CAMBRIDGE
Minnesota's Opportunity Community℠

300 3rd Avenue NE, Cambridge Minnesota 55008
763.689.3211
www.ci.cambridge.mn.us

Residential Decks

This handout is a summary of the permit & inspection process as well as standard requirements based on State Building Code and Cambridge City Zoning regulations regarding Residential Decks and Porches (3 season, 4 season, screen or unenclosed). Information contained herein does not contain all of the specific codes for construction, and shall only be used as a guide. *Decks not attached to a structure AND less than 30 inches require a Zoning Permit.

Permit Submission Requirements:

- Completed building permit application, including valuation (materials & labor).
- Two complete sets of structure plans (footing plan, framing plan and elevations).
- Two copies of a survey or site Plan (which includes lot lines and dimensions, the locations and ground coverage area (size) of all existing structures, the location of proposed deck, indicate setbacks from property lines and any additional information which may be required).
- If a porch is attached and enclosed, it is considered living area. If a porch is unenclosed, or a deck and it is located on the back side of the home, the rear yard coverage worksheet is required.
- If the property is located in the shoreland overlay district, the impervious area calculation worksheet is required.

Zoning Requirements: Refer to General Residential Setback Requirements Guidelines.
Deck / Porch Permit Fees: See the Cambridge Fee Schedule at ci.cambridge.mn.us
Licensing Requirements:

- Contractors must be licensed in the State of Minnesota if performing more than one single trade. Minnesota State license number must be provided on permit application.
- Contractors working on a structure built prior to 1978 are required to provide their Lead Certification Number (see permit application for exceptions.)
- Property owners may perform building related trades on property they own. Property owners may perform mechanical trades, such as plumbing, heating & electrical on property they own and occupy, otherwise a licensed contractor is required. Property owners doing their own work will be required to sign the Property Owner Waiver acknowledging their responsibilities to the Minnesota State Building Code, to Zoning Ordinances and to other applicable rules and regulation when they are acting as general contractor. All sub-contractors hired must be licensed and disclosed on the application.
- Rental property owners may perform building trade work. However, all plumbing, HVAC and electrical work on rental property shall be performed by a licensed contractor.
- Property owners renovating dwellings with the intent to sell must be state licensed if performing work on more than one property in a two-year period.

Inspection Requirements: The inspection card and approved plans must be on site upon the start of work until the final inspection has been performed and passed. All construction work shall remain accessible and exposed for inspection until approved by the Building Inspection Department. All required inspections will be listed on the permit card. A final inspection is required upon completion of project and approvals for all other inspections have been complete; please call 763-552-3210 to schedule an inspection. A 24 hour notice is required for all inspections (time frame is subject change during busy times).

Structural Definitions

Cantilevers: Overhanging Joists and Beams: Joists should not overhang beams by more than two feet, nor should beams overhang posts by more than one foot unless a special design is approved.

Flashing: All connections between deck and dwelling shall be weatherproof. Any cuts in exterior finish shall be flashed.

Deck Ledger: The deck ledger shall be properly attached with lag screws and provided with hold down tension devices in at least two locations.

Framing Details: Joists frames into the side of a girder shall be supported by an approved joist hanger.

Frost Footings: Frost footings shall be required for any deck attached to a dwelling, porch or garage that has frost footings. The minimum depth to the base of the footing is 42". The diameter of the frost footing is determined on the load imposed.

Guardrails: Required on all decks more than 30 inches above grade. Rail must be 36 inches minimum in height. Open guardrails and stair railings must have intermediate rails or an ornamental pattern that a four inch sphere cannot pass through.

Handrails: The top shall be placed not less than 34 inches or more than 38 inches above the nosing of the treads. Stairways having four or more risers shall have at least one handrail. Handrail ends shall be returned or terminated in posts. The hand grips shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip shall have a smooth surface with no sharp corners.

Live Load/Dead Load: All decks shall be designed to support a live load of 50 pounds per square foot.

Nails and Screws: Use only stainless steel, high strength aluminum or hot-dipped galvanized. Approved nails must be used on joist hangers as per manufacturer's specs.

Special Design Note: Think you might enclose your deck in the future? Deck plans are on the assumption that the deck will be used only as a deck for the life of the structure. Because footing sizes, setbacks, structural supports, and a host of other deck components are different for enclosed spaces than they are for decks, it is important that you indicate on your plans the desire to convert the deck at a future date. You should then design your deck to carry future loads and meet setbacks and other rules.

Stairs: Minimum width is 36 inches. Maximum rise is 7 ¾ inches, minimum rise is 4 inches. Minimum run is 10 inches. Largest tread width or riser height shall not exceed the smallest by more than 3/8 inch. Nominal 2 inch material required for exterior stair construction.

Wood Required: All exposed wood used in the construction of decks is required to be of approved wood of natural resistance to decay (redwood, cedar, etc.) or approved treated wood. This includes posts, beams, joists, decking and railings. When redwood and cedar are proposed it must be verified as heartwood.

Deck Framing

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

SPECIES[c]	SIZE[d]	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1 – 2 × 6	4-11	4-0	3-7	3-3	3-0	2-10	2-8
	1 – 2 × 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1 – 2 × 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1 – 2 × 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2 – 2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 – 2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 – 2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 – 2 × 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3 – 2 × 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3 – 2 × 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
	3 – 2 × 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
	3 – 2 × 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3 × 6 or 2 – 2 x 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 × 8 or 2 – 2 × 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 × 10 or 2 – 2 × 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 × 12 or 2 – 2 × 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 × 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 × 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 × 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 × 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3 – 2 × 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3 – 2 × 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3 – 2 × 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3 – 2 × 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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. 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.
g. Beam cantilevers are limited to the adjacent beam's span divided by 4.

TABLE R507.7
MAXIMUM JOIST SPACING FOR DECKING

DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking diagonal to joist[a]
$1^1/_4$-inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.2	In accordance with Section R507.2

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

SPECIES[a]	SIZE	ALLOWABLE JOIST SPAN[b]			MAXIMUM CANTILEVER[c, f]		
		SPACING OF DECK JOISTS (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	1-3	1-4	1-6
	2 × 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 × 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 × 12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d],	2 × 6	9-6	8-8	7-2	1-2	1-3	1-5
	2 × 8	12-6	11-1	9-1	1-11	2-1	2-3
	2 × 10	15-8	13-7	11-1	3-1	3-5	2-9
	2 × 12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 × 6	8-10	8-0	7-0	1-0	1-1	1-2
	2 × 8	11-8	10-7	8-8	1-8	1-10	2-0
	2 × 10	14-11	13-0	10-7	2-8	2-10	2-8
	2 × 12	17-5	15-1	12-4	3-10	3-9	3-1

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. Live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$.

c. 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.

TABLE R507.9.1.3(1)
DECK LEDGER CONNECTION TO BAND JOIST[a]
(Deck live load = 40 psf, deck dead load = 10 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[b, c]	30	23	18	15	13	11	10
$^1/_2$-inch diameter bolt with $^1/_2$-inch maximum sheathing[c]	36	36	34	29	24	21	19
$^1/_2$-inch diameter bolt with 1-inch maximum sheathing[d]	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 R703.4 to prevent water from contacting the house band joist.

