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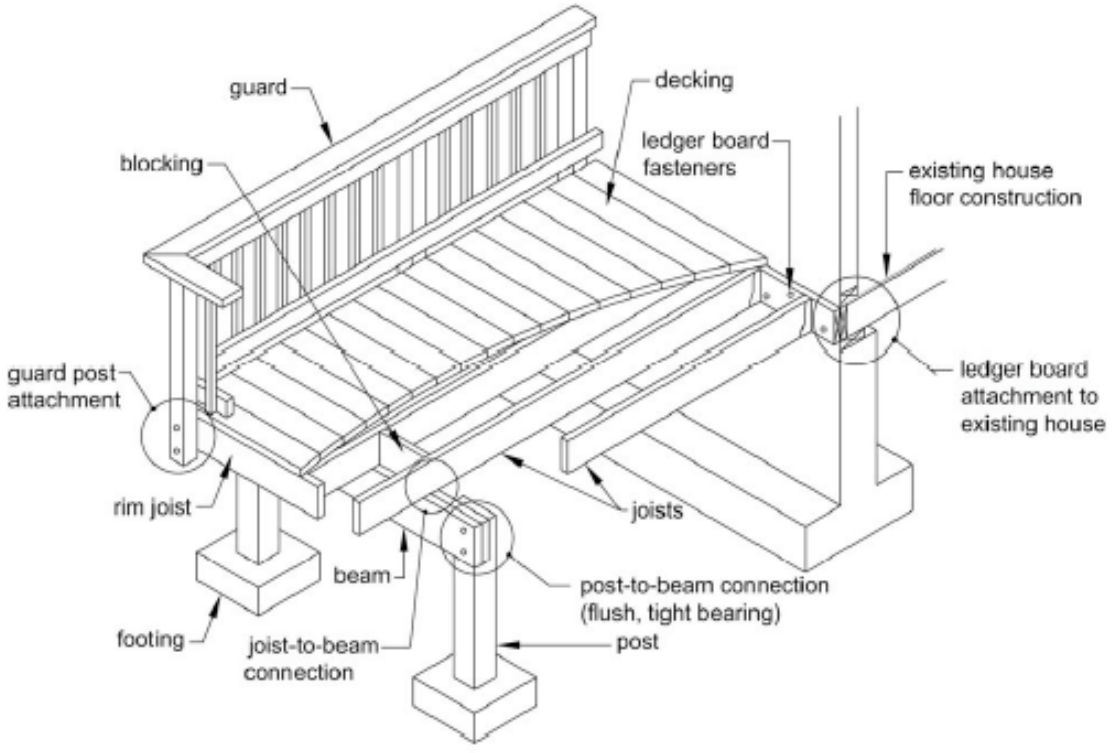
CIVIL STRUCTURAL MUNICIPAL PA UCC INSPECTIONS & PLAN REVIEWS

Residential Deck Design And Construction

The following guide utilizes the prescriptive requirements of the 2018 International Residential Code (IRC) as adopted by the Pennsylvania Uniform Construction Code (PA UCC). The purpose of this document is to provide contractors and homeowners with guidelines and details for the construction of a typical residential deck. These guidelines and details are limited to single level – single span deck designs using a uniform floor live load of 40 psf and dead load of 10 psf over the entire floor of the deck. Decks supporting uniform loads exceeding 50 psf or large concentrated loads such as hot tubs, spas, outdoor kitchens, roofs, and sunrooms must be evaluated and approved by a registered design professional. Tables and details provided in this guide are taken from the IRC. This should not be considered as a complete list of code requirements. **As this is a guide only, contact the authority having jurisdiction for additional requirements or modifications to the following information.**



