

**Village of Menands
Deck Construction: General Technical Guidance**

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This document is intended to provide thorough, though non-comprehensive, technical guidance detailing relevant and applicable code requirements (as determined by the International Building Code) for the construction of an exterior deck. Though not all International Building Code (IBC) regulatory requirements for decks are included, those that are included within this package are necessary to be met for the lawful construction of a deck. Compliance with the codes included within this technical guidance document does not ensure complete compliance with all current IBC codes. Individuals or entities planning on building a deck should still review the current edition of IBC codes for the construction of decks.

The figures included within this packet are generalized and are not intended to be used for construction purposes. The figures are included to highlight various components and code requirements for lawful deck construction. After reviewing the technical guidance, please review the application information sheet, which details the necessary paperwork to be submitted prior to permit acquisition.

While not all inclusive, the comments within the technical guidance should be used as a general guide to code compliance. Complete and accurate information will expedite the plan review process.

This document is arranged as follows:

Chapter 1:

Generally introduces the reader to key structural components of decks that are subject to regulation, as set forth by the IBC. Provides figures with key structural components indicated, so the reader can gain clarity on the structural composition of a deck.

Chapter 2:

Describes general code requirements for the key structural components introduced in Chapter 1. Structural components, and the codes that apply to them, are detailed in alphabetical order. Includes figures and tables sourced from the IBC detailing specific materials, dimensions, and design specifications for various components.

Chapter 3:

Gives specific dimensional data that needs to be submitted as part of the application process, on generalized deck design drawings, to give the reader clarity on the specificity required in their design drawings.

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Chapter 1:

General Information:

1. Decks are exterior structures with several key structural members, namely: footings, posts, beams, joists, and floorboards. Decks, and their key structural members, are subject to the International Building Codes which regulate materials, performance standards, and other aspects of deck construction.
2. For the construction of a deck to be lawful, the owner of the property on which a deck is to be constructed (or a duly authorized representative of the owner) must first obtain a building permit. To obtain a building permit, the aforementioned owner/representative must successfully complete the Building Permit Application, the Deck Construction Supplemental Application, submit any additional and necessary drawings, and pay the associated fee (see Deck Construction Information Sheet).
3. Decks can be attached to a structure or freestanding. If a deck is freestanding, the structural support nearest the structure is provided by a row of beams and posts. If the deck is attached to the structure, however, a ledger and fasteners are used to support the end nearest the structure in lieu of posts and footings.

General Deck Components:

1. Figures 1, 2 and 3 illustrate common features of decks. Some of the most relevant and applicable code requirements for such features, as put forth by the IBC, are detailed in the proceeding sections.

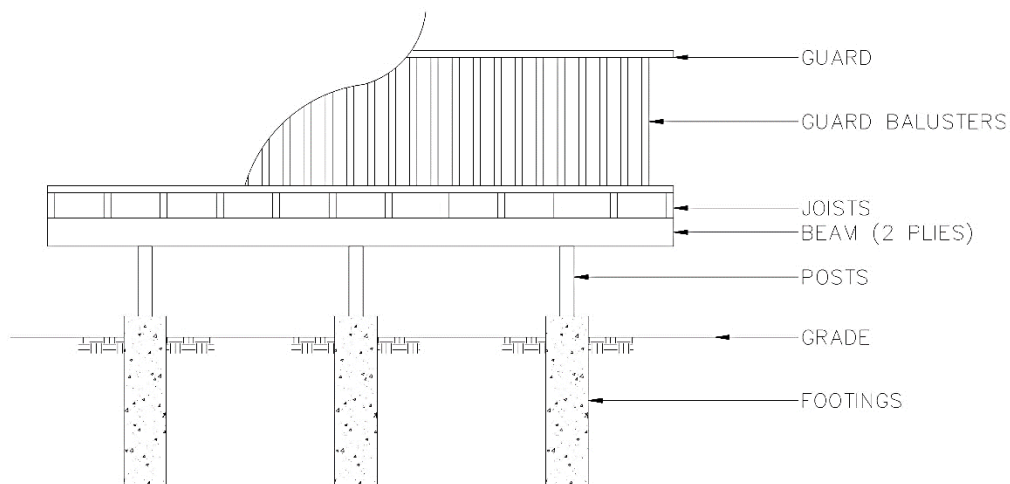


Figure 1:

Profile

Deck

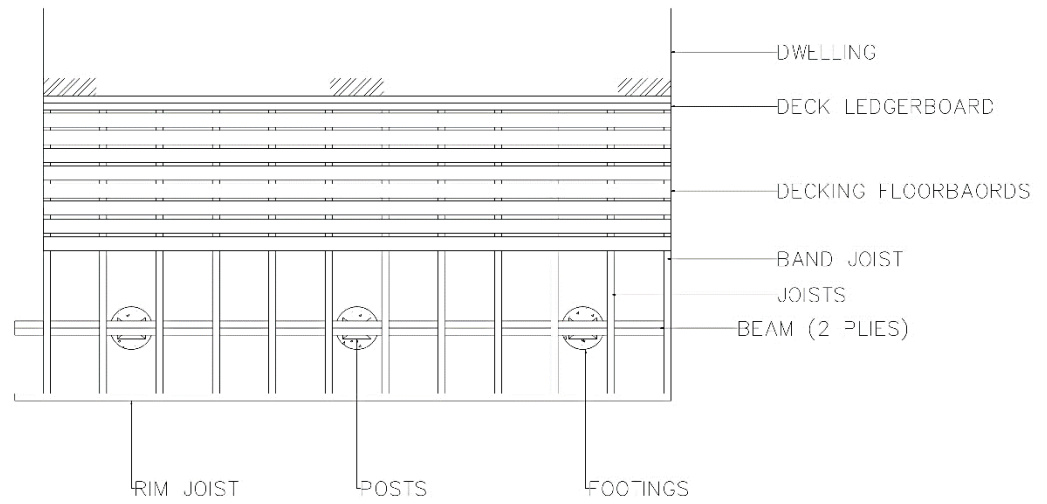


Figure 2: Deck Plan

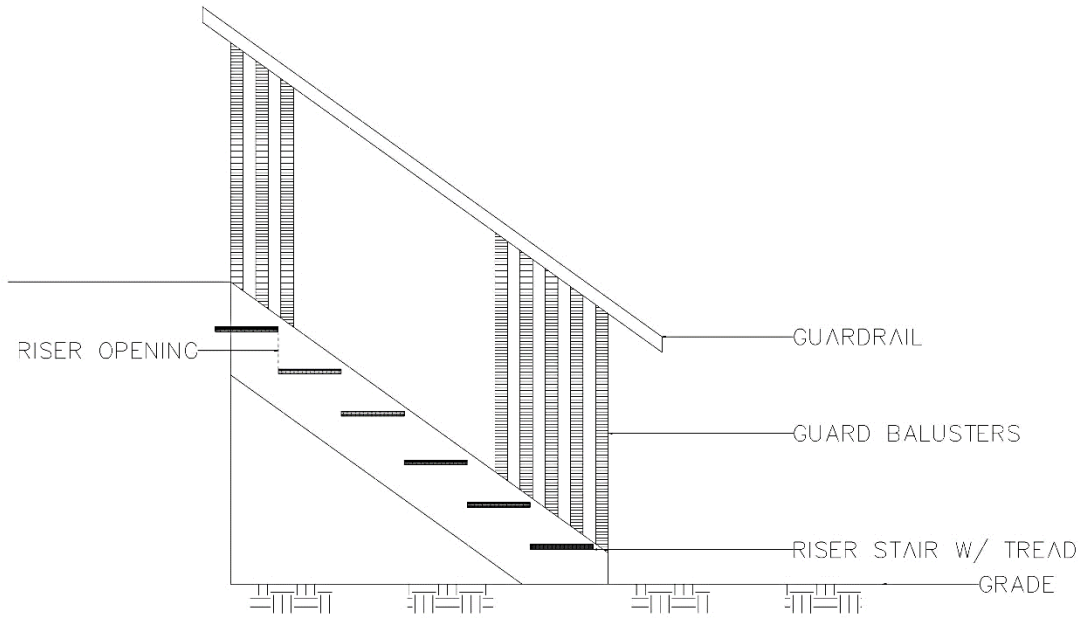


Figure 3: Stair Detail

Chapter 2:

Beam Requirements:

1. Beams, being vital structural components of decks, are regulated by the IBC. IBC codes regulating deck beam span lengths are dependent on material selection. To ensure compliance with IBC codes, beam span lengths (as shown in Figure 4) are to conform with the lengths detailed in Table 1 for various beam materials and dimensions. In that beam span length is partly dependent on material selection, Table 1 also details acceptable lumber species and lumber sizes for beams used to construct exterior decks.
2. Beam span lengths, or the maximum length a beam can run between supports, is measured from the centerline of bearings or supports.

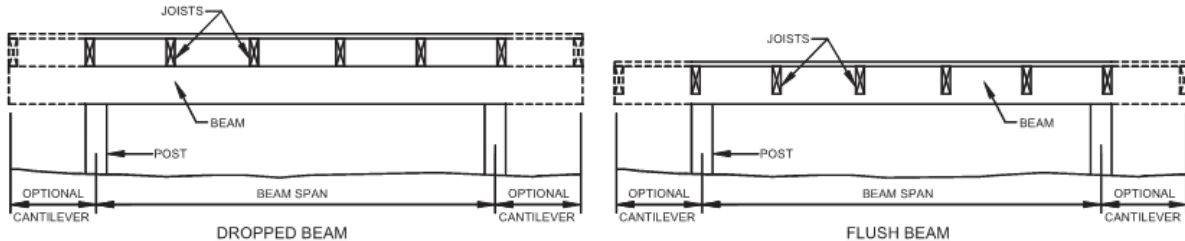


Figure 4: Spans for Wood Beams

3. Beam plies must be fastened with two rows of 10d (3-inch x 0.128-inch) nails at 16 inches on center along each edge.
4. Beams shall be allowed to cantilever at each end up to one fourth of the actual beam span, but no longer.
5. Beams must span continuously between posts. Beam splicing must only occur at interior post locations. Beams bolted to posts must have at least two (2) 0.5-inch bolts per post. Stagger bolts on post.
6. The ends of each beam shall have not less than 1.5-inches of bearing on wood or metal and not less than 3-inches on concrete or masonry, for the entire width of the beam.
7. Beam lumber species, size, span and spacing (if applicable) specifications will be required with the design drawings that are to be submitted with the Building Permit Application and Deck Construction Supplemental Application.

DECK BEAM SPAN LENGTHS^{a, b} (ft. - in.)

SPECIES ^c	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	2 – 2 × 6	6-11	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 × 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/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.

b. Beams supporting deck joists from one side only.

c. No. 2 grade, wet service factor.

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

e. Includes incising factor.

f. Northern species. Incising factor not included.

Table 1: Maximum Permissible Spans for Wood Beams

Footing Requirements:

1. Footings are subject to frost heave and are therefore susceptible to damage. As such, footings must lay a minimum of 48-inches below ground surface.
2. There are a multitude of ways to successfully construct a code compliant footing. Some select examples of footings are shown in Figure 5 (below). Footing dimensions, placement and footing form specifications will be required with the permit application and accompanying design drawings.
3. Footings are not required to extend below frost depth if the deck is to be free standing (i.e. if the deck is not attached to the dwelling).

