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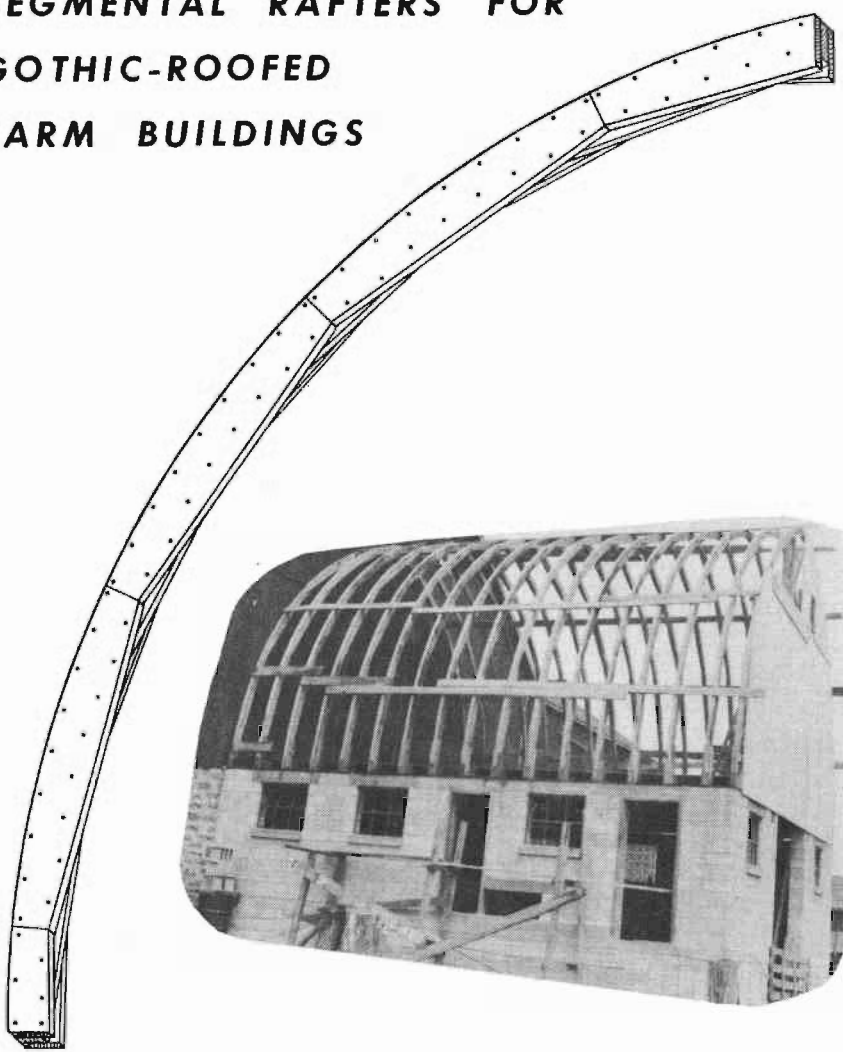
SEGMENTAL RAFTERS FOR GOTHIC-ROOFED FARM BUILDINGS



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SEGMENTAL RAFTERS FOR GOTHIC-ROOFED FARM BUILDINGS

By D. V. DOYLE, Engineer

Boards of short length and rough finish can be used satisfactorily for making segmental or sawed-type rafters for farm buildings. The rough-sawn boards that might be cut from the common kinds of wood in a farm woodlot or obtained from a small sawmill can be fabricated into strong and dependable framing members for barns, machine sheds, and other farm buildings.

In general, boards 8 inches wide and 1 inch thick and from 6 to 8 feet long are used to make rafters for buildings from 26 to 36 feet in width. The curvature of the roof is scribed near the edge of each board from a template and cut with a band or circular saw. The ends of the boards are cut along the radii of the curve. The rafters are assembled by lapping the board segments in three courses and securely nailing them together. Seasoned lumber should be used in the construction of the rafters; but to facilitate nailing of dense woods, such as the heavy hardwoods, it may be necessary to use partially seasoned lumber.

The rafter sections are trimmed at their ends and used in pairs on 24-inch centers to form a Gothic-type roof. Each pair of sections is joined together with a tie plate or collar beam at the peak before it is erected. The sections are anchored at the base by bolts, brackets, or nailed plywood tie plates.

A variation of this construction for low-pitched curved roofs of moderate span is to set single rafter sections -- instead of pairs -- on vertical frame or masonry walls to form a low arch type of roof framing.

