ALDRICH TOWING-PATH CHANGE BRIDGE
Erie Canal, Bridge No. 35
Sexton Bridge
Spanning the New York State Heritage Trail,
Aqueduct Park (Moved from Macedon, Wayne County, NY)
Palmyra
Wayne County
New York

HAER No. NY-315

PHOTOGRAPHS

REDUCED COPIES OF MEASURED DRAWINGS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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HISTORIC AMERICAN ENGINEERING RECORD

ALDRICH TOWING-PATH CHANGE BRIDGE
(Erie Canal, Bridge No. 35)
(Sexton Bridge)

HAER No. NY-315

Location:	Spanning the New York State Heritage Trail, Aqueduct Park, Palmyra, Wayne County, New York.
Date of Construction:	1858
Builders:	John Hutchinson (Troy, New York), contractor and builder. George W. Eddy, Mohawk and Hudson Iron Works (Waterford, New York), founder and machinist.
Present Owner:	Town of Macedon, New York, 30 Main Street, Macedon, Wayne County, New York (Nelson Warner, Supervisor, 1998).
Present Use:	Monument and footbridge
Significance:	The Aldrich Change Bridge is the oldest dated iron bridge in New York State and one of only two bridges known to survive from the first enlargement of the Erie Canal. In addition to its importance as an artifact of one of the nation's earliest and most significant public works, it draws attention to one of the lesser known and largely overlooked designs of Squire Whipple, nineteenth-century America's foremost theoretician-practitioner of truss bridge design. Fabricated in the Waterford, New York, iron works of George W. Eddy and erected by John Hutchinson of Troy, the Aldrich change bridge was a product of the rich industrial complex then flourishing at the confluence of the Mohawk and Hudson Rivers in eastern New York. Hutchinson emerged as a prominent contractor for iron bridge superstructures during the years of the canal's first enlargement, competing directly with Whipple himself.
Project Information:	Documentation of the Aldrich Towing-Path Change Bridge was prepared under the guidance of the Historic American Engineering Record, National Park Service, during the summer and fall of 1998, in cooperation with the Aldrich Change Bridge Restoration Committee. Funding for this project came in the form of a 1997 Canal Corridor Initiative Grant from the U.S. Department of Housing and Urban Development (HUD).
Historian:	William P. Chamberlin, PE (Schenectady, New York), 1998.

CHRONOLOGY

1855	Contract awarded to John Hutchinson of Troy to fabricate and erect six iron superstructures for enlarged Erie Canal, including a two-span towing-path change bridge at the Rochester weighlock.
1858	Aldrich Towing-path Change Bridge, then identified as Erie Canal Bridge No. 70A, constructed.
1879	Bridge 70A and its companion span 70B are removed due to damage to their shared central pier, and placed in storage at State Yard in Rochester for future reuse.
1880	Bridge 70B is adapted and shortened by 10' in order to replace a collapsed timber change bridge on the Erie Canal just west of Palmyra. Bridge is now known officially as Bridge No. 35, but locally known as the Sexton Bridge, and then the Aldrich Change Bridge after nearby landowners.
1913	New York Barge Canal restructuring bypasses and closes Erie Canal between Waynesport and Port Gibson, including Palmyra spur. Bridges along this segment are removed.
1915	Aldrich Towing-path Change Bridge is removed and sold for $100 to farmer George B. Lent, who moves it to his farm between Macedon and Palmyra. Bridge is placed across Ganargua Creek to allow Lent direct access from his barn to his north field.
1939	Lent farm is purchased by the Baker family.
1961	Earl J. Baker and wife Mildred assume ownership of farm.
1965-1975	Aldrich Bridge is largely abandoned and left to deteriorate following local road work that hampers access between the bridge and the Baker farm barn.
1996	High water and ice wash bridge off its concrete abutments into Ganargua Creek.
1997	Town of Macedon obtains custodial ownership of Aldrich Bridge for use as a historical monument. The iron superstructure of the bridge is rescued from the Ganargua creek bed by local volunteers, and placed in storage in the equipment yard of the Macedon Highway Department, 2067 O'Neill Road, Macedon, Wayne County, New York.
1999	Aldrich Towing-path Change Bridge superstructure is slated for restoration and re-erection on new stone abutments on the Palmyra-Macedon Towpath Trail, part of the planned New York State Heritage Trail system that follows the route of the New York State Barge Canal.[1]

[1] "Aldrich Change Bridge: Documentation & Restoration," in *Newsletter of the Society for Industrial Archeology*, Vol. 27, No. 2 (Summer 1998): 1 and 3.

I. INTRODUCTION AND DESCRIPTION OF THE BRIDGE

The subject of this documentation is a single-span, seven panel, iron bridge superstructure supported by two unskewed trusses without overhead bracing (pony trusses). The distinctive visual features of this superstructure are the gently curved upper chords of the trusses, formed from segments of hollow cast-iron pipe, and the exaggerated camber of its floor, which rises well above the bridge's nearly horizontal lower chords to parallel its upper chords. The bridge served as a change bridge over the Enlarged Erie Canal and its design is unique to that function among surviving nineteenth-century American bridges.

A. The Canal Change Bridge

The change bridge addressed a problem endemic to all early canals: how to conveniently move the mule driver, team, whiffletree, and tow ropes from one side of the channel to the other when required by obstruction or topography. The solution was ingenious in its simplicity. The towpath was ramped upward in the direction of travel to one end of a small bridge provided for the crossing, ramped down in the opposite direction at the other end of the bridge, and then turned 180 degrees to continue beneath the bridge in the original direction of travel. If towing was in the opposite direction, the sequence was reversed. These relationships can be seen clearly in two photographs taken of Aldrich Change Bridge about 1900.[2] During the change, the mule driver guided the towing team from one side of the bridge to the other, lifted the trailing end of the whiffletree and tow ropes to keep them from hitting the hooves of the animals, and tended the tow ropes to assure that they didn't snag or abrade unnecessarily on the upper chord of the truss.[3] In the case of the Aldrich Bridge, the mule driver's burden was eased by the camber of the bridge's floor, which extended into the trusses so that the distance between the top of the floor and the top of the upper chord was uniform and about waist high, a height to which the whiffletree could be lifted without undue effort. This feature also allowed the upper chord to partially support the tow lines during the change without adding unnecessary resistance to their movement across the bridge. The canal side of both ramps was fitted with timber curbing to provide a smooth approach to the bridge's (also smooth) upper chord, thus reducing the possibility of the tow lines becoming snagged during the change.[4]

As with most of the earliest Erie Canal bridges, change bridges were constructed initially of wood, but as iron gained general acceptance as a structural material after about 1850, it gradually replaced wood in all but farm bridges. Change bridges were also constructed in several different styles, depending on the proximity of other bridges to where the change was needed. Because it was more economical to build a bridge that could serve more than one function, change bridges were often "piggybacked" on a road or farm

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[2]Images of the Aldrich Towing-path Change Bridge (photographs) from glass-plate negatives owned by the Palmyra Historical Society and archived at the Palmyra King's Daughters Free Library, Inc., 127 Cuyler Street, Palmyra, New York. See Field Records, NY-315, Exhibit 1.