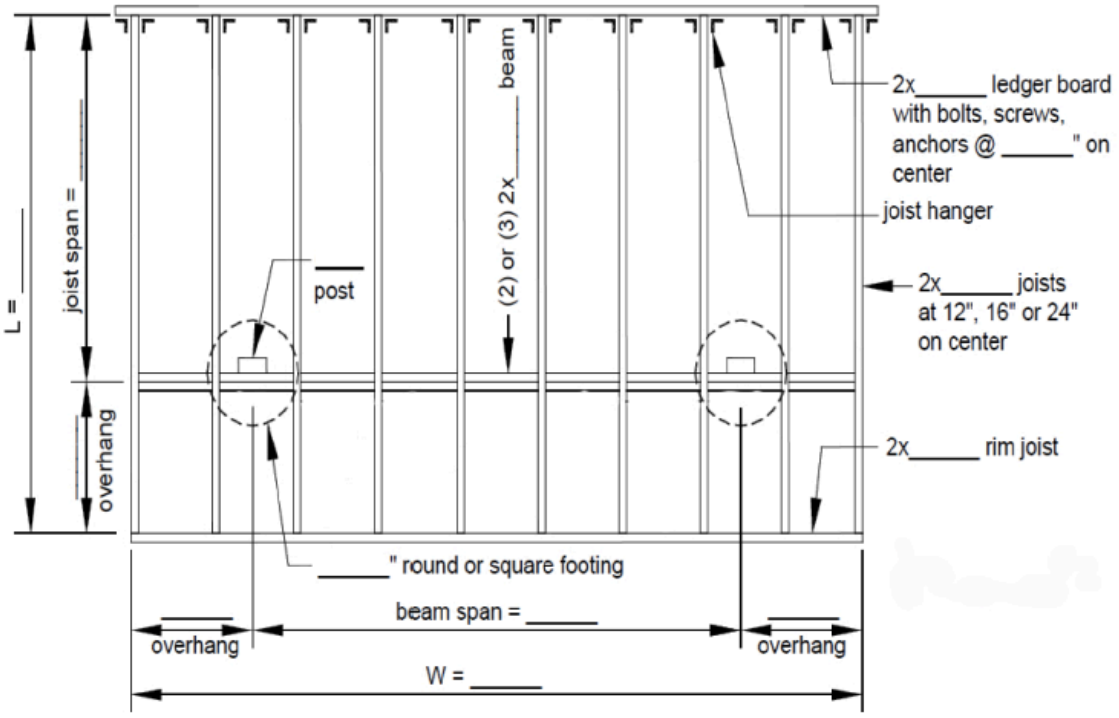
GENERAL REQUIREMENTS

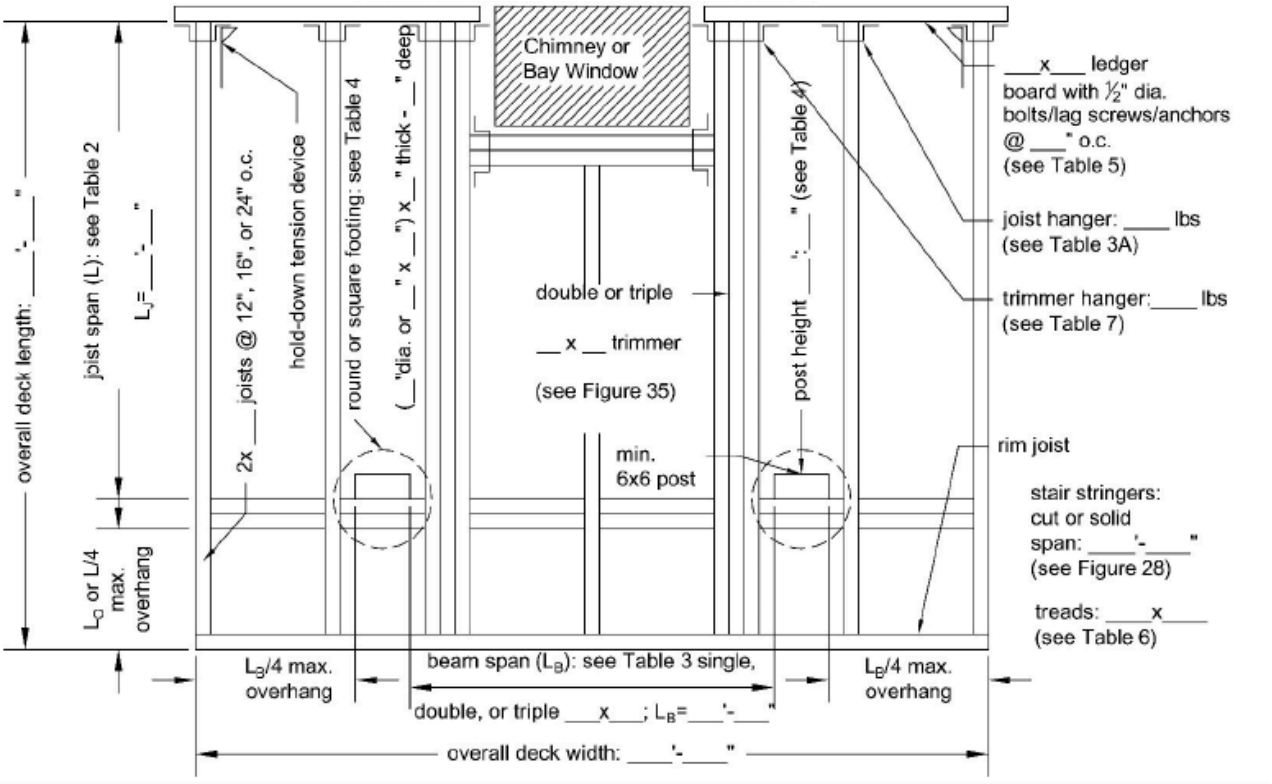
1. Manufactured materials shall be installed in accordance with the manufacturer's installation instructions. Where conflicts occur between the code and manufacturer's installation instructions, the more restrictive provisions shall apply.
2. Decks shall not be attached to house overhangs (cantilevers), cantilevered box or bay windows, brick or stone veneers, exterior finishes, or chimneys. These decks would require self-supporting construction methods or a design by a licensed engineer.
3. All wood materials shall be No. 2 grade or better lumber, preservative-treated or naturally resistant to decay. Lumber in contact with the ground shall be rated as ground-contact. Design calculations and details shall be submitted for all engineered wood products. Cuts, notches and drilled holes of preservative-treated wood members shall be field treated with an approved wood preservative.
4. All fasteners shall be hot-dipped, zinc-coated galvanized steel, stainless steel, silicone bronze or copper in accordance with Table R507.2.3. Hardware and mechanical connectors (joist hangers, post anchors, etc.) shall be galvanized, stainless steel, or coated to resist corrosion.
5. Plastic composite deck boards, stair treads, guards, and handrails shall comply with the requirements of ASTM D7032. The materials or their packaging shall bear a label that indicates compliance with ASTM D7032 and includes the allowable loads and the maximum allowable spans. Copies of material labels and installation instructions shall be available on site for review.
6. Where exterior decks attach to a wall or floor assembly of wood-frame construction, corrosion-resistant metal flashing or approved non-metallic material that is compatible with the substrate of the structure and the decking materials shall be installed to prevent water from contacting the house band joist.
7. Stairways shall have a light source that illuminates all stairs and landings. Lights shall be operable from interior switches, motion detectors or timed switches. Low voltage lighting at each tread is permissible.
8. All decks that are accessible from the inside of the dwelling shall have at least one receptacle outlet accessible from the deck.
9. Decks for swimming pools must also adhere to the requirements for guards and any other applicable regulations.

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	In accordance with ASTM F1667	Hot-dipped galvanized per ASTM A153	Stainless steel, silicon bronze or copper
Bolts[c] Lag screws[d] (including nuts and washers)	In accordance with ASTM A307 (bolts), ASTM A563 (nuts), ASTM F844 (washers)	Hot-dipped galvanized per ASTM A153, Class C (Class D for $^{3}/_{8}$-inch diameter and less) or mechanically galvanized per ASTM B695, Class 55 or 410 stainless steel	Stainless steel, silicon bronze or copper
Metal connectors	Per manufacturer's specification	ASTM A653 type G185 zinc coated galvanized steel or post hot-dipped galvanized per ASTM A123 providing a minimum average coating weight of 2.0 oz./ft^2 (total both sides)	Stainless steel

EXAMPLE DECK FRAMING PLANS

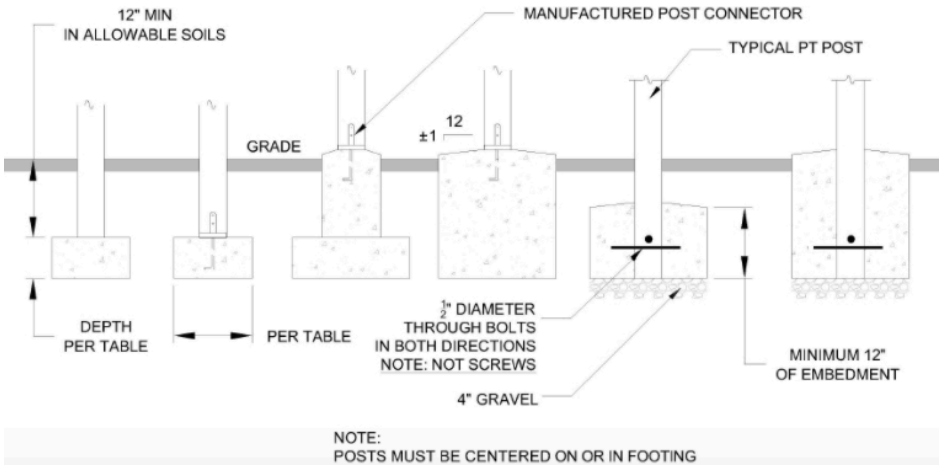




DECK FOOTINGS

1. All decks shall be supported on concrete footings, piers, or other approved structural systems that are designed to support all loads.
2. Concrete for footings shall have a minimum compressive strength of 3,000 psi.
3. The minimum size of concrete footings shall be in accordance with Table R507.3.1 based on the tributary area and an allowable soil bearing capacity of 1,500 psf (14” diameter minimum). Increased bearing values are permitted if documented by a geotechnical evaluation of the soils at the particular location.
4. Footing depth below grade shall be in accordance with minimum local requirements for frost and bear on undisturbed or natural soil. Deck footings closer than 5’-0” to an existing exterior house wall must bear at the same elevation as the existing footer of the house.
5. Footings shall not be installed over utility lines or piping of any kind. Footings are to be arranged not to interfere with existing underground utilities and piping.
6. Footings are required where stairs are supported by posts (12” diameter minimum).

