HISTORIC ILLINOIS ENGINEERING RECORD

95TH STREET BRIDGE

HIER No. CK-2017-37

Location: Spans Calumet River at 95th Street, Chicago, Cook County, Illinois

USGS Quadrangle: Lake Calumet Quadrangle, Illinois – Cook County
7.5 Minute Series

Present Owner: City of Chicago

Present Use: Vehicular Bridge

Significance: The 95th Street Bridge was built 1953-58 over the Calumet River and replaced a 1903 "first-generation" trunnion bascule bridge that featured tall through trusses braced over the roadway. The use of considerably lower pony trusses on the current bridge followed long-established models for bridges established decades earlier by Edward Bennett and the Chicago Plan Commission. The design of the 95th Street Bridge harmonized with the earlier Ewing Avenue, 100th Street, and 106th Street Bridges, all of which are located in a heavy industrial area on Chicago's far southeast side. Such bridges were intended to enhance civic beauty while playing a pivotal role in facilitating traffic circulation. However, the 95th Street Bridge is considered a "fourth generation" trunnion bascule design due to its greater technological sophistication, such as automated control from a single bridge house, as well as its simpler detailing as seen in its railings that are primarily functional, rather than ornamental. Especially significant is the bridge house exhibiting the influence of International style modernism, due to its cubic form, banded windows, and flat roof, although here the smooth limestone walls are detailed with stripped-down pilasters.

PART I. HISTORICAL INFORMATION

A. Physical History

1. Dates of construction: 1953-58 (opened June 27, 1958)

2. Designers: City of Chicago bridge engineers Stephen J. Michuda, M.D. Krausman, and Jerome R. Butler

3. Original and subsequent owners: City of Chicago

4. Builders: Overland Construction Company (superstructure); Kenny Construction Co. (substructure)

5. Original plans and construction: The 95th Street Bridge over the Calumet River was built as a double-leaf counter-balanced trunnion bascule span. Each leaf of the steel superstructure had two rivet-connected steel pony trusses. The bridge had a span of 203 feet from face to face of piers. Its 62-foot width open steel grid roadway was flanked by two concrete-filled steel grid sidewalks. The span had s 21 foot vertical clearance above the water.[1] The movable portion of the bridge had metal hand rails with plain, horizontal railings.

   The bridge was designed to rotate around fixed trunnions located at the center of gravity of the movable span or leaf. Each leaf was mounted on two trunnions and operated by electric motors. The gearing for each leaf consisted of a rack and pinion system, driven by two separate driven train and direct current motor units. To accommodate operating machinery maintenance or failures, either motor unit was capable of raising the leaf individually. The electric motors engaged a gear pinion, forcing the bridge drive rack downward. The entire weight of each leaf concentrated on two trunnion bearings as it opened and the supports allowed space for the path of the large counterweight rigidly fixed to the rear end of the truss. As the counterweight on the land side of the axis dropped downward into a pit, the leaf rotated around the trunnion pins, while the forward part of the leaf opened upward over the channel.

   The 95th Street Bridge featured one operator's house, which was located on the northeast side of the structure. From here, the bridge tender controlled the electric motors, center-lock mechanism, and the mechanical motor brakes and machinery brakes that slowed the speed of the movable leave as they reached the fully open or fully closed position. The steel-framed operator's house exhibited the influence of International style modernism, due to its cubic form, banded windows, and flat slab roof, although here the smooth limestone walls are detailed with stripped-down pilasters.

6. Alterations and additions: Deteriorated grating and panels were replaced in 2006 and the webs were repaired.

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[1] Chicago Department of Transportation, Bureau of Bridges and Transit, "95th Street Bridge Protection Systems – General Plan and Elevation," October 1998.

B. Historical Context

Chicago's Early Movable Bridges

Chicago's first movable bridge was built in 1834 over the main branch of the Chicago River at Dearborn Street. This wooden drawbridge was operated by chains and provided a sixty-foot opening for the passage of vessels. In 1840, a pontoon swing bridge was erected at Clark Street. This early bridge type had a movable span that rested on a pontoon in the water and then swung to one side to provide passage. During the 1840s, variations of the pontoon bridge were erected at Wells, Randolph, and Kinzie Streets. All of these early bridges were destroyed during devastating winter floods that swept Chicago in 1849.[2]

Chicago's first iron swing bridge was built at Rush Street in 1856, marking the start of a new era in bridge construction in the city.[3] The swing bridge quickly became Chicago's predominant type of movable bridge during the second half of the nineteenth-century. This type of bridge was supported on a permanent pier located in the center of the waterway. When open, the structure rotated horizontally around the center pier and was aligned parallel to the river banks, creating a channel on each side of the pier for passage.

Although swing bridges represented an advance over earlier ferries and pontoon bridges, they were far from ideal—especially when the Chicago River was used more extensively for shipping. Chicago's waterways were increasingly plied with ever-larger lake vessels that were unable to pass the swing bridges' obstructionist mid-channel piers, and collisions between boats and bridges were commonplace. Even after the bridges changed from hand to steam power operation, they were slow to operate. Moreover, since swing bridges offered minimal barriers to approaching vehicles other than roadway gates, horse-drawn teams were in danger of falling into the water whenever they opened.

The City of Chicago experimented with a variety of movable bridge types during the 1890s in a quest to find alternatives to the swing bridge. The first attempt was made in 1891 with construction of the so-called "jack-knife" or folding bridge at Weed Street, which was a movable bridge without center pier.[4] Each leaf of the bridge was hinged at two places and in the raised position, the hinged leaves folded against the supporting towers on each bank. A second jack-knife bridge was installed at Canal Street in 1893. However, the jack-knife design was never widely used and eventually abandoned since the numerous joints required for its operation necessitated frequent and expensive maintenance.

