



Heritage Impact Assessment, Bridge 3-E Municipal Class Environmental Assessment, Township of Centre Wellington, Ontario

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Executive Summary

Parslow Heritage Consultancy, Inc. (PHC) was retained by R.J. Burnside & Associates Limited, on behalf of the Township of Centre Wellington (the Proponent) to undertake a Heritage Impact Assessment (HIA) for Bridge 3-E, Township of Centre Wellington, Ontario. The bridge is located on Sixth Line, approximately 1.9 km north of Wellington Road 22 in the southeast portion of the Township of Centre Wellington. The HIA was completed as a component of a Municipal Class Environmental Assessment (MCEA).

The purpose of the HIA is to review the cultural heritage value or interest (CHVI) of Bridge 3-E, as identified in the Cultural Heritage Evaluation Report (CHER) (PHC 2024) and to evaluate potential direct and indirect impacts to the bridge based on the proposed changes. Bridge 3-E is currently part of a study which is evaluating several alternatives for the currently closed bridge, including removal, rehabilitation, and replacement.

Evaluation of Bridge 3-E in the CHER (PHC 2024) found the bridge to be a candidate for Listing under Section 27 of the OHA, or Designation under Section 29 of the OHA. The bridge also exceeded the 60-point threshold for heritage value based on the Ontario Ministry of Transportation's (MTO) bridge assessment standards.

At the time of the cultural heritage evaluation site visit undertaken for the CHER, Bridge 3-E had been permanently closed to vehicular traffic. The bridge retains examples of all original finishes but exhibited significant degradation resulting in the exposure of the underlying square steel reinforcement bar. A single steel tie beam has been added to the upper limit of the arches, thereby imposing a height restriction to the structure that was not part of the original design. Visual inspection shows all components of the original structure to be present, but to be in varying degrees of degradation resulting in exfoliation of concrete structure and exposure of the internal rebar. A 2022 Ontario Structure Inspection Manual (OSIM) report recommended the bridge be replaced within 1-5 years.

The evaluation of potential direct and indirect impacts to Bridge 3-E through the proposed removal, remediation, or replacement options found that removal of Bridge 3-E would result in the loss of physical heritage attributes and lead to impacts to the view toward the bridge. Remediation of Bridge 3-E is anticipated to result in minimal to no impacts to the physical heritage attributes of the bridge (pending final design plans). The evaluation of impacts found replacement would result in the loss of the physical heritage attributes of Bridge 3-E and may also lead to impacts to the view towards the bridge (pending final design).

Bridge 3-E is visually appealing and largely retains its as-built form. As such, the bridge reflects the design and style of a past time and contributes to the rural agricultural landscape of the area. As such, the following recommendations are made for Bridge 3-E, based on the options for improvements being considered as part of study:

Removal

- 1. Prior to removal, architectural drawings of the extant bridge be completed and provided to local historical societies, libraries, and the municipal archives, at the discretion of the Township of Centre Wellington**
- 2. The CHER and HIA reports be provided to local historical societies, libraries, and the municipal archives, at the discretion of the Township of Centre Wellington.**

Rehabilitation

1. **Rehabilitation of the bridge in its current form allow for the retention of all identified heritage attributes.**
2. **The Township consider Designation of the bridge under Part IV of the Ontario Heritage Act.**
3. **The CHER and HIA reports be provided to local historical societies, libraries, and the municipal archives, at the discretion of the Township of Centre Wellington.**

Replacement

1. **Prior to replacement, architectural drawings of the extant bridge be completed and provided to local historical societies, libraries, and the municipal archives, at the discretion of the Township of Centre Wellington**
2. **Any replacement of Bridge 3-E be designed to reflect the existing “rainbow arch” design, thereby providing a conservation measure for the identified physical heritage attributes.**
3. **An interpretive plaque be affixed to the replacement bridge to identify the original bridge (see Figure 9), thereby providing a conservation measure for the identified historical and contextual value.**
4. **The CHER and HIA reports be provided to local historical societies, libraries, and the municipal archives, at the discretion of the Township of Centre Wellington.**

The *Provincial Policy Statement* (2020) notes that CHVI is identified for cultural heritage resources by communities. Thus, the system by which heritage is administered in Ontario places emphasis on the decision-making of local municipalities in determining CHVI. It is hoped that the information presented in this report will be useful in those determinations.

Project Personnel

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Senior Cultural Resource Specialist

Christopher Lemon, B.Sc., Dip. Heritage, CAHP

Lead Cultural Heritage Specialist

Jamie Lemon, M.A.

Project Manager

Acknowledgements

Andrew Dawson

R.J. Burnside & Associates Limited

Project Context

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Bridge 3-E was included in the 2013 publication “Arch, Truss & Beam: The Grand River Watershed Heritage Bridge Inventory” and was identified as being of increased historical interest based on age, design, construction method or overall scarcity.

A site visit was conducted on April 29, 2024, to document the bridge and surrounding landscape. Documentation took the form of high-resolution photographs using a Nikon D5600 DSLR camera the collection of field notes and the production of measured drawings. The assessment strategy was derived from the National Parks and Sites Branch Canadian Inventory of Historic Buildings (Parks Canada 1980), Well Preserved: The Ontario Heritage Foundation Manual on the Principles and Practice of Architectural Conservation (Fram 2003), the Guide to Field Documentation (HABS 2011), and the Standards and Guidelines for the Conservation of Historic Places in Canada (Parks Canada 2010).

This HIA was written for a project located on the Treaty lands and Territory of the Mississaugas of the Credit First Nation and the traditional territory of the Haudenosaunee and the Attiwandaronk.

