PLATE 10: : Typical Metal Plate Girder (Through) Bridge: Crossing Railroad Tracks at Severn

SOURCE: MDOT Photographic Archives (Hughes Co. Photographers, 1932)

PLATE 11: **Typical Metal Plate Girder (Deck) Bridge: Bridge on Baker Street in Baltimore** SOURCE: MDOT Photographic Archives (Hughes Co. Photographers, 1931)

Usually it is the difficulty of shipping very long plate-girders from bridge shop to site that determines the superior limit of such spans. The loading of long girders on cars for shipment is quite an art, and it should be entrusted only to men experienced in such loadings; for, otherwise, the metal is liable to be injured in transit or the cars break down. . . . About as long a plate-girder as has ever been shipped in one piece was one of one hundred and thirty-two (132) feet. It required four flat cars to transport it. Longer plate-girder spans than this have been built, notably tubular bridges and swing spans, but they were shipped in parts and assembled at site. This expedient for simple spans is really permissible only in case of bridges to be sent to foreign countries, and it is to be avoided if possible even then, because it is sometimes difficult to obtain a satisfactory job of field-riveting when making the splices, although the use of pneumatic riveters tends to reduce materially the force of this objection [Waddell 1916:409].

Further development in girder bridge technology between 1900 and 1930 was marked primarily by the spread of concrete-encased rolled I-beam structures, and by the introduction of the familiar mid-to-late twentieth century highway bridge in which deep steel beams support a deck of reinforced concrete. Victor Brown and Carleton Conner in their 1933 handbook *Low Cost Roads and Bridges* remarked on the adaptability and economy of the latter type of girder bridge:

> With the introduction of the deep beam sections (30, 33, and 36 inches deep) now available, it has been possible to greatly simplify details of steel construction, particularly in the shorter span bridges. Spans of 60 to 100 ft. can be worked out, using available beam sections which will show considerable savings when compared with the older type low truss construction. . . .Where a concrete floor slab is used the beams are well protected from weather exposure and painting cost will be greatly reduced. . . .The beam spans have the further advantage that they can be widened or sidewalks added if this becomes necessary, whereas the pony truss spans cannot be widened [Brown and Conner 1933:506-507].

After the World War II hiatus on non-defense-related bridge construction ended in 1945, economical highway girder bridges such as those described by Brown and Conner were readily built by county and municipal officials across the United States.

Technological advances in use of non-traditional metals, such as aluminum, also characterized some metal girder bridge design and construction after World War II. Although ALCOA in 1933 had designed a lightweight aluminum deck for the 1882 Smithfield Street Bridge in Pittsburgh, the earliest aluminum bridge in the United States was a 100-foot-long railroad plate girder span designed by ALCOA and built in 1946 to replace an existing bridge over the Grasse River, near Massena, New York (Trinidad 1984:1). Prior to this bridge, only a bascule bridge at Sunderland, England, and a Scottish footbridge had been made of aluminum (Alison 1984).

The Massena, New York, bridge and a 1950 long-span aluminum highway bridge at Arvida, Quebec, served to demonstrate the capabilities of aluminum as a structural material. Maryland's only known aluminum bridge is a girder bridge (Bridge # 13046) designed and built in 1963 by the State Highway Administration and International Aluminum Structures, Inc., to carry State Route 32 over the South Branch of the Patapsco River near Sykesville (Alison 1984; Suffness 1992a).