

**Cultural Heritage Evaluation and
Heritage Impact Assessment:
Norwich Street Bridge**

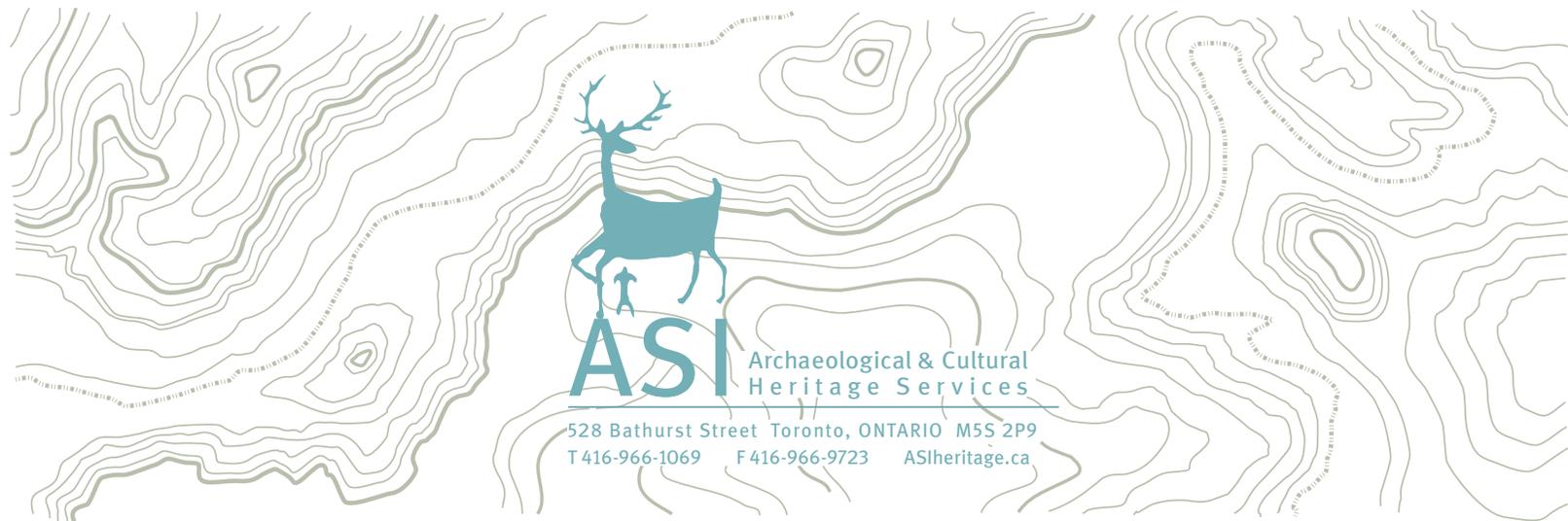
**Norwich Street over the Speed River
City of Guelph, Ontario**

Prepared for:

GM BluePlan Engineering Limited
650 Woodlawn Road West
Guelph, ON N1K 1B8
T 905-356-7003

ASI File 16EA-093

November 2016



**Cultural Heritage Evaluation and
Heritage Impact Assessment:
Norwich Street Bridge**

**Norwich Street over the Speed River
City of Guelph, Ontario**

EXECUTIVE SUMMARY

ASI was contracted by GM BluePlan to conduct a Cultural Heritage Evaluation and Heritage Impact Assessment of the Norwich Street Bridge as part of the Reconstruction of Norwich Bridge Municipal Class Environmental Assessment study. The study area encompasses the bridge, which is located on Norwich Street between Arthur Street North and Cardigan Street and is designated under Part IV of the *Ontario Heritage Act* (City of Guelph By-Law [1998] – 15786).

This report will establish the cultural heritage significance of the Norwich Street Bridge and assess impacts of the proposed undertaking in consideration of its determined cultural heritage value. The bridge carries pedestrian traffic over the Speed River in the City of Guelph, Ontario. According to available bridge documentation and existing plaques on the bridge itself, the Norwich Street Bridge was built in 1882 (City of Guelph Designation By-Law, 1998).

The Norwich Street Bridge is currently protected under Regulation 9/06 of the *Ontario Heritage Act*. Its heritage significance is based upon its design, associative, and contextual value given the relative rarity of comparable structures in the City of Guelph, the associations with the Hamilton Bridge Company and the industrial history of the City, and its continued association with settlement, growth, and economic development in this part of the City of Guelph.

Following the evaluation of potential impacts on the heritage resource (see Table 2), it was determined that Conservation Alternatives 1 – 3 are the typically the preferred alternatives, given that no impacts are expected to the heritage resource and its identified heritage attributes. To extend the service life of the bridge, **Alternative 3 is the preferred alternative, as it will both retain heritage features and maintain the current use of the structure.** The remaining conservation alternatives (4 – 9) have a range of impacts, with Alternatives 8 and 9 being the least preferred options given the level and nature of the impacts resulting from removal of the bridge.

Given the identified heritage value of the Norwich Street Bridge, the following recommendations and mitigation measures should be considered and implemented:

1. **Conservation Alternative 3 is the preferred alternative.** As part of the selection of the preferred alternatives as part of the Environmental Assessment, a clear rationale for the proposed course of action should be documented.
2. A Strategic Conservation Plan providing guidance for managing change over the lifespan of the structure should be completed by a qualified heritage professional and reviewed by heritage staff at the City of Guelph.
3. This report should be filed with the heritage staff at the City of Guelph, the local history section of the Guelph Public Library, the Archives of Ontario, and other local heritage stakeholders that may have an interest in this project.

4. This report should be filed with the Ministry of Tourism, Culture and Sport for review and comment.
5. Should retention of the bridge be chosen as the preferred alternative (one of Conservation Alternatives 1 – 7), the character-defining elements identified in Section 8.1 should be retained and treated sympathetically.



**ARCHAEOLOGICAL SERVICES INC.
CULTURAL HERITAGE DIVISION**

PROJECT PERSONNEL

<i>Senior Project Manager:</i>	Lindsay Graves, MA, CAHP <i>Cultural Heritage Specialist Assistant Manager, Cultural Heritage Division</i>
<i>Project Manager:</i>	Joel Konrad, Ph.D. <i>Cultural Heritage Specialist</i>
<i>Project Coordinator:</i>	Sarah Jagelewski, Hon. BA <i>Staff Archaeologist and Assistant Manager of the Environmental Assessment Division</i>
<i>Project Administrator:</i>	Carol Bella, Hon. BA <i>Research Archaeologist</i>
<i>Report Preparation:</i>	Joel Konrad
<i>Graphics Preparation:</i>	Blake Williams, MLitt <i>Geomatics Specialist</i>
<i>Report Reviewer:</i>	Lindsay Graves



TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
PROJECT PERSONNEL	iii
TABLE OF CONTENTS	iv
1.0 INTRODUCTION	1
2.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT CONTEXT	2
2.1 Legislation and Policy Context	2
2.2 Municipal Consultation	5
2.3 Cultural Heritage Evaluation and Heritage Impact Assessment Report	5
3.0 HISTORICAL CONTEXT AND CONSTRUCTION	6
3.1 Introduction.....	6
3.2 Local History and Settlement	7
3.2.1 Guelph Township.....	7
3.2.2 City of Guelph.....	7
3.3 History of the Study Area, Norwich Street Bridge, and Previous Bridge Crossings	7
3.3.1 <i>Hamilton Bridge Works Company Ltd., Hamilton, Ontario</i>	9
3.4 Bridge Construction.....	14
3.4.1 <i>Early Bridge Building in Ontario</i>	14
3.4.2 <i>Construction of the Norwich Street Bridge</i>	14
4.0 EXISTING CONDITIONS AND INTEGRITY	14
4.1 Comparative Geographic and Historic Context of Pony Truss Bridges	17
4.2 Additional Cultural Heritage Resources	18
5.0 HERITAGE EVALUATION OF THE NORWICH STREET BRIDGE	18
6.0 STATEMENT OF CULTURAL HERITAGE VALUE.....	20
7.0 ALTERNATIVES TO BE CONSIDERED FOR HERITAGE BRIDGES AS PART OF THE ENVIRONMENTAL ASSESSMENT PROCESS.....	21
8.0 ENVIRONMENTAL ASSESSMENT OPTIONS.....	22
8.1 Evaluation of Impacts	22
8.2 Preferred Option	22
9.0 RECOMMENDATIONS	25
10.0 REFERENCES	26
APPENDIX A: Photographic Plates	28
APPENDIX B: Select Structural Drawings	38
APPENDIX C: Bridge Alternatives (GM BluePlan – 2015)	41

LIST OF FIGURES

Figure 1: Location of the Study Area.	1
Figure 2: The study area overlaid on 1856 mapping	10
Figure 3: The study area overlaid on the 1868 mapping	10
Figure 4: The study area overlaid on 1872 Mapping	11
Figure 5: The study area overlaid on 1915 mapping.....	11
Figure 6: The study area overlaid on the 1935 mapping	12
Figure 7: 1948 photography of the subject bridge following a heavy flood	12
Figure 8: The study area overlaid on 1965 mapping	13
Figure 9: The study area overlaid on 1975 mapping	13
Figure 10: Orthographic image of the subject bridge	16
Figure 11: Structural drawings of the bridge, 2001.	39
Figure 12: Structural drawings of the bridge, 1948.....	40

LIST OF TABLES



Table 1: Evaluation of the Norwich Street Bridge using Ontario Regulation 9/06 19
Table 2: Evaluation of the Potential Impacts of Bridge Improvement Alternatives on the Cultural Heritage
Resource and Identified Heritage Attributes 23



1.0 INTRODUCTION

ASI was contracted by GM BluePlan to conduct a Cultural Heritage Evaluation and Heritage Impact Assessment of the Norwich Street Bridge as part of the Reconstruction of Norwich Bridge Municipal Class Environmental Assessment study. The study area encompasses the bridge, which is located on Norwich Street between Arthur Street North and Cardigan Street and is designated under Part IV of the *Ontario Heritage Act* (City of Guelph By-Law [1998] – 15786).

This report will establish the cultural heritage significance of the structure and assess impacts of the proposed undertaking in consideration of its determined cultural heritage value. The bridge carries pedestrian traffic over the Speed River in the City of Guelph, Ontario (Figure 1).

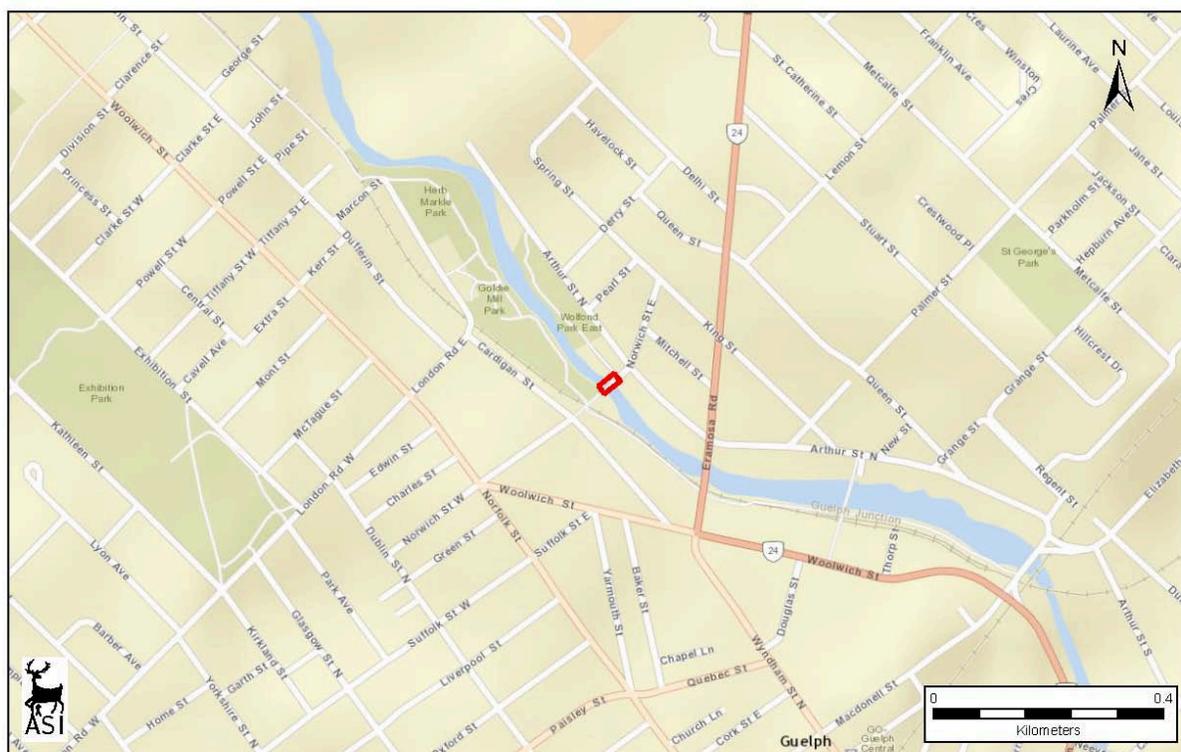


Figure 1: Location of the Study Area.

