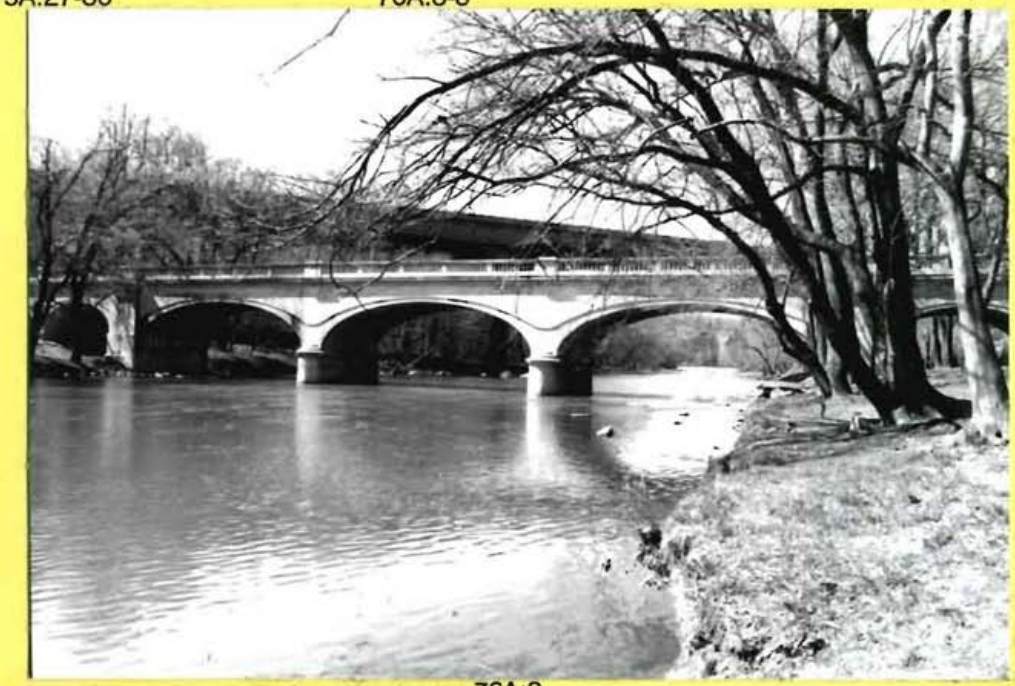
10. NAME(S) OF STRUCTURE

State Bridge Number 698

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

75A:27-36 76A:3-8



76A:3

12. SOURCES

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Plans on file at Delaware DOT: Contract #BNC-7, 70-05-002, 80-071-02

13. INVENTORIED BY:	**AFFILIATION**	**DATE**
P.A.C. Spero & Company with Kidde Consultants for Delaware DOT		April-November 1988

HABS/HAER INVENTORY

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

1. NAME(S) OF STRUCTURE

State Bridge Number 698

2. LOCATION

Van Buren Street over Brandywine Creek & Flume
Wilmington, New Castle County, Delaware

3. DATE(S) OF CONSTRUCTION

1906

4. USE (ORIGINAL/CURRENT)

Vehicular

5. RATING

CA

6. CONDITION

Fair: Spalling, cracking and calcium stains on arches, piers and abutments.

7. DESCRIPTION

State Highway Bridge 698 (Van Buren Street Bridge) is a 353 feet long, eight span filled, solid spandrel concrete arch bridge and aqueduct. The spans vary in length, measuring 9'-0", 28'-0", 28'-0", 56'-0", 56'-0", 56'-0", 33'-0" and 33'-0". Arch reinforcement consists of I beams in the short spans and latticed, riveted girders in the long spans; Thacher bars reinforce the stairs and retaining walls. The bridge carries two lanes of traffic with a total horizontal clearance of 24'-0"; the concrete deck is supported on compacted fill over the arch ribs. The Van Buren Street Bridge is highly embellished, from the concrete substructure to the ornate balustrade. The bridge is topped with an ornate, urn-shaped concrete balustrade divided into sections which mirror the spans by dentiled short square columns and end posts. All piers are corbeled at the top and rounded below, while four are extended up through the parapet and topped with decorative light posts. The west wing walls serve as the base for a straight staircase that leads to the bridge deck from the park. At the stairs the parapet is extended to act as a railing and is decorated with incised geometric shapes. Square columns serve as the newels at the bottom of the stairs. When viewed in elevation, the detailed ornamentation is augmented by decorative arch rings which emphasize the arch structure, and the corbeled fascia. A marble bridge plate, located between spans 1 and 2 on the south elevation, documents the 1906 date of construction and lists the members of the Board of Water Commissioners and the Chief Engineer, Theodore A. Leisen.

