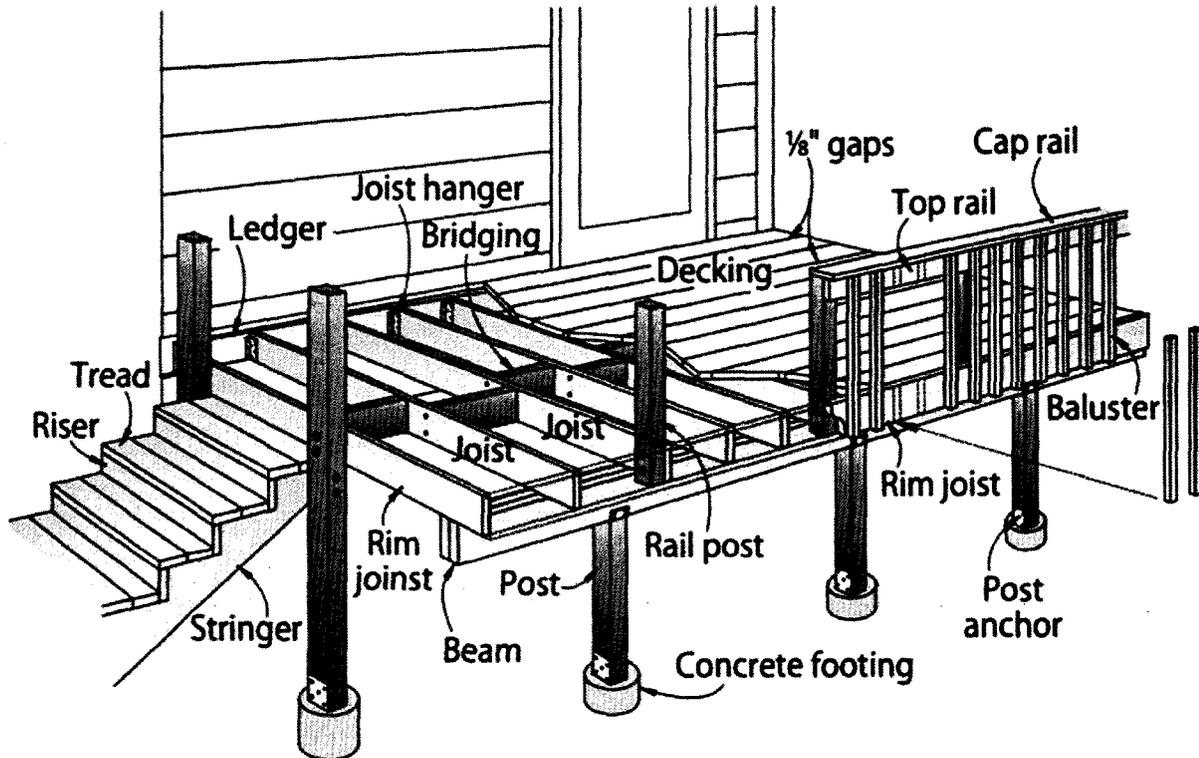


## METRO WEST INSPECTION SERVICES, INC.

Box 248 / Loretto, MN 55357 / Phone: 763-684-0383 / Fax: 763-682-0988

### **BUILDING PERMITS MADE EASIER FOR DECKS**

This handout is a **guide** only and does not contain all of the requirements of the Minnesota State Building Code or city ordinances.



### **BUILDING PERMITS**

Building permits are required for decks with the following exception: freestanding decks, regardless of size, if they are not more than 30 inches above adjacent grade. Freestanding decks do not require footings that extend below the frost depth.

Building permits are not required for patios made of concrete or pavers on grade.

*At least 2 business days before you dig...*

**Gopher State One Call  
(651) 454-0002 - - or - - 811**

## DO YOU THINK YOU MIGHT ENCLOSE YOUR DECK IN THE FUTURE?

Deck plans are approved based on the assumption that the deck will be used *only* as a deck for the life of the structure. Because there are so many components that will vary by becoming a porch, it is important that you indicate this possibility on your plans. Your deck design should reflect the future loads (including the addition of a hot tub), meet setbacks and any other applicable rules.

## MATERIALS

### Fasteners

Nails and other hardware must be hot-dipped zinc-coated (galvanized), stainless steel or equivalent. Screws should be either hot-dipped galvanized or electroplated with a polymer coating. With lag screws, use a flat washer under the head. Use washers under the nut and head of machine bolts and just under the nut of carriage bolts.

