

4/12 SLOPE

DESIGN AND PERFORMANCE DATA ON 4/12 "W" TRUSSES

DESIGN DATA

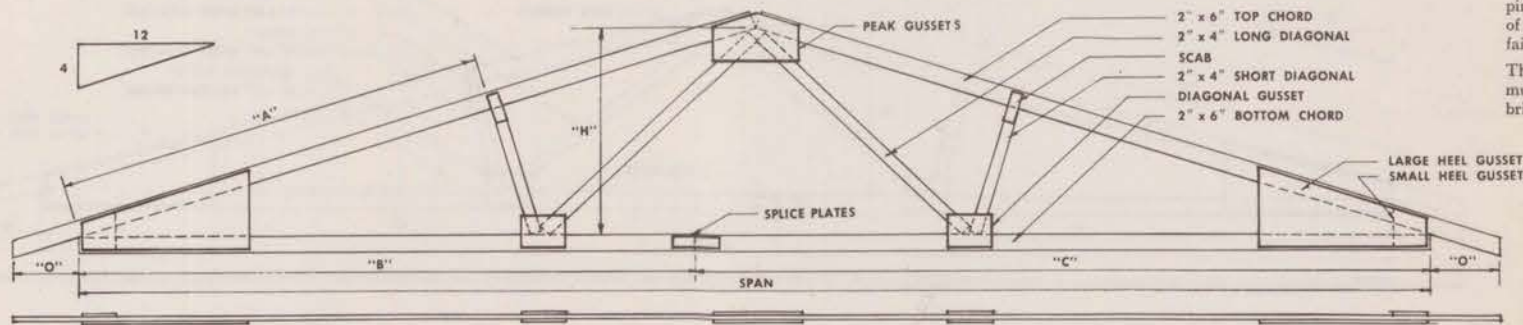
Spans of 29'-0" to 40'-8"
Slope of 4/12

Recommended Design load (pounds per square foot of horizontal projection)

Roof (dead load + live load)	60 psf
Ceiling (dead load)	35 psf
Attic storage (live load)	5 psf
	20 psf

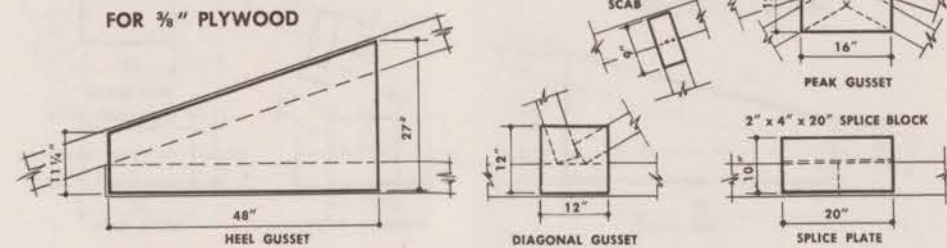
PERFORMANCE DATA ON 40'-8" TEST

Maximum allowable deflection (1/360 span)	1.36"
Deflections at design load	
quarter points	0.33"
mid-span	0.38"
Test load at failure	296 psf

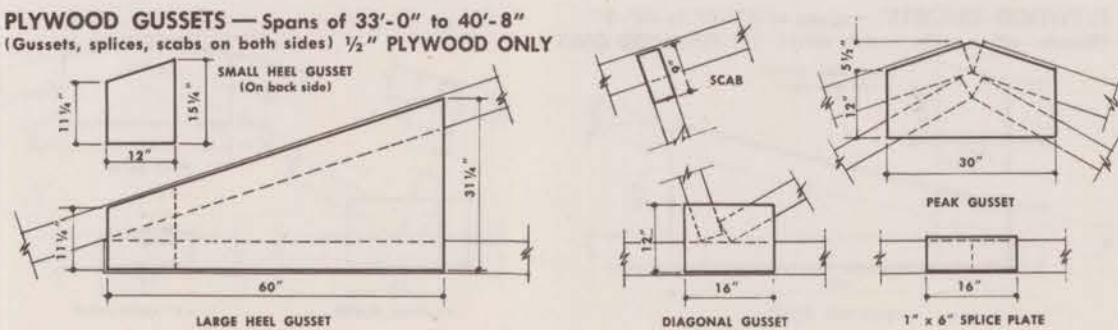


PLYWOOD GUSSETS — Spans of 29'-0" to 32'-8" (Gussets, splices, scabs on both sides)

FOR 3/8" PLYWOOD



PLYWOOD GUSSETS — Spans of 33'-0" to 40'-8" (Gussets, splices, scabs on both sides) 1/2" PLYWOOD ONLY



STRUCTURAL DESIGN DATA FOR NAIL-GLUED "W" TRUSSES

The graphical methods of analysis generally used for trusses designed with pin-connected joints should not be used for analyzing trusses with nail-glued plywood gussets because the rigidity of the nail-glued joints produces an entirely different stress distribution. Bending stresses become important in the rigid joint truss while the diagram analysis ignores them completely; furthermore, experimental stress analysis has shown that the actual axial stresses are substantially lower than those calculated in the diagram analysis.

