APPENDIX

E CULTURAL HERITAGE EVALUATION REPORT AND IMPACT ASSESSMENT

CULTURAL HERITAGE EVALUATION REPORT
BOSWORTH BRIDGE, No. B007028
WELLINGTON ROAD 7 (WR 7)

(LOT 2, CONCESSION 13 & 14
GEOGRAPHIC TOWNSHIP OF PEEL)

TOWNSHIP OF MAPLETON
COUNTY OF WELLINGTON, ONTARIO

April 2015
Revised
December 2015

Prepared for:
MMM Group Ltd.

Prepared by:

UNTERMAN McPHAIL ASSOCIATES
HERITAGE RESOURCE MANAGEMENT CONSULTANTS

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1.0 INTRODUCTION

MMM Group Limited retained Unterman McPhail Associates, Heritage Resource Management Consultants, to undertake a Cultural Heritage Evaluation Report (CHER) for the Bosworth Bridge on Wellington Road 7 (WR 7) in the Township of Mapleton, County of Wellington ***(Figure 1)***. The Bosworth Bridge was completed in 1949 for the County of Wellington. The County of Wellington has classified the one span structure as a Warren Camelback steel pony truss design type. The County of Wellington is planning to undertake rehabilitation or replacement work on the structure.

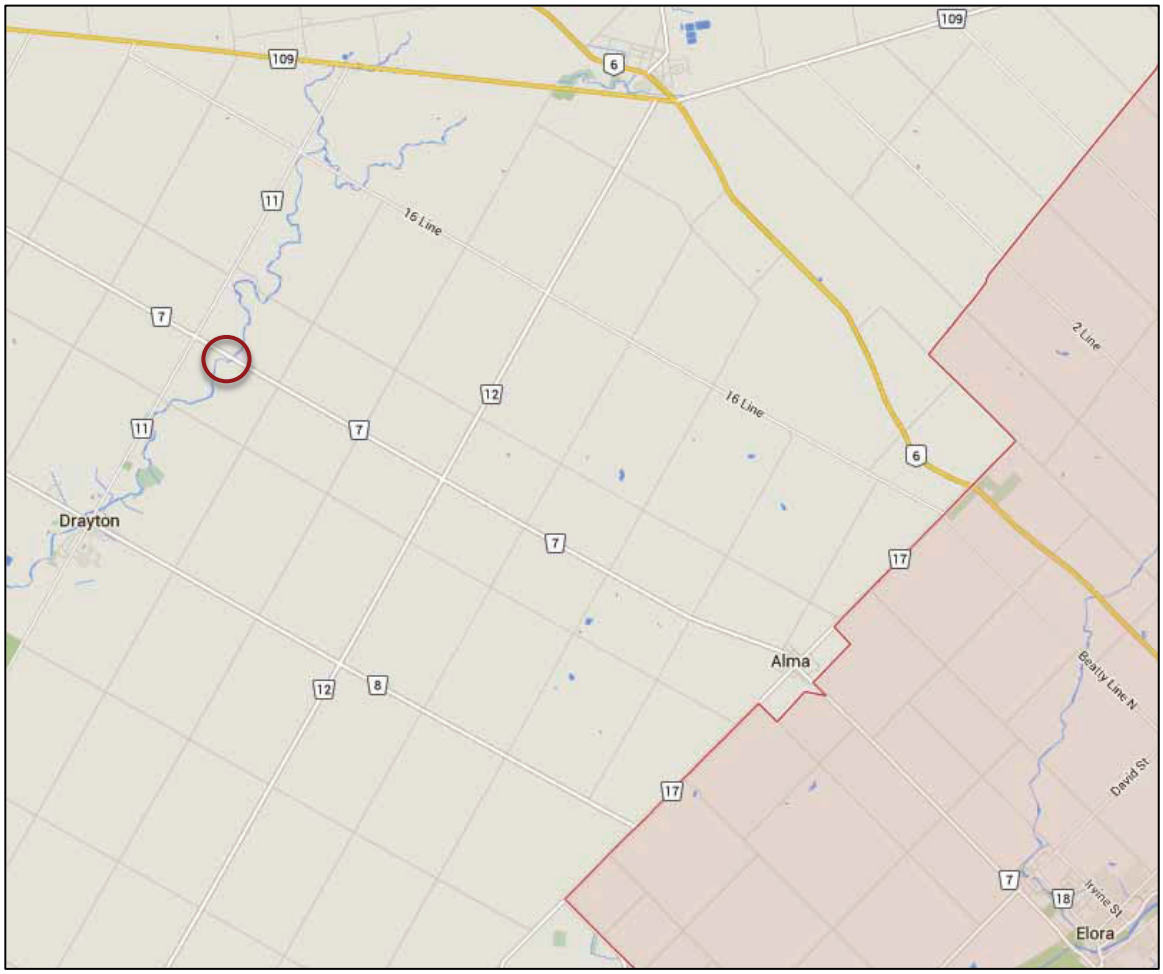

Figure 1. Location of the Bosworth Bridge, Township of Mapleton, County of Wellington [Google 2015].

The Township of Mapleton confirms the subject structure is not listed on a municipal heritage register or inventory of cultural heritage resources or designated under the *Ontario Heritage Act.* The Grand River Conservation Authority has included the subject bridge in the document *Arch, Truss & Beam: The Grand River Watershed Heritage Bridge Inventory* (March 2013); however, it has been misclassified as a Howe Camelback

steel pony truss structure. The Ministry of Culture's Ontario Heritage Bridge List (July 2015) does not include the Bosworth Bridge as a provincial heritage structure.

This Cultural Heritage Resource Evaluation (CHER) includes a historical summary of the bridge, a description of the bridge and its setting, an evaluation of the cultural heritage value of the bridge, a summary of cultural heritage value and mitigation recommendations. The bridge was evaluated using the criteria set out under Ontario Regulation 9/06, which were developed for the purpose of identifying and evaluating the cultural heritage value or interest of a property proposed for protection under Section 29 of the *Ontario Heritage Act*. Ontario Regulation 9/06 describes the three criteria as design value or physical value, historical value or associative value, and contextual value.

Historical maps, photographs and drawings are included in Appendix A. Appendix B contains a bridge survey form with current photographs of the Bosworth Bridge. Appendix C includes a County of Wellington list of comparable metal truss structures under its jurisdiction.

2.0 HISTORICAL SUMMARY

2.1 Peel Township, County of Wellington

In 1788, the lands of the present day County of Wellington were divided between the Districts of Nassau and Hesse. The Province of Quebec was separated into Upper and Lower Canada in 1791 and the Nassau District was renamed the Home District and the Hesse District became the Niagara District. In the same year, the Colonial Office and government of Upper Canada decided to adopt a policy to set aside one-seventh of all land as Clergy Reserves and an additional one-seventh as Crown Reserves as a means of supporting a Protestant clergy and financing government expenditures in the colony. Since these lands could not be set aside in areas already surveyed and settled, entire townships in new and unsettled areas were designated as Crown Reserves to compensate.[1] Further subdivision of the districts occurred in 1798.

For militia, electoral and land registration purposes, the District of Wellington was designated as the County of Waterloo in 1838. The district included part of the area known "The Queen's Bush", a vast tract of land that stretched north to Georgian Bay and west to Lake Huron between the developed lands to the southwest and the lands of the German Company in Waterloo County. When the *Municipal Act of 1849* abolished all districts and replaced them with counties, Wellington District was renamed the County of Waterloo. It included almost all of the townships in the later counties of Waterloo, Wellington and Grey and Guelph and was designated as the government seat. In 1852, Waterloo County was split into three areas as the United Counties of Waterloo,

[1] Leo A. Johnson, *History of Guelph 1827-1927* (Guelph, Ont.: Guelph Historical Society, 1977) 5.

Wellington and Grey. The County of Wellington officially became a separate governmental unit in 1854.

Surveyor Augustus Jones surveyed a line in 1784 from the Head of the Lake (Burlington) to the supposed headwaters of the Grand River. Starting at Burlington Bay, Jones ran a straight-line in a northwesterly direction at an angle of 45 degrees until it crossed the Conestoga River at the present site of Arthur. This survey line became known Jones' Base Line. The townships of Puslinch, Guelph, Nichol, Peel and Arthur on the west side and Eramosa, Garafraxa and Luther Townships on the east side were surveyed from this Base line. Eventually the line was extended northward as far as Owen Sound.

As early as 1833 and prior to the township survey, black settlers began to arrive in the southern area of Peel Township. They established a significant settlement on a block of land granted by the Crown. Each settler was given a free grant of 50 acres.[2] By 1840, Euro-Canadian settlement in Peel Township had began with an influx of people with German background from Waterloo County and English and Irish settlers.

Provincial Land Surveyor R.W. Kerr undertook the Peel Township survey in 1843.[3] It was named after Sir Robert Peel, Prime Minister of Great Britain. In 1846, *Smith's Canadian Gazetteer* described Peel Township as being in the Wellington District and formerly part of the Queen's Bush. It had not been long open for settlement and no return had yet been made for the township. It was said to have about 1,000 inhabitants.[4] The official land sale began in 1847. The Drayton area was settled at that time with the arrival of the Jones, Dales and Hambly families.

The Elora and Saugeen Road, a private enterprise, was opened across Peel Township from Alma to Bosworth in the early 1850s as a toll road. It was taken over by the County of Wellington in 1861. Teamsters, who came down the Saugeen Road heading for Guelph, used the Elmira Road, now WR 86. Other township roads included the Garafraxa Road from Cummock to Arthur and the Centre Sideroad between Arthur and Macton. The Garafraxa Road was assumed by the County of Wellington in 1863 and became known as the Owen Sound Road, and in the 20th century, it became Highway 6. In 1870, the Wellington, Grey & Bruce Railway was built across Peel Township from Alma to Drayton, greatly enhancing the transportation access to the area. It became part of the Grand Trunk Railway and then the Canadian National Railway (CNR).

The *Illustrated Historical Map* (1877) shows an established rural landscape in Peel Township with a grid pattern of local roads, farm complexes and small population centres. The village at Drayton on Conestogo River served as the main centre. The crossroad hamlet of Bosworth had developed at the intersection of boundary road between Peel and Maryborough Townships and the Elora and Saugeen Road.

[2] Hutchinson, 305.
[3] Ibid.
[4] Wm. H. Smith, *Smith's Canadian Gazetteer* (Toronto: H. & W. Rowsell, 1846) 143.

By 1901, Peel Township had a population of 3,865 people. Topographic maps of the 20th century show a rural agricultural landscape with small communities, a comprehensive road system, churches and schools. In 1999, Peel Township was amalgamated with the Township of Maryborough and the Village of Drayton to became part of the Township of Mapleton in the County of Wellington.

2.2.1 Bosworth

The hamlet of Bosworth was established on Lot 19, Concessions 13 and 14 in the Township of Marysborough and partly in the neighbouring Township of Peel. Located at the strategic intersection of the Elora and Saugeen Road and the township boundary line road, the hamlet was named after Bosworth, England, the battlefield of King Richard II and Henry Tudor. The first settler in the area, John Harrington, arrived c1850. The Bosworth post office was opened in 1854.[5] Bosworth experienced growth as a result of the anticipation of the arrival of the Wellington, Grey and Bruce Railway. In 1871, its population was stood at 150 people. The hamlet contained a few residences, two hotels, a cabinetmaker shop, a shoe shop, a general store and it was serviced by a daily mail service and stagecoach service from Guelph to Southhampton on Lake Huron.[6]

When the railway bypassed the hamlet, Bosworth suffered a decline in its economic fortunes but still had the Ontario Hotel and a post office in 1879.[7] In 1884, the Arthur Junction Railway from Galt also bypassed the hamlet, contributing it the centre's further decline. By 1889, the population of Bosworth had been reduced to about 30 people. It still had a hotel as well as a school, a blacksmith shop, two stores, a carpentry shop and a business that sold organs, pianos and sewing machines.[8] The Bosworth Hotel was closed in 1899.[9] The post office followed in 1914.[10] By the 1930s, the hamlet comprised one house and a gasoline pump.[11] Both buildings were eventually demolished. Today, the community is commemorated by its name on topographical maps and in association with the subject bridge on WR 7.

2.2 Bosworth Bridge and Wellington County Road 7

In the mid 19th century, a number of Elora citizens organized a joint stock company to build a road, which became known as the Elora and Saugeen Road, to provide access to the northern townships in the County of Wellington. In 1851, the Wellington District

[5] LAC. Postal History and Philately, Post Offices and Postmasters, Bosworth, Wellington, Ontario. Access: --<http://www.bac-lac.gc.ca/eng/discover/postal-heritage-philately/post-offices-postmasters/Pages/item.aspx?IdNumber=7953&> (February 2015).
[6] Hutchinson, 317.
[7] *The Wellington County Gazetteer and Directory for 1879-80* (Elmira, Ontario: Armstrong & Delion, 1879) 94.
[8] Hutchinson, 343.
[9] Ibid., 317.
[10] LAC. Postal History and Philately, Post Offices and Postmasters, Bosworth, Wellington, Ontario.
[11] Hutchinson, 343.

Council enacted a bylaw authorizing the Council to buy stock in the road company and lend money to the enterprise. In 1852, the road was classified as a toll road with toll gates, one of which was located at Bosworth on the boundary line between Peel and Maryborough Townships. The Council then provided money to Nichol Township to make a gravel road. By 1860, the Elora to Alma Road was graveled; in 1861, a grant was provided to gravel the road through Peel Township.[12] Hugh Roberts of Pilkington Township acquired the contract to clear the road across Maryborough Township from Bosworth to Teviotdale and built the first bridges over the Conestogo River at Bosworth and Rothsay.[13] The County of Wellington took the road over in 1861 and abolished toll gates on all of its roads in 1864.[14] The Elora and Saugeen Road then became known as the "Gravel Road".[15] With a terminus at Southampton on Lake Huron, stage coaches soon began to provide regular service along its length. This road was an important element in the development and improvement of road transportation in the northern townships in the County of Wellington. It became know as Road 58 in the 20th century and is currently WR 7.

The first bridge over the Conestogo River on the Elora and Saugeen Road south of crossroads hamlet of Bosworth was probably built in timber. By the early 20th century, the structure was a narrow, single lane metal truss structure. The topographic map (1937) shows the mark "I", indicating the presence of the steel bridge at the subject crossing of the Conestogo River ***(Appendix A)***. The Bosworth Road was paved in the mid 20th century. The name of Bosworth seems to have been used by the county from the early to mid 20th century onwards.

In 1946, the County of Wellington embarked on a multi-year review and renewal of its county road system, including its bridges. At that time, County Engineer W.H. Keith identified 20 bridges with clear roadway widths of 16-ft. (4.88 m) or less that should be considered for replacement or widening in the near future. As well another 43 structures, identified as having a clear roadway width of less than 20-ft. (6.10 m) but more than 16-ft. (4.88 m), were identified as future problems on the main roads.[16] In early April of 1946, the Wellington County Council received a report from its county roads committee that included a list of bridges of greater than twenty feet that were considered to be inadequate for present traffic needs. The list recommended replacement for single lane steel truss bridge, which was considered to be too narrow for main road traffic and of light design, on Road 58 near Bosworth.[17]

In October of 1947, the county roads committee reported on the affect of the construction of the Conestogo Dam on the established system of county roads and bridges. It noted that a main bridge over the Conestogo River, comprising a 130-ft. (39.62 m) span with a

[12] Hutchinson, 12.
[13] Ibid., 343
[14] Ibid., 306 and 343.
[15] Ibid., 13.
[16] WCMA, Wellington County Council Minutes, Session Commencing 13 April 1946, 47.
[17] Ibid., 9 April 1946, 46.

steel superstructure, was to be removed. The report suggested the bridge floor width be increased to at least 24-ft. (7.32 m) and it be reused in another location, possibility on Road 58 at Bosworth.[18] In April 1948, the county roads committee continued the discussion of re-erecting steel work from the damaged Conestogo River Bridge on another road.[19] In June of 1948, it was recommended that the steel structure from the 4th Line Bridge be remodeled and reconstructed to provide *"a safe and adequate structure to replace the present Bosworth Bridge on Road 58"*.[20] The county bridge engineer's report at the same session reported the salvage and dismantling work on the 4th Line Bridge had been completed and it was safely stored and marked for re-erection, if desired.[21]

The county roads committee report dated June 17, 1948, recommended the county council give serious consideration to proceeding with the remodeling and reconstruction of the 4th Line steel truss bridge to provide a sale and adequate replacement structure for the Bosworth Bridge on Road 58.[22] Drawings were prepared in 1948 for the reusing the 4th Line Bridge superstructure as the replacement structure for the Bosworth Bridge on Road 58 ***(Appendix A)***. The drawing included the abutments, wingwalls and handrail for the structure. In August 1948, the county road between the Centre Sideroad in Peel Township at Parker and the Peel and Maryborough Townline at Bosworth were closed in order to replace the Bosworth Bridge over the Conestogo River.[23]

Following the approval of the Wellington County Council, the county roads committee reported to the county council in late October 1948, that a contract had been awarded, subject to the approval of the Department of Highways, to replace the "unsafe and inadequate" Bosworth Bridge on Road 58 with the remodeled and reconstructed 4th Line Bridge superstructure on new concrete abutments. The committee felt this was the most economical way to secure a clear roadway width of 24-ft. (7.32 m) on a new Bosworth bridge.

Although the new concrete bridge abutments were completed to provide for the new road width and some 20-ft. (6.10 m) of extra span, the DHO would only approve the reuse of the salvaged 4th Line superstructure if it was re-erected in its original condition. Although the roadway would not be widened as recommended, the roads committee was prepared to proceed with the provincial conditions and reuse of the 4th line bridge in it original condition in order to complete the new Bosworth bridge by the fall of 1948 until the bridge contractor started a complete new superstructure, in accordance with the necessary regulations, could be supplied for the spring of 1949. The roads committee requested guidance and instruction from the council on the matter. The county engineer informed the council the Bosworth Bridge replacement contract had proceeded to the point the superstructure erection was in preparation, and the structure was expected to be

[18] Ibid., 8 October 1947, 1.
[19] Ibid., 20 April 1948, 53.
[20] Ibid., 15 June 1949, 53.
[21] Ibid., 119.
[22] Ibid., June 17, 1948,114, 119.
[23] "A New Bridge Opened For Traffic", *Arthur Enterprise News* (October 13, 1949) 1.

completed in the fall, including the concrete floor, without the widened roadway width. On October 22, 1948, the Committee of the Whole Council County recommended the County Road Committee be authorized to leave the Bosworth Bridge for the next few months and to proceed with the erection of a new superstructure with a 24-ft. (7.32 m) width and the necessary load requirements in the spring of 1949.[24]

In November 1948, C.C. Parker, Consulting Engineer, was contracted to prepare drawings for the new Bosworth Bridge on Road 58 ***(Appendix A)***. Arnott Construction of Arthur, Ontario, carried out the general contract. The new structure designed in accordance with the Specifications for Highway Bridges, Ontario, 1935. The county engineer reported to county council in June 1949 that the work on the new bridge approaches at Bosworth had been completed and the steel work should be underway by midsummer.[25] The *Drayton Advocate* reported on the Bosworth Bridge work on August 25, 1949.

> *The new bridge over the Conestogo River on the gravel road just east of Bosworth corner is nearing completion. The span wide enough for two cars to pass readily, is now ready for painting. Workmen of the Hamilton Bridge Co. finished the steel this week and have left for a project in Noranda, Quebec. While there are steel sides, there are no cross-beams at the top. Workmen of the Arnott Construction Company, Arthur, will shortly commence to lay the floor. It is hoped the bridge will be ready for use by October. The roadway has been raised four feet from its previous level. For the past year traffic has been detoured by the 12th Peel in summer and Drayton last winter."*[26]

The county engineer's report to council dated October 11, 1949, noted the Bosworth Bridge contract had been completed and the new structure was opened to traffic in the last week.[27] On October 13, 1949, the *Arthur Enterprise News* reported Mr. Emerson Simmons of Drayton, the Wellington County bridge foreman, had officially opened the new Bosworth Bridge on Saturday morning. Mr. Dowling of Rothsay was noted as the driver of the first car driven over the new bridge. The completed Bosworth Bridge, erected at the cost of approximately $50,000[28], was described in the newspaper article.

