



COMMONWEALTH

HERITAGE ASSESSMENT OF THE JOHNSON STREET BRIDGE, VICTORIA

Prepared for Delcan

April 2009

COMMONWEALTH HISTORIC RESOURCE MANAGEMENT LIMITED

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Introduction

Having just passed its eighty-fifth birthday, Victoria's Johnson Street Bridge approaches a crossroads. The City of Victoria will decide whether to rehabilitate or replace the landmark 'big blue' bridge. Many factors will influence this decision, one of which is its heritage value. The present report provides a history of the bridge and its context, and then uses that history to assess its heritage value. This material is intended to help the City make an informed decision about the future of the bridge.



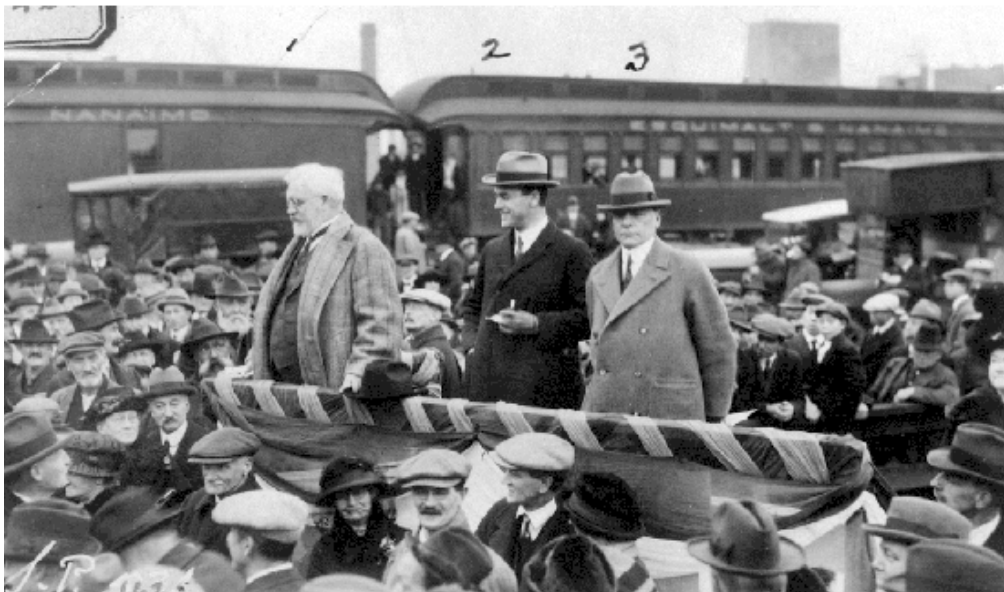
The Johnson Street Bridge seen closed and open. The two views show how the counterbalance and the span balance each other. (Wikipedia)

This heritage assessment has been prepared by Commonwealth for Delcan, under authorization from the City of Victoria's Engineering Department. The report has been written by Harold Kalman, PhD. Research on the history of the bridge was undertaken by Cairn Crockford, MA, and research on the engineering was done by Christin Doeinghaus, MRAIC. Robert D. Turner, MSc, added valuable material.

Contextual History

The Johnson Street Bridge

January 11, 1924, was a banner day in Victoria. Mayor Reginald Hayward, Premier John Oliver, and E&N Railway Superintendent J.D. Fraser proudly opened the new Johnson Street Bridge. 'On behalf of the civic administration and of the citizens as a whole,' the Mayor declared, 'I want to express gratification at the completion of this structure. ... Many obstacles were met and had to be overcome by those to whom the project was entrusted, thus adding from time to time to the cost of the structure. We have now, however, an excellent bridge ... linking up the old Songhees Reserve industrial area, Victoria West, and Esquimalt.' The Premier also alluded to a bumpy path: 'I wish to congratulate the people upon the completion of a protracted and somewhat expensive undertaking.'



