HISTORIC BRIDGES ON THE RIDEAU WATERWAYS SYSTEM
A PRELIMINARY REPORT
by
ROBERT W. PASSFIELD

(1976)
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These scans are pure text, done before the days of page image scans with text recognition. As such, although thoroughly proofed, some errors may remain (see “Errors” on next page).

In December 2019, the Board of Friends of the Rideau passed a resolution to allow these scans to be donated to Randall D. Payne for posting to the ParksCanadaHistory.com website in order to provide greater public access to these important research documents. This website does a tremendous public service in making these documents, in digital form, freely available to the general public.

Friends of the Rideau

Friends of the Rideau is a volunteer run, non-profit organization, dedicated to preserving and enhancing all those elements that make the Rideau a unique North American waterway. It was formed in 1985 and is now one of the few remaining Parks Canada “cooperating associations,” working with Parks Canada to enhance programs and services available to the public.

The goals of Friends of the Rideau are to:

- Enhance and preserve the natural and cultural heritage of the Rideau Canal.
- Increase public awareness and enjoyment of the Rideau Canal.
- Develop strong public support for the long-term well being of the Rideau Canal.
- Promote co-operative Rideau Canal information distribution.

More information about Friends of the Rideau can be found at:

www.rideaufriends.com
DIGITAL TRANSCRIPTION

This is a digital transcription of Parks Canada Manuscript Report 212. Pagination has been kept exactly as it was in the original document so that page references to the paper document will match this digital document. The document has been reformatted from the original to improve readability.

ERRORS

Although every effort has been made to make this digital version true to the original, it is possible that it still contains OCR errors which can be quite subtle, for instance changing an i to an l (which can at times form a real word – i.e. mail/mall). This is one reason to make sure any citations include the “digital edition” addition, to differentiate it from the original paper copy.

CREDITS

The concept to digitize several of the important Rideau Manuscript Reports was conceived in 2007 by Ken W. Watson, local Rideau author and historian and Chair of Friends of the Rideau’s Publication Committee, as a method to make these valuable research documents more accessible to the general public.

Mary Ann Stienberg of the Rideau Canal Office of Parks Canada was instrumental in obtaining Parks Canada permission for Friends of the Rideau to make this digital document available to the general public. Thanks to Kevin Fox of Parks Canada for the loan of the report.

Digital document scanning, proofing, formatting and setting into final digital book form was done by Ken W. Watson on behalf of Friends of the Rideau.

The final document benefitted from a review and additions by Robert W. Passfield.

CITATION NOTES

The most heavily cited source is “PAC”, which is today’s “Library and Archives Canada” (LAC), which was previously the “National Archives of Canada” (NAC) and prior to that it was the “Public Archives of Canada” (PAC).

MANUSCRIPT REPORT SERIES

Shortly after Parks Canada took over the administration of the Rideau Canal in 1972 (previously under the jurisdiction of the Department of Transport) they tasked several of their high quality researchers and historians with detailing various historical/heritage aspects of the Rideau Canal. This resulted in a series of research reports on the Rideau Canal, produced from the mid-1970s through to the mid-1980s.

Intended mostly for internal use, these reports were produced in limited numbers with only a few receiving broader distribution through the History and Archaeology series of books published by the Ministry of Environment (National Historic Parks and Sites Branch of Parks Canada).

A few copies of the manuscript reports were also distributed to “various public repositories in Canada for use by interested individuals.” They used to be found in the local Rideau region libraries (Smiths Falls & Elgin) of Parks Canada. Those libraries were shut down by Parks Canada in 2012, making access to this valuable research material much more difficult for local researchers.
Timber swing bridges across the Rideau Canal in 1890.

Map by Ken W. Watson with data by Robert W. Passfield, 2006
Timber swing bridges across the Rideau Canal in 2006.

Map by Ken W. Watson with data by Robert W. Passfield, 2006
Historic Bridges on the Rideau Waterways System

A Preliminary Report

by Robert W. Passfield

NOTE: This is only a portion of Manuscript Report 212. Two separate sections that did not deal with the Rideau Canal were omitted:

The St. Peter’s Canal Swing Bridge (1976)

and

The Upper Dorchester Covered Bridge, Westmorland County, New Brunswick (1977)

both by

Robert W. Passfield
Manuscript Report Series is printed in a limited number of copies and is intended for internal use by the Department of Indian and Northern Affairs. Copies of each issue are distributed to various public repositories in Canada for use by interested individuals. Many of these reports will be published in Canadian Historic Sites/Lieux historiques canadiens and may be altered during the publishing process by editing or by further research.

La Série intitulée Travail inédit est imprimée à tirage limité pour les besoins du ministère des Affaires indiennes et du Nord canadien. Des exemplaires de chaque rapport sont distribués à des archives publiques au Canada, où les intéressés peuvent les consulter.

Bon nombre de ces rapports paraîtront dans la revue intitulée Canadian Historic Sites/Lieux historiques canadiens, et pourront être remaniés ou mis à jour.
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Abstract

This report locates and identifies bridges of historic interest on the Rideau waterways system. The historic bridges are grouped according to their general type (moveable or fixed) and their material(s) of construction. A history and description of each of these structures is given along with a brief history of the bridge site.
Historic Bridges on the Rideau Waterways System

Introduction

Over the navigation channel of the Rideau Canal, including the Tay Canal branch, there are a total of forty-two bridges. Of these, six are railway bridges: 5 fixed high levels, and 1 bascule; and 36 are road bridges: 19 fixed high levels, 1 vertical lift, 1 bascule, and 15 swing bridges. In addition, there are 17 bridges at lock stations which span either the river or the waste weir channel. Of these, nine are constructed on dams/waste weirs, six over the waste weir or river channel and two are railway bridges. In all there are 59 bridges on the Rideau Waterway. None of these bridge structures were erected at the time of the canal's construction. The oldest bridge structures date from 1888. The timber king post truss swing bridges, however, are replicas of an older type of swing bridge which has been retained through reconstruction.

Of these 59 bridges 26 are briefly described in this paper. These bridges were selected on the basis of criteria established for assessing the historical significance of bridges over the Rideau waterways system in an internal document prepared by the writer in 1975.

The present report consists of short historical accounts of the individual bridges selected on the basis of the 1975 document. The bridges are grouped, and described, according to general type (moveable or fixed) and material(s) of construction. Eventually a more definitive treatment of the bridges will be done.
To supplement the information contained in this report, the "Rideau Canal: Preliminary Site Studies" series, produced by Restoration Services Division, Engineering and Architectural Branch, with the assistance of the Research Division, National Historic Parks and Sites Branch should be consulted.

**Timber Swing Bridges**

The five timber swing bridges found on the Rideau Canal are replicas of a swing bridge designed for use on the Rideau Canal in 1864 (Fig. 39) which was in turn a modification of a type of swing bridge erected on the canal as early as 1843 if not before (Figs. 37, 38). Previous to that date moveable bridges on the Rideau Canal were of the rolling bridge type (Fig. 36). The timber swing bridges have been completely rebuilt at approximately twelve year intervals over the years; but their basic structure has been maintained with but a few minor alterations.

The superstructure of each bridge consists of a heavy timber frame span, supported by a corbel frame under the heel section of the span, and strengthened by means of a Kingpost truss set over each of the two main stringers. Each truss consists of a heavy timber main post and three iron suspension rods which are fixed at one end to the main stringer at the heel, toe, and mid-point of the long-arm, and at the other end, to the transverse cap beam directly over the main posts. The bridge is further strengthened by knees and braces placed inside the main posts and the frames. To provide horizontal stability, the bridges are further equipped with iron roller wheels which run about the pivot on a concentric iron track circle, some 12 feet in diameter, set into the pivot pier. There are also roller wheels set into the toe and heel beams which run on the abutments of the bridge to provide ease of opening and closing. With the exception of the working parts, several angle braces and the suspension rods, the whole of the
superstructure is constructed of timber with a plank deck and wooden railings. The timber swing bridges vary slightly in length; but are approximately 70 feet long and have a standard clear width of 12 feet with a loading capacity of five tons. All are manually operated by means of a capstan and chains or a push bar (Fig. 39).  

Timber swing bridges today are to be found at Nicholsons locks, Kilmarnock, Jones Falls, Brass Point and Lower Brewers (Washburn). All but the Brass Point bridge either span or are adjacent to lock chambers and comprise a single swing span. Of this group of timber swing bridges, the oldest crossing site is that at Kilmarnock built at the time of the construction of the canal, c.1832. The other bridges were built at Nicholsons locks in 1864, Lower Brewers (Washburn) in 1872, Jones Falls in 1883, and Brass Point in 1887 (Figs. 2-6).

The five timber swing bridges are excellent replicas of the 1864-65 model Rideau Canal swing bridge and closely approximate the appearance of the rolling bridges erected on the canal at the time of its construction. These bridges contribute a great deal toward maintaining the original appearance of the canal as built by Colonel By. They provide functioning examples of a type of historic bridge structure which can no longer be found standing on any of the other Canadian canals.

