Landmarks Preservation Commission
September 14, 1982, Designation List 159
LP-1222

WASHINGTON BRIDGE, over the Harlem River from West 181st Street, Borough of Manhattan, to University Avenue, Borough of the Bronx. Built 1886-89; competition designs by Charles C. Schneider and Wilhelm Hildenbrand modified by Union Bridge Company, William J. McAlpine, Theodore Cooper, and DeLemos & Cordes; chief engineer William R. Hutton; consulting architect Edward H. Kendall.

Landmark Site: Manhattan Tax Map Block 2106, Lot 1 in part; Block 2149, Lot 525 in part, consisting of those parts of these lots upon which the structure and approaches of the bridge rest. The Bronx Tax Map Block 2538, Lot 32 in part; Block 2880, Lots 1 & 250 both in part; Block 2884, Lots 2, 5 & 9 all in part, consisting of those parts of these lots upon which the structure and approaches of the bridge rest.

Boundaries: The Washington Bridge Landmark is encompassed by a line running southward parallel with the eastern curb line of Amsterdam Avenue; a line running eastward which is the extension of the southern curb line of West 181st Street to the point where it crosses Undercliff Avenue; a line running northward parallel with the eastern curb line of Undercliff Avenue; a line running westward from Undercliff Avenue which intersects with the extension of the northern curb line of West 181st Street, to the point of beginning.

On November 18, 1980, the Landmarks Preservation Commission held a public hearing on the proposed designation as a Landmark of the Washington Bridge and the proposed designation of the related Landmark Site (Item No 8.). The hearing was duly advertised in accordance with the provisions of law. Two witnesses spoke in favor of designation. There were no speakers in opposition to designation.

DESCRIPTION AND ANALYSIS

The Washington Bridge, the next major extant bridge constructed in New York City after the Brooklyn Bridge, is a monument in the history of nineteenth-century American engineering. A steel and cast- and wrought-iron arch bridge with arched masonry approaches, the Washington Bridge was constructed over the Harlem River in 1886-1889 to connect the Washington Heights section of Manhattan with the Bronx. It has long been considered one of the nation's finest nineteenth-century steel arch bridges, perhaps second only to the famous Eads Bridge in St. Louis of 1867-74.

History of the Project

After the Civil War, as the development of upper Manhattan proceeded, plans were begun for a crossing over the Harlem River to the Bronx. In 1868 the Board of Commissioners of Central Park (then responsible for the layout of new streets in upper Manhattan) considered the question of a new bridge in connection with the development of Washington Heights when Andrew Haswell Green, executive officer of the Board, suggested in a report that a bridge be built north of the High Bridge Aqueduct (Completed in 1848 by engineer John B. Jervis, High Bridge is a designated New York City Landmark.) In 1869 the New York State Legislature authorized a survey of bridge locations along the Harlem River, and an act of May 19, 1870, mandated the newly created Department of Public Parks to locate and build a bridge. Following a delay of several years, the New York State Supreme Court appointed commissioners in February 1876, to supervise the assemblage of land for the new bridge. A site was chosen 1500 feet north of High Bridge and land was acquired on both sides of the river.[1]

After another delay of several years, four alternate bridge designs including suspension, iron cantilever, and masonry arch types were proposed in February 1881, by William Jarvis McAlpine, chief engineer of the Department of Public Parks. In 1883 the department requested further design submissions and several were received, for cantilever and metal arch bridges. But since the only action in fifteen years was land acquisition, political pressure was applied (particularly by Andrew H. Green) for the transfer of bridge construction authority to a different body. On June 11, 1885, the Legislature created the Harlem River Bridge Commission (Chapter 487, Laws of 1885), and three new commissioners were appointed on July 21, 1885. William J. McAlpine was named chief engineer to the commissioners on September 29, 1885.

McAlpine (1812-1890) was one of the country's leading engineers, involved during his long career with a great variety of difficult engineering projects in the United States, Canada, and around the world. Raised in upstate New York, he was a student of engineer John B. Jervis. Projects on which he worked included numerous railroads and canals in New York State and elsewhere, the waterworks of Brooklyn, Albany, and Chicago, the U.S. Navy Yard dry dock in Brooklyn, and the Third Avenue Bridge and Riverside Park and Drive in New York City. In 1852 he was elected State Engineer of New York, and served as State Railroad Commissioner from 1855 to 1857. In 1865 he was chairman of the commission of engineers appointed to examine plans for the St. Louis Bridge. He served as third president of the American Society of Civil Engineers from 1868 to 1869.

The Iron and Steel Arch Bridge

Interest in the use of iron and steel for American bridges had increased greatly in the last third of the nineteenth century. The arch bridge was the second oldest form, after the suspension bridge, in which iron was used exclusively for structural members. The first iron arch bridge was constructed by Darby and Wilkinson in 1775-1781 over the River Severn at Coalbrookdale, England. The first American iron arch bridge, completed in 1839 by Richard Delafield, carried the National Road over Dunlap's Creek at Brownsville, Pennsylvania. The second American iron arch bridge was the Pennsylvania Avenue Bridge-Aqueduct over Rock Creek in Washington, D.C., built by Gen. Montgomery C. Miegs in 1858. But the use of the iron arch for bridges in the United States was rare until after the Civil War, when foundries were finally able to cast elements on a large enough scale. Carl Condit asserts that, "When the arch of iron and steel finally began to compete successfully with other forms, it did so because the builders frequently chose it on aesthetic rather than functional grounds."[2] With the triple-span Eads Bridge crossing the Mississippi River at St. Louis, designed by James B. Eads and built in 1867-1874, the use of steel was introduced into American bridge construction. The Eads Bridge is generally considered the greatest of the nineteenth-century American metal arch bridges.

