HISTORIC AMERICAN ENGINEERING RECORD

PASSERELLE IN LINCOLN PARK

HAER No. IL-155

Location:	Spanning N. Lake Shore Dr. (U.S. Rt. 41) on axis of E. Menomonee St., Chicago, Cook County, Illinois.
USGS Quadrangle:	Chicago Loop, Illinois (7.5-minute series).
UTM Coordinates:	16/447960/4640325
Dates of Construction:	1939-1940.
Designer:	Chicago Park District: M. J. Glicken, architectural designer; Lyman C. Riggle, structural designer; C. J. Kelly, structural engineer.
Fabricators:	American Bridge Co. (Gary, Indiana), superstructure; Joseph T. Ryerson & Son, Inc. (Chicago), concrete reinforcing steel.
Builder:	Chicago Park District, co-sponsored by U.S. Works Progress Administration (WPA).
Present Owner:	Chicago Park District.
Present Use:	Pedestrian bridge.
Significance:	This pedestrian bridge, or passerelle, is the only one spanning North Lake Shore Drive, a major commuter route through Chicago's Lincoln Park. The strikingly modern welded steel arch with concrete approaches was constructed with U.S. Works Progress Administration sponsorship, unusual because the WPA is better known for bridges designed in a rustic mode and built with manual labor. The Lincoln Park passerelle gained national recognition in the Museum of Modern Art's exhibition, "Built in USA, 1932-44," and is also listed in the National Register of Historic Places.
Historian:	Justin M. Spivey, January 2001.
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.

An Introduction to Lincoln Park

Presently Chicago's Lincoln Park begins just north of Navy Pier (city grid 600 north), and continues along the Lake Michigan shoreline for more than seven miles, to Ardmore Avenue (5800 north). From the sixty acres dedicated as Lake Park in 1860, Chicago's oldest park has grown through land acquisition and landfill to twenty times its original size. (To honor the late U.S. president, and avoid confusion with another Lake Park, the Chicago city council changed the name in 1865.) Lincoln Park's first expansion, southward from Webster Avenue to North Avenue, occurred in 1869. Part of this area included the City Cemetery, which was soon cleared of graves to prevent the spread of cholera via groundwater into the lake.[1] Following the prominent example of New York's Central Park, advocates for Lincoln Park intended to provide a naturalistic setting to improve both the health and the character of Chicago's urban residents. In February 1869, the Illinois legislature passed a bill establishing a Lincoln Park Commission, as well as similar bills for commissions on the south and west sides of Chicago. The three commissions struggled for decades afterward with their identities as municipal corporations, and with issues of taxation and land acquisition in the districts they served.[2]

Despite the Lincoln Park commissioners' legal troubles, landscape designer Swain Nelson began to implement his 1865 plan, and also constructed a lake-front drive. This drive, and the boulevards that connected Chicago's parks to each other, served in the late nineteenth century as promenades of the sort described in Theodore Dreiser's *Sister Carrie.*[3] The 1869 Lincoln Park Act, in addition to establishing the commission, authorized land acquisition along the Lake Michigan shore south of the park's boundary. This strip of land would not only

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[1] Julia Sniderman, et al., "Lincoln Park," Cook County, Ill., National Register of Historic Places Registration Form, 1994, U.S. Department of the Interior, National Park Service, Washington, D.C., 1, 48-49, 54. The reader is referred to this comprehensive and well-written document for a more detailed description of Lincoln Park's development.

[2] A detailed discussion of these issues is beyond the scope of this report because the Lincoln Park passerelle post-dates the formation of a city-wide park district in 1934. See Julia Sniderman et al., "The Historic Resources of the Chicago Park District," Cook County, Ill, National Register of Historic Places Registration Form, 1990, U.S. Department of the Interior, National Park Service, Washington, D.C.

[3] Theodore Dreiser, *Sister Carrie,* 2nd Norton Critical Ed. (New York: W. W. Norton, 1991). The author is indebted to Julia S. Bachrach, Director of Research and Planning for the Chicago Park District, for recommending this novel.

increase the drive's length, but also provide shore protection for the buildings beyond. Nelson and his partner Olaf Benson began constructing the drive southward from Diversey Parkway in 1870. They had reached Menomonee Street the next year, and the southern terminus at Pine Street by 1875.[4] This roadway, several incarnations later, is still known as Lake Shore Drive.

The park's function changed as the nineteenth century progressed, from a purely aesthetic setting to one that provided for recreation and sports. The formerly naturalistic landscape sprouted playing fields, bridle paths, lagoons for boating, and bathing beaches. Likewise, it was not long before Chicagoans realized that Lake Shore Drive could be used to bypass the congestion of city streets. Traffic had increased to a point when, in an 1896 report, Lincoln Park commissioners suggested that pedestrian overpasses and tunnels would solve the "important problem" of conflict between pedestrians and vehicles.[5] The idea for grade separations in Lincoln Park was likely inspired by those that began appearing in New York's Central Park in 1885, based on Frederick Law Olmsted's plan of three decades before.[6] Regardless, it came to naught because the commissioners were evidently unwilling to fund such a project, asking instead for private donations. Grade separations would not appear on North Lake Shore Drive until the late 1930s. A map of Lincoln Park at the century's close shows North Lake Shore Drive as a broad, tree-lined thoroughfare, with a parallel bridle path, crossing the park on a more or less straight alignment.[7] East of the drive, a parallel breakwater (built during 1885 and 1886) formed a long, narrow lagoon. The drive's nineteenth-century alignment and the lagoon remain in the park today, although significantly further from the lake shore.

During the Great Depression, federally sponsored construction projects would completely transform this section of Lincoln Park, creating a new bathing beach at North Avenue and relocating and widening North Lake Shore Drive. The Lincoln Park Commission had been consolidated with Chicago's other park districts, then twenty-one in number, to form the Chicago Park District (CPD) in 1934. From 1937 to 1941, this new entity obtained financial assistance from New Deal agencies to construct new landfill east of the lagoon, a new beach and bath house, and an eight-lane, grade-separated highway for through traffic. The old roadway, renamed Cannon Drive, has since been relegated to a parking area for the beach. With U.S. Works Progress Administration (WPA) sponsorship, the CPD constructed a welded steel arch pedestrian bridge to provide beach access across the new North Lake Shore Drive. This report will first

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[4] Julia S. Bachrach, "Lake Shore Drive — A Chronology," typescript, n.d., Chicago Park District archives, Chicago, Ill. (hereinafter cited as CPD Archives).