[3]F. H. Godfrey, *The Godfrey Letters* (Syracuse: The Canal Society of New York State, 1973), 14.

[4]No explanation for the distinctive profile of these iron change bridges has been found, that given here being an informed interpretation by the author. Structural considerations that also help explain details of change bridge design are included elsewhere in Section I.A. These considerations do not hold completely for timber "farm and change bridges" because of their different profile and construction.

bridge where both needs could be accommodated by a single crossing. On road bridges,[5] this was typically accomplished by placing the towpath outside of one of the bridge's main truss lines, as with a sidewalk, and supporting its outboard side with a smaller truss suited to the change function.[6] These combinations were referred to as "road and change bridges," "highway and change bridges," or "street and change bridges." When a change bridge was combined with a wooden farm bridge, the practice was to allow both farm and towpath traffic to share the same way. In such instances, timber planks were added to the top of the upper chord to prevent tow ropes from snagging on the ends of the iron rods that served as hangers and that extended above, and were bolted to, the upper chord. These arrangements were referred to as "farm and change bridges."

TABLE 1
ERIE CANAL CHANGE BRIDGES

	1860 Inventory of 578 Bridges[9]			1906 Inventory of 642 Bridges[10]		
Function	Wood	Iron	Total	Wood	Iron	Total
Towing-path Change Bridge	3	3	6	1	9	10
Farm and Change Bridge	4	0	4	0	0	0
Highway and Change Bridge	5	1	6	2	8	10
			16			20

When piggybacking was not an option, the change bridge was designed to serve that function alone, and this was the case with the Aldrich Bridge. These arrangements were identified as "towpath" or "towing-path" change bridges.[7] Because the loads that these bridges carried were relatively light, the trusses that supported them could be light as well. In fact, change bridges were among the lightest bridges built for canal use. However, this feature, which had economic importance, also rendered these structures more

[5]The term *road* is used here in its broadest sense to include both *streets* (municipal roads) and *highways* (rural roads). This convention has been adopted to avoid confusion, as Erie Canal bridge inventories are not consistent in their use of these terms, either internally among inventories for different years, or for different canal divisions in the same year.

[6]"Bridge No. 169. - Change and Highway Bridge at Pendleton, N.Y. May 12th, 1905 (photograph)." Series 11833, *Barge canal construction photographs, 1905-1921, western division preliminary, Volume 1* (hereinafter cited as *Barge canal photographs*). New York State Archives, Albany, New York. See Field Records, NY-315, Exhibit 2.

[7]The official designation seems to have been "towing-path change bridge." See "Whipple's General Plan of Towing-path Change Bridge, E.C.E.," *Annual Report of the State Engineer and Surveyor on the New York State Canals for the Year 1862* (Albany, NY: State Engineer's Office, 1863), 440 (hereinafter cited as *Whipple's General Plan*). See Field Records, NY-315, Exhibit 3.

susceptible to failure through buckling of the trusses, particularly in longer spans. This concern for lateral stability likely explains the unusually high cambering of the bridge's floor. By connecting the floor beams to the cast-iron posts of the trusses at some distance above the lower chords, the floor could serve the additional function of bracing the trusses laterally, certainly more so than had the floor been positioned at the level of the lower chord, the more common practice. The typical approaches to stiffening the trusses, that is, deepening them and providing them with overhead bracing, were not compatible with the change function, though the gentle arching of the upper chord was likely done for this purpose. By adjusting the camber of the floor to parallel the upper chord at an appropriate distance, the job of the mule driver was also made easier, as noted earlier.[8]

Change bridges were relatively uncommon. An inventory of extant bridge structures on the Erie Canal reported in 1860[9] identified only sixteen change bridges among 578 crossings of all types (2.8 percent); and a similar inventory reported in 1906[10] identified only twenty out of a total of 642 (3.1 percent). In 1860, most of the change bridges were made of iron, but by 1906, most were made of iron (see Table 1).

B. Superstructure of the Aldrich Change Bridge

At its most recent canal location, in Palmyra, the cast-and-wrought-iron superstructure of the Aldrich Change Bridge was reported in 1897 to be 74'-0" in overall length, with a clear span of 71'-3" between abutment faces and a width of 13'-3" measured center-to-center of its trusses. The lower chord was cambered 16" with a canal clearance of 12'-9" and a towpath clearance of 10'-5". Its 7'-2" deep trusses supported a 22-1/2" thick floor system.

One of the bridge's most distinctive features is the profile of the upper chord of its two trusses, each formed from seven segments of 6-1/2"-outside-diameter cast-iron pipe.[11] The pipe segments are aligned and their ends beveled where they join to form a gentle arch above the trusses' five interior panels. Elongated "windows" have been cast into the underside of the ends of each of the interior segments to allow them to straddle the cast-iron posts upon which they rest. The posts' vertical alignment and fixity is assured at each upper chord joint by a horizontal pin which is clevised into a saddle at the upper end of the post, and which penetrates the beveled bearing surfaces of the abutting pipe segments through a pair of opposing semicircular notches machined into the pipe ends. The following inscription is embossed along one side of each of the center segments:

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[8]See note 4.

[9]*Annuol Report of the Canal Commissioners for the Year 1859* (Albany, NY: Commissioner's Office, 1860), 1071-1088 (hereinafter cited as *Canal Commissioners*).

[10]Noble E. Whitford, "History of the Canal System of the State of New York," Supplement to the *Annual Report of the State Engineer and Surveyor of the State of New York for the Year 1905* (Albany, NY: Brandow Printing Company, 1906), 1069-1129 (hereinafter cited as *State Engineer*).

[11]The outside and inside diameters of pipe segments recorded by the HAER field team were 6-1/2" and 5" respectively. These values disagree with measurements in 1877, 7" and 6" respectively (*Bridge survey registers,* Bridge No. 70A), and in 1897, 6-1/2" and 5-1/2" respectively (*Rolled maps*). These inconsistencies may be attributable to variations in the diameter of these castings, as such variations were observed by the HAER field team, or to measurement error.