Base Map: ©OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA ESRI Street Maps)

The following report is presented as part of an approved planning and design process subject to Environmental Assessment (EA) requirements. This portion of the EA study is intended to address the proposed replacement/rehabilitation of the subject structure. The principal aims of this report are to:

- Describe the methodology that was employed and the legislative and policy context that guides heritage evaluations of bridges over 40 years old;
- Provide an historical overview of the design and construction of the bridge within the broader context of the surrounding township and bridge construction generally;



- Describe existing conditions and heritage integrity;
- Evaluate the bridge using Regulation 9/06 of the *Ontario Heritage Act* and draw conclusions about the heritage attributes of the structure; and
- Assess impacts of the undertaking, ascertaining sensitivity to change in the context of identified heritage attributes and recommend appropriate mitigation measures.

2.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT CONTEXT

2.1 Legislation and Policy Context

This cultural heritage assessment considers cultural heritage resources in the context of improvements to specified areas, pursuant to the *Environmental Assessment Act*. This assessment addresses above ground cultural heritage resources over 40 years old. Use of a 40-year-old threshold is a guiding principle when conducting a preliminary identification of cultural heritage resources (Ministry of Transportation 2006; Ministry of Transportation 2007; Ontario Realty Corporation 2007). While identification of a resource that is 40 years old or older does not confer outright heritage significance, this threshold provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from retaining heritage value.

For the purposes of this assessment, the term cultural heritage resources was used to describe both cultural heritage landscapes and built heritage resources. A cultural landscape is perceived as a collection of individual built heritage resources and other related features that together form farm complexes, roadscares and nucleated settlements. Built heritage resources are typically individual buildings or structures that may be associated with a variety of human activities, such as historical settlement and patterns of architectural development.

The analysis throughout the study process addresses cultural heritage resources under various pieces of legislation and their supporting guidelines. Under the *Environmental Assessment Act* (1990) environment is defined in Subsection 1(c) to include:

- cultural conditions that influence the life of man or a community, and;
- any building, structure, machine, or other device or thing made by man.

The Ministry of Tourism, Culture and Sport is charged under Section 2 of the *Ontario Heritage Act* with the responsibility to determine policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario and has published two guidelines to assist in assessing cultural heritage resources as part of an environmental assessment: *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (1992), and *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (1981). Accordingly, both guidelines have been utilized in this assessment process.

The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (Section 1.0) states the following:

When speaking of man-made heritage we are concerned with the works of man and the effects of his activities in the environment rather than with movable human artifacts or those environments that are natural and completely undisturbed by man.



In addition, environment may be interpreted to include the combination and interrelationships of human artifacts with all other aspects of the physical environment, as well as with the social, economic and cultural conditions that influence the life of the people and communities in Ontario. The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* distinguish between two basic ways of visually experiencing this heritage in the environment, namely as cultural heritage landscapes and as cultural features.

Within this document, cultural heritage landscapes are defined as the following (Section 1.0):

The use and physical appearance of the land as we see it now is a result of man's activities over time in modifying pristine landscapes for his own purposes. A cultural landscape is perceived as a collection of individual man-made features into a whole. Urban cultural landscapes are sometimes given special names such as townscapes or streetscapes that describe various scales of perception from the general scene to the particular view. Cultural landscapes in the countryside are viewed in or adjacent to natural undisturbed landscapes, or waterscapes, and include such land uses as agriculture, mining, forestry, recreation, and transportation. Like urban cultural landscapes, they too may be perceived at various scales: as a large area of homogeneous character; or as an intermediate sized area of homogeneous character or a collection of settings such as a group of farms; or as a discrete example of specific landscape character such as a single farm, or an individual village or hamlet.

A cultural feature is defined as the following (Section 1.0):

...an individual part of a cultural landscape that may be focused upon as part of a broader scene, or viewed independently. The term refers to any man-made or modified object in or on the land or underwater, such as buildings of various types, street furniture, engineering works, plantings and landscaping, archaeological sites, or a collection of such objects seen as a group because of close physical or social relationships.

Additionally, the *Planning Act* (1990) and related *Provincial Policy Statement (PPS)*, which was updated in 2014, make a number of provisions relating to heritage conservation. One of the general purposes of the *Planning Act* is to integrate matters of provincial interest in provincial and municipal planning decisions. In order to inform all those involved in planning activities of the scope of these matters of provincial interest, Section 2 of the *Planning Act* provides an extensive listing. These matters of provincial interest shall be regarded when certain authorities, including the council of a municipality, carry out their responsibilities under the *Act*. One of these provincial interests is directly concerned with:

2.(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest

Part 4.7 of the *PPS* states that:

The official plan is the most important vehicle for implementation of this Provincial Policy Statement. Comprehensive, integrated and long-term planning is best achieved through official plans.



Official plans shall identify provincial interests and set out appropriate land use designations and policies. To determine the significance of some natural heritage features and other resources, evaluation may be required.

Official plans should also coordinate cross-boundary matters to complement the actions of other planning authorities and promote mutually beneficial solutions. Official plans shall provide clear, reasonable and attainable policies to protect provincial interests and direct development to suitable areas.

In order to protect provincial interests, planning authorities shall keep their official plans up-to-date with this Provincial Policy Statement. The policies of this Provincial Policy Statement continue to apply after adoption and approval of an official plan.

Those policies of particular relevance for the conservation of heritage features are contained in Section 2-Wise Use and Management of Resources, wherein Subsection 2.6 - Cultural Heritage and Archaeological Resources, makes the following provisions:

2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved.

A number of definitions that have specific meanings for use in a policy context accompany the policy statement. These definitions include built heritage resources and cultural heritage landscapes.

A built heritage resource is defined as: “a building, structure, monument, installation or any manufactured remnant that contributes to a property’s cultural heritage value or interest as identified by a community, including an Aboriginal community” (PPS 2014).

A cultural heritage landscape is defined as “a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Aboriginal community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association” (PPS 2014). Examples may include, but are not limited to farmscapes, historic settlements, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways, and industrial complexes of cultural heritage value.

In addition, significance is also more generally defined. It is assigned a specific meaning according to the subject matter or policy context, such as wetlands or ecologically important areas. With regard to cultural heritage and archaeology resources, resources of significance are those that are valued for the important contribution they make to our understanding of the history of a place, an event, or a people (PPS 2014).

Criteria for determining significance for the resources are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used. While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation (PPS 2014).

Accordingly, the foregoing guidelines and relevant policy statement were used to guide the scope and methodology of the cultural heritage assessment.



2.2 Municipal Consultation

The City of Guelph heritage planner, Stephen Robinson, was consulted for additional information on the bridge, during which time all heritage documentation pertaining to the bridge was provided.¹

2.3 Cultural Heritage Evaluation and Heritage Impact Assessment Report

The scope of a Cultural Heritage Evaluation (CHE) is guided by the Ministry of Tourism, Culture and Sport's *Ontario Heritage Toolkit* (2006). Generally, CHEs include the following components:

- A general description of the history of the study area as well as a detailed historical summary of property ownership and building(s) development;
- A description of the cultural heritage landscape and built heritage resources;
- Representative photographs of the exterior and interior of a building or structure, and character-defining architectural details;
- A cultural heritage resource evaluation guided by the *Ontario Heritage Act* criteria;
- A summary of heritage attributes;
- Historical mapping, photographs; and
- A location plan.

Using background information and data collected during the site visit, the cultural heritage resource is evaluated using criteria contained within Ontario Regulation 9/06 of the *Ontario Heritage Act*.

Ontario Regulation 9/06 provides a set of criteria, grouped into the following categories which determine the cultural heritage value or interest of a potential heritage resource in a municipality:

- i) Design/Physical Value;
- ii) Historical/Associative Value; and
- iii) Contextual Value.

As the heritage resource is designated under the *Ontario Heritage Act*, a Heritage Impact Assessment (HIA) is required and the resource considered for designation under the *Ontario Heritage Act*.

In early 2011, the Ministry of Tourism and Culture (MTC) indicated that bridges not owned by the Ministry of Transportation be evaluated against Ontario Regulation 9/06 and not the Ministry of Transportation's *Ontario Heritage Bridge Guidelines* (Interim, 2008) or the *Ontario Heritage Bridge Program* (1991). With this in mind, the MTC recommends that a Heritage Impact Assessment is necessary for structures found to have potential heritage significance, as determined by the cultural heritage evaluation (MTC, June 2011).

The scope of a Heritage Impact Assessment (HIA) is provided by the MTC's *Ontario Heritage Tool Kit*. An HIA is a useful tool to help identify cultural heritage value and provide guidance in supporting environmental assessment work. As part of a heritage impact assessment, proposed site alterations and project alternatives are analyzed to identify impacts of the undertaking on the heritage resource and its

¹ Meeting occurred 19 October 2016.



heritage attributes. The impact of the proposed development on the cultural heritage resource is assessed, with attention paid to identifying potential negative impacts, which may include, but not limited to:

- Destruction of any, or part of any, significant heritage attributes or features;
- Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance;
- Shadows created that alter the appearance of a heritage attribute or change the viability of an associated natural feature or plantings, such as a garden;
- Isolation of a heritage attribute from its surrounding environment, context or a significant relationship;
- Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features;
- A change in land use (such as rezoning a church to a multi-unit residence) where the change in use negates the property's cultural heritage value;
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect a cultural heritage resource, including archaeological resources.

Where negative impacts of the development on the cultural heritage resource are identified, mitigative or avoidance measures or alternative development or site alteration approaches are considered.

3.0 HISTORICAL CONTEXT AND CONSTRUCTION

3.1 Introduction

Built in 1882, the Norwich Street Bridge is a single span, riveted Pratt pony truss bridge carrying pedestrian traffic over the Speed River in a generally east-west orientation in the City of Guelph, Ontario. Historically, the study area is located within part of Bridge Street, Part of the Island at the foot of Norwich Street, in River Speed, Registered Plan 8 and Part of the Bed of River Speed in the City of Guelph, Ontario (Figures 2 and 3).

Cultural heritage resources are those buildings or structures that have one or more heritage attributes. Heritage attributes are constituted by and linked to historical associations, architectural or engineering qualities and contextual values. Inevitably many, if not all, heritage resources are inherently tied to "place"; geographical space, within which they are uniquely linked to local themes of historical activity and from which many of their heritage attributes are directly distinguished today. In certain cases, however, heritage features may also be viewed within a much broader context. The following section of this report details a brief historical background to the settlement of the surrounding area. A description is also provided of the construction of the bridge within its historical context.



3.2 Local History and Settlement

3.2.1 Guelph Township

Guelph Township is named after the Royal House of Brunswick, family of the English monarch, George IV. Guelph Township was surveyed by John MacDonald in 1830 and the land in the township was purchased by the Canada Company, which consisted of a group of British speculators who acquired more than two million acres of land in Upper Canada for colonization purposes (Mika and Mika 1981:186). A large number of settlers arrived in the township before it was surveyed. The first settler in the township was Samuel Rife, who squatted near the western limits of the township around the year 1825.

Waterloo Road, formerly Broad Road, was built by Absalom Shade and was finished around 1827, the year the Town of Guelph was founded (Mika and Mika 1981:186). Many settlers arrived in the township between the years 1827 and 1830.

3.2.2 City of Guelph

While the present boundaries for the City of Guelph fall within the former Townships of Puslinch and Guelph, the historic community of Guelph was situated on the River Speed in Guelph Township. Guelph was first laid out by a novelist named John Galt, head of the Canada Company, in 1827. The original plan for the town depicted lots reserved for the company offices, a saw mill, a market square, two churches and a burial ground. Registered plans of subdivision for this village date from 1847-1865. The first settlers were attracted here in the next few years. By the late 1840s, the population of Guelph had reached 1,480, and it was incorporated as a town in 1850. It was also selected as the capital of Wellington County, and it was also deemed to be an inland port of entry. The population had reached 6, 878 by 1873. By April 1879, the population exceeded 10,000 and Guelph was incorporated as a city. Guelph contained a wide variety of trades and professions by the 1840s (see Johnson 1977:83). By the 1870s, Guelph contained churches, banks, insurance agencies, a library, two newspapers, telegraph offices, hotels, stores, flour, saw, and planing mills, woollen factories, foundries, machinery works, sewing machine works, musical instrument manufacturers, tanneries, soap and candle factories, shoemakers, wooden ware manufacturers, and two breweries. It was a station for both the Grand Trunk and Canadian Pacific Railways. Guelph was built on a number of hills which gives it a picturesque appearance, and a number of fine heritage structures in the city were built out of native limestone (Cameron 1967; Crosby 1873: 134; Fischer & Harris 2007: 132; Rayburn 1997: 145; Scott 1997: 94-95; Winearls 1991:680-684).