[5] Lincoln Park Commission, *Report of the Commissioners of Lincoln Park, From April 1, 1895, to March 31, 1896* (Chicago, 1896), 5, CPD Archives.

[6] Carl W. Condit, *American Building Art: The Twentieth Century* (New York: Oxford Univ. Press, 1961), 277.

[7] J. H. Lindrooth, "Lincoln Park, Chicago, Ill., 1899," map in I. J. Bryan, *Report of the Commissioners and a History of Lincoln Park* (Chicago, 1899), CPD Archives.

explain the transportation policies that created a need for the bridge, then describe its design and the technologies used to construct it.

The Chicago Park District's Transportation Role

CPD engineers have always influenced transportation throughout the city, if not the nation. Nowhere is this more evident than on the lake front, where debates over pedestrian access, Lake Shore Drive traffic, Illinois Central Railroad tracks, Chicago Harbor dock lines, and the Meigs Field airport inevitably involve the parks and confirm their effect on land-based, water, and even air transportation. The creation of tax districts for "park and boulevard" improvements implied a dual role of recreation and transportation from the beginning, but during the New Deal era, Chicago park districts extended their role far beyond the pleasure drives they created during the nineteenth century. Not only did the CPD begin conducting vehicle safety inspections during the New Deal era, but it also contemplated establishing a driving school. Its traffic engineers went outside park boundaries in suggesting that certain city streets be made one-way to improve traffic flow within the parks.[8] Even after federal highway funding and Chicago's functional consolidation of 1959 transferred road-building powers to the Department of Public Works, park events such as the annual week-long Taste of Chicago festival in Grant Park extensively alter the city's transportation pattern.[9]

Before and after the park consolidation of 1934, Chicago park roads caught the attention of the national engineering press. Park engineers' articles appeared alongside their highway department counterparts' in trade magazines and engineering society journals.[10] After park consolidation, Lake Shore Drive improvements and the Outer Drive Bridge spanning the Chicago River received even greater attention. Highway designers nationwide would look to limited-access park roads such as Lake Shore Drive as examples. One history of Chicago public works even claimed (albeit somewhat inaccurately) that cloverleaf interchanges were "pioneered" on the drive.[11] Nonetheless, the CPD did produce truly innovative structures for traffic control, grade separation, and pedestrian access. These included movable lane dividers on North Lake Shore Drive, a rigid-frame reinforced bridge over North Avenue, and welded steel pedestrian

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[8] CPD, *Third Annual Report* (Chicago, 1937), 145, 147.

[9] In 1991, Chicago mayor Richard M. Daley created the Department of Transportation, which is now responsible for road construction and maintenance.

[10] See, for example, H. C. Alexander, "Parks and Park Roads," *Journal of the Western Society of Engineers* 1, No. 5 (Oct. 1896): 649-53; M. M. Lawrence and W. S. Maynard, "Methods and Cost of Roadway Reconstruction in the Lincoln Park System, Chicago, During 1911," *Engineering & Contracting* 38, No. 23 (4 Dec. 1912): 633-35; or Linn White, "Park Drives and Boulevards," *Municipal Engineering* 44, No. 2 (Feb. 1913): 89-95.

[11] Chicago Department of Public Works, *Chicago Public Works: A History* (Chicago: Rand McNally, 1973), 52. Chicago's own Condit credited Parisian engineer Eugène Henard with the invention in 1906, but stated that Lake Shore Drive was the first "systematic use of the cloverleaf for a succession of intersections"; see *American Building Art,* 282-83.

bridges, descriptions of which appeared in national professional publications.[12] CPD engineers also exchanged design ideas and traffic data with those planning Chicago's expressway system. Eriksen Drive in Burnham Park, now part of South Lake Shore Drive, provided inspiration to the city's early limited-access highway plans.[13] The network proposed by the city's Department of Superhighways in 1939, in fact, show already constructed segments of Lake Shore Drive as "existing superhighways," with extensions planned to the city limits.[14] Ultimately the city's expressway system would be built to superior standards of geometry and safety, but Lake Shore Drive was nonetheless influential as an early high-speed automobile route.

Demonstrating the growing importance of park roads after the 1934 consolidation, activities of the Engineering Division's Traffic Engineering Section begin to figure prominently in CPD annual reports with the first issue of 1935. According to that report, "None of the superseded park districts, except the former South Park System maintained traffic engineering forces."[15] Not surprisingly, the South Parks Commission's Traffic Engineer, Otto K. Jelinek, retained his title after the consolidation. His section of the CPD's annual reports would not look out of place in the Department of Public Works', discussing signs and signals, accidents, rush-hour traffic, and new highway construction. The CPD's transportation role drew criticism from a citizens' committee appointed to assess progress of the consolidated Park District. In their 1938 report, the committee took issue with CPD's maintenance of boulevards outside of parks, noting that street and highway departments used vehicle and fuel taxes for this same purpose.[16] Until maintenance of park roads and boulevards was turned over to the city's Department of Public Works under the 1959 Functional Consolidation Act, CPD remained an effective second transportation agency within city limits.

As head of traffic engineering for the consolidated park system, Jelinek and his staff enjoyed a larger area in which to plan new roads. By the second annual report, the Traffic Engineering Section was projecting a connection between LaSalle Street and North Lake Shore

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[12] See, for example, Lawrence T. Smith, "Chicago Park Passerelle," *Engineering News-Record* 122, No. 1 (5 Jan. 1939): 25-26; Otto K. Jelinek, "Chicago Builds a Convertible Roadway," *Engineering News-Record* 124, No. 23 (6 June 1940): 788-91; or Lawrence T. Smith and Paul Lillard, "Extensometer Stress Measurements, North Avenue Bridge, Chicago, Ill.," *Transactions of the American Society of Civil Engineers* 107 (1942): 1447-77.

