour stone retaining wall at the northeast and southwest corners of the structure, which is in fair condition with voids and light undermining.

Recommendation

We recommend placing riprap along the footings NOW to prevent further erosion. We recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	73
Estimated Total Cost	$98,000.00	**Implementation Ranking**	Medium	**Previous BCI**	74

Structure Name Line 2 Road **ID Number** B12

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$13,000.00
		$0.00
	Sub Total	$13,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$25,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$85,000.00
	Total	**$98,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0647-0717

Measurements Span = 6.1m, Length = 13.4m, Height = 3.2m , Fill= 0.1m

Additional Notes

Access Requirements

Line 2 Road
B12

Photograph No. 1: 0660: Roadway over the structure looking west.

Photograph No. 2: 0670: North elevation.

Line 2 Road
B12

Photograph No. 3: 0717: South elevation.

Photograph No. 4: 0680: Interior of the structure looking north.

Structure Name	Line 1 Road	**ID Number**	B13
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 1 Road, 0.09km west of Four Mile Creek Road	**Span Lengths (m)**	12.2
Structure Type	RCS	**Deck Area (m2)**	172
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	2012	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is generally in good condition with light settlement and longitudinal and transverse cracks, and light wearing of the asphalt surface in the eastbound lane. There is steel beam guiderail with channels and tapered ends over the structure, which is generally in good condition. There is vehicular damage to the southwest guiderail. The vegetated roadway and rock protection embankments are in good condition. There is light to medium erosion of the southwest side slope adjacent to the riprap slope protection. The concrete sidewalks are in good condition with isolated narrow transverse cracks in the north sidewalk. The deck drains are unobstructed and are in good condition. The parapet walls and pedestrian rails are in good condition. There is narrow vertical cracking in the parapet wall at 2m intervals.

The concrete deck soffit is in good condition. There is a narrow longitudinal crack through the center of the structure, running from abutment to abutment. The concrete overhangs of the bridge deck soffit are in good condition with isolated narrow transverse cracks with efflorescent staining on the south overhang. The concrete abutments and wingwalls are in good condition. There is a utility on the south side of the structure. There is a buildup of debris south of the structure.

Recommendation

We recommend repairing the guiderail at the southwest corner NOW.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	76
Estimated Total Cost	$8,000.00	**Implementation Ranking**	Medium	**Previous BCI**	77

Structure Name Line 1 Road **ID Number** B13

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

Repair Damaged Steel Beam Guiderail - RIR		$8,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$8,000.00
	Total	**$8,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0468-0577

Measurements Span = 12.2m, Length = 14m

Additional Notes

Access Requirements

Line 1 Road
B13

Photograph No. 1: 0470: Roadway over the structure looking south.

Photograph No. 2: 0571: North elevation.

Line 1 Road
B13

Photograph No. 3: 0534: Underside of the structure and west abutment.

Photograph No. 4: 0472: Damage to the steel beam guiderail at southwest corner.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 1 Road	**ID Number**	B14
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 1 Road, 0.01km east of Concession 2 Road	**Span Lengths (m)**	6.3
Structure Type	RF	**Deck Area (m2)**	113
Yr Constructed	Circa 1960	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is in fair to good condition with light to medium settlement on the west approach and narrow to wide cracks at both ends of the bridge (approximately 0.2m², poor). There are small isolated potholes along the north edge of the roadway. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners of the structure. The exposed portions of the bridge deck top are in good condition with areas of light scaling.

The concrete bridge deck soffit is generally in good condition with isolated narrow to wide cracking and light scaling. There is evidence of light leakage and staining onto the deck soffit at the north and south ends. The concrete abutments are generally in good condition with isolated narrow to wide vertical cracks and an area of light concrete segregation at the northeast corner. There is medium erosion at the southeast corner and severe erosion at the southwest corners. There is medium erosion at the northeast and northwest corners.

Recommendation

We recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure. We recommend replacing the damaged hazard marker at the southwest corner NOW.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	76
Estimated Total Cost	$69,500.00	**Implementation Ranking**	Medium	**Previous BCI**	77

Structure Name Line 1 Road **ID Number** B14

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

MIS - Miscellaneous - Other Work

Replace damaged hazard marker

Engineering Cost

Engineering - RIR		$9,000.00
		$0.00
	Sub Total	$9,000.00

Construction Cost

Install Steel Beam Guiderail - RIR		$60,000.00
Replace Damaged Hazard Marker - MIS		$500.00
		$0.00
		$0.00
		$0.00
	Sub Total	$60,500.00
	Total	**$69,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0578-0646

Measurements Span = 6.3m, Length = 18m, Height = 2.5m, Fill = 0.1m

Additional Notes There is posion ivy at this location.

Access Requirements

Line 1 Road
B14

Photograph No. 1: 0596: Roadway over the structure looking west.

Photograph No. 2: 0605: South elevation.

Line 1 Road
B14

Photograph No. 3: 0628: Underside of the structure looking north.

Photograph No. 4: 0582: Damaged hazard marker at southwest corner.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 1 Road	**ID Number**	B15
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 1 Road, 0.19km west of Concession 2 Road	**Span Lengths (m)**	4.3
Structure Type	RB	**Deck Area (m2)**	58
Yr Constructed	2019	**Load Posting**	None
Yr Rehabilitated	N/A	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure and on the approaches is in good condition. There is thrie-beam guiderail over the structure in good condition. There is steel beam guiderail with soft-stop end treatments at all four corners in good condition. The concrete curbs are in very good condition.

The precast concrete box culvert units are in very good condition. There is a light spall in the soffit at the north end of the structure. There are areas of parging on the abutment sidewalls and soffit, especially at the south end and northeast corner. The concrete wingwalls are in very good condition. There is a fish channel through the structure.

Recommendation

None.

General Overall Condition	Very Good	**Priority Rating**	Adequate	**Current BCI**	89
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	90

Structure Name	Line 1 Road	**ID Number**	B15

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0286-0366
Measurements	Span = 4.3m, Length = 13.4m , Height = 2.2m , Fill = 0m
Additional Notes	
Access Requirements	

Line 1 Road
B15

Photograph No. 1: 0297: Roadway over the structure looking west.

Photograph No. 2: 0314: South elevation.

Line 1 Road
B15

Photograph No. 3: 0366: North elevation.

Photograph No. 4: 0322: Interior of structure looking north.

Structure Name	Queenston Street	**ID Number**	B16
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	3
Location	Queenston Street, 0.25km south of Niagara River Park	**Span Lengths (m)**	10.2, 10.2,10.2
Structure Type	SOSG	**Deck Area (m2)**	264
Yr Constructed	Unknown	**Load Posting**	22, 36, 50 tonnes
Yr Rehabilitated	2014	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt roadway over the structure is in good condition. There is steel beam guiderail at all four corners of the structure, which is in good condition. There are several split timber posts and rotated blocks at the southeast corner. There is a loose connection block on the first post at the southeast corner. There are roundings at all four corners of the structure. The riprap covered embankments are generally in good condition. The concrete parapet walls and steel railings over the structure are in good condition. There are isolated narrow vertical cracks in the parapet walls at the railing post connections. The concrete sidewalk over the structure is in good condition. The galvanized steel bridge deck drains are in good condition.

The concrete bridge deck soffit and overhangs are generally in good condition with isolated areas of narrow cracking. The structural steel girders and structural steel piers are generally in good condition with isolated areas of light to medium surface corrosion where the coating system is beginning to fail. There is an area of medium to severe corrosion at the bottom flange of the west-most girder at the south abutment. There are also isolated areas of light to medium corrosion at the connections. The elastomeric bearings are in good condition. The concrete retaining walls at the piers are generally in good condition with light scaling. The concrete abutments and bearing seats are in good condition. There is a watermain on the east side of the structure. There is light to medium surface corrosion on several of the watermain hanger brackets.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	74
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	75

Structure Name	Queenston Street	**ID Number**	B16

Recommended Rehabilitation

Engineering Cost

	$0.00
	$0.00
Sub Total	$0.00

Construction Cost

	$0.00
	$0.00
	$0.00
	$0.00
	$0.00
Sub Total	$0.00
Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0787-0904
Measurements	Span = 10.2m + 10.2m + 10.2m (30.6m), Width = 8.6m
Additional Notes	The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR007W/GR007E). Rehabilitation Notes: 2014 - The structure was rehabilitated. Work included construction of new deck overhangs, sidewalk, parapet walls, deck drains, and cleaning and coating of the structural steel.

Access Requirements

Queenston Street
B16

Photograph No. 1: 0805: Roadway over the structure looking north.

Photograph No. 2: 0902: West elevation.

Queenston Street
B16

Photograph No. 3: 0875: Underside of the centre span looking span north.

Photograph No. 4: 0885: Severe corrosion on the south exterior girder.

Structure Name	Line 5 Road	**ID Number**	B19
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 5 Road, 0.43km east of Concession 7 Road	**Span Lengths (m)**	3.8
Structure Type	RF	**Deck Area (m2)**	36
Yr Constructed	c.1950	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The gravel roadway over the structure and on the approaches is in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The hazard markers at the northwest and southeast corners have been damaged. The vegetated roadway embankments and armour stone erosion protection are in good condition. The concrete curbs and headwalls are generally in good condition with localized transverse cracks, particularly near the ends of the deck and several light spalls throughout. There is a severe spall and collision damage at the northeast and southwest corners (approximately 0.5m², poor).

The bridge deck soffit is generally in good condition with a medium spall at the interface between the north fascia and the deck soffit. There is also a light spall with exposed corroded reinforcing steel at the northwest corner of the soffit. The concrete abutments are generally in good condition with light to medium scaling above the waterline. The concrete wingwalls are in good condition. The streambed is scoured within the structure, exposing the footings by approximately 0.3m to 0.7m. There is medium scour of the abutment footings.

Recommendation

We recommend placing riprap along the footings NOW to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	72
Estimated Total Cost	$98,000.00	**Implementation Ranking**	Medium	**Previous BCI**	73

Structure Name Line 5 Road **ID Number** B19

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$13,000.00
		$0.00
	Sub Total	$13,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$25,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$85,000.00
	Total	**$98,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0588-0640

Measurements Span = 3.8m, Length = 9.5m, Height = 2m, Fill = 0.1m

Additional Notes

Access Requirements

Line 5 Road
B19

Photograph No. 1: 0601: Roadway over the structure looking east.

Photograph No. 2: 0627: North elevation.

Line 5 Road
B19

Photograph No. 3: 0609: Interior of structure looking south.

Photograph No. 4: 0626: Severe vehicular damage to northeast corner of concrete curb.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 5 Road	**ID Number**	B20
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 5 Road, 0.23km east of Concession 6 Road	**Span Lengths (m)**	3.8
Structure Type	RF	**Deck Area (m2)**	52
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated approach roadways are generally in good condition with medium settlement at the extents of the structure. There are several patched potholes with light to medium settlement on the east and west approaches. The surface treated roadway over the structure is generally in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners of the structure. The vegetated roadway embankments are in good condition.

The structure has been widened by 6m to the south. The exposed portions of the bridge deck top are generally in good condition with light scaling. The concrete curbs and headwalls are in good condition. The original portion of the bridge deck soffit is generally in good condition with localized areas of light delamination and light to medium spalls with exposed corroded reinforcing steel (approximately 0.2m², poor). The widened portion of the bridge deck soffit is in good condition. The concrete abutments of the original portion of the structure are generally in good condition with light to medium scaling throughout. There are areas of light honeycombing and light scour along the footings of the original portions of the abutments. The widened portions of the concrete abutments are in good condition with areas of light honeycombing above the waterline. The abutment footings are exposed by approximately 0.5m throughout the structure. The concrete wingwalls are in good condition.

Recommendation

We recommend placing riprap along the footings in 1-5 Years to prevent further erosion.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	73
Estimated Total Cost	$29,000.00	**Implementation Ranking**	Low	**Previous BCI**	74

Structure Name Line 5 Road **ID Number** B20

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$4,000.00
		$0.00
	Sub Total	$4,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$25,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$25,000.00
	Total	**$29,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0479-0515

Measurements Span = 3.8m, Length = 13.2m (7.2m original, 6m south extension), Height = 1.9m , Fill = 0m

Additional Notes Rehabilitation Notes: Unknown - the structure was widened 6m to the south at some time in the past.

Access Requirements

Line 5 Road
B20

Photograph No. 1: 0487: Roadway over the structure looking east.

Photograph No. 2: 0494: South elevation.

Line 5 Road
B20

Photograph No. 3: 0504: Interior of the structure looking south.

Photograph No. 4: 0512: Spalling and delaminations with exposed corroded reinforcing steel in soffit.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 5 Road	**ID Number**	B21
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☐ Driveway ☑ Other	**Number of Spans**	1
Location	Line 5 Road, 0.73km east of Concession 6 Road	**Span Lengths (m)**	6.4
Structure Type	OTHER Timber Deck on Steel Girders	**Deck Area (m2)**	31
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at a private field entrance. There is no traffic protection provided over the structure or on the approaches. The timber deck is in good condition. The timber curb along the west edge of the structure has loosened.

The structural steel girders consist of rail sections and are generally in fair condition with light to medium corrosion throughout. There is a small isolated perforation along the second interior girder from the east at the south abutment. There is a light sag in the steel rail section girders. The south abutment is generally in poor condition with severe forward rotation (approximately 150-200mm at maximum). There are several narrow vertical and horizontal cracks with efflorescent staining on the south abutment. The north abutment is generally in good condition with light to medium scaling. The top of the abutments are severely scaled. The concrete wingwalls are in fair condition with light to medium concrete disintegration and scaling.

Recommendation

We recommend closing the structure (with barricades or by removal) and/or replacing the structure NOW. This report does not include a recommendation for traffic protection because the structure is located on a private field entrance.

General Overall Condition	Poor	**Priority Rating**	NOW	**Current BCI**	48
Estimated Total Cost	$345,000.00	**Implementation Ranking**	Medium	**Previous BCI**	50

Structure Name Line 5 Road **ID Number** B21

Recommended Rehabilitation

RSL - Replace Same Location

Engineering Cost

Engineering - RSL		$45,000.00
		$0.00
	Sub Total	$45,000.00

Construction Cost

Replace Structure - RSL		$300,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$300,000.00
	Total	**$345,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0641-0706

Measurements Span = 6.4m, Length = 4.8m , Height = 1.8m, Fill = 0m

Additional Notes Rehabilitation Notes: 2020 - Timber deck was replaced c.2020.

