

Fig. 20.—ANOTHER TYPE OF MANSARD ROOF CONSTRUCTION

Fig. 21.—ALTERNATIVE METHODS OF FINISHING AT CURBS

Fig. 18.—TYPICAL OUTLINES OF MANSARD ROOF

Fig. 19.—A TYPE OF MANSARD ROOF CONSTRUCTION COMMONLY ADOPTED

Figs. 18 to 21.—SINGLE MANSARD ROOF DETAILS

rafters, usually about every fourth member. This bracing will considerably stiffen the frame and lessen its liability to rack. The rafters should be bird's-mouthed to the wall plate, and also fixed to the side of joists. This will help to stiffen the roof. Every fourth or fifth stud should be tenoned into the cill and curb. Where wind bracing is employed, the

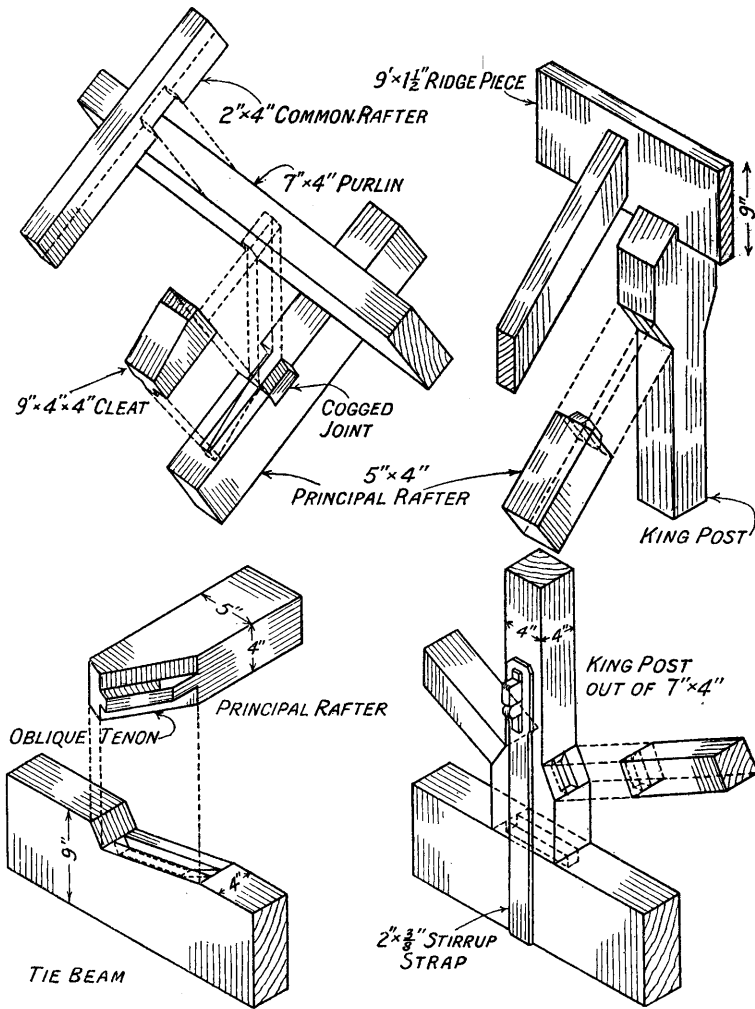


Fig. 3.—KING-POST TRUSS JOINTS

To form an abutment as nearly as possible at right angles to the inclination of the member, the king-post is reduced in size to about half its width in the middle, and to secure the joints further, iron straps are used (see Fig. 2).

Joints

The joint between the top of the principal rafter and the king-post is strengthened and made more secure with two three-way straps and

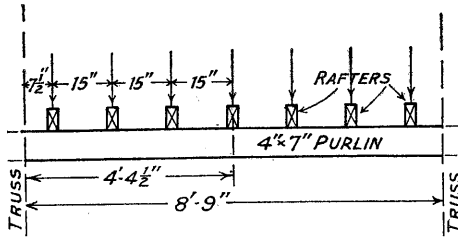


Fig. 4.—LOADS ON PURLIN

Maximum Span

The maximum span for rafters of a nominal breadth of 2 in. and a spacing of 15 in., to carry slates or tiles on boarding, etc., is given in the Table below.

Design of Purlins

The purlin section is set at right angles to the rafter. It is then subjected to a normal load due to the rafters. The loads coming on the purlins from the rafters may be considered as being distributed, which gives a maximum moment slightly less than when they are considered as concentrated loads on each rafter (see Fig. 4). The span will be taken as 8 ft. 9 in., and the distance apart 8 ft., giving an area of 70 sq. ft. The weight of the purlin over this area is .86 lb. per square foot, therefore the weight to be designed for is $29.8 + .86 = 30.66$ lbs. per square foot over an area of 70 ft., = 2,146.2 lbs.

Common Rafters Nominal Dimensions	Maximum Span	
	Slates	Tiles
<i>in. in.</i>	<i>ft.</i>	<i>ft.</i>
2 × 3	7.3	6.8
2 × 4	9.75	9.1
2 × 4½	11.0	10.2
2 × 5	12.1	11.3
2 × 6	14.6	13.4

Using a 4-in. by 7-in. section as given in the Table on page 44, the safe fibre stress will be:—

$$f = \frac{2146 \times 8.75 \times 12 \times 6}{8 \times 4 \times 7 \times 7} = 860 \text{ lbs. per square inch.}$$

Taking the loads to act at the centre of the rafters, the maximum moment is:—

$$M = \left[\left(\frac{2146}{2} \times \frac{8.75}{2} \right) - \frac{2146}{7} (1.25 + 2.5 + 3.75) \right] 12$$

$$= [(4694.375) - (2299.125)] 12 = 28,743 \text{ in. lbs.}$$

$$\text{Modulus section of purlin} = \frac{4 \times 7 \times 7}{6} = 32.66.$$

$$\text{Maximum stress in the timber} = \frac{28743}{32.66} = 880 \text{ lbs.}$$