Site Description and Context

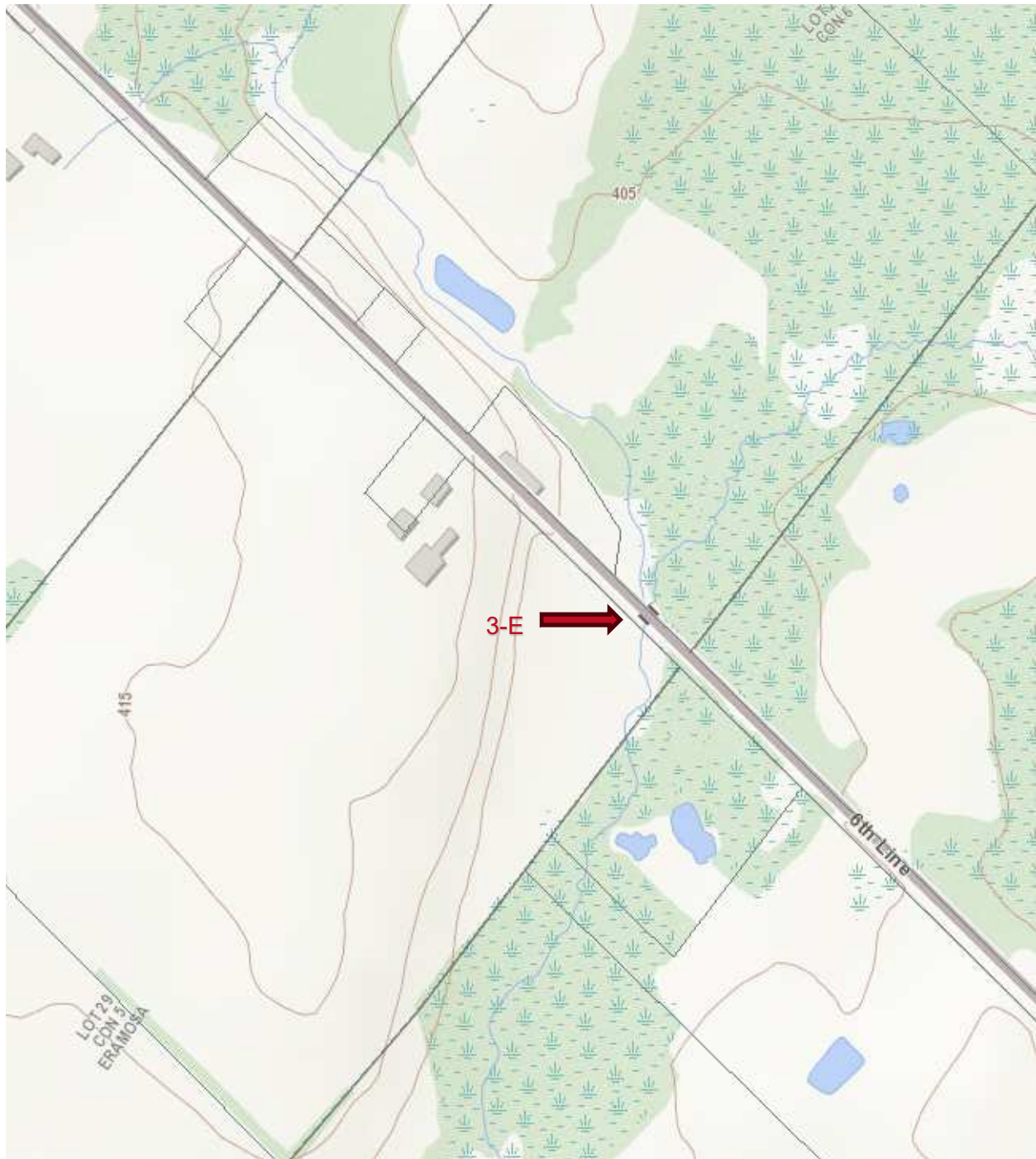
Bridge 3-E is located on 6 Line in the road allowance between Lot 29 Concession 5 and Lot 29 Concession 6, in the former township of Eramosa, now Township of Centre Wellington, Ontario.

Applicant Contact Information

R.J. Burnside & Associated Limited c/o Andrew Dawson
3 Ronell Crescent, Collingwood, ON L9Y 4J6
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Township of Centre Wellington c/o Adam Dickieson
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Location of Bridge



Legislative and Policy Framework

The following assessment reviews municipal legislation and policies designed to protect cultural heritage resources that may be affected by development in the Township of Centre Wellington.

Municipal Policies

Township of Centre Wellington Municipal Official Plan

Section C.2 of the Official Plan (OP) of Centre Wellington (consolidated January 2023) outlines four Goals and Objectives to the management of Cultural Heritage Resources.

1. To protect the Township's heritage resources from neglect, deterioration, demolition, alteration, redevelopment or changes in use which threaten their existence or integrity
2. To encourage and support the functional and economic use of heritage buildings
3. To identify, and protect and enhance natural areas
4. To encourage public awareness and appreciation of the heritage resources of the Township and the value of protecting these resources to both residents and visitors

County of Wellington Official Plan

Section 4.1 of the County of Wellington Official Plan deals with cultural heritage and archaeological resources:

Cultural heritage and archaeological resources form an important and in many cases highly visible part of the community fabric. These resources are a source of civic pride for the residents, a benefit to the local economy through tourism, and are important to our understanding of the settlement of the County. The policies of this Plan, in conjunction with the Ontario Heritage Act, provide a framework for the protection and enhancement of cultural heritage resources in Wellington.

Built Heritage

Wellington has a rich history reflected in many buildings and structures, either individually or in groups, which are considered to be architecturally or historically significant to the community, county, province or country.

Cultural Heritage Landscapes

A cultural heritage landscape is a defined geographical area of heritage significance which has been modified by human activities and is valued by a community. It involves a grouping(s) of individual heritage features such as structures, spaces, archaeological sites and natural elements, which together form a significant type of heritage form, distinctive from that of its constituent elements or parts. Examples may include, but are not limited to, heritage conservation districts designated under the Ontario Heritage Act, and villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways and industrial complexes of cultural heritage value.

For cultural heritage landscapes to be significant, they must be valued for the important contribution they make to our understanding of a place, an event, or a people.

Section 4.1.5 provides policy direction related to cultural heritage resources:

- a) *significant built heritage resources and significant cultural heritage landscapes shall be conserved. Conserved means the identification, protection, use and/or management of heritage and archeological resources in such a way that their heritage values, attributes and integrity are retained. This may be addressed through a conservation plan or heritage impact assessment in accordance with Section 4.6.7.*
- b) *The need for a Heritage Impact Assessment and/or Conservation plan will be based on the heritage attributes or reasons for which the resource is identified as significant, and will normally be identified in pre-consultation on development applications.*
- c) *Wellington County will work with its local municipalities to identify significant cultural heritage landscapes. The identification of significant cultural heritage landscapes shall be implemented through at least one of the following options:*
 - i. *Added to an Official Plan through an Amendment that shows the resource as an overlay designation on the Schedule, and adds site-specific policies where needed;*
 - ii. *included in the municipal register of properties that Council considers to be of cultural heritage value or interest but have been designated;*
 - iii. *Designated under the Ontario Heritage Act.*
- d) *The need for a Heritage Impact Assessment.*
- e) *Wellington will encourage the conservation of significant built heritage resources through heritage designations and planning policies which protect these resources.*
- f) *The re-use of heritage buildings is often a valid means of ensuring their restoration, enhancement or future maintenance. Projects to re-use heritage buildings may be given favourable consideration if the overall results are to ensure the long term protection of a heritage resource and the project is compatible with surrounding land uses and represents an appropriate use of land.*
- g) *Where a property has been identified as a protected heritage property, development and site alteration may be permitted on adjacent lands where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved. Mitigative measures and/or alternative development approaches may be required in order to conserve the heritage attributes of the protected heritage property affected by the adjacent development or site alteration.*
- h) *The County recognizes the important cultural significance of the Grand River as a Canadian Heritage River, and the need to conserve its inherent values.*

Existing Conditions Review

Design and Construction

Bridge 3-E is an example of a bowstring through arch bridge constructed of reinforced concrete. This style of bridge is colloquially referred to as a 'rainbow arch bridge'. The Grand River Watershed Heritage Bridge Inventory attributes the construction date to 1919 (GRCA 2013). Bridge 3-E represents one of the few remaining 'rainbow arch bridges' that Wellington County was once known for. The bowstring through arch design was developed in the early 20th century and reached its height of popularity in the 1920's and 1930's. The design was popular as it required minimal material, was relatively simple to install and could easily accommodate vehicular traffic. The bowstring design was well suited to situations where riverbanks were low and there was limited room for below deck support. The bowstring design was popularized by Fergus architect Charles Mattaini. Mr. Mattaini was born in Italy and emigrated to Canada in 1892. Following his emigration to Canada, he settled in Fergus and started an engineering and construction firm where he employed the engineering skills he had developed while constructing tunnels through the Alps. Mattaini developed the bowstring design and his company eventually built close to 70 bowstring bridges in Southern Ontario, with a high number of them being constructed in Wellington and Waterloo counties (Brennan 2019).

