CULTURAL HERITAGE EVALUATION
OLD BOOTH STREET BRIDGE, 9 FLEET STREET
OTTAWA, ONTARIO

Julie Harris

Contentworks Inc.

25 July 2019

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Property Identification

Municipality: City of Ottawa

Address: 9 Fleet Street

Owner: City of Ottawa

PIN: 041120111

Structure Name: Old Booth Street Bridge

Date of Construction: 1873

Date of Modifications: 1889 (widening to the east); before 1910 (widening to the west); 2017 (construction of the new Booth Street Bridge above)

Site Visit Date: 25 June 2019

Report Date: 23 July 2019

EXECUTIVE SUMMARY

This Cultural Heritage Evaluation Report (CHER) considers the heritage value of the Old Booth Street Bridge[1] (Figure 1 and Figure 2) constructed in 1873-4. The Old Booth Street Bridge is a closed-spandrel stone arch bridge with stone parapets. It crosses the old Ottawa aqueduct in the LeBreton Flats area of Ottawa, Ontario. It is located below the new Booth Street Bridge (Figure 3). The old bridge was widened twice by the City by the early 20th century. The property is part of a municipal heritage designation for the City Water Works Building on Fleet Street (By-law Number 22-82.)

The CHER written by Julie Harris[2], Contentworks Inc., for a Class EA required in advance of modifications to the Old Booth Street Bridge. The CHER evaluates the structure using the provincial guidelines for the heritage evaluation of bridges as a means of determining how the heritage value of the bridge might be affected by options under consideration concerning modifications to be the bridge. An evaluation using municipal criteria is not required since the bridge is already determined to be of heritage value under the *Ontario Heritage Act*.

The consultant's recommendations concerning the heritage value of the Booth Street are contained in Appendix B: Evaluation of the Old Booth Street Bridge using the Evaluation Criteria from the Ontario Heritage Bridge Guidelines. The consultant assessed the bridge as being "heritage" due to it receiving 78 points out of 100 using the Ontario Heritage Bridge Criteria. Appendix C is a draft Statement of Cultural Heritage Value (SCHV) for the Old Booth Street Bridge that supplements the City's draft SCHV for the broader property associated with the Ottawa Water Works at LeBreton Flats (Appendix D) and an existing SCHV for the Fleet Street Pumping Station (Appendix E).

Maps, drawings, plans and images are located in the Figures section at the end of this document and cross-referenced throughout the text.

A separate report, a Heritage Impact Assessment (HIA), has been prepared to assess four alternatives developed by Parsons for the City of Ottawa in April 2019 for modifying the Old Booth Street Bridge (Appendix F). The heritage assessment considers the options against the conservation guidance from the *Ontario Heritage Bridge Guidelines for Provincially Owned Bridges* and the *Standards and Guidelines for the Conservation of Historic Places in Canada.*

[1] Since a new bridge in the same location is also known as the Booth Street Bridge, this report names the subject bridge as the Old Booth Street Bridge for clarity purposes.

[2] Julie Harris, BA, M. Museum Studies, CAHP, has over 30 years of experience in heritage evaluation and historical research. She has been qualified as a witness in the field of heritage evaluation for the purposes of an OMB; served as a provincial appointee to the Conservation Review Board of Ontario; and conducted architectural histories for hundreds of buildings, engineering works and landscapes for various government clients.

1.0 INTRODUCTION

About the Project

The City of Ottawa is considering options for the renewal of the Old Booth Street Bridge either in its current configuration or as a narrower structure centred on the original arch dating from 1873-4 (Figure 4). Because the bridge is included on the Ontario Heritage Bridge List as a structure "considered to have cultural heritage value and worthy of conservation efforts"[3], the Ontario Ministry of Tourism, Culture & Sport requested an evaluation of the Cultural Heritage Evaluation Report (CHER) as part of a Class EA for proposed changes to the Old Booth Street Bridge. The CHER documents the bridge as a potential heritage resource using the criteria and report contents recommended in the Province of Ontario's *Ontario Heritage Bridge Guidelines for Provincially Owned Bridges* (2008). The criteria set for evaluations using the *Ontario Heritage Bridge Guidelines* attached here as Appendix A. The bridge is already a heritage structure through a municipal designation for the City Waterworks Building on Fleet Street (By-law Number 22-82.)

The Old Booth Street Bridge was originally constructed in 1873-4 to cross the open aqueduct that brought water from the Ottawa River to the Fleet Street pumping station (Figure 5). In the late 19th and early 20th century, the Old Booth Street Bridge was almost tripled in width with additions on the east and west sides (Figure 6 and Figure 7). Today, the Old Booth Street Bridge sits below the new Booth Street Bridge that spans the Confederation Line LRT tracks, the old Ottawa aqueduct (an open aqueduct) and the covered aqueduct that runs parallel to the old aqueduct to the north. The Old Booth Street Bridge is a relic, out-of-service structure that is visible from a multiuse trail and from the lower-level entrance of the new Pimisi LRT station (Figure 8 and Figure 9).

In its history, design and context, the Old Booth Street Bridge is connected with the Fleet Street Pumping Station, the work of Thomas Coltrin Keefer and the history of LeBreton Flats. It was constructed as part of Keefer's Ottawa Water Works project as one of a series of four arched bridges crossing the aqueduct (Figure 10). A fifth bridge for the water works, Pooley's Bridge (Figure 11), has a different history, as does a sixth bridge constructed for Canada Central Railway at the far end of the aqueduct (Figure 12). The Canada Central Railway Bridge is comprised of three independent but adjoining stone arch barrels of similar geometry and construction to the four Keefer bridges, including the Old Booth Street Bridge.[4]

[3] Ministry of Transportation, *Ontario Heritage Bridge Guidelines for Provincially Owned Bridge* (2008): 28. The list includes the Booth, Lloyd, Letter and Pooley's bridges, but not the Broad Street Bridge. The Broad Street Bridge was decommissioned prior to 2008.

[4] Barry Padolsky Architect Ltd. et al., *Ottawa Waterworks: The Aqueduct & Bridges at LeBreton* Flats, 1992. Prepared for Regional Municipality of Ottawa-Carleton, City of Ottawa and the National Capital Commission: 36.

The Old Booth Street Bridge was widened in two stages (Figure 6 and Figure 7) as LeBreton Flats grew in importance as a neighbourhood for transportation, industry, commerce and housing. Beginning in the 1960s, all buildings on LeBreton Flats were demolished as part of a major urban redevelopment project led by the National Capital Commission. Bridges and some roads were left intact for many years, but most civic infrastructure was removed or replaced with the exception of functioning and relic elements associated with the Ottawa Waterworks, including the bridges, pumping station and aqueduct. The Old Booth Street Bridge provided access for traffic and pedestrians traveling across the Chaudière Bridge between Gatineau and Ottawa (Figure 13).

Description of the Bridge

The Old Booth Street Bridge is located at 9 Fleet Street on a property parcel that includes part of the Ottawa's former open aqueduct (Figure 3). The bridge is composed of three stone arches covered in a concrete deck. The bridge is sided with stone parapets. The outside walls of the visible arches have stone facing in a traditional arch pattern with a keystone. The bridge is no longer in use. It sits below the new Booth Street Bridge at the lower north entrance of the new Pimisi LRT station.

The oldest portion of the Old Booth Street Bridge consists of a stone arch that was likely 7.5 m wide. It was designed in 1873 and completed in 1873 or 1874. A specification drawing for the bridge dated 1873 depicts the arch as being 30 feet (about 9 metres) wide between the parapets, but it is very possible that the bridge was not built exactly to specifications. The arch remaining from the original bridge was widened by 5.5 m to the east in 1889 and to the west by 5.5 m before 1910. It appears that materials from the original bridge were reused to face the widened bridge and rebuild the parapets.[5]

The widening of the Old Booth Street Bridge in 1889 was likely connected to the building of a broad arch to connect the Lloyd and Lett bridges for a crossing by the Canadian Atlantic Railway (later Grand Trunk) in 1885. Other types of traffic (by foot and cart) likely chose the Booth Street route which would have prompted the City to widen both Booth Street and the bridge. The second widening around 1910 was likely related to the new (1909-1911) covered aqueduct, which led to improvements of several road on LeBreton Flats (Figure 14).

Engineering inspections of the bridge show that the centre arch (the oldest portion) is in the best condition. The second oldest section (the east arch from 1889) is in better condition than the newest portion (the west arch, ca 1910). The parapet walls are leaning and the east wing wall has been partially deconstructed. The stones taken from the parapet have been retained on city property to the west of the bridge.

[5] Site visit discussions, 25 June 2019, and City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct (SN017030) – Condition Assessment and Renewal Options Analysis Report* (February 2018): i.

2.0 HISTORY

The Old Booth Street Bridge is associated with the history of the Ottawa Water Works the engineering legacy of Thomas C. Keefer and the history of LeBreton Flats.

Ottawa Water Works

The Ottawa Water Works is an early Canadian example of municipal water works system that is distinguished by its age and by the survival of the full set of its key physical elements (Figure 15), namely, its pumping station, aqueduct and bridges.

Prior to the installation of water systems, urban residents accessed water through wells on private land or on public streets, or by hauling water from a pond, river or creek.[6] In Ottawa, water was initially supplied to Barrack's Hill (now Parliament Hill) from the river by hand cart. Until 1875, when the Ottawa Water Works began delivering piped water to many streets, a thriving enterprise of water carriers served households and firefighting. Residents could also draw water from a well that was drilled to serve Lower Town and a second well drilled in 1840 at Kent and Wellington streets to serve Upper Town.[7] Well-to-do people often chose to buy spring water from private sellers. Carlsbad Springs was a popular local source of mineral water for Ottawa residents.

In the 1850s, the City of Ottawa began a long process of determining options to replace wells with a piped system that could serve a growing population, reduce sources of contamination, and be available for fire fighting. The City of Ottawa had the foresight to hire Thomas Coltrin Keefer, perhaps Canada's most important civil engineer, to lead its plan for a modern waterworks system. His first plan was outlined in 1859 when only six water supply systems existed in British North America.[8] Keefer's revised plan was finally approved by Ottawa City Council in 1872, commissioned for operation in 1874, and fully completed in 1875.[9] The City of Ottawa was very proud of its water system, which it described as the "best and most perfect system in either Europe or America."[10] With expansions, upgrades and technological changes, Keefer's project outlined in 1859 remains a component in Ottawa's clean water supply 148 years later.

The Old Booth Bridge is a surviving component in the original Ottawa Water Works system. It was constructed to Keefer's designs and specifications to cross the aqueduct that drew water

[6] A succinct and reliable history of Canadian water supply systems is: Letty Anderson, "Water-Supply," in *Building Canada: A History of Public Works* (Toronto: University of Toronto Press, 1988): 195-220.
[7] Lucien Brault, *Ottawa Old & New* (1946): 112.
[8] Padolsky, *Ottawa Waterworks*: 9.
[9] Padolsky, *Ottawa Waterworks*: 12
[10] *Guide to the City of Ottawa and Dominion Exhibition, 1879 : with official programme and full particulars of grand civic demonstration, sports, &c, to be held in Ottawa, September 22nd, 23rd, 24th, 25th, and 26th* (Ottawa: [1879]): 17.

from the Ottawa River to the waterworks building on Fleet Street. Three other bridges were constructed to cross the aqueduct at Lloyd, Lett and Broad streets. A fifth bridge (Pooley's Bridge) was rebuilt in stone in 1873 to cross a gully and tailrace to the north of the new pumping station. Pooley's Bridge is connected to the waterworks in history and function, but it was designed by the City's Engineer, George Hugo Perry, rather than by Keefer. Pooley's Bridge was designated by the City of Ottawa as a heritage property through Bylaw 65-95.

The design of the Ottawa Waterworks aqueduct was dictated by the need to establish a clean source of water, the volume of water to pump, and managing the effects of ice.[11] To collect the large volume of clean water needed, a clean water intake pipe was laid several hundred feet into Nepean Bay, bypassing land pollution and the sawmill refuse in the river.[12] Keefer designed the Ottawa Waterworks for hydraulic power, which was cheaper than steam due to energy that could be drawn from the drop in the Ottawa River at the Chaudière Falls.

A central and critical component in Keefer's design was the Ottawa aqueduct. Keefer proposed a channel that was 10 feet deep and 12 feet wide to supply pumps with 800 horsepower of water power. The initial system was designed to pump 2.5 million gallons of water per day.[13] The narrow channel was also designed to reduce the potential for various forms of ice to damage racks and turbines.[14]

The final location of the aqueduct on LeBreton Flats was chosen from options that included routes along Victoria and Amelia islands, Oregon Street, Queen Street and the gully. The selected gully route "followed a natural depression through which the Ottawa River flowed during times of high water. A reserve of land of sufficient width and unoccupied by buildings was available for development."[15] An estimated 30,710 cubic yards (23,479 cubic meters) of material[16] was excavated for the aqueduct in the gully that served both as a means to bring water in to power the waterworks and to hold the clean-water intake pipe.

