



**BOOTH STREET BRIDGE RENEWAL PROJECT
9 FLEET ST., OTTAWA, ONTARIO**

HERITAGE BRIEF

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TABLE OF CONTENTS		<u>Page #</u>
1.	INTRODUCTION.....	1
2.	HISTORICAL OVERVIEW	2
3.	HERITAGE VALUE	4
4.	EXISTING CONDITIONS.....	5
5.	REHABILITATION APPROACH.....	8

1. INTRODUCTION

The Old Booth Street Bridge is a closed-spandrel stone arch bridge, originally constructed in 1873-4, that crosses the old Ottawa aqueduct in the LeBreton Flats area of Ottawa, Ontario. The bridge was extended on the east and west sides in the late 19th and early 20th centuries. 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.

The Old Booth Street Bridge now sits below the overhead multi-span Booth St. Bridge structure constructed in 2016. Currently it is not in use and 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 intention of the Booth Street Bridge Renewal project being undertaken by the City of Ottawa is to remove the east and west extensions to the bridge and to rehabilitate the original centre portion of the bridge as a pedestrian/cycling transportation link for future multi use pathways.

This Heritage Brief contains a brief historical overview of the bridge structure, its cultural heritage value, and existing conditions/concerns. It also outlines the proposed approach to rehabilitating the original bridge structure and the adjacent landscaped elements.

The Heritage Brief excludes comments on work to the aqueduct below the bridge, or work outside the immediate boundaries of the project.



Figure 1: Overall view of the east side of the Old Booth Street Bridge, looking south.

2. HISTORICAL OVERVIEW

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 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.

Today, the Old Booth Street Bridge sits below the overhead Booth Street Bridge and is currently not in use. It is accessible by a multi-use pathway at the southeast quadrant of the bridge and the Pimisi LRT station to the south.

The property is owned by the City of Ottawa. 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