The Design Competition

Deciding that the new Harlem River Bridge should stand as a monument that could be compared with the recently completed Brooklyn Bridge, an iron suspension bridge designed by John and Washington Roebling (a designated New York City Landmark), the commissioners announced a formal design competition on October 16, 1885. Specifications for the design of the bridge included: a clear span of at least 400 feet, an iron or steel superstructure on masonry piers, and a width of 80 feet (with 50-foot roadway and two sidewalks). The requirement for the new technology of iron or steel construction indicated the importance the commissioners attached to the project. This competition became one of the most interesting such

design competitions held in the U.S. in the nineteenth century. By December 1885, seventeen designs for the proposed Harlem River Bridge had been received from many distinguished American engineers. Four of the proposals were retained by the commissioners for further consideration. A board of experts, appointed to assist the commissioners in the choice of a design, included chief engineer McAlpine, architect Edward H. Kendall, and civil engineers Theodore Cooper and Pomeroy P. Dickinson. Two prizes were awarded, each for a double-span, open web, parallel chord, metal arch design. The winning design was by Charles Conrad Schneider, while the second prize went to Wilhelm Hildenbrand.

After the projected cost of the Schneider design came under criticism, McAlpine requested that Col. Julius W. Adams, consulting engineer for the New York City Department of Public Works, submit a masonry arch bridge proposal, even though this would not meet the competition requirements. Adams' design was then modified by the Union Bridge Company, by the substitution of solid web steel arches, but this too was not accepted. The Union Bridge Company then submitted plans for a less costly and elaborate version of the two winning designs, substituting a steel plate webwork for ornamental rib lattice bracing. These plans were adopted by the commissioners, after further modifications by McAlpine and Theodore Cooper (now a consulting engineer). In July 1886, the elderly McAlpine resigned as chief engineer, though he remained with the project as a consulting engineer. William Rich Hutton was hired as chief engineer in August 1886, the position in which he served until the completion of the bridge.

Hutton (1826-1901) was also a prominent engineer. Originally from Maryland, he had moved to New York City in 1880. Projects with which he was associated included the Washington (D.C.) Aqueduct, the Chesapeake and Ohio Canal (as chief engineer, 1869-74), the Western Maryland Railway (as chief and consulting engineer, 1871-81), the design of locks and dams on the Kanawha River in West Virginia (1874-78), and the New Croton Aqueduct, New York (as consulting engineer, 1886). After the Harlem River Bridge project, Hutton was chief engineer of the Hudson River Tunnel from 1889 to 1901.

Construction of the Bridge

The bridge assembled an impressive force of distinguished engineers, architects, contractors, and sub-contractors. William J. McAlpine became a consulting engineer at the start of construction and William R. Hutton was chief engineer throughout construction. Theodore Cooper, as consulting engineer, aided in the revision of the plans and specifications and was in charge of the inspection of construction. Cooper (1839-1919) was a prominent industrial and bridge engineer whose previous work had included assisting James Eads on the St. Louis bridge. He was later to be a consulting engineer to the New York Rapid Transit Commission. Frank A. Leers (1844-1890) "by whom the metal structure was practically built"[4] according to Hutton, was engineer to the contractors (Passaic Rolling Mill Company). Leers worked out the design of the metal spans for the working drawings, in consultation with Cooper. Alfred Noble (1844-1914), resident engineer from August 1886 to June 1887, had worked on numerous other bridge and canal projects. John Bogart (1836-1920) was resident engineer from August 1887, to March 1889. The consulting architect was Edward Hale Kendall (1842-1901). Kendall's designs had included a number of cast-iron buildings and elevated stations and the Gorham Apartments (1883) at West 19th Street and Broadway.

Passaic Rolling Mill Company was the contractor for the iron and steel work. Watts Cooke, president of the company, was superintendent of the construction of the steel arches. Myles Tierney was masonry contractor. Anderson and Barr was sub-contractor for caisson foundation work. John Pierce, a nationally known contractor and president of the New York and Maine Granite Paving Block Company, was sub-contractor for granite. Pierce had supplied the granite for numerous major structures, including the Brooklyn Bridge, Brooklyn Post Office, and State, War, and Navy Building, Washington. The Barber Asphalt Paving Company was sub-contractor for the roadway. The Spang Steel Works and Union Mills of Pittsburgh supplied the steel plates and bars that were shaped into parts by the Passaic Company. The Jackson Architectural Iron Works supplied the cast-iron cornice and balustrade, which were designed by architects DeLemos & Cordes. The Jackson Architectural Iron Works, an early (1840) and leading New York foundry, received numerous commissions for structural and ornamental ironwork including the American Museum of Natural History, Carnegie Hall, Metropolitan Life Insurance Building, and State, War, and Navy Building. Theodore W. DeLemos (1850-1909) and August W. Cordes (1850-?) were German architects who formed a partnership in 1884. They are most noted for their commercial designs, which included the original Macy's Department Store (1901), at Broadway and West 34th Street, the Siegel-Cooper Dry Goods Store (1895) at 616-32 Sixth Avenue, and Adams Dry Goods Store (1900) at 675-91 Sixth Avenue.