JOHN . HUTCHINSON . CONTRACTOR & BUILDER . TROY NY.
G . W . EDDYS FOUNDRY . WATERFORD . NY . 1858

Where the arches turn down at the end panels, the pipe segments are fitted onto circular tenons at the ends of hollow cast-iron elbows, also pinned to the posts. The extreme ends of the upper chords are seated on cast-iron shoes into which the threaded rods of the lower chord are also bolted. Truss diagonals and counters consist of wrought-iron rods connected by eyes to the upper-chord pins and bolted to the bottoms of the post castings.

The lower chords consist, in the interior five panels, of pairs of elongated links of wrought-iron rod that loop around, and are supported by, oval pins (or trunnions) cast integrally with the vertical posts. This style of detail has been referred to as "link and pin" construction.[12] In the end panels, these lower chords consist of pairs of single wrought-iron eye bars that are looped around the pins at the post ends and that pass through, and are bolted to, the cast-iron shoes at the abutment ends. The total cross sectional area of wrought iron in the lower chord rods increases from the end-span panels to the center-span panels by almost exactly 1 square inch per panel, reflecting the progressively greater tensile load carried by the lower chords from the end to the center of the trusses:

Panels 1 and 7:	2 @ 1-3/8" diam. = 2.97 sq. in.
Panels 2 and 6:	4 @ 1-1/8" diam. = 3.98 sq. in.
Panels 3 and 5:	4 @ 1-1/4" diam. = 4.91 sq. in.
Panel 4:	4 @ 1-3/8" diam. = 5.94 sq. in.

Each of the truss's seven panels is defined by six vertical cast-iron posts that include the lower chord pins, provide connection to and vertical support for the upper chord, support connections for truss diagonals and counters, and to which the floor beams are connected. These posts are complex castings but can be described simply as small, tapered columns with an H-shaped cross section, detailed to accommodate their several functions. Floor beams, consisting of pairs of 12"-back-to-back wrought-iron channels are connected to these posts.[13] These channels replaced dimensioned timbers that supported the floor before the bridge was moved from Rochester to Palmyra in 1880.[14] As with the timber beams before them, the iron floor beams are connected at successively higher positions on the posts so that the finished floor arches gently upward toward the center of the span on a curve that parallels the upper chord. The floor itself was missing when the bridge was moved in 1997 from the Baker farm but was reported in 1897 to have consisted of 4" x 8" pine stringers (or joists) supporting 2-1/2"-thick oak planking, bringing the floor system

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[12] *Ralled maps.*

[13] "Sketch of Floor Beams for Change Bridge at Palmyra No. 35," Record Series B0380, *Western divisian canal maps and plans,* No. 1244, (hereinafter cited as *Maps and plans*). New York State Archives, Albany. See Field Records, NY-315, Exhibit 6.

[14] *Bridge survey registers,* Bridge No. 70A.

to a total thickness of 22-1/2".[15] The top surface of the floor, at both the Rochester and Palmyra locations, was 3'-6" below the top of the upper chord.[16] Lateral bracing of the floor is provided in each of the interior panels by pairs of 5/8" diameter, diagonally crossing, wrought-iron rods bolted to the webs of the floor beams.

Seven of the twelve cast-iron posts are fractured horizontally at the approximate height of the floor beam supports, and these fractures have been reinforced by bolting pairs of splice plates to the webs. Also, one of the undamaged posts has been cast from a pattern that is stylistically different from the others, suggesting a different pattern maker and the possibility of its being a replacement for the original post at this location.

II. HISTORY OF THE BRIDGE

A. Construction at the Rochester Weighlock in 1858

After eight years of construction and the expenditure of slightly over $7 million, the 363-mile-long Erie Canal was opened in the autumn of 1825, connecting Lake Erie with the Hudson River at Albany. Its trapezoidal cross section was 40'-0" wide at the water's surface, 28'-0" wide at the bottom and 4'-0" deep. Its eighty-three locks raised and lowered boats through a 675'-0" difference in elevation while eighteen aqueducts carried the canal over streams and obstructions. The canal reduced travel time between its terminals from twenty to ten days.[17] One of the official celebrants of its completion credited the canal's builders with ". . . build[ing] the longest canal in the world in the least time, with the least experience, for the least money, and to the greatest public benefit."[18] It was an immediate public and commercial success.

However, by 1834, it had become apparent that major repairs were needed to sustain structural integrity, as well as improvements to accommodate the annually increasing business of the canal and the larger boats that served that business. Particularly troublesome was the narrow width of the one-way locks that could accommodate only a single boat at a time and then in only one direction at a time. The first tangible step toward enlarging the canal was taken in that year when the State Legislature accepted the recommendation of the Canal's Commissioners and authorized the doubling of all of the locks between Syracuse and Albany as well as other improvements.[19] Notwithstanding this early effort, progress on the canal's enlargement was mired in financial, political, and ultimately legal and constitutional issues. In 1854, the State Legislature authorized the expenditure of $2.25 million a year for each of four successive years, required that all new work be let by competitive bidding, and established the Canal Contracting Board

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[15] *Rolled maps.* The number of stringers was not given in the 1897 inventory but is assumed to be the same as reported in 1877 (*Bridge survey registers*), i.e., six.

[16] *Rolled maps* and *Bridge survey registers,* Bridge No. 70A.

[17] Whitford, 798.

[18] William L. Stone, "Narrative of the Festivities, etc.," Colden's *Memoir (*New York: 1825), 331; as reported by Whitford, 799.

[19] Whitford, 213-217.

to administer the contracts.[20] By the spring of 1855, plans and estimates had been prepared and the Contracting Board was advertising for bids.

Among those contracts advertised during the first year of the new authorization were several for groups of iron bridge superstructures. Crossings of the Erie and its feeders had been built of timber until 1840, when Earl Trumbull of Little Falls built an 80'-0" span of iron for the enlargement at Frankfort. During the next ten years, approximately twenty more truss bridges of iron were erected under individual contracts.[21] Collectively, these "experiments" gave Canal engineers experience with the utility and cost of bridges built with this new structural material. At its meeting of December 17, 1851, the Canal Board accepted the recommendation of the State Engineer and Surveyor and adopted iron bridges for use on the enlargement, except for farm bridges that were considered temporary or expendable.[22] A contemporaneous testimonial, reflective of the high esteem in which these new bridges were held, stated:

> Between twenty-five and thirty of the enlarged bridges are completed and in use. Several of these are of iron, beautiful and substantial structures. It is a matter of great importance to the cities and villages along the line of the canal, that the Canal board has decided to construct in future iron bridges principally.[23]

On September 18, 1855, the Canal Board awarded John Hutchinson of Troy a contract to fabricate and erect six iron superstructures on Canal Sections 264, 266, and 275, including a two-span towing-path change bridge at the Rochester weighlock. The weighlock spans were to be 84'-6" and 53'-6" long, and each was to be supported by two trusses built on Whipple's "trapezoidal plan."[24] This structure was to replace a two-span timber change bridge that had likely been built about 1850 when the new and enlarged weighlock at Rochester was opened.[25] For his work, Hutchinson was paid the same unit price, $15.00 per linear foot for both spans, a total of $2,070.00. In a supplemental agreement to his contract, he was paid an additional $144.00 to install a tubular railing connecting the upper chords of the two spans, undoubtedly to provide a

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[20]Respectively, Chapters 16, XX and 329, Laws of 1854, State of New York.

