

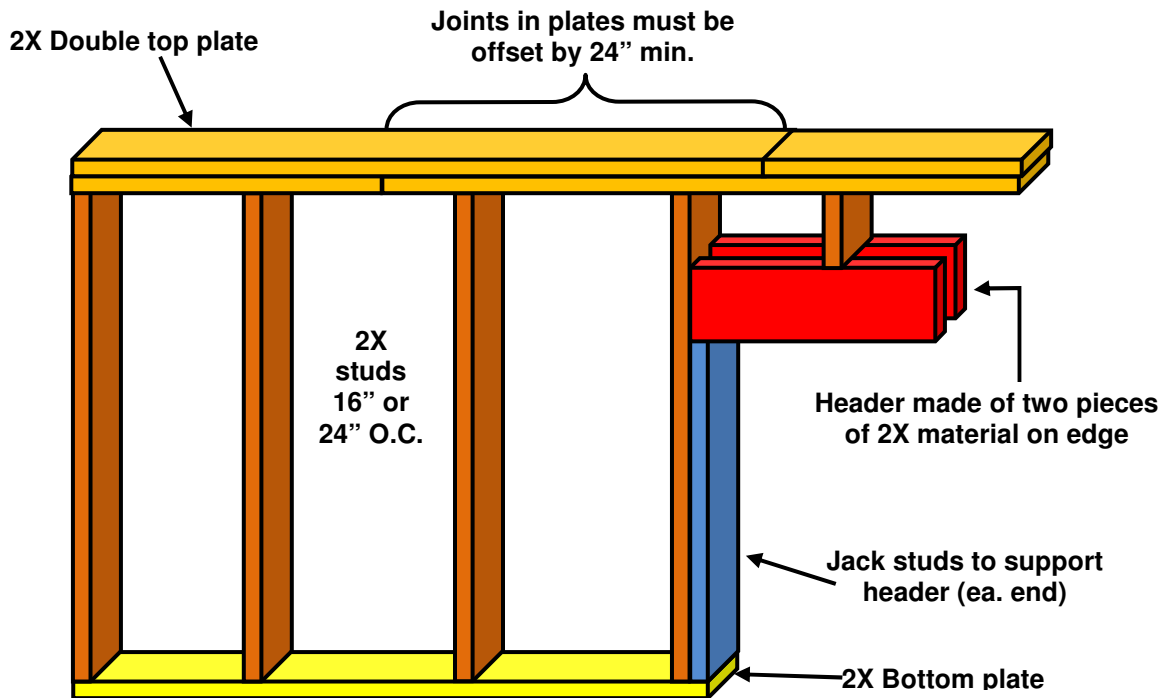


BASIC WOOD FRAMING
City of Grand Rapids
Building Safety Division
218-326-7601
www.grandrapidsmn.org



This handout is intended only as a guide and is based in part on the 2007 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



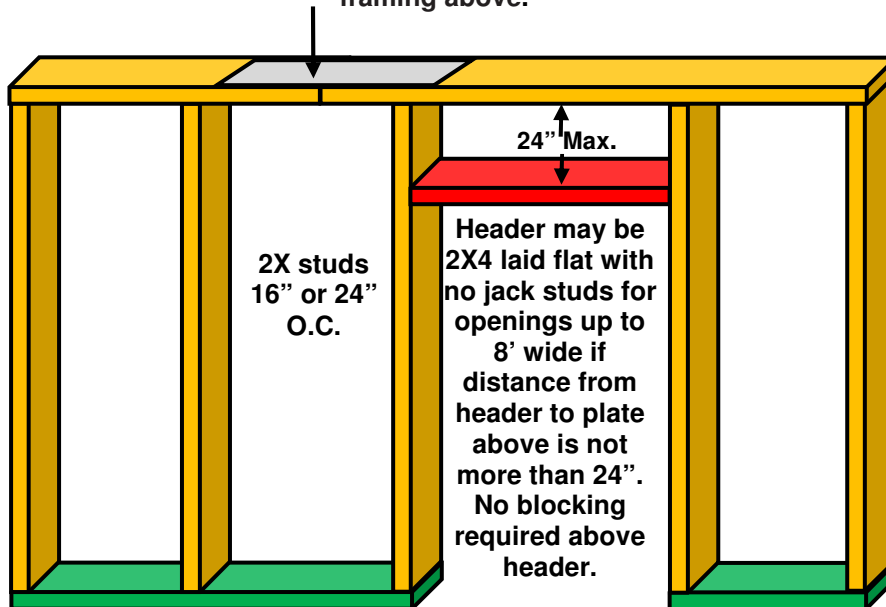
SIZE, HEIGHT AND SPACING OF WOOD STUDS

TABLE R602.3(5)