In 1894, another type of movable bridge—the vertical-lift—was built over the South Branch of the Chicago River at Halsted Street and designed by Kansas City-based engineer John Alexander Low (J.A.L.) Waddell. Operated on the same theory as an

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2 Chicago Department of Public Works Annual Report, 1901: 86.

3 Ibid: 87.

4 DPW Annual Report, 1891: 162. The jack-knife bridge design used at Weed and Canal Streets was patented by a Captain Harmon.

elevator, the bridge had a 130-foot-long steel truss span weighing 280 tons, which was lifted vertically between two towers that rose 155 feet above the river level.[5] It was operated by steam hoisting machinery located on top of the lift span at its center. However, its $237,000 cost was enormous in comparison to other bridges and it required constant repairs. As a result, the vertical-lift, like the jack-knife design, was never a popular bridge design in Chicago and only one other such bridge was constructed along the Chicago River.[6]

Chicago was at the cutting edge of bascule bridge technology during the 1890s, as engineers experimented with and patented a number of different types. Bascule bridges operated on the same principal as medieval drawbridges. The modern bascule bridge is constructed of steel, machine-driven, and defined by a movable span, or leaf, balanced by a counterweight on the other side of the axis. The axis can be stationary, where the leaf rotates about a fixed trunnion (trunnion bascule), or moving, where the leaf rocks or rolls along a track (rolling-lift bascule).

Bascule bridges represented a great improvement over swing bridges. They were rapidly operated, allowed for a clear channel of navigation, and could be built close together since they swung vertically rather than horizontally. Bascule spans were also safer than swing bridges since the open leaf served as its own barrier to approaching vehicles. Bridges of this type may be either single-leaf, where the entire leaf over the waterway is raised on one side of the waterway, or double-leaf, where leaves on either side of the waterway are raised simultaneously.

Chicago's first bascule bridge was a Scherzer rolling-lift design, built near Van Buren Street in 1895 for the Metropolitan Elevated Railroad. Invented by William Scherzer, this type of bridge was raised by gears that engaged a drive rack at the rear of the span, forcing this section downward. As the forward end rose, the span rolled back (similar to the runners on a rocking chair) on a tread plate instead of rotating around a fixed axis. The Scherzer Rolling Lift Bridge Company—located in Chicago's Monadnock Building—designed thirteen vehicular bridges for the City of Chicago between 1895 and 1907 as well as several railroad bridges. The City paid an average of $18,000 to purchase the design and plans for each of these structures, which added a considerable sum to the total cost.[7] Another major objection to the Scherzer rolling-lift bridge design was that its

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5 "The Halsted St. Lift Bridge over the Chicago River." *Engineering News* (19 April 1894) 320-321.

6 The vertical lift proved considerably more popular for railroad use, especially after Waddell and his new partner, John L. Harrington, brought the design to maturity with a series of refinements after 1907. The South Halsted Street vertical lift bridge was replaced by the current bridge at this location in 1932-24. The vertical lift bridge built by the Pennsylvania Railroad in 1914 along the South Branch of the Chicago River near 18th Street is extant.

7 The 1908 DPW Annual Report includes a table listing all Chicago bridges, along with the cost paid for royalties (if any) and the total cost of each structure. Other Scherzer bascule bridges were erected at Van Buren Street (1895), North Halsted Street (River, 1897), Taylor Street (1900), and Cermak Road (1906). Today there are only two extant Scherzer rolling-lift bridges in Chicago: the Cermak Road Bridge a railroad bridge built for the Pennsylvania Lines over the Sanitary and Ship Canal (1901; expanded 1909-10).

rolling mechanisms necessitated massive foundations that not only lessened the width of the river channel but also proved incompatible to some river banks.[8]

Despite the introduction of three new movable bridge types—the jack-knife, Waddell vertical-lift, and Scherzer rolling-lift—as of 1895, all but five of Chicago's 50 movable bridges were still swing bridges.[9] Although some of these swing bridges were operated by steam, the majority relied upon hand power. In 1897, the U.S. Army Corps of Engineers conducted a survey of the Chicago River, which illustrated how swing bridges served as obstacles to navigation and prevented the latest 432-foot vessels from continuing along the waterway.[10] The survey's findings were presented to the Western Society of Engineers in June 1898 by G.A.M. Liljencrantz, District Engineer of the Army Corps of Engineers' Chicago District, an arm of the U.S. War Department that had recently become the powerful federal ally of industries shipping on the Chicago River. In Liljencrantz's report, "Obstructive Bridges and Docks in the Chicago River," he strongly argued against the further construction of swing bridges with mid-channel piers.[11]

Toward the end of the nineteenth-century, declining water-borne trade highlighted the Chicago River's problems. In 1900, the City's Bridge Commissioner reported that, "There has been a decrease in the number of vessels entering the Chicago River during the year of 6.5 per cent as compared with the year 1899, and of 17.3 per cent as compared with the year 1898. The cause of this falling off in navigation is no doubt to be found in the fact that the large boats that rapidly take the place of older ones cannot successfully navigate the river owing to the obstructions met with transportation tunnels and center-pier bridges."[12]

This situation finally forced government officials, industries, and navigation interests, such as the Lake Carriers Association, to demand the removal of swing bridges from the narrow, winding Chicago River. The River and Harbor Act of 1899 gave the Secretary of War authority to order bridges removed, and imposed his approval as a necessary step in constructing bridges over navigable waterways. The stage was set for the Army Corps to clear swing bridges from the river. When presented with petitions from navigation interests concerning the removal of obstructions along the waterway, the Army Corps held public hearings, which typically resulted in the Secretary of War's order that a bridge be removed.

<u>"First Generation" Chicago-type Trunnion Bascule Bridge Design: 1900-10</u>

Faced with the need to replace the vast majority of its swing bridges in the coming years, Chicago's bridge engineers decided to develop their own bascule bridge design. The

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8 Thomas G. Pihlfeldt, Assistant Engineer for the City of Chicago, voiced this objection in the 1895 *DPW Annual Report*, p. 88.

