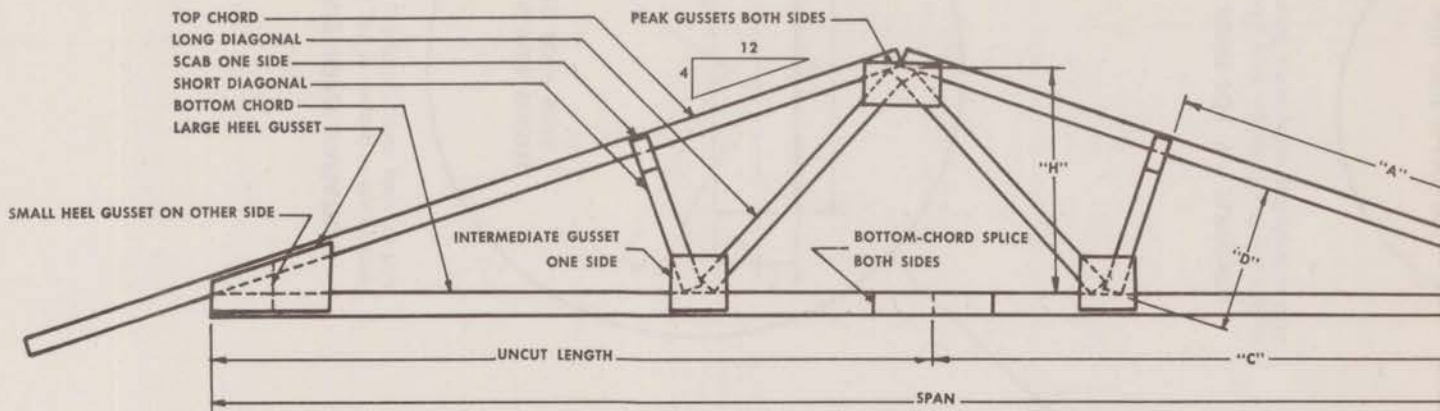


4/12 NAIL-GLUED ROOF TRUSS

2' ON CENTER, 20'-8"



DESIGN AND PERFORMANCE DATA FOR 4/12 NAIL-GLUED ROOF TRUSS

STRUCTURAL DESIGN DATA

The graphical methods of analysis are unreliable in calculating stresses in the nail-glued truss. They do not consider the combined stresses due to secondary bending caused by the extreme rigidity of the nail-glued joint. The "W" nail-glued truss designs are based upon full-scale test results. Three types of test were performed: load-and-recovery; long-duration at design load; and load-to-destruction.

For the *load-and-recovery test*, two trusses were set up in the normal position, 24 inches on center, and covered with $\frac{3}{8}$ -inch plywood sheathing with the grain of the outer plies perpendicular to the truss chords and with sections spaced so the sheathing did not touch adjacent sheets. Loads were applied by means of concrete blocks placed so as to avoid arching action.

An initial load of 10 pounds per square foot, representing the dead load, was applied before beginning deflection readings. Live loads were applied in increments of 10 pounds per square foot and deflection readings

were taken along the bottom chords of the trusses. After each increment was applied, the entire live load was removed and the residual deflections recorded. After removal of the design live load of 30 pounds per square foot, the residual deflection averaged .003 inches. The loads were increased until a live load of 100 pounds per square foot was recorded.

For the *long-duration test*, the pair of trusses was loaded with 10 pounds per square foot dead load and 30 pounds per square foot live load (considered the design load). The trusses supported this load for 60 days without failure.

For the *load-to-destruction test*, load was added to the trusses after completion of the long-duration test until failure occurred at a loading of 147 pounds per square foot. Failure appeared to have occurred in the top chord between the peak gusset and the intermediate compression member. No glue-line connection failures were observed.

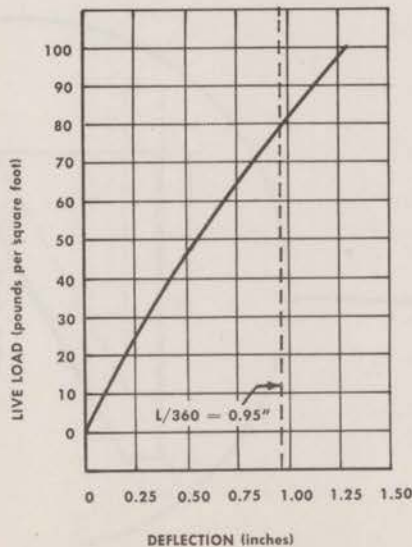
DESIGN DATA

Span: 20'-8" to 28'-8"
Slope: 4/12

Dead Load	10 psf.
Live Load	30 psf.
Total	40 psf.