| STUD SIZE | BEARING WALLS | | | | | NONBEARING WALLS | |
|-----------|----------------|---|--|--|--|------------------|-----------------|
| | MAXIMUM HEIGHT | MAXIMUM SPACING WHEN SUPPORTING ROOF AND CEILING ONLY | MAXIMUM SPACING WHEN SUPPORTING ONE FLOOR, ROOF, AND CEILING | MAXIMUM SPACING WHEN SUPPORTING TWO FLOORS, ROOF AND CEILING | MAXIMUM SPACING WHEN SUPPORTING ONE FLOOR ONLY | MAXIMUM HEIGHT | MAXIMUM SPACING |
| 2X4 | 10 | 24 | 16 | - | 24 | 14 | 24 |
| 2X6 | 10 | 24 | 24 | 16 | 24 | 20 | 24 |

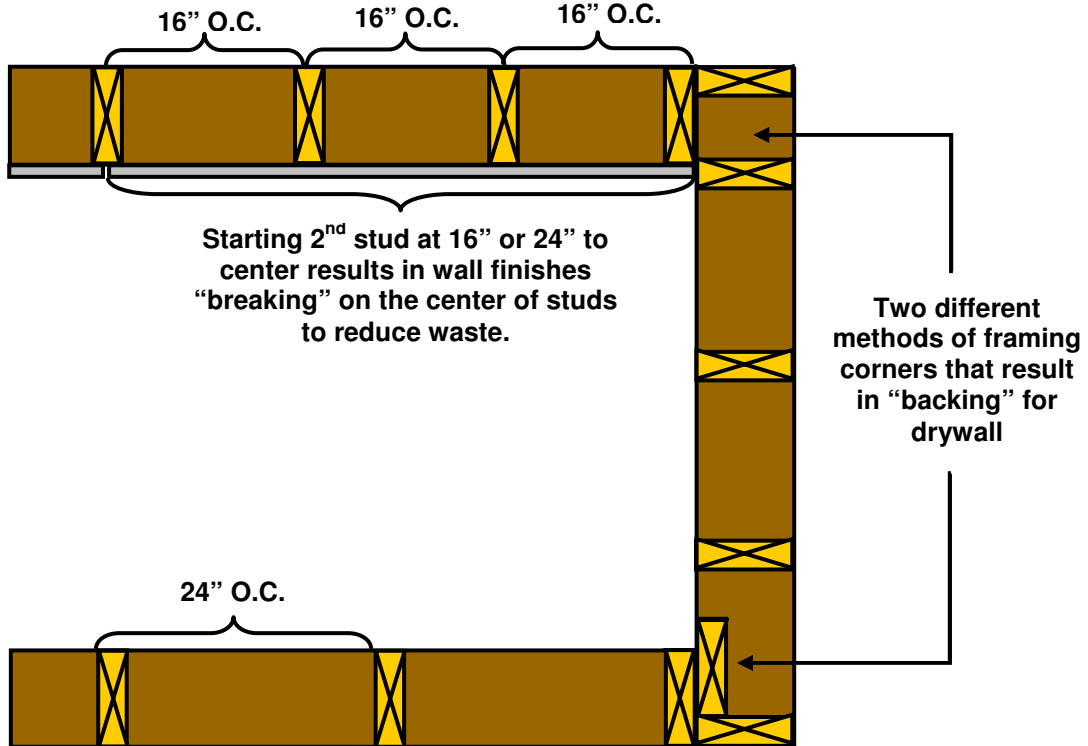
TYPICAL FRAMING FOR NON-BEARING WALLS OR BASEMENT WALLS

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.