9 DPW Annual Report, 1895: 48.

10 G.A.M. Liljencrantz, "Obstructive Bridges and Docks in the Chicago River*," Journal of the Western Society of Engineers* (June 1898) 3.

11 Liljencrantz, 27.

12 DPW Annual Report, 1900: 34.

decision was attractive as it allowed the City to avoid royalty payments on patented designs, as noted by the City's Bridge Commissioner in 1900: "The most important work done in this Division is the development and preparation of plans for bascule bridges of a new design. By this action the city is saved large sums of money which otherwise would have to be paid for royalties on patented bridges, and I am safe in saying that the city will have better and cheaper bridges."[13] The predominant patented design used by the City for vehicular bridges at that time was the Scherzer rolling-lift, with thirteen erected between 1895 and 1907.

In 1899, the City's Bridge Division undertook an extensive study of the most advanced movable bridge designs in the United States and Europe to determine which type was most suitable to the conditions of the Chicago River and its branches. Under the leadership of City Engineer John Ernst Ericson, a distinguished civil engineer, four classes of movable bridges were studied: swing bridges, vertical-lift, rolling-lift, and trunnion bascule. [14] After an extended investigation, the trunnion bascule type was selected as the one that could most fully meet Chicago requirements, both from a practical and an economical point of view. Ericson, together with Assistant City Engineer Thomas G. Pihlfeldt and their colleagues in the Bridge Division, then developed three complete bascule bridge designs, differing in appearance, method of mounting, etc., but all involving the main feature—that of revolving on a fixed trunnion.[15]

These designs were submitted to an independent Board of Consulting Engineers, which was appointed by the Commissioner of Public Works and consisted of three well-known engineers: E.L. Cooley, Ralph Modjeski and Byron B. Carter. The Board selected and recommended the design designated as No. 3, with some modifications, which were subsequently carried out.[16]

The *Annual Report of the Department of Public Works* for 1900, which includes a detailed account of the process involved in developing the new Chicago-type trunnion bascule bridge, does not identify its designers by name. However, an article in the July

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[13] Ibid.

[14] John Ernst Ericson (1858-1927), a native of Sweden, graduated from the Royal Polytechnic Institute in Stockholm in 1880 and immigrated to the United States the following year. He worked as a draftsman for the City of Chicago from 1884-86 and assistant engineer of the Sanitary District of Chicago for two years. In 1893 he was appointed Assistant City Engineer of Chicago, and in 1897 he was promoted to the post of City Engineer, a position he retained until at least 1913. During his employment with the City of Chicago, Ericson supervised the construction of many important public works projects, including those for water tunnels, water cribs, and pumping stations. Biographical information on Ericson taken from the following sources: Clark J. Herringshaw, *Clark J. Herringshaw's City Blue Book of Current Biography: Chicago men of 1913* (Chicago: American Publishers Association, 1913); *Notable Men of Chicago and Their City* (Chicago: Chicago Daily Journal, 1910) 119; and *Prominent Democrats of Illinois* (Chicago: Democrat Publishing Company, 1899) 172-73.

[15] Thomas G. Pihlfeldt (1858-1941) was a Norwegian immigrant with German engineering training who had been with the City of Chicago's bridge division since 1894. For information on Philfeldt see: Kenneth Bjork. *Saga in Steel and Concrete: Norwegian Engineers in America* (Northfield, Minnesota: Norwegian-American Historical Association, 1947), 121; "Pihlfeldt Dies at 82," *Chicago Daily News* (January 23, 1941).

[16] DPW Annual Report, 1900: 88. The final report of the Board of Consulting Engineers was published in: "The Chicago Type of Bascule Bridge," *Engineering Record* 42 (July 21, 1900) 50-52.

21, 1900 issue of *Engineering Record* noted that City Engineer John Ericson credited Edward Wilmann, City Bridge Engineer, along with Karl Lehman, Alexander von Babo and Thomas Pihlfeldt, Assistant City Engineer, for providing valuable assistance in developing the three initial designs. An article on the Chicago-type bascule bridge published in the July 28, 1900 issue of *Engineering Record* stated that, "The plans were prepared by Mr. John Ericson, city engineer,…"[17]

The Chicago type bascule bridge, as developed by City engineers from 1899 to 1900, rotated around a fixed trunnion located at the design center of gravity of the movable span or leaf. Bridges could have one or two leaves. In opening, the bridge rotated about this shaft and raised its leaves to a nearly vertical position, giving a completely clear and unobstructed passage for river vessels. Such a bridge was raised or lowered by the operation of curved racks attached to the tail ends of each truss arching above the roadway. The pinions that engaged the racks were operated by an electric motor and machinery, generally located below the roadway and controlled by an operator located in a small house near the river bank. This gearing action was aided by massive fixed counterweights at the rear of the bridge that descend into watertight pits along the river bank. When the bridge was open or opening, the trunnions in each leaf supported the entire dead weight of the structure.[18]

The selected trunnion bascule design No. 3 became the model for nearly every subsequent movable bridge constructed in Chicago. The trunnion bascule had many advantages. Its fixed center of gravity required less massive foundations than the Scherzer rolling-lift, it had a minimum of moving parts, and because its leaves were almost perfectly balanced, and the bridge could be opened and closed quickly. The trunnion style also featured a locking mechanism to prevent tipping upward when in the closed position.

