

POWERSCOURT BRIDGE

(Percy Bridge)

Spanning Chateaugay River, First Concession Road,
Elgin/Hichinbrooke, Huntingdon County, Quebec, Canada

Chateaugay vicinity

Franklin County

New York

HAER NY-332

NY-332

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service

U.S. Department of the Interior

1849 C Street NW

Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

POWERSCOURT¹ BRIDGE (Percy Bridge) HAER No. NY-332

Location: Spanning Chateauguay River at First Concession Road,
between Elgin and Hinchinbrook townships, Huntingdon County,
Quebec Province, Canada
45.007N/74.160W

Structural Type: McCallum through truss covered bridge

Date of Construction: 1861

Builder: Robert Graham

Present Use: Vehicular and pedestrian bridge

Significance: The Powerscourt Bridge is one of the oldest covered bridges in Canada and the only surviving example of a McCallum type truss in the world. Patented in 1851 and 1857, the McCallum truss was used on North American railways until about 1870, when prefabricated iron trusses came into widespread use.

Historian: Researched and written by Lola Bennett, March 2004.

Project Information: The National Covered Bridges Recording Project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Historic American Buildings Survey/Historic American Engineering Record, a division of the National Park Service, U.S. Department of the Interior. The Federal Highway Administration funded the project.

¹ The Powerscourt Post Office was established in 1864 and operated until 1915.

Chronology

- 1815 Daniel McCallum born at Renfrew, Scotland.
- 1820s First settlements in Huntingdon County, Quebec
- 1851 Daniel McCallum patents an "Inflexible Arch Truss Bridge" for use on railroads
- 1855 Elgin Township formed
- 1857 First bridge at this site washes out in a flood
- 1857 Daniel McCallum receives a second patent for his design
- 1858 Daniel McCallum forms the McCallum Bridge Company at New York City
- 1861 Second (temporary) bridge at this site washes out in a flood
- 1861 Present covered bridge built by Robert Graham
- 1862 Daniel McCallum appointed head of military railroads in U.S.
- 1864 Powerscourt Post Office established
- 1869 Powerscourt Bridge repaired
- 1878 Daniel McCallum dies at Brooklyn, New York
- 1890 Powerscourt Bridge repaired
- 1892 Powerscourt Bridge repaired
- 1896 Powerscourt Bridge repaired
- 1904 Powerscourt Bridge rebuilt
- 1949 Richard Sanders Allen identifies Powerscourt Bridge as a McCallum truss
- 1950 Powerscourt Bridge's cedar shingle roof replaced with metal roof
- 1984 Powerscourt Bridge designated a National Historic Site of Canada
- 1988 Powerscourt Bridge's lower chords rebuilt
- 2003 Powerscourt Bridge recorded by the Historic American Engineering Record

Introduction

Covered bridge construction in Canada principally occurred in the eastern provinces. New Brunswick once had hundreds of covered bridges, and Quebec had at least 878². Canadian builders tended to follow a few standard truss plans—primarily Burr, Town and Howe—that were also popular in the United States. There are presently 159 surviving covered bridges in Canada. The vast majority of these bridges are Town lattice and Howe trusses built in the first half of the twentieth century. The Powerscourt Bridge is one of the oldest covered bridges in Canada³ and the only surviving example of a McCallum type truss in the world.

Description

The Powerscourt Bridge is a two-span McCallum type truss wood covered bridge on concrete-faced mortared stone piers and abutments. The west span is 80'-3" long and the east span is 85'-3" long. Including the eight-foot shelter panels at each end, the total length of the bridge, along the ridge, is 180 feet. The truss (from the top of the upper chord to the bottom of the lower chord) is 17'-6" high at mid-span and 15'-6" high at the ends, 24'-0" wide overall (22'-8" wide at the east end), with a roadway width of 19'-6".

Each truss has eight panels, spaced 9'-6" on center. The connections are notched and bolted at the panel points. The arched upper chord has a rise of about 2 feet over its length (radius of approximately 400 feet), is composed of a 10"x12" timber flanked by two lines of 4"x12" planks. The lower chord is four lines of 4"x12" planks with shear blocks bolted together. The upper and lower chords are fastened together with paired vertical 6"x7½" posts, inclined so as to be perpendicular to the upper chord. Between the posts, there are paired 6x6" diagonal braces angling up towards the center and single 6"x7" counterbraces angling down towards the center of each span. A 6"x8" secondary chord extends along the underside of the upper chord in panels 3 through 6 and butts up against the arch brace, which diagonally crosses the two end panels in each truss and carries the thrust of the curved upper chord down to the end of the lower chord.

The upper lateral system consists of 6"x10" tie beams notched onto the upper chord at every panel point. There are metal tie rods between the upper chords at approximately every other panel point, and diagonal lateral bracing 5"x5" between the upper chords and the tie beams. There are sway braces between the posts and tie beams at every other panel point. Rafters, measuring approximately 2"x6", frame onto the upper chord and rise diagonally up to a central ridge board set on struts perpendicular to the tie beams. The rafters support a series of 1"x3" nailers, spaced 1 foot apart, to which is fastened a corrugated metal roof. The roof system is irregular as it follows the arch of the upper chord.

² According to covered bridge historian Joseph Conwill, the June 2003 version of Quebec's covered bridge inventory lists 878 covered bridges plus 72 boxed pony trusses that once existed.

³ The Guthrie Bridge (1845) at St-Armand-Ouest, Quebec Province, is reportedly the oldest covered bridge in Canada.