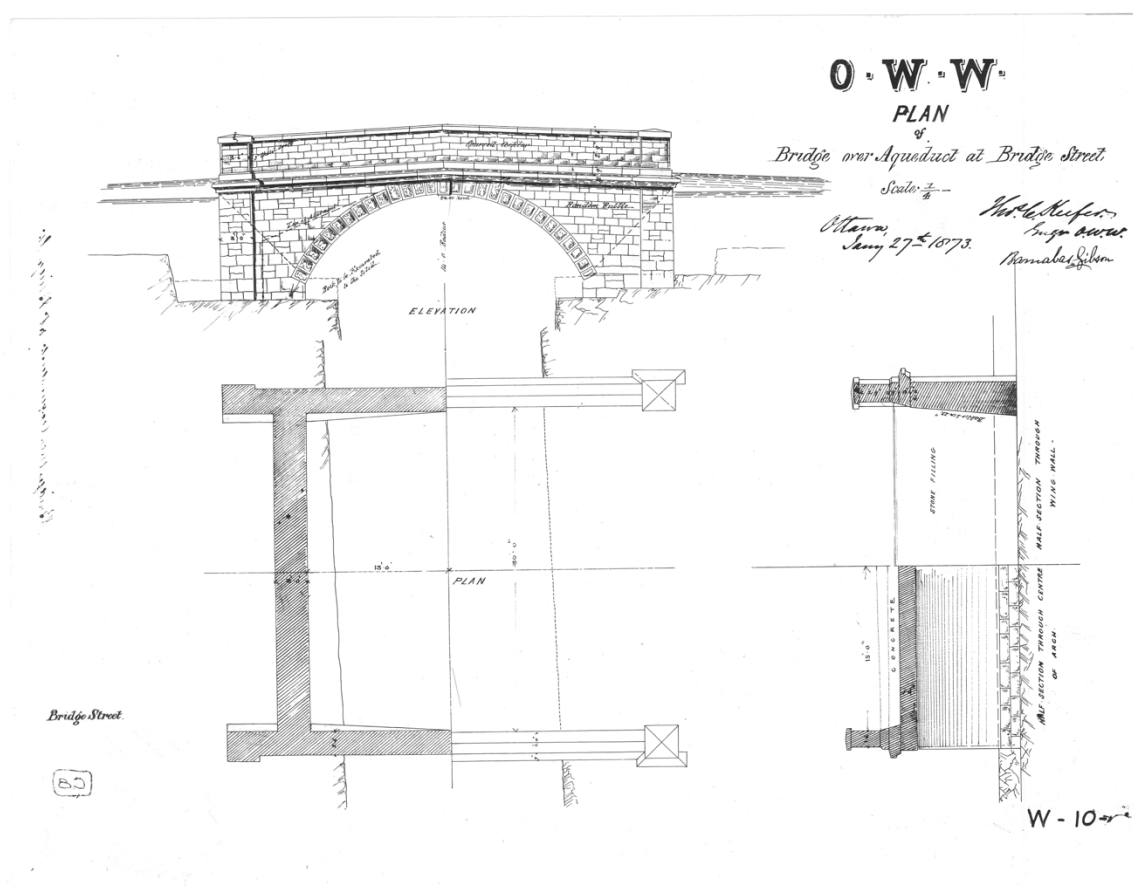


Figure 2: Plan for Bridge over Aqueduct at Bridge Street dated January 27, 1873

2. HISTORICAL OVERVIEW, CONT'D:



Figure 4: Photo looking west towards the Old Booth Street Bridge, 1903



Figure 5: Photo looking northwest towards the Old Booth Street Bridge below the overhead Booth Street Bridge structure, 2019

3. HERITAGE VALUE

The following is a summary of the cultural heritage value and character defining attributes of the Old Booth St. Bridge as outlined in the draft Statement of Cultural Heritage Value (SCHV) in Appendix C of the Cultural Heritage Evaluation prepared by Contentworks in July 2019.

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.

4. EXISTING CONDITIONS:

The Old Booth Street Bridge is a stone arch bridge constructed in 1873-4 with extensions added on the east and west sides in the late 19th and early 20th centuries.

The existing bridge has an overall length of approximately 14.2 metres, and a clear span opening of approximately 10.1 metres. The overall width of the bridge is approximately 19.4 metres and the roadway width excluding the sidewalks is approximately 13.3 metres. The north end of the bridge terminates at a concrete wall abutment from the overhead bridge structure above. To the south, there are 4 large circular concrete columns supporting the overhead bridge structure above and the new LRT station beyond. The east and west views from the bridge look along the aqueduct to the Broad Street Bridge to the west and the Lloyd Street Bridge to the east.

The road surface on the bridge is graded to slope down from the south side to the north side. The existing road surface is asphalt with concrete sidewalks along the east and west parapet walls. The existing west parapet wall varies in height on the bridge from approx. 1200mm at the south end to 1620mm high at the north end due to the existing change of grade across the bridge.

There are existing lights mounted to the underside of the overhead bridge structure above that light the sidewalks on the bridge.

There are a variety of landscape treatments adjacent to the four corners of the existing bridge.



Figure 6: Photo of the east side of the Old Booth Street Bridge looking southwest towards the LRT Station, 2019.



Figure 7: Photo of the Old Booth Street Bridge looking north towards the concrete wall abutment supporting the overhead Booth Street Bridge, 2019.

4. EXISTING CONDITIONS, CONT'D:

For the purposes of this report, the existing stone elements on the Old Booth Street Bridge are identified as follows:

1. Voussoir stone arches visible from the underside of the bridge
2. Springing stones at the base of the voussoir stone arches
3. Stone abutments either side of the voussoir stone arch on the topside (assumed)
4. Stone faces of the voussoir arches
5. Rubble stone spandrel walls surrounding the faces of the voussoir arches
6. Projecting rubble stone north and south wing walls
7. Coursed ashlar stone parapet walls
8. Cut stone projecting band courses
9. Cut stone parapet cap stones

