

Welcome

NC Deck Basics

NCRBC Appendix M



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Board Rule: 21 NCAC 12B .0301 Course Requirements

Disclaimer:

“THE NORTH CAROLINA LICENSING BOARD FOR GENERAL CONTRACTORS HAS APPROVED THIS COURSE ONLY AS TO ITS RELEVANCE TO THE PRACTICE OF GENERAL CONTRACTING IN NORTH CAROLINA. THE COURSE PROVIDER AND INSTRUCTOR ARE RESPONSIBLE FOR THE ACCURACY OF THE CONTENT AND COMPLIANCE WITH ALL STATE AND FEDERAL LAWS DURING THE ADMINISTRATION OF THE COURSE”.



What we will cover

1. Introduction on deck failures
2. Deck requirements in appendix M
3. Amendments/Permitting
4. How to use-Construction Example



Appendix M

APPENDIX M WOOD DECKS

This appendix is a North Carolina addition and not part of the 2015 *International Residential Code*. There will be no underlined text.
(The provisions contained in this appendix are adopted as part of this code.)

SECTION AM101 GENERAL

AM101.1 General. A deck is an exposed exterior wood floor structure that is permitted to be attached to the structure or freestanding. Roofed porches (open or screened-in) are permitted to be constructed using these provisions.
AM101.2 Deck design. Computer deck design programs are permitted to be accepted by the code official.

SECTION AM102 FOOTINGS

AM102.1 Footings. Support posts shall be supported by a minimum footing in accordance with Figure AM102.1(1) and Table AM102.1. Minimum footing depth shall be 12 inches (305 mm) below finished grade in accordance with Section R403.1.4. Tributary area is calculated as shown in Figure AM102.1(2).

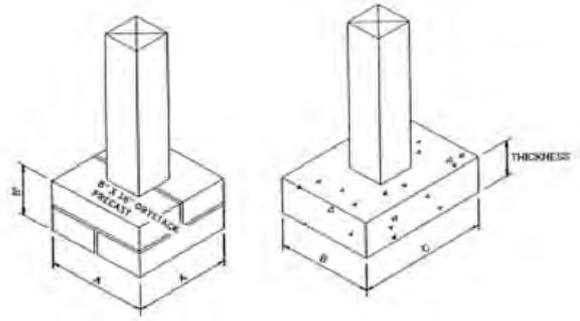


FIGURE AM102.1(1)
SUPPORT POST FOOTING

TABLE AM102.1
FOOTING TABLE^{a, b, c}

SIZE (Inches)	TRIBUTARY AREA (square feet)	THICKNESS (Inches)	
		Precast	Cast-In-Place
A x A	B x C		
8 x 16	36	4	6
12 x 12	40	4	6
16 x 16	70	8	8
—	100	—	8
—	150	—	8

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m².
a. Footing values are based on single floor and roof loads.
b. Support post must rest in center one-third of footing.
c. Top of footing shall be level for full bearing support of post.

Failures

Exterior Wood Decks-Exposed

(U.S. Consumer Product Safety Commission)

Estimated that as many as 60 percent of the 45 million deck structures in America have safety issues, more than half are beyond their service life.

Decks study- Injuries and structural Failures

Since 2003, deck collapses have caused thousands of reported injuries and several deaths in the US. The most tragic deck collapse to date occurred in 2003 when a porch gave way in Chicago, killing 13 people and injuring 57. This incident created a concern for deck and porch safety across the country.

Decks: CPSC estimates that between 2016 and 2019, there were about 2,900 injuries and two deaths associated with collapses/ failures of decks, balconies and porches.

Professional Builder's Magazine recently published that the deck market is pushing nearly 7 billion a year



Failures

So why do decks fail? Connections & Overloading



Exterior Wood Decks-Exposed

Contributing factors to deck collapse and failures:

1. **Rotten wood**: Most decks are made of wood, a material that is vulnerable to the elements, particularly in the Midwest. Older decks may be weakened by rotting wood and rusted screws and nails. In other cases, the wood may not have been treated or sealed properly, resulting in water damage.
2. **Termite infestation**: Properly treating wood can prevent termite infestation.
3. **Poor design or construction**: Decks are governed by local building codes, just like other structures. A homeowner or contractor may try to save time or money by not building a deck to code. More decks are built without permits and inspections.
4. **Improper or defective materials**: This could include using wood that is too weak, or screws and nails that are not long enough or strong enough. It would also include wood that was already rotting when purchased.
5. **Lack of inspection and maintenance**: A building's owner has an obligation to regularly inspect and perform needed maintenance on his decks and porches.
6. **Exceeding capacity**: Having too many people on a structure at one time, or having items on it that are too heavy to be supported by it, is a recipe for disaster. It's up to the building's owner to know and enforce those limits.

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Failures

Results

Table 1. Annual National Estimate of Injuries from a Deck or Wood Porch

	Deck & Porch	Railing	Stairs	Total
2003	29,400	4,880	3,480	37,760
2004	37,720	5,520	3,120	46,360
2005	31,160	4,680	3,680	39,520
2006	36,640	5,440	3,860	45,940
2007	43,880	6,120	5,160	55,160
TOTAL	178,800	26,640	19,300	224,740

Note: These are the estimated total number of people with injuries that went to the hospital emergency room due to falling off or becoming injured from a wood deck or porch. These numbers do not include slipping on a wet or icy surface, splinters, falling on a deck or other minor incidents, including alcohol or drug related injuries that occurred on a deck or porch.

Table 2. Annual National Estimate of Injuries as a Result of a Structural Failure or Collapse

	Deck & Porch	Railing	Stairs	Total
2003	4,080	1,760	280	6,120
2004	3,640	2,400	320	6,360
2005	3,800	1,880	560	6,240
2006	4,080	2,080	390	6,550
2007	4,600	3,000	400	8,000
TOTAL	20,200	11,120	1,950	33,270

Note: The injuries in the previous table, Table 1, were not all a result of a structural failure. Of the 37,760 injuries occurring in 2003, 6,120 were a result of a structural failure or collapse. Table 2 provides estimated data for injuries that were a result of a deck, porch, railing or stair that collapsed, gave way, wood failed or wood that broke. Nearly 15% of all injuries are a result of a structural failure.

Data collected by the Consumer Product Safety Commission's National Electronic Injury Surveillance System.



Appendix M

12 sections labelled AM (Appendix M)

1. General
2. Footers
3. Flashing
4. Deck attachment
5. Girder support & spans
6. Joist spans & cantilevers
7. Floor decking
8. Post Height
9. Deck bracing
10. Stairs
11. Handrails, Guards and General
12. Ocean hazard areas



APPENDIX M WOOD DECKS

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(The provisions contained in this appendix are adopted as part of this code.)

SECTION AM101 GENERAL

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AM101.2 Deck design. Computer deck design programs are permitted to be accepted by the code official.

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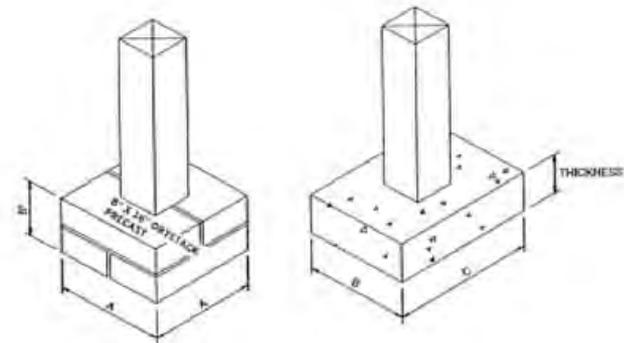


FIGURE AM102.1(1)
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—	16 x 24	100	—	8
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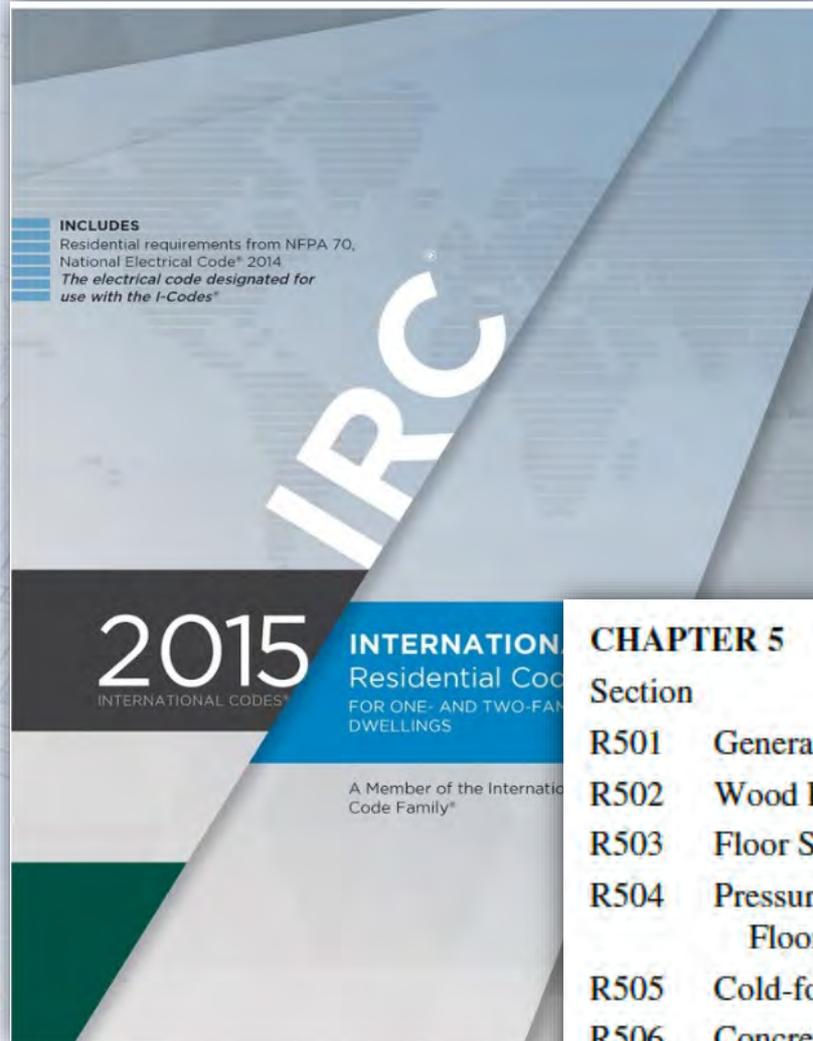
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b. Support post must rest in center one-third of footing.

c. Top of footing shall be level for full bearing support of post.

Chapter 5- IRC Decks (R507- 6 ½ pages)



Keeping
Appendix M
provision for now

CHAPTER 5 FLOORS.....	97
Section	
R501 General	97
R502 Wood Floor Framing	97
R503 Floor Sheathing	106
R504 Pressure Preservative-treated-wood Floors (On Ground)	108
R505 Cold-formed Steel Floor Framing (<u>Deleted</u>) ...	108
R506 Concrete Floors (On Ground).....	108
R507 Exterior Decks (<u>Deleted</u>) See Appendix M. . . .	108

Decks are considered Accessory Structures per R101.2.2 and Chapter 2

Are all decks regardless of size required to have permits/inspections?

Yes

R101.2.1 Accessory buildings. Accessory buildings with any dimension greater than 12 feet (3658 mm) shall meet the provisions of this code.

R101.2.2 Accessory structures. The following *accessory structures* shall meet the provisions of this code.

1. Decks, see Appendix M,
2. Gazebos,
3. Retaining walls, see Section R404.4,
4. Detached masonry chimneys located less than 10 feet (3048 mm) from other buildings or lot lines,
5. Swimming pools and spas, see Appendix V,
6. Detached carports,
7. *Docks, piers, bulkheads*, and waterway structures, see Section R327.

Exception: Portable, lightweight carports not exceeding 400 square feet (37 m²) or 12 feet (3658 mm) mean roof height.

ACCESSORY STRUCTURE. A structure that is not defined as an *accessory building*. Examples of accessory structures are fencing, decks, gazebos, arbors, retaining walls, barbecue pits, detached chimneys, playground equipment, yard art, *docks, piers*, etc.

Let's walk through appendix M and design/build a deck using the following:

Consumer wants an attached deck with the following requirements:

1. Deck is attached to the home and is 12'x16' (no roof).
2. Deck joists are perpendicular to the house and span is 12'.
3. There are 3 support posts being used.
4. Deck is 5' off grade (finished grade to walking deck surface).
5. There is one set of steps off the deck with an 8' span.
6. Minimum size drop double 2x girder?
7. Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?

Can I use the prescriptive appendix M deck code?



GENERAL

Appendix M Wood Decks

(Entire section is a NC amended appendix)

Section AM101

- **AM101.1 General.** A deck is an exposed exterior wood floor structure which may be attached to the structure or freestanding. **Roofed porches (open or screened-in) may be constructed using these provisions.**

1 Deck & Roof

Opened or screened-in



GENERAL

Know the limitations of Code



GENERAL

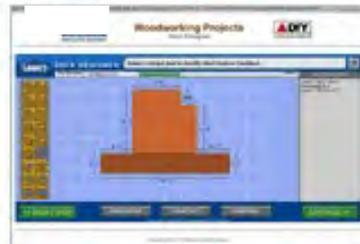
AM101.2 Deck design. Computer deck design conjunction with deck programs may be accepted by the Code Enforcement Official.



You are ready to launch the Deck Designer. Click the links to the right to create your dream deck. Loading the Deck Designer for the first time could take several minutes over a dialup connection. Please be patient.

[DESIGN YOUR DECK](#)

[BUILD YOUR DECK](#)



Appendix M

(doesn't mention but this applies)

Definition

DECK. An exterior floor system supported on at least two opposing sides by an adjoining structure or posts, piers, or other independent supports.

Protection of Wood (exterior deck)

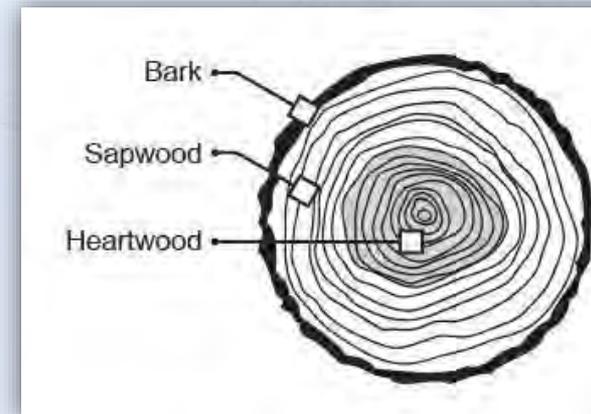
R317.1 Location required. Protection of wood and wood based products from decay shall be provided in the following locations by the use of naturally durable wood or wood that is preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use. Preservatives shall be listed in Section 4 of AWPA U1.

Definition

NATURALLY DURABLE WOOD. The heartwood of the following species with the exception that an occasional piece with corner sapwood is permitted if 90 percent or more of the width of each side on which it occurs is heartwood.

Decay resistant. Redwood, cedar, black locust and black walnut.

Termite resistant. Alaska yellow cedar, redwood, Eastern red cedar and Western red cedar including all sapwood of Western red cedar.



AWPA Use Categories

Use Categories are simply a system of classifying the hazards to which wood products are exposed. The higher the number/letter combination, the greater the potential for fungal decay and insect attack. When using treated wood, make sure it is treated to an AWPA Use Category equal to or higher than the intended application. For example, UC4A is higher than UC3B. Types of products in the three most common Use Categories are as follows:

UC3B Above Ground, Exposed: Usually deck boards, rails, siding, joists, etc.

UC4A Ground Contact, General Use: Soil, concrete, or fresh water contact items such as deck or fence posts, or some special heavy duty above ground applications like beams or girders.

UC4B Ground Contact, Heavy Duty: For structural members that are difficult and/or expensive to replace.

Joists

Currently Standardized Preservatives/Retentions

To help you find products treated in accordance with AWPA Standards, the following table shows the most common retentions for each AWPA Use Category. The listings are specific to Southern pine and Douglas-fir.

Code	Preservative Name	UC3B	UC4A	UC4B
ACQ	Alkaline Copper Quaternary, Types B or C	0.25	0.40	0.60
ACQ	Alkaline Copper Quaternary, Types A or D	0.15	0.40	0.60
CA-B	Copper Azole, Type B	0.10	0.21	0.31
CA-C	Copper Azole, Type C	0.060	0.15	0.31
CuN-W	Copper Naphthenate, Waterborne	0.070	0.11	---
CX-A	Copper HDO	0.206	---	---
EL2	DCOI-Imidicloprid plus stabilizer	0.019	---	---
PTI	Propiconazole-Tebuconazole-Imidicloprid	0.018	---	---
PTI	PTI plus Stabilizer	0.013	---	---

(The following end tag is not from a real product—it is presented to help you identify AWPA Standardized products.)

ECO-GREEN 9000
The Most Excellent Treated Wood On Earth.



