

WILLOW RUN EXPRESSWAY BRIDGES 10-102  
(~~Bridge R01~~)

US-12 over the Conrail Railway, Eastbound  
Ypsilanti vicinity  
Washtenaw County  
Michigan

HAER No. MI-97-A

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MICH  
SI-YPSEV  
IA

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
Northeast Region  
Philadelphia Support Office  
U.S. Custom House  
200 Chestnut Street  
Philadelphia, P.A. 19106

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HISTORIC AMERICAN ENGINEERING RECORD

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(~~Bridge R01~~)  
US-12 over the Conrail Railway, Eastbound  
Vicinity Ypsilanti  
Washtenaw County, Michigan

Photographer:    Dietrick Floeter      June 1995

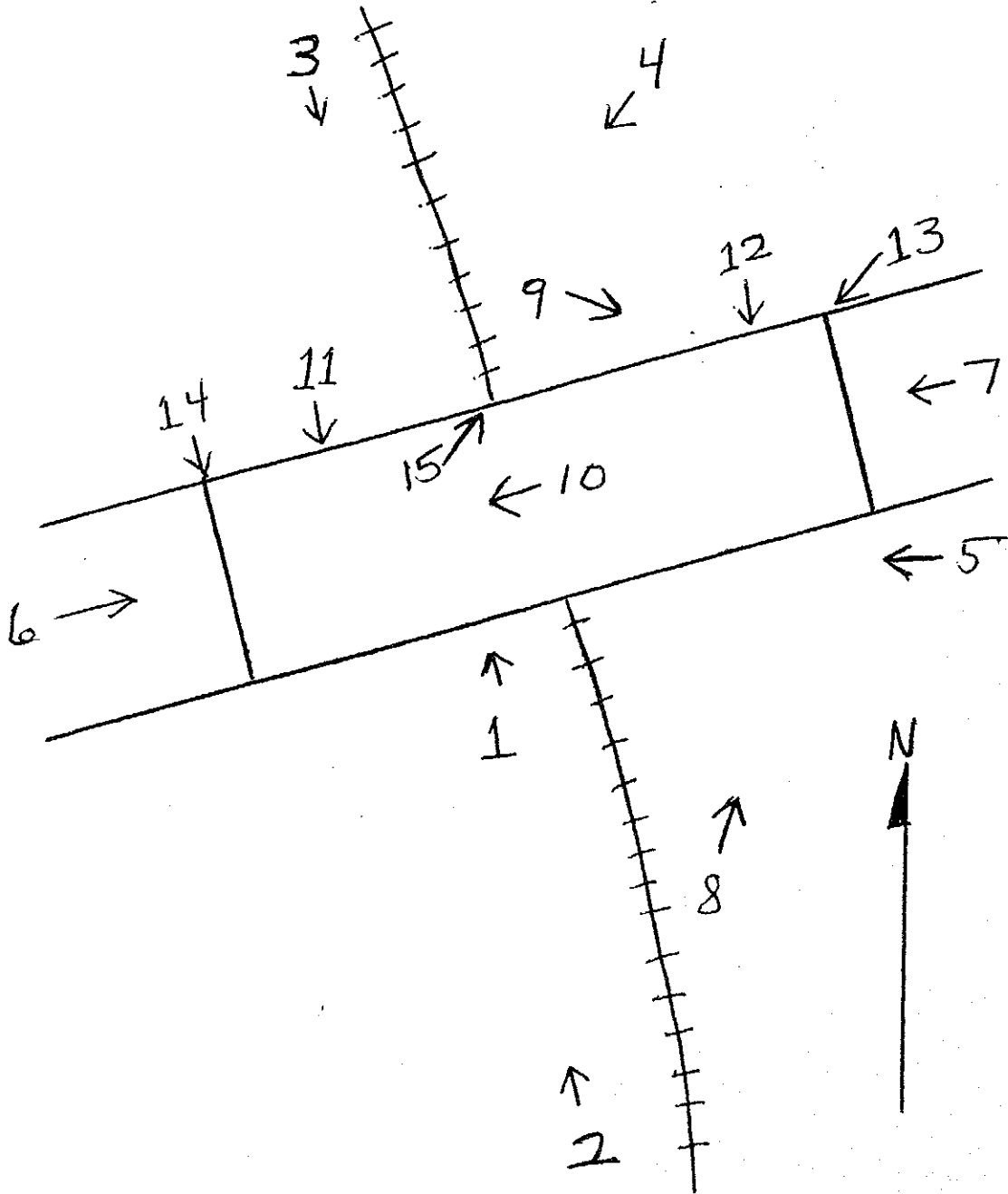
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~~EASTBOUND (Bridge R01)~~

