



BASIC WOOD FRAMING

City of Grand Rapids
Building Safety Division

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This handout is intended only as a guide and is based in part on the 2015 Minnesota State Building Code, Grand Rapids City ordinances, and good building practice. While every attempt has been made to insure the correctness of this handout, no guarantees are made to its accuracy or completeness. Responsibility for compliance with applicable codes and ordinances falls on the owner or contractor. For specific questions regarding code requirements, refer to the applicable codes or contact your local Building Safety Division.

TYPICAL BEARING WALL FRAMING

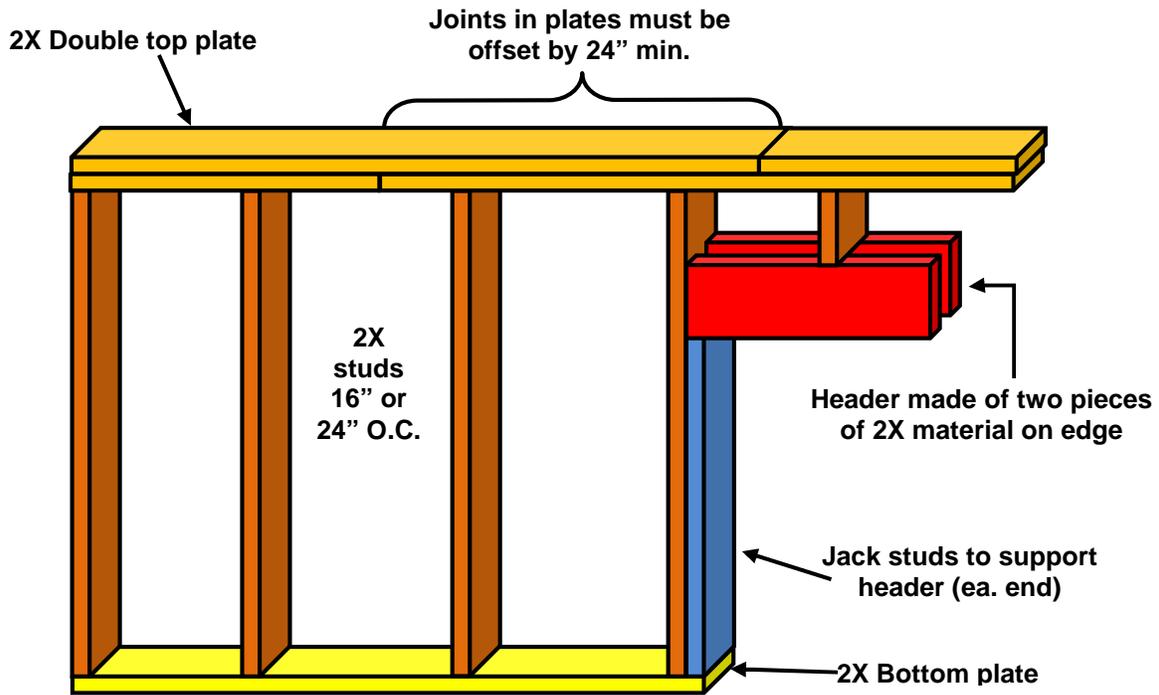
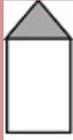
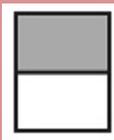


TABLE R602.3(5) SIZE, HEIGHT AND SPACING OF WOOD STUDS^a

STUD SIZE (inches)	BEARING WALLS					NONBEARING WALLS	
	Laterally unsupported stud height ^a (feet)	Maximum spacing when supporting a roof-ceiling assembly or a habitable attic assembly, only (inches)	Maximum spacing when supporting one floor, plus a roof-ceiling assembly or a habitable attic assembly (inches)	Maximum spacing when supporting two floors, plus a roof-ceiling assembly or a habitable attic assembly (inches)	Maximum spacing when supporting one floor height ^a (inches)	Laterally unsupported stud height ^a (feet)	Maximum spacing (inches)
							
2 x 3 ^b	—	—	—	—	—	10	16
2 x 4	10	24 ^c	16 ^c	—	24	14	24
3 x 4	10	24	24	16	24	14	24
2 x 5	10	24	24	—	24	16	24
2 x 6	10	24	24	16	24	20	24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.093 m².