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

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

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

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger[a]	2 inches[d]	$^3/_4$ inch	2 inches[b]	$1^5/_8$ inches[b]
Band Joist[c]	$^3/_4$ inch	2 inches	2 inches[b]	$1^5/_8$ inches[b]

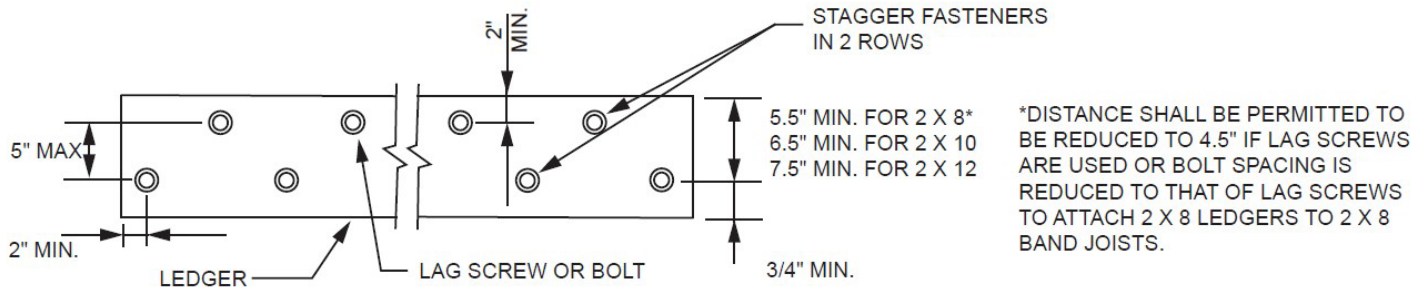
For SI: 1 inch = 25.4 mm.

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 R507.9.1.3(1).

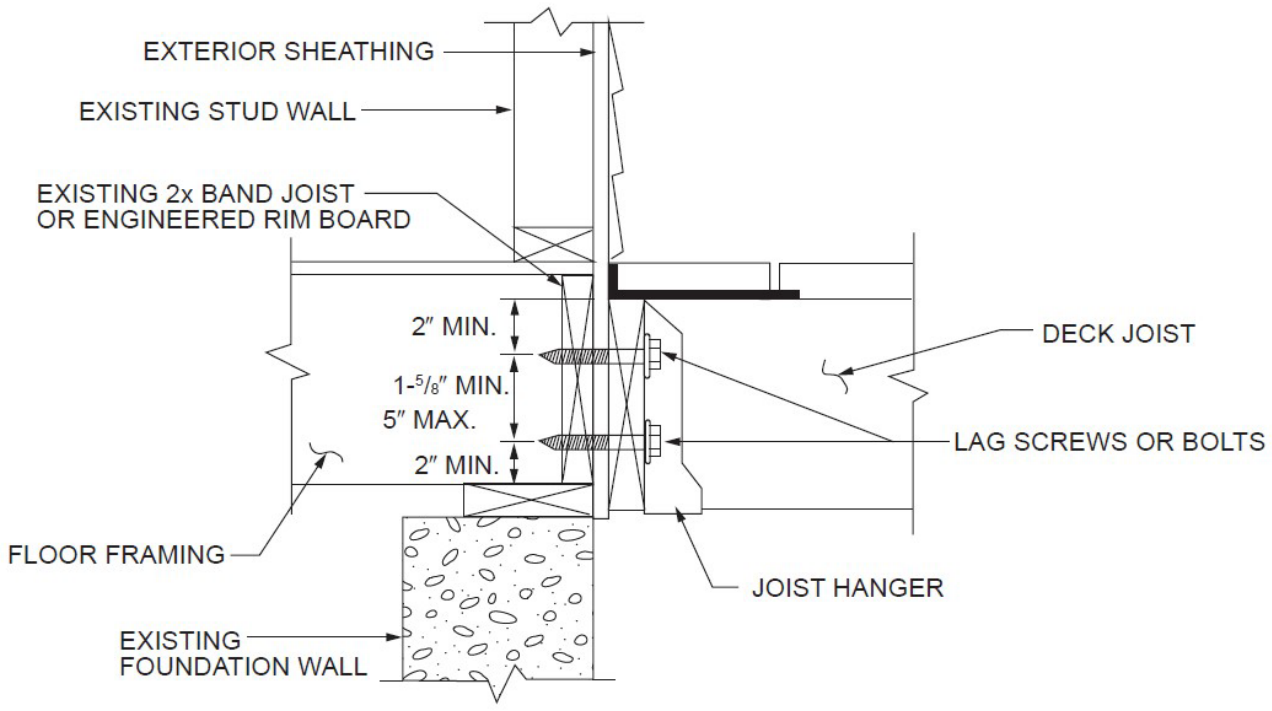
b. Maximum 5 inches.

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 R507.9.1.3(1).

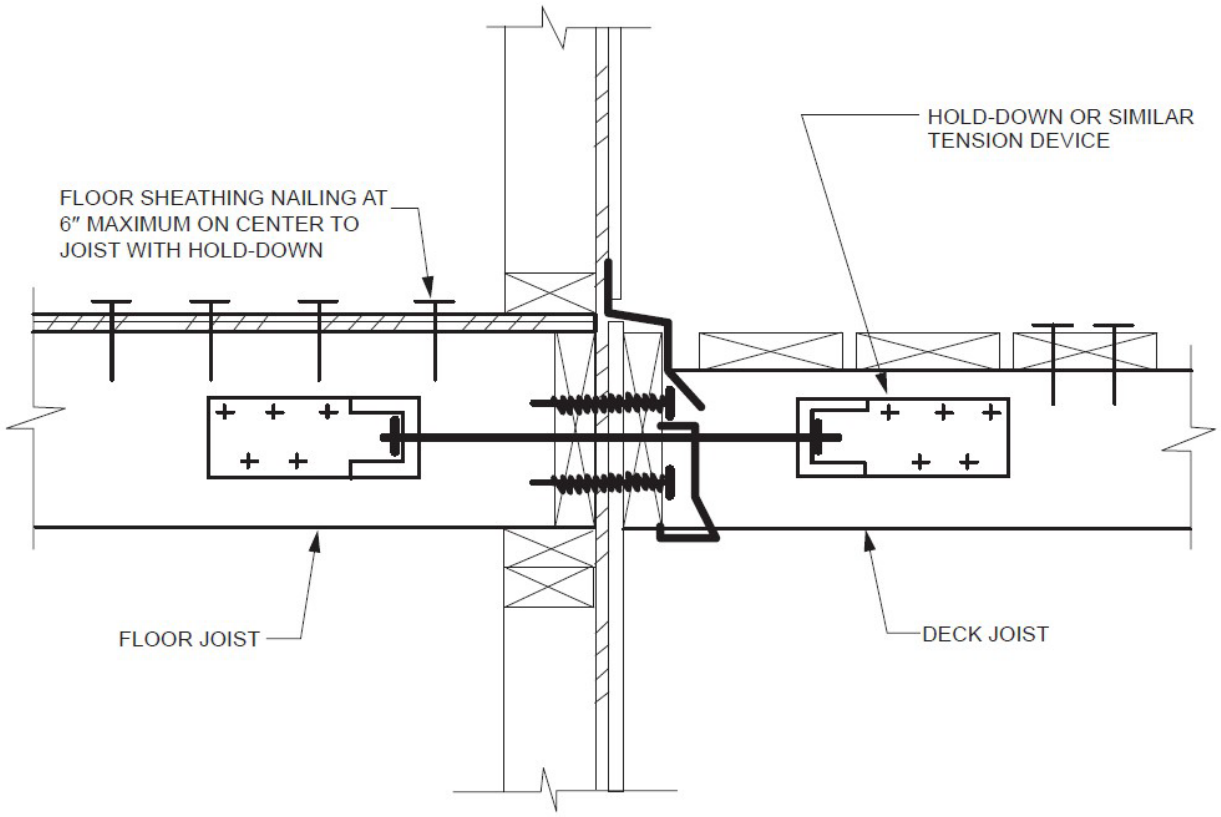


For SI: 1 inch = 25.4 mm.



