DATA SHEET

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Sheet #:	D6b.5
Title:	TRESTLES: STEEL
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GENERAL

A steel trestle, or viaduct, is a bridge consisting of a series of spans supported on towers or bents, or a combination of towers and bents. The spans are usually deck girders, although riveted trusses are sometimes used. Individual designs are formulated to cover specific problems in fabrication, erection and traffic conditions, and follow an accepted practice, or pattern.

SPANS

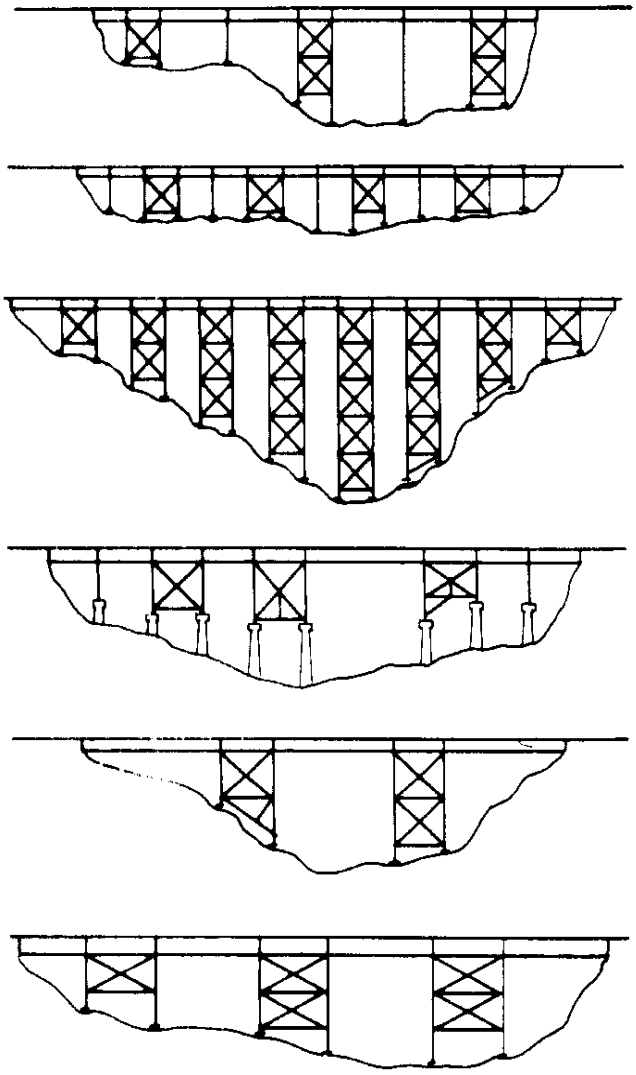
For a given trestle, the tower span is usually made constant--30 feet for low towers, and 40 feet for high towers being common. Tower spans 20 to 25 feet in length for low and medium height viaducts on electric railroads and branch line steam roads are suggested by some authorities. For very high spans, the tower spans should be 1/4 to 1/5 the tower height. The steel towers and steel bents are often combined with concrete piers (See typical examples, to the right.)

Intermediate spans are most frequently either equal to or double in length to the tower span, but they should not be more than double, or greater than about 80 feet in length. Longer spans are used if the terrain presents difficulties for the foundations of the towers.

The intermediate spans should increase in length as the heights of the adjacent towers increase, but for simplicity of fabrication, not more than two different lengths are customary.

Separate girder spans in a given trestle are often of the same depth, even though they may vary in length, such as a 30-foot tower span and a 60-foot intermediate span. In such instances a slight deviation from accepted practices in girder depth is permissible, i.e., the longer girder may be somewhat shallower than normal, as the shorter girder will be deeper than necessary. These permissible variations can be ignored by the model builder in the interests of simplicity, and the girder depth recommended in Data Sheet D6c.4 for the longest span should be used for all spans in a given structure.