Contracts for construction of the Harlem River (or "Manhattan") Bridge were signed on July 14, 1886. The design of the metal arch spans was changed slightly after the contract was signed. A decorative cornice and balustrade, designed by DeLemos & Cordes, were added after the commissioners decided during construction that a more ornamental structure was desirable. The plans that had been adopted for the masonry work were considered unsatisfactory, but in order to avoid further delay, work was commenced on the foundations and substructure in August 1886. Modifications were to be made during the course of construction.

The construction of the bridge was a significant engineering feat, employing approximately 500 men. First, three piers were built up to cornice height. The central pier, located on the east shore of the river, was built on a pneumatic caisson resting on solid rock forty feet below mean water. The masonry arch approaches were constructed next, using extensive wooden falsework to form the arches. The construction of the two iron and steel arch spans took the labor of 200 men from September 1887 to May 1888, and also used extensive falsework.

The majority of the construction work of the Harlem River Bridge was completed by December 1888, and the bridge was opened to privileged pedestrians with special passes. In February 1889, the contractors officially turned the bridge over to the commissioners, and on Washington's Birthday the bridge was officially re-named the Washington Bridge, as part of the national centennial celebration of George Washington's inauguration as President in New York on April 30, 1789. The proximity of the bridge to Fort Washington and Washington Heights was another factor prompting the change of name. There was never to be an official opening ceremony for the new Washington Bridge. Because of bad weather in February a ceremony was postponed until spring, but after arguments between the commissioners and the City, as well as adverse public sentiment, the plans were cancelled. The bridge remained closed as the commissioners continued to argue over their salaries. Finally the impatient public tore down the barricades in December 1889, and the bridge was placed in use. The total cost of the Washington Bridge was $2,851,684.55.

The Design of the Bridge

The design of the Washington Bridge is asymmetrical due to site conditions along the Harlem River; the Manhattan side has steeper, more abrupt bluffs, while the Bronx has a longer and more gradual slope. Thus the approaches to the bridge are different; the Manhattan approach consists of three semi-circular masonry arches, while the Bronx approach consists of three semi-circular arches and one seven-centered masonry arch. These masonry arches, constructed of concrete faced with coursed Maine and Connecticut granite and gneiss ashlar, have voussoirs with keystones. The overall structures of the approaches have bracketed granite cornices which are capped by granite balustrades cut in a circular pattern. Originally, bronze fleur-de-lis ornaments were placed within these circles. The Bronx approach originally had a granite stairway with bluestone steps, as well as a median island in the roadway. Each approach abuts one of the outer piers; a large central pier is located on the Bronx shore of the Harlem River. The three piers are constructed of concrete faced with the same granite and gneiss ashlar as the approaches and have bracketed granite cornices. The piers are set on ashlar bases and accented by rock-faced quoins. The solid granite balustrade above the piers originally enclosed seating areas with bronze gas and electric lampposts.

The piers support the two steel arches, the western one spanning the river and the eastern one spanning railroad tracks. At 510 feet each, the spans are longer than those of the famous Eads Bridge. Each arch span is constructed of six enormous arched girders that are composed of a series of steel plates riveted together, giving the appearance of voussoirs. Each arch has a heavy top and bottom chord. This was the first use in the U.S. of plate girders for arch ribs.[5] Each arch rib has its own set of skewbacks (from which the arches spring) which are hinged by means of a pivotal bearing. The Washington Bridge is an example of the "two-hinged arch" type of bridge, described by Condit: "in this form the arch is rigid throughout its length but hinged at the abutments or springlines; as a consequence, the maximum bending stress is at the crown, from which it decreases to a theoretical zero at the hinges."[6] This type was a technological advance in steel arch construction. Condit also described the construction of the Washington Bridge above the arches: "the deck of the bridge rests on the usual spandrel posts, but the curious feature is that there is no diagonal bracing whatever, the stiffening members consisting entirely of horizontal struts running both transversely and longitudinally."[7] These vertical posts and struts, along with the floor beams, are made of wrought iron. The spans are surmounted by a classically-ornamented cornice and balustrade of cast iron over wrought iron plate. The denticulated and modillioned cornice is set above a frieze containing a motif of shield and branches. Above each shield rises a balustrade post, ornamented by a seahorse and shell motif and decorative cap. Between the posts, the balustrade features stylized Ionic columns alternating with medallions originally having a torch and scroll motif. The top rail of the balustrade incorporates an egg-and-dart motif. All of the metal surfaces of the bridge were painted a gray color "darker than the granite masonry, but in harmony with it."[8] Bronze lampposts for gas light and later (1905) additional electric lampposts originally appeared at intervals along the entire length of the bridge. The roadway was constructed of granite block, over which asphalt was applied. The sidewalks were originally of bluestone.

Automobiles first began to cross the Washington Bridge in 1906. That same year the New York City Interborough Railroad Company began the operation of two surface car tracks over the bridge. The increase in automobile traffic necessitated changes in the roadway. The median at the Bronx end was removed. The side-

walks were narrowed and the roadway was widened. In the later twentieth century with the construction of the Harlem River Drive and Cross Bronx Expressway, the bridge approaches on both sides were changed. Today the balustrade of the Washington Bridge appears in slightly altered form. The gas and electric bronze lampposts have been removed. A chain link safety fence and standard highway lampposts have been installed. Sections of the cast-iron and granite balustrade are missing, including such decorative elements as the bronze fleur-de-lis, post caps, the inner motif of the medallions, and sections of stone coping. The metal surfaces of the bridge have been painted an orange color.