3.3 History of the Study Area, Norwich Street Bridge, and Previous Bridge Crossings

Historically, the subject bridge crossing is located in part of Bridge Street, Part of the Island at the foot of Norwich Street, in the River Speed, Registered Plan 8 and Part of the Bed of the River Speed, in the City of Guelph, Ontario. A review of existing materials held at the City of Guelph, as well as historic mapping, archival records, council minutes, and periodicals confirmed that an earlier, wooden bridge was originally constructed in the location of present structure. This earlier structure was removed when the current structure was erected in 1882. Further, research revealed an 1856 survey indicating a proposed bridge at this location, undertaken by Frederic George (Figure 2). This earlier bridge was removed when the extant structure was erected in 1930.



According to the 1868 James Hobson *Map of the City of Guelph*, Norwich Street is an historically surveyed road in the City of Guelph (Figure 3). Significant development is visible on either side of the bridge, with a street pattern reflective of nineteenth-century urban development. While the hand-drawn map has faded, one can still clearly make out Norwich Street, which runs in a generally east-west direction. The street crosses the Speed River and turns to the north just northeast of the city centre. While no plans for the former wooden bridge exist, Council Minutes from 1869 reveal that \$410 was levied to pay J and J Hall to complete masonry and wood work on the existing Wellington Foundry Bridge (Norwich Street Bridge). In 1875, Joseph Hobson was commissioned to complete drawing plans for a new bridge to replace the existing Wellington Foundry Bridge, though miscellaneous funds were allotted to bridge repair for the wooden bridge in 1873 and 1875 (City of Guelph, Heritage File). In 1882, the Roads and Bridges Committee and the Board of Works passed a motion that \$1000 be allotted to the construction of a new, iron bridge crossing the Speed River at Norwich Street. The work was initiated in October, 1882 and in December of that year, a full payment of \$2003.00 was made to the Hamilton Bridge Company to construct both the Neeve Bridge and the Norwich Street Bridge (City of Guelph, Heritage File).

The *Bird's Eye View of Guelph*, published in 1872 (Figure 4), depicts the original wooden bridge within the broader, urban landscape of the immediate area. The map indicates industrial buildings to the north of the bridge, though very little development on other locations adjacent to the bridge.

The 1915 *Planning Map of the City of Guelph* (Figure 5) confirms that the crossing was still in use at that time. The Canada Ingot Iron Culvert Company is pictured directly to the north of the structure. Generally, the area surrounding the bridge can be described as industrial and commercial.

Topographic mapping from 1935 (Figure 6) depicts Norwich Street in its present alignment with the current bridge carrying the road over the Speed River. The Canada Ingot Iron Culvert Company is depicted in the same location as earlier mapping, with additional structures identified to the south and southeast of the structure. The 1935 mapping thus confirms that a high degree of commercial and industrial development had occurred on the banks of the Speed River to the north and south of the subject bridge.

In the spring of 1948, heavy flood waters eroded the stone foundations of the west bank, causing the west end of the bridge to sink and the bridge to be impassible (Figure 7). According to a *Guelph Mercury* article published on 30 March 1948, the northwestern corner of the bridge dropped two feet below road level, forcing traffic to be rerouted while the bridge was closed for repairs (*Guelph Mercury*, 1948).

Topographic mapping from 1965 (Figure 8) confirms the existence of the bridge and the present alignment of Norwich Street. The map clearly depicts industrial development to the south of the bridge, along with the Guelph Junction Railway passing to the west of the structure across Norwich Street. Of note is the addition of industrial development to the northwest of the bridge, where a concentration of substantial industrial buildings is depicted.

Topographic mapping from 1975 (Figure 9) depicts Norwich Street in its present alignment with the current bridge carrying the road over the Speed River. The map depicts a general change in land use surrounding the bridge, with the removal of industrial buildings to the north and south, including the original Canada Ingot Iron Culvert Company.



3.3.1 Hamilton Bridge Works Company Ltd., Hamilton, Ontario

The design and the steel used in the construction of the Norwich Street Bridge was supplied by the Hamilton Bridge Works Company Limited, a manufacturer based in Hamilton, Ontario. The company was founded by Sir John Hendrie, 11th Lieutenant Governor of Ontario, around 1872 as a manufacturer of machine tools and named the Hamilton Tools Works. Soon after its inception, the company became involved in the construction of simple railway bridges, including structures for the Great Western Railway and was soon renamed the Hamilton Bridge and Tool Works. The company's first major bridge contract was the swing bridge over the Burlington Canal for the Hamilton & North Western Railway in 1876.

The company was renamed the Hamilton Bridge Works Co. Limited in 1894 and sold to J.H. Tildon soon after. Tildon placed particular emphasis on steel bridge and building construction and was awarded the Bloor Street Viaduct in Toronto in 1910 for his efforts. The company's operations were expanded in 1913 when it began work on the Canadian Pacific Office building in Toronto. Increased demand for steel used in shipbuilding during World War I offered another avenue for expansion and the company expanded to fill demand. The name was once again changed to the Hamilton Bridge Company Limited in 1928, though it still provided steel for a wide variety of projects, including the Bank of Commerce Building, Toronto, as well as the manufacturing of armored vehicles during World War II.

Subsidiary companies were established in the 1940s and 1950s. In 1954 the Bridge and Tank Company of Canada Limited subsumed the Hamilton Bridge Company and its subsidiaries and the company was renamed the Hamilton Bridge and Tank Company. Some of the company's projects include the Blue Water Bridge in Sarnia, the reconstruction of the Victoria Bridge in Montreal, the Burlington Canal lift bridge, the Burlington Skyway Bridge, and the Lion's Gate Bridge in Vancouver. The company closed in 1984.



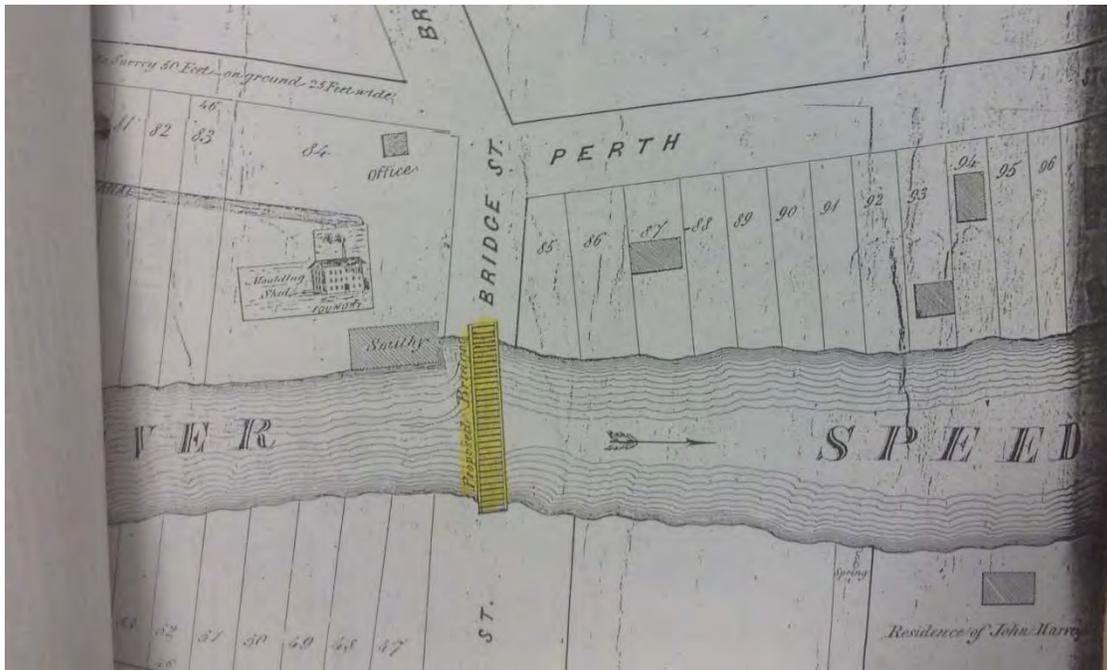


Figure 2: The study area overlaid on 1856 mapping

Base Map: *Frederick George's Plan, 1856*



Figure 3: The study area overlaid on the 1868 mapping

Base Map: *James Hobson, 1868.*





Figure 4: The study area overlaid on 1872 Mapping

Base Map: *Bird's Eye View of Guelph, 1872*

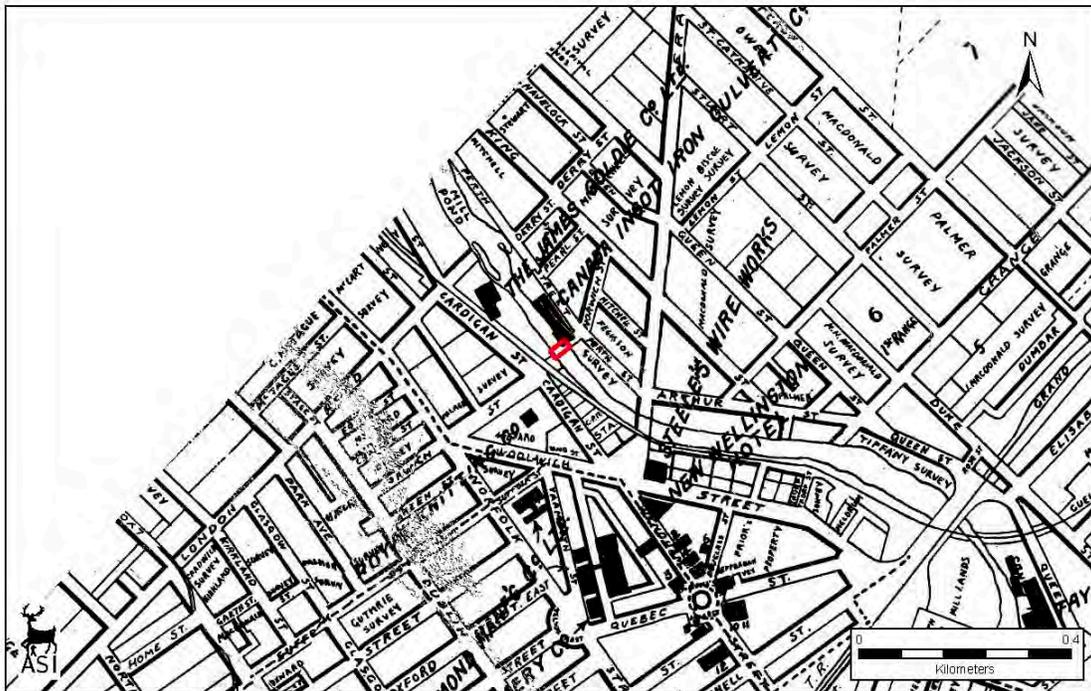


Figure 5: The study area overlaid on 1915 mapping

Photo Reference: *City of Guelph Planning Map, 1915*



Figure 6: The study area overlaid on the 1935 mapping
Base Map: NTS Sheets 40/P-09 (Guelph) (Department of Energy, Mines and Resources 1935)

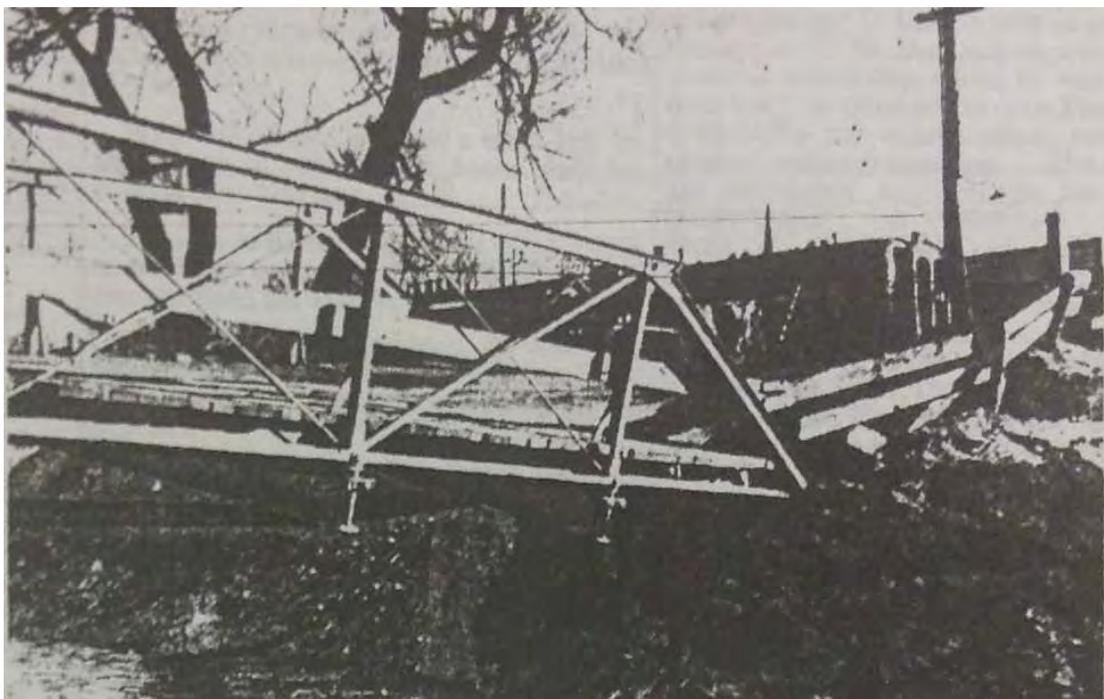


Figure 7: 1948 photography of the subject bridge following a heavy flood
Base Map: *the Guelph Mercury*, 1948

3.4 Bridge Construction

3.4.1 Early Bridge Building in Ontario

Up until the 1890s, timber truss bridges were the most common bridge type built in southern Ontario. Stone and wrought iron materials were also employed but due to higher costs and a lack of skilled craftsmen, these structures were generally restricted to market towns. By the 1890s, steel was becoming the material of choice when constructing bridges given that concrete was less expensive and more durable than its wood and wrought iron predecessors. Steel truss structures were very common by 1900, as were steel girder bridges. The use of concrete in constructing bridges was introduced at the beginning of the twentieth century, and by the 1930s, it was challenging steel as the primary bridge construction material in Ontario (Ministry of Culture and Ministry of Transportation [n.d.]:7-8).

