

WELLAND CANAL SECOND AQUEDUCT

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August, 2007

Welland Second Canal Aqueduct

Welland, Ontario

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ARCHITECTURE

Construction (Figs. 2, 9-25)

The Second Welland Canal aqueduct is constructed of thousands of cut stones weighing approximately one ton each. It consists of a series of four stone arches supporting a large trough through which the canal and ships once passed. The four arches are 45 feet wide with a span of 45 feet each. They are capped with rows of stone voussoirs and stabilized with projecting buttresses between the arches. The entire structure of stone blocks and concrete mat is supported by a network of wooden pilings topped with timber framing. When it was completed in the 1840's, the aqueduct measured 45 feet wide and over 315 feet long. The channel depth was 10 feet 8 inches.¹

Construction of the Second Canal Aqueduct was described in detail in an 1872 report by Chief Engineer John Page:

...At the south end of the stretch just mentioned [the Deep Cut], the [Second] canal is carried over the Welland River by means of an aqueduct, formed of a heavy class of well built ashlar masonry. This structure is so arranged that the present bottom of the canal is one foot under the ordinary surface of the river, and also that the undersides of the center portions of the arches over the waterway of the stream are fully five feet below its surface.

It will therefore be evident that it is to a certain extent a dam, through which a siphon-culvert [on a large scale] has been formed of a sectional area sufficient to allow the necessary volume of water to pass.

Previous to the erection of the structure, that part of the bed of the river to be occupied by it was laid dry, and a channel formed for the temporary diversion of the stream. The foundations were then well piled, and the masonry carried up before the water was allowed to resume its original course.

The aqueduct is 316 feet long, and the trunk 45 feet wide between the side walls, which is carried up to a height suited to the Grand River level.

It is supported by 4 arches, each 40 foot span, and 7 feet rise, the voussoirs of which are 2 ½ feet in depth, and the spandrel filling is of masonry and concrete, brought fully up to the crown of the arches.

¹ City of Welland Local Architectural Conservation Advisory Committee, Historical and Architectural Reflections of the City of Welland, p. 45.

Transverse timbers were then laid and secured between the side walls, over which a floor of plank was subsequently placed. On this there is a depth of 18 ½ feet, when the summit water is at its full height, or 20 feet over the level of the present mitre sill of Port Colborne lock...[The Report goes on to describe how this aqueduct may be adapted for use in the “Enlarged” canal being contemplated]²

The construction and appearance of the Second Canal Aqueduct is also described in detail in a letter from Samuel Keefer to W. B. Robinson written July 7, 1846:

In reference to Mr. Zimmerman’s contract for the Aqueduct across the Chippewa, I have the honor to report, that it is utterly impossible for him to complete that work at the present contract price, because the price is altogether inadequate....

From the peculiar nature and importance of this structure, the masonry must necessarily be done in the most careful and accurate manner in order to insure its perfect stability...

In the Chippewa Aqueduct every attention has been paid to the joints and all parts of the work essential to its permanence and durability, but the faces of the stones have been left quite rough as they came from the quarry, with merely a margin draught around the axis, by which a small saving of expense is effected, but the stone being of large dimension and light in color (coming from the best of the Thorold quarries) the structure when completed will have a very bold and massive appearance...³

Age

In 1837 H. H. Killaly was hired by the Welland Canal Company to survey and report on the condition of the Canal, and in his report, submitted in 1841, he recommended replacing the wooden locks along the length of the canal and the wooden aqueduct at Welland with locks and aqueducts made of stone.⁴ The aqueduct was begun in 1842, was still under construction in 1846 and it appears was not completed until about 1850.⁵

² Report of the Chief Engineer, 29 April 1872, [Canada. *Sessional Papers (No. 6) for 1873*, p. 41], cited by Roberta M. Styran and Roberta Taylor in The “Great Swivel Link”: Canada’s Welland Canal (Toronto, 2001), p. 217.

³ Samuel Keefer to W. B. Robinson, 7 July 1846, National Archives of Canada, RG 43, Vol. 2249, *Letterbook 11 July 1846-13 November 1847*, p.p. 10-10; hereafter *Letterbook 1846-1847*; cited in The “Great Swivel Link”, p. 23. Samuel Keefer was Chief Engineer for the Canal and W. B. Robinson was the Commissioner of Public Works.

