Appendix B

Existing Conditions Reports

City of Vaughan

Cultural Heritage Existing Conditions Report for the Humber Bridge Trail Bowstring Arch Bridge

Project Number:
60160807

Date:
September, 2012

Heritage Impact Assessment Report - DRAFT

Humber River (West Branch) Bridge, Structure No. 008601
Class Environmental Assessment for Bowstring Arch Bridges on Humber River Trail and McEwen Bridge on Kirby Road
City of Vaughan, Ontario

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Heritage Impact Assessment Report - DRAFT

Humber River (West Branch) Bridge, Structure No. 008601
Class Environmental Assessment for Bowstring Arch Bridges
on Humber River Trail and McEwen Bridge on Kirby Road
City of Vaughan, Ontario

EXECUTIVE SUMMARY

Archaeological Services Inc. was contracted by AECOM, Markham, to conduct a heritage impact assessment of the Humber River (West Branch) Bridge (Structure No. 008601) in order to establish the cultural heritage significance of the structure. This assessment is being conducted as part of the Class Environmental Assessment for Bowstring Arch Bridges on Humber River Trail and McEwen Bridge on Kirby Road. The Humber River (West Branch) Bridge was built in 1918 to carry the Humber Bridge Trail (formerly Major Mackenzie Road) over the west branch of Humber River in the City of Vaughan, Ontario. The structure is a concrete bowstring arch bridge which is currently owned and maintained by the City of Vaughan.

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations and application of Regulation 9/06 of the *Ontario Heritage Act*, the Humber River (West Branch) was determined to retain cultural heritage value or interest and may be considered for municipal designation under the *Ontario Heritage Act*. In particular, it was determined to retain strong historical and contextual values given its location at a traditional bridging point and association with the Humber River, and strong design values given its bridge type, age and association with noted civil engineer, Frank Barber.

Following the evaluation of potential impacts on the heritage resource (see Table 2), it was determined that Conservation Alternatives 1 – 3 are the preferred alternatives, given that no impacts are expected to the heritage resource and its identified heritage attributes, with Alternative 1 being the most preferred. 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 cultural heritage value of the Humber River (West Branch) Bridge, the following recommendation and mitigation measures should be considered and implemented:

1. Based on the results of heritage evaluation, Conservation Alternatives 1 -3 are the preferred alternatives, with Alternative 1 being the most preferred. 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. This report should be filed with the Cultural Services Division at the City of Vaughan and Heritage Vaughan for review and comment, and to other organizations that may have an interest in this project, including but not limited to: the Toronto Regional Conservation Authority; and, the Humber Water Alliance-Heritage Subcommittee.

3. This report should be filed with the Ministry of Tourism and Culture review and comment.

4. 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.

5. Should replacement of the bridge be chosen as the preferred alternative (Conservation Alternative 8 or 9), two mitigation options should be considered:

    a. Replacement/removal of existing bridge and construction of a new bridge with replication of the appearance of the heritage bridge in the new design, with allowances

for the use of modern materials. The character-defining elements identified in Section 8.1 should be considered for replication.

b. Replacement/removal of existing bridge and construction of a new bridge with historically sympathetic design qualities to the heritage bridge, with allowances for the use of new technologies and materials.

c. In addition to (a) and (b), development of a commemorative strategy, such as plaquing, may be appropriate.

ARCHAEOLOGICAL SERVICES INC.
BUILT HERITAGE AND CULTURAL LANDSCAPE PLANNING DIVISION

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1.0 INTRODUCTION

Archaeological Services Inc. (ASI) was contracted by AECOM, Markham, to conduct a heritage impact assessment of the Humber River (West Branch) Bridge (Structure No. 008601) in order to establish the cultural heritage significance of the structure. This assessment is being conducted as part of the Class Environmental Assessment for Bowstring Arch Bridges on Humber River Trail and McEwen Bridge on Kirby Road. The Humber River (West Branch) Bridge was built in 1918 to carry the Humber Bridge Trail (formerly Major Mackenzie Road) over the west branch of Humber River in the City of Vaughan, Ontario (Figure 1). The structure is a concrete bowstring arch bridge which is currently owned and maintained by the City of Vaughan.

