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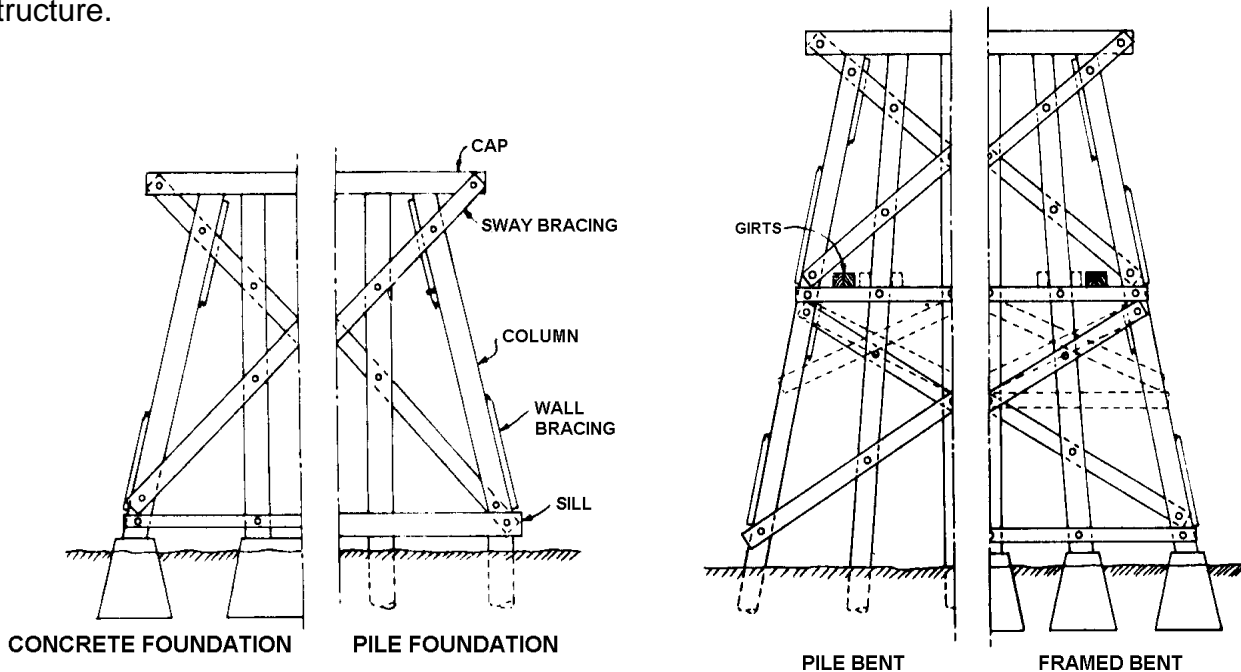
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Sheet #:	D6b.3
Title:	TRESTLES: WOOD
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GENERAL CONSTRUCTION

Wood trestles consist of a series of bents spanned by beams or stringers. The vertical members of columns of the bent may be timbers or piles. They are usually 14 inches in diameter, if piles, or 12"x12" timbers if framed. For very high bents, timber framed construction is the only practical method. Extremely high timber trestles are probably a thing of the past; modern construction would take the shape of a steel viaduct. Cluster bents were a relatively recent trend (1900-1910) toward smaller timber sizes. They replace the 12"x12" timbers by pairs of 8"x12" or 10"x12" or groups of four 8"x8" timbers, in standard bent assemblies.

Most bents are sway-braced to resist lateral wind force and the rack of locomotives. Pile bents less than eleven feet high have enough stiffness so that sway braces may be omitted. Sway bracing both diagonal and horizontal usually consists of 3"x10" timbers. Older trestles (circa 1890) sometimes assisted or replaced sway-braces by inclining the columns to form a triangulated structure.



TYPICAL 4-COLUMN BENT

Typical 4-post bent, for heights of up to 19 feet from ground to bottom of the rail. Pile or concrete foundations with framed construction are shown; pile construction would be similar. For less than 8 feet height in pile construction, omit sway bracing.

TYPICAL 5-COLUMN, 2-STORY BENT

Typical 5-post and 5-pile bents, for heights from 20 to 30 feet. The framed bent is shown with concrete foundation, but may use a timber sill with pile foundations. In multi-story bents such as these, height variations are absorbed in the bottom story, as shown. If the lower story is less than 8 feet high, sway bracing is arranged in accordance with the broken lines above. Alternate girt location shown in broken line, used on older construction.