> *The new Bosworth bridge located less than a mile east of Bosworth, once a promising hamlet on the townline, now merely a memory; is Wellington's second largest bridge to be built in recent yeas and is a very handsome structure located in attractive scenic surroundings. Like the Glenallan bridge it is almost entirely the product of Arthur labour, the contractors having been the Arnott Construction Company […].*

[24] WCMA, Wellington County Council Minutes, Session Commencing October 21, 1948, 33, 41 and 42.
[25] Ibid. Session Commencing June7, 1949, 119.
[26] "Bosworth Bridge Near Completion", *Drayton Advocate* (August 25, 1949) 114.
[27] WCMA, Wellington County Council Minutes, Session Commencing October 11, 1949, 37.
[28] "A New Bridge Opened For Traffic", *Arthur Enterprise News* (October 13, 1949) 1.

> *[….] the Bosworth Bridge is of a pony arch structure. With Mr. Harvey Snowe acting as foreman, two massive abutments were built that carry in all about three hundred tons of steel and concrete. The Hamilton Bridge Company did the steel work and the rest of the job including putting in a lot of fill done by the Arnott men. The bridge has a span of one hundred and thirty five feet and a width of twenty-four feet. Steel to carry such as bridge must be quite massive. Close examination of the structure gives one an idea of the engineering skill now required in the building of a bridge such as modern traffic conditions requires […].*[29]

The *Drayton Advocate* also reported that the Bosworth Bridge was opened for traffic on October 20, 1949.[30]

2.3 Steel Truss Bridges

A truss is a structural component comprised of a combination of members, typically in a triangular arrangement that form a rigid framework. The member arrangement determines the specific truss type. Steel truss bridges are categorized by the traffic they are designed to accommodate. A deck truss has traffic traveling on top of the main structure, a traffic flow between parallel superstructures which are not cross-braced at the top is a pony truss, and the structural steel is higher and cross-braced above the traffic for a through truss. Generally, pony trusses, which are smaller and lighter structures, are used to cross narrow spans and through trusses are used for longer spans. The oldest metal truss bridges have pin connections. Rivetted connections were the preferred bridge assembly technique in the early 20th century. Rivets were replaced by bolted connections in the post Second World War period.

The Pratt truss, a popular application for iron and steel bridges particularly at the end of the 19th century and into 20th century, was used for through, pony and deck spans. The Warren Truss was patented in 1848 in Great Britain by James Warren and Willoughby Theobald Monzani.[31] It consists of horizontal top and bottom chords longitudinal members joined by angle cross members to form inverted equilateral triangle shapes along its length. The triangle could be further subdivided by vertical members.

The Pratt truss gave rise to many variations such as the Parker truss patented in 1870 by American engineer Charles H. Parker.[32] A modified Parker truss with a top chord that did not stay parallel with the bottom chord and had exactly five slopes in the upper chord and end posts became known as a "Camelback" truss. This "Camelback" variation created a lighter structure without losing strength and placed less dead load at the ends and more

[29] Ibid.
[30] "Road Expenditures for the County Reach $244,452" (October 20, 1949) 1.
[31] Parsons Brinckerhoff and Engineering and Industrial Heritage, *A Context for Common Historic Bridge Types NCHRP Project 25-25, Task 15* (October 2005) 2-7.
[32] Ibid., 3-34.

strength concentrated in the centre. The web members, which vary in length from one panel to the next, made it more complicated to build.[33]

Steel truss bridges began to appear on Ontario roads in the mid-1880s. Improved production methods brought the cost of steel down to that of wrought iron, thus making steel bridges more economical. Steel bridges grew in popularity after 1900. By the beginning of the First World War, when most of Canada's railways had been completed, there was a shift in the steel industry to the construction of steel road bridges to address the increasing volume of road vehicles.

An important development with steel road bridges was the replacement of a timber deck with a reinforced concrete slab deck after 1900. The Department of Public Highways Ontario issued specifications for steel highway bridges in 1917.[34] Through trusses were used in applications requiring longer spans or for carrying heavier traffic. The pony truss bridge, which proved to be easy to erect and was relatively inexpensive, found widespread application and was particularly useful for shorter spans on county and township roads. American, and then Canadian, highway departments adopted the Parker truss as a standard design for pony trusses from 30 to 60 feet (9.14 m to 18.29 m) and through trusses from 100 to 300 feet (30.48 m to 91.44 m) in the early 1900s.[35]

Many steel bridges were constructed in the first part of the 20th century in Ontario and they retained their popularity with the Department of Highways through the 1930s despite developments in concrete bridge construction. In the mid to late 1930s, DHO designed and built several structures described as "low steel trusses", i.e., pony trusses, on provincial highways. Due to steel shortages during the Second World War, no steel truss bridges were built on Ontario's highway system from 1942 to 1945. Post 1945, other bridge types superseded the pony truss and fewer pony truss structures were built on Ontario's roads in the post Second World War period.

2.4 Bridge Designer/Builder

W.H. Keith, County of Wellington Engineer, supervised the project. C.C. Parker Consultants undertook the design for the structure with the design drawings being stamped by C.C. Parker. P. Eng. Hamilton Bridge Company Limited manufactured and erected the steel truss. L.M. Arnott was the general contractor for the project.

[33] pghbridges.com, Bridges & Tunnels of Allegheny County & Pittsburgh, PA., Bridge Basics. Access: <http://www.pghbridges.com/basics.htm> (April 2015).
[34] *Appendix to the Department of Public Highways Ontario Annual Report* (1917) 5.
[35] Ibid.

2.4.1 C.C. Parker Consultants

Clarence Collins Parker was born on September 28, 1906, in Humber Bay, Etobicoke Township, the son of fruit grower W.C. Parker and mother Jessie Collins.[36] C.C. Parker graduated in civil engineering from the University of Toronto in 1929 and completed his Masters at the same institution in 1933. Upon graduation he worked for the Department of Highways as a bridge engineer on the Queen Elizabeth Way (QEW) and later as structural engineer for Hamilton Bridge. He designed the first bridge on the QEW and later worked on the port-works in Ahu Dhabi on the Arabian Gulf.[37]

In 1946, he founded the consulting firm of C. C. Parker Consultants, based in Hamilton. The company grew from three staff to over a hundred with branches in London, Ottawa, and Edmonton. The firm's earliest projects included bridges and buildings. In partnership with Parsons and Brinckerhoff of New York, the company was responsible for the design of Highway 403 through Hamilton, the lift bridge at the Burlington Beach canal, a transportation master plan for the City of Hamilton in 1963 and parts of the Burlington Street improvements in 1980. C. C. Parker & Associates has been described as, "*Hamilton¹s major consulting engineering firm of the late 20th century*".[38] C.C. Parker died in 1981. Stantec Consulting Ltd. acquired the company in the mid-1990s.

The firm of C.C. Parker is known to have designed the following Ontario bridges, amongst many others, in the mid 20th century:[39]

- Mill Creek Viaduct (1948), St. Thomas;
- Wellington Road Underpass (1955), Highway 401, London;
- Trafalgar Township Bridge No. 6 (1958), Highway 401, Milton;
- Toronto Township Bridge No. 11 (1958), Highway 401, Mississauga;
- A number of bridges on Highway 403 (early 1960s) in Hamilton area;
- Burlington Beach Canal lift bridge; and,
- the Scheifele Bridge (1958), Township of Woolwich, Region of Waterloo.

2.4.2 W.H. Keith. P. Eng., County of Wellington Engineer

William H. Keith was the County Engineer for the County of Wellington when the Bosworth Bridge was built. He was involved in the original county scheme to reuse the

[36] rootsweb, The Ontario Vital Statistics Project, Ontario Birth Registrations. #047607-06 (York Co) Clarence Collins Parker, September 28, 1906.
Access: --<http://freepages.genealogy.rootsweb.ancestry.com/~births/> (March 2015).
[37] Robin S. Harris and Ian Montagnes, ed. *Cold Iron and Lady Godiva: engineering education at Toronto 1920-1972* (University of Toronto Press, 1973) 134.
[38] J.W. Disher, *By Design: The Role of the Engineer in the History of the Hamilton Burlington Area* (Hamilton, Ontario: Hamilton Engineering Interface, Inc., 2001) 155.
[39] The list of bridges is compiled from the following sources: Disher, 155; D.O. Robinson, "Three Typical Concrete Bridges", *Roads and Bridges* (Toronto: Monetary Times Printing Co. of Canada: October 1949) 84; Archaeologix Inc. and Historica Research Limited, *Inventory of Highway 400 and 401 Bridges, Technical Appendix* (Prepared for Central Region, Ontario Ministry of Transport, November 2004) 14, 22.

steel truss superstructure from the 4th Line for the Bosworth Bridge renewal in 1948 and was involved in the preparation of the first drawings for the Bosworth Bridge, dated 1948.

William Hargreaves Keith was born on March 28, 1900, the son of William Keith and Caroline Mary Frances Simpson, in York, Ontario. According to the 1901 and 1911 census, his family resided in Newmarket, Ontario. He still lived in Newmarket in 1921. He married Joyce MacNaughton Larkin in Toronto, Ontario, on December 30, 1925. The marriage certificate indicates his profession was "civil engineer".

Mr. Keith appears to have become the County Engineer for the County of Wellington c1933. The Keiths moved to Guelph when he assumed his duties at the county office. Keith served as the Commander in Chief of the Wellington County Home Defense Guards in 1940.[40] W.H. Keith received his certificate of military qualification in the Canadian Army, upon completion of practical examination, on 26 September 1943, and then was appointed as an Officer by Ministry of National Defence, on the same day. He was recommended for Lieutenancy, Active Militia of Canada on 19 March 1946.[41]

Keith was involved in the organization of a professional association for county and municipal engineers in the late 1940s and early 1950s. In February 1948, he sat on a committee to draw up a constitution and bylaws for the County Engineers Association.[42]

Keith retired as the county engineer for the County of Wellington c1965.[43] During his tenure the County undertook major improvements on its roads. Keith was responsible for the design of many new and replacement bridges in the County between 1933-1965. Bridge structures known to be associated with Keith while county engineer include, but are not limited to, the following structures:

- Bosworth Bridge, County Road 7, Township of Mapleton, County of Wellington, Steel Truss, 1949;[44]
- Blatchford Bridge, County Road 32, Township of Puslinch, County of Wellington, Speed River, Warren Pony Truss, 1949;[45]
- Penfold Bridge, Wellington Road 16, Township of Centre Wellington, County of Wellington, Concrete T-beam, 1959;[46]

[40] WCMA, A1991.235, Slide view of Wellington County Engineer W.H. Keith of Guelph, speaking to Wellington County Home of Defense Guards, c1940) June 1, 1940).
[41] WCMA, Accession #A1980.14, William Hargreave Keith (1902-1958), County Engineer, County of Wellington.
[42] Orland French and Gary May, *Sharing with Pride: The Story of Municipal Engineers in Ontario.* Mississauga: The Municipal Engineers Association, 2009) 21.
[43] F.B.D. Arnold, *A Brief History of The County Engineers Association of Ontario* (November 1985).
[44] Heritage Resource Centre. *Arch, Truss & Beam: The Grand River Watershed Heritage Bridge Inventory*. (March 2013) 224-225.
[45] Ibid., 208-209.

- Salem Bridge (Woolwich Street Bridge) Township of Centre Wellington, County of Wellington, Steel Truss, 1952;[47]
- Metcalfe Street Bridge (Badley Bridge), Metcalfe Street (Wellington Road 21), Village of Elora, County of Wellington, Steel Truss, 1953;[48]
- Rothsay Bridge, County Road 7, Township of Mapleton, County of Wellington, Steel Pony Truss, 1952;[49]
- Emerson Simmons Bridge, County Road 11, Township of Mapleton, County of Wellington, Steel Truss, 1952;[50]
- Moorefield Bridge, County Road 10, Township of Mapleton, County of Wellington, Steel Truss, 1954;[51]
- Caldwell Bridge, Wellington Road 43 (Gartshore Road), Township of Centre Wellington, Steel Truss, 1955;[52]
- Flax Bridge, County Road 11, Township of Mapleton, County of Wellington, Steel Truss, 1954;[53] and
- Township of Mapleton Bridge MB009, Sideroad 15, Township of Mapleton, County of Wellington, Concrete T-beam, 1958.[54]

2.4.3 Hamilton Bridge Company Limited

Sir John Hendrie established the Hamilton Tools Works in Hamilton, Ontario by 1872, or possibly earlier. Through the company's work of manufacturing machine tools, it became involved in the construction of simple railway bridges, including structures for the Great Western Railway. It was renamed the Hamilton Bridge and Tool Works. The company won its first major contract with the swing bridge over the Burlington Canal for the Hamilton & North Western Railway in 1876.[55]

William Hendrie Sr. reorganized the firm in 1876; it was renamed, once again, in 1894 becoming the Hamilton Bridge Works Co. Limited. After a short period of financial difficulty during this time period, the firm was closed. It was sold by auction to J. H. Tilden, who reopened it in 1895. The business flourished in the latter part of the 1890s and into the early 20th century, specializing in steel bridge construction, and making steel for the fabrication of buildings and bridges. Its first major contract outside the Hamilton area was the Bloor Street Viaduct in Toronto in 1910. Its operations were expanded in 1913 when the company began work on the Canadian Pacific office building in Toronto,

[46] Unterman McPhail Associates, *Draft Cultural Heritage Evaluation Report: Penfold Bridge, No. B016038 (Lot 20, Con. 4 and 5, Geographic Township of West Garafraxa) Wellington Road 16 (WR 16), Township of Centre Wellington, County of Wellington, Ontario* (February 2015).
[47] Heritage Resource Centre, 294-295.
[48] Ibid., 296-297.
[49] Ibid., 216-217.
[50] Ibid., 222-223.
[51] Ibid., 216-217.
[52] Ibid., 298-299.
[53] Ibid., 220-221.
[54] Ibid., 226-237.
[55] Disher, 122.

one of Canada's first skyscrapers.[56] The Hamilton Bridge Works Co. expanded again during the First World War with the fabrication of parts for the shipbuilding industry. Its name was changed to the Hamilton Bridge Company in 1928.[57] The company provided steel for the Bank of Commerce Building, Toronto in 1929-1930 and during the Second World War it manufactured armoured vehicles.[58] It remained a family company until after World War II.

The company established some subsidiary companies in the late 1940s and early 1950s. In 1954, the Bridge and Tank Company of Canada Limited took over the assets of the Hamilton Bridge Company and its subsidiaries. The firm continued under the name of Hamilton Bridge and Tank into the early 1980s. Over the years CN and CP were major clients of the company for the construction of railway bridges. Notable bridge projects include: several bridges over the Welland Canal, the Blue Water Bridge, Sarnia, the reconstruction of the Victoria Bridge, Montreal, the Burlington Canal lift bridge, the Burlington Skyway bridge and the Lion's Gate Bridge, Vancouver.[59] The company ceased operation in 1984

2.4.3 Arnott Construction Company

Leonard M. Arnott founded Arnott Construction in Arthur, Ontario in 1929. It became an incorporated company in 1954.[60] By 1949 the company had been involved in the construction of very substantial bridges in different parts of Ontario such as the Bosworth Bridge in the County of Wellington and a concrete rigid frame structure with a 70-ft. span in Blanchford Township, Perth County near St. Mary's.[61] In 1949, Arnott Construction employed about 30 people and, in addition to its bridge building business, operated a mixing plant at Galt [Cambridge]. The company undertook sizeable contracts in Simcoe County and constructed seventeen culverts on Highway 6 north of Arthur in late 1949.[62] Between 1954 and 1974, Arnott Construction completed hundreds of projects in southwestern Ontario. In 1974, the company moved to Collingwood, Ontario. It was reorganized in 1983. Today the company is a civil engineering firm that specializes in the water and sewer main industry with its head office in Midhurst and an area office in Collingwood.[63]

[56] Ibid.
[57] Hamilton Public Library Digital Collections. Industrial Hamilton: A Trail to the Future, Hamilton Bridge Works (Bridge and Tank Company of Canada). Access: --<http://epe.lac-bac.gc.ca/100/205/301/ic/cdc/industrial/bridgeworks.htm>.
[58] Ibid.
[59] Disher, 123.
[60] Arnott Construction Ltd. Access; --<http://www.arnottgroup.com/about.html> (January 2015).
[61] "A New Bridge Opened For Traffic", *Arthur Enterprise News* (October 13, 1949) 1.
[62] Ibid.
[63] Arnott Construction Ltd. Access: --<http://www.arnottgroup.com/about.html> (January 2015).

3.0 CULTURAL HERITAGE LANDSCAPE DESCRIPTION

3.1 Area Context

Portions of the Township of Mapleton, including the Drayton area, are located within the physiographic region known as the Dundalk Till Plain. The area around Drayton is located on its margins. The Plain is a major headwater area for the Grand, Nith and Conestogo Rivers. The topography of the area is generally rolling with steep slopes associated with larger creeks and rivers. The soil is a mix of clay, gravel and boulders deposited by receding glaciers. As a major tributary of Grand River, which is recognized as a Canadian Heritage River, the Conestogo River wends its way through the Township of Mapleton draining the geographical townships of Maryborough and Peel.

Peel Township was settled mid 19th century for agricultural use. The landscape was divided into a grid like pattern of concession and and sideroads. The Elora and Saugeen Road was built as a toll road in the early 1860s between Alma and Bosworth in Peel Township and then continued into Maryborough Township. In 1864, the County of Wellington assumed the road and the toll was removed. Soon after the road surface was gravelled and the road became known as the Gravel Road. The 19th century crossroads community of Bosworth, for which the bridge is named, was located at the intersection of the Elora and Saugeen Road and the township boundary road, now WR 7 and WR 11, respectively. The hamlet prospered in the 1860s and 1870s, but after being bypassed by the railway lines, the community declined in the latter part of the 19th century, eventually, all but disappearing in the early 20th century. Currently, there are no buildings remaining from its past.

The community of Drayton, which was established on the Conestogo River in the mid 19th century, is located on WR 11 to the west of its intersection with WR 7. For the most part, the area in the vicinity of the Bosworth Bridge remains as a local agricultural economy today.

3.2 Site Description

Built in 1949, the Bosworth Bridge is located on WR 7 in the Township of Mapleton, just 0.90 km. south of WR 11. Specifically, the bridge is located on Lot 2, Concessions 13 and 14, geographic Township of Peel, County of Wellington ***(Figure 2)***. At the bridge crossing, the Conestogo River runs east to west in direction and WR 7 runs north to south. The naturalized river valley through which the Conestogo River wends its way and the surrounding agricultural land characterizes the immediate area of the bridge.

WR 7 is a two lane paved road with a double line at the bridge crossing and a posted road speed of 80 km./hr. at the bridge. The road is a well used by truck and local car traffic. As the road descends from the north and south into a wide valley associated with the Conestogo River, it provides a vista of both the river and the Bosworth Bridge. The north and south bridge approaches have long steel guardrails on both sides of the road. Hazard

signs, signs for the Conestogo River and a no fishing sign are located on the bridge approaches. The immediate area around the bridge is naturalized vegetation.

One or more residences, not visible from the road, are located at 7951 WR 7 in a forested area on the northeast quadrant of the bridge. A small wood frame shed belonging to the Grand River Fisheries is located on the northeast corner of the bridge. It has a municipal number of 7945 WR 7. A drive provides entrance to a small concrete, garage-like structure on the southeast corner of the bridge at 7943 WR 7. Immediately to its south, another drive provides entrance to an agricultural building and an older barn structure at 7941 WR 7. An associated older farmhouse is located on a hill to the south of the agricultural buildings. There is also an entrance drive in the southwest quadrant of the bridge; buildings on the property are not visible from the public road or on an aerial view.

Figure 2. Aerial view of the Bosworth Bridge on the Conestogo River [Microsoft Corporation 2015].

4.0 BUILT HERITAGE RESOURCE DESCRIPTION

The following description of the Bosworth Bridge is based on original drawings (1949), rehabilitation drawings (1987), inspection reports (2009, 2011 and 2013) and a site visit in February 2015. A bridge survey form with current photographs is found in Appendix B. Imperial measurements from the original 1949 drawings are used in the description of the bridge with metric measurements provided in brackets. For the purposes of this report, the Bosworth Bridge is considered to be oriented north to south. Due to the winter conditions and accumulation of snow and ice on the top chord, the commemorative plaque on the bridge was not visible during the survey.

4.1 Bosworth Bridge, No. B007028

Figure 3. East elevation of the Bosworth Bridge.