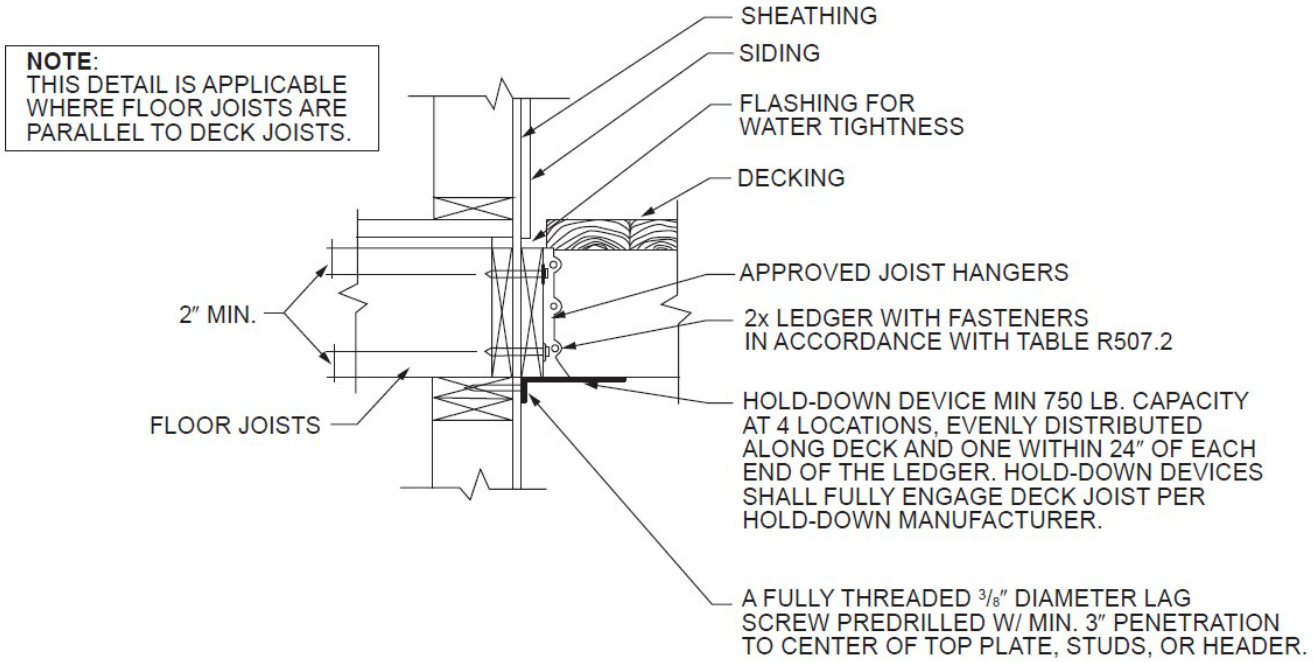
For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS



For SI: 1 inch = 25.4 mm.