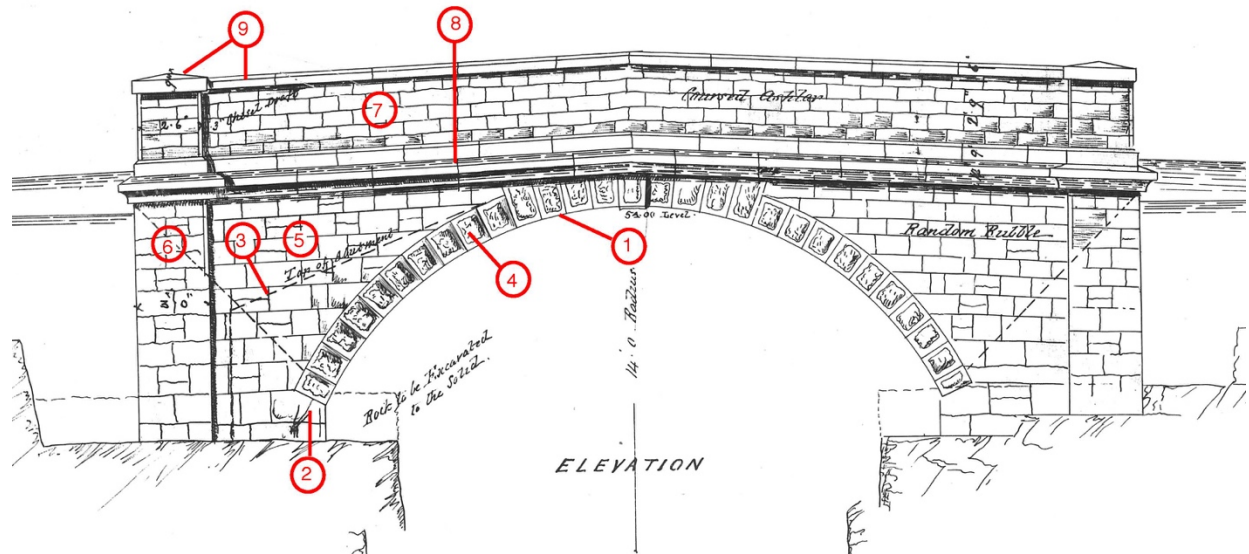


Figure 8: Elevation for Bridge over Aqueduct at Bridge Street dated January 27, 1873, annotated to illustrate the various existing stone elements.

4. EXISTING CONDITIONS, CONT'D:

A condition assessment in 2018 by WSP Inc. reported that overall 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".

The existing voussoir stones on the underside of the centre arch and the east and west extensions were reported to be in fair condition. Along the east side of the Centre Arch, the voussoir stones have been removed/damaged due to the installation of a water main in this location.

The existing stone faces of the east and west extensions including the faces of the voussoir arches, spandrel walls, wing walls, parapets walls and associated cut stone projecting band courses/cap stones were reported to be in fair to poor condition due to cracking, stone delamination, splitting, spalling, bulging and mortar loss. The southern portion of the east parapet wall was dismantled/stored in 2016 due to severe leaning issues and concerns regarding the existing condition.

It is unknown at this time whether the existing stone faces of the voussoir arches, spandrel walls and wing walls are still intact on the Centre Arch or if the stone was removed when the east and west extensions were constructed. The Centre Arch parapet walls would have been removed at this time, probably including the cut stone projecting band courses.



Figure 9: View of the existing watermain between the Centre Arch and the East Extension, 2018



Figure 10: View of the west parapet wall of the West Extension looking north, 2019



Figure 11: View of the west parapet wall of the West Extension looking south, 2019



Figure 12: View of the east parapet wall of the East Extension dismantled in 2016, 2019

5. REHABILITATION APPROACH

The intention of the Booth Street Bridge Renewal project, being undertaken by the City of Ottawa, is to remove the east and west extensions to the bridge and to rehabilitate the original centre portion of the bridge as a pedestrian/cycling transportation link for future multi use pathways.

The rehabilitated bridge will continue to have an overall length of approximately 14.2 metres, and a clear span opening of approximately 10.1 metres. The overall width of the bridge will be approximately 8.4 metres and the roadway width will be approximately 6.8 metres.

The north end of the bridge will continue to terminate at the concrete wall abutment from the overhead bridge structure above. To the south, the entrance to the bridge will be framed by the 2 central circular concrete columns that support the overhead bridge structure above, with views to the new LRT station beyond. The east and west views from the bridge, looking along the aqueduct to the Broad Street Bridge to the west and the Lloyd Street Bridge to the east, will be maintained.

The road surface on the rehabilitated bridge will to be graded symmetrically from the centre of the bridge sloping down equally to the south and north sides. The new road surface is to be asphalt with granite curbs along the face of the stone parapets.

The new parapet walls will be stone parapet walls approximately 990mm high above the road surface with modern metal pipe railings over to meet the minimum height requirement of 1370mm required by municipal cycling standards.

The existing stonework on the rehabilitated bridge is to be repaired/repointed when found to be in good condition, or reconstructed using reclaimed stone from the dismantling of the east and west extensions where possible when found to be missing/damaged. If the reclaimed stone is not suitable or if there are insufficient quantities, new replacement stone is to be provided. The replacement stone is to be St. Mark's limestone. The parapet cap stones and projecting band courses will be new stone elements made of St. Mark's limestone similar in profile/detailing to the original Booth St. Bridge as illustrated in the Keefer drawing from 1873.