3.4.2 Construction of the Norwich Street Bridge

Built in 1882, the Norwich Street Bridge is a single span, riveted Pratt pony truss bridge carrying pedestrian traffic over the Speed River in a generally east-west orientation in the City of Guelph, Ontario. Historically, the study area is located within part of Bridge Street, Part of the Island at the foot of Norwich Street, in River Speed, Registered Plan 8 and Part of the Bed of River Speed in the City of Guelph, Ontario. According to available documentation, the bridge was designed and constructed in 1882 by the Hamilton Bridge Works Company Ltd. The structure was constructed to replace an earlier wooden, single-span bridge. Although drawings for the original bridge are not available, repair drawings from 1948 and structural drawings from 2001 are available (Appendix B).

According to the available reference documents, refurbishments were undertaken on the subject bridge in 1948 (City of Guelph, Heritage File).

4.0 EXISTING CONDITIONS AND INTEGRITY

A field review was undertaken by Joel Konrad on 19 October 2016 to conduct photographic documentation of the bridge crossing and to collect data relevant for completing a heritage evaluation of the structure. Results of the field review and existing documentation received from the client and provided by the City of Guelph were then utilized to describe the existing conditions of the bridge crossing. This section provides a general description of the bridge crossing and associated cultural heritage features. For ease of description the bridge is considered to have an east-west orientation. Photographic documentation of the bridge crossing is provided in Appendix A.

The single-span, riveted steel Pratt pony truss bridge was designed and built in 1882 to carry one lane of Norwich Street over the Speed River. In 1962, a pedestrian walkway was added to the south side of the bridge and, due to increased public pressure, the entire structure was converted to a pedestrian bridge sometime after 2002 (Triton Engineering 2002: 1). In 1994, the compression ties required significant strengthening and thus repairs were undertaken to reconstruct the tension tie connections to maintain the minimum load capacity (Triton Engineering 2002: 1). The bridge consists of original steel truss members and tension cables, painted green, which make up the superstructure of the span. Riveting is present on the truss members, with metal plates bolted to some of the steel members, likely to add further strength to the structure. At the north end of the span, along the top horizontal member, the words “Hamilton Bridge Co



Builders Hamilton, ONT. 1882” has been imprinted at either end of the bridge. In addition, a metal plaque has been fashioned to the top horizontal member with the following words inscribed:

Norwich Street Bridge. This steel and iron bridge, built in 1882 by the Hamilton Bridge Co., facilitated the movement of material in this nineteenth century industrial area and today is a distinctive heritage feature of the Goldie Hill Neighborhood. Designated as a structure of historical and architectural interest by the City of Guelph, 1998.

Between the trusses, wood boards between have been laid down to serve as the deck. A modern, metal railing system has been added to the bridge deck, flanking the deck within the truss superstructure. Guiderails have been placed at the northeast and northwest quadrants of the bridge approaches and continue within the truss structure along the north side of the bridge. A former pedestrian walkway was cantilevered to the south side of the bridge in 1962 and is fabricated of metal painted green.

The bridge rests on stone foundations covered in concrete. A stone retaining wall stretches north from the bridge at the northeast quadrant while a concrete wingwall extends from the west abutment at the northwest quadrant. The approaches to the bridge are paved, with signage indicating the bridge is closed to vehicular traffic.

The bridge crossing is bounded primarily by park land at the northwest, northeast, and southwest quadrants. These parklands are characterized predominantly by deciduous trees lining the Speed River on both the east and west banks, with grassland approximately ten metres from the bank at the northwest and southwest quadrants and the Guelph Junction Railway tracks approximately 40 metres from the bank of the Speed River. Residential lots are located along the banks of the Speed River at the southeast quadrant, while stone row-houses are located approximately 30 metres east of the bank of the Speed River at the northeast quadrant of the bridge.



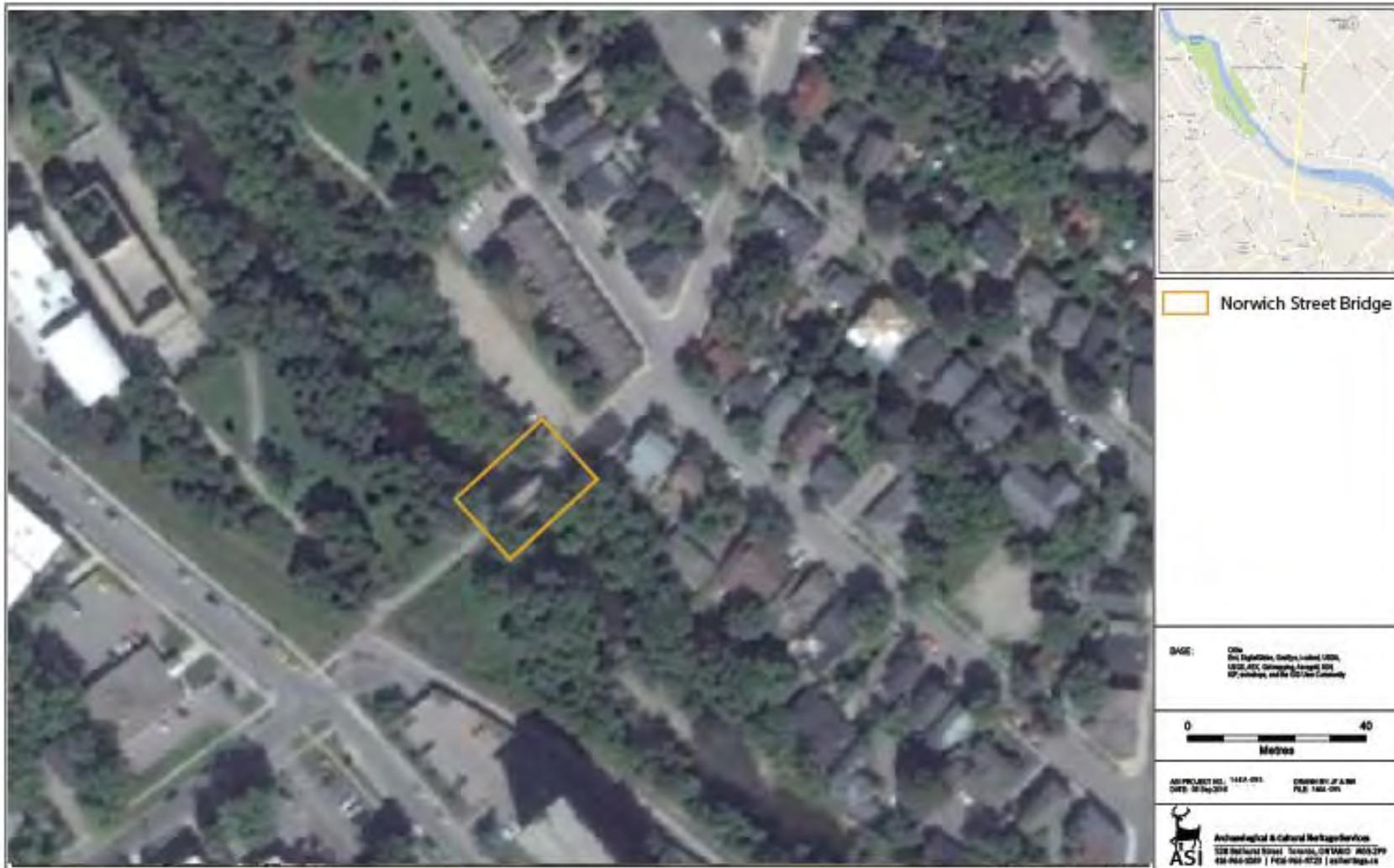


Figure 10: Orthographic image of the subject bridge

Base Map: ESRI DigitalGlobe

The Norwich Street Bridge is currently owned and maintained by the City of Guelph. According to an inspection report undertaken in 2002 by Triton Engineering Services, the structure features a total deck length of 16.7 metres (Triton Engineering 2002: 1). The following results were noted in the report:

A detailed visual inspection was conducted by Triton Engineering Services Limited in November 2000 as part of the City of Guelph's annual bridge inspection program. The investigation revealed significant deterioration and corrosion and recommended immediate repairs for further testing. In 2001 several knee braces were replaced to improve the stability of the trusses and timber curbs were added for protection of the trusses. A detailed steel corrosion survey was then conducted to determine the existing load capacity of the trusses in accordance with the Canadian Highway Bridge Design Code (CHBDC)...The bridge has been posted for a restricted load limit of 5 tonnes, equivalent to a light delivery truck, since 1976, when the bridge was under the jurisdiction of the MTO...the analysis has revealed that many of the bridge components have scale down factors well below the minimum threshold. Some components rated as low as 33% below threshold. This type of bridge structure has very little redundancy in terms of load carrying capacity and failure of a truss component under vehicular load would likely result in a complete collapse of the structure. Compounding the problem is that steel components fabricated in the 1800s are considered to be very brittle in nature and catastrophic failure could occur with little or no advance warning...the investigations also revealed that the approaches leading to and from the bridge do not meet any of the current regulations for vehicle occupant protection against vehicular impacts with the bridge trusses...It is recommended that the bridge be closed to vehicular traffic. It is further recommended that the future rehabilitation/replacement alternatives for the bridge structure be investigated further and discussed with the various stakeholders.

According to the Biennial Bridge Inspection Report, completed in 2015 by Engineered Management Systems Inc., the Norwich Street Bridge's retained the following deficiencies:

- Deck: severe decay
- East Retaining Wall: severe loss of mortar
- Barrier: required updates for pedestrian traffic
- Truss: in some areas steel is in advance state of deterioration and beyond repair
- Bracing: Severe corrosion
- West Abutment: Medium to severe disintegration and cracking
- East Abutment: Medium to severe disintegration
- Barings: Severe to very severe corrosion

4.1 Comparative Geographic and Historic Context of Pony Truss Bridges

The single-span, Pratt truss bridge is a Pratt pony truss bridge with an overall length of 18.3 metres. As the bridge was located within the Grand River Watershed, the publication *Arch, Truss and Beam: The Grand River Watershed Heritage Bridge Inventory* (Grand River Conservation Authority 2013) was used for a comparative review of similar bridges in the area. According to this inventory, there are fourteen steel pony truss bridges in the Grand River Watershed. These are summarized as follows:

- Seneca Bridge, built in 1912 across the Black Creek. Single span, total bridge length unknown;



- Burt Road Bridge, built in 1920 crossing Fairchild Creek. Single span with a total bridge length of 15.9 metres;
- Roulston Bridge, built in 1920 crossing the Smith Creek. Single span with a total bridge length of 18.7 metres;
- Line 76 Truss Bridge, built in 1920 crossing a tributary of the Nith River. Single span with a total bridge length of 15.2 metres;
- Blatchford Bridge, built in 1949 crossing the Speed River. Single span, with a total bridge length of 34.2 metres;
- Rothsay Bridge, built in 1952 across the Mallet River. Single span, with a total bridge length of 18.7 metres;
- Moorefield Bridge, built in 1954 across the Moorfield Creek. Single span, with a total bridge length of 22.6 metres;
- Flax Bridge, built in 1954 across Mitchell's Creek. Single span, with a total bridge length of 22.3 metres;
- Emmerson Simmons Bridge, built in 1952 across the Conestogo River. Two-span, with a total bridge length of 65.3 metres;
- Bosworth Bridge, built in 1949 crossing the Conestogo River. Single span, with a total bridge length of 42.1 metres;
- Mallet River Bridge, built in 1910 crossing the Mallet River. Single span, with a total bridge length of 17 metres;
- Centre Wellington Bridge, built in 1890 crossing the Carroll Creek. Single span, with a total bridge length of 11.8 metres;
- Salem Bridge, built in 1952 across Irvine Creek. Single span, with a total bridge length of 32.6 metres; and
- Dirksen Farm Bridge, built in 1900 across the Conestogo River. Single span with total bridge length unknown.