Built in 1949, the County of Wellington classifies the one span Bosworth Bridge as a steel Warren Camelback steel pony truss by ***(Figure 4)***. The original C.C. Parker drawings for the structure indicate it was to be built in accordance to the *Specifications for Highway Bridges, Ontario, 1935*.

The structure uses cast-in-pace, reinforced concrete abutments, wingwalls and deck. Flex metal guardrails with wood posts are found on both sides of the north and south approaches. There is no skew on the bridge

The overall length of the structure including the concrete handrail system is 166-ft. 2-in. (50.65 m). The overall span length of the structure is 134-ft. 4 $^{7}/_{8}$ (40.97 m).

Steel floor beams and stringers support a concrete deck covered with asphalt. The total width of the deck with its concrete curbs is 27-ft. 6-in. (8.38 m). The bridge carries two lanes of vehicular traffic, one northbound and one southbound on WR 7. It comprises a 24-ft. 7-in (7.48 m) carriageway width with two lanes measuring 12-ft. 3-in. (3.74 m) each. Each of the reinforced concrete curbs on the north and south sides of the structure measure 1-ft. 6 in. (450 mm) wide. The deck slopes slightly from the centre line on each side for drainage. Each deck end has an approach slab and an expansion joint.

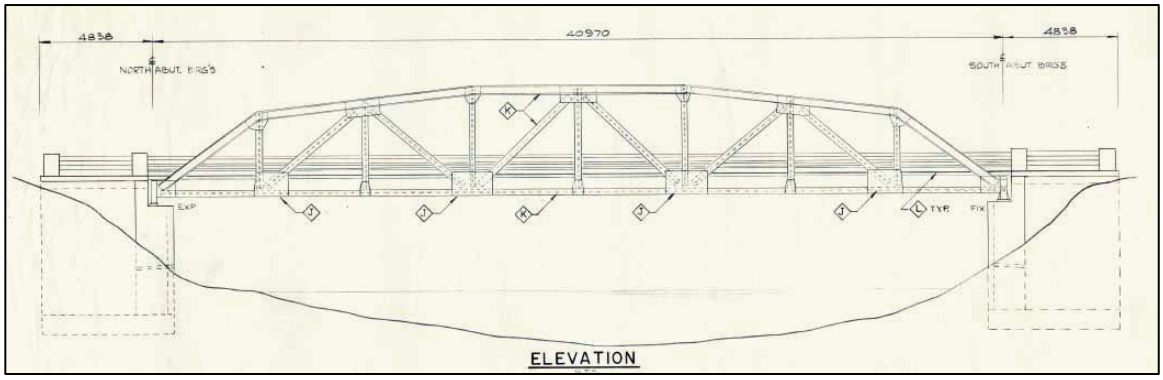

Figure 4. Elevation of the Bosworth Bridge [MRC, 1987].

The two steel trusses consist of wide flange (WF) beam units in varying standard sizes and specifications. Each truss consists of three centre panels, each measuring 17-ft. 1-in. (5.21 m), and two end panels measuring 16-ft. 11 ½ -in. (5.17 m) in length. The centre section of the top chord is 16-ft. (4.88 m) in height. The top chord sections on either side of the centre section slope downwards to a height of 12-ft. (3.66 m). Vertical members of varying height are located at the centre point of the middle top chord and at each angle of top chord.

The Warren truss aspect of the design is apparent through the use of equilateral triangles. The "Camelback" aspect of the truss design is characterized by the five angles of the upper chord. The top chord slope change results in web members that vary in length from the centre panel outwards.

The camelback component of the truss comprises five slopes of the top chord of the metal truss ***(Figure 4)***. No truss measurements were provided in the inspection reports on the drawings.

There existing guardrail consists of three flat metal railing fixed to concrete end posts and bolted to the inside of the east and west trusses. The original 1948 design drawing indicates a decorative treatment on the side, but this appears not to have been executed. The total height of the railings is 3- ft. (762 mm) in height and each railing is set 10-in. on centre.

The original standard DH concrete railing located on all four corners of the structure comprises three sections with a large concrete end post at the truss end and two smaller

concrete posts with two horizontal concrete railings between the posts. The total length of each railing is 16-ft. (4.88 m). Each concrete post is 2-ft. 6-in. (762 mm) in height.

A commemorative plaque is located on the south end of the east top chord of the truss. It states:

The County of Wellington
1949

Ross MacLellan	*Warden*
Goldwin Burt	*County Road*
R, H, Shannon	*Committee*
E. H. Benham	
W.H. Keith	*County Engineer*
L.M. Arnott	*Contractor*

4.2 Modifications

Drawings and inspection reports indicate the Bosworth Bridge underwent some rehabilitation work in 1987, which was carried out by McCormick Rankin Corporation (MRC). R. Skelton, P.Eng, stamped the drawings. The work included, but was necessarily not limited to, replacing asphalt on the deck and approaches, removing concrete from the bridge deck and concrete and joints at each end, modifying the drains, installing new expansion joints including replacement of the concrete posts on the ballast wall, deck repairs including waterproofing, strengthening the lower connections of the lower truss chord by removing existing rivets on both sides of selected connections and replacing all with bolts, cleaning and painting the steelwork and repairing spalled concrete at the curbs, posts and underside of the deck.

The Bosworth Bridge has not undergone any major changes to its original design intent. The bridge retains its original handrail system.

4.3 Comparative Analysis

Township of Mapleton

The Township of Mapleton has one (1) example of a steel pony truss bridge under its jurisdiction. Known as the Mallet Bridge, the structure is located on Sideroad 6 and dates to 1910.[64] The Mallet Bridge is included in the bridge inventory of the Grand River watershed (see below).

County of Wellington

[64] R.J. Burnside & Associates Limited. Township of Mapleton 2014 Municipal Bridge Inspection (December 2014); and Heritage Resource Centre, *Arch, Truss & Beam: The Grand River Watershed Heritage Bridge Inventory*, 226-227.

The County of Wellington has nine (9) Warren steel truss bridges under its jurisdiction, including two (2) examples of Warren Camelback steel pony truss structures, namely, the Bosworth Bridge built in 1949 and Hagan's Bridge, built in 1995 ***(see Appendix C)***. The oldest example of a Warren steel truss bridge under its jurisdiction is the Emerson Simmons Bridge, built in 1940, and located on WR 11.[65] The next oldest example of a steel truss bridge under county jurisdiction is the subject structure, the Bosworth Bridge, built in 1949, which is a Warren Camelback steel pony truss ***(see Appendix C)***.

Therefore, the Bosworth Bridge is the oldest example of a Warren Camelback steel pony truss structure and the second oldest example of a Warren steel pony truss under the jurisdiction of the County of Wellington.

Grand River Watershed

The document *Arch, Truss & Beam* (2013) inventoried and evaluated bridges for heritage value within the Grand River watershed. The Grand River with its major tributaries, the Nith, Conestogo, Speed and the Eramosa, is a federally designated Canadian Heritage River. The *Arch, Truss & Beam* notes steel pony truss bridges represent only 9% of the heritage bridges identified by type within the watershed.[66]

Two (2) 19th century examples of steel pony truss structures are in use on a public road in the County of Wellington, with the oldest being the one span Norwich Street East Bridge built in 1882[67] and the second oldest, Centre Wellington Bridge 1-P, built in 1890, located on Sideroad 5 in the Township of Centre Wellington.[68] Within the Township of Mapleton, there are six (6) examples of steel pony truss bridges, including the Bosworth Bridge, built in the 20th century. They are in order of construction date:

- Mallet River, Sideroad 6, one span, built in 1910;
- Bosworth Bridge, Wellington County Road 11, one span, built in 1949;
- Emerson Simmons Bridge, Wellington County Road 11, one span, built in 1952;
- Flax Bridge, Wellington County Road 11, one span, built in 1954;
- Moorefield Bridge, Wellington County Road 10, one span, built in 1954; and
- Rothsay Bridge, Wellington County Road 7, one span, built in 1952.

Of the six (6) steel pony truss structures, the Bosworth Bridge is the second oldest example of this type.

Although the Grand River Conservation Authority Heritage Bridge Inventory notes the Bosworth Bridge is considered to be rare as a survivor of its type, the bridge type was misclassified.

[65] Heritage Resource Centre, *Arch, Truss & Beam: The Grand River Watershed Heritage Bridge Inventory*. This document indicates the construction date of this structure is 1952.
[66] Ibid., 358.
[67] Ibid., 188.
[68] Ibid., 268-269.

Provincial

The Ontario Heritage Bridge List (July 2015) includes several examples of steel truss bridges. Two examples are classified as steel "Camelback" through trusses; however there are no examples of steel "Camelback" pony trusses.

Federal

The Canadian Register of Historic Places (CRHP) is a federal, provincial and territorial (F/P/T) effort and provides a single source of information about all historic places recognized for their heritage value at the local, provincial, territorial and national levels throughout Canada. In the online Canada's Historic Places, The Register contains some Ontario examples of steel trusses structures that have been recognized by municipalities as heritage resources.

4.4 Conclusion

Steel truss bridges were once a common type of bridge construction. Although many examples of this bridge type were built in the late 19th, and in the first half of the 20th century, this bridge type is now considered to be a diminishing resource due to their replacement to meet current safety requirements and traffic needs. The document *Arch, Truss & Beam* notes that steel pony truss bridges now represents only 9% of the heritage bridges identified by type within the Grand River watershed.

From the comparative information provided by the County of Wellington, the Bosworth is one of only two examples of a Warren Camelback steel pony truss under the jurisdiction of the County of Wellington and the older of the two county examples.

Therefore, as an example of a Warren Camelback steel pony truss structure, the subject bridge can be considered to be a rare survivor of its type in the County of Wellington and the Grand River watershed.

5.0 CULTURAL HERITAGE VALUE

5.1 Introduction

The criteria for determining cultural heritage value or interest were set out under "Ontario Regulation 9/06" made under the OHA, as amended in 2005. These criteria were developed to assist municipalities in the evaluation of properties considered for designation. The regulation states that:

"A property may be designated under section 29 of the Act if it meets one or more of the following criteria for determining whether it is of cultural heritage value or interest:

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,
ii. displays a high degree of craftsmanship or artistic merit,
or
iii. demonstrates a high degree of technical or scientific achievement.

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,
ii. yields, or has the potential to yield , information that contributes to an understanding of a community or culture, or
iii. demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.
3. *The property has contextual value because it,*
i. is important in defining, maintaining, or supporting the character of an area,
ii. is physically, functionally, visually or historically linked to its surroundings, or
iii. is a landmark."

Consultation with Township of Mapleton confirms the Bosworth Bridge is not municipally designated under the OHA. It is not included on a local heritage inventory of cultural heritage resources or a municipal heritage register as adopted under the OHA.

5.2 Evaluation

The evaluation criteria set out under "Ontario Regulation 9/06" were applied to the Bosworth Bridge.

5.2.1 Design Value or Physical Value

Design or Physical Value	
i. Rare, unique, representative or early example of a style, type, expression, material or construction method.	**No**
ii. Displays a high degree of craftsmanship or artistic merit.	**Yes**
iii. Demonstrates a high degree of technical or scientific achievement.	**No**

i. Representative example of a style, type: The Bosworth Bridge is classified as a Warren Camelback steel pony truss structure by the County of Wellington. It is one of only two examples of a Warren Camelback steel pony truss under the jurisdiction of the County of Wellington and the older of the two county examples.

When built in 1949, the Bosworth Bridge was described as second largest bridge in the County of Wellington to be built in recent years. The bridge has not been modified and

retains its original guardrail system on the bridge and its standard concrete handrail system on each of the four corners.

The Bosworth Bridge is the second oldest steel pony truss structure within the Grand River watershed. Steel pony truss bridges were once plentiful in the Grand River watershed and in the County of Wellington, but there numbers are now diminished.

Therefore, the Bosworth Bridge is considered to be an example of a rare survivor of its type within the County of Wellington and the Grand River watershed.

ii. Displays a high degree of artistic merit: When built, the Bosworth Bridge was noted in the Arthur newspaper as being a "handsome" structure, a testament to its Warren Camelback steel pony truss design and its craftsmanship. It has a commemorative plaque.

The Bosworth Bridge is considered to display a high degree of craftsmanship.

iii. Demonstrates a high degree of technical or scientific achievement: The Bosworth Bridge does not demonstrate a high degree of technical achievement as a Warren Camelback steel pony truss structure.

5.2.2 Historical Value or Associative Value

Historical or Associative Value	
i. Has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community.	**No**
ii. Yields, or has the potential to yield, information that contributes to an understanding of a community or culture.	**No**
iii. Demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.	**Yes**

i. Direct associations with a theme and event: A bridge spanned the Conestogo River at this location by the mid 19th century as part of the early Elora and Saugeen Road, an important transportation and settlement route. There was a narrow steel truss bridge at this location by the early 20th century. This structure was replaced in 1948-49 by the current bridge as part of a County of Wellington initiative in the late 1940s and 1950s to upgrade the county road system and its bridge structures to modern standards.

It is concluded the Bosworth Bridge does not have direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community.

ii. Yields information that contributes to an understanding of a community or culture: No aspects of the bridge have been identified that would contribute to an understanding of a community of culture.

iii. Designer: C.C Parker, Consulting Engineers, is considered to be an engineer who is of provincial significant in the 20th century. The Hamilton Bridge Company is considered to bridge builder of significance to the province. W. H. Keith. County of Wellington Engineer, is considered to be an engineer who is significant to the County of Wellington in the 20th century. Many County of Wellington bridges are attributable to Keith during his employment as county engineer. The Arnott Construction Company is considered to be of some significance to the County of Wellington and other areas in the province as a bridge builder.

Therefore, the Bosworth Bridge demonstrates the work of engineers and builders who are considered to be significant locally, regionally and provincially.

5.2.3 Contextual Value

Contextual Value	
i. Is important in defining, maintaining, or supporting the character of an area.	**Yes**
ii. Is physically, functionally, visually or historically linked to its surroundings.	**Yes**
iii. Is a landmark.	**Yes**

i. Character: The naturalized setting of the wide river valley of the Conestogo River in this location characterizes this area of WR 7. The Bosworth Bridge is an important landscape element in defining this character.

ii. Linkages: A bridge has spanned the Conestogo River at this location since the mid 19th century and formed part of the Elora to Saugeen Road, an important transportation and settlement route. A narrow steel truss bridge was replaced in 1948-49 by the current structure.

Therefore, the Bosworth Bridge is physically, functionally, visually, and historically linked to its surroundings.

ii. Landmark: The Warren Camelback steel pony truss design of the subject bridge with its location in a wide river valley provides a physical landmark in the landscape and on WR 7.

The Bosworth Bridge is considered to be of value as a physical landmark within the area.

5.3 Summary of Cultural Heritage Value

It is determined through the application of the "Criteria for Determining Cultural Heritage Value" under "Ontario Regulation 9/06" that the Bosworth Bridge is of some cultural heritage value for contextual reasons.

5.3.1 Statement of Cultural Heritage Value

The Bosworth Bridge, built in 1949 for the County of Wellington, is classified as a Warren Camelback steel pony truss bridge. It is one of only two examples of a Warren Camelback steel pony truss under the jurisdiction of the County of Wellington and the older of the two county examples. When built, the Bosworth Bridge was noted in the Arthur newspaper as a "handsome" structure and the second largest bridge in the County of Wellington to be built in recent years. The bridge has not been modified and retains its original guardrail system on the bridge and its standard concrete handrail system on each of the four corners. The Bosworth Bridge is the second oldest steel pony truss structure within the Grand River watershed. Steel pony truss bridges were once plentiful in the Grand River watershed and in the County of Wellington, but their numbers are now diminished. The Bosworth Bridge is considered to be an example of a rare survivor of its type within the County of Wellington and the Grand River watershed.

W.H. Keith, County of Wellington Engineer, supervised the project. Keith is accredited with the design of many other bridges in the County of Wellington during his years of employment as county engineer from c1933 to 1965. In the formative year after the Second World War, Keith initiated a program on behalf of the county to improve its road system and renew its bridges to modern standards. C.C. Parker, Consulting Engineer, a well known bridge engineering company in the Province of Ontario, designed the bridge. C.C Parker is considered to be an engineer of regional and provincial significance to the 20th century. The Hamilton Bridge Company is considered to bridge builder of significance to the province in the late 19th and 20th centuries. Arnott Construction Company of Arthur acted as the general contractor. This company is considered to be of significance to the County of Wellington, as well as other areas in the province, as a bridge builder.

The Bosworth Bridge is an important landscape element in defining the naturalized setting of the wide river valley of the Conestogo River in this location on WR 7. character. The route of WR 7 started in the mid 19th century as the Elora to Saugeen Road, an important transportation and settlement route that contributed significantly to the settlement and development of the northern townships of the County of Wellington. A bridge has spanned the Conestogo River at this location on the road since the mid 19th century. The current structure replaced an earlier narrow steel pony truss in 1949. The Bosworth Bridge is physically, functionally, visually, and historically linked to its surroundings. It is considered to be of value as a physical landmark within the area and on WR 7 due to its metal truss design and its location in a wide river valley.

5.3.2 Description of Heritage Attributes

Heritage attributes, i.e., character defining elements, of the Bosworth Bridge include:

- Its cast-in-place concrete abutments and wingwalls;
- Its steel truss components comprising the Warren Camelback steel pony truss structure;
- Its one span design;
- Its original horizontal steel guardrail;
- Its cast-in-place, original concrete handrail on all four corners; and
- Its commemorative plaque.

6.0 MITIGATION RECOMMENDATIONS

6.1 Introduction

The County of Wellington wishes to develop, identify and evaluate options to address the structural deficiencies of the Bosworth Bridge, No. B007028.

An undertaking should not adversely affect cultural heritage resources and intervention should be managed in such a way that its impact is sympathetic with the value of the resources. When the nature of the undertaking is such that adverse impacts are unavoidable it may be necessary to implement management or mitigation strategies that alleviate the deleterious effects to cultural heritage resources. Mitigation measures lessen or negate anticipated adverse impacts to cultural heritage resources. These measures may include such actions as avoidance, monitoring, protection, relocation, documentation, salvage, remedial landscaping, etc., and may be a temporary or permanent action.
The principal heritage philosophy for the protection of cultural heritage resources is retention in-situ and the preservation of the material integrity to the maximum extent possible, consistent with public safety. The following heritage conservation options, listed in descending order of preference, should be considered within the context of the project:

1. Retention of existing built heritage resource in-situ with no major modifications.
2. Retention of existing built heritage resource in-situ with sympathetic modifications.
3. Retention of existing built heritage resource adapted for a new use, e.g., pedestrian walkway, bicycle path or scenic viewing with a new sympathetically designed structure in proximity.
4. Relocation of existing built heritage resource to an appropriate new site nearby in its municipality, preferably in the vicinity of the existing site to preserve its historical value.
5. Salvage of elements of built heritage resource for incorporation into other structures.

6. Full recording and documentation of the built heritage resource and its associated cultural heritage landscape and if it is to be demolished.

6.2 Mitigation Recommendations

The Bosworth Bridge is considered to be of local and regional cultural heritage value, see ***Section 5.3.1 Statement of Cultural Heritage Value***. Its cultural heritage value lies within its design/physical, historical/associative and contextual values.

Within this context, the mitigation recommendations are listed below.

- Given the demonstrated contextual value of the existing bridge, any rehabilitation work should be designed in such a manner to retain its role in the environment.
- If the bridge is to be replaced a sensitively designed new structure can address the identified contextual heritage attributes of the bridge as set out in Section ***5.3.2***.
- Due to winter snow accumulation at the bridge during the survey work for this CHER, it is recommended that additional photographs of the bridge be taken before any rehabilitation work is undertaken. They may be appended to this CHER.
- This CHER should be distributed to the County of Wellington as part of its record of the project. Copies should be provided to the Township of Mapleton and the Grand River Conservation Authority and the Region of Waterloo.
- The County of Wellington, with the Grand River Authority, should consider commemorating the bridge site with an interpretative plaque.

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Map 285: Peel Twp. Plan for Bosworth Bridge, County Road 58 [now County Road 7] Concession 13, 1948.

Map 588, Map of the County of Wellington, Canada West. Guy Leslie and Charles J. Wheelock, P.L.S., Orangeville, 1861. Lithographed by W.C. Chewett & Co. Toronto.