0 123456 789010

ABC Wood Treating Corporation, Inc.
Anytown, USA (www.website.com)

AWPA U1 UC3B Above Ground, Exposed
0.27 EWP-A (Excellent Wood Preservative, Type A)

2 X 6 - 12 #1 SELECT SYP
See back of tag for important information

Agency Logo Here 

Appendix M

(doesn't mention but this applies)

Fasteners

R317.3 Fasteners and connectors in contact with preservative-treated and fire-retardant-treated wood. Fasteners, including nuts and washers, and connectors in contact with preservative-treated wood and fire-retardant-treated wood shall be in accordance with this section. The coating weights for zinc-coated fasteners shall be in accordance with **ASTMA153**. Stainless steel driven fasteners shall be in accordance with the material requirements of **ASTM F1667**.

R317.3.1 Fasteners for preservative-treated wood. Fasteners, including nuts and washers, for preservative treated wood shall be of **hot-dipped, zinc-coated galvanized steel, stainless steel, silicon bronze or copper**. **Coating types and weights** for connectors in contact with preservative-treated wood shall be in accordance with the connector manufacturer's recommendations. In the absence of manufacturer's recommendations, a minimum of ASTM A653 type G185 zinc-coated galvanized steel, or equivalent, shall be used.

Exceptions:

1. 1/2-inch-diameter (12.7 mm) or greater steel bolts.
2. Fasteners other than nails and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B695, Class 55 minimum.
3. Plain carbon steel fasteners in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment shall be permitted.

HOT-DIP GALVANIZING COATING DESIGNATION SYSTEM

ASTM A653 (2015a) uses a coating designation for hot-dip galvanizing that indicates the amount of galvanizing in ounces per square foot (oz/ft²) of surface area. For example, hardware designated as G185 has a galvanized coating that weighs 1.85 oz/ft² (the weight includes both surfaces of the coated material) and a minimum of 0.64 oz/ft² on one side because coatings are not always evenly distributed on both sides. Metal connectors are often stamped with the coating designation, but fasteners generally are not, so it is necessary to look at the packaging to determine the amount of galvanizing for fasteners.

ASTM A 653 Coating Designation	Minimum Coating Weight (oz/ft ²)		
	Triple Spot Test		Single Spot Test
	Average Total Both Sides	Average One Side	Total Both Sides
G210	2.10	0.72	1.80
G185	1.85	0.64	1.60
G165	1.65	0.56	1.40
G140	1.40	0.48	1.20
G115	1.15	0.40	1.00
G90	0.90	0.32	0.80
G60	0.60	0.20	0.50
G40	0.40	0.12	0.30
G30	0.30	0.10	0.25

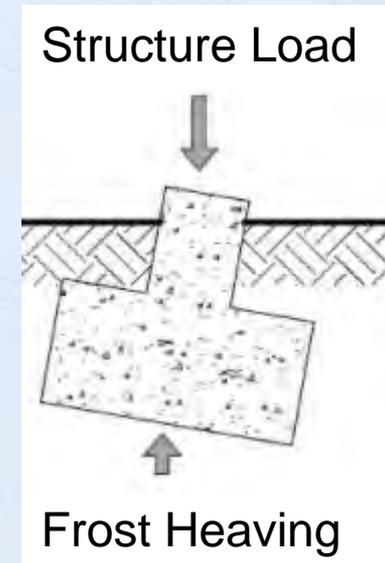


Section AM102

Footers

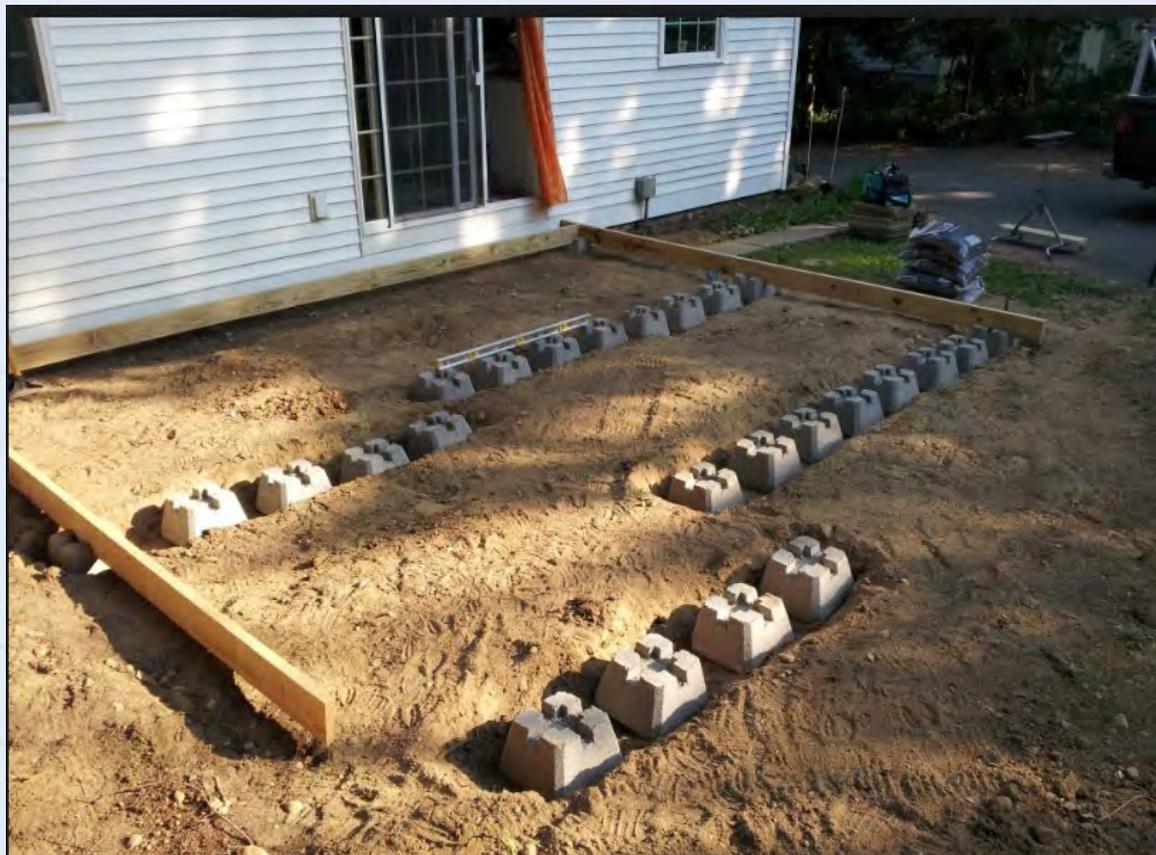
- **AM102.1 Footers.** Support post shall be supported by a minimum footing per **Figure AM102 and Table AM102.1** Minimum footing depth **shall be 12" below finished grade** per R403.1.4. **Tributary area** is calculated per Figure AM102.1.

Exterior footer
In the ground 12"

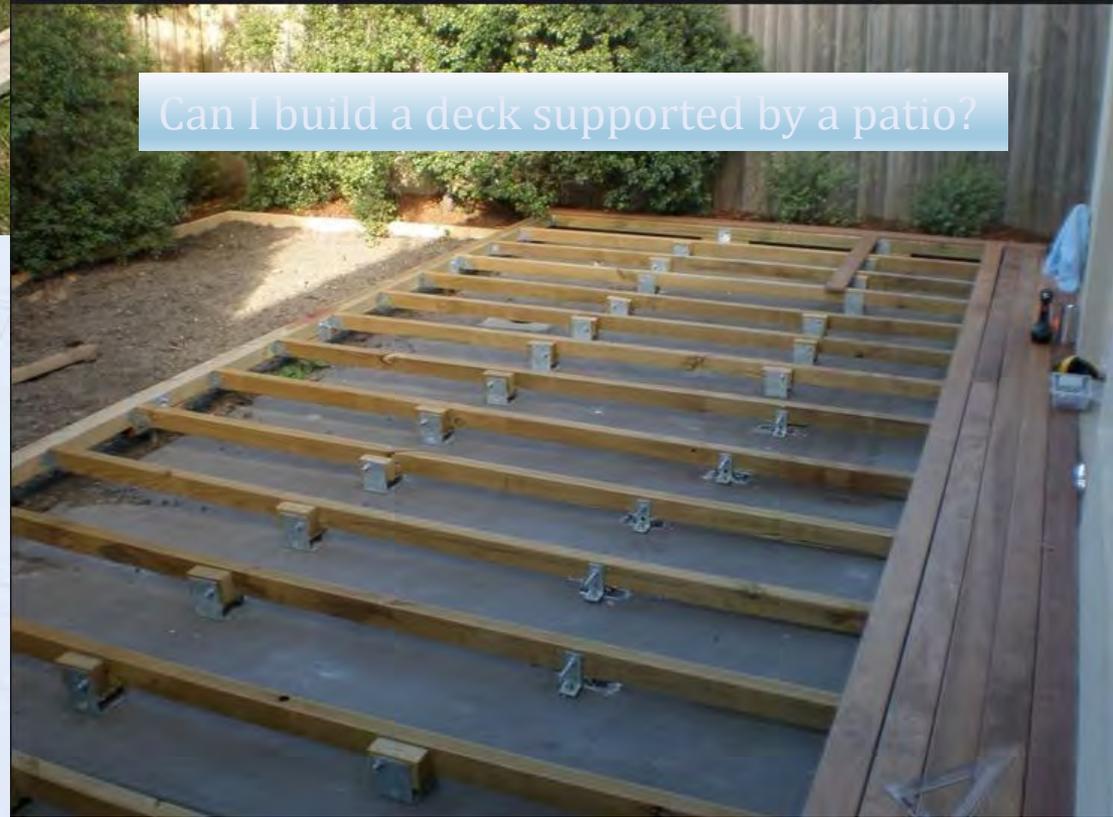


FOOTERS

Footer Depth



NORTH ELEV



What about decks on grade?

FOOTERS

Footing Table AM102.1

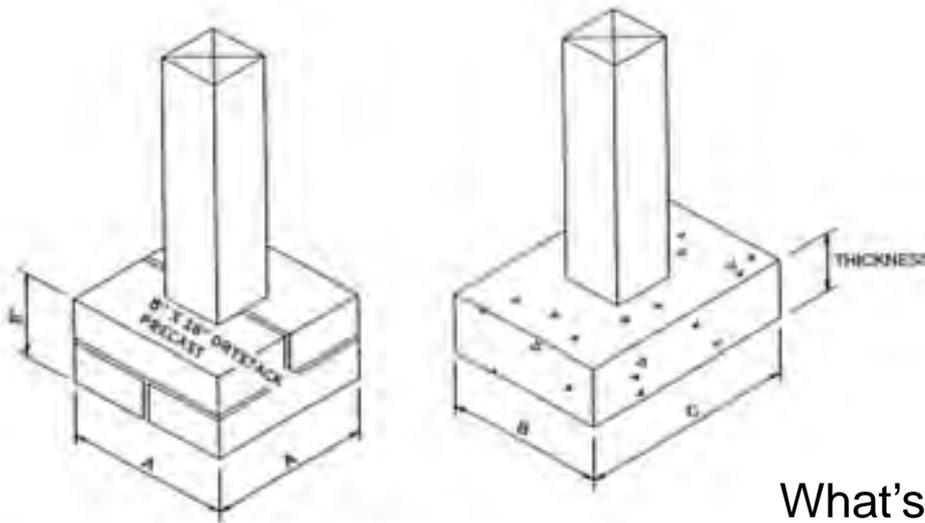


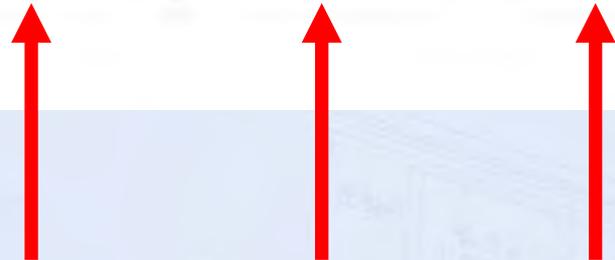
FIGURE AM102.1(1)
SUPPORT POST FOOTING

What's the advantage of a precast

TABLE AM102.1
FOOTING TABLE^{a, b, c}

SIZE (inches)		TRIBUTARY AREA (square foot)	THICKNESS (inches)	
A x A	B x C		Precast	Cast-In-Place
8 x 16	8 x 16	36	4	6
12 x 12	12 x 12	40	4	6
16 x 16	16 x 16	70	8	8
—	16 x 24	100	—	8
—	24 x 24	150	—	8

For all: 1 inch = 25.4 mm, 1 square foot = 0.0929 m².
 a. Footing values are based on single floor and roof loads.
 b. Support post must rest in center one-third of footing.
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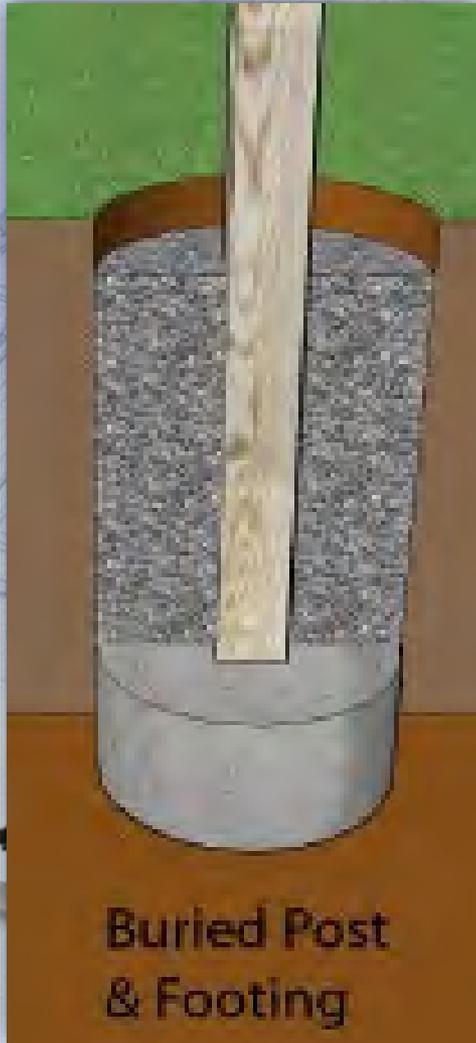


NORTH ELEVATION

FOOTERS

Footer Depth

Form Tubes- Can you use for decks?



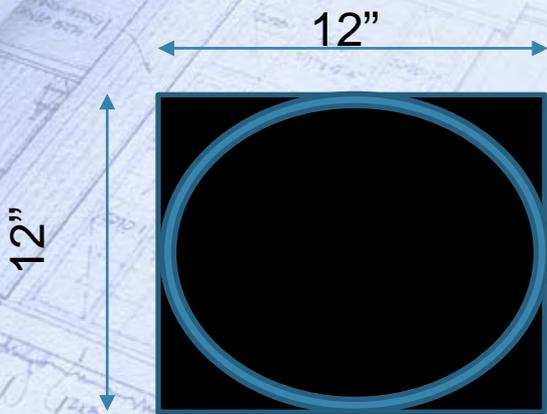
FOOTERS

Typical question

SIZE (inches)	
A x A	B x C
8 x 16	8 x 16
12 x 12	12 x 12
16 x 16	16 x 16
—	16 x 24

Question: Can I use a 12" round footer (Form tube) instead of the 12x12 footer indicated in Table AM102.1?

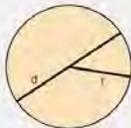
Answer: No, a 12" round footer doesn't have the same surface area as the prescriptive 12"x12" square footer.



However, if a larger form was used to give the same surface area it is possible.
 12x12 sq= 144 inches.