Access Requirements

Line 5 Road
B21

Photograph No. 1: 0653: Driveway over the structure looking south.

Photograph No. 2: 0689: West elevation.

Line 5 Road
B21

Photograph No. 3: 0663: Underside of the structure looking south.

Photograph No. 4: 0698: Outward rotation in south abutment.

Structure Name	Line 5 Road	**ID Number**	B22
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 5 Road, 0.78km east of Concession 5 Road	**Span Lengths (m)**	7.0
Structure Type	RF	**Deck Area (m2)**	83
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved approaches are in good condition. The surface treated roadway over the structure is generally in good condition with light to medium deterioration and cracking along the edges of the roadway. There are steel beam guiderails over the structure and on the approaches, which are in good condition. There is an area of vehicular damage at the west end of the south guiderail. Extruder end treatments have been provided at all four corners. A pedestrian rail has been installed over the north side of the structure; however, the rail does not span the full length of the structure. The vegetated roadway embankments are generally in good condition with light settlement adjacent to the structure. The concrete curbs and headwalls are in good condition. The structure has been widened by 1.5m to the north and to the south.

The concrete deck soffit of the original structure is generally in good condition with light honeycombing throughout and isolated areas of delaminations and exposed corroded reinforcing steel throughout, especially at the interface between the abutment sidewalls and bridge deck soffit. The soffit of the widened portions of the structure is in good condition. There is evidence of leakage at the construction joints between the original structure and the newer portions. The concrete abutments of the original structure are generally in good condition with areas of light scaling, light honeycombing, and isolated narrow vertical cracks with efflorescent staining. There are isolated areas of severe scour above the footing (approximately 0.2m², poor, at a 100mm -150mm depth). The abutments and wingwalls of the widenings are in good condition. The east footings are exposed by approximately 0.2m due to scour. There is a utility mounted to the west abutment through the structure.

Recommendation

We recommend scheduling for a Patch, Waterproof, and Pave (PWP) in 1-5 Years. We recommend placing riprap along the footings in 1-5 Years to prevent further erosion.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	70
Estimated Total Cost	$161,000.00	**Implementation Ranking**	Medium	**Previous BCI**	71

Structure Name Line 5 Road **ID Number** B22

Recommended Rehabilitation

PWP - Patch Waterproof and Pave

SPI - Scour Protection Improvement

Engineering Cost

Engineering - PWP, SPI		$21,000.00
		$0.00
	Sub Total	$21,000.00

Construction Cost

Patch, Waterproof, and Pave - PWP		$120,000.00
Place Riprap Erosion Protection - SPI		$20,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$140,000.00
	Total	**$161,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0516-0591

Measurements Span = 7m, Length = 1.7 (north ext), 9m (original), 1.7m (south ext) (12.4m total), Height = 2m, Fill = 0m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR061N/GR061S).

Access Requirements

Line 5 Road
B22

Photograph No. 1: 0532: Roadway over the structure looking east.

Photograph No. 2: 0539: North elevation.

Line 5 Road
B22

Photograph No. 3: 0578: Underside of the structure looking north.

Photograph No. 4: 0551: Evidence of leakage and staining at the construction joint (typical).

Structure Name	Concession 3 Road	**ID Number**	B23
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☐ Driveway ☑ Other	**Number of Spans**	1
Location	Concession 3 Road, 0.30km south of Line 2 Road	**Span Lengths (m)**	9.2
Structure Type	OTHER Timber Deck on Steel Girders	**Deck Area (m2)**	30
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure was closed with a concrete barrier some time since the previous inspection.

The structure is located at a private field entrance. A "Use at Own Risk" sign is posted at the entrance to the field. There is no traffic protection provided over the structure or on the approaches. There is a concrete barrier at the west end of the structure. The vegetated roadway embankments are generally in good condition with light to medium erosion at all four corners and in front of the abutments. The steel rail curbs are generally in good condition with light surface corrosion throughout. The steel rail curbs are not fastened to the deck. The timber plank deck is in poor condition with several punch-throughs and does not extend the full width of the structure. Some timber planks are severely rotted.

The structural steel girders are generally in good condition with light surface corrosion throughout. There are areas of deformation at the ends of several girders. Remnants of paint coatings are noted. The decked over portion of the superstructure is made from a flat-bed and timber that has been placed spanning between the abutments. The concrete abutments are generally in fair condition with severe spalling of the bearing seats with wide cracks and exposed reinforcing steel (approximately 4.0m², poor). A small dam is located upstream and there is a buildup of vegetation at the dam.

This report does not include a cost estimate for traffic protection or structural steel coating because the structure is located on a private field entrance.

Recommendation

We recommend removing and/or replacing the structure NOW.

General Overall Condition	Poor	**Priority Rating**	NOW	**Current BCI**	10
Estimated Total Cost	$402,500.00	**Implementation Ranking**	High	**Previous BCI**	15

Structure Name Concession 3 Road **ID Number** B23

Recommended Rehabilitation

RSL - Replace Same Location

Engineering Cost

Engineering - RSL		$52,500.00
		$0.00
	Sub Total	$52,500.00

Construction Cost

Replace Structure - RSL		$350,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$350,000.00
	Total	**$402,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0718-0725

Measurements Span = 9.2m, Width = 3m, Height = 2.9m, Fill = 0m

Additional Notes Rehabilitation Notes: 2021 - It appears that the structure may have been closed since the last inspection, however, the concrete block barrier, pylons, and bridge closed sign have been removed.

Access Requirements

Concession 3 Road
B23

Photograph No. 1: 0718: Driveway over the structure looking east.

Photograph No. 2: 0724: North elevation.

Concession 3 Road
B23

Photograph No. 3: 0725: South elevation.

Photograph No. 4: 0722: Concrete barrier at west end.

Structure Name	McNab Road	**ID Number**	B2016
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	McNab Road, 0.62km north of Church Road	**Span Lengths (m)**	4.9
Structure Type	RF	**Deck Area (m2)**	58
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	30-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition with light settlement at the extents of the structure. There are steel beam guiderails over the structure with extruders at all four corners. The vegetated roadway embankments are in good condition. The structure has been widened to the east at some time in the past. The west concrete curb and headwall are separated from the deck by a wide horizontal crack, with cracks extending into the northwest and southwest wingwalls. The east concrete curb and headwall are in good condition with light honeycombing.

The original concrete deck soffit is in good condition with narrow cracking and efflorescent staining at the west end. The soffit of the widened portion of the structure is in good condition. There is evidence of leakage at the construction joint between the original and widened portions of the soffit. The abutments of the original portion of the structure are in fair to good condition. There are narrow horizontal cracks with efflorescent staining on the north abutment sidewall. There is medium to severe scour on the north abutment sidewall at and below the waterline.

The previous inspection noted the north footing is exposed by approximately 400mm. The water level at the time of inspection did not show any exposed footings. The previous inspection noted there is an area of undermining at the centre of the north footing (approximately 1.2m long, 0.2m height, and 0.2m width). There is medium build up of sediment along the north abutment sidewalls. The abutment sidewalls of the widened portions of the structure are in good condition. There is narrow vertical cracking and efflorescent staining at the construction joints between the original and widened portions of the wingwalls. There is a buildup of silt along the south abutment sidewall. The concrete wingwalls are in good condition with an area of medium scaling on the northwest wingwall.

Recommendation

We recommend placing riprap along both abutment walls NOW to prevent further erosion and undermining.

General Overall Condition	Fair	**Priority Rating**	NOW	**Current BCI**	68
Estimated Total Cost	$29,000.00	**Implementation Ranking**	Medium	**Previous BCI**	69

Structure Name McNab Road **ID Number** B2016

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$4,000.00
		$0.00
	Sub Total	$4,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$25,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$25,000.00
	Total	**$29,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0001-0103

Measurements Span = 4.9m, Length = 6.4m (Original) + 4.5m (east extension), Height = 1.2m , Fill = 0.4m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR064E/GR064W).

Rehabilitation Notes: Unknown - the structure was widened 4.5m to the east at some time in the past.

Access Requirements

McNab Road
B2016

Photograph No. 1: 0022: Roadway over the structure looking south.

Photograph No. 2: 0086: West elevation.

McNab Road
B2016

Photograph No. 3: 0076: North abutment sidewall looking northeast.

Photograph No. 4: 0103: Leakage, cracking and efflorescent staining along joint bewteen the original structure and the east extension, looking south..

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2020
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☑ Driveway ☐ Other	**Number of Spans**	1
Location	Townline (Grantham) Road, 0.18km north of 83 Carlton Street	**Span Lengths (m)**	5.5
Structure Type	SSMP	**Deck Area (m2)**	36
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at the entrance to a private driveway. The gravel driveway over the structure is in fair condition with rutting. The roadway is humped over the structure. There is no traffic protection provided over the structure or on the approaches. The vegetated roadway embankments are in good condition.

The steel multi-plate pipe arch culvert is in fair to good condition with areas of medium corrosion along the waterline and light surface corrosion, primarily at the southeast corner. There is efflorescent staining at several of the bolt locations.

The stacked stone and gabion retaining walls are in fair to good condition with loss of stone in the upper basket at the northwest corner and minor outward rotation at the southwest embankment. There are voids in the stacked stone retaining wall at the southeast corner.

Recommendation

None. This report does not include a recommendation for traffic protection because the structure is located on a private driveway entrance.

General Overall Condition	Fair	**Priority Rating**	Adequate	**Current BCI**	65
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	66

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2020

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0238-0296
Measurements	Span = 5.4m, Height = 3m, Fill = 0.3m
Additional Notes	
Access Requirements	

Townline Road (Grantham Road)
B2020

Photograph No. 1: 0242: Driveway over the structure looking east.

Photograph No. 2: 0255: North elevation.

Townline Road (Grantham Road)
B2020

Photograph No. 3: 0267: Underside of the structure looking north.

Photograph No. 4: 0277: Area of medium corrosion at the waterline (typical).

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2021
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☑ Driveway ☐ Other	**Number of Spans**	1
Location	Townline (Grantham) Road, 0.25km north of Carlton Street	**Span Lengths (m)**	4.6
Structure Type	SSMP	**Deck Area (m2)**	29
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at the entrance to a private driveway. The gravel driveway is in good condition; however, there is light erosion along the south side and light rutting. There is no traffic protection provided over the structure or on the approaches.

The steel multi-plate pipe arch culvert is generally in good condition with medium surface corrosion near the crown at isolated locations throughout. There is a light deformation in the steel structure at the southeast corner. There is silt build-up along the edges of the waterline, primarily at the southeast and northwest corners.

The stacked stone and gabion retaining walls are generally in good condition with minor shifting and light bulging. There is a buildup of vegetation and fallen trees at the south end of the culvert.

Recommendation

We recommend removing the buildup of vegetation and fallen trees at the south end of the structure NOW. This report does not include a recommendation for traffic protection because the structure is located on a private driveway entrance.

General Overall Condition	Fair	**Priority Rating**	NOW	**Current BCI**	66
Estimated Total Cost	$3,000.00	**Implementation Ranking**	Low	**Previous BCI**	68

Structure Name Townline Road (Grantham Road) **ID Number** B2021

Recommended Rehabilitation

MIS - Miscellaneous - Other Work

Remove vegetation and fallen trees

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

Remove Vegetation and Fallen Trees - MIS		$3,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$3,000.00
	Total	**$3,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0297-0347

Measurements Span = 5.4m, Height = 3m, Fill = 0.3m

Additional Notes

Access Requirements

Townline Road (Grantham Road)
B2021

Photograph No. 1: 0306: Driveway over the structure looking west.

Photograph No. 2: 0345: South elevation

Townline Road (Grantham Road)
B2021

Photograph No. 3: 0330: Underside of the structure looking north.

Photograph No. 4: 0315: Vegetation and debris at north end of structure, looking south.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2022
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☑ Driveway ☐ Other	**Number of Spans**	1
Location	Townline (Grantham) Road, 0.32km north of Carlton Street	**Span Lengths (m)**	5.5
Structure Type	SSMP	**Deck Area (m2)**	36
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at the entrance to a private driveway. The gravel driveway over the structure is in fair condition with light rutting and severe potholes on the approaches. There is no traffic protection provided over the structure or on the approaches.

The steel multi-plate pipe arch culvert is in fair to good condition with light to medium corrosion at the waterline. There is a perforation/damage above the waterline and rust staining at the northwest corner of the structure which may have occurred during installation. There is sediment buildup along the east side of the cell.

The gabion basket retaining walls are in fair to good condition with some shifting, rotation, and light to medium bulging. There is a small void between the SSMP sidewall and gabion baskets at the southwest corner. There is light to medium erosion of the side slope at all four corners of the structure.

Recommendation

None. This report does not include a recommendation for traffic protection because the structure is located on a private driveway entrance.

General Overall Condition	Fair	**Priority Rating**	Adequate	**Current BCI**	66
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	68

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2022

Recommended Rehabilitation

Engineering Cost

	$0.00
	$0.00
Sub Total	$0.00

Construction Cost

	$0.00
	$0.00
	$0.00
	$0.00
	$0.00
Sub Total	$0.00
Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0348-0411
Measurements	Span = 5.4m, Height = 3m, Fill = 0.3m
Additional Notes	
Access Requirements	

Townline Road (Grantham Road)
B2022

Photograph No. 1: 0355: Driveway over the structure looking east.

Photograph No. 2: 0397: North elevation.

Townline Road (Grantham Road)
B2022

Photograph No. 3: 0366: South elevation.

Photograph No. 4: 0376: Underside of the structure looking north.

Structure Name	Line 3 Road	**ID Number**	B2023
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 3 Road, 0.01km east of Townline (Grantham) Road	**Span Lengths (m)**	4.6
Structure Type	RF	**Deck Area (m2)**	40
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The gravel roadway approaches are in fair to good condition. The gravel roadway over the structure is generally in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The concrete curbs and headwalls are generally in good condition with localized spalls in the northeast and southwest corners.

The concrete deck soffit is generally in good condition with localized areas of light scaling and stained narrow transverse cracks with efflorescent staining. There is a medium delamination in the soffit approximately 3m from the north end (0.2m² poor). The concrete abutments are generally in good condition with isolated narrow to very wide vertical cracks. There is severe scour and a wide crack on the abutment footings. A vertical crack approximately +/-10mm wide extends though the full depth of the east abutment sidewall and into the footing. The footings are exposed with medium scour, approximately 600mm in depth, most notably at the south end.