Four moveable bridges were built at the time of the canal's construction. As early as 1843 these were beginning to be replaced by swing bridges and in the following decades new swing bridge crossings were built across the canal. By the late 1880s, on the eve of the decision of the Department of Railways and Canals to commence replacing timber swing bridges with steel structures, there were 18 timber swing bridges on the Rideau Canal. Thirteen of these were single span swing bridges. The other five were swing spans forming part of larger continuous span, low level, crossings. By 1930, the number of timber swing
bridges had been reduced to 13. This number has dwindled further until today only five remain, including the Brass Point swing span.

Combination Timber Swing and Fixed Steel Bridge:

Brass Point (1902-03)

The Brass Point timber Kingpost truss swing span forms part of a long low level bridge which crosses the narrow neck of water connecting Cranberry Lake and Little Cranberry Lake. It is located approximately half way between the Jones Falls and Upper Brewers lock stations and carries Burnt Hills Road across the waterway. This county road connects Seeley's Bay on Highway 15 on the East side of the Canal with Battersea on the main county road to the west of the canal.

The present Brass Point bridge consists of a Kingpost truss timber swing span and four fixed steel spans. The swing span is of the same design as the other Kingpost swing bridges on the Rideau Canal; while the four steel spans are low through trusses of a Warren truss design. The bridge overall is 467 feet 6 inches long with 3 steel spans of 100 feet, one of 95 feet, and a swing span of 72 feet 6 inches. The steel spans have a clear road width of 15 feet; while that of the swing span is a standard 12 feet. The loading capacity rating of the crossing has been downgraded to as low as two tons in recent years due to the deteriorating condition of one of the timber crib piers (Fig. 6).¹⁰

The first bridge erected at Brass Point in 1887, consisted of eight timber truss fixed spans and a Kingpost truss swing span supported on rock filled timber cribs and abutments.¹¹ During the winter of 1902-03, the fixed timber spans were replaced by the existing four steel spans and the sub-structure was rebuilt from the waterline up.¹² The timber swing span has been renewed from time to time with the latest renewal dating from 1964.

At one time there were as many as five low level
continuous span crossings on the Rideau system. In addition to the Brass Point bridge these included bridges erected at Becketts Landing and Manotick in 1867, Olivers (Rideau) Ferry in 1874, and Wellington (Kars) in 1879. Each of these consisted of multiple fixed spans in conjunction with a Kingpost truss swing span. Today, the Brass Point bridge is the only one of its type standing on the Rideau Canal or anywhere else in Ontario.

**Vertical Lift Bridge**

*Pretoria Avenue, Ottawa* (1915-17)

The Pretoria Avenue vertical lift bridge which joins Pretoria Avenue on the left, or west bank of the canal to Hawthorne Avenue on the right, or east, bank is unique on the Rideau System and is apparently the only bridge of its type in Canada. Moreover, it remains virtually unchanged in appearance from the date of its construction.

The first bridge on the Pretoria Avenue site was built in 1889-90 by the Department of Railways and Canals about 600 feet north of the present lift bridge, at the foot of John Street (Argyle Avenue). This was a steel truss swing bridge resting on timber piers. When the bridge eventually proved to be too narrow and light to handle increasing traffic demands, the Corporation of the City of Ottawa entered into an agreement in 1915 with the Federal Government, with the former undertaking to build an electrically operated steel lift bridge on the line of Pretoria Avenue south of the existing swing bridge, which was to be removed. Construction commenced in 1915; and the present structure was completed in 1917.¹³

The Pretoria Avenue bridge erected in 1915-17 is a Strauss direct lift bridge manufactured by the Strauss Bascule Bridge Company of Chicago, U.S.A. It is a vertical lift, deck bridge consisting of three steel spans: a centre arched lift span some 84 feet long centre to centre of bearings, and two fixed approach spans. Overall the bridge
is 205 feet long with a 44 foot clear roadway and two six foot wide sidewalks. The bridge rests upon two concrete piers set in the river and its abutments. They are faced in stone above the water line with the piers being carried above the deck of the bridge, to provide towers to house the operating machinery and the bridge operator. The bridge has a vertical lift of 20 feet, which provides a total 30 foot clearance over the water when raised. It is electrically operated by means of vertical climbing racks and counterweights located in the towers (Fig. 7).

In appearance the bridge has altered little over the years. The open centre truss span and the facing on the exterior of the outside fixed span plate girders date from the original, as does the trellised iron crossing guard at either end of the bridge. The original asphalt covered timber deck and two lines of street car tracks have been removed and a different deck installed. This consists of reinforced concrete on the fixed spans and an open steel grating on the lift span.

**Steel Through Truss Swing Bridges**

At present there are five through truss swing bridges extant on the Rideau Canal system. All are rivetted steel structures, and were erected in the period 1888-1903 when the Department of Railways and Canals followed a policy of replacing the timber King post truss swing bridges with iron and/or steel superstructures. These bridges were of various truss types; and the five which remain differ widely in their structural design. They are to be found at Long Island, Burritts Rapids, the Narrows, and on Beckwith and Drummond streets in Perth (Figs. 8-12).

All of these structures are of the unequal arm, or bobtail, centre-bearing type of horizontal swing bridge which turn and are supported upon a pivot pier erected on one wall of a lock or on one bank of the navigation channel. They are stabilized by means of counterweights placed under...
the short arm, or heel, of the swing span, and by roller wheels
fixed to the underside of the bridge outside of the centre pivot.
The roller wheels run on a concentric track circle, about 12 feet
in diameter, set into the pivot pier. Three of these bridges
consist of single swing spans which either cross the navigation
channel (Burritts Rapids), or over a lock (Long Island and the
Narrows). The other two, the Beckwith and Drummond street
bridges, cross the Tay River channel in Perth and each comprises a
swing and a fixed span.

**Burritts Rapids** (1897)

Burritts Rapids is the [second] oldest bridge crossing on
the Rideau system with the first bridge across the river at
that site dating from 1824. At the time of the construction
of the canal, Burritts Rapids was one of the six sites on the
canal chosen for the erection of bridges. A fixed bridge was
constructed there in 1832 some 900 yards above the lock. This
bridge provided a 28 foot clearance over the water. In 1851,
a timber kingpost truss swing bridge was erected on the site.
This bridge was renewed at intervals thereafter until 1897 when
the present steel through truss swing bridge was constructed.

The present Burritts Rapids bridge, erected in 1897, is
an unequal arm, or bobtail, through truss structure of one span
which crosses the south, or navigation, channel of the Rideau
River at Burritts Rapids. It is supported upon a masonry
abutment and pivot pier which form the banks of a 33 foot wide
navigation channel. The bridge is 65 feet 6 inches long with a
clear road width of 13 feet. It is manually operated by means
of a turning lever inserted in the deck over the pivot. It has
a plank deck, and wooden railings along the inside of two
trusses. This bridge has the most interesting appearance of
all the steel through truss swing bridges on the Rideau Canal
as it is of an asymmetrical truss design combining a Pratt and
Fink truss.
Indeed, the Burritts Rapids bridge is of a design not found on other Canadian canals, or for that matter likely anywhere else (Fig. 8).

**Long Island: 1935 (1903)**

There was no bridge crossing at Long Island prior to the construction of the Rideau Canal. With the construction of the Long Island flight of locks, the stone arched dam, and the waste weirs over the by-wash channel on Nicoll's Island and Mud Creek in 1827-32, it was possible to cross the Rideau River there on foot. Pedestrians could do this by walking across the top of the lock gates and along the top of the other engineering structures. Indeed, there was a footpath connecting the stone arched dam and the two waste weirs. However, no bridge was constructed over the locks.\(^{20}\)

In 1863, a fixed bridge, the Dawson bridge, was built across Mud Creek just below the Nicoll's Island by-wash channel by a group of local residents. At the same time, they instituted a ferry service to convey vehicles and travellers from the east bank of the Rideau River around the head of the locks to the stone arched dam from where they could proceed directly to the Dawson bridge.\(^{21}\) This was the first road crossing at Long Island.

In 1874, Mr. James Latimer under contract with the government, built a swing bridge across the upper lock at Long Island. The bridge that Latimer erected was an unequal arm, or bobtail, centre-bearing kingpost truss swing bridge.\(^{22}\) The design was that adopted for use on the Rideau Canal in 1864-65.\(^{23}\) Facsimiles of this model swing bridge are still being erected on the Rideau Canal today. The timber kingpost swing bridge at Long Island was rebuilt from time to time until 1935 when the present steel structure was erected over the upper lock.\(^{24}\)

The present Long Island swing bridge was built by the Hamilton Bridge Works Company of Hamilton, Ontario, and
erected just above the locks at Hogs Back in 1903. In 1930, it was dismantled and moved to Long Island for storage prior to its being re-erected there in 1935. This is an unequal arm, or bobtail, centre-bearing swing bridge supported upon a masonry pivot pier and abutments which rest on the lock walls. It is a low through, or pony, truss structure of a Pratt truss design with trellised posts. The bridge is 72 feet 8 inches long with a 12 foot roadway. The inside of the two main girders is lined with wooden railings. This bridge has a wooden floor consisting of three-inch planks spiked to timber joists, and was designed to have an eight ton carrying capacity. It is manually operated by means of a turning lever inserted through the deck of the bridge to operate the rack and pinion turning unit (Fig. 9).²⁵

Narrows (1898)

