Prescriptive Residential Wood Deck Construction Guide

Note: A permit is required in the City of Woodland for any deck which meets any of the following conditions:
- deck is 200 square feet or more
- deck is 30 inches or more above grade
- deck is attached to a dwelling

This tip sheet provides building code information applicable to deck design, but does not take into account all conditions which may affect design such as slope conditions, decks supporting in excess of 70 psf uniform loads, etc. You may need to hire a licensed architect or an engineer to design decks where any of the **following conditions apply:**

- The deck serves other than a one or two family dwelling building
- The deck design includes more than one level
- The deck will support hot tubs, spas or other heavy objects
- The walking surface is more than ten feet above grade
- The deck ledger is attached to house overhangs, bay windows, bricks, stone or concrete block
- The deck is bearing on ground with slope greater than 2 feet horizontal for every 1 foot vertical
- The deck is self supporting (Not attached to an exterior wall)

Deck Construction Notes:

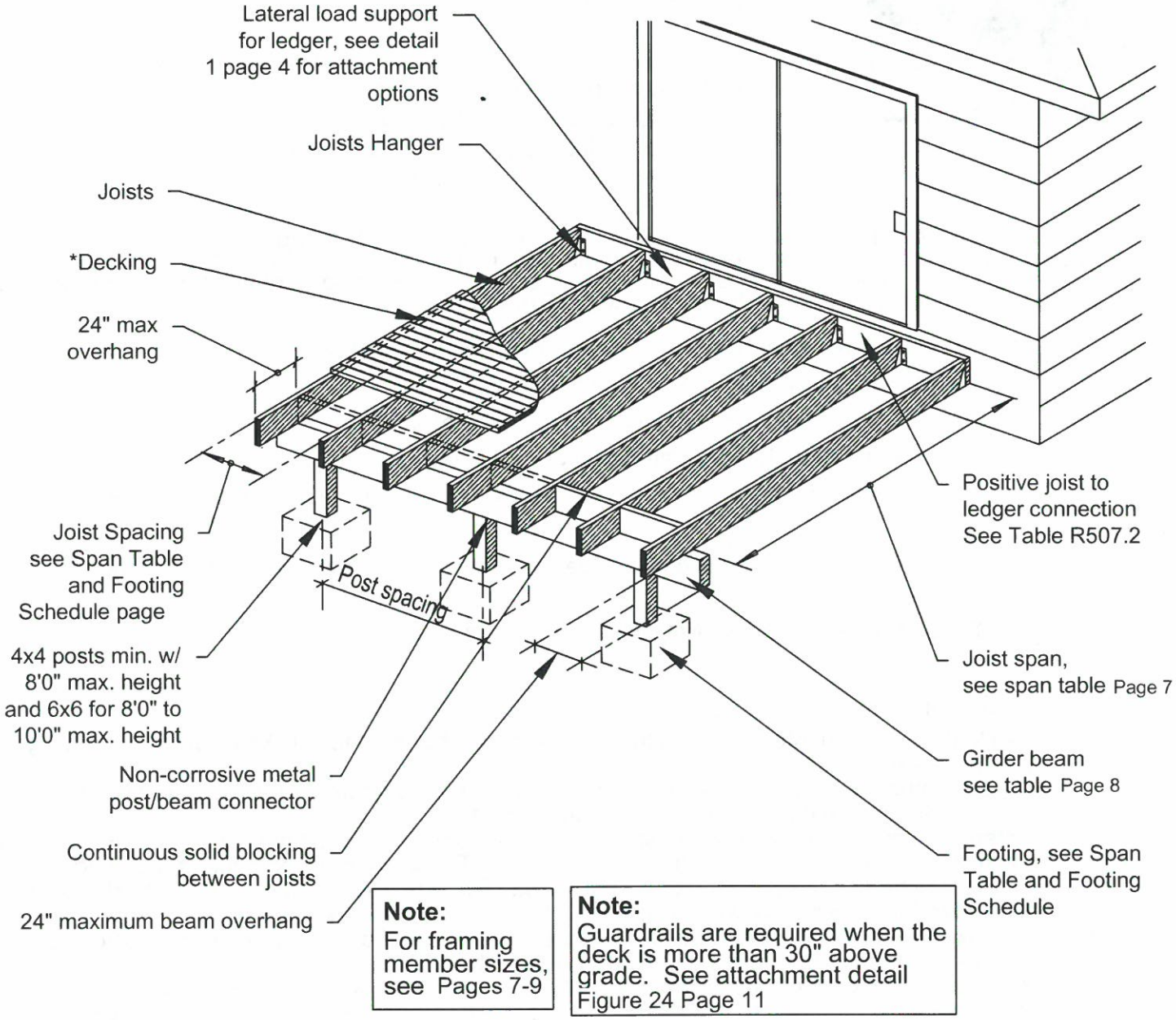
1. The illustrations and information in this tip sheet may be used for decks whether or not they require a permit.
2. All wood must be pressure treated or naturally resistant to decay. Treat all cut ends with end-cut solution. Use ground-contact treated wood.
3. Fasteners, hangers, nails, etc., must be stainless steel, hot-dipped galvanized, or as specifically required for the specified wood preservative used. The coating weights for zinc-coated fasteners to be in accordance with ASTM A 153. Provide documentation in the field showing the required fastener protection considering the wood chosen for your deck.
4. You may modify any components of this tip sheet with justification by analysis or calculation. Any modifications must be reviewed prior to permit issuance.
5. See Figure 33 page 11 for Stairs, Figure 32B page II for Handrails, and Figure 24 Page 11 for Guardrails.
6. This tip sheet is intended to represent good construction practices for deck construction and related IRC requirements.
7. All wood assumed to be Hem-Fir #2 or better.
8. Attachments must be per manufactured specifications.