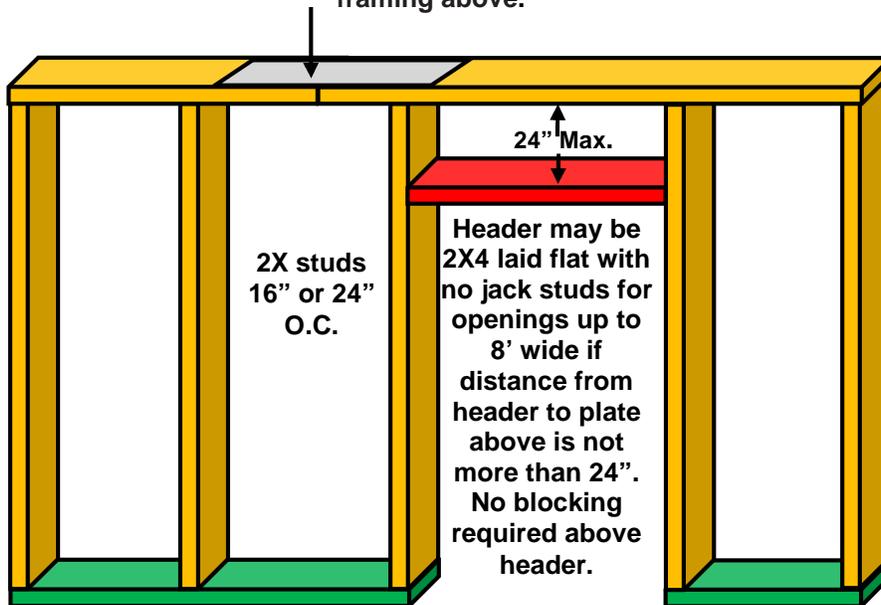
a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where justified by analysis.

b. Shall not be used in exterior walls.

c. A habitable attic assembly supported by 2 x 4 studs is limited to a roof span of 32 feet. Where the roof span exceeds 32 feet, the wall studs shall be increased to 2 x 6 or the studs shall be designed in accordance with accepted engineering practice.

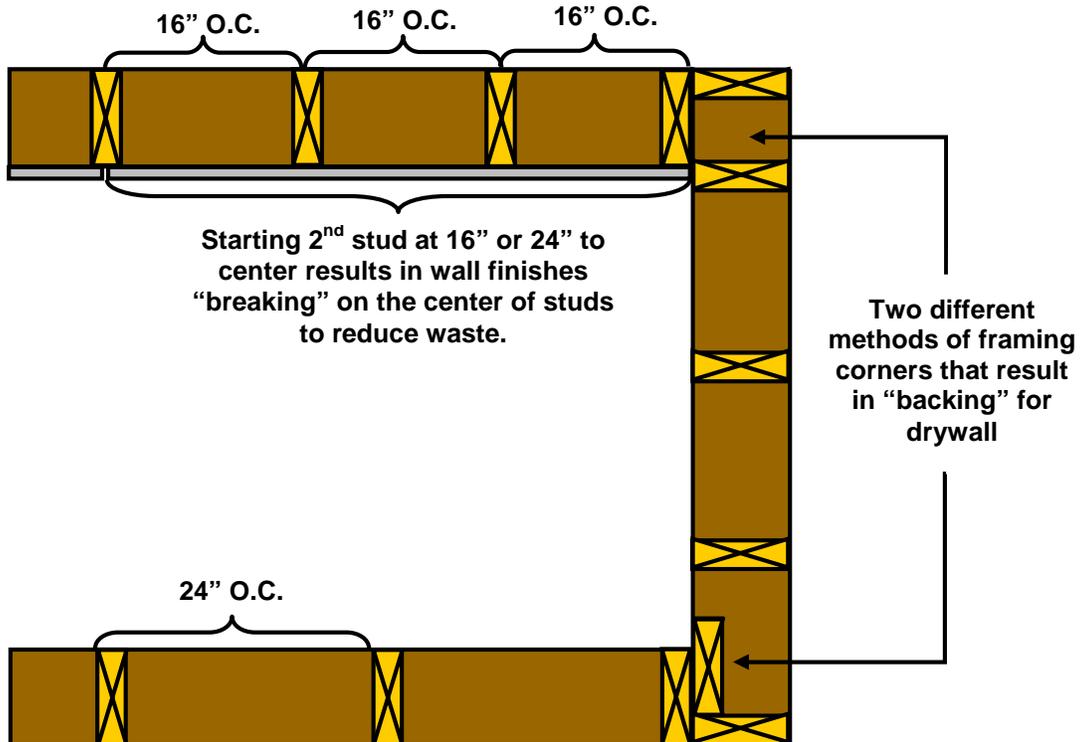
TYPICAL FRAMING FOR NON-BEARING WALLS OR BASEMENT WALLS

