Landmarks Preservation Commission
September 29, 1987; Designation List 192
LP- 1553

CARROLL STREET BRIDGE, over the Gowanus Canal, Borough of Brooklyn. Built 1888-89; Brooklyn Department of City Works; Robert Van Buren, Chief Engineer; George Ingram, Engineer-in-Charge; superstructure built by New Jersey Steel and Iron Company (Cooper, Hewitt & Company).

Landmark Site: The Landmark Site is encompassed by a line extending across Carroll Street which is 58'-2" east of and perpendicular to the intersection of the northern curb of Carroll Street with the eastern end of the Carroll Street Bridge deck; southerly across the southern sidewalk of Carroll Street to the northern property line of Block 453, Lot 1; westerly along the northern property line of Block 453, Lot 1; southerly along a portion of the western property line of Block 453, Lot 1; westerly along a line extending across the Gowanus Canal which is a continuation of the northern property line of Block 452, Lot 15; northerly along the western property line of Block 452, Lot 19, and the operator's house to the northwest corner of the operator's house; northerly along a line across the southern sidewalk of Carroll Street to the point on the southern curbline which is 36'-4" from the western edge of the Carroll Street Bridge deck; northerly along a line across Carroll Street and the northern sidewalk to the southern property line of Block 445, Lot 11; easterly along the southern property line of Block 445, Lot 11; easterly along a line extending across the Gowanus Canal to the southern property line of Block 439, Lot 1; easterly along the southern property line of Block 439, Lot 1; and southerly along a line extending northerly across the northern sidewalk of Carroll Street to the point of beginning, Borough of Brooklyn.

On November 12, 1985, the Landmarks Preservation Commission held a public hearing on the proposed designation as a Landmark of the Carroll Street Bridge and the proposed designation of the related Landmark Site (Item No. 8). The hearing had been duly advertised in accordance with the provisions of law. Four witnesses spoke in favor of designation. The consultant representing the Department of Transportation took no position in regard to designation. The Commission received several letters in support of this designation.

DESCRIPTION AND ANALYSIS

Summary

The Carroll Street Bridge over the Gowanus Canal, built in 1888-89, is one of the oldest bridges in New York City and the oldest of four known extant late-nineteenth/early-twentieth century American bridges of the "retractile" type. This unusual movable bridge functions by rolling back horizontally on wheels set on steel rails, thus providing clear passage through the canal channel. The Carroll Street Bridge was designed by engineers of the Brooklyn Department of City Works; the superstructure was constructed by the New Jersey Steel and Iron Company, a subsidiary of the prominent firm of Cooper, Hewitt & Company. It continues to operate essentially as it has since its completion.

Gowanus Canal[1]

In 1847, developer-businessman Col. Daniel Richards petitioned the Brooklyn Common Council for permission to open streets in South Brooklyn. Richards had initiated the planning for the Atlantic Docks and Basin (begun 1840), and the Erie and Brooklyn Basins, Red Hook, which were the first of the major improvements to transform the Brooklyn commercial waterfront. As the port of New York expanded in the nineteenth century, the entire shoreline of Brooklyn from Greenpoint down to Red Hook was built up with docks and warehouses. To further spur commerce and development in South Brooklyn, Richards envisioned at the same time the creation of a mile-long barge canal fashioned out of Gowanus Creek, and the draining of the adjacent marshlands. It was not until 1866-69, however, that state legislation was passed to improve the Gowanus Canal, through dredging, the construction of docks, and rebuilding of bridges. The Gowanus Canal Improvement Commission was appointed to oversee the projects, while the Brooklyn Improvement Company was to perform construction work. As completed the canal extended the mile between Hamilton Avenue and Baltic Street, and five branches with docks extended for an additional two-thirds of a mile. One hundred feet wide and varying in depth from twelve to sixteen feet, the Gowanus Canal became lined with such industrial concerns as lumber, coal, brick, and stone yards, and flour and plaster mills. Six bridges crossed the canal, one of which was at Carroll Street.