As an alternate to this tip sheet, the following may be used when designing your deck.

- Engineered design

GENERAL INFORMATION:

- Consult with your local land use or planning department regarding setbacks and other zoning regulations
- Obtain a building permit before starting construction
- The intent of this tip sheet is to address basic code information related to residential deck construction only.



Note:
For framing member sizes, see Pages 7-9

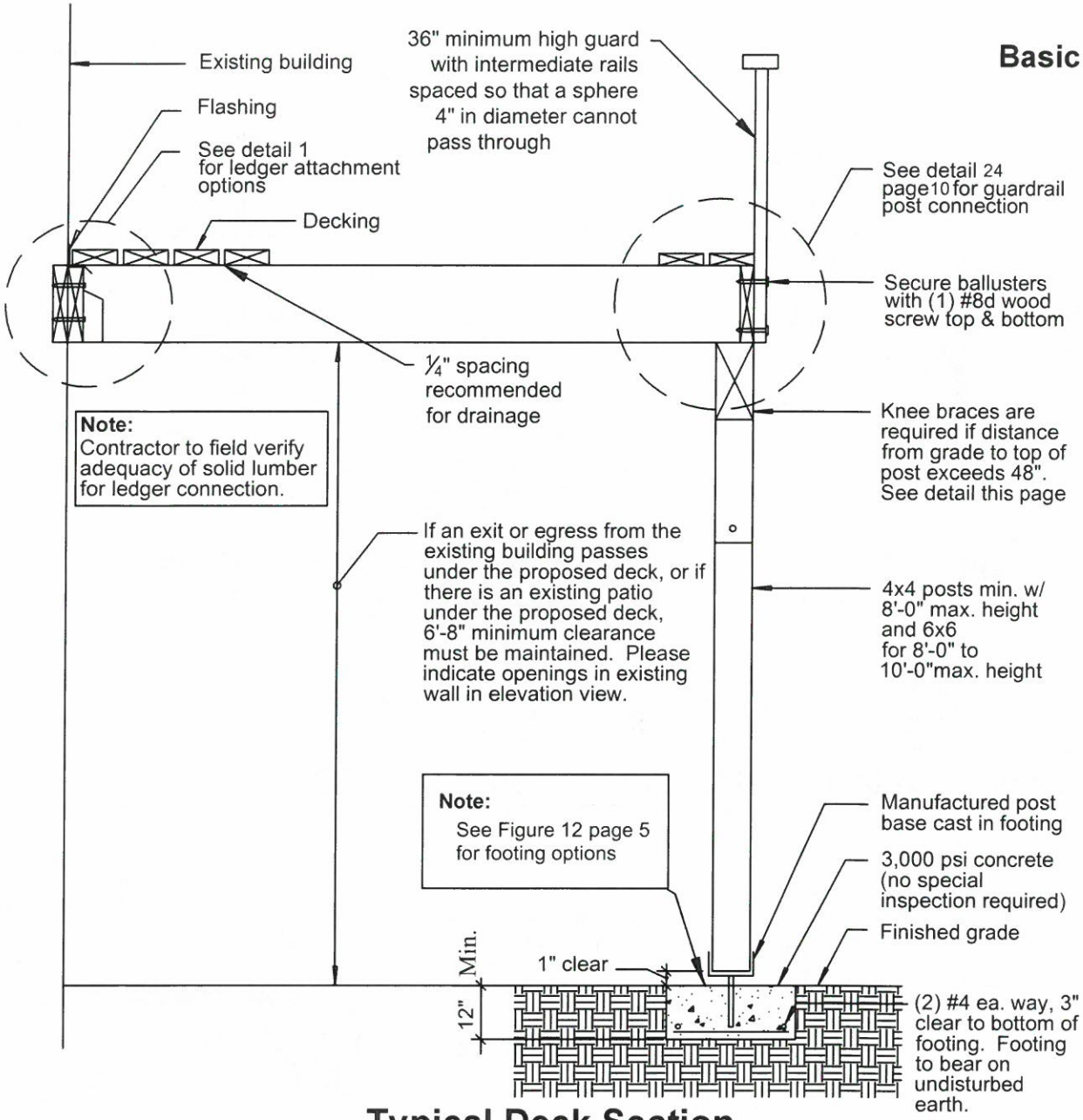
Note:
Guardrails are required when the deck is more than 30" above grade. See attachment detail Figure 24 Page 11