### Lumber

All wood used in deck construction must be pressure-treated lumber or wood that is naturally resistant to decay such as redwood or cedar.

Wood used above ground, in contact with the ground, or below ground, requires different degrees of treatment. Check the labels of the material you are buying to determine where it can be used. *Because some preservative treatments are very corrosive, make sure that any fasteners or metal connectors used in the construction of your deck are approved by the manufacturer for use with treated wood.*

### Decking

Materials commonly used for decking include standard dimension lumber (either 2x4 or 2x6), radius-edged decking or a manufactured decking product. Radius-edged Patio Decking (5/4 decking) has been specifically developed for outdoor decks.

*Redwood and cedar patio decking is intended to be used flat-wise in load-bearing applications where spans do not exceed 16" o.c. (12" o.c. when installed diagonally to joists). Southern pine decking may span 24" o.c. or 16" o.c. when installed diagonally to joists.*

Manufactured decking (composite) may be used when approved by the building department

## GENERAL BUILDING CODE REQUIREMENTS

1. **Footings** must be sized properly and extend to frost depth (if attached to the house).
2. **Decks** need to be designed for a 40-pound per square foot live load and a 10-pound per square foot dead load. Decks exposed to the weather must be constructed of approved wood with natural resistance to decay such as redwood, cedar or treated wood, or other material (composite plastics, etc.) **WITH PRIOR APPROVAL OF THE BUILDING INSPECTOR.**
3. **Pressure-Treated Wood** - Recent changes have been made in the chemicals used in the manufacture of pressure-treated wood. Chromated copper arsenate, also known as CCA, is being phased out and the most common new treatments approved for outdoor use are Alkaline Copper Quaternary (ACQ) and Copper Azole. According to the lumber and fastener industry, the newer chemicals being used to treat the wood approved for outdoor use are considerably more corrosive than those previously treated with CCA and therefore require special fasteners, hangers, and greater care in the selection of materials that may come in contact with the wood. The fastener industry has indicated that some of the hangers and

fasteners currently on the market may not perform with some of the new treatments. Designers, builders, and homeowners will need to pay particular attention to the grade marks on the lumber, and verify that proper hardware (hangers, nails, brackets) are appropriate with the particular treatment of the lumber. This not only applies to decks utilizing these products but sill plates and posts as well. The code references the American Wood Preservers Association (AWPA), which has published information on this issue. Particular attention should also be made to the manufacturer's installation instructions for the hardware. Questions should be directed to your wood and fastener supplier or your local Building Official.

**4. Columns and posts** in contact with the ground or embedded in concrete, earth or masonry must be of special pressure treated wood approved for ground contact. Cedar or redwood posts need an 8 inch separation from the ground.

**5. All decks**, balconies or porches, open sides of landings and stairs which are more than 30" above grade or a floor below must be protected by a guard not less than 36 inches in height. Open guard and stair railings require intermediate rails of an ornamental pattern such that a sphere 4 inches in diameter cannot pass through.

**6. If a stairway** is to be provided, it must be not less than 36 inches in width. Stairways may be constructed having an 7 3/4-inch maximum rise (height) and a 10-inch minimum run (length). The largest tread rise and tread run may not exceed the smallest tread rise or run by more than 3/8 inch. Stairway illumination is required by the code.

**7. Handrails** are required on all stairways having 4 or more risers. Handrails may not be less than 1 1/4" nor more than 2 5/8" in cross sectional area. The handrails must be graspable, continuous and uninterrupted. Top of handrail must be not less than 34 inches nor more than 38 inches above the nosing (front edge) of treads and they must be returned to a wall or post.

The electrical code requires overhead power lines to be located a minimum 10 feet above decks and platforms. Existing lines may need to be raised if a new deck is to be installed beneath them.

Outside meters, wells, and septic systems. When locating a deck care must be given to the location of existing gas and electric meters, wells, and septic systems. These may need to be relocated to allow for construction of the deck. Septic systems and wells may be difficult to relocate, requiring an alternative location for the deck. Prior to placement of any deck that will interfere with these devices, contact the building inspector.

Outside water meter readers. Prior to placement of any deck that will interfere with the operation or accessibility of the reader, contact your local Building Inspector or Water Department to obtain information and procedures on relocating these devices. Note: For specific code requirements, please contact us.