⁴ H.H. Killaly, Chairman, Board of Works. “Memoranda Respecting various Public Works heretofore in progress, or projected in the Province of Canada...prepared and submitted for the consideration of His Excellency the Governor General”; Upper Canada. House of Assembly, *Journal*, 1841, Appendix C.C. cited in The “Great Swivel Link”, p. 23.

⁵ Historical and Architectural Reflections, p. 44.

Samuel Keefer wrote to Walter Shanly on July 24, 1848 that he would “..send up Mr. Woodruff in a day or two to complete...the section of the cofferdams at the aqueduct.... Styran and Taylor, The “Great Swivel Link”, p.p. 145, 292.

Engineers

The engineering works on the Second Welland Canal were under the charge of Walter and Francis Shanly, sons of an Irish lawyer who settled near London Ontario. Walter was in charge of all the work from Thorold to Port Colborne. Prior to this all of Canada's engineering requirements were met by Royal Engineers from Britain. The Shanlys were among the first Canadian trained engineers. They studied engineering in Montreal and designed railways, bridges and tunnels in both the United States and Canada, including the well known Hoosac Tunnel at North Adams, Massachusetts and the bridge of the Humber River at Toronto whose intricate herring-bone design withstood Hurricane Hazel in 1954.

Contractors and Builders

Samuel Zimmerman

Contractor Samuel Zimmerman (1815-1857) emigrated from Pennsylvania to Canada West in 1842. Shortly thereafter he was awarded seven contracts for construction on the Welland Canal, including those for the Aqueduct and Aqueduct Lock.

Zimmerman was born into a family of modest circumstances on March 17, 1815 in Huntington County, Pennsylvania. Of German descent, he was the fifth son in a family of eight. With little formal schooling, he went to work at an early age as a labourer on construction and public works projects. About 1842 he came to Thorold to become involved in the reconstruction of the Welland Canal, and between 1846 and 1849 built under contract to the Board of Public Works four locks and the aqueduct for a contract price of \$ 100,000. He gained a reputation as one of the "best and most successful" contractors employed by the government chiefly by refusing to allow work on his projects to be stopped by canal workers' strikes. By 1848 he had made a considerable profit, the basis for his later fortune, and in that year married Margaret Woodruff, granddaughter of Connecticut United Empire Loyalist Ezekiel Woodruff and daughter of businessman, War of 1812 veteran and Member of Parliament Richard Woodruff of St. Davids, where the pair settled.⁶

Zimmerman's success as a canal contractor brought him into the field of railway construction. In 1849 the Great Western Railroad contracted the firm of Oswald, Zimmerman and Company to build the eastern division of the Great Western from Paris to Niagara Falls for the sum of \$600,000. Zimmerman was also a promoter of and contractor for the Niagara Falls Suspension Bridge. Designed by eminent American engineer John Augustus Roebling, it was completed in 1855 and connected the Great

A cross section of the canal in The Welland Ship Canal Between Lake Ontario and Lake Erie 1913-1932, by Major P.J. Cowan (London, 1935), Fig. 145, dates the "old" aqueduct to 1850.

⁶ "Walter Woodruff", History of the County of Welland, p. 512.

Western to the American railway network. As a railway promoter and contractor, Zimmerman displayed a flair for publicity and showmanship, organizing free rides and lavish evening entertainments for prominent businessmen and politicians. Despite missed construction deadlines on the eastern division and a train that fell off the loose tracks on the inaugural run, the company received a substantial bonus for "early completion".