A total of eight "first generation" trunnion bascule bridges were built in Chicago between 1902 and 1909 according to the design developed by City Engineers. They included the bridges at Cortland Street (formerly Clybourn Place; North Branch), 1902; East Division Street (North Branch Canal), 1903; Ninety-Fifth Street (Calumet River), 1903; West Division Street (North Branch), 1904; North Western Avenue (North Branch), 1904; Archer Avenue (South Branch), 1906; North Avenue (North Branch), 1907; North Halsted Street (North Branch), 1908; and Kinzie Street (North Branch), 1909.[19] All of these bridges had tall through-trusses braced over the roadway as well as modest, wood frame operator houses. The construction of the earliest of these "first generation" bridges

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17 "The Chicago Type of Bascule Bridge," *Engineering Record* (July 21, 1900); "The Lift or Bascule Type of Movable Bridges." *Engineering Record* (July 28, 1900) 73.

18 A detailed description of the City's Design No. 3 for a trunnion bascule bridge is included in the *DPW Annual Report* for 1900: 88-89.

19 The Archer Avenue and Kinzie Street bridges were single-leaf bridges, while the others were all double-leaf. Today, only three bridges remain from this initial group of first generation Chicago-designed trunnion bascule bridges. They are to be found at Cortland Street, West Division Street (River), and Kinzie Street.

was made possible by the City of Chicago's authorization in April 1900 of $850,000 for new bridges.[20]

<u>"Second Generation" Chicago-type Trunnion Bascule Bridge Design: 1911-30</u>
Despite the spurt of new bridge construction in the early 1900s, as of 1908 twenty-nine of Chicago's 51 vehicular bridges remained swing bridges, with many still operated by hand power.[21] In that year, bridge engineer Thomas G. Pihlfeldt highlighted the dilapidated condition of swing bridges along the Chicago River's north and south branches, noting that their removal should take precedence over swing bridges along the main channel, many of which were comparatively new structures and in fairly good shape.[22]

It was not until a $4.6 million bond issue passed in the fall of 1911 that funds were made available for 26 new bridges.[23] This next group of "second generation" bascule bridges, completed between 1913 and 1930, incorporated a number of design improvements that distinguished them in appearance from "first generation" bridges. The later bridges featured the use of pony trusses, rail-height trusses, or deck trusses, all of which were lower in height than the more industrial looking through trusses used on "first generation" bridges. Post-1910 bridges also featured the use of two, rather than three, trusses.

These aesthetic improvements were made possible by new engineering features for movable bridges that were outlined in a set of "General Specifications" prepared by the Bridge Division in 1912, which were discussed in the DPW Annual Report of that year:

> "Since the adoption of the City type as a standard design, constant effort has been made to perfect the details structurally, mechanically and artistically…During July, after a full discussion of the specifications in use for designing our bascule bridges, new General Specifications were prepared and approved. These became effective in August and were published for the use of the bridge division. They cover the design and detailing of the structural parts and machinery of movable city bridges, and also for plate girders….The type of roadway floor has been changed to creosoted wood blocks so as to provide a more permanent flooring."[24]

One of the most significant aspects of the new design exhibited by "second generation" bridges was the internal rack patented in 1911 by Alexander von Babo, the city's Engineer of Bridge Design, which differed from the external rack that previously extended along the truss superstructure's upper chords.[25] Von Babo explained in his patent application that a rack contained internally within the trusses, used in conjunction with a transverse trunnion girder to support the trunnions, allowed space for a larger

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20 DPW Annual Report, 1900: 21. "Mayor's Veto Is Upheld," *Chicago Tribune* (April 5, 1900).
21 Donald N. Becker, "Development of the Chicago type Bascule Bridge," *American Society of Civil Engineers* Transactions, Vol. 109 (1945) 1008.
22 DPW Annual Report, 1908: 210.
23 DPW Annual Report, 1912: 238. "Bonds Win; Court Acts Lose," *Chicago Tribune* (Nov. 8, 1911).
24 DPW Annual Report, 1912: 240.
25 Becker, 1010.

dimension counterweight of a less costly material and allowed placement of the operating machinery and gear trains directly alongside the movable truss. In addition, it "avoided use of unsightly circular racks above the top chords or beneath the bottom chords."[26]

Von Babo's patented design, which changed the location of the rack and pinion, eliminated the need for three trusses to support each leaf. After 1910, all bridges built by the city featured the use of two trusses, which made a striking difference in their appearance.

Another feature of bridge design standardized with the group of second generation bridges completed between 1911 and 1930 was the positioning of the center of gravity in the movable leaves. Ideally, the front and rear portions of a bascule leaf balanced perfectly around the trunnion, and required only the motive force needed to overcome friction to open and close. In early practice, City Engineer John Ericson feared that a perfectly balanced bridge might become unbalanced on hot days when the timber decking dried out and would rise unexpectedly. To avoid this possibility, the first bascules had their center of gravity just ahead of the trunnions and had to be raised fourteen inches before they became balanced. Since this required heavier motors and more substantial front piers for the trusses, Thomas G. Pihlfeldt, Engineer in Charge of Bridges, convinced Ericson that the structure could be exactly balanced by building pockets into the counterweight into which cast iron or lead plates could be placed to account for weight changes caused by the weather.[27] Bridges built after 1910 incorporated Pihlfeldt's counterweight pockets, which also served as a means to re-balance bridges in later years, when more durable concrete and steel grid decks replaced the original wood ones.[28]

Significantly, the 1912 DPW Annual Report also noted that, "Special attention has been given to the architectural treatment of the new bridges and the architects of the Chicago Plan Commission have collaborated with the Bridge Division in this work."[29] This was a reference to the efforts of Edward H. Bennett through his work as consulting architect to the Chicago Plan Commission. This quasi-public agency was established by Mayor Fred A. Busse following the publication of the 1909 *Plan of Chicago*, a document that Bennett co-authored with Daniel H. Burnham and which famously ignited interest in downtown beauty in cities nationwide.