Premier John Oliver, Mayor Reginald Hayward, and E&N Superintendent J.D. Fraser open the Johnson Street Bridge in January 1924. (BC Archives B-00985, for study purposes only)

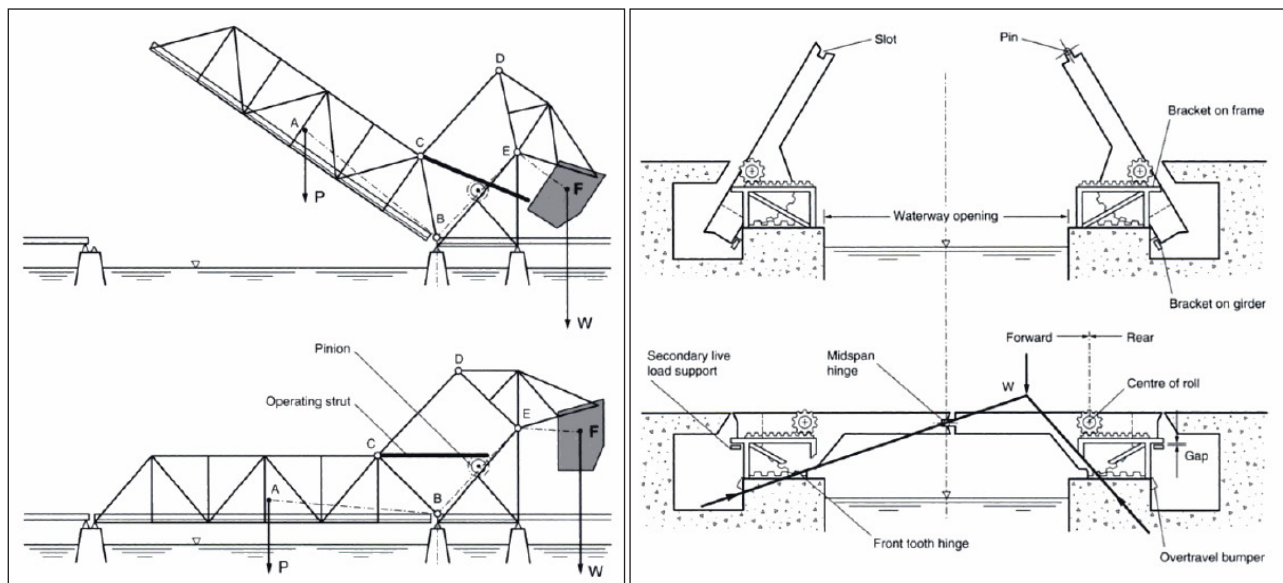
The new Johnson Street Bridge had been a major civic issue for a quarter of a century. It replaced a swing bridge, built in 1888, whose limited load capacity and deck shared by trains and pedestrians had been problematic from the start. Moreover, all other traffic, including streetcars and (later) motor vehicles, had to go all the way north to the Point Ellice Bridge to travel between the city and Esquimalt. Within a decade of the swing span's completion, local visionaries – led by retired architect Thomas C. Sorby, a tireless promoter of improving the Inner Harbour – were calling for a more substantial lift span that would separate trains from vehicles and pedestrians, and which would provide easier navigation between the harbour and the Gorge. The voices supporting a new bridge raised a few decibels when, around 1909, a pedestrian crossing the bridge was struck by a locomotive.

The Province of BC purchased the Songhees Indian Reserve, on the west side of the channel, in 1911, enabling development of the E&N railyards (the Roundhouse and associated structures remain and will soon be rehabilitated), expansion of Victoria's shipyards, and construction of proper approaches for a new bridge. The City of Victoria convened the Johnson Street Bridge Committee in January 1914. However, conflicts soon emerged among the potential participants over the sharing of costs and responsibilities. BC Electric, which operated the streetcar system, soon dropped out of the negotiations and the E&N threatened to do the same. An agreement among the City, the Province, and the Canadian Pacific Railway (owner of the E&N) was finally reached in December 1919.

This was followed in January 1920 by Victorians' voting, by a landslide margin of six to one, to approve a bylaw enabling the City to borrow money for the bridge. The *Daily Colonist* described the bridge ordeal as 'an undertaking which has been among the liv[eli]est topics of local interest for many years,' urging its readers to seize the opportunity and support the project.

The Strauss Trunnion Bascule Bridge

An equally lively technical debate had taken place as to which bridge engineering system to adopt. All were agreed that it should be a bascule bridge, which is a moveable bridge in which the lift span (or 'leaf') is balanced by a counterweight. (A see-saw is a 'bascule' in French.) However, two competing patented bascule bridge designs – trunnion bascules and rolling bascules – were battling it out in early-twentieth-century North America. The champion of the former was engineer Joseph B. Strauss (1870-1938), whose patented Strauss trunnion bascule bridge featured a fixed 'heel trunnion' bearing. The other system was the Scherzer rolling lift bascule bridge, whose leaf rolls during opening and closing; it was developed by brothers William and Albert Scherzer. The battlefield was Chicago, where both firms were based. The first Scherzer bridge opened in 1894, the first Strauss Bridge in 1902.