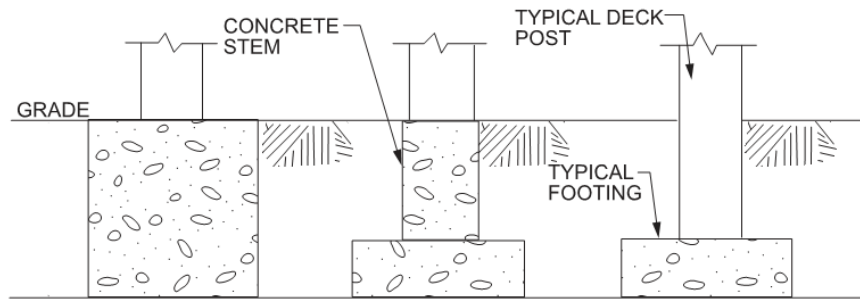


Figure 5: Types of Footings

Guard Requirements:

1. Guards are required along all open-sided walking surfaces (deck, stairs, landings) that are elevated 30-inches or more, measured vertically from the top of the walking surface to the floor or grade below.
2. Guards at open sided walking surfaces shall not be less than 36-inches in height as measured vertically from the top of the walking surface.
3. The required guard shall not have openings from the walking surface to the required guard height (full length of guard baluster) that allow the passage of any object 4-inches or more in diameter or width.
4. Guard specifications will be required with permit application and accompanying design drawings.

Joist Requirements:

1. Acceptable joist lumber species and sizes are as detailed in Table 2 below.

DECK JOIST SPANS FOR COMMON LUMBER SPECIES¹ (ft. - in.)

SPECIES ^a	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER ^b (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS ^c (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	6-8	6-8	6-8
	2 × 8	13-1	11-10	9-8	10-1	10-1	9-8
	2 × 10	16-2	14-0	11-5	14-6	14-0	11-5
	2 × 12	18-0	16-6	13-6	18-0	16-6	13-6
Douglas fir-larch ^d , hem-fir ^d spruce-pine-fir ^d	2 × 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 × 8	12-6	11-1	9-1	9-5	9-5	9-1
	2 × 10	15-8	13-7	11-1	13-7	13-7	11-1
	2 × 12	18-0	15-9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 × 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 × 8	11-8	10-7	8-8	8-6	8-6	8-6
	2 × 10	14-11	13-0	10-7	12-3	12-3	10-7
	2 × 12	17-5	15-1	12-4	16-5	15-1	12-4

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 applied to end.

d. Includes incising factor.

e. Northern species with no incising factor

f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

Table 2: Maximum Permissible Spans for Wood Joists

- The maximum allowable joist span (as shown in Figure 6), or the maximum length a joist can run between supports, must be in accordance with Table 3 (below). The maximum permissible joist span is dependent on joist material and dimensions.
- Joist spacing, which depends on the material selection must be in accordance with Table 3 (below).
- Deck joists shall not cantilever more than one-fourth of the actual, adjacent joist span.

MAXIMUM JOIST SPACING

MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Perpendicular to joist	Diagonal to joist*
1 1/4-inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.3	In accordance with Section R507.3