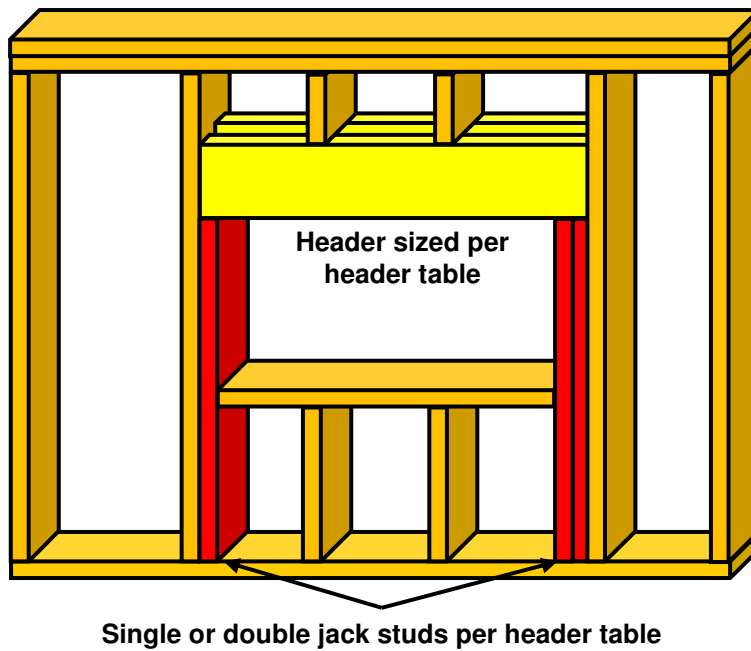


Plates on concrete floors must be treated unless there is a vapor barrier under the slab.

