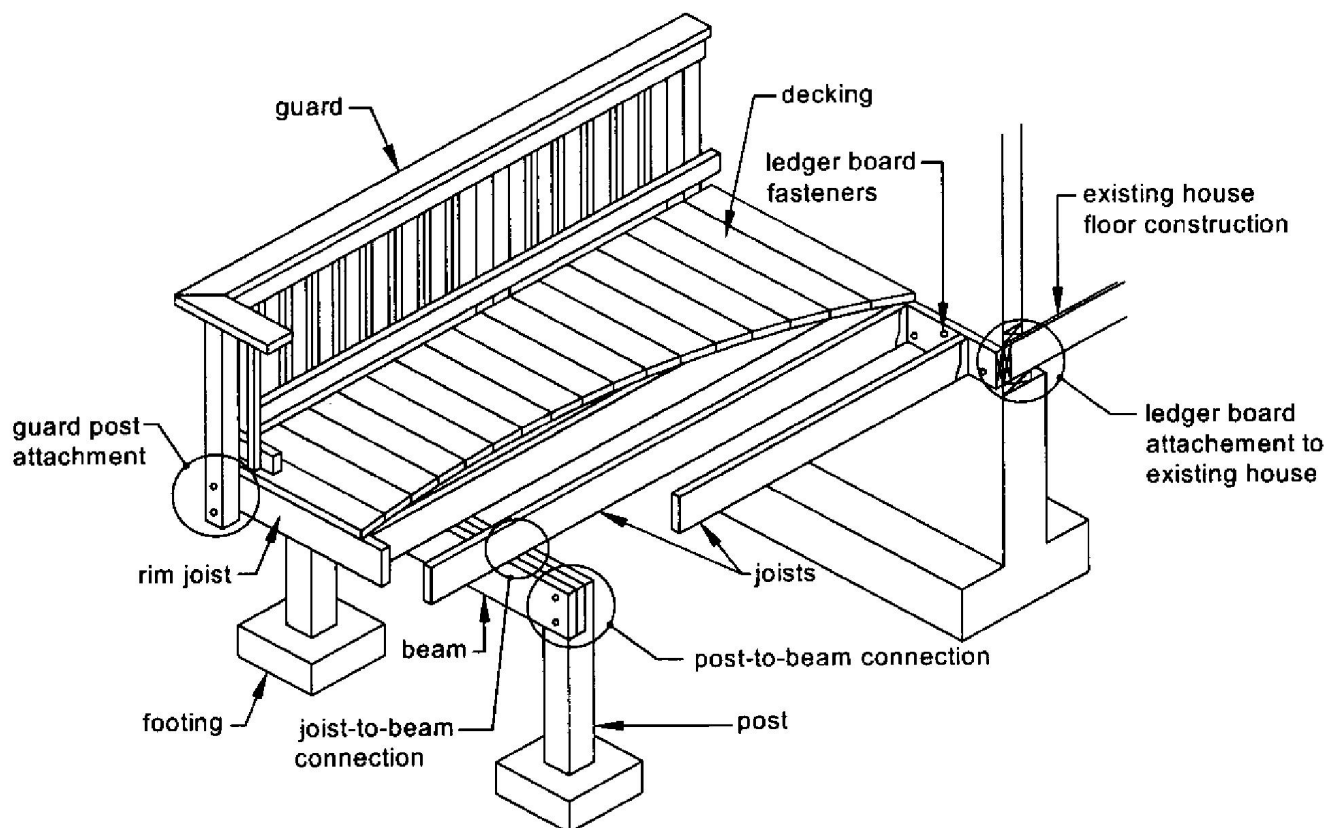




2018 Typical Deck Details

Based on the 2018 International Residential Codes



Exterior Decks

Requirements R507

Deck. Wood-framed decks shall be in accordance with this section. For decks using materials and conditions not prescribed in the section, refer to Section R301.

Materials. Materials used for the construction of decks shall comply with this section. R507.2

Wood materials. Wood materials shall be No. 2 grade or better lumber, preservative-treated in accordance with Section R317, or *approved*, naturally durable lumber, and termite protected where required in accordance with Section R318. Where design in accordance with Section R301 is provided, wood structural members shall be designed using the wet service factor defined in AWC NDS. Cuts, notches and drilled holes of preservative-treated wood members shall be treated in accordance with Section R317.1.1. All preservative-treated wood products in contact with the ground shall be labeled for such usage. R507.2.1

Engineered wood products. Engineered wood products shall be in accordance with Section R502. R507.2.1.1

Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck boards, stair treads, guards and handrails shall comply with the requirements of ASTM D7032 and this section. R507.2.2

Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a label that indicates compliance with ASTM D7032 and includes the allowable load and maximum allowable span determined in accordance with ASTM D7032. Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates compliance with ASTM D7032 and includes the maximum allowable span determined in accordance with ASTM D7032.

Flame spread index. Plastic composite deck boards, stair treads, guards, and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

Decay resistance. Plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be decay resistant in accordance with ASTM D7032. R507.2.2.3

Termite resistance. Where required by Section 318, plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite resistant in accordance with ASTM D7032. R507.2.2.4

Installation of plastic composites. Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturer's instructions. R507.2.2.5

Fasteners and connectors. Metal fasteners and connectors used for all decks shall be in accordance with Section R317.3 and Table R507.2.3. R507.2.3

Flashing. Flashing shall be corrosion-resistant metal or nominal thickness not less than 0.019 inch or *approved* nonmetallic material that is compatible with the substrate of the structure and the decking materials.

Alternate materials. Alternative materials, including glass and metals, shall be permitted.

Footings. Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads in accordance with Section R301. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure R507.3. The footing depth shall be in accordance with Section R403.1.4.

Exception. Free-standing decks consisting of joists directly supported on grade over their entire length.