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 3: Maximum Joist Spacing

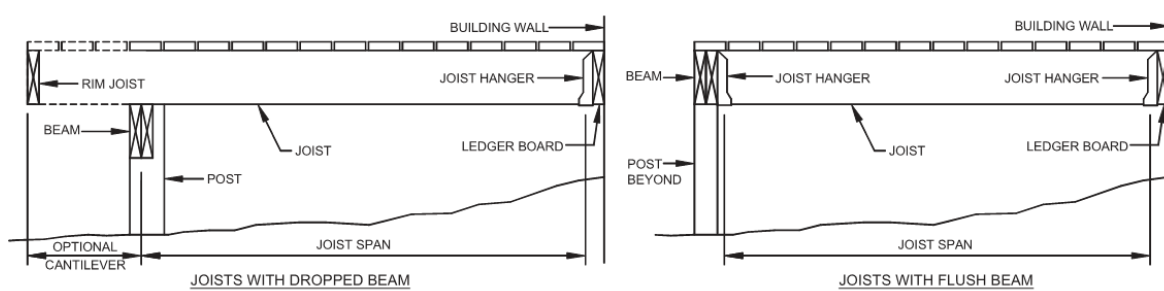


Figure 6: Spans for Deck Joists

- The ends of each joist shall have not less than 1.5-inches of bearing on wood/metal, or 3-inches on concrete/masonry. If joists do not satisfy this condition, joists must be framed into the side of a beam and shall be supported by approved joist hangers.
- Joist hangers must be properly sized (i.e. 2-inch x 8-inch joists require 2-inch x 8-inch joist hangers). Joist hangers must be fully nailed with one nail per hole, as designed.
- Decks off of cantilevered houses require deck joists to either be run to the bearing wall or be supported independently. The rim joist on cantilevers will not support a deck. Decks are not to be attached to house overhangs, bay windows, or chimneys.
- Joist material, dimensions, span and spacing specifications will be required with the permit application and accompanying design drawings.

Band Joist:

- Band joists, or the two outer-most joists in the deck framing, attached by a ledger shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1-inch x 9.5-inch dimensional, Douglas fir, laminated veneer lumber.
- Band joists shall be fully supported by a wall or sill plate below.

Ledger Requirements:

- Deck ledgers shall be a minimum 2-inch x 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 must be bolted to the house and must not be supported on stone or masonry veneer.
- Ledger material and dimension specifications will be required as part of the permit application and accompanying design drawings.

Deck Ledger Connection to Band Joist:

- Deck ledger connections to band joists shall be in accordance with Tables 4 and 5 as well as Figures 7 and 8.

Ledger to Band Joist Fastener Details:

- Fasteners used in deck ledger connections shall be hot-dipped galvanized or stainless steel and shall be in accordance with Table 4 and Figures 7 and 8.

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.

a. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.

b. Snow load shall not be assumed to act concurrently with live load.

c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

d. Sheathing shall be wood structural panel or solid sawn lumber.

e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

Table 4: Deck Ledger Connection to Band Joist

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

For SI: 1 inch = 25.4 mm.

a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).

b. Maximum 5 inches.

c. For engineered rim joists, the manufacturer's recommendations shall govern.

d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).