Based on the review and comparison of the fourteen available bridges in this comparative sample, the subject bridge constructed in 1882 is considered to be the oldest known existing example of a pony truss bridge in the Grand River Watershed, with the eighth-longest known overall length at 18.3 metres. Therefore, the subject bridge is very significant in terms of age, though it is not significant for its overall bridge length.

4.2 Additional Cultural Heritage Resources

A nineteenth-century, stone row house (196 Arthur Street) listed on the City of Guelph's Municipal Register of Heritage Properties is located to the northeast of the Norwich Street Bridge (Appendix A, plate 18). In addition, the Speed River is a tributary of the Grand River, which is identified as a Canadian Heritage River.

5.0 HERITAGE EVALUATION OF THE NORWICH STREET BRIDGE

Table 1 contains the evaluation of Norwich Street Bridge against criteria as set out in Ontario Regulation 9/06 of the *Ontario Heritage Act*. While the bridge has already been designated under the *Ontario Heritage Act* (City of Guelph By-Law [1998] – 15786), this designation occurred prior to the introduction of Ontario Regulation 9/06, which lays out a demonstrable, values based system for evaluation.



Therefore, an evaluation of the bridge was completed using the values-based system to clearly identify what aspects of the bridge retained cultural heritage value.

Table 1: Evaluation of the Norwich Street Bridge using Ontario Regulation 9/06

1. The property has design value or physical value because it:

<i>Ontario Heritage Act</i> Criteria	Analysis
i. is a rare, unique, representative or early example of a style, type, expression, material or construction method;	The Norwich Street Bridge’s Pratt pony truss design with riveted, steel construction and stone and concrete abutments, is the earliest example of theistype of bridge within the Grand River Watershed, with the second oldest, the Centre Wellington Bridge, built eight years later in 1890. The bridge retains two date plates at either end of the southern truss, reading “Hamilton Bridge Co Builders Hamilton, ONT. 1882.” Although similar pony truss bridges exist in the region, the Norwich Street Bridge is one of only two pony truss bridges crossing the Speed River, the other being the Blatchford Bridge constructed in 1949. Thus, the subject bridge is an early example of a pony truss bridge in the region and meets this criterion.
ii. displays a high degree of craftsmanship or artistic merit, or;	This bridge exhibits a low degree of craftsmanship or artistic merit as it is a standard example of a single-span, Pratt pony truss structure. The subject bridge does not meet this criterion.
iii. demonstrates a high degree of technical or scientific achievement.	This bridge exhibits a low degree of technical achievement given its short span, easy access, and gentle water flow in the Speed River below. In addition, unexpectedly heavy flooding in 1948 rapidly eroded the west abutment, leading to emergency shoring up of the sub structure. The subject bridge does not meet this criterion.

2. The property has historical value or associative value because it:

<i>Ontario Heritage Act</i> Criteria	Analysis
i. has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community;	The structure was constructed in 1882 in an urban industrial/residential area that maintained its character into the mid-twentieth century. As a primary crossing in the area, the Norwich Street Bridge served as an essential component in the movement of industrial materials between the mills and foundries that existed on either side of the Speed River. Thus, the bridge has direct associations with the industrialization of the area and meets this criterion.
ii. yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or;	The bridge has the potential to yield information on the industrial history of the area and remains as one of the last vestiges of this period. Therefore, the subject bridge meets this criterion.
iii. demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.	The subject bridge was designed, manufactured, and constructed by the Hamilton Bridge Company Ltd in Hamilton, Ontario. The Hamilton Bridge Company was a prominent steel bridge manufacturer in the area and constructed both the Norwich Street Bridge and the former Neeve Bridge, located to the south of the subject structure, in 1882. The Hamilton Bridge Company was one of the first heavy industries in the City of Hamilton and

Table 1: Evaluation of the Norwich Street Bridge using Ontario Regulation 9/06

	played a major role in providing steel for the bridges and buildings of Southern Ontario’s bridges and buildings in the late nineteenth and early twentieth century. Therefore, the subject bridge meets this criterion.
--	--

3. The property has contextual value because it:

<i>Ontario Heritage Act</i> Criteria	Analysis
i. is important in defining, maintaining or supporting the character of an area;	The bridge is small in scale and reflects the surrounding nineteenth century neighbourhood on the east side of the Speed River. The bridge continues to complement the urban character of the area and contributes to the picturesque setting of the Speed River and therefore the subject bridge meets this criterion.
ii. is physically, functionally, visually or historically linked to its surroundings, or;	The bridge is physically, functionally and historically linked to its surroundings. It serves as a bridging point for pedestrians over the Speed River and is physically associated with Norwich Street. This is a traditional bridging point, first spanned in 1860, and likely a ford location prior to that. Therefore, the subject bridge meets this criterion.
iii. is a landmark.	The bridge serves as a prominent, pedestrian crossing and a waypoint for pedestrians within the City of Guelph. Therefore, the subject bridge serves as a landmark in this area of the City of Guelph.

The above evaluation confirms that this structure meets at least one of the criteria contained in Regulation 9/06 of the *Ontario Heritage Act*. The subject bridge was determined to retain design, associative, and contextual value given the relative rarity of comparable structures in the City of Guelph, the associations with the Hamilton Bridge Company and the industrial history of the City, and its continued association with settlement, growth, and economic development in this part of the City of Guelph. The Norwich Street Bridge is currently a protected property under the *Ontario Heritage Act*, City of Guelph By-law (1998) – 15786.

6.0 STATEMENT OF CULTURAL HERITAGE VALUE

The following is taken from Schedule “B” of the City of Guelph By-law number (1988) – 15786:

This steel and iron bridge was built in 1882 by the Hamilton Bridge Company at a cost of just over \$1000 to City Council, who commissioned the work. A bridge spanned the Speed River at this location as early as 1860 and was known first as “the Wellington Foundry Bridge” and later “the Inglis-Hunter Bridge” because of its close proximity to one of the very early industries in Guelph, established circa 1860 on the easterly bank of the river. The bridge became an important link in the movement of materials across the river, serving the needs of many foundries and mills which occupied this area in the mid-1800s, and the choice of iron over the more traditional and less expensive wooden bridge reflects the growing industrialization of the community. Today, this single span bridge



acts as the gateway to the residential area on the east side of the Speed River and serves as a connecting link between the east and west sides of what is now known as the Goldie Mill Neighbourhood. The bridge is the only surviving example of several iron and steel bridges which once existed in Guelph, and is important as a distinctive heritage feature of the riverscape in this area.

The designation applies to the entire steel and iron bridge structure, including date plates.

Character-defining elements associated with the Norwich Street Bridge include:

- a) Pratt pony truss design;
- b) Riveted steel construction;
- c) Date plates; and
- d) Stone and concrete abutments.

7.0 ALTERNATIVES TO BE CONSIDERED FOR HERITAGE BRIDGES AS PART OF THE ENVIRONMENTAL ASSESSMENT PROCESS

Following the evaluation of the subject cultural heritage resource, the Norwich Street Bridge was determined to retain cultural heritage value. The following nine conservation options/alternatives are arranged according to the level or degree of intervention from minimum to maximum. The conservation options are based on the *Ontario Heritage Bridge Program* (1991), which is regarded as current best practice for conserving heritage bridges in Ontario and ensures that heritage concerns, and appropriate mitigation options, are considered.

1. Retention of existing bridge and restoration of missing or deteriorated elements where physical or documentary evidence (e.g., photographs or drawings) can be used for their design;
2. Retention of existing bridge with no major modifications undertaken;
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 vehicle purposes but adapted for pedestrian walkways, cycle paths, scenic viewing etc.;
6. Relocation of bridge to appropriate new site for continued use or adaptive re-use;
7. Retention of bridge as heritage monument for viewing purposes only;
8. Replacement/removal of existing bridge with salvage elements/members of heritage bridge for incorporation into new structure or for future conservation work or displays;
9. Replacement/removal of existing bridge with full recording and documentation of the heritage bridge.

Given that the bridge was found to retain cultural heritage value under Regulation 9/06, all nine of these conservation options should be considered as part of the Norwich Street Bridge Cultural Heritage Evaluation Report.



8.0 ENVIRONMENTAL ASSESSMENT OPTIONS

Based on the age of the structure and width deficiencies observed during existing bridge inspections, the City of Guelph will determine the future of the Norwich Street Bridge. As part of the study, the nine conservation alternatives listed in Section 7.0 are under consideration as bridge improvement alternatives.

8.1 Evaluation of Impacts

To assess the potential impacts of the proposed alternatives, the cultural heritage resource and identified heritage attributes were considered against a range of possible impacts (Table 2) as outlined in the Ministry of Tourism and Culture document entitled *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* (November 2010), which include:

- Destruction of any, or part of any, significant heritage attribute or feature (III.1).
- Alteration which means a change in any manner and includes restoration, renovation, repair or disturbance (III.2).
- Shadows created that alter the appearance of a heritage attribute or change the visibility of a natural feature of plantings, such as a garden (III.3).
- Isolation of a heritage attribute from its surrounding environment, context, or a significant relationship (III.4).
- Direct or indirect obstruction of significant views or vistas from, within, or to a built and natural feature (III.5).
- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces (III.6).
- Soil disturbance such as a change in grade, or an alteration of the drainage pattern, or excavation, etc. (III.7)

8.2 Preferred Option

In September of 2015, GM BluePlan outlined options for the future of the Norwich Street Bridge (Appendix C) that can be generally categorized as:

- Option 1.1: Do Nothing
- Option 1.2: Rehabilitation
 - a) Historic Restoration
 - b) Sympathetic Restoration
 - c) Sympathetic Restoration with new Bridge Deck
 - d) Sympathetic Restoration with new Bridge Structure
- Option 1.3: Replacement
- Option 1.4: Removal

Based upon the evaluation outlined in Table 2 below, Option 1.2 (Rehabilitation) is the preferred option. In particular, this option would retain identified heritage attributes of the bridge while ensuring the service life is extended to the greatest degree possible. This ‘Sympathetic Restoration with new Bridge Structure’ generally corresponds to Alternative 3 in Table 2: Retention of existing bridge with sympathetic modification.



Table 2: Evaluation of the Potential Impacts of Bridge Improvement Alternatives on the Cultural Heritage Resource and Identified Heritage Attributes

Nine Bridge Improvement Alternatives	Destruction, removal or relocation	Alteration	Shadows	Isolation	Direct or indirect obstruction of significant views	A change in land use	Soil disturbance
1) Retention of existing bridge and restoration of missing or deteriorated elements where physical or documentary evidence (e.g. photographs or drawings) can be used for their design	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.
2) Retention of existing bridge with no major modifications undertaken	Yes – the bridge will be destroyed through neglect.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.
3) Retention of existing bridge with sympathetic modification	No impact.	No impact given that alterations would be sympathetic to heritage attributes. This would include the construction of a structure within the trusses of the Norwich Street Bridge, removing the load bearing strain off the current bridge and thus extending its lifespan.	No impact is anticipated. However, any new structure should be designed to cast minimal shadows on the trusses.	No impact.	No impact.	No impact.	No impact.
4) Retention of existing bridge with sympathetically designed new structure in proximity	No impact.	Yes – impacts are expected given that a new bridge in proximity to the existing one will alter the immediate setting and context of the bridge site. However, given the context as an historical bridge crossing point, this would not remove the subject resource from its historical context.	No impact.	No impact.	No impact.	No impact as the bridge would be retained as a pedestrian bridge.	Yes – impacts are expected through the construction of a new structure in proximity.
5) Retention of existing bridge no longer in use for vehicle purposes but adapted for pedestrian walkways, cycle paths, scenic viewing etc	No impact.	No – the Norwich Street Bridge was converted to a pedestrian bridge fifteen years ago and thus no longer retains continuity with its history as a vehicular bridge.	No impact.	No impact.	No impact.	No – the bridge is already used for pedestrian crossing.	No impact.
6) Relocation of bridge to appropriate new site for continued use or adaptive re-use	Yes – impacts to the heritage resource are expected through relocation.	Yes – alterations to the resource are expected through relocation.	No impact.	Yes – relocation of the resource will isolate it from its original context and relationship to Norwich Street and the Speed River.	No impact.	Yes – a movement of the bridge would result in a change in land-use for the property as the bridging point would no longer retain a protected heritage asset.	Yes – impacts are expected through process of removing the bridge from its current location.
7) Retention of bridge as heritage monument for viewing purposes only	No impact.	Yes – use of bridge for viewing purposes only would result in a change from the current use of the structure and thus is considered to be an alteration.	No impact.	No impact.	No impact.	Yes – use of bridge for viewing purposes only would result in a change from the current use of the structure.	No impact.
8) Replacement/removal of existing bridge with salvage elements/members of heritage bridge for incorporation into new structure or for future conservation work or displays	Yes - Impacts to the heritage resource are expected through removal.	Yes – alterations to the resource are expected through removal.	No impact.	No impact.	No significant impacts to the Norwich Street streetscape are expected provided that a new bridge incorporates a	No impact.	Yes – impacts are expected through removal of the existing bridge and the

Table 2: Evaluation of the Potential Impacts of Bridge Improvement Alternatives on the Cultural Heritage Resource and Identified Heritage Attributes

					similar grade and Pratt pony truss construction.		introduction of a new structure.
9) Replacement/removal of existing bridge with full recording and documentation of the heritage bridge	Yes - Impacts to the heritage resource are expected through removal.	Yes – alterations to the resource are expected through removal.	No impact.	No impact.	No significant impacts to the Norwich Street streetscape are expected provided that a new bridge incorporates a similar grade and Pratt pony truss construction.	No impact.	Yes – impacts are expected through removal of the existing bridge and the introduction of a new structure.