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HISTORIC AMERICAN ENGINEERING RECORD

WILLOW RUN EXPRESSWAY BRIDGES No. 201

(~~Bridge ROL~~)

HAER No. MI-97-A

Location: US-12 over the Conrail Railway, Eastbound  
Ypsilanti vicinity, Washtenaw County  
Michigan

UTM: 17.288830.4680060 (Eastbound)  
17.288780.4680200 (Westbound)  
Quad: Ypsilanti East, MI 1:24,000

Dates of  
Construction: 1941, 1966

Builder: Michigan State Highway Department and  
various contractors

Present Owner: Michigan Department of Transportation,  
425 West Ottawa  
Lansing, Michigan 48909

Present Use: Vehicular Bridges

Significance: This pair of bridges created a grade  
separation between the Willow Run  
Expressway and a railroad line serving  
the Willow Run Bomber plant (1942). The  
Willow Run Expressway, the first  
substantial limited-access highway in  
Michigan, along with its continuation,  
the Detroit Industrial Expressway,  
enabled vast numbers of workers living  
in Detroit to commute to the Willow Run  
plant. This is one of only two highway-  
railroad grade separations to survive  
from the original expressway system.

Project  
Information: This documentation is the result of a  
Memorandum of Agreement between the  
Federal Highway Administration and the  
Michigan State Historic Preservation  
Office as a mitigative measure prior to  
demolition of the structures. It was  
completed in 1995 by Dr. Charles K. Hyde,  
Wayne State University, Detroit, MI 48202

## HISTORY

In January 1941, key Ford Motor Company leaders, including Edsel Ford and Charles Sorensen, visited the offices of the Consolidated Aircraft Company (later, General Dynamics) in San Diego, California, at the request of the federal Advisory Council for National Defense. President Roosevelt wanted the Ford Motor Company to produce Consolidated's new B-24 Liberator bomber for the United States military. Ford agreed to manufacture and assemble 540 bombers a month, roughly one per hour, an unprecedented quantity. In late March 1941, construction began on an enormous factory on Ford property at Willow Run, in eastern Washtenaw County, some 21 miles west of the Detroit border. By the end of the year, Ford had completed an enormous steel-framed building, which measured 1,280 feet by 3,200 feet and created 3.5 million square feet of floor space. Designed by Albert Kahn and costing \$47.6 million, the Willow Run Bomber plant was the second largest war plant built in the United States. Production of parts began in October 1941, followed by center wings in April 1942. The first complete B-24's rolled off the assembly line in September 1942. The plant did not produce one plane an hour until March 1944, but when manufacturing ceased on June 28, 1945, the Willow Run bomber plant had built 8,685 Liberators, a remarkable achievement.<sup>1</sup>

Willow Run became the plant site because Ford owned a 300 acre farm there and additional lands could be bought cheaply. The bomber plant, adjoining hangers, and the adjacent landing field occupied more than 1,000 acres. Charles Sorenson, Ford's production boss, estimated that 90,000 workers would be needed once the plant reached peak production. Housing such a massive influx of workers and their families would become a monumental problem, since rural Ypsilanti Township, where the plant was located, had a population of only 4,153 in 1940 and the city of Ypsilanti, some four miles west of the plant, had only 12,121 residents. Fortunately, peak employment at the plant (June 1943) was 42,331, less than half of Sorenson's projection. Only a small share of these workers lived in the vicinity of the plant because the United States government refused to provide housing for them. Federal authorities built only minimal housing for single workers. At most, in late 1943, the federal government housed about 5,000 bomber workers at Willow Run.<sup>2</sup>