FIGURE R507.9.2(1)
DECK ATTACHMENT FOR LATERAL LOADS



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

FIGURE R507.9.2(2)
DECK ATTACHMENT FOR LATERAL LOADS

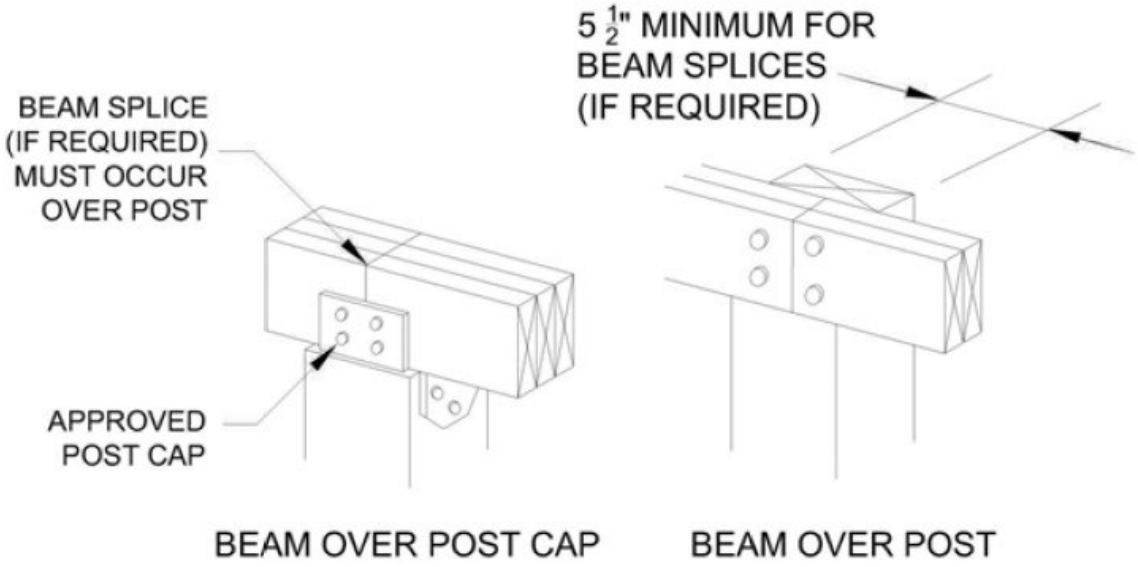
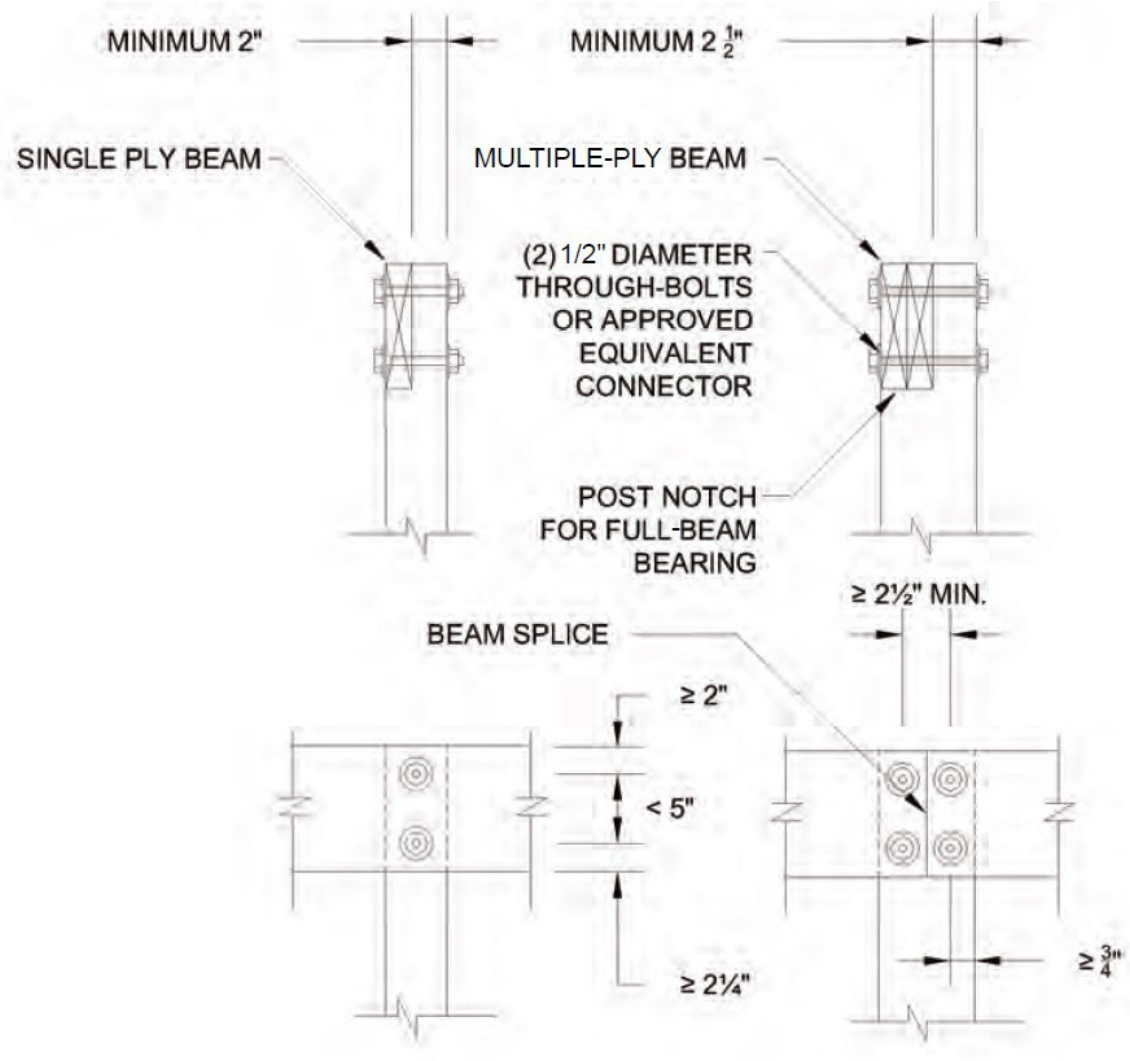
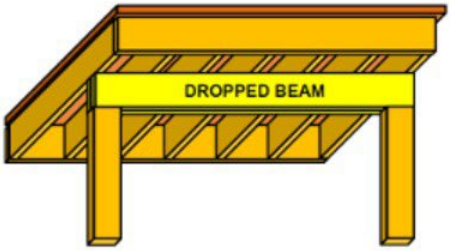
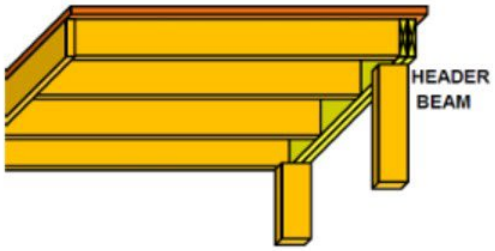
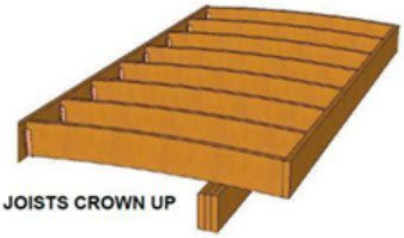


FIGURE R507.5.1(1)
DECK BEAM TO DECK POST

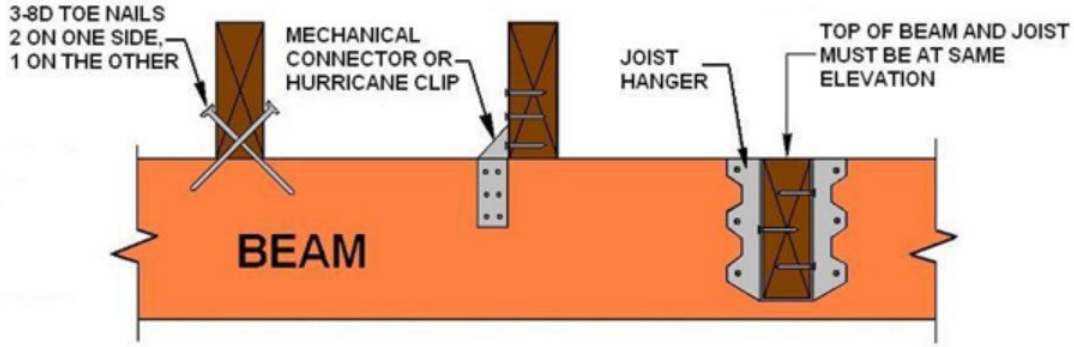






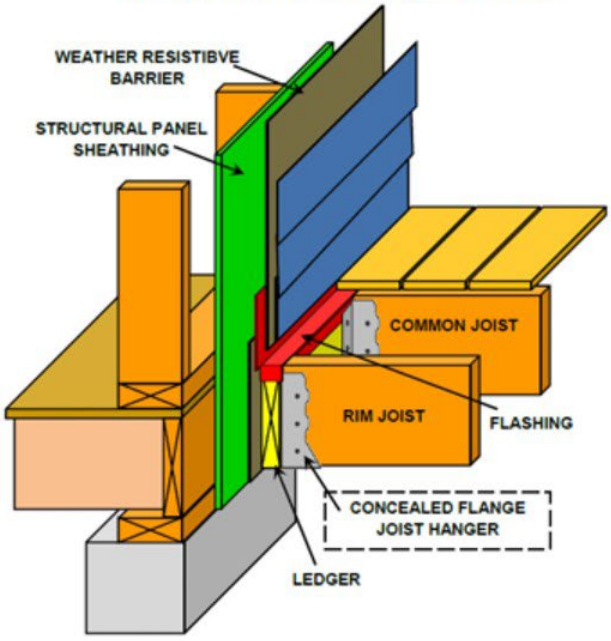


JOIST TO BEAM ATTACHMENTS

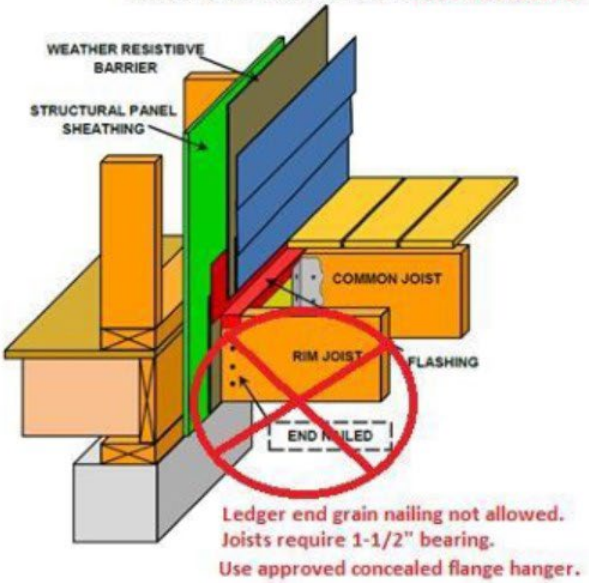


Joists must bear on a beam, ledger strip, or joist hangers. Joist hangers must be installed in accordance with the manufacturer's recommendations. ***Fill all nail holes in joist hangers.***

RIM JOIST ATTACHED TO LEDGER WITH CONCEALED FLANGE HANGER



RIM JOIST ATTACHED TO LEDGER BY END NAILING - NOT ALLOWED

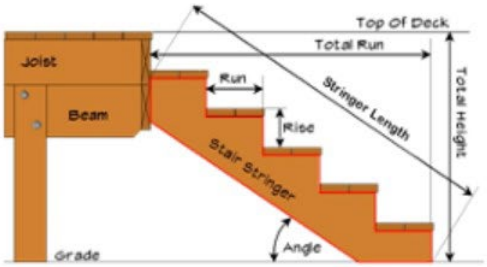


Ledger end grain nailing not allowed.
Joists require 1-1/2" bearing.
Use approved concealed flange hanger.