9.0 RECOMMENDATIONS

The Norwich Street Bridge is currently protected under Regulation 9/06 of the *Ontario Heritage Act*. Its heritage significance is based upon its design, associative, and contextual value given the relative rarity of comparable structures in the City of Guelph, the associations with the Hamilton Bridge Company and the industrial history of the City, and its continued association with settlement, growth, and economic development in this part of the City of Guelph.

Following the evaluation of potential impacts on the heritage resource (see Table 2), it was determined that Conservation Alternatives 1 – 3 are typically the preferred alternatives, given that no impacts are expected to the heritage resource and its identified heritage attributes. However, Alternatives 1 – 2 do not extend the service life of the bridge. To extend the service life of the bridge, **Alternative 3 is the preferred alternative, as it will both retain heritage features and maintain the current use of the structure.** The remaining conservation alternatives (4 – 9) have a range of impacts, with Alternatives 8 and 9 being the least preferred options given the level and nature of the impacts resulting from removal of the bridge.

Given the identified heritage value of the Norwich Street Bridge, the following recommendations and mitigation measures should be considered and implemented:

1. **Conservation Alternative 3 is the preferred alternative.** As part of the selection of the preferred alternatives as part of the Environmental Assessment, a clear rationale for the proposed course of action should be documented.
2. A Strategic Conservation Plan providing guidance for managing change over the lifespan of the structure should be completed by a qualified heritage professional and reviewed by heritage staff at the City of Guelph.
3. This report should be filed with the heritage staff at the City of Guelph, the local history section of the Guelph Public Library, the Archives of Ontario, and other local heritage stakeholders that may have an interest in this project.
4. This report should be filed with the Ministry of Tourism, Culture and Sport for review and comment.
5. Should retention of the bridge be chosen as the preferred alternative (one of Conservation Alternatives 1 – 7), the character-defining elements identified in Section 8.1 should be retained and treated sympathetically.



10.0 REFERENCES

- Armstrong, Frederick H.
1985 *Handbook of Upper Canadian Chronology*. Dundurn Press, Toronto.
- Boulton, D'Arcy.
1805 *Sketch of His Majesty's Province of Upper Canada*. C. Rickaby (reprinted in Toronto by the Baxter Publishing Company, 1961), London.
- Cameron, J.M.
1967 *The Early Days in Guelph*. Guelph (no publisher cited).
- Crossby, P.A.
1873 *Lovell's Gazetteer of British North America*. John Lovell, Montreal.
- Department of Energy, Mines, and Resources.
1935 *National Topographic Survey (NTS) Sheets 40/P-09 (Guelph)*.
1965 *National Topographic Survey (NTS) Sheets 40/P-09 (Guelph)*.
1975 *National Topographic Survey (NTS) Sheets 40/P-09 (Guelph)*.
- Engineering Management Systems Inc
2015 *Biennial Bridge Inspection Report, Norwich Street Over Speed River Bridge, in the City of Guelph, May 2015*.
- Fischer, G. and M. Harris.
2007 *Ontario's Historic Mills*. Boston Mills Press, Erin.
- GM BluePlan Engineering
2015 *Norwich Street Pedestrian Bridges, Structural Inspection and Design Alternatives*
- Johnson, L.A.
1977 *History of Guelph, 1827-1927*. Guelph Historical Society, Guelph.
- Mika, Helma and Nick Mika
1981 *Places in Ontario: Their Name, Origins, and History, Vol 1*. Belleville, Mika Publishing Co.
- Ministry of Culture, Ontario (MCL)
2005 *Ontario Heritage Act*.
2006 *Ontario Heritage Tool Kit*
- Ministry of Culture and Communications, Ontario
1992 *Guidelines for Preparing the Cultural Heritage Resource Component of Environmental Assessments*.
- Ministry of Culture and Recreation, Ontario (MCR)
1981 *Guidelines on the Man-Made Heritage Component of Environmental Assessments*.
- Ministry of Environment, Ontario



- 2006 *Environmental Assessment Act*
- Ministry of Tourism and Culture, Ontario
2010 *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes.*
- Ministry of Transportation (MTO)
2006 *Environmental Reference for Highway Design*
2006 *Environmental Standards and Practices*
2006 *Cultural Heritage – Built Heritage and Cultural Heritage Landscapes: Technical Requirements for Environmental Impact Study and Environmental Protection/Mitigation.*
2007 *Environmental Guide for Built Heritage and Cultural Heritage Landscapes*
- Ministry of Transportation and Ministry of Culture and Communications, Ontario
1991 *Ontario Heritage Bridge Program, Information Package.*
- Ministry of Transportation
2013 *Bridge Inventory.* Report on file at ASI.
- Rayburn, Alan
1997 *Place Names of Ontario.* Toronto: University of Toronto Press.
- Scott, D.E.
1997 *Ontario Place Names. The Historical, Offbeat or Humorous Origins of More Than 1,000 Communities.* Lone Pine Publishing, Edmonton.
- Triton Engineering Services Limited
2002 'Bridge Evaluation Report for the Norwich Street Bridge'
- Smith, W.H.
1846 *Smith's Canadian Gazetteer.* H. & W. Rowsell, Toronto.
- Winearls, J.
1991 *Mapping Upper Canada 1780-1867. An Annotated Bibliography of Manuscript and Printed Maps.* University of Toronto Press, Toronto.

Archival Sources

- City of Guelph
Norwich Street Bridge - Heritage file
- Guelph Civic Museum
James Hobson, *Map of the City of Guelph*, 1868



APPENDIX A: Photographic Plates





Plate 1: Deck of the bridge and approaches, looking east.

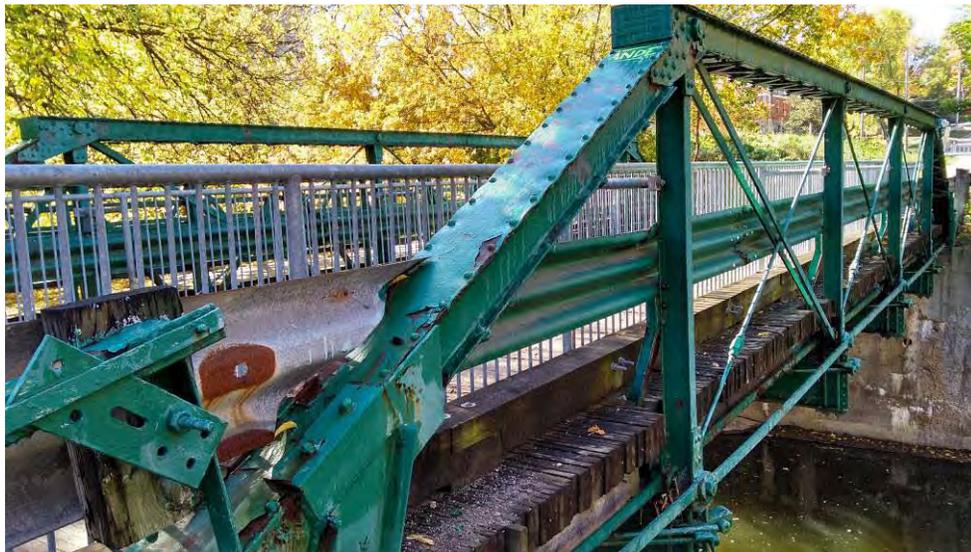


Plate 2: Oblique view of the bridge north elevation, looking west.



Plate 3: Oblique view of the south elevation, looking west.

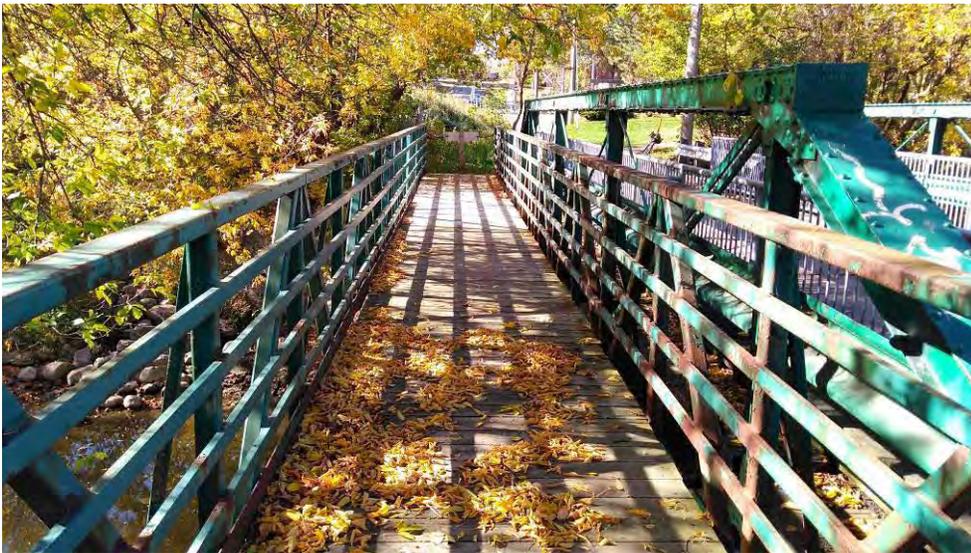


Plate 4: View west along the former pedestrian addition to the south side of the bridge, looking west.



Plate 5: View south toward the modern metal railing system lining the bridge deck.



Plate 6: View southeast toward the wooden bridge deck, modern railing system, and Pratt pony truss superstructure.

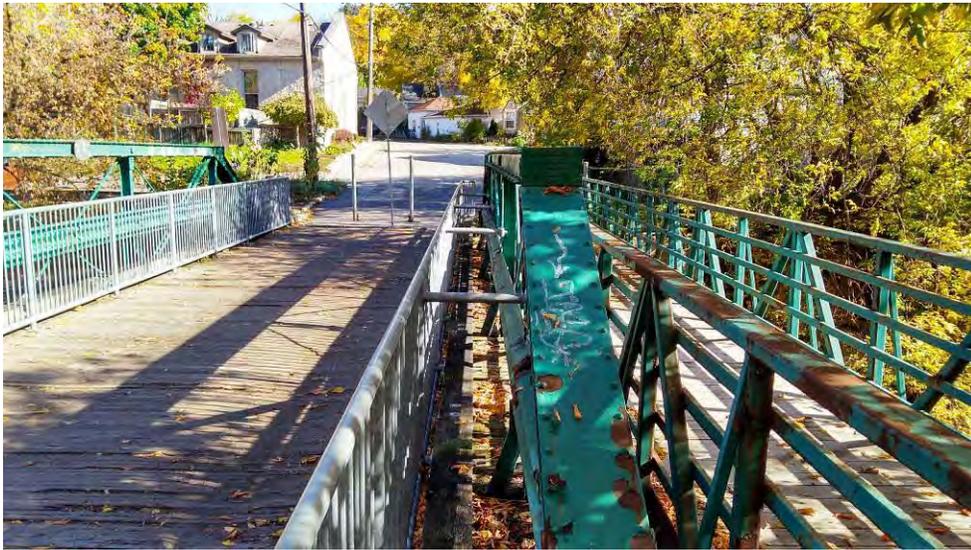


Plate 7: Top chord with riveted bracing on south truss, looking east.

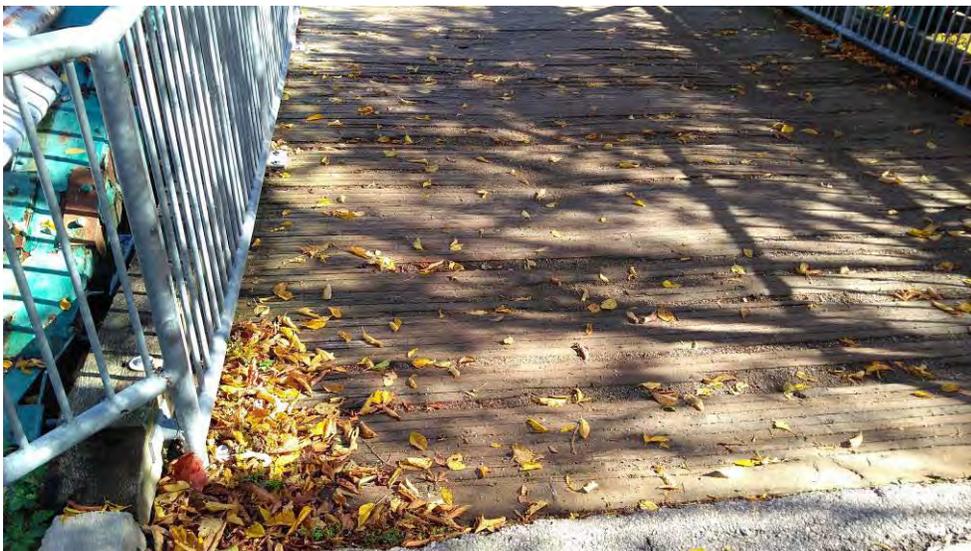


Plate 8: Detail of wooden deck, looking east.