Table 5: Placement of Lag Screws and Bolts in Deck Ledgers and Joists

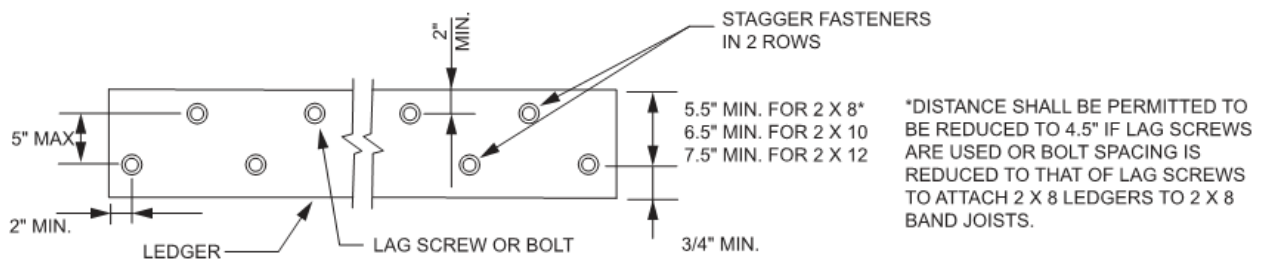


Figure 7: Placement of Lag Screws and Bolts in Ledgers

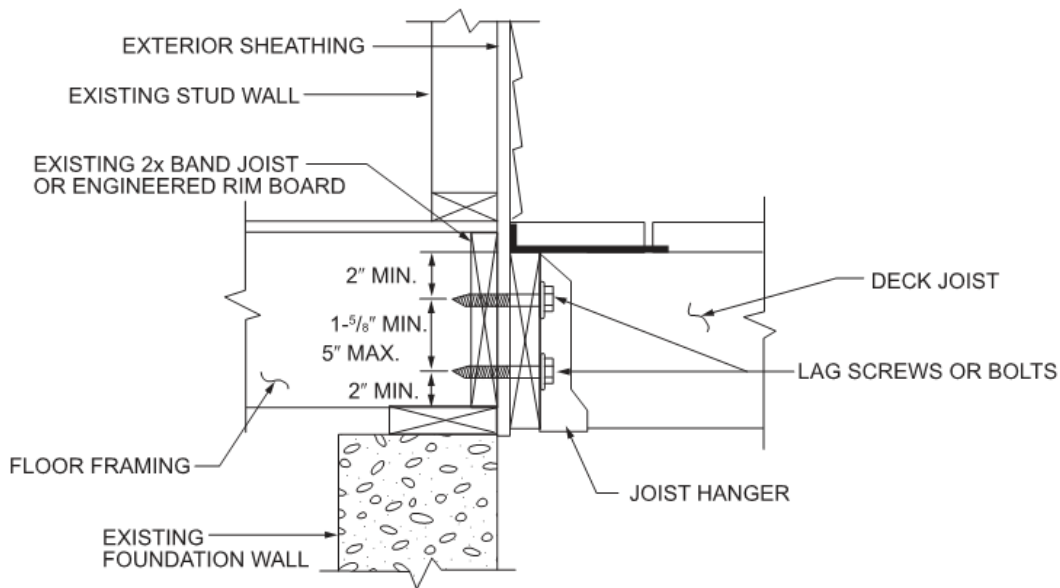


Figure 8: Placement of Lag Screws and Bolts in Band Joists

Post Requirements:

1. For single level wood-framed decks, deck post size shall be in accordance with Table 6. Deck post height is measured from the top of the footing to the site of post attachment to the beam.
2. Posts shall bear on footings in accordance with Figure 9. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors, installed in accordance with the manufacturers' instructions, or a minimum post embedment of 12-inches in surrounding soils or concrete piers

DECK POST HEIGHT^a

DECK POST SIZE	MAXIMUM HEIGHT ^a
4 × 4	8'
4 × 6	8'
6 × 6	14'

For SI: 1 foot = 304.8 mm.

a. Measured to the underside of the beam.

Table 6: Deck Post Sizing

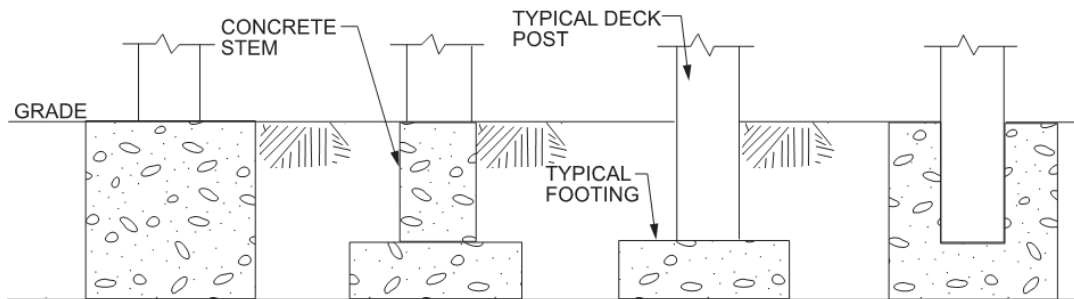


Figure 9: Post Attachment to Footing

3. Cut post ends must be treated with a preservative to maintain the integrity of the material.
4. Post lumber species, sizing and spacing must be included as part of the required design drawings.

Stairway Requirements:

1. A flight of stairs shall not have a vertical rise of larger than 147-inches between floor levels or landings.
2. Stairways are to have a width of not less than 36-inches.
3. Riser height must not surpass 7.75-inches, measured vertically from the leading edge of adjacent treads.
4. Open risers are permitted, provided that openings located more than 30-inches (as measured vertically), to the floor or grade below do not permit the passage of a 4-inch diameter/width object.
5. Tread depths shall be not less than 10-inches, measured horizontally, between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge.
6. Stairs with solid risers are to have nosing projections on treads that are to be not less than 0.75-inch and not more than 1.25-inches.
7. Stairs to decks more than 30-inches off the grade require a guardrail on all open sides, built so that a 4-inch diameter/width object cannot pass through.
8. Handrails are required on at least one side of stairs with four or more risers.
9. Handrail height, measured vertically from the tread nose, shall be not less than 34-inches and not more than 38-inches.
10. Handrails shall not project more than 4.5-inches on either side of the stairway.
11. Specifications on any planned stairs will be required with the permit application and accompanying design drawings.