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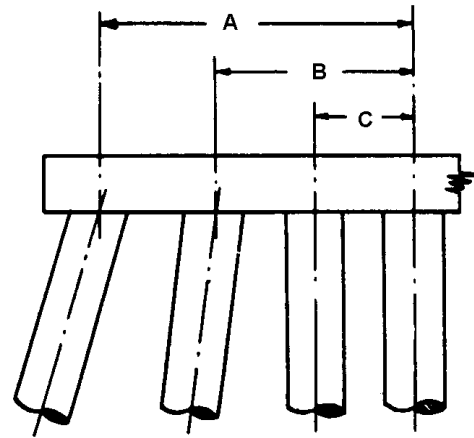
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GENERAL CONSTRUCTION - continued

Modern framed bents use sills 12"x12" and caps 12"x14"x14'-0" (16'-0" long for ballasted decks). Fore-and-aft or wall bracing usually consists of 3"x10" timbers, and is carried on the outer columns. Older construction sometimes had complicated internal wall bracing. The horizontal, longitudinal girts are commonly 6"x10" timbers; one-story bents use no girts, and two-story bents use a pair of doubled girts. A story is the portion of a bent between two horizontal members. Its height is such that the sway-bracing is at about 45", never below 30" or over 60". Late structures carry the girts as far out from the center of the bent (between the two outer columns) as is practical. Older bents may have had girts closer to the centerline. They may be omitted on the bottom story, to pass water and floating debris.

# of Cols	A	B	C
4	4'-0"		2'-0"
5	4'-6"	2'-0"	
6	5'-0"	3'-6"	1'-3"
7	6'-0"	4'-0"	2'-0"



COLUMN SPACING AT CAP

For girt locations in multi-story bents (see drawings on page 1). It should be noted that timber does not generally come in lengths much over thirty feet. Columns are battered 2½" per foot on the outside columns; inside columns, if not vertical, may be battered 1" per foot. "Batter" means that the column is not vertical, but leans in toward the center of the bent. On curves, the batter on the outside of the curve may be increased, as discussed below. For tangent track, wall bracing varies as shown below, with height and loading for trestles built after about 1900. The older the trestle, the less wall bracing was used; some, in fact, had none. On curves of over 7 degrees, additional wall bracing is added on the outside of the curve, filling in the open spaces; and diagonal bracing may be added in the floor system. Panels (bent-to-bent) may be shorter on curves, to carry side loads. Super-elevation may be achieved by placing a wedge-shaped timber between cap and stringers, or by tilting the cap, or by tilting the whole bent. The latter has the same effect as increasing batter on the outside of the curve. The deck is never curved, but is a series of short tangents, with curved track laid on it.

On long trestles, fire barriers may be placed every 400 feet or so. A fill equivalent to four panels may be used, or a single concrete bent, or a concrete pier. Ties are covered with a galvanized iron sheet for six feet each side of a concrete bent or pier.



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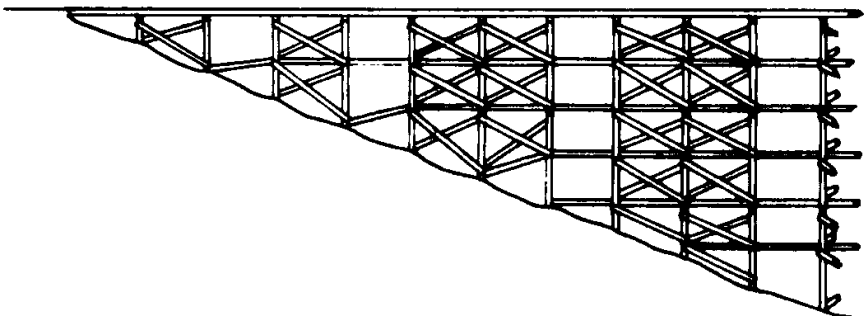
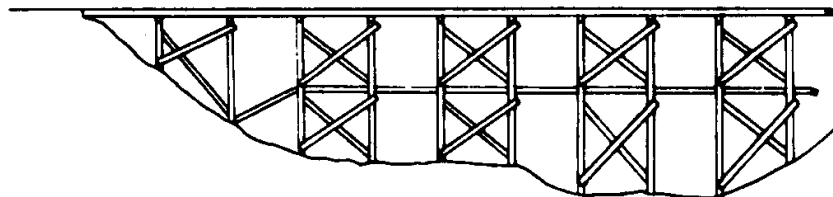
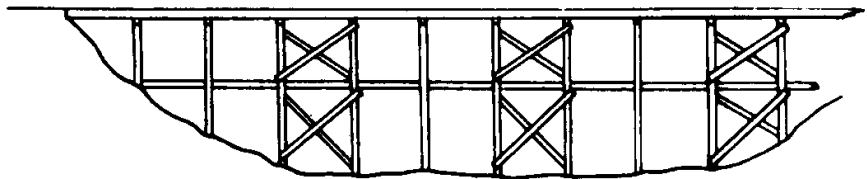
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NUMBER OF COLUMNS PER BENT