Typical Deck

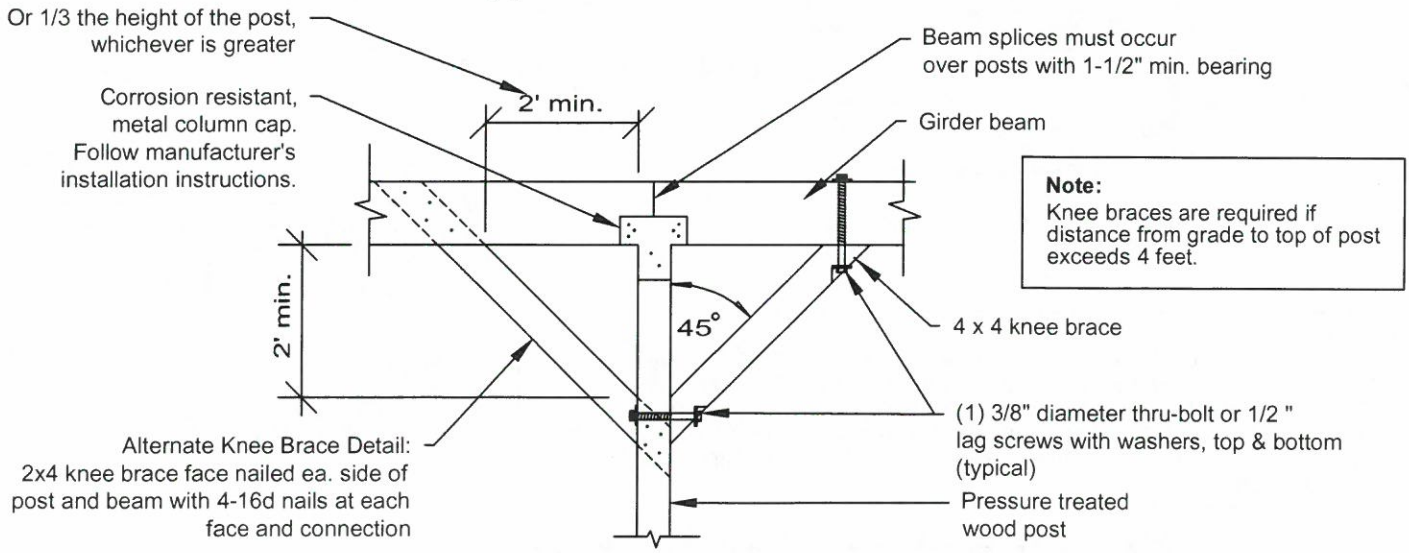
*VERIFY SPAN RATINGS OF PROPOSED DECKING MATERIALS

Submittal Requirements:

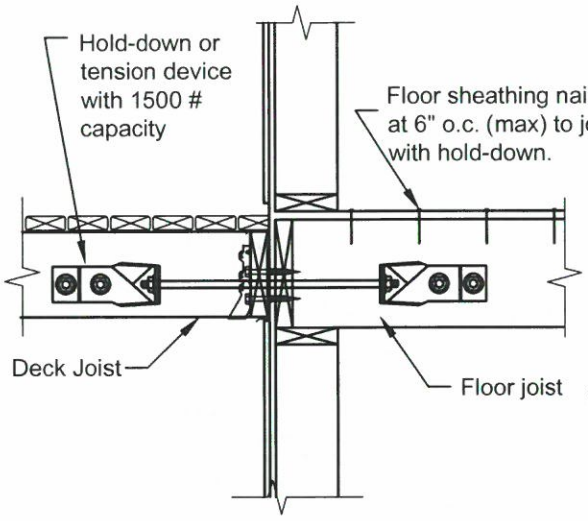
1. Two Site Plans, drawn to scale, showing dimensions of your deck and its relationship to existing buildings or structures on the property and the distance to existing property lines. Include the project address on the drawings.
2. Two plans showing the framing layout of your deck.
3. Fill out a building permit application for the appropriate jurisdiction.
4. If your deck will occur on a steep slope, please contact your local building department for additional requirements.