Carroll Street Bridge

When the old Carroll Street Bridge was closed in 1887, a replacement was needed. But as reported by George Ingram, Assistant Engineer of the Brooklyn Department of City Works, it was as yet undecided what type of bridge was to be chosen:

> ...no progress has been made on the detail plans for the new bridge over Gowanus Canal at Carroll street, and no work can be done until the proper authority shall decide upon the form of bridge, whether centre-channel [retractile] or swing bridge; the property owners favor the centre-channel form of bridge as originally recommended by this bureau, but its construction will involve the use of a strip of land now belonging to private owners, and thus far the Common Council has failed to authorize its purchase.[2]

Ultimately the retractile type was used for the Carroll Street Bridge, as noted in February 1889, by the Department's Chief Engineer, Robert Van Buren:

> I am glad to report that the construction for the substructure of the Carroll Street bridge over the Gowanus Canal is making satisfactory progress, and that this long delayed work will now proceed with all possible dispatch. I am satisfied that the form of bridge which has been selected for this point, and whose construction Mr. Ingram has always advocated, and which

> is now made possible through the efforts of the Commissioner of this department, will reflect credit upon this bureau, and establish a type for all future bridges in this vicinity; the proposal of the well-known firm of Cooper, Hewitt and Co. has been accepted for the superstructure designed by this bureau, and the known reputation of that firm assures a prompt and thorough compliance with the terms of the contract, and a bridge which will be a credit to the city, and a relief to the people interested in its use.[3]

The bridge was completed by the end of 1889, at a total cost of $29,600.[4]

The Engineers of Carroll Street Bridge and Cooper, Hewitt & Company

The design and construction of the Carroll Street Bridge was the responsibility of several individuals and organizations.[5] Robert Van Buren was Chief Engineer of the Carroll Street Bridge project, with George Ingram as Engineer-in-Charge. Charles O. H. Fritzche participated in the design of the original mechanical system. The bridge superstructure was manufactured by the New Jersey Steel and Iron Company, a subsidiary of Cooper, Hewitt & Company.

Robert Van Buren (1843-1919) was Chief Engineer, Bureau of Construction, of the Brooklyn Department of City Works from around 1877 until 1894. A descendant of President Martin Van Buren, he was educated at Rensselaer Polytechnic Institute. In 1898 he became Chief Engineer of the Brooklyn Department of Water Supply, serving until his retirement in 1914, at which time he had worked a total of 49 years in the public sector in Brooklyn and New York City.[6]

Fritzche (c. 1836-1921), a wealthy civil engineer from Paterson, New Jersey, was the inventor of a railroad turntable system.[7]

Cooper, Hewitt & Company[8] was one of the foremost nineteenth-century American firms responsible for the production of iron and steel; its subsidiary, New Jersey Steel and Iron Company, specialized in the construction of bridges and viaducts, particularly for railroads and transit systems. The parent company was the successor to the iron interests of Peter Cooper (1791-1883), the industrialist-inventor and patron of the Cooper Union.[9] After the Canton Iron Works, Baltimore (1830), Cooper founded an ironworks-rolling mill-wire factory in New York City in 1836. He is believed to be the first American to "puddle" iron from anthracite coal. In 1845 the ironworks were moved to Trenton and managed by his son Edward Cooper (1824-1905) and eventual son-in-law Abram Stevens Hewitt (1822-1903). The Trenton Iron Company was incorporated in 1847, with the Coopers and Hewitt owning the stock; Cooper, Hewitt & Company was established as management. From 1845 to 1849, the company developed the largest rolling mill in the U. S. at Trenton, with its primary product being rolled iron railroad rails. During a period of English overproduction of rails, the Trenton Iron Company produced wire and cable, and also became the pioneer in the use of wrought-iron structural members in building construction in 1854-55.[10] The U. S. government contracted the company to produce beams and girders for public building