The gusset plates used in nail-glued trusses form rigid connections between the structural members and introduce secondary bending in the chords and diagonal members. The large peak and heel gussets and the short diagonal connections cause the top chords of the "W" truss to act as a continuous beam, partially restrained at each connection, and it resists a moment which is transferred through the heel gusset from the top chords. The short diagonals are compression members and the long diagonals are in tension.

The deflection pattern of the "W" nail-glued truss under design load is entirely different from that for a pin-connected truss of the same geometry. The results from full-scale tests have proven that pin-connected trusses (using bolted or nailed connections) show more than two times the deflection of nail-glued trusses at design load and four times as much deflection at failure. The test loads at failure on nail-glued trusses are generally higher than on trusses using other types of connections.

The "W" truss designs are based on test results 1) from full-size trusses tested individually in a multiple-cylinder hydraulic testing machine, and 2) on pairs of trusses set up 24" on center, sheathed, bridged for lateral support, and loaded with concrete block as live load on the roof surface and

bottom chord. Three types of tests were made to determine the performance of a design: load-and-recovery, long-duration load, and load-to-destruction tests.

In the load-and-recovery test (a performance test to observe the behavior of a truss under loads that exceed design loads), a load of 100 lbs. per sq. ft. was applied to the truss. Deflection readings were taken as the load was applied in increments of 20 lbs. per sq. ft. Residual deflection was measured after the entire load was removed. The "W" nail-glued trusses are exceptionally stiff and will sustain loads of at least 100 lbs. per sq. ft. without exceeding the allowable deflection of 1/360 of the span.

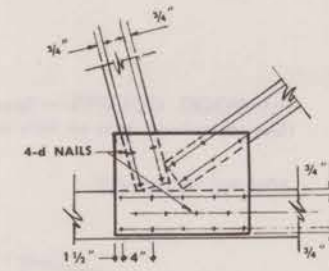
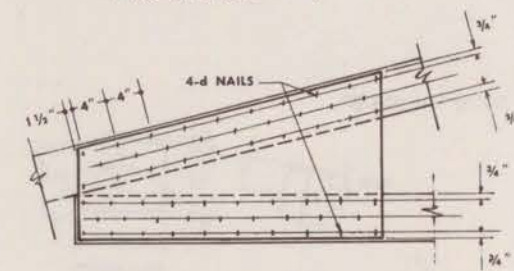
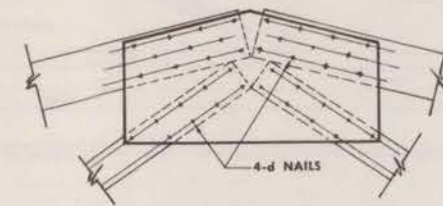
The long-duration test was an accelerated time test lasting 120 days with a design load applied to the truss. The test was designed to expose any deformation or creep that might occur due to heavy loads imposed for a long period. Stiffness is a general characteristic of nail-glued trusses, and they show very little creep under long-duration tests.

The destruction test determined the maximum load capacity of the truss, behavior when greatly over-stressed, and critical points of the design. The nail-glued "W" trusses will carry at least four times the predicted design load before failure. In every case observed, failure occurred in either the top or bottom chord member. Failure never occurred in a plywood gusset or in the glue bond.

Nail-glued roof-trusses do not require precise cutting and fitting of members, but the builder must use good judgment in the selection of materials and must follow the simple instructions for gluing, nailing, curing, and handling the trusses. The quality of material and workmanship will determine the ultimate strength of the truss.

NAILING PATTERN

Drive nails so heads are buried in plywood



UNIVERSITY OF ILLINOIS SMALL HOMES COUNCIL URBANA, ILLINOIS

LONG-SPAN "W" NAIL-GLUED ROOF TRUSSES

2" x 6" Chord Members — 2/12, 3/12, 4/12 Slopes

2'-0" on Center, 29'-0" to 40'-8" Spans

INSTRUCTION SHEET #5

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Revisions 1959 by Rudard A. Jones, registered architect, and Donald H. Percival, wood technologist, University of Illinois Small Homes Council.

