

## METAL ARCH BRIDGES IN MARYLAND

Metal arch bridges in Maryland do not comprise a large group of historic structures, but do include representative examples from both the nineteenth and the twentieth centuries. No early iron arch bridges are known to have been constructed on the Maryland section of the historic National Road, although National Road maintenance inspired Captain Delafield to build the nationally significant Dunlap's Creek Bridge in 1838. The spread and popularity of the metal arch form in Maryland appear to have occurred primarily in the years following the Civil War, as iron and steel making technology rapidly progressed and bridge building firms were founded to take advantage of a ready, growing market for metal highway spans. Small, pony bowstring arch-truss bridges were marketed by such firms as the King Iron Bridge Company and the Smith Bridge Company to county commissioners in Maryland. As already noted, such structures were essentially combination structures, and could adequately function in quite different ways although their appearance remained the same. In some structures, the arched upper member might serve primarily as an arch connected by a truss system to the bottom horizontal chord of the bridge, while in other bridges the trusses might be the primary components and simply feature an arched top chord.

Dating mainly from the 1870s and 1880s, Maryland's known dated late nineteenth century examples of the metal bowstring truss bridge include three pony spans and one larger through bridge, the Waverly Street Bridge at Williamsport (documented as HAER No. MD-83). The three pony spans recorded on prior survey forms are the Crum Road Bridge over Israel Creek in Frederick County (MHT-F-2-5; a circa 1875 King Iron Bridge Company product), the Bennies Hill Road Bridge over Catoctin Creek in Frederick County (MHT-F-2-2; also made by the King firm in about 1880), and Bridge #51 in the Whitaker Mill Historic District in Harford County (MHT-HA-1237; a bowstring arch-truss with Warren truss configuration of undetermined date). Only further field investigation of these structures can adequately determine whether they are primarily metal arch bridges, or pony trusses with arched upper chords, or a combination design.

While many Maryland county authorities found bowstring arch-truss bridges desirable during the last quarter of the nineteenth century, there is also ample evidence that Baltimore City constructed a number of important metal arch bridges between 1880 and 1900, a period which saw the 1888 annexation of a large surrounding area by the city. Few if any of these urban structures appear to have survived (the last known to have been taken down was the Cedar Avenue Bridge), yet they mark a significant chapter in the employment of the arch form in Maryland bridge building. Two familiar Baltimore City metal through arch bridges of the twentieth century, the Howard Street and Guilford Avenue bridges built over Jones Falls and railroad tracks during the 1930s, attest to the visual presence of the city's late nineteenth century metal arches, as both of these twentieth century bridges

were designed to conform with the built landscape of a group of through arches then crossing the Jones Falls and the tracks.

Many of the city's early metal arch bridges over Jones Falls were built under the auspices of the Jones' Falls Improvement Commission, which in 1878 hired prominent Baltimore Bridge Company partner Charles H. Latrobe as consulting engineer. Latrobe's first accomplishment for Baltimore in metal arch bridge design was the Calvert Street Bridge, 579 feet long and consisting of two bowstring arch-truss spans of wrought iron with two viaduct approaches (Baltimore City Commissioner 1882:694). The fourth bridge erected under Jones' Falls Improvement Commission authority was the St. Paul Street Bridge, a 703-foot-long, two-hinged wrought iron, through arch structure with two through metal arch spans of 110 and 280 feet. This was the largest of all the bridges erected by the Commission between 1878 and 1882 (most of the others were metal truss bridges) (Baltimore City Commissioner 1882:393).

Latrobe's first two metal arch bridges for the city survived well into the twentieth century but were ultimately replaced as traffic loads on Calvert and St. Paul Streets increased. The Calvert Street Bridge, built at the time on the edge of the settled city limits, was pronounced by Mayor Ferdinand Latrobe (Charles Latrobe's uncle) a "suitable place to promenade for persons visiting the suburbs" (Nottrodt 1983). The four ornamental lions guarding the bridge were damaged on December 2, 1883 by Irish-American Larry Finnegan, who protested British rule of Ireland by taking an ax to the lions' tails (Nottrodt 1983). Charles Latrobe's next major metal arch bridge project for Baltimore City, the Cedar Avenue Bridge built in 1889-1890, departed from the pattern of wrought iron bowstring arches and two-hinged through arches to adopt a deck arch design. The Cedar Avenue Bridge, crossing the Northern Central Railroad, the Jones Falls valley, and Falls Road, featured a three-ribbed, three-hinged steel trussed-arch 150 feet in length, with side spans carried by three lines of Warren deck trusses (Vogel 1975:16).