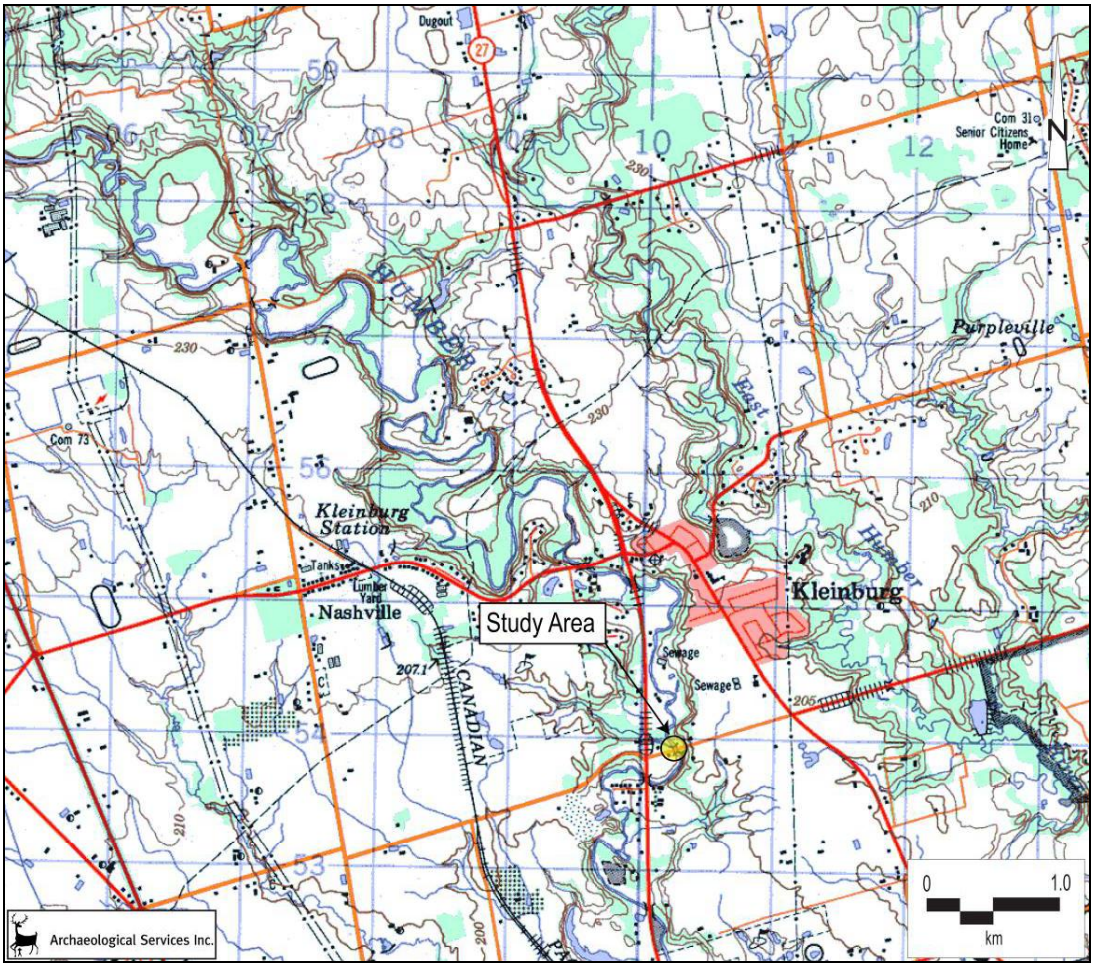

Figure 1: Location of the Humber River (West Branch) Bridge in the City of Vaughan, Ontario
Source: NTS Sheet Bolton 30 M/13

The cultural heritage evaluation of bridges older than forty years is part of an approved planning and design process subject to Provincial and Federal Environmental Assessment (EA) requirements. 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 forty years old (Section 2.0);
- Provide an historical overview of the design and construction of the bridge within the broader context of the surrounding townships and bridge construction generally (Section 3.0);
- Describe existing conditions and heritage integrity (Section 4.0);
- Evaluate the bridge under *Ontario Heritage Act* Regulation 9/06. Based on this evaluation criteria, draw conclusions about the heritage attributes of the structure (Section 5.0); and
- Ascertain sensitivity to change in the context of identified heritage attributes and recommend appropriate mitigation measures (Section 6.0).

The following documents relating to the Humber River (West Branch) Bridge were provided to ASI by AECOM:

- Summary Action Report – Structure 008601 (MTO Site No. 037-0119) Humber River (West Branch) Bridge;
- City of Vaughan Bridge Inventory;
- Region of York Bridge Inventory; and
- Humber River Heritage Bridge Inventory: Overview of the Humber River Heritage Bridge Inventory (Full inventory was not available at the time of this report).

1.1 Heritage Recognition

The Humber River (West Branch) Bridge is currently listed on the Vaughan Heritage Inventory, which is an inventory of resources of cultural heritage interest within the City of Vaughan. Currently, it is not listed on the Listing of Structures of Heritage Significance (LSHS) which serves as the City's Heritage Register, as described under Section 29 of the *Ontario Heritage Act*.[1] Further, it is not designated under Part IV or V of the *Ontario Heritage Act* and it is not listed on the Ontario Heritage Bridge List. The bridge is included in the Humber River Heritage Bridge Inventory (TRCA 2011).

2.0 POLICY FRAMEWORK

Pursuant to the *Environmental Assessment Act*, applicable infrastructure projects are subject to assessment so as to determine related impacts on above ground cultural heritage resources. Infrastructure projects have the potential to impact cultural heritage resources in a variety of ways. These include loss or displacement of resources through removal or demolition and the disruption of resources by introducing physical, visual, audible or atmospheric elements that are not in keeping with the resources and/or their setting.

When considering cultural heritage resources in the context of improvements to specified areas, a forty year old threshold is used as a guiding principle when identifying cultural heritage resources. While identification of a resource that is forty 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 forty years old, this does not preclude the resource from retaining heritage value.

[1] Personal Communications, Lauren Archer (Cultural Heritage Co-ordinator, City of Vaughan), August 26 2010

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

> Cultural conditions that influence the life of man or a community;

as well as,

> Any building, structure, machine or other device or thing made by man.

The Minister of Culture 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* (1980). Accordingly, both guidelines have been utilized in this assessment process.

The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* 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 landscapes* and as *cultural features*.

Within this document *cultural landscapes* are defined as follows:

> 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 homogenous character; or as an intermediate sized area of homogenous 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:

> …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.

The *Planning Act* and related *Provincial Policy Statement* (*PPS*) also 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 into 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...;

The *PPS* indicates in Section 4 - Implementation/Interpretation, that:

> 4.5 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 municipal official plans. Municipal official plans shall identify provincial interests and set out appropriate land use designations and policies. Municipal official plans should also coordinate cross-boundary matters to complement the actions of other planning authorities and promote mutually beneficial solutions.
>
> Municipal official plans shall provide clear, reasonable and attainable policies to protect provincial interests and direct development to suitable areas.

Those policies of particular relevance for the conservation of heritage features are contained in Section 2, *Wise Use and Management of Resources*, in which the preamble states that "Ontario's long-term prosperity, environmental health, and social well-being depend on protecting natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits."