Zimmerman quickly developed close relationships with high profile provincial politicians and during the early 1850's became a railway lobbyist and political power broker of some note. His help was crucial in getting railway bills through the Legislative Assembly. In return, he was rewarded with contracts on his own terms. He also adeptly used the 1852 Municipal Loan Fund Act, which provided for a fund against which municipalities could borrow to invest in railways, to become the contractor for a number of short railways. That year he agreed to build the Cobourg and Peterborough Railway. Despite low quality construction and the repeated collapse of a three mile long bridge across Rice Lake, he refused to turn over the track or the engines and rolling stock until he had been paid in cash and bonds for alleged costs greatly in excess of the original estimate. In 1854 his firm gained the contract to build the Woodstock and Lake Erie Railway because Zimmerman paid a member of the railway company's board of directors \$50,000. to advise a rival contracting firm to submit a higher bid. In early 1857 Zimmerman was in the midst of a power struggle to take over control of what eventually became the Canada Southern Railway when one day he "jauntily walked out of the hotel with his grip in his hand, and entered the omnibus for the Great Western Railway Station" in Toronto. Just 60 minutes later he was "laid low in death" at the bridge over the Desjardins Canal.⁷

Zimmerman was killed by his own railway. Even contemporary accounts of the the disaster alleged that the bridge was "indifferently" built.⁸ The accident happened near Hamilton, on March 12th, 1857. Zimmerman was among fifty-nine people killed when the engine left the tracks as it approached the bridge and the train crashed through the bridge and the ice on the canal below (Figure 9). Zimmerman's death elicited a huge outcry of mourning throughout the peninsula, but particularly in Niagara Falls. The Drummondville (Niagara Falls) Reporter and Farmer's Friend of March 19th, 1857 contained nine columns of mourning, recounting the large meeting in Drummondville

⁷ "Samuel Zimmerman" by J. K. Johnson, in the Dictionary of Canadian Biography, Vol. VIII, p.p. 963-966.

Contract prices for canal and railway construction from "Biographical Sketch of Samuel Zimmerman" printed in the pamphlet entitled "Full Details of the Railway Disaster of the 12th of March, 1857, at the Desjardin's Canal, on the line of the Great Western Railway" (Hamilton, 1857). The sketch was reprinted in full in R. W. Geary's "Samuel Zimmerman, 1815-1857", Welland County Historical Society Papers and Records, Vol. III (Welland, 1927), p.p. 47-57 and formed the basis for a biographical sketch of Zimmerman in A. E. Coombs' History of the Niagara Peninsula and the New Welland Canal (Toronto, 1930), p.172.

⁸ "Accident on the G. W. Railway", St. Catharines Journal, 19 March, 1857, p.3.

where citizens expressed their sorrow and passed a motion of condolence testifying of their "...high estimation of his manly, social, benevolent and gentlemanly qualities, his rare and active business talents and those amiable and genial traits which endeared him to all...." At Clifton (now also part of Niagara Falls), the Town Council passed a motion requesting the citizens to keep the Monday of his funeral as a holiday.⁹ The Welland County Council adopted an address of condolence which read in part:

"The Municipal Council of the County of Welland...avail themselves of this the first opportunity...of expressing their deep sense of the deplorable loss of life...among whom were...the most prominent Samuel Zimmerman, Esquire, of Clifton, who during a long residence in this county, by munificent and well-directed liberality, and by large enterprise and strict business habits, had won the esteem of the whole community..."

The Toronto Globe of March 13th, 1857 said, "Perhaps the death of no man in Canada would be deplored as a calamity by a greater number of persons than that of Samuel Zimmerman."¹⁰

These accolades for Zimmerman were not based solely on his business accomplishments as a railway magnate. Thirty years later, the History of the County of Welland called him the "foster parent" of Clifton, and he was the founder of that village, which later became Niagara Falls. In 1848 Zimmerman had purchased several hundred acres of land on the Canadian side of the Suspension Bridge, laying out streets, selling building lots and erecting commercial buildings. The community was called Elgin, later Clifton, and eventually became Niagara Falls. He also built a gasworks and waterworks for the growing town. At the same time he purchased the Clifton House hotel, upgrading and renovating it into "...one of the most complete and popular hotels that any watering place can boast." Zimmerman's own home was constructed on fifty-two acres on the cliff directly opposite the American Falls. In addition to the residence, there were four lodges, stables and a conservatory. The grounds, including those adjacent to the river, were laid out with shrubbery, forest trees, gravelled walks and fountains (one costing \$ 15,000.). The groves and promenades were lighted during the summer evenings with gas lights. These picturesque grounds later became Queen Victoria Park.

