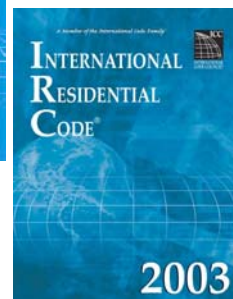
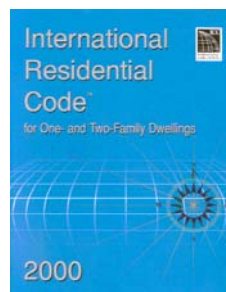




ROOF FRAMING



Prescriptive Method Section "F"

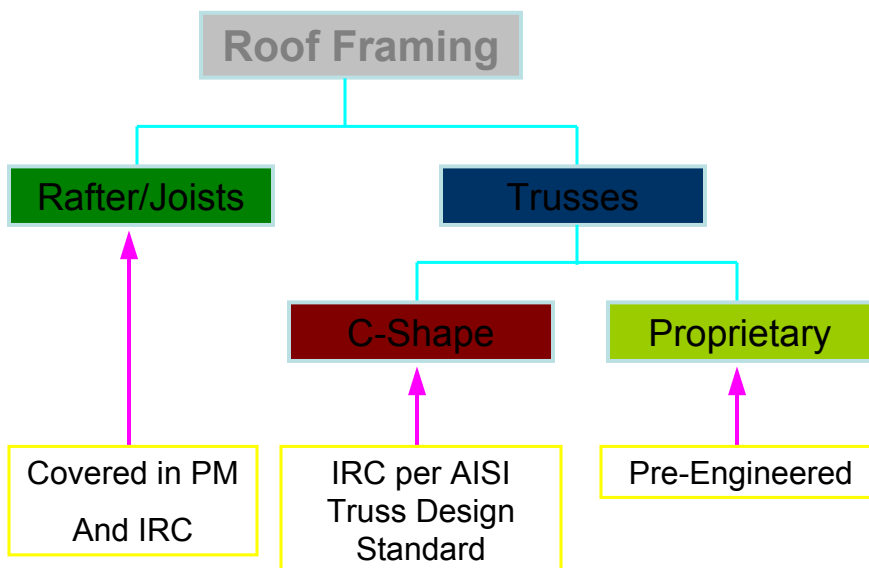


In-Line Framing

- In-Line Framing: All Roof Framing Members Shall Align with Studs Below, Unless a Load Distribution Member is Used.