	Loading*	OPEN DECKS			BALLASTED DECKS			
		E45	E60	E72	E45	E60	E72 Piles Posts	
Length of Panel	12'	4	5	5	5	6	6	6
	13'	4	5	6	5	6	7	6
	14'	4	5	6	5	6	7	6
	15'	5	5		5	6	7	6
	16'	5	6					

ARRANGEMENT OF WALL BRACING

Longitudinal or wall bracing is more extensive for frame than for pile trestles. Pile trestles of E45 or E60 loadings, if over 15 feet high and 100 feet long, may be braced as in the top picture. For heavier loadings, alternate panels should be braced, and for lighter loadings, some bracing may be omitted. The minimum bracing for framed trestles, regardless of height or length, is shown in the middle picture. Trestles over two stories high and 150 feet long are braced in accordance with the bottom picture. Bracing may be omitted from the bottom story of tall trestles if there is the probability that drift-wood will catch in it and endanger trestle.





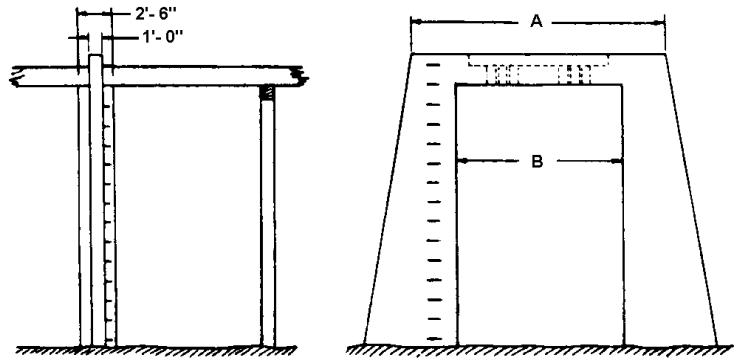
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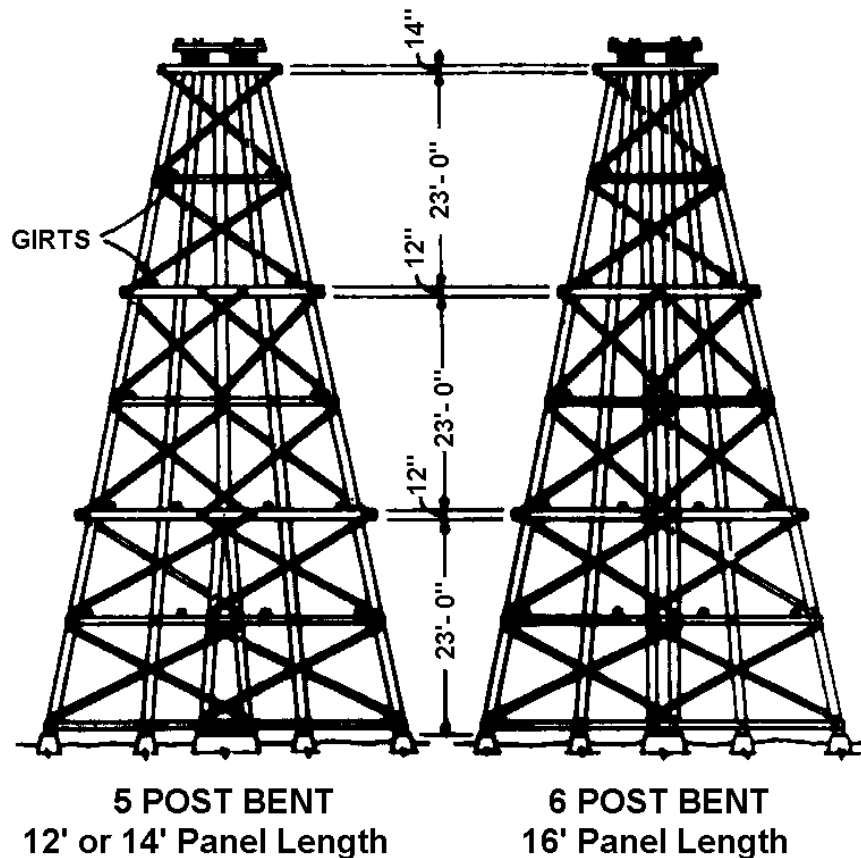
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CONCRETE FIRE STOP

Fire stops in the shape of reinforced concrete piers are generally not over 25 feet high. For greater heights, two facing wooden bents are used, with a covering of sheet iron for fire proofing. The sides of the pier are battered 1/6. Ladder rungs are embedded in the wall of the pier. For open decks, dimensions are A=18 feet, B=12 feet; for ballasted decks. A=20 feet, B=14 feet. Deck stringers rest on the shoulder of the pier as shown, and the tops of the ties are level with the top of the pier.