[13] City of Chicago, City Council, Committee on Traffic and Public Safety, "Limited Ways: A Plan for the Greater Chicago Traffic Area" (Chicago, Dec. 1933), 27, Municipal Reference Collection, Chicago Public Library, Chicago, Ill. (hereinafter cited as MRC).

[14] CPD, *Fifth Annual Report* (Chicago, 1939), 119; City of Chicago, Department of Superhighways, "A Comprehensive Superhighway Plan for the City of Chicago" (Chicago, 30 Oct. 1939), MRC.

[15] CPD, *First Annual Report* (Chicago, 1935), 125.

[16] Max Murdock et al., *Report of the Citizens' Committee Appointed to Investigate the Operations and Expenditures of the Chicago Park District, Presented July, 1938* (Chicago: Chicago Park District, 1938), 11, CPD Archives.

Drive, and a southward extension of South Lake Shore Drive to the Indiana state line.[17] The LaSalle Street link came into existence during Jelinek's tenure, but South Lake Shore Drive was never extended past 67th Street. Persistence of this idea through several decades, however, attests to the regional vision of CPD traffic planners.[18] They undoubtedly recognized that, with its continuous strip of undeveloped land along the lake front, the CPD could construct an urban highway without the expense of private property acquisition and demolition. This role was foreseen by Burnham's Plan of Chicago in 1909, but was ultimately extended to produce the high-speed commuter route that exists today through Lincoln, Grant, Burnham, and Jackson parks.[19]

New Deal Projects in Chicago's Parks

Lake Shore Drive attained its current breadth and length during the era of recovery following the Great Depression, but highway improvements were but one of many New Deal projects in Chicago's parks. The CPD obtained funding from the U.S. Public Works Administration (PWA), and labor from the WPA, for everything from integrating the records of superseded park districts, to constructing a new headquarters and the adjacent Soldier Field stadium. Critics of New Deal programs tended to be less harsh with the PWA, which provided grants used to pay contracting firms, than with the WPA, which used relief workers to perform construction tasks in lieu of contractors. The latter was seen as unfair by pitting government against private industry in the employment of skilled workers.[20] The agencies' approaches reflect the differing philosophies of their leaders. The PWA was created in 1933, during the first round of New Deal legislation, and supervised by Secretary of the Interior Harold L. Ickes. While Ickes favored funding of "massive construction projects," his counterpart Harry Hopkins of the WPA advocated for more direct aid to workers, namely paying their salaries as they labored on smaller projects.[21] The WPA, created during a second round of relief legislation in 1935, thus developed a reputation for sponsoring "make-work" projects that relied on craftsmen and manual laborers rather than skilled workers.

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[17] CPD, *Second Annual Report* (Chicago, 1936), 147.

[18] Proposals for the southward extension of South Lake Shore Drive re-appear into the Interstate highway era, with the never-built Stony Island Avenue Expressway (I-494); see Hal Foust, "Officials Map Numbering System for Expressways Near Chicago," *Chicago Tribune,* 14 Dec. 1958, 1:25. For more about southeast expressway proposals, see Justin M. Spivey, "Chicago Skyway Toll Bridge," HAER No. IL-145, Historic American Engineering Record, National Park Service, U.S. Department of the Interior.

[19] Condit, *American Building Art,* 279.

[20] See, for example,"The Case for PWA," *Engineering News-Record* 119, No. 13 (23 Sep. 1937): 514-15; or "Should WPA Continue in Construction?," *Engineering News-Record* 123, No. 9 (31 Aug. 1939): 280-82.

[21] Roger J. Biles, *A New Deal for the American People* (DeKalb: Northern Illinois Univ. Press, 1991), 44-45, 78, 104-05.

The CPD's Traffic Engineering Section had its share of WPA "make-work" projects. Although these occurred against a background of larger PWA grants such as the Outer Drive Bridge connecting Grant and Lincoln parks, they are nonetheless worth summarizing here. Starting with his first year with the consolidated park system, traffic engineer Jelinek used WPA-sponsored labor to forge many smaller but nonetheless significant administrative links. In May 1935, he secured the commissioners' approval to purchase "standard signs conforming to the specifications of the U.S. government and State of Illinois" and install them in the parks. He also extended the South Parks' system of keeping accident statistics to the entire CPD, evidently attracting national attention among public safety officials. WPA-sponsored laborers performed the necessary clerical work.[22] By the time that CPD police began using standard accident reporting forms in July 1935, Chicago motorists were experiencing more consistent traffic laws and enforcement on park drives and boulevards throughout the system. Traffic studies made by WPA-sponsored workers from 1936 to 1938 were another project intended to unify the park system. The results justified another round of federally sponsored projects, most importantly the highway improvements and pedestrian bridges constructed along Lake Shore Drive.

Unlike the "pounding rocks into shoulders" on rural roads described by one historian of the WPA, workers sponsored by the agency in Chicago built sophisticated, modern structures in the city's parks.[23] It is not surprising, however, why Chicago proved to be an exception to the "make-work" rule. The type of work performed by WPA laborers ultimately depended on the co-sponsoring locality. As a large and heavily industrial metropolitan region, the Chicago area had a proportionately large number of skilled workers unemployed by the Great Depression.[24] Although the WPA is better known for building rustic stone or timber bridges in rural areas, concrete and steel were more familiar materials to the city's laborers, and modernism more familiar to its architects. Consequently, Lake Shore Drive and the passerelle reflect the skills provided by federal relief workers in Chicago.

Highways and Pedestrian Access

During 1939 and 1940, North Lake Shore Drive in Lincoln Park underwent a WPA-sponsored transformation from nineteenth-century park drive to twentieth-century limited-access highway. The traffic plans which led to this improvement recognized that North Lake Shore Drive stood in the way of pedestrians attracted to the lake front, and provided bridges and tunnels

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[22] CPD, *First Annual Report,* 126; ibid., *Second Annual Report,* 44.

[23] James Howley, telephone conversation with author, July 1998, previously quoted in Justin M. Spivey, "Pond Creek Bridge," HAER No. PA-499.

[24] On skilled workers in the WPA, see "The Case for PWA," 515.

accordingly.[25] Although grade-separated pedestrian crossings had been considered before, increased vehicular speeds now made them absolutely necessary.