Prior to the construction of the lock and waste weir at the Narrows in 1831-32, the 'Kingston and Perth Road' passed along a narrow tongue of land which separated Upper Rideau and Big Rideau Lakes.²⁶ The water channel which cut through this narrow neck of land to connect the two lakes was very shallow, approximately 18 inches deep, and was forded by travellers using the road.²⁷ During the construction of the canal however, an embankment was built on this tongue of land and the level of Upper Rideau Lake raised some four feet. The lock and waste weir were built in this embankment; but only the waste weir was bridged.²⁸ No crossing was provided over the lock.²⁹ In 1867, however, the Department of Public Works constructed a timber kingpost truss swing bridge over the lock, thereby reopening the old 'Kingston and Perth Road' connection via the Narrows.³⁰ This structure was renewed periodically over the years until 1964 when the present through truss steel swing bridge was erected just above the Narrows lock.³¹

The present Narrows bridge was originally erected in 1898 at Beveridges locks on the Tay Canal.³² In 1961, the
building of a fixed high level bridge at Beveridges rendered the swing bridge superfluous and it was moved to the Narrows, stored, and eventually re-erected there.\textsuperscript{33} This bridge is a rivetted steel through truss structure of the unbalanced arm, or bobtail, type with the two main girders being a modified Pratt truss. It is 69 feet 9 inches long with a 13 foot clear road width and a loading capacity of five tons. The floor of the bridge consists of three inch planks spiked to longitudinal timber joists. Wooden railings are affixed along the inside of each of the two main girders. The bridge is manually operated by means of a turning lever inserted into the deck of the bridge over the pivot (Fig. 10).\textsuperscript{34}

The Narrows swing bridge, and that at Long Island, are the only two examples on the Rideau Canal of a pony truss swing bridge.

\textbf{The Drummond and Beckwith Street Swing Bridges, Perth} (1888-89)

The Drummond and Beckwith swing bridges in Perth on the Tay Canal branch of the Rideau Canal, are all that remain of the five swing bridges erected over that canal branch when it was rebuilt in 1883-91. Both bridges comprise a fixed and swing span and cross the river channel in Perth on their respective street alignments. These bridges were built by the Robert Weddell Bridge and Engine Works of Trenton, Ontario, and are of the same basic design. The swing spans can best be described as being a Kingpost truss with latticed main posts and transverse cap beam from which suspension cables are hung to support the ends of a low through girder span of the Howe truss type. The fixed spans are simple Howe trusses. Structurally the swing spans are of the unequal arm, or bobtail, centre-bearing swing bridge type stabilized by means of a ring of roller wheels outside of the pivot. Each of the swing spans is 77 feet long with a clear road width of 14 feet 6 inches, and has a
plank deck nailed to timber joists. Their loading capacity is presently rated at five tons.

The bridges differ slightly in that the Beckwith St. bridge is built on a 13 degree skew; and the Drummond St. bridge has a 3 foot 6 inch wide sidewalk cantilevered on the outside of the main girder on the downstream side. The substructures of the two bridges are similar in appearance and consist of masonry abutments, piers and pivot piers. They differ however in height with the Drummond St. bridge having a vertical clearance of 10 feet 6 inches over the water and the Beckwith St. bridge clearing the water by 6 feet 6 inches. There is also a pedestrian pathway passing under the Drummond St. bridge between the pivot pier and the heel abutment. The fixed span of each bridge is identical to the other in appearance and in overall dimensions being 70 feet long with a 14 foot 6 inch clear roadway width. The bridges were manually operated by means of a turning lever inserted into the deck to operate the rack and pinion turning unit (Figs. 11, 12).

At present both the Beckwith and the Drummond street bridges are still being used by vehicle traffic; but the swing spans of the bridges were fixed in 1941 so that they are no longer operational in terms of permitting the passage of marine traffic. On each bridge, the flooring, including the joists, planking, and the 6 inch by 6 inch timber runners along each side of the deck, when last renewed in November 1973, was continued over the joint of the two spans thereby preventing the bridge from being swung. Also at some time or other, several haphazard spot welds have been made to further fix the span: for example, the lock pin shaft on the Beckwith swing span has been spot welded into the socket of the seating plate on the fixed span; and the handrail of the Drummond swing span sidewalk has been spot welded to the handrailing on the abutment by means of a piece of 1 inch by 0.25 inch flat steel four inches long. To the same end several timber shims have been
driven under the span on the heel abutment, pivot pier and centre pier of each bridge. 39 Further downstream, the fixed low level concrete bridge built on the Craig Street alignment in 1954 has only an eight foot clearance above the water.40 This effectively prevents pleasure craft from proceeding upstream to the Perth basin. In terms of road traffic, the Beckwith bridge serves purely local needs; while the Craig and Drummond Street bridges are on the main route connecting Highways 7 to the North with 43 to the South-East (Figs. 11-13).

The Drummond and Beckwith St. bridges are the two oldest steel swing bridges on the Rideau Canal system, and are of a type no longer found on Canadian canals. Both bridges are in keeping with the historic character of many of the homes in the area. On Drummond Street, the Canadian Inventory of Historic Building has recorded 25 buildings which number includes only those presumed or known to have been erected before about 1890. They are domestic buildings of frame or brick and vary considerably in size and architectural style. Included, among others, are an attractive Regency style house of 1859, three large brick houses of Italianate detailing probably dating from the 1880s, two examples of Second Empire design also from the 1880 period as well as several attractive houses of Classic Revival origin. Outstanding among the buildings recorded is the Summit house erected in 1823 and just recently plaqued by the Ontario Historic Board. The majority of the buildings recorded appear to be well kept and in some instances handsomely landscaped presenting the residential district of Drummond Street as a most attractive area.41

**Fixed Timber Bridges**

The Cataraqui River bridges located at Jones Falls and at Upper Brewers Mills are fine examples of an older type of low level, fixed bridge, with rock filled timber piers, which was built over waste weirs and non-navigable parts of the
Rideau waterway from the time of the canal's construction. Each of these survivors adds much to the picturesque nature of the settings in which they are found (Figs. 14, 15).

**Jones Falls (1930)**

The low level fixed timber bridge at Jones Falls is located across the upper end of Whitefish Lake on the Cataraqui River downstream from Jones Falls Dam. It is part of a county road crossing which includes the Kingpost swing bridge over lock 42. The first fixed bridge at this site was constructed in 1883. It has been rebuilt and repaired from time to time. The present bridge dates from 1930 when major renewals were made to the bridge superstructure. The fixed bridge is a simple timber beam, continuous span structure consisting of timber stringers supported on short supplementary beams placed longitudinally over the bridge piers. The deck of the bridge is planked; and there are wooden railings along each side of the bridge. The total length of the six spans of the bridge is 246 feet; and it has a clear road width of 16 feet and a load limit of five tons. The substructure of the bridge consists of rock filled timber cribs and abutments similar to the original piers. Indeed, they may well be the original piers, at least below the water line. Overall, the present structure bears a close resemblance to the original bridge erected on the site in 1883 (Fig. 14).

**Upper Brewers Mills (1934-35)**

The fixed timber bridge at Upper Brewers is located over the Cataraqui River channel at that lock station. Until 1967 it formed, together with the former swing bridge over lock 44, part of County Road 12 which connects Sudbury with Highway 15 across the canal. However, when in that year the new high level reinforced concrete bridge was opened 1400 feet downstream from the lockstation, the road alignment was changed accordingly. At that time, the timber Kingpost
swing over lock 44 was removed; but the fixed timber bridge over
the river was retained to provide a road access to the 46 locks
from Highway 15.\textsuperscript{46}

Apparently there was a road crossing at Upper Brewers
Mills before the construction of the Rideau Canal. This
crossing was restored through the erection of a timber Kingpost
swing bridge over the upper lock in 1850.\textsuperscript{47} There was a timber
fixed bridge over the river from the time of the canal's
construction.\textsuperscript{48} Both bridges were renewed from time to time
thereafter. The substructure of the present fixed bridge was
last rebuilt in 1919-20\textsuperscript{19} and the superstructure in 1934-35.\textsuperscript{50}

The bridge is a simple timber beam structure of a single
span with its floor joists, or stringers, resting on rock
filled timber crib abutments. The deck of the bridge is
planked. There is a wooden railing along each side. The span
is 35 feet long with a clear road width of 16 feet, and a load
limit of five tons.\textsuperscript{51} This bridge closely resembles the timber
fixed bridge which crossed the river in the same location in
the year 1830 (Fig. 15).\textsuperscript{52}

\textbf{Reinforced Concrete Highlevel Bridges}

The Plaza and the Bank Street bridges are two reinforced
high level bridges of particular interest. Both were
constructed just prior to the First World War; but they differ
significantly in their appearance. The Bank Street bridge is a
massive solitary structure constructed totally of reinforced
concrete with little embellishment. The Plaza bridge is part
of a larger complex and is a more ornate structure with its
super-structure being faced in stone and surmounted by a
sandstone balustrade (Figs. 16, 17).

\textbf{The Plaza Bridge, Ottawa}

The Plaza Bridge which crosses the Rideau Canal just
above the eight Ottawa locks is a rather unusual structure. In
effect
it is two bridges in one, connecting Sparks Street on the west bank with Rideau Street on the east bank, and Wellington on the west bank with Rideau Street. It was constructed in 1912 to replace two separate, but adjacent bridges: the Sappers' and the Dufferin.

