CANTILEVER BRIDGES: THE GOVERNOR HARRY W. NICE MEMORIAL BRIDGE

From a technical perspective, cantilever construction of a bridge defines a specific form of support of the bridge rather than a particular bridge type such as the truss or girder. Simply supported bridges are directly supported on piers and abutments, while continuous structures, as developed in both metal and reinforced concrete during the late nineteenth and early twentieth centuries, include spans that are continuous across one or more intermediate supports. By contrast, the cantilever form of support occurs when the support is at one end and the other end of the span is free. Cantilever bridges consist of a series of cantilevered spans including a main span and two anchor spans which flank it (Pennsylvania Historical and Museum Commission, and Pennsylvania Department of Transportation 1986:124).

Based on historical research alone, cantilever bridges in Maryland appear to be represented by only one bridge, which may be briefly described in order to provide historic technological context for the evaluation of that bridge, the 1940 Governor Harry W. Nice Memorial Bridge carrying U.S. 301 over the Potomac River.

Bridge historian J.A.L. Waddell noted that "the development of the cantilever. . . did not proceed very far until modern times, when the truss form of structure had become established and when iron and steel constituted the materials of construction" (Waddell 1916:7). Waddell and subsequent technological historians dated the major advent of modern cantilever bridges to the design and construction of the high bridge over the Kentucky River at Dixville in 1876-1877. This bridge was built by Charles Shaler Smith of the Baltimore-based Baltimore Bridge Company. (for more information on Smith's firm, see the section of this report entitled "Metal Truss Bridges") (Schodek 1987:362). During the late nineteenth and early twentieth centuries, cantilever design and construction of other long-span metal bridges in the United States followed Smith's breakthrough.

Historical research has found no records of nineteenth or early twentieth century cantilever bridge construction in Maryland, by Smith's company or any other bridge firms or public authorities. The only known bridge in Maryland to have employed a cantilever system is the 9,918.84-foot-long Governor Harry W. Nice Memorial Bridge, built between 1938 and 1940 as part of the state's "primary bridge program" that also envisioned construction of the Chesapeake Bay Bridge, the first Baltimore Harbor Tunnel, and the Susquehanna River highway bridge at Havre de Grace (J.E. Greiner Company 1938). In 1938, when construction on the bridge had just begun, main designer and contractor J.E. Greiner Company offered the following description of the bridge as it was to be built:

> The main channel span and the two side spans flanking it, comprise a cantilever unit, the main span of which is 800 feet long and the side spans of which are anchor spans each 366 feet 8 inches long. The cantilever units forming the approaches to the central unit are made up of alternate

> anchor spans and cantilever spans 437 feet 6 inches and 500 feet long respectively. The main section of the bridge is approached from the Virginia end by sixty-three spans of concrete pile bent and steel beam trestle construction 3873 feet long, and four plate girder spans 100 feet long, connecting the trestle with the main cantilever unit. On the Maryland side of the river, the main cantilever section of the bridge is approached by three 100 feet plate girder spans and two 250 feet simple truss spans connecting the filled approach, with the main cantilever section [J.E. Greiner Company 1938:99-101].

The bridge was built to carry U.S. 301 in a key commercial link between Southern Maryland and Virginia's Northern Neck, which hitherto had traded goods only by ship or roundabout highway or train transport. Thus, the Governor Harry W. Nice Memorial Bridge is significant as a major example (perhaps Maryland's only example) of modern cantilevered bridge engineering, and is also important because of its strategic economic usefulness as part of the successful Primary Bridge Program of the Maryland State Roads Commission.