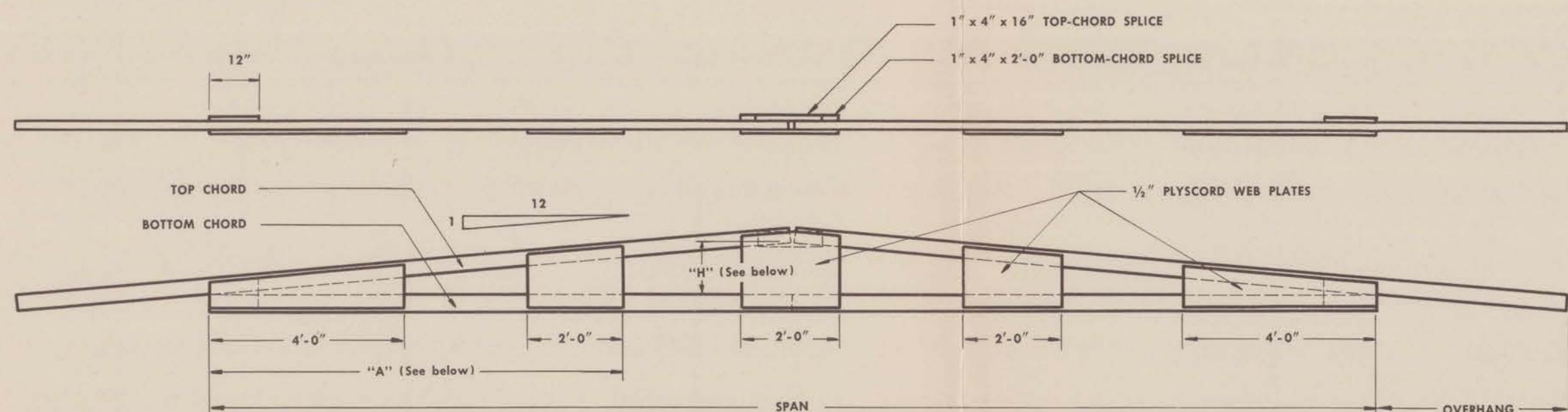
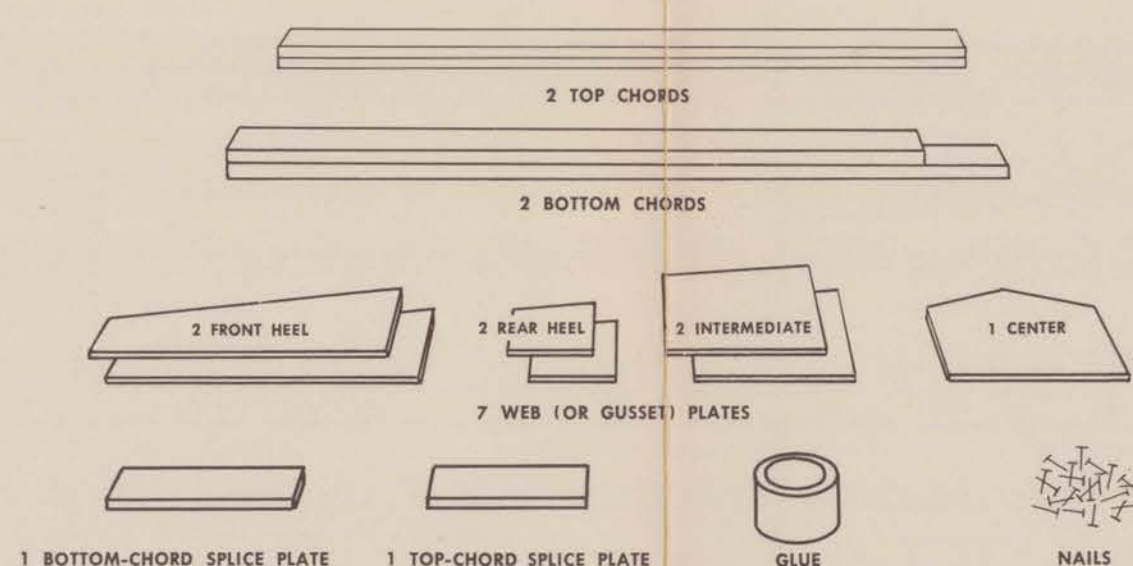


