RESIDENTIAL DECKS

Bremer County
Building & Zoning Department
415 East Bremer Avenue
Waverly, Iowa 50677
319-352-0332
www.co.bremer.ia.us

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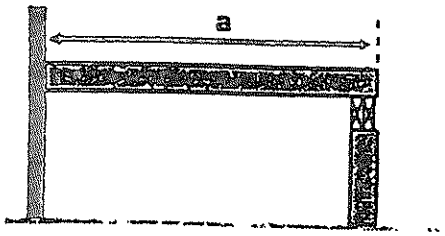
CASE I SOLUTION:



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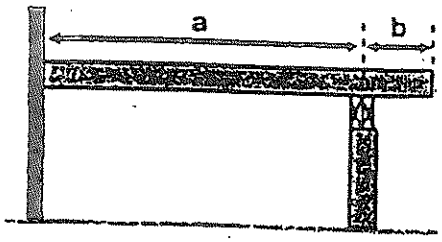
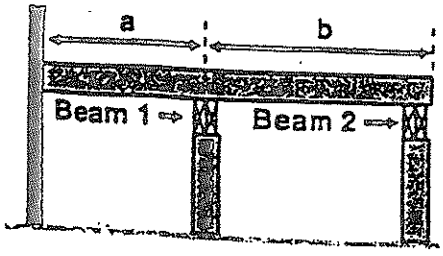


CASE III SOLUTION:



Sample Calculations for Using Joist Span, Beam and Footing Size Tables

Refer to tables for joist, beam and footing size requirement.
Example: a=12' Post Spacing=8'
Use the Joist Span table to find the acceptable joist sizes for a 12' span, 2x8s 16" OC, 2x10s at 24" OC, or 2x12s at 24" OC.
Use the Beam and Footing Sizes table and find the 8' post spacing column. With a 12' joist span the beam may be two 2x8s. The footing diameter at the base must be a minimum of 10" for the corner post and 14" for all intermediate posts.

Use "a" to determine joist size and "a" + "b" to determine beam and footing size. The length of "b" is restricted by both the length of "a" and the size of the joists.
Example a=8' b=2' Post Spacing =10'
Refer to the Joist Span table. For an 8' joist span, 2x6s at 24" OC are acceptable. For sizing the beam, use a joist length of 10' (8'+2') and a post spacing of 10'. The Beam and Footing Sizes table indicates that the beam may be two 2x10s. The footing diameter at the base must be a minimum of 11" for the corner posts and 15" for all intermediate posts. Note that because of the 2' cantilever all footing sizes were increased by 1" as required by footnote 2 at the end of the table.

Use "a" or "b", whichever is greater to determine joist size. Use "a" + "b" to determine the size of Beam 1 and the post footing size for the posts supporting Beam 1. Use the joist length "b" to determine both the size of Beam 2 and the post footing size for the posts supporting Beam 2.
Example a=6' b=7' Post Spacing =9'
Joist size is determined by using the longest span joist (7'). The Joist Span table indicates that 2x6s at 24" OC would be adequate for this span.
For Beam 1 and footings, use a joist length of 13' (6'+7') and a post spacing of 9'. The Beam and Footing Sizes table indicates that the beam may be two 2x10s. The footing diameters for Beam 1 posts shall be 11" for the corner (outside) post and 15" for all intermediate posts. For Beam 2 and footings use Joist length of 7' and post spacing of 9'. The beam may be two 2x8s. The footing diameters for Beam 2 shall be 8" for the corner posts and 11" for all intermediate posts.

Building Permits

A building permit is required for any deck attached to a structure or any detached deck. A site plan must be submitted showing height and setbacks. Also required are the locations of electric, gas and water meters. Application forms are available at the Bremer County Building & Zoning Department or on our website at www.co.bremer.ia.us.

Setbacks

Decks must meet the same setbacks as required of a dwelling. Decks may extend into the setback, providing the deck is less than 30 inches above grade, including the handrail.

Frost Footings

Required for any deck attached to a structure that has frost footings. The minimum depth to the base of the footing is 42 inches.

Live Load

All decks shall be designed to support a live load of 40 pounds per square foot minimum.

Cantilevers

Joists shall not overhang beams by more than 2 feet. Beams shall not overhang posts by more than 1 foot.

Flashing

All connections between deck and dwelling shall be weatherproofed. Any cuts in the exterior finish shall be flashed.

Framing Details

Header beams and joists that frame into ledgers or beams shall be supported by an approved framing anchor, such as joist hangers.