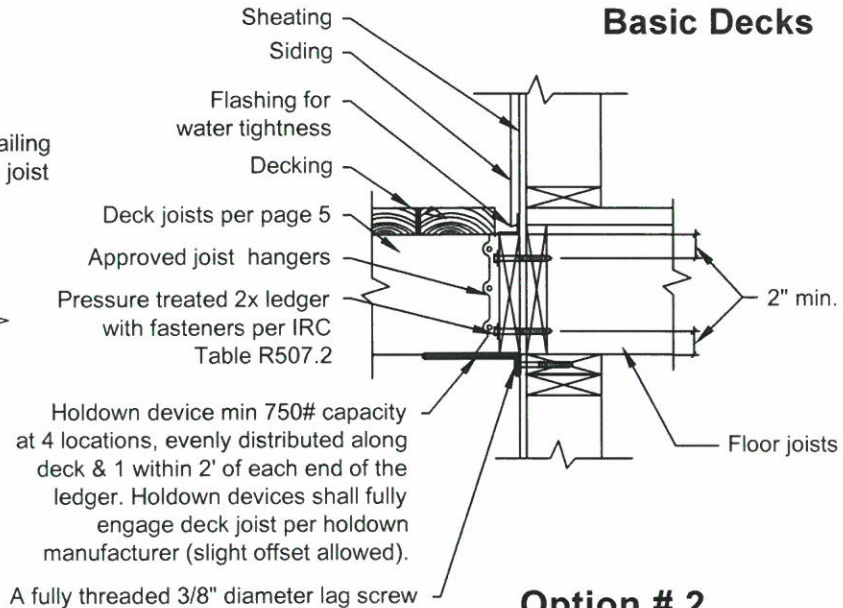
Typical Deck Section



Post to Beam Connection w/ Knee Brace



Option # 1
(Required for New Construction)

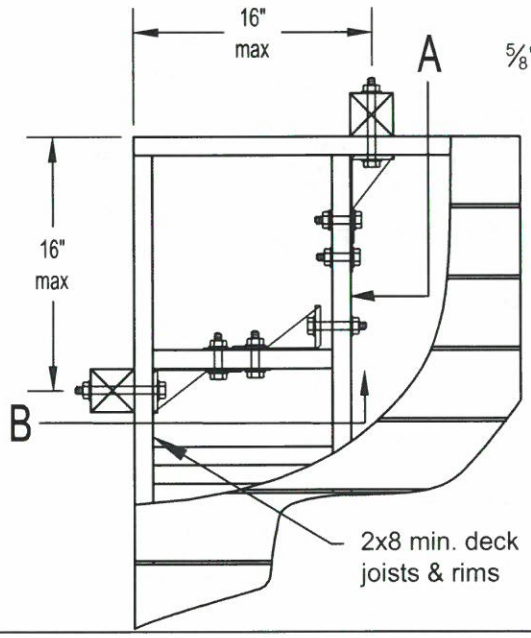


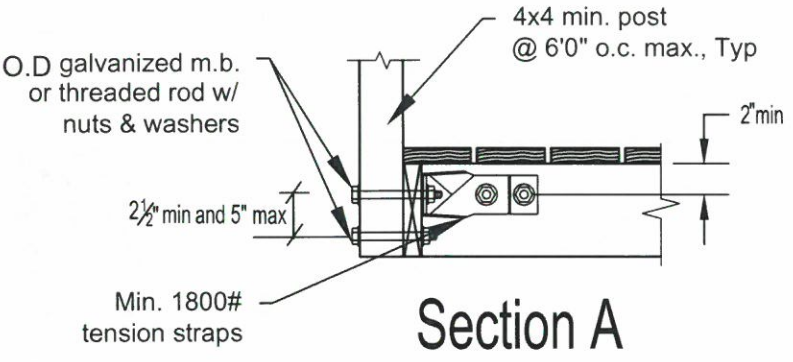
Option # 2
(Existing Construction Only)

Note:
These details are applicable where floor joists are parallel to deck joists.

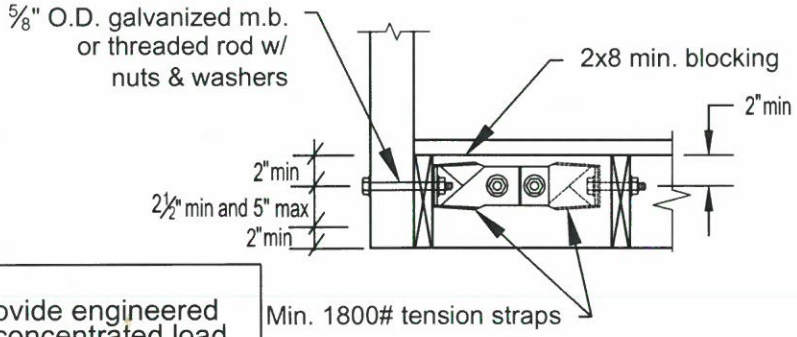
Note:
Holdown devices are not required for decks less than 30" high or free standing decks.

1 Ledger Attachment for Lateral Loads Per IRC 507.2





Section A



Section B

Note:
Use above details for guard connections or provide engineered design that shows Guards can resist a single concentrated load of 200 lbs applied in any direction at any point along the top and have attachment devices and supporting structure to transfer this load to appropriate structural elements of the building per IBC sec 1607.8

2 Guardrail Connection

(Guardrails are required when the deck is more than 30" above grade.)

Figure 12. Typical Footing Options.

