

Post-1900 Patterns in Truss Fabrication and Use

The Good Roads movement of the 1880-1900 period prompted calls for improvement of ordinary bridge structures as well, and in numerous jurisdictions official policy called for replacement of older wooden bridges with metal trusses. The development of the Bessemer and open hearth processes permitted the manufacture of low-carbon structural steel, which became generally available for truss bridge construction during the 1890s (Chard 1986). Other late nineteenth and early twentieth century technological improvements, such as the invention of the portable pneumatic riveter, allowed great flexibility in truss construction. By 1920, built-up truss members could be shop-riveted and the bridge connections riveted on site.

Engineering handbooks of the 1890-1920 period accurately reflected the remarkable versatility and usefulness of the metal truss bridge, whether pin-connected or riveted, built in iron or steel, or utilized for fixed or movable spans. Milo Ketchum's 1908 text *The Design of Highway Bridges* noted American Bridge Company standards recommending pin-connected or riveted Pratt through trusses for highway bridges of 80 to 168 feet, quadrangular Warren riveted trusses for 80- to 152-foot spans, Camelback trusses (Pratts with polygonal top chords, usually having five slopes) for 168- to 220-foot crossings, and pin-connected Petit trusses for spans longer than 220 feet (Ketchum 1908:213).

In 1924, the American Society of Civil Engineers' Special Committee on Specifications for Bridge Design and Construction issued a final report on "specifications for design and construction of steel highway bridge superstructure." The committee, which included prominent Baltimore engineer J.E. Greiner, recommended rolled beam bridges up to 40 feet long, plate girders or lattice trusses from 30 to 100 feet, riveted half-through (or pony) trusses between 50 and 100 feet, riveted trusses at 90 feet and over, and riveted or pin-connected trusses at 150 feet and over (American Society of Civil Engineers Special Committee on Specifications for Bridge Design and Construction 1924:267).

In 1933, Victor Brown and Carleton Conner in their *Low Cost Roads and Bridges* noted several changing patterns in modern roadway truss usage. While "truss spans for low cost bridges" were "commonly of structural steel" and ranged from 60 feet to 250 feet, Brown and Conner found that "near the lower limits and up to 100 feet, the rolled steel I-beam is replacing the pony and short span steel truss." With the development of heavy trucks, which featured high cabs and trailers, deck trusses of steel were gradually replacing through trusses whose portals and overhead bracing limited vertical clearance. Brown and Conner recommended a variety of efficient inexpensive crossings, including combinations of through trusses or pony trusses with reinforced concrete and steel girder approach spans (Brown and Conner 1933:510-516).