Wood Required

Wood used above ground in the construction of decks, including posts, beams, joists, decking, stairs and railings, shall be naturally durable wood or preservative treated wood.

Nails and Screws

Fasteners for preservative treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper.

Deck Attachment for Lateral Loads

Lateral load tension devices shall be installed in at least two locations on each deck. See figure R507.2.3

Guardrails*

Required on all decks more than 30 inches above grade. Rail must be 36 inches minimum in height. Open guardrails and stair railings must have intermediate rails or an ornamental pattern so that a 4 inch sphere cannot pass through.

Exception: the triangular opening formed by the riser, tread and bottom element of a guardrail may be sized so that a 6 inch sphere cannot pass through.

Handrails for Stairs*

Stairways having 4 or more risers shall have at least one handrail.

Stairs*

Minimum width is 36 inches. Maximum rise is 8 inches, minimum rise is 4 inches. Minimum run is 10 inches. Largest tread width or riser height shall not exceed the smallest by more than 3/8 inch.

*Please refer to our brochure Stairway and Handrails

Design Note

Some deck designs may not be appropriate should the placement of a screen porch or 3-season porch on the deck platform be a future consideration. Also keep in mind that there are larger footing requirements to support the additional load of the roof.

Use of this Brochure

The Joist Span Tables and the Beam Span Tables apply only to the species Southern Pine Lumber #2 grade or better. If you use other materials for your deck these tables will not apply.

Your building material supplier may be able to finish design criteria to meet the 40 pound live load requirements for your choice of materials.

This brochure is intended to explain some of the requirements for residential decks. If you have further questions, please call the Building & Zoning Department.

319-352-0332
7:00 A.M.—4:30 P.M.

JOIST SPAN
Based on No.2 or better Southern Pine
(Design Load = 40# LL + 10# DL, Deflection=L/360)

	12" OC	16" OC	24"OC
2 x 6	10'9"	9'9"	8'6"
2 x 8	14'2"	12'10"	11'0"
2 x 10	18'0"	16'1"	13'1"
2 x 12	21'9"	18'10"	15'5"

Original Footing Size	Size Increased 55 Percent	Size Increased 90 Percent
5	6	7
6	7	8
7	9	10
8	10	11
9	11	12
10	12	14
11	14	15
12	15	16
13	16	18
14	17	19
15	19	21
16	20	22
17	21	23
18	22	25
19	23	26
20	25	28
21	26	29

Footnotes to Beam and Footing Size Chart
1. Joist length is total length of joist, including any cantilevers.
2. When the joist extends (cantilevers) beyond support beam by 18" or more, add 1" to footing dimensions shown.
3. Requirements for future 3-season porches or screen porches:
   a. Increase corner footing size shown by 90%
   b. Increase center footing size shown by 55%.
   c. Locate all footings at extremities of deck (no cantilevers).
   d. Beam sizes indicated need not be altered.