3-inch-by-6-inch by a 0.036-inch-thick galvanized steel plate nailed to each segment by six 8d nails on each side or secure to framing above.

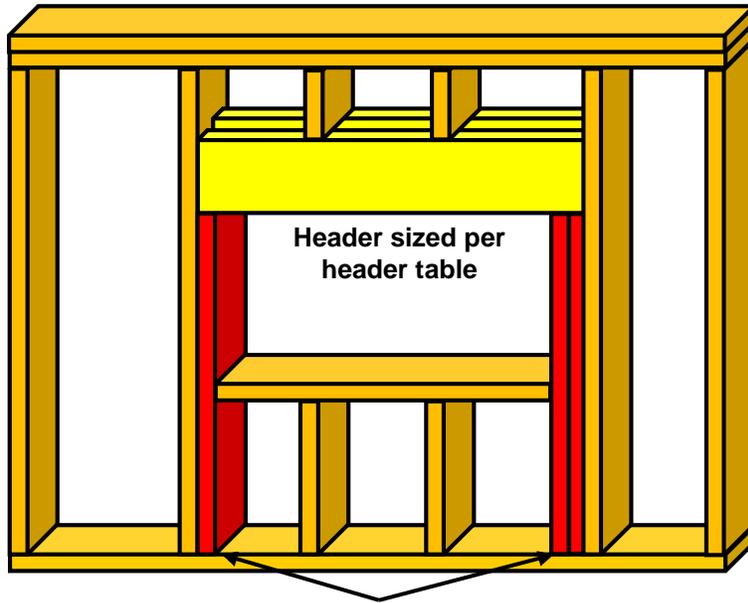


Plates on concrete floors must be treated unless there is a vapor barrier under the slab.

