

**10. NAME(S) OF STRUCTURE**

State Bridge Number 684

**11. PHOTOS (W/ FILM ROLL & FRAME NO.) AND SKETCH MAP OF LOCATION**

49B:4-16



49B:5

Mack, Warren W. "A History of Motor Highways in Delaware", in Reed, Henry Clay, Delaware: A History of the First State, vol.2, pp.535-550 (NY: Lewis Historical Publishing Co., 1947).

Delaware State Program. Delaware State Highways; The Story of Roads in Delaware.... [Newark, Delaware: Press of Kells, 1919].

Federal Writers' Project. Delaware: A Guide to the First State. (New York: Viking Press, 1938).

Delaware State Archives. New Castle County Levy Court Records. Specifications, Proposals, Contract and Bond files.

Delaware State Archives. New Castle County Road Commissioners Records, 1750-1940.

Delaware DOT records: Annual Reports; contract files.

Plans on file at Delaware DOT: Contract #700, 2028, 70-040-09

**13. INVENTORIED BY:**

**AFFILIATION**

**DATE**

P.A.C. Spero & Company with Kidde Consultants for Delaware DOT

April-November 1988

12. SOURCES

# HABS/HAER INVENTORY

See "HABS/HAER Inventory Guidelines" before filling out this card.

## 1. NAME(S) OF STRUCTURE

State Bridge Number 684

## 2. LOCATION

South Heald St. over Conrail  
Wilmington, New Castle County, Delaware

## 3. DATE(S) OF CONSTRUCTION

1942  
4. USE (ORIGINAL/CURRENT)

5. RATING  
Vehicular

SG

## 6. CONDITION

Good

State Bridge Number 684 is a composite girder and slab structure, 21 spans in length, built on a twenty degree skew. The 34'-6" main span comprises 10 concrete encased steel girders. The other spans are concrete slabs. The deck is 57'-2" wide and carries four lanes of traffic, a 2'-0" median and a 4'-0" sidewalk on each side. The substructure consists of concrete abutments and U-shaped wing walls. The main span, the encased steel girder portion, is supported by concrete piers with arched openings, while the slab spans are supported by individual concrete columns with mushroom capitals grouped in threes at each end. The bridge features geometrical embellishment reflecting the influence of the Art Moderne movement of the period. The portals are marked by large concrete pylons with vertical striations and a chevron motif on their outer faces; these pylons formerly supported light standards, and serve as end blocks for a metal railing which runs above the wing walls. The wing walls feature a pattern of incised horizontal lines. Each approach span is defined by large concrete blocks at either end, above the piers; a concrete parapet wall unites the blocks, with rectangular panels punctuated with diamond-shaped openings. Where the approaches meet the main span, the parapet steps up in a series of sloping setbacks to join pylons similar to those at the portals. The parapet of the main span is higher than that of the approach spans; its upper section is decorated with incised horizontal lines. On the main span, diamond-shaped insets of glazed tile replace the openings found on the approach parapets. A steel rail continues the parapet above the wing walls. Bridge 684 is very similar to Bridge 686/Conrail 0.55, Delaware River Extension.

Delaware Department of Transportation records state that Bridge 684 was built in 1942. A plaque on the bridge states that it is named in memory of Paul F. Livingston "Born 1895 Died 1963, Delaware Legislator 1953-1963". Drawings on file at the Delaware Department of Transportation document the details of designs, materials, and construction for this structure. These drawings, dated August 1940, indicate that the bridge was designed under Delaware State Highway Department Contract Number 700 and was a federally aided project ( Federal Aid Project No. FAGM 117-1(3) ). The structure carried Heald Street over the ShellPot Branch of the Pennsylvania Railroad; the drawings note that plans were approved by the Pennsylvania Railroad Office of Engineering for Bridges and Buildings on December 19, 1940. The structure was designed in accordance with American Association of State Highway Officials (AASHO) specifications of 1935 for H-20 loading, (AASHO was the predecessor to today's AASHTO) with some modifications of the flat slab portions. Bids were received June 11, 1941, and contract #700 was awarded to J.A. Bader & Co., Inc. of Wilmington on June 23, 1941 for \$137,774.85. Bethlehem Steel Company of Bethlehem, Pennsylvania supplied the steel. The bridge opened on June 25 of the following year, and work was completed on August 20, 1942. This quick construction time reflects the priority rating this project received from the Public Road in order to avoid wartime delays in material delivery. The parapet, railings, columns, and curb, as well as the expansion rockers, were repaired in 1961 under contract #2028 at a total cost of \$10,050.00. Repairs to the parapets were required in 1961 due to movement of the concrete deck caused by the skew of the bridge over the railroad. Twenty years use had created slab movement greater than an inch; this in turn, applied pressure to the parapets and caused damage. The parapet, railings, columns, and curb, as well as the expansion rockers, were repaired in 1961 under contract #2028 at a total cost of \$10,050.00. Maintenance repairs to the curb, sidewalk, and surface were accomplished in 1970 under contract #70-04-009. Decorative lamp standards, shown in the drawings, may have been removed during railing repairs.

Constructed as a grade crossing elimination, State Bridge 684 carries S. Heald St. over the Pennsylvania Railroad. This multiple span, highly embellished example of a concrete encased steel girder and concrete slab bridge is significant for its multiple spans, its architectural treatment and the structural configuration of its slab spans. Its Art Moderne ornamentation is stylistically very similar to New Castle County Bridge 686 and Sussex County Bridge 257E, both grade crossings. Most steel and concrete bridges surveyed in Delaware were single spans with little ornamentation. In addition to these characteristics, the bridge's slab spans are late applications of an early twentieth century technological innovation more commonly used in building construction, the concrete slab on mushroom columns. The reinforced slab carried on round columns with flared capitals was first developed for building design by C.A.P. Turner in 1905. Application of the mushroom column and concrete slab to bridge construction occurred shortly after that. As the scientific understanding of reinforcement increased in the twentieth century, the form evolved to include a beam which connected cylindrical columns and to the commonly used pier form more typically seen in mid-twentieth century bridge design. Bridge 684 also was designed to eliminate a grade crossing at the Pennsylvania Railroad tracks. Grade crossings posed a dangerous junction between railroad and highway traffic, accounting for thousands of fatalities in the United States in the first quarter of the twentieth century; in 1926, the Delaware State Highway Department began a systematic program of eliminating these hazardous crossings. The railroad companies acted in cooperation with the Highway Department to replace grade intersections with separated crossings. About 1940, the federal government began to offer assistance for this type of construction through the Federal Aid highway program of the Public Roads Administration.