
HERITAGE IMPACT ASSESSMENT
OPTIONS FOR THE OLD BOOTH STREET BRIDGE
OTTAWA, ONTARIO



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Julie Harris
Contentworks Inc.
3 September 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

HIA Date: 3 September 2019

BACKGROUND

ABOUT THE HIA

This Heritage Impact Assessment (HIA) applies the heritage value documented in the Cultural Heritage Evaluation Report (CHER) to an assessment of heritage impacts from four proposed options (Appendix A) for the reconfiguration, replacement and/or renewal of the Old Booth Street Bridge¹ (Figure 1 and Figure 2). The bridge requires repairs and modifications to remain in serviceable condition for a multi-use path.

The Old Booth Street Bridge is a closed-spandrel stone arch bridge with stone parapets. The oldest portion of the bridge was built in 1873-4 with specifications prepared by Thomas C. Keefer for the Ottawa Water Works (Figure 3). The bridge sits below the new Booth Street Bridge (Figure 4) and crosses the old Ottawa aqueduct in the LeBreton Flats area of Ottawa, Ontario. The earliest photographs of the bridge show the structure after it was widened in the late 19th and early 20th century (Figure 5, Figure 6). Its masonry work is similar to other bridges along the aqueduct (Figure 7). The Old Booth Street Bridge property is part of a municipal heritage designation for the City Water Works Building on Fleet Street (By-law Number 22-82.)

The CHER and HIA are authored by Julie Harris², Contentworks Inc., for a Class EA required in advance of modifications to the Old Booth Street Bridge. The CHER evaluated 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 was not required since the bridge is already determined to be of heritage value under the *Ontario Heritage Act*.

The consultant assessed the bridge as being of heritage value using Ontario Heritage Bridge Criteria, with the bridge receiving 78 points out of 100. Appendix B is the resulting 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 and an existing SCHV for the Fleet Street Pumping Station.

HIA REQUIREMENTS

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. 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 8). Today, the Old Booth Street Bridge sits below the new Booth

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.

Street Bridge that spans the Confederation Line LRT tracks and the aqueduct. 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. The width of the bridge is an important heritage attribute, but the arches that support the bridge are of unequal significance. The centre arch built as part of the original aqueduct is the most important and should be conserved.

The HIA for the Old Booth Street Bridge examines four options outlined by Parsons in April 2019 for retaining or replacing the bridge. The assessment is informed by 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*. It calls for a reduction in the width of the bridge to its 1873-4 size and the installation of new parapets that would be similar in appearance to the 1873 specifications.

HERITAGE VALUE OF THE OLD BOOTH STREET BRIDGE

As per the findings of the CHER, the Old Booth Street Bridge is of cultural heritage value due to its historical associations, context, design, and technical achievement, as determined by its evaluation using the *Ontario Heritage Bridge Criteria* and by its inclusion in the designation of the Ottawa Water Works on LeBreton Flats by the City of Ottawa.

The Old Booth Street Bridge is an integral part of a unique landscape, namely, the Ottawa Water Works on LeBreton Flats. It is tangible evidence not only of the City of Ottawa's first and innovative water works system, but also of 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 contributes to a historically and visually cohesive landscape associated with the Ottawa Water Works.

The Old Booth Street 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 and Pooley's Bridge at the tailrace end of the Fleet Street Pumping Station.

CONTRIBUTING HERITAGE ELEMENTS

The tangible characteristics of the Old Booth Street Bridge that contribute to its heritage value and should be conserved are categorized as follows.

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 comprised of the 1873-4 arch and two arches added later
- 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.

HERITAGE GUIDANCE

HERITAGE INTERVENTION STRATEGIES FROM THE *STANDARDS AND GUIDELINES FOR THE CONSERVATION OF HISTORIC PLACES IN CANADA*

The *Standards and Guidelines for the Conservation of Historic Places in Canada* outline defined conservation categories (preservation, restoration and rehabilitation discussed below), and offer more specific guidance for types of heritage, including engineering works.

PRESERVATION

Preservation involves protecting, maintaining and stabilizing the existing form, material and integrity of an historic place or individual component, while protecting its heritage value. *Preservation* can include both short-term and interim measures to protect or stabilize the place, as well as long-term actions to stave off deterioration or prevent damage. This will keep the place serviceable through routine maintenance and small repairs, rather than inoperable during intrusive interventions, extensive replacement and new construction. Preservation is recommended when

- a) Materials, features and spaces of the historic place are essentially intact and convey the historic significance, without extensive repair or replacement;
- b) Depiction during a particular period in its history is not appropriate; and,
- c) Continuation or new use does not require extensive alterations or additions.

REHABILITATION

Rehabilitation involves the sensitive adaptation of an historic place or individual component for a continuing or compatible contemporary use, while protecting its heritage value.

