(DIVISION STREET RIVER BRIDGE)

WEST DIVISION STREET BRIDGE, ~~DIVISION STREET BRIDGE~~
Chicago Bridges Recording Project
Spanning North Branch of Chicago River at West Division Street
Chicago
Cook County
Illinois

HAER No. IL-148

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PHOTOGRAPHS

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HISTORIC AMERICAN ENGINEERING RECORD
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Jet Lowe, photographer, summer 1999.

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# HISTORIC AMERICAN ENGINEERING RECORD

## WEST DIVISION STREET BRIDGE
## (DIVISION STREET RIVER BRIDGE)

HAER No. IL-148

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| Location: | Spanning North Branch of the Chicago River at West Division Street, Chicago, Cook County, Illinois.<br>UTM: 16/445485/4639040<br>USGS Quad: Chicago Loop |
| Date of Construction: | 1904 |
| Designer: | Thomas G. Pihlfeldt and John E. Ericson, Department of Public Works, Chicago, Illinois |
| Builders: | Substructure: FitzSimons and Connell Company, Chicago, Illinois; superstructure: Roemheld and Gallery, Chicago, Illinois |
| Present Owner: | Chicago Department of Transportation, Chicago, Illinois |
| Present Use: | Highway bridge |
| Significance: | When Chicago became a major commercial and industrial center after the Civil War, the most common American drawbridge was the swing bridge, horizontally rotating on a center pier to open two channels. The center pier, however, became a navigational hazard for the ever-larger craft of the late nineteenth century, especially on crowded, narrow waterways such as the Chicago River. During the late 1890s, Chicago City Engineer John Ericson initiated a planning study to find an alternative to the swing span. Finding inspiration in the 1894 Tower Bridge in London, England, the municipal engineering staff developed a new movable-bridge design. The type was known as a double-leaf bascule, French for "seesaw." Each movable leaf rotated vertically on a fixed, steel horizontal axle, or trunnion, leaving the entire river channel open for shipping. With the front of each leaf counterbalanced by weights at the rear, relatively small motors could open and close the span. Completed in 1904, the West Division Street Bridge was the fourth bascule based on the city's new design. |

Historian: Jeffrey A. Hess, August 1999.

Project Description: The Chicago Bridges Recording Project was sponsored during the summer of 1999 by HABS/HAER under the general direction of E. Blaine Cliver, Chief; the City of Chicago, Richard M. Daley, Mayor; the Chicago Department of Transportation, Thomas R. Walker, Commissioner, and S.L. Kaderbek, Chief Engineer, Bureau of Bridges and Transit. The field work, measured drawings, historical reports, and photographs were prepared under the direction of Eric N. DeLony, Chief of HAER.

**Description**[1]

Situated in a commercial-industrial neighborhood, the West Division Street Bridge carries highway and pedestrian traffic over a bend in the North Branch of the Chicago River about one mile northeast of Chicago's main downtown business district. In the 1850s, a private company created a navigable bypass for this circuitous stretch of waterway by excavating the mile-long North Branch Canal. Between the river on the west and the canal on the east lies Goose Island, an artifact of the canal project and the only island in the Chicago River system.[2] Goose Island is widest at its middle, measuring about one-half mile across. At that point, it is bisected by Division Street, historically the area's main east-west thoroughfare. The island's first bridges on this route were center-pier swing spans, built over the river in 1869 and over the canal in 1870. They were known, respectively, as the West Division Street Bridge and the East Division Street Bridge, their designations reflecting their geographic orientation to the island. Initially, these historic names also applied to the two replacement structures constructed in the opening years of the twentieth century, the new East Division Street Bridge being completed in 1903 and the new West Division Street Bridge in 1904.[3]

The 1904 West Division Street Bridge was a movable bridge of the double-leaf bascule variety.[4] Named for the French word for "seesaw," a bascule provided a clear channel for waterway traffic by vertically rotating a span, or leaf, around a horizontal axis. In the engineering literature, the West Division Street Bridge represented a distinct design known as a "Chicago Type Bascule," so called because it was originally developed, and then widely

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[1] Unless otherwise noted, this description of site and structure is based on field inspections conducted by the author in July and August 1999.

