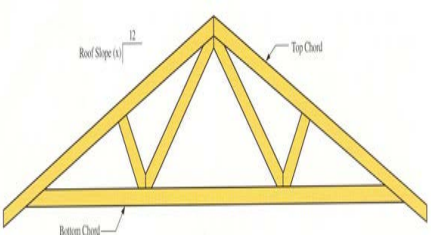
TRUSS / RAFTER TO WALL CONNECTIONS

BUILDING DEPARTMENT
160 LAKE STREET NORTH
BIG LAKE MN 55309
(Main) 763-251-2971 / (Fax) 763-263-0133
www.biglakemn.org



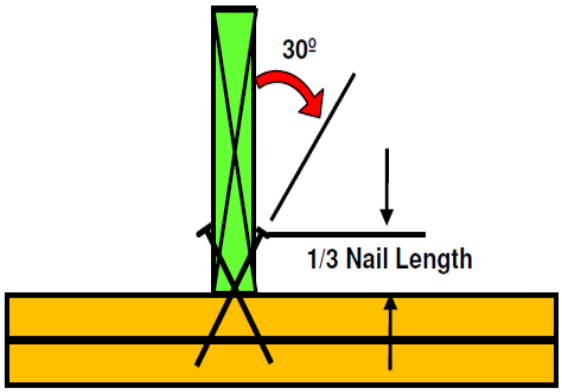
An important aspect of the construction of any building is the connection between the roof and the walls. Trusses or rafters may be attached to walls with a minimum of three of any of the nails shown in the adjoining table as long as the uplift does not exceed 200 pounds. If you are using gun nails, you must use a minimum of a 16d gun nail.

NAIL TYPE	MAXIMUM UPLIFT RESISTANCE CAPACITY (LBS.) FOR THREE TOENAILS
16d Common	178
16d Box	149
12d Common	149
16d Gun Nail	144
12d Sinker	144
16d Sinker	139
10d Common	139
The following do not meet required resistance.	
12d Box	130
12d Gun Nail	120
10d Box	120
10d Gun Nail	110
10d Sinker	106

When using toenails, it is critical that they be properly installed and do not split the heel of the rafter or truss. There are also limitations to the number of toe-nails that can be placed in a member as follows:

- Total number of toe-nails in a 2X4 plate is three (two on one side, one on the other)
- Total number of toe-nails in a 2X6 plate is five (three on one side, two on the other)
- Nailing through metal connector plates is allowed provided the nailing does not damage the metal plates.

Toenails must be installed at an angle of 30 degrees from the vertical and be installed approximately 1/3rd the length of the nail above the top plate. Toe-nail installations that split framing members or that are not installed properly are subject to rejection during the framing inspection. Appropriate connectors would then be required.



PROPER TOENAILING

How do you know if the uplift on your truss/rafter exceeds 200 pounds? The truss design drawings should provide that information. You can also use the table below base on rafter/truss spacing, roof span, and roof pitch to determine uplift.

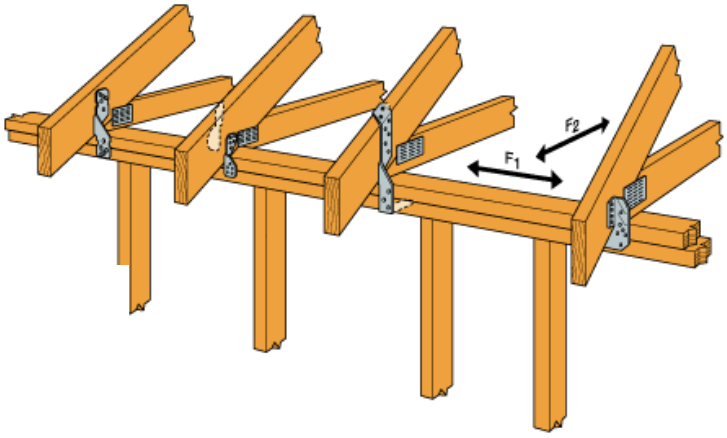
WHEN UPLIFTS EXCEED 200 POUNDS

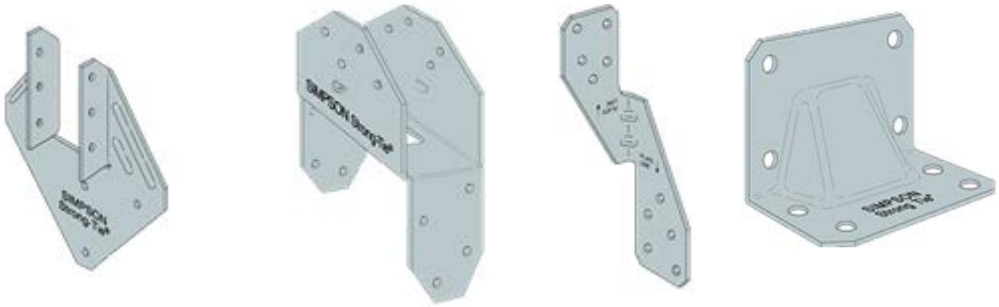
Whenever the uplift force on the truss/rafter to wall **connection exceeds 200 pounds, toe-nails can no longer be used** and approved connectors are required. The adjoining table illustrates those conditions when connectors are required. For example, if the structure is located in an area where the wind exposure is B, the roof pitch is less than 5:12, rafters or trusses are spaced 24" o.c., and the roof span is 28 feet, the uplift at the rafter or truss connection is 208 pounds. This exceeds the performance that can be achieved by toe-nails and connectors must be used that exhibit sufficient resistance to uplift as shown in the table. Connectors must be installed in accordance with the installation instructions provided by the manufacturer. Connectors must be in place and visible at the time of the framing inspection.