Stairs

Stairs must have a maximum rise of 7 ¾ inches and a minimum run of 10 inches measured as shown. The greatest riser height within any flight of stairs shall not exceed the smallest by more than ⅜ inch. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than ⅜ inch. Open risers are permitted provided that a 4” diameter sphere will not pass between the treads.

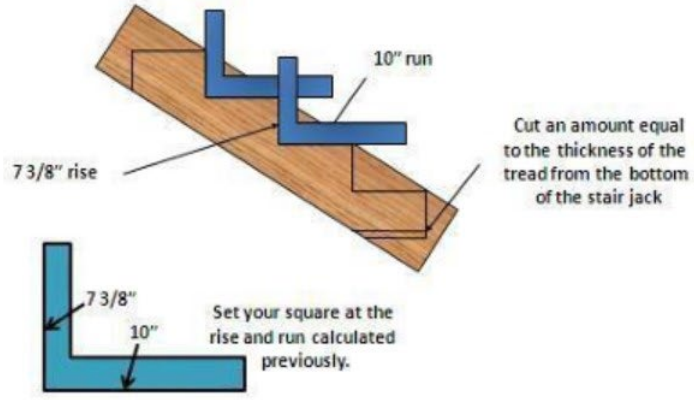
STAIR TERMINOLOGY



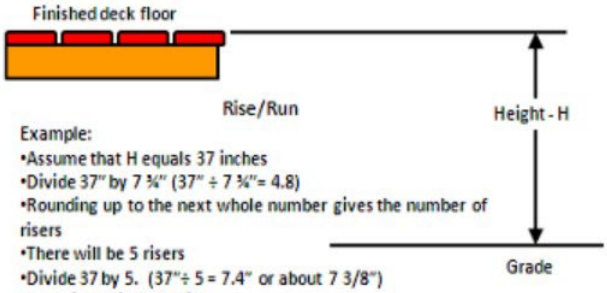
Stair Basics

- The maximum riser height is 7 ¾ inches
- The minimum tread run is 10 inches
- Treads and risers should be approximately equal with the largest not exceeding the smallest by more than ⅜ inch.

LAYING OUT STAIR JACKS



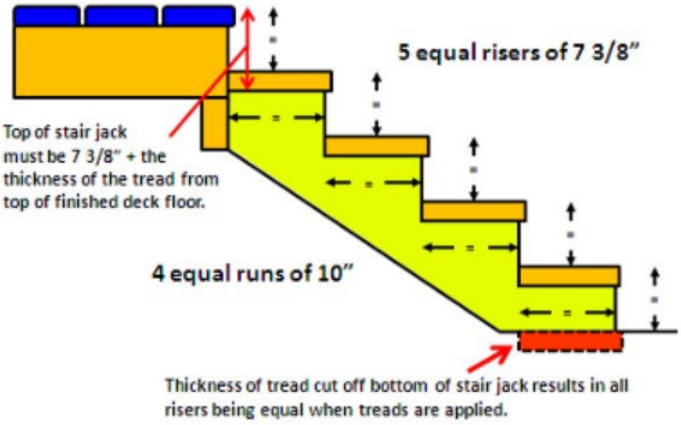
DETERMINING RISE/RUN

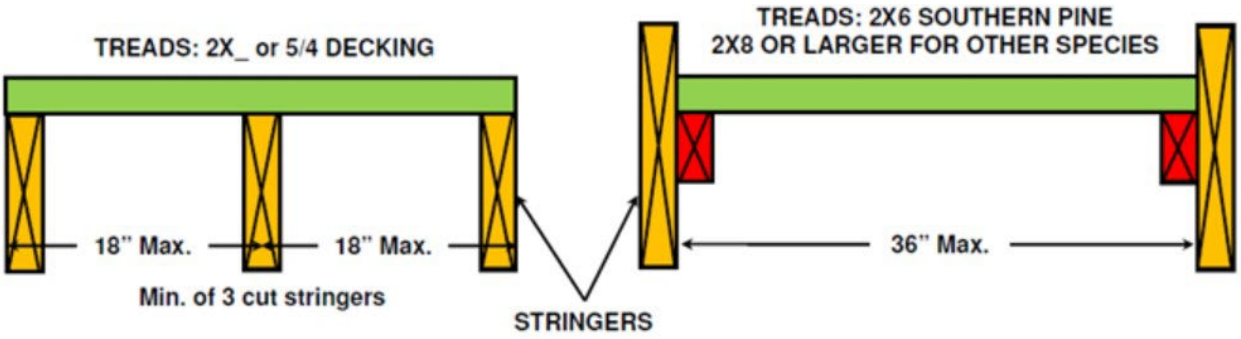


Example:

- Assume that H equals 37 inches
- Divide 37" by 7 ¾" (37" ÷ 7 ¾"= 4.8)
- Rounding up to the next whole number gives the number of risers
- There will be 5 risers
- Divide 37 by 5. (37"÷ 5 = 7.4" or about 7 3/8")
- Each riser will be 7 3/8"
- For 5 risers there will be 4 treads
- Since each tread must be at least 10", the length of the stair from the face of the deck to the face of the bottom riser will