The concrete invert slab below the structure is fair condition with medium to severe scaling throughout and localized narrow to medium cracking. The concrete invert slab extends 2m past the north and south ends of the structure. There is an area of localized light to medium undermining, approximately 150mm in depth at the north end of the structure. The concrete wingwalls are generally in good condition with a crack on top of the northeast wingwall and disintegration of the top of the southeast wingwall (0.1m², poor).

Recommendation

We recommend placing riprap along the footings NOW to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	70
Estimated Total Cost	$103,500.00	**Implementation Ranking**	Medium	**Previous BCI**	71

Structure Name Line 3 Road **ID Number** B2023

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI, RIR		$13,500.00
		$0.00
	Sub Total	$13,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$90,000.00
	Total	**$103,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0412-0469

Measurements Span = 4.6m, Length = 8.7m, Height = 2.5m , Fill = 0m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR067N/GR067S).

Access Requirements

Line 3 Road
B2023

Photograph No. 1: 0421: Roadway over the structure looking east.

Photograph No. 2: 0463: North elevation.

Line 3 Road
B2023

Photograph No. 3: 0436: Underside of the structure looking north.

Photograph No. 4: 0441: Wide crack and exposed footings in east abutment.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2027
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Townline (Grantham) Road, 0.056km north of East and West Line	**Span Lengths (m)**	3.7
Structure Type	RF	**Deck Area (m2)**	38
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure and on the approaches is in fair condition. There is medium to severe settlement at all four corners of the structure. There are isolated medium potholes along the east and west approach shoulders. The steel beam guiderails over the structure is generally in good condition with extruder end treatments at all four corners. The northwest end treatment has been damaged and is no longer properly functioning. There are several guiderail posts over the east side of the structure with rotated or missing offset blocks. The exposed ends of the bridge deck top are in good condition with light scaling.

The concrete deck soffit is in good condition with water staining at the ends. The abutment sidewalls are generally in good condition with narrow to wide vertical cracks at the centre of the structure with efflorescent staining. The footings are exposed by approximately 0.75m throughout the structure. There is light to medium scour along the waterline. The gabion basket retaining walls at the northeast and southeast corners are in fair condition. The northeast gabion basket has rotated outwards and is bulging. The west side slopes are generally in fair condition with minor erosion at both corners. There is a utility along the west fascia of the structure.

Recommendation

We recommend replacing the damaged end treatment at the northwest corner NOW. We recommend placing riprap along the footings NOW to prevent further erosion. We recommend vegetation and tree removal NOW. We also recommend monitoring the northeast gabion baskets for further rotation.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	70
Estimated Total Cost	$50,000.00	**Implementation Ranking**	Medium	**Previous BCI**	70

Structure Name Townline Road (Grantham Road) **ID Number** B2027

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

MIS - Miscellaneous - Other Work

Remove vegetation and trees

Engineering Cost

Engineering - RIR, SPI		$7,000.00
		$0.00
	Sub Total	$7,000.00

Construction Cost

Replace Damaged End Treatment - RIR		$15,000.00
Place Riprap Erosion Protection - SPI		$25,000.00
Remove Vegetation and Trees - MIS		$3,000.00
		$0.00
		$0.00
	Sub Total	$43,000.00
	Total	**$50,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0663-0747

Measurements Span = 3.7m, Length = 10.3m, Height = 2.8m , Fill = 0m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR063E/GR063W).

Access Requirements

Townline Road (Grantham Road)
B2027

Photograph No. 1: 0672: Roadway over the structure looking south.

Photograph No. 2: 0738: East elevation.

Townline Road (Grantham Road)
B2027

Photograph No. 3: 0701: Underside of the structure looking east.

Photograph No. 4: 0746: Damaged end treatment at northwest corner.

Structure Name	Townline Road (Grantham Road)	**ID Number**	B2033
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☑ Driveway ☐ Other	**Number of Spans**	1
Location	Townline (Grantham) Road, 0.3km north of Carlton Street	**Span Lengths (m)**	4.5
Structure Type	SSMP	**Deck Area (m2)**	30
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at the entrance to a private driveway. The asphalt paved driveway is in fair to poor condition with extensive wide cracking, a pothole, and alligator cracking at the west approach. There is extensive deterioration of the asphalt along the edges of the driveway, most notably on the north side. There is no traffic protection provided over the structure or on the approaches. The steel rail beam headwalls are generally in fair condition with light surface corrosion and pitting. The north rail is shifting and rotating outwards. The south rail is shifting and rotating inwards.

The stone masonry retaining walls are in fair to poor condition with localized loss of mortar, missing stones, and shifting of stonework (especially on the south retaining wall). There are three small holes (100mm diameter) through the north edge of the driveway into the stone masonry headwall. There is a small hole (100mm diameter) through the south edge of the driveway into the stone masonry headwall. The steel multi-plate pipe arch culvert is generally in good condition with light to medium corrosion at the waterline. There is efflorescent staining at several of the bolt heads throughout the structure.

Recommendation

We recommend repairing/replacing the headwalls and wingwalls in 1-5 Years. This report does not include recommendations or a cost estimate for improvements to the roadway and railing system over the structure because it is located on a private driveway entrance.

General Overall Condition	Fair	**Priority Rating**	1-5 Years	**Current BCI**	63
Estimated Total Cost	$57,500.00	**Implementation Ranking**	Medium	**Previous BCI**	64

Structure Name Townline Road (Grantham Road) **ID Number** B2033

Recommended Rehabilitation

MIS - Miscellaneous - Other Work

Repair/replace headwalls and wingwalls

Engineering Cost

Engineering - MIS		$7,500.00
		$0.00
	Sub Total	$7,500.00

Construction Cost

Repair/Replace Headwalls and Wingwalls - MIS		$50,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$50,000.00
	Total	**$57,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0122-181

Measurements Span = 4.5m , Length = 6.7m , Fill = 0.2m

Additional Notes

Access Requirements

Townline Road (Grantham Road)
B2033

Photograph No. 1: 0131: Driveway over the structure looking west.

Photograph No. 2: 0171: South elevation.

Townline Road (Grantham Road)
B2033

Photograph No. 3: 0143: North elevation.

Photograph No. 4: 0155: Underside of the structure looking north.

Structure Name	Line 8 Road	**ID Number**	B2034
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☐ Driveway ☑ Other	**Number of Spans**	1
Location	Line 8 Road, 0.01km east of Townline (Grantham) Road	**Span Lengths (m)**	4.9
Structure Type	RF	**Deck Area (m2)**	44
Yr Constructed	Circa 1960	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The approach roadways are unimproved and are in poor condition with severe potholes and rutting. There is no traffic protection provided over the structure or on the approaches. High curbs provide guidance for traffic over the structure. The vegetated roadway embankments are generally in good condition; however, there is severe erosion at all four corners of the structure. The concrete curbs are in fair to good condition with narrow to wide horizontal cracks and light scaling. The south fascia is in fair condition with light scaling and isolated horizontal cracks with efflorescent staining. The north fascia is in poor condition with wide horizontal cracks, efflorescent staining, severe delamination and severe concrete disintegration, especially at the west end. The exposed concrete bridge deck top is in fair to good condition with localized medium scaling and delamination (approximately 3m²).

The concrete deck soffit is generally in good condition with localized light scaling and stained cracking in the northwest, northeast, and southeast corners (approximately 1m²). There are three isolated narrow transverse cracks in the soffit at centre span. There is evidence of leakage between the deck soffit and the abutments at both ends of the structure. The abutments are in fair condition with several wide vertical cracks that have spalled. These cracks extend into the east and west footings.

The wingwalls are generally in good condition with narrow cracking and small spalls. There is a medium to wide vertical crack at the base of the east footing extending into the northeast wingwall. The footings are exposed by approximately 1m due to extensive scouring and are generally in fair condition. There is a large area of undermining at the north end of the east abutment (3m long x 0.2m high, extending approximately 1m under the abutment).

Recommendation

We recommend placing unshrinkable fill in the void at north end of the east abutment NOW. We also recommend placing riprap along the footings and at all four corners of the structure NOW to prevent further erosion.

General Overall Condition	Fair	**Priority Rating**	NOW	**Current BCI**	65
Estimated Total Cost	$57,500.00	**Implementation Ranking**	Medium	**Previous BCI**	67

Structure Name Line 8 Road **ID Number** B2034

Recommended Rehabilitation

SPI - Scour Protection Improvement

MIS - Miscellaneous - Other Work

Fill void under northeast corner of footing

Engineering Cost

Engineering - SPI, MIS		$7,500.00
		$0.00
	Sub Total	$7,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$40,000.00
Fill Void Under Northeast Corner of Footing - MIS		$10,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$50,000.00
	Total	**$57,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0182-0299

Measurements Span = 4.9m, Length = 9m. Fill = 0m

Additional Notes

Access Requirements

Line 8 Road
B2034

Photograph No. 1: 0194: Roadway over the structure looking east.

Photograph No. 2: 0200: North elevation.

Line 8 Road
B2034

Photograph No. 3: 0270: Underside of the structure looking north.

Photograph No. 4: 0290: Undermining at northeast corner.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 8 Road	**ID Number**	B2037
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 8 Road, 0.54km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	4.4
Structure Type	RF	**Deck Area (m2)**	75
Yr Constructed	c.1970	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is generally in fair condition with light potholes over the structure and on the approaches. There is light settlement at the extents of the structure. There is steel beam guiderail over the north side of the structure that is generally in good condition; however the guiderail over the structure is in poor condition. Several of the timber posts have rotated and exhibit severe wood rot and have detached from the guiderail. There is an area of vehicular damage at the west end of the guiderail. There is an eccentric loader system at the northeast and northwest corners. The exposed portions of the concrete bridge deck top are generally in good condition with light scaling. There is an area of severe concrete disintegration at the northwest corner.

The concrete deck soffit is in fair to good condition. There is an area of severe delamination, cracking, rust staining, and evidence of leakage (approximately 0.2m², poor) at the centre-span of the soffit. There is a slight sag towards the north end of the bridge deck soffit; however, it may have been constructed this way. There is a spall with evidence of leakage in the deck soffit, which aligns with one of the steel beam guiderail posts located on the deck. The abutments are generally in good condition. The abutments exhibit localized honeycombing and narrow to wide vertical cracks with efflorescent staining and active leakage. There is a very wide vertical crack at the interface between the east abutment sidewall and the southeast wingwall. There is medium to severe scour on both abutment footings. The footings are exposed by approximately 600mm throughout the structure). At the southeast corner, the footing is exposed by approximately 1.0m and there is severe undermining at this location (approximately 600mm deep).

The southeast embankment behind the southeast wingwall has completely eroded away, leaving no fill behind the wingwall, and the waterway is visible below. This area of loss of fill corresponds with the undermining of the footing noted at the southeast corner. The concrete wingwalls at the southwest and southeast corners are in good condition with minor outward rotation. There is medium to severe erosion at the northeast corner of the structure. There is a utility on the north fascia of the structure.

Recommendation

We recommend placing fill behind the southeast wingwall and filling the void below the southeast wingwall NOW. We also recommend placing riprap along the east and west footings and in front of the southeast wingwall NOW to prevent further erosion. We recommend replacing the portion of guiderail and timber posts over the structure NOW.

General Overall Condition	Fair	**Priority Rating**	NOW	**Current BCI**	66
Estimated Total Cost	$63,500.00	**Implementation Ranking**	Medium	**Previous BCI**	68

Structure Name Line 8 Road **ID Number** B2037

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

MIS - Miscellaneous - Other Work

Place fill at southeast wingwall

Engineering Cost

Engineering - RIR, MIS, SPI		$8,500.00
		$0.00
	Sub Total	$8,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
Place Fill - MIS		$15,000.00
Replace Damaged Guiderail and Posts - RIR		$10,000.00
		$0.00
		$0.00
	Sub Total	$55,000.00
	Total	**$63,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0214-0332

Measurements Span = 4.4m, Length = 17m , Height = 2.6m , Fill = 0.1m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR076N1/GR076N2).

Access Requirements

Line 8 Road
B2037

Photograph No. 1: 0234: Roadway over the structure looking west.

Photograph No. 2: 0301: North elevation.

Line 8 Road
B2037

Photograph No. 3: 0250: Underside of the structure looking north.

Photograph No. 4: 0286: Severe erosion behind southeast wingwall.

Structure Name	Line 8 Road	**ID Number**	B2038
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 8 Road, 0.22km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	4.4
Structure Type	RF	**Deck Area (m2)**	75
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition. There is steel beam guiderails over the structure in fair to poor condition with eccentric loader systems at all four corners. The guiderail has separated from the timber posts at several locations. Several of the timber posts have rotated and exhibit medium to severe wood rot. There are trees at these locations, providing slope stability. The exposed portions of the concrete bridge deck at the south end are generally in fair condition with light scaling throughout. There is medium to severe concrete disintegration on the north end of the exposed deck top and light to medium scaling throughout.

The concrete deck soffit is in good condition. There is an area of narrow cracking, efflorescent staining and evidence of leakage at the north end of the soffit. There is evidence of water runoff in the soffit at both ends of the structure. The concrete abutments are generally in good condition. The abutment sidewalls exhibit isolated areas of light to medium honeycombing and narrow vertical cracks with efflorescent staining and active leakage.

There is a slight sag towards the north end of the bridge deck soffit; however, it may have been constructed this way. There is cracking with efflorescent staining and concrete deterioration at the north fascia and northwest corner of the structure. There is localized medium to severe scour and honeycombing on the abutment footings. Erosion of the streambed within the structure has resulted in the exposure of approximately 1.3m of the west footings and approximately 0.5m exposure of the east footings. There is light to medium erosion at all four corners of the structure.

Recommendation

We recommend placing riprap along the footings in 1-5 Years to prevent further erosion. We also recommend replacing the guiderail in 1-5 Years.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	70
Estimated Total Cost	$103,500.00	**Implementation Ranking**	Medium	**Previous BCI**	72

Structure Name Line 8 Road **ID Number** B2038

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$13,500.00
		$0.00
	Sub Total	$13,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
Replace Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$90,000.00
	Total	**$103,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0090-0213

Measurements Span = 4.4m, Length = 17m , Height = 2m, Fill = 0m

Additional Notes

Access Requirements

Line 8 Road
B2038

Photograph No. 1: 0124: Roadway over the structure looking west.

Photograph No. 2: 0141: South elevation.