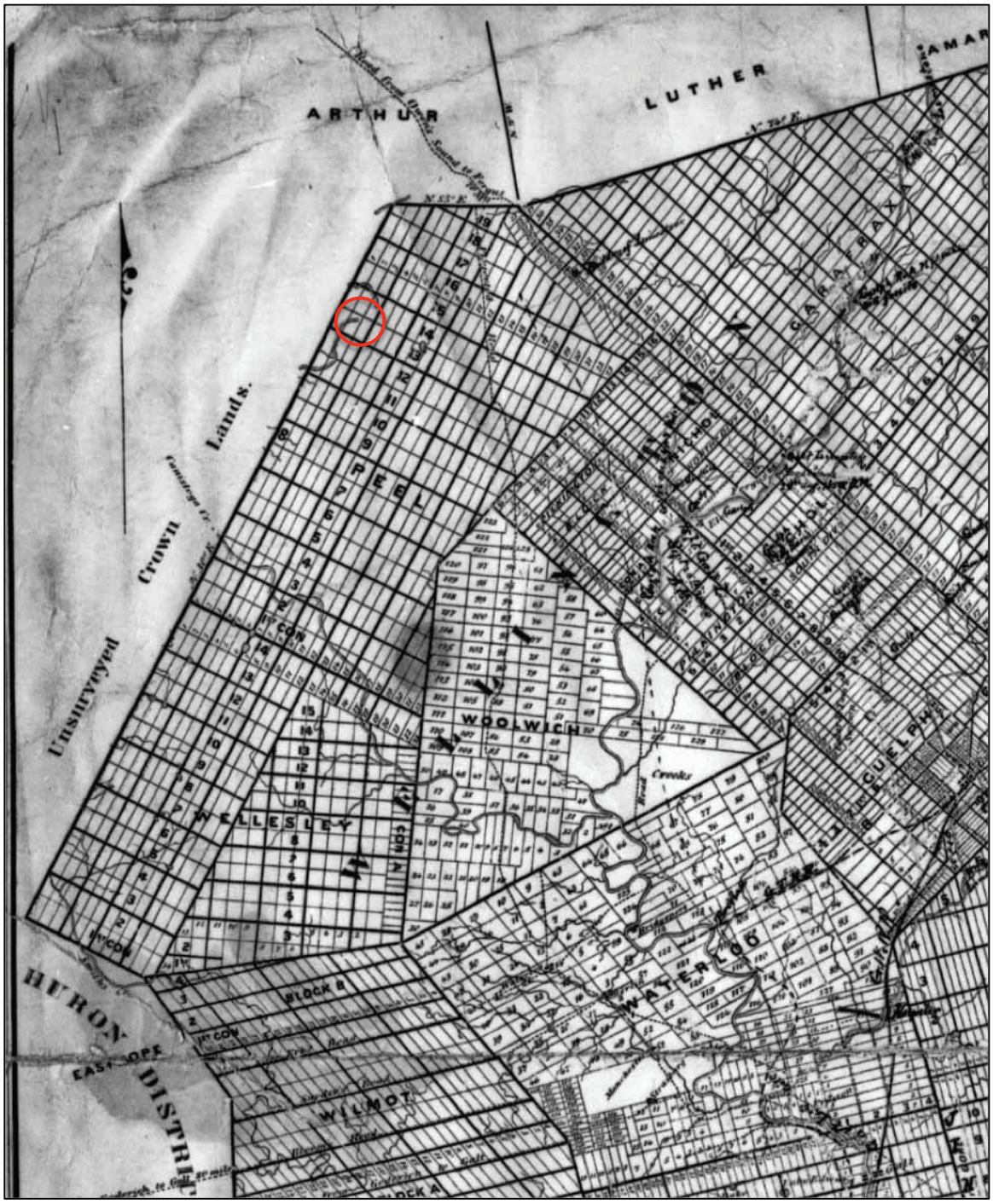
Contacts

Barb Schellenberger, Deputy Clerk, Township of Mapleton, February 2015.

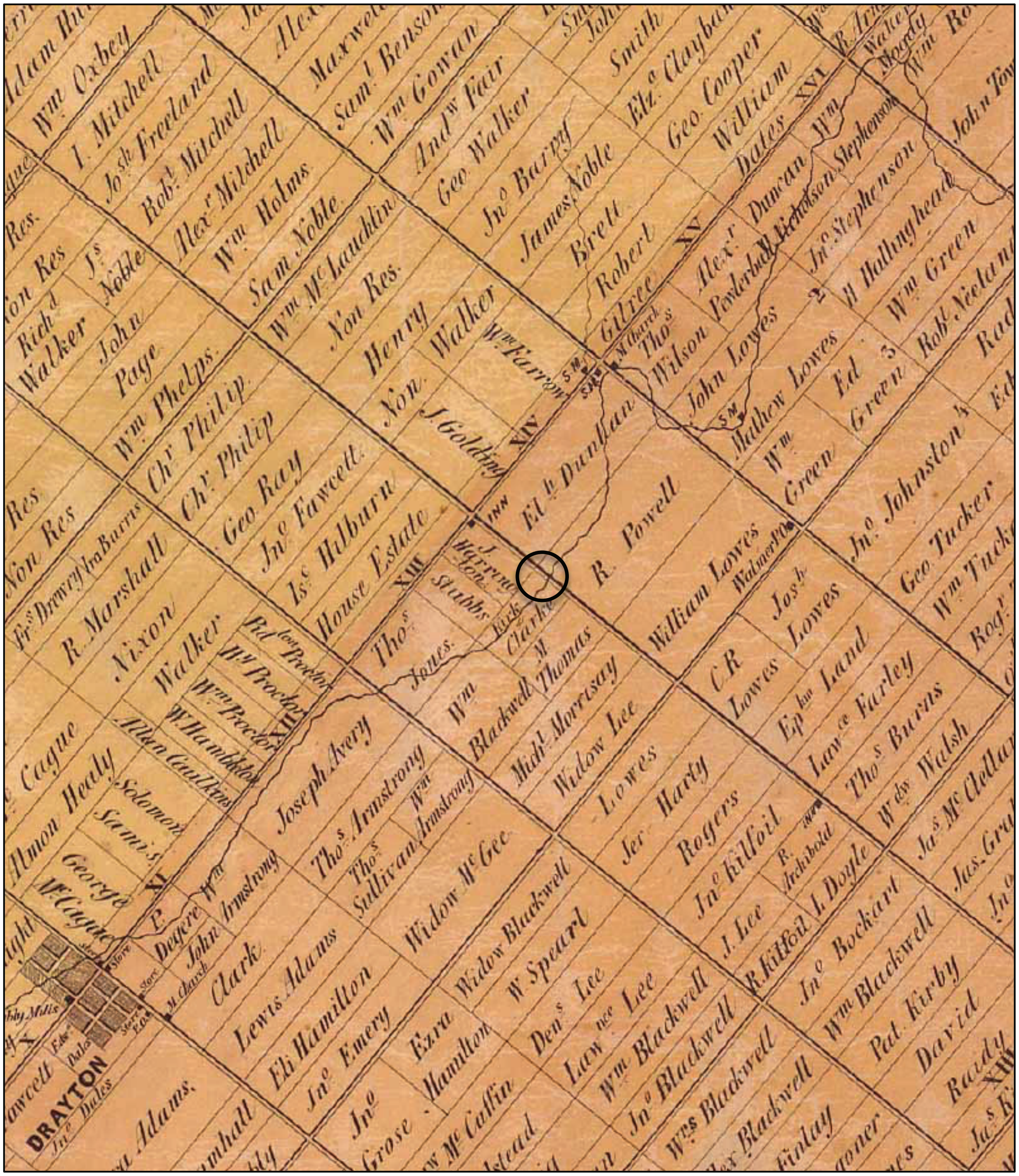
Christine Hickey, Executive/Planning Assistant, Township of Mapleton, February 2015.

Kimberly Somerville, Archives Assistant, Wellington County Museum & Archives (WCMA), January 2015.

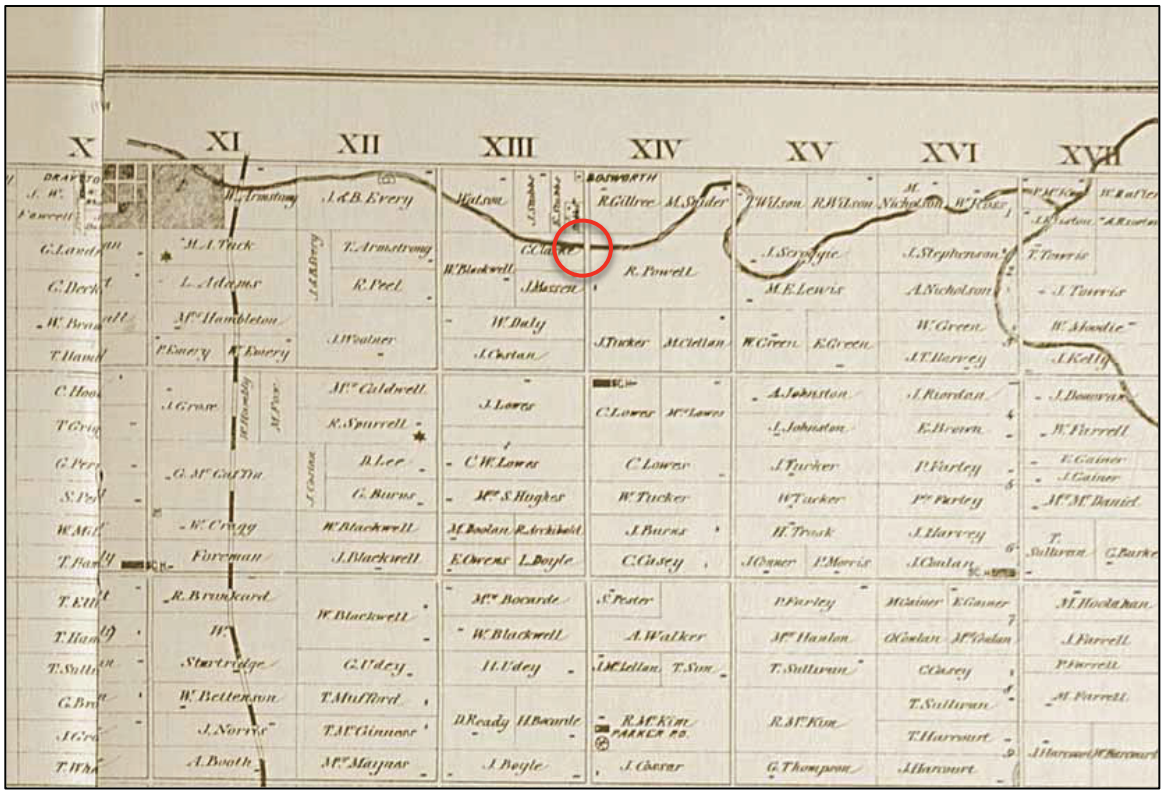
APPENDIX A:
HISTORIC MAPS, PHOTOGRAPHS AND DRAWINGS



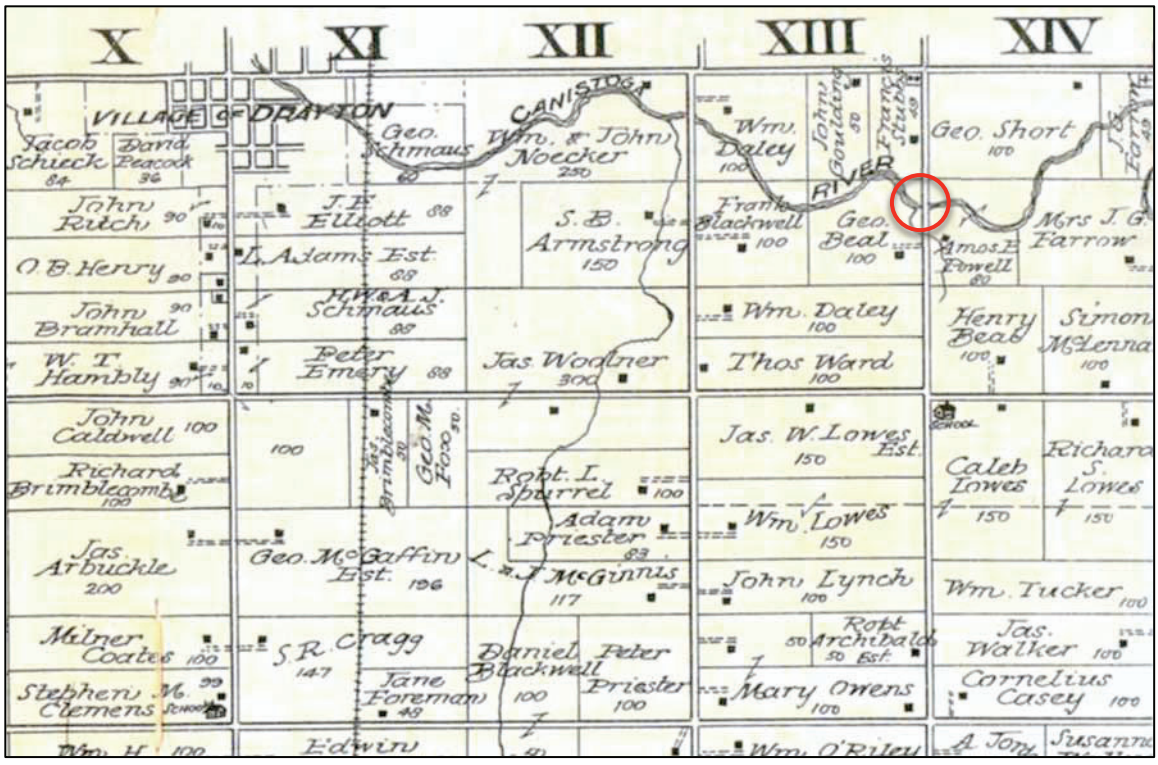
Circle marks the location of the Bosworth Bridge [Map of the Niagara, Gore, and Wellington Districts, including also the Southern Front of the Home District, Canada., 18th June 1845].



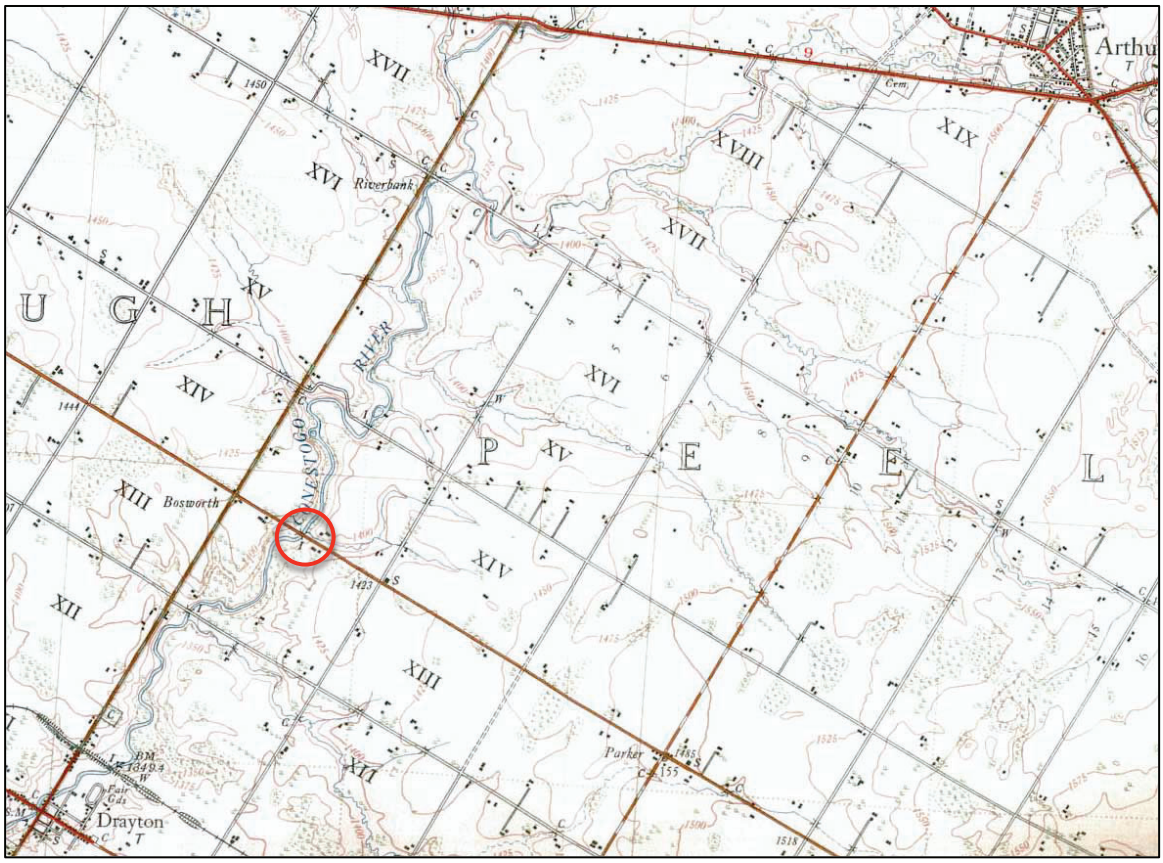
Location of the Bosworth Bridge in Peel Township. County of Wellington [WCMA, Map 588, Map of the County of Wellington, Canada West. Guy Leslie and Charles J. Wheelock, P.L.S., Orangeville, 1861].



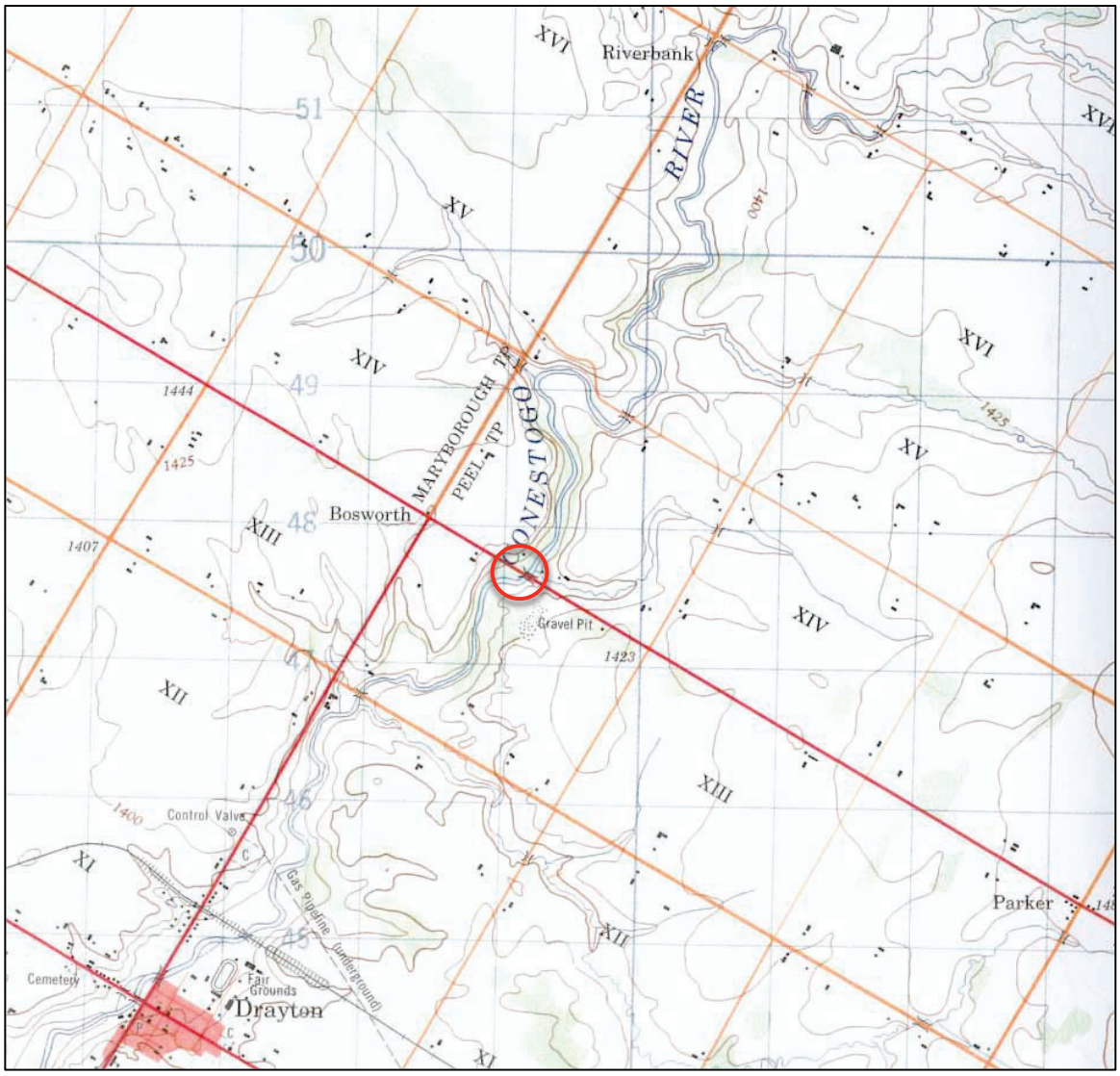
The circle marks the location of the Bosworth Bridge in Peel Township, County of Wellington on the border with Waterloo County [*Illustrated Historical Atlas,* 1877].