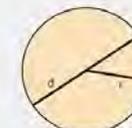


$$A = \pi r^2$$



Radius (r) 6 in
 Diameter (d) 12 in
 Area (A) 113.1 in²

Circle area = $\pi * r^2 = \pi * 36$ [inch²] \approx 113.1 [in²]
 $\pi \approx 3.14159265 \approx 3.14$
 $d = r * 2 = 6$ [inch] * 2 = 12 [inch]



Radius (r) 7 in
 Diameter (d) 14 in
 Area (A) 153.94 in²

Circle area = $\pi * r^2 = \pi * 49$ [inch²] \approx 153.94 [in²]
 $\pi \approx 3.14159265 \approx 3.14$
 $d = r * 2 = 7$ [inch] * 2 = 14 [inch]



NORTH ELEV

FOOTERS

Footing Table AM102.1

Watch the footnotes

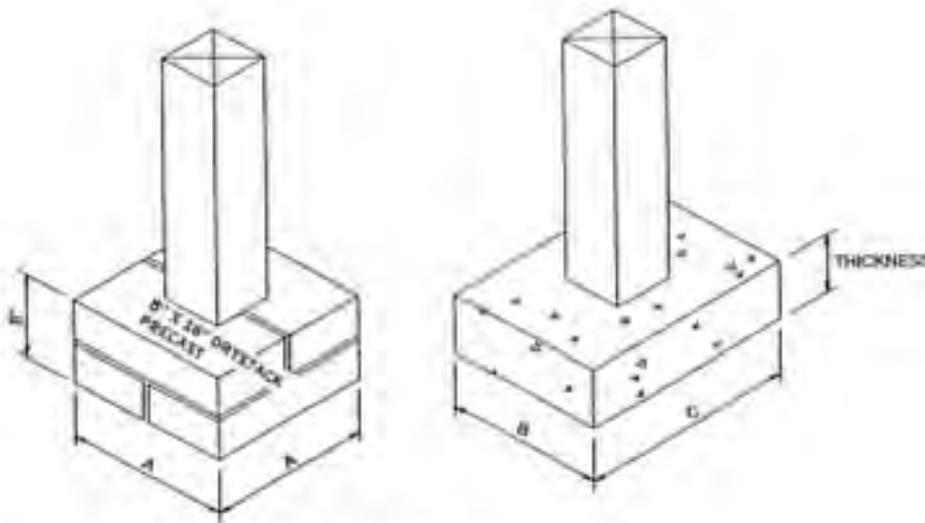


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SUPPORT POST FOOTING

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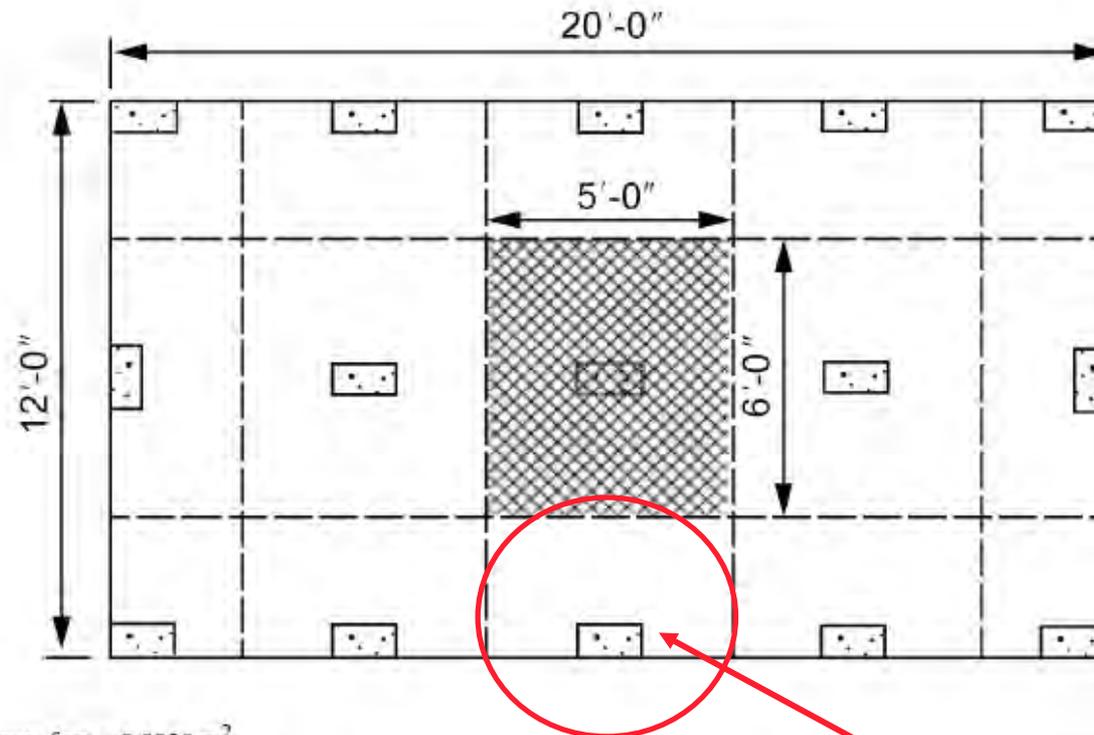


NORTH ELEV

Figure AM102.1

How to calculate tributary area

Half the span distance between bearing points each direction



For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m².

Note: Tributary area of shaded section on the free standing deck shown is 5' × 6' = 30 square feet (2.79 m²). Code will require a minimum footing of 8" × 16" (203 mm × 406 mm) in accordance with Table AM102.1.

FIGURE AM102.1(2)
CALCULATED TRIBUTARY AREA

What about
this one?

Deck design

TABLE AM102.1
FOOTING TABLE^{a, b, c}

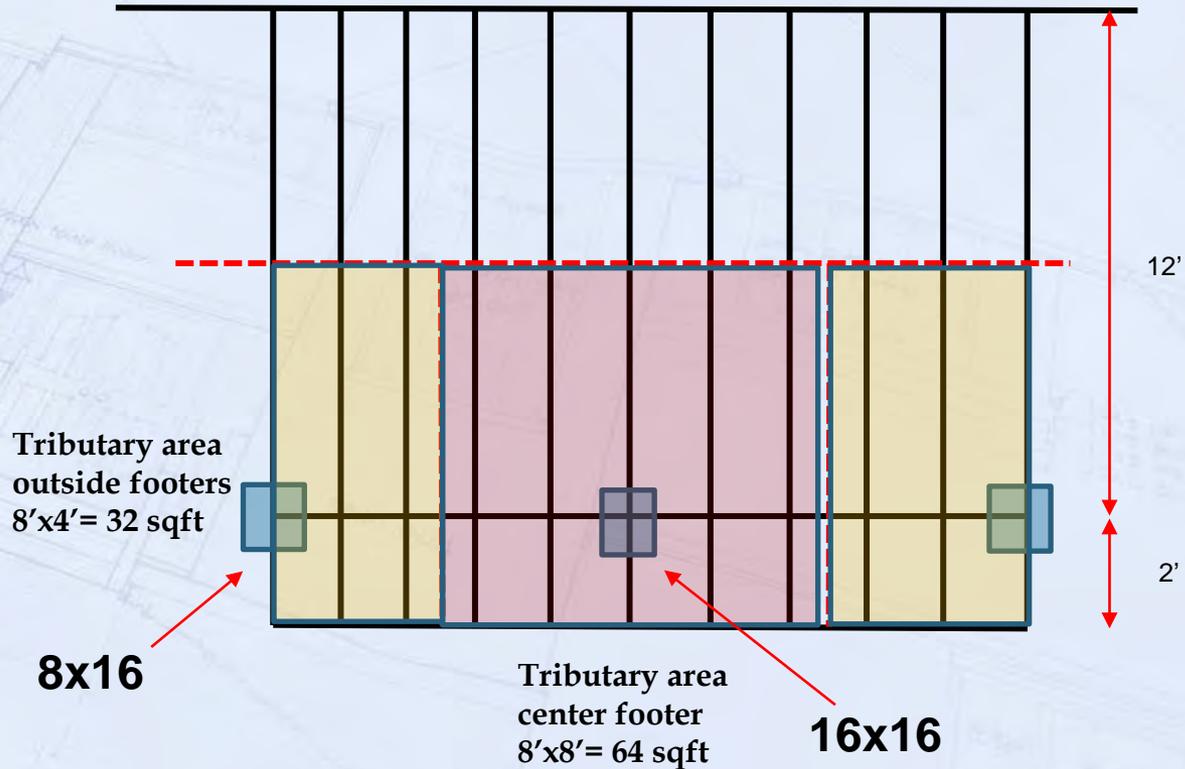
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—	24 x 24	150	—	8

Consumer wants an attached deck with the following requirements:

- Deck is attached to the home and is 12'x16'.
- Deck joists are perpendicular to the house and span is 12'.
- There are 3 support posts being used.
- Deck is 5' off grade (finished grade to walking deck surface).
- There is one set of steps off the deck with an 8' span.
- Minimum size drop double 2x girder spanning 8'?
- Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?
- Vinyl siding house, non-treated house band.

Band attached to house

What size footers are needed?



NORTH ELEV

Section AM103 (2 methods indicated)

Flashing

- **AM103.1 Flashing.** When attached to a structure, the structure to which attached shall have a **treated wood band** for the length of the deck, or **corrosion-resistant flashing** shall be used to prevent moisture from coming in contact with the untreated framing of the structure. **Aluminum flashing** shall not be used in conjunction with deck construction. The deck band and the structure band shall be constructed in contact with each other except on brick veneer structures and where plywood sheathing is required and properly flashed. **Siding shall** not be installed between the structure and the deck band. If attached to a brick structure, neither the flashing nor a treated band for brick structure is required. In addition, the treated deck band shall be constructed in contact with the brick veneer. Flashing shall be installed per **Figure AM103**.



No Z or Cap Flashing mentioned

Flashing

Figure AM103

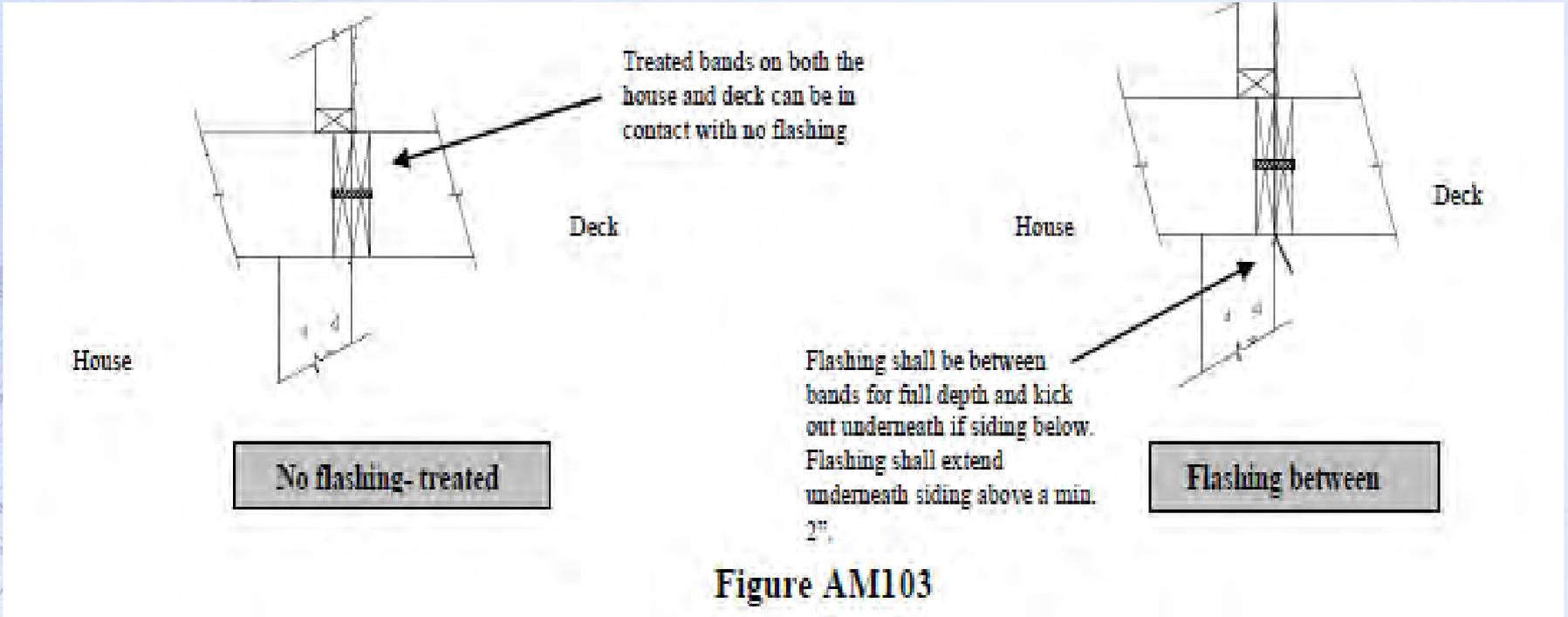


Figure AM103



Flashing



**Cannot use
aluminum flashing**

Flashing



Basement home with deck flashing installed behind siding under band

Section AM104

Deck attachment

AM104.1 Deck Attachment. When a deck is supported at the structure by attaching the deck to the structure, the following attachment schedules shall apply for attaching the deck band to the structure.

4 Methods- The first two are table options

All types except Brick veneer

Table AM104.1(1)

Brick Veneer Attachment

Table AM104.1(2)



Table AM104.1(1)

TABLE AM104.1(1)
DECK ATTACHMENT FOR ALL STRUCTURES EXCEPT BRICK VENEER

FASTENERS	8' MAX JOIST SPAN ^a	16' MAX JOIST SPAN ^a
5/8" Hot-dip galvanized bolts with nut and washer ^b and 12d Common hot-dip galvanized nails ^c	1 @ 3'-6" o.c. and 2 @ 8" o.c.	1 @ 1'-8" o.c. and 3 @ 6" o.c.
OR		
Self-drilling screw fastener ^d	12" o.c. staggered	6" o.c. staggered

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

- a. Attachment interpolation between 8 foot and 16 foot joists span is allowed.
- b. Minimum edge distance for bolts is 2 1/2 inches.
- c. Nails must penetrate the supporting structure band a minimum of 1 1/2 inches.
- d. Self-drilling screw fastener having a minimum shank diameter of 0.195 inches and a length long enough to penetrate through the supporting structure band. The structure band shall have a minimum depth of 1 1/8 inches. Screw shall be evaluated by an approved testing agency for allowable shear load for Southern Pine to Southern Pine lumber of 250 pounds and shall have a corrosion-resistant finish equivalent to hot dip galvanized. Minimum edge distance for screws is 1 7/16 inches. A maximum of 1/2 inch thick wood structural panel is permitted to be located between the deck ledger and the structure band.



The delayed effective date of this Rule is January 1, 2015.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

Table AM104.1(2)

TABLE AM104.1(2)
DECK ATTACHMENT FOR BRICK VENEER STRUCTURES

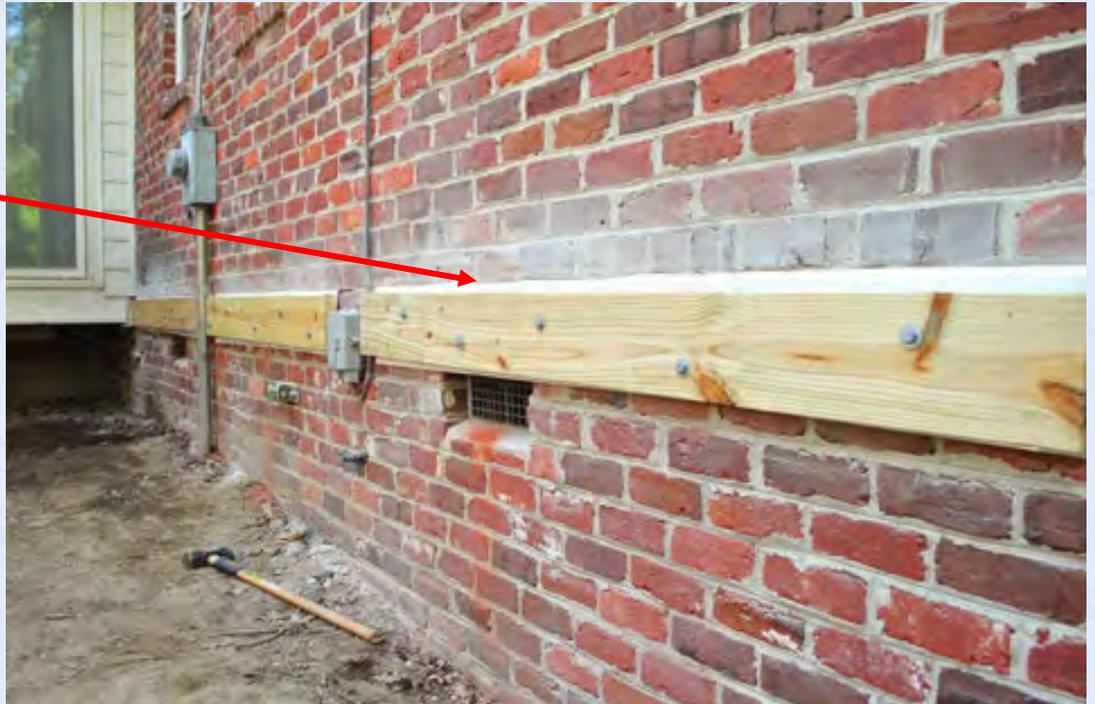
FASTENERS	8' MAX JOIST SPAN ^a	16' MAX JOIST SPAN ^a
5/8" Hot-dip galvanized bolts with nut and washer ^b	1 @ 2'-4" o.c.	1 @ 1'-4" o.c.

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

- a. Attachment interpolation between 8 foot and 16 foot joist span is allowed.
- b. Minimum edge distance for bolts is 2 1/2 inches.



Is flashing required?



Attachment



- **AM104.1.3 Masonry Ledge Support.** If the deck band is supported by a minimum of $\frac{1}{2}$ " masonry ledge along the foundation wall, $\frac{5}{8}$ inch hot dipped galvanized bolts with washers spaced at 48 inches o.c. may be used for support.

