Text for Fair Lawn Avenue Bridge Interpretation

For nearly 150 years Fair Lawn Avenue has been conveyed across the Passaic River by a bridge, connecting the dense industrial city of Paterson in Passaic County to the suburban borough of Fair Lawn in Bergen County. The most recent iteration of the Fair Lawn Avenue Bridge - historically known as the Fifth Avenue Bridge after the original street name - was the third structural crossing in this location. It was built circa 1905 to replace an iron truss bridge destroyed by a major flood along the Passaic River in 1903. The Fair Lawn Avenue Bridge represented a transitional period in bridge construction, utilizing both pinned and riveted field connections to join truss members. The bridge carried vehicular and pedestrian traffic between Fair Lawn and Paterson for over a century.

Flooding Along the Passaic

Due to its location on the Passaic River and relatively low elevation compared to the surrounding land, Paterson and its historic bridges have been repeatedly inundated by floodwaters over the course of its history. While major flooding events in 1810 and 2011 bookend two centuries of an increasing number of major flooding events, the floods of 1902 and 1903 loom largest in the city's history.[1] Paterson had been devastated by a fire in early February 1902 that destroyed 456 buildings in the city, largely in the commercial center of the city and more affluent residential neighborhoods. Less than a month later the city experienced a disastrous flood when heavy rains and snowmelt upriver flowed into the Passaic River and downstream to Paterson. The river rose to fifteen feet above normal, surpassing by about seven feet the flood of 1882, which had been the highest in living memory up to that point. The silk mills of the city–largely spared by the previous month's fire–were greatly damaged, as were the streets and sidewalks. Though most Paterson's bridges survived the flood, many lost railings and were damaged by debris. Despite relief that rumors of more bridge collapses turned out to be false, property damage from the flood was estimated to exceed $1,000,000.[2]

On October 10, 1903, Paterson was once again inundated by an unprecedented flood. Caused by what *Engineering News* called a "very heavy and unusually concentrated rainfall," the 1903 flood surpassed that of the previous year in terms of both height and damage – the high-water mark was approximately three to four feet higher than the flood of 1902.[3] Five individuals were killed and damage for the Passaic River Valley was conservatively estimated at around $7,000,000. The waters swept away nine bridges in Paterson and more outside the city limits. Even those bridges that technically survived - such as Arch Street, Main Street, Wesel (Market) Street, West Street, and Broadway - endured significant damage. The Fair Lawn Avenue Bridge was one of the bridges washed away. Newspapers reported that the entire iron superstructure and two masonry piers were destroyed, and an abutment heavily damaged.[4]

The back-to-back floods also spurred efforts at flood prevention and mitigation along the Passaic River, resulting in the establishment of the Northern New Jersey Flood Commission of 1903 and the Passaic River Flood District Commission of 1906. Problems such as encroachment on the river channel, overdevelopment, and the draining of wetlands were identified and a number of solutions were proposed, though ultimately never implemented. After a flood in 1936, the Army Corps of Engineers was tasked with developing flood control measures for the river, but plans were rejected in the following years.[5]

Rebuilding the Fair Lawn Avenue Bridge

---

[1] Northern New Jersey Flood Commission [NNJFC], *Report of the Northern New Jersey Flood Commission* (Somerville, New Jersey: Unionist-Gazette Association, 1904), 6; Sam Dolnick, "River, at 100-Year High, Ravages a City That Once Thrived on It," *New York Times,* August 31, 2011, http://www.nytimes.com/20111091011nyreqion/paterson-nl-is-devastated-by- ftoods-after-hurricane-irene.html.

[2] "Rushing Waters Engulf Our City," *Paterson Evening News,* March 3, 1902, 1; 'Worst of the Flood is Over,' *Paterson Evening News,* March 4, 1902, 1; "Six Dead in the Flood," and "Paterson Flood is Falling," *New York Times,* March 4, 1902, 2.

[3] "Flood Damage to Bridges at Paterson, N.J.," *Engineering News,* vol. 50, 1903, 377.

[4] "It Rained Bridges At Freeholders' Meeting," *The Paterson Evening News,* October 16, 1903, 1.

[5] Charles H. Capen Jr., "History of the Development of the Use of Water in Northeastern New Jersey," *Journal of the American Water Works Association,* vol. 28, 1936, 977; NNJFC, Report, 8-9, 12-1 3; J. Sanderson Stevens, *Phase 1A Archaeological Investigations for the Proposed Bridge Replacement or Rehabilitation of Bridge No. 1600009 (Fair Lawn Avenue Over Passaic River)* (Newark: North Jersey Transportation Planning Authority and the Passaic County Engineer, February 2000), MULT F 536a, 4-20.