The Zimmerman Bank was founded in Elgin in 1854 by Zimmerman, Oswald, Luther H. Holden, John Hillyard Cameron, Joseph and Richard Woodruff and John L. Ranney. Besides the Welland Mills in Thorold, Zimmerman owned the Niagara Harbour and Dock Company, the 475 ton lake steamer Zimmerman, a part interest in another steamer, the Peerless, and approximately 18,000 acres of real estate across the province, primarily in Hamilton and Toronto. At his death his wealth was estimated at about three million dollars. Zimmerman was buried on his grounds at Clifton and later reinterred next to his wife in St. Davids.¹¹

⁹ Geary, "Samuel Zimmerman", Papers and Records, p.p. 48-49

¹⁰ A.B. Rice, ed. History of the County of Welland, p.p. 234-235, 343.

¹¹ Geary, "Samuel Zimmerman" in Papers and Records p.p. 53-57. Coombs, p.172-173.

Foremen and Labourers

A record of “Persons in charge of Mechanics and Work” on the Second Canal can be found in the National Archives of Canada, and this lists G. Merrill as the foreman in charge of construction of the Aqueduct.¹² Like all the work done on the Second Canal, the ordinary labourers who constructed this aqueduct would have been mainly Irish immigrants. The Jubilee History of Thorold reported that “The year 1841 brought 4,000 men, a large number having families with them to work on the enlargement of the canal. Most these ‘canallers’ were Irishmen”¹³

HISTORY

Event

This aqueduct was built during the construction of the Second Welland Canal, which ran 27.5 miles from Port Dalhousie on Lake Ontario to Port Colborne on Lake Erie. The First Welland Canal had its beginning in 1818 William Hamilton Merritt, and fellow mill owners George Keefer and John DeCou brought forward a proposal to stabilize the supply of water for their mills on the Twelve Mile Creek by linking the creek to the Chippawa River, a project which developed into the plan to connect lakes Erie and Ontario by canal. The three conducted preliminary surveys, petitioned the provincial assembly for incorporation as a canal company, and organized local meetings to win public approval. The Welland Canal Company was chartered in January of 1824 with Keefer as the company's first President. The construction contracts were awarded and sod turned for the First Canal on November 30th, 1824. The first boats to navigate the canal were the Anne and Jane on October 24, 1829. The extension of the canal to Port Colborne on Lake Erie was completed in March of 1833.

The Second Welland Canal was begun in 1841 when the Government of Canada purchased the entire canal from the Welland Canal Company, and decided to enlarge it for nine foot navigation. The number of locks on the canal were reduced from 36 to 27 by increasing the lift of each. The new locks were constructed in stone rather than wood and the leaky wooden aqueduct was replaced by a cut stone aqueduct. The Welland Canal was subsequently enlarged and improved as shipping demanded. The Third Welland Canal was begun in 1871 and completed in 1881, and the Fourth Welland Canal was constructed between 1913 and 1932.¹⁴

Johnson, "Zimmerman", in Dictionary of Canadian Biog. VIII, p. 966.

¹² Samuel Power to Thomas Begly, 25 June 1846; National Archives of Canada, RG 43, Vol. 2248, *Letterbook 1844-1846*, p. 412; cited by Styran and Taylor in The Great Swivel Link. Centennial Yearbook, History of Crowland Township, p. 105.

¹³ Cited in “The Irish built it with sweat, death for 63 cents a day”, Toronto Daily Star, May 31, 1966.

¹⁴ John P. Heisler, The Canals of Canada Canadian Historic Sites: Occasional Papers in Archaeology and History – No. 8 (Ottawa, 1973), p.p. 48-49.

“The Welland Ship Canal” ms., Welland Public Library, Reference Department.