The Illinois Chapter of the American Institute of Architects and the Chicago Municipal Art League also submitted designs to municipal officials for the artistic

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[26] U.S. Patent No. 1,001,800, received August 29, 1911, Alexander F.L. von Babo, 1.
[27] *Chicago Daily News* (October 15, 1936).
[28] Matthew Sneddon, "Chicago Avenue Bridge." HAER No. IL-144, 1999. HABS/HAER Collection. Library of Congress, Washington, D.C.: 8.
[29] DPW Annual Report, 1912: 241.

treatment of city bridges.[30] As plans were readied in 1911 to replace numerous downtown swing bridges with new bascule spans, these and other arts groups announced their intention to weigh-in on their designs, as reported by the *Chicago Tribune*:

"An active campaign for architecturally beautiful bridges in place of the dilapidated structures soon to be replaced by the city was inaugurated yesterday. James Wilson Pattison, secretary of the Municipal Art League, and W.M.R. French, director of the Art Institute, struck the first blows on behalf of several organizations who will interest themselves in the matter…

"The whole trouble with Chicago bridges," said Mr. Pattison yesterday, "is that they are all stock pieces of engineering. It never seemed to occur to anybody to ornament them. A bridge which is at once sturdy and stanch and beautiful to boot is what we want here—something graceful in shape and form and which is as strong and useful as if built in the old methodical way. There ought to be some art deliberately thrust upon Chicago."[31]

George W. Maher was the chairman of the Municipal Art Committee of the Illinois Chapter of the AIA, which developed a policy pertaining to all matters of municipal beautification, including bridge design. Other prominent architects on this committee included Hubert Burnham, Elmer C. Jensen, Earl H. Reed, Jr., Leon E. Stanhope, and M.J. Schiavoni. *The Economist,* Chicago's weekly business magazine, reported in 1916 that due to this Committee's urging, "the bridge department will recommend terra cotta for the construction of all future bridge tower houses. This is a considerable step in advance, as these tower houses, heretofore constructed of wood, galvanized iron or metal, have for the most part been unsightly, so that matte gazed terra cotta as material for them will be a distinct artistic improvement."[32]

Persistent efforts by these various art and architectural organizations resulted in extensive revisions to the type and shape of trusses, the configuration and façade of operator houses and pit walls, and the ornamental detailing of sidewalk railings, light fixtures and other ornamental metal elements.[33] For example, the Washington Street and Grand Avenue Bridges, both completed 1913, were the first bridges in Chicago's central business district to feature curving pony trusses, which quickly became preferable to the higher and more industrial-looking through trusses used on previous "first generation" bridges. Pony trusses continued to be used on bridges well into the 1940s.

However, Bennett and other civic arts groups considered the use of both deck trusses and rail-height trusses aesthetically preferable to pony trusses since they were located beneath the roadway, allowing the ornamental handrails of each bridge to be easily seen. In fact,

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30 The DPW Annual Report for 1912 noted on p. 240: "For the Chicago Avenue Bridge, the Illinois Chapter of the American Institute of Architects submitted designs for its architectural treatment and these plans were adopted."

31 "Want Grace in New Bridges," *Chicago Tribune* (May 7, 1911).

32 "West Madison Street," *The Economist* (January 29, 1916).

33 Joan Draper, *Chicago Bridges* (Chicago: City of Chicago, 1984) 8.

such bridges were depicted in the 1909 *Plan of Chicago*. The Jackson Boulevard Bridge was Chicago's first vehicular bridge to feature deck trusses, thereby conforming to Bennett's design criteria, which also included the design of Beaux Arts style limestone or terra cotta-clad bridge houses with octagonal plans, classical detailing, and mansard roofs. Such artfully-designed bridges were intended to enhance civic beauty while playing a pivotal role in facilitating traffic circulation, both important goals of the *Plan of Chicago*. The most visually impressive of the "second generation" trunnion bascule type is the classically-styled Michigan Avenue Bridge, which was based on the contemporary Alexander III Bridge in Paris. It features gracefully arched deck trusses, integrated embankments, and four monumental Beaux Arts style bridge houses, each embellished with sculptural reliefs highlighting moments in Chicago's history.

"Third Generation" Chicago-type Trunnion Bascule Bridge Design: 1932-49

In 1930, the *Chicago Tribune* announced that a movement "to keep the city's new bridges in harmony architecturally with the Michigan Avenue Bridge and the new Wabash Avenue structure gained ground in the city hall yesterday as officials considered means to prevent the construction in the future of unsightly spans across the river." The announcement was spurred by a 1930 proposal by Richard W. Wolfe, the Commissioner of Public Works, to construct five new downtown bridges, including one at State Street. Interest in the artistic design of bridges remained evident at this time as the Tribune also reported that, "Under a state statute, works of art in public places and designs of all city buildings, bridges, lamps and other public structures must be approved by the Municipal Art Commission as to their design and location." Members of this quasi-public Commission in 1930 had been appointed by the late Mayor William Dever and included real estate developer Potter Potter Jr., meatpacking scion Cyrus McCormick Jr., architect Jarvis Hunt, landscape designer Jens Jensen, and artist Thomas A. O'Shaughnessy."[34]

From an architectural point of view, the period between the Great Depression and World War II constitutes the "third generation" in bridge design. Movable bridges built in the 1930s and 1940s followed established structural and architectural models, but featured simpler ornamental details. These bridges reflect the desire of design engineers to project a more contemporary image as well as the dire state of the economy, which encouraged streamlining.[35] The use of pony trusses on some bridges followed long-established models. The more prominent downtown bridges, such as the one at State Street, featured the use of gracefully arched rail-height trusses partially located beneath the roadway, a design long advocated by civic art groups. The bridge houses of this period feature stripped-down silhouettes, flattened rooflines, and no ornamental references to the classical past. Especially notable are the monumental bridge houses at Lake Shore Drive and North Ashland Avenue, the latter of which features distinctive Art Deco style bas-reliefs with allegorical figures representing the Chicago River.

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34 "Officials Seek to Prevent Building of Ugly Bridges," *Chicago Tribune* (September 13, 1930).