# PLYWOOD WEB ROOF-FRAME — 1/12 SLOPE, 2' ON CENTER, 20'-8" TO 28'-8" SPANS

## TO BUILD THIS ROOF-FRAME

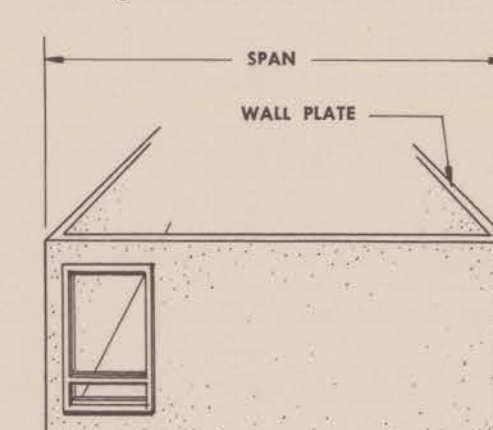


## YOU WILL NEED THIS MATERIAL



## 1 MEASURE SPAN

Determine the span (out-to-out dimension of exterior wall plates) and also the amount of overhang desired.



## 2 ORDER MATERIAL

From the order schedule below, determine the size of pieces needed. Example: A span of 24'-8" requires two 2" x 4" x 16'-0" members for the top chords.

SPAN	ORDER SCHEDULE															
	20' 8"	21' 0"	22' 4"	23' 0"	24' 8"	25' 0"	26' 4"	27' 0"	28' 8"	29' 0"	30' 4"	31' 0"	32' 4"	33' 0"	34' 4"	35' 0"
TWO TOP CHORDS**	Two 2" x 4" x 14'				Two 2" x 4" x 16'				Two 2" x 4" x 18'				Two 2" x 4" x 20'			
TWO BOTTOM CHORDS†	One 2" x 4" x 10'				Two 2" x 4" x 12'				One 2" x 4" x 14'				Two 2" x 4" x 16'			
TWO SPLICE PLATES	1" x 4" x 4'															
WEB PLATES	1/2" Plyscord. ** One-half of 4' x 8' sheet required for one frame.															
GLUE	1 lb. Casein Grade "A" Glue															
NAILS	192 4-d Nails and 20 6-d Nails															

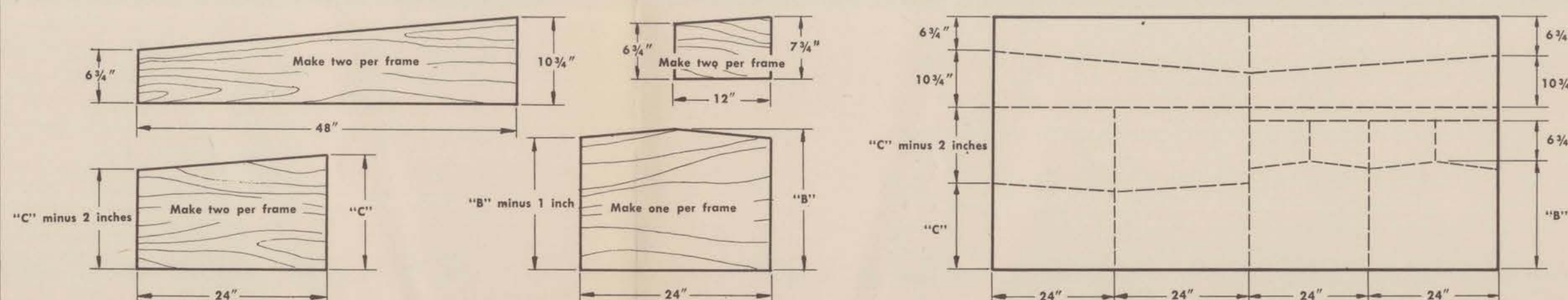
\* Provides the amount of overhang shown in the Cutting Schedule (Fig. 3). If greater overhang is desired, increase length of top chords.  
† Use 1450 p.s.i. stress grade. Apply grading provisions to entire length of piece. Moisture content of lumber should be between 12 and 18 per cent.  
\*\* Exterior plywood is recommended for humid areas.