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~~(Bridges R01 and R02)~~  
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Both Ford and the federal government assumed that the bomber plant employees would live in Detroit or Dearborn and drive to work. Initially, workers could drive to the plant from the Detroit area only by way of Michigan Avenue (U.S. Highway 112) and Ecorse Road (M-17), both two-lane paved roads. Ford Motor Company and Michigan State Highway Department officials estimated that the plant would generate a peak traffic volume of 8,000 passenger cars and 140 busses at the time of shift changes. Throughout the day, a large volume of trucks would deliver raw materials and parts to the plant. On top of plant-related traffic, the nearby roads normally carried an additional 2,500 vehicles per hour. The existing road system was hopelessly inadequate for the traffic the new plant would generate. On 3 September 1941, the Michigan State Highway Department submitted a proposal to the Defense Public Works Agency for a limited-access divided highway system to serve the Willow Run plant. A month later, the agency approved initial funding of \$257,000 to allow construction to begin. On 17 January 1942, the U.S. War Department agreed to spend \$3,220,000 to complete the Willow Run Expressway. The federal government would pay construction costs and the State of Michigan would provide the right-of-way.<sup>3</sup>

The Willow Run Expressway was configured like a giant "U" lying on its side, wrapping around the bomber plant, with the easternmost end open. The southern part of the expressway extended 9.1 miles east to Hannan Road in Romulus, where the second leg of the new highway system, the Detroit Industrial Expressway, continued in an easterly direction. In March and June 1942, the War Department approved the construction of this second leg, which would extend initially to Southfield Road in Allen Park and in time to Wyoming Avenue in Detroit, for a total of 17.1 miles. The Federal government agreed to pay 75 percent of the estimated construction costs of \$9.5 million, with Michigan paying the remainder and providing the right-of-way. The segment extending to Southfield Road opened in January 1943, with the remaining sections completed in November 1944 and February 1945. The total cost of the two expressways, including land acquisition, was considerably higher than the initial estimates. The Willow Run Expressway cost \$5 million and the Detroit Industrial Expressway an additional \$12 million.<sup>4</sup>

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The expressway system presented major challenges to the Michigan State Highway Department, which had direct responsibility for the design of the system, land acquisition, contract administration, and supervising construction. Once planning for the expressway system was underway, three-quarters of the State Highway Department engineering staff were assigned to the Detroit metropolitan area. The State Highway Department used the staff of Robert Moses, New York Commissioner of Parks, as consultants to review plans for the expressway system. Moses, the designer of New York City's limited access parkway system, was widely recognized as the premier authority on the design of limited access highways. The Willow Run Expressway included two tri-level grade separations, an entirely new design feature. The only other tri-level highway bridge in the United States was under construction near the new Pentagon Building in Washington, D.C. The Michigan State Highway Department was also forced by wartime shortages to use as little steel as possible in the construction of the two expressways. They built the concrete roadways without using steel reinforcing rods and virtually all bridges used continuous concrete tee-beams rather than the more orthodox steel girder design.<sup>5</sup>

Construction began in early November 1941 on some relatively simple parts of the project - the upgrading of Ecorse Road (M-17) into a four-lane concrete expressway extending three miles east from the bomber plant and building nearly 14 miles of 22-foot pavement on Wiard and Chase Roads. By working 24 hours and day, seven days a week, with the benefit of unusually mild weather, all the concrete paving was completed by Christmas 1941. Grading for the entire expressway was also completed in the closing months of 1941. During this time, contractors moved 125 railroad carloads of gravel and 7,000 truckloads of dirt every day, for a total of about 350,000 cubic yards of material. The army of construction equipment and men attracted large numbers of sightseers, whose presence clogged the nearby roads and disrupted the movement of the trucks. By Spring, 1942, work was underway on the two tri-level grade separations, six additional grade separations, and the remainder of the roadway system.<sup>6</sup>

WILLOW RUN EXPRESSWAY BRIDGES <sup>No. R01</sup>  
(~~Bridges R01 and R02~~)  
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The Michigan State Highway Department completed the Willow Run Expressway in eleven months and held dedication ceremonies on 12 September 1942. About 15,000 bomber plant workers joined in the celebrations. Under Secretary of War Robert P. Patterson was the principal speaker, but the others who shared the platform were notable: Henry and Edsel Ford; Murray Van Wagoner, Governor of Michigan and former State Highway Commissioner; G. Donald Kennedy, State Highway Commissioner; and Frank X. Martel, President of the Detroit and Wayne County Federation of Labor.<sup>7</sup>