Schematic diagrams of the Strauss Trunnion Bascule Bridge and the Scherzer Rolling Lift Bascule Bridge. (from *Manual of Bridge Engineering*)

Both the Strauss Bascule Bridge Company and the Scherzer Rolling Lift Bridge Company submitted preliminary drawings and cost estimates for the Johnson Street Bridge in 1913. One letter from the Chicago Department of Public Works to the City of Victoria calls the 'trunnion type best'. However, the decision to go with the Strauss design was made by Victoria City Council, on the recommendation of City Engineer Frank Preston, only on January 29, 1920, a week and a half after the bridge bylaw was approved by the City's electorate. Preston toured the Chicago bascule bridges later that year, in September 1920.

The Strauss trunnion bascule bridge was an enduring design. Many were built in Canada; the earliest appear to be four spans over the Trent Canal in Ontario, built in 1909-11. Designs for about twenty other Canadian bridges of this type produced earlier than the Johnson Street Bridge can be found in the collection of Joseph Strauss Bridge Plans at Stanford University Libraries. Perhaps the only other bridge of this type in Canada as familiar as the Johnson Street Bridge is the Cherry Street Bridge in Toronto (1931; designated under the Ontario Heritage Act).



View of the Cherry Street Bridge, a Strauss trunnion bascule bridge built in 1931.
(Wikipedia)

Joseph Baermann Strauss earned considerable fame as a bridge engineer. A native of Cincinnati, Ohio, he was born into an artistic family yet developed a fascination for bridges. He developed his bascule bridge design, described as 'a utilitarian structure, practical but unlovely,' while he was working for engineer Ralph Modjeski in Chicago. Strauss established the Strauss Bascule Bridge Company in 1904; it was later renamed Strauss Engineering Corporation. He was a tenacious promoter as well as an innovative designer who held 46 patents for a variety of products.

The Strauss Company built some 400 bascule bridges across the U.S. and many more around the world. The firm was particularly proud of the highly ornamental double-leaf Palace Bridge in St. Petersburg (designed 1911, opened 1916, decoration completed 1939). Others were built in China, Denmark, and France.

The irony is that it was a suspension bridge – his first – that gave Joseph Strauss enduring fame. He was the engineer for the Golden Gate Bridge in San Francisco, which was conceived in 1919, approved in 1930, and opened in 1937, a year before his death.

Construction and Modifications

Once the Johnson Street Bridge was approved by Victoria's voters on January 15, 1920, the City moved quickly towards construction. Mayor Robert J. Porter was 'extremely gratified' that 'the people of Victoria fully recognized the imperative necessity of getting the bridge built,' and ensured that there would be 'no unnecessary delay in getting construction work started.'

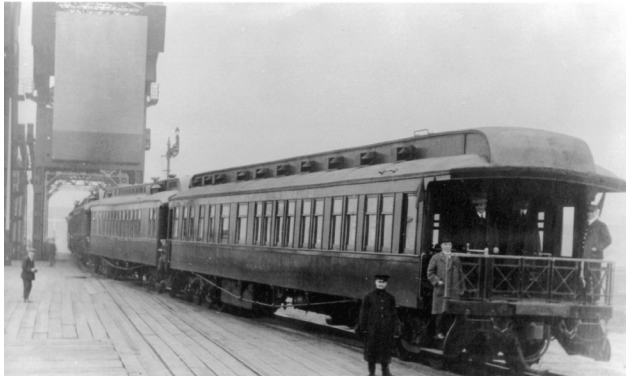
On May 29, 1921, when the caissons, abutments, and piers were well under construction, the *Daily Colonist* devoted several pages to construction progress and information provided by City Engineer Frank Preston. The substructure of the bridge and the fixed approaches were designed and built by the City of Victoria's Engineering Department, under Preston's direction. More than 10,000 cubic yards of concrete were poured. The Strauss Company designed the steel superstructure, which was fabricated in Walkerville, Ontario, by the Canadian Bridge Company.

The main opening span is 148 feet (45 m) long and weighs 350 tons. It is balanced on the highway span by a hollow concrete structure that contains a number of smaller concrete weights and which weighs more than 780 tons. The counterweight is lighter on the railway span. The large racks that provide the movement are powered by two 75-horsepower electric motors. The eastern approach is spanned by a 110-foot fixed girder, while the western approach as a 73-foot fixed girder. The final cost was \$918,000, 27 per cent higher than the estimated cost of \$720,000.