Accordingly, in subsection 2.6, *Cultural Heritage and Archaeological Resources*, makes the following relative provisions:

> 2.6.1 Significant built heritage resources and cultural heritage landscapes shall be conserved.
>
> 2.6.3 Development and site alteration may be permitted on adjacent lands to protected heritage property 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. Mitigation 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.

This provides the context not only for discrete planning activities detailed in the *Act* but also for the foundation of policy statements issued under Section 3 of the *Act*.
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 (*PPS* 2005):

> Built heritage resources mean one or more buildings, structures, monuments, installations or remains associated with architectural, cultural, social, political, economic, or military history, and identified as being important to a community.
>
> Cultural heritage landscapes mean a defined geographical area of heritage significance that has been modified by human activities. Such an area is valued by a community, and is of significance to the understanding of the history of a people or place. Examples include 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* 2005).

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* 2005).

2.1 Heritage Impact Assessment Report

In early 2011, the Ministry of Tourism and Culture (MTC) indicated that bridges owned by either upper or lower-tier municipalities should 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 (MTC, February 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. An HIA includes the following components

- A general description of the history of the study area as well as a detailed historical summary of property ownership and structure development;
- A description of the cultural heritage landscape and built heritage resources;
- Representative photographs of the structure and character-defining architectural details;
- A cultural heritage resource evaluation guided by the *Ontario Heritage Act* criteria;
- A summary of heritage attributes;
- Consideration of alternatives, mitigation and conservation methods;
- Historical mapping and 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 Regulation 9/06 of the *Ontario Heritage Act*.

Ontario Heritage Act 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.

Should the potential heritage resource meet one or more of the above mentioned criteria, it may be considered for designation under the *Ontario Heritage Act*.

3.0 HISTORICAL CONTEXT AND CONSTRUCTION

3.1 Introduction

The Humber River (West Branch) Bridge is a single span, concrete bowstring arch bridge that carries Humber Bridge Trail over the West Branch of the Humber River. The structure was built in 1918 and likely replaced an earlier structure at this site. Historically, the study area is located on part of the road allowance between Lots 20 and 21, Concession 8, in the former Township of Vaughan, County of York, now part of the City of Vaughan.

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. Section 3 of this report provides a brief historical background of settlement in the surrounding area. A description is also provided of the construction of the bridge within its historical context.

3.2 Land Use History

The land within the Township of Vaughan was acquired by the British from the Mississaugas in 1784. The first township survey was undertaken in 1793, and the first legal settlers occupied their land holdings in 1796. The township was named in honour of Benjamin Vaughan, who was one of the negotiators for the Treaty of Paris which ended the American Revolutionary War in 1783. In 1805, Boulton (1805:89) described that the soil in Vaughan was "much improved," and due to its proximity to York "may be expected to form an early and flourishing settlement." Vaughan was initially settled by Loyalists, the children of Loyalists, disbanded soldiers, and by Americans including the Pennsylvania Dutch, French Huguenots, and Quakers. By the 1840s, the township was noted for its excellent land and "well cleared and highly cultivated farms" (Armstrong 1985:148; Reaman 1971:19; Rayburn 1997:355; Smith 1846:199).

The following land use history is based on a combination of land registry records, historic mapping and local history resources where available. Given that the bridge is located between Lot 20 and Lot 21 in Concession 8, the abstract index to the land deeds for both parcels were investigated.

According to the index, all 200 acres of Lot 20, Concession 8 in the Township of Vaughan was patented to the Canada Company by the Crown in 1831. It was subsequently sold to Allen Stevenson, who in 1846, proceeded to divide the parcel into halves: the west half was purchased by John Stevenson and the east half was purchased by James Stevenson. The subject bridge is located in the west half of Lot 8. In 1877, John Stevenson sold the west half to Samuel McDonald for $4475. Samuel McDonald and his descendants retained ownership of the property well into the twentieth century. There were no references to the construction of a bridge on this property found at the land registry.

Lot 21, Concession 8 in the Township of Vaughan was delivered by Crown Patent to Charles Tumble in 1802. Ownership of the 200 acre parcel was transferred a number of times in the first half of the nineteenth century, and remained under the sole ownership of the Capner family from 1852 until 1913. In 1913, the property was bequeathed to James I. H. Devins, who later proceeded to subdivide and sell off small parcels of the original property. There were no references to the construction of a bridge on this property found at the land registry.

Historic mapping from 1860 depicts John Stevenson as the owner of the portion of Lot 20 (the west half) that contains the present study area (Figure 2). “Capner” is depicted as the owner of Lot 21 as a whole. No structures appear to have been located within the study area boundaries. However, one structure, most likely a homestead, is located just southwest of the study area, within John Stevenson’s property. Historic mapping from 1878 depicts Samuel McDonald in the west half of Lot 20 and Joseph Capner in Lot 21 (Figure 3). Historic mapping from both 1860 and 1877 indicate that the study area is a traditional bridge crossing point. It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

A review of twentieth century topographic mapping indicates that the bridge was in use as part of the Major Mackenzie Road thoroughfare until at least the 1960s. The earliest topographic map available dates to 1919, and indicates that the subject bridge was in place by this time (Figure 4). The letter ‘M’ (masonry) indicates that the bridge was either stone or concrete. The 1985 topographic map indicates that Major Mackenzie Road was no longer a through road, and a by-pass has since been constructed to the south of the study area.