Determining Size of Building

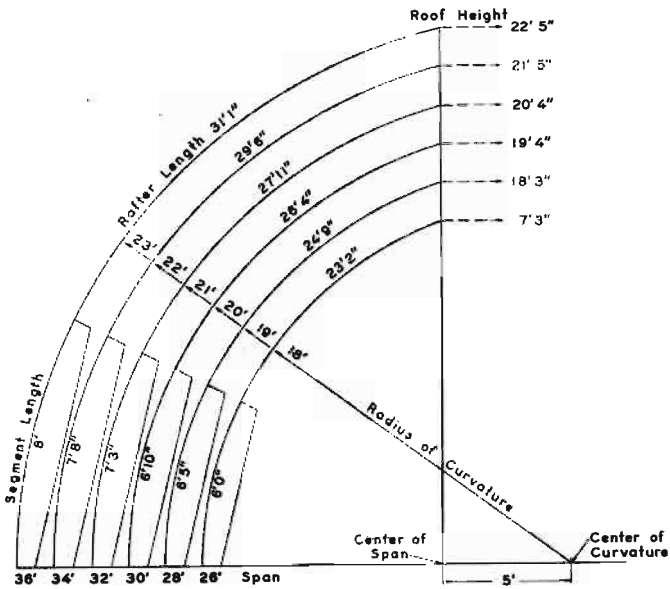

Figure 1.

For a given roof span of between 26 and 36 feet, consult figure 1 to determine the radius of curvature of the roof, the length of board segments along the arc, rafter length, and roof height.

Construction of Template

With a pencil on the end of a cord or a steel tape extended to equal a radius of curvature selected from figure 1, scribe an arc on a lightweight board or piece of plywood (fig. 2). This piece must be 10 or 12 inches wide and long enough to serve as a template.

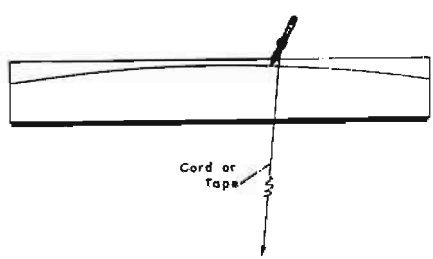

Figure 2.

Without moving the board, plot off along that arc the length of the segment given in figure 1. (This curved distance can be approximated with a straight rule by measuring along the arc in not more than 2-foot chords.)

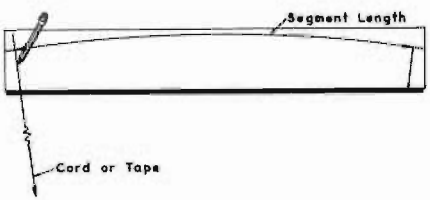

Figure 3.

Hold the tape or cord at each end of the segment and scribe a line to indicate the slanting end cuts (fig. 3).

Carefully saw along the scribed lines (fig. 4).

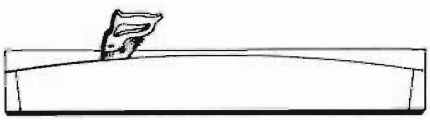

Figure 4.

To get segments of the desired width, place two stop blocks on the template, one at each end along the straight edge; distance A shown in figures 5 and 6 depends upon the width of boards available for rafters (approximately 8-inch material). When the blocks are properly positioned, nail them in place and the template is ready to use.

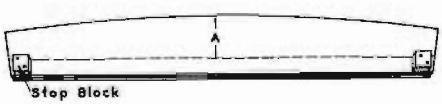

Figure 5.

Use of Template

Place the template on each rafter segment board with the stop blocks against the board and scribe along the curved edge and ends of the template (fig. 6). Use either a circular saw with plenty of set or a bandsaw to cut the board segments along the scribed lines.

Figure 6.

Form for Construction of Rafter

With the pencil attached to the end of the cord or else a steel tape stretched to equal the radius of curvature, scribe an arc