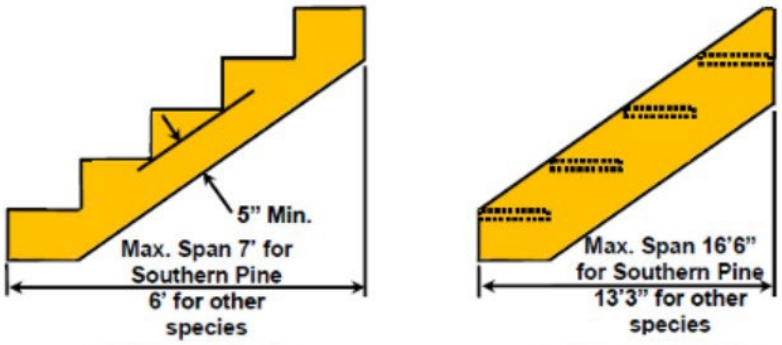
THE COMPLETED STAIR





STAIR STRINGER SPANS

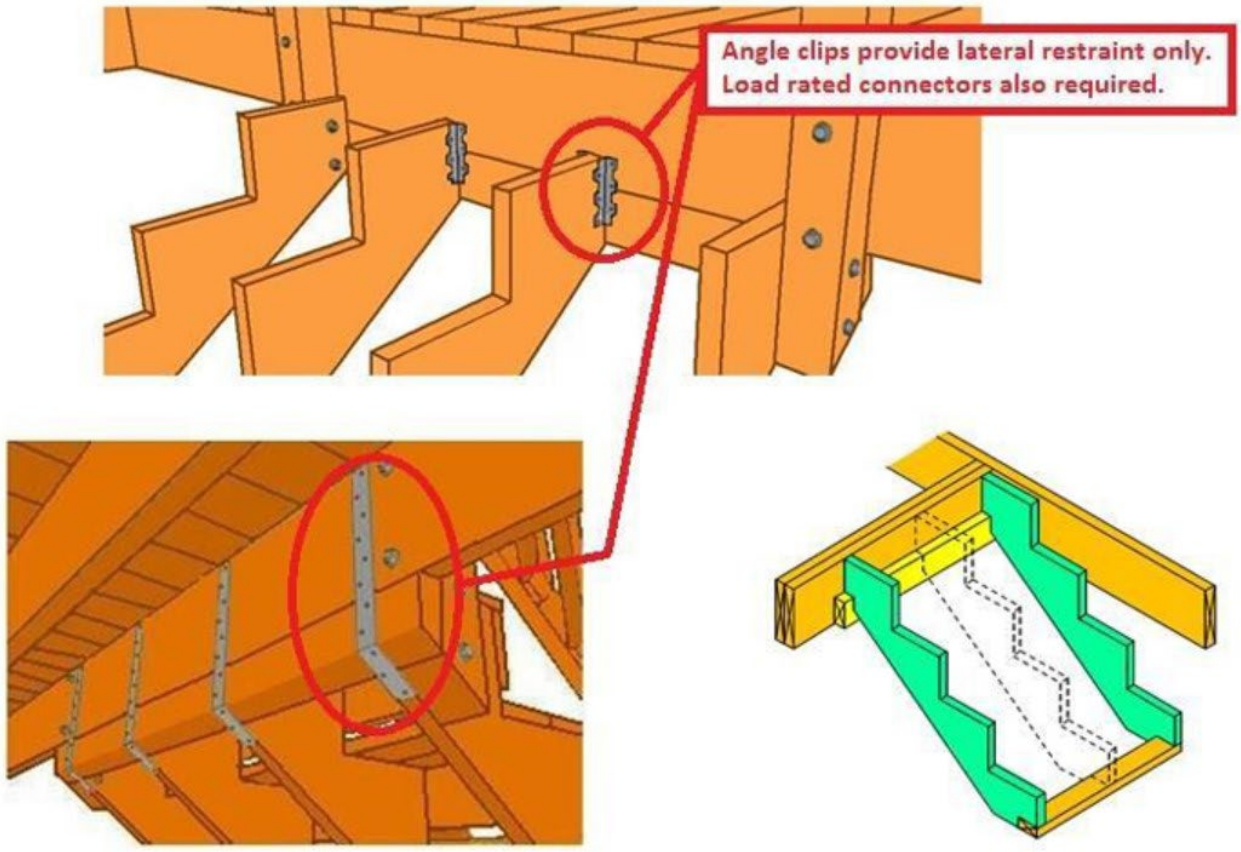
LANDINGS OR COLUMNS AND BEAMS MAY BE USED TO SHORTEN STRINGER SPANS



CUT STRINGER

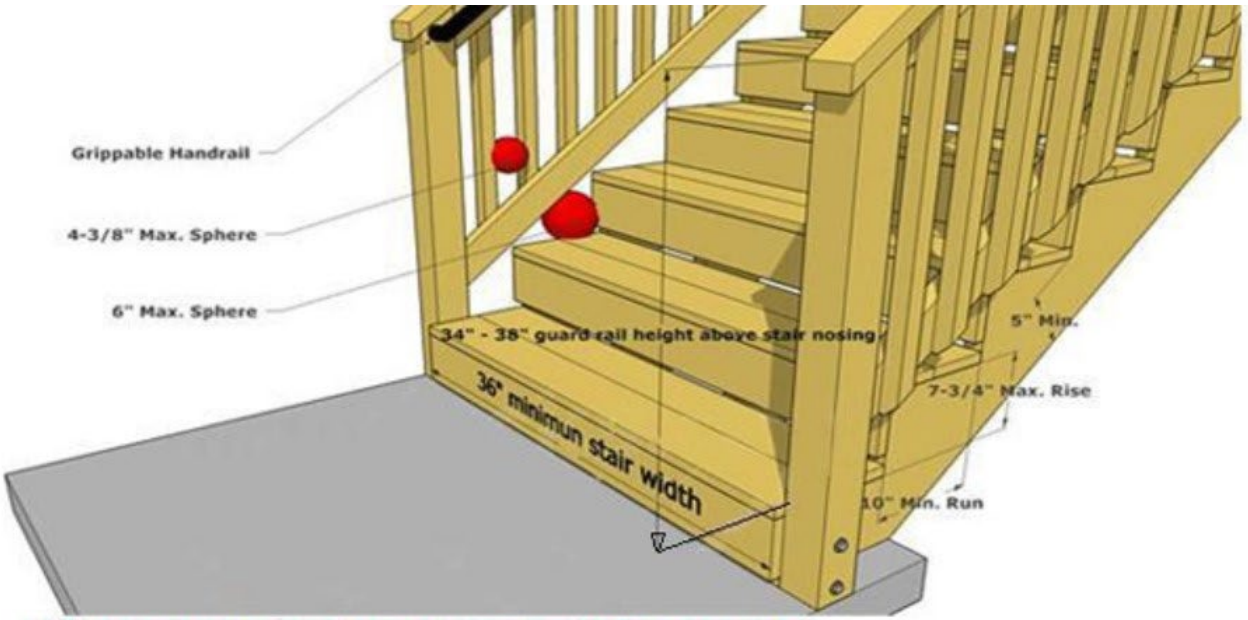
SOLID STRINGER

STAIR ATTACHMENTS



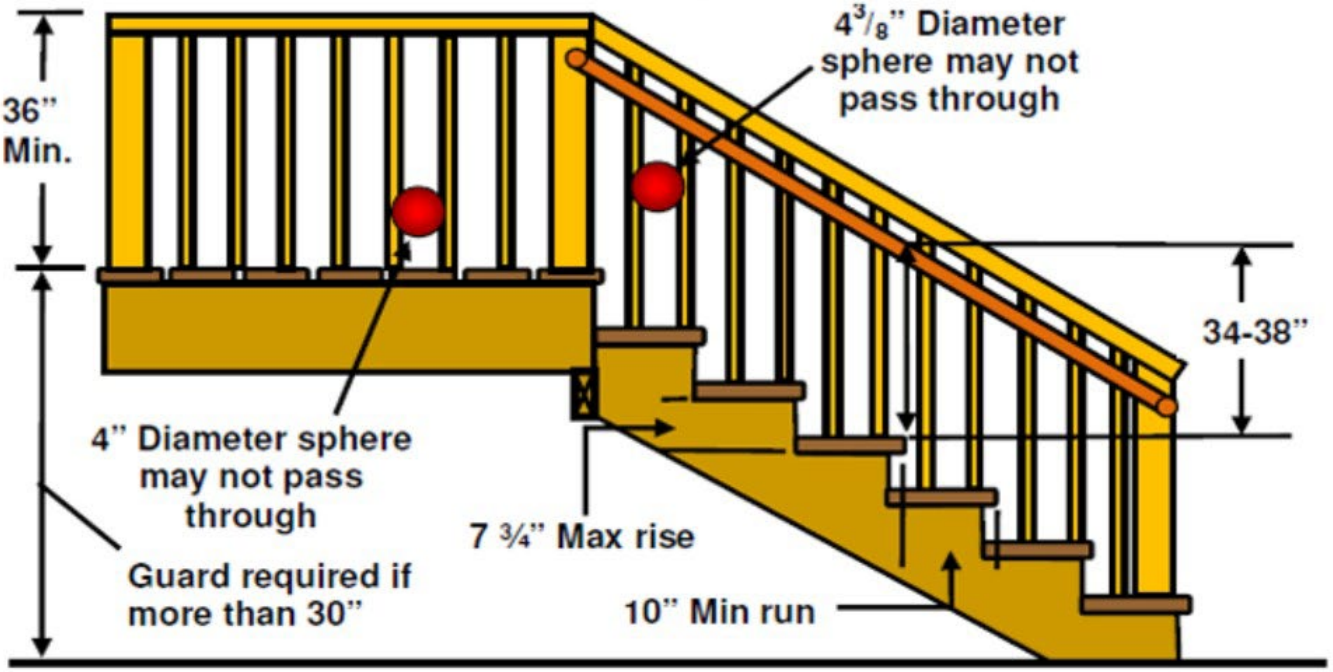
GUARDS AND HANDRAILS

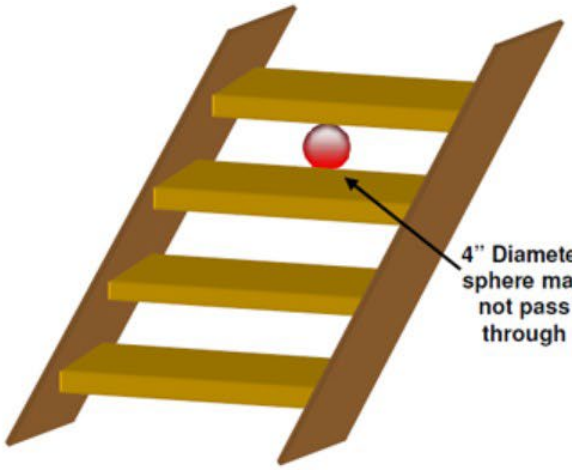
Guards and handrails must be provided as shown on the following illustrations. Guards must continue down stairs where the stair is more than 30 inches above grade. The height of guards on stairs must be 34 inches minimum. Handrails must be provided on at least one side when there are four or more risers. Handrails must have returns on each