## 3 CUT MEMBERS ACCORDING TO THIS SCHEDULE (Cut one pattern roof-frame first.)

SPAN	CUTTING SCHEDULE																
	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	
BOTTOM CHORDS	10'-0"	10'-0"	10'-10"	11'-0"	11'-2"	12'-0"	12'-0"	12'-0"	12'-10"	13'-0"	13'-2"	13'-4"	14'-0"	14'-0"	14'-0"	14'-0"	14'-8"
TOP CHORDS	Cut Top Chords Only If Less Overhang Than That Listed in Item "O" Is Desired.																
OVERHANG	"O"	43 1/2"	41 1/2"	39 1/2"	37 1/2"	35 1/2"	33 1/2"	31 1/2"	29 1/2"	27 1/2"	25 1/2"	23 1/2"	21 1/2"	19 1/2"	17 1/2"	15 1/2"	13 1/2"
HEIGHT (Inside Dimension)	"H"	10 3/4"	10 3/4"	10 3/4"	10 3/4"	11"	11 1/4"	11 1/2"	11 3/4"	12"	12 1/4"	12 1/2"	12 3/4"	13"	13 1/4"	13 1/2"	13 3/4"
DIMENSION "A"		7'-8"	7'-9"	7'-10"	7'-11"	8'-0"	8'-1"	8'-2"	8'-3"	8'-4"	8'-5"	8'-6"	8'-7"	8'-8"	8'-9"	8'-10"	8'-11"
WEB PLATES	"B"	17 1/2"	17 1/2"	17 3/4"	17 3/4"	17 3/4"	17 3/4"	17 3/4"	18 1/4"	18 1/4"	18 1/4"	18 1/4"	18 1/4"	18 1/4"	19 1/4"	19 1/4"	19 1/4"
	"C"	14 3/4"	14 3/4"	14 3/4"	14 3/4"	14 3/4"	14 3/4"	14 3/4"	15 1/4"	15 1/4"	15 1/4"	15 1/4"	15 1/4"	15 1/4"	16 1/4"	16 1/4"	16 1/4"
BOTTOM-CHORD SPLICE PLATE	1" x 4" x 2'-0"																
TOP-CHORD SPLICE PLATE	1" x 4" x 1'-4"																