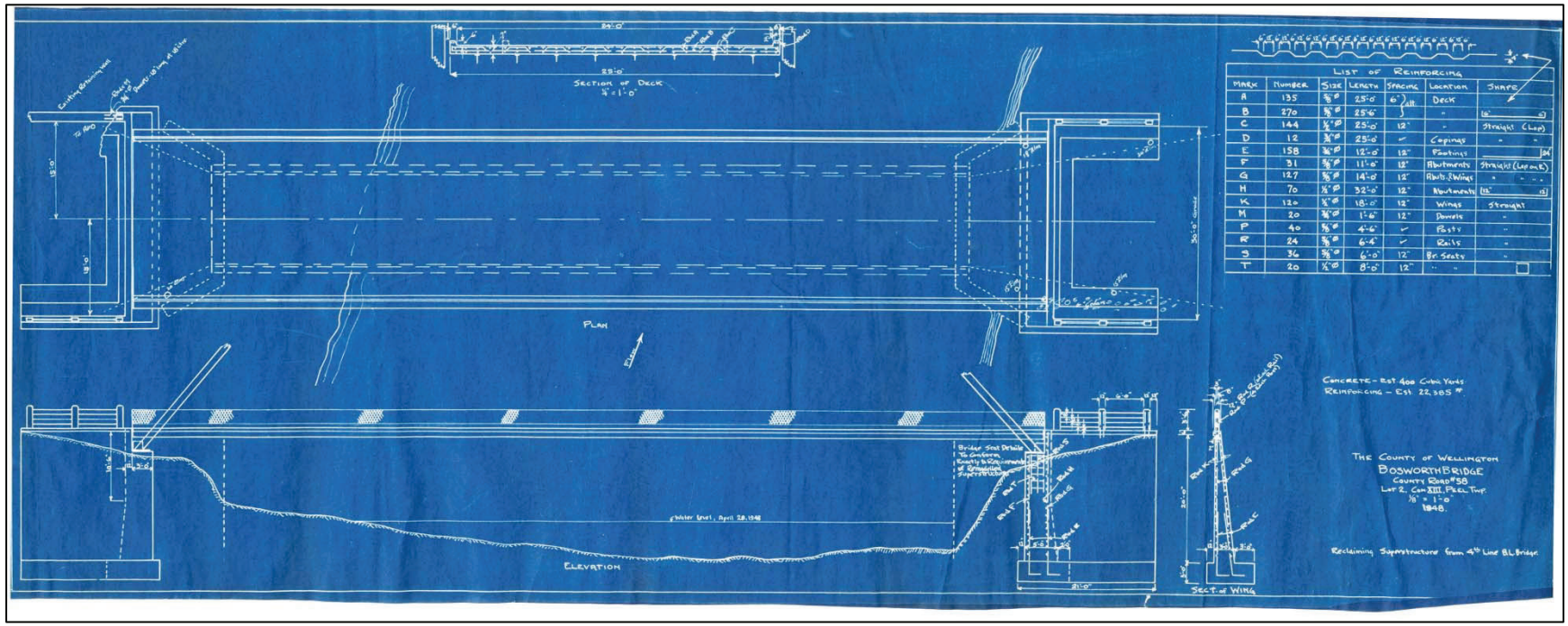
The circle marks the location of the Bosworth Bridge *Historical Atlas,* 1906].



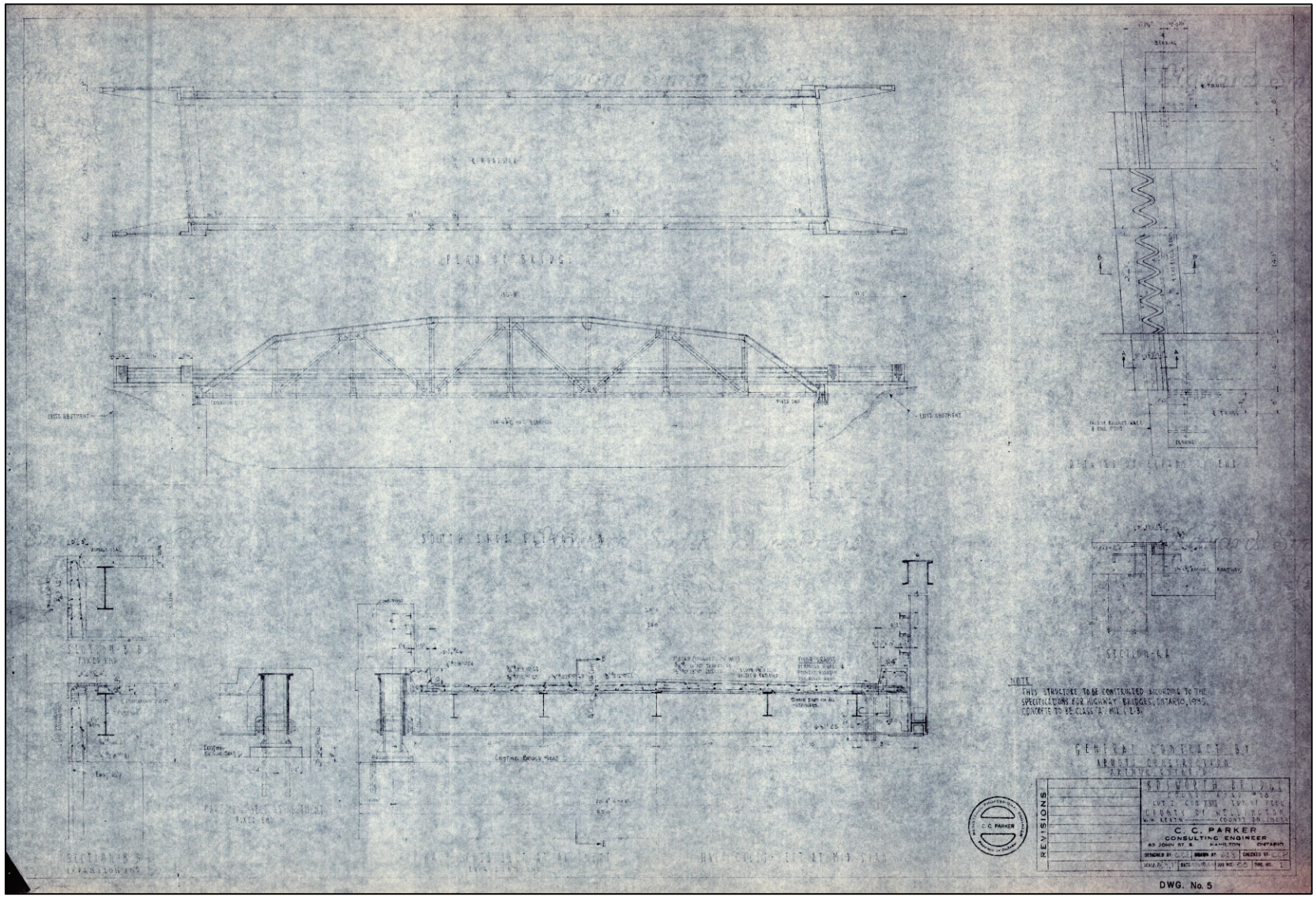
Circle marks the location of the Bosworth Bridge on the Conestogo River, Peel Township, County of Wellington. The 1937 bridge is denoted as "I" indicating a metal structure [NTS: Palmerston 40 P/15, 1937].



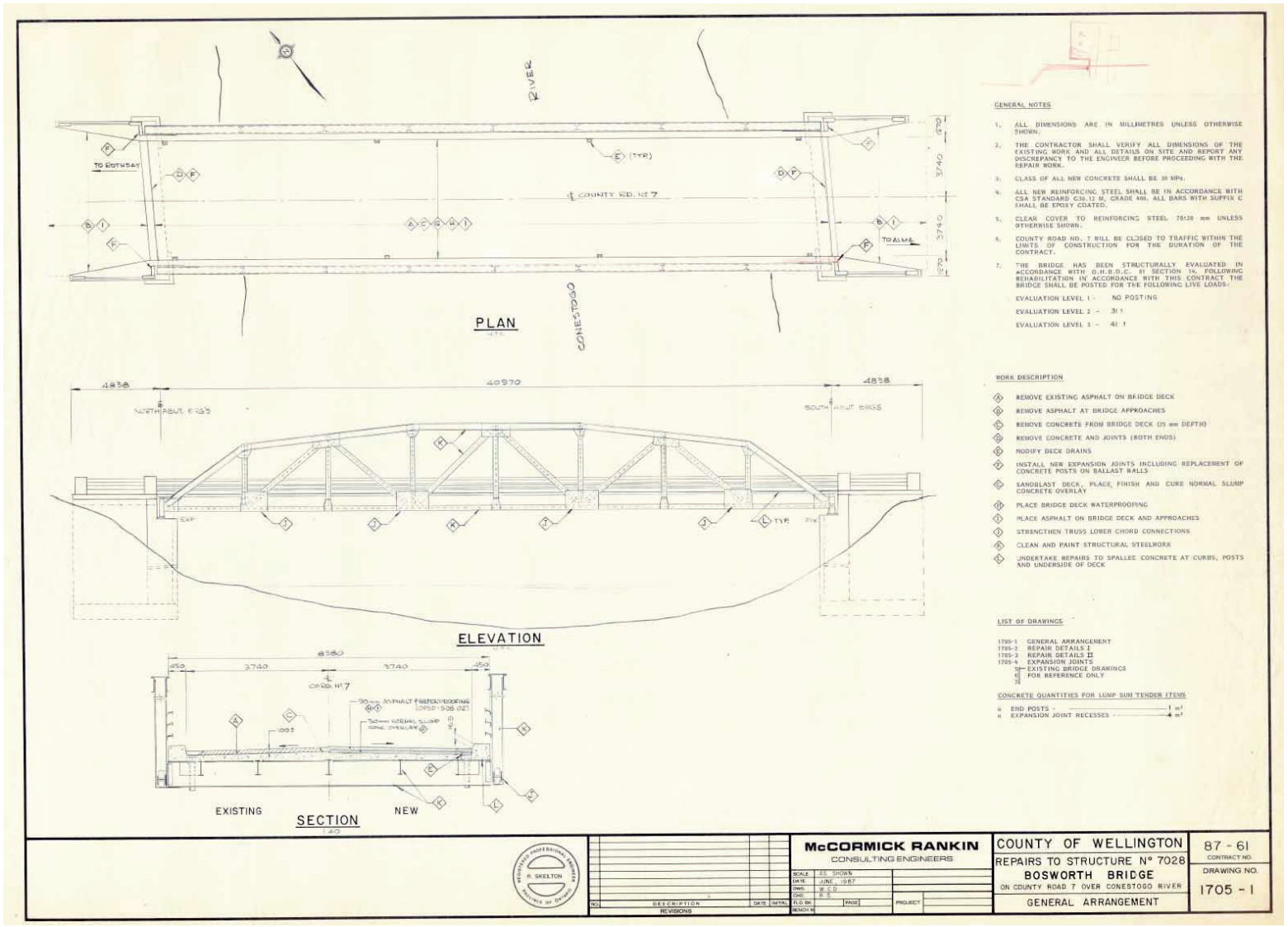
Circle marks the location of the Bosworth Bridge on the Conestogo River, Peel Township, County of Wellington. [NTS: Palmerston 40 P/15, 1974].



WCMA, Map 285: Peel Twp. Plan for Bosworth Bridge, County Road 58 [now County Road 7] Concession 13, 1948.

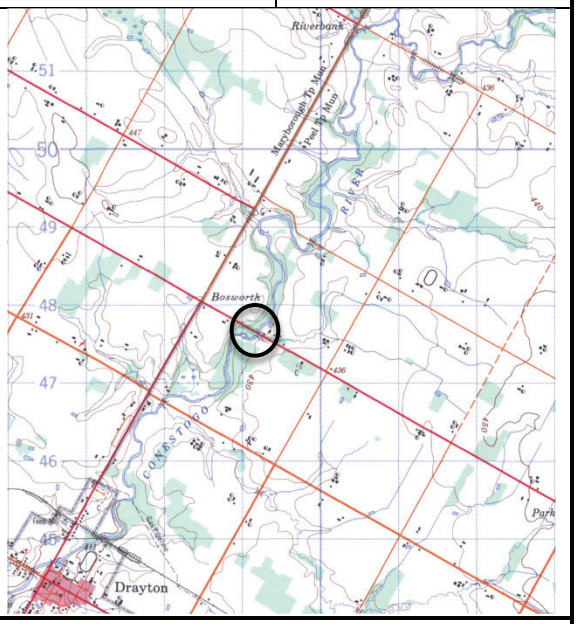


C.C. Parker. Consulting Engineer. Dwg. No. 6, General Contract by Arnott Construction, Arthur, Ontario. Bosworth Bridge, County Road #58, Lot 7, Concession XIII, Twp. Of Peel, County of Wellington, November 18, 1948.



McCormick Rankin Corporation. Repairs to the Structure No. 7028, Bosworth Bridge, County Road 7 over the Conestogo River, Contract No. 87-61. June 1987.

APPENDIX B:
BOSWORTH BRIDGE
SURVEY FORM

BRIDGE NAME: **Bosworth Bridge**	Recorder: Unterman McPhail Associates	Ref. No. **B007028**
HIGHWAY: **Wellington Road 7**	Map: NTS: Palmerston, 40P/15, 1986	Date: February 10, 2015
Lot: 2 Con: 13 & 14 Geographic Township of Peel Township		
Municipality: Mapleton		
County / R.M.: County of Wellington		
1:50:000 Map Ref.:		
Military Grid Ref.:		
Air Photo Ref.:		
Description: The bridge is located on Wellington Rd. 7 about 0.90 km east of Wellington Rd. 11.		

BRIDGE ENVIRONMENT & USES

Water/Road/Rail/Other Crossing:
The Bosworth Bridge crosses the Conestogo River.

Surrounding Land-Uses & Landscape: WR 7 runs in a south to north direction. It is a two lane paved road with a double line at the bridge crossing. The posted speed on the road at the bridge is 80 km./hr. Traffic, both truck and car, was steady over the bridge at the time of the survey. Long steel flex guardrails are located on both the north and south bridge approaches. The Conestogo River, which is a major tributary of the Grand River watershed, is noted with a sign on the north and south sides of the bridge. A no fishing sign are located on each approach to the bridge. All four corners of the bridge have a hazard sign. The immediate area around the bridge is forested with one or two residences. An older farm complex is located on southeast of the bridge crossing at one or two other residences are hidden in the forested area in the northeast quadrant. The former hamlet of Bosworth is located to the north of the bridge. A small wood frame shed belonging to the Grand River Fisheries is located on the northeast corner of the bridge.

Bridge Uses: It carries two lanes of vehicular traffic over the Conestogo River.

DESIGN

Materials: Steel superstructure; reinforced cast-in-place concrete abutments, wingwalls and deck

Construction Techniques: Steel Warren Camelback steel pony truss

Decorative Features: Commemorative plaque on the south end of the east truss. Not visible due to ice and snow during the site visit.

Landscape Quality: The bridge is located in a scenic surroundings.

State of Preservation: Structure rehabilitated in 1987 with overlay, waterproofing and pavement of deck, replacement of expansion joints, coating of steel; 2008, installation of braces at compression diagonals to improve load capacity.

Other Comments: The bridge runs in a north-south direction. There is no skew.

DIMENSIONS	
Carriageway Width: 11-ft. 5-in. (3.47 m)	Longest Span: 134-ft. 5-in. (40.97 m)
No. of Lanes: Two	Shortest Span: N/A
Sidewalks: None	Overall Length: 166-ft. 2-in. (50.65 m)
Capacity: Unposted	Overall Width: 32-ft. 20-in. (20.02 m)
No. of Spans: One	Clearance: Unknown

HISTORY
Date Built: 1949
Engineer/Designer: C.C. Parker Consulting Engineers/W.H. Keith, County of Wellington Engineer
Construction Firm: Hamilton Bridge Company and Arnott Construction Company, Arthur Ontario
Drawings/Specifications: Yes
Photos: No
Historical Association: The County of Wellington identified the Bosworth Bridge as being of insufficient width in 1948 and recommended that it be replaced with a wider structure. The County prepared drawings for the reuse of the 4th Line metal truss superstructure for the Bosworth bridge; however, DHO indicated that 4th Line structure had to be rebuilt at its original width of 16-ft. The County then approved the cost for a new steel superstructure. C.C. Parker Consulting Engineer of Hamilton prepared drawings dated November 18, 1948. The Hamilton Bridge Company manufactured the steel superstructure and erected it on site. Arnott Construction Company of County of Wellington acted as the general contractor. The Hamilton Bridge Company made and erected the steel superstructure. The bridge was completed in 1949 and opened in late October of that year to traffic. The construction of the Bosworth Bridge is indirectly associated with County of Wellington road improvements undertaken in the late 1940s and 1950s to improve the county road system and its bridge structures.
Previous Bridges: Yes. A metal truss bridge with a 16-ft. wide carriageway.
Other Comments:

PROPERTY RIGHTS & RESPONSIBILITIES	
Owner: County of Wellington	Maintenance: County of Wellington

PLANNED UNDERTAKING

GENERAL COMMENTS
The Bosworth Bridge is included in the publication, *Arch, Truss & Beam: The Grand River Watershed Heritage Bridge Inventory* (March 2013) prepared by Heritage Resource Centre for the Grand River Authority and included in the preliminary inventory compiled for the publication, *Grand Old Bridges: The Grand River Watershed Bridge Inventory*. Prepared for the Grand River Conservation Authority (April 6, 2004) by Robinson Heritage Consulting.

PHOTOGRAPHS

View north on WR 7 to the Bosworth Bridge [UMcA February 2015].

View south on WR 7 to the Bosworth Bridge [UMcA February 2015].

View southeast to south abutment [UMcA February 2015].

View to north abutment showing underside of deck [UMcA February 2015].

East elevation [UMcA February 2015].

West elevation [UMcA February 2015].

PHOTOGRAPHS

East metal truss roadside [UMcA February 2015].

West metal truss roadside [UMcA February 2015].

Detail of the original concrete handrail on the northeast corner [UMcA February 2015].

Metal truss and abutment connection [UMcA February 2015].

Detail of middle section of truss system [UMcA February 2015].

Detail of rivetted connectionon metal truss [UMcA February 2015].

PHOTOGRAPHS

Bosworth Bridge commemorative plaque is located on the south end of the east truss (MMM Group 2013). Not visible under snow/ice during February 2015 site visit.

Oblique of east elevation to the north. Commemorative plaque located on the south end [MMM Group 2013].

Oblique of west elevation to the north. [MMM Group 2013].

Metal guiderail on bridge [MMM Group Dec. 23, 2011].

