

### Decks

The following are examples of information that should be included on plans submitted for building permits for residential decks. They are **examples only** and should not be construed as being code compliant for every application. It is the responsibility of the homeowner or person preparing the plans to show in detail how they will build their deck. Some designs may require more detail than others.

Your deck plans should replicate exactly how you will build your deck. We will review your plans before we issue the building permit to identify code violations before you start work. The more detailed your plans, the more likely you avoid corrections in the field.

When you receive your permit, you will also be given one set of plans stamped "Approved". Once your plans are approved, you should not change your design without approval by the St. Michael Building Department. **You should read through the approved plans to determine if the plan reviewer noted any corrections to your plan.** If you have any questions regarding any of the corrections, you should contact us before proceeding.

**REQUIRED INFORMATION WHEN APPLYING FOR A PERMIT:** We will not accept computer generated plans from retail home centers as they are material lists for estimating purposes only. Deck plans shall be site specific to your property and include the following:

- A. Submit 2 copies of a Certificate of Survey or 2 Copies of a plot plan drawn to scale indicating the lot dimensions, the location and ground coverage area of existing structure(s), and the location and area of the proposed structure. Indicate the setbacks from property lines. If you do not have a survey contact the building department to see if there is a copy in your address file.
- B. Submit 2 copies of drawings showing proposed designs and materials. Drawings shall be drawn to scale and shall include the following information:
  1. Floor Plans shall include the following:
    - Indicate proposed deck size.
    - Indicate size and spacing of floor joists.
    - Indicate size, location, and spacing of posts.
    - Indicate stair stringer spacing.
    - Indicate size of headers/beams.
    - Indicate specific decking material.
  2. Cross Section of either a rear or side view shall include the following:
    - Diameter and depth of footings.
    - Size of posts.
    - Header size supporting floor joists.
    - Floor joists size and spacing.
    - Flooring material.
    - Guardrail height (if any).
    - Type of lumber to be used.
    - Provide detail of beam to post connection, deck ledger connection, flashing detail. and stairway rise and run (see attached samples 1, 2, and 3).
- C. Checklist attached to the end of this handout must be completed before submitting permit application.

Plans created at home centers are not acceptable for plan review. These computer designs do not allow homeowners to duplicate conditions at their home. Applications submitted with these types of plans will be returned to the applicant.

This handout is intended only as a guide and is based in part on the 2012 Minnesota State Building Code, St. Michael City ordinances, and good building practice. While every attempt has been made to insure the correctness of this handout, no guarantees are made to its accuracy or completeness. Responsibility for compliance with applicable codes and ordinances falls on the owner or contractor. For specific questions regarding code requirements, refer to the applicable codes or contact your local Building Department.