A headworks structure (not extant) at the entrance to the aqueduct regulated the flow of water drawn from the Ottawa River's Nepean Bay, above the Chaudière Falls. Below the railway bridge, a valve house was built into the aqueduct.[17] The Aqueduct, a channel 3600 feet long (1097 m) with vertical sides, cut through bedrock, connected the headworks to the pumphouse forebay. The embankment was raised to prevent floodwaters entering the channel, to avoid both contamination during high water season, and to avoid interruption of work. The embankment slope was laid with large rocks. The clean-water pipe was comprised of a wood-stave, 30-inch

[11] Padolsky, *Ottawa Waterworks*: 17.
[12] Padolsky, *Ottawa Waterworks*: 17.
[13] Padolsky, *Ottawa Waterworks*: 18; Keefer, *Report of Water Supply*, 1869; Greene, *Water Works Committee Report*, 1871; Perry, *Water Works Committee Report*, 1871.
[14] Padolsky, *Ottawa* Waterworks: 17.
[15] Padolsky, *Ottawa* Waterworks: 18; Keefer, *Report of Water Supply*, 1869.
[16] Padolsky, *Ottawa* Waterworks: 18.
[17] The stonework of the aqueduct clearly shows where the stop valve was located.

water pipe laid at the bottom of the channel and extending several hundred feet out in deep water in Nepean Bay. The Aqueduct Channel has "undergone only minimal alterations in response to changes in technology and the impact of neighbouring activities", since its construction.[18]

To maintain access for workers and residents from the south side of the aqueduct to the industrial areas to the north, the contract for the Ottawa Waterworks included the construction of four stone bridges that crossed the aqueduct at Broad Street, Booth Street (formerly Bridge Street), Lloyd Street, and Lett Street (formerly Cathcart Street). A single vaulted stone structure carried the Canada Central Railway lines across the most westerly part of the channel. A stone bridge at the tail race, Pooley's Bridge, was constructed in advance of the works to connect Queen Street (now Fleet Street) to Wellington Street. Construction proceeded very quickly, with the pumping station in commission in 1874 and the first tap opened in 1875. The stone bridges were completed in 1874. A second aqueduct was constructed in 1909-11 that was enclosed in a concrete vault along Ottawa Street. A deadly typhoid epidemic in 1911-1912 from polluted water prompted a major expansion to the system that included a pumping station built on Lemieux Island in 1915, along with a bridge to carry the pipes to the mainland. Between 1929 and 1932 a rapid sand water purification plant was constructed.

The construction of the Ottawa Waterworks was prompted by three concerns – more potable water to keep up with the needs of a growing city; clean water free of disease, especially typhoid; and more water available for fighting fire. The aqueduct, pumphouse, bridges and other waterworks infrastructure, and their subsequent updates, were constructed to address these needs and were essential to Ottawa's development as a city.

Engineering Legacy of Thomas C. Keefer (1821-1915)

Thomas C. Keefer[19] is recognized as one of the leading engineers of his era. He received a Legion of Honour Medal and a CMG (Companion, Order of St. Michael and St. George) from Queen Victoria for extraordinary and important services in the Commonwealth, which included work on the Erie and Welland canals, works on the St. Lawrence and Ottawa rivers, the Victoria Bridge in Montréal, waterworks for Hamilton, Montréal, Ottawa and Peterborough, and the redesign of waterworks for Halifax and Toronto.

> *The [Ottawa] aqueduct survives as one of the last vestiges of Keefer's enormous contribution to engineering systems in Canada. The intricate design of surviving features is a testament to the pride and integrity that went into early public works. Next to his written words, the bridges represent the moment in time and design of the mind of a technological dreamer.*[20]

[18] Padolsky, *Ottawa Waterworks*: 43, 50.
[19] H. V. Nelles, "Keefer, Thomas Coltrin," *Dictionary of Canadian Biography*, vol. 14, University of Toronto/Université Laval, 2003, accessed July 21, 2019, www.biographi.ca/en/bio/keefer_thomas_coltrin_14E.html.
[20] Padolsky, *Ottawa Waterworks*: 14

Keefer spent a major portion of his professional life in Ottawa after marrying Elizabeth McKey, the daughter of Thomas McKay, one of Bytown's wealthiest men. He designed hydraulic powered waterworks for Montréal and Ottawa, and steam powered works for Hamilton. He was the founding president of the Canadian Society of Civil Engineers in 1887, and was the first Canadian to become president of the American Society of Civil Engineers. Keefer was also a prolific author and promoter of Canadian industry and development.

LeBreton Flats

LeBreton Flats has a long history (at least 8,000 years) of use by Indigenous Peoples and a much shorter history as a site of industrial, transportation and residential development. The Algonquin presence was clear to newcomers, as testimony in both written and oral records demonstrates. While the area's clearing and redevelopment has erased the original forested landscape, a sense of a place connected to its ancient history remains strong due to its location near Chaudière Falls. While the Old Booth Street Bridge is located within the surviving Indigenous cultural landscape that has been documented through archaeology and historical accounts by Algonquin People and newcomers, no direct connections between the bridge and Indigenous history have been identified to date.[21]

LeBreton Flats' period of intense development as a civic space for industrial, transportation, commercial and residential uses began in the mid 1800s and ended abruptly in the early 1960s with the clearing of the Flats for redevelopment by the federal government. The Old Booth Street Bridge attests to the history of LeBreton Flats as a busy industrial hub in a number of ways. It was one of multiple crossing points for the aqueduct, including similar bridges at Lett Street, Lloyd Street, and Broad Street, indicating the amount of traffic to the area. All the bridges were widened or changed to accommodated development. The Broad Street Bridge was widened in 1897 to accommodate industrial traffic and the addition of double tracks for the Electric Railway Company.[22] The Lloyd and Lett bridges were joined by a broad arch for a railway crossing, and the Old Booth Street Bridge was widened twice.

Following the 1962 expropriation and demolition of the neighbourhood of LeBreton Flats by the National Capital Commission, the bridges and road surfaces remained as some of the only indicators of the area's industrial and residential history. The Booth Street Bridge, in particular, is one of the only pieces of original infrastructure that continued to be in use until very recently (2017). The Broad Street Bridge was used for light traffic until the late 1980s.

[21] The author of this report reviewed various documents and maps and could not find a direct connection but no information was sought directly from the Algonquins of Ontario or other Indigenous organizations or individuals.

[22] *Evening Journal* (Ottawa), Thursday, 28 October 1897 and the *Ottawa Journal,* Tuesday 9 November 1897.

3.0 DESIGN

History of Construction

The Old Booth Street Bridge is constructed of grey, roughly dressed stone with courses laid in a brick bond pattern on the closed spandrels and parapets. The voussoirs and facing stones at the same level as the arch are slightly larger than those of the parapet wall above. A string course of finely dressed stone runs at the level of the roadway. The cap of the parapet is similarly dressed. The parapets are terminated by wing walls. A large portion of the parapet of the east elevation was removed, likely to remove debris and stabilize the parapet, during the construction of the new bridge above.[23] The expansion of the Old Booth Street Bridge in phases is visible on its underside by the presence of three arches.

The earliest representation of the Old Booth Street Bridge is a specification drawing prepared by the Ottawa Waterworks engineer Thomas C. Keefer (Figure 4). It called for a classically inspired stone arch bridge with a single arch specified as 14 feet (4.27 m) in radius. The bridge was to be 26 feet (7.92 m) long between the stone abutments and 30 feet (9.14 m) wide between the stone parapets. The stone arch was to be filled to level with stone filling. The coursed-stone parapets were to be 2 feet 9 inches (0.84 m) in height above the deck plus a cap of 6 inches (0.15 m), with concrete used for the top rail, a moulded band along the base of the parapet and caps. The parapet was pitched with the highest point in the centre above the arch keystone.

The earliest photograph located of the Old Booth Street Bridge dates from 1903 (Figure 16). It depicts a structure almost identical to the structure as it appeared in 1968 (Figure 17), being 8 courses of stone above the string course at the top of the arch and the stone cap. It cannot be determined from the photographs if the sections specified to be built of concrete in the 1873 plan may have been rendered in stone. Other differences between the specification drawing from 1873 and the 1903 photograph (which only shows the east parapet and the arch) are also visible in a photograph of the Lett Street Bridge in 1903 (Figure 18). They include: a straight string course at the level of the roadway and top of the arch, rather than a slightly pitched stringcourse that rises to meet the top of the arch; a straight horizontal cap on the parapet rather than a pitched parapet; and a broader arch.

The exact dates of the widening of the Old Booth Street Bridge have not been confirmed.[24] The Ottawa Fire Insurance Plan of 1878 depicts the Old Booth Street Bridge as being about half the width of Bridge Street (now Booth) (Figure 19). The same configuration is shown on a map from

[23] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*. Photos 1-2.

[24] The author of this report consulted online newspapers and annual reports of the City of Ottawa available at the City of Ottawa Archives, as well as many other sources that might have included information about the bridge. The Ottawa Water Works were owned by the City, which was fully responsible for the maintenance of the Old Booth Street Bridge throughout its history. Many early records of the City of Ottawa were destroyed in the 1931 fire that engulfed Ottawa's former city hall.

1887 (Figure 20). In 1889, however, it appears that the Old Booth Street Bridge may have been widened as part of a larger project undertaken by the City of Ottawa to improve Booth Street.[25] The contractor cited in the newspaper was W[illiam] J. Loughran (also spelled Laughren) who is listed in the Ottawa city directory of that year as a contractor.

A map describing the extent of the great fire of 1900 (Figure 21) that destroyed most of LeBreton Flats and areas south as far as the Central Experimental Farm depicts the Old Booth Bridge as the narrow structure. After this map, the chronology becomes uncertain for almost two decades. The 1901 Fire Insurance Plan (Figure 10) shows the bridge at its current width (almost twice as wide as the original drawing), while a later map from 1906 shows a narrow bridge with an extension on the east side (Figure 22). As per an engineering report about the bridge, "It is conceivable that the east extension and watermain under the [east] structure were actually constructed immediately after the 1900 'Great Fire' in order to facilitate easier access to the completely destroyed LeBreton Flats as it was being reconstructed as well as to improve the fire protection."[26]

At some point, possibly as part of the construction of the covered aqueduct in 1910-11, the Old Booth Street Bridge was widened to its current width of 20.1 m (65.94 feet), as shown in a 1928 aerial view (Figure 23). In its current configuration, the bridge has an overall length of 14.8 m and a clear span (length of the opening) of 10.1 m.

The original section of the bridge was 9 m (29.53 feet) wide between the parapets. It was left in place with two arches built on either side. Each arch is 5.5 m in width and slightly askew to better match the angle of the road and the aqueduct below. The inside width of the bridge deck between the parapets matched the width of Booth Street before the sections on either side of the aqueduct were removed for the building of the LRT line and the new Booth Street Bridge.

In 1968, the National Capital Commission completed an engineering assessment of the aqueduct structures on LeBreton Flats. The engineering firm hired for the inspection concluded that "the four structures [Lloyd, Lett, Booth and Broad Street bridges] are adequate to carry proposed crossings of roads and services, provided that these crossings are made at grade."[27] The report also noted that the Booth Street Bridge was of inadequate width for a proposed road scheme planned for implementation in 1972 as part of a plan to move the Department of Defense headquarters to LeBreton Flats. The inspection did not include a structural analysis because the bridges could not be considered for use in the 1972 scheme.

With respect to the Old Booth Street Bridge, the 1968 report stated:

> The structure in general appears to be in very good condition … Minor deterioration of

[25] *Evening Journal* (Ottawa), 9 August 1889: 1.
[26] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct:* 2.
[27] National Capital Commission/M.M. Dillon Limited, *Report on the Structural Inspection of the Ottawa Street Aqueduct Arch and the Bridges over the Open Aqueduct, LeBreton Flats, National Capital Commission*, 1968: 2.

> the footings had occurred at the south west corner where some of the masonry appeared to be loose and the mortar cracked.
>
> A steel or case iron line of approximately 30 inch diameter is imbedded in the underside of the arch and crosses the aqueduct. …. It is possibly a casing for the 16 inch diameter water main running under Booth Street.[28]

For nearly 50 years after this assessment, the Old Booth Street Bridge continued to be used as a traffic bridge (Figure 13 and Figure 24).

Current State

Today, the Old Booth Street Bridge is a single span masonry arch over the aqueduct. The faces of the arch, with the exception of the voussoir stones, are likely to have been reused following the two widenings of the bridge. Test pit excavations in 2009 did not locate any previous spandrel walls.[29] It is very likely, but not certain, that the parapets were rebuilt using original materials each time the bridge was widened – first on the east and then on the west. Stone masons were often directed to reuse stone.

A condition assessment in 2018 by WSP Inc. (engineers) reported that the bridge had "serious structural and material issues" and that the "centre arch is in better condition than the extensions, with the east extension in better condition than the west extension." [30] The report also stated that:

> In addition to the expected deterioration due to the age and exposure of the material components of the structure (stones and mortar), the exterior faces of the structure are leaning progressively outward and most pronounced in proximity of the centre of the span. The extension to the east and west also exhibit downward deformation associated with loss of mortar between the stones, closing of joints and deterioration of stones and loss of integrity of the structural matrix at the "spring line" location where the maximum thrust from the arch is exerted. This combined with the possibly of some issues during construction of widening resulted now in subsidence of the exterior arches and some nominal loss of shape. Similar deformations but to a lesser degree were noted in the east face.[31]

Further issues with the bridge arches are noted in the report, including the removal of voussoir stones in the east side extension, cracked stones, and cracks in the spandrel walls. The stone parapet walls are leaning outward towards the aqueduct (Figure 25), and the west wall has

[28] National Capital Commission/M.M. Dillon Limited, *Report on the Structural Inspection of the Ottawa Street Aqueduct Arch and the Bridges*: 11.
[29] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*: 3.
[30] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*: i.
[31] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*: i.