end or terminate in a newel post. Other handrail shapes having an equivalent gripping shape may be used with prior approval of the Building Department. Handrails must be continuous for the entire length of the stairs and may not be interrupted by newel posts except at landings. Hand rails and guards must be designed to support a 200 lb. load applied in any direction at any point along the top of the guard or rail.

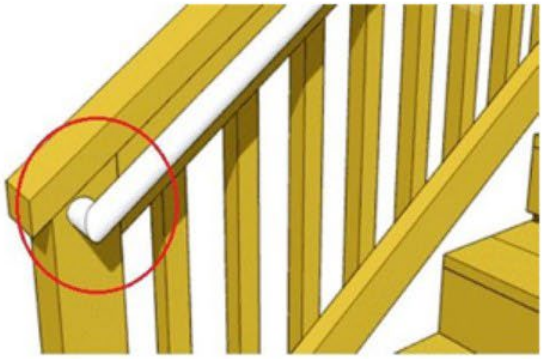


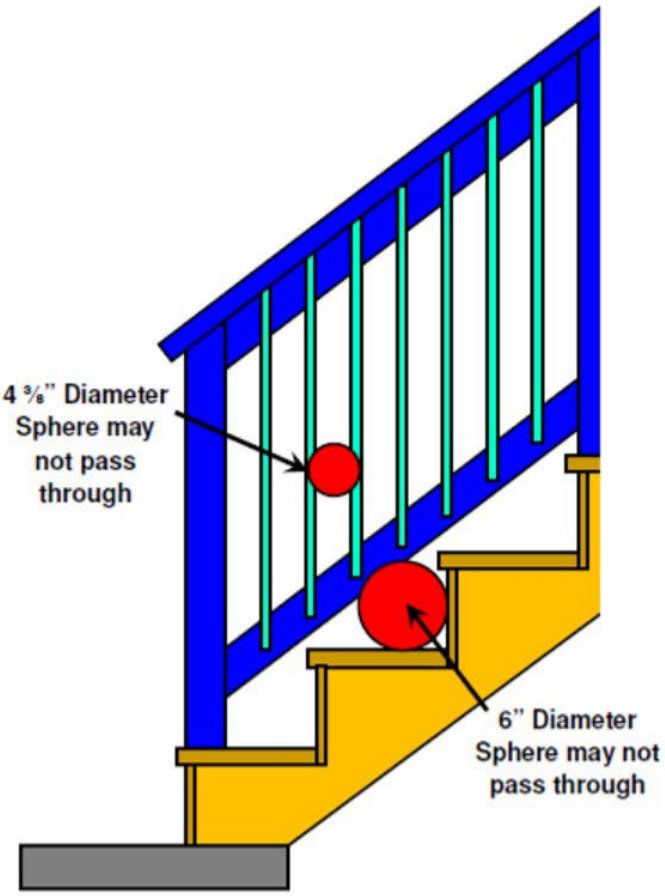
LANDING SHALL SPAN FULL WIDTH OF STAIRS & EXTEND
A MINIMUM OF 36 INCHES IN THE DIRECTION OF TRAVEL.

STAIRS MUST BEAR ON STRUCTURAL MATERIAL (i.e. treated lumber, concrete, gravel)
AND BE PERMANENTLY RESTRAINED FROM LATERAL MOVEMENT.

