CEA

*Pittsburgh *Washington, PA * State College * Hempfield * Philadelphia

PO Box 103 Elizabeth, PA 15037 1-866-410-4952

RESIDENTIAL DECKS 2009-IRC

Section 403.62 of the Commonwealth of Pennsylvania Uniform Construction Code (UCC) states: "An owner or authorized agent who intends to construct, enlarge, alter, repair, move or demolish or change the use of occupancy of a residential building regulated by the Uniform Construction Code shall first apply to the Building Code Official and obtain the required permit."

PLAN REQUIREMENTS:

Applicant of must submit (2) sets of drawings that shall include deck framing (including materials and dimensions), deck cross sections, stairways, guiderails, and handrail details. Dimensions must include height and spans. Bracing & Fastening information must be clearly noted. All posts or postings must show dimensions including in ground depth no less than 36" deep. All contractors must submit copy of Workman's Compensation (notarized waiver if sole proprietor). All contractors must submit a copy of the PA Home Improvement Contractors License (if applicable).

(b) An application must include (2) copies of a site survey or plot plan for UCC compliance and local Zoning information.

A Building Permit is not required where the deck or walking surface is less than 30" above grade. Any portion of the deck or walkway above 30" shall require a Permit.

NOTE: Any Electrical components or additions must be applied by a separated Electrical Permit and inspected by CEA prior to final inspection. CEA Electrical (412) 889-1995.

NOTE: ALL decks must be a minimum of southern pine grade #2 or better and shall be pressure treated ACQ or CA-B.

NOTE: Decks shall not be attached to house overhangs, cantilevered bay windows, brick veneers, stone, exterior finishes or chimneys without prior approval from a PA registered Architect or Engineer.

NOTE: Framing hardware and fasteners shall be hot dipped galvanized or stainless steel.

NOTE: Decks surrounding above ground pools above 30" of grade must comply with the regulations.

NO shall be used or occupied until all final inspections have been performed and approved.

PLAN SPECIFICATIONS Draw to scale or include dimensions on plans

Deck Framing Plan

- **Ledger Board**: Type, size and attachment details for ledger board. Ledger board attachment to the existing house shall be capable of supporting the new deck. Details are to include the existing house construction that will support the ledger, type of flashing, type/size of ledger board, type/size/spacing of ledger anchors. IRC R502.2.2
- **Flashing**: Remove exterior finishes prior to installing the ledger board. Install flashing where ledgers are secured to existing construction. Flashing is required at ledger connections of wood framed walls. Approved corrosion-resistant flashing materials include copper, vinyl or self-adhering polymer-modified bitumen, or other products that do not react with copper. IRC R703.8
- **Beams**: Identify the location, size, type, number of plies, and span of structural beams. Secure built-up wood beams with no less than two rows of 10d galvanized or stainless steel nails in a staggered pattern 16" on center. 3 rows of 10d nails needed for beams 10" or deeper. For beams secured to opposite sides of posts, install solid full depth 2x blocking at 4'0" on center.

MINIMUM BEAM SIZES FOR SINGLE SPAN JOIST LOADS

Joist Span	Minimum Beam Size*
0-6'8"	(2) 2" x 6"
6'8"-11'2"	(2) 2" x 8"
11'2"-15'9"	(2) 2" x 10"
16'0"-18'9"	(2) 2" x12"

*Beam sizes are based on support post spacing of 8 feet with single span floor joists extending from ledger board. This table is not applicable for beams carrying floor joist loads from two directions. This table is not applicable for decks supporting hot tubs or other concentrated loads. IRC R501.2

- **Floor Joists**: Identify the size, type, on center spacing and direction of span of the floor joists.

MAXIMUM JOIST SPANS

Joist Size	Joist Spacing, on center	Joist Span (no overhang)
2x6	16"	9'9"
2x6	24"	8'6"
2x8	16"	12'10"
2x8	24"	11'0"
2x10	16"	16'1"
2x10	24"	13'1"
2x12	16"	18'10"
2x12	24"	15'5"

2009 IRC Table R502.3.1(2)
Spans are based on 40 PSF live load, 10 PSF dead load, southern pine #2, deflection of L/360. This table is not applicable for decks supporting hot tubs or other concentrated loads.