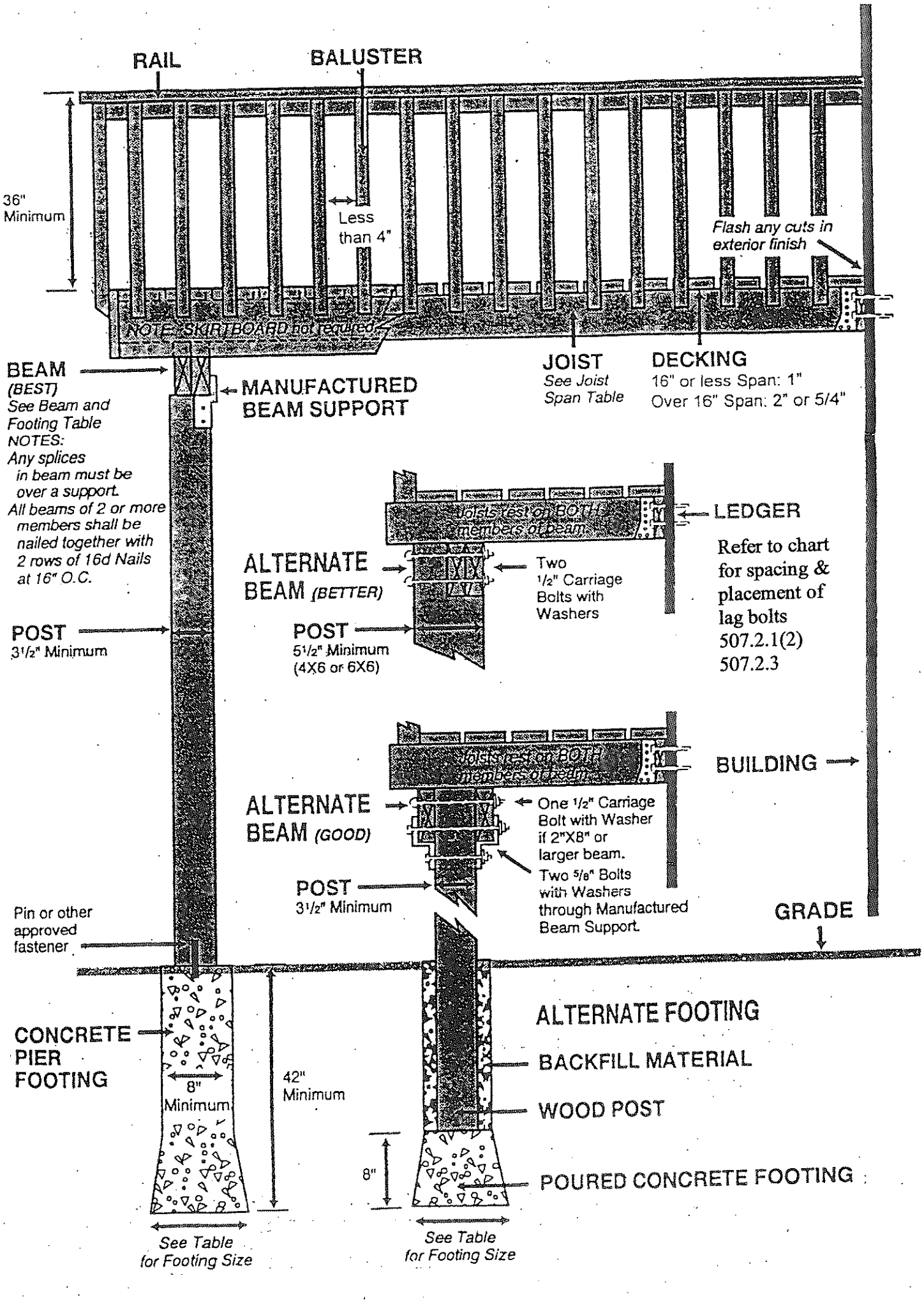
Beam and Footing Sizes

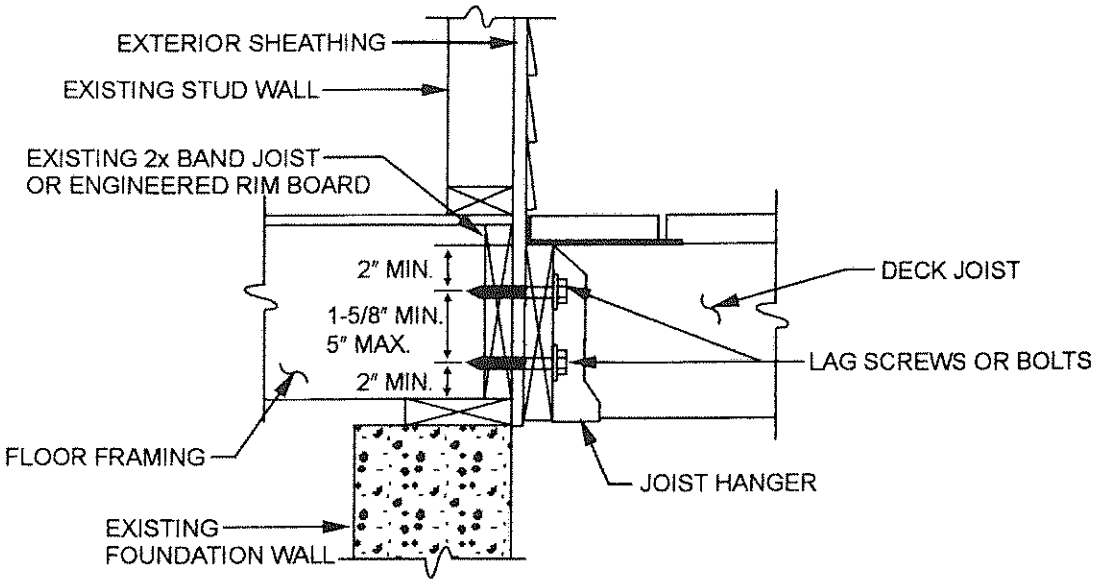
Based on #2 or Better Southern Pine

Read Post Spacing This Side

Read Joist Length This Side

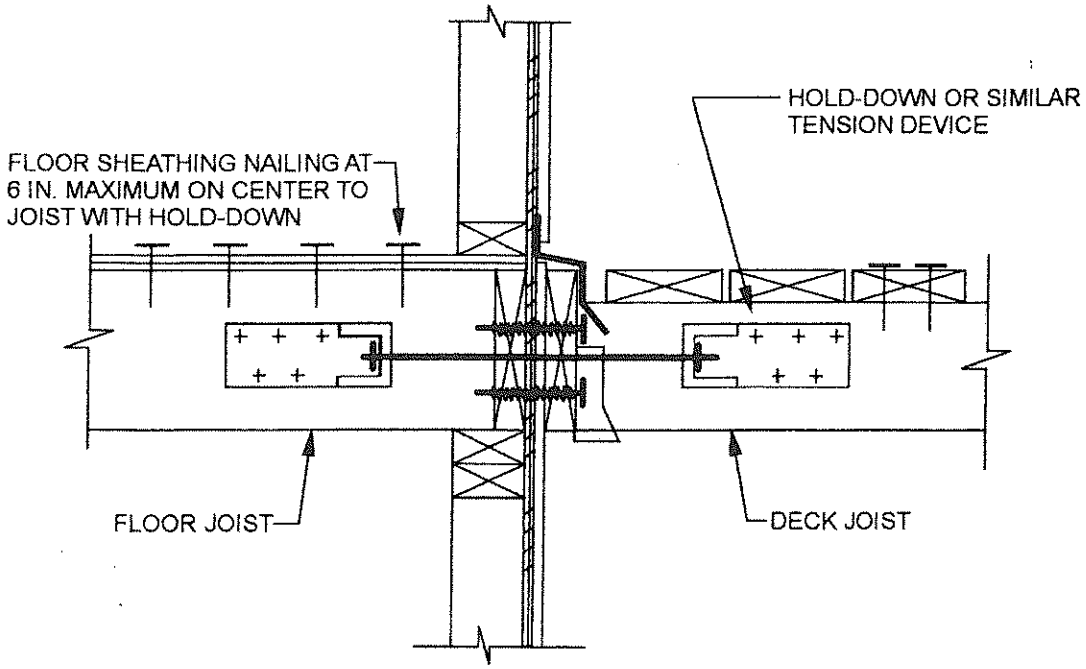
		4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'
6'	Southern Pine Beam	1-2x6	1-2x6	1-2x6	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10
	Corner Footing	5	6	6	7	7	7	8	8	9	9	9
	Intermediate Footing	8	8	9	9	10	10	11	12	12	13	13
7'	Southern Pine Beam	1-2x6	1-2x6	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10	2-2x12
	Corner Footing	5	6	7	7	8	8	8	9	9	10	10
	Intermediate Footing	8	8	9	10	11	11	12	13	13	14	14
8'	Southern Pine Beam	1-2x6	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12
	Corner Footing	6	6	7	8	8	8	9	9	10	10	11
	Intermediate Footing	8	9	10	11	11	12	13	13	14	15	15
9'	Southern Pine Beam	1-2x6	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10
	Corner Footing	6	7	7	8	9	9	10	10	10	11	11
	Intermediate Footing	9	10	10	11	12	13	14	14	15	15	16
10'	Southern Pine Beam	1-2x6	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10	3-2x10
	Corner Footing	6	7	8	8	9	10	10	11	11	12	12