TABLE R507.2.3			
FASTENER AND CONNECTOR SPECIFICATIONS FOR DECKS ^{a, b}			
ITEM	MATERIAL	MINIMUM FINISH/COATING	ALTERNATE FINISH/COATING ^e
Nails and timber rivets	<u>In accordance with ASTM F1667</u>	<u>Hot-dipped galvanized per ASTM A153</u>	Stainless steel, silicon bronze or copper
Bolts ^c Lag screws ^d (including nuts and washers)	In accordance with <u>ASTM A307</u> (bolts), <u>ASTM A563</u> (nuts), <u>ASTM F844</u> (washers)	Hot-dipped galvanized per <u>ASTM A153</u> , Class C (Class D for 3/8-inch diameter and less) or mechanically galvanized per <u>ASTM B695</u> , Class 55 or 410 stainless steel	Stainless steel, silicon bronze or copper
Metal connectors	Per manufacturer's specification	<u>ASTM A653</u> type G185 zinc coated galvanized steel or post hot-dipped galvanized per <u>ASTM A123</u> providing a minimum average coating weight of 2.0 oz./ft ² (total both sides)	Stainless steel

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

a. Equivalent materials, coatings and finishes shall be permitted.

b. Fasteners and connectors exposed to salt water or located within 300 feet of a salt water shoreline shall be stainless steel.

c. Holes for bolts shall be drilled a minimum 1/32 inch and a maximum 1/16 inch larger than the bolt.

d. Lag screws 1/2 inch and larger shall be predrilled to avoid wood splitting per the National Design Specification (NDS) for Wood Construction.

e. Stainless-steel-driven fasteners shall be in accordance with ASTM F1667.

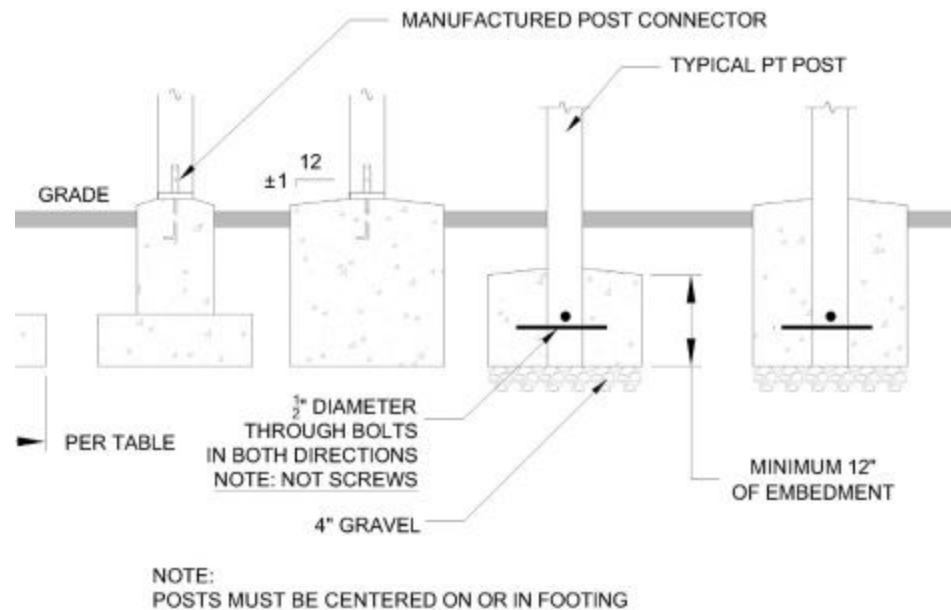


FIGURE R507.3
DECK POSTS TO DECK FOOTING CONNECTION

Minimum depth. Exterior footings shall be placed not less than 12 inches below the undisturbed ground surface. R403.1.4

- 18" below finished grade
- 18" square or 18" round diameter

Deck posts. For single-level wood-framed decks, post sizes shall be 6x6 and a maximum height shall be 14'0".

Exception: Landings and decks less than 30" in height can use 4x4 post.

Deck posts to deck footing connection. Where posts bear on concrete footings in accordance with Section R403 and Figure R507.4.1, lateral restraint shall be provided by manufactured connectors or a minimum post embedment of 12 inches in surrounding soils or concrete piers. Other footing systems shall be permitted. R507.4.1

Exception: Where expansive, compressible, shifting or other questionable soils are present, surrounding soils shall not be relied on for lateral support.

Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure R507.5 shall be in accordance with Table R507.5. Beam plies shall be fastened with two rows of 10d (3-inch x 0.128-inch) nails minimum at 16 inches on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the allowable beam span. Deck beams of other materials shall be permitted where designed in accordance with accepted engineering practices. R507.5

Deck beam bearing. The ends of beams shall have not less than 1 1/2 inches of bearing on wood or metal and not less than 3 inches of bearing on concrete or masonry for the entire width of the beam. Where multiple –span beams bear on intermediate posts, each ply must have full bearing on the post in accordance with Figures R507.5.1 (1) and R507.5.2 (2) R507.5.1

Deck beam connection to supports. Deck beams shall be attached to supports in a manner capable of transferring vertical loads and resisting horizontal displacement. Deck beam connections to wood posts shall be in accordance with Figures R507.5.1(1) and R507.5.1(2). Manufactured post-to-beam connectors shall be sized for the post and beam sizes. Bolts shall have washers under the head and nut.

Deck joists. Maximum allowable spans for wood deck joists, as shown in Figure R507.6 shall be in accordance with Table R507.6. The maximum joist spacing shall be limited by the decking materials in accordance with Table R507.37. The maximum joist cantilever shall be limited to one-fourth of the joist span or the maximum cantilever length specified in Table R507.6, whichever is less. R507.6

Deck joist bearing. The ends of joists shall have not less than 1 1/2 inches of bearing on wood or metal and not less than 3 inches of bearing on concrete or masonry over its entire width. Joists bearing on top of a multiple-ply beam or ledger shall be attached by a mechanical connector. Joist framing into the side of a beam or ledger board shall be supported by approved joist hangers. R507.6.1

Deck joist lateral restraint. Joist ends and bearing locations shall be provided with lateral resistance to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not fewer than three 10d (3-inch by 0.128-inch) nails OR THREE No. 10x3-inch long wood screws.

Decking. Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.7. Wood decking shall be attached to each supporting member with not less than two 8d threaded nails or two No. 8 wood screws. Other approved decking or fastener systems shall be installed in accordance with the manufacturer's installation requirements.