[21] S. Whipple, *The Canal Bridges, A Specimen of the Manner of Awarding Contracts, by the Canal Board (*Albany: January 1852), 11 pp. (hereinafter cited as *Canal Bridges*). Richard S. Allen Archive, National Covered Bridge Society, Westminster, Vermont.

[22]Minutes of the Canal Board, December 17, 1851; Series A0868, *Minutes, 1833-1855* (hereinafter cited as *Minutes).* New York State Archives, Albany.

[23]*Canal Commissioners* (1852), 60.

[24]*Contract documents for canal enlargements and repairs, ca. 1836-1900,* Series A1899, Box 18, Packet 997 (hereinafter cited as *Contract documents*). New York State Archives, Albany. See Field Records, NY-315, Exhibit 7. The advertisement for bids that is part of this packet identifies two of the six proposed superstructures as trapezoidal trusses, including the change bridge, and includes specifications for constructing "Whipple's Trapezoidal Iron Truss Superstructures."

[25]*Canal Commissioners* (1851), 42.

smooth transition for the tow ropes.[26] In canal records, the change bridge at the Rochester weighlock is identified as No. 70; the longer south span being No. 70A, the shorter north span, No. 70B.[27]

By 1879, the canal's Western Division Engineer had become concerned about damage being caused to boats brushing against the center pier of the change bridge at the weighlock, and he recommended that the pier be removed and the bridge replaced. He also suggested that the longer south span be used without modification to replace one of the decaying timber farm bridges in the Division, and that the shorter span be lengthened for a similar purpose.[28] Later that same year, both spans were removed and placed in storage at the State Yard in Rochester and the offending pier taken down.[29] In the spring of 1880, a new 141' iron bowstring truss change bridge was erected at the weighlock by the newly formed Hilton Bridge Construction Company of Albany, for the price of $4,630.00.[30]

B. Relocation to Palmyra-Macedon in 1880

At about this same time, engineers were beginning to note the deteriorating condition of a wooden change bridge, identified as Bridge No. 35, just west of the Village of Palmyra, about twenty miles east of the weighlock. The bridge had been erected at that location when the canal was enlarged so that the towpath could be moved from the south to the north embankment, thus avoiding commercial buildings just east of the site. Canal engineers had observed stone to be missing from at least two of the bridge's four abutment wing walls and the abutments themselves to be "shaken" as the result of boats striking them. At least one of the bridge's timber chords was cracked badly enough to warrant its description in a category of "special defects." Other timbers were judged to be "old" and the bridge's protective coating of white paint, as "worn out."[31] In 1879, along with five other wooden bridges in the Western Division, Bridge No. 35 had been condemned and a recommendation made that all six be replaced immediately by structures of wrought iron.[32] Plans and specifications for a new wrought-iron bowstring truss to replace the wooden change bridge

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[26]Final Estimates and Accounts, *Contract Documents*; also, Final Account, State of New York Enlargement of the Erie Canal to John Hutchinson, Series B0377, Vol. 147, *Final Estimates and Accounts, ca. 1835-1905,* 174. New York State Archives, Albany.

[27]*Canal Commissianers* (1860); *Bridge survey registers,* Bridge Nos. 70A and 70B.

[28]"Report of Western Division Engineer to State Engineer and Surveyor for the Fiscal Year Ending October 1, 1879," Series B0670, *Western divisian engineer's annual reparts, estimates af expenses, and other reparts regarding canals,* 1856-1901, Book H, 32 (hereinafter cited as *Western Divisian Engineer*). New York State Archives, Albany.

[29]*Western Divisian Engineer,* 42.

[30]*State Engineer* (1881), 126; *Western divisian engineer,* Vol. 6, 363-370; and Victor C. Darnell, *Directory of American Bridge-Building Companies, 1840-1900,* Occasional Publication No. 4 (Washington, D.C.: Society for Industrial Archeology, 1984), 36.

[31]*State Engineer* (1880), 112; and *Bridge survey registers,* Bridge No. 35.

[32]*State Engineer* (1880), 109-110.

were prepared,[33] but before a contract could be let, the old wooden bridge collapsed under the load of a team and driver. Both were thrown into the canal, but only the driver was able to reach the shore and avoid drowning.[34]

Because the event, which occurred on September 6, 1880, threatened serious disruption of canal traffic, authorities were quick to respond. The reporter who covered the story for the *Wayne County Journal*, noting the prompt arrival of Canal officials and their immediate attention to removing the fallen structure from the ditch, speculated that a new iron bridge might very well be in place before his paper went to press three days hence.[35] Earlier plans for replacing Bridge No. 35 with a new iron superstructure were now clearly untimely, so canal authorities opted for the expediency of adapting the longer of the now-stored spans from the Rochester weighlock to fit the crossing near Palmyra. Accordingly, its 84'-6" length was shortened by approximately 10' by removing one of its two center spans, and its timber floor beams were replaced by pairs of back-to-back, 12"-deep wrought-iron channels.[36] Considering the rarity of these single-purpose change bridges, it was providential indeed that one had become available within what was probably no more than six months of its need, and at a location that was little more than twenty miles distant.

Three years after the longer weighlock span was moved to Palmyra, the shorter span, No. 70B, was also taken from the Canal Yard at Rochester and transported to the village of Tonawanda, where it replaced a condemned wooden towpath bridge across the mouth of Ellicott Creek.[37] It remained at that location until it was removed, sometime between 1910 and 1914, due to Barge Canal construction.[38]

The change bridge west of Palmyra was referred to in canal documents of the Western Division as Bridge No. 35, its numerical order from the division's eastern boundary. But, as with most of the Canal's other bridges, it was also given a name. These names were most commonly taken from the street or road that the bridge carried, from the surname of contiguous property owners, or from geographic or cultural features in their vicinity. Thus, Bridge No. 35 was also called the Sexton Bridge after Pliny T. Sexton, an early businessman who owned land on both sides of the canal at the time of the enlargement.[39] More recently, the bridge came to be known locally as the Aldrich Change Bridge after a nearby farmer who

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[33] *Western Division Engineer* (1879), Vol. 6, 452-456 and 460-463.