The first bridge on the site, the Sappers', was built in 1828 by the Royal Engineers at the time of the construction of the canal.\(^{53}\) It was a fixed, high level structure constructed of dressed stone with a single arched span crossing the canal and stone parapets which enclosed a roadway of 18 feet clear width.\(^{54}\) This bridge provided a 28 foot clearance over the canal and a road connection between Sparks and Rideau streets.\(^{55}\) In 1871, Samuel Keefer, a Brockville Civil Engineer of note, was employed to design and build a new bridge on the Wellington-Rideau alignment.\(^{56}\) In the following year, Keefer built the Dufferin bridge.\(^{57}\) This was a high level fixed structure comprising three arched spans each 70 feet long, constructed of wrought iron plate girders which formed the springing of the arches. The superstructure was supported on two heavy ashlar piers and abutments. At the same time, Keefer removed the stone parapets from the Sappers' bridge to obtain a 24 foot wide roadway and proceeded to widen it to 50 feet overall. The finished bridge was then united to the Dufferin bridge on the east bank by means of a stone retaining wall of 20 foot radius.\(^{58}\)

The present bridge, the Plaza Bridge, was built in 1912 at which time the Sappers' and the Dufferin bridges were totally demolished.\(^{59}\) At the same time the triangular open area which formerly separated the south side of the Dufferin Bridge from the north side of the former Sappers' Bridge was bridged over to form a single triangular shaped bridge with a plaza in the centre. This structure consists of a reinforced concrete slab deck supported on steel beams which in turn rest upon concrete piers and abutments. The piers from the springing line up, and the
outside face of the arches are faced with stone. There is a sandstone balustrade. It is a three arched span, high level fixed bridge with the centre span over the canal providing a 26 foot 5 inch clearance above water level. In 1938, or shortly thereafter, the bridge was widened by extending the upstream side of the bridge about 18 feet out, on the east bank, to meet the corner of (Union) Central Station and swinging the west bank end upstream some 75 feet to bring the south face of the bridge in line with the north face of the Station. This, however, altered the appearance of the bridge only slightly as the balustrade and stone facing of the new section was made to conform in detail to that of the existing bridge (Fig. 16).

The Plaza Bridge was constructed at the same time as the Chateau Laurier and Union Station and with the other two structures forms to all appearances an integrated complex with each structure complementing the other. The Plaza Bridge has become an Ottawa landmark.

**Bank Street Bridge, Ottawa (1913-14)**

The Bank Street bridge crossing the Rideau Canal in Ottawa is a high level fixed bridge constructed of reinforced concrete. It was built by the Corporation of the City of Ottawa in 1913-14. The first bridge over the canal on the Bank Street alignment was constructed by the Department of Railways and Canals in 1866. In that year, a Kingpost truss swing bridge was erected. This was replaced by a similar swing bridge in 1882 and in turn by a through truss steel swing bridge in 1898. In 1910, the City Corporation approached the Department of Railways and Canals for permission to build a new bridge which would be suitable for the passage of electric trolley cars as well as for motor vehicles. Permission was granted and in 1913-14, the City of Ottawa erected the present structure.

The present Bank Street bridge is a high level fixed
bridge constructed entirely of reinforced concrete. It consists of six arched spans with the southernmost arch spanning Colonel By Drive, the adjacent two arches crossing the canal, and the two arches on the North bank next to the canal spanning two lanes of the Driveway on that side of the canal. The northernmost arch is in-filled with wood to form a storage shed. The Bank Street bridge has an arched deck four traffic lanes wide, two six foot wide sidewalks, and was originally crossed by a double line of electric car tracks, since removed. It is presently equipped with lighting fixtures and steel handrails such as are common to most modern highway bridges (Fig. 17).

The modernization of the deck of the Bank Street bridge has deprived it of its original appearance; however, much remains that renders it of interest. This bridge represents an early attempt to provide a crossing over the canal which would permit the unimpeded passage of heavy road vehicles, such as street cars, and yet would not interfere with marine traffic on the canal. With its massive size and concrete arch type of construction, it has become a landmark dominating the canal horizon at Lansdowne Park.

**Bascule Bridge: Kingston (1915-16)**

The Kingston Bascule bridge is located in the Kingston Causeway which carries Highway 2 across Kingston Harbour at the Cataraqui River entrance to the Rideau Canal. The first bridge on this site was erected in 1827, prior to the construction of the Rideau Canal. This was a timber bridge, approximately one third of a mile long, consisting of numerous 40 foot spans and a single swing span, supported on masonry piers. The present bascule bridge was constructed in 1915-16 as part of a causeway. In the causeway there are three bridges, separated by manmade islands: a fixed steel, low level, through truss bridge at the left bank; the bascule bridge in the centre; and a reinforced concrete bridge at the right bank which is used.
as a through passage by smaller pleasure craft.

The Bascule bridge is a Strauss trunnion bascule type of lift bridge designed by the Strauss Bascule Bridge Company of Chicago. It is a one span structure, 160 feet long with a 24 foot clear road width, and a 4 foot wide sidewalk cantilevered on the outside of the upstream side. The lift span consists of a high through. Warren, truss with posts; and it is floored with a steel grating deck. The bridge is operated by means of an electric motor-gasoline engine (Figs. 18, 19).\textsuperscript{68}

Bascule bridges made their first appearance over Canadian canals at the commencement of the second decade of the 20th century when the first bascule was erected at Lindsay, Ontario on the Trent Canal. Within a year seven bridges of the same type were commenced and several followed in the next few years including the Kingston bascule built in 1915-16.\textsuperscript{69} For a brief period these bridges appear to have been very much in demand for canal crossings; but they soon gave way again to swing bridges of the through truss and through plate girder types. The Kingston bascule bridge, built in the early years of the bascule bridge demand, provides an excellent example of this type of bridge. Another bridge of this type found on the Rideau System is the C.N.R. bridge above the detached lock at Smiths Falls.

Through Plate Girder Swing Bridges

The five through plate girder swing bridges on the Rideau Canal are all of a kind. They are of the unequal arm, or bobtail, centre-bearing type of horizontal swing bridge which is stabilized with the aid of cast iron ballast counter-weights and roller wheels. There are four roller wheels outside of the centre pivot which run on a concentric track circle fixed to the pivot pier; and two rollers at each end of the bridge which seat on curved surface rest
castings fixed to the abutments on the centre line of the main girders (bridge closed). Each bridge structure consists of two main girders, approximately five feet deep, of rivetted or welded plate steel, joined at their base by transverse "I" beams which support the floor. The decking of these bridges is of different types. The two oldest bridges, erected at Merrickville in 1933 and Chaffey's in 1949, have laminated wood and an asphalt plank deck, respectively. The other three, erected at Kingston Mills in 1956, on Abbott St., Smiths Falls in 1959, and at Old Slys in 1962, have a combination concrete and steel grating deck with concrete on the short arm and steel grating on the long arm of the bridge. These bridges vary in length from 74 feet to 87 feet and in road width from 12 feet 6 inches to 24 feet, and have a loading capacity of 20 tons, with the exception of the Chaffey's span which is limited to ten tons. All of the plate girder swing bridges are electrically operated by means of a two horsepower motor, reducer, and rack and pinion drive unit, with the exception of the Chaffey's bridge which is hydraulically operated (Figs. 20-25).

These particular bridges are representative of a type of structure erected at a particular period in the history of the canal.

Other Fixed Bridges

There are four fixed bridges on the Rideau Waterway which are of significant interest. These represent different types of bridge structures ranging from the high level arched span Laurier bridge, to the low truss bridge over the waste weir channel on Confederation Drive in Smiths Falls, to the deck truss and the high through truss, or box beam, bridges found at Burritts Rapids and Nicholsons locks, respectively, on the west branch of the Rideau River (Figs. 26-31).
Laurier Bridge (1900-01)

The Laurier bridge which carries Laurier Avenue across the Rideau canal is a combination steel and concrete structure. It comprises eleven spans: four steel spans over the canal and the Queen Elizabeth Driveway on the west bank, which are all that remains of the original bridge erected in 1900-01, and seven concrete spans on the east bank which were built in 1943 to replace the steel spans carrying Laurier Avenue over the Canadian National Railway tracks.

The first bridge on the site of the present Laurier Avenue bridge was built by the Corporation of the City of Ottawa in 1872 to connect Maria Street (Laurier Avenue) on the west bank of the canal with Theodore Street on the east bank. It was a high level fixed, skew, bridge consisting of one timber Queenpost truss span some 60 feet long and two smaller trestle approach spans supported on trestle framework towers. The whole structure was made of rough-cut cedar logs. The wooden truss, which provided a 28 foot clearance over the canal, was completely reconstructed in 1891. Four years later the bridge was extended further along the line of Theodore Street east to permit trains to pass underneath the roadway on the east bank. By an agreement with the City of Ottawa, the Ottawa, Arnprior and Parry Sound Railway Company was given permission in 1895, to construct a wooden viaduct some 200 feet long and 28 feet wide complete with sidewalks, over their railway lines. This structure abutted on the Laurier bridge to form one integral structure. It was supported on trestle bents approximately 16 feet centre to centre. Moreover, the railway also agreed to maintain that portion of the bridge, and to replace it with an iron viaduct of the same length which would conform in materials, style, height and width to any bridge which the Corporation of Ottawa or the Federal Government might in the future build on the Maria Street alignment. This agreement was carried out in 1900-01.