FOOTING TYPES



HOW TO CALCULATE TRIBUTARY AREA

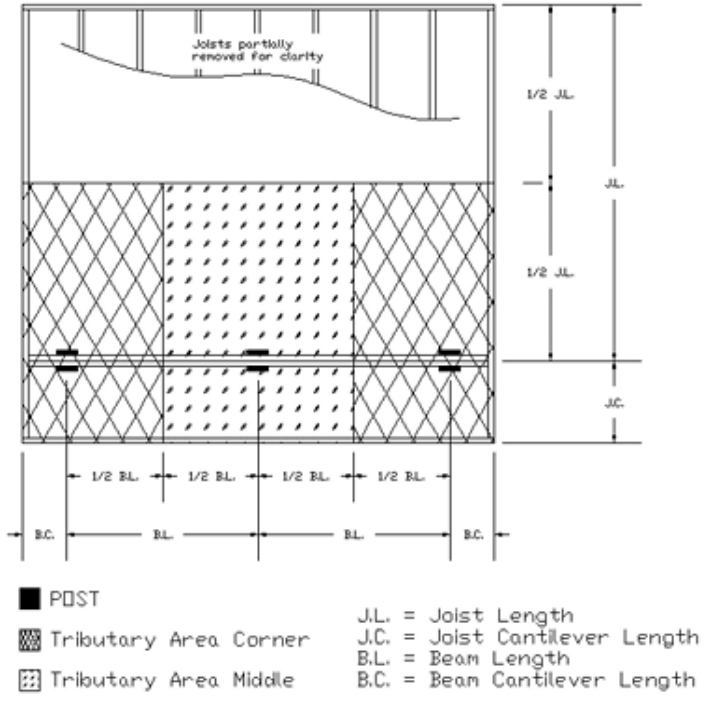
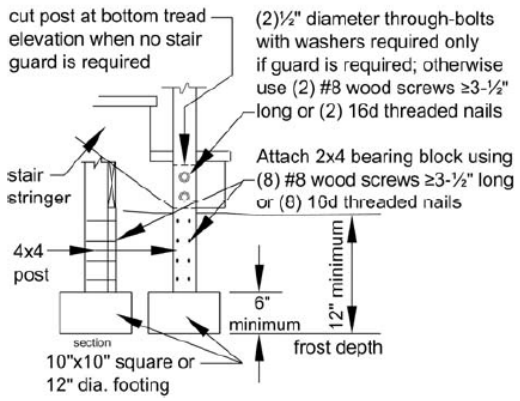


TABLE R507.3.1
MINIMUM FOOTING SIZE FOR DECKS

LIVE OR GROUND SNOW LOAD[b] (psf)	TRIBUTARY AREA (sq. ft.)	LOAD BEARING VALUE OF SOILS [a,c,d] (psf)											
		1500[a]			2000[a]			2500[a]			≥ 3000[a]		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	14	16	6	12	14	6	12	14	6	12	14	6
	60	17	19	6	15	17	6	13	15	6	12	14	6
	80	20	22	7	17	19	6	15	17	6	14	16	6
	100	22	25	8	19	21	6	17	19	6	15	17	6
	120	24	27	9	21	23	7	19	21	6	17	19	6
	140	26	29	10	22	25	8	20	23	7	18	21	6
	160	28	31	11	24	27	9	21	24	8	20	22	7
50	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	15	17	6	13	15	6	12	14	6	12	14	6
	60	19	21	6	16	18	6	14	16	6	13	15	6
	80	21	24	8	19	21	6	17	19	6	15	17	6
	100	24	27	9	21	23	7	19	21	6	17	19	6
	120	26	30	10	23	26	8	20	23	7	19	21	6
	140	28	32	11	25	28	9	22	25	8	20	23	7
	160	30	34	12	26	30	10	24	27	9	21	24	8
60	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	16	19	6	14	16	6	13	14	6	12	14	6
	60	20	23	7	17	20	6	16	18	6	14	16	6
	80	23	26	9	20	23	7	18	20	6	16	19	6
	100	26	29	10	22	25	8	20	23	7	18	21	6
	120	28	32	11	25	28	9	22	25	8	20	23	7
	140	31	35	12	27	30	10	24	27	9	22	24	8
	160	33	37	13	28	32	11	25	29	10	23	26	9
70	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	18	20	6	15	17	6	14	15	6	12	14	6
	60	21	24	8	19	21	6	17	19	6	15	17	6
	80	25	28	9	21	24	8	19	22	7	18	20	6
	100	28	31	11	24	27	9	21	24	8	20	22	7
	120	30	34	12	26	30	10	24	27	9	21	24	8
	140	33	37	13	28	32	11	25	29	10	23	26	9
	160	35	40	15	30	34	12	27	31	11	25	28	9

FOOTING REQUIREMENTS FOR STAIRS



DECK POSTS

1. Deck post size shall be in accordance with Table R507.4.
2. Posts must be centered on the footing.
3. Posts shall be restrained at the bottom to prevent lateral displacement by approved manufactured connectors or by a minimum 12” embedment into surrounding soils or concrete.
4. Two-ply beams shall be attached to 4x4 posts with an approved post cap or by notching a 6x6 post. Three-ply beams shall be attached to 6x6 posts with an approved post cap. Manufactured post to beam connectors shall be sized for the post and beam and installed per manufacturer’s installation instructions.

5. Cut ends and notches of posts shall be field treated with an approved wood preservative.

TABLE R507.4
DECK POST HEIGHT[a]

DECK POST SIZE	MAXIMUM HEIGHT[a, b] (feet-inches)
4 × 4	6-9[c]
4 × 6	8
6 × 6	14
8 × 8	14

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

a. Measured to the underside of the beam.

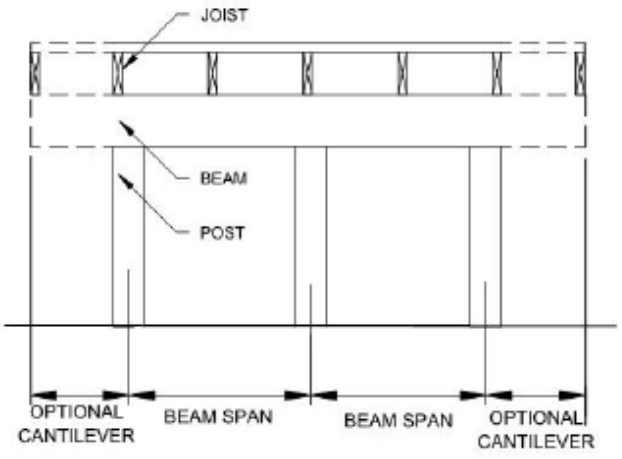
b. Based on 40 psf live load.

c. The maximum permitted height is 8 feet for one-ply and two-ply beams. The maximum permitted height for three-ply beams on post cap is 6 feet 9 inches.

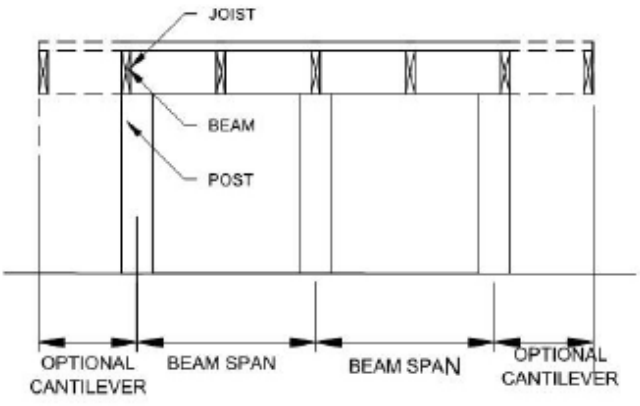
DECK BEAMS

1. The maximum allowable spans for wood deck beams shall be in accordance with Table R507.5. Beam span is measured between the centerline of bearing at each end of the beam and does not include cantilevers/overhangs.
2. Beam plies shall be fastened in accordance with the Beam Assembly detail.
3. Beams are permitted to cantilever at each end up to one-fourth of the actual beam span.
4. Deck beams of other materials shall be permitted where designed in accordance with accepted engineering practices.
5. The ends of beams shall have minimum 1½” of bearing on wood or metal and not less than 3” 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.
6. Deck beam to post connections shall be by either approved post cap or by notching of the post to allow the beam to rest directly on the post.
7. Bolts shall have washers under the head and nut.