Conclusion

The Washington Bridge is considered a bridge of major significance constructed in the United States in the nineteenth century. Its design has been praised consistently since its construction. In 1888 Scientific American remarked that the bridge "with its two immense archways and general boldness of design,...will for many years be an ornament to the city."[9] The New York Times praised it as "one of the most imposing, beautiful and substantial to be found anywhere about the metropolis and is especially interesting as a perfect and consistent edifice in the arched style of architecture."[10] Noted architectural critic Montgomery Schuyler, in Century Magazine in 1900, called the Washington Bridge" an admirable and exemplary work, perhaps the most conspicuously successful monument that American engineering has produced...the bridge proper it would be difficult to overpraise. The completed work so perfectly and evidently fulfills its function and fills its place that the general scheme seems to the spectator a matter of course."[11] In 1929 engineer Charles Evan Fowler considered it "in many respects one of the finest pieces of bridge architecture in the world, especially in details, and the masonry is particularly notable for its solid construction, and the perfection of its design and detailing."[12] More recently, the eminent American engineering historian Carl Condit noted that "the two-hinged arch suddenly achieved prominence when it was selected for one of the great steel spans of the century...Washington Bridge is unquestionably an impressive work of structural art, technically and visually..."[13] A significant engineering feat, the Washington Bridge remains one of New York City's most beautiful bridges.

Report Prepared by Jay Shockley
Landmarks Preservation Commission Staff

Report Typed by Barbara Sklar

FOOTNOTES

1. The Bronx bluff, an area of estates, included the land of William B. Ogden where the bridge was to be located.

2. Carl W. Condit, American Building Art: The Nineteenth Century (New York: Oxford University Press, 1960), p. 183.

3. A design submitted somewhat later by Thomas Curtis Clarke of the Union Bridge Company, rejected because it did not meet the competition requirements, was of interest as the first non-hypothetical American proposal for a reinforced concrete bridge.

4. William R. Hutton, The Washington Bridge Over the Harlem River (New York: Leo von Rosenberg, 1889), preface.

5. David Plowden, Bridges: The Spans of North American (New York: Viking Press, 1974), p. 170.

6. Condit, p. 193.

7. Condit, p. 194.

8. Hutton, p. 32.

9. "Erection of the Harlem River Bridge at 181st Street," Scientific American, 58 (February 18, 1888), p. 101.

10. Sharon Reier, The Bridges of New York (New York: Quadrant Press, Inc., 1977), p. 80.

11. Montgomery Schuyler, American Architecture and Other Writings, Volume II (Cambridge, Mass.: Belknap Press, 1961), p. 357.

12. Charles E. Fowler, The Ideals of Engineering Architecture (Chicago: Gilette Publishing Company, 1929), p. 195.

13. Condit, p. 194.

FINDINGS AND DESIGNATION

On the basis of a careful consideration of the history, the architecture, and other features of this structure, the Landmarks Preservation Commission finds that the Washington 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 Washington Bridge is a significant monument in the history of American engineering; that its construction represents the technological advances made in American bridge engineering in the nineteenth century; that it is one of the important examples of the use of the steel arch in nineteenth-century American bridges; that it is one of the important early examples of the two-hinged type of metal arch bridge, a type that achieved prominence after the construction of the Washington Bridge; that it was the first American bridge to use steel plate girders for arch ribs; that its design and construction represents the collaboration of a highly distinguished group of American engineers, architects, and contractors; that it is the next major extant bridge constructed in New York City after the Brooklyn Bridge; and that its distinctive design continues to make the Washington Bridge one of New York City's most beautiful.

Accordingly, pursuant to the provisions of Chapter 21 (formerly Chapter 63) of the Charter of the City of New York and Chapter 8-A of the Administrative Code of the City of New York, the Landmarks Preservation Commission designates as a Landmark the Washington Bridge over the Harlem River, Boroughs of Manhattan and the Bronx, and designates the following as its Landmark Site: Manhattan Tax Map Block 2106, Lot 1 in part; Block 2149, Lot 525 in part, consisting of those parts of these lots upon which the structure and approaches of the bridge rest. The Bronx Tax Map Block 2538, Lot 32 in part; Block 2880, Lots 1 & 250 both in part, Block 2884, Lots 2,5, & 9 all in part, consisting of those parts of these lots upon which the structure and approaches of the bridge rest.

Boundaries: The Washington Bridge Landmark is encompassed by a line running southward parallel with the eastern curb line of Amsterdam Avenue; a line running eastward which is the extension of the southern curb line of West 181st Street to the point where it crosses Undercliff Avenue; a line running northward parallel with the eastern curb line of Undercliff Avenue; a line running westward from Undercliff Avenue which intersects with the extension of the northern curb line of West 181st Street, to the point of beginning.