After two extensions were added later, the Willow Run Expressway consisted of 21.2 miles of two-, four-, six-, and eight-lane divided highways. The widest roadways, including the sections which this pair of bridges carry over the railroad lines, were found near the bomber plant's main parking lots. The narrowest were simply feeder roads or entrance ramps from existing surface streets to the expressway segments of four or more lanes. The Michigan Highway Department estimated that each 11-foot lane could carry 1,500 vehicles per hour. The northern portion of the Willow Run system connected to Ecorse Road (M-17) and Michigan Avenue (US-112), two important surface roads extending easterly through western Wayne County. The southeastern part of the expressway connected with the Detroit Industrial Expressway extending to Detroit. Finally, the southwestern extension of the expressway connected to Michigan Avenue (US-112), west of the City of Ypsilanti, creating a 7-mile long bypass of downtown Ypsilanti.<sup>8</sup>



DESCRIPTION

Each of the two bridges have identical design characteristics and vary only slightly in overall dimensions. Both are reinforced concrete structures using continuous concrete T-beams to carry the bridge deck and roadway. Each consists of three spans which rest on two piers and concrete abutments. Both carry four lanes of traffic, each 11 feet wide, and have two concrete shoulders, each 14 feet wide, making each bridge 72 feet wide overall.

The eastbound bridge has a center span measuring 56 feet 4 inches long and two side spans, each measuring 41 feet 4 inches long, for an overall length of 139 feet. The center span of the eastbound bridge creates a vertical clearance of 21 feet 5 inches above the railroad grade. The westbound bridge has a center span measuring 62 feet 2 inches and two side spans, each measuring 62 feet 2 inches long, for an overall length of 154 feet 2 inches. The center span of the westbound bridge creates a vertical clearance of 20 feet 2 inches above the railroad grade.

The grade separations created by both bridges come from the fact that the roadway is elevated above the railroad grade level via a long elevated approach created with earth embankments. One end of the side spans rest on massive reinforced concrete abutments and the other end rests on the concrete piers.

The reinforced concrete piers for both bridges are virtually identical, measuring 74 feet long, 18 feet high, 3 feet wide at the base and 2 feet wide at the top, with 2 1/2 inch bevelled edges on all corners. The ends and sides of each pier have a single decorative flute, which measure 5 inches wide and 1.75 inches deep. The ones on the end of the piers are centered and extend to the top of the pier, while the flutes on the pier sides are set back 15 1/2 inches from the end of the pier and extend only to within 3 feet of the top of the pier.

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~~(Bridges R01 and R02)~~  
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The continuous T-beam bridge features concrete beams that vary in depth over the length of the bridge, producing a profile which gives the appearance of a gentle arch. As a result, the height or depth of the bridge proper, excluding railings, varies from 5 feet 10 inches at the piers to 3 feet 2 inches at the center of the center span. The side spans are only 3 feet 6 inches high at the abutments. The individual T-beams which comprise the structural support system for the bridge, also vary in size between the center line of the bridge and the outer edge at the railings.

Each of the spans of both bridges consists of 14 continuous T-beams. Their size and configuration can be seen from under the spans, where the "leg" of each T is distinctly seen, giving the appearance of parallel ribbing. Each leg or rib is 1 foot 6 inches wide and their edges are 4 feet 3 inches apart, making the top or crown of the T, which supports the bridge deck, 5 feet 9 inches wide. The center spans and each of the side spans each have two sets of cross members running perpendicular to the legs of the T-beams and tying them together. The depth or height of the ribs vary considerably within each span. At the middle of the center spans, the ribs are 12 inches deep, but then increase to a depth of 14 inches at the piers. At the center of abutments of the side spans, the ribs are only 16 inches in depth and then gradually reach a depth of 24 inches at the piers. The ribs, however, also increase in depth to 2 feet 3 inches as one moves from the center of the side spans to the outer edges, immediately beneath the railings. These variations in the depth of the legs of the T-beams reflects the variations in tension and compression forces they are subjected to.

The railings (1966) consist of a series of rectangular concrete rails, each 48 inches long, 15 inches high, and 12 inches deep, resting and centered on concrete supports 15 inches long, 12 inches high, and 12 inches deep. The supports are 33 inches apart and rest on the bridge deck. The rails have 1 1/2 inch bevelled edges all around, while the concrete supports have 1 inch bevelled edges. At the top of the rail, there are steel brackets to hold the round steel guard rail, which is 4 inches in diameter. The brackets, which are 6 inches square at the base and 14 inches high, are placed 7 feet apart and are centered above the concrete supports.