Line 8 Road
B2038

Photograph No. 3: 0182: Underside of the structure looking north.

Photograph No. 4: 0211: Rotted and rotated timber posts (typical).

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Concession 6 Road	**ID Number**	B2052
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☑ Driveway ☐ Other	**Number of Spans**	1
Location	Concession 6 Road, 0.16km south of Line 2 Road	**Span Lengths (m)**	3.1
Structure Type	RF	**Deck Area (m2)**	16
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at the entrance to a private driveway. The gravel driveway is in fair condition with light settlement adjacent to the structure. There is no traffic protection provided over the structure or on the approaches. There is light erosion of the embankment at all four corners. The exposed concrete deck wearing surface is generally in good condition with light scaling.

The concrete deck soffit is in good condition with a narrow transverse crack at the centre of the soffit. The abutment sidewalls are in good condition with light honeycombing along the bottom of both abutments. The east footing is exposed approximately 100mm. There is light scour along the waterline. The stacked stone retaining walls are in fair condition with loss of mortar, missing stones, minor rotation outwards, and light bulging allowing erosion of backfill. There is a cast in place concrete wingwall at the northwest corner that is in fair condition and appears to be rotating slightly outwards; however, it may have been constructed this way.

Recommendation

None. This report does not include a recommendation for traffic protection because the structure is located on a private driveway entrance.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	72
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	73

Structure Name	Concession 6 Road	**ID Number**	B2052

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0424-0484
Measurements	Span = 3.1m, Width = 5.2m, Height = 1.7m, Fill = 0m
Additional Notes	
Access Requirements	

Concession 6 Road
B2052

Photograph No. 1: 0424: Driveway over the structure looking west.

Photograph No. 2: 0469: North elevation.

Concession 6 Road
B2052

Photograph No. 3: 0440: South elevation.

Photograph No. 4: 0444: Underside of the structure looking north.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Warner Road	**ID Number**	B2060
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Warner Road, 0.68km east of Concession 6 Road	**Span Lengths (m)**	3.1
Structure Type	RF	**Deck Area (m2)**	29
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located on an unmaintained section of a dead-end road. The gravel approach roadways are in fair to poor condition with settlement and loss of granular base. The gravel roadway over the structure is unmaintained and is in fair to poor condition. There is no traffic protection provided over the structure or on the approaches. The concrete curbs are in fair condition with light to medium scaling on the north curb. There is also an area of medium concrete disintegration at the centre of both curbs. The south fascia is in fair to good condition with light scaling. The north fascia is in fair condition with narrow to wide horizontal cracks and efflorescent staining.

The concrete deck soffit is generally in good condition with evidence of leakage, efflorescent staining, stalactites, and concrete segregation at the north end. The abutment sidewalls are in fair condition. There are areas of concrete segregation and evidence of leakage at the interface between the west abutment sidewall and bridge deck soffit. There is a severe spall at the southwest corner of the structure. There is erosion of the side slope at this location. The footings are exposed on the west side by approximately 0.15m. The bridge is currently not in use and there is a fence crossing the bridge on the east side of the structure.

Recommendation

We recommend the Town remove the structure from the database as it is under the jurisdiction of the City of Niagara Falls.

General Overall Condition	Fair	**Priority Rating**	Adequate	**Current BCI**	68
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	69

Structure Name	Warner Road	**ID Number**	B2060

Recommended Rehabilitation

Engineering Cost

	$0.00
	$0.00
Sub Total	$0.00

Construction Cost

	$0.00
	$0.00
	$0.00
	$0.00
	$0.00
Sub Total	$0.00
Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0856-0904
Measurements	Length = 8m, Span = 3m, Height = 1.7m, Fill = 0.1m
Additional Notes	This structure is included in The City of Niagara Falls inspection inventory as Structure ID S003B Warner Road (BRG_00003).

Access Requirements

Warner Road
B2060

Photograph No. 1: 0866: Roadway over the structure looking west.

Photograph No. 2: 0895: North elevation.

Warner Road
B2060

Photograph No. 3: 0894: Underside of structure looking south.

Photograph No. 4: 0898: Efflorescent staining, active leakage and stalactites at north fascia/curb.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Concession 3 Road	**ID Number**	B2067
Classification	☐ Bridge ☐ Structure ☑ Culvert ☑ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☑ Driveway ☐ Other	**Number of Spans**	1
Location	Concession 3 Road, 0.50km south of Line 2 Road	**Span Lengths (m)**	2.8
Structure Type	CSP	**Deck Area (m2)**	22
Yr Constructed	2021	**Load Posting**	None
Yr Rehabilitated	N/A	**Current AADT**	Unknown
Inspection Date	01-Sep-21	**Date AADT**	
Previous Inspection	21-May-19	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located at the entrance to 1599 Concession 3 Road. The gravel driveway over the structure is generally in good condition with isolated areas of settlement around the guiderail posts. The steel beam guiderail over the structure is in good condition with terminal ends at all four corners.

The corrugated steel pipe culvert is in very good condition. The precast concrete block retaining walls are in very good condition. The cast in place concrete fascias are in very good condition.

Recommendation

We recommend removing the structure from the inspection database as the span is less than 3m.

General Overall Condition	Very Good	**Priority Rating**	Adequate	**Current BCI**	90
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	45

Structure Name	Concession 3 Road	**ID Number**	B2067

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Darryl Bakker, P.Eng., and Robert Ellis of ELLIS Engineering Inc.
Photos	0708-0735
Measurements	Span = 2.8m, Length = 7.9m, Fill = 0.5m
Additional Notes	
Access Requirements	

Concession 3 Road
B2067

Photograph No. 1: 0710: Driveway over the structure looking east.

Photograph No. 2: 0735: North elevation.

Concession 3 Road
B2067

Photograph No. 3: 0709: South elevation.

Photograph No. 4: 0726: Underside of structure looking north.

Structure Name	Line 9 Road	**ID Number**	B2085
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 9 Road, 0.09km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	3.7
Structure Type	RF	**Deck Area (m2)**	36
Yr Constructed	Circa 1960	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The structure is located on an unmaintained road. The gravel roadway over the structure is in fair to poor condition with medium to severe potholes. There is no traffic protection provided over the structure or on the approaches. The vegetated roadway embankments are in fair condition with extensive erosion in the northwest, northeast, and southeast corners, most notably at the northwest corner. The concrete curbs and headwalls are generally in good condition with a wide crack through the headwall slab in the southwest corner (approximately 0.1m², poor).

The concrete deck soffit is in generally good condition with medium pop-outs (approximately 0.1m², poor), exposed corroded reinforcing steel, and light honeycombing. The concrete abutments are generally in good condition. There is a wide vertical crack and an area of severe delamination at the southwest and northwest corners. There is a medium spall at the bottom of the west abutment sidewall at the waterline. There is a narrow vertical crack at the ends of the deck slab on the deck fascia. Erosion of the streambed within the structure has resulted in the exposure of the footings to a depth of approximately 1m. The footing is undermined at the southwest corner by approximately 0.3m. The concrete wingwalls are generally in good condition with isolated vertical hairline cracking. There is a storm drain outlet has been built at the southeast corner, extending from the wingwall.

Recommendation

We recommend placing riprap along the footings and at all four corners of the structure in 1-5 Years to prevent further erosion.

General Overall Condition	Fair	**Priority Rating**	1-5 Years	**Current BCI**	67
Estimated Total Cost	$34,500.00	**Implementation Ranking**	Low	**Previous BCI**	68

Structure Name Line 9 Road **ID Number** B2085

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$4,500.00
		$0.00
	Sub Total	$4,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$30,000.00
	Total	**$34,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0001-0089

Measurements Span = 3.7m

Additional Notes

Access Requirements

Line 9 Road
B2085

Photograph No. 1: 0017: Roadway over the structure looking east.

Photograph No. 2: 0087: South elevation.

Line 9 Road
B2085

Photograph No. 3: 0032: North elevation.

Photograph No. 4: 0073: Underside of the structure looking north.

Structure Name	Line 7 Road	**ID Number**	B2091
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 7 Road, 0.43km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	5.6
Structure Type	RF	**Deck Area (m2)**	105
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition with light settlement at the extents. There is no traffic protection provided over the structure or on the approaches. Delineators are provided on the south side of the roadway. The vegetated roadway embankments are in good condition. There are stone boulders at the northeast corner of the structure, providing sufficient slope protection. The exposed concrete deck top is in good condition with light scaling.

The concrete deck soffit exhibits extensive light to medium honeycombing with minor scaling of the north fascia. The concrete abutment sidewalls are generally in good condition with isolated narrow vertical cracks. There are two vertical cracks in the east abutment with active leakage and staining. There is isolated light honeycombing in both abutment sidewalls. There is severe scour on the east abutment footing. Erosion of the streambed within the structure has resulted in exposure of approximately 0.4m to 0.6m of the east footing. The watercourse is partially obstructed by approximately 1.0m of siltation at the west abutment wall. There is a utility attached to the north fascia.

Recommendation

We recommend placing riprap along both footings in 1-5 Years to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	74
Estimated Total Cost	$103,500.00	**Implementation Ranking**	Low	**Previous BCI**	75

Structure Name Line 7 Road **ID Number** B2091

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$13,500.00
		$0.00
	Sub Total	$13,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$90,000.00
	Total	**$103,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0333-0416

Measurements Span = 5.6m, Length = 19m, Height = 2m, Fill = 0m

Additional Notes

Access Requirements

Line 7 Road
B2091

Photograph No. 1: 0345: Roadway over the structure looking west.

Photograph No. 2: 0409: South elevation.

Line 7 Road
B2091

Photograph No. 3: 0368: Underside of the structure looking south

Photograph No. 4: 0407: East abutment sidewall and scour along east footing.

Structure Name	Line 7 Road	**ID Number**	B2093
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 7 Road, 0.78km east of 100 - Four Mile Creek Road	**Span Lengths (m)**	4.3
Structure Type	RF	**Deck Area (m2)**	39
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is generally in good condition with light to medium settlement at the extents of the structure. There are steel beam guiderails over the structure, which are in good condition. There are extruders at the northeast, southeast, and southwest corners with hazard markers, and a driveway rounding at the northwest corner. The hazard marker at the southwest corner is damaged. There is a CPP drainage pipe with a punch-through at the northwest corner of the structure, resulting in loss of fill at this location. The concrete headwalls are in fair condition with cracking, scaling, light spalling and delamination (approximately 1.5m², poor) on the north headwall.

The concrete deck soffit is in fair to good condition with localized minor honeycombing and narrow to wide cracking with efflorescent staining. There are also isolated areas of severe delamination and spalling at the north and south ends of the soffit (approximately 1.5m², poor on each end). The north fascia exhibits cracking, efflorescent staining, and delamination (approximately 2m², poor). There is also cracking, delamination, leakage, and efflorescent staining of the deck soffit and fascia at this location. The concrete abutments are generally in fair condition with localized vertical wide cracking and efflorescent staining. There is a bulge in the west abutment sidewall; however, it may have been constructed this way. Severe scour of the abutment footings has caused minor undermining in the northwest corner. Erosion within the structure has exposed the footings by a maximum of 0.5m.

Recommendation

We recommend scheduling the structure for replacement in 6-10 Years.

General Overall Condition	Fair	**Priority Rating**	6-10 Years	**Current BCI**	64
Estimated Total Cost	$460,000.00	**Implementation Ranking**		**Previous BCI**	65

Structure Name Line 7 Road **ID Number** B2093

Recommended Rehabilitation

RSL - Replace Same Location

Engineering Cost

Engineering - RSL		$60,000.00
		$0.00
	Sub Total	$60,000.00

Construction Cost

Replace Structure - RSL		$400,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$400,000.00
	Total	**$460,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0367-0432

Measurements Span = 4.3m, Length = 9m, Height = 2m, Fill = 0m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR071N/GR071S).

Access Requirements

Line 7 Road
B2093

Photograph No. 1: 0379: Roadway over the structure looking east.

Photograph No. 2: 0390: North elevation.

Line 7 Road
B2093

Photograph No. 3: 0421: Underside of the structure looking north.

Photograph No. 4: 0416: Wide vertical cracks and efflorescent staining in abutment sidewall.

Structure Name	Line 6 Road	**ID Number**	B2099
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 6 Road, 0.81km east of 100 - Four Mile Creek Road	**Span Lengths (m)**	4.3
Structure Type	RF	**Deck Area (m2)**	93
Yr Constructed	Circa 1960	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is generally in fair condition with light settlement at the extents of the structure and deterioration along the edges of the roadway. No traffic protection is provided over the structure or on the approaches. There are no hazard markers. The vegetated roadway embankments are generally in good condition with medium to severe erosion at all four corners of the structure. The bridge has been widened to the north and to the south at some time in the past. The exposed portions of the bridge deck top are in good condition with light scaling.

The concrete deck soffit of the original structure is generally in fair to good condition. There is an area of severe spalling with exposed corroded reinforcing steel, and medium to severe delaminations at both the north and south ends of the original soffit (approximately 1.0m² poor (north), and 1.5m² poor (south)). The concrete abutment sidewalls of the original structure are generally in good condition. There are wide vertical cracks and spalling between the original and widened portions of the structure with evidence of leakage and efflorescent staining at these locations. There are 300mm CSP culverts draining through the newer portions of the abutment sidewalls at all four corners in fait to poor condition with perforations, efflorescent staining and active leakage onto the abutment sidewalls. The concrete deck soffit and abutment sidewalls of the widened portions of the structure are generally in good condition. The footings are exposed by approximately 0.2m to 0.6m. The watercourse is unobstructed with minor erosion within the structure.

Recommendation

We recommend placing riprap along the footings in 1-5 Years to prevent further erosion.

General Overall Condition	Fair	**Priority Rating**	1-5 Years	**Current BCI**	69
Estimated Total Cost	$34,500.00	**Implementation Ranking**	Medium	**Previous BCI**	70

Structure Name Line 6 Road **ID Number** B2099

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$4,500.00
		$0.00
	Sub Total	$4,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$30,000.00
	Total	**$34,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0433-0528

Measurements Span = 4.3m, Length = 4.9m (north ext.), 7.7m (original), 5.6m (south ext.) (18.2m total), Height = 2.1m , Fill= 0m

Additional Notes Rehabilitation Notes: Unknown - The bridge was widened to the north and south.

Access Requirements

Line 6 Road
B2099

Photograph No. 1: 0433: Roadway over the structure looking west.

