TECHNICAL NOTE NUMBER 262

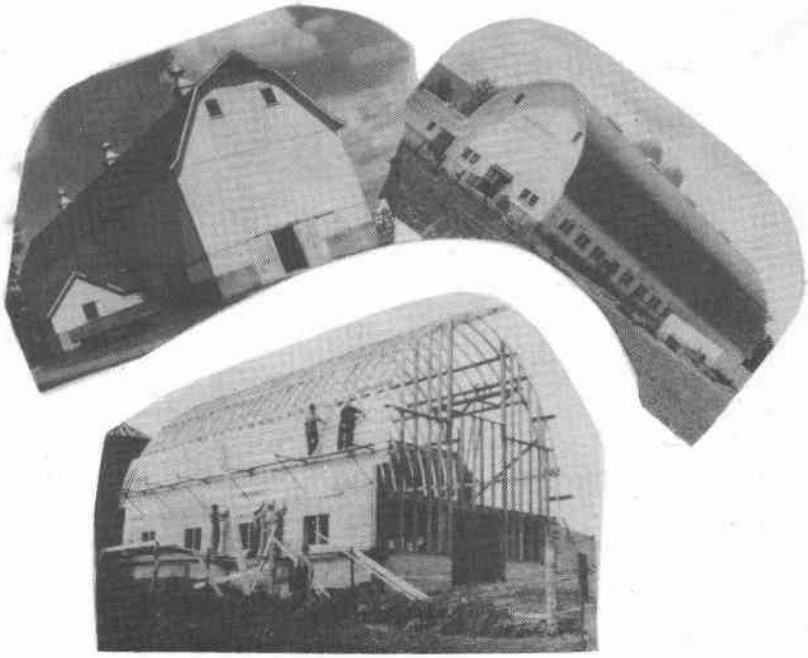
UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE

FOREST PRODUCTS LABORATORY

MADISON 5, WISCONSIN January 1962

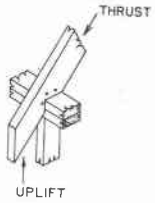
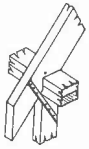
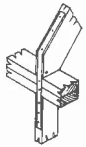
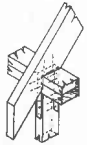
Strong Joints + Strong Materials Properly Used = Strong Buildings

By JOHN A. SCHOLTEN, Engineer

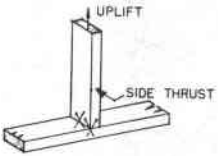
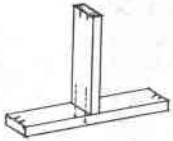
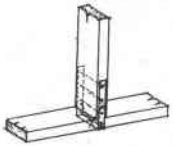
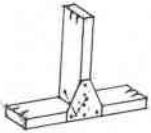


COMPARISON OF STRENGTH AND RIGIDITY OF VARIOUS TYPES OF JOINTS

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.	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	30	50

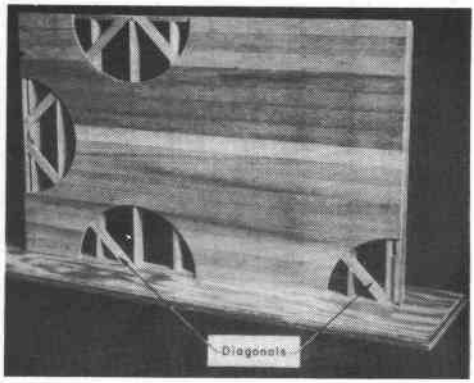
STUD-TO-SILL JOINTS

	UPLIFT		SIDE THRUST	
	Relative rigidity	Relative maximum load	Relative rigidity	Relative maximum load
	PERCENT	PERCENT	PERCENT	PERCENT
 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.	100	100	100	100
 Two sixteenpenny common nails driven through 2 by 4 plate member into stud.	---	70	95	75
 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.	240	510	70	170
 Stud toenailed to sill with two eightpenny nails. Gusset attached to narrow faces of stud and sill with three eightpenny nails.	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.)

Z M 120 731

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.