House

Deck

Cannot sit on
brick veneer



- **AM104.1.4 Other means of support.** Joist hangers or other means of attachment may be connected to house band and **shall be properly flashed.**



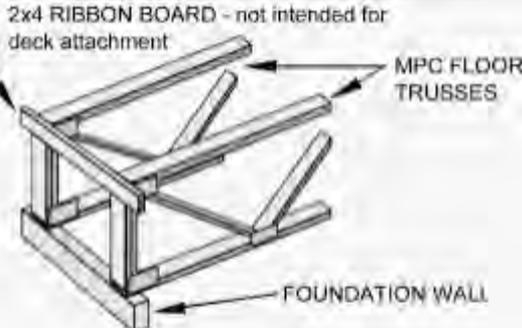
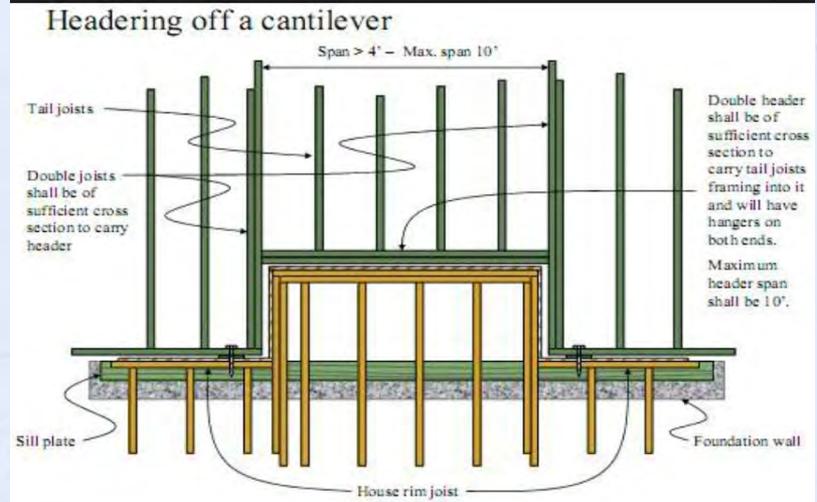
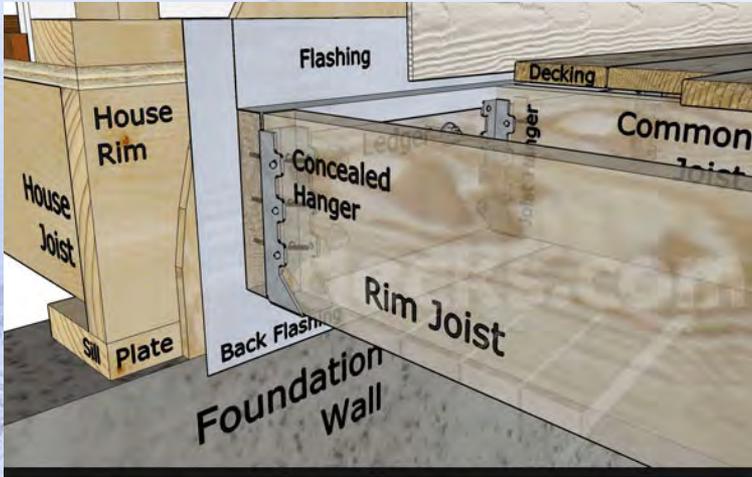
Possible option

Hangers attached directly to house band and band is either treated or flashing is applied to protect band



Attachment

Typical Attachment Concerns



Attachment

Engineered alternates are allowed if installed correctly



Deck design

TABLE AM104.1(1)
DECK ATTACHMENT FOR ALL STRUCTURES EXCEPT BRICK VENEER

FASTENERS	8' MAX JOIST SPAN ^a	16' MAX JOIST SPAN ^a
5/8" Hot-dip galvanized bolts with nut and washer ^b and 12d Common hot-dip galvanized nails ^c	1 @ 3'-6" o.c. and 2 @ 8" o.c.	1 @ 1'-8" o.c. and 3 @ 6" o.c.
OR		
Self-drilling screw fastener ^d	12" o.c. staggered	6" o.c. staggered

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

a. Attachment interpolation between 8 foot and 16 foot joists span is allowed.

b. Minimum edge distance for bolts is 2 1/2 inches.

c. Nails must penetrate the supporting structure band a minimum of 1 1/2 inches.

d. Self-drilling screw fastener having a minimum shank diameter of 0.195 inches and a length long enough to penetrate through the supporting structure band. The structure band shall have a minimum depth of 1 1/4 inches. Screw shall be evaluated by an approved testing agency for allowable shear load for Southern Pine to Southern Pine Lumber of 250 pounds and shall have a corrosion-resistant finish equivalent to hot dip galvanized. Minimum edge distance for screws is 1 1/16 inches. A maximum of 1/2 inch thick wood structural panel is permitted to be located between the deck ledger and the structure band.

Consumer wants an attached deck with the following requirements:

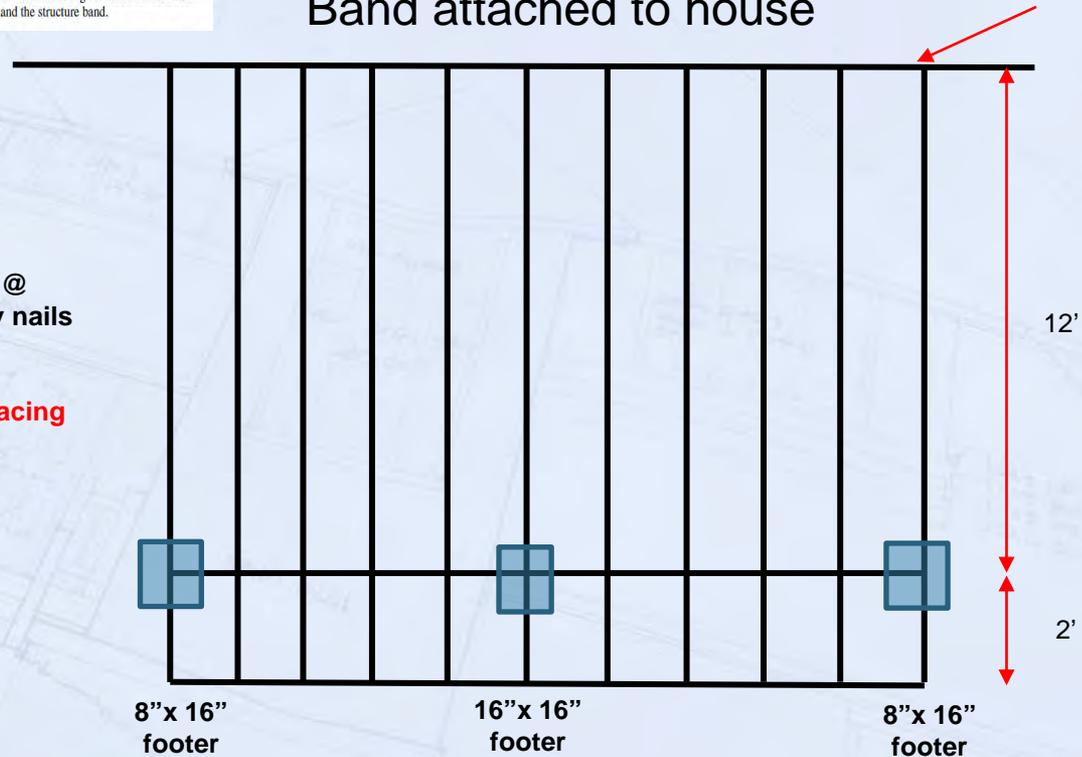
- Deck is attached to the home and is 12'x16'.
- Deck joists are perpendicular to the house and span is 12'.
- There are 3 support posts being used.
- Deck is 5' off grade (finished grade to walking deck surface).
- There is one set of steps off the deck with an 8' span.
- Minimum size drop double 2x girder spanning 8'?
- Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?
- Vinyl siding house, non-treated house band.

Galvanized flashing
between deck and
house bands

Band attached to house

Attachment & Flashing?

- 5/8" through bolts 1 @ 16" o.c. with 12d galv nails 2 @ 6" o.c., **or**
- Self drilling screws staggered 6" o.c. spacing**



NORTH ELEV

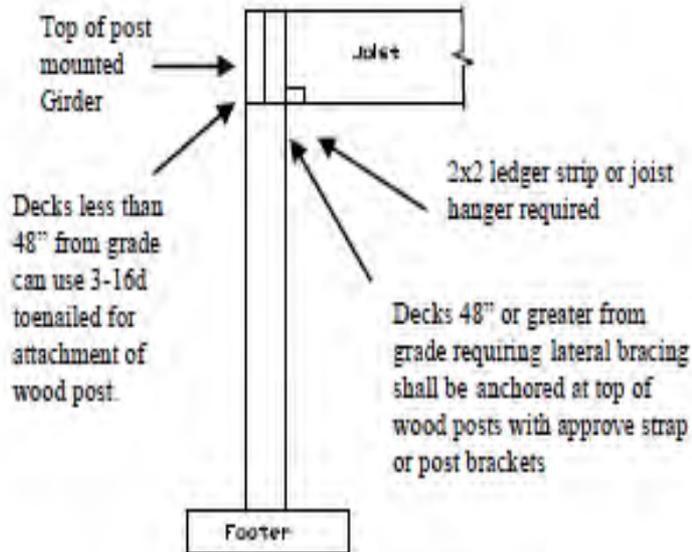
Girders

Section AM105

GIRDER SUPPORT AND SPAN

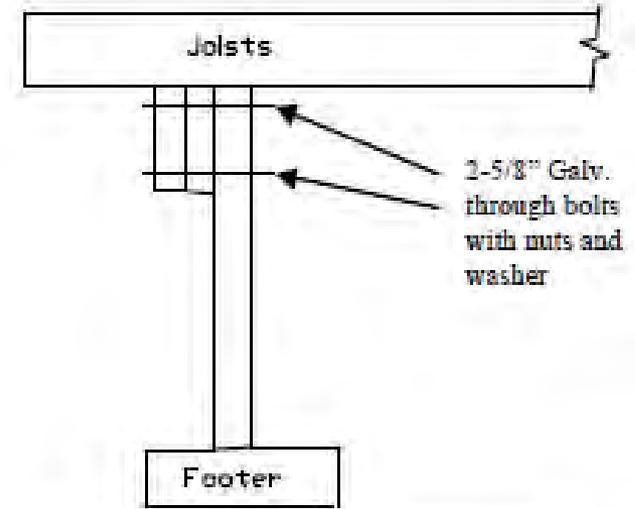
AM105.1 General. Girders shall bear **directly on the support post** with the post attached at top to prevent lateral displacement **or** be connected to the **side of the posts** with two 5/8 inch (16 mm) hot dip galvanized bolts with nut and washer **with one of the methods shown in Table AM105.1**. Girder support is permitted to be installed in accordance with Figure AM105.1(1) for top mount; Figure AM105.1(2) for side mount and Figure AM105.1(3) for split girders. See Figure AM105.1(4) for cantilevered girders.

2 connection options
4 installation options



Top mount/flush

Figure AM105.1(1)



Side mount dropped girder

Figure AM105.1(2)

Side of post Girder connection

New Table

Table AM105.1 Girder Connection to Side of Post

<u>Maximum Girder Thickness</u>		
<u>Any</u>	<u>3" (Double 2X)</u>	<u>1-1/2" (Single 2X)</u>
<u>Two 5/8" diameter bolts¹</u>	<u>Four 6" long screws²</u>	<u>Three 4" long screws²</u>

1. Bolts shall be hot dip galvanized through bolts with nut and washer

2. Screws shall be hot dipped galvanized self-drilling screw fastener having a minimum diameter of 0.270", staggered so that the screws are not in a line, and having a minimum edge distance of 1-1/2 inches.

The delayed effective date of this Rule is January 1, 2020.

The Statutory authority for Rule-making is G. S. 143-136; 143-138.

Girders

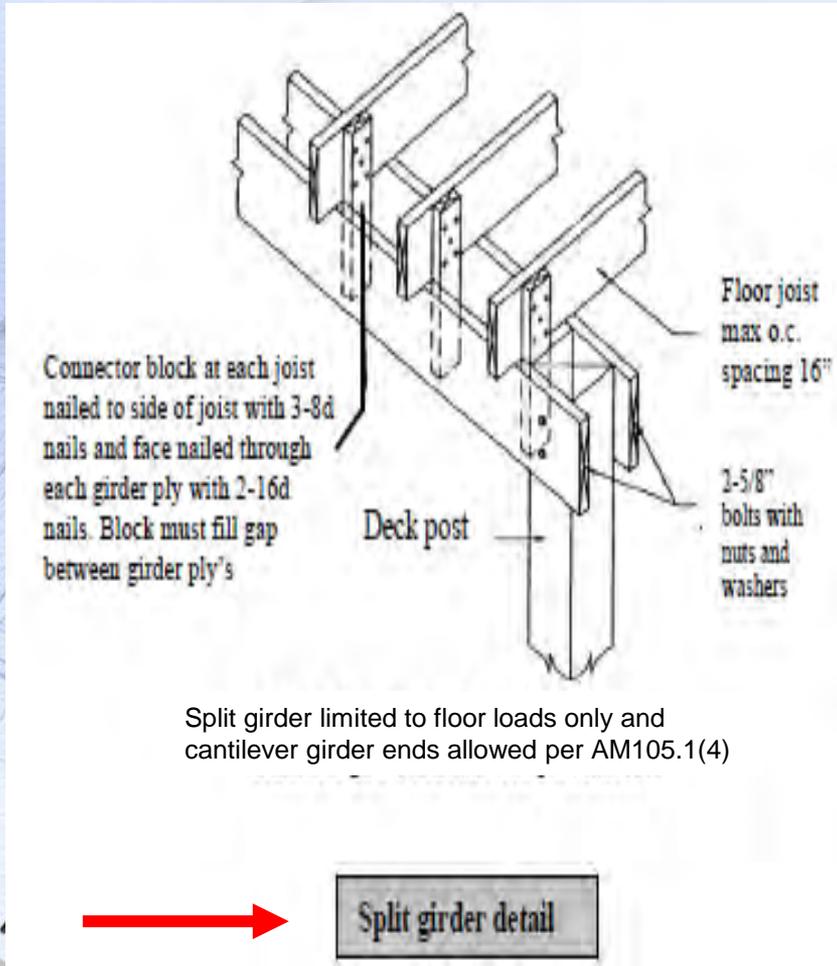


Figure AM105.1(3)

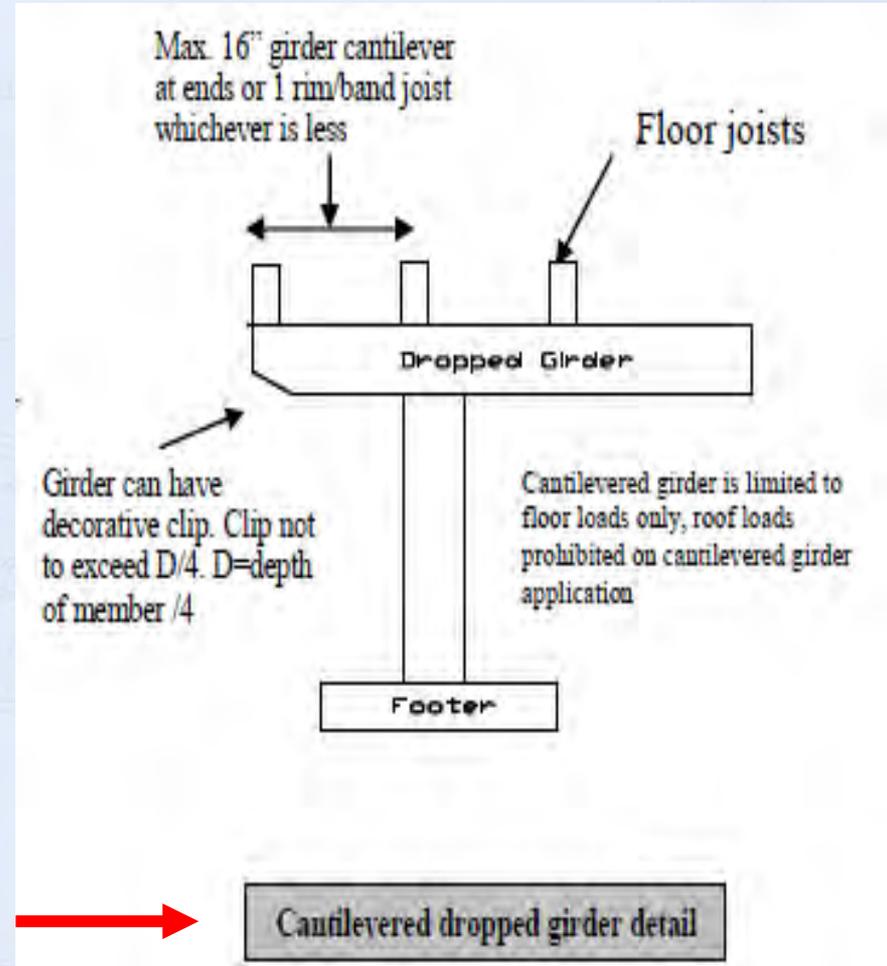


Figure AM105.1(4)

Girders

No Roof

AM105.2 Girder span for uncovered porches and decks.