[34] "Falling of a Canal Bridge," *Wayne County Journal*, 9 September 1880.

[35] Ibid.

[36] Moving of the bridge from Rochester to near Palmyra is recorded in a handwritten note on the back of the inventory page for Bridge No. 35 (*Bridge survey registers*), and in the report of the Western Division Engineer for the year ending December 1880 (*State Engineer, 1880,* p. 127). The shop drawing for the new floor beams survives among canal papers at the New York State Archives (see *Maps and plans*).

[37] *State Engineer* (1883), 116; *Western Division Engineer* (1883), Vol. 7, 438; and "Tow Path Bridge No. 176. Over Ellicott Creek, Tonawanda, NY., May 12th, 1905" (photograph), *Barge canal photographs.* See Field Records, NY-315, Exhibit No. 8.

[38] *Barge canal photographs.* Relocated Bridge No. 70B was present July 19, 1910 when negative 7381 was exposed but had been removed by October 5, 1914 when negative 10370 was exposed.

[39] Lorene Warner, Personal communication with the author, 23 October 1981.

owned property immediately east of the bridge and whose farmhouse was at the site,[40] though the bridge was never known in canal records by that name. Other local names included "Macedon-Palmyra Line Bridge," because of its alignment roughly coincident with the boundary between those two towns, and "Carry-over Bridge."[41]

Other than periodic painting of the superstructure and replacement of the timber flooring, and occasional repointing and repair of abutment stonework, there is little in the record to indicate that work other than routine maintenance was done on the bridge during its thirty-five-year tenure over the canal at Palmyra. The record is notably silent on the splice plates used to reinforce seven of the cast-iron posts. However, the annual report of the Division Engineer for calendar year 1880 did include Bridge No. 35 on a list of those for which the superstructure needed repair, and it is possible that the web reinforcements could have been added shortly thereafter. In fact, it is likely that the splices and new wrought-iron floor beams were added during the winter of 1880-81, after the canal closed to commercial traffic for the winter.[42]

C. Sale to George B. Lent in 1915

In 1905, two years after its authorization, construction began on the New York State Barge Canal, an undertaking to both modernize the canal's infrastructure and to introduce more effective and efficient methods of operation and management. In the process, new alignments were chosen for many segments of the old canal.[43] In 1913, it was recommended that the spur passing through Palmyra, which by then had been bypassed, be closed.[44] Over the next two years, old bridges that crossed the now abandoned canal between Port Gibson and Waynesport were removed.[45] In 1915, the Aldrich Change Bridge was removed and sold for $100.00 to George B. Lent, who moved it to his farm between Macedon and Palmyra and placed it across Ganargua Creek to provide direct access from his barn to his north field.[46] The Lent farm

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[40]Spencer Knapp, Personal communication with the author, 16 October 1981; see also, D. G. Beers, *Atlas of Wayne County, New York* (Philadelphia: 1874), 43.

[41]Warner and Knapp, personal communications. See notes 40 and 41.

[42]This argument rests on the assumptions that had the superstructure of Bridge No. 70A needed repair after its removal from the weigh-lock site, such repair would have been delayed until a need for the old superstructure had been established. Because the collapse of the bridge at Palmyra required a timely response to keep traffic moving, and because the collapse occurred late in the season (September 6), repairs would have been delayed several weeks until the canal closed for the year, according to this scenario. That the new wrought-iron floor beams were, in fact, added during the fall or early winter of 1880 is supported by the date on which the shop drawings were transmitted to the Canal Superintendent, December 7, 1880 (*Maps and plans*) and by the report of the Division's engineer for the year ending December 1880 (*State Engineer,* 1880, 127).

[43]Noble E. Whitford, *History of the Barge Canal of the State of New York,* Supplement to the *Annual Report of the State Engineer and Surveyor for the Year Ended June 30, 1921* (Albany, NY: J. B. Lyon Company, 1922), 610 pp.

[44]*Annual Report of the Superintendent of Public Works on the Canals of the State for the Year 1913* (Albany, NY: 1914), 188 (hereinafter cited as *Superintendent of Public Works*).

[45]*Superintendent of Public Works* (1914-1915).

[46]*Superintendent of Public Works* (1916), 89.

was acquired by the Baker family in 1939, and by 1961 it was owned by the present occupants, Earl J. Baker and his wife, Mildred.[47] The bridge was, in effect, abandoned in the late 1960s or early 1970s when improvements to the county road that separates the barn from the bridge rendered access to the bridge by farm machinery unsafe.[48] The town of Macedon obtained custodial ownership of the Aldrich Bridge in 1996 after it had been washed from its abutments by ice and high water. Citizen volunteers salvaged the superstructure, dismantled it, and moved it to storage at the Macedon Town Highway Department's equipment yard pending its restoration and re-erection on the Palmyra-Macedon Towpath Trail, part of the planned New York State Heritage Trail system that follows the route of the New York State Barge Canal.[49]

III. JOHN HUTCHINSON (1814-1870) AND G. W. EDDY (1811-1897)

The collaboration between John Hutchinson and George Washington Eddy is clearly established by their names cast into the upper chord of the Aldrich Change Bridge trusses. Hutchinson was a resident of Troy, then the center of a flourishing industrial development that had begun early in the nineteenth century at the confluence of the Mohawk and Hudson Rivers in eastern New York. He was one of a number of persons for whom the enlargement of the Erie Canal provided an unprecedented opportunity for employment and financial gain, and that opportunity became the catalyst for a major change in the focus of his business life.

Before embarking on the enterprise of bridge building, Hutchinson had been the proprietor of a modest business at the corner of Grand Division (now Grand) and Mechanic streets on a site near the Hudson River that has since been leveled for a small public park. City directories indicate his presence in Troy as early as 1837 and identified his trade variously as blacksmith, mechanic, and founder of iron railings.[50] His business was not recorded in any of the industrial censuses of the period, however, and the only map found on which its location is indicated identifies it only by a symbol representing "furnace and foundry."[51]

In 1854, Hutchinson changed the nature of his work significantly when he successfully competed for ten contracts to erect thirty-seven new cast and wrought-iron bridge superstructures for the Erie Canal enlargement.[52] All of these bridges but one were based on Whipple's patented "independent truss" that had been adopted in 1851 by the Canal Board as a standard for most of its road and street crossings. By this

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[47]Liber 366, 175; Liber 496, 510, Wayne County Clerk's Office, Lyons, New York.