Types of Steel Roofs



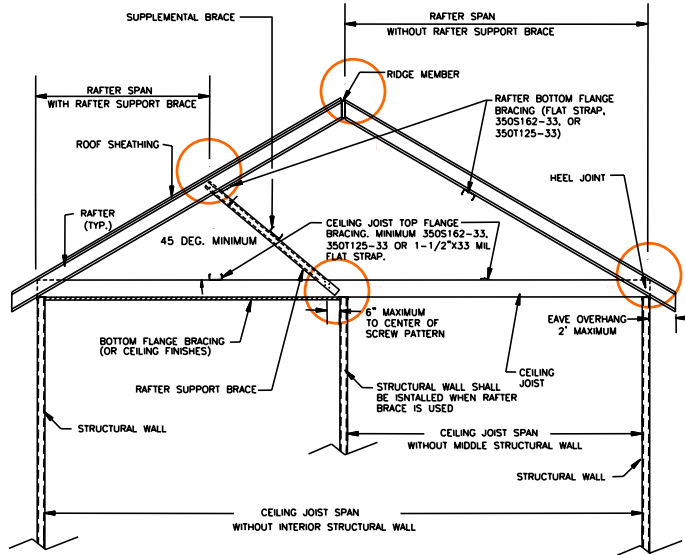
C-Shaped Trusses



Proprietary Trusses



Typical Roof Components



Joist and Rafter Span Tables

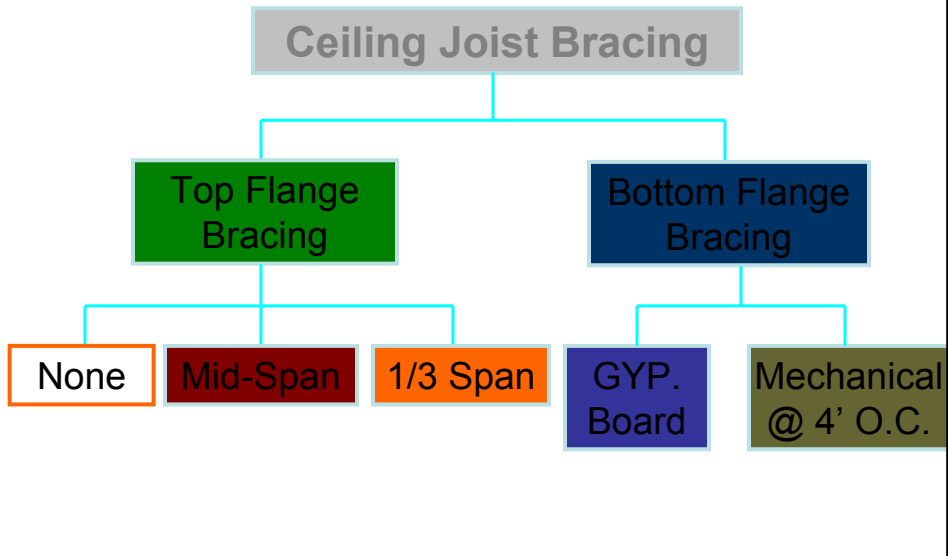
Ceiling Joists Span Tables

Single Spans				Two Equal Spans			
No Attic Storage		Attic Storage		No Attic Storage		Attic Storage	
Stiffeners	No Stiffeners	Stiffeners	No Stiffeners	Stiffeners	No Stiffeners	Stiffeners	No Stiffeners
F2-1	F2-5	F2-3	F2-7	F2-2	F2-6	F2-4	F2-8