35 Draper, 20.

"Fourth Generation" Chicago-type Trunnion Bascule Bridge Design: 1952-67

The "fourth generation" trunnion bascule bridges erected in Chicago during the 1950s and 1960s were sleeker and technically more sophisticated than their predecessors. For example, they featured automated control from a single bridge house, as well as railings that were primarily functional, rather than ornamental. Downtown bridges of this period were typically designed with gracefully arched deck or rail-height trusses. Bridge houses of this era exhibit the influence of International style modernism with their cubic form, banded windows, flat roofs, and smooth, unadorned wall planes clad in smooth limestone or granite. Examples include bridges at Congress Parkway, 1956; Van Buren Street, 1956; 95th Street, 1958; Harrison Street, 1960; and Dearborn Street, 1963.

History of the 95th Street Bridge

The present-day 95th Street Bridge is situated within a heavy industrial area on the far southeast side of Chicago that began to develop in the 1870s after the federal government appropriated money for a harbor at the mouth of the Calumet River. The six-mile length of the Calumet River between Lake Michigan and Lake Calumet was dredged and widened over the next quarter century, during which time the Calumet region began its meteoric rise as one of the world's great industrial complexes and steel-producing areas, well-served by both rail and water transportation. Industrialist George Pullman built an approximately 3,500-acre industrial town on the western shores of Lake Calumet in the early 1880s to house the factories used to produce the Pullman Palace Car Company's railroad passenger cars and to house its employees. Steel production began in South Chicago during the same decade in a plant that in 1901 became part of the South Works of the U.S. Steel Corporation.

Enterprises in Pullman and South Chicago attracted other industries to the Calumet region, which by the 1890s included distilleries, lumber yards and planning mills, brick making operations, paint factories, terra cotta works, ice plants, agricultural implements, shoe companies, and bed factories. The early twentieth-century saw the expansion of steel production along the shores of Lake Michigan into northwestern Indiana, where the massive new plants for U.S. Steel and Inland Steel were built in Gary and East Chicago, respectively. Additional industry was drawn to the newly created Indiana Harbor Canal, which connected the Grand Calumet River with Lake Michigan at East Chicago. By 1920, the Calumet and Indiana Harbor complexes became the most important on the Great Lakes, featuring oil refineries, chemical plants and other heavy industry in addition to the steel mills.[36]

The first bridge to span the Calumet River at 95th Street was a hand-operated center-pier swing bridge built in 1891 by the Chicago Forge and Bolt Company.[37] The second 95th Street Bridge was one of only eight "first generation" trunnion bascule bridges built

[36] Good overview histories of Pullman, South Chicago, Gary and East Chicago can be found in: William Erbe, ed. *Local Community Fact Book: Chicago Metropolitan Area 1990* (Chicago: Chicago Fact Book Consortium, 1995).

[37] Table titled, "Chicago Bridges, 1908," contained in the DPW Annual Report for 1908. Chicago Department of Public Works, "W. Van Buren Street Bridge – Statistics and Data," 1956.

according to the design developed by City Engineers from 1899 to 1900. The specifications drawn up by city engineers for this bridge required a clear horizontal channel of 120 feet, two roadways and two sidewalks, and a vertical clearance of 16 ½ feet. The bridge was built by Roemheld and Gallery of Chicago.[38] Thomas G. Pihlfeldt, Assistant Engineer for the City of Chicago, noted that the designs for both this bridge and the bridge at East Division Street, "were practically copies of [the City of Chicago's] design No. 3."[39] (See essay titled, "First Generation" Chicago-type Trunnion Bascule Bridge Design: 1900-09.)

During the 1950s and 1960s the Division of Bridges and Viaducts of Chicago's Department of Public Works was intent on replacing aging downtown river bridges, such at the 1903 two-lane span at 95th Street. A bond issue of $8,000,000 for the construction of new bridges was authorized by the Chicago City Council on July 11, 1951, following approval by referendum on June 1951. The funds were intended for proposed bridges at North Halsted Street (River), Van Buren Street, and 95th Street.[40] Planning for a new bascule bridge at this location was underway in 1953.[41] Kenny Construction Company was awarded the substructure contract and Overland Construction Company was awarded the superstructure contract.

The new $5,300,000 95th Street Bridge was formally opened to all traffic by Mayor Richard J. Daley on June 14, 1958. Whereas the old bridge had two traffic roadways each 18 feet wide, the new bridge accommodated six lanes of traffic upon completion. The old bridge had only a 16 ½ foot clearance above the water. In contrast, the new structure had a 21-foot vertical clearance and thus did not require the average of 4,000 openings a year demanded by the old bridge.[42]

The use of pony trusses on the 95th Street Bridge followed long-established models for bridges established decades earlier by Edward Bennett and the Chicago Plan Commission. The design of this bridge harmonized with the earlier Ewing Avenue, 100th Street, and 106th Street Bridges, all of which are located within this heavily industrial area of the city's far southeast side. Such bridges were intended to enhance civic beauty while playing a pivotal role in facilitating traffic circulation. However, the 95th Street Bridge is considered a "fourth generation" trunnion bascule design due to its greater

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38 Jules E. Roemheld, President of the company, previously served for many years as a construction engineer for the City of Chicago's Department of Public Works, where he designed and constructed a number of Chicago bridges. He left to establish his own company, Roemheld and Gallery, which constructed the superstructures of five Chicago vehicular bridges between 1903 and 1906. Other Chicago vehicular Bridges erected by Roemheld and Gallery include: 95th Street, 1903; Division St. (River), 1904; Archer Avenue, 1906; and North Avenue, 1907. The Roemheld and Gallery partnership evidently dissolved by 1908, as the operation was then called the Roemheld Construction Company. Roemheld served as a consultant in the construction of the Golden Gate Bridge in California and later worked as manager of the steel department of the Great Lakes Dredge and Dock Company, retiring in 1939. "Jules Eugene Roemheld," *Chicago Tribune* (obituary), 18 Feb. 1947.