LAYING OUT WALLS – 16" AND 24" ON CENTER

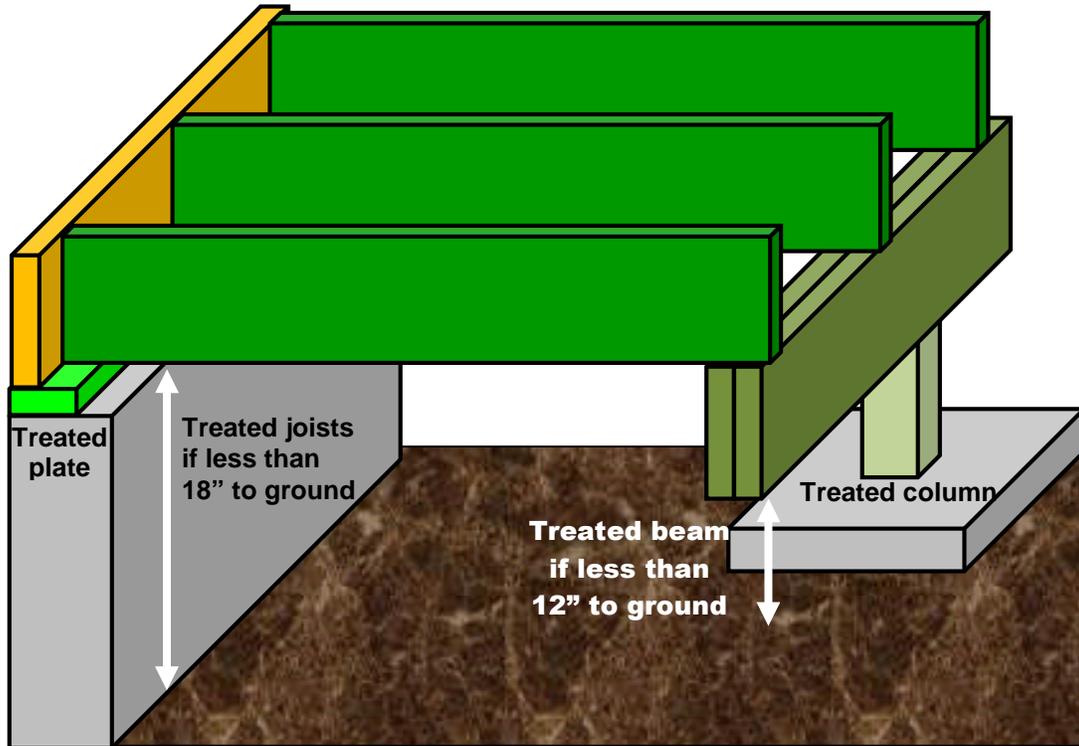


FRAMING OPENINGS IN BEARING WALLS



GIRDER AND HEADER SPANS FOR INTERIOR BEARING WALLS (IN FT/IN)					
TABLE R502.5(2) (#2Hem Fir or SPF)					
HEADERS AND GIRDERS SUPPORTING	SIZE	BUILDING WIDTH (FT)			
		20	24	28	32
		SPAN (JACK STUDS)	SPAN (JACK STUDS)	SPAN (JACK STUDS)	SPAN (JACK STUDS)
One floor only	2-2X4	3-1 (1)	2-11 (1)	2-8 (1)	2-7 (1)
	2-2X6	4-6 (1)	4-3 (1)	3-11 (1)	3-9 (1)
	2-2X8	9-1 (1)	5-4 (1)	5-0 (2)	4-9 (2)
	2-2X10	7-0 (2)	6-7 (2)	6-1 (2)	5-9 (2)
	2-2X12	8-1 (2)	7-7 (2)	7-0 (2)	6-7 (2)
	3-2X8	7-2 (1)	6-9 (1)	6-3 (1)	5-11 (2)
	3-2X10	8-9 (1)	8-2 (1)	7-7 (2)	7-2 (2)
	3-2X12	10-2 (2)	9-6 (2)	8-10 (2)	8-3 (2)
	4-2X8	9-0 (1)	8-3 (1)	7-8 (1)	7-3 (1)
	4-2X10	10-1 (1)	9-5 (1)	9-0 (1)	8-4 (2)
	4-2X12	11-9 (1)	10-11 (2)	10-2 (2)	9-8 (2)
	Two floors	2-2X4	2-2 (1)	2-0 (1)	1-10 (1)
2-2X6		3-2 (2)	3-0 (2)	2-9 (2)	2-7 (2)
2-2X8		4-1 (2)	3-10 (2)	3-6 (2)	3-4 (2)
2-2X10		4-11 (2)	4-7 (2)	4-3 (2)	4-1 (3)
2-2X12		5-9 (2)	5-5 (3)	5-0 (3)	4-9 (3)
3-2X8		5-1 (2)	4-9 (2)	4-5 (2)	4-2 (2)
3-2X10		6-2 (2)	5-9 (2)	5-4 (2)	5-1 (2)
3-2X12		7-2 (2)	6-9 (2)	6-3 (2)	5-11 (3)
4-2X8		6-1 (1)	5-8 (2)	5-3 (2)	5-0 (2)
4-2X10		7-2 (2)	6-8 (2)	6-2 (2)	5-10 (2)
4-2X12		8-4 (2)	7-9 (2)	7-2 (2)	6-10 (2)

CRAWL SPACES



FLOOR JOIST SPANS #2 SPF				
TABLE R502.3.1(2)				
Joist spacing	2X6	2X8	2X10	2X12
16" O.C.	9-4	12-3	15-5	17-10
19.2" O.C.	8-9	11-6	14-1	16-3
24" O.C.	8-1	10-3	12-7	14-7

GIRDER SPANS AND HEADER SPANS FOR EXTERIOR BEARING WALLS - #2 HEM FIR OR SPF							
TABLE R502.5(1)							
GIRDERS AND HEADERS SUPPORTING	SIZE	20		28		36	
		Span	NJ	Span	NJ	Span	NJ
Roof and ceiling	2-2x4	2-10	1	2-6	1	2-3	1
	2-2x6	4-2	1	3-8	2	3-3	2
	2-2x8	5-4	2	4-7	2	4-1	2
	2-2x10	6-6	2	5-7	2	5-0	2
	2-2x12	7-6	2	6-6	2	5-10	3
	3-2x8	6-8	1	5-9	2	5-2	2
	3-2x10	8-2	2	7-0	2	6-4	2
	3-2x12	9-5	2	8-2	2	7-4	2
	4-2x8	7-8	1	6-8	1	5-11	2
	4-2x10	9-5	2	8-2	2	7-3	2
	4-2x12	10-11	2	9-5	2	8-5	2
	2-2x4	2-7	1	2-3	1	2-0	1