"severe" sagging in the middle (Figure 8).[32]

The 2018 engineering study was inconclusive about whether stones or concrete from the original bridge were used to face the arches or rebuild the parapets of the widened bridge.[33]

Other changes to the bridge, in addition to the east and west arches, have included:

- Repointing
- Partial deconstruction and storage of stones from the east parapet wall in 2016[34]
- Installation of a gas main under the bridge
- Installation of a water main in the east arch (Figure 26)
- Stabilization of the structure by installing reinforced concrete abutments under the structure in 1997

Other Stone Bridges in Ontario and Ottawa

Newcomers to the Ottawa area in the early 19th century brought bridge-building skills with them, but they were generally preoccupied with practical concerns about river crossings, rather than creating lasting infrastructure. Cheap and efficient methods for fixed crossings included flat timber boards laid over piles or a series of queen or king post trusses on wooden piers. Around 1850, more elaborate wooden bridges using new truss designs were constructed for railway crossings. Many railway bridges used wrought iron trusses to reduce the risk of fire in urban areas from the 1860s to the 1880s, when steel became a practical option for bridges. The first reinforced concrete arch bridge appeared in Ontario in 1906.

Stone bridges were relatively rare in Ontario due to the required time, money and skill.[35] The Rideau Canal, for example, did not include a stone bridge in spite of the generous use of stone for canal structures, such as dams and lock walls. Built c 1856-7, the Lyndhurst Bridge (Figure 27) is reported to be Ontario's oldest stone bridge. It is a three-span stone arch bridge designed by John Roddick and built by Miles Fulford and Simon Ransom.[36] The Glen Morris Road Bridge (Figure 28) in the Township of South Dumfries was constructed circa 1854 by the Great Western Railway Company to link Harrisburg with Galt.[37] The Blair Stone Arch (Figure 29) is an abandoned stone masonry arch bridge located in the City of Cambridge. It may date to the first half of the 19th century.[38] Gow's Bridge in Guelph, Ontario, built in 1897, is designated as a

[32] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*: 6.
[33] City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*: 3.
[34] The City of Ottawa retains a drawing of the dismantling of the stone wall by McCormick Rankin. See: City of Ottawa/WSP, *Booth Street Bridge over Open Aqueduct*: 3.
[35] Stephen Robinson and Tracie Seedhouse. *Grand Old Bridges: The Grand River Watershed Bridge Inventory* ([Cambridge, Ont.]: Robinson Heritage Consulting, 2004): 7.
[36] www.ontariobeneathourfeet.com/lyndhurst-bridge.
[37] Stephen Robinson and Tracie Seedhouse. *Grand Old Bridges*: 52-53.
[38] Stephen Robinson and Tracie Seedhouse. *Grand Old Bridges*: 118-9.

heritage property by the City of Guelph.[39] The two-arch bridge is constructed of locally quarried limestone construction with low stone walls and stone piers. The Church Street Bridge (Figure 30) is one of two surviving stone bridges in the Town of St. Mary's. It was constructed in 1884 to replace an earlier wooden bridge at the same location. It was built using designs by local architect William Williams.[40] Closer to Ottawa, the Pakenham Stone Arch Bridge was constructed in 1903 and strengthened with concrete in 1984 (Figure 31).

Five stone-arch bridges are extant in Ottawa; all of them are associated with the Ottawa Water Works – the Pooley's, Lett Street, Lloyd Street, Old Booth Street and Broad Street bridges.

[39] "Gow's Bridge," *Register of Historic Places in Canada*, online at: www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=5518&pid=0.
[40] "Church Street Bridge," *Register of Historic Places in Canada*, online at: www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=13972&pid=0.

4.0 ENVIRONMENT

The immediate setting of the bridge has evolved and changed in multiple ways since the 1870s. The area was transformed in the last decades of the 19th century with the influx of industry, railways and homes, including the covering of a part of the aqueduct between Lett and Lloyd streets to provide for Canada Atlantic Railway tracks.[41] The area was all but destroyed in the great fire of 1900, but was quickly rebuilt with a greater emphasis on industry, warehousing and transportation (Figure 32). Many people never moved back after the fire. Finally, in the 1960s, almost everything associated with the area's industrial, transportation, commercial and residential history was removed as part of the clearing of LeBreton Flats by the National Capital Commission for redevelopment. Buildings were demolished, roads and sidewalks were left to disintegrate, railway tracks were removed, contaminated soil was taken away, and the aqueduct grew wilder as vegetation took root along its banks. In 1992 the original open aqueduct was described as, "a mere shadow of its former self", but "still a vibrant green space with significant potential as a scenic vista and quiet environment within a planned urban development."[42] The Old Booth Street Bridge was left intact to serve as a primary route from Ottawa to Gatineau along Booth Street. The other bridges, with the exception of Pooley's Bridge, were largely abandoned.

Today, the Old Booth Street Bridge sits immediately below the new Booth Street Bridge on the north side of the Pimisi LRT station. The new LRT tracks parallel the aqueduct until it turns north near the pumping station. Most of the land to the north of the aqueduct and west of Booth Street remains undeveloped. Within LeBreton Flats the extant pumping station, which has been rehabilitated and continues in operation, five bridges and the 756-metre[43] aqueduct remain. While the Old Booth Street Bridge is currently hidden from view, the opening of the Pimisi LRT station and a multiuse path along the south side of the aqueduct will bring it back into view, albeit within a new context (Figure 33). Views to and from the Old Booth Street Bridge along the aqueduct and between the bridges over the aqueduct will not be impaired. A list of extant heritage elements associated with the Ottawa Water Works is included in the Draft Statement of Cultural Heritage Value for Ottawa Water Works at LeBreton Flats (Appendix E).

[41] Padolsky, *Ottawa Waterworks*: 20.
[42] Padolsky, *Ottawa Waterworks*: 7.
[43] City of Ottawa and Robinson Consultants, "City of Ottawa's Lemieux Island Transmission Main Replacement Program, Low and High Pressure Transmission Mains," [2015]. Online at: https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&ved=2ahUKEwjb5Z6p2cnjAhVnRN8KHbjiBswQFjAEegQIABAC&url=http%3A%2F%2Fwww.bv.transports.gouv.qc.ca%2Fmono%2F0980426%2F33_History_dictates_design_diameter_transmission_main.ppt&usg=AOvVaw3vG1-z9pliah2BoNjTPsQh.

5.0 HERITAGE RECOGNITIONS

The Old Booth Street Bridge is including in the boundaries of the property designated under By-law Number 22-82 for the "City Waterworks Building on Fleet Street." The existing Statement of Cultural Heritage Value and a draft for a new statement are included as Appendix D and Appendix E.

The historic Ottawa Water Works were also recognized as an American Water Works Association Canadian Waterworks Landmark in 1981.[44]

[44] American Water Works Association, "Water Landmarks Award," online at: www.awwa.org/Membership-Volunteering/Awards/Water-Landmarks-Award.

6.0 SOURCES

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[Smythe, Robert], "Eels under Fleet Street (E-E-E!!!)," *Urbsite*, online at: http://urbsite.blogspot.com/2012/08/eels-under-fleet-street-e-e-e.html.

Susan M. Ross, "Waterpower, the Lachine Canal, and the Industrial Development of Montreal," *IA. The Journal of the Society for Industrial Archeology*, Vol. 29, No. 1, (2003): 49-64.

Ontario Heritage Trust, "Fleet Street Pumping Station," online at www.heritagetrust.on.ca/en/properties/fleet-street-pumping-station. The Fleet Street Pumping Station building is subject to an Ontario Heritage Trust heritage easement secured with the City of Ottawa in 1983.

7.0 FIGURES

Figure 1: West arch and parapet of the Old Booth Street Bridge, March 2019. Source: Parsons.

Figure 2: East arch and parapet of the Old Booth Street Bridge, March 2019. Source: Parsons.

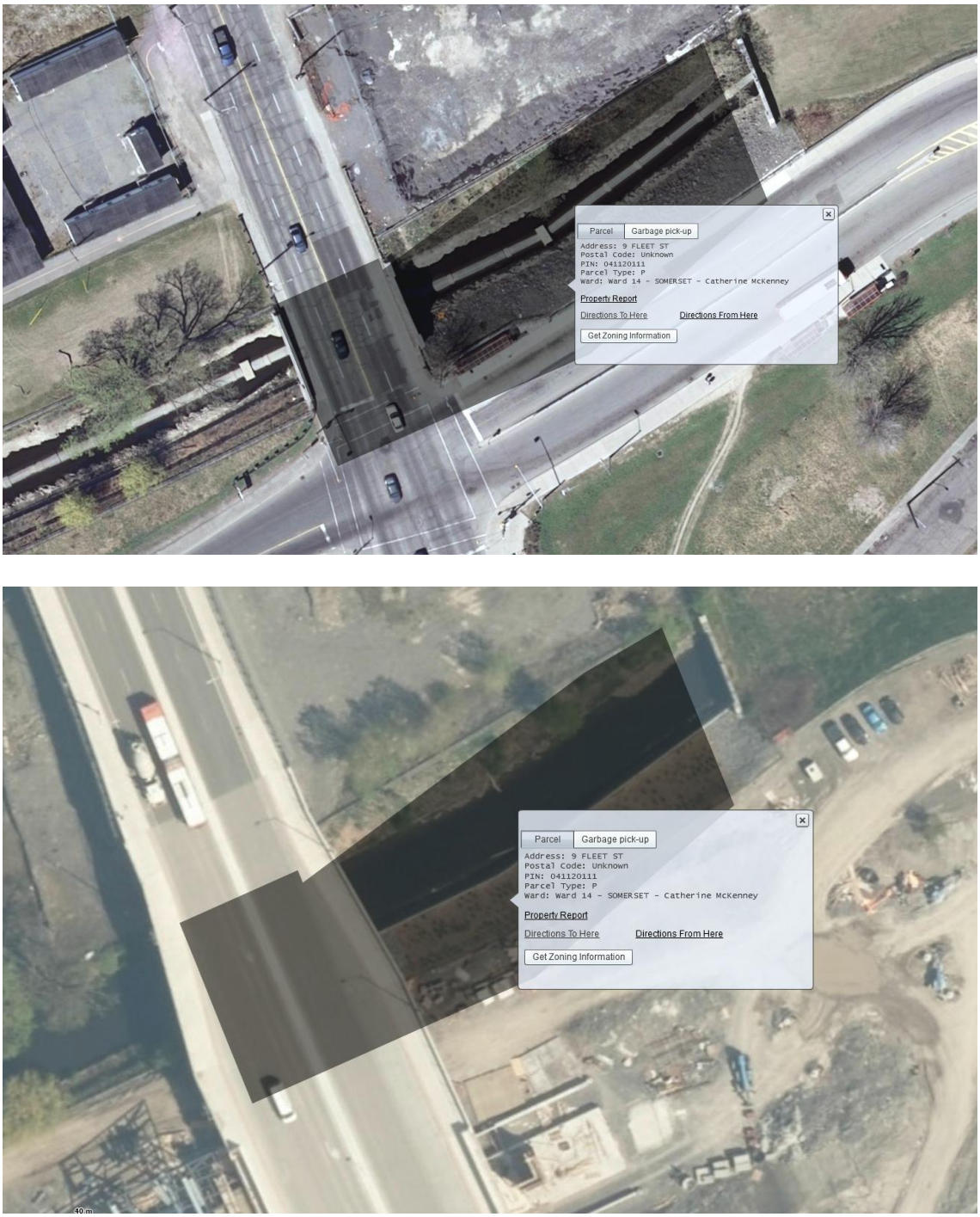


Figure 3: GeoOttawa property boundaries. Old Booth Street Bridge, 2007 (top) and current Booth Street Bridge located above the old bridge, 2017 (bottom). Source: GeoOttawa, retrieved online on 5 July 2019.

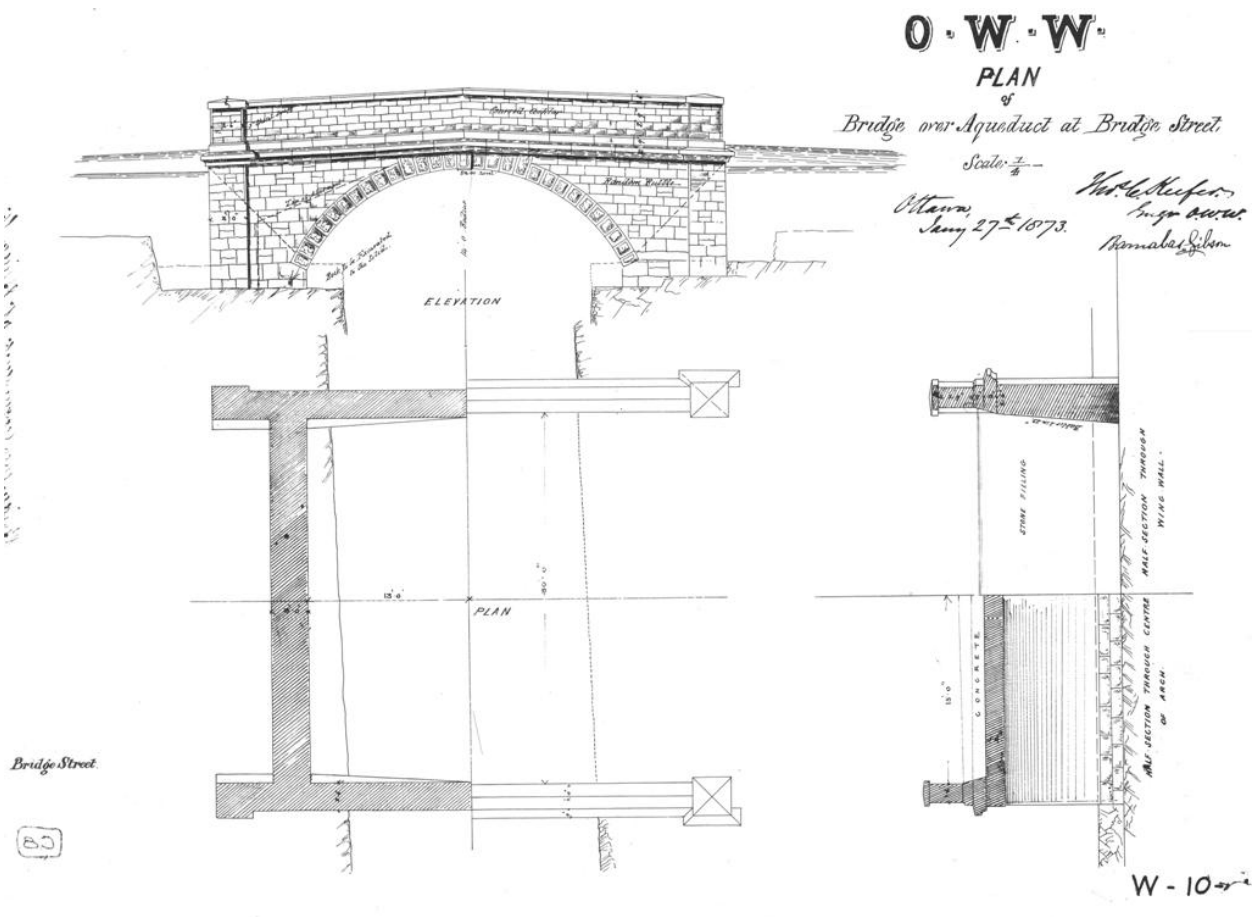


Figure 4: [Ottawa Water Works] Plan for Bridge over Aqueduct at Bridge Street, signed Thomas C. Keefer Engineer, OWW, and Barnabas Gibson??, dated January 27th, 1873. Source: Copy located in the records of Barry Padolsky, Architects. Original source location undetermined.