Rehabilitation can include replacing missing historic features. The replacement may be an accurate replica of the missing feature or it may be a new design compatible with the style, era and character of the historic place

Consider *Rehabilitation* as the primary treatment when:

- a) Repair or replacement of deteriorated features is necessary;
- b) Alterations or additions to the historic place are planned for a new or continued use; and,
- c) Depiction during a particular period in its history is not appropriate.

Rehabilitation can revitalize historical relationships and settings and is therefore more appropriate when heritage values related to the context of the historic place dominate. A plan for *Rehabilitation* should be developed before work begins.

RESTORATION

Restoration involves accurately revealing, recovering or representing the state of an historic place or individual component as it appeared at a particular period in its history, while protecting its heritage value. *Restoration* may include removing non character-defining features from other periods in its history and recreating missing features from the restoration period. *Restoration* must be based on clear evidence and detailed knowledge of the earlier forms and materials being recovered.

Consider *Restoration* as the primary treatment when:

- a) An historic place's significance during a particular period in its history significantly outweighs the potential loss of existing, non character-defining materials, features and spaces from other periods;
- b) Substantial physical and documentary or oral evidence exists to accurately carry out the work; and,
- c) Contemporary additions or alterations and are not planned.

HERITAGE INTERVENTION STRATEGIES FROM THE *ONTARIO HERITAGE BRIDGE GUIDELINES FOR PROVINCIAALLY OWNED BRIDGES*

Interventions (with the most preferable form of intervention at the top) that have potential to conserve, in whole or in part, the heritage value of historic bridges can be categorized as follows.

1. Retention of existing bridge with no major modifications
2. Retention with restoration of missing or deteriorated elements
3. Retention of bridge with sympathetic modification
4. Retention of bridge with sympathetically designed new structure nearby
5. Retention of bridge adapted for alternative use

6. Retention of bridge as heritage monument for viewing purposes
7. Relocation of bridge – applicable for smaller, lighter structures
8. Bridge removal and replacement with sympathetically designed structure

Note on Option #8

No Retention is only viable when:

- Structural deficiencies are too extensive to allow rehabilitation
- Cost to repair is prohibitive (see Section 4.4)
- Bridge has been severely altered and little of its original form exists
- Structure is functionally obsolete and all other rehabilitation options are not possible

IMPACT ASSESSMENT

OPTIONS FOR THE OLD BOOTH STREET BRIDGE

The following options are outlined by Parsons (2019) (Appendix A). Each approach recognizes that the Old Booth Street Bridge is an obsolete structure that can no longer serve (and is not needed for) its original function as a traffic bridge.

ALTERNATIVE 1: “DO NOTHING”

Description: This option allows the bridge to continue to deteriorate, with sufficient work undertaken only to stop its collapse. The bridge would not be used for any type of traffic, including pedestrian crossings, except along the centre arch as long as it remains safe. As per the WSP report, the “obvious and predominant disadvantage of this option will be continued deterioration of the structure and that the structure will remain unsightly and somewhat unfitting the surroundings of the new LRT station.” (p. 10)

General Heritage Impacts: Heritage attributes will be negatively affected because they will eventually disappear or be removed.

Alignment with Intervention Approaches

Standards and Guidelines Approach: No alignment, unless the goal is to maintain a slowly disintegrating ruin (which can be a legitimate form of conservation for some types of industrial heritage.)

Ontario Heritage Bridge Guidelines: No alignment. The arch would be retained, but it would be neither repaired nor stabilized to the extent that it could serve as a “as heritage monument for viewing purposes” (conservation option 4).

Recommendations & Mitigation: The option does not meet any heritage conservation goals and provides no positive heritage outcomes concerning the conservation of heritage values and tangible heritage attributes. Mitigation would require a series of steps to stabilize the structure sufficiently to allow it to serve as “heritage monument”, including monitoring deterioration and

conservation planning to address each step in the deterioration process to protect public safety and determine when full removal would be required.

ALTERNATIVE 2: “IN-KIND REHABILITATION”

Description: This alternative involves repair of the existing arches and restoration of the appearance of the exterior stonework of the spandrels and parapet. Each of the arches would be left in place, repaired, and stabilized with concrete, epoxy and new stone. The bridge would then be covered by a new slab and deck to prevent water intrusions. In this option, each parapet would be rebuilt with concrete core. Existing stones would be applied as cladding to match the 1903 appearance of the bridge.

Alignment with a Conservation Approach

Standards and Guidelines Approach: This alternative falls within the category of Rehabilitation.

Ontario Heritage Bridge Guidelines: This option aligns with category 3: Retention of bridge with sympathetic modification.

Recommendations & Mitigation: This option can be recommended and implemented (if determined to be feasible) with mitigation provided below. It allows the bridge to remain visibly part of the set of stone arch bridges that cross the aqueduct; it protects a rare example of a structural stone bridge in Ontario and a historic stone bridge designed by Keefer; and it retains the century-old width of the bridge.