The counterweights for the highway span (left) and railway span (right) dominate this view from the east. (Robert D. Turner)

The highway span was completed by May 1923 although, as was noted above, the official opening did not take place until January 1924. The railway span was completed in October 1923. The date '1922' appears on the bridge, which probably records when the steel was fabricated.



The E&N Parlour Car *Malabat* is the last car in this train, about to leave Victoria station. This photo shows the original wooden deck. (BC Archives F-05357, for study purposes only)



The Royal Train carrying King George VI and Queen Elizabeth crosses the Johnson Street Bridge in 1939. (Dave Wilkie Photo, Collection Robert D. Turner)

The bridge alignment required additional negotiations and compromises. It is not on the line of Johnson Street, as the City and Province would have preferred, in order to accommodate the curvature of the railway tracks leading from the station. The City would also have preferred the two spans to have been in separate locations, but the federal government would not allow the additional obstruction to the waterway that such a scheme would have entailed.

The original wood deck absorbed rainwater and became heavier (as well as slippery) when wet. This affected the balance and put a strain on the lift mechanism. In 1966 it was replaced with open steel grid decking, which drained water and maintained its weight. In 1979 extensive repairs were made to the superstructure, which had become severely corroded. The steel was painted blue after the repairs. The colour was chosen because its oxides match its pigment, and so the colour fades little over time. 'Big Blue,' as the bridge came to be called may have been blue for only thirty years, but this is the colour by which Victorians know it.



A ViaRail 'Dayliner' and vehicular traffic cross the bridge on their respective spans. (Robert D. Turner)

Only one daily train each way crosses the bridge these days, although there is considerable talk about using the E&N tracks and the bridge for a proposed light rail commuter service. The highway span is much busier, accommodating some 30,000 cars daily and ensuring that motorists remain very familiar with this Inner Harbour landmark. The bridge is also used by many cyclists and pedestrians travelling from Vic West to work and shop in the downtown core.

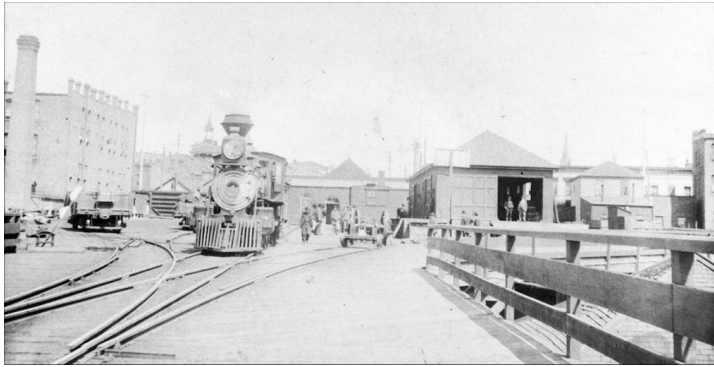
Urban Context

The Johnson Street Bridge comprises a key part of larger cultural landscape that contains many heritage resources relating to the E&N Railway. These include the E&N Roundhouse complex in Victoria West, which comprises the Roundhouse, Backshop, Car Shop, Stores Building, and Turntable, all virtually unaltered since their construction in 1913 and collectively designated a municipal heritage site and a national historic site. (These structures will soon be rehabilitated as part of a new mixed-use development.) The site of the former Russell's Station lies just to the west. On the downtown side, the ViaRail Station terminates the extant railway resources; however the large open space at the intersection of the Johnson and Wharf Streets, framed by the historic Janion Hotel, is a reminder of the former E&N Station and track complex. And tying the complex together is the E&N main line track, with its overpass crossing Esquimalt Road.



Aerial view of the Inner Harbour, showing the E&N cultural landscape in the foreground. The Johnson Street Bridge is seen at the far left and the Roundhouse complex is near the right. The upper harbour in the Gorge channel, with its wharves, is seen at the lower left. (Roundhouse Properties Limited Partnership / Hotson Bakker Boniface Haden)

The old E&N Station, built for the 1888 crossing, remained in use until its demolition in 1972, which forced passengers to disembark in Victoria West (at the former Russell's Station, at today's Catherine Street and Esquimalt Road) until the construction of the ViaRail Station in 1986.