Improvement of Lake Shore Drive served purposes other than transportation. While the CPD proudly promoted the new highway's capacity and forward-looking design, it also emphasized the highway's positive effect on the park as a whole. Relocation of North Lake Shore Drive to the east side of the lagoon meant that shore protection could be improved as part of the highway project.[26] Creation of one wide roadway meant that several narrower ones could be abandoned, answering charges that Lincoln Park's road network occupied too great a portion of its area. The 1938 citizen's committee report noted, "Motor traffic has usurped large areas of the park system, particularly on the lake shore.... Some thought should be given by the park management to checking this tendency."[27] Perhaps motivated by this criticism, Jelinek wrote two years later that the new North Lake Shore Drive would consolidate into one roadway the several north-south drives "that formerly subdivided the park into areas of no recreational value."[28] As a result, Lincoln Park's roads have since fit into a two-level hierarchy: narrow, winding drives for low-speed internal circulation, and the wide, straight North Lake Shore Drive for high-speed through traffic. Most importantly, the highway project created large traffic-free areas for recreation. For these reasons, the CPD's 1940 annual report called "the limited highway skirting the lake shore ... the outstanding project of the Park District for the year."[29]

The CPD used WPA-sponsored labor in all phases of the "Limited Highway in Lincoln Park" project (as it was called on the WPA docket), from traffic studies and planning, to actual construction.[30] The new North Lake Shore Drive opened between North and Fullerton avenues in late 1940, with a later extension to Belmont Avenue covered by the same project. In her chronology of Lake Shore Drive developments, archivist Cheryl Winter noted that "WPA helped the Chicago Park District construct everything except the movable separators."[31] (The latter

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[25] Language in CPD, *A Traffic Survey,* vol. 1, *Summary: Scope and Methods* (Chicago, 1938), 71, MRC, makes this recognition seem almost grudging: "In the Chicago Park District some 58 million people, many of them children and the aged, used the parks' recreational facilities in 1937. At some time or other all these people demanded the right to cross the Park boulevards and drives."

[26] See CPD, *Sixth Annual Report* (Chicago, 1940), 17. Evidently the CPD decided on this location late in the process, for a 1938 study shows Cannon and Beach drives abandoned, with a new North Lake Shore Drive on the west side of lagoon. See CPD, *A Traffic Survey,* vol. 8, *A Problem in City Planning: Lake Shore Drive* (Chicago, 1938), 7, MRC.

[27] Murdock et al., "Report of the Citizens' Committee," 6.

[28] Jelinek, "Chicago Builds a Convertible Roadway," 788.

[29] CPD, *Sixth Annual Report,* 17.

[30] Documents also cite a WPA project number, 30291, for the Limited Highway in Lincoln Park.

[31] Cheryl Winter, "Lake Shore Drive A Report on Its Stages of Development" typescript, 1973, MRC; cf. CPD, *Seventh Annual Report* (Chicago, 1941), 141.

were hydraulically lifted lane dividers devised by the Traffic Engineering Section, which were raised and lowered during the day to provide a wider roadway in the peak travel direction. The CPD stopped using the dividers in 1978, and began removing them eleven years later.[32]) WPA sponsorship did, however, include the construction of grade-separated pedestrian crossings over and under the new highway.

The section of Lincoln Park in which the passerelle is located underwent radical change during 1939 and 1940. Examining maps drawn before and after this time, one notices not only North Lake Shore Drive in a new location, but also a long, curving peninsula at North Avenue where only a small nub of land projected before.[33] Contractors paid by a PWA grant constructed the peninsula to protect a new bathing beach. The North Avenue Beach features a bath house shaped like a tugboat, and was formally dedicated on 30 July 1940.[34] This major attraction, separated from the rest of Lincoln Park by North Lake Shore Drive, required a grade-separated crossing for the large number of pedestrians that would be drawn there. The "Passerelle Near Menomonee Street," as it was called by its designers, answered this need. (Menomonee Street does not extend into Lincoln Park, but the pedestrian bridge is located where the street's axis intersects North Lake Shore Drive.) The passerelle, designed and built concurrently with the new alignment of North Lake Shore Drive that it spans, was likewise co-sponsored by WPA.

The passerelle on axis with Menomonee Street is actually the only pedestrian crossing over North Lake Shore Drive in Lincoln Park; all others are subways. In a comparable distance through Burnham and Jackson parks, there are six pedestrian bridges over South Lake Shore Drive: on axis with 35th, 43rd, 47th, 49th, 57th and 63rd streets.[35] Each has a unique design produced by CPD architects, except for twin structures at the first two locations. In contemporary CPD publications, these are called "passerelles," a French term no doubt intended to add elegance. In overall effect, however, these welded steel bridges comprise a veritable menagerie of structure types: girders, arches, and trusses. Because at least some had been completed prior to 1940, it is not unreasonable to conclude that property owners along Lincoln Park knew of them and wanted to avoid a similar situation.

Property owners along Lincoln Park voiced concern about the appearance of North Lake Shore Drive in proportion to their greater visibility of it. Private property abuts Lincoln Park directly, without the intervening railroad found along Burnham and Jackson parks. Recalling

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[32] Jelinek, "Chicago Builds a Convertible Roadway"; "Outer Drive Work Planned for Spring," *Chicago Sun-Times,* 16 Nov. 1988, 7.

[33] See, for example, U.S. Department of the Interior Geological Survey, *Chicago Loop Quadrangle: Illinois — Cook County, 7.5-minute Series* (Washington, D.C.: U.S. Government Printing Office, 1929 et seq.).

[34] CPD, *Sixth Annual Report,* 17. The project was officially called "North Ave. Beach Improvement," PWA Docket No. 1732-F; see CPD, *Proceedings* 5 (28 June 1938): 61.

[35] Although these bridges are beyond the scope of this report, it is worth mentioning that at least those at 47th, 49th, and 57th streets were constructed by WPA labor, with materials procured through a combination of Park District and WPA requisitions; see Lawrence T. Smith, "Chicago Park Passerelle," *Engineering News-Record* 122, No. 1 (5 Jan. 1939): 25; and CPD, *Proceedings* 2 (28 Apr. 1936): 951.