Figure 5: Fleet Street Pumping Station, originally designed as a one-storey limestone masonry building by Thomas C. Keefer. Pumping capacity was increased in 1888 when new machinery was installed in an addition designed by architect E.L. Horwood, who also replaced the original mansard roof with a second storey. Source: James R. Skinner/Wikipedia, 2006, https://en.wikipedia.org/wiki/Fleet_Street_Pumping_Station#/media/File:FleetStreetPumpingStation.png.

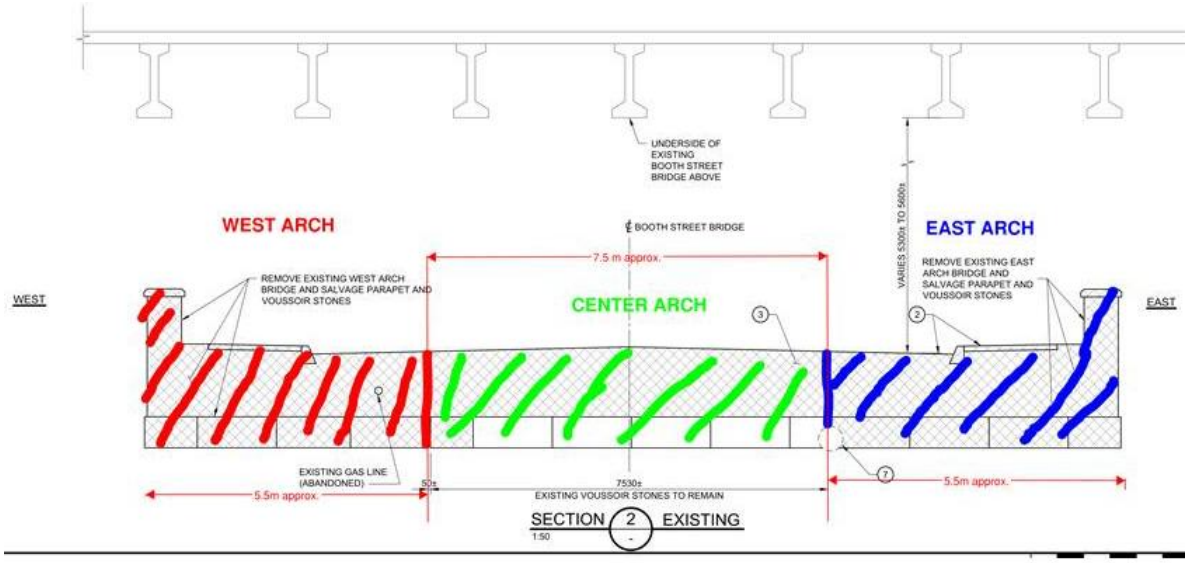


Figure 6: Annotated version of the General Arrangement of the Booth Street Bridge prepared by Parsons. Drawing revised 21 May 2019. Source: Parsons.

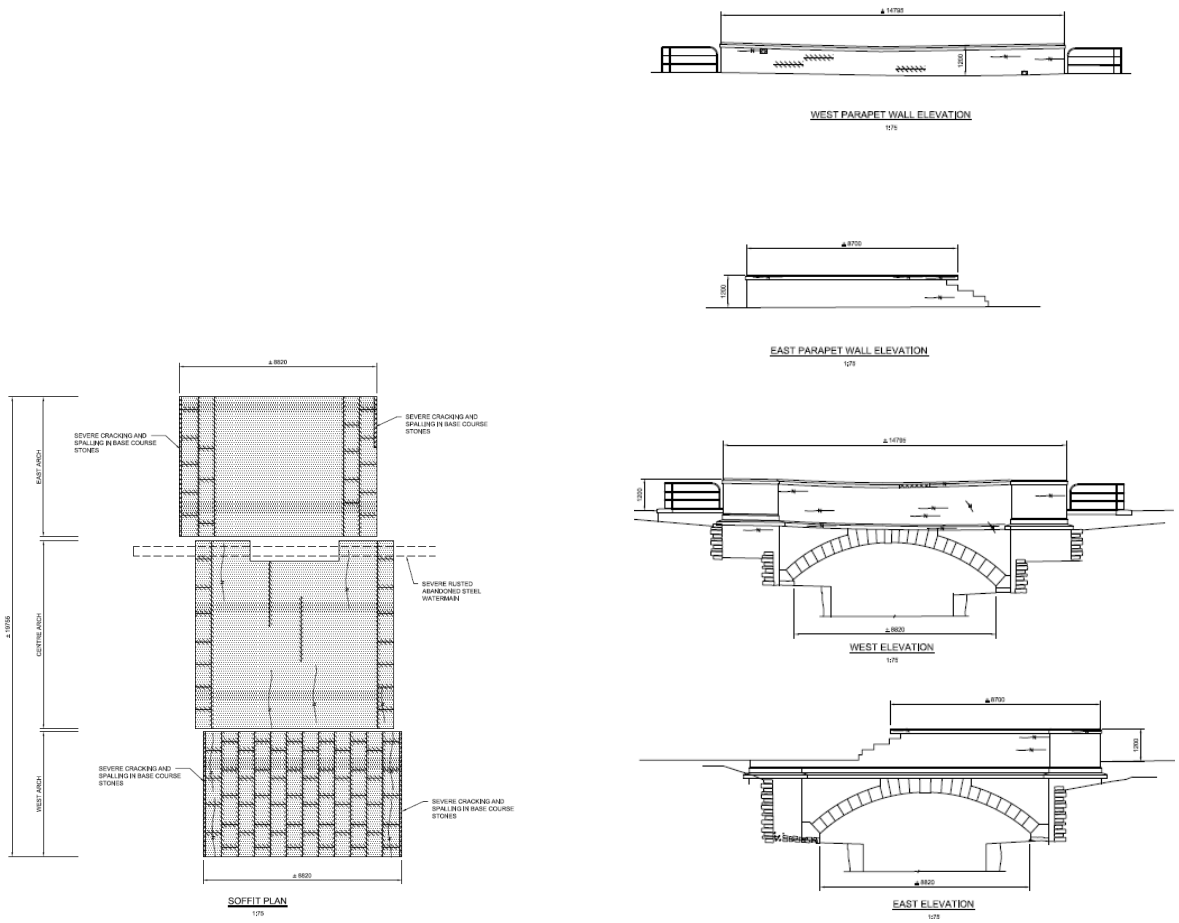


Figure 7: Plan view (left) and elevation views (right) of the existing conditions of the Old Booth Street Bridge showing cracks, moss of mortar, erosion, etc. Source: City of Ottawa/WSP, Booth Street Bridge over Open Aqueduct (SN017030: Condition Assessment and Renewal Options Analysis Report, February 2019 (Final), Dwg. No. 03.)

Figure 8: Looking south from Old Booth Street towards the new Pimisi LRT station, June 2019. Source: Contentworks.

Figure 9: Looking north from Old Booth Street Bridge towards a pier supporting the new Booth Street Bridge, June 2019. Source: Contentworks.

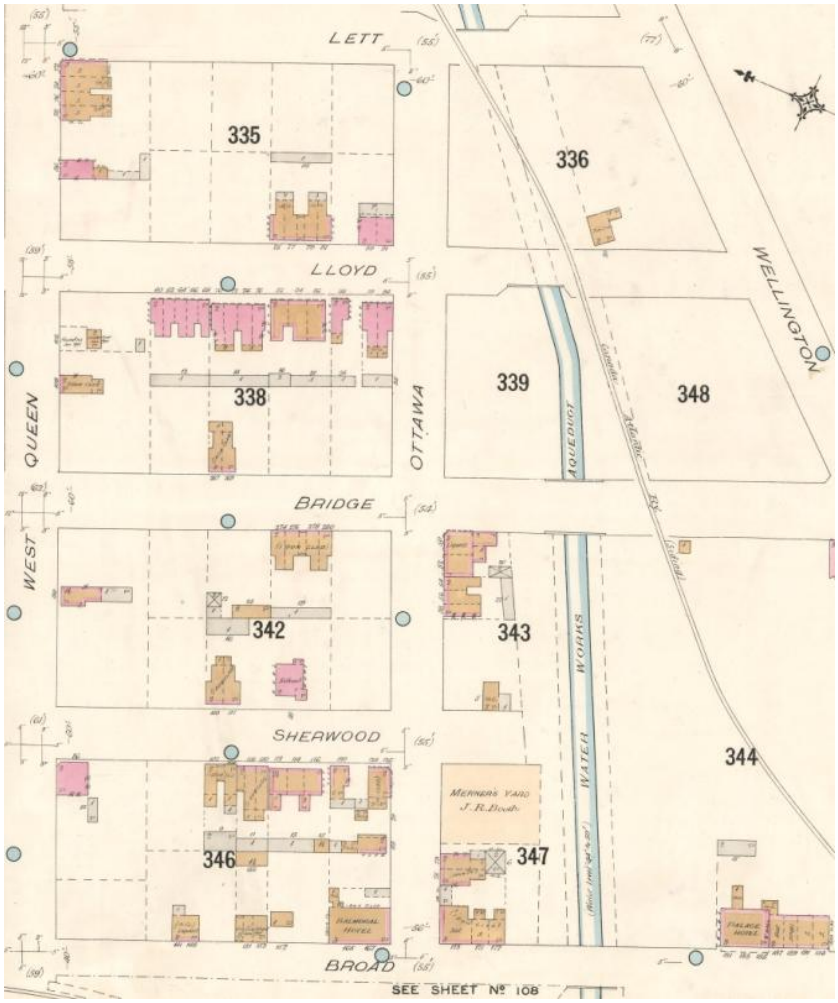


**Figure 10: Fire Insurance Plan, 1888 revised to 1901, detail showing the Old Booth Street Bridge. The bridge is depicted as about 60 feet (15.24 m) wide. The map may not be accurate. Source: Library and Archives Canada, e010689235 sheet 48. **

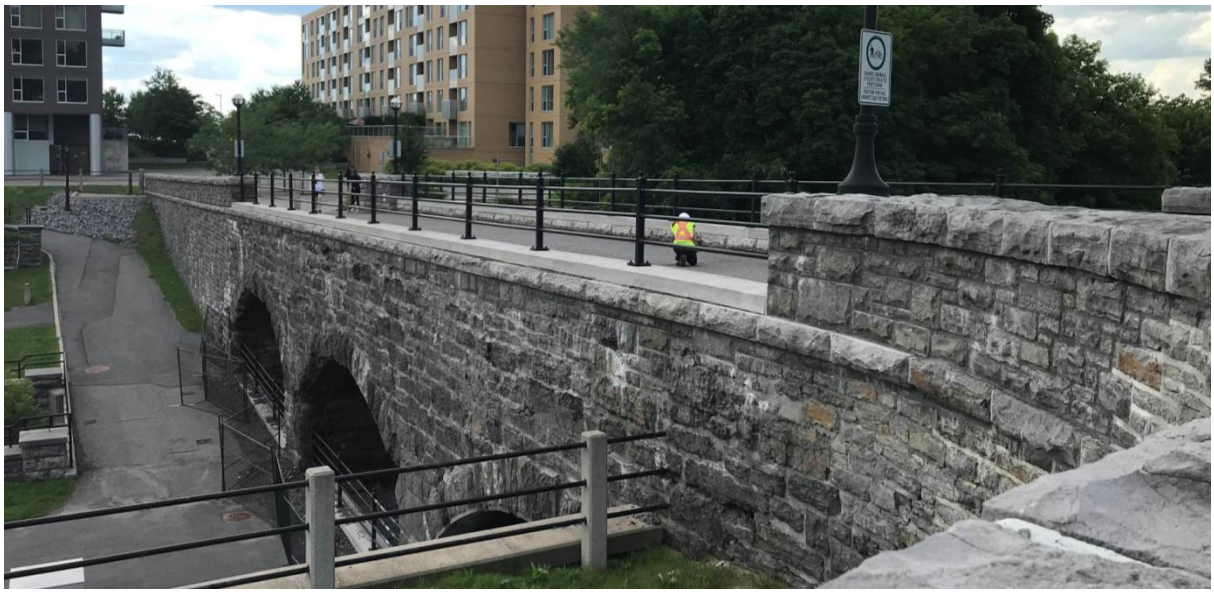


Figure 11: Pooley's Bridge, south arches, June 2019. Source: Contentworks.