Passaic County Engineer William Whitmore developed plans for many of the replacement bridges over the Passaic River, including the original plans drafted for the Fair Lawn Avenue Bridge. The plans called for a three-span Pratt truss – characterized by vertical members and diagonals that slope down towards the center – with concrete piers finished to imitate ashlar stone construction. Whitmore also called for the spans to be reused from the 33rd Street Bridge in Paterson, which had been damaged in the flood and were being stored on the banks of the river. Sometime after this initial design, the plan was revised to a two-span Pratt truss with a simple concrete pier. The Fair Lawn Avenue Bridge became one of only three through truss bridges constructed in the wake of the 1903 flood, along with the Straight Street Bridge and Arch Street Bridge. The primary structural components of the bridge were fabricated by the largest steel manufacturer in the world at the time, United States Steel, which formed in 1901 when the Carnegie Steel Company merged the Federal Steel Company and National Steel Company.

Notably, the Fair Lawn Avenue Bridge utilized both pinned and riveted connections. Most nineteenth-century American metal trusses used pin connections, with structural members connected by round pins that were reasonably easy to erect in the field but were susceptible to loosening under the shaking caused by fast-moving vehicular loads. By around 1890, stronger riveted connections began to be utilized, with the riveting done by machine in the erection shop and the span shipped to its location already assembled. Pinned truss connections largely fell out of use by the twentieth century, making the Fair Lawn Avenue Bridge a rare example of a transitionary period in truss bridge construction.

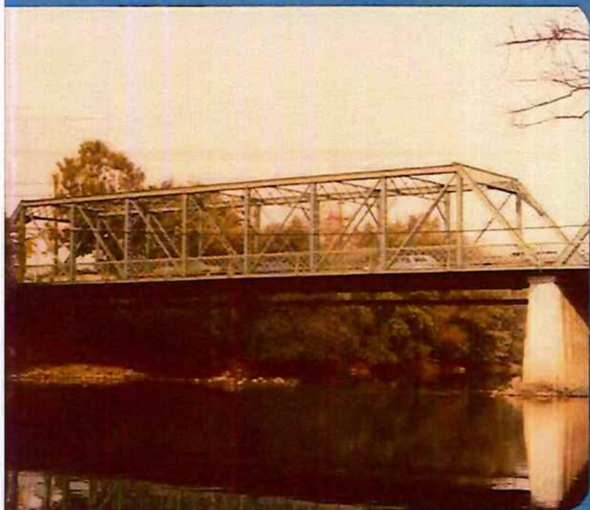
As the Riverside neighborhood continued to develop in the twentieth century, the Fair Lawn Avenue Bridge grew incompatible with increasing traffic in the area. A 1922 report of the City Plan Commission suggested replacement and realignment of the bridge to better integrate with the Paterson street system. The bridge was never replaced and remained largely unchanged until 1967 when the arched concrete deck was removed and replaced with a steel grate deck. New stringers were added to replace the deteriorated members and support the modern deck. Additional bracing was added at the portals in the 1980s. In 2014 it was announced that, due to structural and functional deficiencies, the bridge would be replaced with a wider, two-span bridge. The construction of the new bridge will start in 2020.