Maximum allowable spans for wood deck girders, as shown in **Figure AM105.2**, shall be in accordance with **Table AM105.2**. Girder plies shall be fastened with two rows of 10d (3-inch \times 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Girders shall be permitted to cantilever at each end up to one-fourth of the actual beam span. **Splices** of multi span beams shall be located at interior post locations.

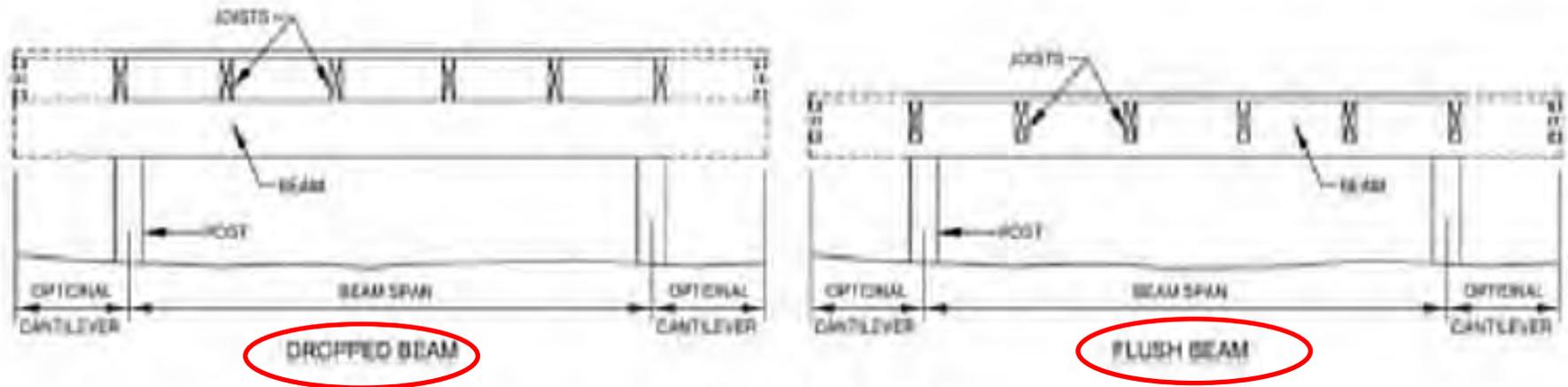


FIGURE AM105.2
TYPICAL DECK GIRDER SPANS

**Conflict with AM105.2
Cantilever Girder and
Figure AM105.1(4)**

Let's look at the table for no roof applications

Girders

No Roof

TABLE AM105.2
DECK GIRDER SPAN LENGTHS^{a, b}
(feet – inches)

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

b. Girders supporting deck joists from one side only.

c. No. 2 grade, wet service factor.

d. Girder 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.

Girders

With Roof

AM105.3 Girder span for roofed porches and decks.

Girder spans for covered decks shall be in accordance with **Tables R602.7(1) and (2).**

TABLE R602.7(1)
GIRDER SPANS^a AND HEADER SPANS^a FOR EXTERIOR BEARING WALLS
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf) ^e																	
		30						50						70					
		Building width ^c (feet)																	
		20		28		36		20		28		36		20		28		36	
Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d
Roof and ceiling	1-2 x 8	4-6	1	3-10	1	3-5	1	3-9	1	3-2	1	2-10	2	—	—	—	—	—	—
	1-2 x 10	5-8	1	4-11	1	4-4	1	4-9	1	4-1	1	3-7	2	—	—	—	—	—	—
	1-2 x 12	6-11	1	5-11	2	5-3	2	5-9	2	4-8	2	3-8	2	—	—	—	—	—	—
	2-2 x 4	3-6	1	3-2	1	2-10	1	3-2	1	2-9	1	2-6	1	2-10	1	2-6	1	2-3	1
	2-2 x 6	5-5	1	4-8	1	4-2	1	4-8	1	4-1	1	3-8	2	4-2	1	3-8	2	3-3	2
	2-2 x 8	6-10	1	5-11	2	5-4	2	5-11	2	5-2	2	4-7	2	5-4	2	4-7	2	4-1	2
	2-2 x 10	8-5	2	7-3	2	6-6	2	7-3	2	6-3	2	5-7	2	6-6	2	5-7	2	5-0	2
	2-2 x 12	9-9	2	8-5	2	7-6	2	8-5	2	7-3	2	6-6	2	7-6	2	6-6	2	5-10	3
	3-2 x 8	8-4	1	7-5	1	6-8	1	7-5	1	6-5	2	5-9	2	6-8	1	5-9	2	5-2	2
	3-2 x 10	10-6	1	9-1	2	8-2	2	9-1	2	7-10	2	7-0	2	8-2	2	7-0	2	6-4	2
	3-2 x 12	12-2	2	10-7	2	9-5	2	10-7	2	9-2	2	8-2	2	9-5	2	8-2	2	7-4	2
	4-2 x 8	9-2	1	8-4	1	7-8	1	8-4	1	7-5	1	6-8	1	7-8	1	6-8	1	5-11	2
	4-2 x 10	11-8	1	10-6	1	9-5	2	10-6	1	9-1	2	8-2	2	9-5	2	8-2	2	7-3	2
	4-2 x 12	14-1	1	12-2	2	10-11	2	12-2	2	10-7	2	9-5	2	10-11	2	9-5	2	8-5	2

Girders

Continued

AM105.3 Girder span for roofed porches and decks.

Girder spans for covered decks shall be in accordance with Tables R602.7(1) and (2).

With Roof

TABLE R602.7(2)
GIRDER SPANS^a AND HEADER SPANS^a FOR INTERIOR BEARING WALLS
 (Maximum spans for Douglas fir-larch, hem-flr, southern pine and spruce-pine-flr^b and required number of jack studs)

HEADERS AND GIRDERS SUPPORTING	SIZE	BUILDING Width ^c (feet)					
		20		28		36	
		Span	NJ ^d	Span	NJ ^d	Span	NJ ^d
One floor only	2-2 × 4	3-1	1	2-8	1	2-5	1
	2-2 × 6	4-6	1	3-11	1	3-6	1
	2-2 × 8	5-9	1	5-0	2	4-5	2
	2-2 × 10	7-0	2	6-1	2	5-5	2
	2-2 × 12	8-1	2	7-0	2	6-3	2
	3-2 × 8	7-2	1	6-3	1	5-7	2
	3-2 × 10	8-9	1	7-7	2	6-9	2
	3-2 × 12	10-2	2	8-10	2	7-10	2
	4-2 × 8	9-0	1	7-8	1	6-9	1
	4-2 × 10	10-1	1	8-9	1	7-10	2
	4-2 × 12	11-9	1	10-2	2	9-1	2
Two floors	2-2 × 4	2-2	1	1-10	1	1-7	1
	2-2 × 6	3-2	2	2-9	2	2-5	2
	2-2 × 8	4-1	2	3-6	2	3-2	2
	2-2 × 10	4-11	2	4-3	2	3-10	3
	2-2 × 12	5-9	2	5-0	3	4-5	3
	3-2 × 8	5-1	2	4-5	2	3-11	2
	3-2 × 10	6-2	2	5-4	2	4-10	2
	3-2 × 12	7-2	2	6-3	2	5-7	3
	4-2 × 8	6-1	1	5-3	2	4-8	2
	4-2 × 10	7-2	2	6-2	2	5-6	2
	4-2 × 12	8-4	2	7-2	2	6-5	2

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

a. Spans are given in feet and inches.

b. No. 1 or better grade lumber shall be used for southern pine. Other tabulated values assume #2 grade lumber.

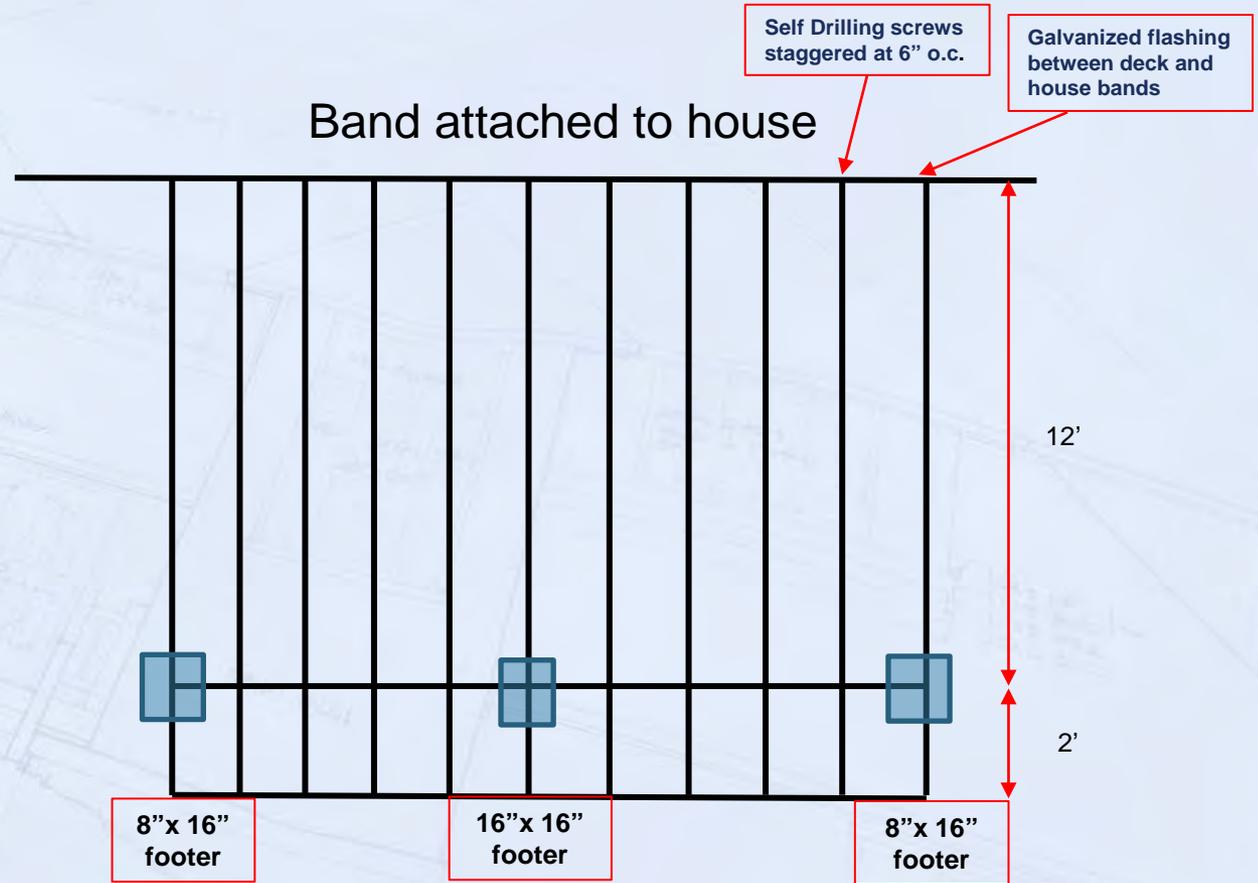
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

Deck design

Consumer wants an attached deck with the following requirements:

1. Deck is attached to the home and is 12'x16'.
2. Deck joists are perpendicular to the house and span is 12'.
3. There are 3 support posts being used.
4. Deck is 5' off grade (finished grade to walking deck surface).
5. There is one set of steps off the deck with an 8' span.
6. Minimum size drop double 2x girder spanning 8'?
7. Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?
8. Vinyl siding house, non-treated house band.



Girder Span & Support

Remember no roof. What is the size of the girder I can use in this application, what about the size of the post 4x4 or 6x6?



NORTH ELEVATION

SECTION AM106 JOIST SPANS AND CANTILEVERS

AM106.1 Joist spans for uncovered porches and decks.

Maximum allowable spans for wood deck joists, as shown in **Figure AM106.1**, shall be in accordance with **Table AM106.1**. Deck **joists** shall be permitted to **cantilever not greater than one-fourth of the actual, adjacent joist span.**

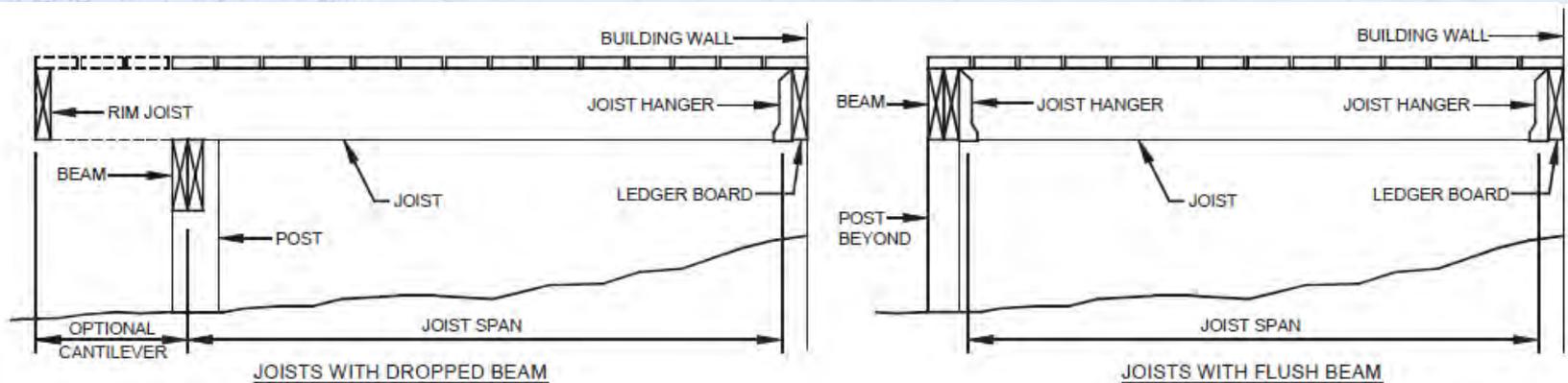


FIGURE AM106.1
TYPICAL DECK JOIST SPANS

TABLE AM106.1
DECK JOIST SPANS FOR COMMON LUMBER SPECIES^f
(feet - inches)

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, $L/\Delta = 360$.

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

d. Includes incising factor.

e. Northern species with no incising factor.

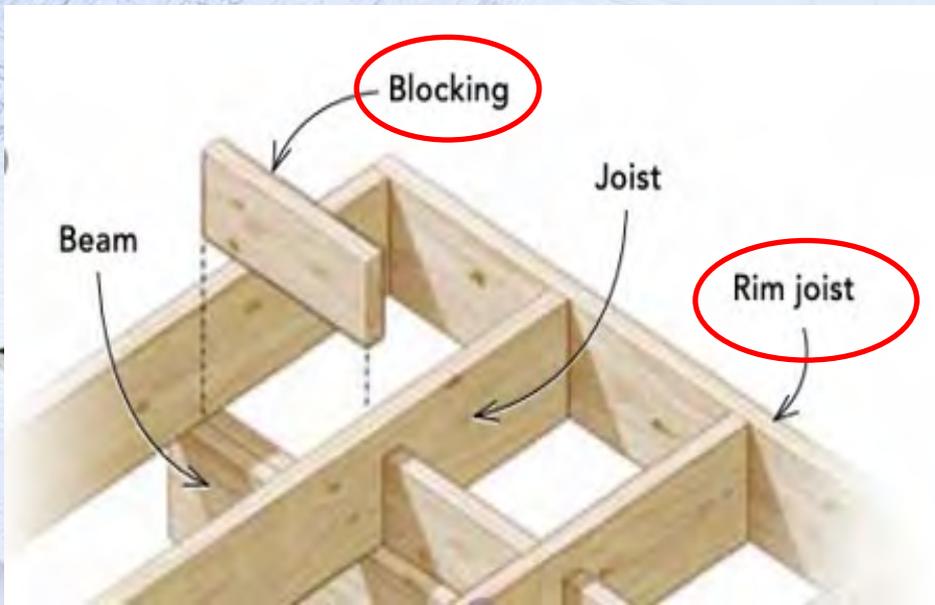
f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

Joist

No Roof

AM106.1.1 Lateral restraint at supports.

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 joists**, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not less than (3) 10d (3-inch \times 0.128-inch) nails or (3) No. 10 \times 3-inch (76 mm) long wood screws.



Joist

With Roof

AM106.2.Roofed porches and decks.