Montgomery Ward's much earlier lawsuit over structures in Grant Park obstructing his Michigan Avenue view, residents and owners of buildings along North Lake Shore Drive sought to prevent visual clutter in Lincoln Park. There is precedent for protest in a 1928 resolution of the American Institute of Architects' Chicago Chapter, condemning the design of bridges then recently constructed.[36] Further public outcry caused the demise of one ambitious plan for the Belmont Harbor area of Lincoln Park, which showed six "ramp type passerelles" of plate-girder construction across North Lake Shore Drive at every other cross street from Briar Place to Grace Street. Following complaints from real estate and business organizations, the CPD built only two of the crossings — at Briar Place and Aldine Avenue — as pedestrian subways.[37] Lincoln Park's only pedestrian bridge resulted from a different plan, to provide access to North Avenue Beach. Because of the park's greater width there, or perhaps more elegant arch form constructed, the passerelle near Menomonee Street seems to have avoided public disapproval.

Modern Design

Soon after its completion, the passerelle earned a measure of approval from the architectural community. Interestingly, critics praised the same design aspect for different reasons. To some, the curving forms of arch and deck were an example of academic Modern design, while to others these showed a playful side appropriate to the park setting. First came recognition from New York's Museum of Modern Art, which included the structure in its exhibition, "Built in USA, 1932-44."[38] As a result, the passerelle received coverage in *Architectural Forum* shortly thereafter. The magazine praised the bridge's "integration of engineering and architectural elements," and printed plans, elevations, and details of the structure, along with Hedrich Blessing's photographs of a trenchcoat-wearing figure standing alone on the bridge.[39] The emptiness of these scenes echoes the clean lines of the Modern design for which the bridge received national attention. Five years later, one of Blessing's photographs appeared in *The Architecture of Bridges,* another Museum of Modern Art publication. Here, however, the text referred to the "complete felicity" of the bridge's curving forms, emphasizing a

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[36] Harry H. Bentley, Secretary, Chicago Chapter, American Institute of Architects, letter to Eugene R. Pike, President, Lincoln Park Commission, 14 Apr. 1928. Lincoln Park box, archivist's subject files, CPD Archives.

[37] CPD, "Lincoln Park — Diversey to Montrose, Ramp Type Passerelles, Location of Typical Units," Drawing Set No. 101-6, n.d., plan files, Chicago Park District, Chicago, Ill. (hereinafter cited as CPD Plan Files); CPD, *Proceedings* 4 (8 Feb. 1938): 613. Smith also mentioned property owners' objections to "the ramp-type footbridge" in "Chicago Park Passerelle," 25.

[38] Michelle Harvey, Project Assistant, Museum Archives, Museum of Modern Art, New York, N.Y., e-mail correspondence with author, 26 July 1999. The passerelle appears on page 114 of the exhibition catalog (Exhibit No. 258c, 24 May - 22 Oct. 1944).

[39] "Pedestrian Bridge, Chicago, Ill.," *Architectural Forum* (July 1944): 97-99. A footnote on page 97 indicates that the passerelle was "chosen by the Museum of Modern Art as one of the country's 47 best structures."

different facet of the design.[40] Another photograph shows families with children crossing the bridge on their way to the beach, a more realistic reflection of its function. Although for different reasons, academics and functionalists agreed that the passerelle's design was of national significance.

Yet the passerelle is not the work of a nationally-known architect. The CPD did most of its design work in-house, so the passerelle is a creation of its architectural and engineering divisions. These divisions hired extra staff for the design of "emergency work" sponsored by New Deal agencies.[41] As with many structures, the staff actually responsible for the passerelle's design are lost in the shadow of a figurehead. The *Architectural Forum* article describing the structure lists but one name, CPD Chief Engineer Ralph H. Burke.[42] It is unlikely, however, that Burke had much to do with the passerelle. From 1939 to 1941, his attentions turned away from the CPD to supervising construction of Chicago's subway system, during which time he was on leave of absence from CPD.[43] Unfortunately those who did design the passerelle remain relatively unknown. A pencil sketch of the passerelle in CPD archives was signed by architect M. J. Glicken, who may have originated the design.[44] Glicken's name appears on working drawings, along with that of Lyman C. Riggle, who has the ambiguous title of Structural Designer on this and at least one other project completed by CPD in 1940.[45] Because Riggle's name appears only on drawings with concrete reinforcing or steel construction details, it is reasonable to assume that he was an engineer. C. T. Kelly, given the title of Structural Engineer, may have performed or checked structural engineering calculations. Others, such as Principal Construction Engineer James P. Gallagher, most likely acted in a supervisory role.

Steel Fabrication

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[40] Elizabeth B. Mock, *The Architecture of Bridges* (New York: Museum of Modern Art, 1949), 53.

[41] Buchsbaum, "Architectural Activities of the Chicago Park District," *Illinois Society of Architects Monthly Bulletin* 20, No. 10-11 (Apr.-May 1936): 1. Although the Outer Drive bridge, a design credited to Strauss Engineering Corp., might seem an exception to the in-house rule, in this article Buchsbaum noted that Park District staff produced the "final working drawings."

[42] "Pedestrian Bridge, Chicago, Ill.," 97. This article was the basis for the National Register nomination giving him credit for the passerelle's design; see Sniderman et al., "Lincoln Park," 80.

[43] "Membership List," *Journal of the Western Society of Engineers* 44, No. 4 (Aug. 1939): 171; "Membership List," *Journal of the Western Society of Engineers* 64, No. 4 (Aug. 1941): 171; CPD, *Fifth Annual Report,* title page; ibid., *Sixth Annual Report,* title page.

[44] M. J. Glicken, "Proposed Passerelle North of North Avenue, Chicago Park District," sketch, n.d., Lincoln Park box, archivist's subject files, CPD Archives.

[45] Lawrence T. Smith and Lyman C. Riggle, "Bridging Busy Electrified Tracks," *Engineering News-Record* 125, No. 7 (15 Aug 1940): 210-12.