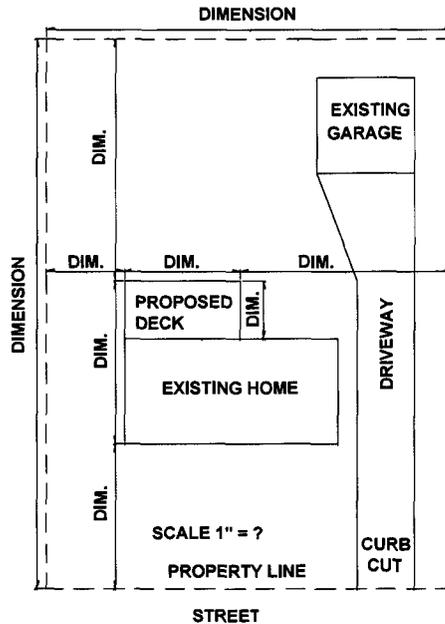
#### **PLAN SUBMITTAL REQUIREMENTS**

The following shows the minimum detail expected so the permit process can proceed smoothly. TWO sets of each plan are required. Plans do not need to be professionally drawn. The application for permit can be filled out at the time you drop off your plans.

### SURVEY OR SITE PLAN

1. A Certificate of Survey or Site Plan drawn to scale indicating the dimension, location and size of the existing structures(s), and the location and size of the proposed deck. Indicate setbacks to property lines from the proposed deck.

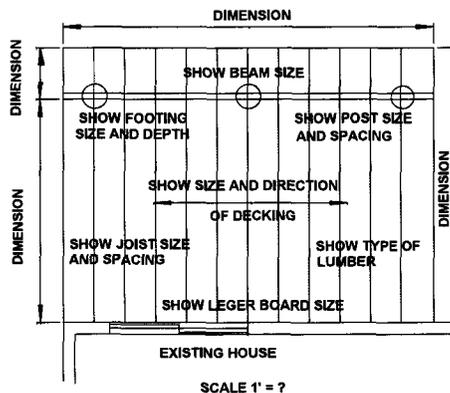
**SAMPLE SITE PLAN**



### FLOOR PLAN

1. Proposed deck size.
2. Size and spacing of floor joists.
3. Size and type of decking material.
4. Size, type, location, and spacing of posts.
5. Size and type of beams.
6. Beam splices must be centered over the columns.

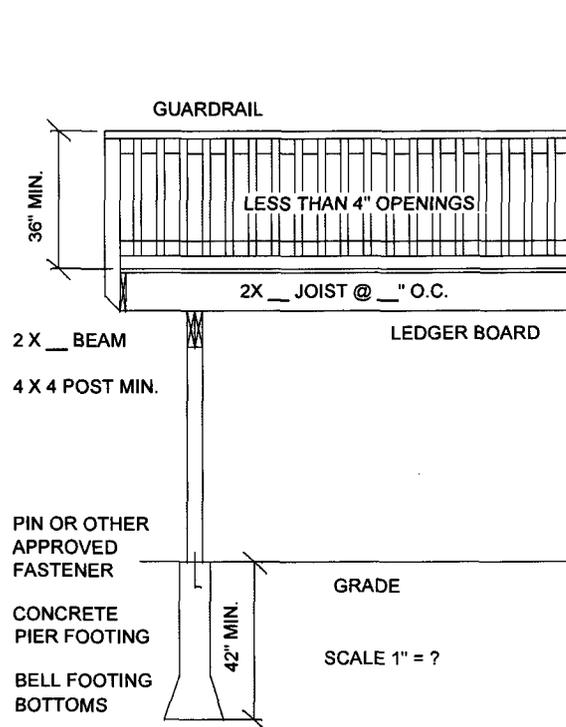
**SAMPLE FLOOR PLAN**



**ELEVATION PLAN:**

1. Height of structure from grade.
2. Size and depth of footings.
3. Guard height and spacing (if any).
4. Stairway rise/run and handrail height (if any).
5. Clearance of overhead wires (if applicable)
6. House floor construction (floor trusses, I-Joist, etc.)

**SAMPLE ELEVATION**



## SECTION R507 DECKS

### R507.1 Decks.

Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

### R507.2 Deck ledger connection to band joists.

For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir or *approved* decay-resistant species and a 2-inch (51 mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with 1/2-inch (12.7 mm) lag screws or bolts with washers in accordance with Table R507.2. Lag screws, bolts and washers shall be (12.7 mm) lag screws or bolts with washers in accordance with Table R507.2. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.