Joists spans shall be in accordance with **Table R502.3.1(2)** with 40-pounds per square-foot live load and 10-pounds per-square-foot dead load. Cantilevered floor joists shall be in accordance with Table R502.3.3(1).

TABLE R502.3.1(2)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
 (Residential living areas, live load = 40 psf, $L/\Delta = 360$)^b

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf				
			2 x 6	2 x 8	2 x 10	2 x 12	2 x 6	2 x 8	2 x 10	2 x 12	
			Maximum floor joist spans								
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
12	Douglas fir-larch	SS	11-4	15-0	19-1	23-3	11-4	15-0	19-1	23-3	
	Douglas fir-larch	#1	10-11	14-5	18-5	22-0	10-11	14-2	17-4	20-1	
	Douglas fir-larch	#2	10-9	14-2	18-0	20-11	10-8	13-6	16-5	19-1	
	Douglas fir-larch	#3	8-11	11-3	13-9	16-0	8-1	10-3	12-7	14-7	
	Hem-fir	SS	10-9	14-2	18-0	21-11	10-9	14-2	18-0	21-11	
	Hem-fir	#1	10-6	13-10	17-8	21-6	10-6	13-10	17-1	19-10	
	Hem-fir	#2	10-0	13-2	16-10	20-4	10-0	13-1	16-0	18-6	
	Hem-fir	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3	
	Southern pine	SS	11-2	14-8	18-9	22-10	11-2	14-8	18-9	22-10	
	Southern pine	#1	10-9	14-2	18-0	21-11	10-9	14-2	16-11	20-1	
	Southern pine	#2	10-3	13-6	16-2	19-1	9-10	12-6	14-9	17-5	
	Southern pine	#3	8-2	10-3	12-6	14-9	7-5	9-5	11-5	13-6	
	Spruce-pine-fir	SS	10-6	13-10	17-8	21-6	10-6	13-10	17-8	21-6	
	Spruce-pine-fir	#1	10-3	13-6	17-3	20-7	10-3	13-3	16-3	18-10	
	Spruce-pine-fir	#2	10-3	13-6	17-3	20-7	10-3	13-3	16-3	18-10	
Spruce-pine-fir	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3		

Joist

With Roof

AM106.2. Roofed porches and decks.

Joists spans shall be in accordance with Table R502.3.1(2) with 40 pounds per square-foot live load and 10-pounds per-square-foot dead load. **Cantilevered floor joists** shall be in accordance with **Table R502.3.3(1)**.

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)

MEMBER & SPACING	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		
	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.

- Tabulated values are for clear-span roof supported solely by exterior bearing walls.
- Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, and spruce-pine-fir for repetitive (three or more) members. No.1 or better shall be used for southern pine or spans shall be multiplied by 0.85 for No. 2 southern pine.
- Ratio of backspan to cantilever span shall be not less than 3:1.
- Connections capable of resisting the indicated uplift force shall be provided at the backspan support.
- 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).
- See Section R301.2.2.2.5, Item 1, for additional limitations on cantilevered floor joists for townhouses in Seismic Design Category 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. Where the cantilever length is 24 inches or less, solid blocking at the support for the cantilever shall not be required.
- Linear interpolation shall be permitted for building widths and ground snow loads other than shown.

What issues do you see in the photo



Deck design

TABLE AM106.1
DECK JOIST SPANS FOR COMMON LUMBER SPECIES¹
(feet - inches)

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

Consumer wants an attached deck with the following requirements:

- Deck is attached to the home and is 12'x16'.
- Deck joists are perpendicular to the house and span is 12'.
- There are 3 support posts being used.
- Deck is 5' off grade (finished grade to walking deck surface).
- There is one set of steps off the deck with an 8' span.
- Minimum size drop double 2x girder spanning 8'?
- Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?
- Vinyl siding house, non-treated house band.

Self Drilling screws
staggered at 6" o.c.

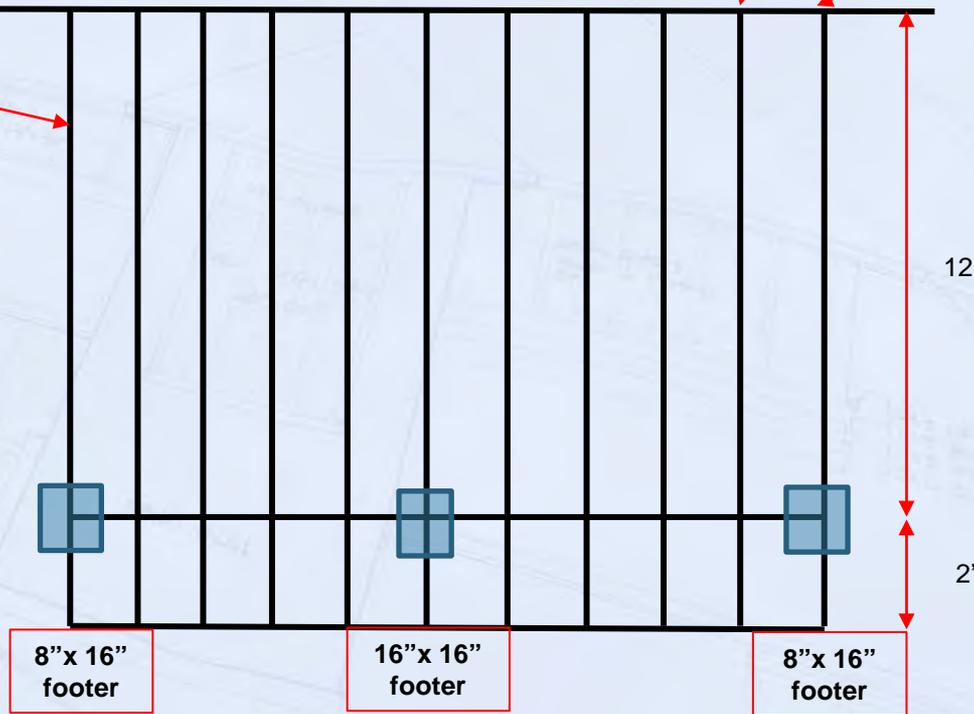
Galvanized flashing
between deck and
house bands

Band attached to house

Joist

- What minimum size joists that must be used in this application?
- Is blocking required at bearing locations?

2x10's



NORTH ELEV

Decking

SECTION AM107 FLOOR DECKING

AM107.1 Floor decking. Floor decking shall be **No. 2 grade treated Southern Pine** or equivalent. The minimum floor decking thickness shall be in accordance with Table AM107.1.

**TABLE AM107.1
FLOOR DECKING THICKNESS**

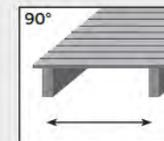
SPACING	DECKING (nominal)
12" o.c.	1" S4S
16" o.c.	1" T&G
19.2" o.c.	1 ¹ / ₄ " S4S
24"-36" o.c.	2" S4S

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

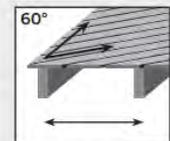


CODE COMPLIANCE

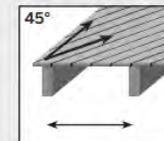
ADJUST JOIST SPACING TO ACCOMMODATE ANGLED DECKING PATTERNS



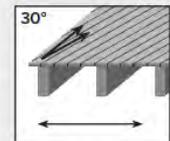
Perpendicular to joists.
See chart below.



At a 60° angle, maximum
joist spanning is 2"
(51 mm) less than listed in
the chart below.



At a 45° angle, maximum
joist spanning is 4"
(102 mm) less than listed
in the chart below.



At a 30° angle, maximum
joist spanning is 1/2 of
the distance listed in the
chart below.

Alternate
products per
manufacturers
instructions

Post

SECTION AM108 POST HEIGHT

AM108.1 Post height. Maximum height of deck support posts shall be in accordance with **Table AM108.1.**

**TABLE AM108.1
DECK SUPPORT POST HEIGHT**

POST SIZE ^a	MAXIMUM POST HEIGHT ^{b, c}
4" × 4"	8'-0"
6" × 6"	20'-0"

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

- a. This table is based on No. 2 Southern Pine posts.
- b. From top of footing to bottom of girder.
- c. Decks with post heights exceeding these requirements shall be designed by a registered design professional.



Deck design

TABLE AM108.1
DECK SUPPORT POST HEIGHT

POST SIZE ^a	MAXIMUM POST HEIGHT ^{b, c}
4" x 4"	8'-0"
6" x 6"	20'-0"

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

a. This table is based on No. 2 Southern Pine posts.

b. From top of footing to bottom of girder.

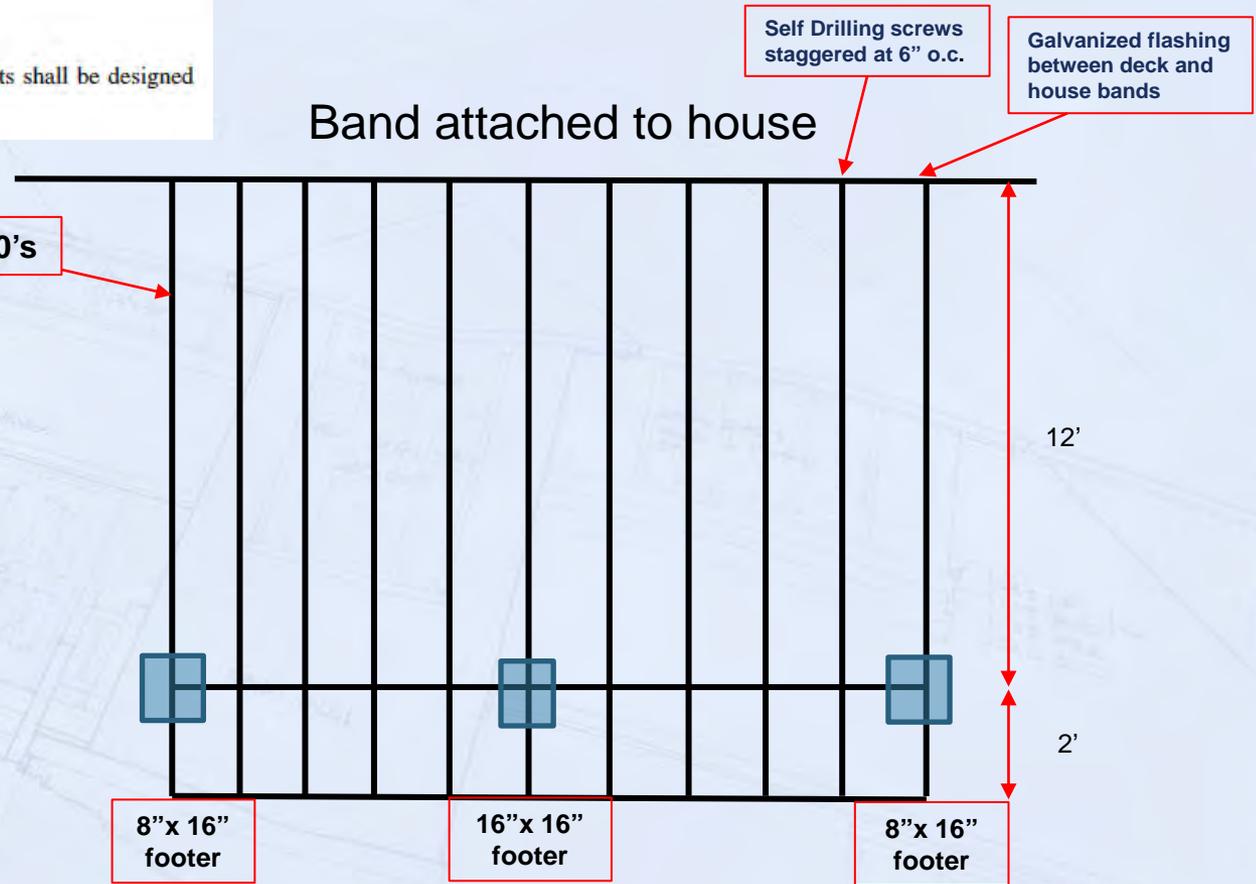
c. Decks with post heights exceeding these requirements shall be designed by a registered design professional.

Consumer wants an attached deck with the following requirements:

- Deck is attached to the home and is 12'x16'.
- Deck joists are perpendicular to the house and span is 12'.
- There are 3 support posts being used.
- Deck is 5' off grade (finished grade to walking deck surface).
- There is one set of steps off the deck with an 8' span.
- Minimum size drop double 2x girder spanning 8'?
- Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?
- Vinyl siding house, non-treated house band.

- Decking required thickness?
- What size post is needed?

Band attached to house



Bracing

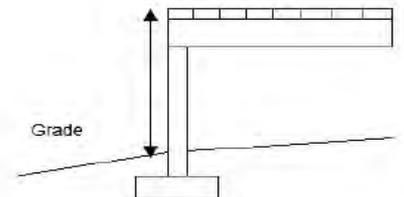
SECTION AM109 DECK BRACING

AM109.1 Deck bracing. Decks shall be braced to provide lateral stability. Lateral stability shall be provided in accordance with one of the methods in Sections **AM109.1.1 through AM109.1.5.**

3 Methods of bracing but when is it required by code?

When you exceed these 2 conditions

AM109.1.1 Lateral bracing not required. When the deck floor height is **less than 4 feet** (1219 mm) above finished grade as shown in Figure AM109.1(1) **and** the deck **is attached to the structure** in accordance with Section AM104, lateral bracing is not required. Lateral bracing is **not required for freestanding decks with a deck floor height 30 inches** (762 mm) or less above finished grade.



Less than 4' (decking to grade) and attached to structure no bracing required

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

**FIGURE AM109.1(1)
NO LATERAL BRACING**



Bracing

Option #1

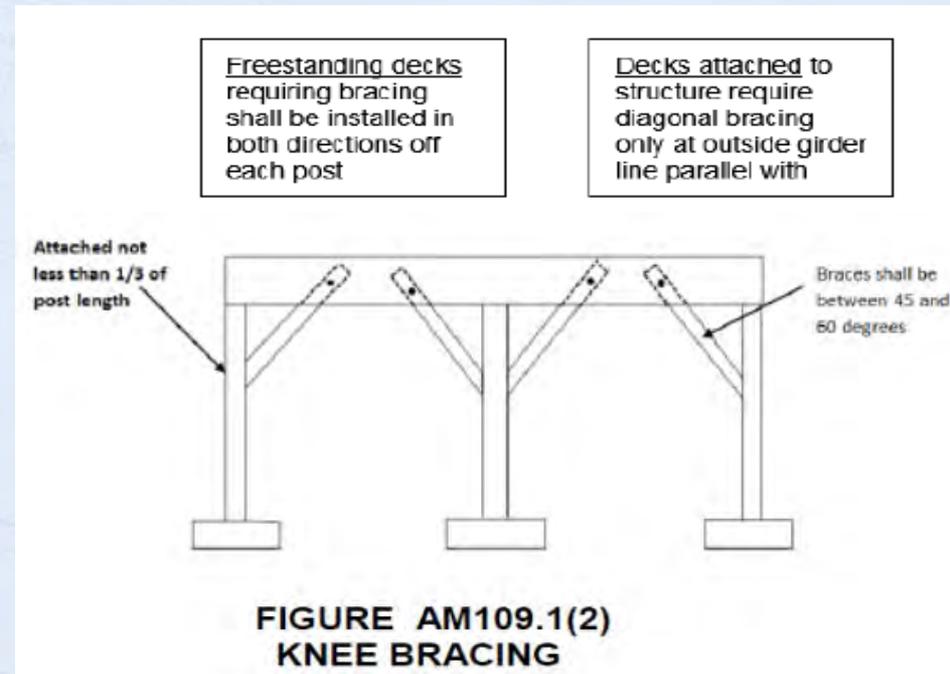
AM109.1.2. Knee bracing.

4x4 wood knee braces are permitted to be provided on each column in both directions for freestanding decks or parallel to the structure at the exterior column line for attached decks per Figure AM109.1(2). The knee braces shall attach to each post at a point **not less than 1/3** of the post length from the **top of the post**, and the braces shall be angled **between 45 degrees (0.79 rad) and 60 degrees (1.05 rad)** from the horizontal. Knee braces shall be **bolted** fastened to the post and the **girder/double band** in accordance with one 5/8 inch (16 mm) hot dip galvanized bolt with nut and washer at both ends of the brace of the methods shown in Table AM109.1. as shown in Figure AM109.1(2).