Current Condition

At the time of the cultural heritage evaluation site visit undertaken for the CHER, Bridge 3-E had been permanently closed to vehicular traffic. The bridge retains examples of all original finishes but exhibited significant degradation resulting in the exposure of the underlying square steel reinforcement bar. A single steel tie beam has been added to the upper limit of the arches, thereby imposing a height restriction to the structure that was not part of the original design. Visual inspection shows all components of the original structure to be present, but to be in varying degrees of degradation resulting in exfoliation of concrete structure and exposure of the internal rebar. A 2022 Ontario Structure Inspection Manual (OSIM) report recommended the bridge be replaced within 1-5 years (Appendix B).

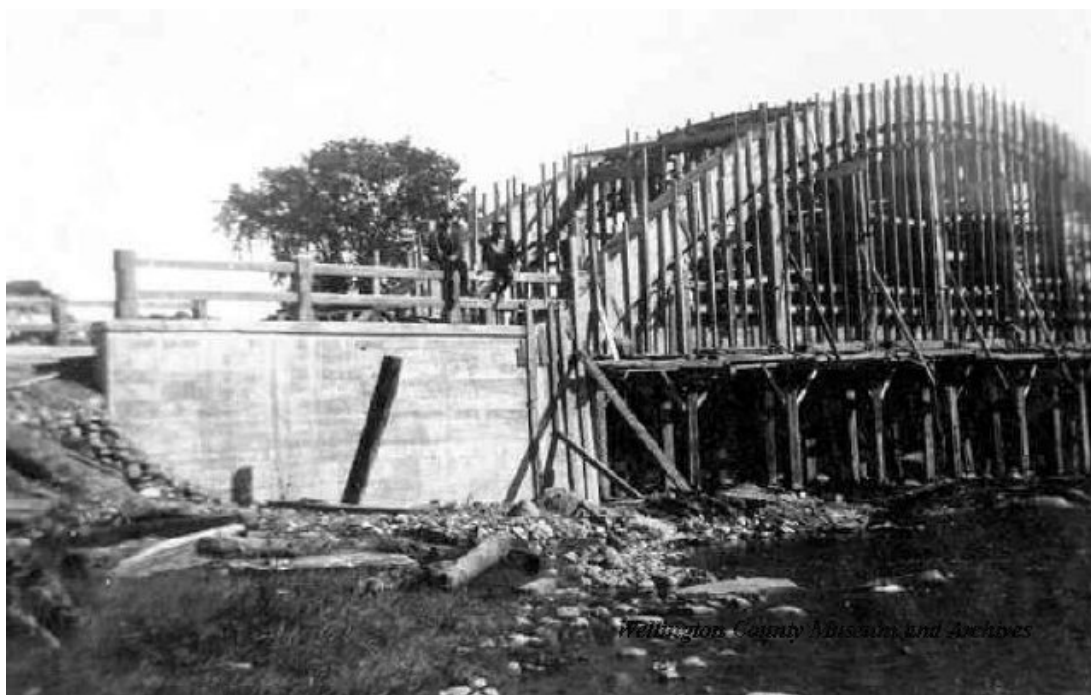


FIGURE 1: UNDATED HISTORIC IMAGE OF THE CONSTRUCTION OF A BOWSTRING BRIDGE, IMAGE 3032, PART OF THE MATTAINI FOND ON FILE WITH WELLINGTON COUNTY MUSEUM AND ARCHIVES



FIGURE 2: BRIDGE 3-E, SOUTH SIDE OF BRIDGE, FACING NORTH



FIGURE 3: BRIDGE 3-E, SOUTHSIDE OF BRIDGE, FACING NORTH



FIGURE 4: BRIDGE 3-E, TYPICAL GUARDRAIL, SOUTH SIDE



FIGURE 5: BRIDGE 3-E, TYPICAL GUARDRAIL NORTH SIDE



FIGURE 6: BRIDGE 3-E, BRIDGE DECK, FACING NORTHWEST



FIGURE 7: BRIDGE 3-E, TYPICAL EXAMPLE OF DETERIORATION, EXAMPLE IS OF SUPERSTRUCTURE CENTRAL SUPPORT



FIGURE 8: BRIDGE 3-E, UNDERSIDE OF BRIDGE DECK

Bridge 3-E Draft Statement of Cultural Heritage Value

Bridge 3-E is located on Sixth Line, approximately 1.9 km north of Wellington Road 22, in the road allowance between Lot 29 Concession 5 and Lot 29 Concession 6, in the former township of Eramosa, now Township of Centre Wellington, Ontario. Bridge 3-E is an example of a bowstring through arch bridge constructed of reinforced concrete. This style of bridge is colloquially referred to as a 'rainbow arch bridge'. The Grand River Watershed Heritage Bridge Inventory attributes the construction date to 1919 (GRCA 2013). Bridge 3-E represents one of the few remaining 'rainbow arch bridges' that Wellington County was once known for. The bowstring through arch design was developed in the early 20th century and reached its height of popularity in the 1920's and 1930's. The design was popular as it required minimal material, was relatively simple to install and could easily accommodate vehicular traffic. The bowstring design was popularized by Fergus architect Charles Mattaini. Mr. Mattaini was born in Italy and emigrated to Canada in 1892. Following his emigration to Canada, he settled in Fergus and started an engineering and construction firm where he employed the engineering skills he had developed while constructing tunnels through the Alps. Mattaini developed the bowstring design and his company eventually built close to 70 bowstring bridges in Southern Ontario, with a high number of them being constructed in Wellington and Waterloo counties (Brennan 2019).

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Evaluation of Bridge 3-E found the bridge to be a candidate for Listing under Section 27 of the OHA, or Designation under Section 29 of the OHA. The bridge also exceeded the 60-point threshold for heritage value based on the MTO bridge assessment standards.