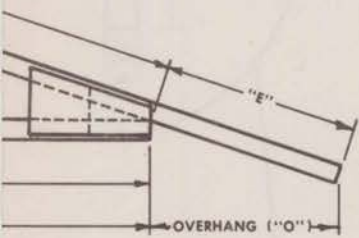
ACTUAL TEST DATA (average of 2 trusses)

Deflection at 30 psf. live load	0.30"
Average residual set after release of 30 psf.	0.003"
Average residual set after release of 100 psf.	0.035"
TOTAL LOAD at Failure	147 psf.



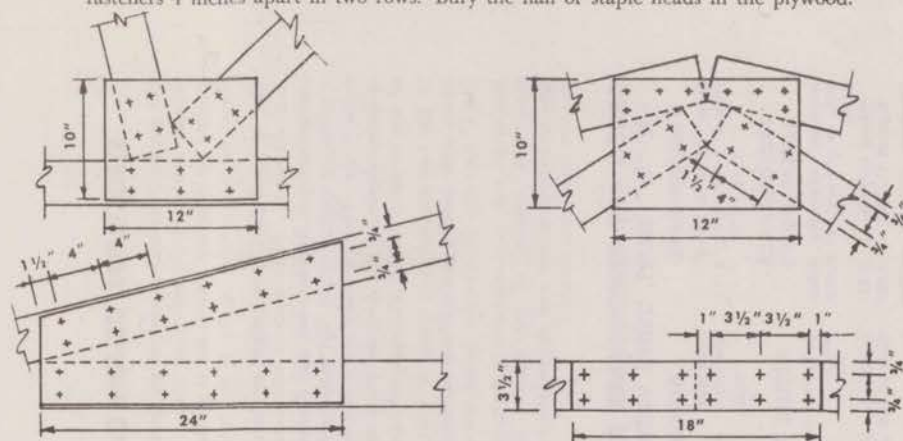
4A

" TO 28'-8" SPANS



FASTEN GUSSETS

Use 4d nails or 1½" staples for fastening gussets, scabs, and splice plates. Space fasteners 4 inches apart in two rows. Bury the nail or staple heads in the plywood.



MATERIALS AND NAIL-GLUING

The quality of material and workmanship is important to the ultimate strength of the truss. Good judgment in the selection of materials must be used and the simple rules for nail-gluing and truss handling, as set forth in Small Homes Council Instruction Sheet #1, *Nail-Gluing of Roof Trusses and Frames and Other Structural Components*, must be followed.

- Use unsanded plywood, ½" thick. It should be of a structural interior type, but for humid areas the plywood should be fabricated with exterior glue. The plywood must meet Commercial Standard CS45-60 as certified by an approved testing laboratory. (A modified design with larger gusset plate sizes permits the use of ⅜" plywood;— see Instruction Sheet #13.)
- Use 4d common nails or 1½" staples for nail-gluing the plywood plates. The fasteners should be spaced no farther than 4" o.c. in two rows and ⅜" from the edges.
- The casein glue must meet Federal Specification MMM-A-125, Type I or II. (Type II is preferred since it contains a mold inhibitor.)

A phenol-resorcinol adhesive (Federal Specification MIL-A-397B) is acceptable if a waterproof glue is desired. Mix the glue according to the manufacturers instructions. After nailing, stack the trusses and do not handle them during the curing period. Protect the trusses from rain.

- The major chords of the truss should be fabricated with "1500F" stress-rated (rated by visual inspection or machine) 2 x 4 members. The interior members (the long and short diagonals), should be of material rated as "Construction Grade" by grading rules of the West Coast Lumber Inspection Bureau (WCLB) or the Western Pine Association (WPA), or "No. 2 Dimension" by the Southern Pine Inspection Bureau (SPIB) or equivalent in other grading rules. In all cases, the moisture content of the lumber should be from 12 to 18 per cent.
- Fabricate and cure the trusses above 50° F. When the temperature is between 50° F and 70° F, a 16-hour curing period is necessary; when the temperature is 70° F or above, an 8-hour curing period is needed. A minimum curing temperature of 70° F is required for waterproof glues.

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