

TECHNICAL NOTE NUMBER 262

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

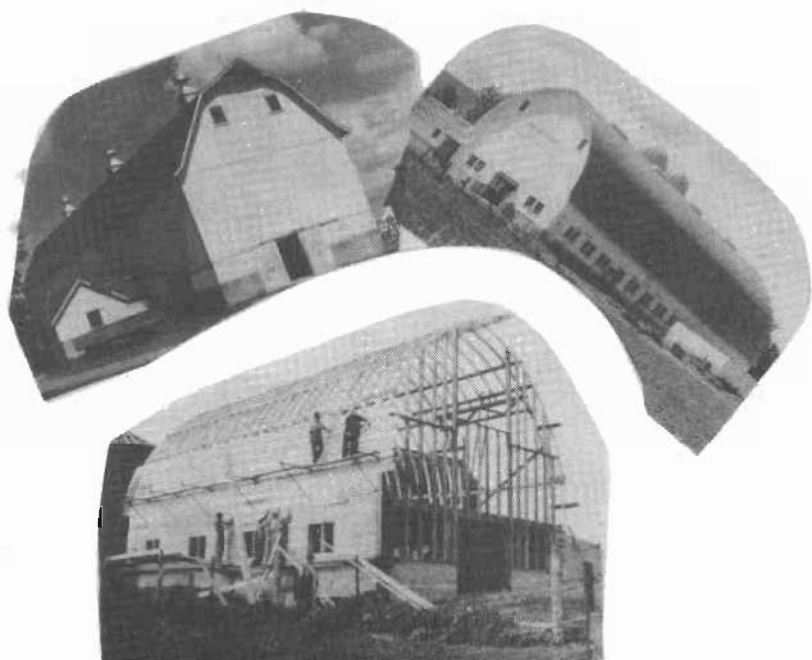
FOREST PRODUCTS LABORATORY

MADISON 5, WISCONSIN

January 1962

**Strong + Strong Materials = Strong
Joints Properly Used = Buildings**

By JOHN A. SCHOLTEN, Engineer



COMPARISON OF STRENGTH AND RIGIDITY OF VARIOUS TYPES OF JOINTS

RAFTER-TO-PLATE JOINTS

UPLIFT		THRUST	
Relative rigidity	Relative maximum load	Relative rigidity	Relative maximum load
PERCENT	PERCENT	PERCENT	PERCENT

Six tenpenny nails. Two nails toenailed into top of plate and one into narrow edge of top plate on each wide face of rafter.

UPLIFT

100

100

100

100

Rafter toenailed to wide face of upper plate with two tenpenny nails. One metal strap attached to each face of rafter and stud with six fourpenny nails.

50

140

60

80

Rafter toenailed to wide face of upper plate with two tenpenny nails. Metal strap 21 inches long nailed to rafter, plate, and stud with fourpenny nails as shown.

40

110

70

70

Twenty-four-inch strap nailed to each face of notch with two tenpenny nails and to each narrow face of stud, and to interior face of each plate with fourpenny nails as shown.

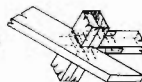
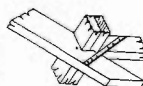
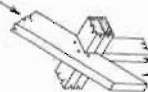
25

95

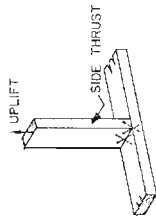
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50

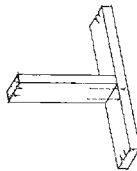
THRUST



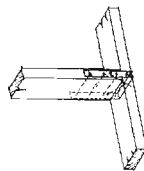
STUD-SILL JOINTS



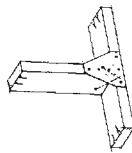
Four eightpenny common nails, two toenailed on each wide face. Nails were started $3/4$ to $7/8$ inch from end of stud and driven at a 30° angle with stud.



Two sixteenpenny common nails driven through 2 by 4 plate member into stud.



Stud toenailed to sill with two eightpenny nails. Metal strap attached to narrow face of stud with three eightpenny nails and one eightpenny nail in each narrow face of sill.



Stud toenailed to sill with two eightpenny nails. Gusset attached to narrow faces of stud and sill with three eightpenny nails.

UPLIFT		SIDE THRUST	
Relative rigidity	Relative maximum load	Relative rigidity	Relative maximum load
PERCENT	PERCENT	PERCENT	PERCENT

100 100 100 100

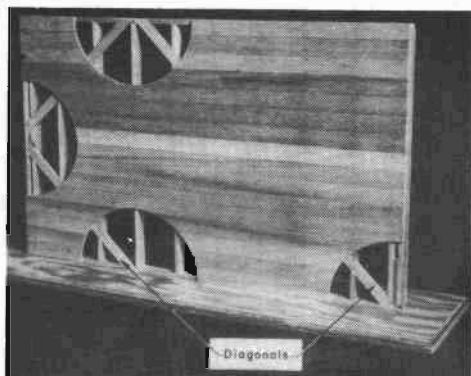
--- 70 95 75

240 510 70 170

90 220 70 120

(Straps and gusset were made from 24-gage galvanized metal. Straps were 1 inch wide and gusset at base was 5 inches wide. All nails were common wire nails.)

Diagonals Add Strength



Wall section with diagonal
let-in bracing is 4 times
as stiff and 3-1/2 times
as strong as...

an unbraced wall section.