APPENDIX C:
LIST OF COMPARABLE METAL TRUSS STRUCTURES OWNED BY THE COUNTY OF WELLINGTON (FEBRUARY 2015)

List of Comparable Metal Truss Structures Owned by the County of Wellington (February 2015)

Bridge Name	Bridge Number	Road Name	Overall Length	# Spans	Span Lengths	Constr Date	Bridge Type	Municipality
Bosworth Bridge	B007028	WR7	42.1m	1	41.0m	1949	Warren Camelback Pony Truss	Mapleton
Hagan's Bridge	B000067	Eramosa-Nichol Townline	26.8m	1	26.0m	1995	Warren Camelback Pony Truss	Guelph-Eramosa
Spring Creek Bridge	B006010	WR6	16.5m	1	15.2m	1953	Warren Pony Truss	Wellington North/Minto
Rothsay Bridge	B007019	WR7	18.7m	1	18.3m	1952	Warren Pony Truss	Mapleton
Moorefield Bridge	B010023	WR10	22.6m	1	20.7m	1955	Warren Pony Truss	Mapleton
Flax Bridge	B011025	WR11	22.3m	1	21.0m	1964	Warren Pony Truss	Mapleton
Simmon's Bridge	B011029	WR11	65.3m	2	30.5m	1940	Warren Pony Truss	Mapleton
Salem Brdige	B018050	WR18	32.6m	1	32.0m	1951	Warren Pony Truss	Centre Wellington
Blatchford Bridge	B032085	WR32	32.4m	1	31.7m	1950	Warren Pony Truss	Puslinch

WELLINGTON COUNTY

HERITAGE IMPACT ASSESSMENT

BOSWORTH BRIDGE (B007028)

REVISED REPORT – SEPTEMBER 16, 2021

wsp

HERITAGE IMPACT ASSESSMENT

BOSWORTH BRIDGE (B007028)

WELLINGTON COUNTY

REVISED REPORT

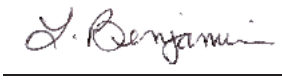
PROJECT NO.: 20M-01326-00
DATE: SEPTEMBER 16, 2021

WSP
582 LANCASTER STREET WEST
KITCHENER, ON, CANADA N2K 1M3

WSP.COM

SIGNATURES

PREPARED BY



Lindsay Benjamin, MAES, MCIP, RPP, CAHP
Cultural Heritage Specialist

September 16, 2021
Date

APPROVED[1] BY

Joel Konrad, PhD, CAHP
Cultural Heritage Lead - Ontario

September 16, 2021
Date

WSP Canada Inc. ("WSP") prepared this report solely for the use of the intended recipient, Wellington County, in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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WSP makes no other representations whatsoever concerning the legal significance of its findings.

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This limitations statement is considered an integral part of this report.

EXECUTIVE SUMMARY

WSP was retained by Wellington County to complete a Schedule B Municipal Class Environmental Assessment (MCEA) Study and Preliminary Design for the Bosworth Bridge, Structure No. B007028, on Wellington Road 7, in the Township of Mapleton.

In advance of the commencement of the MCEA Study, Unterman McPhail Associates completed a Cultural Heritage Evaluation Report (CHER) for the Bosworth Bridge in December 2015. Following an evaluation using Ontario Regulation 9/06, the CHER determined that the bridge is of cultural heritage value or interest, specifically possessing design/physical, historical/associative and contextual values.

As a requirement of the MCEA Study, WSP has completed a Heritage Impact Assessment (HIA) of the Bosworth Bridge to identify existing environmental conditions, identify potential environmental impacts, specifically those resulting from the structure's proposed replacement, and describing measures, alternative development or site alteration approaches to avoid or mitigate potential negative impacts, if any. This document builds upon the CHER to address the requirements for the HIA.

The completion of this HIA has resulted in the following recommendations:

1. The Bosworth Bridge should be recorded through a Documentation and Salvage Report containing measured drawings, a thorough photographic record and written description of the bridge as well as recommendations for elements worthy of salvage prior to demolition (i.e., steel truss members, commemorative bridge plaque). This report should be shared with the County of Wellington and the County of Wellington Museum & Archives. The bridge should be documented to the standard outlined according to section 6.3.1.4 of the Ministry of Transportation's *Environmental Guide for Built Heritage and Cultural Heritage Landscapes* (2007), and according to the *Historic American Engineering Record* (HAER) guidelines. The CHER and HIA may provide sufficient documentation of the bridge, only requiring preparation of a Salvage Plan.
2. Commemoration opportunities should be explored for the bridge with community input.
3. The construction of a new bridge should be designed in a manner that draws from the design inspiration and materials of the extant bridge while maintaining legibility. Design considerations should explore the incorporation of the scale, massing, rhythm and finishes of the original bridge, where possible and feasible. Specifically, the members of a Warren pony truss, the placement and design of the concrete railings, and siting at the same location over the Conestogo River should be considered in the final design for the replacement structure.

PROJECT PERSONNEL

CLIENT

Client Contact	Joe de Koning, P. Eng. Construction Manager, Wellington County

WSP

Project Manager	William Van Ruyven, P. Eng. Project Manager, Transportation – Bridge Engineering
Cultural Heritage Specialist	Lindsay Benjamin, MAES, MCIP, RPP, CAHP Cultural Heritage Specialist
Report Preparation	Lindsay Benjamin
GIS and Mapping	Jason Stephenson, MES GIS Specialist
Report Review	Joel Konrad, PhD, CAHP Cultural Heritage Lead – Ontario

TABLE OF CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 PROJECT CONTEXT

WSP was retained by Wellington County to complete a Schedule B Municipal Class Environmental Assessment (MCEA) Study and Preliminary Design for the Bosworth Bridge, Structure No. B007028, on Wellington Road 7, in the Township of Mapleton. The County is seeking to replace the bridge with a new structure (Appendix A).

In advance of the commencement of the MCEA Study, Unterman McPhail Associates (UMcA) completed a Cultural Heritage Evaluation Report (CHER) for the Bosworth Bridge in December 2015. Following an evaluation using Ontario Regulation (O. Reg.) 9/06 (*Ontario Heritage Act*), the CHER determined that the Bosworth Bridge is of cultural heritage value or interest (CHVI), specifically possessing design/physical, historical/associative and contextual values.

As a requirement of the MCEA Study, WSP has completed a Heritage Impact Assessment (HIA) of the Bosworth Bridge to identify existing environmental conditions, identify potential environmental impacts, specifically those resulting from the structure's proposed replacement, and describing measures, alternative development or site alternation approaches to avoid or mitigate potential negative impacts, if any. This document builds upon the CHER to address the requirements for the HIA.

Located between the communities of Rothsay and Parker, the Bosworth Bridge, a single span Warren Camelback steel pony truss, carries Wellington Road 7 across the Conestogo River, 0.9 km east of Wellington Road 11 in the Township of Mapleton, Wellington County (Figure 1).

Service Layer Credit Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

wsp

LEGEND

- Bosworth Bridge

TITLE: FIGURE 1: PROJECT LOCATION

SCALE:	PROJECT NO:	DATE:
1:15,000	20M-01326-00	15 JAN 2021
DRAWN BY: JAS	CLIENT: COUNTY OF WELLINGTON	

PROJECT: HERITAGE IMPACT ASSESSMENT
BOSWORTH BRIDGE

0 400 800 m

N

CREDITS: LAND INFORMATINO ONTARIO

Document Path: C:\Users\jason.stephenson\Documents\GIS\2020\BosworthBridge\BosworthHIA_Fig1_ProjectLoc.mxd

2 LEGISLATION AND POLICY CONTEXT

2.1 PROVINCIAL AND MUNICIPAL CONTEXT AND POLICIES

2.1.1 PROVINCIAL POLICY CONTEXT

This HIA considers built heritage resources and cultural heritage landscapes in the context of a proposed bridge replacement under the *Environmental Assessment Act* (1990), the *Planning Act* (1990), and O. Reg. 160/02: Standards for Bridges (*Public Transportation and Highway Improvement Act*, R.S.O. 1990, c. P.50). This assessment addresses above-ground built heritage resources over 40 years old (MTO, 2007; Ontario Realty Corporation, 2007) as well as through the application of the Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016), and the Municipal Engineers Association's (MEA) *Municipal Heritage Bridges, Cultural, Heritage and Archaeological Resources Assessment Checklist* (2014).

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, and;
- Any building, structure, machine, or other device or thing made by man.

The MHSTCI 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 Ontario's cultural heritage resources. To that end, the MHSTCI has published the following 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);
- *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (1981); and
- *Ontario Heritage Toolkit, Info Sheet #5: Heritage Impact Assessments and Conservation Plans* (2006).

All guidelines have been utilized in this assessment process.

Additionally, the *Planning Act* and related *Provincial Policy Statement* (PPS) (2020) provide guidance on the identification and conservation of built heritage resources and cultural heritage landscapes. In Subsection 2.6 - Cultural Heritage and Archaeological Resources, the *PPS* states that:

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

2.1.2 WELLINGTON COUNTY OFFICIAL PLAN

The *County of Wellington Official Plan* was adopted by Wellington County Council on September 24, 1998, approved by the Ministry of Municipal Affairs on April 13, 1999, came into effect on May 6, 1999 and was last updated on August 15, 2019. Policies relevant to this HIA include:

4.1.2 *Ontario Heritage Act*

Under the *Ontario Heritage Act*, a local Council may pass by-laws to:

Designate individual properties of cultural heritage value or interest, in accordance with the criteria set out in Ontario Regulation 9/06. Such a by-law shall include a description of the property and a statement of cultural heritage value or interest and description of the heritage attributes;

4.1.5 Policy Direction

Significant built heritage resources and significant cultural heritage landscapes shall be conserved. Conserved means the identification, protection, use and/or management of cultural heritage and archeological resources in such a way that their heritage values, attributes and integrity are retained. This may be addressed through a conservation plan or heritage impact assessment in accordance with Section 4.6.7.

4.6.7 Heritage Impact Assessment and Conservation Plan

A heritage impact assessment and conservation plan may be required to determine if any significant built heritage resources or cultural heritage landscapes are impacted by a development proposal. A heritage impact assessment is a study to determine if any significant resources are impacted by a development proposal, whether the impacts can be mitigated, and by what means. A heritage impact assessment will generally be required to contain:

a) Historical research, site analysis and evaluation.

b) Identification of the significance and heritage attributes of built heritage resources and/or cultural heritage landscapes.

c) Description of the proposed development or site alteration.

d) Assessment of development or site alteration impact.

e) Consideration of alternatives, mitigation and conservation methods. Methods to minimize or avoid a negative impact on a significant built heritage resource or cultural heritage landscape include, but are not limited to:

    i) alternative development approaches;

    ii) isolating development and site alteration from significant built and natural features and vistas;

    iii) design guidelines that harmonize mass, setback, setting, and materials;

iv) limiting height and density;

v) allowing only compatible infill and additions;

vi) reversible alterations;

vii) buffer zones; and

viii) site plan control.

f) Implementation and monitoring.

g) Summary statement and conservation recommendations.

2.2 METHODOLOGY

The recommendations of this HIA are based on an understanding of the physical values of the property, a documentation of its history through research, an analysis of its social and physical context, comparisons with similar properties and mapping.

This HIA is guided by key documents and policies such as: the MEA's *Municipal Heritage Bridges, Cultural, Heritage and Archaeological Resources Assessment Checklist*; O. Reg. 160/02*: Standards for Bridges;* the *Reference Guide on Physical and Cultural Heritage Resources* (Government of Canada, 1996); the *Ontario Heritage Toolkit*; the *Guidelines for Preparing the Cultural Heritage Resource Component of Environmental Assessments*; the *Ontario Heritage Bridge Guidelines* (MTO, 2008); and the HIA requirements set out in Section 4.6.7 of the *County of Wellington Official Plan*.

An HIA examines a property in its entirety, including its relationship to its surroundings, as well as its individual elements – engineering works, landscape, etc.

For the complete background of the Bosworth Bridge, including the history of the immediate context, land-use history, comparative analysis, evaluation of the bridge according to O. Reg. 9/06, the Draft Statement of Cultural Heritage Value and List of Heritage Attributes, please consult the 2015 CHER prepared by UMcA.

To address the requirements of an HIA, this report will include:

- A review of the impact of the proposed alternatives on the CHVI and identified heritage attributes of the subject bridge;
- Recommendations for appropriate alternatives or mitigation measures; and
- Recommendations for future reporting, if required.

3 EXISTING CONDITIONS

An inspection of the bridge and the landscape context was conducted by WSP's Pouya Pourbeik, Designer, Engineer-in-Training, and Christopher Singh, Inspector, on September 24, 2019 to complete the 2019 OSIM Report. Additional photographs were taken on October 23, 2019. Lara Wood, Professional Archaeologist, completed further photographic documentation on November 17, 2020. The description of the structure and study area that follows will reference the associated images included in Section 3.1.

3.1 DESCRIPTION OF STRUCTURE

Constructed in 1949, the Bosworth Bridge is a two-lane, single span Warren Camelback steel pony truss structure on Wellington Road 7, located 0.9 km east of Wellington Road 11 in the Township of Mapleton (Figure 1). The bridge is not listed on a municipal heritage register or inventory of cultural heritage resources or designated under the *Ontario Heritage Act.* It is also not included on the list of provincial heritage properties maintained by the MHSTCI.

The structure uses cast-in-place, reinforced concrete abutments, wingwalls and deck with an asphalt paving surface and cast-in-place concrete railings at the bridge approach. The traffic barriers consist of three (3) structural steel tees (WT) that are connected directly to the vertical and diagonal members of the truss. The steel truss members are riveted together. The bridge is oriented east to west and spans approximately 42 m, while the roadway width is 7.5 m, the overall width is approximately 8.6 m and the total deck length, including the concrete handrail system, is 50.7 m. Embankments on either end of the bridge consist of soil and overgrown, low lying vegetation. Approaches to the bridge on both sides are straight and decline in elevation as the road enters the river valley. Flex metal guardrails with wood posts are found on both sides of the east and west approaches. The bridge is skewed 4.1 degrees (Images 1-18).

The steel floor beams and stringers of this steel pony truss structure support a concrete deck overlain by an asphalt wearing surface (Image 13). The bridge carries two lanes of traffic, one eastbound and one westbound on Wellington Road 7. There are no sidewalks or shoulders included on the structure.

The two steel trusses consist of wide flange beam units with three centre panels and two end panels, each measuring 5.2 m in length (UMcA 2015) (Image 1-4). The centre section of the top chord is 4.88 m high and sections on either side slope downwards to a height of 3.7 m (UMcA 2015). The Warren truss design is evidenced through the use of equilateral triangles (Image 7) and the Camelback design is characterized by the five angles of the upper chord. A commemorative plaque is located on the east end of the east top chord of the truss (Image 18). The original concrete railings located on each corner of the bridge are comprised of two balustrades and an end post with two horizontal concrete railings spanning between the posts (Image 15-16). The total length of each railing is 4.9 m and each concrete post is 0.9 m (UMcA 2015). The east and west bridge approaches include long steel guardrails on both sides of the road.

The Bosworth Bridge has not undergone any major changes to its original design intent, and it retains the original handrail system (UMcA 2015). The first known rehabilitation completed for the subject bridge took place in 1987 when the structure was 38 years old. The work was done under Contract No. 87-61 prepared for the County of Wellington by McCormick Rankin. This rehabilitation involved cleaning and coating of the structural steel, strengthening the truss lower chord connections, replacement of the expansion joints, concrete overlay, waterproofing and paving (WSP 2018). The second known repair took place in 2008 and included the installation of braces at the compression diagonals to improve the load capacity of the bridge (WSP 2018). The last known repairs took place in 2013 and included jacking the bridge and placing shims underneath of the rocker bearings to level the deck with the concrete end dams at the ballast wall (WSP 2018).

Image 1: Looking east across the bridge

Image 2: Looking west across the bridge

Image 3: Looking south towards the bridge's north elevation

Image 4: Looking northwest towards the bridge's south elevation

Image 5: View of the northwest wingwall and embankment

Image 6: View of the end diagonal truss member

Image 7: View of the top chord

Image 8: View of the bottom chord

Image 9: Detail of the rivets connecting truss members

Image 10: Detail of the gusset connection

Image 11: View of west abutment looking west

Image 12: View of east abutment looking northeast

Image 13: Detail of concrete soffit, floor beam and stringer

Image 14: View of the superstructure's underside, note drainage pipe

Image 15: View of concrete railings

Image 16: Detailed view of concrete railings, note exposed rebar

Image 17: Detail of west bridge joint and asphalt wearing surface

Image 18: View of commemorative plaque

3.2 BRIDGE CONDITION

In accordance with legislation, inspections of Ontario's bridges are conducted biennially to monitor the condition of a structure and identify any signs of deterioration that may trigger potential repair or replacement efforts. Municipal Structure Inspection Forms (MSIF) are completed to document the condition of a bridge and complete assessments based on a Building Condition Index (BCI) score out of 100. The scale and interpretation of BCI scores are described in Table 1.

Table 1: BCI Scale and Interpretation

SCALE	SCORE	INTERPRETATION
Very Poor	BCI <50	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.
Poor	BCI <60 and >=50	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
Fair	BCI >=60 and <70	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
Good	BCI >=70 and <85	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.

Very Good	BCI >=85	The infrastructure in the system or network is in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.

The most recent MSIF for the Bosworth Bridge was completed by WSP in September 2019. The form identifies the condition of each bridge element, which are summarized in Table 2 on the following page.

Table 2: Summary of Bridge Condition

BRIDGE ELEMENT	CONDITION (SQ. M)			
	Excellent	Good	Fair	Poor
Deck: Wearing Surface	0	296.28	9	2
Decks: Soffit Thin Slab (Interior)	0	266.50	18	8
Decks: Soffit Thin Slab (Exterior)	0	16.33	41	41
Decks: Drainage	0	0	8	0
Joints: Seals/Sealants	0	2	0	0
Joints: Concrete End Dams	0	6.6	1	.5
Joints: Armouring/ Retaining Devices	0	60	0	0
Barriers: Railing System (Steel flex beam on steel post)	0	374	5	5
Barriers: Railing System (Concrete post and bars)	0	0	9.68	9.68
Barriers: Railing System (Steel railing on truss)	0	76.94	3	2
Beams/MLE's: Floor Beams (End)	0	32.38	4	0
Beams/MLE's: Floor Beams (Intermediate)	0	111.33	16	0
Beams/MLE's: Stringers (End)	0	8	2	0
Beams/MLE's: Stringers (Intermediate)	0	23	7	0
Trusses/Arches: Top Chords	0	145.93	16.5	0
Trusses/Arches: Bottom Chords	0	62.05	17	0
Trusses/Arches: Verticals/Diagonals	0	104.96	46	0
Trusses/Arches: Verticals/Diagonals	0	75.78	33	0
Trusses/Arches: Verticals/Diagonals	9.2	0	0	0
Trusses/Arches: Connections (Bolted)	0	16	0	0

Coatings: Structural Steel	0	0	150.12	524
Abutments: Wingwalls	0	10.9	7	4
Abutments: Abutment Walls	0	27.5	10	10
Embankments and Streams: Stream and Waterways	0	1	0	0
Embankments and Streams: Embankments	0	2	0	2
Approaches: Wearing Surface	0	65	10	0
Totals	**9.2**	**1784.48**	**413.3**	**608.18**
	0.33%	**63.39%**	**14.68%**	**21.6%**

In total, approximately 0.33% of the components of the Bosworth Bridge were considered to be in excellent condition; 63% were considered to be in good condition; 15% were considered to be in fair condition; and 22% were considered to be in poor condition. Overall the MSIF has attributed a BCI of 60.10 (out of 100) and notes the overall condition as “Fair”.

The recommendation provided in the 2019 MSIF indicated that the Bosworth Bridge requires rehabilitation to preserve the remaining service life of the structure within the next 1-5 years (WSP, 2019).

As part of the Schedule B MCEA, the WSP Project Manager and Structural Lead (William Van Ruyven, January 14, 2021) confirmed that while the structure’s BCI scores on the cusp of “Fair”, the bridge is generally in fair to poor condition with major elements in an advanced state of deterioration and approaching the end of their useful service life. Furthermore, the bridge exhibits several functional/operational deficiencies including substandard roadway width and substandard barrier protection and guide rail protection with several components requiring maintenance, rehabilitation and/or replacement.

In addition, the structural support staff noted that truss bridges have main load carrying members that are designed without redundancy. As such, if one element is in poor condition and fails, the entire structure is likely to also have a catastrophic failure, unlike rigid frame or girder structures that can accommodate local failure. One of the bridge’s support bearings was noted to have full depth section loss (Image 19). Local rehabilitation of this member was reviewed and it was determined that the bridge was not designed to be temporarily jacked and a replacement of the bearing would require major work (i.e., removal of the deck, strengthening of connections to temporarily jack and replace the bearing).