construction, and until 1860 a virtual monopoly on their production was held by Cooper, Hewitt & Company. In 1850 the (then) largest American blast furnaces were built at Phillipsburg, New Jersey; expansion of the firm covered a number of other furnaces in the New Jersey-Pennsylvania area. The company was instrumental in a number of technical innovations which caused advances in the American production of iron and steel, including an early Bessemer converter experiment at Phillipsburg (1856), introduction of the French "Martin" process for steel, and the first open-hearth furnace at Trenton. Edward Cooper and Abram Hewitt joined Samuel J. Tilden in prominent roles in the reform movement against "Boss" Tweed in 1871. Hewitt served as U.S. Congressman almost continuously from 1874 to 1886. Both men were elected Mayor of New York City: Cooper in 1879-80 and Hewitt in 1887-88.

Retractile Bridges[11]

The "retractile" bridge has been called "a very unusual type" by engineer J.A.L. Waddell in his influential work Bridge Engineering (1916). This type has also been called in other sources: "Boston draw" bridge, "pull-back draw" bridge, "traversing" bridge, "sliding (draw)" bridge, "retractile draw" bridge, "diagonal sliding" bridge, and "rolling draw" bridge. Generally small, simple spans over narrow channels, they have been employed to provide channel clearance in locations where other bridge types are impractical. A typical retractile bridge is a truss or set of girders supported on a group of rollers which move horizontally along a set of rails; the bridge is powered by a steam or electric engine and a cable-pulley or rack-and-pinion system. When the bridge is closed, one side extends over the abutment, across the channel, and rests on the opposite abutment; when the bridge is in operation the overhanging section acts as a cantilever and is counterweighted. This is the manner in which the Carroll Street Bridge functions; in closed position the bridge is set at an angle to the channel (where there is a slight bend), during operation it moves back diagonally, and in open position rests on an adjacent piece of land. Variations seen in retractile bridges include approach spans which move aside to allow for the main span when open, and "telescope" bridges in which the main span recedes into or above adjacent spans. Retractile bridges were used occasionally for railroads.

The antecedents of the retractile bridge were apparently the medieval drawbridges of Europe. Their development is unclear but they may have been introduced in the mid-nineteenth century in England. The Shoreham-Chichester Line Railroad Bridge, Arun River (1845-62) was called by railway historian Frederick Williams in 1852 "the first of its kind."[12] A timber-and-iron main span rolled back on 18 wheels while a secondary span moved away laterally to clear a space for the main span. Another English example was the Victoria Bridge, Queens Ferry (1897), a telescope retractile bridge in which the main draw spans receded into fixed approach spans.

Possibly the first, and most frequent , use of the retractile bridge in the United States was in Boston, where there were once some dozen examples [hence the name "Boston draw" bridge]. Today, only two Boston retractile bridges are known to survive, both in fixed position, with engines removed: L Street Bridge, Reserve Channel (1892), and Summer Street Bridge, Fort Point Channel (1899-1900).[13]

In New York City, there were once five retractile bridges, of which only two exist today.[14] The Carroll Street Bridge (1888-89) is the older of these, and thus the oldest known extant retractile bridge in the United States. The other extant New York bridge is at Borden Avenue, Dutch Kills, Queens (1908). A wooden retractile bridge at Bayview Avenue, Lemon Creek, Staten Island, constructed sometime before 1861, was for many years the oldest bridge in the city; it was replaced by a steel retractile bridge in 1955-58 which was later discontinued. The Washington Avenue Bridge, Wallabout Canal, Brooklyn (1893) was replaced by a bascule bridge in 1936-37. The Westchester Avenue Bridge, Bronx River, Bronx (1905), was also replaced by a bascule bridge in 1937-38.