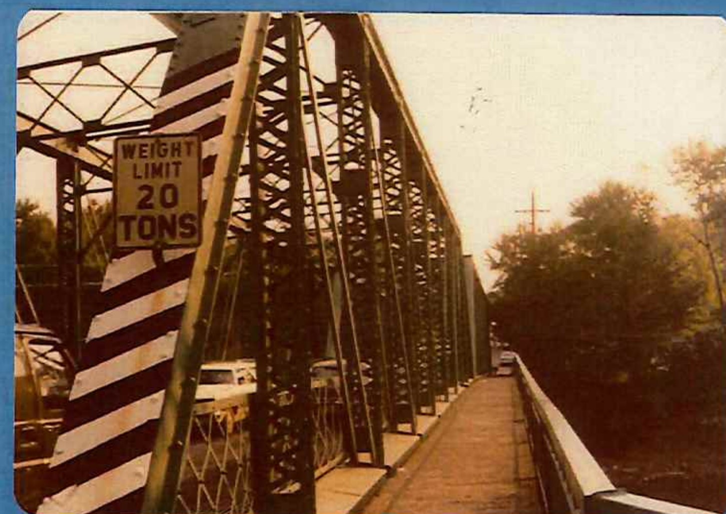

2FT 6IN
N McLean Blvd 20 S
DO NOT ENTER
BRIDGE CLOSED

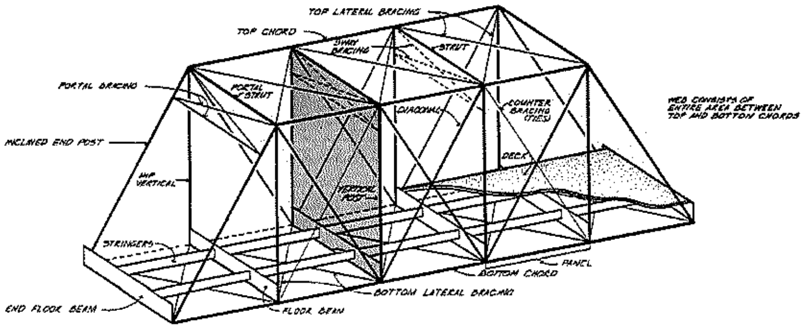
Photo_Information

Photos taken by Rob Tucher for the Historic American Engineering Record, 2017.

1. Oblique view of south elevation. View looking northwest.
5. West skewed portal and view through barrel of trusses. View looking east.
13. Detail view of southeast upper end connection. View looking northwest.




WEIGHT LIMIT 20 TONS



TRUSSES

A STUDY BY THE HISTORIC AMERICAN ENGINEERING RECORD

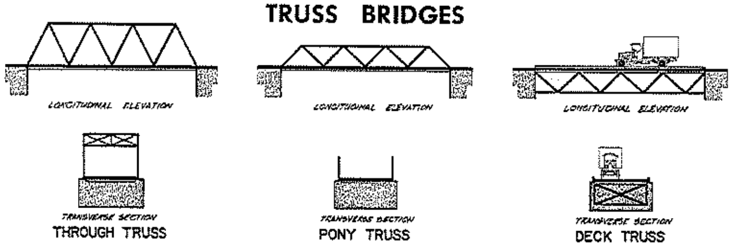
A TRUSS IS COMPOSED OF STRUCTURAL TRIANGLES JOINED TOGETHER WITH PINNED OR RIVETED CONNECTIONS. THE MAIN PIECES OR MEMBERS MAY BE EITHER STIFF HEAVY STRUTS, POSTS OR THIN FLEXIBLE BARS. IT IS THE ARRANGEMENT OF THESE MEMBERS THAT DETERMINES THE SPECIFIC TRUSS TYPE.

STRUCTURAL MEMBERS RESIST FORCES IN TWO PRIMARY WAYS — COMPRESSION AND TENSION. HEAVY RIGID MEMBERS MAY RESIST BOTH COMPRESSIVE AND TENSILE FORCES, BUT THIN RODS CAN ONLY RESIST TENSION AND THESE CHARACTERISTICS ARE MAJOR CLUES IN TRUSS IDENTIFICATION. NOTE THAT THE MAIN STRUCTURAL MEMBERS OF A TRUSS PANEL MAY BE SUPPLEMENTED BY THIN DIAGONAL TIES. BECAUSE TRUSS TYPES ARE DETERMINED BY THEIR MAIN STRUCTURAL MEMBERS, THESE COUNTER BRACES (INDICATED BY BROKEN LINES ON THE IDENTIFICATION SHEET) MAY BE IGNORED. AFTER MATCHING THE STRUCTURAL OUTLINE OF THE TRUSS IN QUESTION WITH THE DIAGRAM IT MOST RESEMBLES, CHECK TO MAKE SURE THE ARRANGEMENT OF HEAVY COMPRESSION AND LIGHT TENSION MEMBERS IS COMPATIBLE WITH THE DIAGRAM. IF THERE IS AGREEMENT, THEN THE BASIC TRUSS TYPE IS IDENTIFIED.