Photograph No. 2: 0523: South elevation.

Line 6 Road
B2099

Photograph No. 3: 0518: Underside of the structure looking north.

Photograph No. 4: 0487: Severe spall at south end of original portion of the soffit.

Structure Name	Line 6 Road	**ID Number**	B2101
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 6 Road, 0.41km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	5.7
Structure Type	RF	**Deck Area (m2)**	50
Yr Constructed	Circa 1960	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure and the asphalt approach roadways are in good condition with approximately 50mm of settlement at the extents of the structure. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The vegetated roadway embankments are in generally good condition with light erosion at the northwest and northeast corners. The concrete curbs and headwalls are generally in good condition with light disintegration (approximately 0.1m², poor).

The concrete deck soffit is generally in good condition. There is an area of severe spalling, exposed corroded reinforcing steel, and light delamination and the north end of the structure (0.5m² poor). The concrete abutment sidewalls are generally in good condition with localized narrow to wide vertical cracks with efflorescent staining. There is active leakage through the crack in the west abutment sidewall. The concrete footings are severely scoured, the west footing is exposed by approximately 0.6m, and the east footing is exposed by approximately 1m. The concrete wingwalls are in good condition.

Recommendation

We recommend placing riprap along the footings NOW to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	70
Estimated Total Cost	$92,000.00	**Implementation Ranking**	Medium	**Previous BCI**	71

Structure Name Line 6 Road **ID Number** B2101

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$12,000.00
		$0.00
	Sub Total	$12,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$20,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$80,000.00
	Total	**$92,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0529-0587

Measurements Span = 5.7m, Length = 8.8m, Height = 2.7m , Fill = 0m

Additional Notes

Access Requirements

Line 6 Road
B2101

Photograph No. 1: 0530: Roadway over the structure looking west.

Photograph No. 2: 0538: South elevation.

Line 6 Road
B2101

Photograph No. 3: 0541: Underside of the structure looking north.

Photograph No. 4: 0550: Severe scour, wide crack wiith efflorescent staining and active leakage on west abutment.

Structure Name	Line 6 Road	**ID Number**	B2102
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 6 Road, 0.30km east of Concession 6 Road	**Span Lengths (m)**	4.1
Structure Type	RF	**Deck Area (m2)**	45
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition with asphalt paving on the approaches. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The vegetated roadway embankments are in good condition. The bridge was widened by approximately 1.5m to the north and to the south. The newer concrete curbs and headwalls are in good condition. The original concrete curbs and headwalls have been removed. The exposed portions of the concrete bridge deck top are in good condition.

The widened portions of the concrete deck soffit, abutments, and wingwalls are in good condition. The original portion of the concrete deck soffit is generally in good condition with medium to severe spalls, exposed corroded reinforcing steel, and light to medium delaminations, especially at the ends and centre of the original portion. The original concrete abutments are in good condition with light scaling above the waterline and narrow vertical cracks with evidence of leakage at the interface between the original and new portions of the abutment sidewalls. There is medium scour along the footings, which are exposed by approximately 0.3m.

Recommendation

We recommend placing riprap along the footings in 1-5 Years to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	71
Estimated Total Cost	$92,000.00	**Implementation Ranking**	Medium	**Previous BCI**	72

Structure Name Line 6 Road **ID Number** B2102

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$12,000.00
		$0.00
	Sub Total	$12,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$20,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$80,000.00
	Total	**$92,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0417-0478

Measurements Span = 4.1m, Length = 1.5m (north ext), 7.2m (original), 1.5m (south ext) (10.2m total), Fill= 0m

Additional Notes Rehabilitation Notes: Unknown - The structure was widened to the north and south.

Access Requirements

Line 6 Road
B2102

Photograph No. 1: 0425: Roadway over the structure looking east.

Photograph No. 2: 0430: North elevation.

Line 6 Road
B2102

Photograph No. 3: 0442: Interior of structure looking south.

Photograph No. 4: 0449: Spall with exposed corroded reinforcing steel at the centre-span of the soffit.

Structure Name	Line 5 Road	**ID Number**	B2106
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 5 Road, 0.01km west of Concession 3 Road	**Span Lengths (m)**	4.6
Structure Type	RF	**Deck Area (m2)**	58
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	16-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure and on the approaches is in good condition. There is no traffic protection provided over the structure and on the approaches. There are hazard markers at all four corners of the structure. There is vehicular damage to the southwest hazard marker. The vegetated roadway embankments and rock protection are in good condition. The concrete curbs and headwalls are in good condition.

The bridge has been widened to the north and to the south at some time in the past. The concrete deck soffit of the original structure is in fair to poor condition with areas of severe spalling, exposed corroded reinforcing steel, and severe delamination at the ends and at the centre of the original portion (approximately 4m², poor). There is evidence of leakage through the construction joints between the newer and older portions of the structure. There are also delaminated concrete patches on the original deck soffit. The concrete abutments of original structure are generally in good condition with evidence of leakage at the interface between the abutment sidewalls and bridge deck soffit. The concrete deck soffit of the widened portions of the structure is in good condition. Erosion of the streambed within the structure has exposed approximately 0.3m of the east abutment footing.

Recommendation

We recommend scheduling the structure for replacement in 6-10 Years.

General Overall Condition	Fair	**Priority Rating**	6-10 Years	**Current BCI**	63
Estimated Total Cost	$575,000.00	**Implementation Ranking**		**Previous BCI**	64

Structure Name Line 5 Road **ID Number** B2106

Recommended Rehabilitation

RSL - Replace Same Location

Engineering Cost

Engineering - RSL		$75,000.00
		$0.00
	Sub Total	$75,000.00

Construction Cost

Replace Structure - RSL		$500,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$500,000.00
	Total	**$575,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0707-0758

Measurements Span = 4.6m, Length = 1.5m (south ext), 7.9m (original), 1.5m (north ext) (10.9m total), Height = 2m , Fill = 0,2m

Additional Notes Rehabilitation Notes: Unknown - The structure was widened to the north and south.

Access Requirements

Line 5 Road
B2106

Photograph No. 1: 0708: Roadway over the structure looking east.

Photograph No. 2: 0754: North elevation.

Line 5 Road
B2106

Photograph No. 3: 0726: Underside of structure looking south.

Photograph No. 4: 0723: Area of severe spalling, delamination, and exposed reinforcing steel at the north end of the original soffit.

Structure Name	Line 4 Road	**ID Number**	B2113
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 4 Road, 0.01km west of Concession 3 Road	**Span Lengths (m)**	4.9
Structure Type	RF	**Deck Area (m2)**	59
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure and on the approaches is generally in good condition with light settlement at the extents of the structure. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners of the structure. The vegetated roadway embankments and rock protection are generally in good condition with light erosion at all four corners. The concrete curbs and headwalls are in good condition with light damage at the southwest corner. The bridge has been widened by 1.5m to the north and to the south. The deck was widened on the existing wingwalls.

The concrete deck soffit of the original structure is in fair to poor condition with severe spalling (approximately 3.0m², poor, to a 70mm depth) adjacent to the construction joint at the north end with exposed corroded reinforcing steel. There is severe to very severe delamination throughout the entire soffit of the original structure, particularly at the east portion of the original structure. Approximately 50% of the soffit is delaminated. There are also isolated medium spalls with exposed corroded reinforcing steel in the original concrete soffit. There is evidence of leakage and efflorescent staining at the construction joints between the original and new portions. The concrete deck soffit of the widened portions of the structure is in good condition.

The concrete abutments of the original structure are generally in good condition with localized medium scour along the east footing. The east footing is exposed by approximately 300mm at the centre of the structure. The watercourse is obstructed at the east side with debris, concrete, and siltation. A small dam is located upstream of the structure. There is a utility on the north side of the structure.

Recommendation

We recommend scheduling the structure for replacement in 1-5 Years.

General Overall Condition	Poor	**Priority Rating**	1-5 Years	**Current BCI**	56
Estimated Total Cost	$575,000.00	**Implementation Ranking**	Medium	**Previous BCI**	58

Structure Name Line 4 Road **ID Number** B2113

Recommended Rehabilitation

RSL - Replace Same Location

Engineering Cost

Engineering - RSL		$75,000.00
		$0.00
	Sub Total	$75,000.00

Construction Cost

Replace Structure - RSL		$500,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$500,000.00
	Total	**$575,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0592-0658

Measurements Span = 4.9m, Length = 12m, Height = 1.4m , Fill = 0.2m

Additional Notes Rehabilitation Notes: Unknown - The structure was widened to the north and south.

Access Requirements

Line 4 Road
B2113

Photograph No. 1: 0658: Roadway over the structure looking west.

Photograph No. 2: 0603: North elevation.

Line 4 Road
B2113

Photograph No. 3: 0636: Underside of the structure looking north.

Photograph No. 4: 0618: Severe spall in the origional deck soffit at the north construction joint.

Structure Name	Line 4 Road	**ID Number**	B2114
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 4 Road, 0.48km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	4.3
Structure Type	RF	**Deck Area (m2)**	35
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The gravel roadway over the structure is in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The northwest hazard marker is damaged and broke. The vegetated roadway embankments are in good condition with light erosion at the northeast and northwest corners. The concrete curbs and headwalls are in fair to good condition with isolated areas of light concrete disintegration.

The bridge deck soffit is in good condition with a medium spalls with exposed corroded reinforcing steel at the south end (approximately 0.5m², poor). There are several light spalls at the ends of the structure. The concrete abutments are in good condition. The footings are exposed by approximately 0.2m throughout the structure. The concrete wingwalls are in good condition.

Recommendation

We recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	72
Estimated Total Cost	$69,000.00	**Implementation Ranking**	Medium	**Previous BCI**	73

Structure Name Line 4 Road **ID Number** B2114

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

Engineering Cost

Engineering - RIR		$9,000.00
		$0.00
	Sub Total	$9,000.00

Construction Cost

Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$60,000.00
	Total	**$69,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0719-0758

Measurements Span = 4.3m, Length = 8.1m, Height = 2m, Fill = 0.2m

Additional Notes

Access Requirements

Line 4 Road
B2114

Photograph No. 1: 0722: Roadway over the structure looking east.

Photograph No. 2: 0748: North elevation.

Line 4 Road
B2114

Photograph No. 3: 0725: South elevation.

Photograph No. 4: 0742: Interior looking north.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 4 Road	**ID Number**	B2115
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 4 Road, 0.13km west of Concession 6 Road	**Span Lengths (m)**	3.7
Structure Type	RF	**Deck Area (m2)**	36
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The gravel roadway over the structure and on the approaches is in good condition. There is no traffic protection provided over the structure or on the approaches. There are hazard markers are at all four corners of the structure. The hazard marker at the southwest corner is missing. The hazard marker at the northwest has broken off. The vegetated roadway embankments are in good condition. The concrete curbs and headwalls are generally in good condition with localized transverse cracking and light to severe scaling, particularly at the ends of the deck. There are wide cracks through the fascia and bridge deck at the northeast and southeast corners. There is also a wide crack through the north fascia and bridge deck at mid-span.

The concrete deck soffit is generally in good condition with localized transverse and longitudinal cracks, delamination, and small spalls with exposed corroded reinforcing steel (approximately 0.5m², poor). The concrete abutment sidewalls are generally in good condition with narrow to wide vertical cracks with efflorescent staining. The footings are exposed by approximately 0.6m and there is medium scour on the footings. The concrete wingwalls are in good condition. The watercourse is unobstructed.

Recommendation

We recommend placing riprap along the footings NOW to prevent further erosion. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	70
Estimated Total Cost	$92,000.00	**Implementation Ranking**	Medium	**Previous BCI**	71

Structure Name Line 4 Road **ID Number** B2115

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$12,000.00
		$0.00
	Sub Total	$12,000.00

Construction Cost

Place Riprap Erosion Protection - SPI		$20,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$80,000.00
	Total	**$92,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0807-0869

Measurements Span = 3.7m, Length = 9.7m, Height = 2.1m , Fill = 0.3m

Additional Notes

Access Requirements

Line 4 Road
B2115

Photograph No. 1: 0811: Roadway over the structure looking west.

Photograph No. 2: 0862: South elevation.

Line 4 Road
B2115

Photograph No. 3: 0858: Underside of the structure looking north.

Photograph No. 4: 0839: East abutment sidewall and footing.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	East and West Line	**ID Number**	B85205
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	East and West Line, 1.35km east of Townline (Grantham) Road	**Span Lengths (m)**	3.0
Structure Type	RB	**Deck Area (m2)**	38
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved road over the structure is generally in good condition with longitudinal and transverse cracks. There is a wide longitudinal crack in the east bound lane at the west approach. The steel beam guiderail over the structure is in good condition with extruders at all four corners.

The concrete deck soffit is in good condition with evidence of minor leakage at the joints between the pre-cast cells. The concrete fascia is also in good condition with minor patching evident. The concrete abutment sidewalls are in good condition. There is rip-rap erosion protection at all four corners of the structure.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	74
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	75

Structure Name	East and West Line	**ID Number**	B85205

Recommended Rehabilitation

Engineering Cost

	$0.00
	$0.00
Sub Total	$0.00

Construction Cost

	$0.00
	$0.00
	$0.00
	$0.00
	$0.00
Sub Total	$0.00
Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0090-0182
Measurements	Span = 3.0, Length = 12.7m, Height = 1.8m, Fill = 0.45m
Additional Notes	The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR057N/GR057S).
Access Requirements	

East and West Line
B85205

Photograph No. 1: 0096: Roadway over the structure looking east.

Photograph No. 2: 0170: South elevation.

East and West Line
B85205

Photograph No. 3: 0140: North elevation.

Photograph No. 4: 0143: Underside of the structure looking south.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Four Mile Creek Bridge	**ID Number**	B85210
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	East and West Line, 0.20km east of Concession 6 Road	**Span Lengths (m)**	15.2
Structure Type	RF	**Deck Area (m2)**	175
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is generally in good condition with small potholes and narrow to wide longitudinal and transverse cracking. The steel beam guiderail over the structure is in good condition. There is an eccentric loader installed at the northeast corner, with extruders located at the remaining corners. There is medium erosion and possible undermining at the southeast corner at the edge of the bridge deck cantilever. The concrete parapet walls and railings are in good condition with isolated areas of hairline cracking and light alkali aggregate reaction.