By the 1920s, the retractile bridge, never extensively employed, had fallen out of favor. Otis E. Hovey commented in Movable Bridges (1926) that they "now appear to be nearly obsolete."[15]

Description

The Carroll Street Bridge, a trapezoidal-shaped retractile bridge, is a simple 107-foot span composed of: two riveted steel plate girders (the shorter of which is counterweighted) supporting the deck structure (riveted floor beams, rolled beam stringers [not visible], wood plank deck with timber curbs) having one traffic lane and two bracketed cantilevered sidewalks (also with wood plank deck); a small central riveted latticework post- and- truss system frame supporting steel eye-bar stay cables (which act as a cantilever when the bridge is in operation); carriage truck frames attached to the lower flanges of the girders, supported on wheels set on three sets of steel rails on timber supports; part of the mechanical system consisting of wire cables, pulleys, and guides; and metal handrailing. Also on the Landmark Site are the bridge receiving site, asphalt approach roadways, timber abutments, stone bulkhead walls, safety traffic gates, and metal handrailings flanking the approaches.

A small polygonal brick operator's house with round-arched fenestration is located at the west end of the bridge. A recent accident has caused damage to the structure. The house contains the remaining portion of the mechanical system, including the electric motor and winch [not covered in this designation]. The bridge was converted from steam engine to electric motor in 1907-08.

Alterations to the original bridge structure have included: replacement of steel rails, and wheels, axles, and journals of the carriage trucks (1914-15); and replacement of most of the handrailing (c. 1945-48).[16]

Report prepared by Jay Shockley
Research Department

NOTES

1. This information was compiled from: Henry W. B. Howard, edit., History of the City of Brooklyn: From its Settlement to the Present Time (Brooklyn: Brooklyn Daily Eagle, 1893), pp. 133, 163; and Henry R. Stiles, edit., The Civil, Political, Professional and Ecclesiastical History and Commercial and Industrial Record of the County of Kings and the City of Brooklyn, New York, from 1683 to 1884, Part 2 (New York: W.W. Munsell & Co., 1884), pp. 636-643.

2. Brooklyn Department of City Works, Annual Report (1887) (Brooklyn: Department of City Works, 1888), pp. 29-30.

3. Ibid., Annual Report (1888), p. 39.

4. Ibid., Annual Report (1889), p. 18; New York City, Department of Bridges, Annual Report (1905-12) (New York: Martin B. Brown Co., 1913), pp. 287-288.

5. New York City, Department of Transportation, Carroll Street Bridge Drawings, 1889.

6. Robert Van Buren, obituary, New York Times, December 17, 1919, p.17; Brooklyn Department of City Works, Annual Reports, 1877-94.

7. "Prize for 'Japanese War'," Charles O. H. Fritzche obituary, New York Times, July 14, 1921, p. 10.

8. The information was compiled from: Dumas Malone, edit., Dictionary of American Biography (New York: Charles Scribner's Sons, 1936), pp. 396-397, 409-410, 604-606; R. W. Raymond, "Biographical Notice of Abram S. Hewitt" and "Biographical Notice of Edward Cooper," Transactions (American Institute of Mining Engineers), 34 (1904), 186-204, and 37 (1907), 349-356; Real Estate Record Association, A History of Real Estate, Building and Architecture in New York City (New York: Arno Press, 1967), pp. 484-485; and Esmond Shaw, Peter Cooper and the Wrought Iron Beam (New York: Thistle Press, 1960).

9. The Cooper Union (1854-59, Frederick A. Peterson), Third Avenue and Astor Place, was established as a free school in the arts and sciences. Today it is a designated New York City Landmark.

10. The first buildings constructed with wrought-iron structural members were: Harper Brothers Building (1854, James Bogardus and John B. Corlies, demolished); U.S. Assay Office (originally Bank of the United States, 1823, Martin Thompson), renovations (1854, demolished, facade in the Metropolitan Museum of Art); Nassau Hall, Princeton University (1854-59, reconstruction); and Cooper Union.