TABLE R507.2

FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND A 2-INCH NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST <sup>c, f, g</sup> (Deck live load – 40 psf, deck dead load = 10 psf)

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'
<b>Connection details</b>	<b>On-center spacing of fasteners<sup>d, e</sup></b>						
1/2 inch diameter lag screw with 15/32 inch maximum sheathing <sup>a</sup>	30	23	18	15	13	11	10
1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 inch maximum sheathing and 1/2 inch stacked washers <sup>b, h</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. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2 inch.
- c. Ledgers shall be flashed to prevent water from contacting the house band joist.
- d. Lag screws and bolts shall be staggered in accordance with Section R507.2.1.
- e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.
- f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.
- g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist.
- h. Wood structural panel sheathing, gypsum board sheathing or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.

**R507.2.1 Placement of lag screws or bolts in deck ledgers and band joists.**

The lag screws or bolts in deck ledgers and band joists shall be placed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1(2).

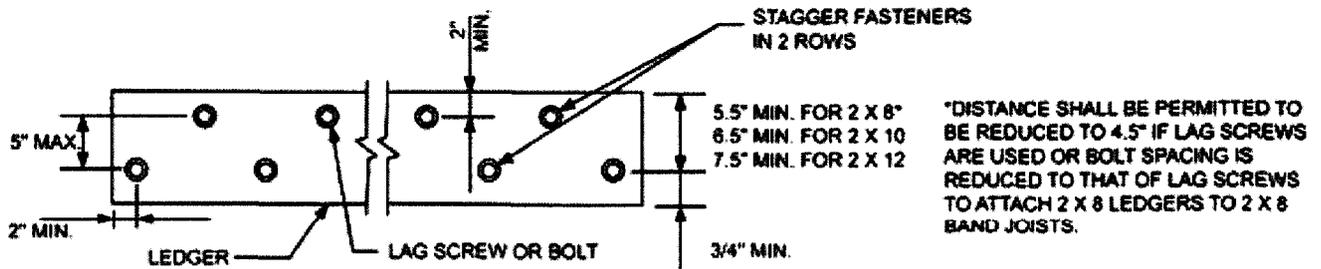
**TABLE 507.2.1.  
PLACEMENT OF LAG SCREWS AND BOLTS  
IN DECK LEDGERS AND BAND JOISTS**

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>	1/4 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.

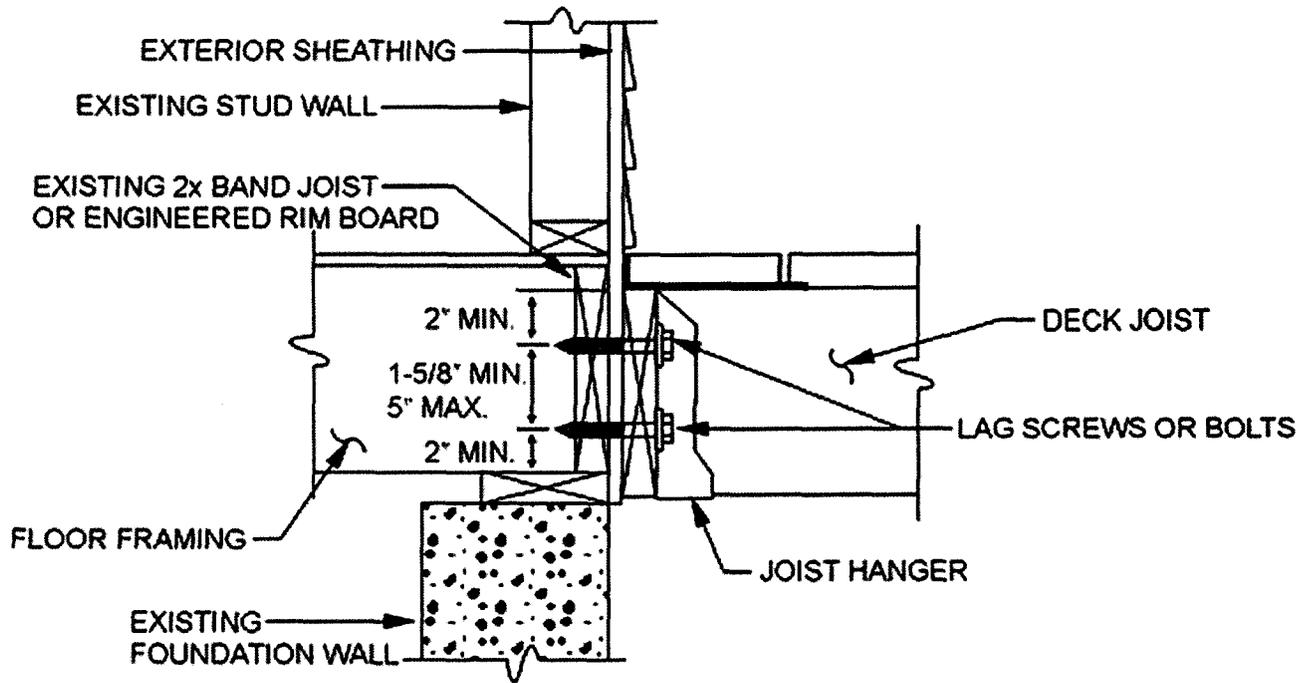
- a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).
- b. Maximum 5 inches.
- c. For engineered rim joists, the manufacturer's recommendations shall govern.
- d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).