Vertical and lateral supports. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. For decks with cantilevered framing members, connection to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

Vertical and lateral supports at band joist. Vertical and lateral supports for decks shall comply with this section. R507.9

Vertical supports. Vertical loads shall be transferred to band joists with ledgers in accordance with this section. R507.9.1

Ledger details. Deck ledgers shall be a minimum 2-inch by 8-inch nominal, pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer. R507.9.1.1

Band joist details. Band joists supporting a ledger shall be a minimum 2-inch solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 9 1/2-inch dimensional, Douglas fir or better, laminated veneer lumber. Band joists shall bear fully on the primary structure capable of supporting all required loads. R507.9.1.2

Ledger to band joist details. Fasteners used in deck ledger connections in accordance with Table R507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.9.1.3(2) and Figures R507.9.1.3(1) and R507.9.1.3(2). R507.9.1.3

Lateral connection. Lateral loads shall be transferred to the ground or to a structure capable of transmitting them to the ground. Where the lateral load connection is provided in accordance with Figure R507.9.2(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds. Where the lateral load connections are provided in accordance with Figure R507.9.2(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds. R507.9.2

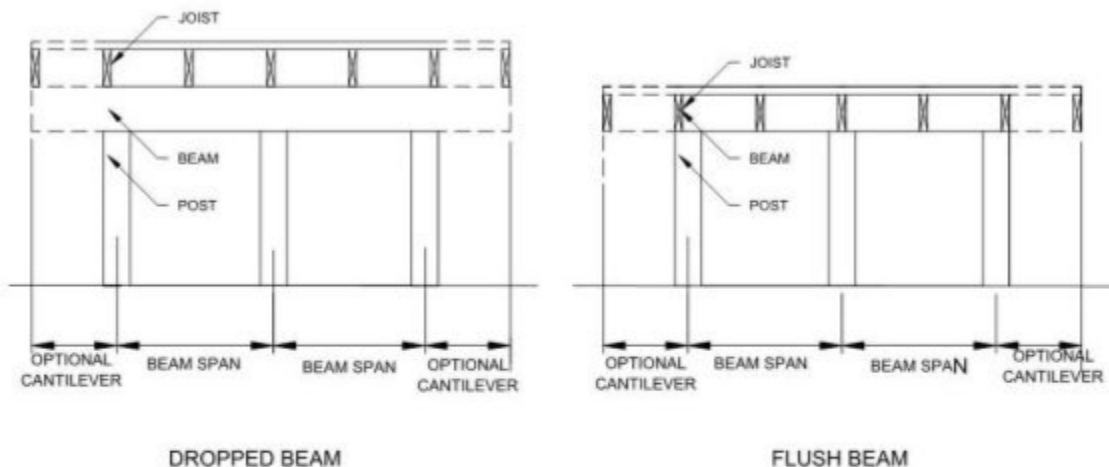


FIGURE R507.5
TYPICAL DECK JOIST SPANS

FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK BEAM SPAN LENGTHS^{a, b, c} (feet - inches)

SPECIES ^a	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1 - 2 × 6	4-11	4-0	3-7	3-3	3-0	2-10	2-8
	1 - 2 × 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1 - 2 × 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1 - 2 × 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2 - 2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 - 2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 - 2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 - 2 × 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3 - 2 × 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3 - 2 × 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
	3 - 2 × 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
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 × 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 × 8 or 2 - 2 × 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 × 10 or 2 - 2 × 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 × 12 or 2 - 2 × 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 × 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 × 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 × 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 × 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3 - 2 × 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3 - 2 × 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3 - 2 × 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3 - 2 × 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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 = 40 psf, dead load = 10 psf, $L/\Delta = 360$ at main span, $L/\Delta = 180$ at cantilever with a 220-pound point load applied at the end.

b. Beams supporting deck joists from one side only.

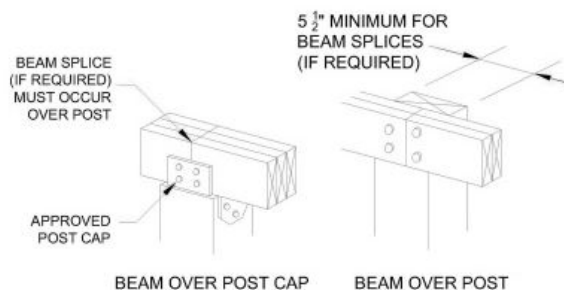
c. No. 2 grade, wet service factor.

d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

e. Includes incising factor.

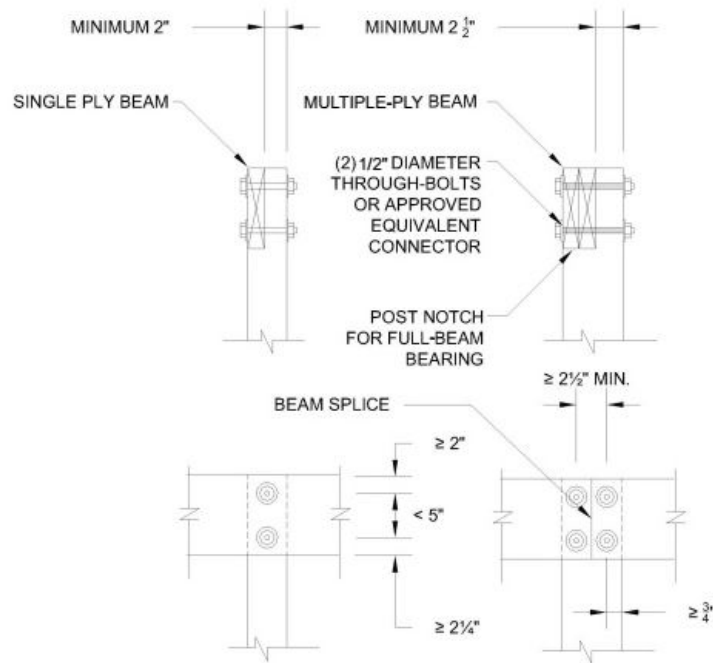
f. Northern species. Incising factor not included.

g. Beam cantilevers are limited to the adjacent beam's span divided by 4.



For SI: 1 inch = 25.4 mm.

FIGURE R507.5.1(1)
DECK BEAM TO DECK POST



For SI: 1 inch = 25.4 mm.