Latrobe, in his 1890 report to the city commissioner, offered further instructive details regarding the Cedar Avenue Bridge and its construction. The superstructure was fabricated by the King Iron Bridge and Manufacturing Company of Cleveland, Krug & Son of Baltimore erected the ornamented hand railing, and the masonry work was done by Jones and Thorne of Baltimore. Incidentally indicating that the Warren deck truss side spans were not original to the bridge, Latrobe's description of the structure outlined why he chose a metal arch for the site:

Owing to the solid rock at Jones' falls at this point, I concluded that a brace arch would be well adapted to the main span, and would certainly present a more graceful appearance than a rectangular truss. This being settled, girders were used for the side spans, so that the bridge as built consists of a braced arch span one hundred and fifty feet long over the water, a seventy-two-foot latticed girder over the Falls road at the eastern end, a seventy-two-foot latticed girder at the western end over the Northern

Central Railway, and thence two plate girders twenty-four feet six inches each to reach the western abutment, which stands in Druid Hill Park [Baltimore City Commissioner 1890:936-937].

The Cedar Avenue Bridge opened a key crossing into the newly annexed Druid Hill neighborhoods; Latrobe did not know of "any recent improvement within the City limits which has been of more use to those who live within its influence" (Baltimore City Commissioner 1890:937).

Charles Latrobe's three major Baltimore metal arches were not immediately followed by similar structures, either in the city or in Maryland generally. The record of metal arch construction in the state resumed in the 1930s, when Baltimore municipal engineers and State Roads Commission officials again concentrated on improvement of key downtown crossings of the Jones Falls valley and adjacent railroad tracks. On December 23, 1935, the State Roads Commission awarded a contract, with Federal Public Works Administration (P.W.A) aid and approval, to the American Bridge Company to furnish a two-span, three-hinged, tied steel arch bridge to replace the 1879 truss bridge carrying Guilford Avenue over the Pennsylvania Railroad (see Plate 12). Complete with United Electric Railways trolley tracks and protective metal and glass screens to prevent persons from climbing up the surface of the arches, the Guilford Avenue Bridge opened on November 2, 1936 (Baltimore City Department of Public Works 1936:252).

Between 1937 and 1939, a second similar bridge, also designed by the Bridge Division of the Baltimore Department of Public Works, was built in downtown Baltimore to carry Howard Street over the B&O and Pennsylvania Railroad tracks. Built with P.W.A. funds and labor like the Guilford Avenue arch and many other Maryland bridges of the 1930s, the Howard Street Bridge featured two three-hinged, tied steel arch spans of 270.4 and 270.67 feet respectively, with plate girder side spans (Baltimore City Department of Public Works 1937:245-246). The Howard Street Bridge opened for traffic in early 1939 (Baltimore City Department of Public Works 1938:232).

Subsequent to construction of the Guilford Avenue and Howard Street spans in Baltimore, only two other mid-twentieth century through steel arch bridges are known to have been built in Maryland. In 1942, the vertical lift movable bridge crossing the Chesapeake and Delaware Ship Canal at Chesapeake City was destroyed during a collision with a freighter. Wartime priorities postponed replacement of this bridge until 1948, when a new Chesapeake City Bridge, a high-level, two-lane tied arch structure with steel hangers, was constructed (Gray 1985:261,289). Maryland's other documented mid-twentieth century metal arch bridge is the Blue Bridge, a two-span tied through arch built in 1955 under State Roads Commission authority to cross the Potomac between Cumberland and Ridgely, West Virginia (Leviness 1958:137; Maryland State Roads Commission 1956b:61). A search of all official reports of the Maryland State Roads Commission

for the 1900-1960 period located no further references to design and construction of metal arch bridges in Maryland.