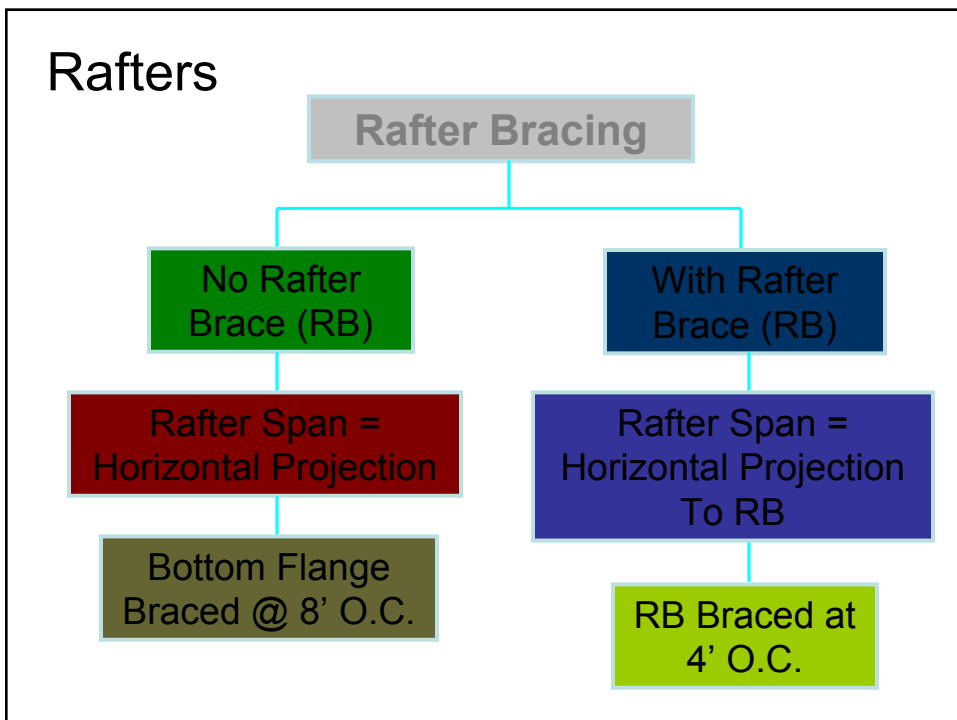
Rafter Span Table

F3-1

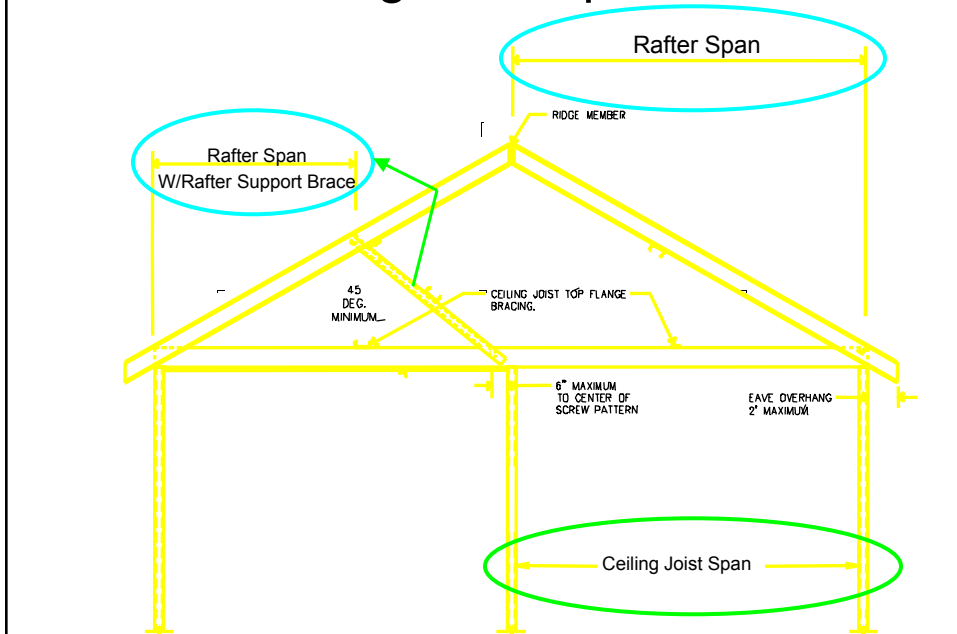
Ceiling Joists



Rafters



Rafter & Ceiling Joist Span

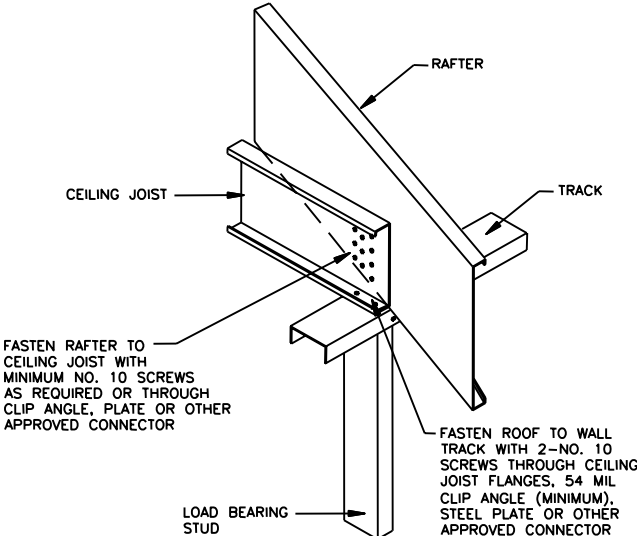


Splicing

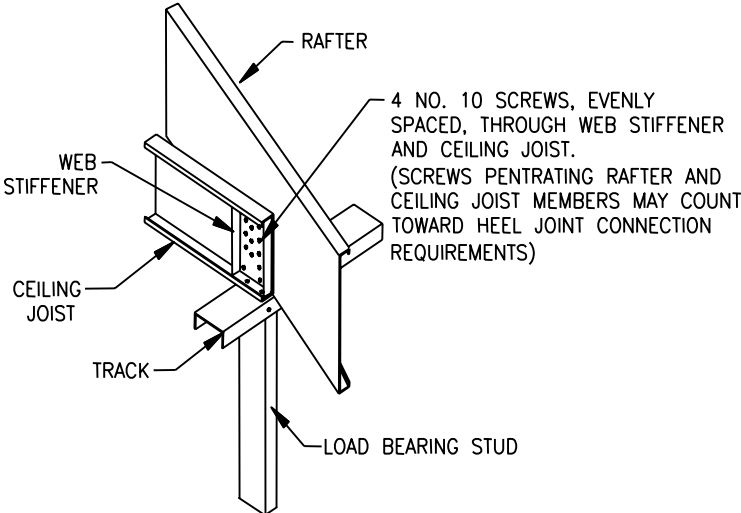
Splices Are Not Permitted in Any Structural Member (except ceiling Joists) WITHOUT AN APPROVED DESIGN!!

Splices in Ceiling Joists Are Permitted Only at Interior Load Bearing Walls. Splices at Other Locations Are Not Permitted WITHOUT AN APPROVED DESIGN!!

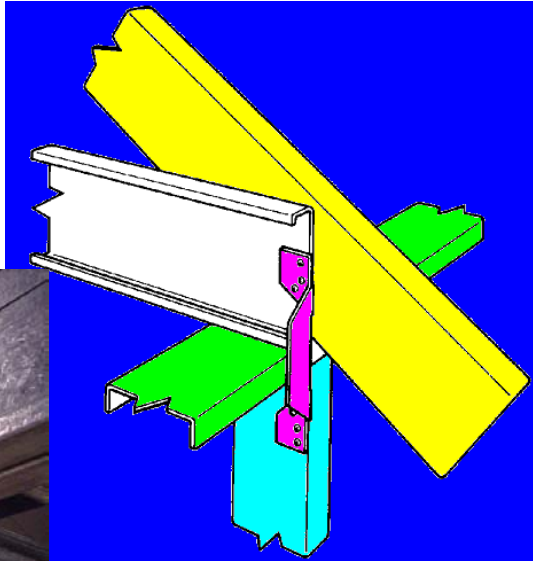
Rafter To Ceiling Joist Connection No Web Stiffener