Mortar types and mixtures will be carefully selected to suit the existing conditions and stone strength/porosity.

The landscape treatments adjacent to the four corners of the rehabilitated bridge are designed to be similar in treatment and plantings, integrating the reclaimed voussoir stones from the arches of the East & West Extensions where possible.

5. REHABILITATION APPROACH, CONT'D:

The following is a summary of the proposed rehabilitation approach as illustrated on the Booth Street Bridge Renewal drawings prepared by Parsons dated June 9, 2020:

1. Following aqueduct dewatering operations, install protection system upstream and downstream of the bridge structure.
2. Install protection over the water main feeder pipe, and temporary shoring for the Centre Arch and East & West Extensions.
3. Carefully excavate fill on bridge structures down to the existing arch voussoir stones and stone abutments, including removal of sidewalks, asphalt and concrete pavement. (It is noted that stacked stone rubble may be encountered at the ends of the arches. Should the rubble be intact, then it should remain in place undisturbed so as to contribute to the overall structure load distribution system). Remove existing retaining walls/landscaping adjacent to the wing walls of the East & West Extensions.
4. Carefully dismantle, reclaim and store the existing stonework from the parapet walls, spandrel walls and wing walls of the East & West Extensions.
5. Carefully dismantle, reclaim and store the existing voussoir stonework from the arches of the East & West Extensions.
6. Carefully remove abandoned watermain pipe along east face of the Centre Arch. Stabilize the adjacent stonework as required due to removals. Cut pipe off at limits of excavation and grout/seal portion of pipes remaining in situ.
7. Scenario 1 (Existing stonework in good condition): Repair/repoint the existing stonework on the arch faces, spandrel walls and wing walls in situ. Anticipated repair methods to include localized stone replacement, dutchman repairs, jahn repairs and epoxy injection repairs. Use existing reclaimed stone from the East & West Extensions where possible for stone repairs. If the reclaimed stone is not suitable or if there are insufficient quantities, provide new replacement stone.

Scenario 2 (Existing stonework in poor condition, damaged or missing): Reconstruct the existing stonework of the arch faces, spandrel walls and wing walls in situ. Use existing reclaimed stone from the arch faces, spandrel walls and wing walls of the East & West Extensions where possible for reconstruction work. If the reclaimed stone is not suitable or if there are insufficient quantities, provide new replacement stone. Stonework to match the overall appearance of the existing stonework.
8. Construct the stone parapet walls on the restored/reconstructed spandrel walls and wing walls of the Centre Arch as detailed. Use reclaimed stone from the parapet walls of the existing East & West Extensions where possible. If the reclaimed stone is not suitable or if there are insufficient quantities, provide new replacement stone. Provide new projecting stone band courses and parapet cap stones, similar in profile, dimensions and detailing to the original Booth St. Bridge as illustrated on the 1873 Keefer drawing. Stonework to match the overall appearance of the existing stonework.
- 8A. Provide new metal pipe rails centred on parapet cap stones as detailed.

5. REHABILITATION APPROACH, CONT'D:

9. Repair/repoint the existing arch voussoir stones and stone abutments on the top side of the Centre Arch. Anticipated repair methods to include localized stone replacement, dutchman repairs and epoxy injection repairs.
10. Repair/repoint the existing arch voussoir stones on the underside of the Centre Arch. Anticipated repair methods to include localized stone replacement, dutchman repairs, jahn repairs and epoxy injection repairs.
11. Repair/repoint the existing springing stones of the Centre Arch. Anticipated repair methods to include localized stone replacement, dutchman repairs.
12. Install fill material on the topside of the restored Centre Arch.
13. Install new reinforced concrete distribution slab and waterproofing & protection board.
14. Place a layer of Granular A and asphalt over the waterproofing membrane.
15. Grade the approaches and install granite curbs and gutters.
16. Carry out landscaping, construct retaining walls, install railings on approaches and connect to existing railings/fences. Integrate existing reclaimed voussoir stonework from the arches of the East & West Arches where possible in the new landscape elements.

It is recommended that the existing lights mounted to the underside of the overhead bridge structure above be relocated to light the rehabilitated Booth St. bridge as a separate project.