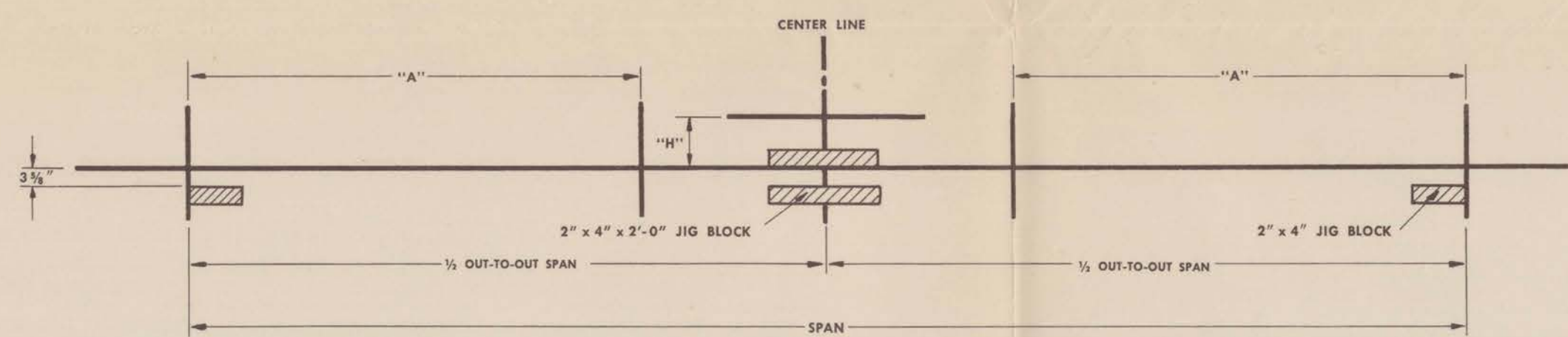
## 4 CUT WEB PLATES

Using these diagrams, cut the necessary web plates for the pattern roof-frame. Diagram at right shows how web plates for two roof-frames can be cut from a 4' x 8' sheet of plyscord. Dimensions "B" and "C" are given in the Cutting Schedule (Fig. 3). Make sure the grain of the plyscord runs parallel to the bottom chord.



## 5 CONSTRUCT JIG

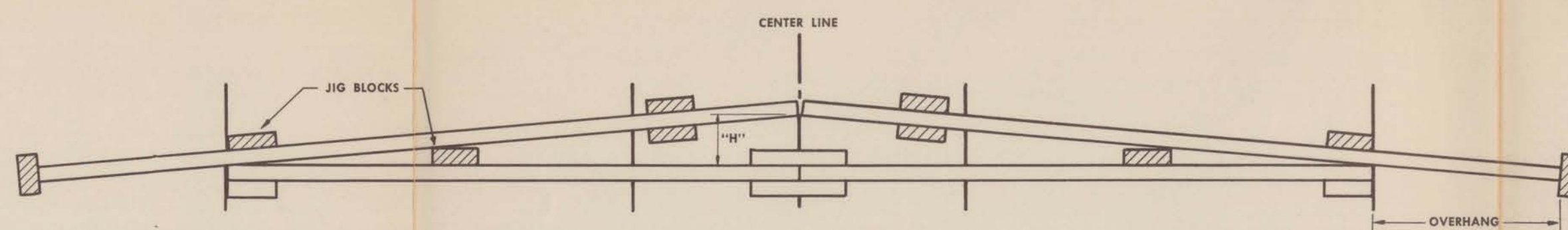
Lay out a chalk line equal to the span and divide it as shown below. Mark off dimension "H" (from Cutting Schedule) on center line. Nail 2" x 4" jig blocks as indicated.



## 6 COMPLETE JIG AND PATTERN

Put top and bottom chords into position. If either member of the bottom chords is warped, it should be placed with crown up. The distance between the top chords and the bottom chord at the center line should equal "H".

Establish the desired overhang. Nail 10 more 2" x 4" jig blocks as shown in diagram. This completes the jig and the roof-frame is ready for gluing and nailing.