Figure 2: Location of study area in the Township of Vaughan, 1860
Source: *Tremaine Map of York County*

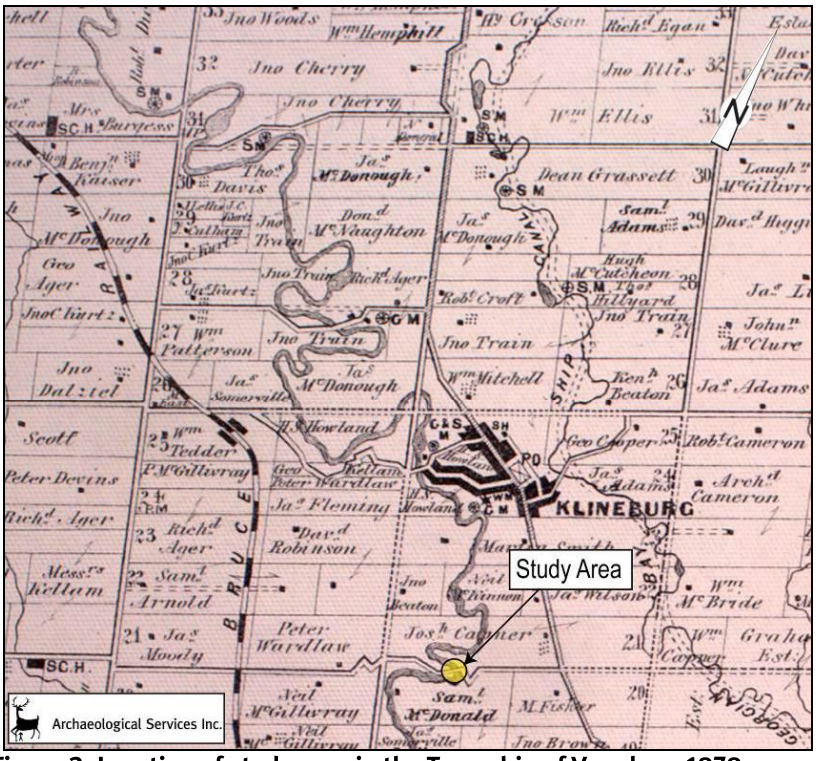

Figure 3: Location of study area in the Township of Vaughan, 1878
Source: *Illustrated Historical Atlas of York County, Ont.*

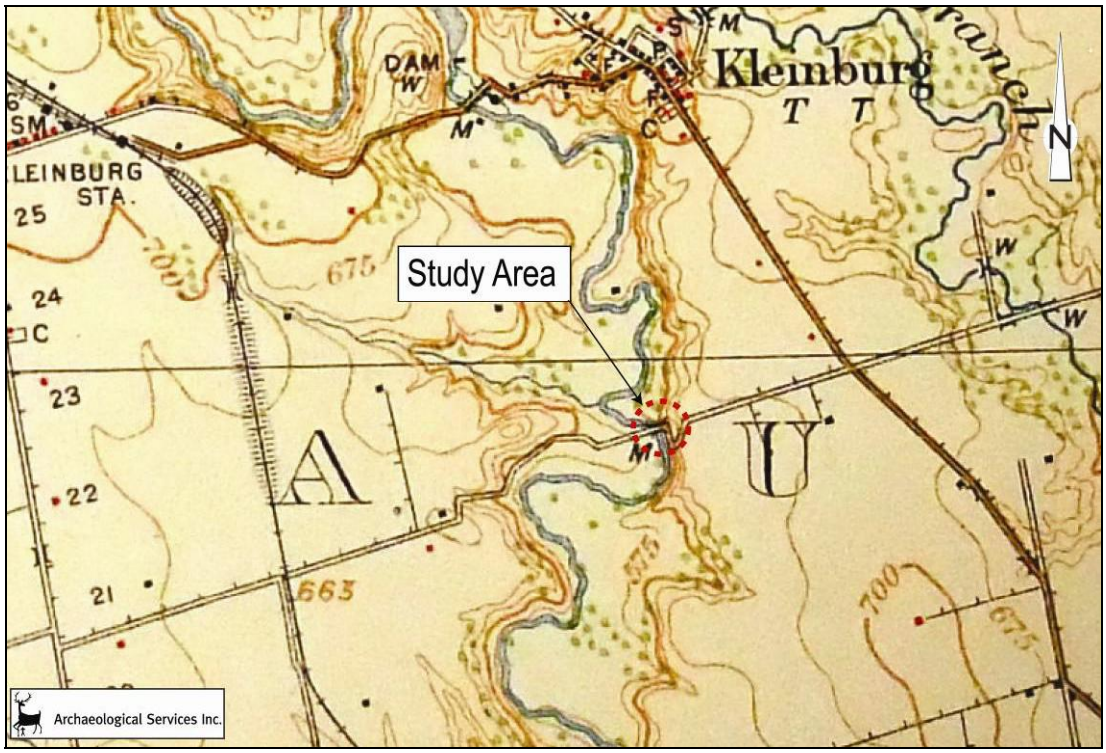

Figure 4: Location of study area on a 1919 topographic map.
Source: Department of Militia and Defence

3.3 Bridge Construction

3.3.1 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 their higher costs and a lack of skilled craftsman, these structures were generally restricted to market towns. By the 1890s, steel had become the material of choice when constructing bridges given that it was less expensive and more durable than its wood and wrought iron predecessors. Steel girder and truss structures were very common by 1900. The use of concrete in bridge construction 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 (Heritage Resources Centre 2005:7-8).

Structural steel in highway bridges had become a popular choice in the early twentieth century, given the increasing price of timber and its short lifespan of approximately ten years. Steel bridges with concrete abutments, instead of a traditional masonry substructure, were recognized for their durability and affordability ([…] 1907:62). Concrete arch bridges also made an appearance by the beginning of the twentieth century, having been successfully employed in Europe and in the United States since the 1880s (Cuming 1983:44). Reinforced concrete was first used in an arch bridge at Massey in 1906 and by 1909, the first concrete truss or tied arch bridge was constructed on the Middle Road at Etobicoke Creek by Frank Barber and C. W. Young (Cuming 1983:44, 47).