Figure 12: Former Central Canada Railway Bridge constructed in 1873 at the west end of the aqueduct, 2012. Only the east side of the bridge is visible; the rest of the bridge and a large portion of the aqueduct was covered for railway purposes early in its history.Source: https://s3.amazonaws.com/gs-waymarking-images/68e82f51-1ab6-4d55-90ec-ca61d0b7db4e.JPG.

Figure 13 a & b: Old Booth Street Bridge in 2007, prior to the construction of the new bridge. Top, looking north along Booth Street; bottom, looking west towards the Broad Street Bridge. Source: Google Streetview, 2007, accessed 5 July 2019.

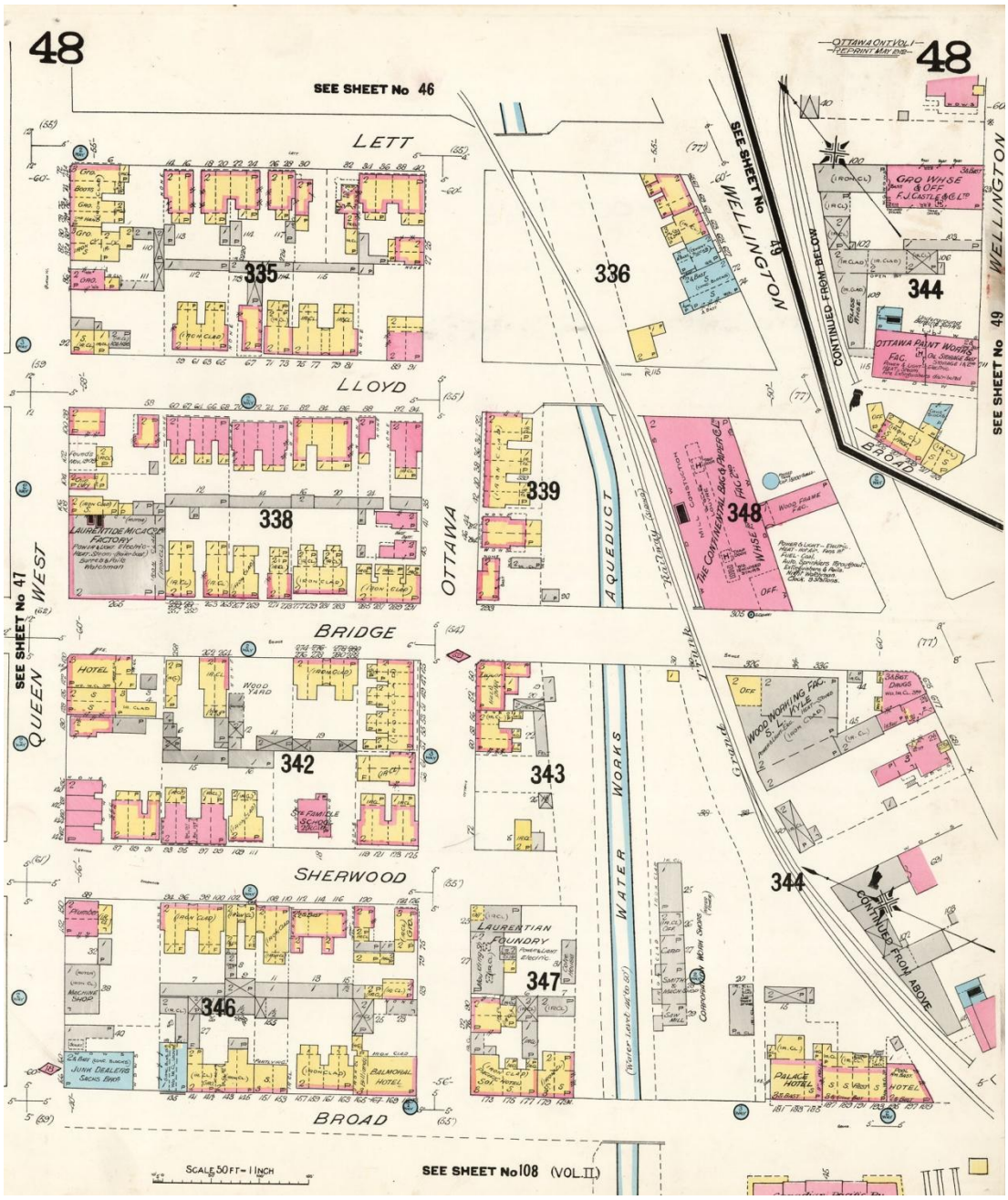


Figure 14: Detail from the 1912 Fire Insurance Plan (1902 revised until 1912). Source: Library and Archives Canada, Insurance plan of the city of Ottawa, Ontario, Volume 1, September 1902, revised 1912, R6990-291-X-E.

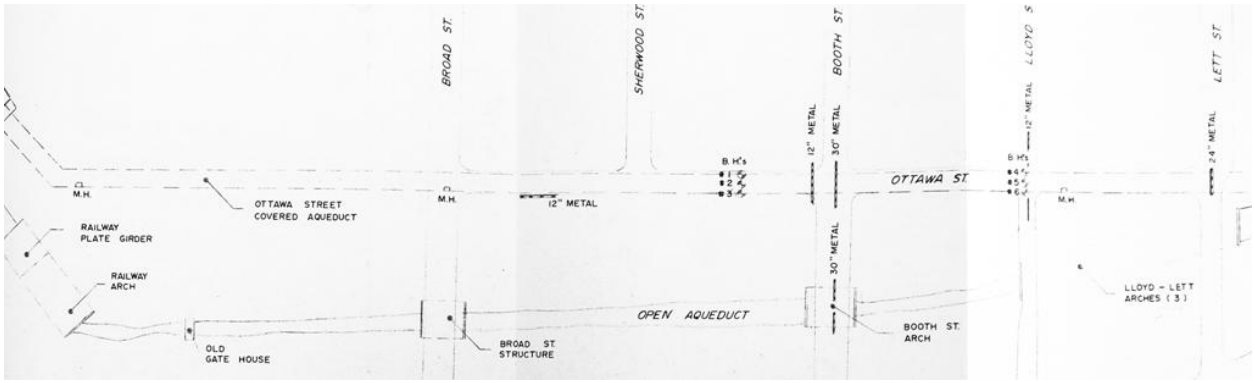


Figure 15: Detail from a Plan of Aqueducts Structures, 1968. Source: National Capital Commission/M.M. Dillon Limited, Report on the Structural Inspection of the Ottawa Street Aqueduct Arch and the Bridges over the Open Aqueduct, LeBreton Flats, National Capital Commission, 1968.

Figure 16: Looking west towards the Old Booth Street Bridge, 1903. Source: City of Ottawa Archives, Ottawa Water Works MG305, Accession 40D91.

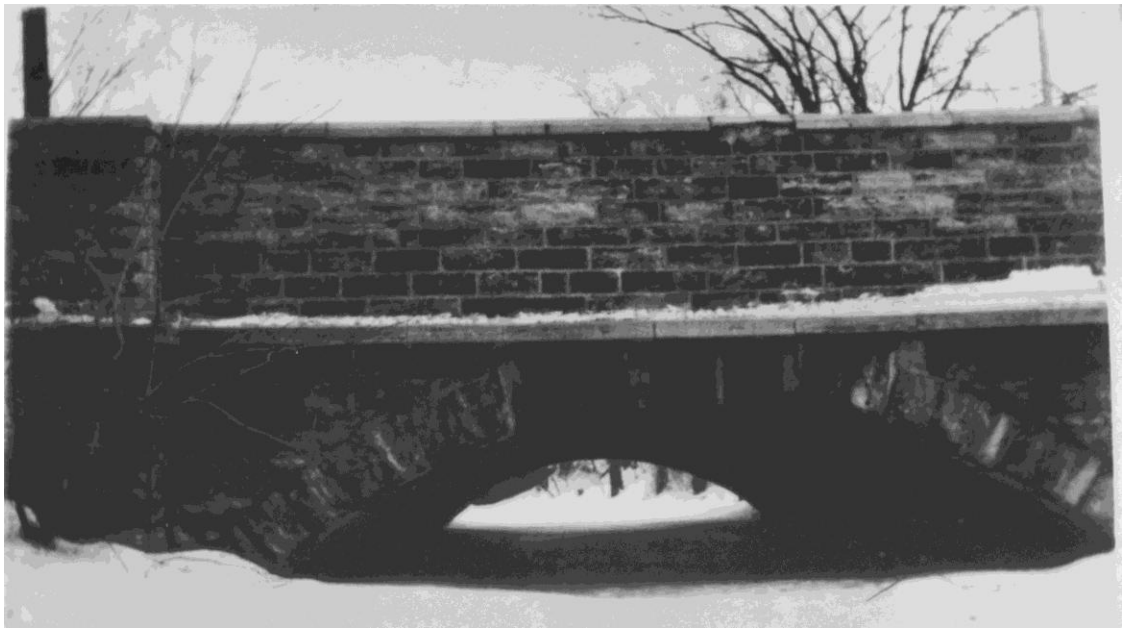


Figure 17: Old Booth Street Bridge, 1968. The bridge parapets and width of the arch appear to be the same as it was in the 1903. Source: City of Ottawa Archives, Ottawa Water Works MG305, Accession 40D91.

Figure 18: Looking west towards the east spandrel of the Lett Street Bridge, 1903. The parapet is much shorter that it appears in the 1911 photograph and may have been under construction to be raised when this photo was taken. Source: City of Ottawa Archives, Ottawa Water Works MG305, Accession 40D91.

Figure 19: Fire Insurance Plan, 1878, detail showing the Old Booth Street Bridge. The bridge is depicted as being about half the width of the street, with is 61 feet (15.75 m) wide. Source: Library and Archives Canada, e010695525 sheet 48.

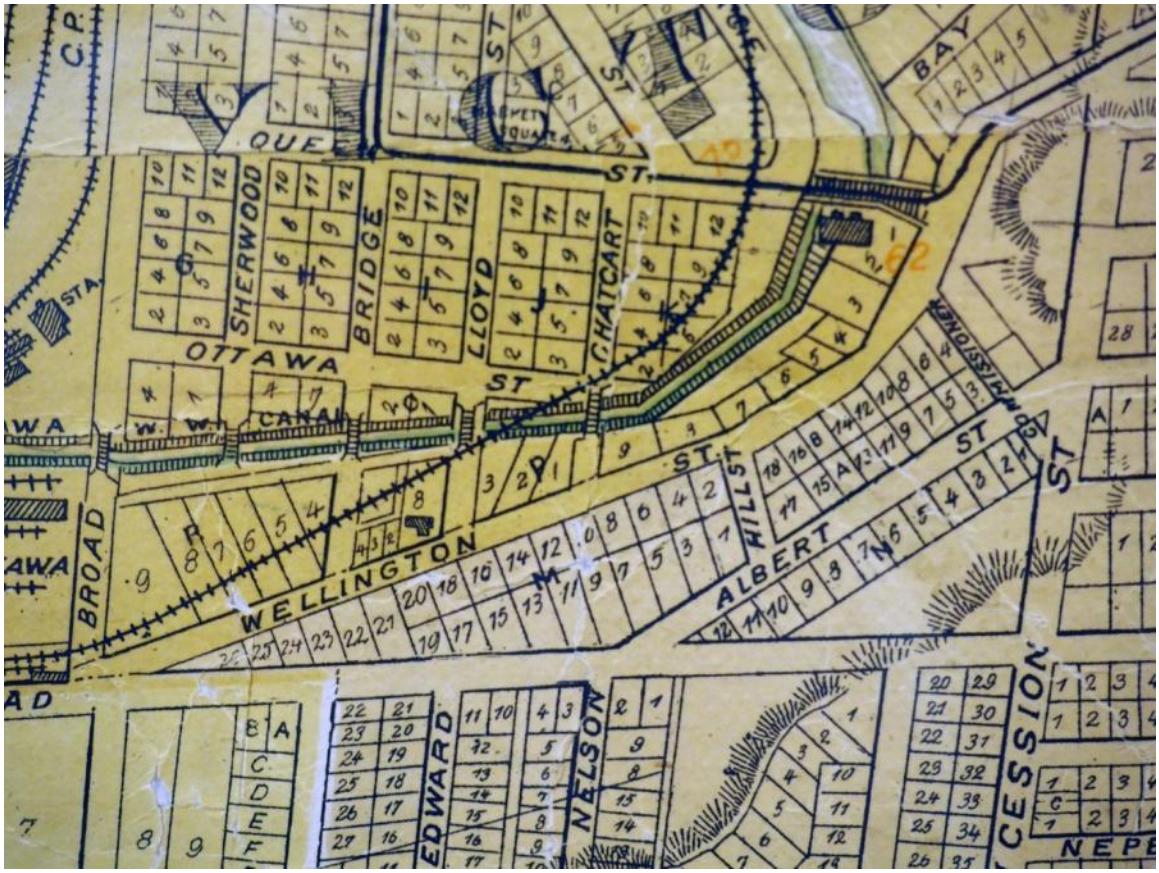


Figure 20: Map 1887. Source: City of Ottawa Archives.