TYPICAL BEAM ARRANGEMENTS

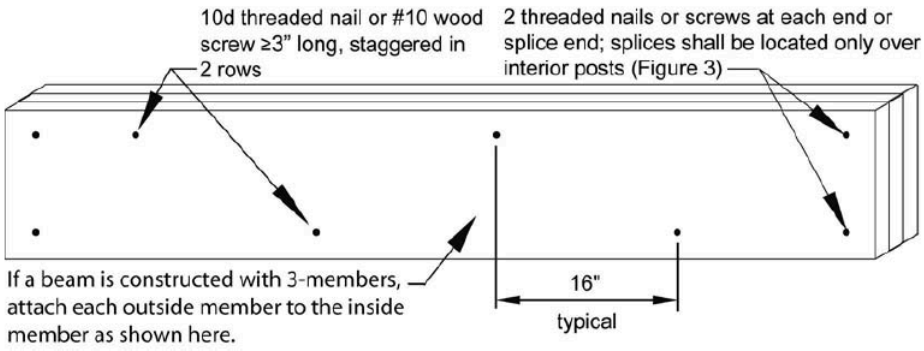


DROPPED BEAM



FLUSH BEAM

BEAM ASSEMBLY DETAIL

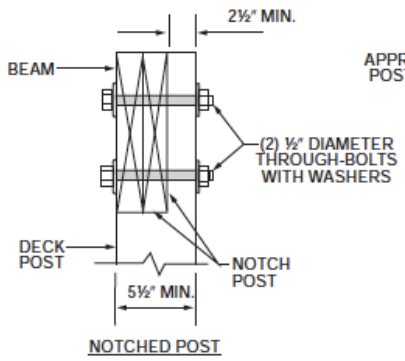


ALLOWABLE BEAM SPANS

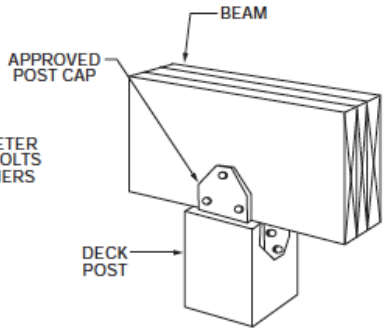
TABLE R507.5
DECK BEAM SPAN LENGTHS[a, b, g] (feet - inches)

SPECIES[c]	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
	3 – 2 × 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10
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	4-8	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

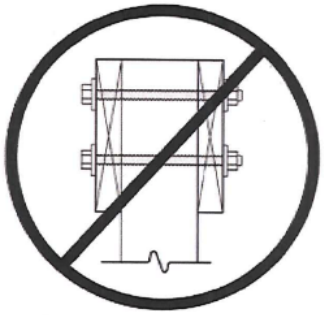
BEAM CONNECTION TO POST



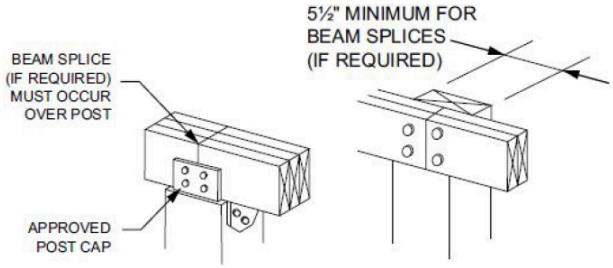
NOTCHED POST



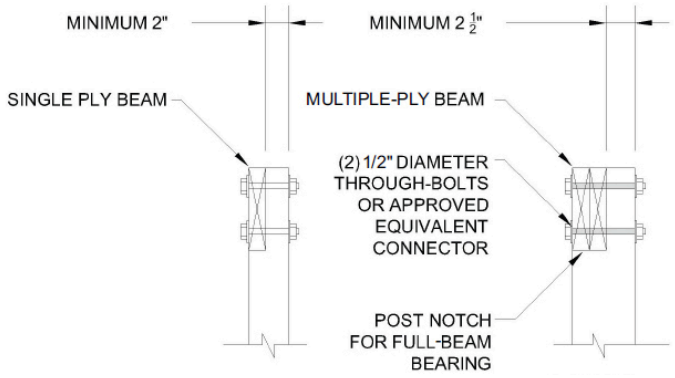
POST CAP

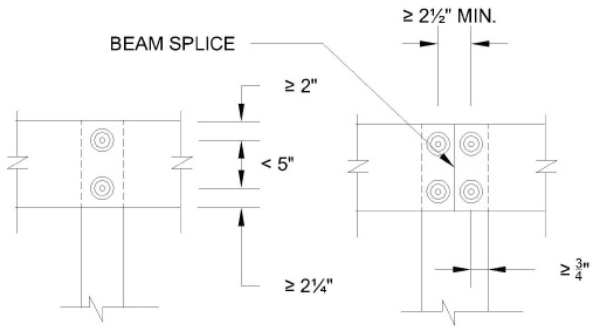


SPLICED BEAM CONNECTION TO POST



BEAM OVER POST CAP BEAM OVER POST





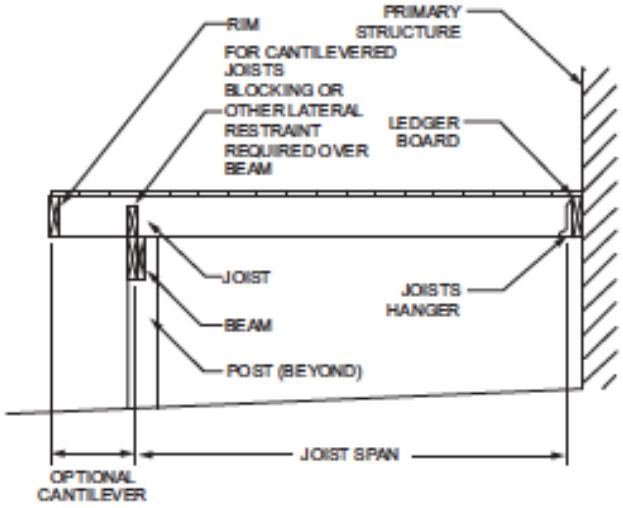
DECK JOISTS

1. The maximum allowable spans for wood deck joists shall be in accordance with Table R507.6. The maximum joist spacing shall be limited by the decking materials in accordance with Table R507.7. **If using composite deck boards, the joist spacing shall be in accordance with the manufacturers installation instructions.**
2. 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. Joist span is measured between the centerline of bearing at each end of the joist and does not include cantilevers.
3. The end of each joist shall have a minimum 1½" bearing on wood or metal and not less than 3-inches on concrete or masonry for the entire width of the joist. Joists bearing on top of a multiple-ply beam shall be fastened in accordance with Table R602.3(1). Joists bearing on top of a single-ply beam shall be