Mitigation measures that would further heritage conservation aims would include:

- Leaving the stone arches intact through stabilization and building a separate structure to carry the load of the bridge replacement.
- Rebuilding the parapets in stone only, salvaging and using as many stones as possible from the existing parapets in an order and arrangement that would be close to the appearance of the parapet in the photograph from 1903.

ALTERNATIVE 3: “RECONSTRUCTION”

Description: This option calls for returning the bridge to its 1873-4 width by removing the two outside arch extensions, rebuilding the parapets with existing and new stones cladding a concrete core, installing a new concrete slab to carry the load of the crossing above (but separated from) the arch, and pressure grouting to stabilize the 1873-4 arch.

Alignment with a Conservation Approach

Standards and Guidelines Approach: This alternative falls primarily in the category of Rehabilitation.

Ontario Heritage Bridge Guidelines: Category 6: Retention of bridge adapted for alternative use

Recommendations & Mitigation: This option can be recommended and implemented (if determined to be feasible) with mitigation provided below. This option focuses on the bridge’s value as a testimony to the original construction period of the water works (1873-4), rather than on its heritage value as a structure that has evolved in concert with the history of LeBreton Flats. The feasibility of this approach will depend on findings from the investigations undertaken during the demolition of the outside arches. The investigations will confirm whether the original stone facings of the spandrel walls on the 1873-4 arches are intact and whether the central arch has sufficient integrity to be stabilized with pressure grout.

The “reconstruction option” is intended to retain the original arch and rebuild the parapets based on the 1873 drawing. It is reasonable to suppose, but not certain, that the bridge and its parapets were originally built to match the 1873 drawing and that the enlargement of the bridge in later decades led to modifications of the parapets to their appearance in a 1903 photograph.

From the ground level looking towards the outside walls of the bridge, the bridge would appear to be a stone bridge with tall parapet walls. On the bridge deck, however, the parapet walls will be very low, about 1.0 m in height above the deck. Protective railings of 1.37 m in height will be required on either side of the bridge. Curved approaches to the bridge from the multi-use paths are also being considered for small vehicles that may need to cross the bridge for snow clearing, maintenance and emergencies.

Mitigation options that should be considered for this option include:

- Preparing and following a heritage conservation strategy (heritage brief) for the Old Booth Street Bridge through the services of a qualified heritage consultant (architect and/or engineer) to determine the appropriate level of investigation and analysis required.
- Following the Standards and Guidelines,³ the heritage brief should cover:
 - o How bridge components, including the two outside arches, will be documented to provide documentary evidence for the rebuilding of the bridge
 - o Dismantling, storing and reusing stones from the existing bridge (all eras)
 - o Documenting, dismantling and removing other material
 - o Testing, proof-testing and protecting the original arch in each phase of work.
 - o Detailed designs for all new elements, including barriers and curves on the approaches, to ensure that they are distinct from, but physically and visually compatible with, the historic bridge
- Of specific concern, the heritage brief should describe how the work will be phased to determine whether the original stone spandrels on the 1873-4 arch are intact and, if not, what options will be considered
- The protective railing should be designed with materials and colours that are sensitive to the appearance of the stone bridge. A railing set on top of the deck and topped with a

³ See General Guidelines for Engineering Works, *Standards and Guidelines for the Conservation of Historic Places in Canada, Second Edition*: 196.

cantilevered top rail, for example, might be useful for addressing the effective height of the barrier while also allow pedestrians to stand next to the barrier with a better view over the bridge towards the aqueduct.

ALTERNATIVE 4: “REPLACEMENT”

Description: This option involves the removal of the existing bridge and its replacement. The new bridge would be a new utilitarian steel structure. The current width would remain.

Recommendation and Mitigation: This option would retain a crossing at Booth Street, but it would not protect any tangible heritage attributes. From a heritage assessment perspective, this option is the least desirable of the four alternatives.

CONCLUSION

Among the options presented, Option #3 “Reconstruction” is the most appropriate option. With the implementation of suggested mitigation measures, it can provide for the rehabilitation of the original stone arch bridge to serve a new function while also retaining the cohesiveness of the Ottawa Water Works landscape.

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.