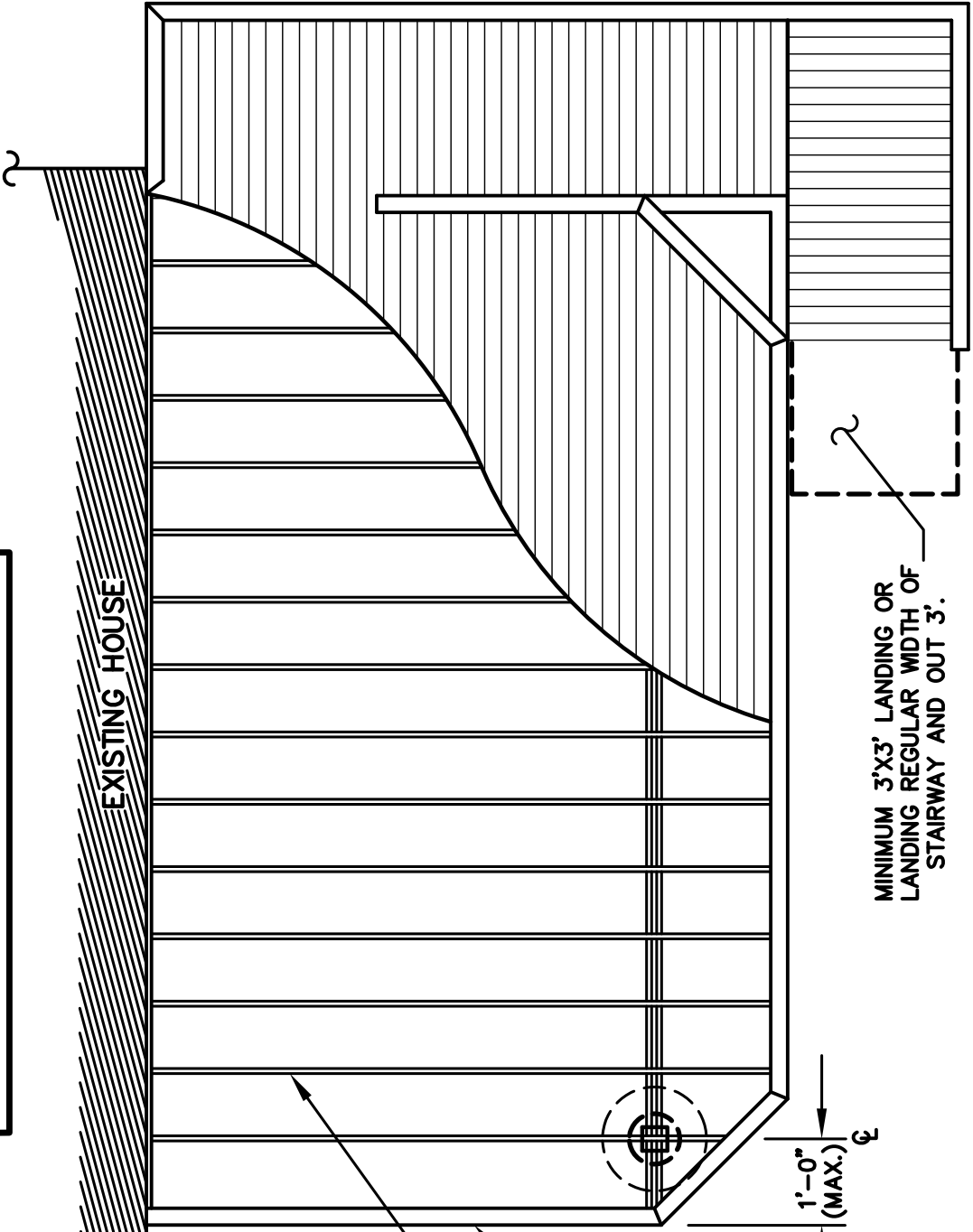
For additional City information, please check the website or contact City Hall at:  
[www.stmichaelmn.gov](http://www.stmichaelmn.gov)  
11800 Town Center Drive NE, Suite 300, St. Michael, MN 55376  
[inspections@stmichaelmn.gov](mailto:inspections@stmichaelmn.gov) (Email) 763-497-2041 (Phone)

# RESIDENTIAL DECKS

## Information Sheet

<b>Building Permits</b>	Permits are required for any deck attached to your home. Check with the building and zoning department for any detached decks.
<b>Setbacks</b>	Building code and zoning requirements apply. Contact the zoning department for setback requirements for your property.
<b>Frost Footings</b>	Required for any deck attached to an existing dwelling, porch or garage that has frost footings. The minimum depth to the base of the footing is 42". See frost depth rules in the Minnesota State Building Code.
<b>Live Load</b>	All decks shall be designed to support a live load of 40 pounds per square foot.
<b>Guards</b>	Required on all decks more than 30 inches above grade or a lower deck. Rail shall be 36 inches minimum in height. Guardrails must have intermediate rails or an ornamental pattern that a 4" sphere cannot pass through, stair railings must have 4 3/8" spacing. The triangular openings formed by the riser, tread and bottom element of a guard may be sized so that a 6 inch sphere cannot pass through.
<b>Cantilevers "Overhanging Joists and Beams"</b>	Joists shall not overhang beams by more than two feet, nor shall beams overhang posts by more than one foot unless a special design is approved.
<b>Flashing</b>	All connections between deck and dwelling shall be weatherproof. Any cuts in exterior finish shall be flashed.
<b>Framing Details</b>	Header beams and joists that frame into ledgers or beams shall be supported by approved framing anchors such as joist hangers.
<b>Nails and Screws</b>	Use only stainless steel, high strength aluminum or hot-dipped galvanized.
<b>Wood Required</b>	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.
<b>Stairs</b>	<p>Minimum width is 36 inches. Maximum rise is 7 3/4 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 <u>within</u> any flight of stairs.</p> <p>All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway. The illumination of exterior stairs shall be controlled from inside the dwelling unit.</p>
<b>Handrails</b>	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 1/4 inches or more than 2 5/8 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.
<b>Special</b>	Some deck designs <b>may not</b> be appropriate should the placement of a screen porch or 3-season porch on the deck platform be a future consideration.