LAYING OUT WALLS – 16" AND 24" ON CENTER

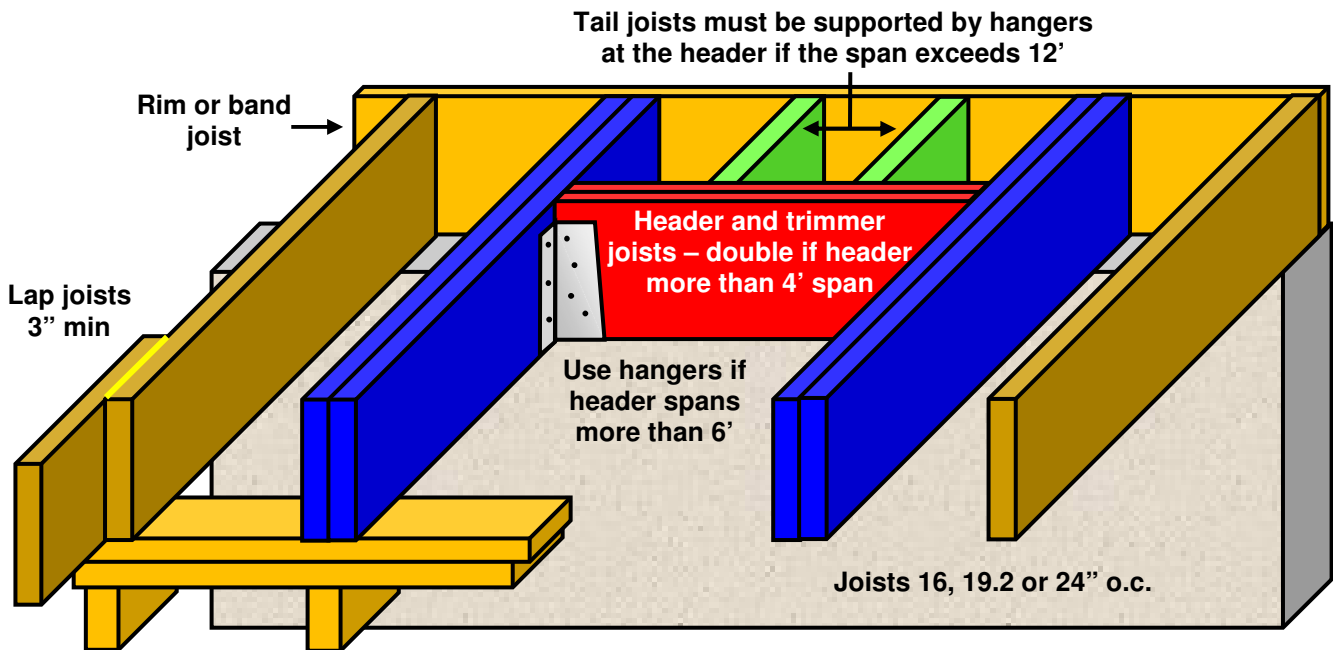


FRAMING OPENINGS IN BEARING WALLS

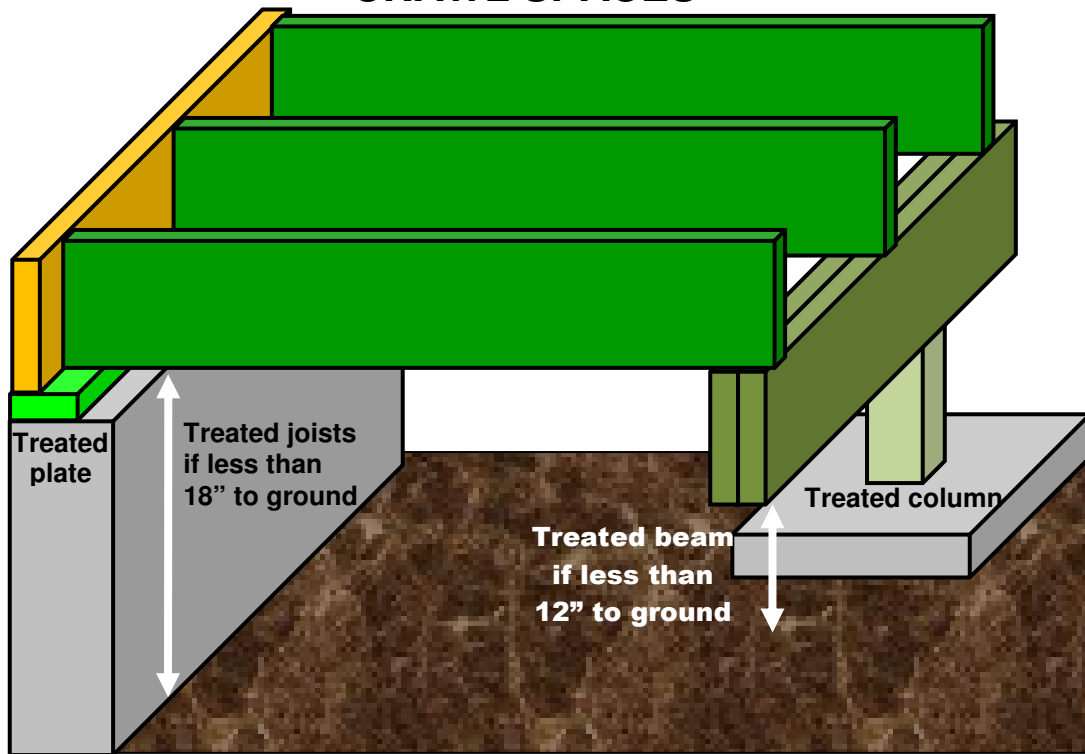


| GIRDER AND HEADER SPANS FOR INTERIOR BEARING WALLS (IN FT/IN) | | | | | |
|--|--------|---------------------|-------------------|-------------------|-------------------|
| TABLE R502.5(2) (#2Hem Fir or SPF) | | | | | |
| HEADERS AND GIRDERS SUPPORTING | SIZE | BUILDING WIDTH (FT) | | | |
| | | 20 | 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) | 1-9 (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) |