11. This information was compiled from: Morgan W. Davies, The Theory and

Practice of Bridge Construction in Timber, Iron and Steel (London: Macmillan & Co., 1908), pp. 406-411; Martin Gay, "Harlem River Bridges," Proceedings (New York: Municipal Engineers of the City of New York, 1905), p. 82; Otis E. Hovey, Movable Bridges (New York: John Wiley & Sons, 1926), pp. 16-18; Jacob S. Langthorn, Types of Movable Bridges (New York: Brooklyn Engineers Club, [1904?]), pp. 150-151; C. C. Schneider, "Movable Bridges," Transactions (American Society of Civil Engineers), 60 (June 1908), pp. 261, 268; J. A. L. Waddell, Bridge Engineering, Vol. 1 (New York: John Wiley & Sons, 1916), pp. 663-667.

12. Cited in: J. M. Richards, National Trust Book of Bridges (London: Jonathan Cape, 1984), p. 108.

13. Telephone conversations with: Robert Vogel, National Museum of American History, Smithsonian Institution; and Peter Stott, Massachusetts Historical Commission.

14. Information compiled from: Annual Reports of Brooklyn Department of City Works and New York City, Departments of Bridges, Public Works, and Plants and Structures; and New York City, Department of Highways, "Bridges Under the Jurisdiction of the Department of Highways" [listing], drawer 472 (December 31, 1960, with later annotations).

15. Hovey, p. 18.

16. Op. cit., Annual Reports; New York City, Department of Transportation, Photographs of Carroll Street Bridge (1942-43, 1953).

FINDINGS AND DESIGNATIONS

On the basis of a careful consideration of the history, the architecture and other features of this structure, the Landmarks Preservation finds that the Carroll Street Bridge has a special character, special historical and aesthetic interest and value as part of the development, heritage and cultural characteristics of New York City.

The Commission further finds that, among its important qualities, the Carroll Street Bridge is a significant work of engineering as an example of a rare and unusual bridge type, the retractile bridge, and is the oldest known extant retractile bridge in the United States; that it is one of the oldest bridges in New York City, constructed in 1888-89 and designed by the Brooklyn Department of City Works; that it reflects the history of the development of the Gowanus Canal in Brooklyn in the nineteenth century; that its superstructure was manufactured by Cooper, Hewitt & Company, one of the leading American iron and steel firms of the day; and that its original brick operator's house, containing part of the mechanical system, is a significant feature on the Landmark Site.

Accordingly, pursuant to the provisions of Chapter 21, Section 534, of the Charter of the City of New York and Title 25, Chapter 3, of the Administrative Code of the City of New York, the Landmarks Preservation Commission designates as a Landmark the Carroll Street Bridge over the Gowanus Canal, Borough of Brooklyn, and designates the following as its Landmark Site: the site encompassed by a line extending across Carroll Street which is 58'-2" east of and perpendicular to the intersection of the northern curb of Carroll Street with the eastern end of the Carroll Street Bridge deck; southerly across the southern sidewalk of Carroll Street to the northern property line of Block 453, Lot 1; westerly along the northern property line of Block 453, Lot 1; southerly along a portion of the western property line of Block 453, Lot 1; westerly along a line extending across the Gowanus Canal which is a continuation of the northern property line of Block 452, Lot 15; northerly along the western property line of Block 452, Lot 19, and the operator's house to the northwest corner of the operator's house; northerly along a line across the southern sidewalk of Carroll Street to the point on the southern curbline which is 36'-4" from the western edge of the Carroll Street Bridge deck; northerly along a line across Carroll Street and the northern sidewalk to the southern property line of Block 445, Lot 11; easterly along the southern property line of Block 445, Lot 11; easterly along a line extending across the Gowanus Canal to the southern property line of Block 439, Lot 1; easterly along the southern property line of Block 439, Lot 1; and southerly along a line extending northerly across the northern sidewalk of Carroll Street to the point of beginning, Borough of Brooklyn.

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_____. Photographs of Carroll Street Bridge, taken by J. Shelderfer, 1942-43, 1953.