3.3.2 Concrete Bowstring Arch Bridge Construction

The concrete bowstring arch bridge, introduced to Ontario's landscape in 1909 with the construction of the Middle Road Bridge at Etobicoke Creek, was widely used across Ontario to span waterways. This type of bridge used a concrete compression arch over the bridge deck which was tied to the road bed, while vertical tension members from the arches supported the deck. In 1910, after the successful completion of the Middle Road Bridge, Frank Barber submitted an article to *The Canadian Engineer* (1910:184) promoting the use of this bridge type in Ontario's highways by advocating for their structural stability and permanence, aesthetic appeal, comparative costing to contemporary to steel bridges of the day, and adaptability to different contexts (it could be built on a skew; did not require deep abutments; or could be built upon older abutments).

3.3.3 Construction of the Humber River (West Branch) Bridge

According to Township of Vaughan Council Minutes, the Humber River (West Branch) Bridge (referred to as the Bell Bridge in the minutes[2]) was built in 1918 to the designs and specifications of Frank Barber, Consulting Engineer.[3] In the minutes, Frank Barber is also indicated as serving as the Township Engineer. The single span, reinforced concrete, bowstring arch bridge was constructed by the firm Ritchie Construction Company of Beamsville, Ontario for $2587.00 in accordance with the plans and specifications as prepared by Frank Barber. The original drawings for this structure are not believed to exist. A review of archival holdings located at the Ontario Archives, the City of Vaughan Archives, and the County of York Land Registry did not provide any original documents such as bridge designs or surveys, or historical photographs. The Ministry of Transportation (Central Region), the Toronto and Region Conservation Authority (TRCA), and the Cultural Services Division at the City of Vaughan were also consulted.

The available documentation for the Humber River (West Branch) Bridge indicates that the structure has not previously undergone any major rehabilitation or repair work. As such, the original features and design of the bridge appear to be intact. Additionally, historic research did not reveal any details regarding previous structures at this location. Historic mapping indicates that there were probably structures at this crossing since the mid-nineteenth century. These were likely timber structures which generally had a lifespan of ten years. Timber bridges were becoming obsolete by this time given their short life expectancy; susceptibility to flooding; maintenance costs; and inability to accommodate the new farm machinery and automobiles of the day.

4.0 EXISTING CONDITIONS AND INTEGRITY

A field review was undertaken by Lindsay Popert, ASI, on September 10, 2010, 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 bridge inspection reports received from the client were then utilized to describe the existing conditions of the bridge crossing. This section provides a general

[2] Available historic records do not indicate why this bridge was called the Bell Bridge in the early twentieth century. There is no evidence of a 'Bell Family' living on Lots 20 and 21 in Concession 8.
[3] The bridge was thought to have been built in 1914, as indicated in the Municipal Structure Inspection Form. It is possible that the original designs for the bridge date to 1914, and perhaps the construction of the bridge was delayed to 1918 due to the War. This date was obtained from Township of Vaughan Council Minutes.

description of the bridge crossing and associated cultural heritage features. Photographic documentation of the bridge crossing is provided in Section 7.0.

The Humber River (West Branch) Bridge is a concrete bowstring arch bridge that carries Humber Bridge Trail (formerly Major Mackenzie Road) over the Humber River in the City of Vaughan, Ontario. Located approximately 0.4 km east of Highway 27, the structure served as a major river crossing until the Major Mackenzie Road alignment was moved to its present position in the late twentieth century. The bridge continues to serve vehicular traffic and provides access across the river to a single residential property. A review of historic mapping indicates that this bridge was predated by earlier structures.

The Humber River (West Branch) Bridge is a single span, concrete bowstring arch bridge measuring 20 m in length and 4.9 m in width. A plaque, likely recording the date of erection and the construction company, was formerly located on the easterly portion of the top chord, north elevation. The single span bridge features a cast-in-place concrete deck resting on concrete abutments and concrete arched trusses. The deck is bounded by the original concrete post and double rail handrail system. There are no sidewalks.

The last biennial inspection took place in late 2008. The Summary Action Report for the subject bridge (AECOM 2009) indicated that the Humber River (West Branch) Bridge presents a number of performance deficiencies and indicated that a number of structural elements require replacement due to their poor condition. The report notes that many components of the bridge are severely deteriorated and are suffering from severe spalling, scaling, delaminations, loss of concrete, and exposed and deteriorating steel components. Field review confirmed that the bridge is in a state of disrepair.

4.1 Comparative Analysis

According to the City of Vaughan Bridge Inventory, there are a total of two concrete bowstring arch bridges owned and maintained by the municipality. The Humber River (West Branch) Bridge is the older of the two, dating to 1918 while the second bridge, known as the McEwen Bridge, dates to 1923. A third bridge, formerly owned by the City of Vaughan and presently under the ownership of the TRCA and within the Boyd Conservation Area, is located just north of Langstaff Road on the Humber River in Vaughan (Figure 5). A review of the 1919 topographic map indicates that a concrete bridge was located at this site by 1919 and most likely corresponds to the bridge that is presently located in the Boyd Conservation Area. The TRCA indicated that a fourth concrete bowstring arch bridge is located on the Humber River in the Claireville Conservation Area in Brampton. Known as the Wiley Bridge, this structure was built in circa 1924 and has recently undergone rehabilitation work.[4] Further, it was confirmed that there are no concrete bowstring arch bridges remaining on the Humber River in the Town of Caledon[5].

According to the Region of York Bridge Inventory, the Region does not own/maintain any concrete bowstring arch bridges[6].