39 DPW Annual Report, 1900: 90-91.

40 DPW Annual Report, 1951: 196, 201.

41 DPW Annual Report, 1953.

42 "95th Street's New Bridge to Open June 27," *Chicago Tribune*, June 14, 1958.

technological sophistication, such as automated control from a single bridge house, as well as its simpler detailing as seen in its railings that are primarily functional, rather than ornamental. Especially significant is the bridge house exhibiting the influence of International style modernism, due to its cubic form, banded windows, and flat roof, although here the smooth limestone walls are detailed with stripped-down pilasters.

“Fifth Generation” Chicago-type Trunnion Bascule Bridge Design: 1976-84
Chicago’s “fifth generation” trunnion bascule bridges featured all-welded box girders that extended above-deck to railing height. This was innovative as previous vehicular bridges in Chicago used riveted trusses. Fifth generation examples include the bridges at Loomis Street (1977), Columbus Drive (1982) and Randolph Street (1984). The Loomis and Randolph Street Bridges replaced Scherzer rolling-lift designs. The Columbus Street Bridge was the first at its site, which was half-way in-between the Michigan Avenue and Outer Drive Bridges. It was a vital link in a larger improvement project to extend Columbus Drive, which then dead-ended at Monroe Street, northward from Monroe to Grand Avenue. This massive structure was the largest in Chicago upon completion, measuring 269 feet long and 111 feet wide between trunnions. Its trunnions were set back from the river, allowing pedestrians to walk beneath it at river level. The Columbus Drive and Randolph Street bridges were both granted a design award by the American Institute of Steel Construction shortly after their completion.

PART II. ENGINEERING INFORMATION

A. Description of Bridge Structure: The 95th Street Bridge over the Calumet River is a double-leaf counter-balanced trunnion bascule span. Each leaf of the steel superstructure has two rivet-connected steel pony trusses. The bridge has a span of 203 feet from face to face of piers. Its 62-foot width includes a six-lane open steel grid roadway that is flanked by two concrete-filled steel grid sidewalks. The span has a 21-foot vertical clearance above the water. The movable portion of the bridge has metal hand rails with plain, horizontal railings.

The bridge was designed to rotate around fixed trunnions located at the center of gravity of the movable span or leaf. Each leaf is mounted on two trunnions and operated by electric motors. The gearing for each leaf consists of a rack and pinion system, driven by two separate driven train and direct current motor units. To accommodate operating machinery maintenance or failures, either motor unit is capable of raising the leaf individually. The electric motors engage a gear pinion, forcing the bridge drive rack downward. The entire weight of each leaf concentrates on two trunnion bearings as it opens and the supports allow space for the path of the large counterweight rigidly fixed to the rear end of the truss. As the counterweight on the land side of the axis dropps downward into a pit, the leaf rotates around the trunnion pins, while the forward part of the leaf opens upward over the channel.

The 95th Street Bridge features one operator's house, which is located on the northeast side of the structure. From here, the bridge tender controls the electric motors, center-lock mechanism, and the mechanical motor brakes and machinery brakes that slow the speed of the movable leaves as they reached the fully open or fully closed position. The steel-framed operator's house exhibits the influence of International style modernism, due to its cubic form, banded windows, and flat slab roof, although here the smooth limestone walls are detailed with stripped-down pilasters.

B. Site

1. General Setting and Orientation: The 95th Street Bridge, located about thirteen miles southeast of Chicago's central business district, is oriented in a east-west direction and carries vehicular and pedestrian traffic over the Calumet River. It is situated within a heavy industrial area in the South Chicago community area and is situated between the Ewing Avenue (92nd Street) and 100th Street bascule bridges. Commercial facilities that sell sailboats and yachts are located near the east side of the bridge.

PART III. SOURCES OF INFORMATION

A. Architectural Drawings:
Chicago Department of Transportation, Bureau of Bridges and Transit, "95th Street Bridge Protection Systems – General Plan and Elevation," October 1998.

B. Bibliography:

1. Primary and unpublished sources:

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Herringshaw, Clark J. *Clark J. Herringshaw's City Blue Book of Current Biography: Chicago men of 1913*. Chicago: American Publishers Association, 1913.

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"Mayor's Veto Is Upheld," *Chicago Tribune* (April 5, 1900).

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Sneddon, Matthew, "Chicago Avenue Bridge." HAER No. IL-144, 1999. HABS/HAER Collection. Library of Congress, Washington, D.C.

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"West Madison Street," *The Economist*, January 29, 1916.

2. Secondary and published sources:
Draper, Joan. *Chicago Bridges*. Chicago: City of Chicago, 1984.

C. Likely Sources Not Yet Investigated: Original plans for this bridge and those of later alterations may be on file at the Chicago Department of Transportation Office. The construction permit may be on file at either CDOT or the U.S. Army Corps of Engineers' Chicago office. The James Parker Photo Collection at UIC may have images of this bridge in Series 1, boxes 2 and 3, which were inaccessible as they were being digitized. Only box 1 of Series 1 in this collection was reviewed.

D. Supplemental Material: Historic photos of the 95th Street Bridge are attached to the end of this report.

PART IV. METHODOLOGY OF RESEARCH

A. Research Strategy: The research strategy focused on identifying detailed information about the 95th Street Bridge from primary source materials, such as the City of Chicago Department of Public Works Annual Reports, historic photographs, and contemporary engineering articles, as well as published books and reports.

B. Actual Research Process: Research focused on reviewing City of Chicago Department of Public Works Annual Reports from varying years, which are on file at the Harold Washington Library's Municipal Reference Department. Research also relied upon contemporary newspaper articles found via proquest and included a review of the online catalogs of various repositories to identify other print and photographic materials related to this bridge.