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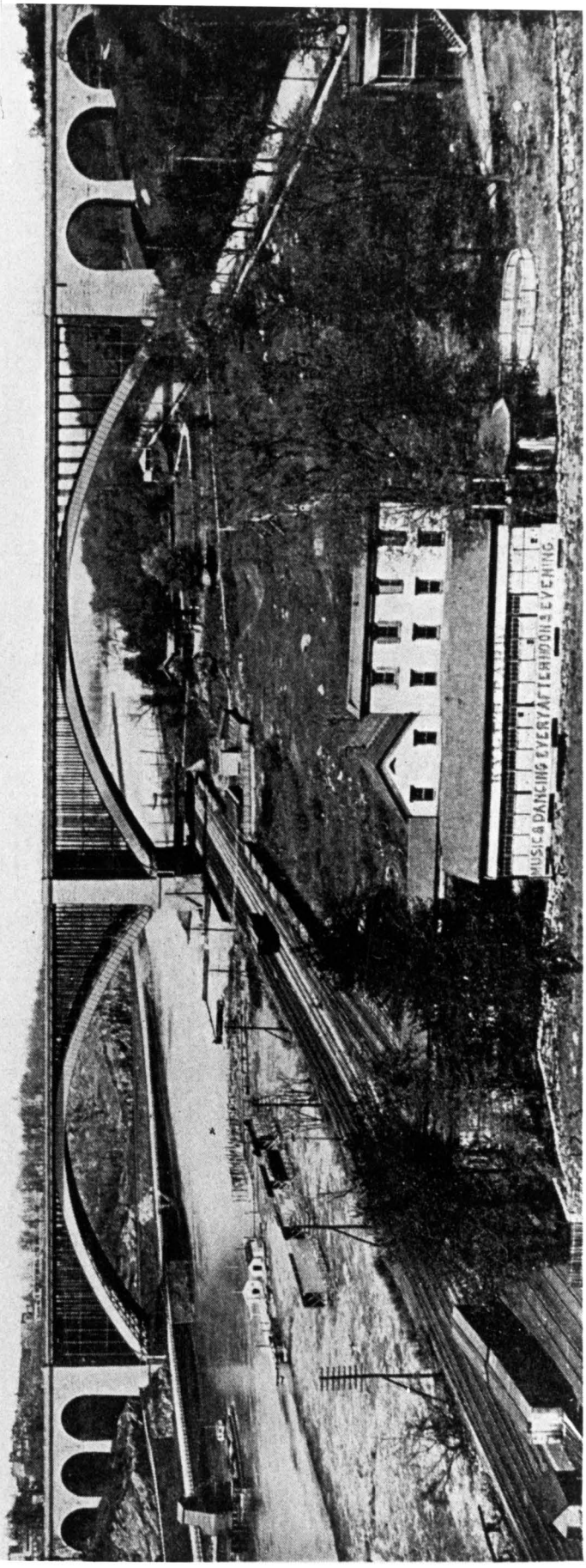
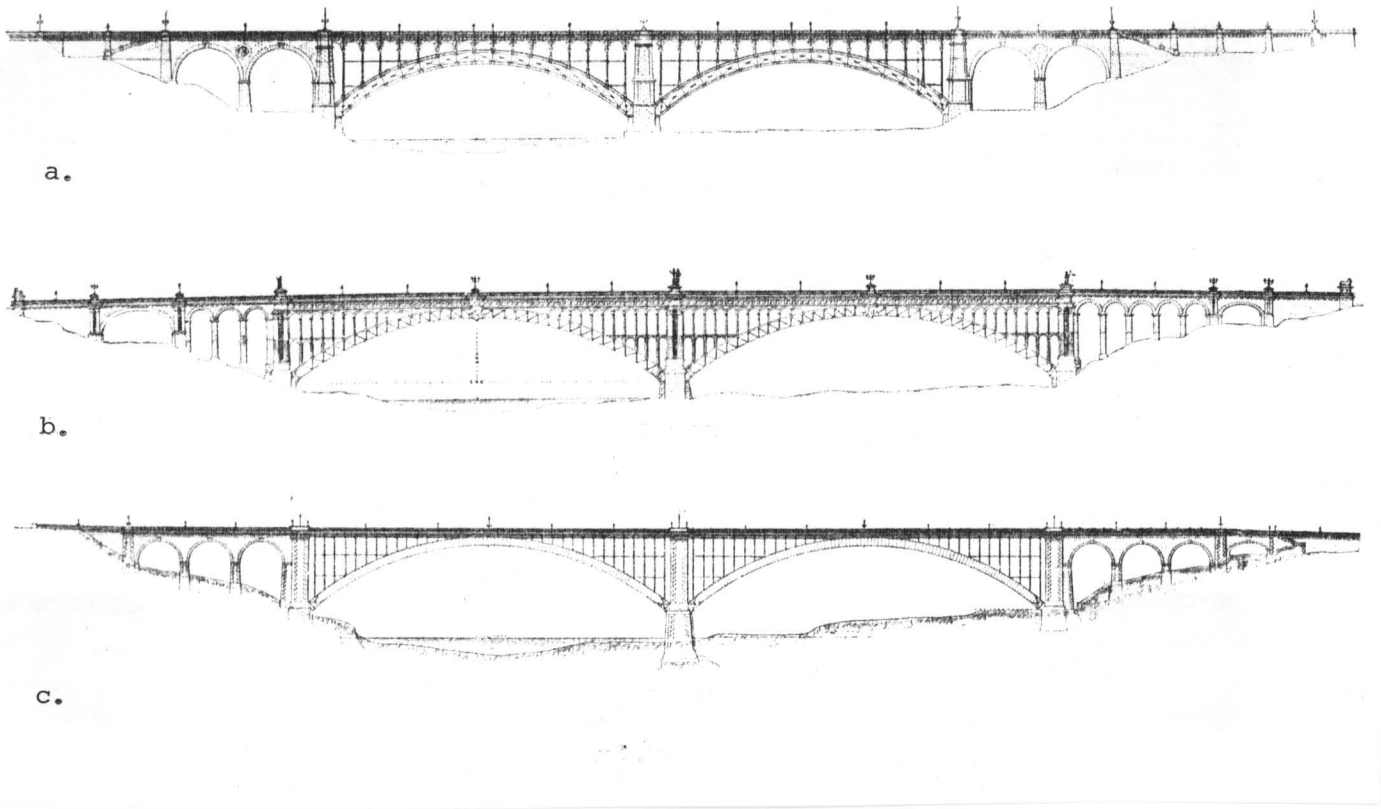