[2] Perry R. Duis and Glen E. Holt, "Chicago's Only Island," *Chicago History* (February 1979):170.

[3] The dates of all Chicago highway bridges constructed before 1950 can be found in City of Chicago, Department of Public Works, Bureau of Engineering, Division of Bridges, "Bridge History and Data," Drawing Nos. 16188-16192, 1943, rev. 1950, in Chicago Department of Transportation, Plan File Archives, 30 North LaSalle Street, Chicago, Illinois (hereafter cited as CDT Plan Archives). For use of the historic names, see *Mayor's Annual Address and the Twentieth-Eighth Annual Report of the Department of Public Works . . . 1903* (Chicago: Allied Printing, n. d.), 61. Eventually the historic nomenclature proved confusing, especially after city street maps began designating the bridges' shared route as West Division Street. To identify the two structures more clearly, city engineers adopted the practice of calling them the Division Street River Bridge and the Division Street Canal Bridge. This study, however, will refer to the river crossing by its historic name, the West Division Street Bridge.

[4] City of Chicago, Bureau of Engineering, Plans for Division Street Bridge over North Branch Chicago River, 1902, 18 sheets, Drawing Nos. 6174-6191, in CTD Plan Archives. For descriptions of the original construction, see "The Division Street Bascule Bridge, Chicago," *Engineering Record* 50 (20 August 1904):215-218; George F. Samuel, "New Bridge Construction," *Mayor's Annual Message and the Twenty-Ninth Annual Report of the Department of Public Works . . . 1904* (Chicago: Allied Printing, n.d.), 174; Donald N. Becker, "Development of the Chicago Type Bascule Bridge," *American Society of Civil Engineers Transactions* (February 1943):276.

employed, by Chicago municipal engineers for the city's numerous highway crossings of the Chicago River.[5] As exemplified by the West Division Street Bridge, a Chicago Type Bascule exhibited the following basic characteristics: two counterbalanced, truss-supported leaves rotating on fixed, horizontal, steel trunnions, or axles; counterweights rigidly attached to the rear of the trusses beneath the bridge's deck, or roadway level; and electric-powered operating machinery that opened and closed the leaves by means of a pinion-activated rack incorporated into the rear of each truss.

Measuring about 260 feet in length from abutment to abutment, the West Division Street Bridge consisted of two symmetrical halves, each containing a fixed, steel-girder approach section and a movable leaf supported by three riveted, 115-foot-long, steel trusses spaced on 21-foot centers. The seven-panel trusses were modified versions of a Pratt truss, the most common form of highway bridge built in the United States during the early twentieth century. The West Division Street trusses differed from the standard highway Pratt in the configuration of their tail ends. Instead of displaying inclined end posts at the shore portals, the tail ends of the trusses arced upward from the roadway in a bold curve. To supply rigidity to these tall rear members, the trusses' portals incorporated deep overhead lateral bracing. The remaining forward panels gradually decreased in depth, so that additional overhead bracing was unnecessary. The West Division Street Bridge, therefore, resembled an overhead truss near the shore and a pony truss over the waterway.

The approach section at each end of the bridge was 60 feet in width and carried a roadway of wood paving blocks resting on a concrete slab supported by steel buckle plates between steel floor beams. The approach sidewalks were concrete, with lattice-work iron railings overlooking the river. The overall width of each movable leaf was also 60 feet, although the wood deck within its trusses was only 42-feet wide. The balance was made up by two nine-foot-wide metal brackets cantilevered from the bottom chords of the outside trusses. The brackets carried eight-foot-wide plank sidewalks, each flanking an 18-foot-wide roadway separated by the center truss. Each roadway carried streetcar tracks.