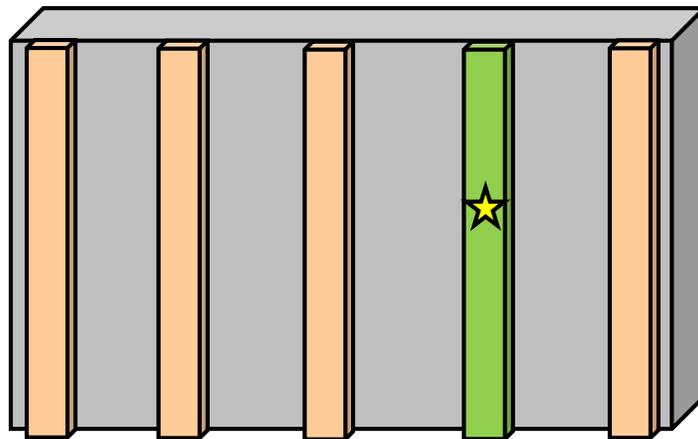
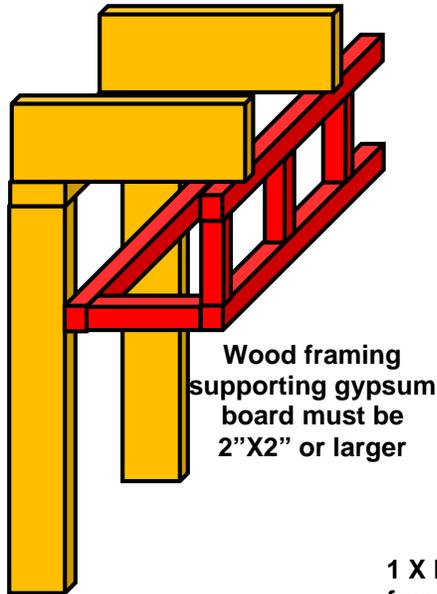
Roof, ceiling and one center-bearing floor	2-2x6	3-9	2	3-3	2	2-11	2
	2-2x8	4-9	2	4-2	2	3-9	2
	2-2x10	5-9	2	5-1	2	4-7	3
	2-2x12	6-8	2	5-10	3	5-3	3
	3-2x8	5-11	2	5-2	2	4-8	2
	3-2x10	7-3	2	6-4	2	5-8	2
	3-2x12	8-5	2	7-4	2	6-7	2
	4-2x8	6-10	1	6-0	2	5-5	2
	4-2x10	8-4	2	7-4	2	6-7	2
	4-2x12	9-8	2	8-6	2	7-7	2
Roof, ceiling and one clear span floor	2-2x4	2-5	1	2-1	1	1-10	1
	2-2x6	3-6	2	3-1	2	2-9	2
	2-2x8	4-6	2	3-11	2	3-6	2
	2-2x10	5-6	2	4-9	2	4-3	2
	2-2x12	6-4	2	5-6	3	5-0	3
	3-2x8	5-7	2	4-11	2	4-5	3
	3-2x10	6-10	2	6-0	2	5-4	2
	3-2x12	7-11	2	6-11	2	6-3	2
	4-2x8	6-6	1	5-8	2	5-1	2
	4-2x10	7-11	2	6-11	2	6-2	2
4-2x12	9-2	2	8-0	2	7-2	2	
Roof, ceiling and two center-bearing floors	2-2x4	2-4	1	2-0	1	1-9	1
	2-2x6	3-5	2	3-0	2	2-8	2
	2-2x8	4-4	2	3-9	2	3-5	2
	2-2x10	5-3	2	4-7	3	4-2	3
	2-2x12	6-1	2	5-4	3	4-10	3
	3-2x8	5-5	2	4-9	2	4-3	2
	3-2x10	6-7	2	5-9	2	5-3	2
	3-2x12	7-8	2	6-9	2	6-1	3
	4-2x8	6-3	2	5-6	2	4-11	2
	4-2x10	7-7	2	6-8	2	6-0	2
4-2x12	8-10	2	7-9	2	7-0	2	
Roof, ceiling, and two clear span floors	2-2x4	2-0	1	1-8	1	1-5	2
	2-2x6	2-11	2	2-7	2	2-3	2
	2-2x8	3-9	2	3-3	2	2-11	3
	2-2x10	4-7	3	4-0	3	3-6	3
	2-2x12	5-4	3	4-7	3	4-1	4
	3-2x8	4-8	2	4-1	2	3-8	2
	3-2x10	5-9	2	4-11	2	4-5	3
	3-2x12	6-8	2	5-9	2	5-2	3
	4-2x8	5-5	2	4-8	2	4-2	3
	4-2x10	6-7	2	5-9	2	5-1	2
4-2x12	7-8	2	6-8	2	6-5	3	