# CITY EXAMPLE PLAN



DECKS SHALL NOT BE ATTACHED TO ANY EXISTING CANTILEVERS WITHOUT PRIOR APPROVAL FROM THE CITY.

TREATED JOISTS 16" O.C.

TREATED BEAM

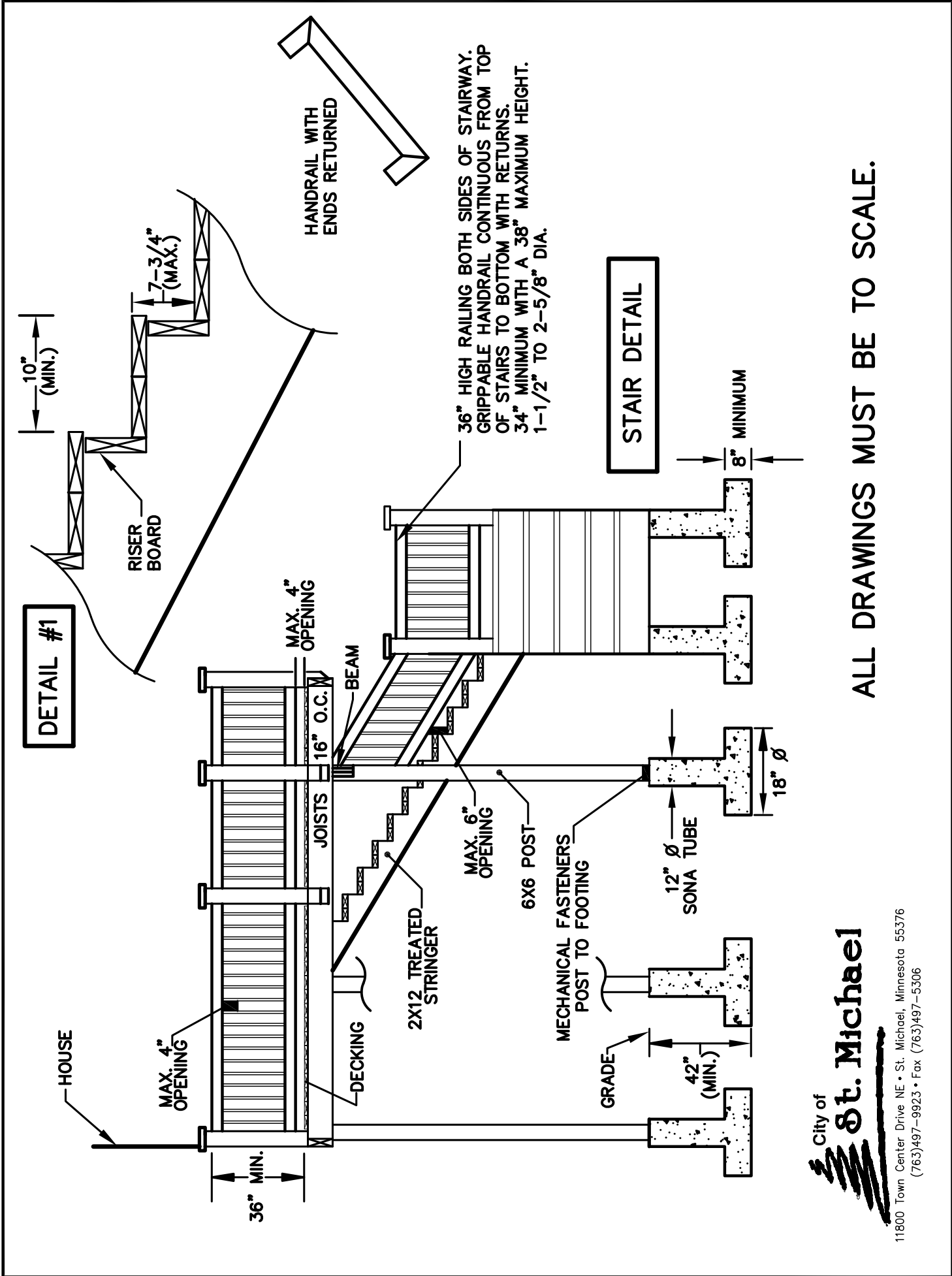
2'-0" (MAX.)