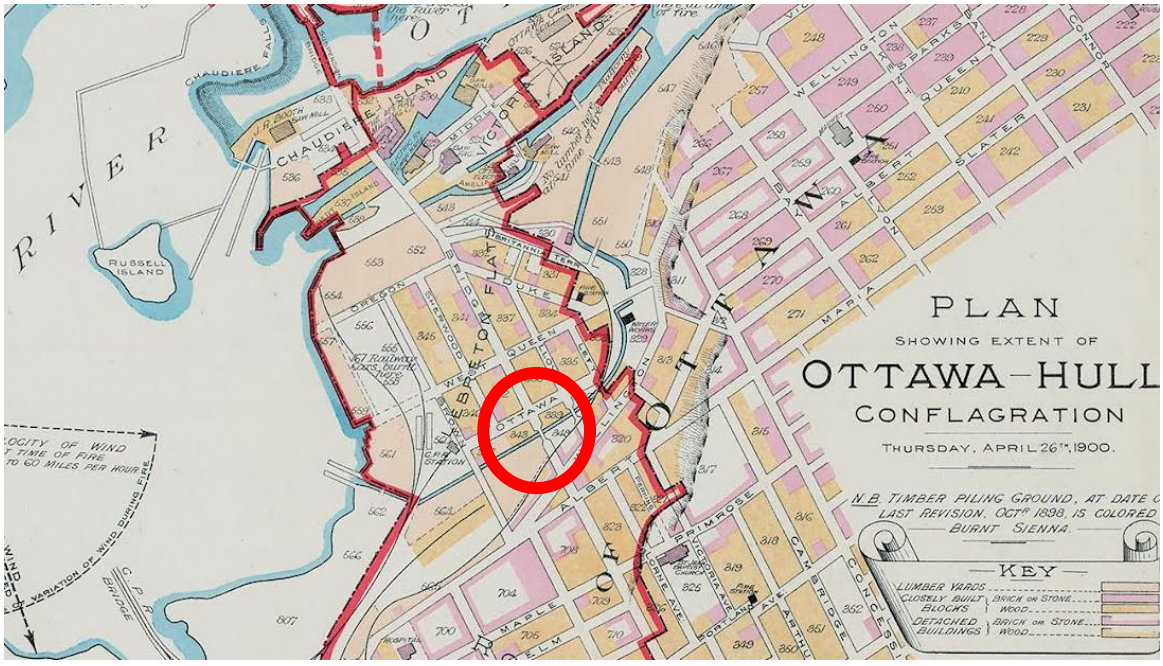


Figure 21: Fire Insurance Plan map showing the boundaries of the great fire in 1900. The Old Booth Street Bridge (circled) is narrow in this drawing. Source: Original map – City of Ottawa Archives; copy obtained online from urbsite at: http://4.bp.blogspot.com/-QHxpv8gKPWA/T49OU9nb7bI/AAAAAAAAGEs/QJ5I7SCHxxc/s1600/map1900firelimits.jpg

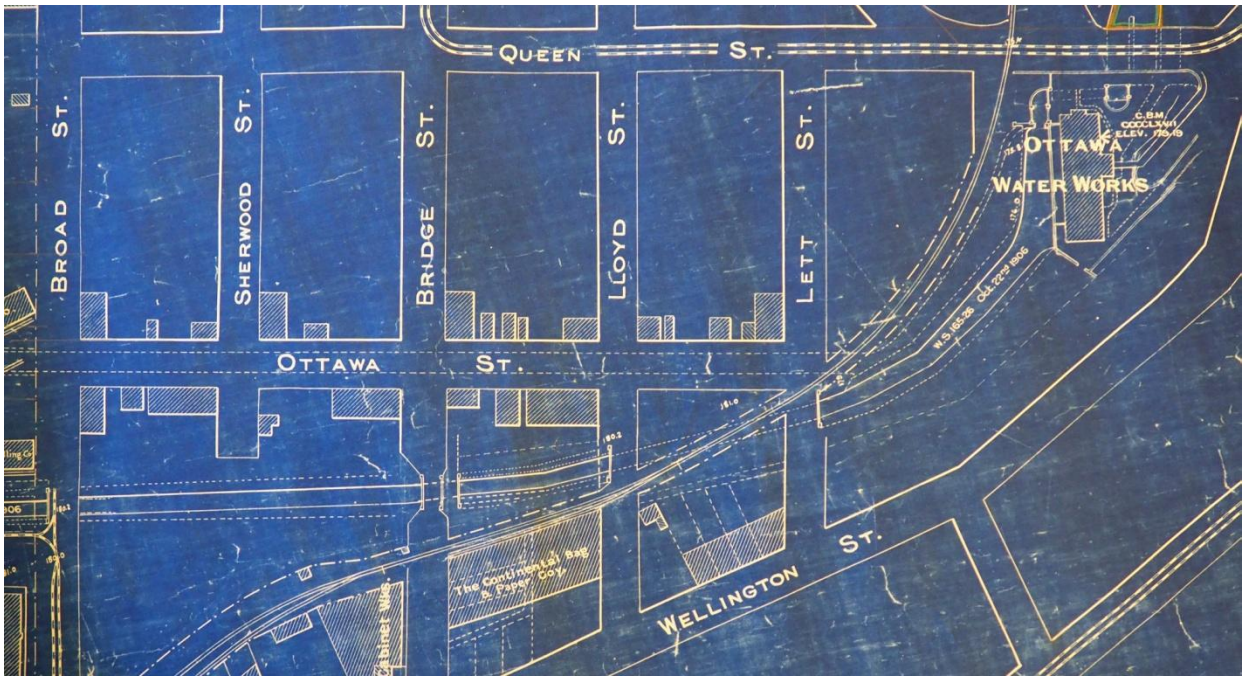


Figure 22: Detail from a 1906 map of Ottawa showing the Old Booth Street Bridge with an addition executed or planned on the east side. The map may not be accurate. Source: City of Ottawa Archives, Accession 2010.0334.1.

Figure 23: Aerial view of the Old Booth Street Bridge (circled) in 1928. Source: GeoOttawa.

Figure 24 a & b: Old Booth Street Bridge in 2012, prior to the construction of the new bridge. Top, looking west towards the Broad Street Bridge; bottom, looking east towards the Lloyd Street Bridge. Source: Google Streetview, 2012, accessed 5 July 2019.

Figure 25: Looking south towards the east parapet of the Old Booth Street Bridge, June 2019. Source: Contentworks.

Figure 26: View (looking north) of the water pipe running along the arch added on the east side of the Old Booth Street Bridge. The stone arch of the original bridge is visible on the left side (arrow). Source: Parsons, March 2019.

Figure 27: Lyndhurst Bridge, Lyndhurst, Ontario. Source: Online at: www.ontariobeneathourfeet.com/lyndhurst-bridge.

Figure 28: Glen Morris Bridge, Grand report.

Figure 29: Blair Stone Bridge, Grand report.

Figure 30: Church Street Bridge, St. Mary's, Ontario. Source: Online at: https://fr.wikipedia.org/wiki/Fichier:St_Marys_Ontario_Church_Street_Bridge.jpg.

Figure 31: Five-arch stone bridge, Pakenham, 2005. Source: Contentworks.

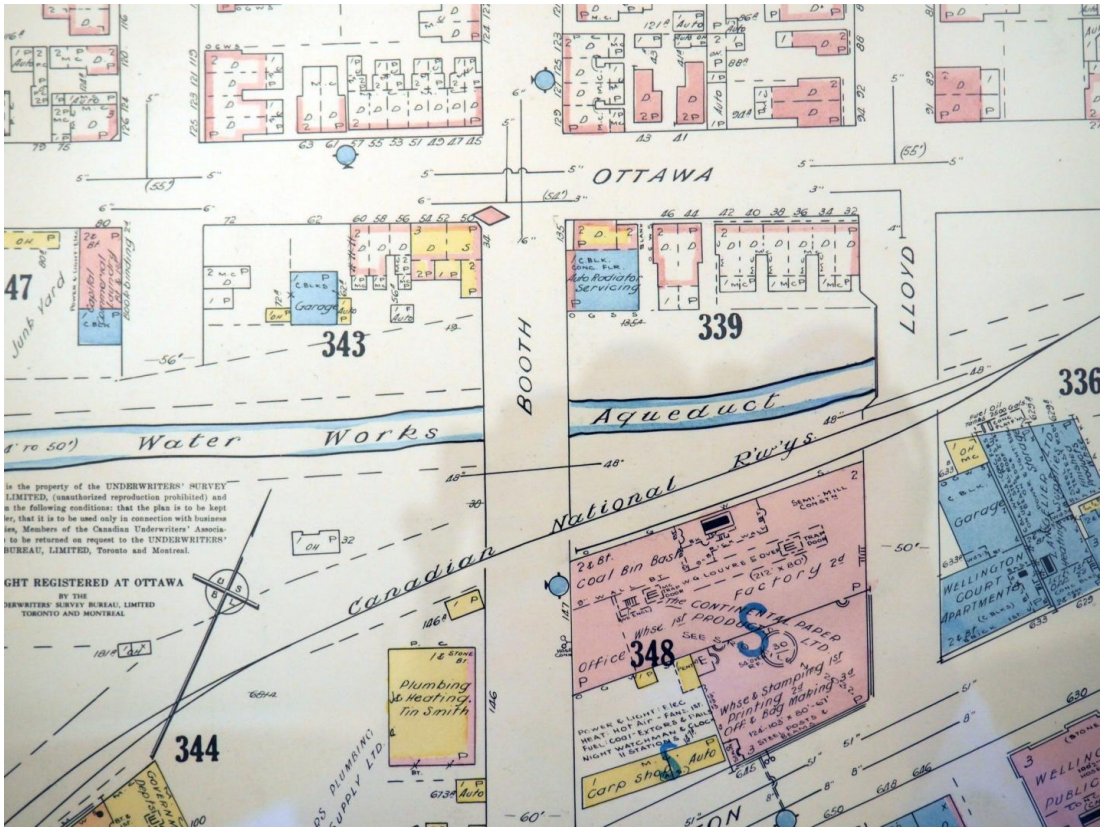


Figure 32: Detail from a 1956 Fire Insurance Plan for the City of Ottawa. The map may not be accurate. Source: City of Ottawa Archives, Accession 2010.0334.1.

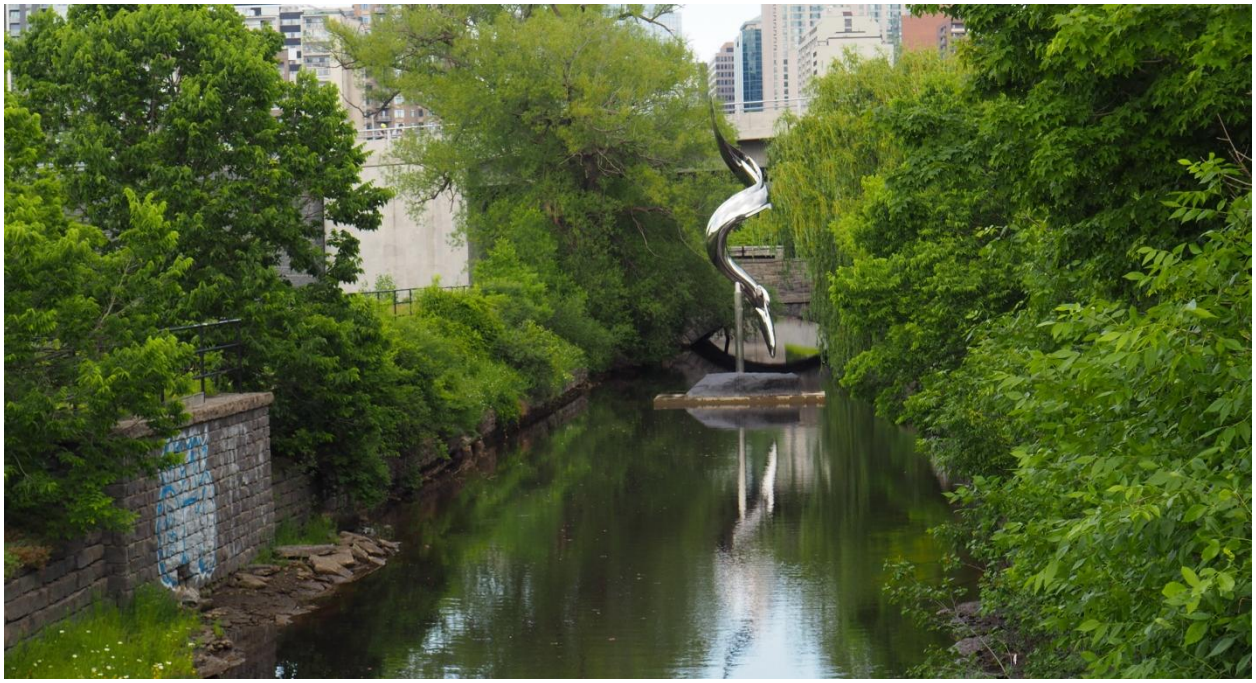


Figure 33: Open aqueduct for the Ottawa Water Works, with a public art piece installed just west of the Old Booth Street Bridge. Source: Contentworks, June 2019.

APPENDIX A: HERITAGE BRIDGE EVALUATION CRITERIA FROM THE ONTARIO HERITAGE BRIDGE GUIDELINES

For the purposes of these Guidelines, a bridge with a score of 60 or greater is considered provincially important. Even if a bridge does not achieve the score needed for being provincially significant, it may reach a threshold for being of local heritage interest or value.