MULTI-STORY BENTS





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TYPICAL WOOD TRESTLE CONSTRUCTION

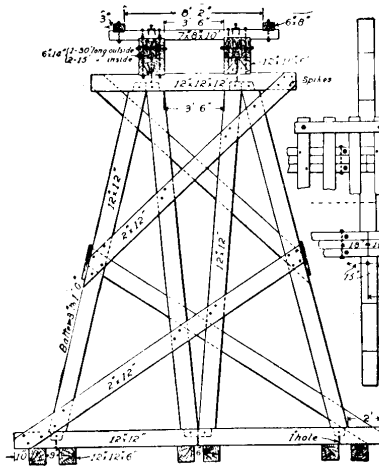


FIG. 1.—CROSS-SECTION.

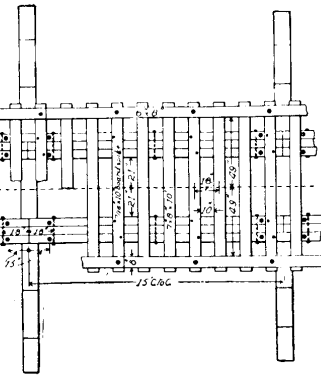


FIG. 3.—PLAN.
SINGLE-DECK TRESTLE.

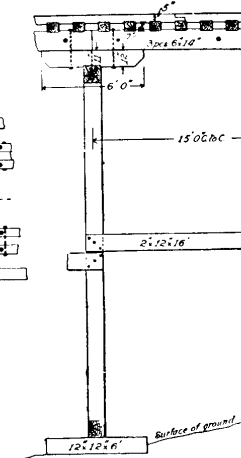


FIG. 2.—ELEVATION.

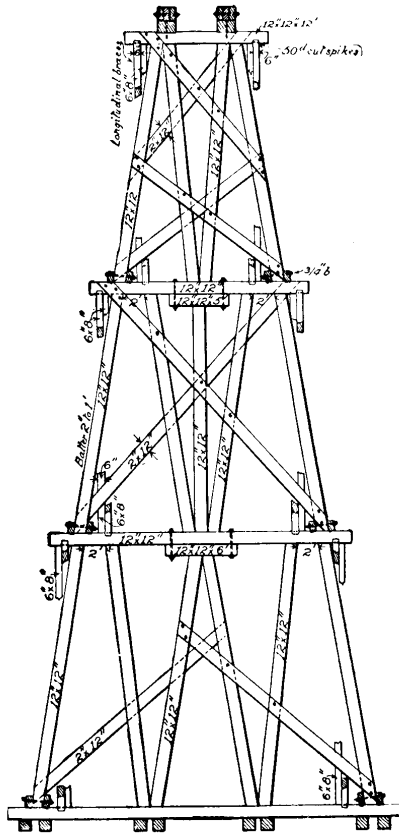


FIG. 4.—CROSS-SECTION.

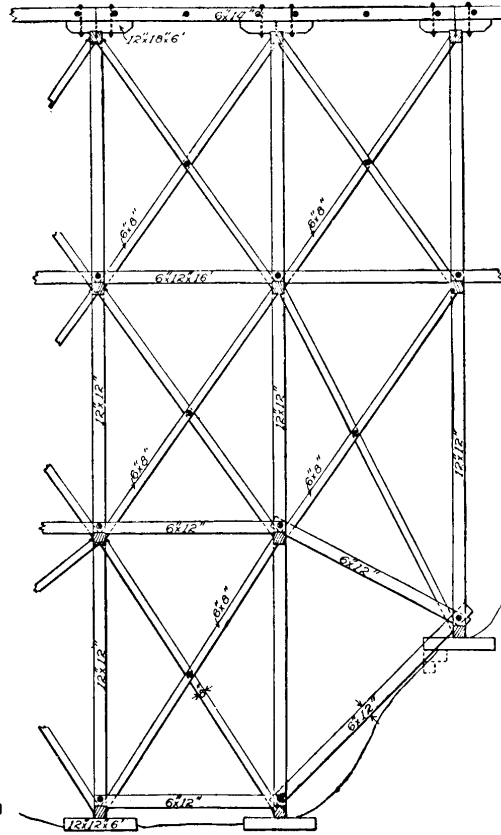


FIG. 5.—ELEVATION.

SCALE OF FEET
0 1 2 3 4 5
10 15 20 25

TRIPLE-DECK TRESTLE.

STANDARD TRESTLE, CHARLESTON, CINCINNATI & CHICAGO RR