[4] Personal Communications, Susan Robertson (Humber River Project Manager, Watershed Planning), October 2 2010
[5] Personal Communications, Sally Drummond (Heritage Resource Officer, Town of Caledon), October 4 2010
[6] Bridge Inventory provided by AECOM, October 18, 2010.

Figure 5: Former Langstaff Road Bridge in the Boyd Conservation Area, Vaughan
Source: ASI, October 2010

4.2 Additional Cultural Heritage Resources

The subject bridge spans the Humber River, which is a recognized Canadian Heritage River. A review of the heritage mapping layer at the City of Vaughan's online Map Viewer indicated that there are no previously identified heritage properties in the vicinity of the study area.

5.0 HERITAGE EVALUATION OF THE HUMBER RIVER (WEST BRANCH) BRIDGE

Table 1: Evaluation of the Humber River (West Branch) Bridge using *Ontario Heritage Act* Regulation 9/06

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

i. is a rare, unique, representative or early example of a style, type, expression, material or construction method;	Concrete bowstring arch bridges were a very common bridge type throughout southern Ontario during the 1910s through to the 1930s and 1940s, but since have declined in number given their inability to accommodate modern vehicular and highway needs. Constructed in the late 1910s and currently in poor condition, the subject bridge represents a simple, earlier concrete bowstring arch design, but given its poor condition, it is not a particularly representative example of this bridge type. However, given that there are likely only four of this type remaining on the Humber River, three of which are in Vaughan, it is considered to be an important example of a rare or vanishing bridge type in Ontario.
ii. displays a high degree of craftsmanship or artistic merit, or;	The subject bridge does not feature any decorative elements or evidence of superior craftsmanship. It is acknowledged that bridge elements indicating a high degree of craftsmanship or artistic merit may have been lost given the poor condition of the bridge. While likely a common detail on concrete bowstring arch bridges (it is also extant on the other remaining concrete bowstring arch bridges in Vaughan), the chamfered edges of some concrete elements (including the posts, rails and chords) are noted.
iii. demonstrates a high degree of technical or scientific achievement.	There are three known concrete bowstring arch bridges in the City of Vaughan. While hundreds of these structures were built across southern Ontario, relatively few remain. The bridges feature roughly the same

Table 1: Evaluation of the Humber River (West Branch) Bridge using *Ontario Heritage Act* Regulation 9/06

	dimensions, design, and date to the same time period. The Humber River (West Branch) Bridge is not known to exhibit any particular technical value from an engineering perspective.

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

i. has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community;	The structure retains historical associations with the original Major Mackenzie Road alignment, which was first surveyed and established in the early to mid-nineteenth century. Given that this is a traditional bridge crossing, it retains important associations with early township settlement and development.
ii. yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or;	This bridge crossing and its associations with the original Major Mackenzie Road alignment help to communicate patterns of township development as well as improvements in transportation infrastructure in the nineteenth and twentieth centuries.
iii. demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.	The structure was designed by Frank Barber of Toronto, a consulting engineer and who was also noted as serving as Township Engineer in 1918. The bridge was constructed by the firm Ritchie Construction Company of Beamsville and built for the Township of Vaughan. Frank Barber is a notable engineer who was responsible for the design of concrete bowstring arch bridges across Southern Ontario in the early twentieth century. He was involved in the design of a number of early concrete bridges, many of which were prototypes (The Middle Road Bridge in 1909; the first open spandrel concrete arch at Weston in 1910).

3. The property has contextual value because it:

i. is important in defining, maintaining or supporting the character of an area;	The design, scale and general massing of the bridge was built to accommodate early rural vehicular traffic and agricultural machinery in the early twentieth century. This bridge continues to compliment the rural character of the area and contributes to the picturesque setting of the Humber River valley.
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 vehicles and pedestrians over the west branch of the Humber River and is physically associated with the Humber River and the surrounding rural landscape.
iii. is a landmark.	The bridge is a prominent feature in the landscape, particularly when viewed from the Humber River and when experienced by pedestrians and drivers who use the bridge to cross the river. Additionally, given that it is listed on the municipal inventory of resources of cultural heritage interest, it is considered to have perceived importance and value within the community.

Given that the Humber River (West Branch) Bridge met at least one of the criteria contained in Regulation 9/06, this cultural heritage resource may be considered for municipal designation under the *Ontario Heritage Act.*

In summary, character-defining elements associated with the Humber River (West Branch) Bridge include, but are not limited to:

- Concrete bowstring arch construction;
- The chamfered edges of some concrete elements (including the posts, rails and chords;
- Association with Frank Barber, Engineer;
- Its current alignment which retains historical associations with former bridges built to span the Humber River at this point;
- Association with the other concrete bowstring arch bridges spanning the Humber River;
- Scenic views of the bridge from the Humber River and from the roadway.

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

Following the evaluation of the subject cultural heritage resource, the Humber River (West Branch) Bridge was determined to retain cultural heritage value. The conservation options presented below are contained in the Ontario Heritage Bridge Program guidelines (1991), which is regarded as the current best practice for conserving heritage bridges in Ontario and ensures that heritage concerns, and appropriate mitigation options, are considered. The following nine conservation options are arranged according to level or degree of intervention from minimum to maximum:

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 evaluated to retain cultural heritage value under Regulation 9/06, all nine of these conservation options should be considered as part of the Humber River (West Branch) Bridge Class Environmental Assessment.

7.0 ENVIRONMENTAL ASSESSMENT OPTIONS

The City of Vaughan is undertaking a pair of separate, but simultaneous Class Environmental Assessment (EA) Studies for the proposed rehabilitation of two bowstring arch bridges over the Humber River. The City of Vaughan has initiated this study to determine how to best address the potential access issues created by the deterioration of these two bridges, and identify appropriate courses of action to improve the

structural integrity of the bridges. As part of the study, the nine conservation alternatives listed in Section 6.0 are under consideration as bridge improvement alternatives.