8. HISTORICAL DATA

Delaware Department of Transportation records state that Bridge 698 was built in 1906; original drawings are filed at the Department. The drawings indicate that the nationally prominent Concrete-Steel Engineering Company of New York served as consulting engineers; from 1901 to 1912, preeminent American engineer, Edwin Thacher, a reinforced concrete pioneer, was associated with the firm. Constructed as a joint project by the Water Commission and the Park Commission, the Van Buren Street Bridge was an integral part of a major project undertaken to improve the city's water supply. The concrete arches encased a pipe, 48 inches in diameter, carrying water across the Brandywine from Porter Reservoir on Concord Pike to the filter station at 16th and Market Streets. The first concept developed by the Water Commission involved submerging the water main across the Brandywine River. Planners decided to incorporate the large main within a bridge, affording the pipe better protection and linking two sections of Brandywine Park to make the Zoo more readily accessible to visitors. The cost of this combination highway bridge and aqueduct was $40,000, paid according to a 1900 agreement: the Parks Commission paid for one-third of the cost and the Water Commission paid for two-thirds. The two agencies which had cooperated in constructing the bridge continued to share jurisdiction over its maintenance until 1958, when the Park Board took full control. At that date, an inspection of the structure undertaken by the State Highway Department indicated that the bridge required repairs and improvements totaling $200,000. The Department's inspection found the substructure in unexpectedly good condition, but recommended removing the deteriorating deck, sidewalks, and balustrades, and replacing the roadway with a modern, wider thoroughfare. In 1970, the roadway was widened 3'-0" by removing the curb and sidewalk on one side; the existing balustrade was carefully preserved.

9. SIGNIFICANCE

State Bridge 698 is the only example of a multiple span solid spandrel, filled concrete arch bridge. This highly embellished structure is also the earliest concrete bridge surveyed in the state. Among the first structures in Wilmington to utilize the relatively new technology of reinforced concrete, or "concrete-steel", construction, the Van Buren Street Bridge represents an early application of this technology to a multiple span bridge set in a city park. It demonstrates the aesthetic potential of the new material,as well as the versatility of design possibilities in the unobtrusive incorporation a 48-inch water main within this monolithic structure. The Van Buren Street Bridge also has considerable technological significance, reflecting the variety of early twentieth century concrete reinforcement types in its reinforcing scheme: beam reinforcement (both latticed and Melan-type rolled I-beam) and bar reinforcement (Thacher bars). Consulting engineers were the Concrete-Steel Engineering Company of New York City, which had achieved national prominence in the field of reinforced concrete bridge construction. In the decade ending in 1904, this company and its predecessors had constructed 300 reinforced concrete spans across the country. Among the American engineers who contributed to the development of reinforced concrete bridge technology during its formative period was Edwin Thacher (1840-1920), associated with Concrete-Steel Engineering Company from 1901 to 1912. Thacher became interested in steel-reinforced concrete construction in the late 1880s, and by 1895 had made this a specialty. He designed and constructed viaducts and bridges for leading southern railroads during the period 1889-1904. Also during this period, he became the western representative of Fritz von Emperger's company, and was instrumental in disseminating the Austrian engineer's technological innovations in the United States. Among Thacher's numerous patents are designs for deformed steel bar reinforcement, early examples of the reinforcement used in current design. The bridge drawings specify that Thacher bars were used as reinforcement in the stairs and buttresses of the Van Buren Street Bridge.