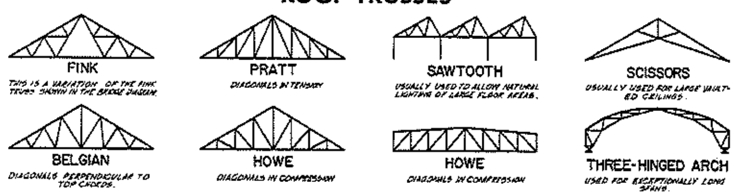
THIS SHEET OF TRUSS DIAGRAMS PRESENTS ONLY THE STANDARD FORMS OF THE MOST COMMON TRUSSES. THERE ARE ALSO MANY "HYBRID" TRUSSES THAT DO NOT FALL INTO EASILY-DEFINED CATEGORIES. IN SUCH CASES, IDENTIFICATION SHOULD BE MADE AS CLOSELY AS POSSIBLE IN TERMS OF THE STANDARD DESIGNS. ADDITIONALLY TRUSSES OFTEN ARE INVERTED, CREATING OUTLINES QUITE DIFFERENT FROM THE ORIGINAL — TENSION MEMBERS BECOMING COMPRESSION MEMBERS AND VICE VERSA. BEFORE ASSUMING A TRUSS IS NOT REPRESENTED ON THE DIAGRAM, CHECK TO SEE IF IT IS AN INVERTED FORM.

MOST BRIDGE TRUSSES ARE OF THREE BASIC TYPES. IF THE DECK AND/OR RAILS ARE LEVEL WITH THE BOTTOM CHORDS, IT IS A THROUGH TRUSS. A PONY TRUSS IS A THROUGH TRUSS WITH NO LATERAL BRACING BETWEEN TOP CHORDS. A DECK TRUSS CARRIES ITS TRAFFIC LOAD LEVEL WITH THE TOP CHORDS.