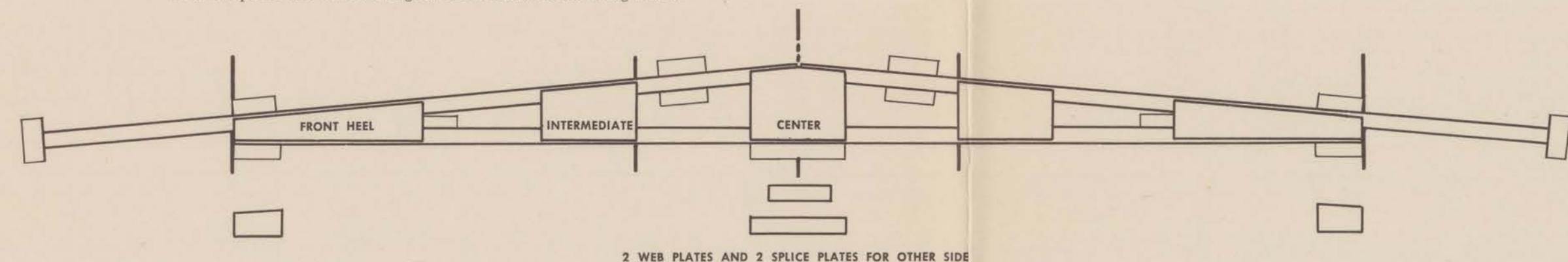
## 7 CHECK PATTERN

- Recheck alignment on all members. Be sure all members are tight along the center line. Place additional blocks where needed.
- Place web plates in position on the roof-frame and check for proper fit. Make sure their edges do not extend beyond the top and bottom chords in such a way as to interfere with roof sheathing or ceiling material.
- Disassemble the pattern roof-frame.
- Use members of disassembled roof-frame as pattern for cutting the members of all frames to be built.
- Assemble roof-frames, using blocks and chalk lines as a jig. Proceed with gluing and nailing.

## 8 MARK FOR GLUING

Place the five web plates on the roof-frame as shown in the diagram. Mark their outside edges, remove, and apply glue within web-plate area. (See instruction sheet, "Nail-Gluing of Roof Trusses and Frames.") Nail web plates as shown in Figure 9. Remove roof-frame from jig. Turn roof-frame over. Glue and nail the 2 web plates and 2 splice plates on the other side.

Stack completed roof-frames. Let glue set 24 hours before handling frames.



## STRUCTURAL DESIGN DATA

The design of this statically indeterminate plywood web roof-frame is based upon test results using electric resistance strain gages in an experimental stress analysis of a model.\* Top and bottom chords are subjected to both bending and axial stresses with the critical stresses occurring at the juncture of the chord members and the web plates. When the frame is considered loaded with 40 pounds per square foot of horizontal projection (25 pounds live load; 15 pounds dead load), the stresses shown in the table occur.

The glue areas at the web plates were designed so that the axial forces were transmitted from one piece to the next without exceeding the allowable shear parallel to the glue bond of 90 pounds per square inch.† A large factor of safety was used. The heel web plates were made sufficiently long so that the transverse shear stresses under design load were well below the allowable 300 pounds per square inch.

\* "A New Low-Pitched Roof Truss with Nail-Glued Connections," Purdue University, Agricultural Experiment Station Bulletin 116 (to be published).  
† "Design of Nail-Glued Plywood Gusset Plates," Purdue University, Agricultural Experiment Station Bulletin 613, 1954, Lafayette, Indiana.

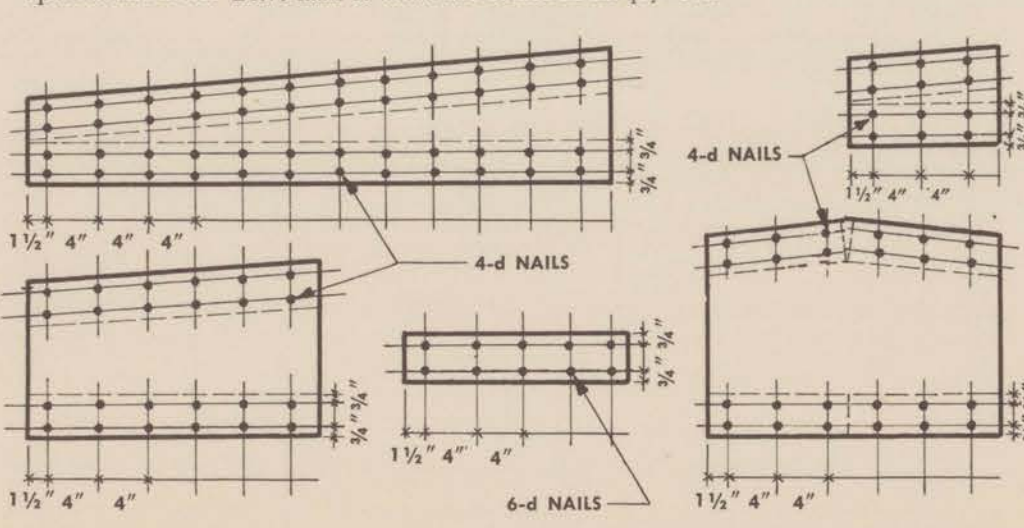
## UNIT STRESSES DEVELOPED UNDER DESIGN LOAD (pounds per square inch) Span 28'-8"

Position	Axial Stress	Bending Stress	Combined Stress
A	-477	9	486
B	602	140	742
C	-490	270	760
D	606	467	1073
E	-688	465	1153
F	533	623	1156
G	-633	206	839
H	566	16	582

Note: Negative sign denotes compression.