FIGURE R507.5.1(2)
NOTCHED POST-TO-BEAM CONNECTION

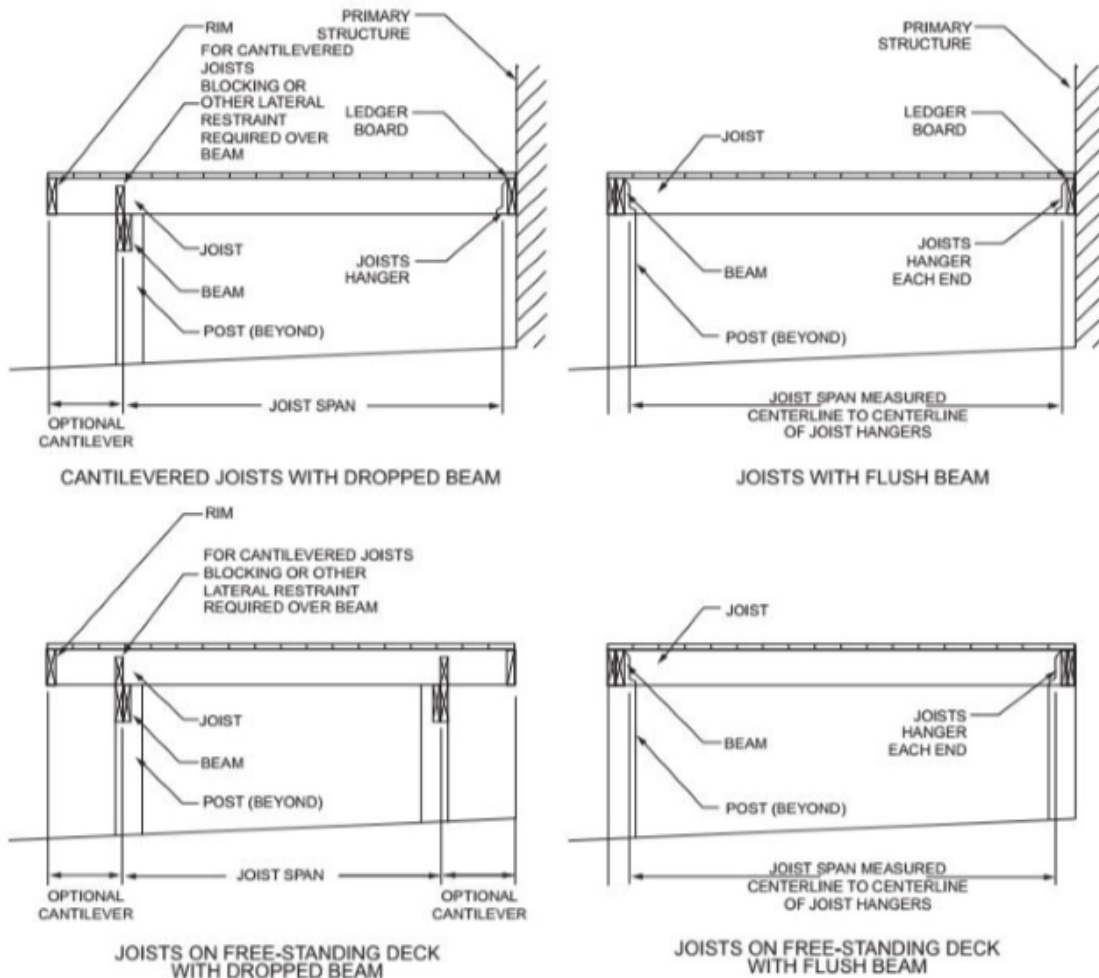


FIGURE R507.6
TYPICAL DECK JOIST SPANS

TABLE R507.6							
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. - in.)							
SPECIES _a	SIZE	ALLOWABLE JOIST SPAN _b			MAXIMUM CANTILEVER _{c, f}		
		SPACING OF DECK JOISTS(inches)			SPACING OF DECK JOISTS WITH CANTILEVERS _c (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	1-3	1-4	1-6
	2 × 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 × 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 × 12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-larch _d , hem-fir _d , spruce-pine-fir _d ,	2 × 6	9-6	8-8	7-2	1-2	1-3	1-5
	2 × 8	12-6	11-1	9-1	1-11	2-1	2-3
	2 × 10	15-8	13-7	11-1	3-1	3-5	2-9
	2 × 12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa pine _e , red pine _e	2 × 6	8-0	8-0	7-0	1-0	1-1	1-2
	2 × 8	11-18	10-7	8-8	1-8	1-10	2-0
	2 × 10	14-11	13-0	10-7	2-8	2-10	2-8
	2 × 12	17-5	15-1	12-4	3-10	3-9	3-1
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 = 40 psf, dead load = 10 psf, L/Δ = 360.							
c.Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load.							
d.Includes incising factor.							
e.Northern species with no incising factor.							
f.Cantilevered spans not exceeding the nominal depth of the joist are permitted.							

TABLE R507.7		
MAXIMUM JOIST SPACING FOR DECKING		
DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking diagonal to joists _a
1 1/4-inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.2	In accordance with Section R507.2
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.		
a.Maximum angle of 45 degrees from perpendicular for wood deck boards.		

TABLE R507.9.1.3(1)
DECK LEDGER CONNECTION TO BAND JOIST^{a, b} (Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

CONNECTION DETAILS	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'
	On-center spacing of fasteners						
1/2-inch diameter lag screw with 1/2-inch maximum sheathing ^{c, d}	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing ^d	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing ^e	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.

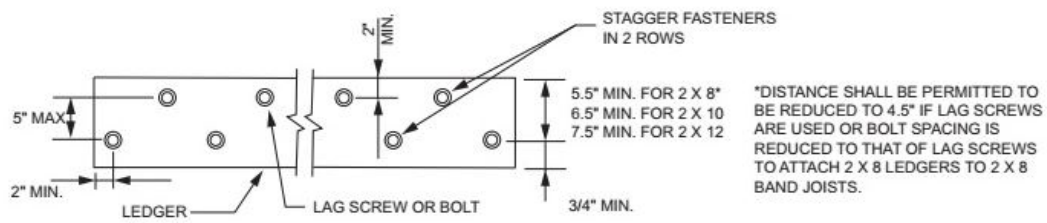
- Ledgers shall be flashed in accordance with [Section R703.4](#) to prevent water from contacting the house band joist.
- Snow load shall not be assumed to act concurrently with live load.
- The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- Sheathing shall be wood structural panel or solid sawn lumber.
- 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 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.