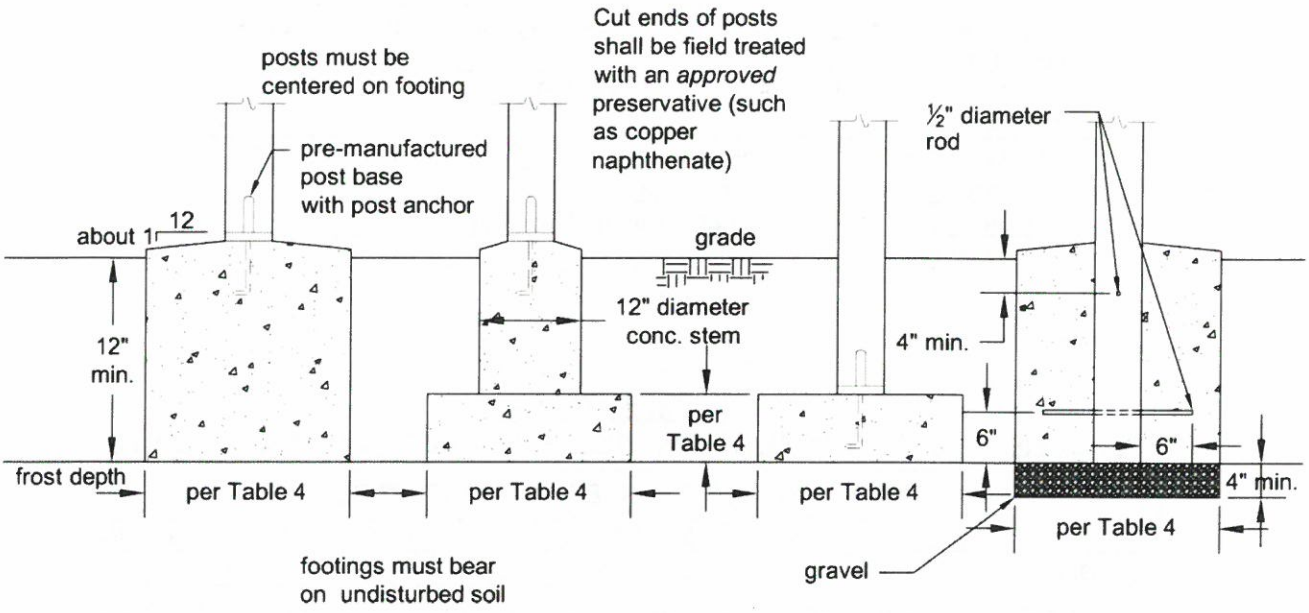


TABLE R507.2 [WA AMENDED]
DECK LEDGER CONNECTION TO BAND JOIST[a, b] (Deck live load = 60 psf, deck dead load = 10 psf, snow load = 25 psf)

CONNECTION DETAILS	JOIST SPAN						
	6' and less	6'1" to 8'	8'1"[2] to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
	On-center spacing of fasteners						
½ inch diameter lag screw with ½ inch maximum sheathing [c,d]	22	16	13	11	9	8	7
½ inch diameter bolt with ½ inch maximum sheathing[d]	30	22	18	15	13	11	10
½ inch diameter bolt with 1 inch maximum sheathing[e]	26	19	16	13	11	10	9

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

a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
b. Snow load shall not be assumed to act concurrently with live load.
c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
d. Sheathing shall be wood structural panel or solid sawn lumber.
e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

Deck Connections

All fasteners, nails, bolts, screws, etc. must be corrosion resistant. See Deck Construction Note 3, page 1. Follow manufacturer's instructions for timber connectors.		
	Connections	Nailing
1	Joist on deck beam; toenail each end	(3) 8d
2	Bridging or blocking to joist; toenail ea. side, ea. end	(3) 8d
3	2x decking to joist or deck beam; blind and face nail	(2) 16d
4	Joist hangers	All holes

TABLE 507.2.1
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGER AND BAND JOISTS

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
LEDGER[a]	2 Inches[d]	3/4 Inch	2 Inches[b]	1 5/8 Inches[b]
BAND JOIST[c]	3/4 Inch	2 Inches[e]	2 Inches[b]	1 5/8 Inches[b]

For SI: 1 inch = 25.4mm

a. Lag screw 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).
e. The 2inches may be reduced to 3/4 inch when the band joist is directly supported by mudsill, a header or by double top wall plates.