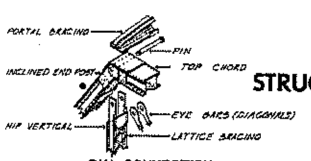
TRUSS BRIDGES



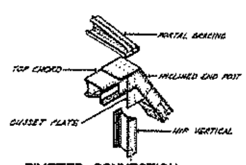
ROOF TRUSSES



STRUCTURAL CONNECTIONS



PIN CONNECTION



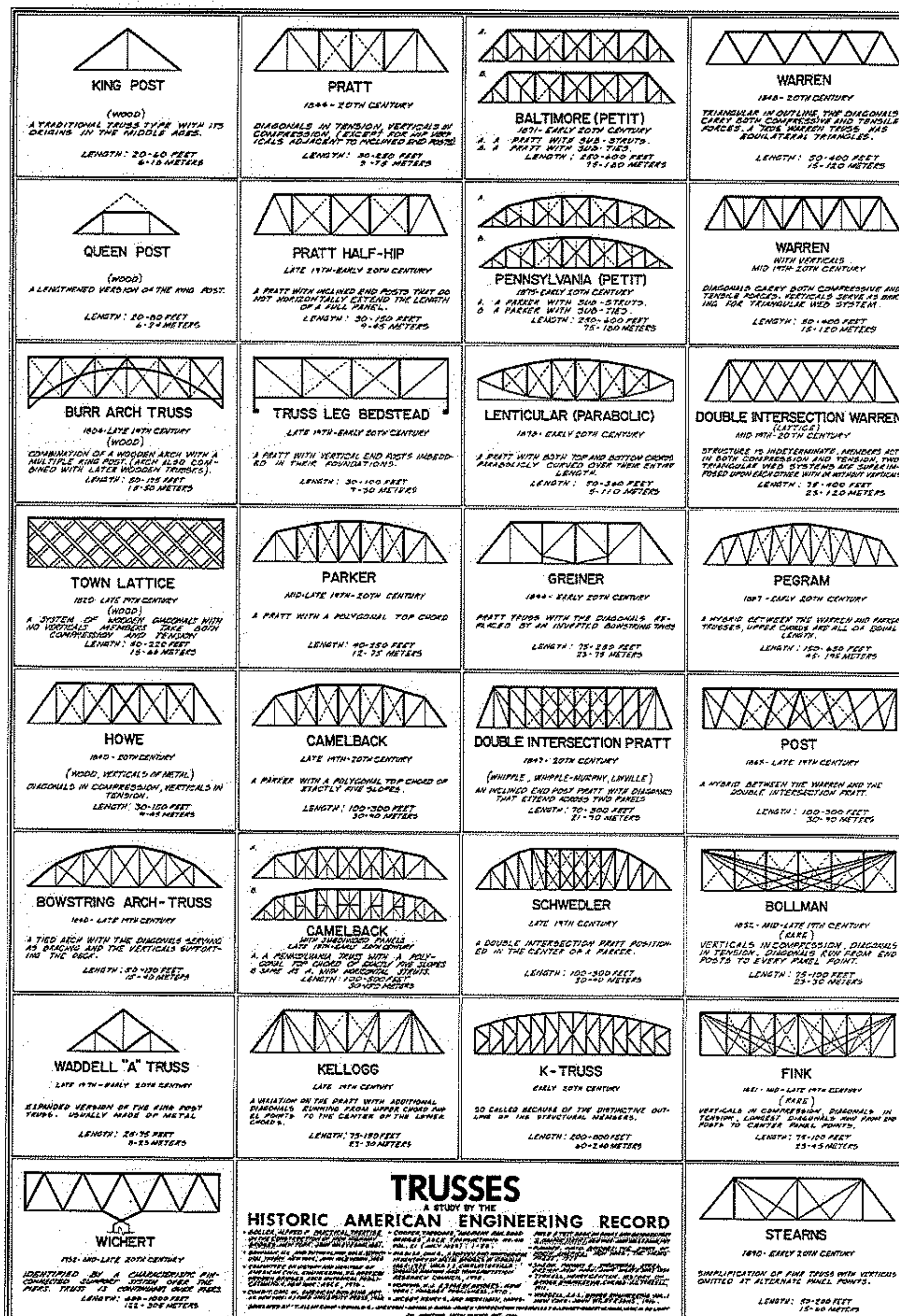
RIVETED CONNECTION

OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION
TECHNICAL INFORMATION PROJECT

TRUSS IDENTIFICATION: NOMENCLATURE

HAER TH-1 | HISTORIC AMERICAN ENGINEERING RECORD | SHEET 1 OF 2 SHEETS

PRINTED BY THE MONTGOMERY C. MEIGS ORIGINAL CHAPTER OF THE SOCIETY FOR INDUSTRIAL ARCHEOLOGY, ROOM 5020 NATIONAL MUSEUM OF HISTORY AND TECHNOLOGY, SMITHSONIAN INSTITUTION, WASHINGTON, D.C., 20560



OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION
TECHNICAL INFORMATION PROJECT