Criteria Category	Rating	Score	Evaluation Criteria
Design / Physical Value (Total Marks 50)			
Functional Design (Maximum score 20)	Excellent	20	Displays a high degree of technical merit or scientific achievement and; - Is one of a kind or prototype (first or earliest example of its kind), or - Is exemplary for its kind (i.e. the longest, highest, etc. of its kind)
	Very Good	16	Displays a high degree of technical merit or scientific achievement and; - Includes types in which fewer than five survive within a Region.
	Fair	12	This category includes types of which fewer than five survive within a Region, regardless of degree of technical merit or scientific achievement, even if many were originally constructed.
	Common	0	Of little value from a technical or scientific perspective. Many were built, many remain.
Visual Appeal (Maximum score 20)	Excellent	20	High degree of craftsmanship or stylistic merit for most of the elements of the bridge; the design elements are well balanced and overall the structure is well proportioned; modifications are sympathetic.
	Very Good	12	Well-proportioned bridge that has a general massing that is appropriate to the landscape in which it is situated.
	Fair	4	Structure has only one or two noteworthy elements or is severely altered from its original form.
	None	0	Common materials or combinations
Materials (Maximum score 10)	Excellent	10	Provincially rare or unusual materials. Stone, wrought iron are examples of provincially rare materials.
	Very good	8	Regionally rare or unusual materials. Wood and riveted steel are examples of regionally rare materials.
	Good	5	Unusual Combinations: this is reserved for materials that are used in combination(s) that are considered unusual or remarkable.

	Common	0	Common materials or combinations
Contextual Value (Total marks 25)			
Landmark (Maximum score 15)	Excellent	15	Physically prominent: The bridge is highly significant physically and a primary symbol in the area. This includes 'gateway' structures. - It is a critical element in understanding a family of bridges within a corridor
	Good	9	Locally significant: The bridge is perceived in the community as having symbolic value rather than purely visual or aesthetic value. - It is an important element in understanding a family of bridges within a corridor.
	Fair	3	A familiar structure in the context of the area. - It is a contributory element in understanding a family of bridges within a corridor.
	Common	0	No prominence in area
Character Contribution (Maximum score 10)	Excellent	10	The bridge is the critical element in defining the character of the area and is of great importance in establishing or protecting this character.
	Good	6	Maintains or contributes to the overall character of the area and is of municipal importance in establishing or protecting this character.
	Common	0	Character contribution is minimal.
Historic / Associative Value (Total marks 25)			
Designer/Construction Firm (Maximum 15)	Excellent	15	Known influential designer-builder: structure demonstrates or reflects the innovative work or ideas of companies, engineers and/or builders having major impacts on the development of a community. For this item, community is broadly defined to include professional groups who have been demonstrably affected by the work in question.
	Good	9	Known prolific builder-designer: companies, engineers, and/or builders directly responsible for a large number of structures whose activities led to design or construction refinements and the establishment of standard forms.
	Fair	3	Known undetermined contribution: companies, engineers, and/or builders about who have made a limited/minor contribution to a community.
	Unknown	0	Those responsible for the design/construction are not known
Association with a Historical theme, person or event (Maximum score 10)	Excellent	10	Direct Association with a theme or event that is highly significant in understanding the cultural history of the nation, province or municipality.

Good	6	Close association with a theme or event within an area
Common	0	Limited or no association with historic themes or events.

APPENDIX B: EVALUATION OF THE OLD BOOTH STREET BRIDGE USING THE EVALUATION CRITERIA FROM THE ONTARIO HERITAGE BRIDGE GUIDELINES

Criteria Category	Rating	Score	Discussion/Comments
Design / Physical Value (Total Marks 34/50)			
Functional Design (Maximum score 20)			This category includes types of which fewer than five survive within a Region, regardless of degree of technical merit or scientific achievement, even if many were originally constructed
	Fair	**12**	**The Old Booth Street Bridge is one of five stone-arch bridges in the region.**
Visual Appeal (Maximum score 20)			Well-proportioned bridge that has a general massing that is appropriate to the landscape in which it is situated.
	Very Good	**12**	**The Old Booth Street Bridge has been modified, but it has visual appeal due to its stone parapets and the stone arch.**
Materials (Maximum score 10)			Provincially rare or unusual materials. Stone, wrought iron are examples of provincially rare materials.
	Excellent	**10**	**The Old Booth Street Bridge is a stone arch bridge**
Contextual Value (Total marks 19/25)			
Landmark (Maximum score 15)			Locally significant: The bridge is perceived in the community as having symbolic value rather than purely visual or aesthetic value. It is an important element in understanding a family of bridges within a corridor.
	Good	**9**	**The Old Booth Street Bridge is part of a set of bridges crossing the aqueduct.**
Character Contribution (Maximum score 10)			The bridge is the critical element in defining the character of the area and is of great importance in establishing or protecting this character.
	Excellent	**10**	**The Old Booth Street Bridge is a key element in protecting the heritage character of the Ottawa Water Works landscape. The landscape, which includes the aqueduct, pumping station and bridges, has been disrupted by new construction, including a high bridge and a light-rail corridor.**
Historic / Associative Value (Total marks 25/25)			
Designer/Construction Firm (Maximum 15)			Known influential designer-builder: structure demonstrates or reflects the innovative work or ideas of companies, engineers and/or builders having major impacts on the development of a community. For this item, community is broadly defined to include

			professional groups who have been demonstrably affected by the work in question.
	Excellent	**15**	**The Old Booth Street Bridge was designed by Thomas C. Keefer who is a nationally and locally significant engineer.**
Association with a Historical theme, person or event (Maximum score 10)			Direct Association with a theme or event that is highly significant in understanding the cultural history of the nation, province or municipality.
	Excellent	**10**	**The Old Booth Street Bridge was part of the historic Ottawa Water Works and is directly associated with the history of LeBreton Flats from its industrialization to its clearing.**

Total Score – 78/100

APPENDIX C: DRAFT STATEMENT OF CULTURAL HERITAGE VALUE AND HERITAGE ATTRIBUTES OF THE BOOTH STREET BRIDGE

The Old Booth Street Bridge has heritage value as a heritage bridge of provincial interest and as a heritage property that is designated by the City of Ottawa as part of the Ottawa Water Works, LeBreton Flats.

Description of the Heritage Bridge

The Old Booth Street Bridge is a stone arch bridge with stone parapets. It was constructed in 1873-4 and extended on the east and west sides in the late 19th and early 20th centuries. The bridge is located on the former alignment of Booth Street (originally called Bridge Street) that was a main access road to the Chaudière industrial area and the bridge crossing the Ottawa River to Quebec. The Old Booth Street Bridge now sits below a new bridge where it is only accessible by a multi-use pathway and the north lower exit of the Pimisi LRT station. The property is owned by the City of Ottawa.

The Old Booth Street Bridge was constructed in 1873-4 for the Ottawa Water Works as one of a set of four road bridges that crossed an open aqueduct running through LeBreton Flats to the pumping station. The entire water works system, including the bridges, was designed by one of Canada's leading civil engineers, Thomas C. Keefer.

The bridge is completely covered by the new bridge, with one of the piers of the new bridge serving as a wall that terminates the view across the bridge to the north and the entrance to the LRT station creating the terminus to the south view. East and west views, however, lead along the aqueduct to the Broad Street Bridge to the west and the Lloyd Street Bridge to the east.

Cultural Heritage Value

The Old Booth Street Bridge is of cultural heritage value due to its historical associations, context, design, and technical achievement. It is an integral part of a unique landscape, namely, the Ottawa Water Works on LeBreton Flats. It is tangible evidence not only of the water works system, but also the evolution of LeBreton Flats as an area of significant transportation, industrial and demographic change that is of high importance to Ottawa's history as an urban centre and as the Capital of Canada. Alterations to the bridge's design, especially its widening, were a response to the City of Ottawa's need to adjust the road network in LeBreton Flats to the needs of residents, industry and railways. The Old Booth Street Bridge is also of heritage value due to its original design by Keefer for one of his major water works projects. Contextually, the bridge helps define the water works component within LeBreton Flats. It is historically and visually connected to the other bridges of the water works systems, as well as to the aqueduct itself that runs through the Flats. The bridge is also of value because it is a stone arch bridge, of

which only a few survive in Ontario other than the five (four traffic and one railway) bridges crossing Ottawa's old aqueduct.

Character Defining Attributes

The attributes of the Old Booth Street Bridge and its immediate site that contribute to cultural heritage value are set out below in the categories addressed in its evaluation using evaluation criteria from the Ontario Heritage Bridge Guidelines.

Key design and physical attributes of the Old Booth Street Bridge include:

- Its crossing of the Ottawa aqueduct
- Its stone construction, including its three arches
- Its stone parapets
- Its limestone construction and detailing that connect it to the primary materials used on all the Ottawa Water Works structures
- Its width
- Its closed spandrels, coursed limestone masonry, string course above the arch, large cut-stone voussoirs and thick wing walls that create the appearance of pilasters at either end of the arch

Key contextual attributes of the Old Booth Street Bridge include:

- Its visual and spatial relationship with other bridges along the aqueduct
- Views from the bridge to the aqueduct and from the aqueduct and other bridges to the Old Booth Street Bridge

Key historical attributes of the Old Booth Street Bridge include:

- Elements related to its design by Thomas C. Keefer and history as a water works structure
- Elements related to its evolution in response to the growth of LeBreton Flats as an area of industrial and transportation development.

APPENDIX D: DRAFT STATEMENT OF CULTURAL HERITAGE VALUE FOR THE OTTAWA WATER WORKS, LEBRETON FLATS – BYLAW 22-82

The following Statement of Cultural Heritage Value was developed recently to replace the current SCHV for the Fleet Street Pumping Station and Aqueduct. It has not been reviewed or approved by the Council of the City of Ottawa.

Description of Property

The Ottawa Water Works complex is a cultural heritage landscape comprised of the City Water Works Building at 10 Fleet Street, the open aqueduct to the west including the headworks, the channelled tailrace to the north of the pumping station, and five stone bridges that cross the aqueduct. The bridges include four single-span bridges; the Canada Central Railway, Broad Street, Booth Street, and the combined Lloyd/Lett/Grand Trunk Railway bridge and the triple span Pooley's Bridge, located north of the pumping station. The complex was constructed in 1872-74, with additions to the Water Works building in 1888 and 1899. The Ottawa Water Works is located on LeBreton Flats, west of downtown Ottawa.

Heritage Value

The Ottawa Water Works has cultural heritage value for its role in the early development of municipal water works systems in Canada, its association with local engineer Thomas Coltrin Keefer, its design and physical value and its contextual value as an cultural heritage landscape and the only remaining historic structures on LeBreton Flats.

Associative or Historic Value

The Ottawa Water Works has historic value as an early example of a municipal water works systems built in the late 19th century. The Carleton Country fire of 1870 and the Great Chicago fire of 1871, combined with a desire to provide clean drinking water, led Ottawa City Council to engage Thomas Coltrin Keefer to oversee the design and construction of the Water Works building and aqueduct in 1872. In 1870, there were only seven municipal water works in Canada. During the following decade, 23 systems were constructed, including the Ottawa system and by 1900 there were 235 municipal systems. The Ottawa Water Works has cultural heritage value for its continued use in the provision of clean drinking water to the city of Ottawa.

The Ottawa Water Works has historic value for its association with Thomas Coltrin Keefer, a prominent Ottawan and one of the leading civil engineers in Canada in the mid-19th century. Early in his career Keefer worked on the Welland and Erie Canals and in 1845 he was appointed engineer in charge of timber slides and river works for Bytown. Keefer settled in Ottawa, but continued to be involved in large scale engineering projects elsewhere including the Montreal Water Works (1853) and Hamilton Water Works (1859). Keefer first prepared plans for the Ottawa Water Works in 1859. Keefer is commemorated for his engineering works as a National

Historic Person and the plaque is located at the Water Works building.

The Water Works building also has cultural heritage value for its association with prominent Ottawa architect Edgar L. Horwood. Horwood designed the 1899 expansion to the pumping station. Horwood practiced privately in the late 19th and early 20th centuries before being appointed Chief Dominion Architect in 1915, a post he held for two years, after which he returned to private practice for the remainder of his career. He designed several well-known buildings in Ottawa including the Britannia Yacht Club and several public schools including First Avenue and Mutchmor.

The earliest structure in the Water Works complex is Pooley's Bridge which was constructed by Alexander Sparks in 1872 to the specifications of City of Ottawa Engineer George Hugo Perry. Pooley's Bridge has associative value as the oldest remaining structure from Ottawa's municipal development program of the 1870s to establish permanent infrastructure. Other projects from this era include the first City Hall (burned 1931), the first civic park at Major's Hill, and the pumping station. Pooley's Bridge has historic value for its age and continued use as a bridge; it is the oldest bridge in Ottawa and it is considered the second oldest stone arch bridge in Ontario.

Design Value

The Water Works building has design value as a good example of late 19th century industrial building. It is a two storey flat roofed building constructed in phases beginning in 1873-74. The original Keefer building was a one storey structure with a mansard roof. In 1888, additional pumps were installed in a ground floor addition designed by local architect E.L. Horwood. In 1899, the mansard roof was removed and a second storey, flat-roofed addition was added. The building is well-detailed, and includes rusticated stone arches and voussoirs, pairs of segmentally arched windows on the ground floor and round arched windows on the second storey.

Pooley's Bridge has design value as a large, triple arched, closed-spandrel stone bridge. The bridge over the channelled tailrace is a good and rare example of a large stone bridge in Ottawa and is a representative example of 19th century bridge design.

The aqueduct has design value for its industrial and intentionally rustic character. Hewn from the bedrock, it is a unique industrial structure in Ottawa. It is characterized by its uneven stone edges, gradually sloping sides with soft landscaping and limestone pitching and the four low, single span stone bridges that cross it.