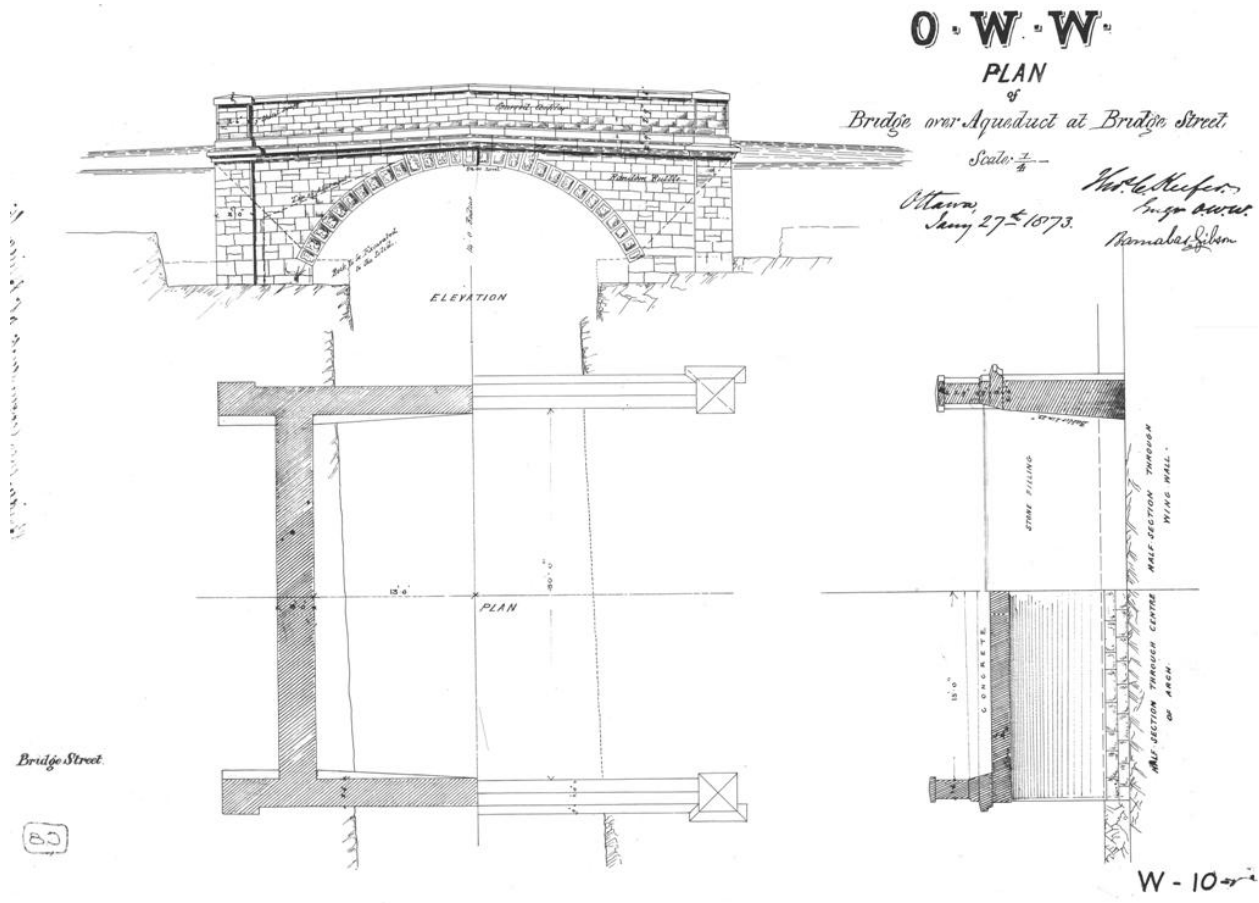


Figure 3: [Ottawa Water Works] Plan for Bridge over Aqueduct at Bridge Street, signed Thomas C. Keefer Engineer, OWW, and Barnabas [Gibson], dated January 27th, 1873. Source: Copy located in the records of Barry Padolsky, Architects. Original source location undetermined.