7.1 Evaluation of Impacts

To assess the potential impacts of the undertaking, the cultural heritage resource and identified heritage attributes were considered against a range of possible impacts as outlined in the Ministry of Tourism and Culture document entitled *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* (September 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 it 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 (III.7).

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	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	No impact.	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.	No impact.	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.	No impact.	No impact.	Yes – views of surrounding landscape and views to the bridge from the Humber River and surrounding landscape will be altered.	No impact.	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.	Yes – a change in use would result in alterations to the heritage resource.	No impact.	No impact.	No impact.	Yes – use of bridge for pedestrian walkways, cycle paths, scenic viewing, et cetera, would result in a change from the original use of the structure.	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.	Yes – views to the bridge from the surrounding landscape will be altered.	Yes – the adaptive re-use of the bridge for purposes other than vehicular purposes would result in a change from the original use of the structure. If the bridge remains in vehicular use, no impact is expected.	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 original 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 original 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 surrounding landscape are expected provided that the new bridge retains a similar scale, grade and alignment.	No impact.	Yes – impacts are expected through removal of the existing bridge and the 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 surrounding landscape are expected provided that the new bridge retains a similar scale, grade and alignment.	No impact.	Yes – impacts are expected through removal of the existing bridge and the introduction of a new structure.

8.0 CONCLUSIONS

The Humber River (West Branch) Bridge is a concrete bowstring arch bridge that carries Humber Bridge Trail (formerly Major Mackenzie Road) over the Humber River in the City of Vaughan, Ontario. Built in 1918, the bridge was designed by Frank Barber and constructed by the firm Ritchie Construction Company of Beamsville. Located approximately 0.4 km east of Highway 27, the structure served as a major river crossing until the Major Mackenzie Road alignment was moved to its present position in the late twentieth century. The bridge continues to serve vehicular traffic and provides access across the river to a single residential property.

8.1 Summary Statement of Cultural Heritage Value

The Humber River (West Branch) Bridge retains historical associations with former bridges built at this crossing and their relationship to early township transportation networks, settlement patterns and infrastructure improvements. This bridge crossing is recognized for its contribution to the growth and development of the township and its service as a vital east-west link in the township transportation network. Further, the bridge retains historical associations with its designer, Frank Barber, a significant early twentieth-century civil engineer.

The design value of the structure relates to its rarity, given that the Humber River (West Branch) Bridge is one of four known concrete bowstring arch bridges remaining on the Humber River and possibly the oldest remaining of this bridge type on the Humber River; as such, it is considered an early example and therefore important example of a rare and vanishing bridge type in Ontario.

The bridge retains strong contextual values resulting from its: recognition by the community as a cultural heritage resource; association with previous bridges at this crossing point on the Humber River; landmark value and contribution to the picturesque qualities of the surrounding area; and its role as part of a family of bridges within the Humber River corridor, together which contribute to the character of the Humber River, a Canadian Heritage River.

In summary, character-defining elements associated with the Humber River (West Branch) Bridge include, but are not limited to:

- Concrete bowstring arch construction;
- The chamfered edges of some concrete elements (including the posts, rails and chords;
- Association with Frank Barber, Engineer;
- Its current alignment which retains historical associations with former bridges built to span the Humber River at this point;
- Association with the other concrete bowstring arch bridges spanning the Humber River;
- Scenic views of the bridge from the Humber River and from the roadway.

8.2 Recommendations

Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations and application of Regulation 9/06 of the *Ontario Heritage Act*, the Humber River (West

Branch) was determined to retain cultural heritage value or interest and may be considered for municipal designation under the *Ontario Heritage Act*. In particular, it was determined to retain strong historical and contextual values given its location at a traditional bridging point and association with the Humber River, and strong design values given its bridge type, age and association with noted civil engineer, Frank Barber.

Following the evaluation of potential impacts on the heritage resource (see Table 2), it was determined that Conservation Alternatives 1 – 3 are the preferred alternatives, given that no impacts are expected to the heritage resource and its identified heritage attributes, with Alternative 1 being the most preferred. 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 cultural heritage value of the Humber River (West Branch) Bridge, the following recommendation and mitigation measures should be considered and implemented:

1. Based on the results of heritage evaluation, Conservation Alternatives 1 -3 are the preferred alternatives, with Alternative 1 being the most preferred. 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. This report should be filed with the Cultural Services Division at the City of Vaughan and Heritage Vaughan for review and comment, and to other organizations that may have an interest in this project, including but not limited to: the Toronto Regional Conservation Authority; and, the Humber Water Alliance-Heritage Subcommittee.

3. This report should be filed with the Ministry of Tourism and Culture review and comment.

4. 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.

5. Should replacement of the bridge be chosen as the preferred alternative (Conservation Alternative 8 or 9), two mitigation options should be considered:

    a. Replacement/removal of existing bridge and construction of a new bridge with replication of the appearance of the heritage bridge in the new design, with allowances for the use of modern materials. The character-defining elements identified in Section 8.1 should be considered for replication.

    b. Replacement/removal of existing bridge and construction of a new bridge with historically sympathetic design qualities to the heritage bridge, with allowances for the use of new technologies and materials.

    c. In addition to (a) and (b), development of a commemorative strategy, such as plaquing, may be appropriate.

9.0 PHOTOGRAPHIC DOCUMENTATION

Plate 1: View of bridge crossing from the west.

Plate 2: View of bridge crossing from the east.

Plate 3: View of south elevation from the west bank.

Plate 4: Oblique view of south elevation from the east bank.

Plate 5: View of north elevation from the east bank.

Plate 6: View of north elevation from the west bank.

Plate 7: View under the bridge, looking east from the west abutment.