View of the E&N Station complex in Victoria, c.1890, taken from the east side of the former swing bridge. The Janion Hotel stands at the left. (Robert D. Turner Collection)



The present ViaRail Station, just east of the Johnson Street Bridge. It was designed by architect Yves Roy and built in 1986. (Commonwealth)

The Johnson Street Bridge also forms part of a second industrial cultural landscape, formed by the mouth of the Gorge and including the rapidly disappearing industrial sites along the channel. Once the focus of Victoria's shipbuilding and lumber industries, the area is in the process of a transition to residential and light commercial use epitomized by the large Dockside Green development.

The Bridge comprises a part of the Greater Victoria trail system. It connects with the pedestrian path system around the Inner Harbour; it also connects with the Galloping Goose Trail and the Lochside Regional Trail, extending north to the Swartz Bay ferry terminal.

Predecessor Bridges

The first crossing over the mouth of the Gorge was the 'Victoria Bridge', a low-level wagon bridge built in 1854-55. By 1859 there were calls for its removal because it blocked boat access to the upper harbour. This led to the construction of replacement crossings at Rock Bay and Point Ellis. Both were completed by 1861. The Victoria Bridge was dismantled a year later and replaced by ferry service.



The only known photo of the Victoria Bridge, built in 1854-55 and removed in 1862, shows it was a low-level wood structure. (BC Archives G-04715, for study purposes only)

The second bridge at the Johnson Street alignment was a swing bridge, built in 1888 to provide the Esquimalt & Nanaimo Railway with access to downtown Victoria. It was designed and built under the direction of Joseph Hunter, Chief Engineer of the E&N. The hand-operated swing span consisted of a compound through truss, rotating on a central pier. The approaches were wood trestles.

Prime Minister Sir John A. Macdonald, formerly Victoria's Member of Parliament, drove the last spike, marking the formal completion of the transcontinental railway, which had been a condition of British Columbia's entering Confederation in 1871.



The swing bridge built in 1888 enabled trains to reach downtown Victoria and boats to access the upper harbour. A single track and a pedestrian walkway shared the wood deck. (BC Archives G-02980 and G-03435, for study purposes only)

The bridge accommodated pedestrians as well as trains. Vehicles used the Point Ellice Bridge (on the alignment of today's Bay Street Bridge) to the north. The inadequacies of the swing bridge were recognized early and vocally. This led to agitation for the present Johnson Street Bridge, which is discussed at the beginning of this report.

Heritage Assessment

The purpose of a heritage assessment is to identify the heritage values of a historic place (also called a heritage resource), and to attempt to determine the degree of significance of each value relative to other places. This is relatively straightforward when a large group of historic places is being assessed simultaneously and the relative values become apparent.¹ It is less clear when a single historic place is assessed in isolation, as is the present case, because no baseline is apparent and there are no absolute values.² Nevertheless this is an exercise that is done frequently by professionals.

This section will begin by assessing the value of the Johnson Street Bridge using categories that are common in heritage practice. It will then relate the values to the historic themes in the City of Victoria Civic Thematic Framework, currently in its final draft stage.

¹ A methodology for doing this is found in Harold Kalman, *The Evaluation of Historic Buildings*, Ottawa: Parks Canada, 1979. This quantification method received wide acceptance in the subsequent two decades.

² This is the purpose of a Statement of Significance, a format for determining heritage value and 'character-defining elements' introduced by Parks Canada around 2001 as part of the federal Historic Places Initiative. The 'SOS' does not identify heritage values, but does not attempt to quantify either absolute or relative values.

Heritage Value

Social-historical Values

- The present Johnson Street Bridge was built to improve access between Victoria the industrial lands on the west bank of the harbour channel that were created by the purchase of the Songhees Reserve by the Province of BC in 1911, and was seen as an essential component of Victoria's aspirations for economic and industrial development.
- The Bridge was also built to improve access between Victoria and the Dockyard and Army Base in Esquimalt.
- The Bridge is closely associated with the Esquimalt & Nanaimo Railway, which was a partner in its development. The bridge was necessary to provide access to Victoria for the heavy steam locomotives and passenger trains used by the E&N, which contributed to the economic prosperity of Vancouver Island. The bridge also permitted access for freight traffic to the E&N yards (called the Albion Yards) and many warehouses and industries along Store Street and nearby areas.
- The Bridge is part of a larger cultural landscape focussed on the E&N Railway (see below, Contextual Values). The E&N came about as a condition of BC entering Canadian Confederation. The present features of the cultural landscape were enabled by the purchase of the Songhees Lands by the Provincial Government in 1911, a significant event in the development of Victoria.
- The construction of a high-capacity moveable bridge in this location was seen by many people as an essential link in Victoria's transportation system and in the development of the Inner Harbour as an industrial centre, focussing in part on the once-vital shipbuilding industry.
- The protracted negotiations to build the bridge and the subsequent negotiations over its precise alignment are representative of the ongoing tensions and cooperation among the three levels of government and the corporate sector.
- The lift span ensured access between the Inner Harbour and the Gorge, both navigable waterways lined with industries, including sawmills and shipyards that depended on water access.