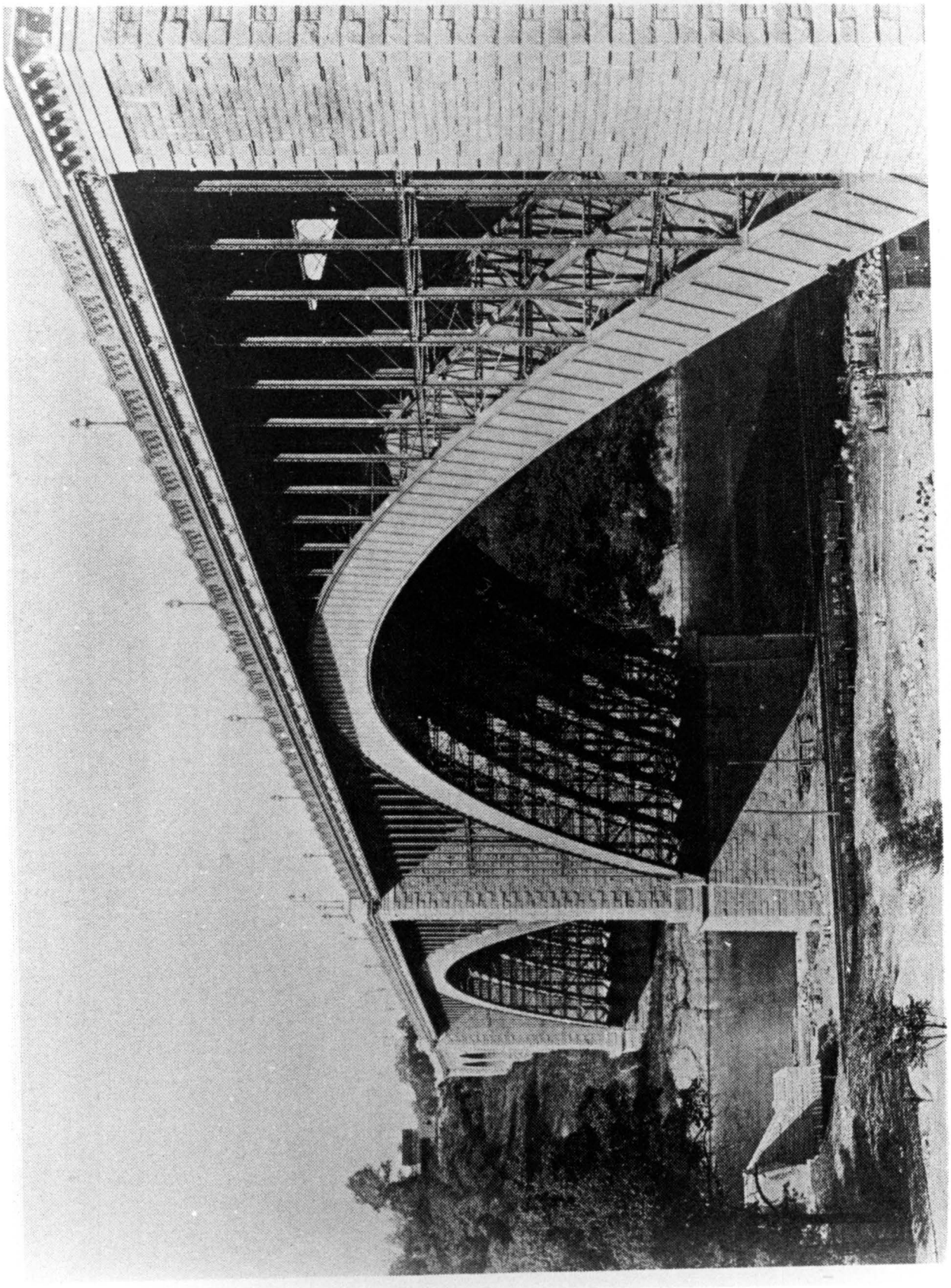
Washington Bridge (19th century view)