The substructure of each leaf was divided into two basic components: a solid six-foot-long abutment set back from the shore and a hollow 48-foot-long pier extending into the waterway. Both were stone-capped concrete resting on wood piling. While steel tie rods reinforced the abutment, tie rods and built-up steel beams strengthened the pier, which supported the entire weight of the movable leaf. The leaf was counterbalanced by a concrete and cast-iron counterweight enclosed in a riveted, steel-plate box rigidly attached to the three trusses at the tail end of their bottom chords. The counterweight arrangement placed the movable leaf's center of gravity near the center of the arc formed by the trusses' curved rear members. At the center of gravity, the bottom chords of each truss were rigidly connected to a transverse, 16-inch-diameter, cast-steel trunnion, designed to serve as a rotating axle for lifting and lowering the movable leaf. As measured over the waterway, from leaf-to-leaf, the trunnions stood 173 feet apart. Bearings

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[5] See, for example, C.B. McCullough and Phil A. Franklin, "Bascule Bridges," *Movable and Long-Span Steel Bridges*, ed. George A. Hool and W.S. Kinne (New York: McGraw-Hill Book Company, 1923), vol. I, 20.

enclosed each end of the trunnions, and these fixtures rested on 34-foot-long, steel box girders that spanned the hollow portion of the pier. Tapering at the rear so as to pass over the counterweight box, the trunnion girders also carried built-up steel columns supporting, by means of transverse steel girders, the front part of the bridge's fixed approach section. The approach section joined the movable-leaf roadway on the water side of the trunnions. The location of this joint was one of the bridge's significant design features. It ensured that highway traffic entered the movable leaf in front of the center of the gravity, so that there was no danger of the live load opening the leaf.

Since the movable leaves were counterbalanced, relatively little power was required to open and close the bridge. For each leaf, the motive force took the form of two 37-horsepower, direct-current motors mounted, along with the rest of the lifting machinery, on an inclined steel platform located beneath the approach roadway between the abutment and pier.[6] Each motor independently engaged the main drive shaft by means of open gearing. The drive shaft carried three pinions, each designed to engage an open cast-steel rack bolted to the curved tail end of one of the movable-leaf trusses. To open the leaf, the drive chain powered the racks downward causing the trusses to rotate on their trunnions, thereby lifting the front of the leaf away from the waterway. As the tail ends of the trusses descended, they carried the counterweight downward into the hollow section of the pier. In fully open position, the bridge provided a clear channel of 133'-0". Closing the leaf was simply a matter of reversing the motors.

To cushion the leaf's movement at the two ends of travel, the tail end of each truss was provided with a pair of piston-like pneumatic buffers, one mounted on the underside of the fixed approach section and the other positioned below on the pier. The upper buffer was activated by a metal bumper located on the upper part of the truss, just above the curved rack. As the tail end of the truss descended into the substructure during the leaf's opening cycle, the bumper eventually pressed against a cam attached to the upper buffer's piston. This action forced the piston into its chamber, creating compressed-air resistance that gently brought the movement of the piston, cam, and truss to a halt. Similarly, the lower buffer retarded the movement of the leaf during the closing cycle. In its case, as the tail end of the truss moved upward, a lug attached to the counterweight engaged a pin-and-eyebar linkage that was an extension of the lower buffer's piston. As in the upper buffer, the piston compressed the air in its chamber, and the ensuing resistance arrested the leaf's motion. The action of the upper buffer's piston was assisted by a spring device, while the lower buffer's piston was partly governed by a manually operated check valve that controlled the compression level of the piston chamber. Additional equipment for the bridge's operation included drive-train emergency breaks and electric-powered, bolt-type center locks, which tied together the truss ends of the two movable leafs in order to ensure rigidity of the bascule span under live load. The operating equipment on each leaf had its own electric-powered control center, sheltered in a wood-framed, gable-roofed operator's house standing adjacent to the fixed approach section on a steel frame supported directly by the substructure.

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[6] The machinery area between the abutment and pier is currently enclosed by siding. Although the design drawings are silent on the matter, the original construction, in the interest of public safety, probably contained a similar feature.

The west-leaf house stood on the north side of the bridge; the east-leaf house on the south side.