At that time the Department of Public Works decided
to replace the Laurier Avenue (formerly Maria Street) bridge with a more modern masonry and steel structure.\textsuperscript{75}

The bridge built in 1900-01 was 344 feet long with 38 foot wide roadway and consisted of eight steel girder spans supported on steel trestle bents with rock faced ashlar footings and abutments. The reinforced concrete deck was supported on four lines of main longitudinal girders consisting of a 35 foot plate girder span on the west side of the canal over the (Queen Elizabeth Driveway) roadway; the centre 80 foot arched span; and a plate girder viaduct 226 feet long on the east side over the Canada Atlantic Railway Company tracks. The bridge was also equipped with two eight foot wide sidewalks cantilevered on the side of the outside girders and surmounted with 14 iron lamp posts with electric lights. It was built on a skew, and provided a 27 foot clearance over the canal water level.\textsuperscript{76}

Today all that remains of the Laurier Bridge erected in 1900-01 are the steel girder spans on the West bank and the steel arched span over the canal. The railway viaduct portion of the bridge on the east bank was replaced in 1943 by a reinforced concrete bridge over the Canadian National Railway tracks.\textsuperscript{77} Moreover, the original steel hand railings and lamp posts have been replaced and, at present, the appearance of the deck conforms to that of any modern reinforced concrete highway bridge. The substructure of the Laurier Avenue bridge, and particularly the rivetted arch span, is of interest as it exposes to view the elaborate arrangement of braces and stiffeners adopted to support longitudinal girders on late 19th and early 20th century bridges. This contrasts directly with the clean, uncluttered lines of the more modern reinforced concrete high level bridges found elsewhere along the Rideau Canal. In all, what remains of the original 1900-01 Laurier Avenue bridge is an interesting piece of industrial archaeology (Figs. 26, 27).
Confederation Drive Waste Weir Channel Bridge, Smiths Falls (1904)

The waste weir channel bridge on Confederation Drive on the north side of the canal basin in Smiths Falls, was erected in 1904 by the Locomotive and Machine Company of Montreal. It is located approximately 50 feet below the waste weir dam and provides a through driveway connecting Beckwith Street on the east, via Confederation Drive across Jason Island and the high stone dam, with city streets to the north of the stone dam. The bridge is a low level, fixed steel structure consisting of two Warren truss spans. Overall, it is 159 feet long and 16 feet wide, inside of the trusses, and has a five foot wide sidewalk cantilevered on the outside of the upstream truss. The deck of the bridge consists of three inch planks spiked to 12 inch wooden joists, or stingers; and it has a carrying capacity of five tons. The substructure comprises a masonry pier and two concrete abutments.

The Confederation Drive bridge site apparently dates from the time of the canal's construction when a bridge was built by the operators of a mill on Jason Island. This bridge, of which to date virtually nothing is known, crossed the waste weir channel a short distance below the waste weir on dam. In 1849, the Royal Engineers laid out a road, Basin Street to the east of the bridge to connect with Beckwith Street, and built a new, more substantial bridge on the same alignment as the former bridge. At the same time a road, Jason Street, was apparently built from the western end of the bridge across Jason Island and the high stone dam to connect up with existing streets to the north of the stone dam. The 1849 bridge was rebuilt in 1870, and was completely renewed in 1889. At the latter date, the bridge site was moved a short distance to the south to align with Canal Street adjacent to the old Basin Street road allowance which was abandoned. In 1904, this bridge was
in turn replaced by the present structure. The existing bridge was owned and maintained by the Department of Transport until 1968 when it was transferred to the town of Smiths Falls (Figs. 28, 29). The present Confederation Drive bridge provides access from Beckwith Street to Centennial Park which the Town of Smiths Falls recently laid out on Jason Island. It is an example of a type of truss bridge, the Warren truss, which was very popular among bridge builders during the heyday of steel truss bridge construction. Two other road bridges of interest, the Burritts Rapids deck truss bridge and the high through truss bridge at Nicholson's locks, are not located on the Rideau Canal proper. They are located over the Rideau River at locksites where the canal occupies an artificial channel cut into the east bank of the river. To date little research has been carried out on either of these structures.

**Burritts Rapids Fixed Bridge** (1920)

The Burritts Rapids bridge is a low level, fixed steel structure consisting of two Warren deck truss spans. It was erected by the Ontario Bridge Company in 1920. The handrails are latticed steel; and there is a sidewalk on the upstream side cantilevered outside the truss. The bridge has a wooden, asphalt covered, deck and is supported upon a concrete pier and abutments. It is the only example of a deck truss road bridge to be found on the Rideau Canal (Fig. 30).

**Nicholson's Fixed Bridge** (c. 1900)

The Nicholson's lock fixed steel bridge consists of a high through truss, or box beam, span with a steel beam approach span on the right bank. The Dominion Bridge Company erected this bridge about 1900. It has a wooden, asphalt covered, deck and is supported upon a concrete pier and abutments. This type of bridge was seldom built along the
Rideau as a fixed bridge and there were never any swing bridges of this type constructed on the Rideau although they are found on other Canadian canals, such as the Lachine. At present this bridge, along with the fixed bridge in the Kingston Causeway and the multi-span bridge at Beckett's Landing, are the only bridges of this type to be found on the Rideau Canal (Fig. 31).

**Railway Bridge:**

**Canadian National Railways Bascule Bridge** (1911)

The Canadian National Railway bascule bridge at Smiths Falls is located just above the detached lock. This is a Scherzer rolling lift bascule bridge carrying a single line of track. There are also two through plate girder approach spans supported on concrete piers and abutments. The lift span is 69 feet long and is manually operated. During the navigation season, the bridge is kept open (raised), and is closed only for the passage of trains (Figs. 32, 33).

This bridge was erected in 1911 at a time when a number of bascule bridges, both road and rail, were being erected on Canadian canals. It differs slightly in design from the Kingston bascule. The lift spans also are different with the railway bridge having a through plate girder lift span and that of the Kingston bascule being a high through truss.

**Conclusion**

The Rideau Canal as it stands is particularly unique to North American historic canals in that it is a functioning canal system with original locks, operating machinery and auxiliary structures, or close replicas thereof, still standing and in use. The bridges on the canal are part of this historic canal in two respects. On the one hand, there are five timber swing bridges extant which are replicas of the swing bridges erected on the canal at an early date; and, on the other hand, there are bridges of various types.
constructed at different periods in its history. In effect, the Rideau Canal bridges provide a visual history of the evolution of canal bridge structures which reflect developments in bridge building technology from the early 19th century to the present.
Appendix A.

List of Historic Bridges On The Rideau Waterways System

<table>
<thead>
<tr>
<th>On The Navigation Channel Rideau Canal (Ottawa to Kingston)</th>
<th>Date of 1st Bridge at the crossing</th>
<th>Date of erection of existing bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Plaza (fixed concrete, high level)</td>
<td>1828</td>
<td>1912</td>
</tr>
<tr>
<td>Laurier Avenue (fixed high level, steel - concrete)</td>
<td>1872</td>
<td>1900-01 steel spans 1943 concrete spans</td>
</tr>
<tr>
<td>Pretoria Avenue (vertical lift)</td>
<td>1889-90</td>
<td>1915-17 [1980-81]</td>
</tr>
<tr>
<td>Bank Street (fixed concrete, high level)</td>
<td>1866</td>
<td>1913-14</td>
</tr>
<tr>
<td>Long Island (steel through truss swing)</td>
<td>1874</td>
<td>1935 (1903)¹</td>
</tr>
<tr>
<td>Burritts Rapids (steel through truss swing)</td>
<td>1824²</td>
<td>1897</td>
</tr>
</tbody>
</table>