Photo Credit: Jenkins



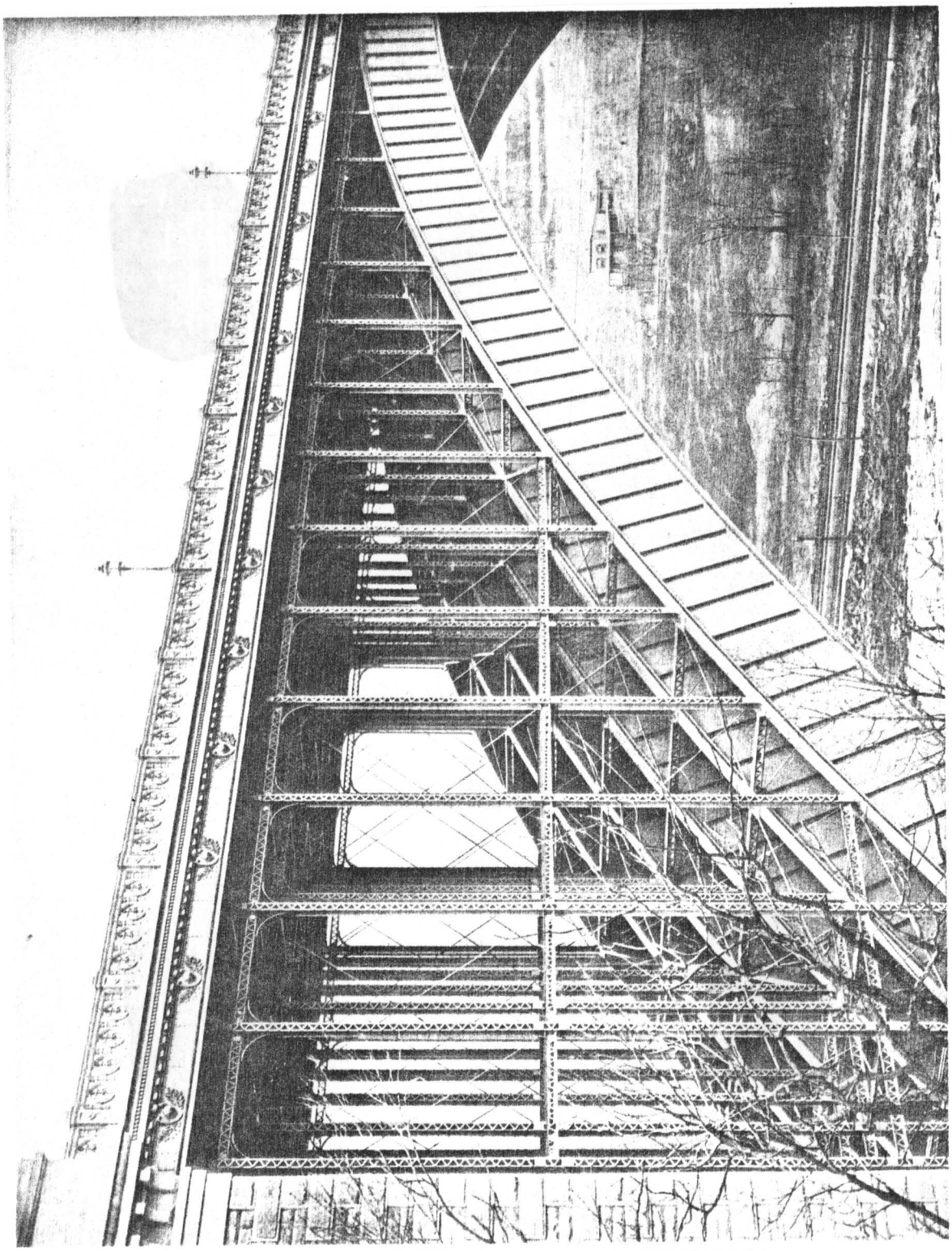
a. Competition Design, First Place; Charles C. Schneider
b. Competition Design, Second Place; Wilhelm Hildenbrand
c. Washington Bridge as built