[48]Earl J. Baker, Personal communication with the author, December 1998. Photographs from the author's collection that were taken of the bridge in 1978 at its location on the Baker farm are included in the field records. See Field Records, NY-315, Exhibit No. 9.

[49]See note 1.

[50]*Troy City Directories*, 1837-1858 (hereinafter cited as *Directories*).

[51]S. A. Beers, Civil Engineer, *Map of the City of Troy, New York*, 1845. Rensselaer County Historical Society, Troy, New York.

[52]*Contract Documents*, Packets 983-987, 997, 1010-1012 and 1022.

action, Hutchinson had put himself in direct competition with Whipple and Whipple's nephew, John M. Whipple, with whom the inventor was in partnership. Hutchinson's entry into this market provided a serious challenge to Whipple's hopes for monopoly, and the two eventually became engaged in a bitter and prolonged dispute over patent fees.[53] In the short period of twenty-eight days, Hutchinson was awarded ten contracts for the fabrication and erection of 3,460 linear feet of iron bridge superstructure, likely the single largest order of his career and most certainly beyond the capacity of his modest shop. What has come to be known as the Aldrich Towing-path Change Bridge was built under one of the contracts awarded to Hutchinson in August and September of 1854.[54]

Though there were nearly twenty foundries in Troy at the time,[55] Hutchinson chose his collaborator from the smaller community of Waterford, New York, on the opposite (west) bank of the Hudson River, about four miles north of his own establishment in Troy. By the mid-1850s, George Eddy had become one of the region's most prominent founders, having started business in 1847 after arriving in Waterford with his father, an engineer, and one older brother. His various manufacturing endeavors, which included stoves, steam car wheels, cast iron statuary, and large valves for water and gas lines, many based on his own inventions, would result in his being remembered after his death in 1897 as a man of "exceptional innovative genius."[56] In 1858, his Mohawk and Hudson Iron Works and Foundry had the capacity to handle a large volume of work as well as the experience that would be required to cast the intricate posts and the equally demanding hollow upper chord segments required for the change bridge in Rochester. Eddy's location west of the Hudson precluded the need for Hutchinson to transport finished work across the river, and the strategic location of his shops adjacent to the Champlain Canal gave him direct water access to the Erie, immediately to the south.[57] The partnership seemed a natural fit.

It is likely that Hutchinson and Eddy collaborated on all thirty-seven of the new iron superstructures, though no direct evidence of such collaboration has been found beyond the names embossed on the upper chords of the Aldrich Change Bridge. Eddy's workers would have made the patterns, molded the iron castings, and probably fabricated the wrought iron, though Hutchinson could likely have done the latter as well. As the contractor and builder, Hutchinson would have seen to the legal and administrative matters of contracting with the State, hired work crews, and supervised erection of the superstructures.[58]

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[53]This dispute is recorded in papers relating to the business of the Canal Board between 1856 and 1865 (Series A1140, *Petitians and appeals ta the canal board, 1828-1926,* New York State Archives, Albany, NY), and in several Acts of the New York State Legislature. It has been synthesized by Francis E. Griggs, Jr., "The Patent Fee Wars," *Call Him Squire* (unpublished and undated typescript), 336-351.

[54]See note 53.

[55]*Directories,* 1859.

[56]*The Eddy Family in America* (Boston: The Eddy Family Association, 1930), 355; and S. E. Hammersley, *The Histary af Waterford, New Yark (*Waterford, NY: 1957), 169-170.

[57]Map of the Town of Waterford, Saratoga County, New York, compiled by Richard Clark, Philadelphia, 1856.

[58]Some of Hutchinson's activities in connection with the erection of iron bridge superstructures during this period are described in a letter from Squire Whipple to Judge Samuel Nelson of Utica, New York, dated June 7, 1858, as reported by Griggs.

With this new work well underway in 1859, John Hutchinson began to advertise himself as a bridge builder[59] and continued to build iron bridges of several types through 1866, when his son, John D. Hutchinson, joined him in managing the business.[60] The scant records available suggest that the senior Hutchinson was not well at this time and approaching bankruptcy, in spite of what would seem to have been a lucrative business.[61] His son assumed responsibility for the business in the following year.[62] At the time of the elder Hutchinson's death in 1870, at the age of 56, it was claimed that he had built over 200 iron bridges under state contracts alone,[63] though this number has not been verified.

Under the younger Hutchinson's management, the outlook for the business seemed positive. The new owner's wife was reported to be independently wealthy and to have invested needed capital,[64] and Hutchinson began to advertise more aggressively for work other than canal contracts.[65] However, the situation seems again to have worsened,[66] and by 1874 neither the company nor Hutchinson were listed in the Troy directory. Failure of the business and the Hutchinsons' departure from Troy at that time may have been related, at least in part, to the nationwide business depression of 1873.

After leaving Troy, the younger Hutchinson was associated briefly with another nephew of Whipple's, James W. Shipman, in the Cincinnati Bridge Company, and then for a longer period with Shipman in the New York Bridge Company. In both of these enterprises, the principal focus seems to have been to market bridges that were based on the designs of Squire Whipple, including both his cast and wrought-iron arched truss and the double-intersection Pratt truss that was commonly referred to as a "Whipple truss."[67] John D. Hutchinson died in Peekskill, New York in 1897.[68]

E. Squire Whipple (1804-1888) and his Towing-path Change Bridge

While the association between John Hutchinson and George Eddy is established by the embossing on the upper chords of the Aldrich Change Bridge, the connection of that bridge to one of the nineteenth century's most influential theoretician/practitioners of bridge design is established by a set of engineering

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[59] *Directories,* 1859.

[60] *Directories,* 1866.

[61] *R. G. Dunn & Company Credit Ledgers,* New York, Vol. 538: 99 (hereinafter cited as *Ledgers*). Manuscript Division, Baker Library, Harvard University, Cambridge, Massachusetts.

[62] *Directories,* 1867.

[63] Obituary, John Hutchinson, *The Daily Whig,* Vol. 38, No. 29 (15 April 1870): 3.

[64] *Ledgers,* 274.

[65] *Directories,* 1867.

[66] *Ledgers,* 274.

[67] Darnell, 42, 46 and 48.