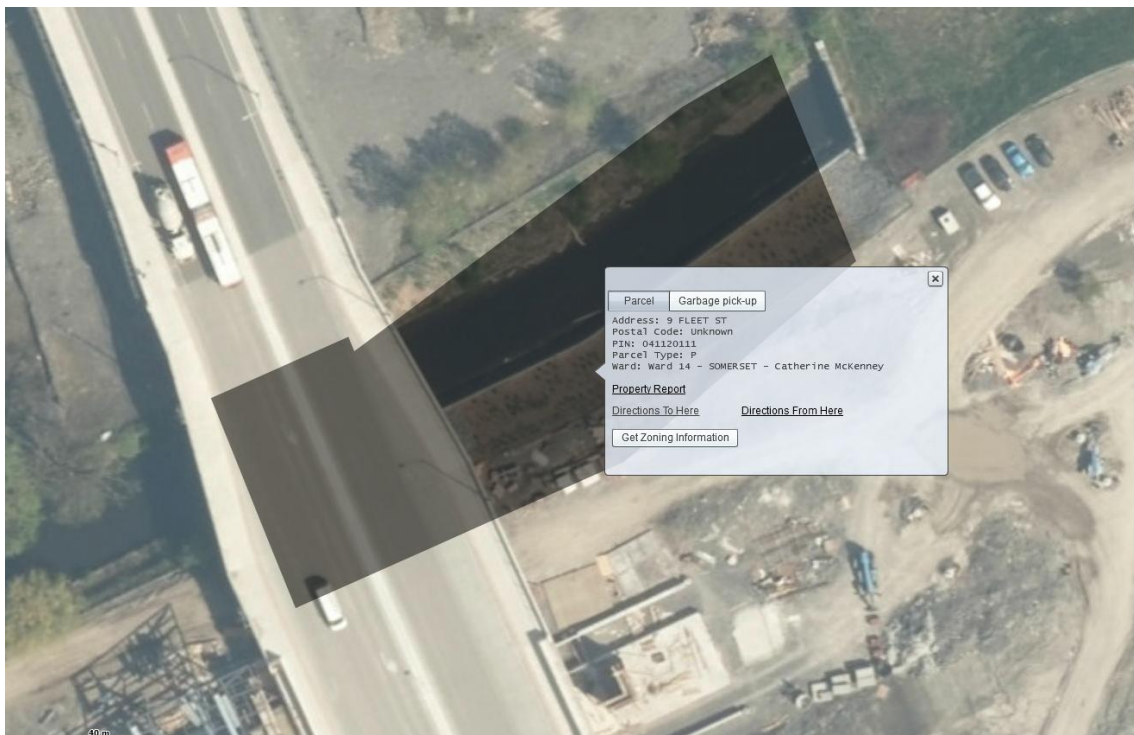
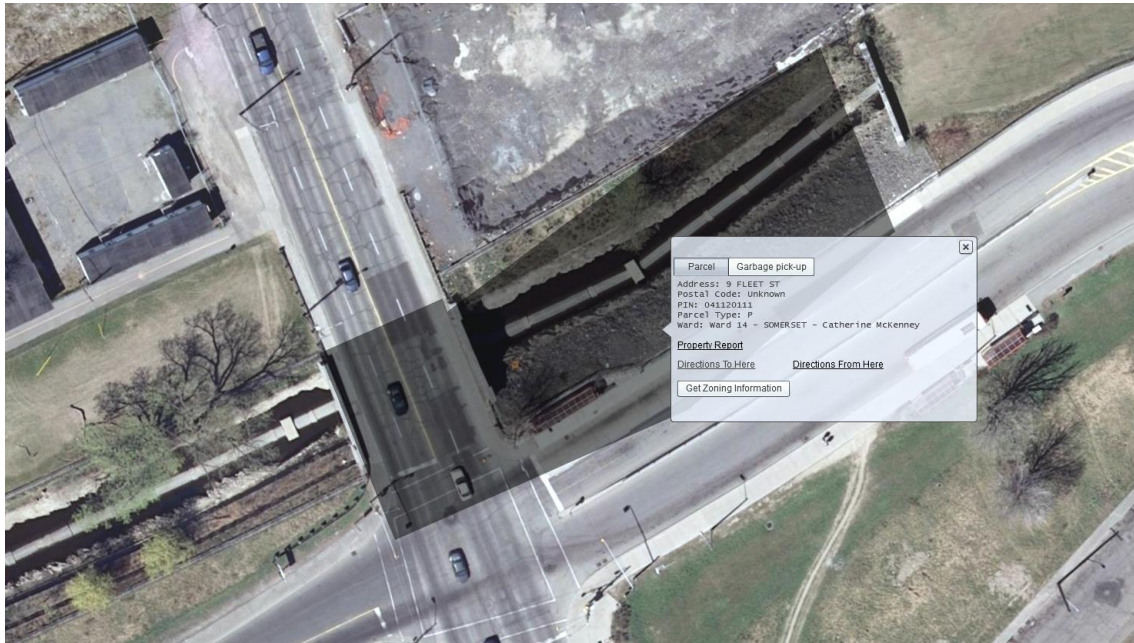


Figure 4: GeoOttawa property boundaries. Old Booth Street Bridge, 2007 (top) and current Booth Street Bridge located above the old bridge, 2017 (bottom). Source: GeoOttawa, retrieved online on 5 July 2019.



Figure 5: Looking west towards the Old Booth Street Bridge, 1903. Source: City of Ottawa Archives, Ottawa Water Works MG305, Accession 40D91.