- **Floor Deck**: Identify the type of decking to be installed. Typical materials include 2"x6" or 5/4" (five-quarter) lumber. IRC R503.1 Composite decking is permitted if installed per manufacturer's product specifications. IRC R317.4.1
- **Support Posts**: Identify the location of support posts on the framing plan. 4" x 4" posts are permitted for decks up to 36" above grade. Decks above 36" are to be supported on 6" x 6" posts. Post to beam connections require (2) ½" diameter hot-dipped galvanized or stainless steel thru-bolts with washers. Single ½" diameter bolts are permitted for 2" x 6" beams. IRC R407.3
- **Footings**: Illustrate footing locations on the framing plan. IRC R403.1
- **Stairways**: Identify stairway(s) and/or deck elevation changes on the framing plan. IRC R311.3.

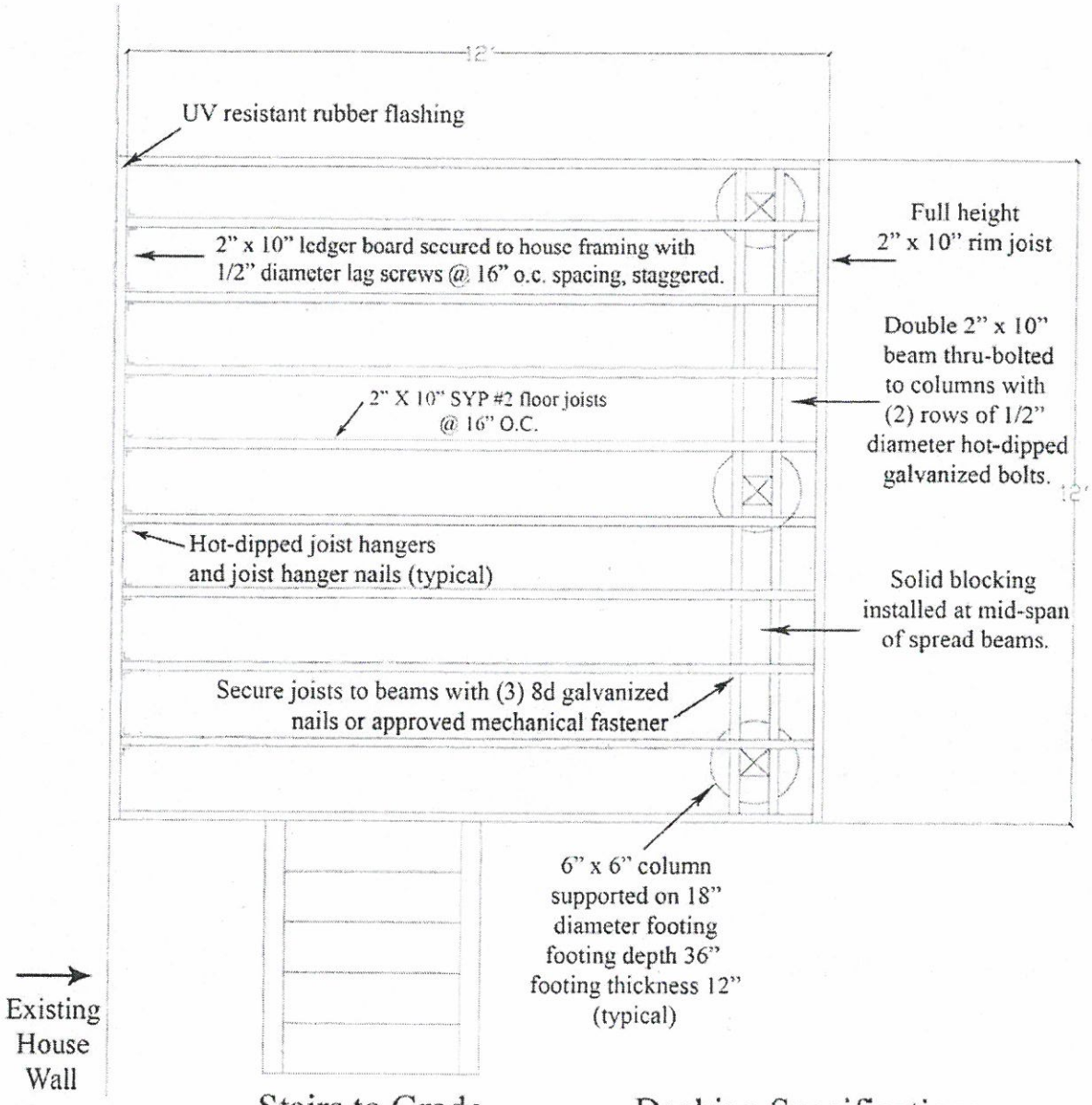
PLAN SPECIFICATIONS Draw to scale and include dimensions on plans