TYPICAL FLOOR FRAMING



CRAWL SPACES

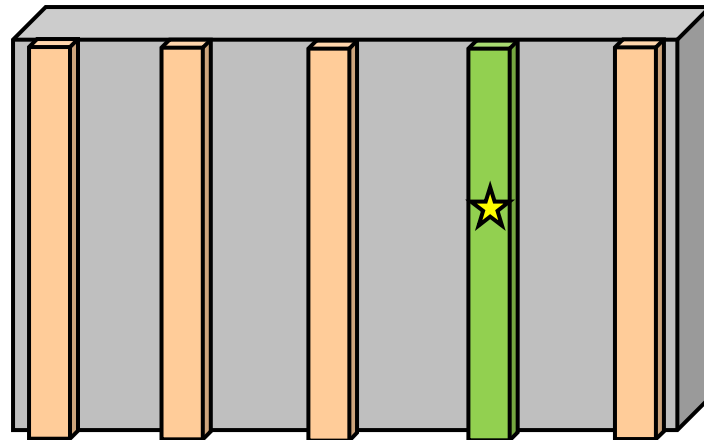
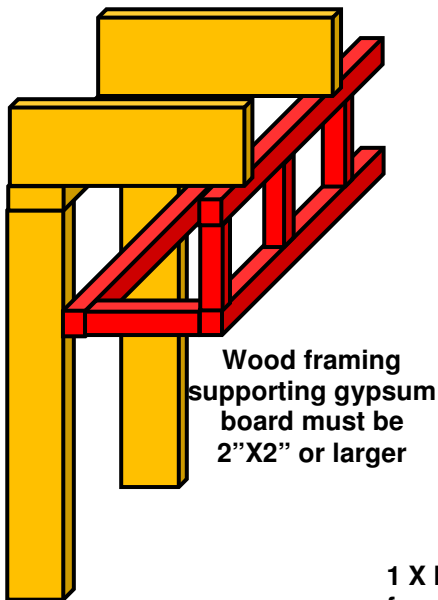


| FLOOR JOIST SPANS #2 SPF | | | | |
|--------------------------|-----|------|------|-------|
| TABLE R502.3.1(2) | | | | |
| Joist spacing | 2X6 | 2X8 | 2X10 | 2X12 |
| 16" O.C. | 9-4 | 12-3 | 15-5 | 17-10 |
| 19.2" O.C. | 8-9 | 11-6 | 14-1 | 16-3 |
| 24" O.C. | 8-1 | 10-3 | 12-7 | 14-7 |

| 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 |
| Roof, ceiling and one center-bearing floor | 2-2x4 | 2-7 | 1 | 2-3 | 1 | 2-0 | 1 |
| | 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 |

FURRING VS. FRAMING



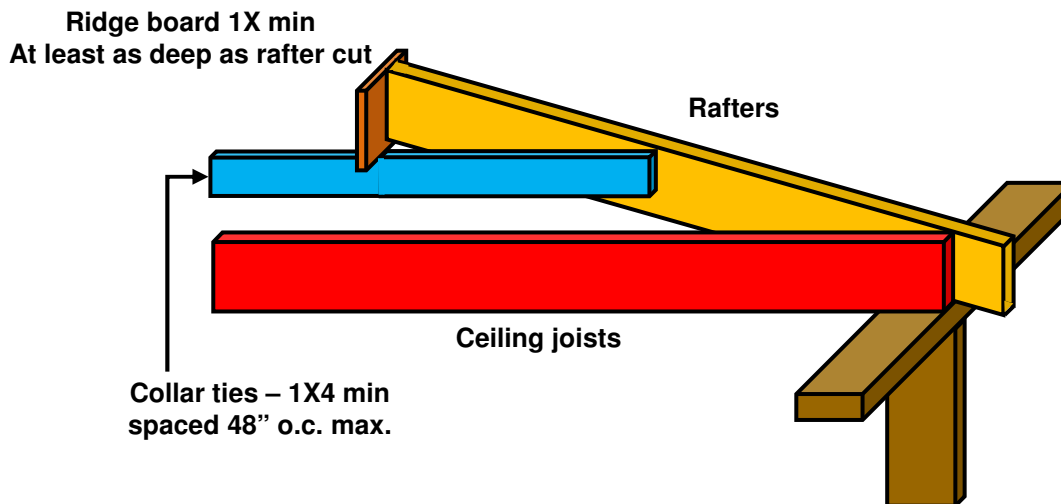
1 X Furring strips may only be used over solid backing or framing spaced not more than 24" o.c. ★ Furring strips placed against a concrete or masonry wall must be treated unless a vapor retarder is placed between the wall and furring strips

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

ROOF FRAMING



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.

RAFTER SPANS FOR #2 HEM FIR AND SPF

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

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.