Change

TABLE AM109.1
FASTENING OF BRACE TO POST AND GIRDER/BAND (CHOOSE ONE)

Fastener	Installation	Minimum Distances
One 5/8" diameter hot dipped galvanized through bolt with nut and washer	Perpendicular to post or girder/band	2-3/16" end distance
Two hot dipped galvanized (ASTM A153, Class C, minimum) screws having minimum diameter of 0.270" and long enough to achieve 3" penetration into the post or girder/band.	Perpendicular to post or girder/band	1" edge distance, 1-1/2" horizontal spacing, minimum 3" end distance



NORTH ELEV

Bracing

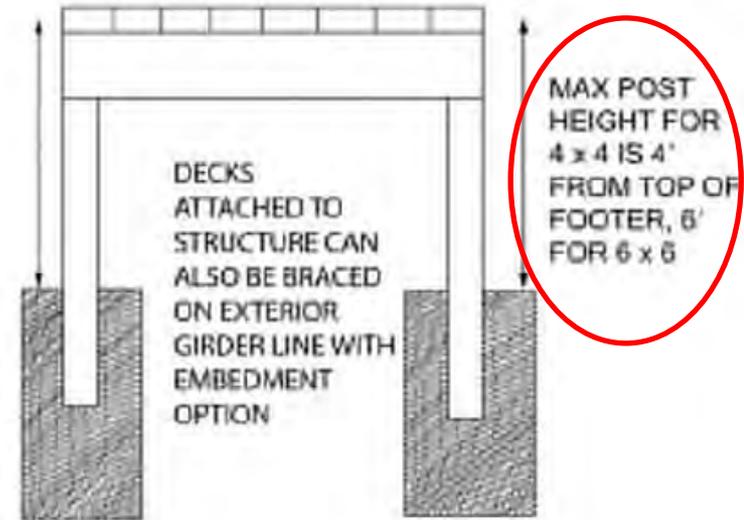
Option #2

AM109.1.3. Post embedment. For **free standing decks** without knee braces or diagonal bracing, lateral stability is permitted to be provided by embedding the post in accordance with **Figure AM109.1(3) and Table AM109.2.**

TABLE AM109.1 AM109.2

POST EMBEDMENT FOR FREE STANDING DECKS

POST SIZE	MAXIMUM TRIBUTARY AREA	MAXIMUM POST HEIGHT	EMBEDMENT DEPTH	CONCRETE DIAMETER
4" x 4"	48 SF	4'-0"	2'-6"	1'-0"
6" x 6"	120 SF	6'-0"	3'-6"	1'-8"



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

FIGURE AM109.1(3)
POST EMBEDMENT

Bracing

Option #3

AM109.1.4 Cross bracing.

2x6 diagonal vertical cross bracing is permitted to be provided in two perpendicular directions for free standing decks or parallel to the structure at the exterior column line for attached decks. The 2x6 bracing shall be attached to the posts with one of the methods in Table AM109.1.4 5/8-inch (16 mm) hot-dip galvanized bolt with nut and washer at each end of each bracing member in accordance with Figure AM109.1(4)

This is typically referred to as X bracing and must be from post to post

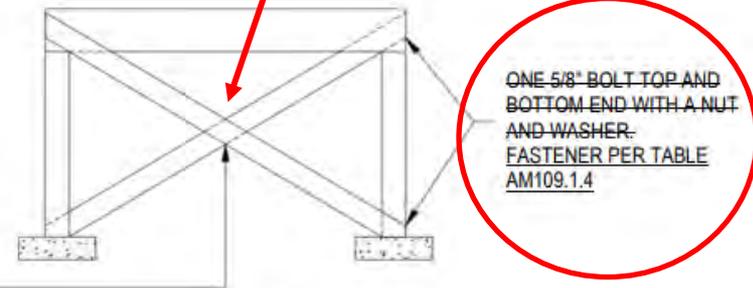
Table AM109.1.4
FASTENING OF BRACE (CHOOSE ONE)

<u>Fastener Type</u>	<u>Diameter (inches)</u>	<u>QTY</u>	<u>Length</u>
<u>Bolt</u>	<u>5/8^a</u>	<u>1</u>	<u>As required</u>
<u>Screws</u>	<u>0.27^b</u>	<u>2</u>	<u>Long enough to achieve a 1 1/2" thread penetration of structural member opposite head of screw.</u>

a. Bolts shall be hot dip galvanized through bolts with nut and washer

b. Screws shall be hot dip galvanized (ASTM A153, Class C, minimum) self drilling screw fastener having a minimum diameter of 0.27", and installed in the center of the post with a minimum of 1" space between screws.

New table



IF SPAN BETWEEN POSTS IS GREATER THAN 7', CENTER BLOCKING AND ONE 5/8" BOLT WITH NUT AND WASHER — WITH FASTENER(S) PER TABLE AM109.1.4 REQUIRED

FIGURE AM109.1(4)
CROSS BRACING

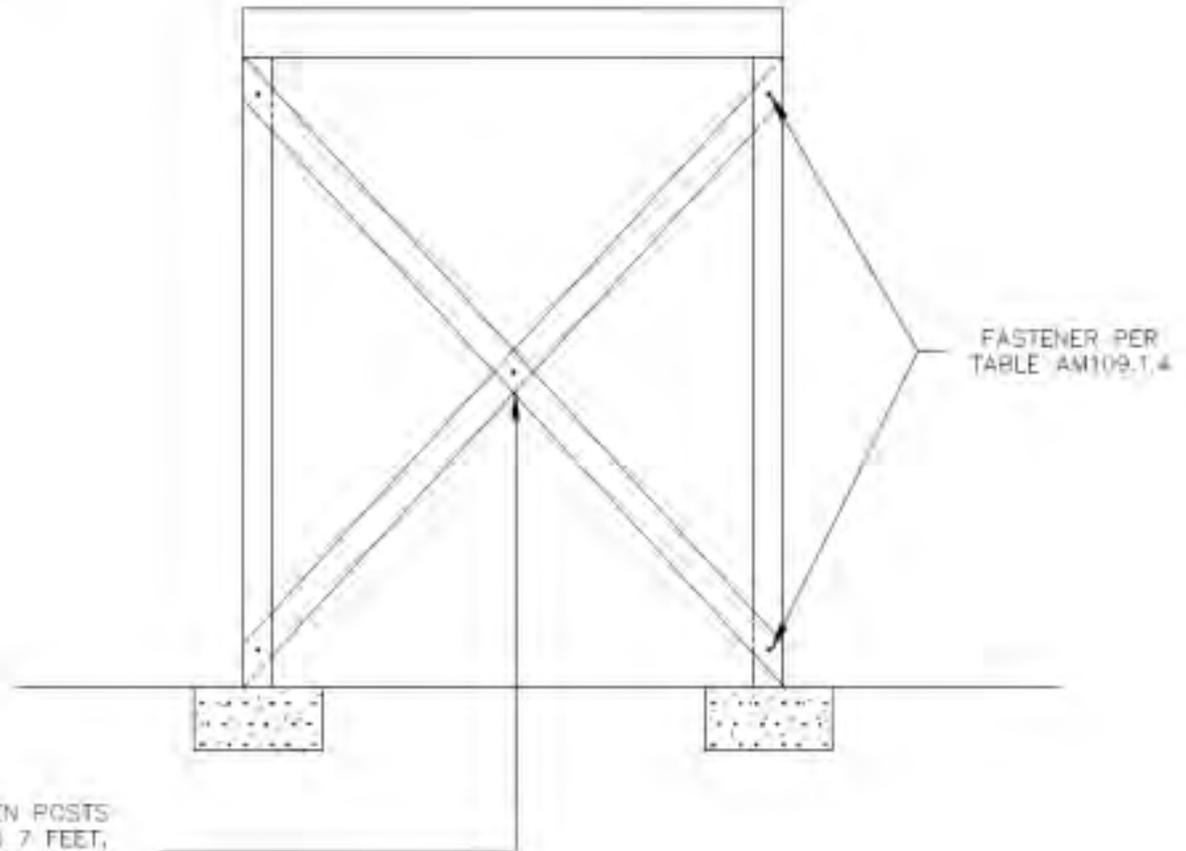


Bracing

Correction-Errata

2018 NC Residential Code

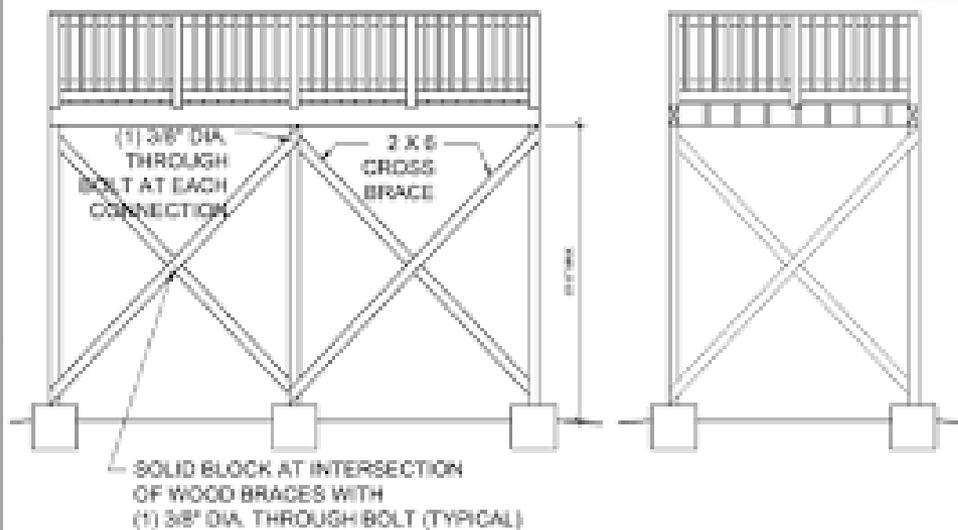
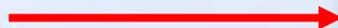
ERRATA – Figure AM109.1(4) corrected bracing location and lapping (200708).



IF SPAN BETWEEN POSTS
IS GREATER THAN 7 FEET,
CENTER BLOCKING WITH FASTENER(S)
PER TABLE AM109.1.4 REQUIRED

Bracing

Is this allowed?



Bracing

AM109.1.5. Piles in coastal regions. For embedment of piles in coastal regions, see Chapter 46.

Piles not posts

R4603.1. General. All one- and two-family dwellings in areas **identified as coastal high hazard areas** or ocean hazard areas shall be constructed on a pile foundation of wood or concrete.

R4603.2 Concrete piles. **Concrete piles** are permitted to be used if made and installed in accordance with the *North Carolina Building Code*, **Chapter 18**.

R4603.3 Size of wood piles. Round timber piles shall not be less than **8 inches (203 mm) in diameter** at building level and have a minimum tip diameter of 6 inches (152 mm). Square timber piles shall not be less than 8 inches square (0.005 m²), nominal. Piles supporting uncovered stairs, uncovered walkways and uncovered decks shall be 6 inches × 6 inches (153 mm × 153 mm) minimum, or if round, have a minimum tip diameter of 6 inches (153 mm). Piles supporting uncovered stairs, uncovered walkways and uncovered decks less than 5 feet (1524 mm) above grade are permitted to be 4 inches × 4 inches (102 mm × 102 mm) minimum.

R4603.4 Required depth of piles. Pile tip shall extend to a depth of not less than 8 feet (2438 mm) below the natural grade or finished grade of the lot, whichever is lower. **All pilings within the ocean hazard area shall have a tip penetration of at least 5 feet (1524 mm) below mean sea level or 16 feet (4877 mm) below average original grade, whichever is least.** Structures within ocean hazard areas that are placed upon the site behind a line 60 times the annual erosion rate away from the most seaward line of stable natural vegetation are exempt from this additional tip penetration requirement.

R4603.5 Spacing of wood piles. The maximum center-to-center spacing of wood piles shall **not be more than 8 feet** (2438 mm) on center under load-bearing sills, beams, or girders. For dwellings having more than two stories above piles or where the piling spacing exceeds 8 feet (2438 mm) on center, the pile foundation shall be designed by a *registered design professional*. Pile spacing in the nonload-bearing direction are permitted to be 12 feet (305 mm).

R4603.6 Tying and bracing of wood piles. If sills, beams or girders are attached to the piling, a minimum of two 5/8-inch (16 mm) galvanized steel bolts per beam member shall be through bolted at each piling connection in accordance with Figure R4503.6(a). When piling is notched so that the cross section is reduced below 50 percent or is top bearing, sills, beams or girders shall be attached using 3/16 × 4 × 18-inch (5 × 102 × 467 mm) hot dip galvanized straps, one each side, bolted with two 5/8 inch (15.9 mm) galvanized through bolts in accordance with Figure R4603.6(b) and Figure R4603.6(c). At corners, girders shall be connected to the pile with a minimum 3/16 × 4 × 18-inch (5 × 102 × 467 mm) hot dip galvanized strap bolted with two 5/8 inch (15.9 mm) galvanized through bolts on the exterior and a minimum L4 × 3/16 × 18 inches (102 × 5 × 467 mm) galvanized steel angle bolted with two 5/8 inch (15.9 mm) galvanized through bolts on the interior in accordance with Figure R4603.6(d). Bracing of pile foundations is required where the clear height from ground to sill, beam or girder exceeds 10 feet (3048 mm) or the dwelling is more than one story above piles.

A line of X-bracing is defined as a row of piles with X-bracing provided in at least two bays. A line of X-bracing shall be provided at all exterior pile lines. Where the perimeter lines of X bracing exceed 40 feet (12 192 mm), an additional line of X bracing shall be provided near the center of the building. See Figure R4603.6(e). X-bracing shall be with 2 × 10s through bolted with two 3/4-inch (19.1 mm) bolts at each end. The *code official* is permitted to accept alternative bracing designs if they bear the seal of a *registered design professional*.

R4603.7. Protection against decay. The minimum net retention of preservatives shall be in accordance with **AWPA U1**.

R4603.8 Piling may be placed by auger, jetting or drop hammer. Piling shall receive a final set by drop hammer or other approved methods, acceptable to the *code official* to ensure compaction of material at end bearing.

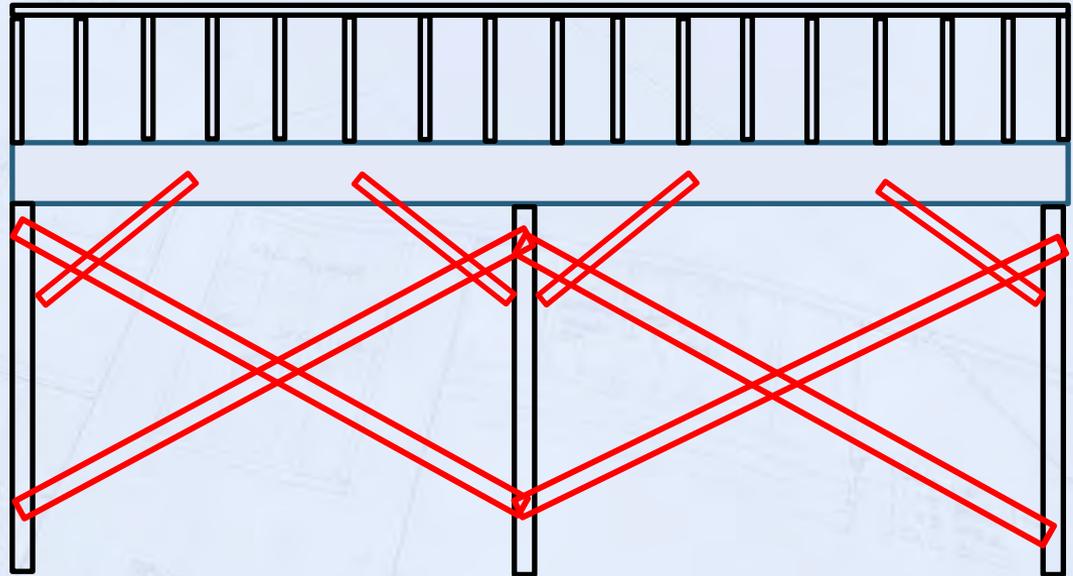
Deck design

Consumer wants an attached deck with the following requirements:

1. Deck is attached to the home and is 12'x16'.
2. Deck joists are perpendicular to the house and span is 12'.
3. There are 3 support posts being used.
4. Deck is 5' off grade (finished grade to walking deck surface).
5. There is one set of steps off the deck with an 8' span.
6. Minimum size drop double 2x girder spanning 8'?
7. Joists are 16" o.c. spacing, what is the minimum size joist that can be used with a 2' cantilever?
8. Vinyl siding house, non-treated house band.

Is lateral bracing required?