TABLE R507.7		
MAXIMUM JOIST SPACING FOR DECKING		
DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking diagonal to joist ^a
1 1/4-inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.2	In accordance with Section R507.2

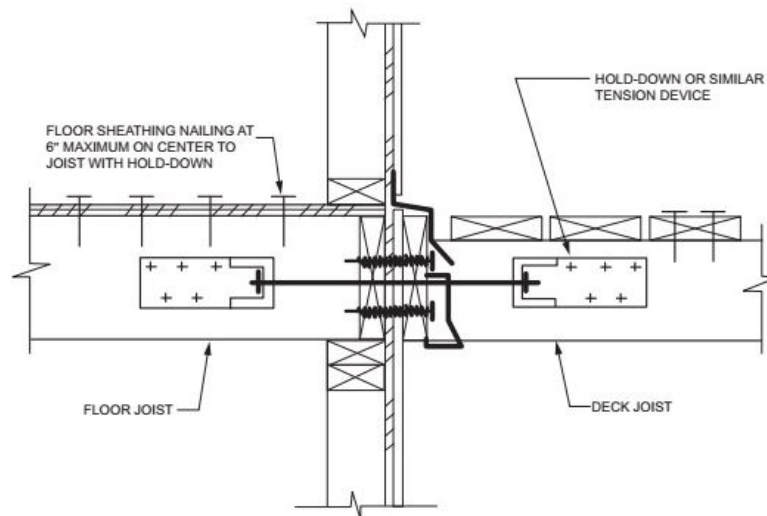
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Maximum angle of 45 degrees from perpendicular for wood deck boards.



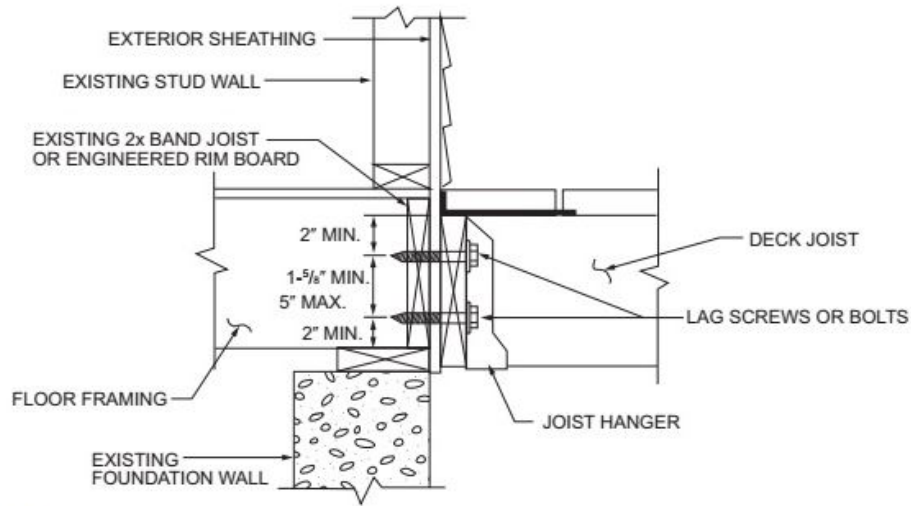
For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS



For SI: 1 inch = 25.4 mm.

FIGURE R507.9.2(1)
DECK ATTACHMENT FOR LATERAL LOADS



For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS

GUARD REQUIREMENTS

All decks greater than 30" above grade are required to have a guard. If you are providing a guard when one is not required, it must meet these requirements. All guards shall be constructed in strict conformance with details herein; any deviations require a plan submission.

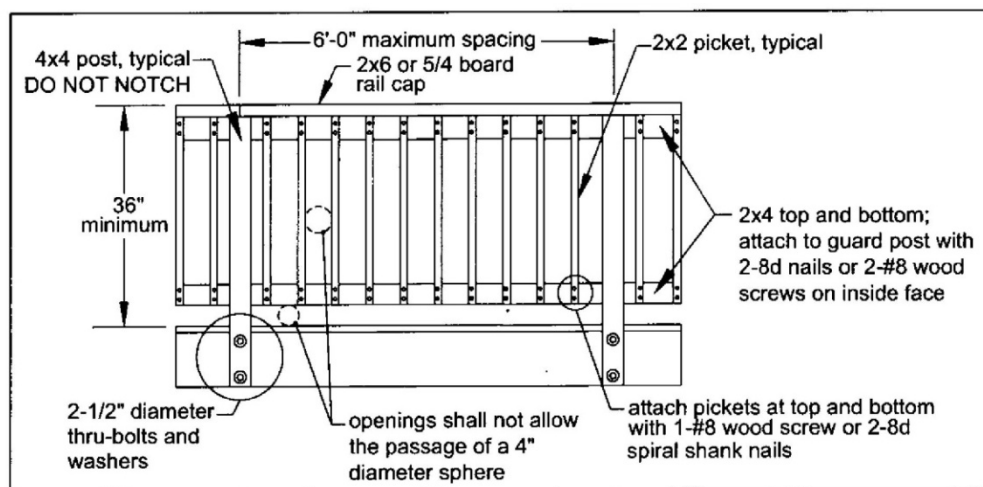


FIGURE 24: TYPICAL GUARD DETAIL

Any pre-fabricated wood, plastic, composite or manufactured guard system purchased from a home center store, lumber company or similar will also require a plan submission.

ONLY THOSE PLASTIC, COMPOSITE OR MANUFACTURED GUARD SYSTEMS LISTED BY AN ACCREDITED TESTING AGENCY ARE APPROVED FOR USE IN THE CITY OF NIXA.

Guard Post To Rim Joist: Use one of the options shown in FIGURE 26 through FIGURE 28 to attach a guard post to a rim joist. See FIGURE 10 for rim joist-to-deck joist and decking-to-rim joist attachment requirements.

Option 1: As shown in FIGURE 26, guard posts are attached to the inside face of the rim joists, to attach guard post to the outside of the rim joist, see OPTION 2 or OPTION 3.