Engineering Values

- The Johnson Street Bridge is one of at least 30 Strauss Trunnion Bascule Bridges designed for a Canadian location between 1909 and the early 1930s. Chronologically, it comes near the middle of this series. It is one of what may be the two most familiar urban bridges of the type in Canada; the other is the Cherry Street Bridge in Toronto, built in 1931.
- The Bridge is a single-leaf trunnion bascule bridge designed and built by the Strauss Bascule Bridge Company. This was an enduring and efficient design that was adopted around the world.
- The Bridge was an unusual variant of the standards Strauss design in that it has two parallel but separate spans, one for the roadway and one for the railway.
- Joseph B. Strauss was one of the most renowned and accomplished bridge engineers in the U.S. and the chief engineer of the Golden Gate Bridge in San Francisco.

- The bridge has a high degree of integrity, retaining its original design even though it has been upgraded over the years to meet changing needs and conditions.
- The physical shape and form of the metal lattice construction has aesthetic value.

Contextual Values

- The Johnson Street Bridge is a very familiar landmark, dominating views of the Inner Harbour and known for its size, scale, conspicuous location, and familiar blue colour.
- It is also a highly travelled bridge, on an important route that links Victoria with Victoria West.
- The Bridge is part of a larger cultural landscape containing resources from the Esquimalt & Nanaimo Railway, including the Roundhouse complex in Victoria West (a National Historic Site and a municipally designated site), the tracks, the overpass over Esquimalt Road, and the ViaRail station, which replaced the E&N Station of 1888.
- It is by far the longest surviving and most familiar of the three bridges that have been built at this location.
- The bridge is an entry statement as the gateway into the Downtown core.
- The bridge is part of the Greater Victoria trail system and connects with the pedestrian path around the Inner Harbour, and also with the Galloping Goose Trail and Lochside Regional Trail, which lead north to the Swartz Bay ferry terminal.

Overall Value

- The Johnson Street Bridge has very high heritage value in the context of Victoria, the Inner Harbour, and the City's and Region's transportation systems.
- The Bridge has high heritage value as an engineering landmark designed by one of North America's most renowned bridge engineers / engineering firms.

Heritage Themes

The City has drafted a Citywide Thematic Framework that defines the principal historical themes represented in the built environment. The Johnson Street Bridge represents, and can serve to interpret, the following themes:

Theme 2: Gateway Economy

2.3 Working Waterfront

- Illustrates the need to establish efficient transportation to develop industry, in this case the shipyards and other industry on the former Songhees Reserve in Victoria West, and within Victoria along Store Street and the freight yards built between Government and Store Streets.

2.5 Historic Infrastructure

- Perhaps the City's most familiar and enduring example of historic infrastructure, carrying the E&N Railway and the road to Esquimalt.
- It is also an important pedestrian structure and has been used since its opening to enable people to walk between Vic West and Downtown.

Theme 3: Capital City

3.1 Governing the West

- The negotiations to build the bridge involved establishing an agreement between the Provincial and Municipal governments, as well as with the Federal government as the regulator of railways.
- The E&N Railway, which is closely associated with the bridge, represents a key condition of BC's entering Canadian Confederation.

Theme 4: Community of Neighbourhoods

4.6 Public Spaces and Gathering Places

- The bridge and its approaches comprise a very familiar public space.
- The bridge links two neighbourhoods: Old Town and Victoria West.

Theme 5: Cultural Fabric

5.1 Architectural Expression

- A significant example of a particularly renowned engineering achievement.
- Part of an important larger cultural landscape.

Conclusion

The Johnson Street Bridge is a very significant heritage landmark whose characteristics illustrate many key themes in the development of Victoria.