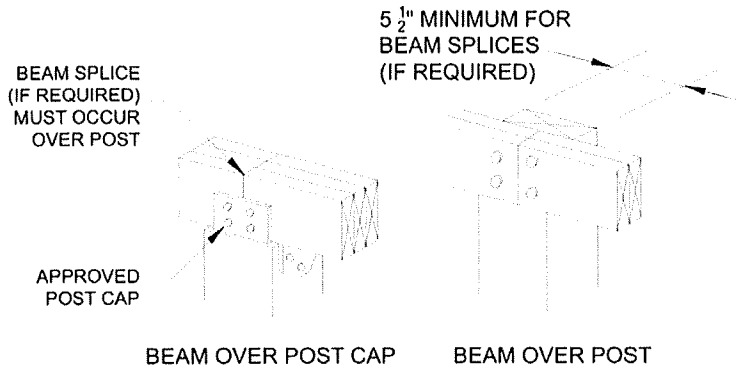
1'-0" (MAX.)

MINIMUM 3'X3' LANDING OR LANDING REGULAR WIDTH OF STAIRWAY AND OUT 3'.

STAIRWAY ILLUMINATION SHALL BE REQUIRED.

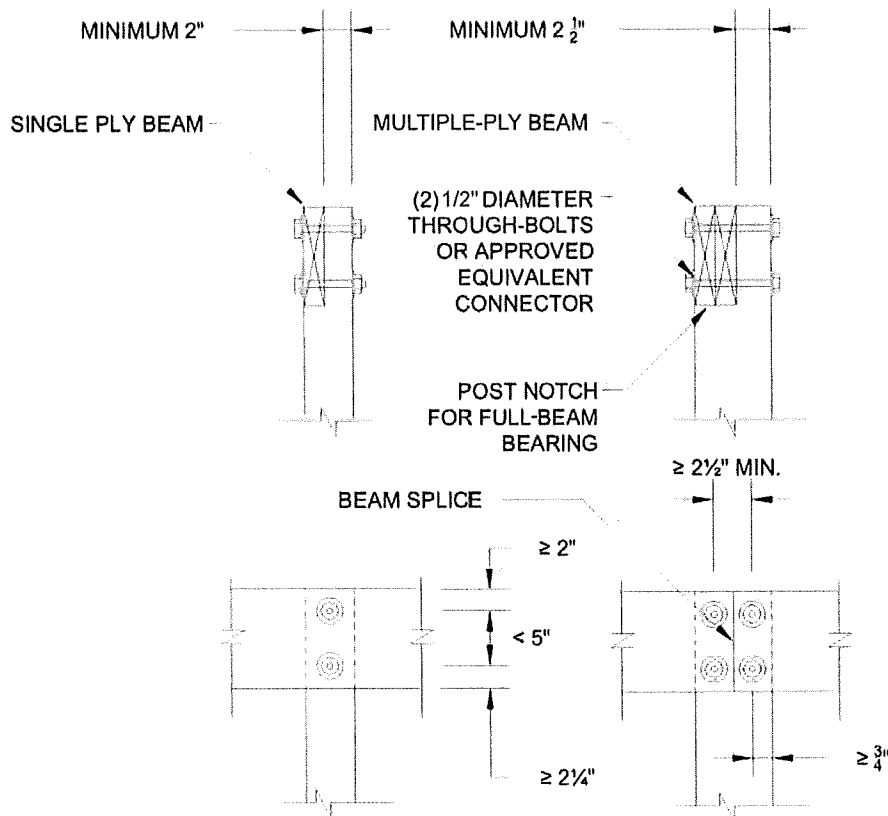
ALL DRAWINGS MUST BE TO SCALE.





For SI: 1 inch = 25.4 mm.

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



For SI: 1 inch = 25.4 mm.