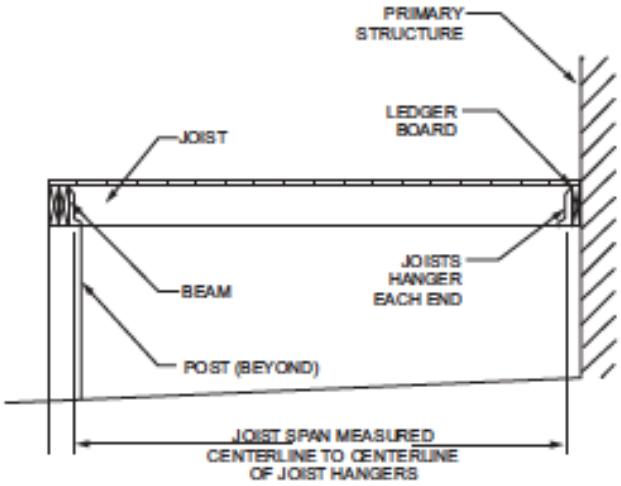
attached by a mechanical connector. Joists framing into the side of a beam or ledger board shall be supported by approved joist hangers.

4. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between the joists, their depth shall equal not less than 60% 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 nails or three No. 10x3-inch long wood screws.
5. 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 instructions.

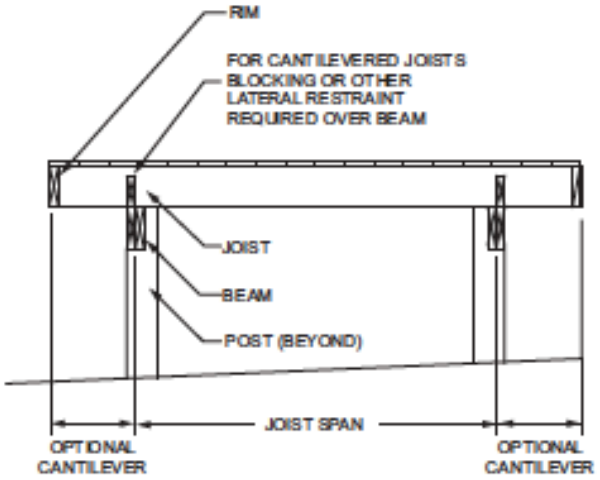
TYPICAL JOIST ARRANGEMENTS



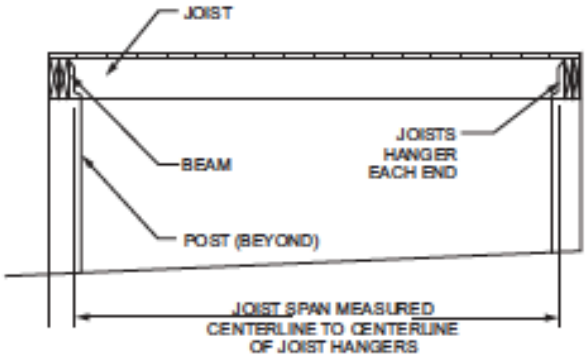
CANTILEVERED JOISTS WITH DROPPED BEAM



JOISTS WITH FLUSH BEAM



JOISTS ON FREE-STANDING DECK WITH DROPPED BEAM



JOISTS ON FREE-STANDING DECK WITH FLUSH BEAM

ALLOWABLE JOIST SPANS AND CANTILEVERS

TABLE R507.6
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. - in.)

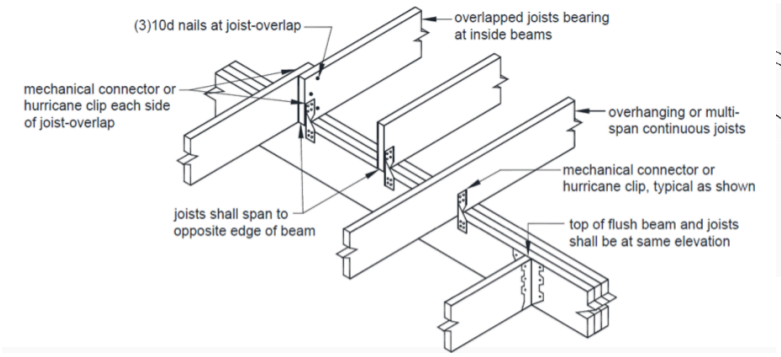
SPECIES[a]	SIZE	ALLOWABLE JOIST SPAN[b] SPACING OF DECK JOISTS (inches)			MAXIMUM CANTILEVER[c, f] SPACING OF DECK JOISTS WITH CANTILEVERS[c] (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	1-3	1-4	1-6
	2 × 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 × 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 × 12	18-0	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	8-10	8-0	7-0	1-0	1-1	1-2
	2 × 8	11-8	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

MAXIMUM JOIST SPACING BASED UPON DECKING MATERIAL

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

JOIST TO BEAM CONNECTION



RIM JOIST CONNECTION

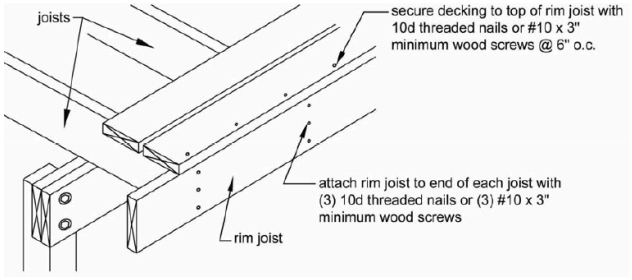
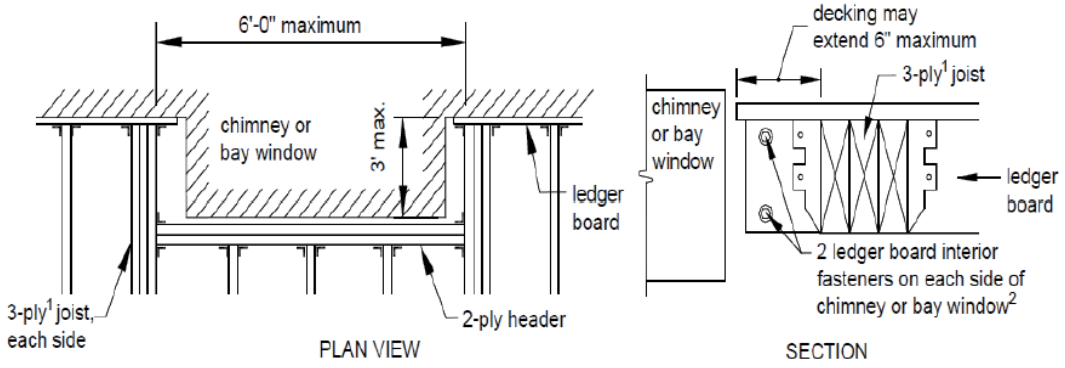


TABLE R602.3(1)—continued
FASTENING SCHEDULE

		Floor	
21	Joist to sill, top plate or girder	4-8d box ($2^1/_2$" × 0.113"); or 3-8d common ($2^1/_2$" × 0.131"); or 3-10d box (3" × 0.128"); or 3-3" × 0.131" nails	Toe nail
22	Rim joist, band joist or blocking to sill or top plate (roof applications also)	8d box ($2^1/_2$" × 0.113")	4" o.c. toe nail
		8d common ($2^1/_2$" × 0.131"); or 10d box (3" × 0.128"); or 3" × 0.131" nails	6" o.c. toe nail

FRAMING AT CHIMNEY OR BAY WINDOW

1. Header sizes shall be the same as the floor joists.
2. When the chimney or bay window is deeper than 3'-0", install 6x6 posts with footings below each triple joist at the location of the header connection.
3. When the header is longer than 6'-0", install 6x6 posts with footings below the header to reduce the span to less than 6'-0".
4. Joist hangers shall be specifically designed to accommodate the number of plies.