Appendixes

Appendix 1: Engineering Drawings and Documents for the Johnson Street Bridge

Engineering drawings and other early documents for the Johnson Street Bridge may be found in two locations:

City of Victoria Archives

Plan Series 1-2, 1-3, 1-4. Various drawings of the bridge, piers, operating machinery, and lubrication chart. Including drawings created by the Canadian Bridge Co. Ltd. (1921-23) and the City of Victoria Engineering Department.

- Inventoried in City Archives Summer 1984 Heritage Trust project by SH

CRS 121. 'Johnson Street Bridge Files.' City of Victoria, City Solicitor, Miscellaneous Files. 1904-63. Includes statements, specifications, engineering reports, contracts, correspondence, drawings, details, more. Locations 11C4 – 11C8.

Stanford University Libraries

Department of Special Collections, Collection number M163. Joseph Strauss Bridge Plans, 1905-1935.

- Plans for the Johnson Street Bridge are contained in File 758
- Inventoried at <http://www-sul.stanford.edu/depts/spc/xml/m0163.xml>
- See Appendix 2 for information on this collection

Appendix 2: Strauss Bascule Bridges designed for Canadian locations

Guide to the Joseph Strauss Bridge Plans, 1905-1935

URL: <http://www-sul.stanford.edu/depts/spc/xml/m0163.xml>

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Department of Special Collections

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Descriptive Summary

Title : Joseph Strauss Bridge Plans, 1905-1935

Collection number : Special Collections M163

Creator : Strauss, Joseph

Extent : 96 containers

Repository : Stanford University. Libraries. Dept. of Special Collections.

Administrative Information

Access Restrictions: Requires a 24 hour paging period.

Publication Rights: Property rights reside with the repository. Literary rights reside with the creators of the documents or their heirs. To obtain permission to publish or reproduce, please contact the Public Services Librarian of the Dept. of Special Collections.

Provenance: Transferred from the School of Engineering, Stanford University, 1966.

Preferred Citation: [Identification of item] Joseph Strauss Bridge Plans, M163, Dept. of Special Collections, Stanford University Libraries, Stanford, Calif.

SCOPE AND CONTENT

The collection consists of original bridge plans and construction drafts. Four different bridge types are represented: Strauss direct lift bridge (S.D.L.B.), Strauss trunnion draw span (S.T.D.S.), Strauss trunnion bascule bridge (S.T.B.B.), and Strauss vertical lift bridge (S.V.L.B.). Years indicated after location of the project are the earliest and latest dated plans in the set; number in parentheses indicates number of plans or sketches in the set.

NOTES ABOUT THE PRESENT LIST

The list of files has been edited by Commonwealth to show only plans for bridges in Canada.
38 entries

Note: We have not verified whether or not these bridges were actually built, whether they are still standing if they were built, and whether this list represents all Strauss bridges designed for Canada. The dates are the dates of the drawings, not necessarily of construction. Some bridges may be represented by multiple entries. This includes both rail and highway crossings. If we are familiar with a particular bridge, we have indicated its status.

File 426: S.T.B.B.

Trent Canal, Lindsay, Ontario, Canada; 1909 -1910

File 427: S.T.B.B.

Trent Canal, Campbellford, Ontario, Canada; 1910

File 428: S.T.B.B.

Trent Canal, Grand Trunk Railway Bridge at Campbellford. Ontario, Canada; 1910

File 429: S.T.B.B.

Saint Andrews Lock, Winnipeg, Manitoba, Canada; 1911 -1912

File 431: S.T.B.B.

Trent Canal, Campbellford, Ontario, Canada; 1911

File 438: S.T.B.B.

Second Narrows, Burrard Inlet, Vancouver, British Columbia; 1924
[opened 1925; destroyed in a collision with a vessel in 1930]

File 457: S.T.B.B.

Ky-ax River, for the Grand Trunk Pacific Railway; 1910

File 507: S.T.B.B.

Princess Louise Docks, Quebec, Canada; 1910 -1911

File 513: S.T.B.B.