FIGURE R507.5.1(2)  
NOTCHED POST-TO-BEAM CONNECTION

## FLOORS

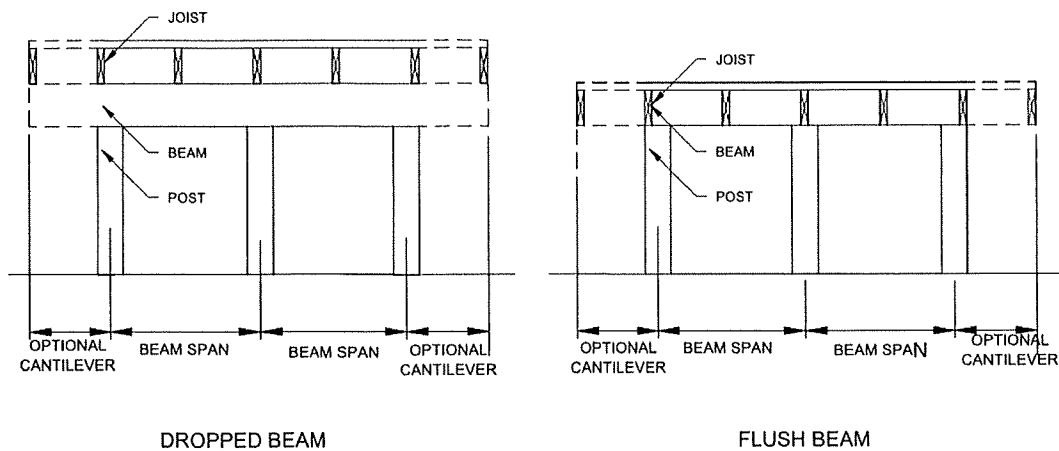


FIGURE R507.5  
TYPICAL DECK JOIST SPANS

TABLE R507.5  
DECK BEAM SPAN LENGTHS<sup>a, b, g</sup> (feet - inches)

SPECIES <sup>a</sup>	SIZE <sup>d</sup>	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 <sup>e</sup> , hem-fir <sup>e</sup> , spruce-pine-fir <sup>e</sup> , redwood, western cedars, ponderosa pine <sup>f</sup> , red pine <sup>f</sup>	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. 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. 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.

FLOORS

TABLE R507.3.1  
MINIMUM FOOTING SIZE FOR DECKS

LIVE LOAD <sup>a</sup> (psf)	TRIBUTARY AREA (sq. ft.)	LOAD BEARING VALUE OF SOILS <sup>a,c,d</sup> (psf)														
		1500 <sup>b</sup>				2000 <sup>b</sup>				2500 <sup>b</sup>				≥ 3000 <sup>b</sup>		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6	12	14	6	12	14	6	12	14	6	12	14	6
	40	14	16	6	12	14	6	12	14	6	12	14	6	12	14	6
	60	17	19	6	15	17	6	13	15	6	12	14	6	12	14	6
	80	20	22	7	17	19	6	15	17	6	14	16	6	14	16	6
	100	22	25	8	19	21	6	17	19	6	15	17	6	15	17	6
	120	24	27	9	21	23	7	19	21	7	17	19	6	17	19	6
	140	26	29	10	22	25	8	20	23	8	18	21	7	18	21	6
	160	28	31	11	24	27	9	21	24	9	18	22	8	20	22	7

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m<sup>2</sup>, 1 pound per square foot = 0.0479 kPa.

- a. Interpolation permitted, extrapolation not permitted.
- b. Live load = 40 psf, dead load = 10 psf.
- c. Assumes minimum square footing to be 12 inches x 12 inches x 6 inches for 6 x 6 post.
- d. If the support is a brick or CMU pier, the footing shall have a minimum 2-inch projection on all sides.
- e. Area, in square feet, of deck surface supported by post and footings.

## FLOORS

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

SPECIES <sup>a</sup>	SIZE	ALLOWABLE JOIST SPAN <sup>b</sup>			MAXIMUM CANTILEVER <sup>c,1</sup>		
		SPACING OF DECK JOISTS (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS <sup>c</sup> (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 <sup>d</sup> , hem-fir <sup>d</sup> , spruce-pine-fir <sup>d</sup> ,	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 <sup>e</sup> , red pine <sup>e</sup>	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 R507.7  
MAXIMUM JOIST SPACING FOR DECKING

DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking diagonal to joist <sup>a</sup>
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.

FLOORS

**TABLE R507.9.1.3(1)**  
**DECK LEDGER CONNECTION TO BAND JOIST<sup>a</sup>**  
 (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 <sup>b,c</sup>	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing <sup>e</sup>	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing <sup>d</sup>	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.