LEDGER BOARDS

1. The depth of the ledger board shall be equal to or greater than the depth of the deck joists but not less than a 2x8.
2. Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.
3. Band joists supporting a ledger shall be a minimum 2-inch-nominal solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 9½-inch dimensional, Douglas-fir or better, laminated veneer lumber. Band joists shall be fully supported by a wall or sill plate below. The band board of the existing structure shall be capable of supporting the new deck. If the band board is not structurally adequate to support the new deck, the new deck shall be freestanding.
4. Remove exterior finishes prior to installing the ledger board. Install flashings where ledgers are secured to existing construction. Both back flashing (behind ledger) and cap flashing (shingle style flashing over ledger board) are to be provided at deck connections. Flashing shall be installed at a door threshold to prevent water infiltration.
5. Fasteners used to connect the ledger board to the band joist shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.9.1.3(2).

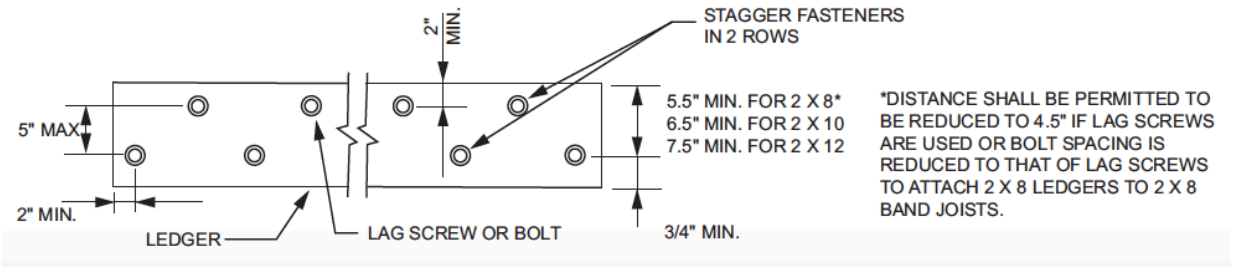
FASTENER REQUIREMENTS

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)

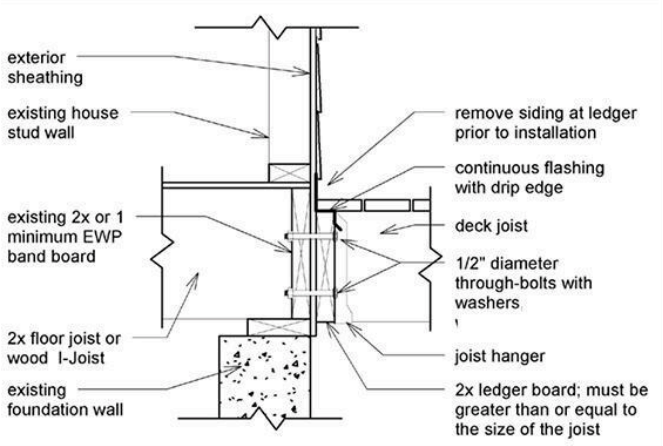
CONNECTION DETAILS	JOIST SPAN						
	6′ and less	6′1″ to 8′	8′1″ to 10′	10′1″ to 12′	12′1″ to 14′	14′1″ to 16′	16′1″ to 18′
	On-center spacing of fasteners						
1/2-inch diameter lag screw with 1/2-inch maximum sheathing[c, d]	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing[d]	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing[c]	36	36	29	24	21	18	16

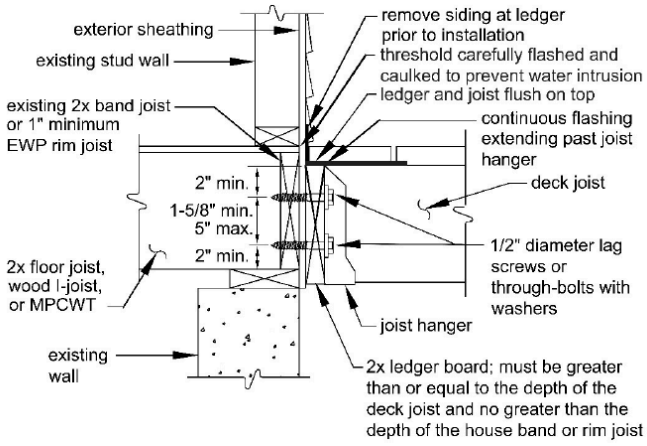
TABLE R507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger[a]	2 inches[d]	3/4 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]



FLASHING REQUIREMENTS

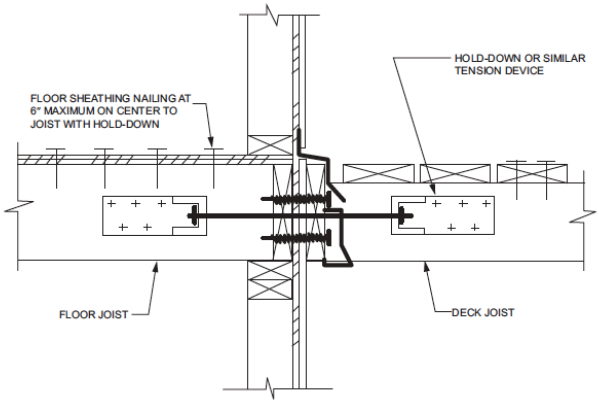




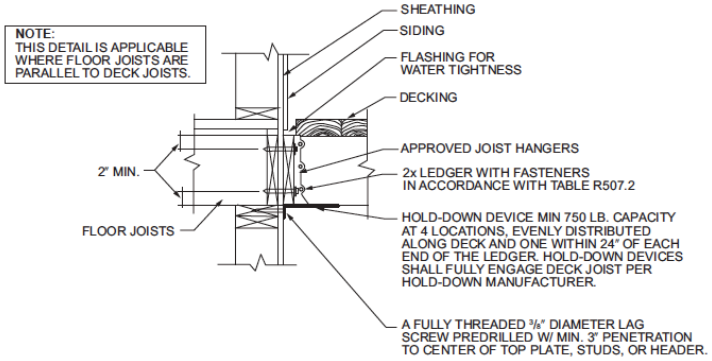
LATERAL LOAD REQUIREMENTS

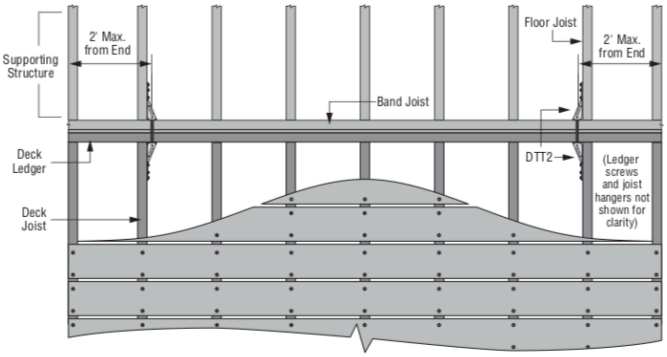
1. Lateral loads shall be transferred to the ground or to a structure capable of transmitting them to the ground. Hold-down tension devices shall be installed in accordance with one of the two following methods:
   a. Install in not less than two locations per deck, within 24” of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds.
   b. Install in not less than four locations per deck. Each device shall have an allowable stress design capacity of not less than 750 pounds.