Roughly one year after the design had been completed, CPD advertised for private-sector bids on fabricating steel for the passerelle, which WPA-sponsored labor would then erect. American Bridge, Bethlehem Steel, Duffin Iron, and Egger Iron companies, and New City Iron Works, each submitted bids for "furnishing and delivering structural steel, handrails, steel floor grids and appurtenances."[46] CPD commissioners opened bids on 21 May 1940, and awarded the contract to American Bridge Company, the low bidder at $10,996, one week later. That company had fabricated steel work for CPD on at least one prior job, the Outer Drive Bridge, completed in 1938. Steel for the passerelle was produced at its Gary plant, which had been known as the American Bridge Works before Andrew Carnegie combined it with thirty other fabricators to form the American Bridge Company in 1900.[47] Plans in CPD files show that American Bridge sub-contracted parts of the work to another Carnegie enterprise. Carnegie-Illinois Steel Corporation submitted shop drawings of their proprietary "I-Beam-Lok" steel grid deck.[48] This deck system consists of a steel grid welded to a metal pan, which is filled with concrete after installation. It appeared in various American Bridge Company publications, and was used on at least one other CPD structure, the Monroe Street Viaduct, completed in 1938.[49] Riggle, who designed both viaduct and passerelle, obviously kept the product in mind.

Most of the Lincoln Park passerelle's steel came from Carnegie mills, but the structure also contains material from a competitor. CPD records show that Joseph T. Ryerson & Son, Incorporated, fabricated reinforcing steel for the passerelle's concrete piers and ramps. The company, incorporated in 1888, remains Chicago's second-oldest business operating under the same name.[50] Ryerson never owned steel mills of its own, and despite a merger with Inland Steel in 1935, retained its own name as a fabricating business.[51] In accordance with the merger agreement, Inland would likely have supplied the material fabricated by Ryerson for the Lincoln Park passerelle. The use of both Inland and Carnegie steels reflects the CPD's efforts to distribute work among many firms during the Depression. Ryerson also fabricated steel work for

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[46] CPD, *Proceedings* (28 May 1940): 31.

[47] Victor C. Darnell, *A Directory of American Bridge-Building Companies, 1840-1900,* Occasional Publication No. 4 (Washington, D.C.: Society for Industrial Archeology, 1984), 85-86.

[48] Carnegie-Illinois Steel Corp., "4-1/4" I-Bm.-Lok, Passerelle Bridge near Menomonee Street, Lincoln Park — Chicago Park District," Drawing No. TL2677 (14 June 1940), accompanying Drawing Set No. 100-148, CPD Plan Files.

[49] See U.S. Steel Corp., *Suspension Bridges* (Pittsburgh: U.S. Steel Corp., American Bridge Division, 1937); also Matthew T. Sneddon, "Monroe Street Viaduct," HAER No. IL-152.

[50] Edward L. Ryerson, Jr., *The Ryerson Chronicle 1886-1964* (Chicago: privately printed, 1964), 21.

[51] Joseph T. Ryerson, "Personal Recollections of Joseph Turner Ryerson, 1880-1947," typescript (Mar. 1947), 179, folder 3, box 9, Ryerson Family Papers, Special Collections, Joseph Regenstein Library, Univ. of Chicago, Chicago, Ill. (hereinafter cited as Ryerson Papers).

a section of the Randolph Street Viaduct, a PWA-sponsored project, in 1936.[52] Although the Randolph Street Viaduct was a large structure, CPD solicited bids in segments, again dividing the work among several fabricators.

Steel fabrication was the only step in the passerelle's construction with significant private-sector involvement. Annual reports indicate that WPA-sponsored labor assisted CPD staff in constructing abutments and approaches and erecting the steel. They completed the task in late 1940, ahead of the Lake Shore Drive construction progressing beneath.[53]

Description

An overall dearth of surface detail, especially a lack of visible fasteners, not only indicates a large amount of welding, but also gives the passerelle an abstract straightforwardness and plasticity that reflects its Modern influences. The relatively new art of structural welding made fastener-free arches possible for the main span. But the smoothness continues where, except for the hand rails, the structure makes a complete transition from steel to concrete at the arch abutments. Architectural historian Elizabeth B. Mock called the approaches "mannered and heavy-handed — not to be compared in quality with the span itself," but this author disagrees.[54] In order to match the thickness of the main span's steel deck, the concrete ramp slabs are daringly thin.[55] Not only do the approach ramps perform the function of carrying bicycle traffic, but they also continue the arc of the deck, increasing its apparent length. The ramp is cantilevered from support piers, T-shaped in plan and tapering outward, which add a playful air appropriate to recreational space. Under the semi-circular stair landing at each end, a pier in the shape of an inverted frustum repeats this theme. Except for stepped corners on the two abutment piers, probably a holdover from the late Art Deco era, the concrete work is mostly free from detailed surface ornament. In the concrete approaches no less than the steel arch, smooth surfaces and curved shapes make the passerelle thoroughly Modern in its architectural expression.

To accommodate the new eight-lane North Lake Shore Drive and proposed service roadways on either side, the passerelle's main arch spans 187'-0" and rises roughly twenty-five

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[52] CPD, *Proceedings* 2 (28 Apr. 1936): 955. Edward L. Ryerson, Jr., chairman of the board and a self-proclaimed "rock-ribbed Republican," publicly voiced opposition to the WPA but was less critical of the PWA; see ibid., *The Ryerson Chronicle,* 31, and typescript of address before American Institute of Steel Construction, 26 Oct. 1937, box 9, folder 6, Ryerson Papers.

[53] CPD, *Sixth Annual Report,* 71, 160.

[54] Mock, *The Architecture of Bridges,* 53.

[55] They might in fact be too thin, for some hand rail anchorages have broken through the slab on the west stair approach. The hand rail has subsequently been replaced by one not matching the original.

feet, measured between the pins forming the end hinges of the three-hinged arch rib.[56] (The arch's rise has changed over time as a result of settlement and consequent repairs, as will be explained below.) The deck is suspended below the arch rib for the middle 142'-0" of the span, and raised above it on struts for the remainder, with sliding expansion joints at both ends and at mid-span. Although the deck is also curved in elevation, with a rise of about six feet, the sliding joints do not provide enough structural continuity for the deck to be considered a three-hinged arch in itself. Instead, the suspenders and struts tie it to the arch rib, adding stiffness to the latter.