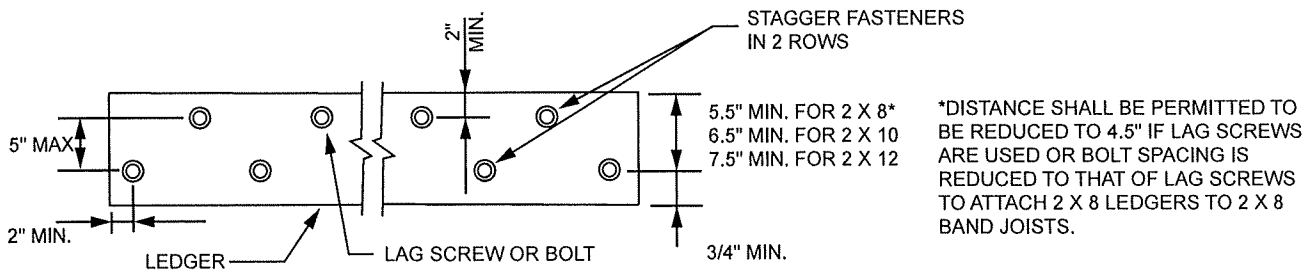
- a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- b. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- c. Sheathing shall be wood structural panel or solid sawn lumber.
- d. Sheathing shall be 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 <sup>a</sup>	2 inches <sup>d</sup>	3/4 inch	2 inches <sup>b</sup>	1 5/8 inches <sup>b</sup>
Band Joist <sup>c</sup>	3/4 inch	2 inches	2 inches <sup>b</sup>	1 5/8 inches <sup>b</sup>

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.

**FIGURE R507.9.1.3(1)**  
**PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS**

# RESIDENTIAL DECKS AND THE 2020 MINNESOTA RESIDENTIAL CODE

Minnesota Department of Labor and Industry

## General requirements and building permits

Effective March 31, 2020, residential exterior decks must be designed and constructed using the 2020 Minnesota Residential Code (MRC), related standards, manufacturer installation instructions, best practices and local jurisdiction zoning codes and ordinances.

Building permits are required:

- When a deck or a platform is more than 30 inches above adjacent grade.
- When a deck or platform is attached to a structure with frost footings.
- When a deck or platform is part of an accessible route.

## Deck materials

All wood used in deck construction must meet requirements of MRC R507.2.1. This includes the grade of the wood (No. 2 or better), preservative treated or naturally durable lumber that has approval by the local jurisdiction. Preservative-treated wood must be appropriate for the installation and meet the American Wood Protection Association's (AWPA) UC3 (above ground) or UC4 (ground contact) use categories. All cuts, notches and holes in preservative-treated wood requires field treatment (MRC R317.1.1). All engineered wood products must meet the requirements in MRC R502.

Exterior deck boards, stair treads, guards or handrails made of plastic composite materials must meet certain performance standards in American Society for Testing and Materials (ASTM) D7302. Labels on materials or packaging will indicate compliance. Follow manufacturer's installation instructions for plastic composite materials.

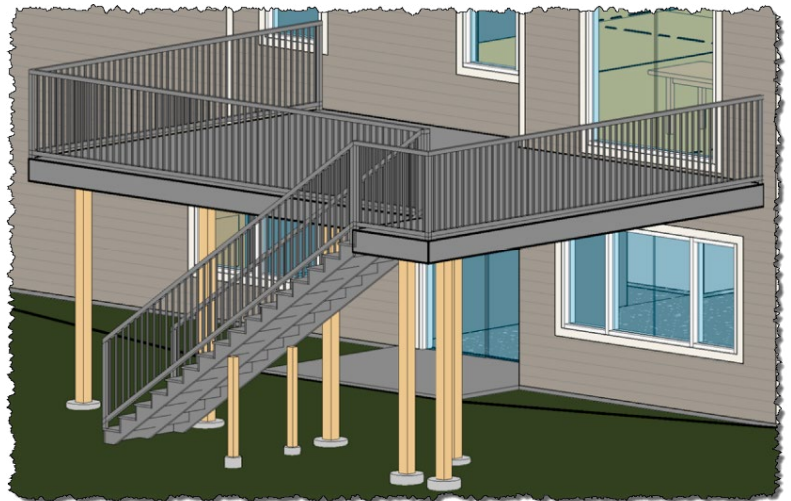
## Fasteners and connectors

Requirements for fasteners are in MRC Table R507.2.3 and R317.3. Fasteners (including nuts and washers) used in preservative-treated wood must be hot-dipped, zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Staples used in preservative-treated wood must be stainless steel. Metal connectors in contact with preservative-treated wood should follow manufacturers recommendations and MRC Table R507.2.3.

Holes for bolts must be drilled between 1/32 and 1/16 of an inch larger than the bolt. Lag screws 1/2 inch or larger should be predrilled to avoid wood splitting.