Image 19: Detail of support bearing indicating full depth section loss

3.2.1 DESIGN AND CONSTRUCTION

Table 3: Bridge Details

Structure Name	Bosworth Bridge	**Road Name**	Wellington Road 7
District	Central Region	**Road Type**	Arterial
Municipality	Township of Mapleton	**Owner**	Wellington County
Bridge or Culvert	Bridge	**Overall Structure Width (m)**	8.6
Structure Type	Warren Camelback steel pony truss	**Roadway Width (m)**	7.48
Span (m)	40.97	**Total Deck Length (m)**	50.65
Truss Depth (m)	4.88	**Total Deck Area (sq. m)**	378.86
Direction of Structure	East/West	**Heritage Description**	None
Year Built/ Rehabilitated	Built 1949	**Waterway**	Conestogo River
Current Load Limit	Not posted	**Designer/ Construction Firm**	C.C. Parker Consultants/ Arnott Construction

3.3 DESCRIPTION OF STUDY AREA AND LANDSCAPE CONTEXT

The bridge is located east of the community of Bosworth on Lot 2, Concessions 13 and 14, in the Geographic Township of Peel, County of Wellington. The study area is comprised of the current bridge, approaches to the bridge and the embankments supporting the bridge. Wellington Road 7 consists of a two lane-divided road with gravel shoulders and posted speed limit of 80 km/hour. The Conestogo River at this location runs north to south and Wellington Road 7 travels east to west. As the road descends from the east and west into the wide river valley, a vista of both the Conestogo River and Bosworth Bridge is provided (UMcA 2015) (Image 20).

The Conestogo River flows through the naturalized river valley and the area immediately surrounding the bridge includes low-lying vegetation and pockets of forest (Images 21 and 25). Adjacent land uses include a small commercial building (Image 27) and agricultural farmstead located in a forested area northeast of the bridge (Image 26), a small Grand River Fisheries shed is located on the northwest corner of the bridge (Images 23 and 24), and agricultural fields, forests and the river valley are located to the south. The river flows in a north-south orientation on the north side of the bridge and then meanders sharply to the west and then south again beyond the south side of the bridge (Image 22).

Image 20: View to bridge looking west down Wellington Road 7

Image 21: Detailed view to bridge looking west down Wellington Road 7

Image 22: View from bridge looking south to Conestogo River

Image 23: View looking west towards Conestogo River/Grand River Fisheries shed

Image 24: View looking east towards Conestogo River/Grand River Fisheries shed

Image 25: View looking west to south embankments and Conestogo River

Image 26: View to adjacent historic farmstead

Image 27: View to adjacent commercial building

3.4 ARCHAEOLOGICAL ASSESSMENTS

A Stage 1 Archaeological Assessment report was completed for the Bosworth Bridge in August 2021, with property inspection conducted in November 2020. Based on the results of this study, a Stage 2 Archaeological Assessment is required for the areas identified as retaining archaeological potential. The Stage 1 report has provided recommendations outlining the completion of the Stage 2 report compliant with the *Standards and Guidelines for Consultant Archaeologists* (MHSTCI, 2011).

4 RESULTS OF HERITAGE EVALUATION

The CHER (dated December 2015) found the Bosworth Bridge to possess CHVI, according to O. Reg. 9/06.

4.1 DRAFT STATEMENT OF CULTURAL HERITAGE VALUE

Description of Property

The Bosworth Bridge is a two-lane, single span Warren Camelback steel pony truss structure spanning the Conestogo River on Wellington Road 7, 0.9 km east of Wellington Road 11 in the Township of Mapleton, County of Wellington.

Cultural Heritage Value or Interest

The Bosworth Bridge, built in 1949 for the County of Wellington, is classified as a Warren Camelback steel pony truss bridge. It is one of only two examples of a Warren Camelback steel pony truss under the jurisdiction of the County of Wellington and the older of the two county examples. When built, the Bosworth Bridge was noted in the Arthur newspaper as a "handsome" structure and the second largest bridge in the County of Wellington to be built in recent years. The bridge has not been modified and retains its original guardrail system and concrete handrail system on each of the four corners. The Bosworth Bridge is the second oldest steel pony truss structure within the Grand River watershed. Steel pony truss bridges were once plentiful in the Grand River watershed and in the County of Wellington, but their numbers are now diminished. The Bosworth Bridge is an example of a rare survivor of its type within the County of Wellington and the Grand River watershed.

W.H. Keith, County of Wellington Engineer, supervised the project. Keith is credited with the design of many other bridges in the County of Wellington during his years of employment as county engineer from c.1933 to 1965. In the formative year after the Second World War, Keith initiated a program on behalf of the County to improve its road system and renew its bridges to modern standards. C.C. Parker, Consulting Engineer, a well-known bridge engineering company in the Province of Ontario, designed the bridge. C.C Parker is an engineer of regional and provincial significance to the twentieth century. The Hamilton Bridge Company is considered a bridge builder of significance to the province in the late nineteenth and twentieth centuries. Arnott Construction Company of Arthur acted as the general contractor. This company is of significance to the County of Wellington, as well as other areas in the province, as a bridge builder.

The Bosworth Bridge is an important landscape element in defining the naturalized setting of the wide river valley of the Conestogo River in this location on Wellington Road 7. The route of Wellington Road 7 began in the mid-nineteenth century as the Elora to Saugeen Road, an important transportation and settlement route that contributed significantly to the settlement and development of the northern townships of the County of Wellington. A bridge has spanned the Conestogo River at this location on the road since the mid-nineteenth century. The current

structure replaced an earlier narrow steel pony truss in 1949. The Bosworth Bridge is physically, functionally, visually, and historically linked to its surroundings. It is considered to be of value as a physical landmark within the area and on Wellington Road 7 due to its metal truss design and location in a wide river valley.

Description of Heritage Attributes

The heritage attributes that reflect the CHVI of the Bosworth Bridge include the:

- Cast-in-place concrete abutments and wingwalls;
- Steel truss components comprising the Warren Camelback steel pony truss structure;
- One span design;
- Original horizontal steel guardrail;
- Cast-in-place, original concrete handrail on all four corners; and
- Commemorative plaque.

5 PROPOSED UNDERTAKING, IMPACTS AND MITIGATION

5.1 DESCRIPTION AND PURPOSE OF PROPOSED UNDERTAKING

The Bosworth Bridge (No. B007028) consists of a single span steel truss structure with a concrete deck over the Conestogo River. The bridge has a span and deck width of 40.1 m and 8.4 m respectively and was constructed circa 1949. The bridge is located on Wellington Road 7 in the Township of Mapleton, 0.9 km east of Wellington Road 11. The study area extends approximately 1 km on either side of the bridge. As part of a bridge inspection conducted in 2019, the Bosworth Bridge was found to be in poor condition with major elements showing signs of significant deterioration. WSP has been retained by the County of Wellington to complete a Municipal Class EA Study to address these items and the County is seeking to replace the bridge with a new structure (Appendix A).

The following four alternatives are being considered for the Bosworth Bridge as a result of the MCEA Study:

Option 1 – Do Nothing

This would not include any repairs to the structure but would include regular monitoring and may require that the bridge be closed and thus the road as well.

Option 2 – Remove Without Replacement

This would include removal of the bridge and closure of the road.

Option 3 – Rehabilitation

Areas of deterioration would be removed and repaired and the bridge may require widening to meet current safety standards. To facilitate the flow of traffic during the bridge rehabilitation, a temporary bailey bridge may need to be installed adjacent to the road to allow through traffic.

Option 4 – Replace

This would include complete removal of the existing structure and replacement with a new bridge. To facilitate the flow of traffic during the bridge replacement, a temporary bailey bridge may need to be installed adjacent to the road to allow through traffic.

5.2 IMPACT ASSESSMENT

This section provides an assessment of the potential adverse effects resulting from the proposed undertakings.

Built heritage resources may experience displacement or **direct impacts**, i.e., demolition or removal of heritage attributes. Direct impacts are permanent, not temporary changes to the cultural heritage environment.

Built heritage resources may also experience disruption, or **indirect impacts**, by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with their character and/or setting. These indirect impacts may be temporary during construction, such as vibration impacts and dust particles, or permanent such as the introduction of new infrastructure. Other indirect impacts of a temporary or permanent nature may include, but are not limited to, changes in grading, alterations to built heritage resource setting and fabric as a result of visual, audible or atmospheric elements, etc. Indirect impacts can be permanent or temporary changes to the cultural heritage environment.

The impacts of each of the four alternatives being considered for the bridge through the MCEA Study will be rated based on the following categories identified in Table 4.

Table 4: Impact Ratings

RATING	DESCRIPTION
None	The proposed undertaking has no impact on the heritage value/attribute.
Low	The undertaking has minimal impact on the heritage value/attribute.
Medium	The undertaking affects/disturbs the heritage value/attribute. The undertaking requires mitigation.
High	The undertaking replaces/removes a heritage value/attribute. The undertaking requires mitigation.

5.2.1 EVALUATION OF IMPACTS

On the following page, Table 5 provides an evaluation of the impacts of the four alternatives being explored in the MCEA Study.

Table 5: Evaluation of Impacts

CRITERIA	EVALUATION			
	Option 1: Do Nothing	**Option 2: Remove Without Replacement**	**Option 3: Rehabilitation**	**Option 4: Replace**
Destruction of any, or part of any, significant heritage attributes or features.	Impact Rating: None Rationale: No heritage attributes will be impacted if the bridge remains *in situ*.	Impact Rating: High Rationale: Removal of the bridge would result in the destruction of all heritage attributes.	Impact Rating: None Rationale: No heritage attributes will be destructed.	Impact Rating: High Rationale: Replacement of the bridge would result in the destruction of all heritage attributes.
Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance.	Impact Rating: None Rationale: No heritage attributes will be impacted if the bridge remains *in situ*.	Impact Rating: None Rationale: Removal of the bridge is not considered an "alteration" and will result in the destruction of all heritage attributes.	Impact Rating: Medium Rationale: Rehabilitation of the bridge to meet current safety standards and repair deteriorated elements may result in some physical changes to the heritage attributes.	Impact Rating: None Rationale: Replacement of the bridge is not considered an "alteration" and will result in the removal of all heritage attributes.
Shadows created that alter the appearance of a heritage attribute or change the viability of a natural feature or plantings, such as a garden.	Impact Rating: None Rationale: There will be no new shadows created.	Impact Rating: None Rationale: There will be no new shadows created.	Impact Rating: None Rationale: There will be no new shadows created.	Impact Rating: None Rationale: There will be no new shadows created.
Isolation of a heritage attribute from its surrounding environment,	Impact Rating: None Rationale:	Impact Rating: None Rationale:	Impact Rating: None Rationale: Rehabilitation of the	Impact Rating: None Rationale: Replacement of the

context or a significant relationship.	No heritage attributes will be impacted if the bridge remains *in situ*.	Removal of the bridge will remove all the heritage attributes.	bridge will not result in the isolation of any heritage attributes.	bridge will remove all the heritage attributes.
Direct or indirect obstruction of significant views or vistas within, from, or to built and natural features.	Impact Rating: None Rationale: Significant views or vistas were not identified as heritage attributes of the bridge.	Impact Rating: None Rationale: Significant views or vistas were not identified as heritage attributes of the bridge.	Impact Rating: None Rationale: Significant views or vistas were not identified as heritage attributes of the bridge.	Impact Rating: None Rationale: Significant views or vistas were not identified as heritage attributes of the bridge.
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.	Impact Rating: None Rationale: No change in land use will occur if the bridge remains *in situ*.	Impact Rating: High Rationale: The removal of the bridge will result in a change in land use resulting from the closure of an arterial road.	Impact Rating: None Rationale: There will be no change in use.	Impact Rating: None Rationale: There will be no change in use.
Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.	Impact Rating: None Rationale: No land disturbance will occur if the bridge remains *in situ*.	Impact Rating: Low Rationale: Removal of the bridge will result in soil disturbance.	Impact Rating: None Rationale: There will be no change in grade.	Impact Rating: None Rationale: There will be no change in grade.

5.2.2 RESULTS OF IMPACT ASSESSMENT

The impact assessment outlined in Section 5.2.1 has reviewed the four alternatives being explored for the Bosworth Bridge through the MCEA Study and determined the following:

- **Option 1 – Do Nothing** will not result in any impacts to the bridge's heritage attributes however it will also not address the deteriorating condition of the structure.
- **Option 2 – Remove Without Replacement** will result in significant impacts as it would require the complete demolition of the bridge and its heritage attributes, removal of the bridge's contextual relationship to the historic crossing of Wellington Road 7 over the Conestogo River, and closure of Wellington Road 7 at the river crossing.
- **Option 3 – Rehabilitation** of the bridge to meet current safety standards and to repair deteriorated elements will result in physical changes, thus impacting the integrity of the bridge's heritage attributes.
- **Option 4 – Replacement** of the bridge in its entirety will result in significant impacts through the destruction of all the structure's heritage attributes as well as removal of the bridge's contextual relationship to the historic crossing of Wellington Road 7 over the Conestogo River at this location.

From a cultural heritage perspective, the alternatives that retain the physical truss structure of the Bosworth Bridge in its current location are the most desirable (Options 1 and 3). If the bridge is to be retained and/or rehabilitated, the heritage attributes should be conserved. Option 4, which would see the current bridge removed and replaced with a new bridge, could maintain several of the bridge's design and contextual attributes through the application of mitigation measures. Option 2 represents the least desirable option as it would see the complete removal of the structure and closure of Wellington Road 7 at the river crossing.

5.3 CONSIDERED ALTERNATIVES AND MITIGATION MEASURES

When adverse impacts are expected from proposed site alteration, alternatives and mitigation measures should be considered to manage the site alteration in a way that will not adversely affect built heritage resources and cultural heritage landscapes. The preferred heritage approach for the protection of resources is retention *in situ* and the preservation of the material integrity to the maximum extent possible, as public safety allows.

In situations where the nature of site alteration is such that adverse impacts are unavoidable, it is possible to implement mitigative conservation strategies that lessen the adverse effects to the built heritage resources and cultural heritage landscapes. Conservation options are outlined in the *Ontario Heritage Bridge Guidelines* (OHBG) (MTO, 2008), regarded as current best practice for conserving heritage bridges in Ontario. While the OHBG's are intended for use in the assessment of provincially-owned structures and are not directly applicable in the municipal context, they ensure that heritage concerns and appropriate mitigation options are considered.

5.3.1 ALTERNATIVES, MITIGATION AND CONSERVATION OPTIONS ANALYSIS

Consistent with the eight conservation options of the OHBG, regarded as appropriate in managing interventions to heritage bridges, and considered in rank order according to the level or degree of intervention from minimum to maximum, WSP has presented the results of impact assessment based on the preferred option being carried forward as part of the MCEA Study and the observed structural condition of the bridge (WSP, 2019).

Below, Table 6 presents the results of impact assessment based on the OHBG conservation options.

Table 6: OHBG Impact Assessment of Bosworth Bridge

OHBG CONSERVATION OPTIONS	ADVANTAGE	DISADVANTAGE	COMMENTS
1) Retention of existing bridge with no major modifications undertaken	This option is consistent with the principle of minimal intervention and would retain all of the bridge's heritage attributes in the short-term. This option is also consistent with the *County of Wellington Official Plan* policy 4.1.5 that encourages the retention of significant built heritage resources and cultural heritage landscapes.	Given the bridge's current state of disrepair and functional/operational deficiencies, this option would pose a significant public safety concern in the long-term.	This option would likely result in the deterioration of the bridge's heritage attributes, and the eventual closure of the bridge, requiring traffic rerouting.
2) 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	This conservation option involves little change to the original fabric of the structure, and repairs made based on the historic record. This option is also consistent with the *County of Wellington Official Plan* policy 4.1.5.	This option does not address the bridge's functional/operational deficiencies including substandard roadway width, barrier protection, and guide rail protection with several components requiring maintenance, rehabilitation and/or replacement. Restoration of the deteriorated components is prohibitively expensive as the bridge's main load carrying members are designed without redundancy.	This option is not viable due to concerns related to the condition of the bridge, notably the deterioration of the support bearing that cannot be addressed through restoration of deteriorated elements. To meet contemporary technical and safety requirements, this option would be cost prohibitive for the County of Wellington.

3) Retention of existing bridge with sympathetic modification	This option is consistent with the principle of preservation of material to its highest integrity and would maintain some heritage attributes of the bridge. This option is also consistent with the *County of Wellington Official Plan* policy 4.1.5.	A *Structure Inspection Report* was completed for the Bosworth Bridge by WSP in May 2020 providing a qualitative assessment and recommendations for necessary repairs and remaining service life. The report findings explored three Options: 1) Minor rehabilitation for a 10-year service life extension; 2) Major rehabilitation for a 25-year service life extension; and 3) Bridge replacement with a new NU girder or steel plate girder structure with crash tested barriers and standard curb-curb width for a 75-year service life. Given the age of the structure, scope of repair required, functional deficiencies and cost of repairs, it was recommended that the bridge be replaced as outlined in the report's Option 3. It is possible that rehabilitation of the bridge to meet current safety requirements and traffic needs (i.e., widening) could result in the modification/ loss of heritage attributes and ultimately the loss of the heritage integrity of the bridge.	Although rehabilitation remains the preferred alternative for the Bosworth Bridge from a cultural heritage perspective, the extent and nature of the deterioration of the structural components of the bridge (i.e., the support bearing), and the extensive repairs needed to address the functional/operational deficiencies (i.e., the substandard roadway width, barrier and guide rail protection), will result in a significant loss of historic materials and a change in the dimensions of the bridge to increase its traffic capacity. Considering these principles, sympathetic modification is not recommended.
4) Retention of existing bridge with a sympathetically designed new structure in proximity	This conservation option would retain the heritage attributes of the bridge and address the safety concerns. This option is also consistent with the *County of Wellington Official Plan* policy 4.1.5.	The Bosworth Bridge and the sympathetically designed new bridge would both require ongoing maintenance, and a new bridge would require additional property to be purchased to expand the road right-of-way and would result in a curve added to the road, creating geometric challenges.	This option is not viable due to the expense of maintaining the existing bridge, acquiring additional property and building a new sympathetically designed structure. It would also introduce undesirable road geometrics that would adversely impact road safety.

5) Retention of existing bridge no longer in use for vehicular purposes but adapted for a new use. For example, prohibiting vehicles or restricting truck traffic or adapting for pedestrian walkways, cycle paths, scenic viewing, etc.	This option is consistent with the principle of minimal intervention and would retain all the heritage attributes of the bridge. Pedestrian or cyclist traffic would likely require less intervention for rehabilitation. This option is also consistent with the County of Wellington's Official Plan policy 4.1.5.	This conservation option alters the use of the bridge from a vehicular bridge to a pedestrian bridge. There is minimal need for a pedestrian bridge in this remote, rural location. This option would require construction of a new road to by-pass the existing bridge, which would pose additional environmental and budgetary impacts.	Pedestrianized bridges are often more appropriate in urban areas where they are well traveled, and the public funding can be justified. This option is not viable due to its expense, engineering constraints and the loss of function as a road bridge.
6) Retention of existing bridge as a heritage monument for viewing purposes only	This conservation option retains the bridge *in situ* and retains its scale and massing. This option is also consistent with the County of Wellington's Official Plan policy 4.1.5.	The bridge will require extensive maintenance and refurbishment and this option removes the bridge as a useful structure and from its historic function as a road bridge. In addition, the County of Wellington will still require a road bridge across the river at this location.	The County of Wellington will require a road bridge at this location. Retaining the Bridge as a heritage monument *in situ* would require realigning the road and construction of a new bridge. Retaining the bridge *in situ* as a heritage monument is not viable due to the considerable expense and engineering constraints.
7) Relocation of smaller, lighter single span bridges to an appropriate new site for continued use (see 4) or adaptive re-use (see 5)	This option is consistent with the principle of preservation of material to its highest integrity and would maintain all the bridge's heritage attributes. Given the bridge's steel pony truss construction, moving the bridge intact may be feasible.	Relocating the bridge would remove its contextual relationship with the crossing over the Conestogo River on Wellington Road 7 east of the community of Bosworth. This option presents considerable risk of damage/destruction of the bridge through the relocation process. The bridge will still require extensive maintenance and refurbishment at considerable expense during disassembly, relocation and future maintenance.	Relocation of bridges is rare and would require a thorough Conservation Plan to facilitate the process.
8) Bridge removal and replacement with a sympathetically	Thorough detailed investigations, the construction and contextual relationships of the	Built heritage resources are finite, meaning once gone, they are gone forever. Demolition would result in	Prior to demolition, the Bosworth Bridge should be recorded through a Documentation and

designed structure: **a) Where possible, salvage elements/ members of the bridge for incorporation into a new structure or for future conservation work or displays;** **b) Undertake full recording and documentation of existing structure**	Bosworth Bridge would be better understood and become part of an example for comparative study. Documentary records could be made accessible to the public through the local library or other commemorative methods. Impacts from the introduction of a new bridge could be minimized if it retained its contextual relationship (i.e., original location) and adopted a design that draws from the materials and design inspiration of the extant bridge while maintaining legibility (new work that is distinguishable from the old). This approach represents a best practice in heritage conservation.	the loss of all the bridge's heritage attributes. Although once common, this bridge type is now a diminishing resource due to replacement to meet current safety requirements and traffic needs. As of 2013, steel pony truss bridges represented only 9% of the heritage bridges identified by type within the Grand River watershed. This number has likely decreased since 2013. The Bosworth Bridge is the oldest example of a Warren Camelback steel pony truss and the second oldest example of a Warren steel pony truss owned by the County of Wellington.	Salvage Report that contains measured drawings, a thorough photographic recording and written description of the structure as well as a list of elements worthy of salvage. The CHER and HIA may provide sufficient documentation of the bridge, only requiring a Salvage Plan. Preservation by record is the least desirable conservation option but may be appropriate in cases where structural integrity of a bridge is poor, rehabilitation is prohibitively expensive, it is technically difficult to stabilize a structure, or where public safety is a concern. The County of Wellington has indicated that they have selected preferred truss bridge candidates to be preserved based on their current condition and location. It is anticipated that these preserved structures will act as representative examples of the bridge style in the County.