TRUSS IDENTIFICATION: BRIDGE TYPES

HAER TH-1 | HISTORIC AMERICAN ENGINEERING RECORD | SHEET 2 OF 2 SHEETS

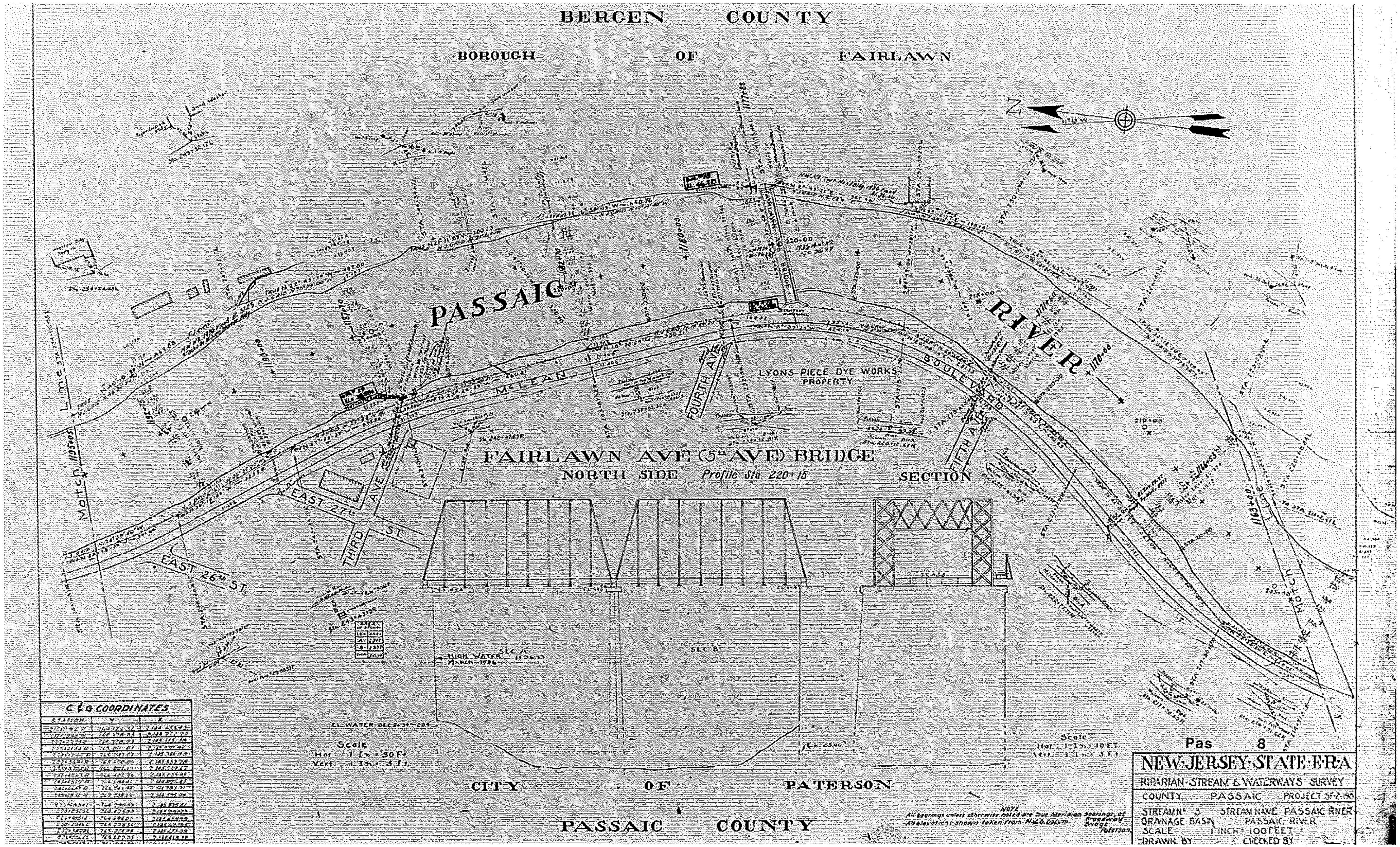
PRINTED BY THE MONTGOMERY C. MEIGS ORIGINAL CHAPTER OF THE SOCIETY FOR INDUSTRIAL ARCHEOLOGY, ROOM 5020 NATIONAL MUSEUM OF HISTORY AND TECHNOLOGY, SMITHSONIAN INSTITUTION, WASHINGTON, D.C., 20560

Source_Information

WPA1_1934
- Works Progress Administration Riparian and Stream Survey of the Passaic River, showing the Fair Lawn Avenue Bridge site plan, section, and elevation in 1934.
- New Jersey Environmental Digital Library via Rutgers University Community Repository.
- This resource may be copyright protected. You may make use of this resource, with proper attribution, for educational and other non-commercial uses only. Contact the contributing organization to obtain permission for reproduction, publication, and commercial use.
- https://doi.org/doi:10.7282/T39S1QX0

HAER truss poster
- Trusses: a study by the Historic American Engineering Record
- Credit: Historic American Engineering Record, National Park Service, Arnold David Jones, 1976
- Rights status not evaluated. For general information see: "Copyright and Other Restrictions...,"(http://www.loc.gov/rr/print/195_copr.html)
- https://www.loc.gov/pictures/item/97515080/

Bridge file photos_1978
- On file with the Passaic County Engineering Department


BERGEN COUNTY
BOROUGH OF FAIRLAWN
PASSAIC RIVER
McLEAN BOULEVARD
LYONS PIECE DYE WORKS PROPERTY
FOURTH AVE
FIFTH AVE
EAST 27th ST
THIRD AVE
THIRD ST
EAST 26th ST
Match Line 1195+00
Match Line 1163+00
FAIRLAWN AVE (5th AVE) BRIDGE
NORTH SIDE Profile Sta 220+15
SECTION
SEC A
SEC B
HIGH WATER MARCH 1936
Scale
Hor. 1 In. = 30 Ft.
Vert. 1 In. = 5 Ft.
Scale
Hor. 1 In. = 10 FT.
Vert. 1 In. = 5 Ft.
C & G COORDINATES
STATION
CITY OF PATERSON
PASSAIC COUNTY
NOTE
All bearings unless otherwise noted are True Meridian Bearings.
All elevations shown taken from N.J.G. Datum.
Pas 8
NEW·JERSEY·STATE·E·R·A
RIPARIAN·STREAM & WATERWAYS SURVEY
COUNTY PASSAIC PROJECT SF-2-195
STREAM No 3 STREAM NAME PASSAIC RIVER
DRAINAGE BASIN PASSAIC RIVER
SCALE 1 INCH = 100 FEET
DRAWN BY CHECKED BY