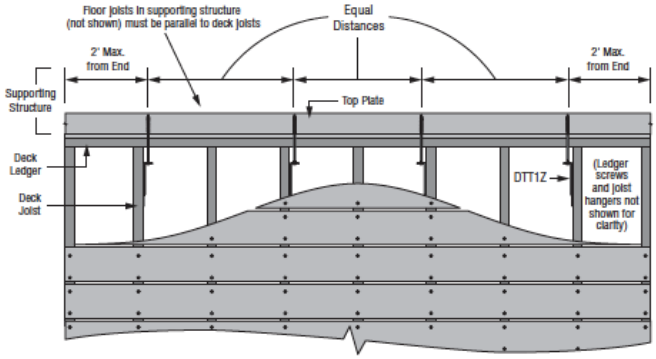
1,500 POUND CONNECTOR INSTALLATION



750 POUND CONNECTOR INSTALLATION

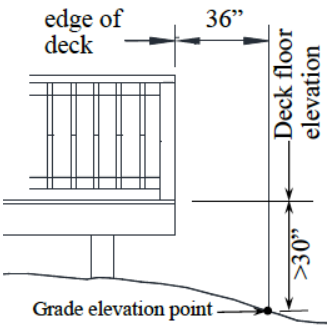






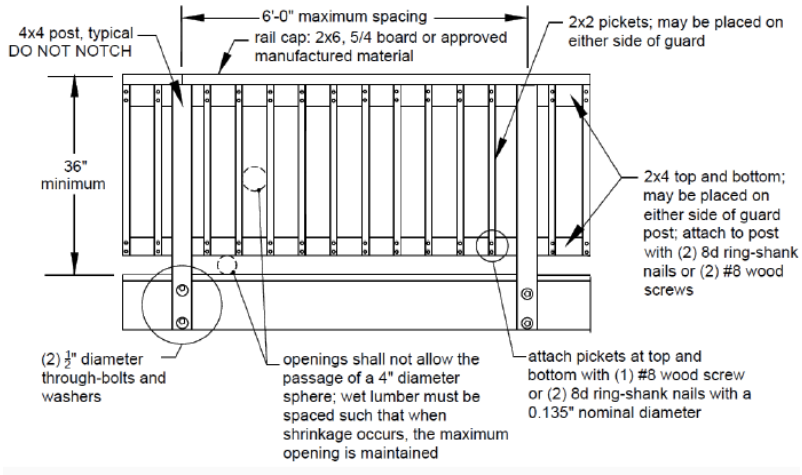
GUARD REQUIREMENTS

1. Guards are required along open sided walking surfaces; including stairs, ramps, and landings that are located 30” vertically above the adjoining floor or grade below at any point within 36” horizontally to the edge of the deck.
2. Wood-plastic or other composite/plastic/vinyl guard system shall be installed in accordance with the manufacturer’s installation instructions and shall be accompanied by a valid evaluation report (ICC-ES or equal). R312.4.1.4
3. Guard posts shall be a minimum 4x4 and must be fastened to floor framing members to ensure the entire guard can resist a minimum 200-pound lateral load applied along the top of the guard assembly.
4. Guard posts may be installed on either side of the rim or outside joists.
5. Guard posts shall not be cut or notched.

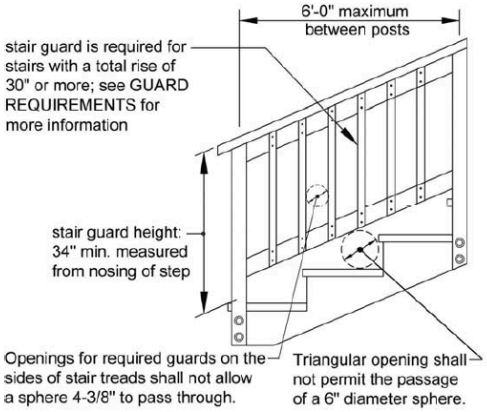


6. Installed guards shall not be less than 36” high. Guards on the open sides of stairs shall not be less than 34” high.
7. Installed guards shall have opening limitations in accordance with the details below.