[68] Obituary, John D. Hutchinson, *Peekskill Star,* 16 February 1897.

drawings that bears his name. In 1862, the Canal Commission published "Whipple's General Plan of Towing-path Change Bridge," drawings that reflected all of the important details of the bridge at Palmyra.[69]

Though his contributions to bridge technology were many, Squire Whipple's reputation derives largely from three achievements. In 1840, he built his first cast- and wrought-iron arch-truss bridge at Utica, New York,[70] a design that he patented the following year.[71] It was this design that the Erie Canal Commissioners adopted as a standard for road bridges during the enlargement of the 1850s, and it was replicated in large numbers by a variety of contractors over the next quarter century. In canal documents of the period, this bridge was referred to as "Whipple's Independent Arch" because its trusses were designed to stand alone without external bracing, thus allowing the bridge's wooden floor system to be replaced from time to time without disturbing the trusses.[72] While not totally original in either concept or execution, Whipple's design was nonetheless the first *successful* all-metal truss bridge in the world. In America, it became the prototype for dozens of designs, referred to generically as bowstring trusses, that collectively became a standard for small to medium crossings well into the 1870s.[73]

In 1847, Whipple published the first of several editions of his ground-breaking work on the theoretical and practical aspects of the design of bridge trusses.[74] In it, he set forth mathematical principles of truss analysis, described a graphical method of solving for unknown forces in truss members, investigated the effect of non-uniform loads, analyzed the relative efficiency of different truss forms, determined the most efficient inclination for diagonals, and investigated the relationship between the depth of a truss and its length. Whipple's work provided the foundation for the development of rational truss design in the United States and, in fact, the world.

In 1852-53, based on the principles published in his 1847 book, Whipple built one of the first iron railroad bridges in the country.[75] He identified his design as a "trapezoidal truss" to distinguish it from other designs then coming into use for iron railroad bridges, and because its parallel top and bottom chords

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[69] *State Engineer* (1863), 440.

[70] *Canol Bridges*, 5.

[71] Letters Patent No. 2,064, "Construction of Iron Truss Bridges," 24 April 1841.

[72] "Schedule of Iron Bridge Superstructures Exhibited for Letting at Rochester, September 17th, 1855," *Contract Documents*. See also, Squire Whipple, "The Development of the Iron Bridge," as reported by A. P. Boller, *The Railroad Gazette* (19 April 1889): 253-254.

[73] The most thorough biographical treatment and critical assessment of Whipple, to date, is that by Griggs (see note 54). Some of Griggs' research has been published in the Fall 1988 and Summer/Spring 1995 issues of *Civil Engineering Practice, Journal of the Boston Society of Civil Engineers* and the July 1994 issue of the American Society of Civil Engineers' *Journal of Professionol Proctice*. Contemporaneous information can be found in *History of Albany County, New York* (Albany: Munsell, 1885), 494-496.

[74] S. Whipple, *A Work on Bridge Building* (Utica, NY: H. H. Curtis, 1847), 120 pp. (hereinafter cited as *Bridge Building*).

[75] The most complete description of this bridge is contained in a letter by Whipple to the editor of *Engineering News ond Contract Journal* (March 1883): 160.

combined with its inclined end posts to form the geometric figure of a trapezoid. He further identified it as being "double canceled" because each of the diagonals extended over two full truss panels.[76] While not the very first iron railroad bridge, Whipple's was the first designed by scientific methods and, with modifications contributed by others, would become the form favored for railroad use well into the last quarter of the nineteenth century. It was this bridge, commonly referred to as a Whipple truss or double-intersection Pratt truss, to which the inventor's name became most closely associated. In another form, in which the diagonals were confined to single panels, Whipple's trapezoidal truss was also used for road and change bridges built for the first enlargement of the Erie Canal.

After completing his formal education in 1830 at Union College in Schenectady, New York, Whipple worked at a variety of engineering jobs, for both the Erie Canal and others. With his awareness that the pending enlargement of the Erie Canal would require construction of hundreds of new bridges to span the widened channel, Whipple spent much of the 1840s developing a theoretical basis for designing trusses, exploring the relative efficiency of different materials and structural cross sections, and designing a variety of truss forms for both timber and iron that could be used for the different classes of bridges that the Canal would require. During this period, he also lobbied the Canal Board to adopt iron as the material of choice for its bridges and, in particular, to adopt his own cast and wrought-iron independent truss design, the feasibility of which had already been demonstrated on several occasions.[77]

After nearly two decades of sporadic progress, the State's legislature authorized, on June 10, 1851, expenditure of $9 million over a three-year period, with the intent of completing the enlargement by the spring of 1854.[78] The process that was adopted by the Canal Board for awarding contracts required that persons submitting proposals for bridge superstructures, whether of iron or wood, furnish not only estimates of quantities and prices, but also their own plans upon which they proposed to fabricate the superstructures. In other words, proposals were to be evaluated on the basis of both price and design.[79] Evidence suggests that the prototype of Whipple's change bridge was one of several designs he submitted for the Canal Engineer's and Commissioner's approval in connection with what came to be known as the "nine million dollar letting" of 1851. That early design survives in the form of a schematic drawing for an eight-panel iron foot bridge of 72'-0" span, the length that would be required for the widened canal. The drawing, identified as "Whipple's Patent Tubular Truss Bridge," includes trusses that are trapezoidal in their overall form, with upper chord segments fabricated from cast-iron tubes pinned at their joints, tapered posts with H-shaped cross sections, pin-and-link style lower chords, and cast-iron floor beams. Except for the exaggerated camber of the upper chords and deck, the design is similar in all important respects to the Aldrich Change Bridge and to the General Plan of 1862.[80] The bridge was clearly intended for light loads. Working drawings for two farm bridges that survive among the canal papers of the New York State

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[76] *Bridge Building*, 77.

[77] *Canal Bridges*, 5.

[78] Chapter 485, Laws of 1851, State of New York.

[79] *Minutes*, 7 October 1851.

[80] "Whipple's Patent Tubular Truss Bridge" (undated), Record Series B0379, Vol. 27, *Plans of mechanical structures on Erie canal, Canastota to Chittenango.* New York State Archives, Albany. See Field Records, NY-315, Exhibit 10.

Archives indicate that Whipple did in fact submit bids for the opening of November 18, 1851, based on that plan.[81]

It is also clear from the title block of Whipple's drawing that there was either an intent on his part to patent the design, or an assumption by others that it was already patented, depending on who rendered the drawing. He could certainly have made a proprietary claim for an iron bridge that combined the trapezoidal form with cast-iron, tubular upper chords. The efficiency of both innovations was in fact analyzed and discussed in his 1847 book.[82] However, for reasons unknown, he failed to follow through and it is not known whether or not any of these bridges were actually built at this time. It is likely that none were because by May, 1852 the courts had declared the Canal Board's method of awarding contracts to be unconstitutional, all work was stopped, and contractors were compensated for construction already completed.[83] Work on the enlargement was not resumed until 1854, by which time it had been decided that farm bridges would continue to be built of timber, not iron.[84]

TABLE 2
WHIPPLE TOWING-PATH CHANGE BRIDGES ON THE ERIE CANAL

Division	Site and Location	Truss Length*	Year Erected	1877 Inventory No.
Western	Weighlock, Rochester	83'-7"	1858	70A
Western	Weighlock, Rochester	52'-1"	1858	70B
Western	Gibson St., Tonawanda	96'-5"	1857	181
Western	- - - - Black Rock	96'-9"	1856	187

* Length between end panel points as given in the 1877 inventory, except No. 70B which is estimated.