Defining Elements

- 'Rainbow Arch Bridge' design
- Decorative guardrail pillars
- Designed and possibly constructed by local well-known architect Charles Mattaini

Heritage Impact Assessment

Description of Proposed Work

Bridge 3-E is currently part of a study which is evaluating several alternatives for the currently closed bridge, including removal, rehabilitation, and replacement. The structure has deteriorated to a point of significant structural concern, which has resulted in its current closure to traffic and, even if rehabilitated, it would still have limited load and traffic carrying capacity. No design plans for the options under consideration are available at this time.

Impact on CHVI

Bridge 3-E was found in the CHER (PHC 2024) to exhibit physical value, historical/associative value, and contextual value. The following heritage attributes were specifically identified:

- 'Rainbow Arch Bridge' design
- Decorative guardrail pillars
- Designed and possibly constructed by local well-known architect Charles Mattaini

To evaluate the potential impacts of the proposed improvements to Bridge 3-E, the guidelines of the MCM's *Info Sheet #5 Heritage Impact Assessment and Conservation Plans*, were reviewed (MCM 2006b):

Destruction of any, or part of any significant heritage attributes or features:

- Proposed removal of Bridge 3-E would result in the loss of physical heritage attributes.
- Pending final design plans, the proposed remediation of Bridge 3-E may result in the loss of physical heritage attributes.
- The proposed replacement of Bridge 3-E will result in the loss of physical heritage attributes.

Alteration that is not sympathetic, or incompatible, with the historic fabric and appearance:

- Proposed removal of Bridge 3-E would result in the loss of physical heritage attributes.
- Proposed remediation of Bridge 3-E should consider approaches that avoid alteration to physical heritage attributes.
- Proposed replacement of Bridge 3-E should consider design plans that reflect and pay tribute to the original design of the bridge.

Shadows created that alter the viability of a heritage attribute or an associated nature feature or plantings, such as a garden:

- Proposed removal of Bridge 3-E would result in the loss of physical heritage attributes.
- It is not anticipated proposed remediation would create new shadows that would impact physical heritage attributes.
- Proposed replacement would remove physical heritage attributes, rendering the impact of shadows not applicable.

Isolation of a heritage attribute from its surrounding environment, context, or a significant relationship:

- Proposed removal would not result in isolation of a heritage attribute, but would result in the loss of physical heritage attributes.
- It is not anticipated proposed remediation would lead to isolation of physical heritage attributes.
- Proposed replacement would remove physical heritage attributes, rendering the impact of isolation as not applicable.

Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features:

- Proposed removal would impact views towards the bridge.
- It is not anticipated proposed remediation would lead to indirect or direct obstruction of views and vistas.
- Proposed replacement could impact views towards the bridge, particularly if a design is chosen that does not reflect the original design.

A change in land use where the change may impact the property's CHVI:

- A change in land use is not being proposed through the proposed options.

Land disturbances such as a change in grade that alters soils and drainage patterns that may adversely affect archaeological and/or cultural heritage resources:

- It is not anticipated that changes in grade through proposed remediation will occur that would adversely affect archaeological and/or cultural heritage resources.
- Proposed removal or replacement would remove physical heritage attributes, rendering the impact of land disturbances as not applicable.

Mitigation Options and Recommendations

Bridge 3-E has been permanently closed to vehicular traffic since 2022. The bridge retains examples of all original finishes but exhibited significant degradation resulting in the exposure of the underlying square steel reinforcement bar. A single steel tie beam has been added to the upper limit of the arches, thereby imposing a height restriction to the structure that was not part of the original design. Visual inspection shows all components of the original structure to be present, but to be in varying degrees of degradation resulting in exfoliation of concrete structure and exposure of the internal rebar. A 2022 Ontario Structure Inspection Manual (OSIM) report recommended the bridge be replaced within 1-5 years.

Evaluation of Bridge 3-E in the CHER (PHC 2024) found the bridge to be a candidate for Listing under Section 27 of the OHA, or Designation under Section 29 of the OHA. The bridge also exceeded the 60-point threshold for heritage value based on the MTO bridge assessment standards.

The evaluation of potential direct and indirect impacts to Bridge 3-E through the proposed removal, remediation, or replacement options found that removal of Bridge 3-E would result in the loss of physical heritage attributes and lead to impacts to the view toward the bridge. Remediation of Bridge 3-E is anticipated to result in minimal to no impacts to the physical heritage attributes of the bridge (pending final design plans). The evaluation of impacts found replacement would result in the loss of the physical heritage attributes of Bridge 3-E and may also lead to impacts to the view towards the bridge (pending final design).

The *Ontario Heritage Bridge Guidelines* (MTO 2008) provides a listing of conservation options, ranked in order of degree of intervention (minimum to maximum). These conservation options are presented below:

- 1) Retention of existing bridge with no major modifications undertaken;
- 2) Restoration of missing or deteriorated elements where physical or documentary evidence (e.g. photographs or drawings) exists for their design;
- 3) Retention of existing bridge with sympathetic modification;
- 4) Retention of existing bridge with sympathetically designed new structure in proximity;
- 5) Retention of existing bridge no longer in use for vehicular purposes but adapted for a new use. For example, prohibiting vehicle or restricting truck traffic or adapting for pedestrian walkways, cycle paths, scenic viewing, etc.;
- 6) Retention of bridge as a heritage monument for viewing purposes only;
- 7) Relocation of smaller, lighter single span bridges to an appropriate new site for continued use (see 4) or adaptive re-use (see 5);
- 8) Bridge removal and replacement with a sympathetically designed structure (See Section 4.4):
 - a. Where possible, salvage elements/members of bridge for incorporation into new structure or for future conservation work or displays;
 - b. Undertake full recording and documentation of existing structure.

Under the current study, Conservation Option 8 would be the most appropriate. In reviewing Section 4.4 of the *Ontario Heritage Bridge Guidelines* (MTO 2008) (Detailed Conditions for Conservation Option 8 – Removal or Replacement), Bridge 3-E can be considered to be in a

state of which “the safety of the existing structure is compromised to the extent that rehabilitation is not a practical option” and “Replacement is required to meet demand requirements that are not achievable through rehabilitation or upgrading of the existing structure”, for the following reasons:

- ▶ The structure is a single-load-path structure in which the failure of a single primary component or connection would cause the structure to collapse. Failure of one of the trusses would cause this structure to collapse. Single-load-path structures are not recommended under current practices due to their risk of catastrophic failure.
- ▶ The structure was designed in early 1900s, to a design vehicle lighter than current standards. In order to address concerns related to loss of capacity due to corrosion of reinforcing steel, or to increase the load carrying capacity of the truss to meet the capacity to carry current vehicle loads, the truss would be required to be replaced in its entirety, which would require all heritage attributes of the structure to be replaced and thereby altering significantly altering the bridge from its original form.
- ▶ The narrow bridge driving platform (4.9 m) does not meet the capacity requirements of a two-lane bridge under current standards. Widening of the structure to meet the minimum width for two-lanes is not feasible without removing the arch truss heritage features. Retaining the bridge as a one-lane, two-way bridge is a safety hazard.