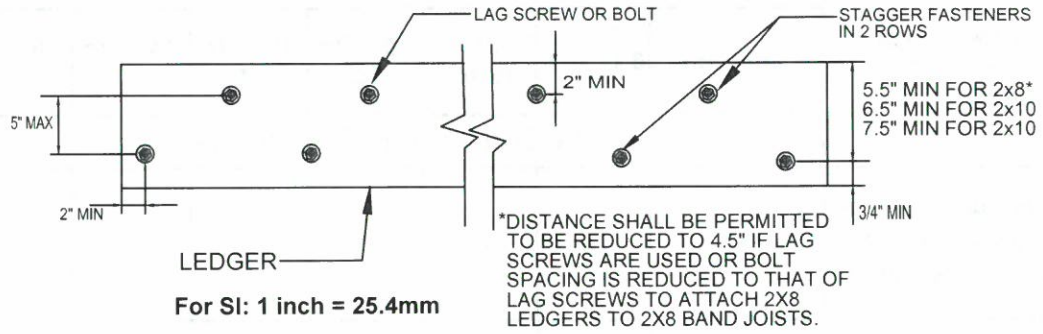


FIGURE R507.2.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGER

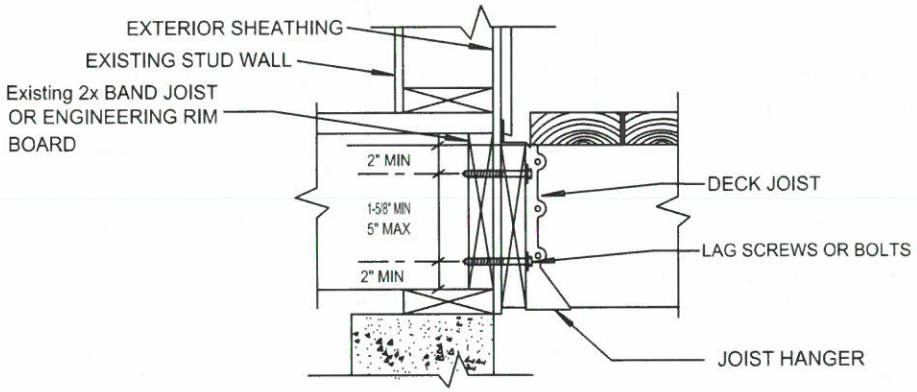


FIGURE 507.2.1(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS

60# LIVE LOAD

TABLE R507.5

DECK JOIST SPANS FOR COMMON LUMBER SPECIES[f] (ft. - in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b] (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	8-6	7-9	6-9	7-7	6-10	6-0
	2 × 8	11-2	10-2	8-11	9-10	8-11	7-9
	2 × 10	14-4	13-0	10-11	15-5	13-4	10-11
	2 × 12	17-5	15-5	12-7	17-11	15-6	12-8
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 × 6	8-1	7-0	5-9	7-5	6-9	5-9
	2 × 8	10-10	9-5	7-8	9-7	8-8	7-7
	2 × 10	13-3	11-6	9-4	13-3	11-6	9-5
	2 × 12	15-4	13-4	10-10	15-5	13-4	10-11
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 × 6	7-6	6-9	5-6	6-10	6-2	5-4
	2 × 8	9-10	8-6	6-11	8-10	8-0	6-11
	2 × 10	12-0	10-5	8-6	12-1	10-6	8-7
	2 × 12	13-11	12-1	9-10	14-0	12-2	9-11

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 60 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 60 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor
f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

60# LIVE LOAD

TABLE R507.6

DECK BEAM SPAN LENGTHS[a, b] (ft. - in.)

SPECIES[c]	SIZE[d]	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	2 – 2 × 6	6-4	6-0	5-6	4-7	3-11	3-5	3-0
	2 – 2 × 8	8-11	8-5	7-2	6-0	5-2	4-6	4-0
	2 – 2 × 10	11-11	10-9	9-2	7-8	6-7	5-9	5-1
	2 – 2 × 12	14-5	12-7	11-2	9-4	8-0	7-0	6-3
	3 – 2 × 6	8-1	7-8	7-3	6-10	5-10	5-1	4-7
	3 – 2 × 8	11-3	10-4	9-5	8-10	7-9	6-9	6-0
	3 – 2 × 10	14-5	12-10	11-10	10-10	9-10	8-7	7-8
	3 – 2 × 12	17-3	15-4	13-10	12-7	11-7	10-6	9-4
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3 × 6 or 2 – 2 x 6	5-5	4-5	3-6	2-11	2-6	2-2	1-11
	3 × 8 or 2 – 2 × 8	7-3	5-9	4-8	3-10	3-4	2-11	2-7
	3 × 10 or 2 – 2 × 10	8-11	7-5	5-11	4-11	4-3	3-8	3-3
	3 × 12 or 2 – 2 × 12	10-4	8-11	7-2	6-0	5-2	4-6	4-0
	4 × 6	6-3	5-11	4-11	4-1	3-6	3-1	2-9
	4 × 8	8-9	7-9	6-6	5-5	4-8	4-1	3-7
	4 × 10	11-0	9-6	8-3	6-11	5-11	5-2	4-7

60# LIVE LOAD

TABLE R507.6

DECK BEAM SPAN LENGTHS[a, b] (ft. - in.) (Continued)

SPECIES[c]	SIZE[d]	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
	4 × 12	12-10	11-1	10-0	8-5	7-2	6-3	5-7
	3 – 2 × 6	6-11	6-6	6-1	5-3	4-6	3-11	3-6
	3 – 2 × 8	9-8	8-6	7-8	6-11	5-11	5-3	4-8
	3 – 2 × 10	11-11	10-4	9-4	8-5	7-7	6-8	5-11
	3 – 2 × 12	13-10	12-0	10-10	9-10	9-1	8-1	7-2