Cross Section

- **Footings**: Identify the footing depth below grade and footing dimensions. Footings shall bear on solid ground and be dug to a depth not less than the frost line depth of 36". No less than 12" of concrete is to be placed under all support posts, the bottom of which is 36" below grade. Footings shall be 12" square or 15" in diameter for 4" x 4" posts. Footings shall be 16" square or 18" in diameter for 6" x 6" posts. IRC R403.1
- **Support Posts**: Identify the size of support posts and the elevation of the deck above grade.
- **Post-to-Beam Attachment**: Identify the location and size of beams and identify the method of attachment between the support posts and beams. Post to beam connections require (2) ½" diameter hot-dipped galvanized or stainless steel thru-bolts with washers. Single ½" diameter bolts are permitted for 2" x 6" beams. IRC R502.9
- **Floor Framing**: Identify the floor joist type, size and span and on center spacing. IRC R502.3
- **Floor Overhangs**: Cantilevers of up to 3 feet are permitted with a backspan to cantilever ratio of 2:1. For example, a 3 foot cantilever requires a minimum 6 foot joist back span. Connections capable of resisting the uplift forces at the backspan support shall be provided. A full depth rim joist shall be provided at the cantilevered ends of the joists. IRC R502.3.3
- **Guardrail System**: Identify guard systems. Provide attachment methods for securing guard posts to deck structure. Guards shall be designed to withstand a 200 pound load applied to the top rail at any point and in any direction. IRC R312.1 & R312.2

Stairway Specifications

- **Stair width**: Provide the proposed width of the stairway. Stairways shall not be less than 36" in clear width. Handrails may project into the clear width by no more than 4 ½" on either side of the stairway. Clear width at and below the handrail height, shall not be less than 31.5" where a handrail is installed on one side and 27" where handrails are provided on both sides. IRC R311.7.1
- **Stair treads and risers**: Provide the proposed stairway riser heights and tread depths. Stairway riser height are not to exceed 8 ¼" with no more than a 3/8 inch variation in riser height within a flight of stairs. The minimum tread depth is 9 inches measured from tread nosing to tread nosing. The greatest tread depth within any flight of stairs may not exceed the smallest by more than 3/8 inch. IRC R311.7.4 per PA UCC 403.21(2) **Risers may be open, but shall not allow the passage of a 4 inch diameter sphere on stairs with a total rise of 30 inches or more.**
- **Stair profile**: A nosing not less than ¾" but not more than 1 ¼" shall be provided on stairways with solid risers. Nosings are not required with a tread depth of 10" or more. IRC R311.7.4..3
- **Stairway illumination**: Exterior stairs shall be provided with a means to illuminate the stairs, including the landings and treads. Exterior stairs shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. The illumination of exterior stairways shall be controlled from inside the dwelling. IRC R311.7.8, R303.6, R303.6.1
- **Guardrails**: Provide an elevation detail of the proposed guard system(s). Guards along elevated deck surfaces shall be no less than 36" in height with openings not to exceed 4". Guards along stairways shall be no less than 34" measured vertically from the stair nosings with openings not to exceed 4 3/8". IRC R312.1 & R312.2
- **Handrails**: Provide a cross sectional detail of required graspable handrail. Handrails having a minimum and maximum heights of 34 inches and 38 inches respectively, measured vertically from the nosing of the treads, shall be provided on the least one side of the stairways of four or more risers. Handrails shall be continuous the full length of the stairs. Handrails shall be graspable and shall be constructed of decay-resistant and/or corrosion resistant material. Circular handrails shall be between 1 ¼" – 2" in diameter. Non-circular handrails with a perimeter dimension greater than 6 ¼" shall provide a graspable finger recess area on both sides of the profile. The width of the handrail above the recess shall be between 1 ¼"-2 ¾" IRC R311.7.7.1 & R311.7.7.3