The Township of Centre Wellington has replaced several bowstring through arch bridges in recent years. Examples photos are provided as Figures 9 and 10. In these two examples, The Township of Centre Wellington employed designs of the replacement bridges that reflected the original bowstring through arch bridge.



FIGURE 9: BRIDGE 24-WG, TOWNSHIP OF CENTRE WELLINGTON



FIGURE 10: BRIDGE 4-F, TOWNSHIP OF CENTRE WELLINGTON

Recommendations

Bridge 3-E is visually appealing and largely retains its as-built form. As such, the bridge reflects the design and style of a past time and contributes to the rural agricultural landscape of the area. As such, the following recommendations are made for Bridge 3-E, based on the options for improvements being considered as part of study:

Removal

1. **Prior to removal, architectural drawings of the extant bridge be completed and provided to local historical societies, libraries, and the municipal archives, at the discretion of the Township of Centre Wellington**
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ASI (ARCHAEOLOGICAL SERVICES INC.)

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BRENNAN, PAT

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COUNTY OF WELLINGTON

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HISTORIC AMERICAN BUILDINGS SURVEY (HABS)

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PARSLOW HERITAGE CONSULTANCY INC. (PHC)

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PROVINCE OF ONTARIO

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1990B PLANNING ACT. AVAILABLE ONLINE: [HTTPS://WWW.ONTARIO.CA/LAWS/STATUTE/90P13](https://www.ontario.ca/laws/statute/90p13). ACCESSED FEBRUARY 2023.

2020 PROVINCIAL POLICY STATEMENT. AVAILABLE ONLINE: [HTTPS://FILES.ONTARIO.CA/MMAH-PROVINCIAL-POLICY-STATEMENT-2020-ACCESSIBLE-FINAL-EN-2020-02-14.PDF](https://files.ontario.ca/mmah-provincial-policy-statement-2020-accessible-final-en-2020-02-14.pdf). ACCESSED FEBRUARY 2023.

TOWNSHIP OF CENTRE WELLINGTON

2005 MUNICIPAL OFFICIAL PLAN (CONSOLIDATED 2013). AVAILABLE ONLINE: [HTTPS://WWW.CENTREWELLINGTON.CA/EN/DOING-BUSINESS/RESOURCES/DOCUMENTS/PLANNING/OFFICIAL-PLAN-CONSOLIDATED-JANUARY-2013.PDF](https://www.centrewellington.ca/en/doing-business/resources/documents/planning/official-plan-consolidated-january-2013.pdf). ACCESSED 31 JULY 2023.

Appendix A



Qualifications

Senior Heritage Specialist – Carla Parslow, PhD, CAHP Member in Good Standing: Dr. Carla Parslow has over 20 years of experience in the cultural heritage resource management (CHRM) industry in Canada. As the President of PHC Inc., Dr. Parslow is responsible for the management of CHRM projects, as well as the technical review and quality assurance of all archaeological and cultural heritage projects completed by PHC. Throughout her career, Carla has managed both large and small offices of CHRM professionals and has mobilized both large (50+) and small (4+) teams of CHRM and Environmental projects offices throughout the province of Ontario. Dr. Parslow has served as either Project Manager or Project Director on hundreds of Archaeological and Cultural Heritage Assessments. Dr. Parslow is a professional member of the Canadian Association of Heritage Professionals (CAHP).

Dr. Parslow is responsible for the overall quality assurance.

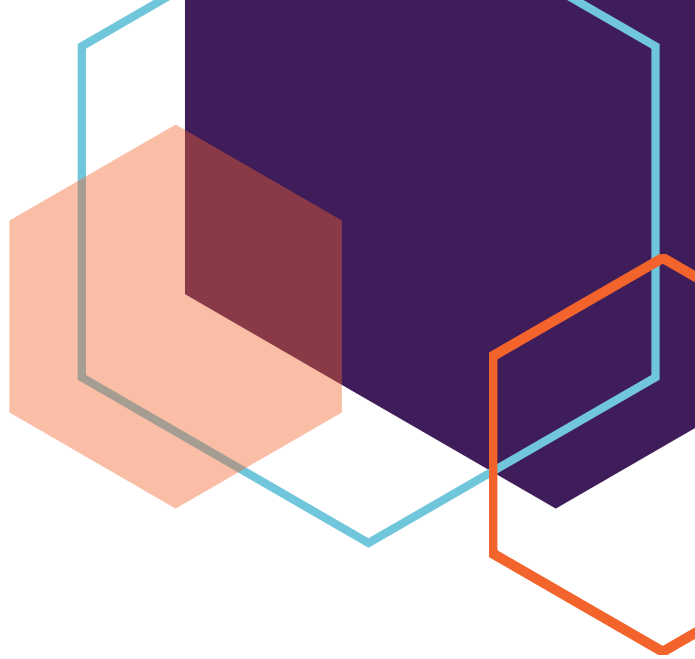
Project Manager – Jamie Lemon, MA: Jamie Lemon is a Senior Archaeologist and Project Manager with PHC and is responsible for managing archaeological and heritage projects across Ontario. She is the primary or secondary author of numerous heritage and archaeological license reports and is proficient at artifact and archaeobotanical analysis. In addition, she is a former field technician and field director with experience on precontact Indigenous and historical Euro-Canadian sites. She has worked on archaeological and heritage projects for mining, land development, transportation, aggregates, and energy sectors. Jamie received a BA in Anthropology from the University of Waterloo in 2007, an MA from Trent University in 2014, and has been active in Cultural Resource Management in Ontario for 17 years. Jamie holds a valid professional license with the Ontario Ministry of Citizenship and Multiculturalism (MCM). Jamie regularly assists clients with navigating the life cycle of archaeological and heritage assessments as it relates to their Project, including interpretation of MCM Standards and Guidelines and engaging with Indigenous communities and other stakeholder groups.

Ms. Lemon is responsible for project management and client relations.

Heritage Specialist – Chris Lemon, B.Sc., Dip. CAHP Member in Good Standing: Chris Lemon is a Cultural Heritage Specialist and Licensed Archaeologist (R289) with 18 years' experience. He received an Honours B.Sc. in Anthropology from the University of Toronto and has completed course work towards an M.A. from the University of Western Ontario. Mr. Lemon has a Diploma in Heritage Carpentry and Joinery and a Certificate in Heritage Planning from Algonquin College. During his career Mr. Lemon has participated in cultural heritage assessments across Ontario as both a Senior Field Director in archaeology and as a Built Heritage Practitioner. Chris's previous experience includes representation on Joint Health and Safety Committees; he is dedicated to maintaining a safety-first focus on all job sites. Chris is a professional member of the Canadian Association of Heritage Professionals (CAHP).

Mr. Lemon is responsible for research, reporting and analysis.