Context

There can be little doubt that the fact that an aqueduct was located at this point over the First Welland Canal was the causative factor in establishing what has now become the City of Welland. John N. Jackson explains it thusly in his book, The Welland Canals and Their Communities:

There can be little doubt but that the City of Welland was born, reared and became an industrial town due to the Welland Canal...Specifically, the *raison d'être* for the first urban settlement, was the feeder canal from the dam at Dunnville on the Grand River. The town grew at the spot where this feeder crossed the Chippawa Creek (Welland River) by means of a wooden aqueduct...The new settlement was given the name "Aqueduct", which was changed to a more dignified "Merrittsville" in 1842, and then to Welland in 1858 when the settlement was incorporated as a Village by Act of Parliament. The importance of the site, presumed initially to be a shanty town for Irish workers on the aqueduct, depended upon the fall in level between the water in the aqueduct and the river, the resultant potential for water power, and the lock which allowed canal boats to enter the Welland River. The settlement became therefore a local centre for river and canal navigation, with access towards the Grand River along the feeder, to Lake Erie and Lake Ontario along the Welland Canal, and to Chippawa and the centre of the peninsula along the Welland River.¹⁵

The Second Canal and its aqueduct begun in the 1840's was located east of the original canal, forming an island between the old and new canal channels. The old channel was spanned by a fixed bridge and the new by a swing bridge at East Main Street. The core of Welland with its businesses and Court House (completed 1856) developed along the road route (East Main Street) east of these two bridges. Grist and carding mills were located near the river along North Main (now Niagara).¹⁶ The construction of a Welland Canal aqueduct here (of which this Second Canal Aqueduct is the earliest surviving example), can therefore be said to represent the causative factor and the nucleus around which the community which is now the City of Welland was formed.

Setting

The Second Canal Aqueduct is located behind Welland's Civic Centre and has been infilled with gardens planted on top of it (Fig. 10). The exposed portion of the aqueduct wall which has a historical plaque mounted on it faces the Recreational waterway (old canal) and Welland Canal Parkway Trail to the west and is fronted with grass. The Second Canal Aqueduct's location and landscaping make it an integral part of the public open space behind the Civic Centre.

¹⁵ John N. Jackson, The Welland Canals and Their Communities (Toronto, 1997), p.p. 43-44.

¹⁶ John N. Jackson, The Welland Canals and Their Communities, p.50.

Landmark

The Second Welland Canal Aqueduct is a unique visual landmark in the City of Welland. This is possibly the oldest known surviving stone aqueduct that carried water transportation in Canada.¹⁷

INTEGRITY

Site

The Second Canal Aqueduct occupies its original site and has not been moved.

Alterations

During construction of the Third Welland Canal, a second aqueduct was built west of this one. (Fig. 2) It was subsequently demolished during Fourth Canal construction although a portion of its east wall was incorporated into the new canal wall. The Second Canal Aqueduct itself remained filled with water for many years. It was later closed at one end and served as a boat slip. In 1946 the base of the aqueduct was converted into a public swimming pool with change house and filtration plant. Use of the pool was discontinued in 1982 and the aqueduct was filled in. In 1984, Public Works Canada partially excavated the aqueduct, but it was subsequently buried again during construction of the current Civic Centre (completed 2005).¹⁸

Condition

The exposed portions of the Aqueduct appear to be in excellent structural condition.

¹⁷ Terry Hughes, "Piece of History' must be saved", Brief to Federal Government, December 1990.

¹⁸ Terry Hughes, quoted by Bill Codd in "Piece of history' must be saved, canal board told", Welland Tribune, Sept. 7, 1989, p. 3
Welland Centennial 1858-1958 Souvenir Booklet (Welland, 1958), p. 9.



Figure 1
Location of Aqueduct
Source: Page's Historical Atlas of Lincoln and Welland, 1872, reproduced in
"A Piece of History Must Be Saved", report prepared by T. Hughes. Dec.1990

