DATA SHEET

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Sheet #:	**D6c.8**
Title:	**STEEL BRIDGES: THROUGH TRUSS, RIVETED, GENERAL**
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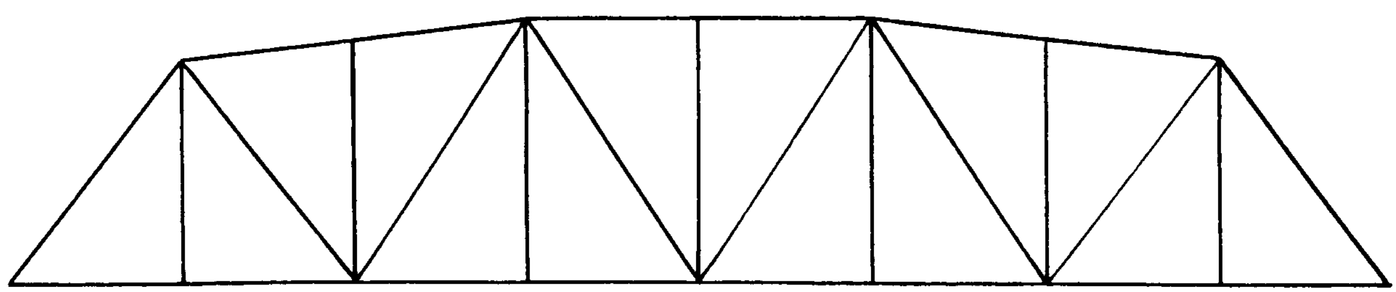
FAVORED TRUSS TYPES, in order given, are the Warren, Pratt, Double-Intersecting and Multiple-Intersecting. These originated as wooden bridge types prior to 1850 and were eclipsed in the era of iron bridges by such spider-web types as the Whipple and Bollman trusses.

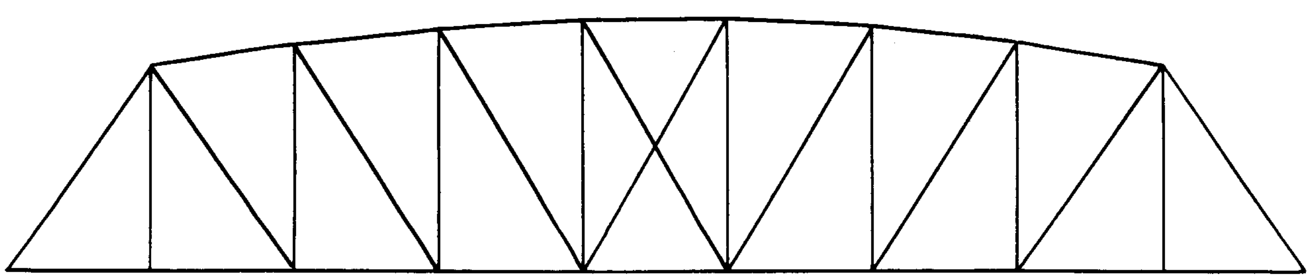
WARREN TRUSS, known in Great Britain as a W Truss. Generally built with an even number of panels. When panels are subdivided, may be called a Baltimore Truss.

PRATT TRUSS, called the N Truss in Great Britain. Usually built with an odd number of panels. When panels are subdivided and top chord is curved, called a Pennsylvania Truss. The term "Castleton Truss," as used in this sheet and accompanying D6c.9, refers to a Pennsylvania Truss with the hips moved a half-panel outward. The prototype is found at Castleton-on-Hudson, N.Y., on the New York Central.

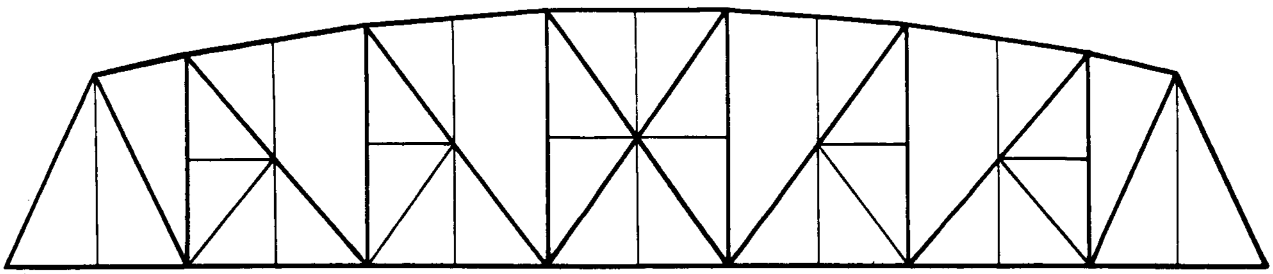
The Warren Truss is generally considered to have the greatest simplicity and efficiency. In long trusses with curved top chords, however, the Pratt type has the advantage of short diagonals, all in tension. In pre-1930 construction, therefore, the Pratt type was favored for long spans. After 1930, construction favored the Warren type. Recent investigation has revealed high secondary stresses near top chords; many bridge designers choose to solve this problem by eliminating vertical hangers. The latest trend is thus away from the Warren type and back to the Pratt, which has only two hangers -- those at the hips.



Plan of center lines of 8-panel Warren Truss from line #5 of table in sheet D6c.9.