Plate 8: Detail of spalling soffit

Plate 9: Detail of exposed rebar.

Plate 10: View of west abutment from the north.

Plate 11: Detail of northwest wingwall.

Plate 12: View of the bridge deck.

Plate 13: View of the north truss.

Plate 14: View of the south truss.

Plate 15: Detail of handrail and end post.

Plate 16: Location of former plate marker.

Plate 17: Detail of chamfered edges.

Plate 18: Detail of damaged handrail and vertical members.

Plate 19: Detail of former patch-up work.

Plate 20: Humber River looking north.

Plate 21: Humber River looking south.

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August 20, 2012

Ms Erika Brown, Environmental Planner
AECOM
300 Town Centre Boulevard, Suite 300
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Dear Ms Brown

Project: Vaughan Bowstring Arch Bridges:
McEwen Bridge and Humber Bridge Trail Bridge – Municipal Class EA
Location: City of Vaughan
MTC File: 19EA067

The Ministry of Tourism, Culture and Sport (MTCS) received the following reports:

> *1. Cultural Heritage Evaluation Report –DRAFT:* ***McEwen Bridge, Structure No. 011601*** *– Class Environmental Assessment for Bowstring Arch Bridges on Humber River Trail and McEwen Bridge on Kirby Road, City of Vaughan Ontario* dated October 2010 prepared by Archaeological Services Inc. and
>
> *2. Cultural Heritage Evaluation Report –DRAFT:* **Humber River (West Branch) Bridge, Structure No. 008** *– Class Environmental Assessment for Bowstring Arch Bridges on Humber River Trail and McEwen Bridge on Kirby Road, City of Vaughan Ontario* dated October 2010 prepared by Archaeological Services Inc.

As part of the Class Environmental Assessment process, the MTCS has an interest in the conservation of cultural heritage resources including archaeological resources, built heritage resources, and cultural heritage landscapes.

MTCS has reviewed the above mentioned reports and has the following comments and recommendations. Since the reports are similar in format, conclusions and recommendations, we have combined our comments to apply to both reports.

The reports appear to have two cover pages with somewhat different titles. One cover refers to the reports as Cultural Heritage Existing Conditions Report, while ASI's cover is titled a Cultural Heritage Evaluation Report (CHER). From the Ministry's perspective, the CHER is the appropriate technical report to evaluate the cultural heritage value of a property.

5.0 Heritage Evaluation uses both the *Ontario Heritage Bridge Program* (1991) (OHBP) and *Criteria for determining cultural heritage value or interest*, established under Ontario Regulation 9/06 of the *Ontario Heritage Act (OHA)*. As noted in the reports, MTO's guideline is meant for provincially owned bridges, and is used to identify heritage bridges of *provincial* significance. Accordingly MTCS considers only the results of the O.Reg.9/06 evaluation. Notwithstanding the applicability of the evaluation criteria, the Conservation Options set out in the OHBP continue to be considered best practices for heritage bridges, regardless of ownership.

The first paragraph of Section 5.1 states that the bridges are not listed on the Ontario Heritage Bridge List, nor designated under Part IV of the OHA. However, as indicated in Section 1.0 of the reports both

bridges are currently listed on the Vaughan Heritage Inventory and also in the *Humber River Heritage Bridge Inventory*, released in July 2011. While, these do not confer heritage protection, it demonstrates that both bridges are recognized as having cultural heritage value. We suggest including reference to these recognitions in this section of the report.

6.1 Conclusions: In keeping with the language of the OHA, we recommend that the phrase "cultural heritage value or interest" be used in place of terms such as "heritage **significance"**.

6.2 Recommendations: The reports conclude that both the McEwen Bridge and Humber River Trail Bridge were determined to retain a high degree of cultural heritage value, and recommend the bridges for inclusion in the Ontario Heritage Bridge List. As noted above, the OHBP is MTO's guideline meant for provincially owned bridges. Since the bridges are municipally owned it may be more appropriate to recommend that the municipality designate the bridges under Part IV of the OHA.

While the reports appropriately outline best practices for conservation options and provide general considerations for these options, the preferred option, from a heritage perspective, is not articulated. Since seven of the nine conservation options indicated recommend retention of the bridge with varying degree of intervention, we conclude that the preferred option from a heritage perspective is retention of the bridge. We recommend revising the report to clearly articulate the recommendations.

In addition, it may be necessary to provide further information considering specific impacts and mitigation, as well as implementation and monitoring recommendations. In this regard, we recommend referring to Ministry of Culture *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* (PDF) as part of the Ontario Heritage Tool Kit, which is available at the Ministry website:
http://www.mtc.gov.on.ca/en/publications/Heritage_PPS_infoSheet.pdf

The reports recommend that Heritage Vaughan and Cultural Services Division at the City of Vaughan be provided with the CHERs for review and comment. MTCS further recommends that the CHERs be made available, upon request, to other organizations that may have an interest in these projects, including but not limited to, the Toronto a Region Conservation Authority and the Humber Water Alliance-Heritage Subcommittee.

The report and its recommendations should be considered as part of the overall EA.

Archaeology: For your information, MTCS's records indicate that a Stage 1 archaeological assessment report for each of the study areas has been submitted, reviewed and accepted by MTC. Additionally, our records show that Stage 2 assessments are recommended for certain portions of both study areas where archaeological potential was indicated.

Please be aware that all archaeological assessments must be completed, reviewed by an Archaeology Review Officer and the recommendations accepted **prior to any ground disturbance**. In addition, reports are reviewed on a first in first out basis and ministry Staff may have additional comments when reviewing.

Thank you for the opportunity to review the CHER reports. We look forward to receiving further EA reports in due course. Should you have any questions please feel free to contact me.

Best Regards

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