The Ottawa Water Works has design value for its innovative engineering; the Water Works took advantage of a natural depression on the flats for the open aqueduct and rather than using the steam-driven pumps that were typical of the period, the pumps were hydraulic. Water was drawn in from the headworks above the Chaudière Falls and fed through the open aqueduct to waterwheels connected to two large pumps. A clear water pipe in the aqueduct provided clean drinking water to the municipal system. The pumps have been replaced over time but the headworks and open aqueduct remain.

Contextual Value

Contextually, the Ottawa Water Works complex has heritage value as a cultural landscape and as the last remaining set of 19th- century structures on LeBreton Flats. LeBreton Flats was a vibrant, working class community linked to the logging industry on the Ottawa River nearby, and was home to foundries and other industry. The neighbourhood was completely cleared in the 1960s as part of the NCC's Gréber Plan and the larger trend of urban renewal in the mid 20th century.

The landscape of the Water Works complex also contributes to an understanding of the former link to Ottawa's 19th century railway system, as evidenced in the arrangement of the bridges over the aqueduct which reflect the former railway and road patterns.

The structures that comprise the Ottawa Water Works are linked by the aqueduct channel, the connection to the Ottawa River and common design elements of the bridges, creating a picturesque cultural landscape. As the only remaining historic structures, they are important in defining the character of the area and are landmarks on LeBreton Flats.

Heritage Attributes:

The following attributes of each structure contribute to the overall understanding and heritage value of the Ottawa Water Works complex.

Water Works Building

- two-storey massing with one storey, flat roofed addition at south end of building
- rusticated limestone construction, laid in even courses
- flat roof with bracketed metal cornice
- five square stone chimneys
- heavy limestone secondary cornice between the first and second storey featuring brackets and smooth stone frieze
- double doors with arched transom window on north and east sides
- smooth stone drip course between foundation and bottom of the ground floor windows
- tall segmentally-arched four-over-four sash windows arranged in pairs on the ground floor with stone voussoirs and keystones
- round arched two-over-two sash windows on the second storey
- round windows along the west façade with stone window surrounds
- rusticated stone pilasters
- date stones on the east and north facades of the building,
- decorative stone details including: brackets, voussoirs, corner pilasters and keystones
- pedestrian bridge leading to second storey entrance on east side of building
- limestone retaining walls
- Interior features including:
    - Original roof construction comprised of iron beams separating narrow brick segmental vaults, visible inside the ground floor, pump room
    - Marble plaque commemorating the construction of the original building in 1874, inscribed with Thomas Keefer's name and the names of the chairman and members of the Ottawa Water Works Commission

- Marble plaque commemorating the expansion of the pumping station 1899-1901
- Pressure gauge with decorative iron work
- Double staircase from the ground floor that merges into a single staircase to the second storey of the building

Aqueduct

- narrow open channel excavated from bedrock with uneven stone edges
- soft landscaped edges including low shrubs such as sumac and honeysuckle and a deciduous trees including mature group of black willow on the west side of the headworks
- limestone pitching along the north and south sides of the bank between the Broad Street Bridge and the Central Canada Railway Bridge
- remnant limestone sluice gate abutments on the north and south side of the channel east of the Central Canada Railway Bridge
- headworks with sluice gate at the Ottawa River
- forebay at the pumping station
- channelled tailrace under Pooley's Bridge extending north

Stone Bridges

- Central Canada Railway Bridge, Broad Street Bridge, Booth Street Bridge, and Lloyd/Lett Street Bridges over the open aqueduct characterized by:
  - low, single arch, closed-spandrel form
  - stone construction laid in regular courses with piers, voussoirs and keystones
- Pooley's Bridge
  - triple arched, closed-spandrel form
  - stone construction laid in random courses with parapets, voussoirs and keystones
  - metal railing with concrete base

Views

- The following views are reinforce the heritage value of the Ottawa Water Works as a cultural landscape:
  - the view looking east from the Central Canada Railway Bridge to the Broad Street Bridge
  - the view looking west from the Broad Street Bridge to the Central Canada Railway Bridge
  - the view north and south from Pooley's Bridge of the tailrace and the Water Works Building.
  - the view looking northeast from the Lloyd/Lett/Grand Trunk Railway Bridge towards the forebay and Water Works Building.

APPENDIX E: CURRENT (1991) STATEMENT OF CULTURAL HERITAGE VALUE FOR THE FLEET STREET PUMPING STATION AND AQUEDUCT – BYLAW 22-82

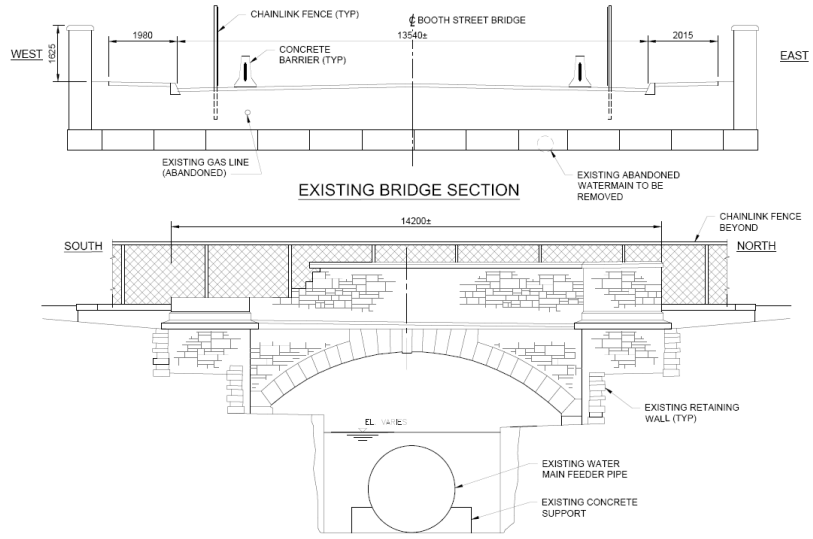
Statement of Cultural Heritage Value- City Waterworks Building and Aqueduct, 10 Fleet Street

The City Waterworks Building and aqueduct are recommended for designation as being of architectural and historical value. Ottawa City Council authorized the construction of this, the first Waterworks Building in 1872, in response to a growing fear of fires in the Ottawa Valley and the Great Chicago Fire of 1871. The building was constructed in 1873-74 to a design by Thomas Keefer, Engineer; who was appointed the First Commissioner of Waterworks in 1874.

The building was originally a one storey structure with a mansard roof. Enlarged over the years to serve the needs of a growing city, the building is now a two storey, flat roofed limestone structure. It is highlighted by its arched window openings, decorative cornices, pilasters, two surge towers, and a grade level aqueduct with stone faced walls. The building, which operates on hydraulic power, is significant for its place in industrial history. The original pump and turbines were replaces in 1943.

APPENDIX F: ALTERNATIVES FOR THE BOOTH STREET BRIDGE, 29 APRIL 2019

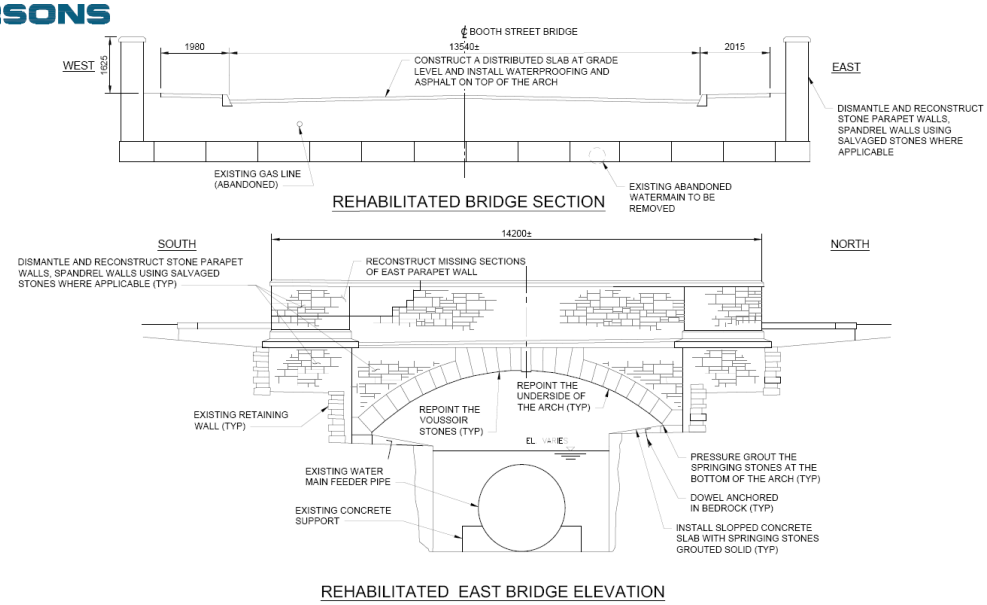
PARSONS



BOOTH STREET BRIDGE ALTERNATIVE 1 - DO NOTHING

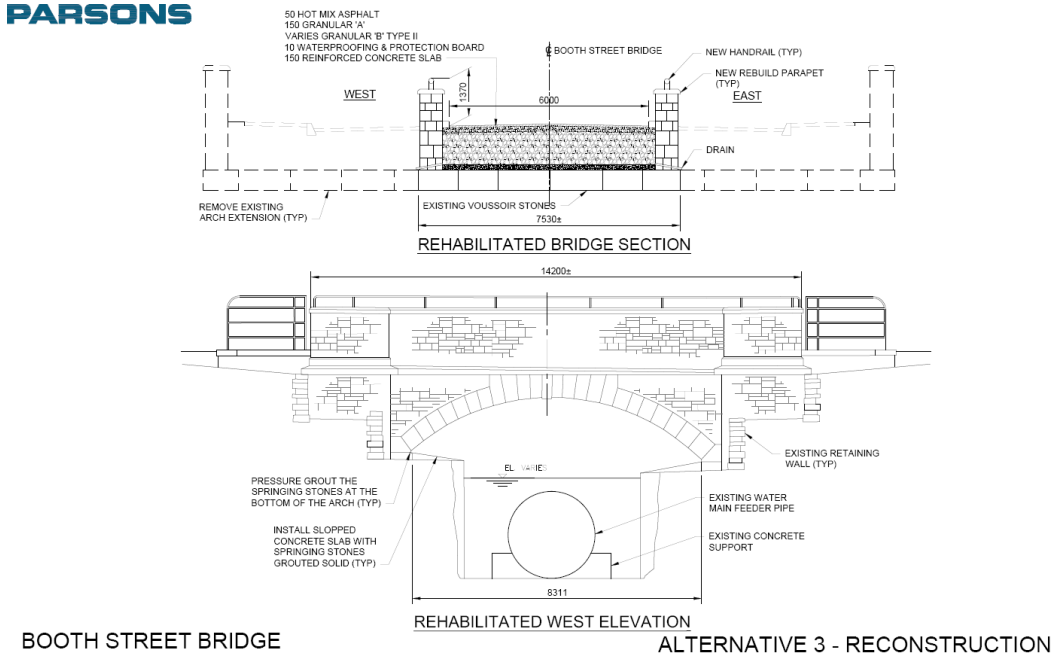
Alternative 1 – Do Nothing

PARSONS

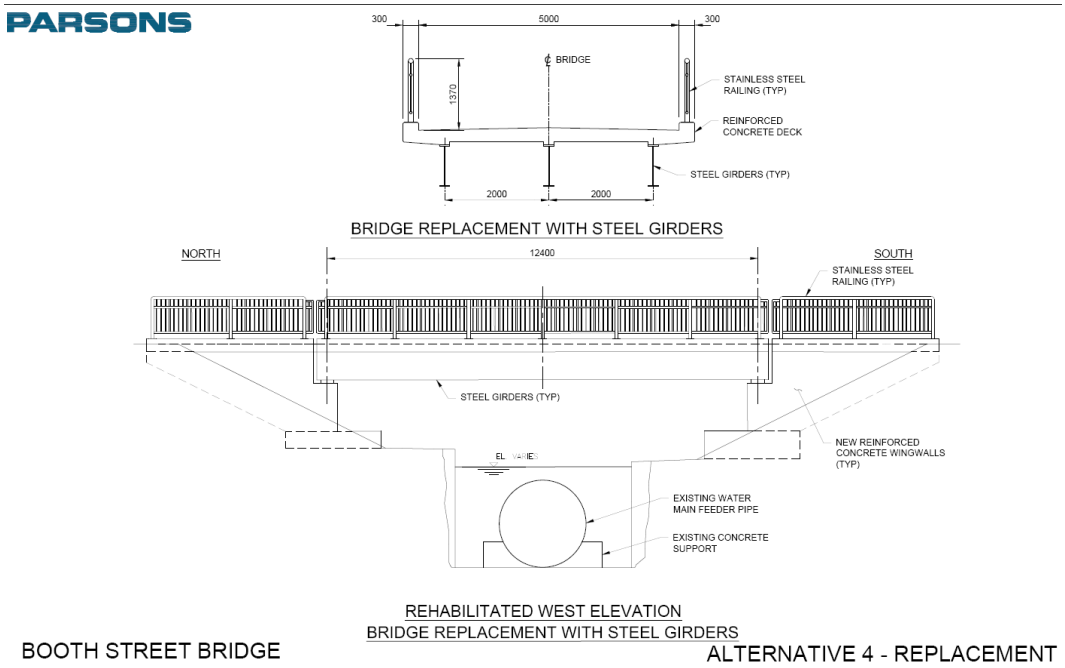


BOOTH STREET BRIDGE ALTERNATIVE 2 - IN-KIND REHABILITATION

Alternative 2 – In-Kind Rehabilitation



Alternative 3 – Reconstruction



Alternative 4 - Replacement