[81]"Plan of Iron Bridge for Farm Crossing," Book No. 27, 13; and Whipple's "Plan of Iron Truss for Farm Bridge," Book No. 45, 20 (also in Book No. 49, 20); all in Series B0292, *Canal structure map and plan books, ca. 1827-1905.* New York State Archives, Albany.

[82]*Bridge Building*, 11-14, 75-77.

[83]Whitford, 202.

[84]See note 23.

By the time work on the enlargement resumed, Whipple had modified his "Tubular Truss Bridge" from a form suitable for farm bridges to one that could function as a change bridge. He did this simply by increasing the camber of the upper chord and deck, in parallel, and a limited number of these modified designs were built as single-purpose change bridges.[85] Only four spans of this single-purpose type, similar to the Aldrich Change Bridge, are known to have been built on the main line of the Erie Canal, all of these between 1856 and 1858 in the Western Division (see Table 2).

Whipple's original trapezoidal design, from which his tubular truss foot bridge and his change bridge were modeled, was intended for heavier loads than would be required by either of these later forms. As a result, its trusses were deeper and supported laterally by overhead bracing. The differences between the high and low forms of Whipple's trapezoidal truss can be seen in the road and change bridge at Pendleton which incorporates both.[86] The details of each were apparently similar enough that the parent specification, when combined with a drawing specific to the actual bridge proposed, could suffice for both.[87] Unfortunately, a construction drawing for the Aldrich Change Bridge and its former companion at the Rochester weigh lock have not been found.

After an illustrious career, Whipple died in Albany, New York in 1888.[88] A eulogy that appeared in the leading construction periodical of the time noted his passing as follows:

> The death of Squire Whipple, on March 15, removes from the engineering world a man who by his individuality and originality practically created the modern art of bridge construction; not only in substituting iron for wood in bridges but in also pointing out the law governing the distribution of strain in framed structures and the proper proportioning of the various members in such structures.[89]

IV. SIGNIFICANCE OF THE BRIDGE

Built in 1858, the Aldrich Towing-path Change Bridge is the oldest dated iron bridge superstructure

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[85]This judgement is based on a review of the Erie Canal only.

[86]See note 6.

[87]Two of the three contracts that account for the four single-purpose change bridges of Table 2 were examined. Each included generic specifications for "Whipple's Patent Iron Truss Bridge Superstructures" (his independent truss) and "Whipple's Trapezoidal Iron Truss Bridge Superstructures." The change bridge was identified as a trapezoidal truss, but no separate specification was provided for this low form.

[88]*Albany Times,* 16 March 1888.

[89]Obituary, *Engineering News and American Railroad Journal,* 24 March 1888: 228.

in New York State[90] and one of only two bridges known to survive from the first enlargement of the Erie Canal.[91] Fabricated at the Waterford, New York, foundry of George Washington Eddy and erected by John Hutchinson of Troy, it is a product of the rich industrial complex then flourishing at the confluence of the Mohawk and Hudson Rivers in eastern New York. The bridge's association with Squire Whipple reveals a heretofore unrecognized design of this eminent nineteenth-century theoretician/practitioner of truss bridge technology.

In a broader context, the Aldrich Change Bridge is one of a small and diminishing number of iron bridges, located mostly in the industrial states of the Northeast and Midwest, that survive from a period when American bridge building was evolving from a craft-based to an engineered technology, roughly between 1840 and 1875. Conventional understanding holds that hundreds of designs were conceived during this period, some patented and some not. Many were never built and, of those that were built, many proved incapable of supporting the requisite loads or failed to compete economically. While many of these early "experiments" defy rational analysis, the Aldrich Change Bridge embodies a combination of form and material that evolved logically from Whipple's understanding of structural mechanics and from his experiments with structural materials and shapes.

Once restored and erected in a public venue, the Aldrich Change Bridge will present a unique opportunity for interpreting the Erie Canal's early history as well as the contributions of one of New York's and the nation's most innovative and prolific nineteenth-century technologists.

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[90]This claim was first asserted in a letter to Mr. and Mrs. Earl J. Baker from William P. Chamberlin, dated 14 June 1991.

[91]The other iron bridge surviving from the first enlargement, a Whipple Independent Truss, was built in 1859, also by John Hutchinson. It currently carries a farm road at the Ehrmentraut farm in the town of Riga, Monroe County, New York. Built originally as a three-truss crossing of Main Street in Brockport (Bridge No. 108), it was moved in 1888 to the crossing identified as Cromwell's (Bridge No. 95). It was purchased by William Ehrmentraut and moved to his farm in 1915.

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"Tow Path Bridge No. 176. Over Ellicott Creek, Tonawanda, NY., May 12th, 1905" (photograph), *Barge canal photographs*

APPENDIX - FIELD RECORDS

Exhihit No. 1
The Aldrich Towing-path Change Bridge. No. 1A: looking northeast from above the south embankment of the Erie Canal, ca.1900. No. 1B: looking east from the north embankment, ca.1900 (see Note 2).

Exhihit No. 2
"Bridge No. 169. - Change and Highway Bridge at Pendleton, N.Y. May 12th, 1905" (see Note 6).

Exhihit No. 3
"Whipple's General Plan of Towing-path Change Bridge," 1863 (see Note 7).

Exhibit No. 4
Inspection report for Canal Bridge No. 35, 1897 (see Note 11).

Exhihit No. 5
Inspection report for Canal Bridge No. 70A, 1877 (see Note 11).

Exhihit No.6
Shop drawing for wrought iron floor beams for Bridge No. 35, 1880 (see Note 14).

Exhihit No. 7
Contract documents for the iron change bridge at the Rochester weigh Lock, Bridge No. 70, 1855 (see Note 25).

Exhibit No. 8
"Tow Path Bridge No. 176. Over Ellicott Creek, Tonawanda, NY, May 12th, 1905" (see Note 38).

Exhihit No. 9
Abandoned Aldrich Change Bridge at the Baker farm, 1978 (see Note 49).

Exhihit No. 10
"Whipple's Patent Tubular Truss Bridge," ca.1851 (see Note 81).