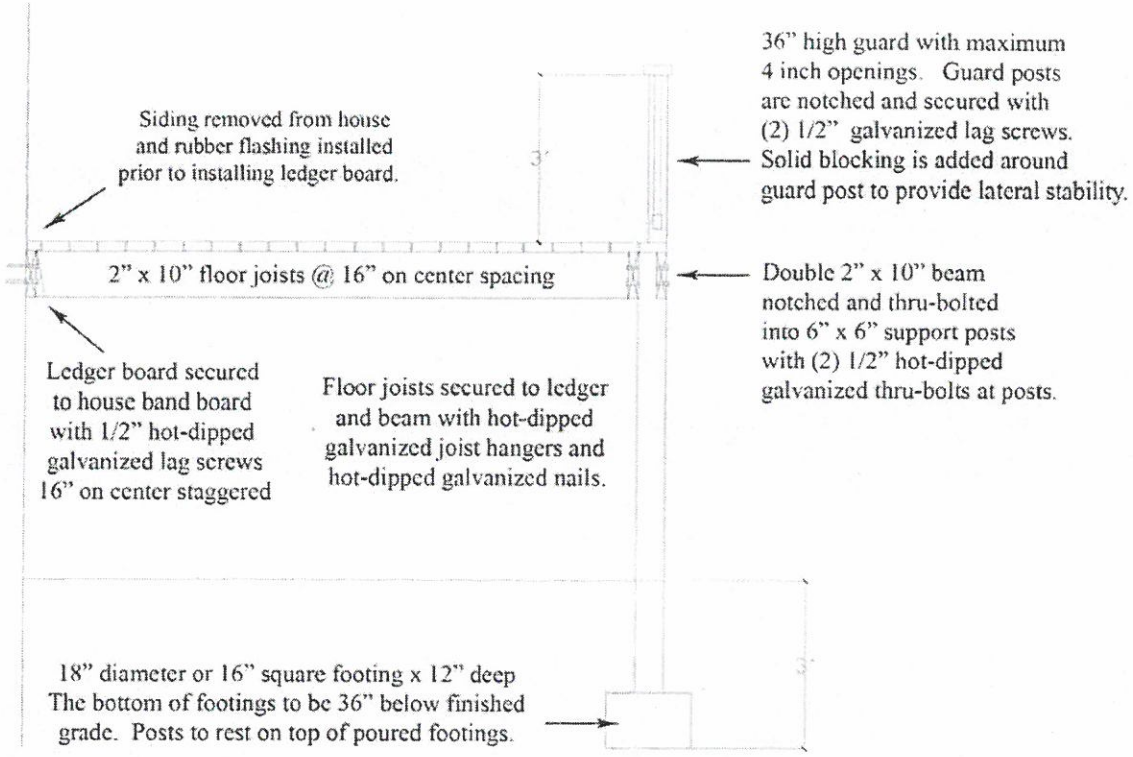
Stairs to Grade

Refer to stair details for construction specifications and dimension requirements

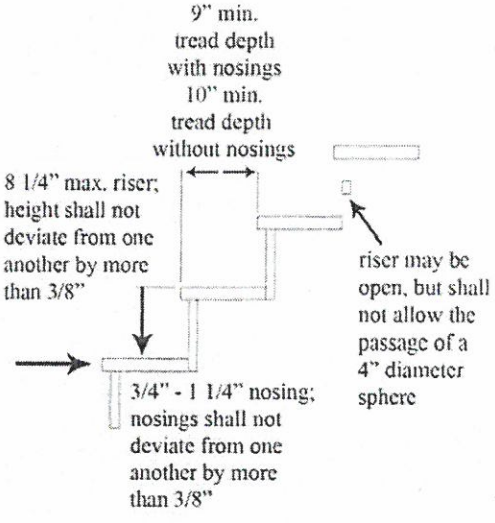
Decking Specifications

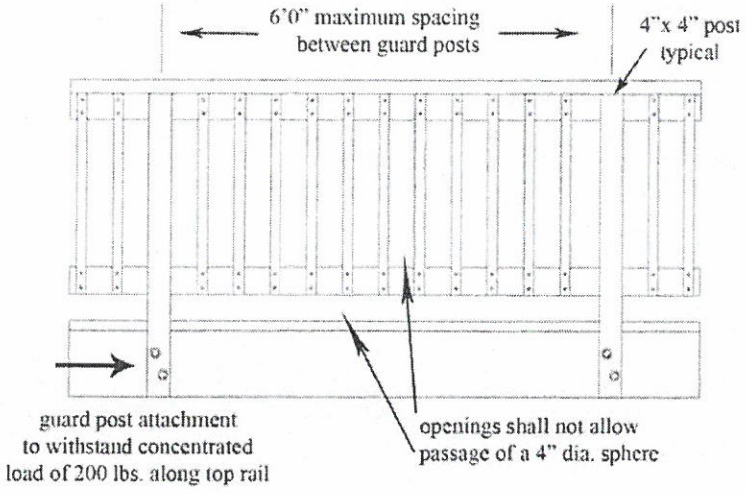
5/4" treated decking, 2x decking or composite decking. Composite materials are to be installed per the manufacturer's installation instructions.

SAMPLE DECK FRAMING PLAN



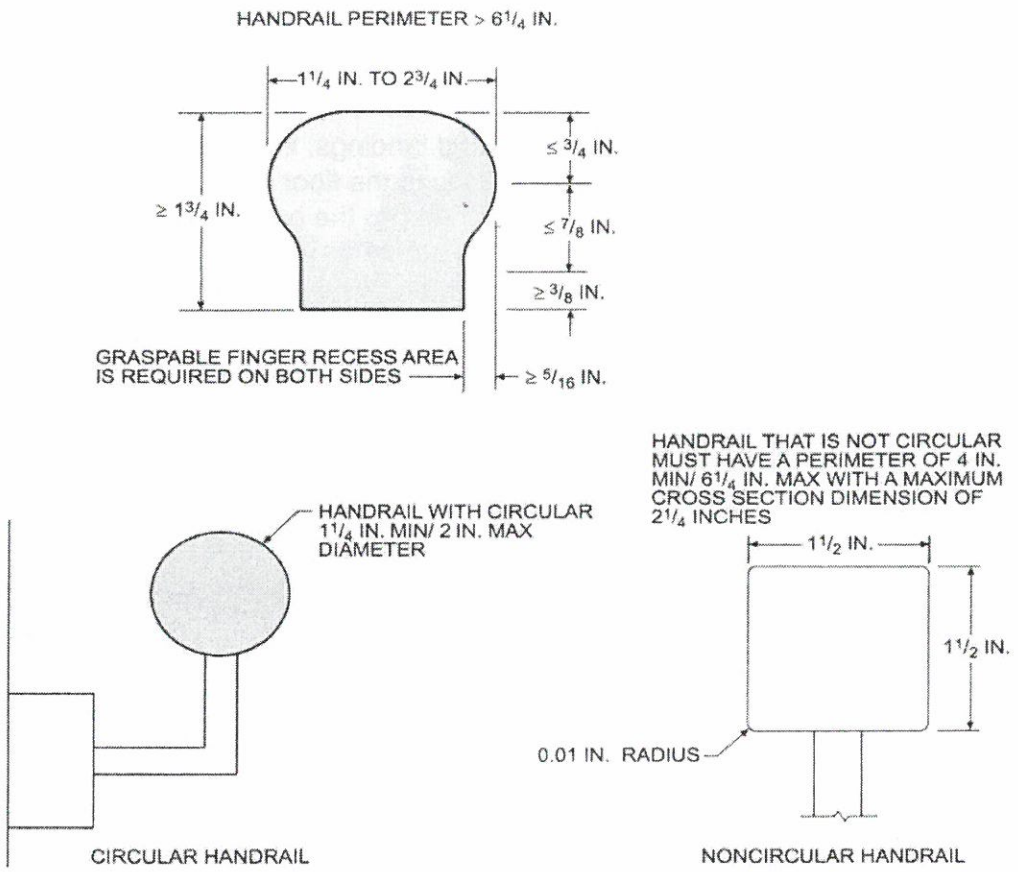
SAMPLE DECK CROSS SECTION



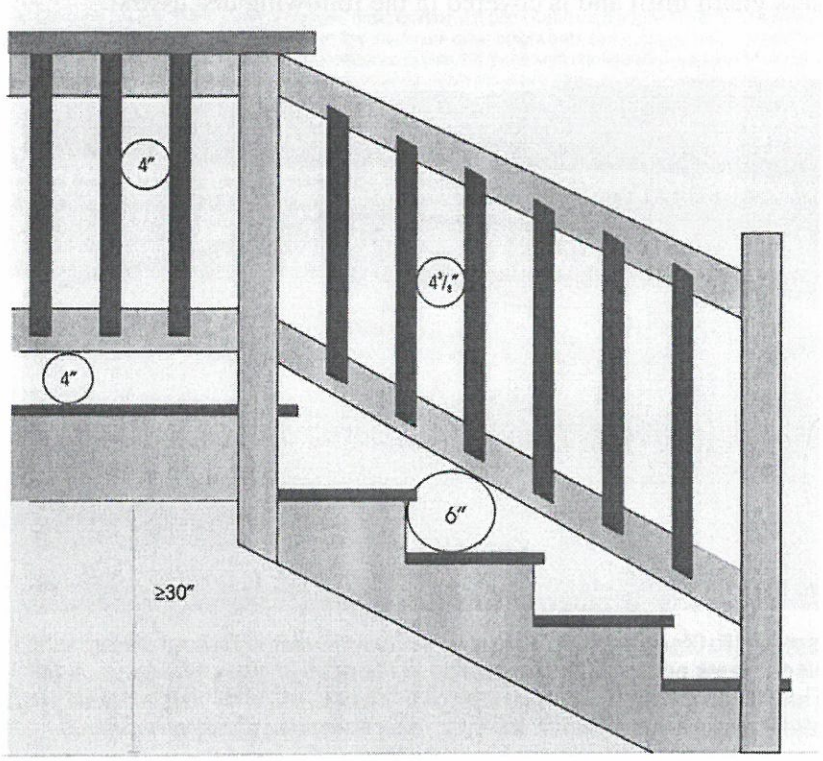


STAIR DETAIL

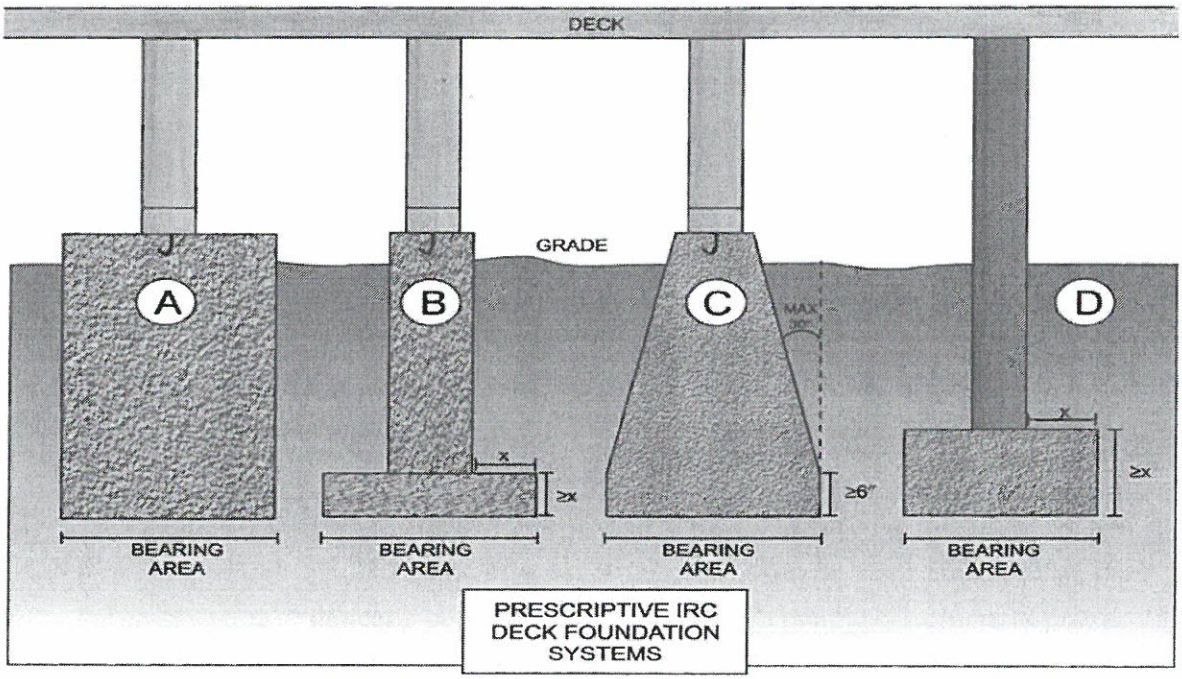
GUARD DETAIL



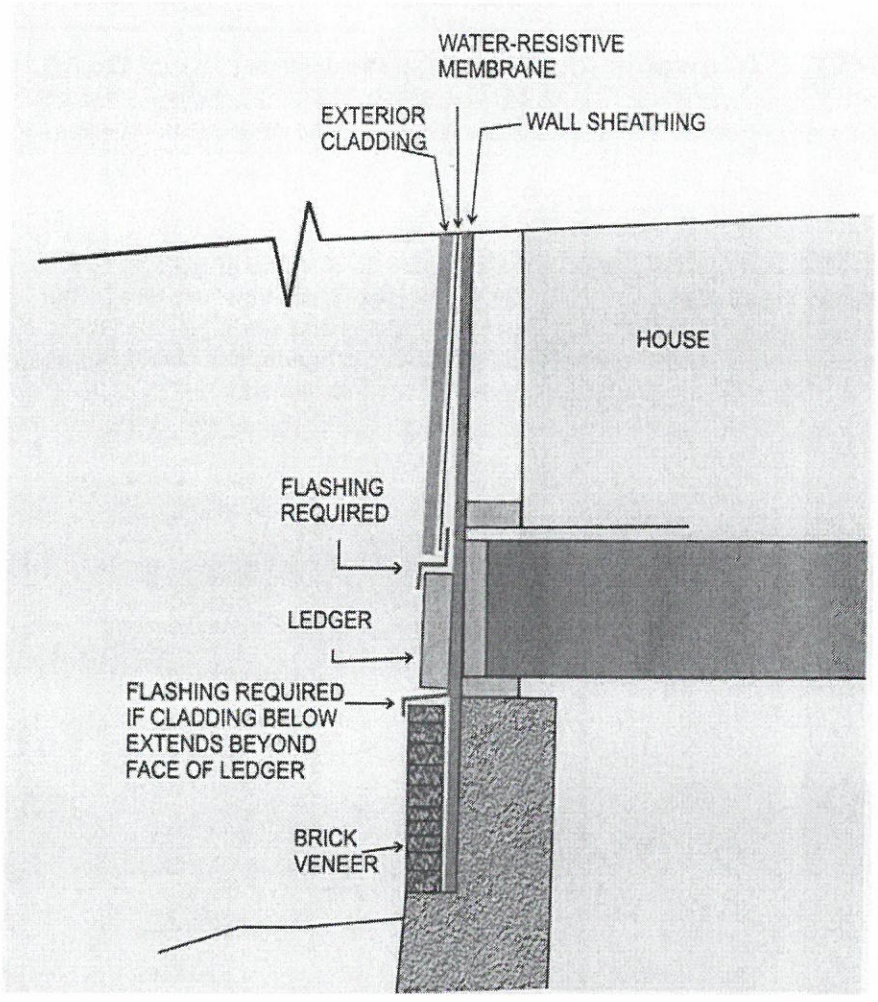
Graspable Handrail Details



Guard Openings



Deck Foundations



Flashing Detail

2009 IRC CODE REFERENCES

The following code sections are applicable for deck additions. This list, although not inclusive, provides general guidance on code provisions affecting deck construction.

- **R502.2.2 Decks.** 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 as applicable. Such attachment **shall not** be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self–supporting. For decks with cantilevered framing members, connections 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. Framing hardware and fasteners shall be hot-dipped galvanized or stainless steel.
- **R502.2.2.1 Deck ledger connection to band joist.** The connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir or approved decay resistant species, and a 2-inch (51 mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with ½ -inch (12.7 mm) lag screws or bolts with washers in accordance with Table R502.2.2.1. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.
- **R502.2.2.1.1 Placement of lag screws or bolts in deck ledgers.** The lag screws or bolts shall be placed 2 inches (51 mm) in from the bottom or top of the deck ledgers and between 2 and 5 inches (51 and 127 mm) in from the ends. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger.
- **R502.2.2.2 Alternate deck ledger connections.** Girders supporting deck joists shall not be supported on deck ledgers or band joists. **Deck ledgers shall not be supported on stone or masonry veneer.**
- **R502.3.3 Floor cantilevers.** Floor cantilever spans shall not exceed nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light-frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2).
- **R502.6 Bearing.** The ends of each joist, beam or girder shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete except where supported by the use of approved joist hangers.
- **R502.6.2 Joist framing.** Joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips not less than nominal 2 inches by 2 inches (51 mm by 51 mm).
- **R502.7 Lateral restraint at supports.** Joists shall be supported laterally at the ends by full–depth solid blocking not less than 2 inches (51 mm) nominal in thickness; or by attachment to a header, band, or rim joist, or to an adjoining stud; or shall be otherwise provided with lateral support to prevent rotation.
- **R502.8 Drilling and notching.** Structural floor members shall not be cut, bored or notched in excess of the limitations specified in this section. Notches shall not exceed 1/6 the depth of the joist, shall not be longer than 1/3 of the depth of the joist and shall not be located in the middle 1/3 of the joist span. The diameter of holes bored or cut into members shall not exceed 1/3 the depth of the joist. Holes shall not be closer than 2 inches to the top or bottom of the joist, or to any other hole located in the member. Where the joist is also notched, the hole shall not be closer than 2 inches to the notch.
- **R502.9 Fastening.** Floor framing shall be nailed in accordance with Table R602.3(1). Where posts and beam or girder construction is used to support floor framing, positive connections shall be provided to ensure against uplift and lateral displacement.

TABLE R502.2.2.1
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 $^1/_2$″.

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 R502.2.2.1.1.

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 R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY[a, b, c, f, g, h]
(Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)

	Maximum Cantilever Span (Uplift Force at Backspan Support in Lbs.)[d, e]											
	Ground Snow Load											
	≤ 20 psf			30 psf			50 psf			70 psf		
	Roof Width			Roof Width			Roof Width			Roof Width		
Member & Spacing	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft
2 × 8 @ 12″	20″ (177)	15″ (227)	—	18″ (209)	—	—	—	—	—	—	—	—
2 × 10 @ 16″	29″ (228)	21″ (297)	16″ (364)	26″ (271)	18″ (354)	—	20″ (375)	—	—	—	—	—
2 × 10 @ 12″	36″ (166)	26″ (219)	20″ (270)	34″ (198)	22″ (263)	16″ (324)	26″ (277)	—	—	19″ (356)	—	—
2 × 12 @ 16″	—	32″ (287)	25″ (356)	36″ (263)	29″ (345)	21″ (428)	29″ (367)	20″ (484)	—	23″ (471)	—	—
2 × 12 @ 12″	—	42″ (209)	31″ (263)	—	37″ (253)	27″ (317)	36″ (271)	27″ (358)	17″ (447)	31″ (348)	19″ (462)	—
2 × 12 @ 8″	—	48″ (136)	45″ (169)	—	48″ (164)	38″ (206)	—	40″ (233)	26″ (294)	36″ (230)	29″ (304)	18″ (379)

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

a. Tabulated values are for clear-span roof supported solely by exterior bearing walls.

b. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, southern pine, and spruce-pine-fir for repetitive (3 or more) members.

c. Ratio of backspan to cantilever span shall be at least 3:1.

d. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.

e. Uplift force is for a backspan to cantilever span ratio of 3:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 3 divided by the actual backspan ratio provided (3/backspan ratio).

f. See Section R301.2.2.2.5, Item 1, for additional limitations on cantilevered floor joists for detached one- and two-family dwellings in Seismic Design Category D_0, D_1, or D_2 and townhouses in Seismic Design Category C, D_0, D_1, or D_2.

g. A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the supported end.

h. Linear interpolation shall be permitted for building widths and ground snow loads other than shown.

TABLE R502.3.3(2)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING EXTERIOR BALCONY[a, b, e, f]

Member Size	Spacing	Maximum Cantilever Span (Uplift Force at Backspan Support in lb)[c, d]		
		Ground Snow Load		
		≤ 30 psf	50 psf	70 psf
2 × 8	12″	42″ (139)	39″ (156)	34″ (165)
2 × 8	16″	36″ (151)	34″ (171)	29″ (180)
2 × 10	12″	61″ (164)	57″ (189)	49″ (201)
2 × 10	16″	53″ (180)	49″ (208)	42″ (220)
2 × 10	24″	43″ (212)	40″ (241)	34″ (255)
2 × 12	16″	72″ (228)	67″ (260)	57″ (268)
2 × 12	24″	58″ (279)	54″ (319)	47″ (330)

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

a. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, southern pine, and spruce-pine-fir for repetitive (3 or more) members.

b. Ratio of backspan to cantilever span shall be at least 2:1.

c. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.

d. Uplift force is for a backspan to cantilever span ratio of 2:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 2 divided by the actual backspan ratio provided (2/backspan ratio).

e. A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the supported end.

f. Linear interpolation shall be permitted for ground snow loads other than shown.