Illustration Credit: Tyrell



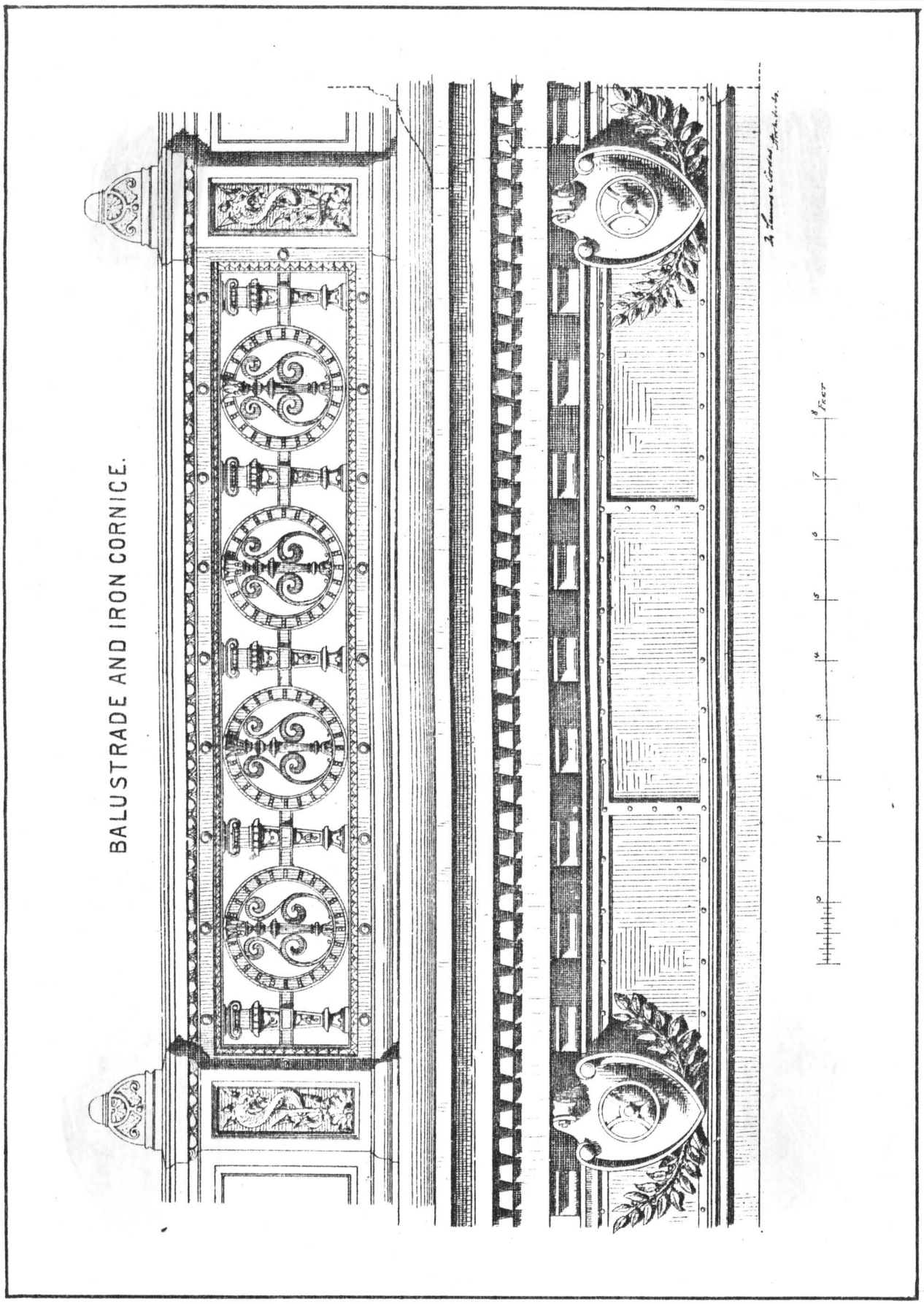
Washington Bridge (19th century photo)

Photo Credit: Schuyler



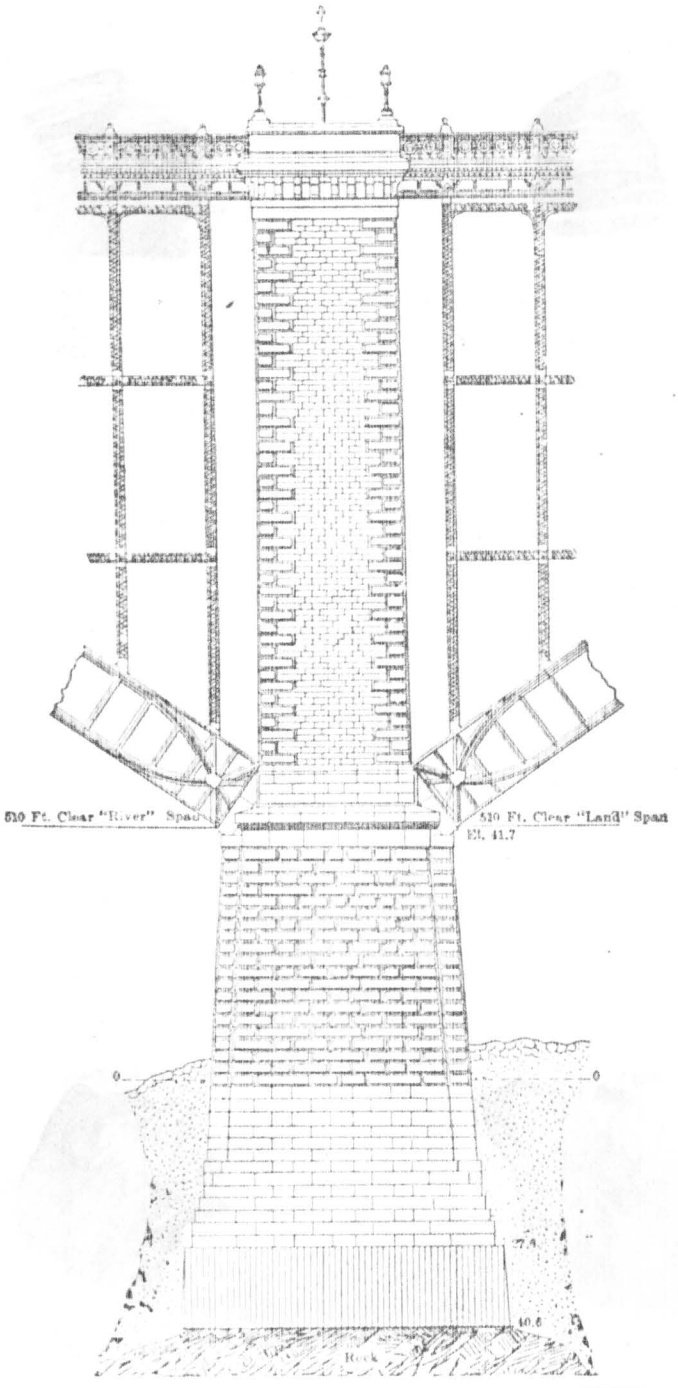
Washington Bridge in 1889

Photo Credit: Hutton



Washington Bridge Cornice and Balustrade
DeLemos & Cordes

Illustration Credit: Hutton



Washington Bridge Pier

Illustration Credit: Fowler