Conservation Option 8 will result in major adverse effects to a cultural heritage resource. The OHBG requires four additional conditions be considered before this option is selected (Table 7). Only one of the following requirements must be met to justify replacing a bridge that is a cultural heritage resource.

Table 7: Detailed Conditions for Conservation Option 8

DETAILED CONDITIONS FOR CONSERVATION OPTION 8	ASSESSMENT RATIONALE
The safety of the existing structure is compromised to the extent that rehabilitation is not a practical option	The safety of the existing structure is compromised. One of the bridge's support bearings was noted to have full depth section loss (Image 19). Local rehabilitation of this member was reviewed, and it was determined that the bridge was not designed to be temporarily jacked and a replacement of the bearing would require major work (i.e., removal of the deck, strengthening of connections to temporarily jack and replace the bearing). The cost of rehabilitation is prohibitive compared to replacement. As such, this is not a practical option.
The cost of rehabilitation is prohibitive compared to replacement	The cost of rehabilitation is prohibitive compared to replacement as indicated in Section 3.2.
The bridge has been severely altered from its original form	Not applicable. The bridge has not been significantly altered from its original form.
Replacement is required to meet demand requirements that are not achievable through rehabilitation or upgrading the existing structure	Replacement is required to meet demand requirements that is not achievable through rehabilitation or upgrading the existing structure as the bridge exhibits several functional/operational deficiencies including substandard roadway width and substandard barrier protection and guide rail protection with several components requiring maintenance, rehabilitation and/or replacement.

5.3.2 RESULTS OF ALTERNATIVES, MITIGATION AND CONSERVATION RECOMMENDATIONS

The CHER completed in December 2015 by UMcA demonstrated that the Bosworth Bridge has design or physical, historical or associative and contextual value in accordance with O. Reg. 9/06. Given the bridge's CHVI, ideally it would be retained on its original site, rehabilitated in a sensitive manner and continued to be used for its original purpose. However, given the bridge's state of deterioration and the public safety concerns related to its functional/operational deficiencies, it is understood that retention and rehabilitation of the bridge is not feasible. Furthermore, the Bosworth Bridge is not considered a good candidate for relocation or reuse. Option 8 – Bridge removal and replacement with a sympathetically designed structure and salvage elements of the bridge for adaptive reuse is the recommended alternative. Prior to demolition, a Documentation and Salvage Report should be prepared by a qualified heritage consultant to record the bridge thorough measured drawings and photographic and written descriptions. Elements worthy of salvage should also be recommended. It may be determined that the CHER and HIA provide sufficient documentation of the bridge, only requiring preparation of a Salvage Plan.

Elements to be salvaged (i.e., steel truss members, commemorative bridge plaque) should be collected prior to demolition. This material could be incorporated into a compatible design for the new bridge (i.e., commemorative bridge plaque) or used to construct a commemorative display or new plaque near the site of the bridge (i.e., in the nearby community of Bosworth). A gateway

feature was recently completed in Elora using salvaged steel from the trusses of the former Badley Bridge at Metcalfe Street, and could serve as an example to inspire commemorative opportunities for the Bosworth Bridge. In addition, the Region of Waterloo's Heritage Bridge Recognition Program has produced a series of historic plaques and represents a practical example of the incorporation of salvaged material from historic bridges into plaque bases. A plaque for the Huron Road Bridge in the City of Kitchener incorporated a piece of steel I-beam removed from the previously extant heritage structure and helps to further tell the story of the resource's notable past and design.

The design of a compatible replacement structure in a manner sympathetic to the current Bosworth Bridge should be explored. Efforts should be made to incorporate design qualities and/or materials of the original bridge and its setting, while maintaining legibility. This approach represents a best practice in heritage conservation. Design considerations should explore the incorporation of the scale, massing, rhythm and finishes of the original bridge, where possible and feasible. Specifically, the members of a Warren pony truss, the placement and design of the concrete railings, and siting at the same location over the Conestogo River should be considered in the final design for the replacement structure.

5.4 SUMMARY OF COMMUNITY ENGAGEMENT

Wellington County was consulted as a part of this project with the intent of information gathering regarding any cultural heritage interests or concerns related to the Bosworth Bridge. This engagement was not combined with the Public Information Centres completed as part of the MCEA. Details regarding the scope and timing of this consultation are provided in Table 8 on the following page.

Table 8: Consultation Record

CONTACT	CONTACT DETAILS	RESPONSE RECEIVED	RESPONSE
Michelle Innocente Senior Planner, Wellington County michellei@wellington.ca	By email on October 13, 2020	October 13, 2020	Michelle suggested contacting Don Kudo in the Engineering Services Department.
Don Kudo County Engineer, Wellington County donk@wellington.ca Joe de Koning Construction Manager, Wellington County joedk@wellington.ca	By email on October 13, 2020	October 14, 2020	Response received from Joe de Koning, Construction Manager. The 2015 Bosworth Bridge CHER was provided. No cultural heritage interests/concerns were reported.

The MHSTCI was circulated this report for review on July 19, 2021. A response was received on August 16, 2021 stating that the report was consistent with the requirements, guidance and standards of the MCEA and with best practice guidance prepared by the MHSTCI. However, the Ministry did provide comments and recommendations outlining suggested revisions. Those revisions have been incorporated into this report. Given that the bridge was found to possess CHVI, the MHSTCI recommended that the CHER and HIA be publicly disclosed for any interested groups and persons for review and comment as part of the EA process.

5.5 RECOMMENDATIONS

Given the identified CHVI of the Bosworth Bridge and the preferred option being carried forward as part of the MCEA Study involving the complete removal and replacement of subject bridge, the following mitigation measures are recommended:

1. The Bosworth Bridge should be recorded through a Documentation and Salvage Report containing measured drawings, a thorough photographic record and written description of the bridge as well as recommendations for elements worthy of salvage prior to demolition (i.e., steel truss members, commemorative bridge plaque). This report should be shared with the County of Wellington and the County of Wellington Museum & Archives. The bridge should be documented to the standard outlined according to section 6.3.1.4 of the MTO *Environmental Guide for Built Heritage and Cultural Heritage Landscapes* (2007), and according to the *Historic American Engineering Record* (HAER) guidelines. The CHER and HIA may provide sufficient documentation of the bridge, only requiring preparation of a Salvage Plan.
2. Commemoration opportunities should be explored for the bridge with community input.
3. The construction of a new bridge should be designed in a manner that draws from the design inspiration and materials of the extant bridge while maintaining legibility. Design considerations should explore the incorporation of the scale, massing, rhythm and finishes of the original bridge, where possible and feasible. Specifically, the members of a Warren pony truss, the placement and design of the concrete railings, and siting at the same location over the Conestogo River should be considered in the final design for the replacement structure.

6 BIBLIOGRAPHY

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2015 *Cultural Heritage Evaluation Report Bosworth Bridge, No. B007028 Wellington Road 7 (WR 7) (Lot 2, Concession 13 & 14 Geographic Township of Peel) Township of Mapleton County of Wellington, Ontario*. Prepared for MMM Group Ltd. Revised December 2015.

WSP

2020 *Structure Inspection Report Bosworth Bridge (Structure B007028)*. Prepared for the County of Wellington. May 21, 2020.

2019 *Municipal Structure Inspection Form, County of Wellington, Bosworth Bridge (B007028), MTO Structure Number 35-104, Wellington Road 7, 0.9 km E of Wellington Road 11*. Prepared for the County of Wellington.

2018 *Memo: Structure Condition/ Structural Needs Analysis Bosworth Bridge Municipal Class EA*. February 28, 2018.

Provincial Standards and Resources

Ontario Heritage Tool Kit. Retrieved from: www.culture.gov.on.ca/english/heritage/Toolkit/toolkit.ht

Ontario Ministry of Tourism, Culture and Sport: *Heritage Conservation Principle's for Land Use Planning*. Retrieved from: www.culture.gov.on.ca/english/heritage/info_sheets/info_sheet_landuse_planning.htm

Ontario Ministry of Tourism, Culture and Sport: *Eight Guiding Principles in the Conservation of Historic Properties*. Retrieved from: www.culture.gov.on.ca/english/heritage/info_sheets/info_sheet_8principles.htm

Municipal Heritage Bridges Cultural, Heritage and Archaeological Resources Assessment Checklist (Revised April 11, 2014)

Ontario Heritage Act (2005)

Ontario Heritage Bridge Guidelines for Provincially Owned Bridges - Interim (2008)

Reference Guide on Physical and Cultural Heritage Resources (1996)

Guidelines for Preparing the Cultural Heritage Resource Component of Environmental Assessments (1992)

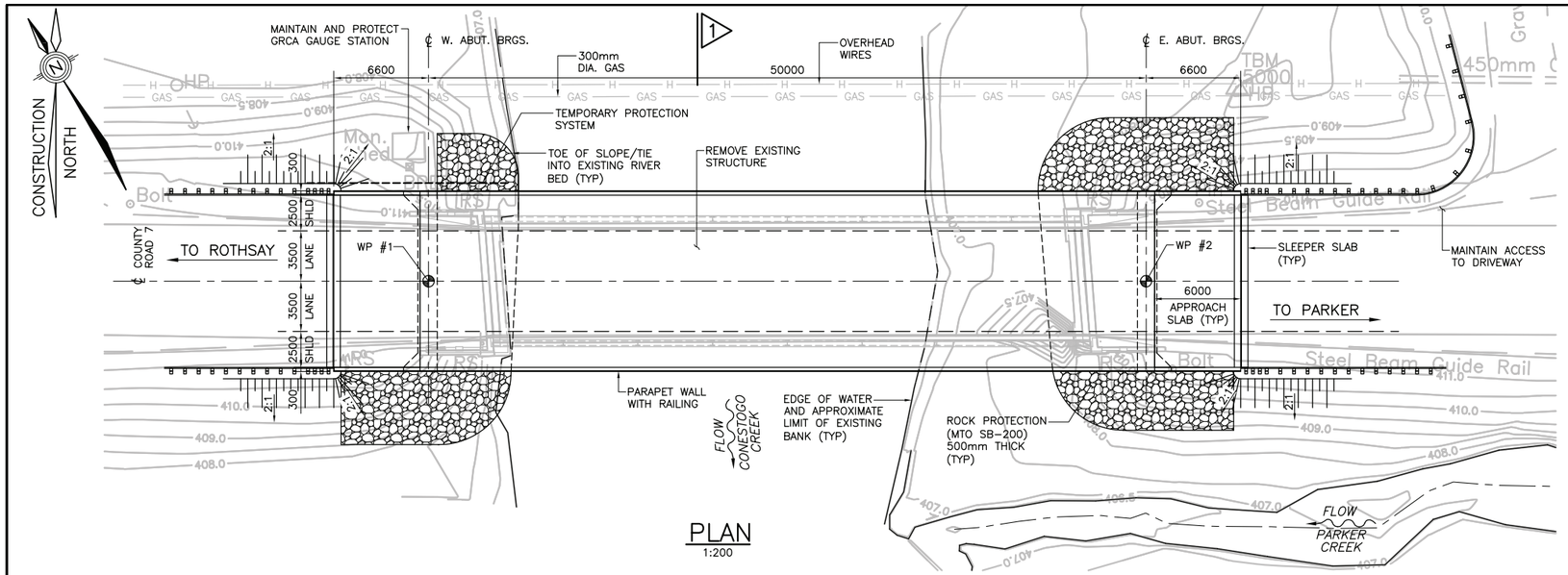
MTO Environmental Guide for Built Heritage and Cultural Heritage Landscapes (2007). Ontario Realty Corporation Heritage Management Process (2007)

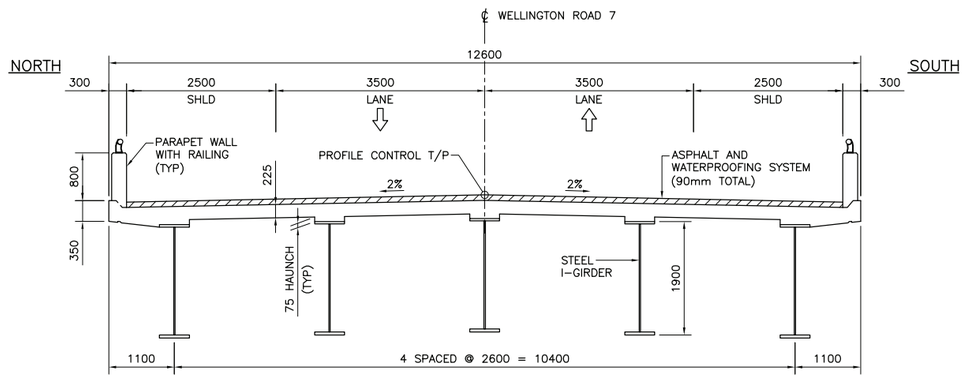
National and International Standards and Resources

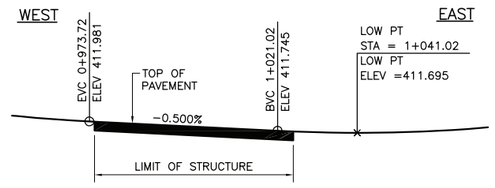
Parks Canada Standards and Guidelines for the Conservation of Historic Places in Canada. Retrieved from: www.pc.gc.ca/docs/pc/guide/nldclpc-sgchpc/index_E.asp

APPENDIX

A DEVELOPMENT PLAN







WORKING POINT DATA				
LOCATION	STATION (m)	NORTHING (m)	EASTING (m)	ELEVATION (m)
WP #1	0+975.000	4847869.0899	529177.2803	411.975
WP #2	1+025.000	4847844.4685	529220.7980	411.727

GENERAL NOTES:

DESIGN CODE:

CANADIAN HIGHWAY BRIDGE DESIGN CODE, CHBDC 2019 CAN/CSA S6-19
LIVE LOAD: CL-625-ONT

CLASS OF CONCRETE:

CLASS C-1 PER CSA 23.1
ALL CONCRETE UNLESS OTHERWISE NOTED 35MPa

CLEAR COVER TO REINFORCING STEEL:

DECK	
TOP	70 ± 20 mm
BOTTOM	40 ± 10 mm
REMAINDER, UNLESS OTHERWISE NOTED	70 ± 20 mm

REINFORCING STEEL:

1. REINFORCING STEEL SHALL BE GRADE 400W.
2. UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES FOR REINFORCING STEEL BARS SHALL BE CLASS B.
3. STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE A MINIMUM YIELD STRENGTH OF 500MPa, UNLESS OTHERWISE SPECIFIED.
4. BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS.
5. GLASS FIBRE REINFORCED POLYMER REINFORCING BARS SHALL BE GRADE I, GRADE II OR GRADE III AS SPECIFIED IN THE CONTRACT DRAWINGS. THE NOMINAL DIAMETER, TENSILE MODULUS OF ELASTICITY AND GUARANTEED MINIMUM TENSILE STRENGTH SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.
6. BAR MARKS WITH THE PREFIX G DENOTE GRADE IIII GLASS FIBRE REINFORCED POLYMER BARS (E=60GPa).
7. BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL STANDARD DRAWING SS12-1, UNLESS INDICATED OTHERWISE.

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL ESTABLISH THE BEARING SEAT ELEVATIONS BY DEDUCTING THE ACTUAL BEARING THICKNESSES FROM THE TOP OF BEARING ELEVATIONS. IF THE ACTUAL BEARING THICKNESSES ARE DIFFERENT FROM THOSE GIVEN IN THE DRAWINGS, THE CONTRACTOR SHALL ADJUST THE REINFORCING STEEL TO SUIT.
2. BACKFILL SHALL NOT BE PLACED BEHIND THE ABUTMENTS UNTIL THE DECK SLAB IS IN PLACE AND HAS REACHED 70% OF ITS DESIGN STRENGTH.
3. BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH ABUTMENTS KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 500 mm.
4. CONSTRUCT ABUTMENTS AND WINGWALLS TO THE BEARING SEAT ELEVATIONS. THE CONTRACTOR SHALL SUPPLY TEMPORARY LATERAL BRACING FOR THE ABUTMENTS. FORMWORK AND LATERAL BRACING SHALL NOT BE REMOVED UNTIL CONCRETE HAS REACHED 70% OF ITS SPECIFIED 28-DAY STRENGTH.
5. SUBDRAINS SHALL BE EXTENDED TO THE LIMIT OF GRADING FROM SLOPE TO SLOPE AND INSTALLED COMPLETE WITH RODENT GRATING (TYPICAL).
6. ROCK PROTECTION (MTO WB-200) TO BE PLACED TO A MINIMUM DEPTH OF 500mm AS SHOWN. WB-200 LAYER TO BE TOP DRESSED WITH A 100mm THICK LAYER OF TABLE A SUBSTRATE.

LIST OF DRAWINGS:

1. GENERAL ARRANGEMENT

LIST OF ABBREVIATIONS:

T/P – DENOTES TOP OF PAVEMENT
WL – DENOTES WATER LEVEL
WP – DENOTES WORKING POINT

APPLICABLE STANDARD DRAWINGS:

OPSD – 0219.130	HEAVY-DUTY SILT FENCE BARRIER
OPSD – 0219.180	STRAW BALE FLOW CHECK DAM
OPSD – 0219.240	DEWATERING TRAP
OPSD – 0219.260	TURBIDITY CURTAIN
OPSD – 0219.261	TURBIDITY CURTAIN, SEAM DETAIL
OPSD – 0912.430	GUIDE RAIL SYSTEM, STEEL BEAM STRUCTURE CONNECTION
OPSD – 3101.150	WALLS, ABUTMENT, BACKFILL MINIMUM GRANULAR REQUIREMENT
OPSD – 3102.100	WALLS, ABUTMENT, BACKFILL DRAIN
OPSD – 3190.100	WALLS, RETAINING AND ABUTMENT WALL DRAIN
OPSD – 3370.100	DECK, WATERPROOFING HOT APPLIED ASPHALT MEMBRANE WITH PROTECTION BOARD
OPSD – 3390.100	DECK DRIP CHANNEL
OPSD – 3419.100	BARRIERS AND RAILINGS STEEL GUIDE RAIL AND CHANNEL ANCHORAGE
OPSD – 3950.100	CONCRETE EXPANSION AND CONSTRUCTION JOINT ON STRUCTURE

METRIC
ALL DIMENSIONS SHOWN HERE ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

NO.	DESCRIPTION	DATE	INITIAL
	REVISIONS		

wsp

SCALE	AS SHOWN	DESIGNED	SH
DATE	JUNE, 2021	CHECKED	CM
DRAFTING	ZP		
CHECKED	SH		
FIELD BK.	PAGE	PROJECT	
BENCH M			

COUNTY OF WELLINGTON

REPLACEMENT OF BOSWORTH BRIDGE STRUCTURE NO. B007028

GENERAL ARRANGMENT

PROJECT NO.

DRAWING NO.

CAD FILE LOCATION AND NAME: S:\2020\20M-01326-00\300\S20M-01326-00-300-0010A.dwg
MODIFIED: 6/9/2021 11:26:39 AM BY: AWADC
DATE PLOTTED: 6/9/2021 11:28:43 AM BY: AWADC