Rafter To Ceiling Joist Connection With Web Stiffener



Alternative Manufactured Connector

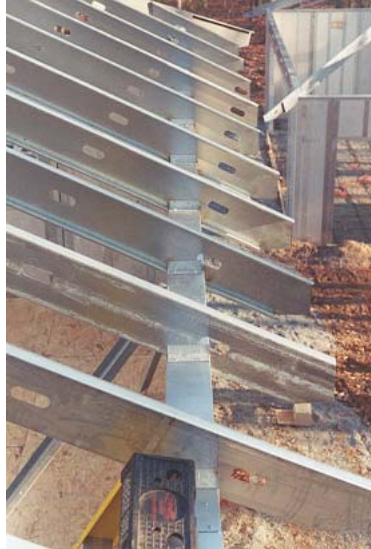


Rafter to Wall Connections

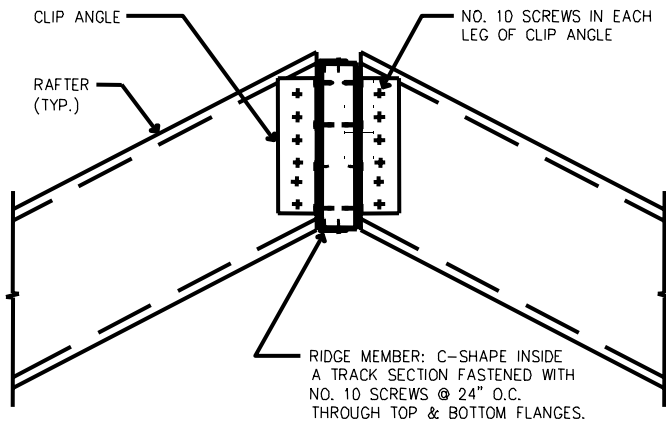
Rafter Preparation



Rafter to Wall Connections



Ridge Member Connection



Roof Diaphragm

- Min. 3/8" APA Rated Sheathing (OSB or Plywood)
- Screws 6" o.c. @ Edges, 12" o.c. Intermediate
- Any Orientation
- Roof Pitch > 9:12 For Buildings With Aspect Ratio > 3:1 Shall have Joists & Rafters Blocked



Roof Diaphragm, High Wind/Seismic

- Min. 3/8" APA Rated Sheathing (OSB or Plywood)
- Screws 6" o.c. @ Edges and 6" o.c. Intermediate Supports
- Any Orientation
- Heavy Roof Systems in SDC D₂ Shall Use Min. 15/32" APA Structural I Plywood W/6" o.c. Screw Spacing @ Edges and in Field



Roof Framing Design Example

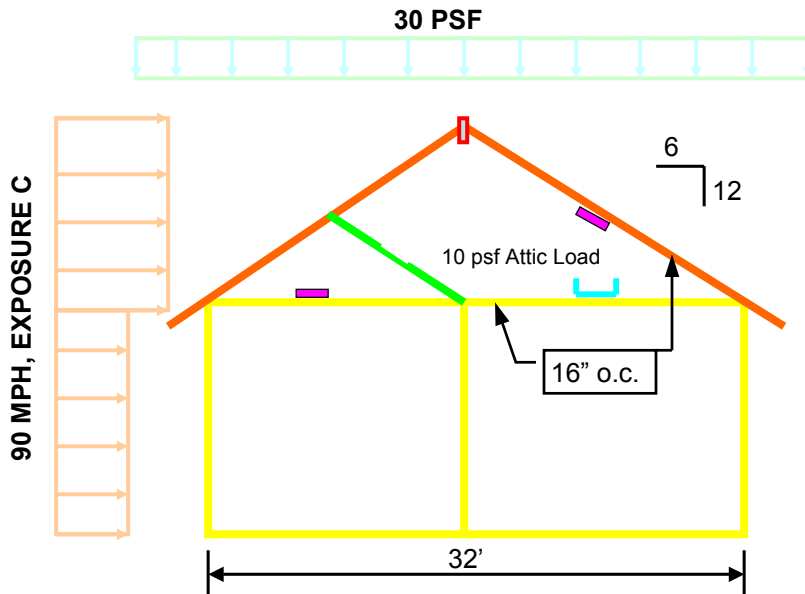


Table F2-2

Ceiling Joist Spans

Two Equal Spans with Bearing Stiffeners
 10 Lbs. per Sq. Ft. Live Load (No Attic Storage)^{1,2,3,4,5}
 F, 33 ksi