GENERAL

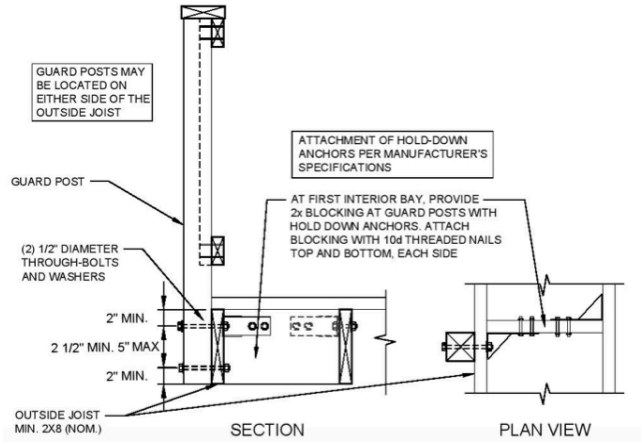


STAIRS

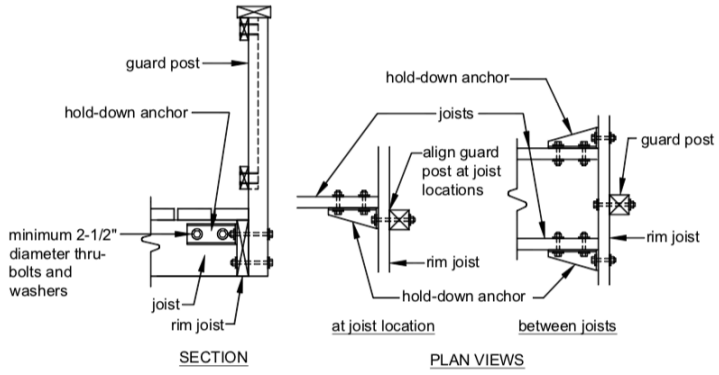


POST MOUNTING

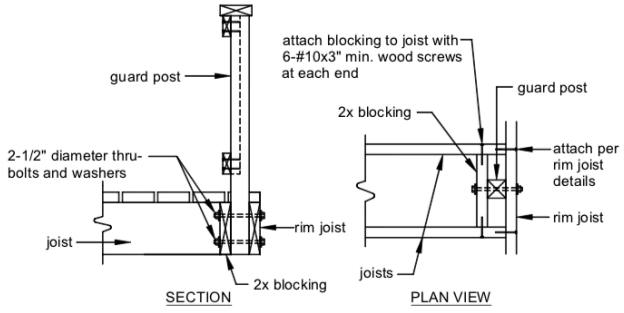
EXTERIOR SIDE OF JOIST



EXTERIOR SIDE OF RIM JOIST



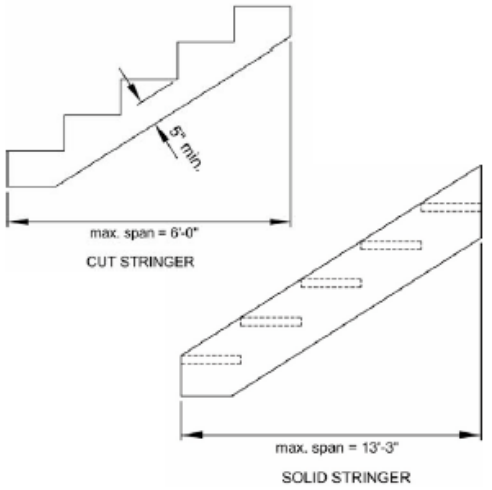
INTERIOR SIDE OF RIM JOIST



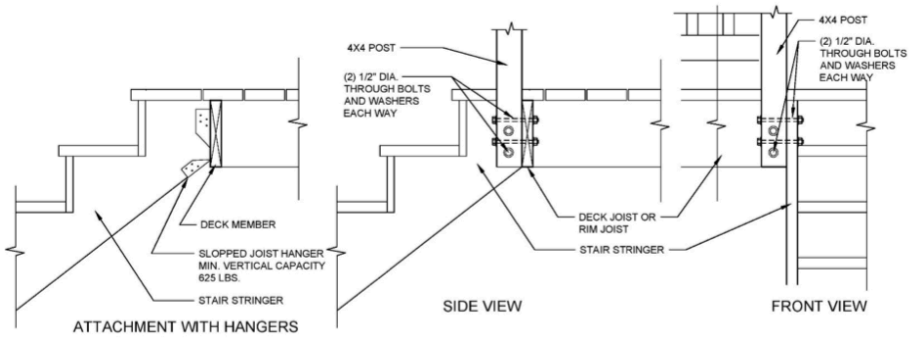
STAIR REQUIREMENTS

1. Stairs shall be constructed with the following dimensions: 36” minimum clear width, 8¼” maximum riser height, and 9” minimum tread depth. Risers may be open but shall not allow the passage of a 4” diameter sphere.
2. A floor or landing is required at the top and bottom of each stairway. Landing widths shall be equal to the total width(s) of the stairway(s) served and extend in the direction of travel not less than 36”.
3. If the vertical height of the stairway exceeds 12’-0”, then an intermediate landing shall be provided. Landings shall be constructed as a free-standing deck with 4x4 support posts.
4. All stringers shall be a minimum sawn or solid 2x12 spaced at a maximum of 18” on center. Stringers shall bear on footings and attach to the deck or landing with approved hangers installed in accordance with manufacturer’s installation instructions.
5. Stairways shall have a light source located at the top landing such that all stairs and landings are illuminated.

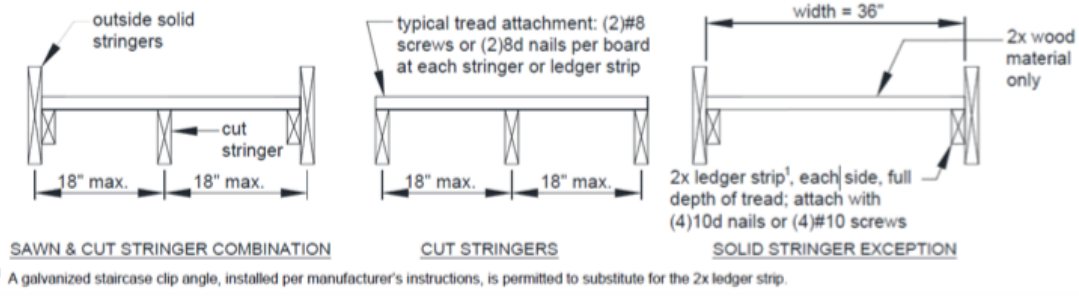
STAIR STRINGERS



STAIR STRINGER CONNECTIONS

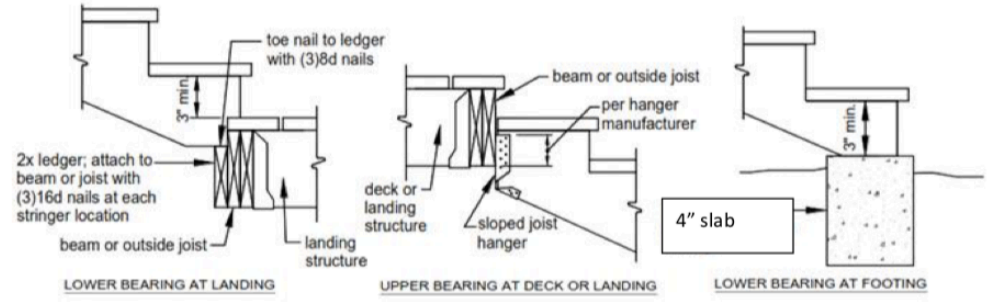


TREAD CONNECTIONS



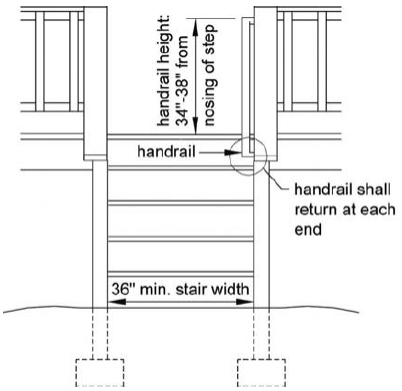
[1] A galvanized staircase clip angle, installed per manufacturer’s instructions, is permitted to substitute for the 2x ledger strip.

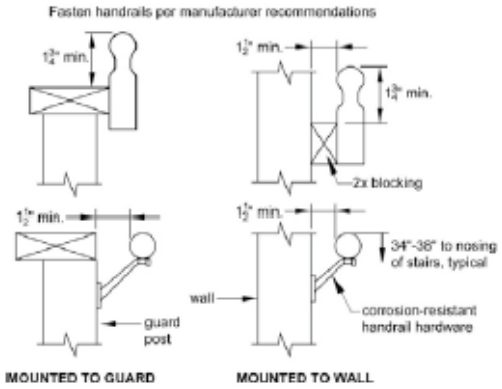
STAIR STRINGER CONNECTIONS AT LANDINGS

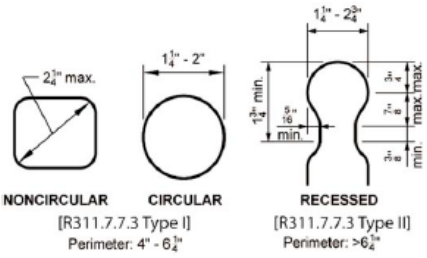


HANDRAIL REQUIREMENTS

1. Handrails shall be provided on at least one side of each run of stairs with four or more risers (height above tread = 34” min. and 38” max.).
2. 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 or wall at each end.
3. Handrails may be interrupted by guard posts at a turn in the stair only.







REQUIREMENTS FOR DECKS AT POOLS

1. Steps used as a means to access the deck shall be capable of being secured to prevent access. A 48-inch high guard/gate is required at the base of the stairs that is self-closing and self-latching and equipped to accommodate a locking device.
2. The release mechanism for the latch shall be a minimum of 54-inches from the bottom of the gate or shall be located on the pool side, 3-inches below the top of the gate with no openings greater than ½-inch within 18-inches of the release latch.