NOTES

<sup>1</sup>Lowell Julliard Carr and James Edson Stermer, Willow Run: A Study of Industrialization and Cultural Inadequacy (New York: Harper & Brothers, 1952), pp. 3-4 and Allan Nevins and Frank Ernest Hill, Ford: Decline and Rebirth, 1933-1962 (New York: Charles Scribner's Sons, 1962), pp. 182-186, 189.

<sup>2</sup>Carr and Stermer, Willow Run, pp. 22, 63 and Nevins and Hill, Ford: Decline and Rebirth, pp. 215-216.

<sup>3</sup>G. Donald Kennedy, State Highway Commissioner, "The Access Highway System at Willow Run," Michigan Roads and Construction, 39 (15 October 1942), pp. 3-4; Nevins and Hill, Ford: Decline and Rebirth, p. 215.

<sup>4</sup>Kennedy, "The Access Highway System at Willow Run," pp. 3-4; "The Super-Highways at Willow Run Bomber Plant," Detroit News, 11 September 1942; "Eleven-Mile Route Serves Willow Run: New Road Has Capacity of 6,000 Vehicles An Hour," Detroit Free Press, 31 January 1943; and "Michigan's Greatest Road System Cost \$26,000,000," Michigan Roads and Construction, 42 (15 March 1945), p. 6.

<sup>5</sup>Kennedy, "The Access Highway System at Willow Run," pp. 3-4 and State of Michigan, Nineteenth Biennial Report of the State Highway Commissioner for the Fiscal Years Ending June 30, 1941 and June 30, 1942 (Lansing, 1942), p. 83.

<sup>6</sup>Ibid.

<sup>7</sup>James Sweinhart, "15,000 Hear Patterson: Under Secretary of War at Willow Run," Detroit News, 12 September 1942 and "Willow Run Tribute Paid: Patterson Says Planes Will Go to Tokyo," Detroit News, 13 September 1942.

WILLOW RUN EXPRESSWAY BRIDGES <sup>W. R01</sup>  
(~~Bridges R01 and R02~~)  
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<sup>8</sup>Michigan State Highway Department, Willow Run Access System Connecting Detroit Labor Reserve and Bomber Plant (no place, no date) and "Michigan's Greatest Road System Cost \$26,000,000," p. 6.

SOURCES OF INFORMATION

- A. Engineering Drawings: The original engineering drawings of these bridges could not be found in the records of the Michigan State Highway Department or in the State Archives of Michigan.
- B. Historic Views: A search of the State Archives of Michigan, the Bentley Historical Library at the University of Michigan, the Burton Historical Collections at the Detroit Public Library, the Ypsilanti Historical Society, and the Ypsilanti Public Library yielded no historic views of these bridges.
- C. Bibliography
1. Primary and Unpublished Sources:
    - Detroit Free Press, September 1942-January 1943.
    - Detroit News, September 1942.
  2. Secondary and Published Sources:
    - Carr, Lowell Julliard and James Edson Stermer. Willow Run: A Study of Industrialization and Cultural Inadequacy. New York: Harper, 1952.
    - Clive, Alan. State of War: Michigan in World War II. Ann Arbor: University of Michigan Press, 1979.
    - Michigan Roads and Construction, 1942, 1945.
    - Michigan State Highway Department. Willow Run Access System Connecting Detroit Labor Reserve and Bomber Plant. No place, no date. State Archives of Michigan, RG-58-5, Vol. 17.
    - Michigan State Highway Department. The Willow Run Expressway System and the Detroit Industrial Expressway. No place, no date. State Archives of Michigan, RG-58-5, Vol. 16.

WILLOW RUN EXPRESSWAY BRIDGES <sup>No. R01</sup>  
~~(Bridges R01 and R02)~~  
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C. Bibliography (continued)

2. Secondary and Published Sources

Nevins, Allan and Frank Ernest Hill. Ford: Decline and Rebirth, 1933-1962. New York: Charles Scribner's Sons, 1962.

Sherman, Don. "Willow Run," Air and Space Smithsonian, Vol. 7, No. 3 (August/September 1992), pp. 74-83.