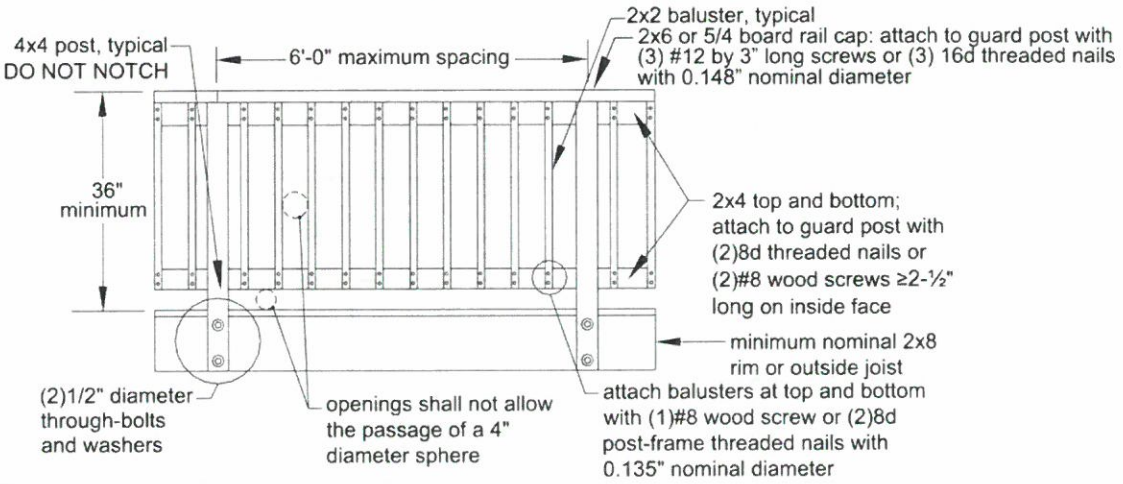
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Ground snow load, live load = 60 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.
b. Beams supporting deck joists from one side only.
c. No. 2 grade, wet service factor.
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
e. Includes incising factor.
f. Northern species. Incising factor not included.

GUARD REQUIREMENTS

All decks greater than 30" above grade are required to have a guard [R312.1] - one example is shown in Figure 24. Other methods and materials may be used for guard construction when *approved* by the authority having jurisdiction.

Figure 24. Example Guard Detail.

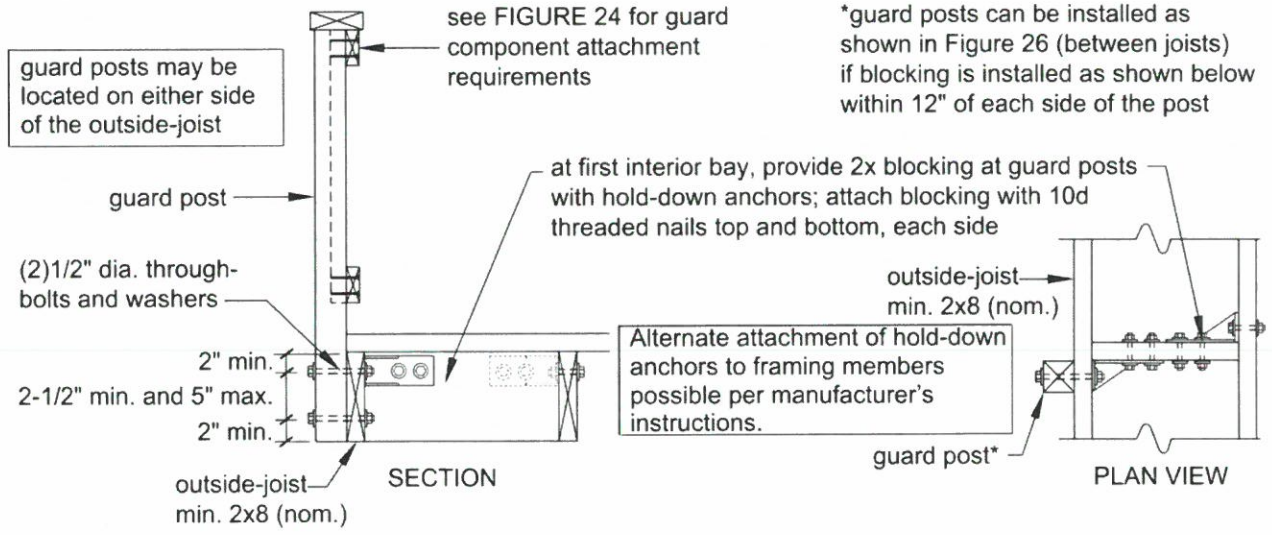


GUARD POST ATTACHMENTS FOR REQUIRED GUARDS

Deck guard posts for required guards shall be a minimum 4x4 (nominal) with an adjusted bending design value not less than 1,100 psi. Outside-joists and rim joists to which guard posts are attached shall be a minimum of 2x8 (nominal).

Guard posts for required guards which run parallel to the deck joists shall be attached to the outside joist per Figure 25. Guard posts for required guards that run perpendicular to the deck joists shall be attached to the rim joist in accordance with Figure 26. Only hold-down anchor models meeting these minimum requirements shall be used. Hold-down anchors shall have a minimum allowable tension load of 1,800 pounds for a 36" maximum guard height and be installed in accordance with the manufacturer's instructions.

Figure 25. Guard Post to Outside-Joist Example.