33
 KSI

Member Designation	Allowable Span (Feet-Inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	12'-11"	10'-11"	13'-5"	10'-11"	13'-5"	10'-11"
350S162-43	14'-2"	12'-8"	15'-10"	12'-11"	15'-10"	12'-11"
350S162-54	15'-6"	13'-10"	17'-1"	14'-6"	17'-9"	14'-6"
350S162-68	17'-3"	15'-3"	18'-6"	16'-1"	19'-8"	16'-1"
350S162-97	20'-10"	18'-4"	21'-5"	18'-10"	21'-11"	18'-10"
550S162-33	14'-4"	12'-11"	16'-7"	14'-1"	17'-3"	14'-1"
550S162-43	16'-0"	14'-1"	17'-11"	16'-1"	20'-7"	16'-10"
550S162-54	17'-4"	15'-6"	19'-5"	17'-6"	23'-2"	19'-0"
550S162-68	19'-1"	16'-11"	20'-10"	18'-8"	25'-2"	21'-5"
550S162-97	22'-8"	19'-9"	23'-6"	20'-11"	27'-11"	25'-1"
800S162-33	16'-5"	14'-10"	19'-2"	17'-3"	23'-1"	18'-3"
800S162-43	17'-9"	15'-11"	20'-6"	18'-5"	25'-0"	22'-6"
800S162-54	19'-1"	17'-1"	21'-8"	19'-6"	26'-4"	23'-9"
800S162-68	20'-9"	18'-6"	23'-1"	20'-9"	28'-0"	25'-2"
800S162-97	24'-5"	21'-6"	26'-0"	23'-2"	31'-1"	27'-9"
1000S162-43	18'-11"	17'-0"	21'-11"	19'-9"	26'-8"	24'-1"
1000S162-54	20'-3"	18'-2"	23'-2"	20'-10"	28'-2"	25'-5"

Ceiling Joist Span

Rafter Span

Two Checks Must Be Considered:

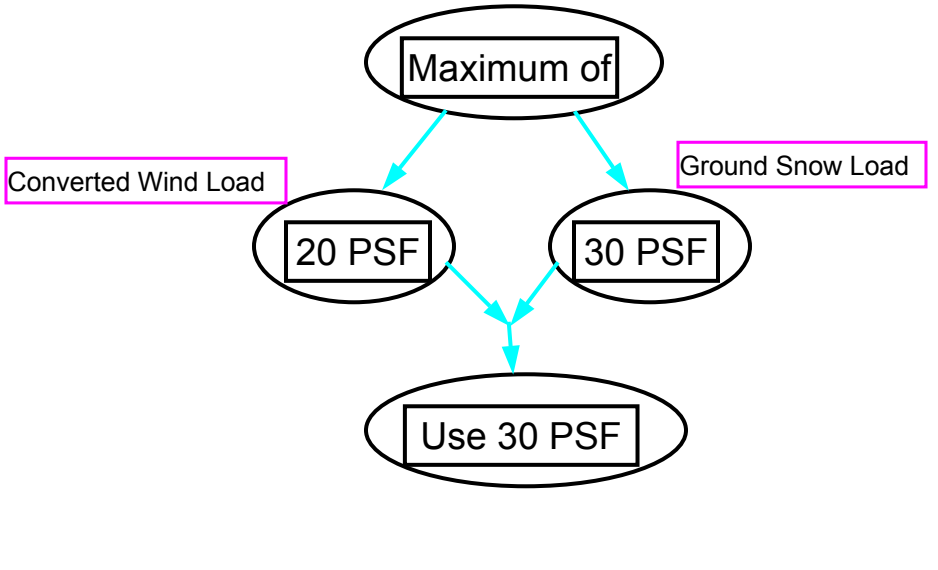
- Loads Due to Ground Snow Loads
- Loads Due to Wind Speed

Convert Wind Load to Snow Load

Table F3-2
Conversion of Basic Wind Speed to Equivalent Snow Load ¹

Basic Wind Speed And Exposure		Equivalent Ground Snow Load (psf)									
Exposure	Wind Speed	Roof Slope									
		3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12
A/B	85 mph	20	20	20	20	20	20	30	30	30	30
	90 mph	20	20	20	20	30	30	30	30	30	50
	100 mph	20	20	20	20	30	30	30	30	50	50
	110 mph	20	20	20	20	30	50	50	50	50	50
	120 mph	30	30	30	50	50	50	70	70	70	-
	130 mph	30	50	50	50	70	70	70	-	-	-
C	85 mph	20	20	20	20	30	30	30	30	50	50
	90 mph	20	20	20	20	30	30	30	50	50	50
	100 mph	20	20	20	20	30	50	50	50	50	50
	110 mph	30	30	30	50	50	50	70	70	70	-
	120 mph	30	50	50	50	70	70	70	-	-	-
	130 mph	50	50	50	70	70	-	-	-	-	-