What are my lateral bracing options



Stairs

SECTION AM110

STAIRS

AM110.1 Stair construction. Stringer spans shall be no greater than **7 feet** (2134 mm) between supports. Spacing between stringers shall be based upon decking material used in accordance with **AM107.1**. Each stringer shall have a minimum of **3 1/2 inches** (89 mm) between step cut and back of stringer. **If used, suspended headers** shall be attached with 3/8- inch (9.5 mm) galvanized bolts with nuts and washers to securely support stringers at the top. **See Figure AM 110.1.**

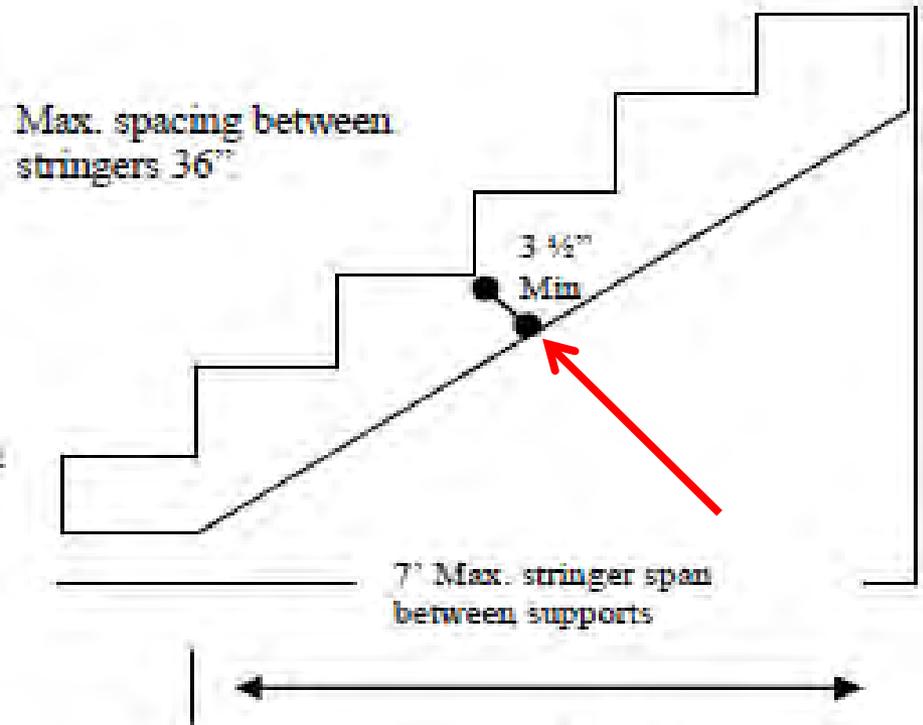


Figure AM110

Stairs

Suspended Header-Top of Stairs



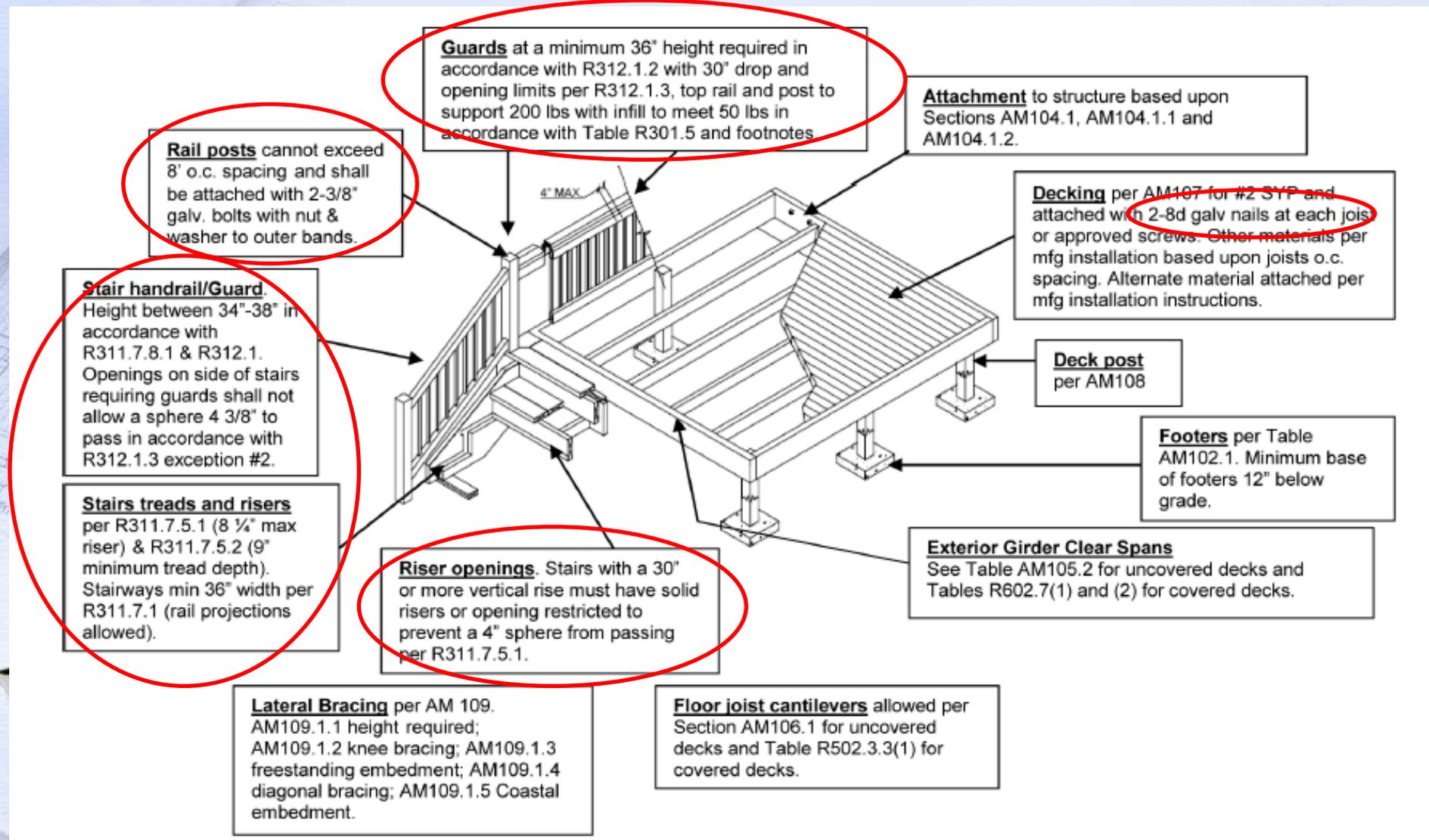


Local job

6-month old
home with
suspended
stringer nailed
only
Homeowner
broke her
back when
stairs gave
way

SECTION AM111 HANDRAILS, GUARDS AND GENERAL

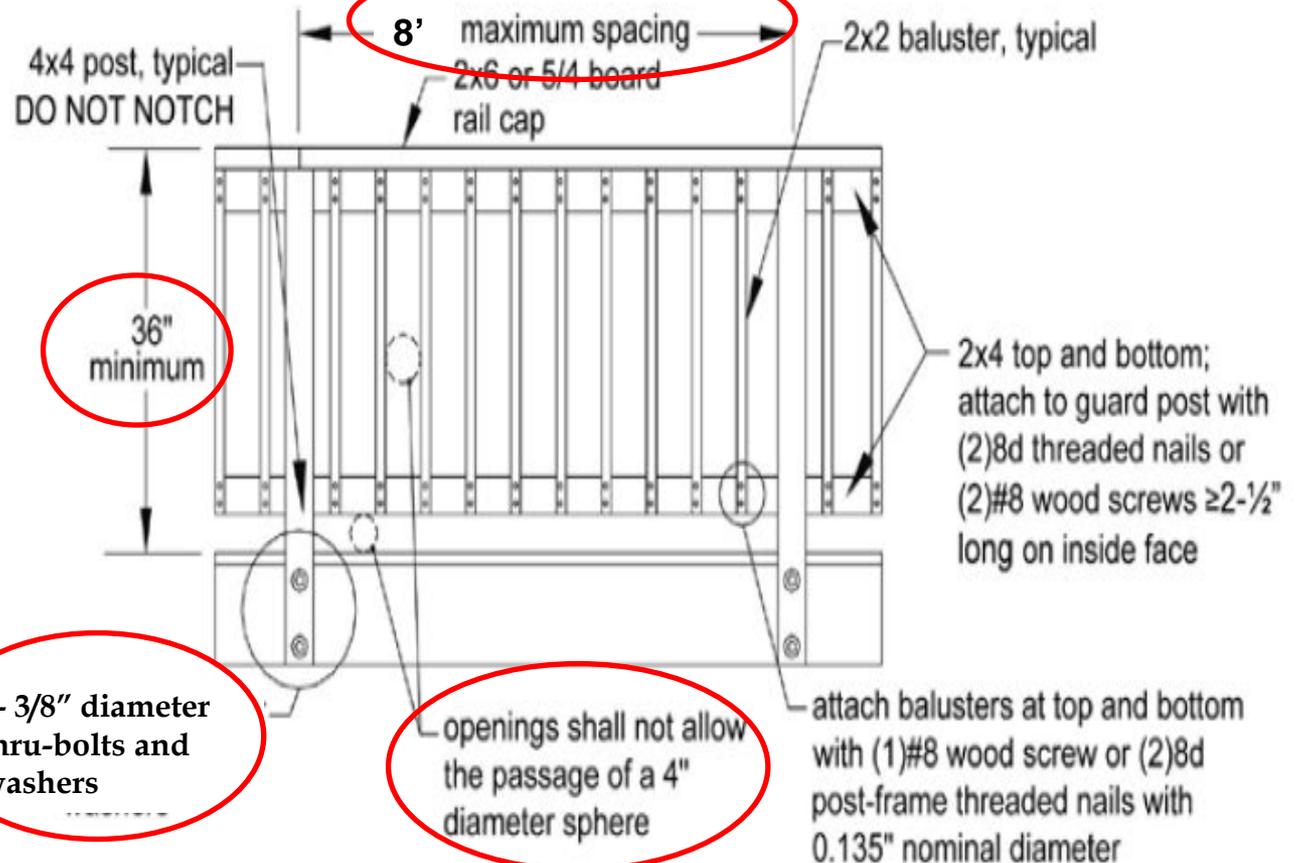
AM111.1 Handrails, guards and general. Deck handrails, guards and general construction shall be as shown in Figure AM111.1.



Interpretation

With regards to deck rail posts which cannot be great than 8' DOI still has the interpretation not allowing 4x4's to be notched

When are guardrails required on decks?





Handrails, Guards & General



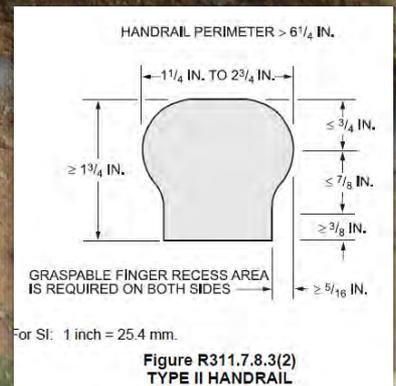
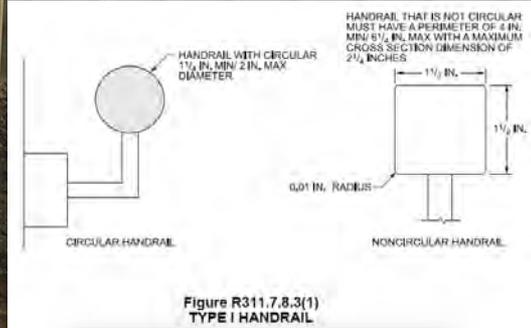
Handrail correct?

What is the minimum Width of Stairs?

R311.7.8.3 Grip-size. Required handrails shall be of one of the following types or provide equivalent graspability.

1. Type I....
2. 2. Type II....

Exception: Exterior handrails (garages and areas exposed to the weather) shall not be more than 3 1/2 inches (89 mm) in cross-section dimension.



Handrails, Guards & General



What are the code issues here?

Handrails, Guards & General

Handrail Termination



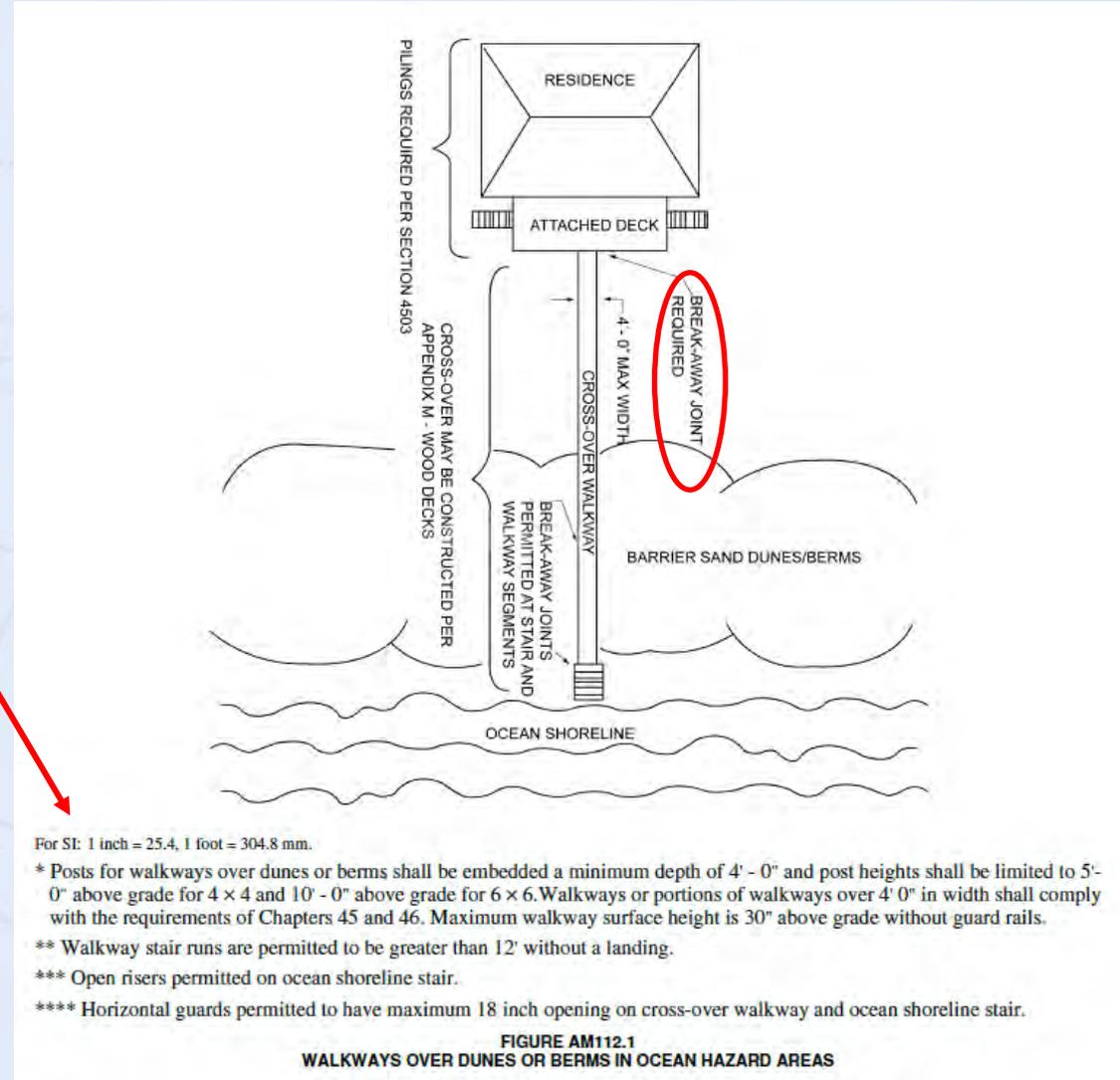
SECTION AM112 WALKWAYS IN OCEAN HAZARD AREAS

AM112.1 Walkways over dunes. Walkways over dunes in ocean hazard areas shall be constructed as shown in Figure AM112.1.

1. Posts are allowed not piles for walkways under 4' in width (can use appendix M).
2. Stairs runs can be greater than 12' without a landing.
3. Open riser permitted on ocean shoreline stair.
4. Horizontal guards can be maximum of 18" on walkway and shoreline stair.

Also indicated

5. Breakaway joint required if it connect to a home or house deck.



NORTH ELEV

Questions

Q: Do I need a permit to build a 10 x 10 deck on my house?

A: Yes. For accessory structure there is no dimension rule like accessory buildings less than 12'

Q: Do I need a permit to build an arbor?

A: No, if free standing and not attached to the home. Attached to the home is part of the structure and would require a permit.

Q: Do I need to brace my free-standing deck if less than 40" above the grade below?

A: Yes, Appendix M Section "AM109 Deck bracing" indicates free standing decks 30" or less above grade no lateral bracing is required.



House Bill 770 – 2016 Session

143-138. North Carolina State Building Code

(b5) Exclusion for Certain Minor Activities in Residential and Farm Structures. – No building permit shall be required under the Code or any local variance thereof approved under subsection (e) for any construction, installation, repair, replacement, or alteration performed in accordance with the current edition of the North Carolina State Building Code and costing fifteen thousand dollars (\$15,000) or less in any single-family residence or farm building unless the work involves: the involves any of the following:

(1) The addition, repair, or replacement of load bearing structures; the structures. **However, no permit is required for replacements of windows, doors, exterior siding, or the pickets, railings, stair treads, and decking of porches and exterior decks that otherwise meet the requirements of this subsection.**

Appendix M exceptions



Questions



Thank You!