Appendix B



OSIM Inspection Report

Structure Condition Summary Form

Structure Name SIXTH LINE
 Structure Number 3-E
 Date of Inspection May 04, 2022
 Project No. 18015
 Consultant HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approach	Wearing Surface	Sq.m	6.00	58.80	0.00	52.80	3.00	3.00	353	245	69	09	12
Barriers	Railing Systems	m	200.00	88.00	0.00	0.00	44.00	44.00	17600	3520	20	08	00
	Posts (Steel/Concrete)	Each	200.00	18.00	0.00	4.00	6.00	8.00	3600	1080	30	08	00
	Top Chords	Sq.m	300.00	64.00	0.00	56.00	4.00	4.00	19200	13080	68	00	00
Trusses/ Arches	Verticals	Sq.m	300.00	5.76	0.00	0.00	2.88	2.88	1728	346	20	01	00
	Bottom Chords	Sq.m	300.00	52.56	0.00	42.56	5.00	5.00	15768	10176	65	00	00
Decks	Deck Top - Thin Slab	Sq.m	120.00	79.80	0.00	0.00	39.90	39.90	9576	1915	20	09	02
	Soffit - Thin Slab	Sq.m	120.00	78.09	0.00	46.85	15.62	15.62	9371	4966	53	00	00
Beams/ Main Longitudinal	Floor Beams - Concrete	Sq.m	200.00	51.30	0.00	41.30	5.00	5.00	10260	6595	64	01	00
Abutment	Wingwalls	Sq.m	350.00	22.40	0.00	18.40	2.00	2.00	7840	5110	65	00	08
	Abutment Walls	Sq.m	900.00	19.38	0.00	17.38	2.00	0.00	17442	12452	71	00	00
									112738	59484			

Bridge Condition Index (BCI)

52.76

Municipal Structure Inspection Form
TOWNSHIP OF CENTRE WELLINGTON

Structure Name 3-E

SIXTH LINE

Field Inspection Information:

Date of Inspection:	May 04, 2022
Inspector:	Tashi Dwivedi, P.Eng., (H.P. Engineering)
Others in Party:	Charlemagne Charles and Sagar Chhayani, (H.P. Engineering)
Equipment Used:	Hammer, Tape, Camera and Chest waders
Weather	Sunny
Temperature	11°C

Additional Investigations Required	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	☐	☒	☐	\$ 10,000.00
DART Survey:	☒	☐	☐	
Detailed Coating Condition Survey:	☒	☐	☐	
Underwater Investigation	☒	☐	☐	
Fatigue Investigation:	☒	☐	☐	
Seismic Investigation:	☒	☐	☐	
Structure Evaluation:	☐	☒	☐	\$ 10,000.00
Load Posting - Estimated Load	0	Total Cost		\$ 20,000.00

Special Notes:

Bridge was closed at the time of the inspection. Superstructure is generally in poor condition should be replaced. A rehabilitation / replacement study is recommended (\$5,000.00). Existing deck barrier is substandard and should be replaced. Light to moderate scaling at water level. Medium diagonal crack at upper northwest corner of north abutment wall.

Medium vertical cracks with heavy efflorescence noted at south abutment wall. Stained cracks, localized delaminations, and light to moderate localized disintegration noted at wingwalls. Medium and wide horizontal cracks, large delaminations, and medium to severe spalls with exposed corroded reinforcement noted throughout floor beam. Numerous damp stains, medium & wide cracks, medium & large delaminations, large spalls noted at soffit. Light to moderate scaling with spalls and concrete disintegration observed on truss/ arches throughout.

Next Detailed Inspection: May 2024

Repair and Rehabilitation Required		Priority				Estimated Construction Cost
Element	Repair and Rehabilitation Required	6-10 years	1 - 5 years	Within 1 year	Urgent	
	Replace Structure	☐	☒	☐	☐	\$967,000.00
		☐	☐	☐	☐	
		☐	☐	☐	☐	
		☐	☐	☐	☐	
		☐	☐	☐	☐	
		☐	☐	☐	☐	
		☐	☐	☐	☐	
		☐	☐	☐	☐	
		☐	☐	☐	☐	
						\$967,000.00

Associated Work:	Comments	Estimated Cost
Approaches		
Detours		\$ 100,000.00
Traffic Control		\$60,000.00
Utilities		
Right of Way		
Environmental Study		\$ 100,000.00
Other		
Contingencies		
Total Cost		\$ 260,000.00

Justification

Construction Cost \$967,000.00
 Associated Costs \$ 260,000.00
 TOTAL Estimated Cost \$1,227,000.00

Municipal Structure Inspection Form

MTO Site Number

35-224

Element Data

Element Group	900	Abutments			
Element Name	901	Abutment Walls			
Location	North and south underside of structure				
Material	Cast-in-place concrete				
Element Type	Conventional closed	Element code	1		
Environment	Moderate				
Protection System	None				
Condition Data	Units	Ex.	Good	Fair	Poor
	Sq. m.	0	17.38	2.00	0

Length	
Width	5.70
Height	1.70
Count	2
Total Qnty.	19.38
Limited Insp.	
Suspected Performance Deficiencies	
-	-

Comments:
Light to moderate scaling at water level. Medium diagonal crack at upper northwest corner of north abutment wall. Medium vertical cracks with heavy efflorescence noted at south abutment wall.

Recommended Work:

Rehab	☐	Replace	☐	Maint. Needs	-	-
Urgent	☐	1-5 yrs	☐	6-10 yrs	☐	Urgent ☐ 1 year ☐

Element Group	900	Abutments			
Element Name	903	Wingwalls			
Location	NE, NW, SE & SW side of structure				
Material	Cast-in-place concrete				
Element Type	Reinforced concrete	Element code	6		
Environment	Moderate				
Protection System	None				
Condition Data	Units	Ex.	Good	Fair	Poor
	Sq. m.	0	18.40	2.00	2.00

Length	4.00
Width	
Height	1.40
Count	4
Total Qnty.	22.40
Limited Insp.	
Suspected Performance Deficiencies	
-	-

Comments:
Stained cracks, localized delaminations, and light to moderate localized disintegration observed.

Recommended Work:

Rehab	☐	Replace	☒	Maint. Needs	-	-
Urgent	☐	1-5 yrs	☒	6-10 yrs	☐	Urgent ☐ 1 year ☐

Element Group	1500	Signs			
Element Name	1501	Sign			
Location	NW, NE, SW, & SW of Structure				
Material	Steel				
Element Type	Hazard Signs x 4 Load Posting Signs x 2	Element code	N/A		
Environment	-				
Protection System	None				
Condition Data	Units	Ex.	Good	Fair	Poor
	Each	0	3	1	2

Length	
Width	
Height	
Count	6
Total Qnty.	6
Limited Insp.	
Suspected Performance Deficiencies	
-	-

Comments:
Small abrasions noted throughout. Southeast hazard sign leaning slightly. Northwest sign is damaged and north closing bridge sign is tilted.