The concrete deck soffit is in good condition with isolated areas of narrow cracking and light delamination on the original portions of the structure. The widened portions of the deck soffit and the deck overhangs are in good condition. The galvanized steel deck drains are in good condition. The concrete abutments and wingwalls are in good condition. There is evidence of leakage on the northwest and northeast wingwall. The vegetated roadway embankments are in good condition. There is a utility on the south fascia of the structure.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	76
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	77

Structure Name Four Mile Creek Bridge **ID Number** B85210

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0183-0266

Measurements Span = 15.2m, Width = 11.5m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR013N/GR013S).

Rehabilitation Notes: Unknown - This structure has been rehabilitated in the past; however, the exact period of rehabilitation is unknown.

Access Requirements

Four Mile Creek Bridge
B85210

Photograph No. 1: 0197: Roadway over the structure looking east.

Photograph No. 2: 0248: North elevation.

Four Mile Creek Bridge
B85210

Photograph No. 3: 0238: Underside of the structure and west abutment looking west.

Photograph No. 4: 0232: Medium erosion and possible underiming at southeast cantilever.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	McNab Road	**ID Number**	C3
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	2
Location	McNab Road, 028km south of Church Road	**Span Lengths (m)**	3.1, 3.1
Structure Type	SSMP	**Deck Area (m2)**	106
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	30-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition. There is no traffic protection provided over the structure or on the approaches. The vegetated roadway embankments are generally in good condition.

The steel multi-plate pipe arch culverts are generally in good condition with light to medium corrosion at the waterline. There are isolated areas of efflorescent staining on the walls and at the bolt locations inside both cells. The galvanized steel sheet wall retaining walls at both ends of the structure are generally in good condition with light rotation of the wall between the two cells at the west end of the structure. There is damage at the west end of the south cell, including several small holes. The north culvert exhibits reverse curvature of the obvert. There is a build-up of debris at the east and west ends of the south cell.

Recommendation

We recommend placing riprap along the upstream and downstream ends of the culverts in 1-5 Years to mitigate the erosion at these locations. We also recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Fair	**Priority Rating**	1-5 Years	**Current BCI**	68
Estimated Total Cost	$80,500.00	**Implementation Ranking**	Low	**Previous BCI**	69

Structure Name McNab Road **ID Number** C3

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI		$10,500.00
		$0.00
	Sub Total	$10,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$10,000.00
Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
	Sub Total	$70,000.00
	Total	**$80,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

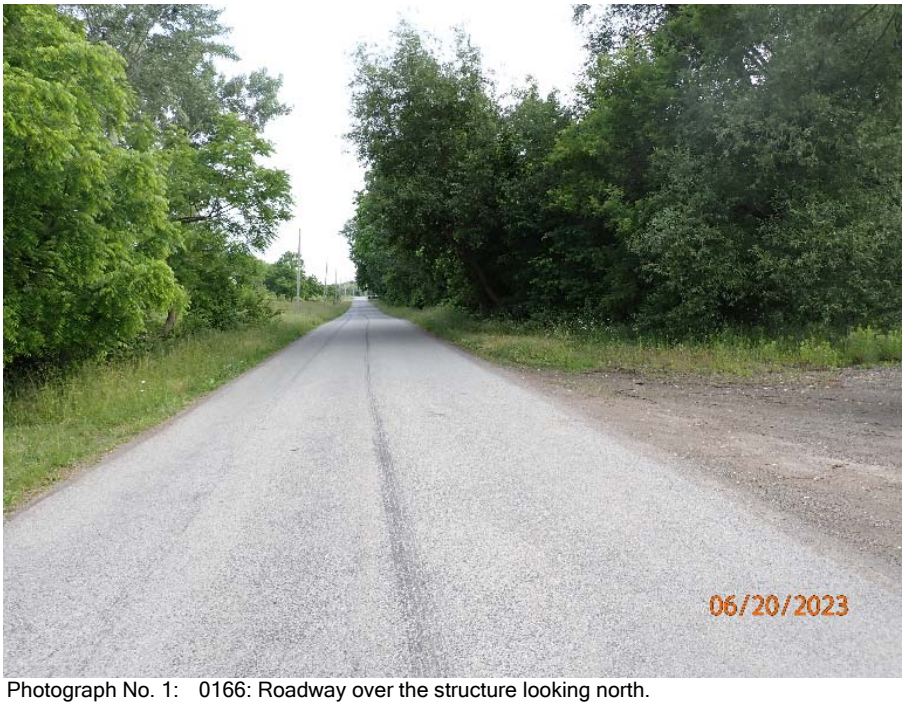
Photos 0164-0237

Measurements Span = 3.1m + 3.1m, Length = 17m, Height = 2.1m , Fill = 0.6m

Additional Notes

Access Requirements

McNab Road
C3



Photograph No. 1: 0166: Roadway over the structure looking north.

Photograph No. 2: 0188: West elevation.

McNab Road
C3

Photograph No. 3: 0209: East elevation.

Photograph No. 4: 0200: Underside of the south cell looking east.

Structure Name	Line 3 Road	**ID Number**	C10
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 3 Road, 0.2km west of 100 - Four Mile Creek Road	**Span Lengths (m)**	8.0
Structure Type	SSMP	**Deck Area (m2)**	136
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	21-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition. There is steel beam guiderail over the structure, which is generally in good condition. Some of the timber offset blocks exhibit minor splitting and have rotated. One of the guiderail posts is missing a timber offset block at the northeast corner. There are eccentric loader end treatments and hazard markers provided in all four corners. The vegetated roadway embankments and rock protection are in good condition.

The multi-plate pipe arch culvert is in good condition. There is efflorescent staining around several of the bolt heads throughout the structure. The concrete footings are generally in good condition with minor scaling at the top of the east footing. The steel sheet covers of the concrete footings exhibit medium corrosion. The watercourse is unobstructed with no evidence of scour. A dam is located approximately 100m upstream of the culvert.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	74
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	75

Structure Name Line 3 Road **ID Number** C10

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0621-0679

Measurements Span = 8.0m, Length = 17m, Height = 4m, Fill = 0.9m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR010N/GR010S).

Access Requirements

Line 3 Road
C10

Photograph No. 1: 0623: Roadway over the structure looking east

Photograph No. 2: 0631: North elevation.

Line 3 Road
C10

Photograph No. 3: 0646: Underside of the structure looking south.

Photograph No. 4: 0649: Medium corrosion along west wall.

Structure Name	Line 2 Road	**ID Number**	C17
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	2
Location	Line 2 Road, 0.01km east of Townline (Grantham) Road	**Span Lengths (m)**	3.7, 3.7
Structure Type	SSMP	**Deck Area (m2)**	120
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	30-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure and on the approaches is generally in good condition with light settlement along the edges of the roadway. There is steel beam guiderail over the structure, which is generally in good condition. There are terminal end treatments at all four corners. There is light vehicular damage at the northwest corner of the structure. The vegetated roadway embankments are in good condition. The stone and concrete fill on the embankments of the structure is generally in good condition with settlement on the north side.

The steel multi-plate pipe arch culverts are in poor condition. The exposed tops of the culverts have light corrosion. There is medium to severe corrosion and section loss along the waterline in both culverts, particularly at the ends. There are perforations along the waterline throughout the west cell. There is an area of severe perforations and 100% section loss at the southwest corner of the west cell. There are also localized perforations at the south end of the east cell. Bulging and corrosion are evident in both cells. There is a deformation in the crown at the mid-span of the west cell, which is approximately 150mm deep. There are isolated areas of efflorescent staining and rust staining at the bolt locations in both cells, several of the bolts are loose in the east cell along the crown. There are light deformations at the ends of both of the culverts. There is undermining at the north end of the west cell, approximately 200mm. There is a build-up of debris at the south end of the structure, limiting access and restricting water flow through the west cell.

Recommendation

We recommend replacing the structure NOW. We also recommend monitoring the structure and roadway every 6 months and after large storm events for signs of failure (settlements, loss of fill, deformations, etc.).

General Overall Condition	Poor	**Priority Rating**	NOW	**Current BCI**	54
Estimated Total Cost	$920,000.00	**Implementation Ranking**	Medium	**Previous BCI**	58

Structure Name Line 2 Road **ID Number** C17

Recommended Rehabilitation

MIS - Miscellaneous - Other Work

RSL - Replace Same Location Monitor structure & roadway

Engineering Cost

Engineering - RSL		$120,000.00
		$0.00
	Sub Total	$120,000.00

Construction Cost

Replace Structure - RSL		$800,000.00
Monitor Structure & Roadway - MIS		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$800,000.00
	Total	**$920,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0470-0580

Measurements Span = 3.7m + 3.7m, Length = 16.2m, Height = 2.1m , Fill = 0.7m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR018N/GR018S).

Access Requirements

Line 2 Road
C17

Photograph No. 1: 0470: Roadway over the structure looking west.

Photograph No. 2: 0538: South elevation.

Line 2 Road
C17

Photograph No. 3: 0499: Interior of the east cell looking south.

Photograph No. 4: 0545: Perforations in the north end of the west cell.

Structure Name	Line 1 Road (Record 1 of 2, NOW)	**ID Number**	C18
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	2
Location	Line 1 Road, 0.01km east of Townline (Grantham) Road	**Span Lengths (m)**	3.7, 3.7
Structure Type	SSMP	**Deck Area (m2)**	141
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	30-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is generally in good condition with light settlement over the structure. There is steel beam guiderail over the structure, which is in fair to poor condition with eccentric loader end treatments at all four corners. Several of the posts and offset blocks are split, rotated, detached, and beginning to rot at the east end of the north guiderail. The vegetated roadway embankments are in good condition. The rock and concrete fill on the embankments of the structure are generally in good condition.

The steel multi-plate pipe arch culverts are in fair to good condition. There is medium corrosion at the waterline throughout the length of the west cell. There are localized areas of severe corrosion and perforations along the waterline at both ends of the west cell. The east cell is approximately 50% silted up and it appears that the waterway does not flow through the east cell. The east cell was not accessible at the time of inspection due to vegetation and silt buildup. It was noted in a previous inspection that the east culvert exhibits hairline cracks of the steel multi-plates along the bolt holes at the top of the sharp radius at one location in the west wall of the east cell for approximately 3m; however, this area is now covered with silt. Both culverts have light deformations at each end. There are medium deformations at the south end of the west cell. The watercourse is unobstructed in the west cell.

There is a second record for this structure containing recommendations and rehabilitation costs for 1-5 Years.

Recommendation

We recommend replacing the steel beam guiderail timber posts NOW.

General Overall Condition	Poor	**Priority Rating**	NOW	**Current BCI**	59
Estimated Total Cost	$15,000.00	**Implementation Ranking**	Medium	**Previous BCI**	60

Structure Name Line 1 Road (Record 1 of 2, NOW) **ID Number** C18

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

Replace Timber Posts - RIR		$15,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$15,000.00
	Total	**$15,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0581-0662

Measurements Span = 3.7m + 3.7m, Length = 19.1m, Height = 2.1m, Fill = 1.1m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR019N/GR019S).

There is poison ivy growing at this location.

Access Requirements

Line 1 Road (Record 1 of 2, NOW)
C18

Photograph No. 1: 0597: Roadway over the structure looking east.

Photograph No. 2: 0648: North elevation.

Line 1 Road (Record 1 of 2, NOW)
C18

Photograph No. 3: 0653: Inerior of the west cell looking north.

Photograph No. 4: 0588: Split timber post (typical).

Structure Name	Line 1 Road (Record 2 of 2, 1-5 Years)	**ID Number**	C18
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	2
Location	Line 1 Road, 0.01km east of Townline (Grantham) Road	**Span Lengths (m)**	3.7, 3.7
Structure Type	SSMP	**Deck Area (m2)**	141
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	30-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is generally in good condition with light settlement over the structure. There is steel beam guiderail over the structure, which is in fair to poor condition with eccentric loader end treatments at all four corners. Several of the posts and offset blocks are split, rotated, detached, and beginning to rot at the east end of the north guiderail. The vegetated roadway embankments are in good condition. The rock and concrete fill on the embankments of the structure are generally in good condition.

The steel multi-plate pipe arch culverts are in fair to poor condition. There is medium corrosion at the waterline throughout the length of the west cell. There are areas of severe corrosion, perforations and section loss along the waterline at both ends of the west cell. The east cell is approximately 50% silted up and it appears that the waterway does not flow through the east cell. The east cell was not accessible at the time of inspection due to vegetation and silt buildup. It was noted in a previous inspection that the east culvert exhibits hairline cracks of the steel multi-plates along the bolt holes at the top of the sharp radius at one location in the west wall of the east cell for approximately 3m; however, this area is now covered with silt. Both culverts have light deformations at each end. There are medium deformations at the south end of the west cell. The watercourse is unobstructed in the west cell.

There is a second record for this structure containing recommendations and rehabilitation costs for NOW.

Recommendation

We recommend scheduling the structure for replacement in 1-5 Years.

General Overall Condition	Poor	**Priority Rating**	1-5 Years	**Current BCI**	59
Estimated Total Cost	$920,000.00	**Implementation Ranking**	Medium	**Previous BCI**	60

Structure Name Line 1 Road (Record 2 of 2, 1-5 Years) **ID Number** C18

Recommended Rehabilitation

RSL - Replace Same Location

Engineering Cost

Engineering - RSL		$120,000.00
		$0.00
	Sub Total	$120,000.00

Construction Cost

Replace Structure - RSL		$800,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$800,000.00
	Total	**$920,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0581-0662

Measurements Span = 3.7m + 3.7m, Length = 19.1m, Height = 2.1m, Fill = 1.1m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR019N/GR019S).

There is poison ivy at this location.

Access Requirements

Line 1 Road (Record 2 of 2, 1-5 Years)
C18

Photograph No. 1: 0597: Roadway over the structure looking east.

Photograph No. 2: 0648: North elevation.

Line 1 Road (Record 2 of 2, 1-5 Years)
C18

Photograph No. 3: 0653: Inerior of the west cell looking north.

Photograph No. 4: 0619: Severe corrosion and perforations at southeast corner in the west cell.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Nassau Road Culvert	**ID Number**	C19
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Nassau Road, 0.1km west of William Street	**Span Lengths (m)**	3.1
Structure Type	RB	**Deck Area (m2)**	60
Yr Constructed	2012	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	17-May-19	**Board Order/ Agreement**	☐
Next Inspection	2027	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is in good condition. There are sealed longitudinal and transverse cracks on the north and south approaches. The steel beam guiderail over the structure is generally in good condition with isolated areas of light damage. There are roundings at all four corners with no hazard markers or extruders present. The southeast rounding has been lightly damaged and is detached.