## 9 NAIL WEB PLATES

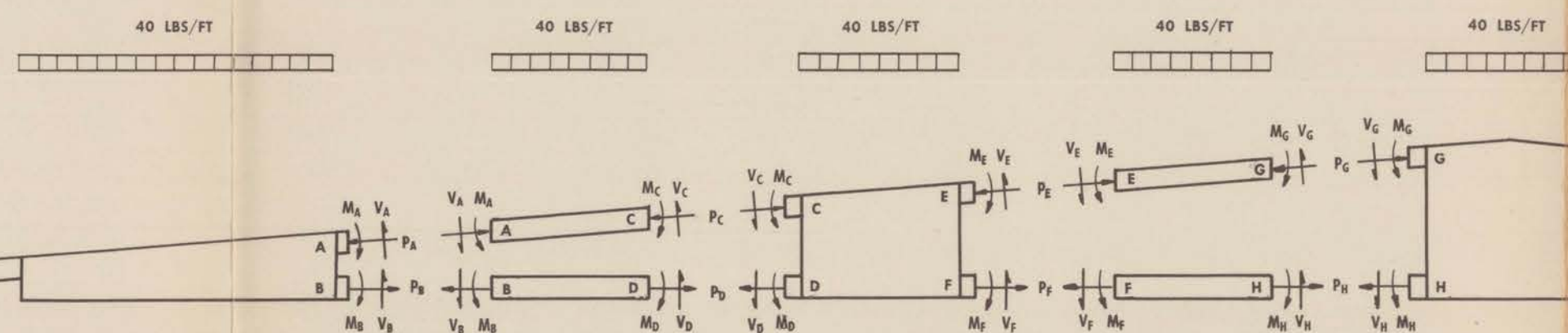
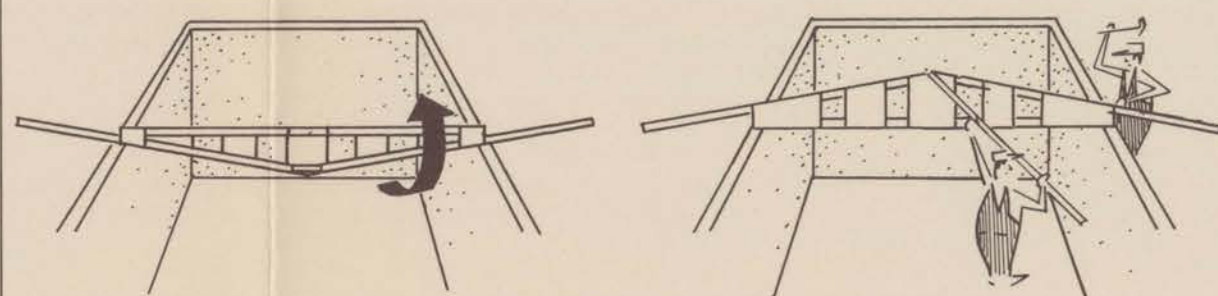
Use 4-d nails for nailing web plates and 6-d nails for splice plates. Space nails four inches apart in two rows. Drive nails so heads are buried in the plywood.



## 10 ERECT ROOF-FRAME

To erect the roof-frame, place it in an inverted position with the ends resting on the wall plates.

Swing the roof-frame into position with a pole.



UNIVERSITY OF ILLINOIS SMALL HOMES COUNCIL URBANA, ILLINOIS

## PLYWOOD WEB ROOF-FRAME — 1/12 SLOPE 2' on Center, 20'-8" to 28'-8" Spans

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