¹ - Data for the replacement after the 1903 flood
<table>
<thead>
<tr>
<th>On The Navigation Channel</th>
<th>Date of 1st Bridge at the crossing</th>
<th>Date of erection of existing bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rideau Canal (Ottawa to Kingston)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nicholsons Locks (timber Kingpost truss swing)</td>
<td>1864</td>
<td>1971</td>
</tr>
<tr>
<td>[Chesters, north of Merrickville]</td>
<td>[c.1816]</td>
<td>[none] – kww(^n)</td>
</tr>
<tr>
<td>Merrickville (through plate girder swing)</td>
<td>c.1832</td>
<td>1933 [1990]</td>
</tr>
<tr>
<td>Kilmarnock (timber King Post truss swing)</td>
<td>c.1832</td>
<td>1970</td>
</tr>
<tr>
<td>Old Slys (through plate girder swing)</td>
<td>1862</td>
<td>1962</td>
</tr>
<tr>
<td>Abbott St., Smiths Falls (through plate girder swing)</td>
<td>c.1832</td>
<td>1959</td>
</tr>
<tr>
<td>C.N.R., Smiths Falls (Rolling lift bascule)</td>
<td>?</td>
<td>1911</td>
</tr>
<tr>
<td>The Narrows (steel through truss swing)</td>
<td>1867</td>
<td>1964 (1898)(^3)</td>
</tr>
<tr>
<td>Chaffeys Lock (through plate girder swing)</td>
<td>pre-dates the canal</td>
<td>1949 [load limit increased to 16 tonnes, fall 1988]</td>
</tr>
<tr>
<td>Jones Falls (timber King Post truss swing)</td>
<td>1883</td>
<td>1960-61 [dismantled spring 1988]</td>
</tr>
<tr>
<td>Brass Point (4 steel fixed spans - timber Kingpost swing)</td>
<td>1887</td>
<td>1903-04 steel spans 1964 timber swing</td>
</tr>
<tr>
<td>Washburn (Lower Brewers) (timber Kingpost swing)</td>
<td>1872</td>
<td>1967 [1987]</td>
</tr>
<tr>
<td>Location</td>
<td>Date of 1st Bridge</td>
<td>Date of erection of existing bridge</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Kingston Mills (through plate girder swing)</td>
<td>1832</td>
<td>1956</td>
</tr>
<tr>
<td>[1st bridge in 1832 was a double leaf timber drawbridge - kww]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kingston Causeway (Trunnion bascule)</td>
<td>1827</td>
<td>1915-16</td>
</tr>
<tr>
<td><strong>Tay Canal (Perth)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beckwith St., Perth</td>
<td>1834(?)</td>
<td>1889</td>
</tr>
<tr>
<td>steel fixed – steel swing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drummond St., Perth</td>
<td>1834(?)</td>
<td>1889</td>
</tr>
<tr>
<td>(steel fixed – steel swing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>On the River/Waste Weir Channel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rideau Canal (Ottawa to Kingston)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burritts Rapids (fixed steel deck truss)</td>
<td>1824</td>
<td>1920</td>
</tr>
<tr>
<td>Nicholas Locks (fixed, high through truss)</td>
<td>1864</td>
<td>c.1900</td>
</tr>
<tr>
<td>Confederation Drive, Smiths Falls (fixed steel, pony truss)</td>
<td>c.1832</td>
<td>1904</td>
</tr>
<tr>
<td>Jones Falls (fixed timber, low level)</td>
<td>1883</td>
<td>1930</td>
</tr>
<tr>
<td>Upper Brewers Mills (fixed timber, low level)</td>
<td>Prior to 1832</td>
<td>1924 substructure 1934-35 Superstructure</td>
</tr>
</tbody>
</table>

[Kingston Mills (fixed timber on the Montreal-Kingston Road)]
[c.1801] [unknown] – kww

Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
List of Historic Bridges on the Rideau Waterways System

Endnotes

1 The Long Island swing bridge was originally erected at Hogs Back in 1903. In 1930 it was dismantled and moved to Long Island where it was re-erected in 1935.

2 The 1824 bridge at Burritts Rapids, which pre-dated the construction of the canal, was the first [second] bridge erected on the Rideau [River]. [the presumed first bridge over the Rideau River is shown on Lt. Joshua Jebb’s 1816 map. It crossed the Rideau River at “Chesters,” just north of Merrickville – see note n1 – kww/rwp]

3 This bridge was originally erected at Beveridge locks in 1898, but was moved to the Narrows in 1961 and re-erected in 1964.

4 The fixed bridge over the Rideau River at Chaffey’s Mills was removed by the Royal Engineers at the time of the canal's construction. A floating bridge of some sort replaced it until 1884 when a kingpost truss swing bridge was erected over the lock and a fixed bridge over the waste weir to complete the crossing.

n1 A fixed bridge is shown on Lt. Joshua Jebb’s 1816 map crossing the Rideau River at “Chesters” (located on the west side of the river) – approximately 1 km north of present day Merrickville. At the time this location was about halfway between Merrick’s Mills and the Brockville Road. The bridge provided a link across the Rideau River to the road on the west side of the river which was built in 1815 – kww

n2 The first bridge at Kingston Mills was a fixed timber bridge, placed across Cataraqui Falls, when the Kingston-Montreal road was completed in about 1801 (the c.1801 date for the road is from “Kingston, A Brief Resume” by Richard Tatley, Manuscript Report 413, Parks Canada, 1977) – kww
Appendix B. Explanation of Technical Terms Used in this Report.

Bascule bridge: A bridge with a moveable leaf, one end of which can be raised about a horizontal axis with the aid of counterweights affixed to the opposite end. There are two types of bascule bridges on the Rideau Canal: the trunnion or pivot bascule (q.v.), and the rolling lift bascule (q.v.).

Bridge truss: A rigid frame formed by an assembly of bridge members. When properly designed, a truss consists of a triangle or combination of triangles, and derives its strength from the rigidity of that configuration. Under heavy loading a triangle will hold its shape until its side members or joints are crushed.

Cap beam (transverse cap beam): A horizontal member fixed across the top of the king posts of a bridge to tie the trusses together and thereby strengthen them against lateral pressures.

Centre-bearing swing bridge: A swing bridge designed so that the weight of the bridge is carried by the centre pivot. This type of swing bridge usually has a concentric circle of roller wheels about the centre pivot; but they serve principally to stabilize the bridge. A heavy pivot beam passing over the centre pivot, carries the dead and live loads to the pivot (Fig. 39).
**Corbel frame**: A supplementary frame set beneath the main frame of a swing bridge span to strengthen it. The side members of the corbel frame extend from the heel of the swing bridge along the bottom of the main stringers for a good part of their length.

**Deck truss bridge**: A bridge of any truss design in which the roadway rests on top of the trusses. This is in contradistinction to the through truss bridge (q.v.; Fig. 35).

**Equal arm swing bridge** (double arm swing bridge): A swing bridge with the pivot situated equidistant from its ends. The pivot of equal arm swing bridges is usually located on a pier in the centre of the water channel being spanned (Fig. 35).

**Fink truss**: One of several bridge trusses (q.v.) invented by Albert Fink, a 19th century American railway bridge builder. The primary members of the Fink truss seen at Burritts Rapids form three triangles. For longer spans, the two outer triangles were divided with additional members (Fig. 34).

**High through truss bridge**: A through truss bridge (q.v.) with a deep truss. These bridges usually have lateral struts joining the top of the trusses above the roadway to strengthen them against turning about their base under lateral pressures (Fig. 35).

**Howe truss**: A truss design patented in 1840 by William Howe of Massachusetts. It consists of parallel top and bottom chords with vertical posts and two diagonals in each panel. One of the distinctive features of this truss is found in the division of stress wherein the verticals are treated as
tension members and the diagonals as compression members. The verticals were wrought iron rods and the diagonals were wood; but as iron gradually replaced wood as the primary construction materials, the verticals came to be constructed of wrought iron the diagonals of cast iron. The Howe truss was the most widely used truss form in the 19th century (Fig. 34).

**Kingpost truss:** The earliest form of truss used in bridge building. It consists of a centre vertical post, the kingpost, with a diagonal brace on each side forming two right angled triangles (Fig. 34).

**Pony truss bridge:** A through truss bridge (q.v.) with a shallow truss. The trusses of a pony truss bridge are joined only by the floor beams of the bridge (Fig. 35).

**Pratt truss:** A truss design patented by Caleb and Thomas Pratt of Massachusetts, Connecticut in 1844. In appearance, this truss conformed closely to the standard Howe truss, but the action of the web members was exactly reversed. The diagonals were in tension and constructed of wrought iron, and the vertical members were in compression and were of wood or cast iron. The superiority of the Pratt truss consisted of having the vertical members in compression rather than the diagonals which were more susceptible to buckling in wide panels. This truss was simplified as advances were made in calculating stresses, so that by 1860 the diagonals were reduced to single members in all but the two centre panels and the end panels. The modified Pratt truss was further simplified in the 1870s when the diagonals were reduced to a single diagonal system throughout the length of the truss. The Pratt truss was rather slow in gaining acceptance; but in time it became second only to the Howe truss in popularity among timber bridge builders (Fig. 34).
Queenpost truss: An early form of truss which evolved from the kingpost truss to meet a need for longer bridge spans. It consists of two vertical posts, the queenposts, joined by a horizontal member on top of the posts with a diagonal brace at each end (Fig. 34).

Rim-bearing swing bridge: A swing bridge designed so that the weight of the bridge is carried by a concentric circle of roller wheels about the centre pivot which serves only as an axis about which the bridge turns. The diameter of the roller wheel circle is usually equal to the width of the trusses with some of the roller wheels being positioned directly under each truss (Figs. 37, 38).

Rolling Bridge (retractile bridge): A moveable bridge set on roller wheels so that the whole structure can be retracted. The wheels usually run on tracks built into the ground, and counter-weights are affixed to the bridge to keep the extended end from dipping down when the bridge is being retracted. The Rideau Canal rolling bridges were strengthened by means of a kingpost truss (q.v.; Fig. 36).

Rolling lift bascule bridge: A type of bascule bridge (q.v.) invented by William Scherzer, the founder of the Scherzer Rolling Lift Bridge Company of Chicago, and patented in 1893. It differs from the earlier trunnion bascule (q.v.) in that the trunnions are replaced with rockers which enable the lift span to rock backwards as it moves upwards. This all but eliminates friction as the bridge is being lifted (Figs. 32, 33).

Skew bridge: A bridge built diagonally across a river or stream rather than perpendicular to it.
Springing (Spring line): A line which can be drawn joining the points where the arch of a bridge meets the supporting abutments or piers.