Chapter 3:

Example Deck Profile:

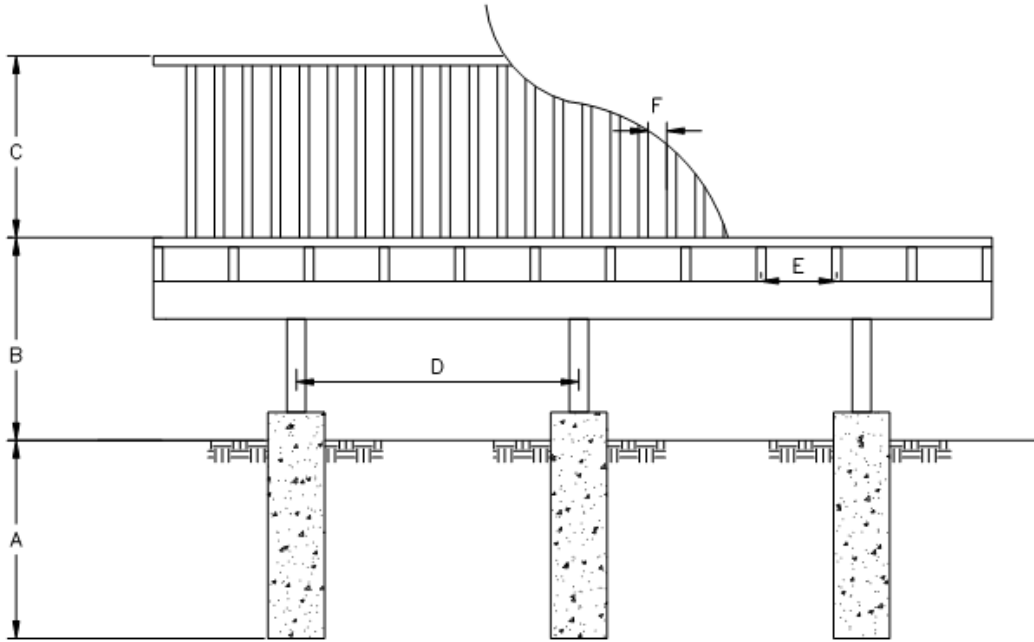


Figure 10: Example Deck Profile

Necessary Dimensional Specifications:

- | | |
|--|--|
| A. Depth of footings below grade | D. Spacing (on-center) of footings/posts |
| B. Height of deck above grade | E. Spacing (on-center) of joists |
| C. Height of guard above walking surface | F. Horizontal space between balusters |

Example Deck Plan:

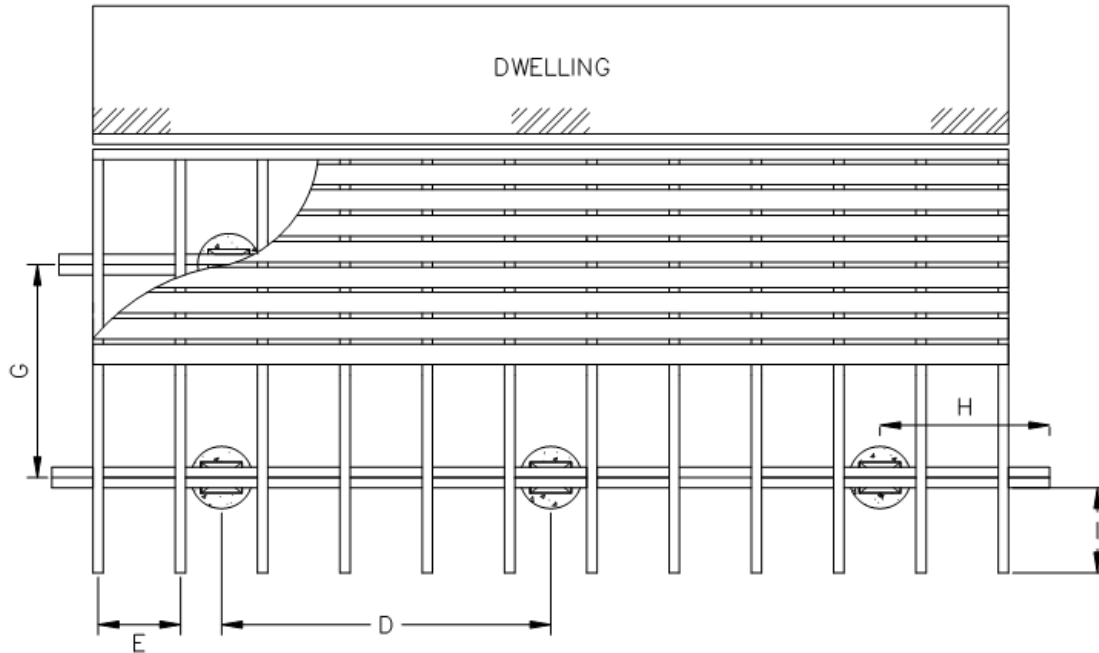


Figure 11: Example Deck Plan

- | | |
|---|-----------------------------|
| D. Spacing (on-center) of footings/posts | H. Length of beam overhang |
| E. Spacing (on-center) of joists | I. Length of joist overhang |
| G. Spacing (on-center) of beams (if applicable) | |

Example Stair Detail:

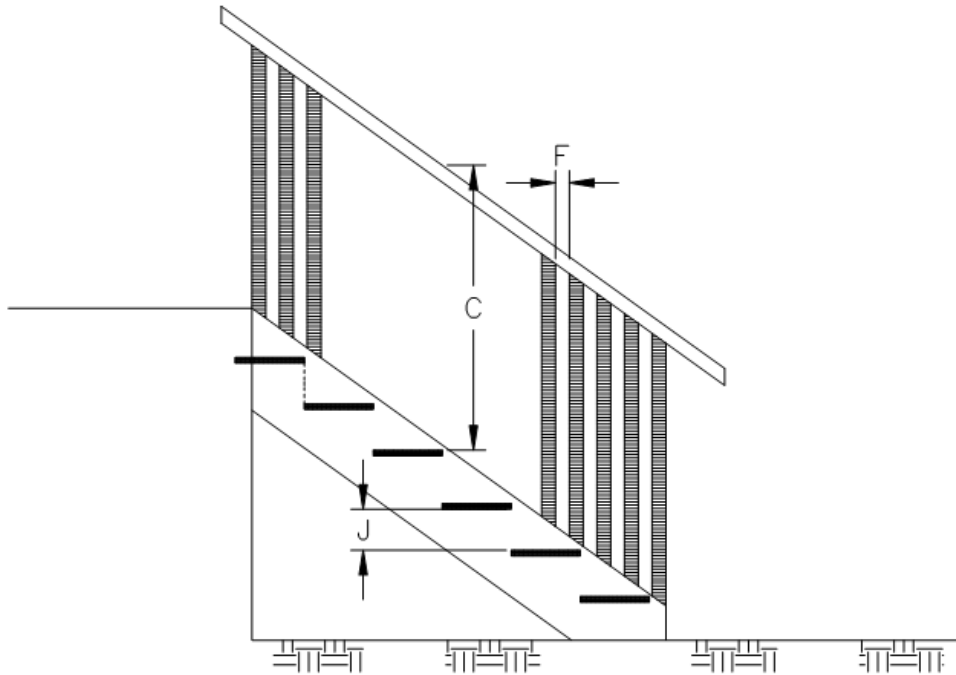


Figure 11: Example Deck Plan

C. Height of guard above stair tread

F. Horizontal spacing between balusters

J. Rise between stair steps