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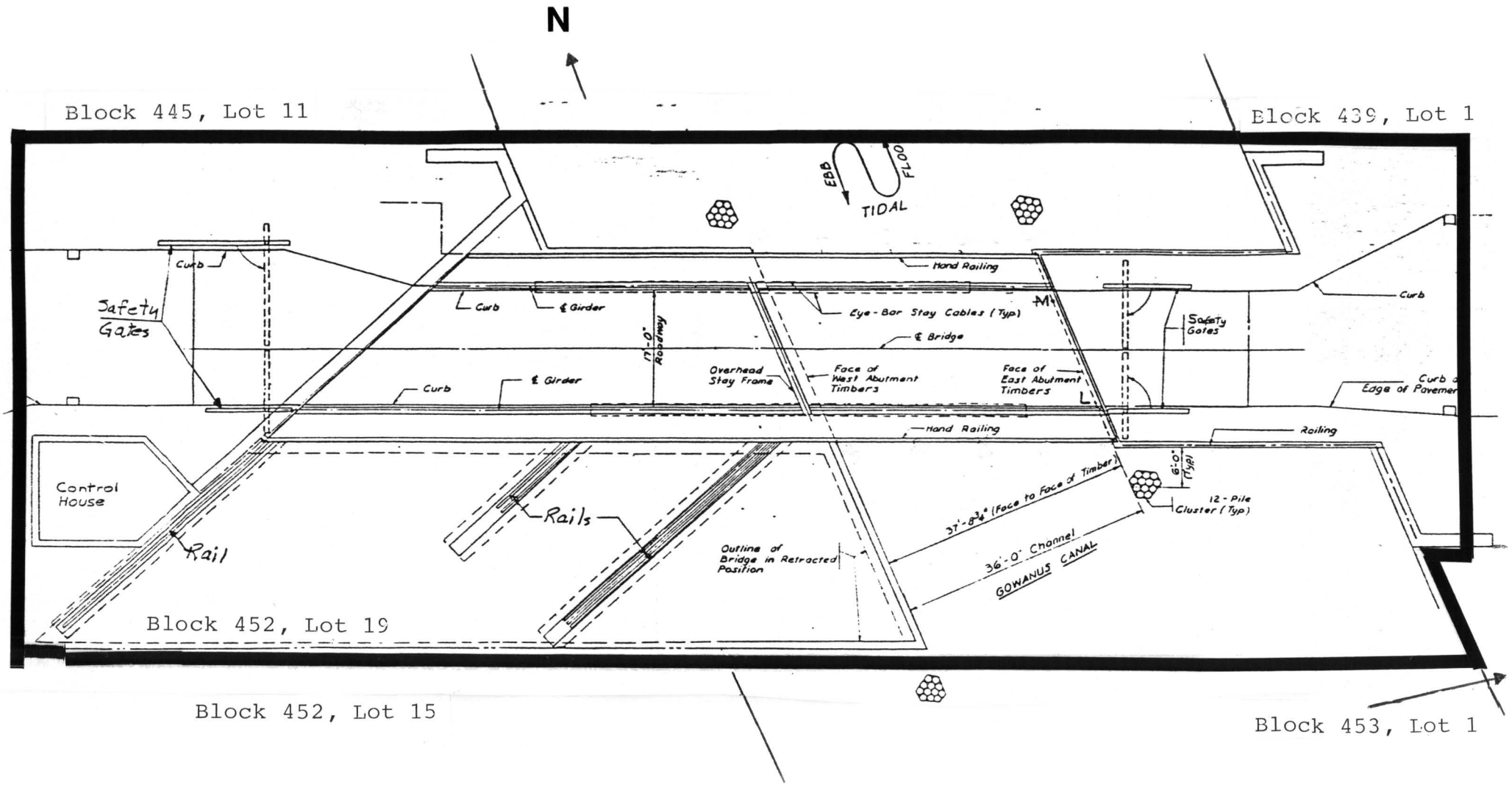