STAIR HANDRAIL REQUIREMENTS

All stairs with 4 or more risers shall have a handrail on at least one side (see Figure 32A) [R311.7.8]. The handrail height measured vertically from the sloped plane adjoining the tread nosing shall be not less than 34 inches and not more than 38 inches (see Figure 30) [R311.7.8.1]. Handrails shall be graspable and shall be composed of decay-resistant and/or corrosion resistant material. Handrails shall be Type I, Type II, or provide equivalent graspability (see Figure 32B). Type I shall have a perimeter dimension of at least 4" and not greater than 6-¼". Type II rails with a perimeter greater than 6-¼" shall provide a graspable finger recess area on both sides of the profile [R311.7.8.3]. All shapes shall have a smooth surface with no sharp corners. Handrails shall run continuously from a point directly over the lowest riser to a point directly over the highest riser and shall return to the guard at each end (see Figure 33). Handrails may be interrupted by guard posts at a turn in the stair [R311.7.8.2].

STAIR FOOTING REQUIREMENTS [R403]

Where the stairway meets grade, attach the stringers to the stair guard posts as shown in Figure 34. Posts shall bear on footings. All footings shall bear on solid ground and shall be placed at least 12 inches below the undisturbed ground surface or below the frost line, whichever is deeper (see Figure 34). Stringers shall bear on a 2x4 bearing block attached to the post as shown. Stringers shall not bear on new or existing concrete pads or patios that are not founded below this depth. When guards are not required (see GUARD REQUIREMENTS), posts may terminate below the bottom tread elevation. Bolts are only required if a guard post is required.

STAIR LIGHTING REQUIREMENTS [R303.7]

Stairways shall have a light source located at the top landing such that all stairs and landings are illuminated. The light switch shall be operated from inside the house. However, motion detected or timed switches are acceptable.

Figure 32A. Handrail Mounting Examples.

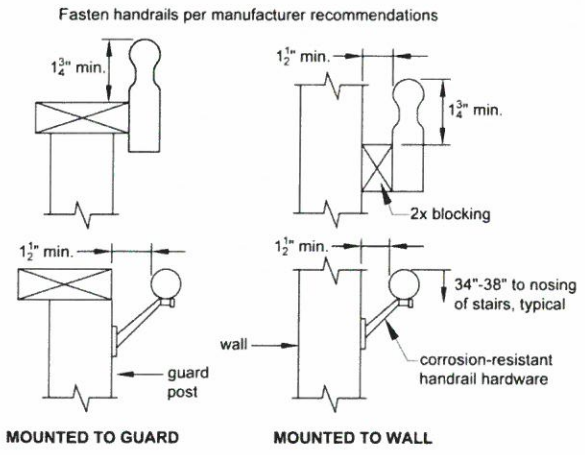


Figure 33. Miscellaneous Stair Requirements.

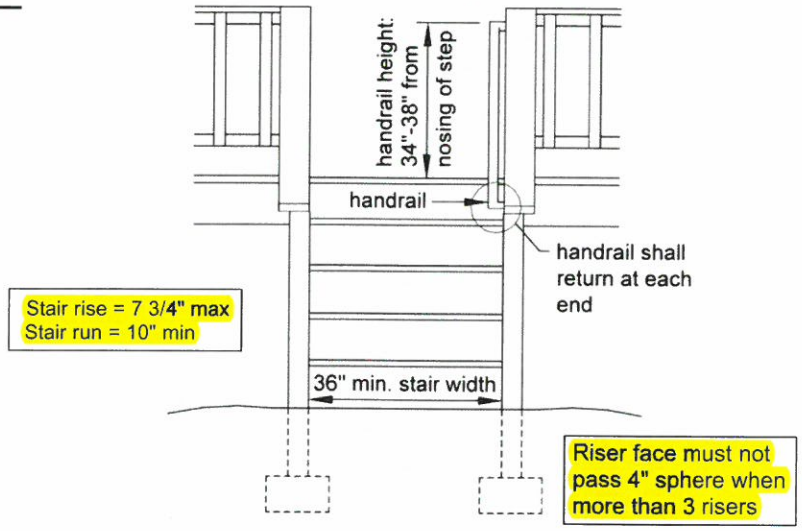


Figure 32B. Handrail Grip Size.

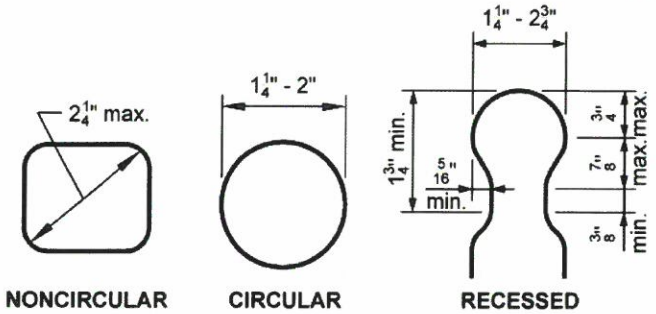


Figure 34. Stair Footing Detail.