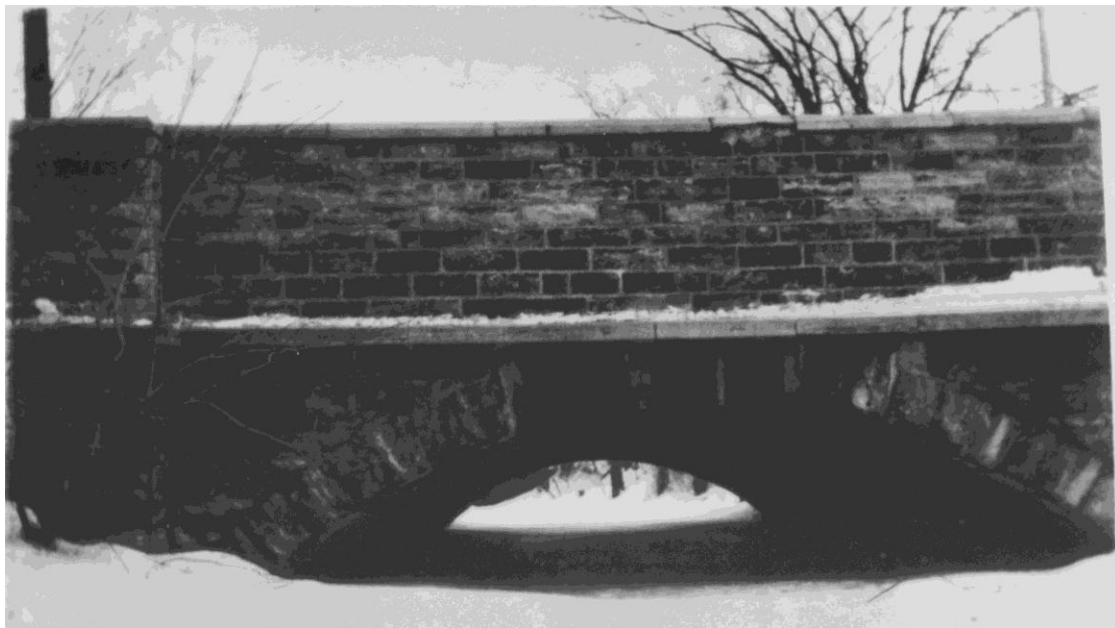


Figure 6: Old Booth Street Bridge, 1968. The bridge parapets and width of the arch appear to be the same as it was in the 1903. Source: City of Ottawa Archives, Ottawa Water Works MG305, Accession 40D91.



Figure 7: 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>.