State of Michigan. Nineteenth Biennial Report of the State Highway Commissioner for the Fiscal Years Ending June 30, 1941 and June 30, 1942. Lansing, 1942.

Wilson, Marion F. The Story of Willow Run. Ann Arbor: University of Michigan Press, 1956.

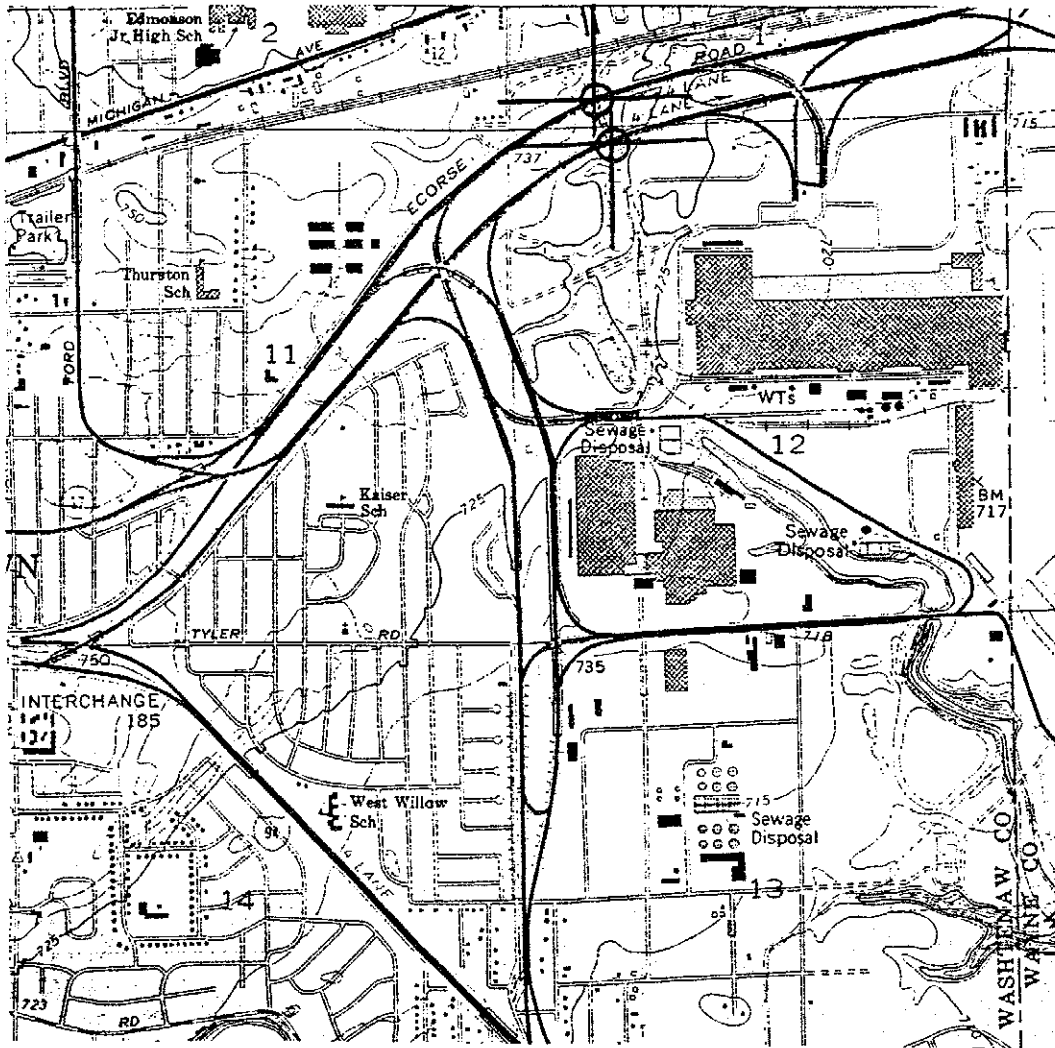
Ypsilanti Daily Press. Golden Anniversary, 1904-1954. Special edition of 30 October 1954.