C. Archives and Repositories Used: Burnham and Ryerson Libraries and its Historic Architecture and Landscape Image Collection; Harold Washington Library's Municipal Reference Collection; James Parker Collection at the Daley Library, University of Illinois at Chicago; Chicago History Museum and its Chicago Bridges Collection and Department of Public Works Photo Collection.

D. Research Staff

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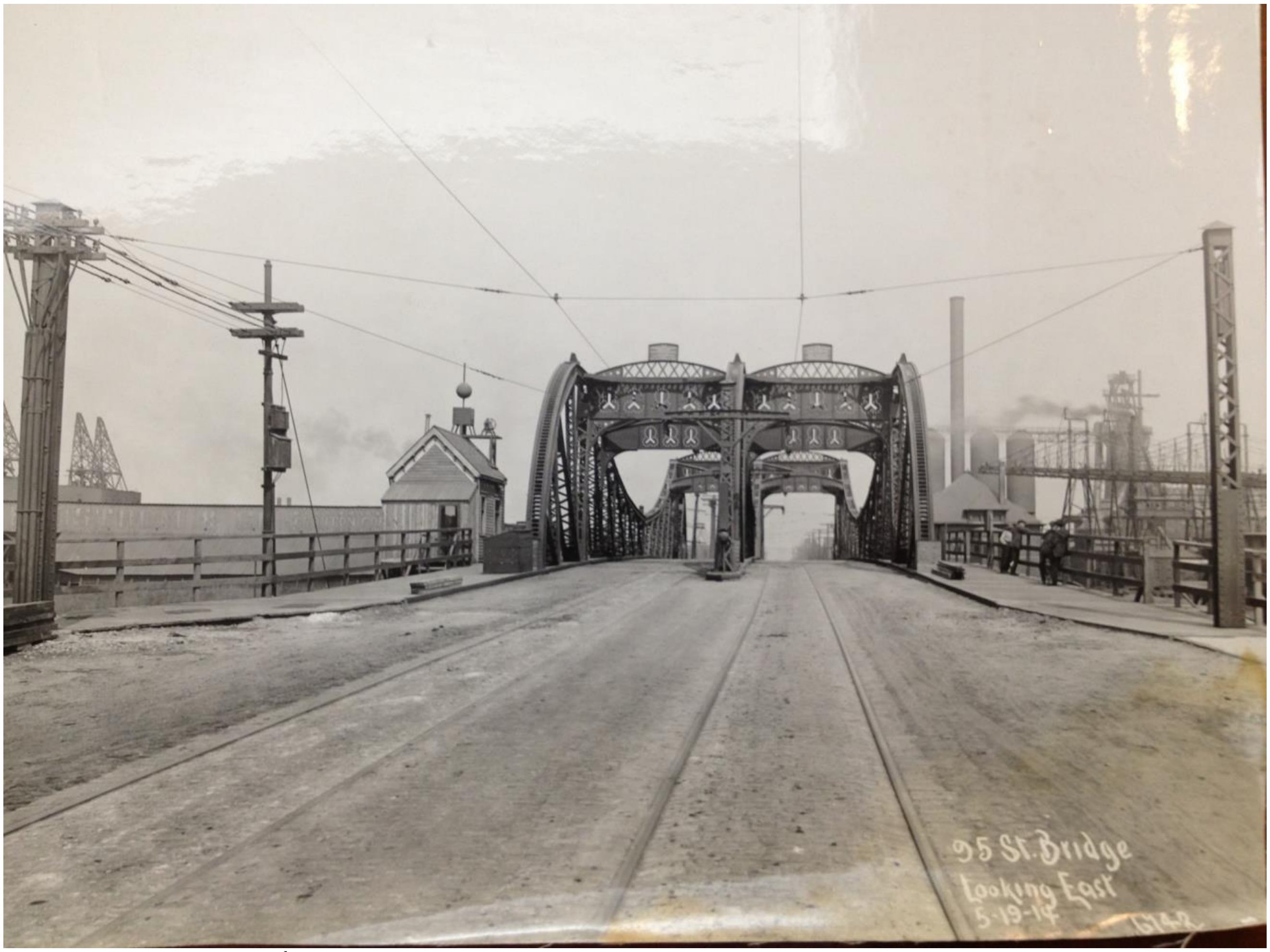
2. Additional Staff: Anne T. Sullivan, FAIA, Principal, Sullivan| Preservation with Monica Giacomucci, independent historic consultant and Jess Farnum, independent historic consultant and photographer

PART V. PROJECT INFORMATION

This documentation project was undertaken to mitigate the adverse effects of the demolition and replacement of the Chicago Avenue Bridge over the North Branch of the Chicago River. This mitigation was proposed in Section 6.0 (page 7) of the Chicago Department of Transportation's Section 106/4(f) report. CDOT proposed, as a mitigation measure for the demolition of the bridge, that the City of Chicago "develop a Bascule Bridge Preservation Plan in order to maintain a representative sample of these types of structures." This report is part of a larger

Bridge Preservation Plan undertaken in 2016-17, which identified and documented surviving bascule bridges in Chicago, grouped them by important categories such as age and bridge sub-type, ranked bridges according to importance, and provided recommendations on which bridges are the best and most important for the City to preserve.



Old bascule bridge at 95th Street, 1914. Chicago Bridges Collection, Chicago History Museum.

95th Street Bridge, 1955. Photographer: Copelin. Department of Public Works Photo Collection, 1860-1948, Chicago History Museum.

95th Street Bridge looking north, February 4, 1959. Department of Public Works Photo Collection, 1860-1948, Chicago History Museum.

95th Street Bridge looking northeast, May 4, 1959. Department of Public Works Photo Collection, 1860-1948, Chicago History Museum.

95th Street Bridge looking northeast, October 2, 1961. Department of Public Works Photo Collection, 1860-1948, Chicago History Museum.