## Footings

Decks are required to be supported on concrete footings or other approved structural systems designed to accommodate all loads in accordance with the MRC. The use of alternative footings must be reviewed for approval by the local building safety department. Footings must be sized to bear loads and suitable for allowable soil-bearing



pressure (MRC Table R401.4.1). The minimum depths of footings must be either 5'-0" (Zone 1) or 3'-6" (Zone 2). Refer to Minnesota Rules 1303.1600 for the counties included in each zone.

## Deck posts

Deck post sizing requirements are in MRC Table R507.4 and are limited to single-level wood-framed decks when sizing the decks other structural components with MRC Table R507.5. The height of the post shown in MRC Table R507.4 is measured from the underside of the beam to the top of the footing. Deck posts are based on using a 40 psf live load for structural member size calculations. Metal connectors must be provided at the top and bottom of posts for lateral restraint.

## Beams

Allowable deck beam span lengths can be determined in MRC Table R507.5. Examples of the flush beams and dropped beams can be seen in the examples shown. Measurements of deck beam lengths need to be from center of post to center of post. The spans used in the table are based on a live load of 40 psf, a dead load of 10 psf, supporting deck joists from one side only and the beam depth must be greater than or equal to the joist depth when using a flush beam configuration. Beam plies shall be fastened with two rows of 10d (3-inch x 0.128-inch) nails or approved fasteners a minimum of 16 inches on center. Beams are allowed to cantilever up to one-fourth of their allowable span at each end.

Ends of beams used in splices must have a minimum of 1-1/2 inches of bearing on wood and 3 inches on concrete.

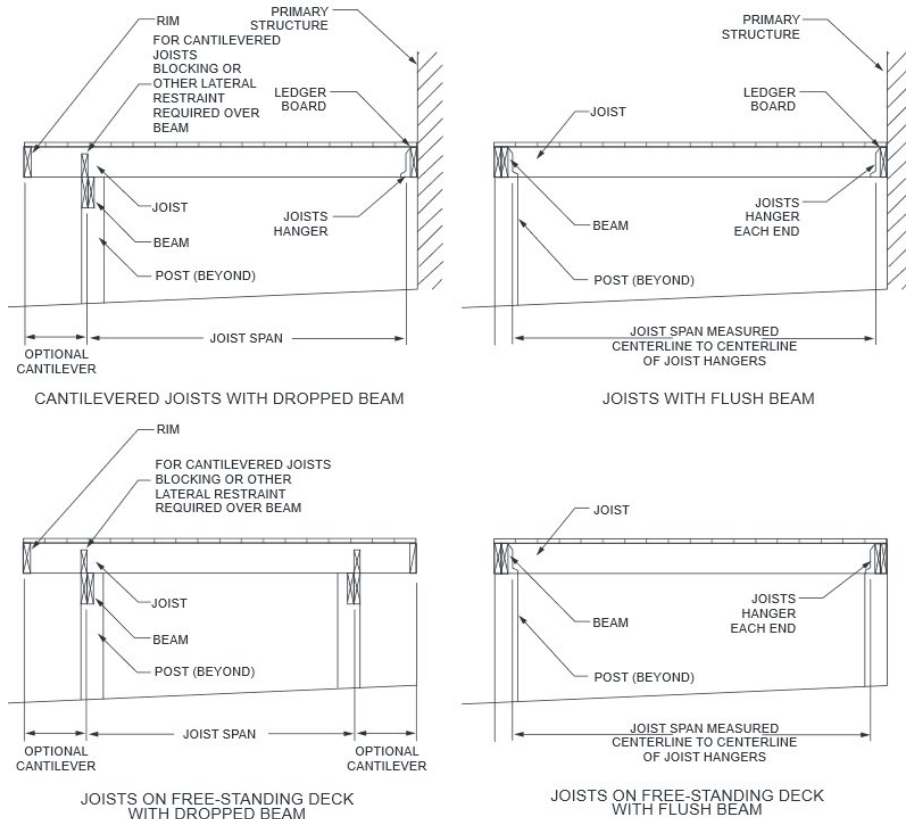
Multiple-span beams must have full bearing on posts (MRC Figures R507.5.1(1) and R507.5.1(2)). Those figures also show beam-to-post connections with metal connector plates and bolts and nuts configurations that are required by MRC R507.5.2.