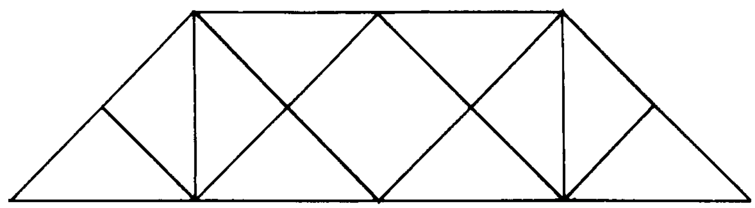


Plan of 9-panel Pratt Truss from line #21 of table in sheet D6c.9. Having an odd number of panels, this truss requires counter-diagonals at least in the center panel. If there were an even number of panels, counters might appear in the two middle panels, in which case the middle vertical would be a post.



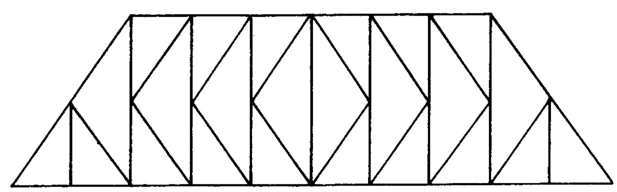
Plan of "Castleton" Truss from line #31 of table in sheet D6c.9. Note subdiagonals.

INTERSECTING-WEB TRUSS. Also called Lattice Truss, or Multiple Warren Truss. Popular before 1920 for spans up to 200 feet. No longer constructed because of inherent difficulties in calculating their stresses. Main advantage lay in appearance.



Plan of 4 panel Double-Intersecting Truss, New York Central prototype. 96 ft. ctr. to ctr. of end pins, 24 ft. ctr. to ctr. of chords. Note lack of intermediate verticals.

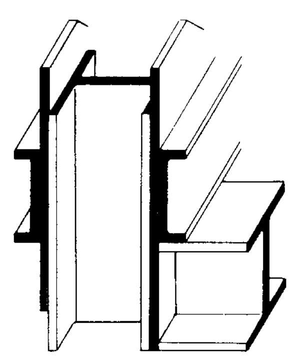
K TRUSS, so named because its plan of elevation resembles a series of capital K's, is a rare type. The only important prototype in North America is the cantilever bridge at Quebec City, QC, Canada.

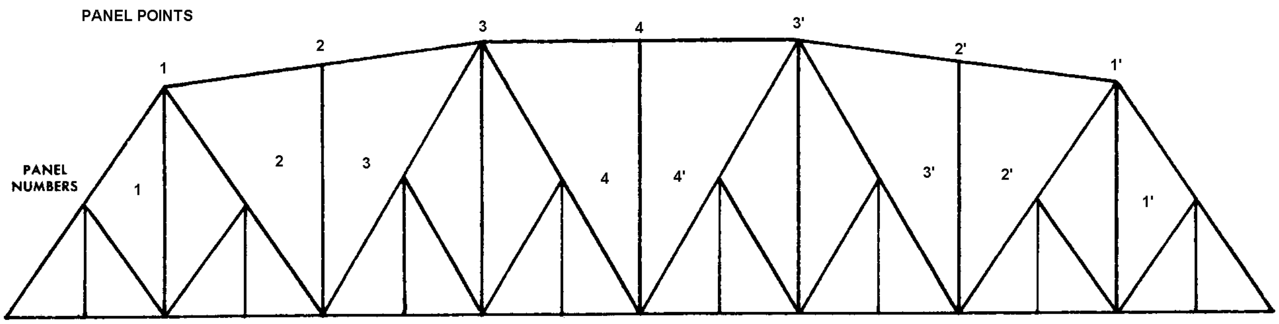


Plan of a typical small K Truss.

PANELS. For spans over 125 feet, the most economical panel length is between 25 feet and 35 feet. Longer panels are subdivided to lighten the floor system, as the weight of a stringer increases as the square of its length. Panels as short as 20 feet may be subdivided when under clearance requirements call for a shallow floor system. Subdivided panels bring secondary stresses into main diagonals, however, and are rarely found in bridges built after 1930. Instead, panels are built to economical lengths in modern construction.

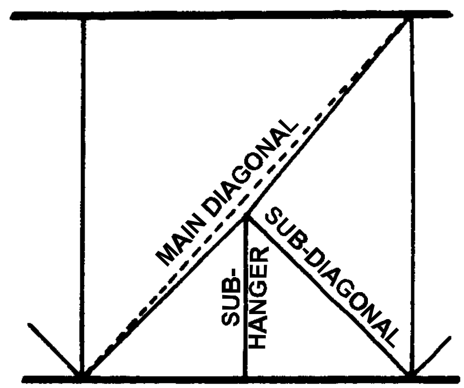
FLOOR SYSTEMS. Refer to D6c.2 for a general discussion of floor systems. Where truss depth is less than 28 feet, floor beams may be suspended beneath bottom chords as shown in the accompanying sketch. Developed from line 1 of table in sheet D6c.9, the sketch shows the bottom chord as a pair of rolled channels and the vertical member as an H.





Plan of center lines of 8-panel Baltimore Truss from line 5 of table, in sheet D6c.8. Note subdiagonals and subhangers. This illustration shows application of panel numbers and panel point numbers as used in this table.

How subdivision causes secondary stresses. Subhanger pulls downward on main diagonal, causing it to bend. This bending is partly, but not entirely, prevented by the subdiagonal. (Subdiagonal shortens slightly under load.)



Theory of "Castleton" Truss. To avoid giving end post a slope of less than 45 degrees, which might bring about collapse of the hip, this point is moved outward a half-panel length. This problem is encountered only when panels are very long. Note nominal members. V-- vertical strut. H -- horizontal strut. All hangers are submembers.