Swing bridge: A moveable bridge which swings horizontally about a vertical axis. Swing bridges may be of either the centre-bearing (q.v.) or rim-bearing (q.v.) design, and conform either to the equal arm (q.v.) or unbalanced arm (q.v.) configuration.

Through truss bridge: A bridge of any truss design in which the roadway rests upon the bottom horizontal members. This is in contradistinction to the deck truss bridge (q.v.). The through truss may be further differentiated into a high through truss (q.v.) or a pony truss (q.v.) bridge depending on the depth of the truss (Fig. 35).

Trunnion bascule bridge (pivot bascule bridge): A bascule bridge (q.v.) with the lift span pivoting at one end about an axle, or, more correctly, trunnions (Figs. 18, 19).

Unbalanced arm swing bridge (single arm swing bridge): A swing bridge with its pivot pier on one side of the water channel with a long arm extending across it. The short arm, or heel, of this type of structure is counterbalanced to compensate for the extra weight and length of the long arm (Fig. 35).

Warren truss: A truss design developed in England by James Warren and Willoughby Monzani, and patented in 1848. The truss initially consisted of a series of equilateral triangles, without verticals. Later the name came to cover all types of triangular trusses, and verticals were added for longer spans. The Warren Truss did not attain much popularity until the late 19th century; and then it was in a modified form consisting...
of the single diagonal with vertical posts. In this later form after 1900, the Warren and the single diagonal Pratt truss became the most common, as well as the most efficient, truss forms utilized in bridge construction. Today, the Warren and Pratt trusses are used almost exclusively in steel truss bridge construction (Fig. 35).

2009 Addendum: Terminology

In this report, and more generally on the Rideau Canal at that time, the timber swing bridges were referred to as “kingpost truss swing bridges” because the swing spans are strengthened by a triangular truss with a center post similar in configuration to a conventional kingpost truss. However, a more recent structural analysis of the Rideau Canal timber swing bridges has revealed that although the conventional kingpost truss and the timber swing bridges are similar in appearance, they differ widely in their structural function.

In a kingpost truss, the truss arms are in compression in carrying the weight of the bridge span, and the live load, to the abutments; and the kingpost is in tension in holding up the center of the span to keep it from sagging. Hence, in a kingpost truss, the truss arms are of a rigid, heavy timber construction, and the kingpost is often of a lighter construction. In contrast, on the Rideau Canal swing bridges the heavy girders carry the weight of the bridge, and the live load, from abutment to abutment. The truss arms simply hold up the ends of the swing span to keep them from sagging when swung off the abutments. Hence, the truss arms consist of light wrought iron or steel rods in tension, and they are supported on a heavy mainpost in compression that rests on the pivot beam. Today the Rideau Canal swing spans are termed “centre-bearing timber truss swing bridges”; and the truss arms have been post-tensioned to carry some of the live load.

- Robert W. Passfield, April, 2009
Bridge trusses:

- **King Post Truss**
- **Queen Post Truss**
- **Howe Truss 1841**

1876
St. Peter's Howe Truss with King Post Truss Tower

1844
Pratt Truss (Parallel Chords)

- **Modified Pratt Truss 1860's**
- **Modified Pratt Truss 1870's**

Modified Pratt Truss
Erected at St. Peter's 1919
Bridge Trusses:

- **Warren Truss**
  - 1848
  - With Posts
  - Double-Diagonal System

Warren Truss
Erected at St. Peter's, 1931

Through Truss Bridge

Deck Truss Bridge

Swing Bridge Conformations:

- Unbalanced or Single Arm Swing Bridge

Equal or Double Arm Swing Bridge
Endnotes

1 Department of Indian Affairs and Northern Development (hereafter cited as DIAND), Canal Records, File No. 4052-253, J.D. Slater, Superintendent, Rideau Canal, to F. Braun, Secretary, Department of Public Works, 30 November 1864.

2 The earliest reference to the erection of a swing bridge over the Rideau Canal is a Royal Engineers drawing, dated 15 November 1843. DIAND, National Historic Parks and Sites Branch, Historic Prints, Drawings and Photographs Collection, Lieutenant H. White, R.E., "Plan and Elevation of Swing Bridge constructed at Merrickville over the Rideau Canal", Royal Engineers Office, Bytown, 15 November 1843.

3 Lieutenant Frome, R.E., "Account of the Causes which led to the Construction of the Rideau Canal, connecting the Waters of Lake Ontario and the Ottawa; the Nature of the Communication prior to 1827; and a Description of the Works by means of which it is converted into a Steam-boat Navigation", Papers on Subjects Connected with the Duties of the Corps of Royal Engineers, ed. John Weale, (London: John Weale, 1844) 2nd. ed.. Vol. I, (hereafter cited as Lieutenant Frome, R.E., Papers), pp. 69-97.

The first moveable bridges erected over the Rideau Canal were of the rolling bridge type rather than swing bridges. However, they were of a kingpost truss design and closely approximated in appearance the later swing bridges although they operated on a different working principle.

Lieutenant Frome, R.E., Papers, pp.69-97.

Public Archives of Canada (hereafter cited as PAC), RG43.B4a, Vol. 210, F.A. Wise, Superintending Engineer, Rideau Canal, to the Manager, Lachine Iron and Steel Bridge Company, Montreal, 6 September 1887.

These figures are based on a calculation taking into account the dates of construction of the various bridges crossing the Rideau Canal in the late 19th century as well as an investigation of the type of bridge found at each of these locations c. 1890.


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Lieutenant Frome, R.E., Papers, pp. 69-97.

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DIAND, Canal Records, File No. 4052 – 224, Vol. I, "Specifications for one steel rivetted swing bridge to be built across the Rideau Canal at Burritts Rapids to replace the present old wooden swing", 10 January 1897.

PAC, National Map Collection, Rideau Canal – 1831, Captain James C. Victor, R.E., "Map from the head of Long Island to the Black Rapids and of the River Jacques from Richmond", 23 March 1831.

DIAND, Canal Records, File No. 4052 – 253, F.A. Wise, Superintending Engineer to F. Braun, Secretary, Department of Public Works, 12 May 1875; and ibid., "Memorial praying for the construction of a bridge over the canal at Long Island, to the Honourable H.L. Langevin, Minister of Public Works", 3 March 1870.


DIAND, Canal Records, File No. 4052 – 255, Vol. I, J.D. Slater, Superintendent, Rideau Canal to F. Braun, Secretary, Department of Public Works, 3 February 1865.

DIAND, Canal Records, File No. 4052 – 253, John Murphy, Acting Superintending Engineer, to Col. A.E. Dubuc, Chief Engineer, Department of Railways and Canals, 20 July 1935.
Ibid., Murphy to Dubuc, 20 July 1935; and ibid., E.E.G., Bridge Engineer, Memorandum to A.E. Dubuc, 6 June 1935.

PAC, R.G. 11, Series II, Vol. 59, File No. 75, Benjamin Tett to the Honourable Charles Alleyn, m.p.p.. Chief Commissioner of the Board of Works, Toronto, 23 June 1858; and DIAND, Canal Records, File No. 4052 - 253, J.D. Slater, Superintendent, Rideau Canal, to F. Braun, Secretary, Department of Public Works, 30 November 1864.


PAC, RG 11, Series II, Vol. 59, File No. 75, Benjamin Tett to the Honourable Charles Alleyn, 23 June 1858.


DIAND, Canals Engineering Files, Bridge Contract No. 12992: Agreement between the Dominion Bridge Company Ltd., and Her Majesty Queen Victoria, represented by the Minister of Railways and Canals, for the construction of one new steel swing bridge at Beveridgtes Bay locks over the Rideau Canal, 20 January 1898.

34 DIAND, Canals Engineering Files, Bridge Contract No.12992: Agreement between the Dominion Bridge Company Ltd. and Her Majesty Queen Victoria, 20 January 1898.


36 Ibid.

37 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entries for Bridge No. 23, Beckwith Street Swing Bridge, Perth, and Bridge No. 24, Drummond Street Swing Bridge, Perth.

38 DIAND, Canal Records, File No. 4052 - 258, L.W. dark, Superintending Engineer, Memorandum, 6 November 1970.

39 Author's observations made on a visit to the bridge site in August 1974.


41 Information furnished the author by Barbara A. Humphreys, Head, Canadian Inventory of Historic Building, National Historic Parks and Sites Branch, DIAND.

42 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entry for Bridge No. 34, Jones Falls fixed timber bridge.

43 Ibid.

44 DIAND, National Historic Parks and Sites Branch, Historic Prints, Drawings and Photographs Collection, Jones Falls photograph no. R4-020-6-0051, provenience: Harold Nichol Collection.


Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212

47 PAC, RG 43, Bl, Vol. 229, F.A. Wise, Superintending Engineer, Rideau Canal, to A.P. Bradley, Secretary, Department of Railways and Canals, 24 October 1883.

48 Provincial Archives of Ontario (hereafter cited as PAO), Burrowes Sketch No. 65, Brewers Upper Mills, May 1830.


51 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entry for Bridge No. 38, Upper Brewers Mills timber fixed bridge.

52 PAO, Burrowes Sketch No. 65, Brewers Upper Mills, May 1830.


54 PAO, Burrowes Sketch No. 13, First Eight Locks of the Rideau Canal, (1834); and DIAND, Canal Records, File No. 4052 - 231, Vol. I, Petition of M.J. Currier to Mr. McDougall, Provincial Secretary, 13 February 1865.