The lower chords of the bridge rest on large bedding timbers on top of the piers and abutments. The floor beams are seated on the lower chord at each panel point. The original wood floor beams have been replaced with pairs of steel I-beams on the Hichinbrook side of the bridge. There are nine lines of 10"x10" stringers on top of the floor beams. A 2"x10" timber plank deck is nailed on top of the stringers.

The exterior of the bridge is covered with board and batten siding to three feet below the upper chord. The housing is continuous over the pier. The sheathing is fastened to nailers on the outer faces of the trusses. The portals are open, framed simply by the end posts of the shelter panels and an overhead strut. There are wood bridge plaques hanging over both portals. A bronze plaque on a stone monument has been installed at the east end of the bridge by the Historic Sites and Monuments Board of Canada.

History

In 1857 a freshet destroyed an existing bridge at this site. A temporary bridge was constructed, but that bridge, too, was destroyed by another flood in March 1861. The Huntingdon, Quebec, County Council immediately appointed a Mr. Middlemiss to prepare plans and specifications for a new bridge. On June 19, 1861, they awarded the construction contract to local blacksmith Robert Graham for \$1,675. Work began on July 1861 and was completed by the end of the year.⁴ The Council accepted the bridge in March 1862. It is likely, though not documented, that a nearby McCallum truss railroad bridge served as a model for the Powerscourt Bridge.⁵

According to Huntingdon County Council *Minutes*, the Powerscourt Bridge was repaired at least a half-dozen times prior to the turn of the century. In 1903-04, Thomas Chalmers rebuilt the piers and superstructure at a cost of \$3857.50.⁶ In 1949, concrete piers were built in front of the abutments to shorten the length of both spans. The lower chords were rebuilt in 1988. The Powerscourt Bridge continues to carry vehicular traffic.

Though structurally deficient, the bridge's rural location has facilitated its preservation. In 1949, covered bridge historian Richard Sanders Allen identified the bridge as the only surviving example of a McCallum type truss, and brought it to the attention of local residents. When the provincial Ministère des Transports announced, in 1983, a plan to replace the bridge with a concrete structure, the community launched a campaign to save the aging landmark. In 1984, the Powerscourt Bridge was designated a National Historic Site of Canada.

⁴ The Council later paid Graham \$69.26 for "extras." [Passfield (1989), p.8.]

⁵ McCallum's booklet, *McCallum's Inflexible Arched Truss Bridge Explained and Illustrated* (p.52), contains a letter from D. Stark, engineer for the Grand Trunk Railway, stating that in 1859 there were six McCallum trusses standing, and three being built, on the line between Montreal and Island Pond, and several more under construction between Island Pond and Portland. A c.1859 inventory of Grand Trunk Railway bridges showing thirteen McCallum truss bridges in the Montreal and Island Pond District and twelve in the Portland district, built during an upgrading of the line in 1858-59.

⁶ Passfield, (1989), p.9.

Design

Daniel Craig McCallum (1815-1878) was born in Scotland and immigrated to America as a child. Educated in public schools and trained as a carpenter, McCallum began his career with the New York & Erie Railroad, and in 1848, was put in charge of building bridges. After conducting experiments on wood truss models, McCallum devised a new type of truss with an arched upper chord and prestressed counterbraces. Combining the arch and truss, he claimed, would "render their united strength available at the same time...and preserve it at a time when any other bridge would fail."⁷ McCallum took out patents in 1851 and 1857 for his "Inflexible Arch Truss," a design that proved so sturdy it even surviving floods and train wrecks. In 1858, McCallum established the McCallum Bridge Company at New York City and the following year published a booklet explaining the merits of his truss design.⁸ By 1860, the McCallum truss was in use on railroad lines across North America.⁹ Daniel McCallum went on to construct railroads for the Union Army during the Civil War, but his truss gradually fell out of favor because it was difficult to frame. By 1870, the McCallum truss was obsolete.

While the Powerscourt Bridge follows the basic member arrangement of McCallum's plan, it lacks several essential details specified in the patent, including seating the arch braces on the abutments, installing tension rods to counteract deflection in the lower chords, and prestressing compression diagonals by means of cast iron bearing shoes. McCallum specified that the arch braces seat directly on the abutments (1851 patent) or in cast iron shoes on the abutments (1857 patent), while the arch braces at Powerscourt seat directly on the lower chords. McCallum specified reinforcing rods for the counters, either bored through the center (1851 patent) or placed against the upper face (1857 patent), but the rods at Powerscourt are not placed as specified and *may* be a later addition. The patents also specify cast iron bearing plates for prestressing the counterbraces. These bearing plates were omitted in the Powerscourt Bridge, and the counterbraces are simply mortised into the posts. These details, either poorly framed or entirely omitted, resulted in structural deficiencies that have plagued the Powerscourt Bridge throughout its life.¹⁰

⁷ D.C. McCallum, Advertisement for "McCallum's Inflexible Arch Truss," in *History of the Railroads and Canals of the United States*, by Henry V. Poor (1860), p.620.

⁸ McCallum, D.C. *McCallum's Inflexible Arched Truss Bridge Explained and Illustrated*. New York: Samuel T. Callahan, 1859.

⁹ According to Raymond Wilson's article "Twenty Different Ways to Build a Covered Bridge," *Technology Review* May 1971, an estimated 150 McCallum truss bridges once existed. In 1858, there were 55 McCallum truss spans on the New York & Erie Railroad and an advertisement for "McCallum's Inflexible Arch Truss" in Poor's 1860 *History of the Railroad and Canals of the United States*, lists 20 railroad lines using this type of truss.

¹⁰ Gerard van Rijn, "Site Visit Report on the Powerscourt Bridge," June 12, 2003. Heritage Conservation Services, Public Works and Government Services Canada.

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ADDENDUM TO:
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