The West Division Street Bascule Bridge survived for over half a century without experiencing major structural modifications. Most repairs involved machinery renewal or deck replacement, as, for example, in the late 1930s, when new center locks were installed, or in the mid-1950s, when the plank roadway of the movable leaves gave way to open steel grids.[7] More noticeable was the replacement, in the late 1960s, of the original operator's houses with Modernist structures displaying flat roofs, overhanging eaves, and vertical wood siding.[8] During the early 1980s, the Department of Public Works considered replacing the West Division Street Bridge with a new double-leaf bascule.[9] Plans were prepared for this project, but construction was never funded. Instead, the West Division Street Bridge was almost completely rebuilt with new structural steel. Completed in 1993, this rehabilitation preserved the span's general appearance, although the new truss webs differed somewhat from the originals in their detailing, employing, for example, bolted instead of riveted connections.[10] The bridge's rebuilding also marked its demise as an operating movable bascule. Technically, the trunnions, racks, and drive trains remained functional, but the upper buffers were removed, the lower buffers locked in place, the movable leaves welded together, and the operator's houses cleared of control equipment.

**History**

In the late nineteenth century, the City of Chicago followed a pay-as-you-go policy for municipal improvements. One result was a chronic shortage of funds for public works, especially in the area of bridge maintenance.[11] The severity of the problem became apparent in the summer of 1898, when the Chicago Department of Public Works completed a systematic inspection of municipal highway spans. As City Engineer John E. Ericson informed the City Council in September of that year, the inspection revealed "a condition that is simply

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[7] Bureau of Engineering, Division of Bridges, "Division Street River Bridge Center Lock, General Plan and Details," 1937, Drawing No. 14952; Bureau of Engineering, Division of Bridges and Viaducts, "Division S. Bridge (River) Redecking Plan and Detail," 1954, Drawing No. 18275, in CDT Plan Archives.

[8] See photos dated 13 February, 11 July, and 20 July, in Box 223757, Chicago Department of Transportation, Storage Archives, Chicago, Illinois.

[9] See Drawing Nos. 38921-39017, 1982, in CDT Plan Archives.

[10] See Drawing Nos. 58001-58083, in CDT Plan Archives. Photos of the project, dated 1992-1993, are in Box 223757, CDT Storage Archives.

[11] City of Chicago, City Council, Proceedings, 14 October 1899, 1336, in Public Documents Division, Harold Washington Municipal Library, Chicago; *Mayor's Annual Message and Twenty-Third Annual Report of the Department of Public Works . . . 1898* (Chicago: Pettibone and Co., 1899), 46-47. Hereafter, the yearly statements of the Department of Public Works will be cited as *DPW Annual Report*, with the appropriate year.

deplorable." Remedial action was essential: "Some of the structures are veritable relics . . . and will shortly become a menace to public safety unless attended to without delay."[12]

Money, however, was not immediately forthcoming for bridge repairs, and Ericson began shutting down unsafe spans. By the fall of 1899, highway crossings had been closed at Ninety-Fifth Street (Calumet River), Clybourn Place (North Branch of the Chicago River), Weed Street (North Branch Canal), and East Division Street (North Branch Canal). Further closures, Ericson warned, could soon be expected over the river's north branch at North Avenue and at West Division Street. The condition report for both these swing bridges was the same: "Wooden member is rapidly rotting away, iron work badly rusted and center pier shaky and rotten."[13]