Rafter Load



Rafter Span W/No Brace

33
KSI

Table F3-1
 Rafter Spans^{1,2,3}
 F_y 33 ksi

Span = 16'

Member Designation	Allowable Span Measured Horizontally (Feet-Inches)							
	Ground Snow Load							
	20 psf		30 psf		50 psf		70 psf	
	Rafter Spacing (in.)							
	16	24	16	24	16	24	16	24
550S162-33	14'-0"	11'-5"	11'-10"	9'-8"	9'-5"	7'-8"	8'-1"	6'-7"
550S162-43	16'-6"	13'-10"	14'-4"	11'-9"	11'-5"	9'-4"	9'-10"	8'-0"
550S162-54	17'-9"	15'-6"	15'-6"	13'-2"	12'-11"	10'-6"	11'-1"	9'-0"
550S162-68	19'-0"	16'-7"	16'-8"	14'-7"	14'-1"	11'-10"	12'-5"	10'-2"
550S162-97	21'-2"	18'-6"	18'-7"	16'-2"	15'-8"	13'-8"	14'-0"	12'-2"
800S162-33	17'-0"	13'-11"	14'-5"	11'-9"	11'-6"	7'-9"	8'-6"	5'-8"
800S162-43	19'-4"	17'-3"	17'-10"	14'-7"	14'-3"	11'-7"	12'-2"	9'-11"
800S162-54	23'-11"	20'-4"	21'-0"	17'-3"	16'-10"	13'-9"	14'-5"	11'-9"
800S162-68	25'-9"	22'-6"	22'-7"	19'-5"	19'-0"	15'-6"	16'-3"	13'-3"
800S162-97	28'-9"	25'-1"	25'-2"	22'-0"	21'-3"	18'-7"	19'-0"	16'-0"
1000S162-43	23'-4"	19'-1"	19'-9"	16'-2"	15'-9"	12'-11"	13'-6"	10'-0"
1000S162-54	27'-8"	22'-7"	23'-5"	19'-1"	18'-8"	15'-3"	16'-0"	13'-1"
1000S162-68	30'-11"	27'-0"	27'-2"	22'-11"	22'-5"	18'-3"	19'-2"	15'-8"
1000S162-97	34'-7"	30'-2"	30'-4"	26'-6"	25'-7"	22'-1"	22'-10"	18'-11"
1200S162-43	25'-5"	20'-9"	21'-6"	17'-6"	17'-1"	11'-5"	12'-6"	8'-6"
1200S162-54	30'-0"	24'-6"	25'-5"	20'-9"	20'-3"	16'-7"	17'-5"	14'-2"
1200S162-68	35'-5"	28'-11"	30'-0"	24'-6"	23'-11"	19'-6"	20'-6"	16'-9"
1200S162-97	40'-4"	35'-3"	35'-5"	30'-11"	29'-10"	25'-5"	26'-8"	21'-9"

Rafter Span With Brace

Span = 8'

33
KSI

Table F3-1
Rafter Spans^{1,2,3}
F_y 33 ksi

Member Designation	Allowable Span Measured Horizontally (Feet-Inches)							
	Ground Snow Load							
	20 psf		30 psf		50 psf		70 psf	
	Rafter Spacing (in.)							
	16	24	16	24	16	24	16	24
550S162-33	11'-0"	11'-3"	11'-10"	9'-8"	9'-5"	7'-8"	8'-1"	6'-7"
550S162-43	16'-6"	13'-10"	14'-4"	11'-9"	11'-5"	9'-4"	9'-10"	8'-0"
550S162-54	17'-9"	15'-6"	15'-6"	13'-2"	12'-11"	10'-6"	11'-1"	9'-0"
550S162-68	19'-0"	16'-7"	16'-8"	14'-7"	14'-1"	11'-10"	12'-5"	10'-2"
550S162-97	21'-2"	18'-6"	18'-7"	16'-2"	15'-8"	13'-8"	14'-0"	12'-2"
800S162-33	17'-0"	13'-11"	14'-5"	11'-9"	11'-6"	7'-9"	8'-6"	5'-8"
800S162-43	21'-1"	17'-3"	17'-10"	14'-7"	14'-3"	11'-7"	12'-2"	9'-11"
800S162-54	23'-11"	20'-4"	21'-0"	17'-3"	16'-10"	13'-9"	14'-5"	11'-9"
800S162-68	25'-9"	22'-6"	22'-7"	19'-5"	19'-0"	15'-6"	16'-3"	13'-3"
800S162-97	28'-9"	25'-1"	25'-2"	22'-0"	21'-3"	18'-7"	19'-0"	16'-0"
1000S162-43	23'-4"	19'-1"	19'-9"	16'-2"	15'-9"	12'-11"	13'-6"	10'-0"
1000S162-54	27'-8"	22'-7"	23'-5"	19'-1"	18'-8"	15'-3"	16'-0"	13'-1"
1000S162-68	30'-11"	27'-0"	27'-2"	22'-11"	22'-5"	18'-3"	19'-2"	15'-8"
1000S162-97	34'-7"	30'-2"	30'-4"	26'-6"	25'-7"	22'-1"	22'-10"	18'-11"
1200S162-43	25'-5"	20'-9"	21'-6"	17'-6"	17'-1"	11'-5"	12'-6"	8'-6"
1200S162-54	30'-0"	24'-6"	25'-5"	20'-9"	20'-3"	16'-7"	17'-5"	14'-2"
1200S162-68	35'-5"	28'-11"	30'-0"	24'-6"	23'-11"	19'-6"	20'-6"	16'-9"
1200S162-97	40'-4"	35'-3"	35'-5"	30'-11"	29'-10"	25'-5"	26'-8"	21'-9"