Recommended Work:

Rehab	☐	Replace	☐	Maint. Needs	-	-
Urgent	☐	1-5 yrs	☐	6-10 yrs	☐	Urgent ☐ 1 year ☐

Municipal Structure Inspection Form

MTO Site Number

35-224

Element Data

Element Group	1600	Approaches				Length	6.00	
Element Name	1601	Wearing surface (app)				Width	4.90	
Location	North & South of Structure						Height	
Material	Gravel						Count	2
Element Type	N/A				Element code	N/A	Total Qnty.	58.8
Environment	Severe						Limited Insp.	
Protection System	None						Suspected Performance Deficiencies	
Condition Data	Units	Ex.	Good	Fair	Poor	9 Rough riding surface		
	Sq. m.	0	52.8	3.0	3.0			

Comments:
Several small potholes noted throughout both approaches.

Recommended Work: Rehab ☐ Replace ☐
Urgent ☐ 1-5 yrs ☐ 6-10 yrs ☐

Maint. Needs 12 Bridge surface repair
Urgent ☐ 1 year ☒

Element Group	400	Barriers				Length	0.25	
Element Name	403	Posts				Width	0.25	
Location	East & West Sides of Deck & Wingwalls						Height	1.00
Material	Cast-in-place concrete						Count	18
Element Type	N/A				Element code	N/A	Total Qnty.	18
Environment	Severe						Limited Insp.	
Protection System	None						Suspected Performance Deficiencies	
Condition Data	Units	Ex.	Good	Fair	Poor	08 Pedestrian / Vehicular Hazard		
	Each	0	4	6	8			

Comments:
Two missing posts at southeast and southwest. Other posts exhibit wide cracks and spalls with exposed corroded reinforcement. Barrier is substandard and should be replaced with code compliant barrier. Localized moderate scaling and spalls noted throughout.

Recommended Work: Rehab ☐ Replace ☒
Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐

Maint. Needs - -
Urgent ☐ 1 year ☐

Element Group	400	Barriers				Length	22.00	
Element Name	402	Railing Systems				Width	0.15	
Location	East & west side of structure						Height	0.15
Material	Cast-in-place concrete						Count	4
Element Type	Concrete Post and Railing				Element code	6	Total Qnty.	88
Environment	Severe						Limited Insp.	
Protection System	None						Suspected Performance Deficiencies	
Condition Data	Units	Ex.	Good	Fair	Poor	08 Pedestrian / Vehicular Hazard		
	m.	0	0	44	44			

Comments:
Numerous rails with wide cracks and spalls with exposed corroded reinforcement. Missing rails at south end. Barrier is substandard and should be replaced. Severe scaling also noted throughout.

Recommended Work: Rehab ☐ Replace ☒
Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐

Maint. Needs - -
Urgent ☐ 1 year ☐

Municipal Structure Inspection Form

MTO Site Number

35-224

Element Data

Element Group	500	Beams/ML'E's				Length	5.70	
Element Name	502	Floor Beams (Intermediate)				Width	0.30	
Location	Underside of structure							
Material	Cast-in-place concrete							
Element Type	Rectangular-solid	Element code	4				Height	0.30
Environment	Moderate						Count	6
Protection System	None						Total Qty.	51.3
Condition	Units	Ex.	Good	Fair	Poor	Limited Insp.		
Data	Sq. m.	0	41.3	5.0	5.0	Suspected Performance Deficiencies		
						1	Load Carrying capacity	

Comments:
Medium and wide horizontal cracks, large delaminations, and medium to severe spalls with exposed corroded reinforcement noted throughout. Concrete patchwork noted at some beam ends. One beam has been externally post tensioned.

Recommended Work: Rehab ☐ Replace ☒ Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐ Maint. Needs - - Urgent ☐ 1 year ☐

Element Group	100	Decks				Length	14.00	
Element Name	102	Deck top (exposed)				Width	5.70	
Location	Top of deck							
Material	Cast-in-place concrete							
Element Type	Cast-in-place conc on supports, composite	Element code	1				Height	
Environment	Severe						Count	1
Protection System	None						Total Qty.	79.8
Condition	Units	Ex.	Good	Fair	Poor	Limited Insp.		
Data	Sq. m.	0	0	39.9	39.9	Suspected Performance Deficiencies		
						9	Rough riding surface	

Comments:
Moderate scaling and small spalls noted throughout. Deck partially covered in gravel. Severe concrete disintegration and spalls with exposed corroded reinforcement on bridge deck.

Recommended Work: Rehab ☐ Replace ☒ Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐ Maint. Needs 02 Bridge Cleaning Urgent ☐ 1 year ☒

Element Group	100	Decks				Length	13.70	
Element Name	103	Soffit Thin Slab (Interior)				Width	5.70	
Location	Underside of deck							
Material	Cast-in-place concrete							
Element Type	N/A	Element code	N/A				Height	
Environment	Benign						Count	1
Protection System	None						Total Qty.	78.09
Condition	Units	Ex.	Good	Fair	Poor	Limited Insp.		
Data	Sq. m.	0	46.85	15.62	15.62	Suspected Performance Deficiencies		
						-	-	

Comments:
Numerous damp stains, medium & wide cracks, medium & large delaminations, and medium & large spalls with exposed corroded reinforcement noted throughout.

Recommended Work: Rehab ☐ Replace ☒ Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐ Maint. Needs - - Urgent ☐ 1 year ☐

Municipal Structure Inspection Form

MTO Site Number

35-224

Element Data

Element Group	1400	Embankments and Streams				Length	
Element Name	1402	Embankments				Width	
Location	NE, NW, SE & SW of structure					Height	
Material	Other					Count	4
Element Type	N/A	Element code	N/A			Total Qty.	4
Environment	-					Limited Insp.	
Protection System	None					Suspected Performance Deficiencies	
Condition Data	Units	Ex.	Good	Fair	Poor		
	Each	0	4	0	0		

Comments:
Embankments are moderately sloped, well vegetated. Minor erosion noted at northeast & northwest embankments. Sediment build up at northwest embankment.

Recommended Work:

Rehab	☐	Replace	☐	Maint. Needs	13	Erosion Control
Urgent	☐	1-5 yrs	☐	6-10 yrs	☐	Urgent ☐ 1 year ☒

Element Group	1400	Embankments and Streams				Length	
Element Name	1401	Streams and Waterways				Width	
Location	Under structure					Height	
Material	Native					Count	1
Element Type	N/A	Element code	N/A			Total Qty.	1
Environment	-					Limited Insp.	
Protection System	None					Suspected Performance Deficiencies	
Condition Data	Units	Ex.	Good	Fair	Poor		
	All	0	1	0	0		

Comments:
Moderate volume and low flow from west to east with no visible obstructions noted at the time of inspection.

Recommended Work:

Rehab	☐	Replace	☐	Maint. Needs	-	-
Urgent	☐	1-5 yrs	☐	6-10 yrs	☐	Urgent ☐ 1 year ☐

Element Group	1300	Foundations				Length	
Element Name	1301	Foundation (below ground level)				Width	
Location	Below abutment walls					Height	
Material	Unknown					Count	
Element Type	Foundation	Element code				Total Qty.	1
Environment	-					Limited Insp.	☒
Protection System	None					Suspected Performance Deficiencies	
Condition Data	Units	Ex.	Good	Fair	Poor		
	N/A	0	1	0	0		

Comments:
Foundations not visible; no signs of instability noted at time of inspection.