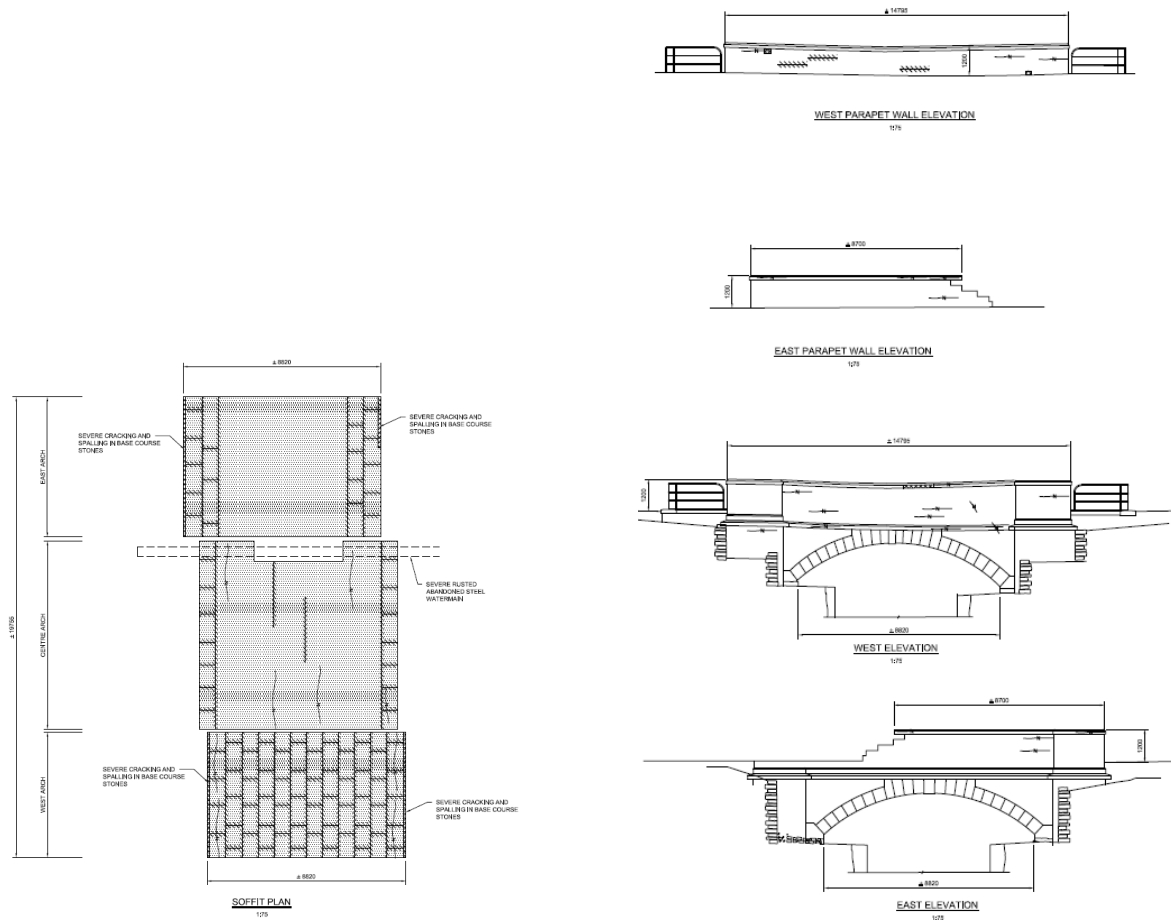
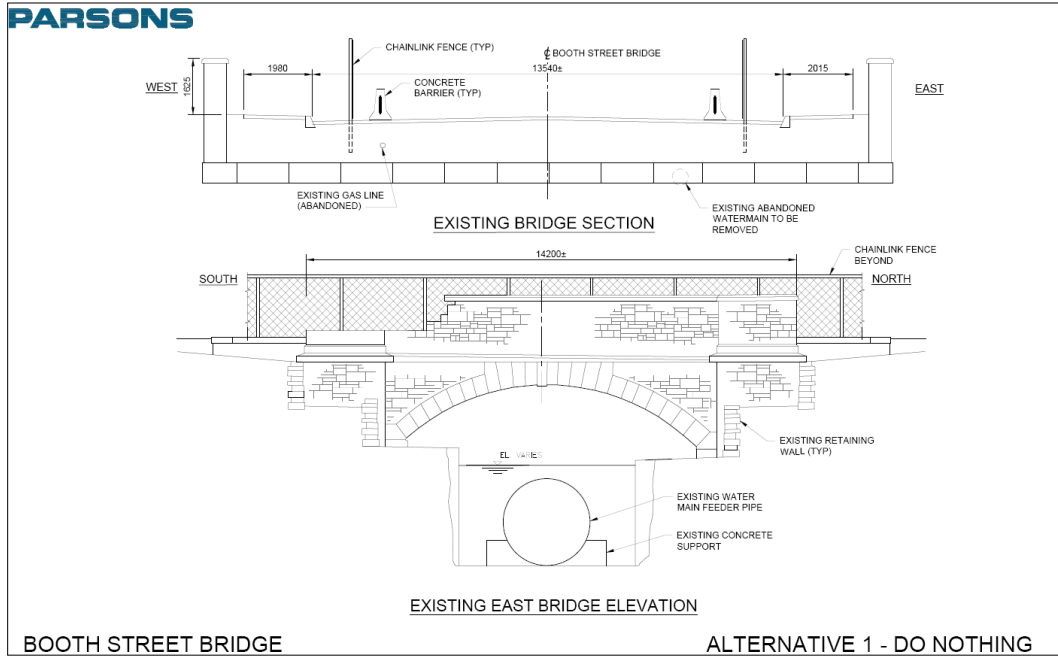
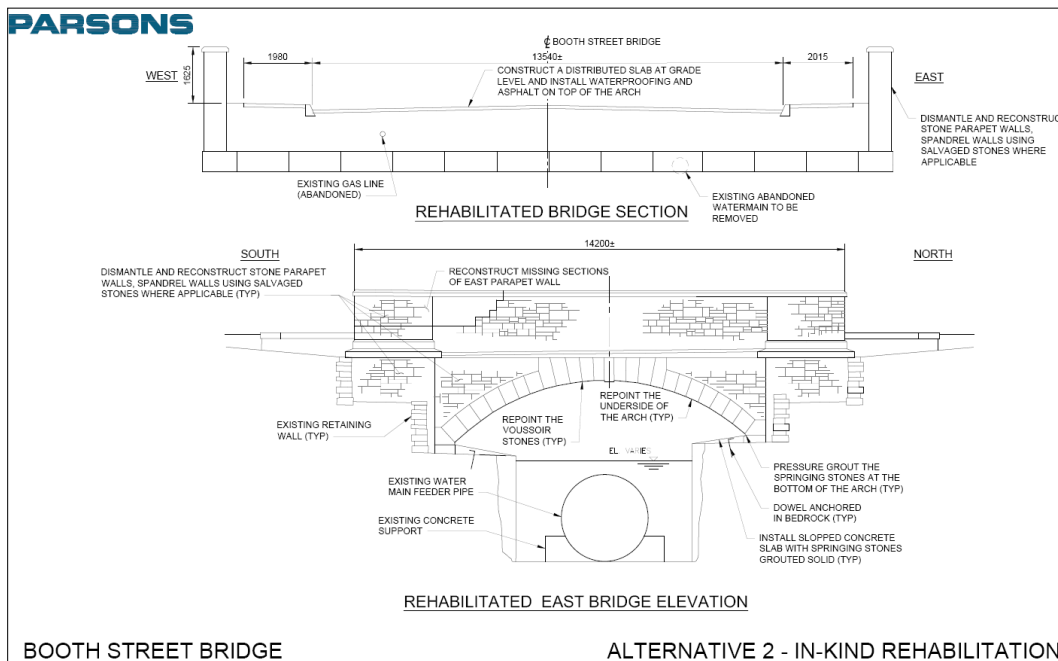


Figure 8: Plan view (left) and elevation views (right) of the existing conditions of the Old Booth Street Bridge showing cracks, moss of mortar, erosion, etc. The drawing on the left shows the three sections of the bridge. Source: City of Ottawa/WSP, Booth Street Bridge over Open Aqueduct (SN017030: Condition Assessment and Renewal Options Analysis Report, February 2019 (Final), Dwg. No. 03.)