Plate 9: Detail of the wood deck, stringers, and truss superstructure.

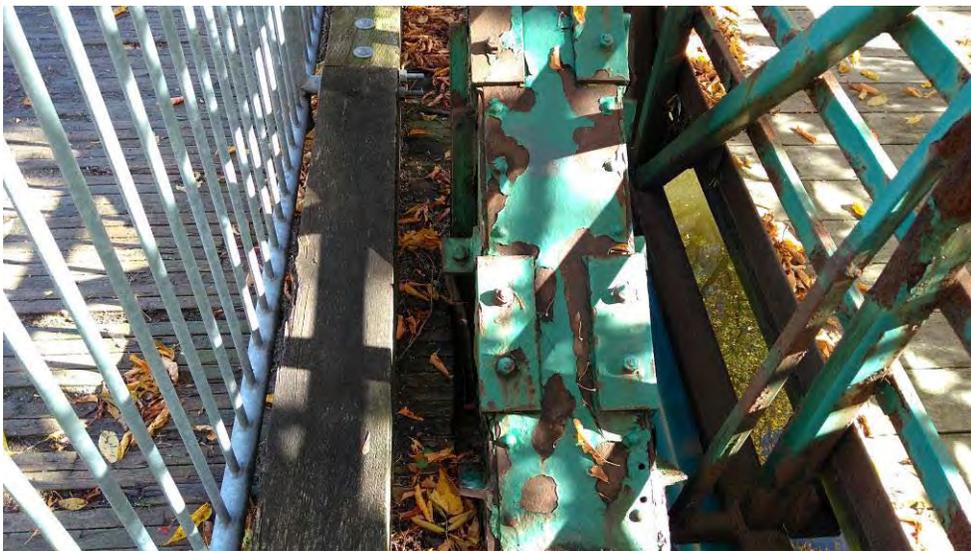


Plate 10: Detail of the top chord. Note the riveting and bolted plates.



Plate 11: View toward the west abutment on the north side of the bridge, looking west.



Plate 12: View toward the east abutment on the north side of the bridge. Note the stone retaining wall stretching north of the bridge.



Plate 13: Detail of the stone retaining wall at the east abutment, looking north.



Plate 14: Heritage plaque located on the north top chord of the bridge.



Plate 15: Detail of the date markers at the east and west ends of the south top chord.

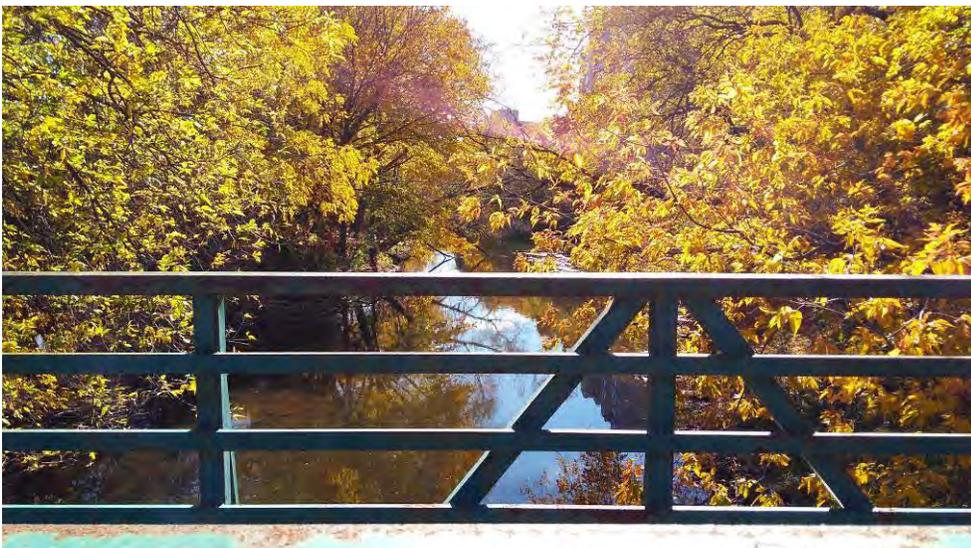


Plate 16: View along the Speed River, looking south.

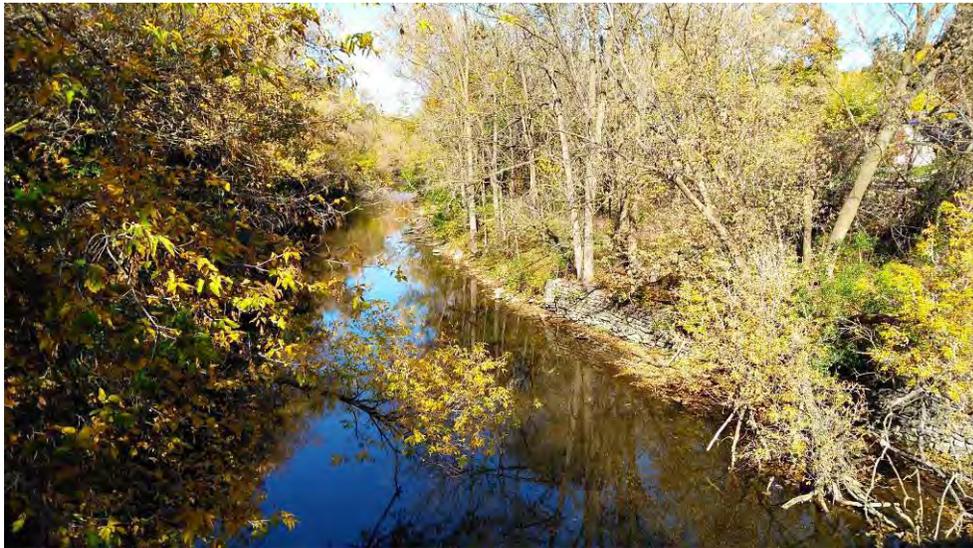


Plate 17: View along the Speed River, looking north.

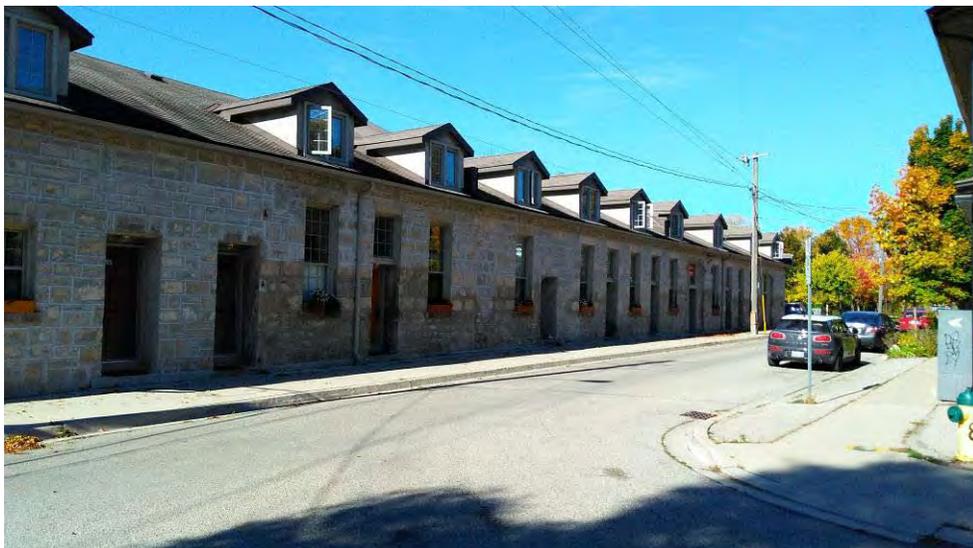


Plate 18: Detail of stone rowhouses at 169 Arthur Street, listed on the City of Guelph Register of Heritage Property.

APPENDIX B: Select Structural Drawings

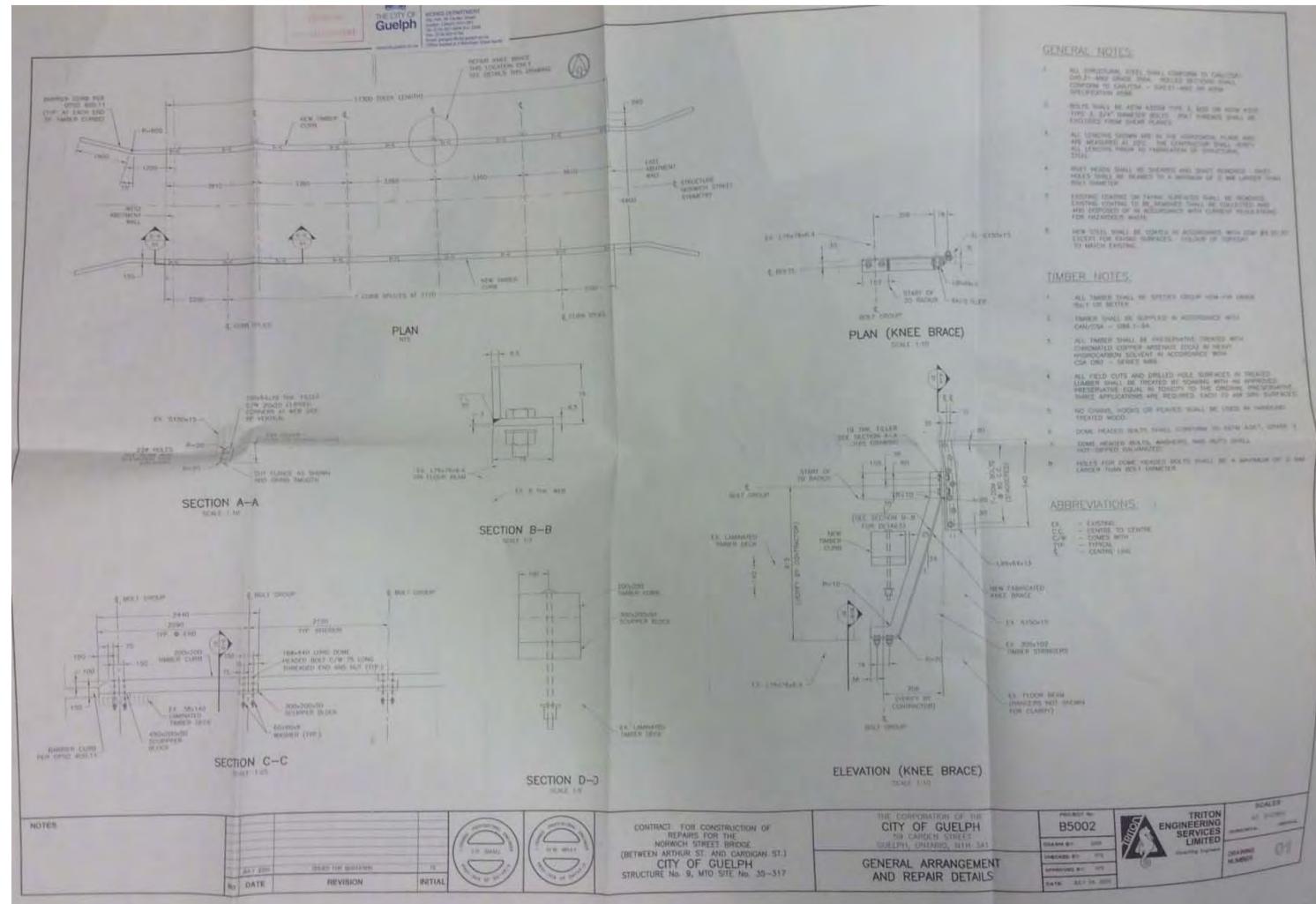


Figure 11: Structural drawings of the bridge, 2001.

Source: Triton Engineering 2001

APPENDIX C: Bridge Alternatives (GM BluePlan – 2015)



PEOPLE | ENGINEERING | ENVIRONMENTS

September 18, 2015
Our File: 115092

Via email: Andrew.Janes@guelph.ca
Mr. Andrew Janes, P.Eng.
Project Engineering Supervisor
Engineering and Capital Services
City of Guelph
1 Carden Street, Guelph, ON N1H 3A1

Re: Norwich Street Pedestrian Bridges, Structural
Inspection and Design Alternatives (Structures
00009-1 and 00009-2)

Dear Mr. Janes,

GM BluePlan Engineering Limited (GMBP) was retained by the City of Guelph (City) to complete the inspections of two pedestrian bridge structures owned by the City and provide capital cost estimates for various design alternatives. These structures were formerly located on the Norwich Street road allowance, between Cardigan Street and Arthur Street North, however, the road allowance has been closed to vehicle traffic and the structures now reside on a pedestrian pathway. Structure inspections were conducted in accordance with the Ontario Structure Inspection Manual (OSIM). Each inspection consisted of an element-by-element evaluation with the information recorded on OSIM inspection forms.