In April 1900, the City Council appropriated $850,000 to begin work on replacing eight unsafe highway spans, including the West Division Street Bridge. But municipal revenues fell short of budget projections, as did receipts in the following year as well. Because of the revenue shortage, the city during 1900-1901 placed only three new bridges under construction, at Ninety-Fifth Street, Clybourn Place, and East Division Street.[14] Planning, however, proceeded for the replacement of the West Division Street Bridge and other spans. The city's bridge division, in fact, had been in a planning mode for several years. During the 1890s, the Department of Public Works had experimented with several types of movable bridges in an attempt to find a substitute for the common center-pier swing span, which had become a navigational hazard on Chicago's narrow waterways for the ever-larger vessels of the late nineteenth century. The city's first alternative to the swing span was a folding-leaf "jackknife" bridge, constructed over the North Branch Canal at Weed Street in 1891. This was followed by two other movable-bridge designs, both constructed over the South Branch of the Chicago River, a vertical-leaf span at South Halsted Street in 1894, and a rolling-lift span at West Van Buren Street in 1895.[15] All three of these bridges employed newly patented designs that required the city to pay royalties for their use. Despite this expense, none of the designs was free from structural or mechanical defects, a situation that seems to have particularly irked Ericson, a Swedish-born-and-trained engineer who had considerable experience in designing water-related structures. In 1897, Ericson became head of municipal engineering in Chicago, and, by his own account, he "very soon after recommended that the city take up the question of investigating movable bridges for the purpose of designing their own bridges." To assist with the study, Ericson called on Thomas G. Pihlfeldt (1858-1941), a Norwegian immigrant with German engineering training who had been with the city's bridge

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[12] City Council, Proceedings, 12 September 1898, 587.

[13] City Council, Proceedings, 18 September 1898, 1060, 14 October 1898, 1336.

[14] For the 1900 and 1901 bridge appropriations, see City Council, Proceedings, 4 April 1900, 11 March 1901. The municipal revenue shortage is discussed by Mayor Carter H. Harrison in City Council, Proceedings, 7 April 1902.

[15] Thomas G. Pihlfeldt, "Designing," *DPW Annual Report, 1900*, 87-88.

division since 1894.[16]

According to Pihlfeldt, Ericson wanted "a critical analysis of the literature on movable bridges built in the United States and Europe, with the view of selecting a type of bridge suitable to the requirements of the Chicago river and its branches." By 1899, Ericson and Pihlfeldt had decided that the best model for the city could be found in the Tower Bridge of London, England. Completed in 1894, this structure was a counterweighted, double-leaf, fixed-trunnion bascule with below-deck operating machinery.[17] The counterbalanced-lever principal of the Tower Bridge was appealing for three main reasons. First, it relied on relatively simple operating machinery that was fairly easy to manufacture and install. Second, it was patent-free, so that its use entailed no royalty payments. Third, it dictated a bridge with a fixed center of gravity, reducing the possibility that the action of the movable span might rock the bridge's substructure. This last consideration was especially important in an area such as Chicago, where unyielding foundations were extremely difficult to achieve. Again according to Pihlfeldt, "This type was discussed in detail and three complete designs were made, differing in appearance, method of mounting, etc., but all involving the main feature, that of revolving on a fixed trunnion."[18]

To test its new designs on the open market, the city made them available for public inspection and announced a competition to design and build the Ninety-Fifth Street Bridge and the East Division Street Bridge. The specifications called for "a movable structure without center pier," but left the choice of bridge type up to the contractor.[19] Bids for the Ninety-Fifth Street Bridge and the Division Street Bridge were opened within two weeks of each other, on 15 May and 1 June 1900, respectively. The Chicago firm of Roemheld and Gallery was the low bidder in both cases and secured both contracts. The competition results seemed to vindicate the municipal engineers' efforts, as Roemheld and Gallery had based their winning bids on one of the city's designs.[20] For additional insurance, Ericson in the summer of 1900 requested the

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[16] "Testimony of John Ericson," *The Scherzer Rolling Lift Bridge Company vs. City of Chicago and Great Lakes and Dock Company*, 63, U.S. Court of Appeals, Seventh Circuit, Records and Briefs, October 1924, Case No. 3606, in Record Group 276, National Archives, Chicago. For Ericson's biography, see John W. Leonard, ed., *The Book of Chicagoans* (Chicago: A.N. Marquis and Company, 1905), 191; *Prominent Citizens and Industries of Chicago* (Chicago: W.P. Dunn Co. for German Press Club of Chicago, 1901), 115-116. On Pihlfeldt, see Kenneth Bjork, *Saga in Steel and Concrete: Norwegian Engineers in America* (Northfield, MN: Norwegian-American Historical Association, 1947), 121; "Pihlfeldt Dies at 82," *Chicago Daily News*, 23 January 1941, 14.