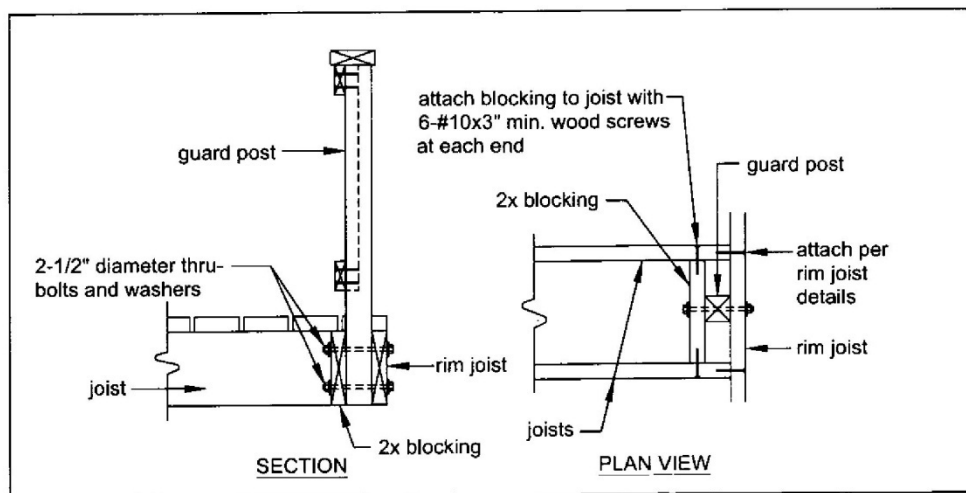


FIGURE 26: GUARD POST TO RIM JOIST DETAIL, OPTION 1

Option 2: As shown in FIGURE 27, *hold-down anchors* must be installed to attach the rim joist to the deck joists. Hold-down anchors must be galvanized with 1.85 oz/sf of zinc (G-185 coating) or shall be stainless steel. There shall be a minimum of two bolts at the anchors' attachment to the joist. Look for model number HD2A in a Zmax coating from Simpson Strong-Tie, model number HD2A in a Triple Zinc coating from USP, or the hot-dipped galvanized DeckLok by Morse Technologies. Other hold-down anchor models meeting the minimum requirements may also be used.

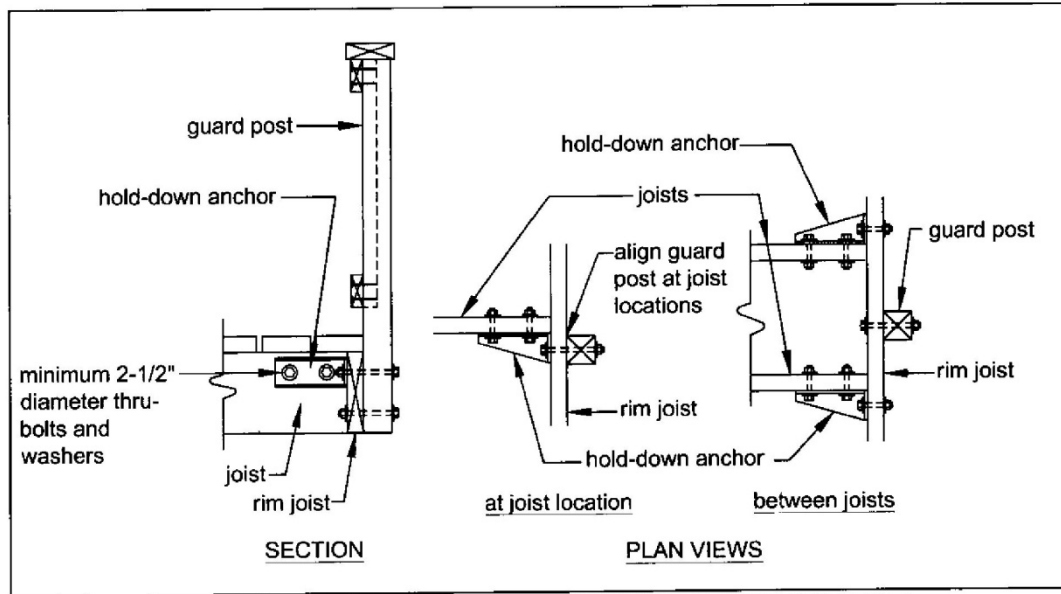


FIGURE 27: GUARD POST TO RIM JOIST DETAIL, OPTION 2

Option 3: As shown in FIGURE 28, the rim joist must be fastened to deck joists with two 20 gage *stud tie plates* attached per the manufacturer's instructions with hot-dipped galvanized or stainless steel fasteners. Stud tie plates must be galvanized with 1.85 oz/sf of zinc (G-185 coating) or shall be stainless steel. Look for model number SP1 in a Zmax coating from Simpson Strong-Tie or model number SPT22 in a Triple Zinc coating from USP. Other tie plate models meeting the minimum requirements may also be used.

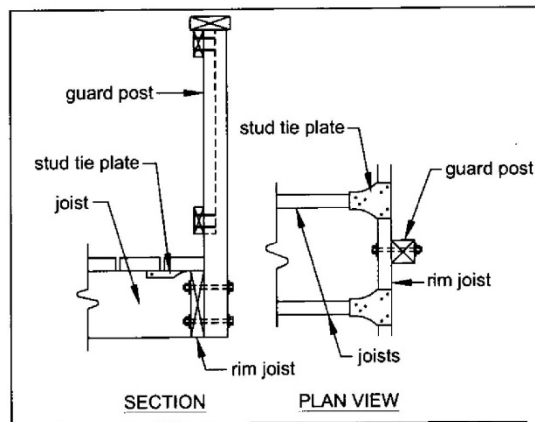


FIGURE 28: GUARD POST TO RIM JOIST DETAIL, OPTION 3

STAIR REQUIREMENTS

Stairs, stair stringers and stair guard shall meet the requirements shown in FIGURE 29 through FIGURE 36. All stringers shall be 2x12. Stair stringers shall not span more than the dimensions shown in FIGURE 30. If the stringer span exceeds these dimensions, then an intermediate landing will be required. All intermediate stair landings must be designed and constructed as a free-standing deck using the details in this package.