Chambly Canal, St. Johns, Quebec, Canada; 1915

File 538: S.T.B.B.
St. Charles River, Quebec, Canada; 1911

File 545: S.T.B.B.
Assiniboine River, Winnipeg, Manitoba, Canada; 1912
[may be the bridge at The Fork, built for the Canadian Northern Railway and completed in 1914; may also be File 670]

File 561: S.T.B.B.
Rainy Lake for the Canadian Northern Railway; 1912

File 573: S.T.B.B.
Catarqui River, Kinaston, Ontario, Canada; 1912 -1914

File 598: S.T.B.B.
Lachine Canal at Rockford; 1911

File 598A: S.T.B.B.
Alterations to Lachine Canal at Rockford; 1923

File 637: S.T.B.B.
St. Charles River, Quebec, Canada; 1924

File 658: S.T.B.B.
South Saskatchewan River for the Canadian Pacific Railway; 1912

File 670: S.T.B.B.
Assiniboine River, Winnipeg, Canada; 1912
[see File 545]

File 676: S.T.B.B.
Fraser River for the Grand Trunk Pacific Railway; 1913

File 750: S.T.B.B.
Provencher Avenue, Red River, St. Boniface, Manitoba, Canada; 1913

File 758: S.T.B.B.
Johnson Street Bridge, Victoria Inner Harbor, Victoria, British Columbia; 1921
[subject of this report; extant]

File 834: S.D.L.B.
Pretoria Avenue Bridge, Rideau Canal, Ottawa, Canada; 1915
[replaced with a new bridge ca. 1985]

File 944: S.T.B.B.
Richelieu River, Iberville, Quebec, Canada; 1915

File 955: S.T.B.B.

Bickell's Bridge, St. Charles River, Quebec, Canada; 1925

File 996: S.T.B.B.

Burlington Channel, Ontario, Canada; 1920

File 1072: S.T.B.B.

Batiscan River, Montreal-Quebec Highway; 1920

File 1128: S.T.B.B.

Welland River, Chippawa, Ontario, Canada; 1919

File 1193: S.T.B.B.

Lynn River, Port Dover, Ontario, Canada; 1920

File 1272: S.T.B.B.

River Thames, Prairie Siding, Ontario, Canada; 1922 -1923

File 1388: S.T.B.B.

Welland Ship Canal, Port Robinson, Ontario, Canada; 1924

File 1493: S.T.B.B.

St. Charles River, Quebec, Canada; 1930

File 1581: S.T.B.B.

Burlington Channel, Ontario, Canada; 1930

File 1580: S.T.B.B.

Ship Channel, Toronto, Ontario, Canada; 1929

[probably the Cherry Street Bridge; extant]

File 864: S.T.B.B.

Keating's Channel, Toronto, Ontario, Canada; 1915 -1916

File 405: S.T.B.B.

Kaministiquia River, Canadian Pacific Railway. 1910

File 409: S.T.B.B.

Welland Canal Feeder, Niagara, St. Catharines & Toronto Railway Co.; 1910

File 333: S.T.B.B.

Red River, for the National Transcontinental Railway; 1909

File 367: S.T.B.B.

Assiniboine River, Winnipeg, Manitoba, Canada; 1909 -1910

Appendix 3: Sources Consulted

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- 1919, October 5. 'Bridging the Waters between Victoria and Reserve.' *Daily Colonist*, p. 23.
- 1920, January 15. 'Vote for Bridge By-law and Victoria's Progress.' *Daily Colonist*, p. 1 and various articles
- 1920, January 16. 'Bridge By-law Gets Support at Polls by Hugh Majority.' *Daily Colonist*, p. 1.
- 1921, May 29. 'Johnson St. Bridge is Well Under Way.' *Daily Colonist*, p. 26.
- 1924, January 12. 'Crowds Witness Bridge Opening.' *Daily Colonist*, p. 1.
- 2009, April 2. Bill Cleverley, 'Blue Bridge needs to be fixed or replaced.' *Times Colonist*.

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British Columbia Archives

- Photograph collection

City of Victoria Archives.

- 'Bridges: Johnson Street' (list of photographs)
- Clark, Cecil. 'Yesterday / Today.' Numbers 188, 488, 580
- 'Johnson Street Bridge' (description)
- Photograph collection
- 'Victoria Industrial Heritage Building Inventory'

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‘Bascule Bridge – The Forks – Winnipeg MB’ Waymark

- Accessed at <http://www.waymarking.com/waymarks/WM2NAC>

City of Victoria. Johnson Street Bridge History.

- Accessed at http://www.victoria.ca/cityhall/departments_engroads_johnsonhistory.shtml#

Guide to the Joseph Strauss Bridge Plans, 1905-1935.

- Accessed at <http://www-sul.stanford.edu/depts/spc/xml/m0163.xml>
- See Appendix 2

Joseph Baermann Strauss

- Accessed at <http://en.structurae.de/persons/data/index.cfm?ID=d000053>

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