[17] "Testimony of Thomas G. Pihlfeldt," *Scherzer vs. Chicago*, 93. Pihlfeldt identified the Tower Bridge as the model in Dan Fogle, "Modest Man is Pihlfeldt," *Chicago Daily New*, 15 October 1936, 21. For a description of the Tower Bridge, see Ottis Ellis Hovey, *Movable Bridges* (New York: John Wiley and Sons, 1926), vol 1, 83-88.

[18] Pihlfeldt, "Designing," *DPW Annual Report, 1900*, 88.

[19] Pihlfeldt, "Designing," *DPW Annual Report*, 1900, 90.

[20] Pihlfeldt, "Designing," *DPW Annual Report, 1900*, 91. The fact that Roemheld and Gallery selected the city's design is perhaps not surprising; partner Jules E. Roemheld (1865-1947), a graduate in civil engineering of Rensselaer Polytechnic Institute, had served as chief engineer of the city's bridge division from 1896 to 1898.

Commissioner of Public Works to submit the new designs to a review panel of independent engineers. In their final report, published in part in *Engineering Record*, the consultants approved the city's overall fixed-trunnion concept, but suggested certain structural modifications. The recommendations included: (1) lowering the bridge's abutments so that their bases would be at the same level as that of the river pier; (2) reinforcing the substructure concrete with a steel framework; and (3) laterally connecting the tail ends of the three movable-leaf trusses for the sake of rigidity and excavating a single tail pit to receive them during the bridge's opening cycle.[21] The first, and possibly the second, of these recommendations, was incorporated into the designs of the Ninety-Five Street and East Division Street bridges, but the third recommendation was held in abeyance, presumably because of cost considerations. Its adoption would have necessitated a complete reworking of the contractor's substructure designs, which had already been approved by the city for construction. Accordingly, the Ninety-Fifth Street Bridge and the East Division Street Bridge, both under construction from 1900 to 1903, were completed as originally planned, with separate counterweights and tailpits for each movable-leaf truss.[22]

All three of the consultant's recommendations, however, were included in the city's next movable-bridge project, the Clybourn Street (later renamed Cortland Street) bascule, which opened to traffic in 1902. Its design was attributed by the national engineering press to City Engineer John Ericson and City Bridge Engineer Edward Wilmann, both of whom signed the original drawings.[23] After Clybourn Street entered construction, Ericson reorganized the city's bridge division, perhaps in recognition of services rendered in the development of the bascule bridge program. In early 1901, Pihlfeldt, previously an "assistant engineer" to Wilmann, was promoted to the newly created position of "Structural Iron Designer in Charge," and in that capacity, he designed the West Division Street Bridge, using the Clybourn Street design as a prototype.[24] In March 1902, the city awarded a low-bid contract for building the substructure of

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After leaving the municipal payroll, Roemheld went into the contracting business with John J. Gallery, about whom little is known. The two men stayed together until 1907, when Roemheld organized his own firm, Roemheld Construction Company. In 1914, this enterprise was absorbed by Great Lakes Dredge and Dock Company. Roemheld remained with the amalgamated firm until his retirement in 1939. His obituary credits him with serving as a "consultant in the construction of the Golden Gate bridge in California." See John William Leonard, *Who's Who in Engineering, 1922-1923* (New York: John W. Leonard Corporation, 1922), 1073; "[Obituary of] of Jules Eugene Roemheld," *Chicago Tribune*, 18 February 1947, 25.

[21] "The Chicago Type of Bascule Bridge," *Engineering Record* 42 (21 July 1900):50-52.

[22] See Jeffrey A. Hess, "East Division Street Bridge," HAER No. IL-147, 1999, in HABS/HAER Collection, Library of Congress, Washington, D.C.