	Intermediate Footing	9	10	11	12	13	14	14	15	16	16	17
11'	Southern Pine Beam	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12
	Corner Footing	7	7	8	9	9	10	11	11	12	12	13
	Intermediate Footing	9	11	12	12	13	14	14	15	16	16	17
12'	Southern Pine Beam	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x10	3-2x12
	Corner Footing	7	8	9	9	10	10	11	12	12	13	13
	Intermediate Footing	10	11	12	13	14	15	16	16	17	18	18
13'	Southern Pine Beam	1-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x12	3-2x12
	Corner Footing	7	8	9	10	10	11	12	12	13	13	14
	Intermediate Footing	10	12	13	14	15	15	16	17	18	19	19
14'	Southern Pine Beam	1-2x6	2-2x6	2-2x6	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x12	3-2x12	3-2x12
	Corner Footing	8	8	9	10	11	11	12	13	13	14	14
	Intermediate Footing	11	12	13	14	15	16	17	18	18	19	20
15'	Southern Pine Beam	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm
	Corner Footing	8	9	10	10	11	12	12	13	14	14	15
	Intermediate Footing	11	12	14	15	16	17	17	18	19	20	21
16'	Southern Pine Beam	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm
	Corner Footing	8	9	10	11	11	12	13	13	14	15	15
	Intermediate Footing	11	13	14	15	16	17	18	19	20	21	21