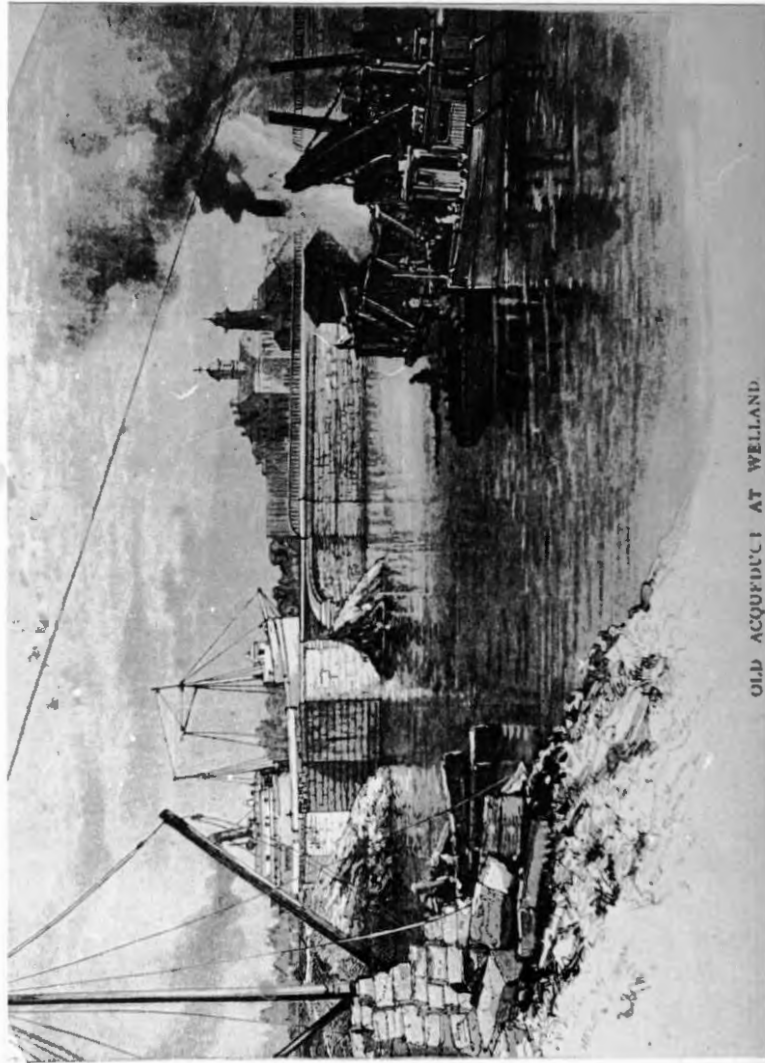
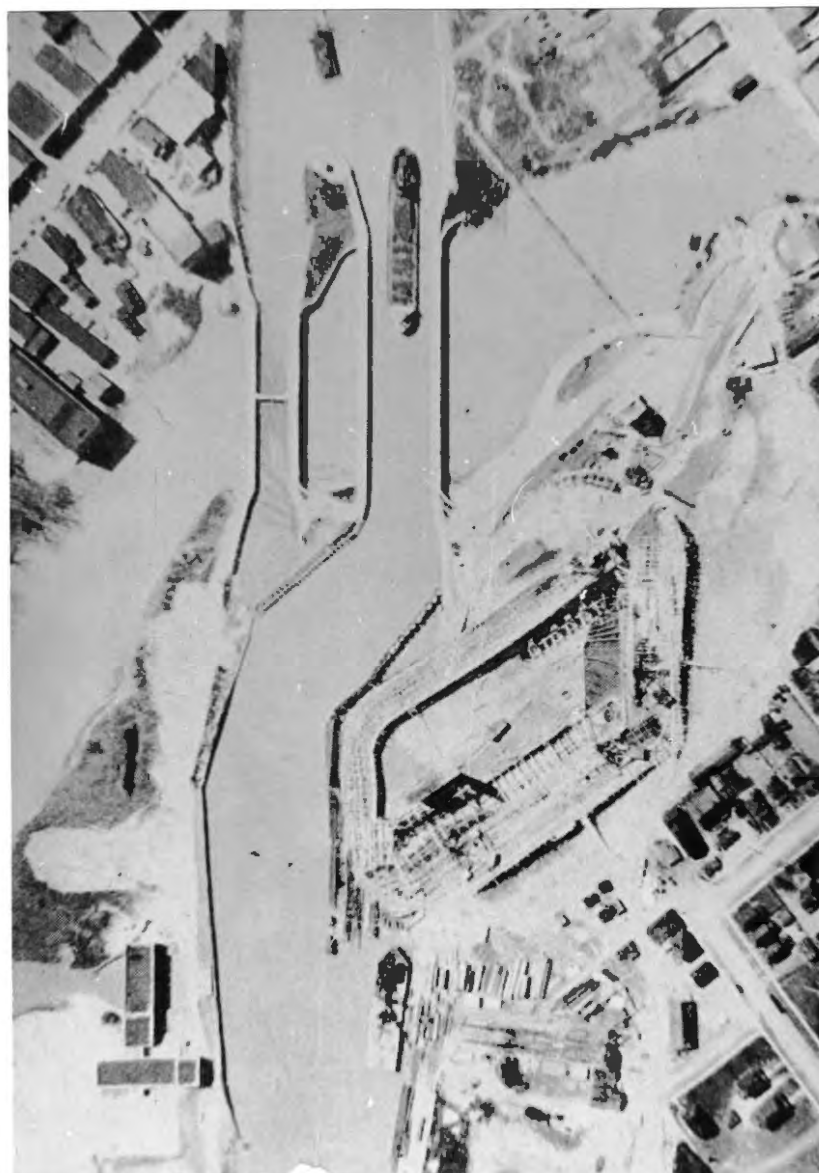