Recommended Work:

Rehab	☐	Replace	☐	Maint. Needs	-	-
Urgent	☐	1-5 yrs	☐	6-10 yrs	☐	Urgent ☐ 1 year ☐

Municipal Structure Inspection Form

MTO Site Number

35-224

Element Data

Element Group	600	Trusses/Arches				Length	14.60	
Element Name	602	Bottom chords				Width	0.40	
Location	East & West sides of structure					Height	0.50	
Material	Cast-in-place concrete					Count	2	
Element Type	Rectangular-solid		Element code	4		Total Qty.	52.56	
Environment	Severe					Limited Insp.		
Protection System	None					Suspected Performance Deficiencies		
Condition Data	Units	Ex.	Good	Fair	Poor			
	Sq. m.	0	42.56	5.00	5.00			

Comments: Light to moderate scaling throughout all exposed faces. Wide cracks at underside of west chord near south end. Large spall / disintegration at exterior vertical face at east chord. Large spall with exposed corroded reinforcement at interior vertical roadway face - east edge of deck.

Recommended Work: Rehab ☐ Replace ☒ Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐ Maint. Needs ☐ - Urgent ☐ 1 year ☐

Element Group	600	Trusses/Arches				Length	16.00	
Element Name	601	Top chords				Width	0.45	
Location	East & west sides of structure					Height	0.55	
Material	Cast-in-place concrete					Count	2	
Element Type	Rectangular-solid		Element code	4		Total Qty.	64.00	
Environment	Severe					Limited Insp.		
Protection System	None					Suspected Performance Deficiencies		
Condition Data	Units	Ex.	Good	Fair	Poor			
	Sq. m.	0	56.0	4.0	4.0			

Comments: Light to moderate scaling at bases of arches and at top of west arch. Spalls noted on north side of west arch.

Recommended Work: Rehab ☐ Replace ☒ Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐ Maint. Needs ☐ - Urgent ☐ 1 year ☐

Element Group	600	Trusses/Arches				Length	0.20	
Element Name	603	Verticals/diagonals				Width	0.20	
Location	East & west sides of structure					Height	1.20 (avg.)	
Material	Cast-in-place concrete					Count	6	
Element Type	Rectangular-solid		Element code	4		Total Qty.	5.76	
Environment	Severe					Limited Insp.		
Protection System	None					Suspected Performance Deficiencies		
Condition Data	Units	Ex.	Good	Fair	Poor			
	Sq. m.	0	0	2.88	2.88			

Comments: Severe spalls noted throughout, completely exposing corroded reinforcement. Some members have almost no concrete remaining over their entire height.

Recommended Work: Rehab ☐ Replace ☒ Urgent ☐ 1-5 yrs ☒ 6-10 yrs ☐ Maint. Needs ☐ - Urgent ☐ 1 year ☐

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.: 3-E



Photo 1 Structure from north approach



Photo 2 Structure from south approach

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.: 3-E



Photo 3 North approach from centre of structure



Photo 4 South approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.: 3-E

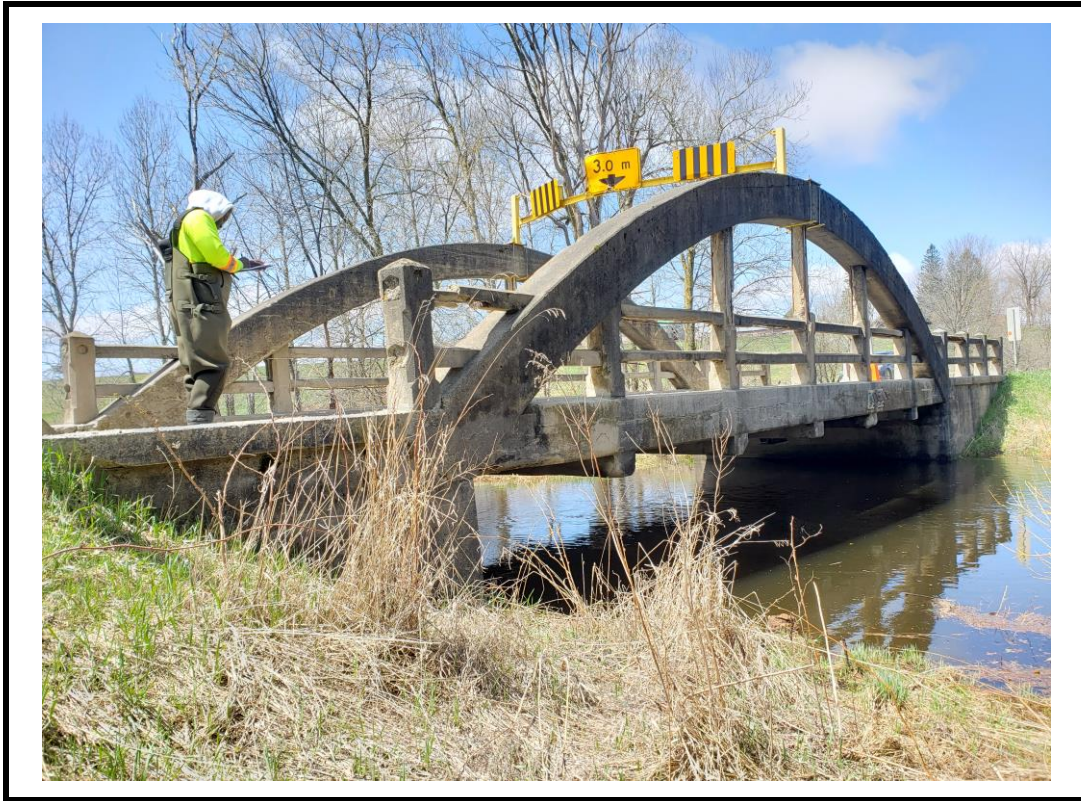


Photo 5 East elevation



Photo 6 West elevation



Photo 7 Concrete disintegration with exposed corroded rebar at northwest of deck barrier post



Photo 8 Severe spalling with exposed corroded rebar at rail in deck barrier



Photo 9 Spalls in exposed concrete deck top



Photo 10 Spall with exposed corroded rebar and sheared railing in deck barrier at southeast corner



Photo 11 Spalls with exposed corroded rebar and delamination at soffit



Photo 12 Large spalls with exposed corroder reinforcement at underside of floor beams and post tensioning system



Photo 13 Large spalls with exposed corroded rebar noted at soffit in between girders



Photo 14 Moderate erosion and scaling were noted at and below the waterline on north abutment wall



Photo 15 Moderate erosion and scaling were noted at and below the waterline on south abutment wall



Photo 16 Wide cracks noted at underside of west chord near south end

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