[23] "Bascule Bridge over the Chicago River at Clybourn Place, Chicago," *Engineering Record* 45 (31 January 1901):76; Drawings No. 8351-8374, 1900, in CTD Plan Archives. Also see photographs included in "Chicago River Bascule Bridge, West Cortland Street," HAER No. IL-138, 1987.

[24] Compare Pihlfeldt's job titles in *DPW Annual Report, 1900* (87) and *DPW Annual Report, 1901* (101). In July 1901, Pihlfeldt took over Wilmann's position as chief bridge engineer; see *Who's Who in Chicago* (1936),

the West Division Street Bridge to the FitzSimons and Connell Company of Chicago. This firm had performed the same task on the Clybourn Street Bridge. In October of the same year, the superstructure contract went to low bidders Roemheld and Gallery, who held the construction contracts for the East Division Street and Ninety-Fifth Street bridges. Substructure work commenced in May 1902, and by the end of the year "all of the piers and tailpits were practically completed."[25] Roemheld and Gallery began erecting the superstructure in August 1903. Making good progress, they placed "the structural steel in the three trusses and floor on both sides of the river" before the end of the year. The West Division Street Bridge opened to traffic in June 1904. Compared to the East Division Street and Ninety-Fifth Street projects, which experienced cost overruns of over 40 percent, the West Division Street Bridge was a model of municipal planning. Its total construction cost of $256,320 was only six percent over the city's original estimate.[26]

Ericson and his colleagues in the city's bridge division had developed their fixed-trunnion bascule design to keep the Chicago River navigable for commercial and industrial traffic. However, Chicago's shipping patterns changed significantly, as the largest carriers increasingly bypassed the Chicago River's entrance on Lake Michigan near the downtown district in order to serve new manufacturing plants located near a deeper harbor at the mouth of the Calumet River in south Chicago. By the mid-1920s, Chicago River shipping tonnage had fallen off to such an extent that the Department of Public Works even suggested the adoption of "a fixed bridge policy" that "could be established beginning 1925, by converting or replacing the 41 existing [movable] bridges, starting in the outlying districts and gradually approaching the river mouth within ten years."[27] If such a policy were to be implemented, the city engineers projected an annual savings of almost $3 million, as movable bridges were much more expensive than fixed bridges to maintain and rebuild. At least partly because of opposition by the Army Corps of Engineers, which held to the belief that the Chicago River should be maintained as a navigable waterway, the city's movable bridges remained in operation.

Chicago's movable bridges proved to be a national asset during World War II, when commercial shipping on the Chicago River markedly increased. But the upsurge in traffic was a wartime anomaly rather than a revitalization. In the post-war period, shipping once again declined, and bridge openings increasingly served the needs of pleasure craft. In 1971, the city

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[25] *DPW Annual Report, 1900*, 100; *DPW Annual Report, 1902*, 135.

[26] *DPW Annual Report, 1903*, 110; *DPW Annual Report, 1904*, 174; "[Cost of] West Division Street Bridge," Drawing No. 6196, n.d., in CDT Plan Archives.

[27] City of Chicago, Department of Public Works, Bureau of Engineering, Division of Bridges, "Preliminary Report on Movable Bridges vs. Fixed Bridges," 16 April 1923, 1-2, in Government Documents Division, Harold Washington Municipal Library. The shift in shipping patterns can be traced in the comparative tonnage statistics for the Chicago River and Calumet Harbor that were presented each year by the Department of Public Works in its annual reports.

administration under Mayor Richard B. Daley once again called for closing many of the river spans, especially on the northern parts of the waterway. As the mayor's office reported, "The bridges are seldom lifted and permanent closing would mean a considerable saving on upkeep of the costly lift machinery. Practically all the river traffic, including barges and tugs, have clearance to pass under the bridges without elevating them."[28] The Army Corps of Engineers eventually agreed, and by the 1990s, all of the North Branch and North Branch Canal bascules, including the West Division Street Bridge, were functioning as fixed highway spans.

[28] "Plan to End Operation of 6 Lift Bridges," *Chicago Sun-Times*, 16 November 1971.

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