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Responsibility for roof trusses built from these plans shall rest with the user of the plans and in no wise on the University of Illinois or Purdue University. When variations from the original plans are incorporated by the user, the roof trusses so built shall not be represented as having been built from a design developed at Purdue University or the University of Illinois.

PRICE: 50 CENTS

Suggested A.I.A. File Number 19 B 3

LONG-SPAN "W" NAIL-GLUED ROOF TRUSSES (Using 2" x 6" Chord Members)

3/12 SLOPE

DESIGN AND PERFORMANCE DATA ON 3/12 "W" TRUSSES

2/12 SLOPE

DESIGN AND PERFORMANCE DATA ON 2/12 "W" TRUSSES

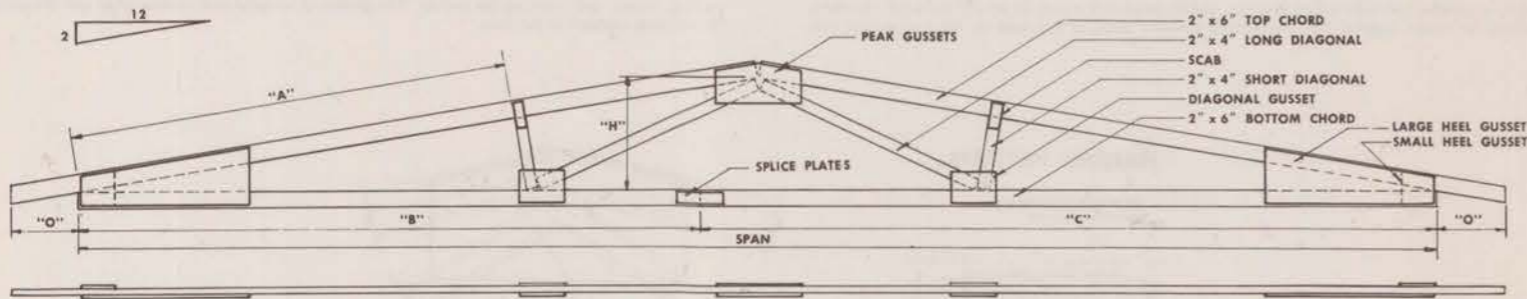
DESIGN DATA

Spans of 29'-0" to 40'-8"
Slope of 2/12

Recommended Design load (pounds per square foot of horizontal projection)
Roof (dead load + live load) 40 psf
Ceiling (dead load) 5 psf

PERFORMANCE DATA ON 40'-8" TEST

Maximum allowable deflection (1/360 span) 1.36"
Deflections at design load
quarter points 0.82"
mid-span 0.94"
Test load at failure 194 psf



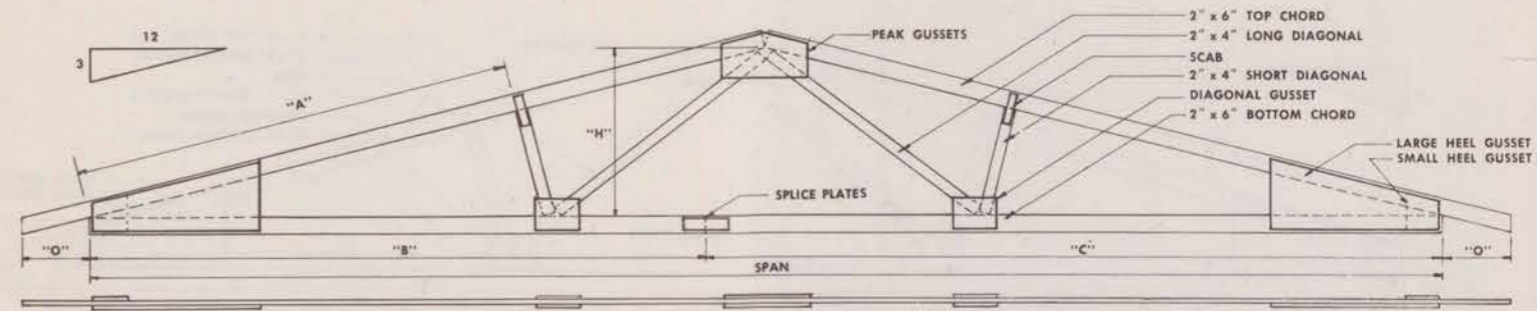
DESIGN DATA

Spans of 29'-0" to 40'-8"
Slope of 3/12

Recommended Design load (pounds per square foot of horizontal projection)
Roof (dead load + live load) 50 psf
Ceiling (dead load) 5 psf