TYPICAL DESIGNS



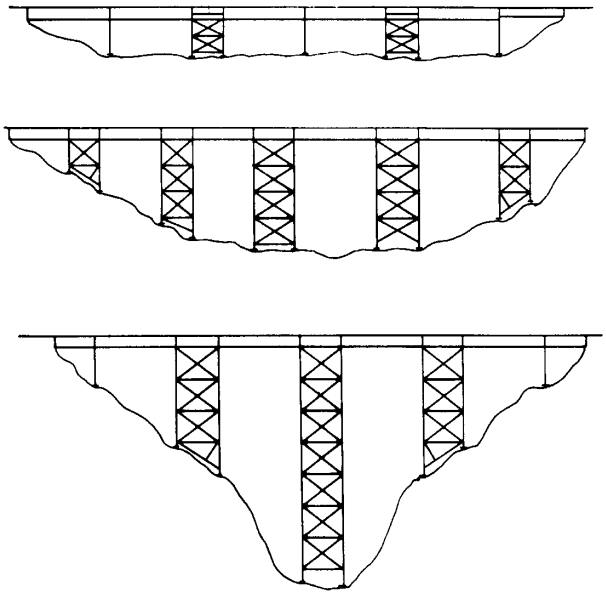
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TOWERS AND BENTS

Columns in the towers and bents for single track viaducts and high double track viaducts should have a batter of 1/6 on tangents and as much as 1/4 on curves. Double track batter may be 1/9 (A.R.E.A. recommends 1/6 for single track, 1/8 for double track). Low double track trestles need not have batter.

Towers and bents should be divided into stages, or stories, whose height is about equal to the tower span. This story height should be used in all towers of the trestle, with any variation in height absorbed in the bottom story. Longitudinal and transverse bracing should have common panel points, although more transverse panels may be needed in a tall, narrow tower so that the bracing will meet the columns at about 45 degrees. The diagonals and horizontal members of the tower bracing may be latticed angles or channels, gusseted to the tower legs. In general, older bridges contain more latticed members, the purpose of which was to economize on steel without weakening the structure. A higher proportionate cost of erection-shop labor, and the increased variety of structural shapes available, dictate the present-day use of such shapes almost exclusively. Rods and adjustable members are not used for laterals. Skew towers should be avoided.

TYPICAL DESIGNS



For trestles on curves, tower spans and intermediate spans of equal length are recommended so that the floor plan of the structure will be a series of chords of the desired radius. As in the case of Timber Trestles (See Data Sheet D6b.3) a steel trestle on a curve should have increased batter on the outside of the curve, as well as super-elevation.

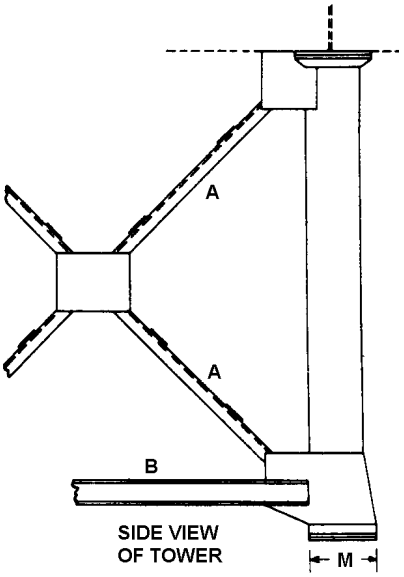
TYPICAL TOWER DESIGNS

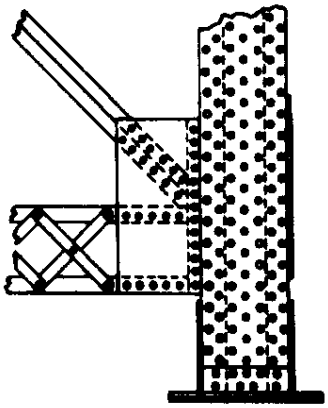
The accompanying drawings were adapted from designs for E-50 loading. For modeling purposes, these designs would show insignificant changes for either lighter or heavier loading than E-50, as the principal differences would be in the depth and weight of the girder spans. Reference should be made to Data Sheet D6c.4 for the correct dimensions for the spans to be used.