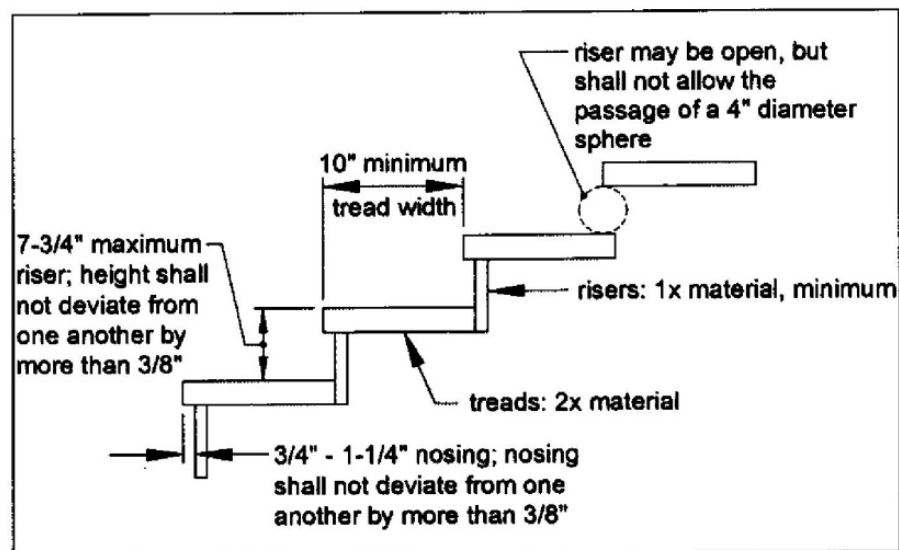


FIGURE 29: TREAD AND RISER DETAIL

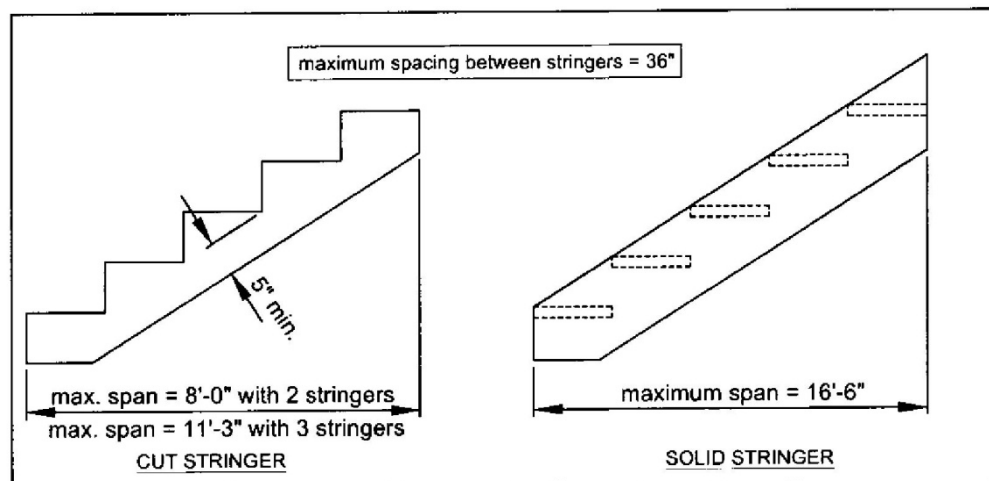


FIGURE 30: STAIR STRINGER REQUIREMENTS

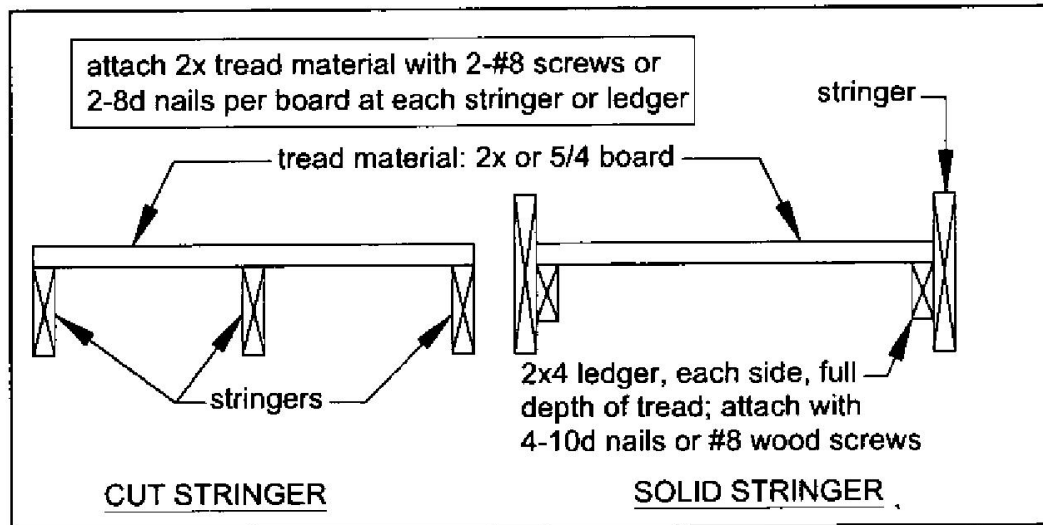


FIGURE 31: TREAD CONNECTION REQUIREMENTS

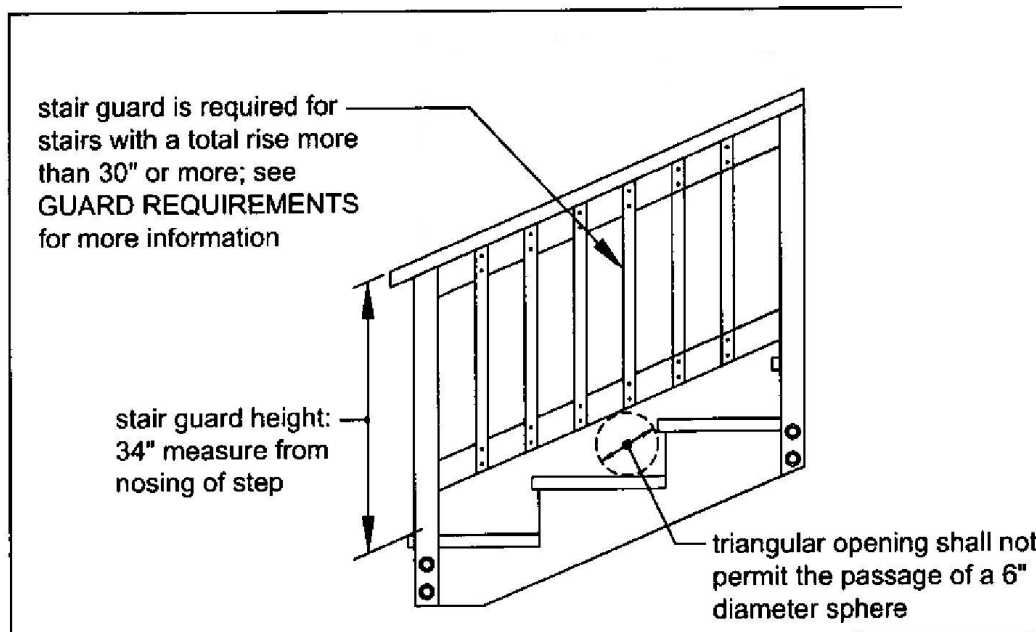


FIGURE 32: STAIR GUARD REQUIREMENTS

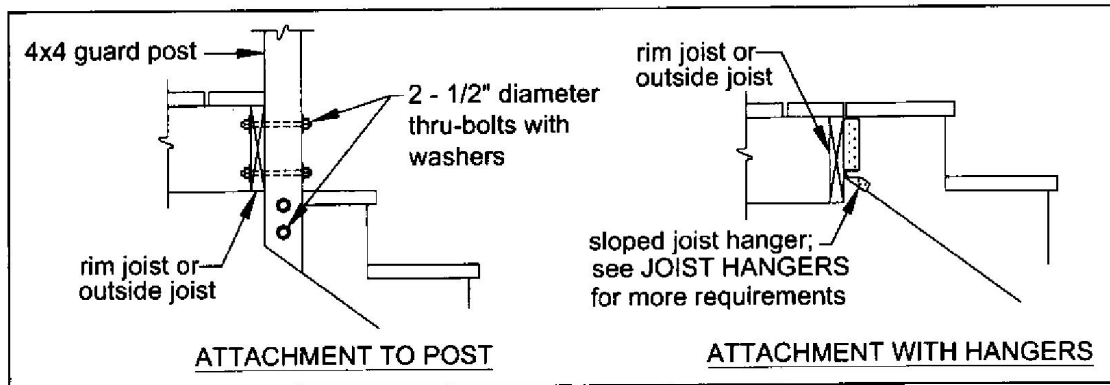


FIGURE 33: STAIR STRINGER ATTACHMENT DETAIL

STAIR HANDRAIL REQUIREMENTS

All stairs with 4 or more risers shall have a handrail on one side. See FIGURE 34. Handrails shall be graspable and shall be composed of decay-resistant and/or corrosion resistant material. The hand grip portion, if circular, shall be between 1 1/4" and 2 1/4" in diameter. Shapes other than circular shall have a perimeter dimension between 4" and 6 1/4" with a maximum cross sectional dimension of 2 1/4". 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 35. Handrails may be interrupted by guard posts only at a turn in the stair.