The following is a detailed summary description of the two structures based on the results of the OSIM inspections. The recommended capital works for rehabilitation have been provided on the OSIM inspection forms, with a suggested priority of less than 1 year for structure 00009-1 and 1-5 years for structure 00009-2. Capital costs have been estimated based on our recent experience in bridge construction projects, including recent tender prices received by GMBP for bridge projects and discussions with suppliers and contractors. The capital cost estimates are presented in 2015 dollar values and do not include HST; however, cost estimates do include associated costs such as engineering design and contingencies. Construction inspection and contract administration costs have not been included in the estimated costs. These costs should be considered as preliminary, as no pre-design work has been completed that may influence costs of items such as environmental considerations, transportation requirements, geotechnical conditions, regulatory authority requirements, etc.

Structure 00009-1: Norwich Street over Speed River (Historical Truss Structure)

This structure is a half through Pratt truss bridge located approximately 70 m east of Cardigan Street on the former Norwich Street road allowance. It has a span of approximately 17.0 m and a traveled width of 3.7 m. This structure conveyed vehicle traffic until approximately 1998, when it was limited to pedestrian traffic only. Bollards are present on the east approach to the bridge; however, small vehicles and maintenance vehicles may still be able to access the bridge from the west approach. The bridge was originally constructed in 1882, and has undergone several rehabilitations over its lifespan including repairs to the steel truss elements in 1994. A plaque noting the historic significance of the bridge is present on the north truss. It is assessed to have a Bridge Condition Index (BCI) of 45.

Major deficiencies with the structure included severe corrosion and loss of section on the floor beams, severe corrosion of identified pin connections, and warping of the top plate of the top chord. The abutments and wingwalls have severely delaminated sections with disintegration, and the northwest footing may be undermined.

The pin connections and floor beams at the middle bays of the bridge (south truss) are the area of greatest concern. The amount of corrosion is difficult to assess based on the visual inspection completed; however, there were several areas of severe corrosion with loss of section noted with the top flange of one floor beam noted to be completely missing in one area. The OSIM inspection completed by Engineered Management Systems Inc. (EMSI) noted 50-60%



loss of section in these areas, which was difficult to confirm given the scope of the inspection; however, immediate and sudden failure may be possible in these heavily corroded areas. It is recommended that the City take action immediately as outlined in the following sections.

Design Alternatives for Consideration:

It is our understanding that the City does not wish to re-open structure 00009-1 to vehicular traffic, but rather wishes to maintain as a pedestrian crossing. Additionally, this structure is anticipated to have substantial cultural heritage significance. Based on this fact and our review of the site, we foresee the following options regarding the future of structure 00009-1:

- 1.1 Do nothing:** This option will soon lead to one of the options discussed below. It does not address the structural deficiencies noted during the visual inspection, and is not a long-term solution. Eventually, the structure will fail if one of the design alternatives discussed below is not implemented. Regular inspections with increasing frequency will be required as the structure's condition deteriorates. This option was not considered in the analysis provided in subsequent sections.
- 1.2 Rehabilitation:** This option would lead to the preservation of some or all of the existing heritage components of the bridge. A detailed structural analysis to confirm the capacity of the rehabilitated structure would be required, as new loads may be introduced through the rehabilitation process to existing elements. As well, an ongoing maintenance program would also need to be implemented by the City in order to properly maintain the structure. Rehabilitation options can be broken down into the following sub-categories:
 - a. Historic Restoration:** This would involve restoring the structure using classic materials and techniques (i.e. use of rivets for structural connections). Construction and design costs would generally be higher for this type of rehabilitation, and these construction techniques will require more time during construction.
 - b. Sympathetic Restoration:** This would involve restoring the structure using modern materials and techniques to mimic the original construction of the bridge (i.e. using bolted connections in lieu of riveted connections).
 - c. Sympathetic Restoration with new Bridge Deck:** This would involve removal of the existing bridge deck and stringers, restoration of the steel truss elements (which would remain following construction), and construction of a new stand-alone bridge deck between the existing trusses. The new construction could be a wood deck on steel girder structure, where the girders bear directly onto the existing abutments (similar to the ends of the existing stringers). The new structure would not rely on the existing steel truss members for any structural support. The existing steel truss would remain as an aesthetic feature of the new crossing.
 - d. Sympathetic Restoration with new Bridge Structure:** This would involve the removal of the existing bridge deck and stringers, restoration of the steel truss elements (which would remain following construction), and installation of a prefabricated pedestrian bridge structure that would not rely on the existing truss elements for structural support. The most cost-effective replacement structure would likely be a prefabricated steel truss pedestrian bridge (Eagle Bridge or equivalent). Given the heavy use of this crossing, strong consideration should be given to installing a galvanized steel structure.
- 1.3 Replacement:** This option would lead to the removal of the existing truss structure and replacement with an identical bridge structure that preserves the historic type of construction of the crossing. This would require specialty contractors and fabricators to construct identical truss elements, as well as substantial engineering design to design all members and connections. An ongoing maintenance program would also need to be implemented by the City in order to properly maintain the structure.
- 1.4 Removal:** This option would lead to the removal of the crossing at this location. Assuming that structure 00009-2 is also removed, pedestrians would be required to use the adjacent road bridge on Eramosa Road. This would alleviate any future costs to the City for maintenance to a crossing, but would be a large inconvenience for users of the existing crossing. Alternatively, structure 00009-2 could be left in place as the sole pedestrian crossing at this location.



We note that, given the heritage significance of this structure, a Municipal Class Environmental Assessment is recommended to determine the preferred design alternative. We would suggest a Schedule B assessment be completed for the removal, replacement or rehabilitation of this structure.

Structure 00009-2: Norwich Street over Speed River Pedestrian (Prefabricated Pedestrian Truss Bridge)

This structure is a half through Pratt truss bridge located approximately 70 m east of Cardigan Street immediately south of structure 00009-1. It has a span of approximately 16.75 m and a traveled width of 1.5 m. This structure appears to have been constructed to convey pedestrian traffic during the time that structure 00009-1 was open to vehicular traffic. Its construction date is not known, but it is believed to have been constructed in 1962. In 1996, the structural trusses were replaced. This bridge also serves as a support structure for a City-owned watermain and sanitary sewer, which hang below the bridge deck. The City previously noted to GMBP that this structure was closed; however, no signage or barriers were present at the time of inspection. This structure is assessed to have a Bridge Condition Index (BCI) of 59.

Major deficiencies with the structure included severe corrosion with loss of section at the vertical to bottom chord connections and partial bearing of the southwest bearing plate on the west abutment. The abutments and wingwalls have severely delaminated and disintegrated sections.

Although there are areas of severe corrosion noted on the truss elements, the structure does not show any signs of localized buckling or failure. Of additional concern is the trip hazard that is present at each of the approaches due to the elevation difference between the bridge deck and the approaches. This bridge was noted to be in use by several pedestrians during the inspection.

Design Alternatives for Consideration:

We foresee the following options regarding the future of structure 00009-2.

- 2.1 Do nothing:** This option will soon lead to one of the options discussed below. It does not address the structural deficiencies noted during the visual inspection, and is not a long-term solution. Eventually, the structure will fail if one of the design alternatives discussed below is not implemented. Regular inspections with increasing frequency will be required as the structure's condition deteriorates. This option was not considered in the analysis provided in subsequent sections.
- 2.2 Rehabilitation:** This option would require rehabilitation of select structural elements, and allow the existing structure to be officially re-opened as a pedestrian crossing. Rehabilitation works would include cleaning and painting structural steel elements, structure strengthening, and providing a proper bearing seat for the southwest bearing plate. An ongoing maintenance program would also need to be implemented by the City in order to properly maintain the structure.
- 2.3 Replacement:** This option would lead to the removal of the existing truss structure and replacement with a new pedestrian structure. The most cost-effective replacement structure would likely be a prefabricated steel truss pedestrian bridge (Eagle Bridge or equivalent). Custom supports for the City's sanitary and watermain pipes suspended from the existing structure would need to be designed by a structural engineer, and communicated to the bridge manufacturer for inclusion in the design loads. We note that this structure appears to be redundant given the adjacent heritage pedestrian structure. An ongoing maintenance program would also need to be implemented by the City in order to properly maintain the structure.
- 2.4 Removal:** This option would lead to the removal of the prefabricated structure at this location. If structure 00009-1 were also removed, pedestrians would be required to use the adjacent road bridge on Eramosa Road. This would alleviate any future costs to the City for maintenance to a crossing, but would be a large inconvenience for users of the existing crossing. Currently, this structure is required to support the City's water and sanitary sewers crossing above the Speed River below, so removal would result in the construction of a support system for the City's infrastructure. It is estimated that two steel I-beams could span across the width of the watercourse, and the galvanized steel floor beams that the pipes are currently suspended from could be reused and attached to the new support beams. An ongoing maintenance program would also need to be implemented by the City in order to properly maintain the structure, though it would be greatly reduced in scope and effort compared to other design options.



Structure 00009-2 is not anticipated to have any cultural heritage significance due to its common construction style and estimated construction date of 1962. Therefore, a Schedule A+ Municipal Class Environmental Assessment is anticipated for this structure.

Cost Estimates

We note that any work on either structure may conflict with existing utilities located at the site. There is City-owned water and sanitary sewer pipes located beneath structure 00009-2, as well as overhead hydro and Bell lines located immediately north of structure 00009-1. Collaboration between the City, Bell and Guelph Hydro would be required for any construction works requiring overhead equipment. Costs and design efforts associated with this have not been included in the scope of work or cost estimates provided herein.

For structure 00009-1, we have provided pre-design estimates for the options discussed above; however, as previously mentioned, a Schedule B Municipal Class Environmental Assessment is recommended due to the heritage value of the structure. The capital cost estimates will be further refined during the Environmental Assessment process, and a preferred alternative may be selected after gathering all stakeholder input. Provided below in Table 1 is a summary of the pre-design estimated costs for each of the options discussed for structure 00009-1:

Table 1: Summary of Cost Estimates for Various Alternatives, Structure 00009-1

Alternative	Description	Estimated Capital Costs (2015 Dollars)	Estimated Service Life after Completion of Construction
Rehabilitation	Historic Restoration	\$515,000	20
	Sympathetic Restoration	\$440,000	20
	Sympathetic Restoration with new Bridge Deck	\$590,000	75
	Sympathetic Restoration with new Bridge Structure	\$390,000	50
Replacement	Replacement with Identical Bridge Structure	\$1,200,000	75
Removal	Removal of Crossing	\$200,000	N/A

Provided below in Table 2 is a summary of the pre-design estimated costs for each of the options discussed for structure 00009-2:

Table 2: Summary of Cost Estimates for Various Alternatives, Structure 00009-2

Alternative	Description	Estimated Capital Costs (2015 Dollars)	Estimated Service Life after Completion of Construction
Rehabilitation	Rehabilitation of Structural Elements and Improvements to Bridge Approaches	\$210,000	20
Replacement	Replacement of Structure with new Prefabricated Bridge (Eagle Bridge of Equivalent)	\$250,000	50
Removal	Removal of Crossing and Installation of Support Structure for Watermain and Sanitary Sewer	\$150,000	N/A

It should be noted that the above cost estimates have assumed that each project will be done individually of the other. We recommend that work on each of the structures is completed simultaneously and bundled into a single contract so that the City could potentially realize cost savings due to economies of scale and similarity of work.



PAGE 5 OF 5
OUR FILE: 115092

Conclusions

Based on the information presented to us, as well as our inspections of each structure and analysis outlined in this letter, we offer the following recommendations:

- Complete a Schedule B Municipal Class Environmental Assessment for the reconstruction of structure 00009-1 due to its heritage value. Stakeholder input, approvals and refined capital cost estimates will provide a basis for selection of the appropriate alternative. Based on the deteriorated condition of the structure, we believe it would be in the City's best interest to pursue options that involve construction a stand-alone bridge structure while maintaining the historic trusses with minor restoration works (sympathetic restoration with new bridge deck or sympathetic restoration with new bridge structure options).
- Remove structure 00009-2 and install a temporary support structure for the existing watermain and sanitary sewer pipes. The existing galvanized steel floor beams that currently connect the pipe support hangers to the existing bridge could be reused and it is anticipated that two steel I-beams would be able to span the width of the watercourse and carry the weight of the pipes. Measures would have to be implemented to deter pedestrians from trying to use this support structure as a crossing (i.e., permanent gates and fencing).

This recommendation does not take into account property access issues, historical or cultural significance, or any other factors not explicitly stated in this letter.

We trust our report provides the information that you require at this time. If you have any questions, or we may be of further assistance, please do not hesitate to contact us.

All of which is respectfully submitted,

GM BLUEPLAN ENGINEERING LIMITED

Per:

A handwritten signature in blue ink, appearing to read 'Jack Turner'.

Jack Turner, P.Eng.