Fig. 2
Second Welland Canal Aqueduct.
Source: Welland Historical Museum



Fig. 3
Second and Third Canal Aqueducts
Source: Welland Historical Museum (original Ontario Archives)



4. OVERHEAD VIEW OF AQUEDUCT

Fig. 4
Old Aqueduct at Welland. B Jackson. Feb. 28, 1930
Source: Welland Historical Museum



Fig. 5
Aerial view of Second and Third Welland Canal Aqueducts
Source: Welland Historical Museum



2. #2 AQUEDUCT, NOW A SWIMMING POOL

Fig. 6
Second Welland Canal Aqueduct.as a swimming pool
Source: Welland Historical Museum



Fig. 7
Third Welland Canal Aqueduct - now removed
Source: Welland Historical Museum



Fig. 8
Aqueduct and river.
Source: Welland Historical Museum



Figs. 9 & 10

Exterior (top photo) and interior (bottom photo) of Second Canal Aqueduct 2007
Source for Figs. 9 to 25 : N. Reid



Figs. 11 & 12
Second Canal Aqueduct 2007



Figs. 13 & 14
Second Canal Aqueduct 2007



Figs. 15 & 16
Second Canal Aqueduct 2007



Figs. 17 & 18
Historical Plaque at Second Canal Aqueduct, 2007



Figs. 19 & 20
Second Canal Aqueduct 2007



Figs. 21 & 22
Second Canal Aqueduct 2007



Fig. 23 & 24
Second Canal Aqueduct 2007



Fig. 25
Second Canal Aqueduct 2007

STATEMENT OF CULTURAL HERITAGE VALUE

Description of Property – Welland Canal Second Aqueduct

This stone aqueduct, now largely filled with earth, is located on the east side of the Welland Recreational Waterway (former Welland Canal) along the Boardwalk and directly west of the present Civic Centre at 60 East Main Street.

Statement of Cultural Heritage Value or Interest

This stone aqueduct was built between 1842 and 1850 during construction of the Second Welland Canal to replace the original 1829 wooden aqueduct which carried the Canal over the Welland River (Chippawa Creek). Constructed of thousands of cut stones weighing approximately one ton each, it consists of a series of four stone arches supporting a large trough through which the canal and ships once passed. It was designed by Irish born engineers Walter and Francis Shanly and built by contractor Samuel Zimmerman. This aqueduct remained in use until construction of the Fourth Welland Canal (1913-1932).

The first urban settlement in what is now Welland came about due to the necessity to construct an aqueduct (of which this is the earliest surviving example) over the Welland River and the nucleus and downtown core of the present city grew up around it. The settlement itself was first known as “Aqueduct”, later “Merrittsville” and finally “Welland”. The aqueduct, therefore, can be said to be the catalyst that created this community.

Description of Heritage Attributes

Key attributes of the aqueduct that reflect its value as the oldest surviving aqueduct on the Welland Canal are:

- constructed of thousands of ashlar cut stones weighing approximately one ton each,
- consists of a series of four stone arches 45 feet wide with a span of 45 feet each capped with rows of stone voussoirs and stabilized with projecting buttresses that support a large trough (now infilled with earth) through which the canal and ships once passed.
- when it was completed in the 1840’s, the aqueduct measured 45 feet wide and over 315 feet long.
- may be the oldest surviving stone aqueduct to carry water transportation in Canada