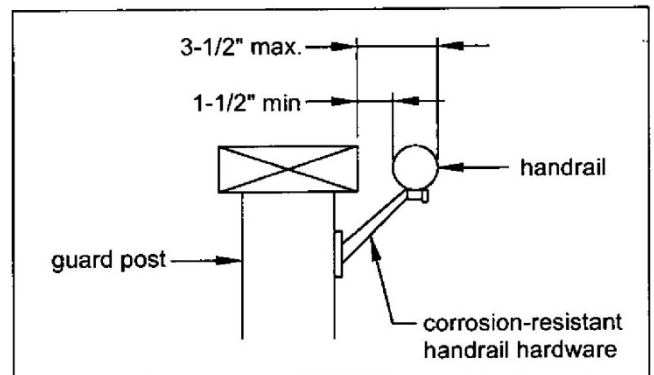


FIGURE 34: HANDRAIL REQUIREMENTS

STAIR FOOTING REQUIREMENTS

Where the stairway meets grade, attach the stringers to the stair guard posts as shown in FIGURE 36. Posts shall bear on footings below frost depth. Stringers shall not bear on new or existing concrete pads or patios that are not founded below frost depth. When guards are not required, see GUARD REQUIREMENTS, posts may terminate below the bottom tread elevation.

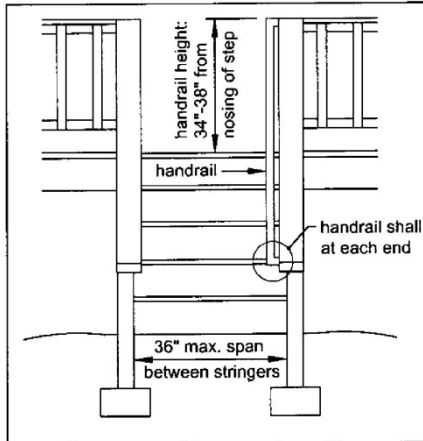


FIGURE 35: MISC. STAIR REQUIREMENTS

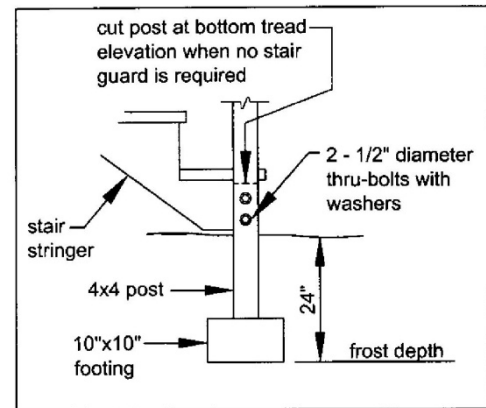
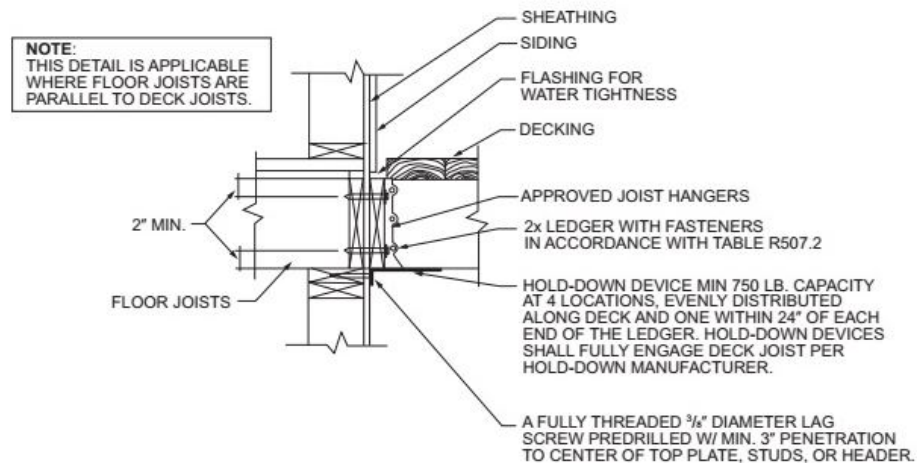


FIGURE 36: STAIR FOOTING DETAIL



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

FIGURE R507.9.2(2)
DECK ATTACHMENT FOR LATERAL LOADS

STAIR LIGHTING REQUIREMENTS

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.