58 Ibid., Samuel Keefer to J.P. Featherstone, 29 May 1871.

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64 DIAND, Canal Records, File No. 4052 – 234, Vol. II, W.H. Bowden, Chief Engineer, Department of Railways and Canals, Memorandum Re High Level Bridge at Bank Street, Ottawa, 14 October 1911.

65 Ibid., A.T. Phillips, Superintending Engineer to Col. A.E. Dubuc, Chief Engineer, Department of Railways and Canals, 10 May 1929.


67 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entries for the La Salle Causeway and Fixed Bridges, and the La Salle Causeway and Bascule Bridge, Kingston.

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69 Department of Railways and Canals, Annual Report, 1910-1911, (Ottawa: King's Printer, 1911), Trent Canal, Wellington Street, Lindsay, Ontario, p. 39.

71 DIAND, Canal Records, Pile No. 4052 - 232, J.D. Slater, Superintendent, Rideau Canal to P. Braun, Secretary, Department of Public Works, Ottawa, 10 June 1872.


73 DIAND, Canal Records, File No. 4052 - 232, J.D. Slater, Superintendent, Rideau Canal, to P. Braun, Secretary, Department of Public Works, Ottawa, 10 June 1872.

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77 Date inscribed on the Laurier Avenue concrete bridge abutment.

78 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entry for Bridge No. 18 over the Waste Weir channel at Smiths Falls.


80 Ibid., J.D. Slater, Superintendent, Rideau Canal, to F. Braun, Secretary, Department of Public Works, 4 July 1871.

81 Ibid., D.A. Ferguson, Mayor, Smiths Falls, to the Minister of the Department of Railways and Canals, 11 April 1888.

82 Ibid., J.D. Slater, Superintendent, Rideau Canal, to F. Braun, Secretary, Department of Public Works, 22 April 1871.
83 PAC, RG 43, B4a, Vol. 211, "Works for which special Appropriations were made", 13 October 1890.

84 DIAND, Canal Records, File No. 4052 - 252, F.A. Wise, Superintending Engineer, Rideau Canal, to A.P. Bradley, Secretary, Department of Railways and Canals, "Plan of Smiths Falls", 29 January 1889.

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86 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entry for Bridge No. 18 over the Waste Weir channel at Smiths Falls.

87 Information supplied by the Regional Municipality of Ottawa-Carleton, Bridge Engineering Section, in a telephone conversation, 29 September 1976.

88 A plaque on the bridge structure states that it was built by the Dominion Bridge Company. No date is affixed. The Ontario government Ministry of Transportation and Communications bridge files (M.T.C. Bridge No. 16-13) gives the date of construction as "approximately 1900".

89 DIAND, Canals Engineering, Rideau Canal Bridge Book, Entry for Canadian National Railways Bascule Bridge, Smiths Falls.

90* The Jones Falls timber swing bridge is no longer extant. For a more recent study of these bridges, see: Robert W. Passfield, "Design Evolution: Reconstructed Timber Swing Bridges on the Rideau Canal", Canal History and Technology Proceedings, vol. XXVI, March 2007, pp. 1-41; and ibid, pp.42-76,"Reconstructing Timber Swing Bridges at Parks Canada". [*2009 addition by rwp]
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File No. 4052 - 232, Laurier Avenue Bridge, Ottawa;
File No. 4052 - 233, Pretoria Avenue Bridge, Ottawa;
File No. 4052 - 234, Bank Street High Level Bridge, Ottawa;
File No. 4052 - 252, Jason Island Waste Channel Bridge, Smiths Falls;
File No. 4052 - 253, Long Island Bridge across Waste Weir;
File No. 4052 - 255, Bridge at Manotick, Ontario;
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The Burrowes Collection of Water-Colours, Burrowes Sketch no. 13, "First Eight Locks of the Rideau Canal", 1834; Burrowes Sketch no. 65, "Brewers Upper Mills", 1830.
Map of Rideau Waterway. (Drawn by Derek Ford.)
Nicholson's swing bridge. A timber kingpost truss swing bridge of the centre-bearing type [Centre-Bearing Timber Truss Swing Bridge]. (Photo by author.)
Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
Kilmarnock swing bridge. A timber kingpost truss swing bridge of the centre-bearing type [Centre-Bearing Timber Truss Swing Bridge]. (Photo by author.)
Jones Falls swing bridge. A timber kingpost truss swing bridge of the centre-bearing type [Centre-Bearing Timber Truss Swing Bridge]. (Photo by author.)
Washburn swing bridge. A timber kingpost swing bridge of the centre-bearing type [Centre-Bearing Timber Truss Swing Bridge]. (Photo by author.)
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Brass Point bridge. Four fixed low level Warren truss steel spans with a kingpost truss timber swing span [Centre-Bearing Timber Truss Swing Bridge]. (Photo by author.)
7 Pretoria Avenue vertical lift bridge, Ottawa. (Photo by author.)
8 Burritts Rapids swing bridge. (Photo by author.)
Long Island swing bridge. (Photo by author.)
The Narrows swing bridge. Note the winged turning handle set in place on the deck, and the timber pier on which the bridge rests when open. (Photo by author.)
Beckwith Street bridge, Perth. A fixed steel Howe truss span with a combination kingpost and Howe truss swing span. (Photo by author.)
Drummond Street bridge, Perth. A fixed steel Howe truss span and a combination kingpost and Howe truss swing span. (Photo by author.)
Craig Street bridge, Perth. A reinforced concrete fixed bridge of a type now being built along the Rideau Canal. The exceptionally low clearance under this bridge, some 8 feet, effectively prevents pleasure boats going up to and through the Beckwith and Drummond Street swing bridges to Perth basin. (Photo by author.)
Jones Falls fixed bridge. Note the kingpost truss timber swing bridge [Centre-Bearing Timber Truss Swing Bridge] in the background. (Photo by author.)
Upper Brewers fixed bridge. A simple timber beam bridge resting on rock filled timber crib abutments. (Photo by author.)
16 The Plaza bridge, Ottawa. (Photo by author.)
Bank Street fixed high level bridge. (Photo by author.)
Kingston bascule bridge. This bridge is located in the La Salle Causeway. Note the position of the counter-weight. (Photo by author.)
Kingston bascule bridge. This is a trunnion, or pivot type bascule bridge. (Photo by author.)
Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
Merrickville swing bridge. A steel through plate girder swing bridge. (Photo by author.)
21 Merrickville swing bridge. Note the wooden deck. (Photo by author.)
Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
Chaffey's swing bridge. A steel through plate girder swing bridge. (Photo by author.)
Kingston Mills swing bridge. A steel through plate girder swing bridge. (Photo by author.)
Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
Abbott Street swing bridge. Smiths Falls. A steel through plate girder swing bridge. Note the tip of the C.N.R. bascule bridge in the background. (Photo by author.)
Old Slys swing bridge. A steel through plate girder swing bridge. (Photo by author.)
Laurier Avenue fixed high level bridge, Ottawa. Note the original steel spans dating from 1900-01 and the concrete spans built in 1943. (Photo by author.)
Laurier Avenue fixed high level bridge, Ottawa. Note the structural detail. (Photo by author.)
Confederation Drive fixed bridge. Smiths Falls. This bridge crosses the waste weir channel. (Photo by author.)
29 Confederation Drive fixed bridge. Smiths Falls. (Photo by author.)
Burritts Rapids fixed bridge. This is a deck truss bridge. (Photo by author.)
31 Nicholsons fixed bridge, Andrewsville. (Photo by author.)
32 Canadian National Railways bascule bridge. Smiths Falls. This is a rolling lift bascule. (Photo by author.)
Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
Canadian National Railways bascule bridge. Smiths Falls. Note the position of the counterweight. (Photo by author.)
34  Sketches of several bridge trusses. (Drawn by author.)
Kingpost Truss

Queenpost Truss

Howe Truss - 1840

Pratt Truss - 1844

Pratt Truss - 1860

Pratt Truss - 1870s

Fink Truss (Short Spans)

Fink Truss (Long Spans)
35  Bridge types and configurations. (Drawn by author.)
Historic Bridges on the Rideau Waterways System, by Robert W. Passfield — part of Manuscript Report 212
Sketch of a Rolling bridge. To date no drawing of a Rideau Canal rolling bridge has been found. This is a composite sketch based on a drawing of a contemporary rolling bridge erected over the Chambly Canal and outlines of rolling bridges shown in several early sketches of Rideau Canal lockstations. (Sketch by author.)
Drawing (Plan and Elevation) of a Rim-bearing swing bridge. This type of bridge was erected on the Rideau Canal as early as 1843. Note the positioning of the kingpost and the small diameter pivot shaft. (Department of Indian and Northern Affairs.)
Drawing (Section and Plan of Turntable) of a Rim-bearing swing bridge. (Department of Indian and Northern Affairs.)
39 Drawing of a Centre-bearing swing bridge. This bridge was adopted for use on the Rideau Canal in 1864-65.

The existing timber swing bridges on the Rideau Canal are replicas of this structure. Note the positioning of the kingpost and the cone and socket pivot bearing which differs significantly from the Rim-bearing swing bridge (Fig. 37, 38). (Department of Indian and Northern Affairs.)