The pre-cast box culvert units are in very good condition with isolated light spalls at the joints. There are two concrete drains through the culvert at the north and south sides at centre-span. There appears to be staining on the sidewalls as a result of the drains. There is a watermain running through the culvert, located at centre-span. The concrete headwalls and wingwalls are in good condition. There is leakage with efflorescent staining at the construction joint between the headwall and the pre-cast end unit at both the east and west ends of the structure.

Recommendation

We recommend re-attaching the southeast leaving end treatment NOW.

General Overall Condition	Very Good	**Priority Rating**	NOW	**Current BCI**	85
Estimated Total Cost	$2,000.00	**Implementation Ranking**	Low	**Previous BCI**	86

Structure Name Nassau Road Culvert **ID Number** C19

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

Re-attach End Treatment - RIR		$2,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$2,000.00
	Total	**$2,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0001-0111

Measurements Span = 3.05m, Height = 2.75m, Length = 19.62m, Fill = 1m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR026N/GR026S).

Access Requirements

Nassau Road Culvert
C19

Photograph No. 1: 0012: Roadway over the structure looking south.

Photograph No. 2: 0039: East elevation.

Nassau Road Culvert
C19

Photograph No. 3: 0050: Underside of the structure looking west.

Photograph No. 4: 0020: Detached post at southeast corner.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Church Road	**ID Number**	C2006
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Church Road, 0.07km east of McNab Road	**Span Lengths (m)**	4.2
Structure Type	SSMP	**Deck Area (m2)**	114
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	20-Jun-23	**Date AADT**	
Previous Inspection	30-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition. There are hazard markers at all four corners of the structure. The vegetated roadway embankments are generally in good condition with medium erosion at the southwest and southeast corners.

The steel multi-plate pipe arch culvert is generally in good condition with light corrosion at the waterline. There is a localized deformation (approximately 300mm) in the east upper sidewall plates, approximately 7.5m from the north end of the culvert, extending 1.5m in length. There are isolated areas of efflorescent staining at the bolts throughout the structure. There is a concrete block retaining wall at the northeast corner in fair to good condition with medium loss of fill adjacent to the structure.

Recommendation

We recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	70
Estimated Total Cost	$69,000.00	**Implementation Ranking**	Medium	**Previous BCI**	71

Structure Name Church Road **ID Number** C2006

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

Engineering Cost

Engineering - RIR		$9,000.00
		$0.00
	Sub Total	$9,000.00

Construction Cost

Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$60,000.00
	Total	**$69,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0104-0163

Measurements Span = 4.4m, Length = 27m, Height = 2.5m, Fill = 0.6m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR073E/GR073W).

Access Requirements

Church Road
C2006

Photograph No. 1: 0111: Roadway over the structure looking east.

Photograph No. 2: 0120: North elevation.

Church Road
C2006

Photograph No. 3: 0150: South elevation.

Photograph No. 4: 0126: Underside of the structure looking south.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Queenston Road	**ID Number**	C2010
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Queenston Road, 0.14km east of Martin Road	**Span Lengths (m)**	3.7
Structure Type	RF	**Deck Area (m2)**	120
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	25-Aug-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is in good condition with isolated wide cracks at the edges of the pavement. The steel beam guiderail over the structure is in good condition with extruders at all four corners. There are isolated areas of medium settlement and cracking around the steel posts over the north side of the structure. The exposed portions of the deck top are in good condition with light scaling.

The concrete bridge deck soffit is in good condition. The concrete abutment sidewalls are generally in good condition. There are four narrow to wide vertical cracks with efflorescent staining, stalactites, rust staining, and evidence of leakage on both abutment sidewalls near the centre of the structure that extend onto the soffit. There are isolated narrow cracks with efflorescent staining in the abutment sidewalls at the north end of the structure. There is extensive scour along the creek waterline, exposing approximately 0.6m to 0.8m of the east and west footings. The scour is most severe in the southern portion of the culvert.

Recommendation

We recommend placing riprap along the footings in 1-5 Years to prevent further erosion.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	72
Estimated Total Cost	$57,500.00	**Implementation Ranking**	Medium	**Previous BCI**	73

Structure Name Queenston Road **ID Number** C2010

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$7,500.00
		$0.00
	Sub Total	$7,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$50,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$50,000.00
	Total	**$57,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0001-0121

Measurements Length = 32m , Span = 3.1m, Height = 2m , Fill = 3.5m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR040N/GR040S).

Access Requirements

Queenston Road
C2010

Photograph No. 1: 0014: Roadway over the structure looking east.

Photograph No. 2: 0112: North elevation.

Queenston Road
C2010

Photograph No. 3: 0055: Interior of structure looking north.

Photograph No. 4: 0090: Isolated narrow to wide cracking with efflorescent staining, rust staining, and evidence of leakage and along west abutment sidewall at centre span.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Queenston Road	**ID Number**	C2011
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Queenston Road, 0.39km east of Townline (Grantham) Road	**Span Lengths (m)**	3.8
Structure Type	RF	**Deck Area (m2)**	130
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	26-Jul-23	**Date AADT**	
Previous Inspection	23-May-19	**Board Order/ Agreement**	☐
Next Inspection	2027	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is in good condition. There are steel beam guiderails over the structure with an extruder at the southwest corner and driveway roundings at the northwest and northeast corners. The vegetated roadway embankments have been re-built since the last inspection and are in good condition. The exposed concrete deck is generally in good condition with light concrete deterioration.

The concrete culvert is in generally good condition with localized narrow vertical cracking, active leakage, and efflorescent staining at the concrete abutments. There is active leakage with efflorescent staining in the bridge deck soffit at the construction joint at centre-span, translating into the abutment sidewalls. The footings are exposed at the south end by approximately 0.3m.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	73
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	74

Structure Name	Queenston Road	**ID Number**	C2011

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0300-0366
Measurements	Span = 3.8m, Length = 34m
Additional Notes	The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR045N2/GR045N3).

Access Requirements

Queenston Road
C2011

Photograph No. 1: 0307: Roadway over the structure looking west.

Photograph No. 2: 0327: North elevation.

Queenston Road
C2011

Photograph No. 3: 0337: Underside of the structure looking south.

Photograph No. 4: 0356: Area of cracking, efflorescent staining, and active leakage in abutment sidewall.

Structure Name	Concession 6 Road	**ID Number**	C2051
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Concession 6 Road, 0.09km north of Line 1 Road	**Span Lengths (m)**	3.1
Structure Type	RF	**Deck Area (m2)**	62
Yr Constructed	1970	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	29-May-19	**Board Order/ Agreement**	☐
Next Inspection	2027	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition with light settlement at the extents of the structure. There is steel beam guiderail over the structure with extruders at all four corners. There is isolated areas of light vehicular damage to the east and west guiderails. The vegetated roadway and rock protection embankments are in good condition.

The concrete culvert is generally in good condition with localized stained and unstained transverse cracks in the deck soffit. There are isolated narrow vertical cracks with leakage in the abutment sidewalls. The watercourse is unobstructed. There is an irrigation pipe running along the east side behind the guiderail. There is a 1.5m span concrete storm drain with a steel grate adjacent to the existing structure on the east that is skewed under the roadway.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	74
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	75

Structure Name	Concession 6 Road	**ID Number**	C2051

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0267-0354
Measurements	Span = 3.1m, Length = 20m
Additional Notes	The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR022E/GR022W).

Access Requirements

Concession 6 Road
C2051

Photograph No. 1: 0271: Roadway over the structure looking north.

Photograph No. 2: 0343: West elevation.

Concession 6 Road
C2051

Photograph No. 3: 0317: East elevation.

Photograph No. 4: 0345: Interior of the structure looking east.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Concession 6 Road	**ID Number**	C2053
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Concession 6 Road, 0.23km south of Line 2 Road	**Span Lengths (m)**	3.5
Structure Type	RB	**Deck Area (m2)**	44
Yr Constructed	2020	**Load Posting**	None
Yr Rehabilitated	N/A	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt roadway over the structure is in good condition. There is steel beam guiderail over the structure that is in good condition with soft stop end treatments at the northwest and southeast corners and terminal sections at the northeast and southwest corners. There are hazard markers at all four corners of the structure. The concrete curbs are in good condition with isolated narrow cracks. The concrete gutters over the structure are in good condition. The vegetated roadway embankment on the west side is in good condition with light erosion adjacent to the structure. The concrete-filled sandbag retaining wall on the east side of the structure is in good condition.

The precast concrete box culvert units are in very good condition. There is evidence of leakage between the second and third construction joints from the west end. There is an isolated light spall between the second and third precast units from the west end. There is a 300mm diameter PVC storm water drain that outlets through the centre of the south abutment sidewall. The exposed ends of the concrete distribution slab are in very good condition. The concrete headwalls are in very good condition. There is riprap erosion protection at all four corners of the structure and along the abutment sidewalls through the structure. There is a rock check dam in the waterway at both ends of the structure.

Recommendation

None.

General Overall Condition	Very Good	**Priority Rating**	Adequate	**Current BCI**	89
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	90

Structure Name	Concession 6 Road	**ID Number**	C2053

Recommended Rehabilitation

Engineering Cost		
		$0.00
		$0.00
	Sub Total	$0.00
Construction Cost		
		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0485-0549
Measurements	Span = 3m, Length = 16.8m, Height = 1.8m, Fill = 0.6m
Additional Notes	
Access Requirements	

Concession 6 Road
C2053

Photograph No. 1: 0500: Roadway over the structure looking south.

Photograph No. 2: 0517: West elevation.

Concession 6 Road
C2053

Photograph No. 3: 0541: East elevation.

Photograph No. 4: 0544: Interior of structure looking west.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Concession 6 Road	**ID Number**	C2054
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Concession 6 Road, 0.42km south of Line 3 Road	**Span Lengths (m)**	3.7
Structure Type	RF	**Deck Area (m2)**	58
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	15-Aug-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure has been repaved since the previous inspection and is in very good condition. There is no traffic protection provided over the structure or on the approaches. There are no hazard markers. The vegetated roadway embankments are in generally good condition with light erosion at all four corners of the structure. The exposed portions of the bridge deck top are in generally in good condition with light to medium scaling. The concrete fascias are generally in good condition with two areas of medium scaling on the east fascia.

The bridge deck soffit is generally in good condition. There are two narrow transverse cracks with efflorescent staining at the centre of the soffit and an area of medium delamination at this location (approximately 0.1m² poor). There is an isolated light spall with exposed corroded reinforcing steel on the north side of the soffit. There is water staining at both ends of the soffit. The concrete abutment sidewalls are in good condition with isolated narrow to wide vertical cracks. There is an area of medium honeycombing at the east end of the south abutment sidewall (approximately 0.1m², poor). There are narrow to wide horizontal cracks at all four corners of the structure between the deck soffit and the abutment wall. The separation appears to continue along the entire north abutment wall. The streambed within the structure is scoured, exposing the top 450mm of the footings. There is a check dam at the west end of the structure.

Recommendation

We recommend placing riprap along the footings NOW to prevent further erosion.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	73
Estimated Total Cost	$34,500.00	**Implementation Ranking**	Low	**Previous BCI**	74

Structure Name Concession 6 Road **ID Number** C2054

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$4,500.00
		$0.00
	Sub Total	$4,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$30,000.00
	Total	**$34,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0759-0806

Measurements Span = 3.7m, Length = 15.7m, Height = 1.8, Fill = 0.3m

Additional Notes

Access Requirements

Concession 6 Road
C2054

Photograph No. 1: 0761: Roadway over the structure looking south.

Photograph No. 2: 0806: East elevation.

Concession 6 Road
C2054

Photograph No. 3: 0798: West elevation.

Photograph No. 4: 0775: Underside of the structure looking west.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 3 Road	**ID Number**	C2117
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 3 Road, 0.06km east of Concession 6 Road	**Span Lengths (m)**	3.6
Structure Type	RF	**Deck Area (m2)**	58
Yr Constructed	Unknown	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is generally in good condition with light settlement at the ends of the structure and light deterioration and patched and unpatched potholes along the edges of the roadway. There is no traffic protection provided over the structure or on the approaches. There are hazard markers at all four corners. The vegetated roadway embankments are generally in good condition. Concrete rubble has been placed on the embankments adjacent to the structure to minimize erosion. The exposed portions of the bridge deck top are in good condition with light scaling.

The bridge deck soffit is in good condition. There are several light spalls with exposed corroded reinforcing steel along the east side of the soffit at the centre of the structure (0.1m² poor). There is water staining at both ends of the soffit. The concrete abutment sidewalls are generally in good condition with isolated areas of medium to severe honeycombing at the bottom of the west abutment sidewall (approximately 0.2m², poor). There is a narrow vertical crack in the east abutment sidewall with evidence of leakage and efflorescent staining. There is a steel drain through the south end of the east abutment sidewall that is in poor condition with severe corrosion and section loss. The streambed has eroded through the structure, exposing approximately 0.3m of both footings. The watercourse is unobstructed.

Recommendation

We recommend placing riprap along the footings in 1-5 Years to prevent further erosion.

General Overall Condition	Good	**Priority Rating**	1-5 Years	**Current BCI**	75
Estimated Total Cost	$34,500.00	**Implementation Ranking**	Low	**Previous BCI**	76

Structure Name Line 3 Road **ID Number** C2117

Recommended Rehabilitation

SPI - Scour Protection Improvement

Engineering Cost

Engineering - SPI		$4,500.00
		$0.00
	Sub Total	$4,500.00

Construction Cost

Place Riprap Erosion Protection - SPI		$30,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$30,000.00
	Total	**$34,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0550-0620

Measurements Span = 3.6m, Length = 16m, Height = 1.8m, Fill = 0.3m

Additional Notes

Access Requirements

Line 3 Road
C2117

Photograph No. 1: 0560: Roadway over the structure looking west.

Photograph No. 2: 0618: North elevation.

Line 3 Road
C2117

Photograph No. 3: 0574: South elevation.

Photograph No. 4: 0580: Underside of the structure looking north.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 2 Road	**ID Number**	C2124
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 2 Road, 0.6km east of Concession 2 Road	**Span Lengths (m)**	3.0
Structure Type	RF	**Deck Area (m2)**	48
Yr Constructed	1930	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is generally in good condition with light deterioration of the roadway edges. There is no guiderail protection over the structure or on the approaches. There are hazard markers at all four corners. The vegetated and rock roadway embankments are generally in good condition. There is medium erosion at the southwest corner and light erosion at the northeast corner. The concrete headwalls are generally in good condition with one spall (approximately 0.2m², poor, to a 75mm depth) on each headwall. The structure was widened by 2.3m to the north and 2.1m to the south.