## Joists

Allowable spans for joists are in MRC Table 507.6. The live load used in the table is 40 psf and a dead load of 10 psf. The maximum cantilever length is determined by the lesser of one-fourth of the joist span or the maximum cantilever length shown in MRC Table 507.6. Joist spacing is limited by the span rating of the decking being used, see MRC Table R507.7.

Deck joists require a minimum of 1-1/2 inches of bearing on wood and 3 inches on concrete. Joist bearing on top of a single-ply beam or ledger shall be attached by a mechanical connector. Use the fastener schedule (MRC Table R602.3(1)) for fastening joists to a multiple-ply beam. Use an approved joist hanger for joist framing into the side of a beam or ledger board.

Where joist hangers or blocking are used, 60-percent of the joist depth must be restrained. If a rim joist is being used, not fewer than three 10d (3-inch x 0.128-inch) nails or three No. 10x 3-inch-long wood screws are required.



## Decking

Use at least two 8d threaded nails or two No. 8 wood screws to attach wood decking to the joist. Other approved decking or fastener systems shall be installed in accordance with the manufacturer's installation requirements.

## Ledger and band joist

A ledger board attached to the exterior wall of the primary structure must be at least 2-inch by 8-inch nominal. Pressure-preservative-treated Southern pine, incised pressure-preservative treated hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers must not support concentrated loads from beams or girders and cannot be supported on stone or masonry veneer.

Band joists supporting a ledger must bear fully on the primary structure and be capable of supporting all required loads. Fasteners used in deck ledger connections in accordance with MRC Tables R507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.9.1.3(2) and figures R507.9.1.3(1) and R507.9.1.3(2). Where connections to the primary structure cannot be verified during inspection, decks must be self-supporting.

## Lateral support

Lateral-load connection devices must be installed to transmit the lateral loads imposed on the deck to the ground. The lateral-load connection device shown in MRC Figure R507.9.2(1), with the threaded rod and connection points on the deck joist and the primary structure floor system, must be installed in two locations on the deck a minimum of 24 inches from the ends. Each device must have an allowable stress design capacity of at least 1,500 pounds.

Where the lateral load connections are provided in accordance with Figure R507.9.2(2), the hold-down tension devices must be installed in at least four locations per deck, and each device must have an allowable stress design capacity of at least 750 pounds. Hold-down tension devices are required to be installed per the manufacturer's instructions.

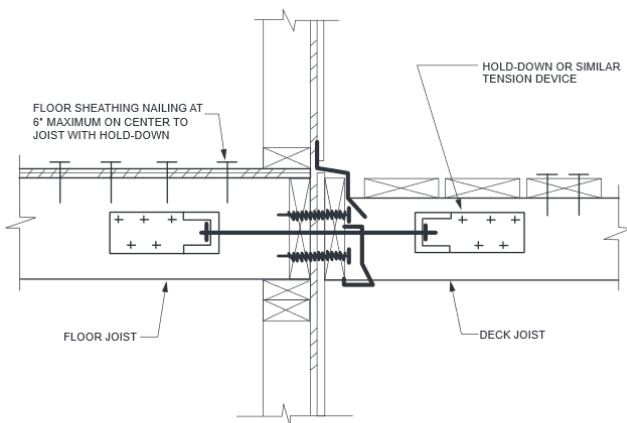


FIGURE R507.9.2(1)  
DECK ATTACHMENT FOR LATERAL LOADS

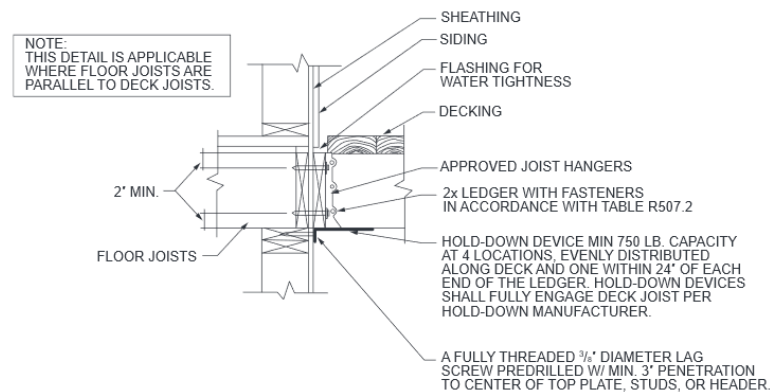


FIGURE R507.9.2(2)  
DECK ATTACHMENT FOR LATERAL LOADS