WILLOW RUN EXPRESSWAY BRIDGES No. R01  
(Bridges R01 and R02)  
HAER No. MI-97-A (page 12)

YPSILANTI EAST, MICHIGAN QUADRANGLE, 1:24,000

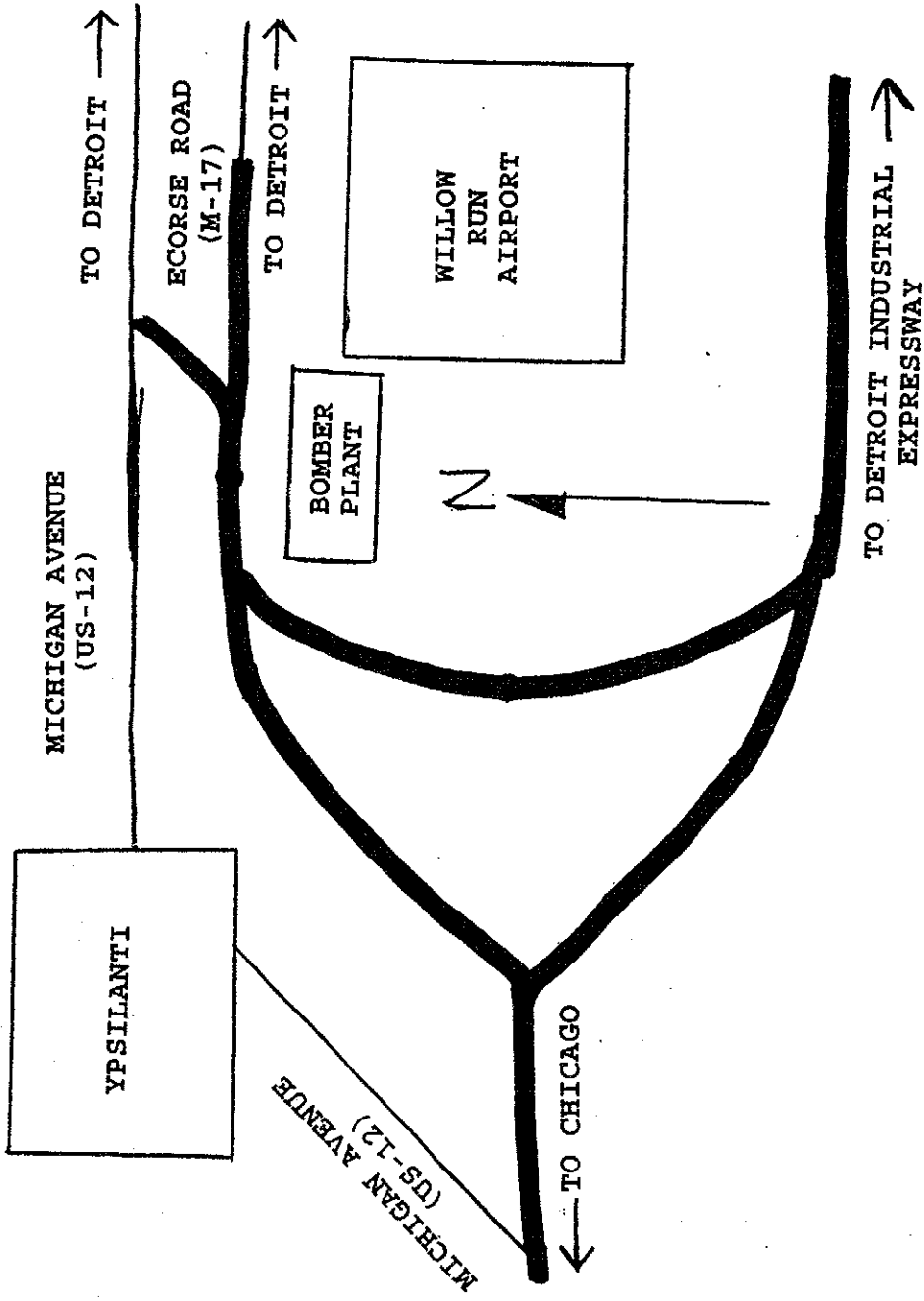
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WILLOW RUN EXPRESSWAY BRIDGES No R02  
~~(Bridges R01 and R02)~~  
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OVERALL PLAN OF WILLOW RUN EXPRESSWAY SYSTEM





WILLOW RUN EXPRESSWAY BRIDGES <sup>No. 201</sup>  
(~~Bridges R01 and R02~~)  
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GENERAL SITE PLAN