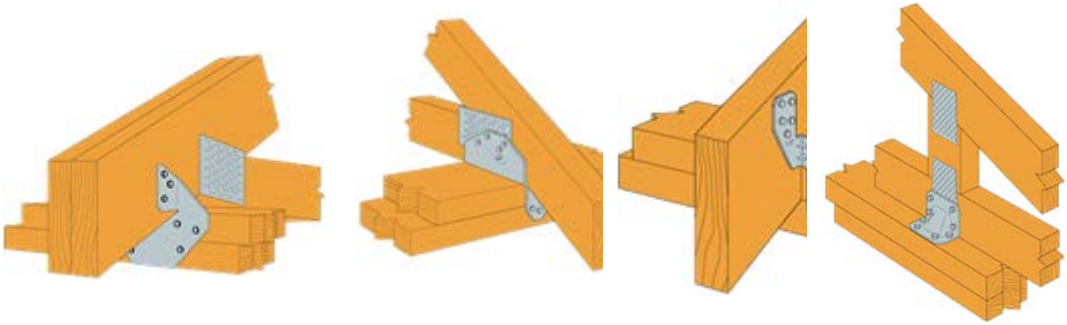
TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION
FORCES FROM WIND (POUNDS PER CONNECTION)[a, b, c, d, e, f, g, h]

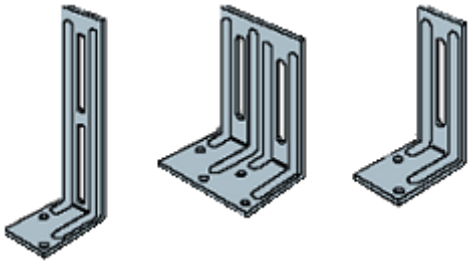
RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B		EXPOSURE C	
		Basic Wind Speed (mph)			
		90			
		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12
12″ o.c.	12	62	54	114	99
	18	78	68	146	127
	24	93	81	179	156
	28	104	90	201	175
	32	115	100	224	195
	36	126	110	246	214
	42	143	124	279	243
	48	159	138	313	272
16″ o.c.	12	83	72	152	132
	18	103	90	194	169
	24	124	108	238	207
	28	138	120	267	232
	32	153	133	298	259
	36	168	146	327	284
	42	190	165	372	324
	48	212	184	416	362
24″ o.c.	12	124	108	228	198
	18	155	135	292	254
	24	186	162	358	311
	28	208	181	402	350
	32	230	200	448	390
	36	252	219	492	428
	42	285	248	558	485
	48	318	277	626	545

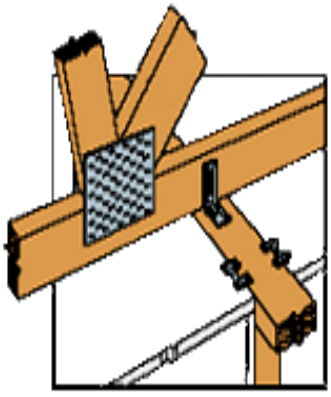
A VARIETY OF CONNECTORS THAT MAY BE USED TO ATTACH TRUSSES TO WALLS



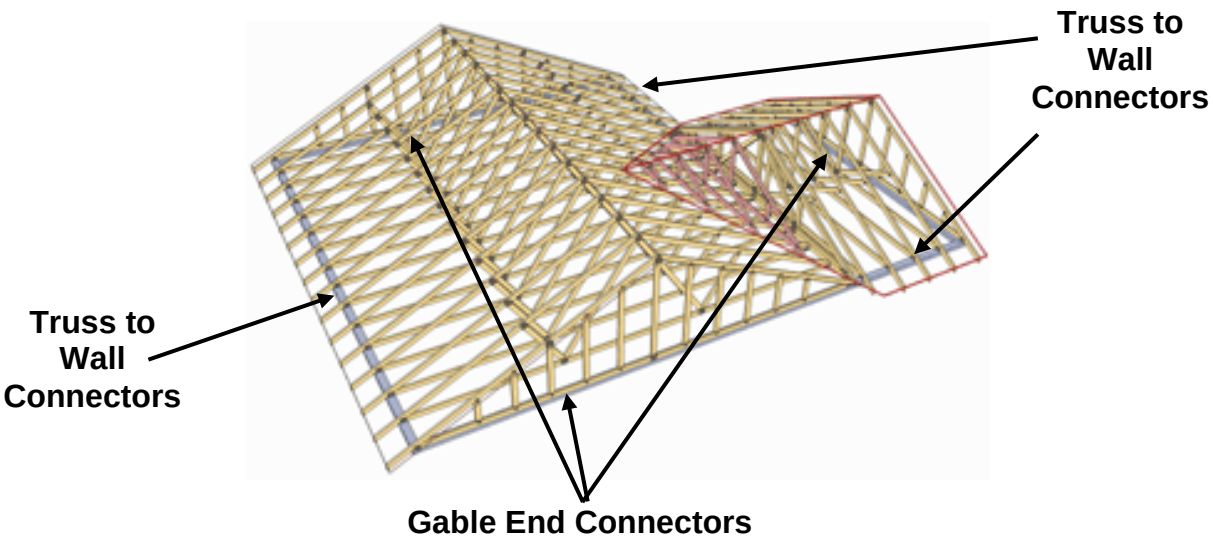








Trusses should not be connected to nonbearing interior partitions but should be allowed “to float”. A number of different types of connectors are made to maintain truss alignment without creating a solid connection. Nails installed in the slots should not be fully driven to allow the truss to move up and down.


Truss to
Wall
Connectors
Truss to
Wall
Connectors
Gable End Connectors