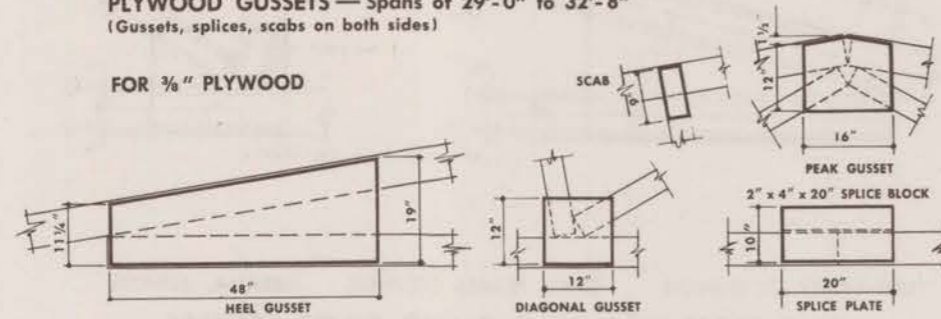
PERFORMANCE DATA ON 40'-8" TEST

Maximum allowable deflection (1/360 span) 1.36"
Deflections at design load
quarter points 0.46"
mid-span 0.54"
Test load at failure 260 psf



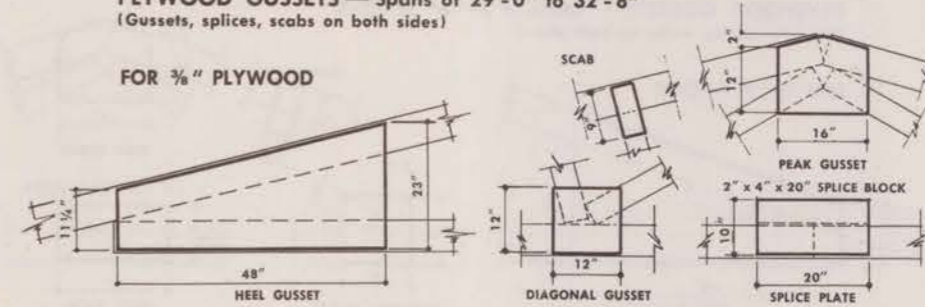
PLYWOOD GUSSETS — Spans of 29'-0" to 32'-8"
(Gussets, splices, scabs on both sides)

FOR 3/8" PLYWOOD

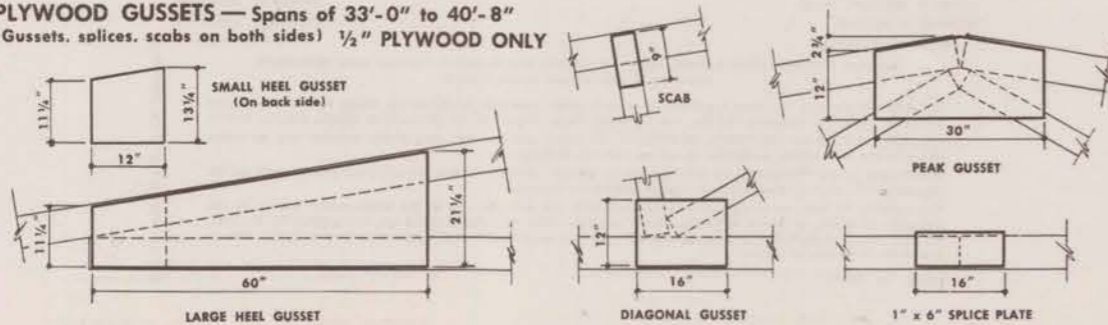


PLYWOOD GUSSETS — Spans of 29'-0" to 32'-8"
(Gussets, splices, scabs on both sides)

FOR 1/2" PLYWOOD



PLYWOOD GUSSETS — Spans of 33'-0" to 40'-8"
(Gussets, splices, scabs on both sides) 1/2" PLYWOOD ONLY



PLYWOOD GUSSETS — Spans of 33'-0" to 40'-8"
(Gussets, splices, scabs on both sides) 1/2" PLYWOOD ONLY