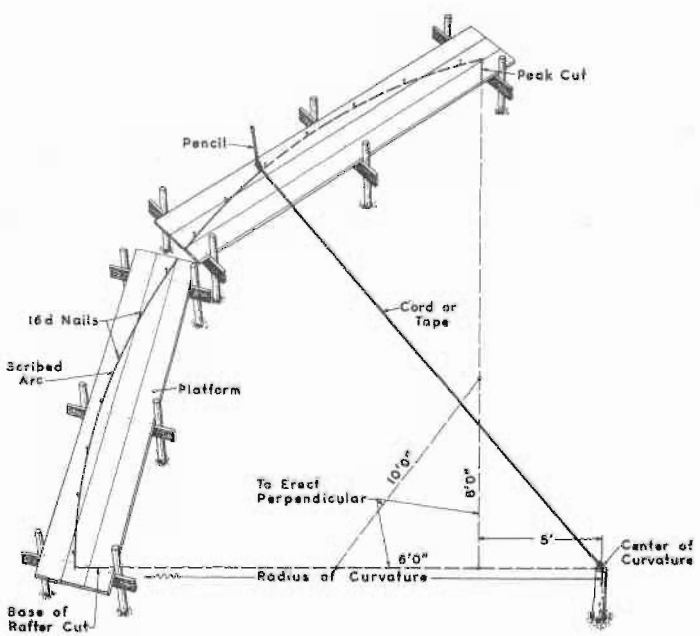

Figure 7.

on a smooth surface, such as the platform set on posts shown in figure 7 or a mow floor.

Plot the length of the rafter as given in figure 1 on this surface (fig. 7). Scribe a line along the cord at one end of the platform to provide the cut at the base of the rafter. Without moving the cord, mark off a point 5 feet along the cord from the center of curvature and from this point erect a perpendicular line to establish the cut at the peak of the rafter (figs. 1 and 7). (A convenient way to insure a perpendicular is to measure off distances of 6, 8, and 10 feet, as shown in figure 7.) Partially drive sixteenpenny nails at about 2-foot intervals along the scribed arc (fig. 7) to provide stops that will assist in assembling the board segments.

Assembly of Rafter

Crosscut two board segments at about a third of their length for each rafter. Assemble the board segments in three courses with staggered joints (fig. 8). Nail the rafter at about 6-inch intervals along its perimeter with zinc-coated eightpenny or tenpenny nails. Transcribe the base and peak cutoff lines from the platform to the rafter. Invert the rafter and repeat the nailing on the opposite side.

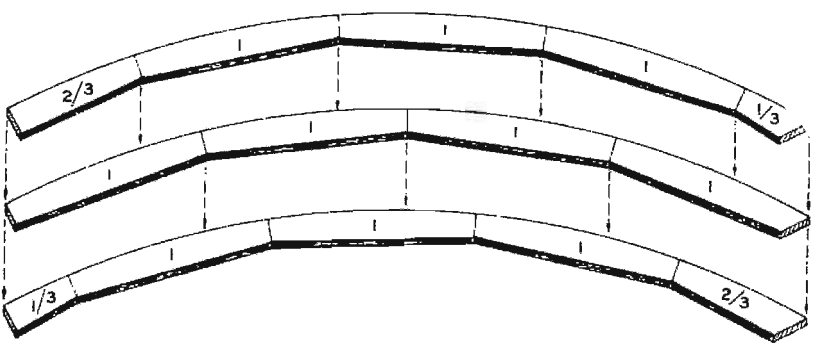

Figure 8.

Erection of Rafters

Cut the rafter ends along the cutoff lines. Join two rafter sections together at the peak with a tie plate or collar beam (fig. 9).

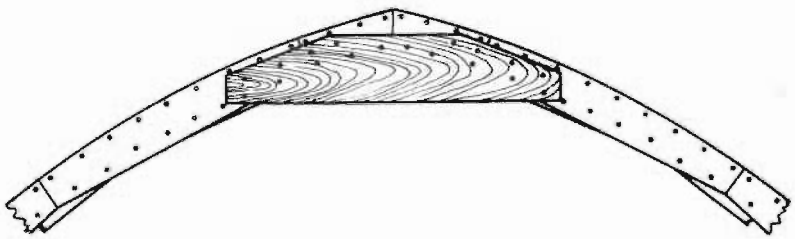

Figure 9.

Raise the rafters into position and set at a 24-inch spacing. Anchor the base with bolts, brackets, or nailed plywood tie plates (fig. 10). The roof can be sheathed to accommodate the type of roof covering desired.

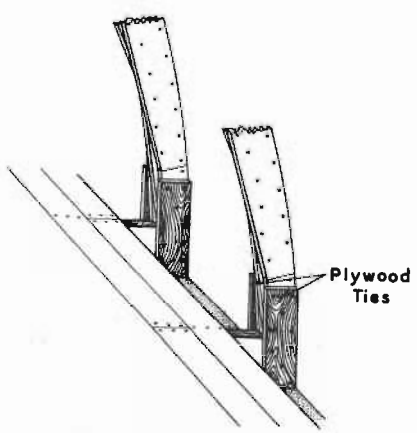

Figure 10.