In the original configuration without diagonal bracing, each vertical plane of arch rib, deck, and suspenders resembled a Vierendeel truss. This truss form lacks diagonals and therefore depends on bending in its members to carry loads. Because the vertical members are slender and therefore flexible, their contribution to stiffening is relatively weak. A structural analysis by Wiss, Janney, Elstner Associates showed that the stiffening effect adds only about eight percent to the ribs' strength.[57] This amount is not large enough to conclusively show that the passerelle's designers intended the stiffening effect. The diagonal members added as part of the 1991 rehabilitation perform a much greater stiffening function. As a result, the passerelle now behaves as a truss-stiffened arch.

The arch ribs remain, visually as well as structurally, the passerelle's most prominent feature. Each rib is a welded box section, open at the top and bottom, presumably to avert the internal corrosion problems that occur in closed sections. The vertical webs of the box section are 13/16"-thick steel plate, tapering in width from 27-1/2" at the spring line to 16" at the center pin. Continuous 3-1/2" x 4" angle sections, welded inside the top and bottom of each web plate with their short legs horizontal, form stiffening flanges. (While the most efficient section in bending has large flanges separated by a thin web, the small area of these flanges demonstrates that the arch rib was designed primarily for axial forces rather than bending.) The two web plates are periodically joined by vertical, 3/4"-thick diaphragm plates across the section and pairs of horizontal, 1/2"-thick batten plates at the top and bottom of the section. Diaphragms occur at 8'-4" intervals, where they serve as points of attachment for the vertical suspenders. Batten plates occur at the same interval, spaced roughly halfway between the diaphragms and welded to the

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[56] The east service roadway was never constructed; the west service roadway serves as a southbound exit from the Cannon Drive parking lot.

[57] Wiss, Janney, Elstner Associates, "Lincoln Park Pedestrian Bridge: Analysis and Upgrading for Chicago Park District" (Northbrook, Ill., 1990), Architecture and Engineering Division files, Chicago Park District, Chicago, Ill., 3. The eight percent figure results from dividing the factor of safety for the arch ribs and deck together (1.4), by the factor of safety for the arch ribs alone (1.3). It is possible that the hand rails, rigidly attached to the vertical members, also perform a stiffening function. According to Gary Klein, engineer with Wiss, Janney, Elstner Associates, telephone conversation with author, 22 July 1999, the hand rails were not included in the structural analysis because their contribution is even less significant than that of the vertical members.

flange angles.[58] Toward each of the three hinges, both diaphragms and batten plates are spaced more closely to distribute concentrated loads occurring there.

Judging from the few riveted connections on the bridge, the erection procedure seems to have been designed to minimize riveting and avoid welding in the field.[59] The arch ribs were likely fabricated in halves by shop welding, then connected by pins during erection. Lateral bracing was then riveted to angle tabs, which had been shop-welded to the ribs. The overhead lateral bracing forms a diamond pattern over the roadway for the middle 75'-0" of the span. Where the ribs descend below the deck, they are stabilized by the deck itself and two planes of cross-bracing (at U1-L1 and L1-L2). Presumably these X-shaped pairs of braces were shop-welded, except for the riveted connection between those in the plane of U1-L1. The minimal number of rivets on the bridge reflects a national decline in that method of fastening during the mid-twentieth century, and its replacement by welded (and later, bolted) connections.

Welded Steel Construction

The passerelle at Menomonee Street is neither the first welded pedestrian bridge in Chicago, nor is it the first in the U.S. Nonetheless, it is significant as an early example, and for the evidence it shows of experimentation with electric arc welding. Welded steel bridges occur along Lake Shore Drive, mostly south of the Chicago River, and represent the products of the CPD's experiments with welding. A welded pedestrian bridge spanning South Lake Shore Drive at East 47th Street in Burnham Park won an honorable mention in the 1938 American Institute of Steel Construction (AISC) "Most Beautiful Steel Bridge" competition.[60] This structure, a three-hinged welded plate girder arch 115'-0" long, appears in AISC's 1939 publication, *Prize Bridges*. CPD architect Emmanuel V. Buchsbaum, formerly of the Lincoln Park Commission, himself owned a copy of this book, and may well have wanted a prize bridge for the park he knew best.[61] With recognition from the Museum of Modern Art and the national architectural press, the passerelle's exposure undoubtedly exceeded that of its predecessor to the south. The Lincoln Park passerelle is both longer and more slender than the 47th Street structure, indicating CPD engineers' growing confidence with what was then a new technique in bridge construction.

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[58] To increase the buckling resistance of the ribs, additional bolted batten plates were added during a 1991 rehabilitation. The bolted plates occur to either side of vertical members on the rib's underside, and also directly over the diaphragms, where they carry the diagonal braces' upper ends.

[59] Note that the passerelle at 47th Street was "completely shop-welded." See Smith, "Chicago Park Passerelle," 25.

[60] American Institute of Steel Construction, *Prize Bridges: 1929-1938* (New York: American Institute of Steel Construction, 1939).

[61] Emmanuel V. Buchsbaum Papers, CPD Archives.

Although a history of welding is beyond the scope of this report, a summary of welded bridge construction in the U.S. will provide the context for the Lincoln Park passerelle.[62] In 1921, the Williams Bridge Company of Syracuse, New York, constructed a footbridge over the Delaware & Hudson Railroad tracks at the General Electric plant in Schenectady.[63] This single 35'-0" span, the first all-welded bridge in the U.S., began a decade of experimentation with electric arc welding for bridge repair and construction. Until the advent of shielded welding electrodes, which reduced inclusions of slag and therefore improved the ductility of welds, bridge engineers avoided butt welds. They therefore initially kept to the truss form, using fillet welds to join members to the same splice and gusset plates found on those of riveted construction. Welded plate girders rose in popularity during the 1940s, however, and featured efficient members with variable-depth webs and variable-thickness flanges.[64] The Lincoln Park passerelle shows some of the earlier conservative practice in the arch ribs' fillet-welded flange angles and batten plates. These overlapping connections could have been joined by rivets, albeit less quickly than by welding. Because of the arch ribs' variable-depth web plates with butt-welded splices, the passerelle belongs to the later, plate-girder era.