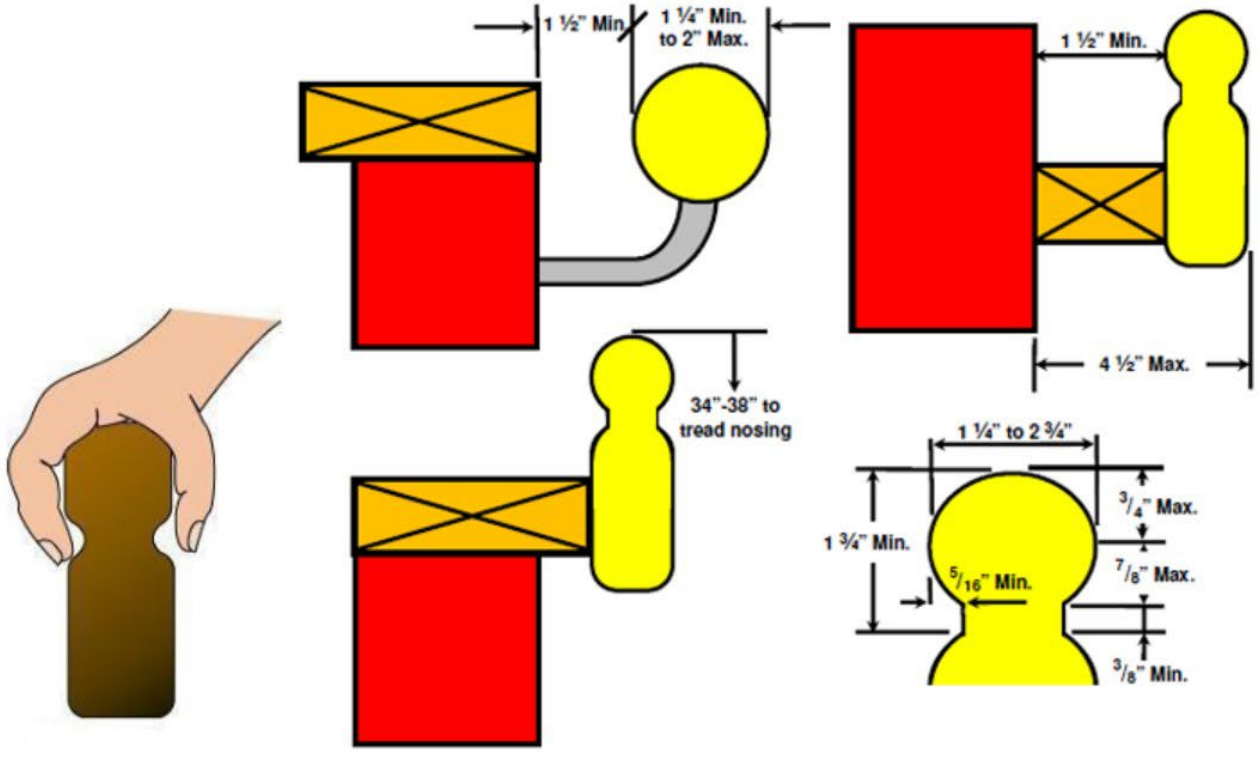


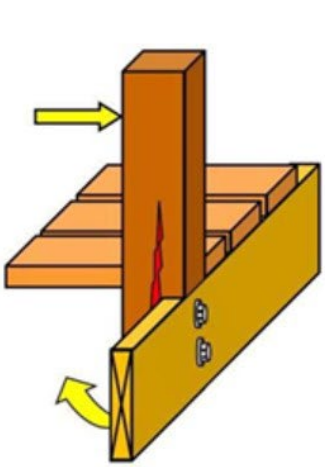


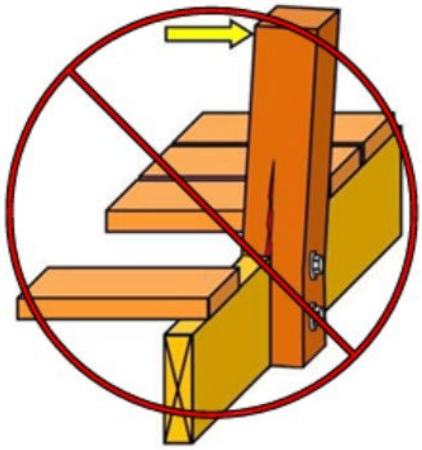


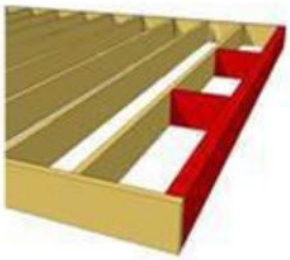


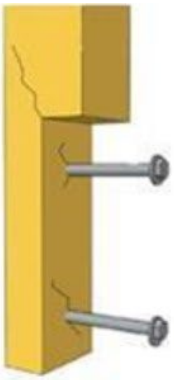
HANDRAILS MUST RETURN TO A NEWEL POST AND BE CONTINUOUS WITHOUT INTERUPTION FOR THE LENGTH OF THE FLIGHT

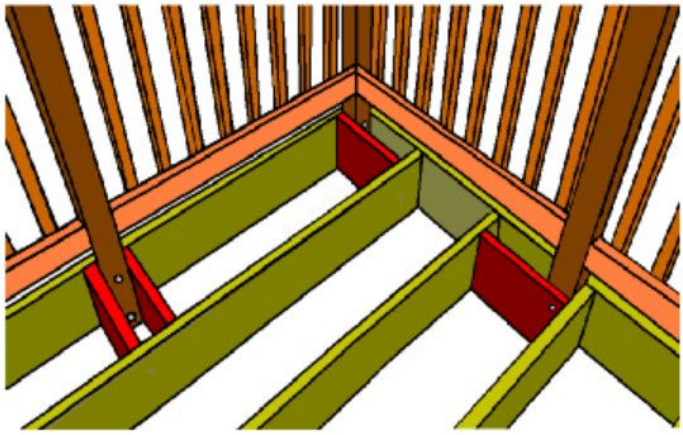


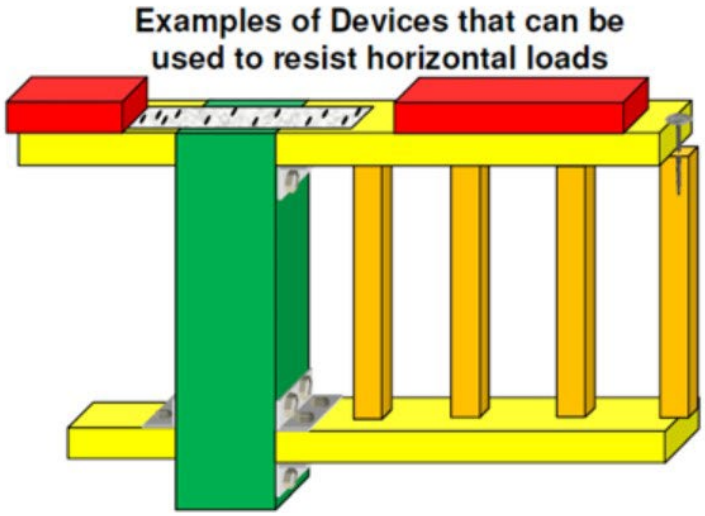












COMPOSITES AND OTHER DECK/RAILING PRODUCTS

Wood/plastic composites used for exterior deck boards, stair treads, handrails and guardrail systems must bear labels indicating compliance with ASTM D 7031 or a current ICC Evaluation Services Report must be made available. Wood/plastic composites complying with ASTM D 7031 must be installed in accordance with the manufacturer's written installation instructions. Wood/plastic composites having an ICC ES Report must be installed in accordance with the manufacturer's installation instructions and the report. READ THE INSTRUCTIONS AND THE REPORTS CAREFULLY. ALL PRODUCTS HAVE SPECIFIC REQUIREMENTS FOR STAIR TREADS. SOME ARE LIMITED TO INSTALLATION PERPENDICULAR TO JOISTS ONLY. PRODUCTS MADE OF ALUMINUM, STEEL, GLASS, OR ANY OTHER MAN MADE PRODUCT MAY BE USED IF THE MANUFACTURER HAS A RESEARCH REPORT FROM THE INTERNATIONAL CODE COUNCIL AND THE PRODUCT IS INSTALLED IN STRICT ACCORDANCE WITH THAT REPORT OR SITE SPECIFIC ENGINEERING IS PROVIDED.