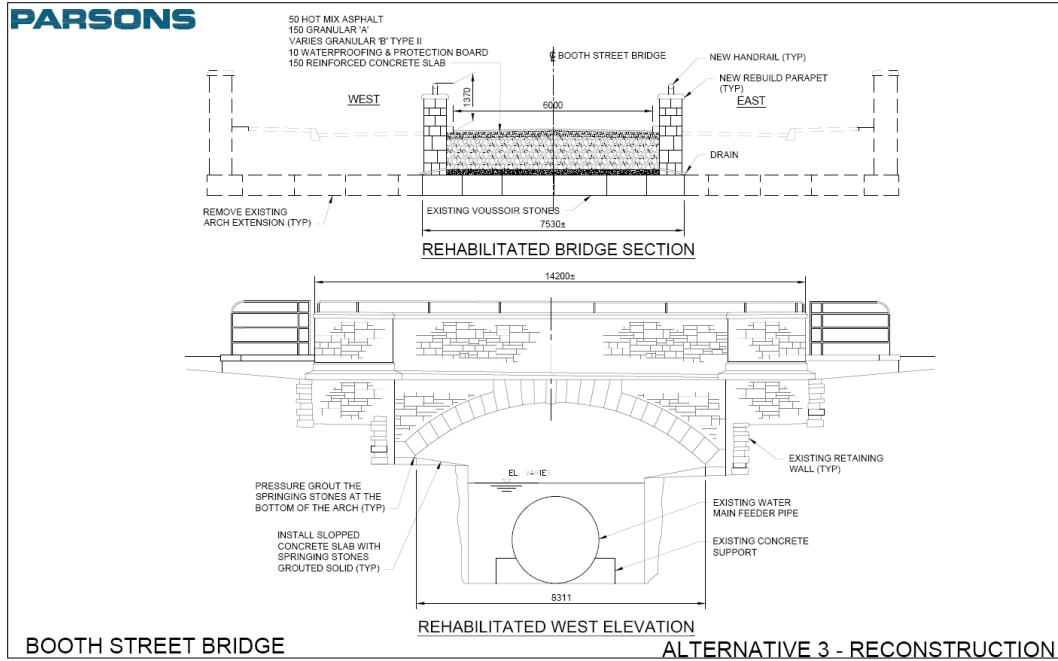
APPENDIX A: ALTERNATIVES FOR THE BOOTH STREET BRIDGE, 2019



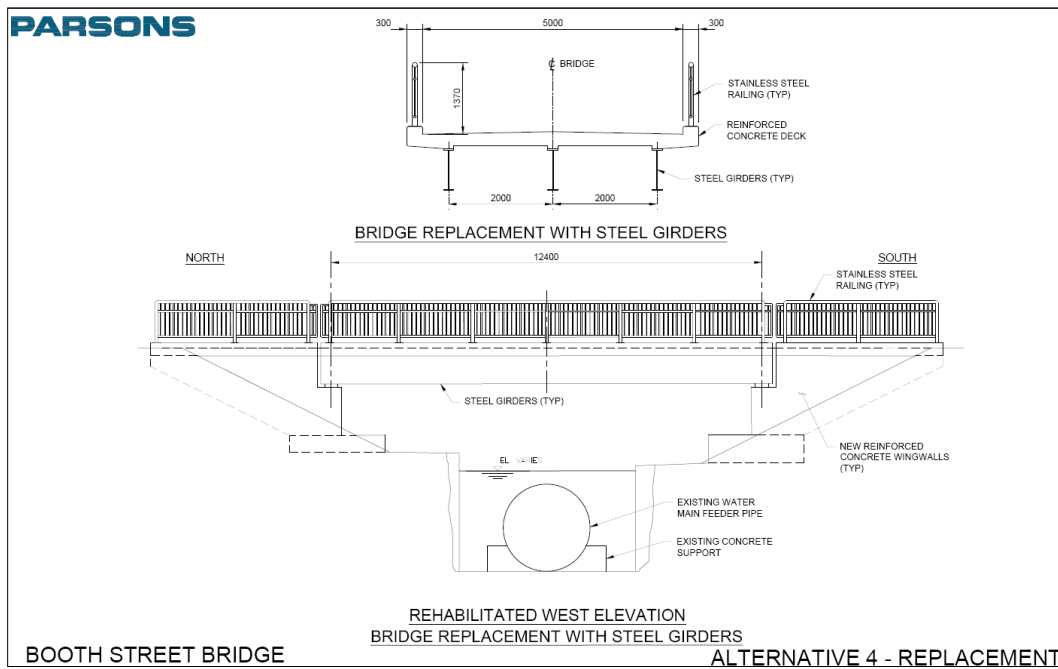
Alternative 1 – Do Nothing



Alternative 2 – In-Kind Rehabilitation



Alternative 3 – Reconstruction



Alternative 4 - Replacement

APPENDIX B: 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 C: 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.