Footbridges were a more fertile ground for experimentation with welding because they carried lighter loads and were subject to less stringent requirements. According to a recent inspection of the Menomonee Street passerelle, "A code that is specifically devoted to the design and analysis of pedestrian bridges does not exist in the United States."[65] The CPD was, in fact, not bound to any building code in 1940. Park architect Emanuel V. Buchsbaum wrote, in a sentence that was thankfully cut from the final version printed in the *Illinois Society of Architects Monthly Bulletin,* "Although we are not required by law to follow the Chicago Building Code, practically all our buildings do comply with the code."[66] This is mostly true for the Lincoln Park passerelle. CPD engineers selected a live load of 100 pounds per square foot (psf), a value likely obtained from contemporary American Association of State Highway Officials (AASHO) design standards. They designed the passerelle to carry this load applied across the entire span, but did not consider a "split" or half-span loading.[67] As modern engineers noted, a split loading of 100

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[62] Jeffrey A. Hess and Robert Hybben gave a more detailed discussion of the subject in"Benton Street Bridge," HAER No. IA-30.

[63] See Frank P. McKibben, "Welded Buildings and Bridges Erected in the United States," *Welding* 2 (Sep. 1931): 612.

[64] Nathan W. Morgan, "Development of Welded Bridge Construction," *Welding Journal* 32, No. 10 (Oct. 1953): 925.

[65] Wiss, Janney, Elstner Associates, "Lincoln Park Pedestrian Bridge," 3.

[66] Emanuel V. Buchsbaum, draft of article for *Illinois Society of Architects Monthly Bulletin,* 9 Jan. 1936, in Buchsbaum Papers, CPD Archives. For comparison, see ibid., "Architectural Activities," 1-2.

[67] Live load of 100 psf, "no split loading," stated in CPD, "Arch Passerelle Near Menomonee, Analysis of Stresses and Data for Raising Crown," sheet 1, Drawing Set No. 100-63 (Oct. 1945), CPD Plan Files; cf. American Association of State Highway Officials, *Standard Specifications for Highway Bridges,* 2nd ed. (Washington, D.C.:

psf would produce higher forces in the arch rib, but would require seven hundred people on half the bridge with the other half empty. This is improbable today, and must have seemed even more so in 1940.[68] By not designing for split loading, CPD engineers produced a lighter and more elegant structure. Increasing public use of the passerelle, however, led the CPD to re-evaluate this assumption a half-century later.

Repair

Two problems have affected the passerelle throughout its lifetime. The first, spreading abutments, was noticed right away. Settlement of the crown occurred because the shallow arch exerts relatively large horizontal thrusts on its abutments, which then spread apart from each other in the sandy soil. Measurements taken in 1989 indicated that "the center hinge has dropped 5 to 6 in. since 1940."[69] The spreading occurred at a decreasing rate, however, as the center hinge had settled three inches within the first five years alone. Drawings from 1945 show that the arch crown was raised 4-7/8" by inserting 1-1/4" shims at the lower hinges.[70] No effort was made to tie back or otherwise stabilize the abutments, however, so they continued to spread apart. A more permanent solution came with the 1991 rehabilitation, which added tie-back anchorages to the existing foundations. Dowels, grouted into surrounding soil, help restrain the abutments from further spreading.[71] The arch ribs were again raised, but this time shims were added to the center hinge.

Given heavy vibrations that had occurred throughout the bridge's lifetime, heavy modern use of the bridge (particularly by pedestrians watching the Air and Water Show at North Avenue Beach) motivated the CPD to re-analyze the structure.[72] The CPD commissioned a 1990 study by Wiss, Janney, Elstner Associates, which found that the passerelle's ribs would fail under a split loading using the design value of 85 psf found in current codes. As noted above, this loading would require an unrealistically large number of people on the bridge. Using a more reasonable value, the engineers found that the arch ribs were safe, but by a narrow margin that

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American Association of State Highway Officials, 1935), 176.

[68] The 700-person (100 psf) figure was scaled up from the 600-person (85 psf) figure in Wiss, Janney, Elstner Associates, "Lincoln Park Pedestrian Bridge," 3.

[69] Wiss, Janney, Elstner Associates, "Lincoln Park Pedestrian Bridge," 7.

[70] CPD, "Arch Passerelle Near Menomonee, Analysis of Stresses," sheet 1.

[71] Wiss, Janney, Elstner Associates, "Rehabilitation of Lincoln Park Pedestrian Bridge near North Ave," 6 sheets, Drawing Set No. 100-1216 (19 Mar. 1991), CPD Plan Files.

[72] Klein, telephone conversation with author, 22 July 1999.

should be increased.[73] Possible strategies for upgrading the span included locking the center hinge, reducing the deck's weight, inserting a mid-span support, or adding cross-bracing in the vertical truss planes. The engineers concluded that cross-bracing would be most effective, and after the CPD accepted the visual impact, diagonals were added to each panel between arch rib and deck. Although these new elements complicate the bridge's design, they allow it to carry loads with current standards of safety.

Conclusion

As a somewhat experimental structure, the Lincoln Park passerelle's continued survival attests to the success of its design. Although the limelight of critical acclaim has faded, it remains a landmark to users of Lincoln Park and to motorists on North Lake Shore Drive. In fact, the passerelle serves a continuing function despite changing ideas about the highway that runs beneath. The Chicago Department of Superhighways' plans to integrate Lake Shore Drive into an expressway system might have spelled disaster for the passerelle, which does not provide a sufficient clearance for trucks. By the 1970s, however, the Chicago Plan Commission was reconsidering Lake Shore Drive's role as an urban expressway, advocating for keeping it as a parkway instead. A 1972 report admonished against upgrading the drive to expressway standards, providing expressway links with existing expressway system, or even extending the drive itself. Indicating its continuing paragon status, a photograph of the Lincoln Park passerelle appeared on the same page, with the caption, "The pedestrian overpass at North Avenue is an excellent example of the kind of access facility needed at more frequent intervals along Lake Shore Drive."[74]

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[73] American Association of State Highway Transportation Officials, *Standard Specifications for Highway Bridges,* edition not specified, paragraph 3.14.1.3, cited in Wiss, Janney, Elstner Associates, "Lincoln Park Pedestrian Bridge," 3.

[74] Chicago Plan Commission, *The Lake-front Plan of Chicago* (Chicago: 1972), 25.

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