Joist To Rafter Connection

Table F2-9
Screws Required For Ceiling Joist to Rafter Connections¹

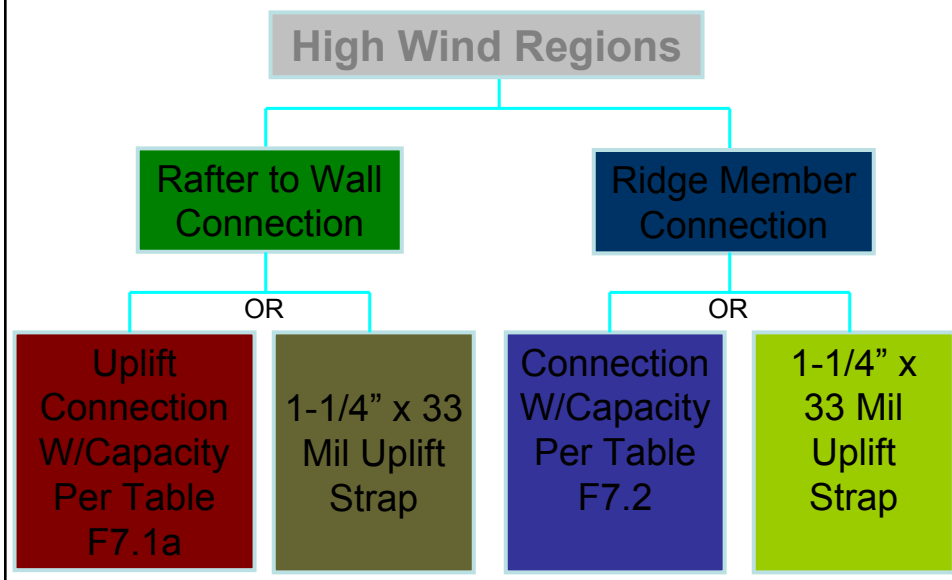
Roof Slope	Number of Screws																			
	Building Width (feet)																			
	24'				28'				32'				36'				40'			
	Ground Snow Load (psf)																			
	20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
3/12	5	6	9	11	5	7	10	13	6	8	11	15	7	8	13	17	8	9	14	19
4/12	4	5	7	9	4	5	8	10	5	6	9	12	5	7	10	13	6	7	11	14
5/12	3	4	6	7	4	4	6	8	4	5	7	10	5	5	8	11	5	6	9	12
6/12	3	3	5	6	3	4	6	7	4	4	6	8	4	5	7	9	4	5	8	10
7/12	3	3	4	6	3	3	5	7	3	4	6	7	4	4	6	8	4	5	7	9
8/12	2	3	4	5	3	3	5	6	3	4	5	7	3	4	6	8	4	4	6	8
9/12	2	3	4	5	3	3	4	6	3	3	5	6	3	4	5	7	3	4	6	8
10/12	2	2	4	5	2	3	4	5	3	3	5	6	3	3	5	7	3	4	6	7
11/12	2	2	3	4	2	3	4	5	3	3	4	6	3	3	5	6	3	4	5	7
12/12	2	2	3	4	2	3	4	5	2	3	4	5	3	3	5	6	3	4	5	7