CARROLL STREET BRIDGE,
over the Gowanus Canal,
Brooklyn
Built: 1888-89

Map: NYCDOT

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PHOTO: SHOCKLEY

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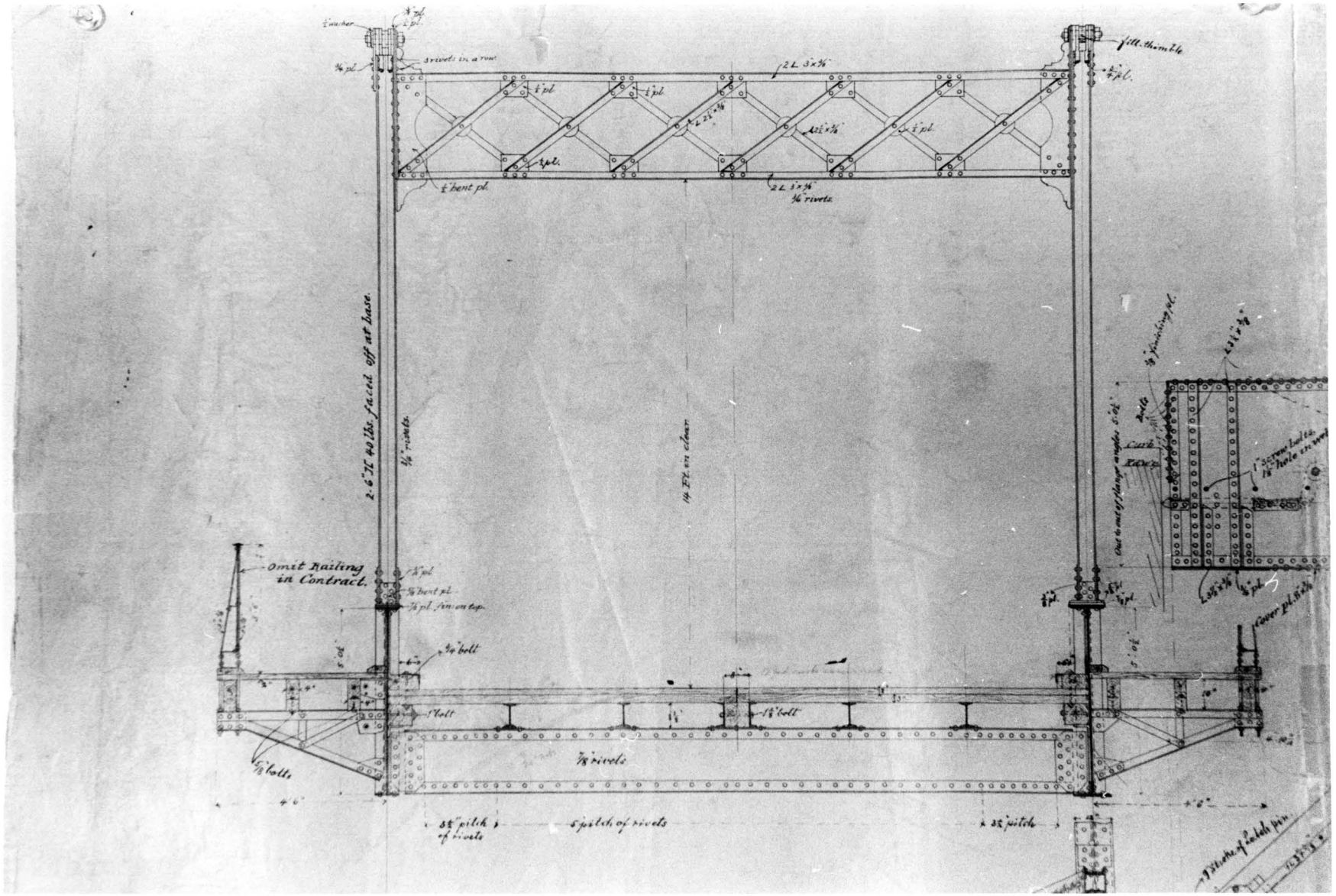

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Drawing: Brooklyn Dept. of
City Works (1889)