RAIL
BALUSTER
36" Minimum
Less than 4"
Flash any cuts in exterior finish
NOTE: SKIRT BOARD not required
BEAM
(BEST)
See Beam and Footing Table
NOTES:
Any splices in beam must be over a support.
All beams of 2 or more members shall be nailed together with 2 rows of 16d Nails at 16" O.C.
MANUFACTURED BEAM SUPPORT
JOIST
See Joist Span Table
DECKING
16" or less Span: 1"
Over 16" Span: 2" or 5/4"
Joists rest on BOTH members of beam
LEDGER
Refer to chart for spacing & placement of lag bolts
507.2.1(2)
507.2.3
ALTERNATE BEAM (BETTER)
Two 1/2" Carriage Bolts with Washers
POST
5 1/2" Minimum
(4X6 or 6X6)
POST
3 1/2" Minimum
Joists rest on BOTH members of beam
BUILDING
ALTERNATE BEAM (GOOD)
One 1/2" Carriage Bolt with Washer if 2"X8" or larger beam.
Two 5/8" Bolts with Washers through Manufactured Beam Support.
POST
3 1/2" Minimum
Pin or other approved fastener
GRADE
CONCRETE PIER FOOTING
8" Minimum
42" Minimum
See Table for Footing Size
ALTERNATE FOOTING
BACKFILL MATERIAL
WOOD POST
8"
POURED CONCRETE FOOTING
See Table for Footing Size



For SI: 1 inch = 25.4 mm.

FIGURE R507.2.1(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS



For SI: 1 inch = 25.4 mm.

FIGURE 507.2.3
DECK ATTACHMENT FOR LATERAL LOADS

TABLE R507.2
FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND A 2-INCH-NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST[c, f, g]
(Deck live load = 40 psf, deck dead load = 10 psf)

JOIST SPAN	6′ and less	6′1″ to 8′	8′1″ to 10′	10′1″ to 12′	12′1″ to 14′	14′1″ to 16′	16′1″ to 18′
Connection details	On-center spacing of fasteners[d, e]						
1/2 inch diameter lag screw with 15/32 inch maximum sheathing[a]	30	23	18	15	13	11	10
1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 inch maximum sheathing and 1/2 inch stacked washers[b, h]	36	36	29	24	21	18	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.

a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2 inch.

c. Ledgers shall be flashed to prevent water from contacting the house band joist.

d. Lag screws and bolts shall be staggered in accordance with Section R507.2.1.

e. Deck ledger shall be minimum 2 × 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.

f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.

g. A minimum 1 × 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist.

h. Wood structural panel sheathing, gypsum board sheathing or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.

TABLE 507.2.1
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger[a]	2 inches[d]	1/4 inch	2 inches[b]	1 5/8 inches[b]
Band Joist[c]	3/4 inch	2 inches	2 inches[b]	1 5/8 inches[b]

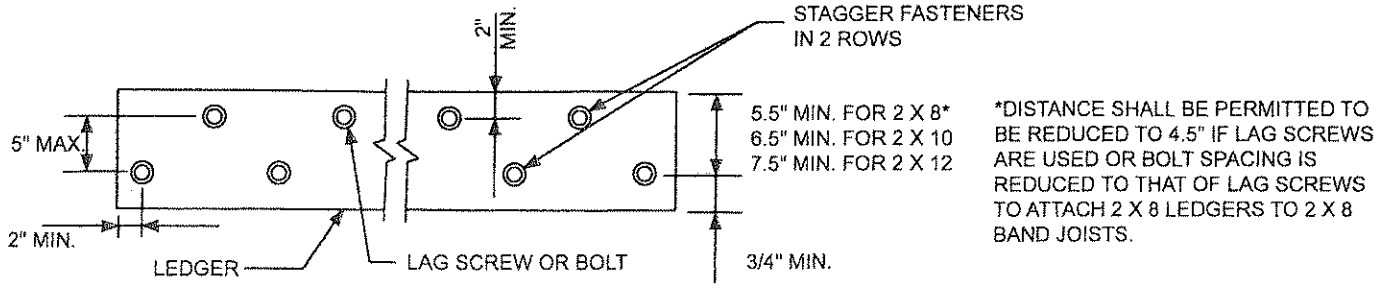
For SI: 1 inch = 25.4 mm.

a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).

b. Maximum 5 inches.

c. For engineered rim joists, the manufacturer's recommendations shall govern.

d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).



For SI: 1 inch = 25.4 mm.

FIGURE R507.2.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS