KEYCODES INSPECTION AGENCY

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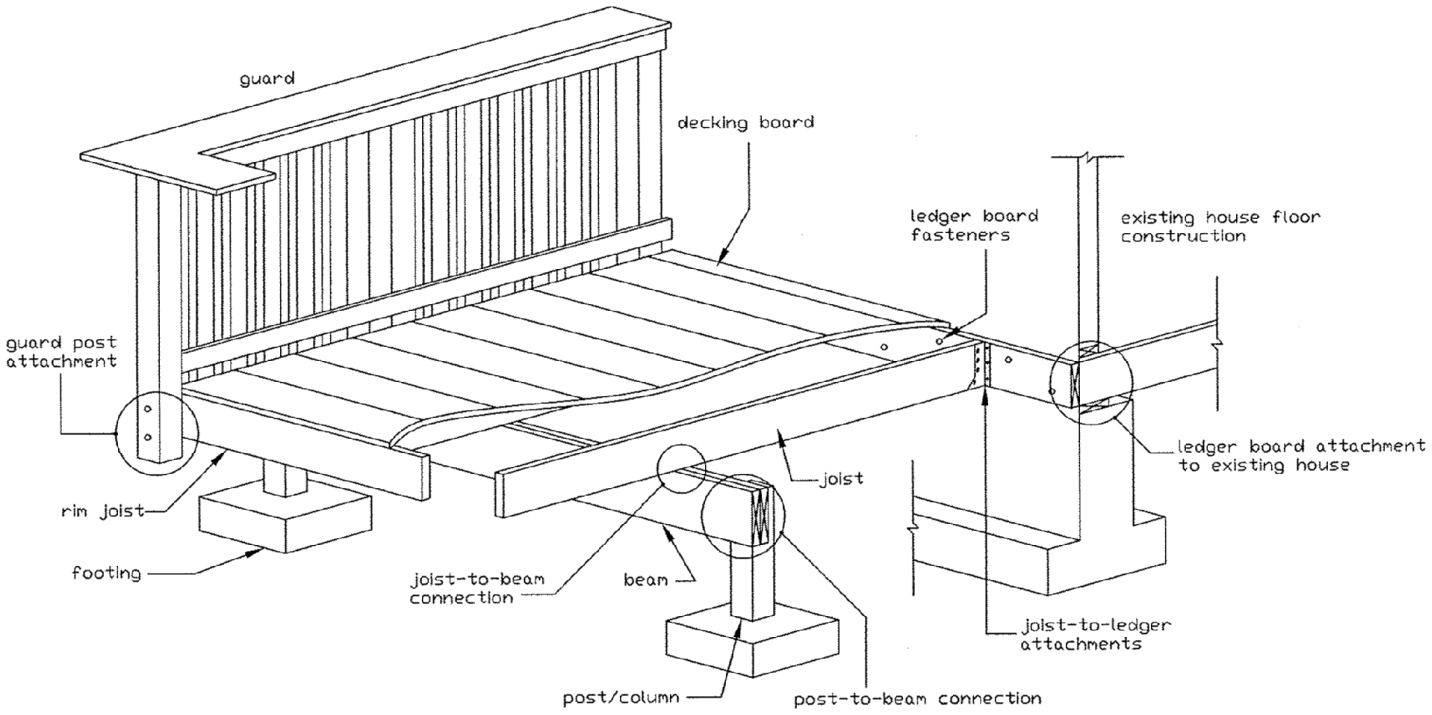
Typical Deck Details

Based on the 2009 International Residential Code

(Designed and Printed August 2010)



CONTENTS

THE USE OF THIS PACKAGE IN LIEU OF SUBMITTED DRAWINGS APPLIES TO SINGLE SPAN, SINGLE LEVEL, RESIDENTIAL DECKS ONLY. DECKS MUST BE CONSTRUCTED IN CONFORMANCE WITH THE 2009 INTERNATIONAL RESIDENTIAL CODE, WHICH SUPERCEDES ANY DISPREPANCY LOCATED HERE WITHIN.

GENERAL INFORMATION

1. Definition: Deck – An exterior floor system supported on at least two opposing sides by an adjoining structure and/or posts, piers, or other independent supports.
2. Wood joists closer than 18" or wood girders closer than 12" to the exposed earth shall be approved pressure-preservative treated.
3. All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be approved pressure-preservative treated wood suitable for ground contact use.
4. All framing members shall be Hem-Fir #2 or Southern pine #2 pressure-treated or better and shall be used in determining spans in the deck design.
5. Wood/plastic composites used in deck boards, stair treads, handrails and guardrail systems shall comply with the provisions of ASTM D 7032 and shall be installed per the manufacturer's instructions.
6. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.
7. All screws and nails shall be hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. All steel bolts shall be of one-half-inch diameter or larger.
8. To resist corrosion, fasteners shall meet the requirements of ASTM A 153.
9. All of the following inspections are required during construction of deck:
    - Footing inspections are required before the concrete is poured. All holes must be cleaned and free from loose dirt.
    - Framing inspections must be completed before the decking may be attached, unless otherwise noted.
    - Final inspection shall be scheduled when all construction of the deck has been completed.
    - NOTE: ALL INSPECTIONS ARE MANDATORY BY LAW. FAILURE TO OBTAIN THE INSPECTIONS MAY CAUSE VIOLATIONS AND FINES.
10. It shall be the duty of the permit holder or their agent to notify the building official that such work is ready for inspection. It shall be the duty of the person requesting any inspections required by this code to provide access and means for inspection of such work.
11. All inspections must be made at least 48 hours in advance. All construction documents shall be on the jobsite and provided to inspector upon request. You may schedule an appointment for inspection by calling Keystone Code Consulting & Enforcement Offices at (610) 866-9663 Monday thru Friday 8:30a.m. – 4:30p.m.
12. Decks may not be occupied until all inspections have been completed and a final approval (in the form of a certificate of occupancy) has been given by the Building Code Official.

FOOTINGS

All footers must be a minimum of 36” below grade and bear on solid, undisturbed 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. The size of footings supporting piers and columns shall be based on tributary load and the allowable soil pressure of 1500 psf (see Figure 1 and Table 1A).

Do not construct footings over utility lines or enclosed meters. Call 1-800-242-1776 before you dig.

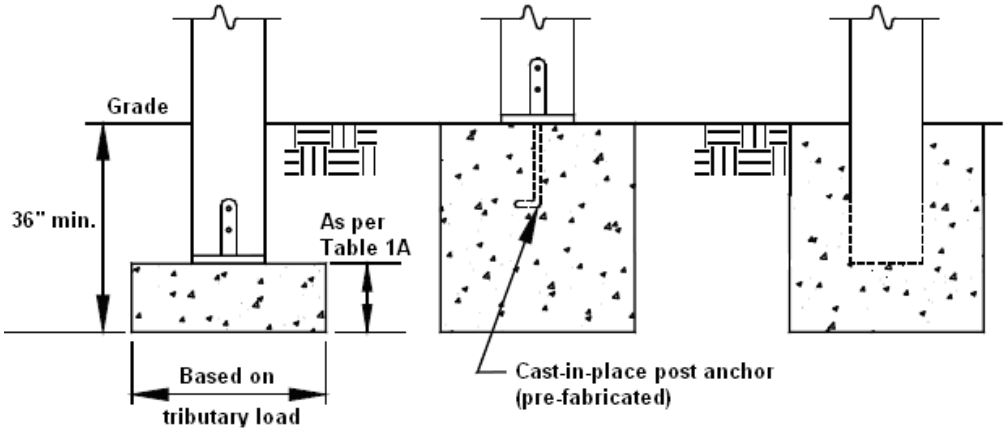


Figure 1

TABLE 1A: FOOTING SIZES

*MODELED FROM THE AMERICAN WOOD COUNCIL’S: *DECK CONSTRUCTION GUIDE 2009**

Beam Span	Joist Span	Round Footing Diameter	Square Footing Dimension	Footing Thickness
6'	≤ 8'	13"	11"	6"
	≤ 12'	16"	14"	6"
	≤ 16'	19"	17"	7"
8'	≤ 8'	15"	13"	6"
	≤ 12'	19"	17"	7"
	≤ 16'	21"	19"	8"
10'	≤ 8'	17"	15"	6"
	≤ 12'	21"	19"	8"
	≤ 16'	24"	22"	9"
12'	≤ 8'	19"	17"	7"
	≤ 12'	23"	21"	9"
	≤ 16'	26"	24"	11"
14'	≤ 8'	20"	18"	8"
	≤ 12'	24"	22"	10"
	≤ 16'	28"	26"	12"
16'	≤ 8'	21"	19"	8"
	≤ 12'	26"	24"	11"
	≤ 16'	30"	28"	13"
18'	≤ 8'	23"	21"	9"
	≤ 12'	28"	26"	11"
	≤ 16'	32"	30"	13"

1. Assumes 1,500 psf soil bearing capacity
2. Assumes 2,500 psi compressive strength of concrete. Coordinate footing thickness with post base and anchor requirements.

JOIST SIZING AND SPAN

Joist spans shall be in accordance with Table 1 and the Figures below. These spans are based on a 40 psf live load, a 10 psf dead load and a deflection of L/Δ = 360 (check with the building department for lumber spans on all other species of woods).

TABLE 1: FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES

Joist Spacing (inches)	Species of Lumber	2x6 (ft.–in.)	2x8 (ft.–in.)	2x10 (ft.–in.)	2x12 (ft.–in.)
12	Hem-Fir #2	10-0	13-2	16-10	20-4
	Southern Pine #2	10-9	14-2	18-0	21-9
16	Hem-Fir #2	9-1	12-0	15-2	17-7
	Southern Pine #2	9-9	12-10	16-1	18-10
19.2	Hem-Fir #2	8-7	11-3	13-10	16-1
	Southern Pine #2	9-2	12-1	14-8	17-2
24	Hem-Fir #2	7-11	10-2	12-5	14-4
	Southern Pine #2	8-6	11-0	13-1	15-5

Cantilever spans shall comply with Table 2 below. This table is not applicable to support a roof. Note that you must support the joists from uplift loads by approved fasteners, such as joist hangers.

TABLE 2: CANTILEVER SPANS FOR FLOOR JOISTS

Member Size	Spacing	Max Cantilever Span	Uplift Force at

		Based on ≤ 30 psf Ground Snow Load	Backspan Support in lbs.
2x8	12”	42”	139
2x8	16”	36”	151
2x10	12”	61”	164
2x10	16”	53”	180
2x10	24”	43”	212
2x12	16”	72”	228
2x12	24”	58”	279

a. Ratio of backspan to cantilever span shall be at least 2:1.
b. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.
c. 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.

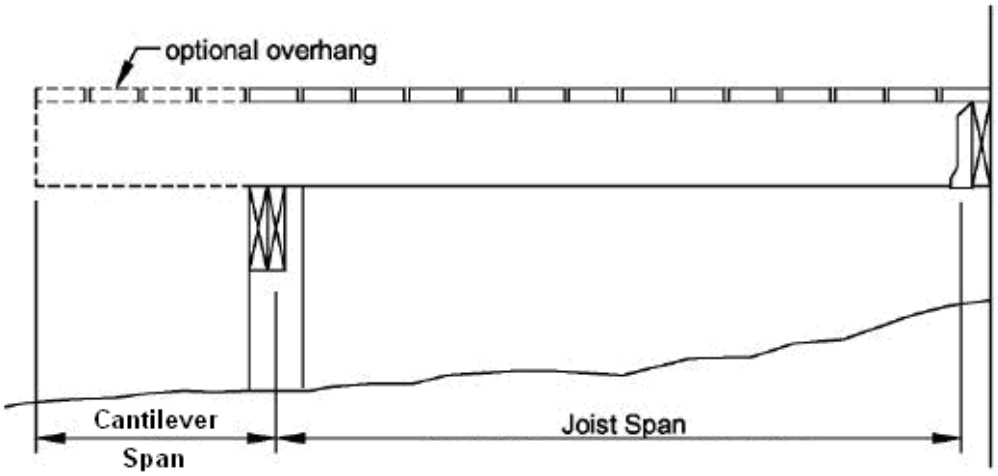


Figure 2

BEAM SIZE AND ASSEMBLY REQUIREMENTS

Beams shall not exceed values in Table 3 below. The ends of each beam shall have not less than 1.5 inches of bearing on wood. Beams may not be supported on deck ledgers or band joists. If using engineered lumber, an engineer’s seal is required upon submission.

TABLE 3: GIRDER SPANS

Size	2-2x4	2-2x6	2-2x8	2-2x10	2-2x12	3-2x8	3-2x10	3-2x12	4-2x8	4-2x10	4-2x12
Span	3’-6”	5’-5”	6’-10”	8’-5”	9’-9”	8’-4”	10’-6”	12’-2”	9’-2”	11’-8”	14’-1”

POST-TO BEAM CONNECTIONS

Post-to-beam connections shall comply with one of the following examples. The notching of a 6x6 post used to allow the beam to rest directly on the post shall use thru-bolts with washers and nuts. The beam is permitted to be attached onto the outside of the posts, provided that an approved fastening connector device is used as per the manufacturer’s installation instructions. Alternate attachment may be the use of an approved post cap (see Figure 3).

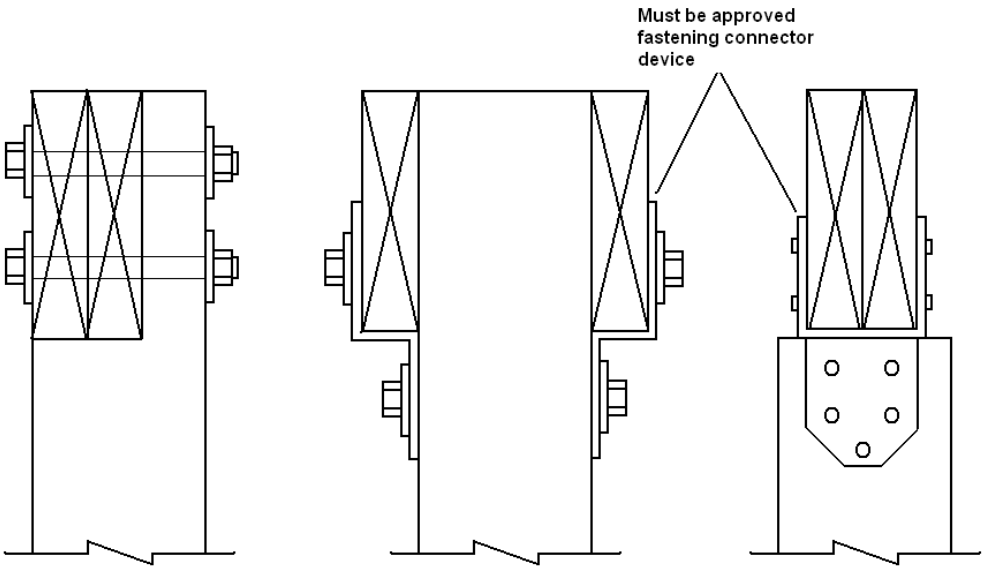


Figure 3

JOIST-TO-BEAM CONNECTIONS

All joists shall be properly attached to each beam and ledger with appropriate means of fasteners. The use of toenails, hurricane clips or joist hangers are permitted. NOTE: THE USE OF SCREWS TO IS NOT PERMITTED. See Figure 4 for available options. (Option 1 is only permitted when deck is attached to house).

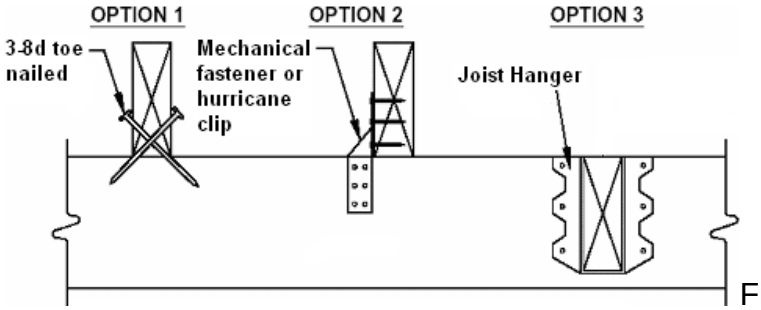


Figure 4

DECK FRAMING PLAN

A framing plan is required when applying for a deck permit. The plan should show the deck from a bird's-eye-view indicating the necessary elements of framing. This includes joist sizes and layout, beam size and spans, footer placement and ledger board attachments, tension device locations, etc. See Figures 5 and 6 for framing plan models.

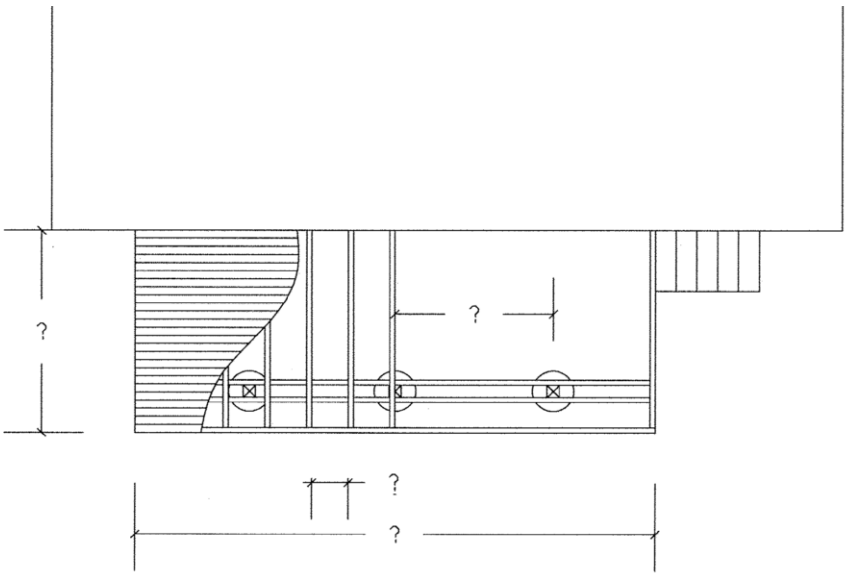


Figure 5

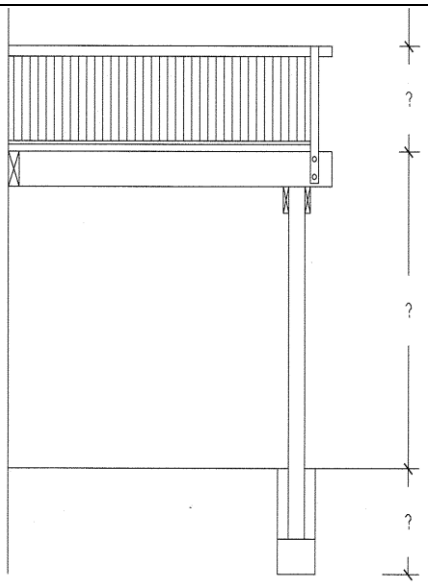


Figure 6

JOIST HANGERS

All joist hangers (shown in Figure 7) shall be used for their intended manufacturing size and made of No. 20 gage steel. Joist hangers shall be corrosion-resistant or shall be protected by galvanizing, electroplating, or with approved steel primer. Nails (10d by 1-1/2" complying with ASTM F 1667) must be used to fasten all components together, or specifically noted by manufacturer for that particular joist hanger. NOTE: YOU MAY NOT ALTER THE HANGER TO ACCOMMODATE OTHER ANGLES OR CONDITIONS.

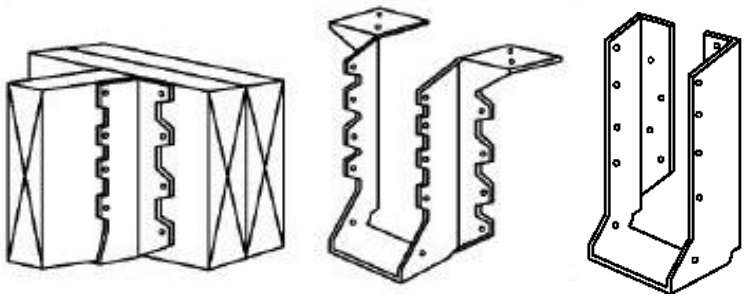


Figure 7

LEDGER ATTACHMENT

The connection between a deck ledger and a 2-inch nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with ½-inch lag screws or bolts with washers in accordance with Table 4. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel. The removal of siding and installation of flashing is required between the house and the ledger. NOTE: YOU MAY NOT ATTACH LEDGER BOARDS TO EXISTING CANTILEVERS, OPEN WEB TRUSSES OR STONE OR MASONRY VENEER. If these conditions occur, the deck must be freestanding. If a freestanding deck is utilized, then it must be braced diagonally to resist lateral loads. *Note: a minimum 1" x 9-½" Douglas Fir laminated veneer lumber rim board shall be permitted in lieu of the 2" nominal band joist.*

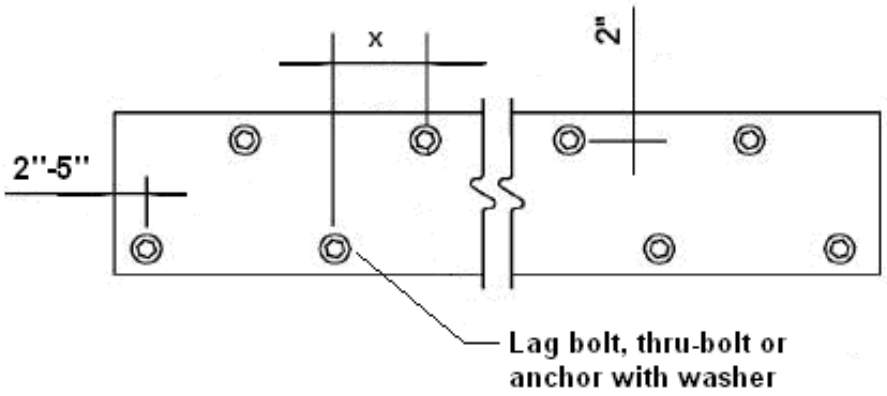


Figure 8

Refer to Table 4 for spacing on ledger fasteners.

TABLE 4:

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]

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 staked washers[b, h]	36	36	29	24	21	18	16

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 and face of the wall sheatjing 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.

e. Deck ledger shall be minimum 2x8 pressure-preservative-treated No. 2 grade lumber, or approved materials by standard engineering practice.

f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1 inch thick engineered wood product, the ledger attachment shall be designed in accordance with accepted engineering practice.

g. A minimum 1 x 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 and the face of the band joist shall be 1 inch.

The following Figures 9-11 provide examples of the correct installation procedures for different types of ledger board fasteners (shown without hold-down tension device).

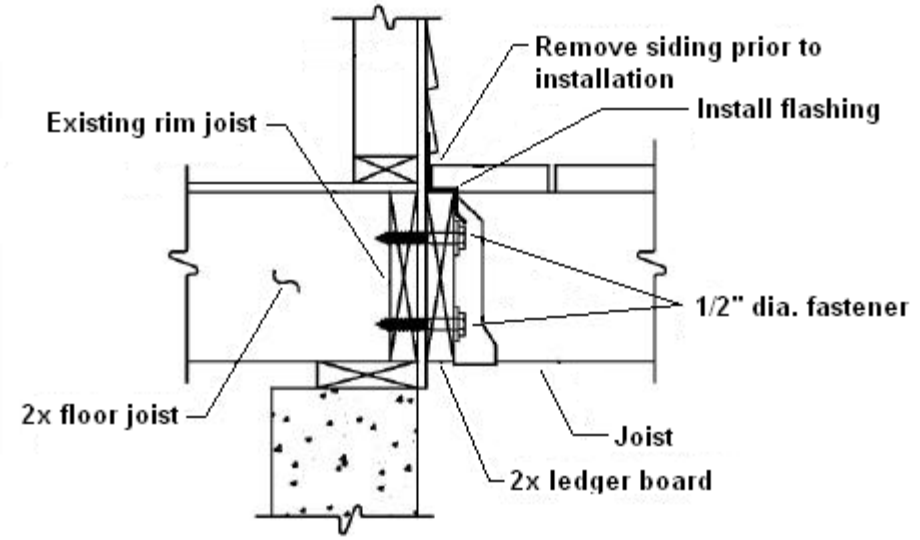


Figure 9: Lag or thru-bolt

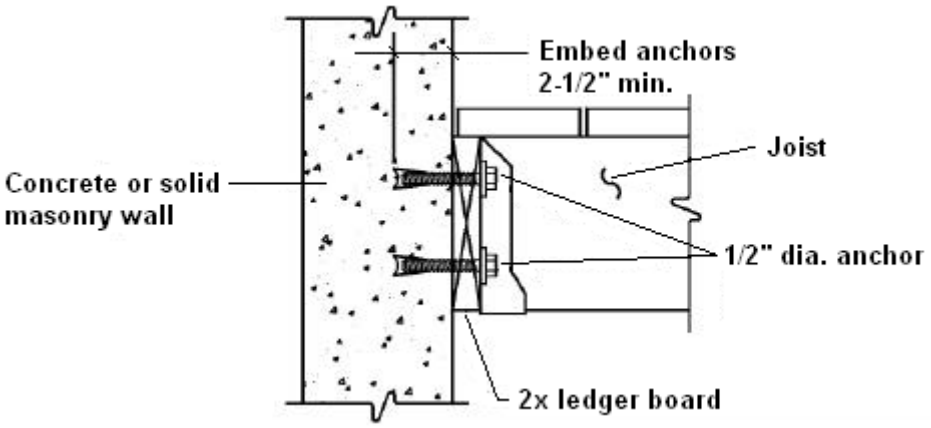


Figure 10: Anchor into concrete

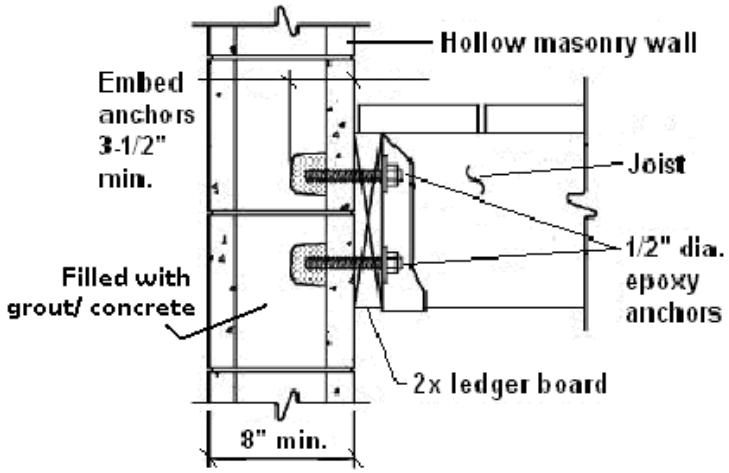
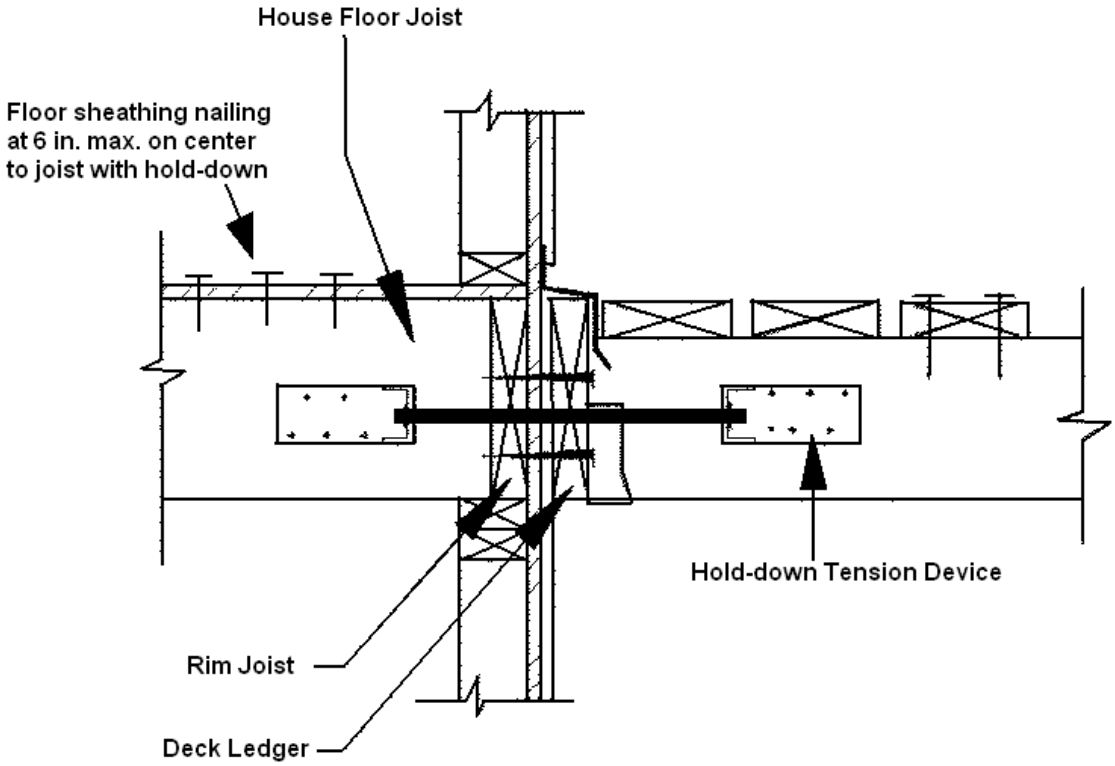


Figure 11: Anchor into hollow masonry

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. Hold-down devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (see figure 12 below). Where positive attachment cannot be verified during inspection, decks shall be self-supporting/free standing. Note: Tension devices used with I-joists must be installed per I-joist's manufacturer's engineered installation instructions.

Figure 12
Hold-down tension devices



ATTACHMENT AROUND A BAY WINDOW OR CHIMNEY

Attaching the ledger to a house overhang, chimney or bay window shall be prohibited. Use an alternate deck framing plan to achieve structural stability without fastening to the projection (see Figure 13 for example). Girders supporting deck joists shall not be supported on deck ledgers or band joists.

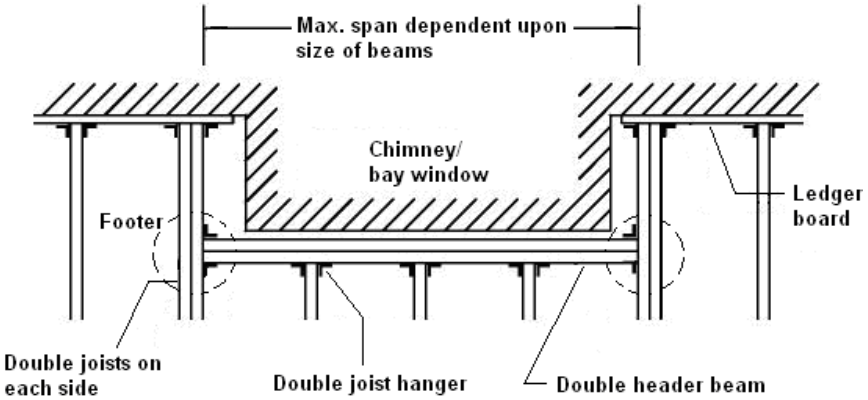


Figure 13

BRACING

Exterior landings, decks, and stairs shall be positively anchored to the primary structure to resist both vertical and lateral forces or shall be designed to be self-supporting. Attachment shall not be accomplished by use of toenails or nails subject to withdrawal.

Freestanding decks shall require diagonal bracing both parallel and perpendicular to the beam at each post. If it is attached to the house in accordance with the information contained here within, then the bracing perpendicular to the house shall not be required.

GUARD REQUIREMENTS

Porches, balconies, ramps or raised floor surfaces located more than 30” above the floor or grade, within 36” horizontally to the edge of the open side, shall have guards not less than 36” in height. Open sides of stairs with a total rise of more than 30” shall not have guards less than 34” measured vertically from the tread nosing. If a fixed bench is adjacent to a guard, the guard height must be measured from the bench surface.

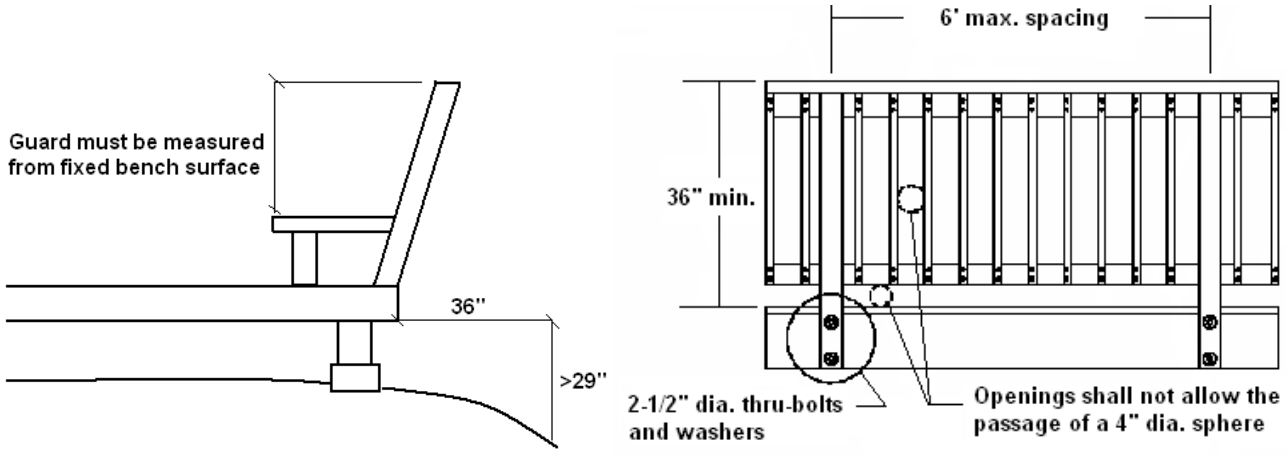


Figure 14

Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow the passage of a sphere 4” or more in diameter. Exceptions: (see Figure 15)

1. The triangular openings formed by the riser, tread and bottom rail at the open side of the stairway are permitted to be of such size that a 6” sphere cannot pass through.
2. Openings for required guards on the sides of stair treads shall not allow the passage of a sphere 4-3/8” in diameter.

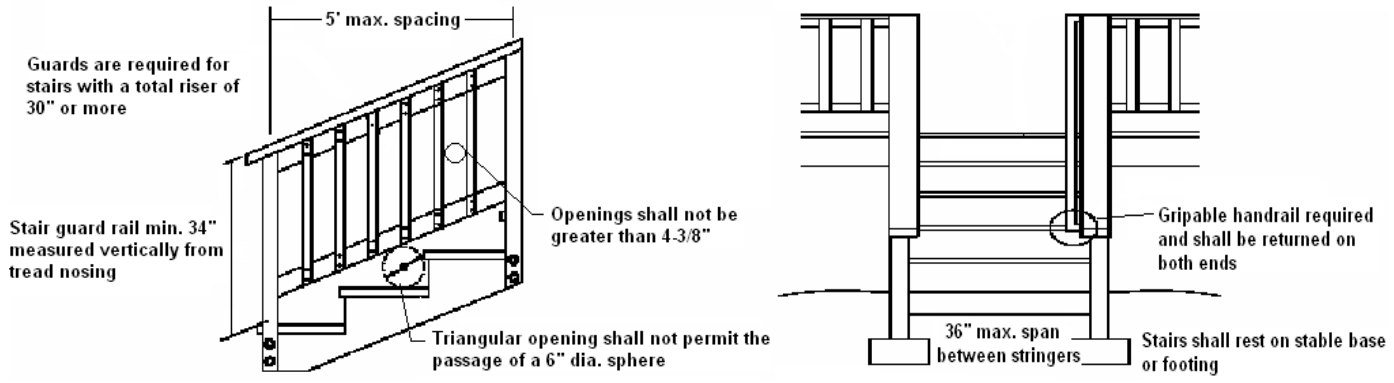


Figure 15

The maximum riser height shall be 8-1/4” measured vertically between leading edges of adjacent treads. The minimum tread depth shall be 9” measured horizontally from beginning to end of tread. Handrails may not be less than 34” nor greater than 38” above tread nosing and must be continuous throughout the run of stairs.

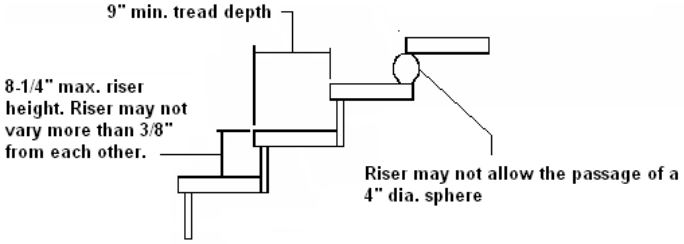


Figure 16: Stair Requirements

STAIR HANDRAIL REQUIREMENTS

Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers. Handrails shall be located between 34” and 38” measured vertically from the sloped plane adjoining tread nosing (see Figure 15). It shall be continuous for the full length of the flight.

Handrail shall comply with one of the following options:

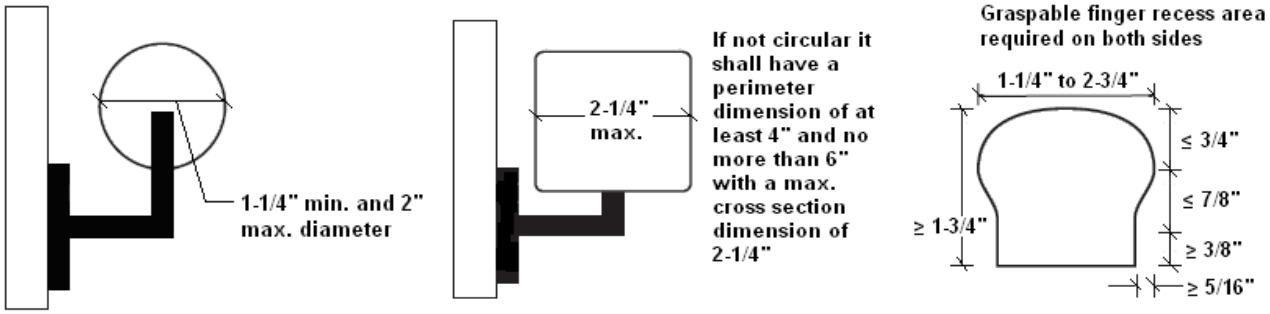


Figure 17

DECKING REQUIREMENTS

Decking material shall be 2”x6” or 5/4” lumber or other approved composite matter. Any synthetic or composite material shall be approved by the building official, only after an ICC Evaluation Report of the particular product. The reports may be found at http://www.icc-es.org/Evaluation_Reports/index.shtml by searching the manufacturer or product name. Decking shall not have a span that would compromise a 50 lb. per square foot load capacity.

APPLICATION AND PROCESS FOR PERMIT

Any owner or authorized agent, who intends to construct a deck, or any other work regulated by the International Residential Code, shall first make application to the building official and obtain the required permit.

Applications are handled by Keystone Code Consulting & Enforcement between the hours 8:30a.m. and 4:30p.m. Monday thru Friday, unless otherwise posted. A total square footage of the proposed deck and the contractor's name (if any), address, and phone number will be required.

Submittals at the time of application shall include a framing/footer plan and a site plan. The site plan must include the deck in reference to the house and property lines (see the following page for an example).

The framing plan shall include placement of footers, spans of joists, and size/span of girder beams. Step, railing and attachment details shall also be incorporated into the plans (see Figures 5 and 6).

Once one has applied and paid for the permit, it will undergo the approval process. The zoning and building departments shall have 15 business days to review each application and contact the owner or agent with any questions/concerns. When the permit is approved, it will be mailed to the applicant's house. Please post such permit in a window/door visible from the street during the construction project.

Failure to obtain the required permit before the start of construction will be subjected to violations and fines as prescribed by law.

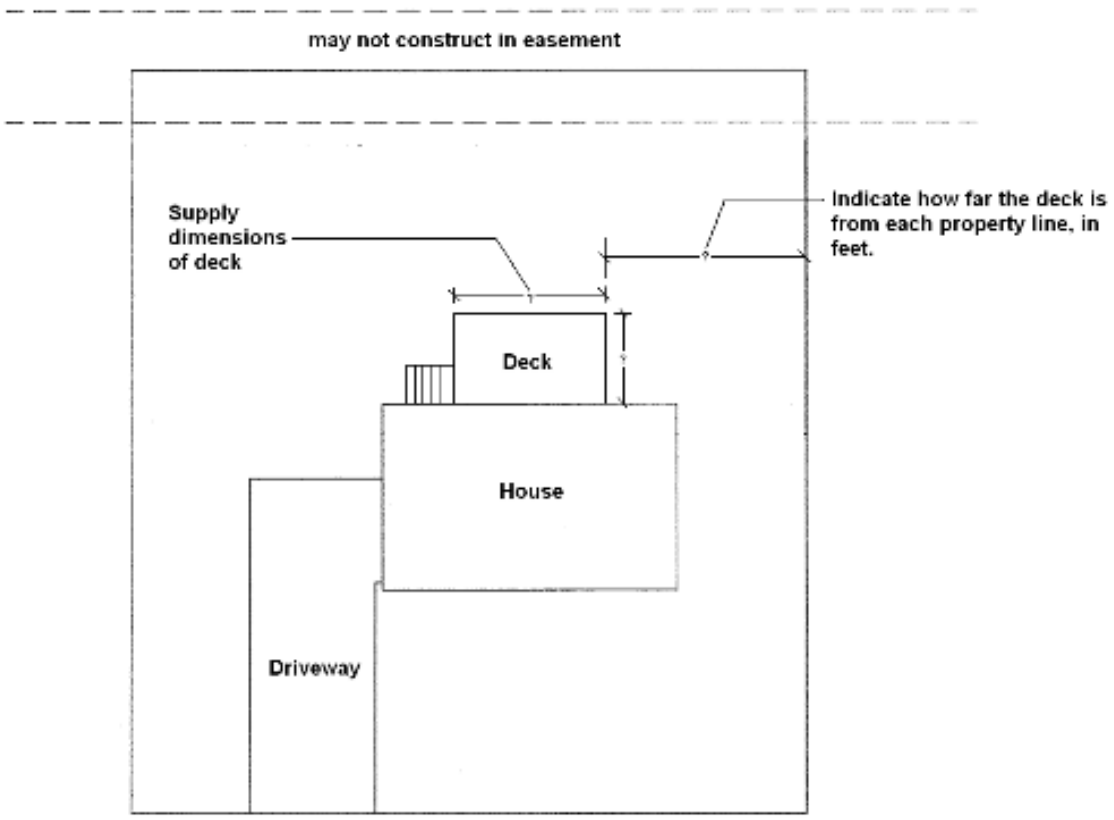


Figure 18: Example of Plot Plan