CEILING JOIST SPANS FOR #2 HEM FIR AND SPF

NO STORAGE IN ATTIC

		2 x 4	2 x 6	2 x 8	2 x 10
12" o.c.	Hem Fir	11-7	18-2	24-0	26+
	SPF	11-10	18-8	24-7	26+
16" o.c.	Hem Fir	10-6	16-6	21-9	26+
	SPF	10-9	16-11	22-4	26+
24" o.c.	Hem Fir	9-2	14-5	18-6	22-7
	SPF	9-5	14-9	18-9	22-11

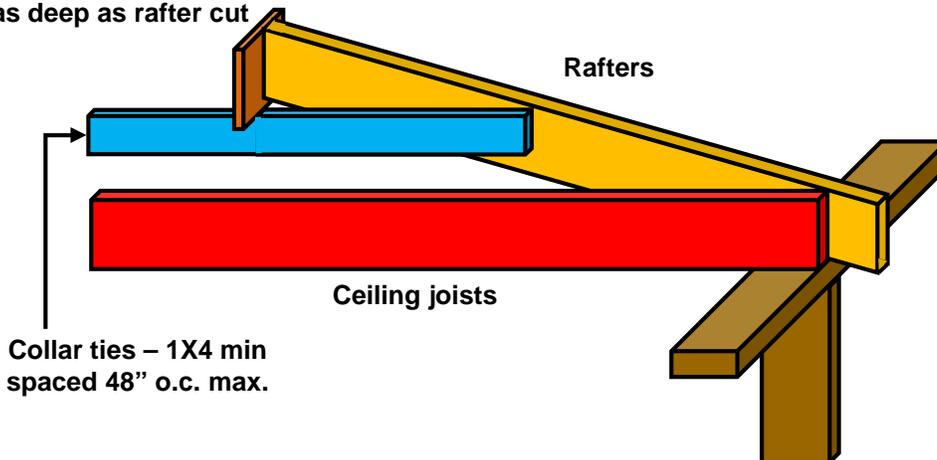
FURRING VS. FRAMING



1 X Furring strips may only be used over solid backing or framing spaced not more than 24" o.c. ★ Furring strips placed against a concrete or masonry wall must be treated unless a vapor retarder is placed between the wall and furring strips

ROOF FRAMING

Ridge board 1X min
At least as deep as rafter cut



ENGINEERED LUMBER

This handout does not cover engineered lumber such as floor or roof trusses, I joists, glue-laminated members, structural composite lumber, and similar products. Refer to the manufacturer's installation instructions for further information.

OTHER FRAMING HANDOUTS

Other handouts are available on cutting, boring and notching framing, fireblocking, gypsum wall board, fasteners, and a host of other code requirements pertaining to wood framing.

RAFTER SPANS FOR #2 HEM FIR AND SPF

		2 x 4	2 x 6	2 x 8	2 x 10
12" o.c.	Hem Fir	6-7	9-7	12-2	14-10
	SPF	6-8	9-9	12-4	15-1
16" o.c.	Hem Fir	5-8	8-4	10-6	12-10
	SPF	5-9	8-5	10-8	13-1
24" o.c.	Hem Fir	4-8	6-9	8-7	10-6
	SPF	4-8	6-11	8-9	10-8