Rafter to Ridge Member Connection

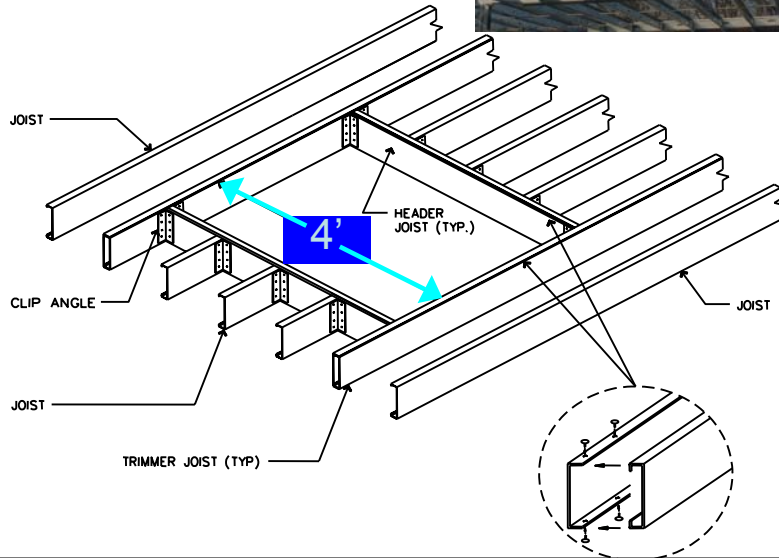
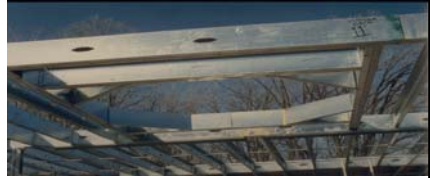
Table F3-3
Screws Required at Each Leg of Clip Angle
For Rafter to Ridge Member Connection¹

Building Width (feet)	Number of Screws			
	Ground Snow Load (psf)			
	0 to 20	21 to 30	31 to 50	51 to 70
24	2	2	3	4
28	2	3	4	5
32	2	3	4	5
36	3	3	5	6
40	3	4	5	7

Additional Requirements For High Wind Regions



Roof Openings

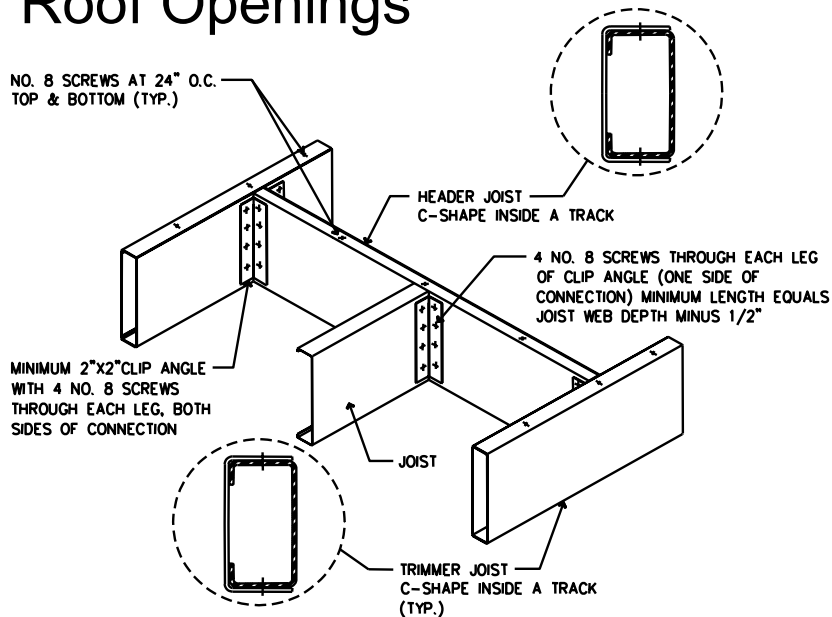


Roof Openings



◆ Similar to floor openings

Roof Openings



Roof Openings

IMPORTANT NOTE:

Just As In Floor Openings, Headers and Trimmers in this Configuration ARE NOT Designed to Carry Additional Loads, Such as From Stair Stringers or Chimney Shafts. If Additional Loading is Required, There MUST BE Another Support, Such as a Post or Load Bearing Wall.

Truss Standard



Hip and Rafter Connection



Hips, Ridge, and Valleys in Place



Connections



Filling in



Arches and Tray Ceilings



Arched Roof



Hybrid Connections



RESOURCES

Steel Framing Alliance

1201 15th Street, N.W., Suite 320, Washington, D.C. 20005
(202) 263-4486 <http://www.steel framing alliance.com>

American Iron and Steel Institute (AISI)

1101 17th Street, N.W., Suite 1300 Washington, D.C. 20036
(202) 452-7100 <http://www.steel.org>

National Association of Home Builders Research Center

400 Prince George's Blvd., Upper Marlboro, MD 20772
(301) 249-4000 <http://www.nahbrc.org>

1-800-79-STEEL