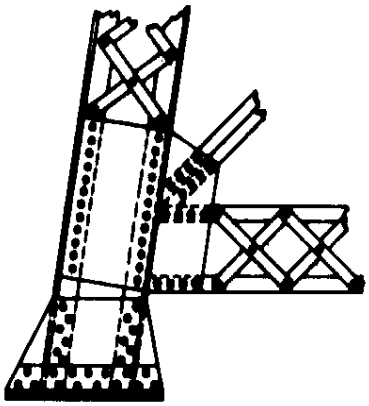
Steel structures are usually painted black over primer coats of red lead, and mixtures of red lead and carbon black (which resembles box car red). However, some railroads use gray or aluminum for the finish coat, so that the modeler is given some leeway to follow his own preferences.

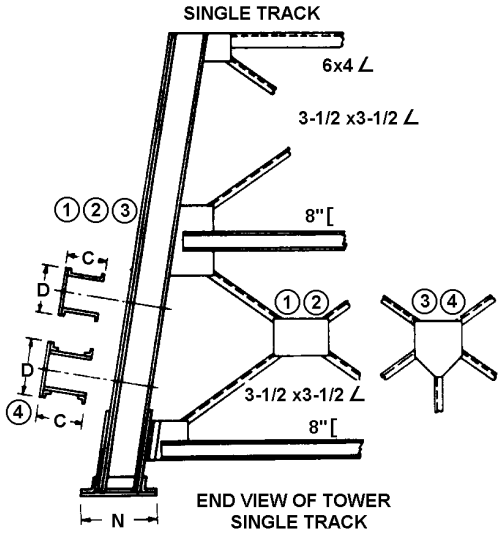
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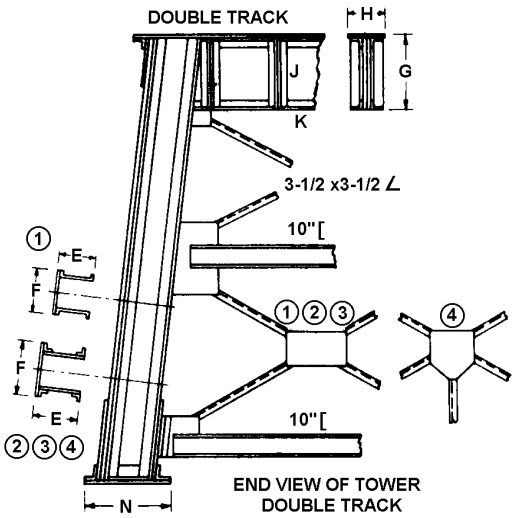
TYPICAL TOWER DESIGNS - continued











	TOWER HEIGHT	SPAN	A	B	C	D	E	F	G	H	J	K	M	N
①	20' to 40'	30'	5x3½ ∠	10"[	12"[	16"	15"[	21"	55"	21"	5x3½	3½x3½	2'-0"	2'-4"
②	30' to 70'	40'	5x3½ ∠	12"[	15"[	20"	20" Web 3½x3½ ∠	23"	64"	23"	5x3½	6x6	2'-0"	2'-6"
③	30' to 100'	30' Tower 60' Inter.	5x3½ ∠	10"[	15"[	21"	22" Web 6x4 ∠	26"	69"	26"	5x3½	6x6	2'-3"	2'-9"
④	90' to 150'	40' Tower 80' Inter.	6x4 ∠	10"[	20" Web 3½x3½ ∠	24"	26" Web 6x4 ∠	30"	79"	30"	6x3½	8x8	3'-0"	3'-2"