The concrete deck soffit of the original structure is generally in good condition with localized areas of severe delamination (approximately 4m², poor) and severe spalling with exposed corroded reinforcing steel (approximately 0.5m², poor) adjacent to construction joints in the soffit at both ends. The concrete abutments of the original structure are in good condition with localized honeycombing (approximately 0.5m² in total). There is a medium pop-out on the east abutment sidewall at the south end. There are drains in the abutment sidewalls at all four corners of the structure with staining and light concrete deterioration around the drains. The concrete deck soffit, abutments, headwalls, and retaining walls of the widened portions of the structure are in good condition. There is a light delamination on the soffit of the north widened portion of the structure. The structure is on a 45 degree skew.

Recommendation

We recommend that the Town review their Roadside Safety Policy NOW to determine if steel beam guiderails are required to provide traffic protection over the structure.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	71
Estimated Total Cost	$69,000.00	**Implementation Ranking**	Medium	**Previous BCI**	72

Structure Name Line 2 Road **ID Number** C2124

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

Engineering Cost

Engineering - RIR		$9,000.00
		$0.00
	Sub Total	$9,000.00

Construction Cost

Install Steel Beam Guiderail - RIR		$60,000.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$60,000.00
	Total	**$69,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0112-0198

Measurements Span = 3m, Length = 15.4m, Height = 1.5m, Fill =0.7m

Additional Notes Rehabilitation Notes: Unknown - The structure was extended to the north and south.

Access Requirements

Line 2 Road
C2124

Photograph No. 1: 0112: Roadway over the structure looking west.

Photograph No. 2: 0140: South elevation.

Line 2 Road
C2124

Photograph No. 3: 0150: Underside of the structure looking north.

Photograph No. 4: 0162: Spall with exposed corroded reinforcing steel at the south construction joint.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	Line 2 Road	**ID Number**	C2129
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	Line 2 Road, 0.08km west of Concession 6 Road	**Span Lengths (m)**	3.1
Structure Type	RF	**Deck Area (m2)**	41
Yr Constructed	1940	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	17-May-19	**Board Order/ Agreement**	☐
Next Inspection	2027	**Drone Inspection**	☐

Effects of Deterioration

The surface treated roadway over the structure is in good condition. There are steel beam guiderails over the structure, which are in good condition. There are extruders at the northwest, northeast, and southeast corners and a driveway rounding at the southwest corner of the structure. There are hazard markers at all corners except for the southwest corner. The vegetated roadway embankments are generally in good condition with light erosion at all four corners.

The concrete culvert is generally in good condition with minor scaling of the exposed top of the deck surfaces and light to medium honeycombing of the deck soffit (approximately 5m²) and abutments (approximately 10m²). There are large isolate patch repairs through the extent of the structure soffit. There is evidence of leakage between the bridge deck soffit and abutment sidewalls on both sides. Localized scaling was also noted, particularly at the north end of the structure. The watercourse is unobstructed.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	70
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	70

Structure Name	Line 2 Road	**ID Number**	C2129

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0355-0423
Measurements	Span = 3.1m, Length = 13.2m, Fill = 0.3m
Additional Notes	
Access Requirements	

Line 2 Road
C2129

Photograph No. 1: 0365: Roadway over the structure looking east.

Photograph No. 2: 0411: South elevation.

Line 2 Road
C2129

Photograph No. 3: 0383: Interior looking south.

Photograph No. 4: 0387: Area of honeycombing in soffit at north end.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	East and West Line	**ID Number**	C85305
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	East and West Line, 0.3km east of Townline (Grantham) Road	**Span Lengths (m)**	3.6
Structure Type	RF	**Deck Area (m2)**	55
Yr Constructed	1960	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is in good condition. There is a severe pothole in the west approach roadway in the east bound lane. The steel beam guiderail over the structure is in good condition with extruders at all four corners. However, the guiderail on the north side of the structure appears to be low.

The bridge deck soffit is in good condition with isolated narrow cracks and evidence of leakage at the north and south ends. The abutment sidewalls are is generally in good condition with two wide vertical cracks with efflorescent staining in each abutment sidewall. There is medium horizontal crack along the west abutment sidewall, approximately 2m in length. Rip rap erosion protection has been placed in front of the exposed footings. There is medium erosion at all four corners of the structure.

Recommendation

We recommend placing riprap at all four corners of the structure NOW. We also recommend that the Town review their Roadside Safety Policy NOW to determine if it is required to raise the north guiderail.

General Overall Condition	Good	**Priority Rating**	NOW	**Current BCI**	72
Estimated Total Cost	$57,500.00	**Implementation Ranking**	Medium	**Previous BCI**	73

Structure Name East and West Line **ID Number** C85305

Recommended Rehabilitation

RIR - Railing Improvement/Replacement

SPI - Scour Protection Improvement

Engineering Cost

Engineering - RIR, SPI	$7,500.00
	$0.00
Sub Total	$7,500.00

Construction Cost

Place Riprap Erosion Protection - SPI	$30,000.00
Raise North Guiderail - RIR	$20,000.00
	$0.00
	$0.00
	$0.00
Sub Total	$50,000.00
Total	**$57,500.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0001-0089

Measurements Span = 3.6m, Length = 15m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR096N/GR096S).

Access Requirements

East and West Line
C85305

Photograph No. 1: 0013: Roadway over the structure looking east.

Photograph No. 2: 0070: South elevation.

East and West Line
C85305

Photograph No. 3: 0042: Underside of the structure looking south.

Photograph No. 4: 0089: Low guiderail at north side of roadway.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	East and West Line	**ID Number**	C85310
Classification	☐ Bridge ☑ Structure ☑ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☑ Roadway ☐ Driveway ☐ Other	**Number of Spans**	1
Location	East and West Line, 0.01km west of Concession 2 Road	**Span Lengths (m)**	8.0
Structure Type	RF	**Deck Area (m2)**	146
Yr Constructed	1970	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	11-Jul-23	**Date AADT**	
Previous Inspection	01-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The asphalt paved roadway over the structure is generally in good condition with longitudinal and transverse sealed and unsealed cracks at the east and west approaches. The steel beam guiderail over the structure is in fair to good condition with extruders at all four corners. There is light to medium wood rot in the timber guiderail posts. There are isolated areas of vehicular damage to the north guiderail located just west of the structure. The north and south guiderails appear to be low. There is erosion around several of the guiderail posts. There appears to be a sinkhole around one of the guiderail posts at the southwest corner of the structure. The concrete fill on the embankments adjacent to the structure is in fair to poor condition and has separated from the riprap. There is medium erosion at all four corners of the structure.

The exposed portions of the bridge deck top are generally in good condition with areas of light scaling. The concrete deck soffit is generally in fair to good condition. There are two wide cracks with efflorescent staining, rust staining, and evidence of leakage, which extends into the abutment sidewalls. There are areas of severe delaminations at the north and south construction joints. The concrete deck soffit has been patched at both ends and exhibits stained narrow cracks. There is medium to severe spalling and isolated areas of medium to severe delamination at the north and south ends of the bridge deck soffit, approximately 3.0m², poor on each end. There is a light spall at the north end adjacent to the patch repaired locations. The concrete abutments are in good condition with light honeycombing at the north end of the west abutment at the waterline. The footings are exposed approximately 50mm on the west side.

Recommendation

We recommend completing a condition survey in view of rehabilitating the structure in 1-5 Years.Minimum rehabilitation work would include: patch, waterproof, and paving the bridge deck; full depth concrete patch repairs at the construction joints; replacing the guiderail; and placing riprap or slope protection at the embankments at all four corners and filling the sinkhole at the southwest corner of the structure.

General Overall Condition	Fair	**Priority Rating**	1-5 Years	**Current BCI**	67
Estimated Total Cost	$487,000.00	**Implementation Ranking**	Medium	**Previous BCI**	68

Structure Name East and West Line **ID Number** C85310

Recommended Rehabilitation

RSP - Rehabilitate Superstructure

RSB - Rehabilitate Substructure

RIR - Railing Improvement/Replacement

PWP - Patch Waterproof and Pave

SPI - Scour Protection Improvement

C/S - Condition Survey

MIS - Miscellaneous - Other Work

Fill sinkhole

Engineering Cost

Engineering - PWP, RSB, RSP, RIR, SPI, MIS	$60,000.00
Engineering - C/S	$25,000.00
Sub Total	$85,000.00

Construction Cost

Fill Sinkhole - MIS	$2,000.00
Replace Steel Beam Guiderail - RIR	$80,000.00
Place Riprap Erosion Protection - SPI	$20,000.00
Patch, Waterproof & Pave - PWP	$200,000.00
Concrete Patch Repairs - RSP, RSB	$100,000.00
Sub Total	$402,000.00
Total	**$487,000.00**

Inspected By Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.

Photos 0367-0467

Measurements Span = 8m, Height = 2.2m , Fill= 1m

Additional Notes The steel beam guiderail at this structure is included in the Guiderail Inspection Program (ID GR002N/GR002S).

Access Requirements

East and West Line
C85310

Photograph No. 1: 0386: Roadway over the structure looking west.

Photograph No. 2: 0407: North elevation.

East and West Line
C85310

Photograph No. 3: 0399: Underside of the structure looking south.

Photograph No. 4: 0437: Delamination at the south end of soffit.

Town of Niagara-on-the-Lake

2023 Municipal Bridge Appraisal - Rehabilitation/Replacement Needs

Structure Name	West Pedestrian Bridge Over 4 Mile Creek	**ID Number**	PED1
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☐ Driveway ☑ Other	**Number of Spans**	1
Location	Niagara Stone Road, 0.15km west of Four Mile Creek Road	**Span Lengths (m)**	31.0
Structure Type	PT	**Deck Area (m2)**	73
Yr Constructed	1990	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The galvanized steel plank deck is in good condition with light surface corrosion. There is a steel cover plate at the south end of the steel plank deck that is generally in fair condition with light damage. The steel handrails over the structure are in good condition. The weathering steel truss components of the structure are generally in good condition. There are isolated areas of light to medium corrosion on the underside of the structure at the bottom chord and along the floor system. The bearings are buried at all four corners. The previous inspection mentions that the bearings are generally in good condition with light corrosion. There is light to medium corrosion in the northwest bearing. The concrete wingwalls are in good condition. The concrete abutments are in good condition. The vegetated embankments are generally in good condition. The watercourse is unobstructed with no evidence of scour. There is a utility attached to the underside of the structure.

There are two corrugated plastic pipe storm drains with rip rap erosion protection at the northwest and southwest corners of the structure which have been installed since the previous inspection. It appears that the sinkholes at the north and south abutments in the previous inspection have been filled.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	73
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	74

Structure Name	West Pedestrian Bridge Over 4 Mile Creek	**ID Number**	PED1

Recommended Rehabilitation

Engineering Cost

	$0.00
	$0.00
Sub Total	$0.00

Construction Cost

	$0.00
	$0.00
	$0.00
	$0.00
	$0.00
Sub Total	$0.00
Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0756-0810
Measurements	Span = 31m, Width = 2.4m
Additional Notes	Rehabilitation Notes: c.2022 - The sinkholes located at the north and south abutments have been filled with granular material.

Access Requirements

West Pedestrian Bridge Over 4 Mile Creek
PED1

Photograph No. 1: 0786: Walkway over the structure looking south.

Photograph No. 2: 0802: West elevation.

West Pedestrian Bridge Over 4 Mile Creek
PED1

Photograph No. 3: 0760: Underside of the structure looking south.

Photograph No. 4: 0809: Filled sinkhole under south end of structure, looking south.

Structure Name	East Pedestrian Bridge Over 4 Mile Creek	**ID Number**	PED2
Classification	☑ Bridge ☑ Structure ☐ Culvert ☐ Municipal	**Previous ID Number**	N/A
Type of Location	☐ Roadway ☐ Driveway ☑ Other	**Number of Spans**	1
Location	Niagara Stone Road, 0.15km west of Four Mile Creek Road	**Span Lengths (m)**	31.0
Structure Type	PT	**Deck Area (m2)**	73
Yr Constructed	1990	**Load Posting**	None
Yr Rehabilitated	Unknown	**Current AADT**	Unknown
Inspection Date	06-Jul-23	**Date AADT**	
Previous Inspection	27-Sep-21	**Board Order/ Agreement**	☐
Next Inspection	2025	**Drone Inspection**	☐

Effects of Deterioration

The galvanized steel plank deck is in good condition with light surface corrosion along the edges. The vegetated embankments are in good condition. The steel handrails over the structure are in good condition.

The weathering steel truss components of the structure are generally in good condition. There are isolated areas of light to medium corrosion on the underside of the structure at the bottom chord and along the floor system. The southeast and northeast steel plate bearings appear to be in good condition with light corrosion. The northwest and southwest bearings were not visible at the time of inspection. The visible portions of the concrete abutments are in good condition. The wingwalls are in good condition. There is a utility connected to the west fascia. There is a small sinkhole approximately 2m north of the south abutment under the structure, approximately 0.3m in diameter and 1m in depth.

Recommendation

None.

General Overall Condition	Good	**Priority Rating**	Adequate	**Current BCI**	72
Estimated Total Cost	$0.00	**Implementation Ranking**		**Previous BCI**	72

Structure Name	East Pedestrian Bridge Over 4 Mile Creek	**ID Number**	PED2

Recommended Rehabilitation

Engineering Cost

		$0.00
		$0.00
	Sub Total	$0.00

Construction Cost

		$0.00
		$0.00
		$0.00
		$0.00
		$0.00
	Sub Total	$0.00
	Total	**$0.00**

Inspected By	Sarah Ellis, P.Eng., and Emma Stephenson of ELLIS Engineering Inc.
Photos	0680-0755, 0811
Measurements	Span = 31m, Width = 2.4m
Additional Notes	
Access Requirements	

East Pedestrian Bridge Over 4 Mile Creek
PED2

Photograph No. 1: 0683: Walkway over the structure looking south.

Photograph No. 2: 0811: West elevation.

East Pedestrian Bridge Over 4 Mile Creek
PED2

Photograph No. 3: 0700: Underside of the structure looking north.

Photograph No. 4: 0742: Northeast bearing.