**FIGURE R507.2.1(1) PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS**



For SI: 1 inch = 25.4 mm.

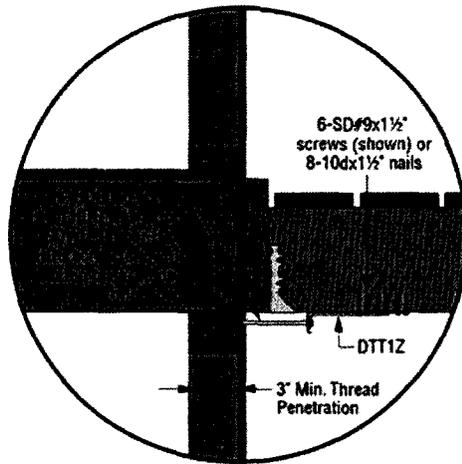
FIGURE R507.2.1(2) PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS



For SI: 1 inch = 25.4 mm.

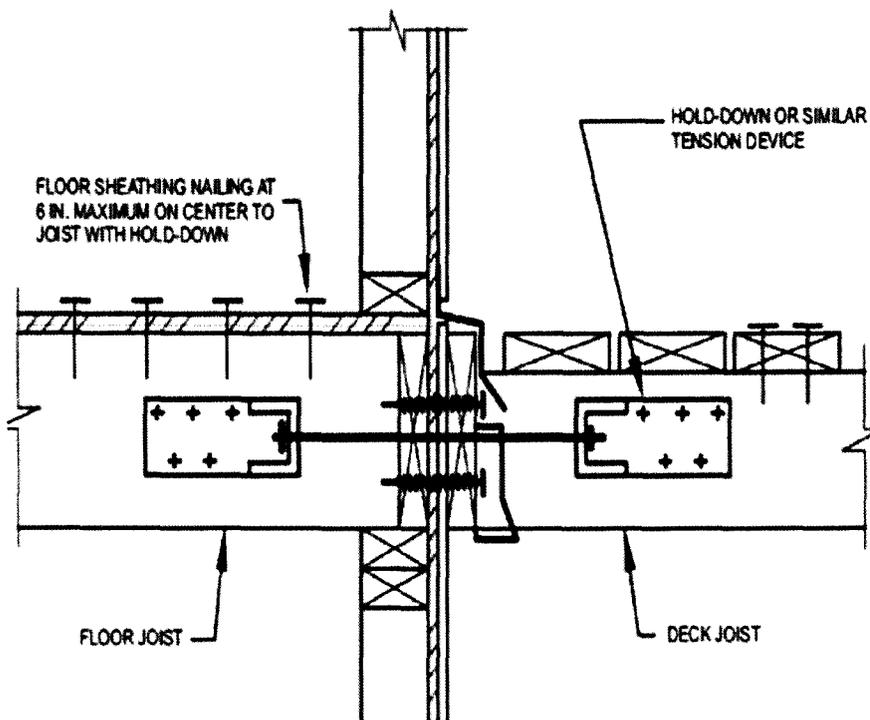
**R507.2.3 Deck lateral load connection.**

The lateral load connection required by Section R507.1 shall be permitted in accordance with Figure R507.2.3. Where the lateral load connection is provided in accordance with Figure 507.2.3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).



R507.2.3 Lateral load connection design shall be submitted for approval, can be achieved by using 4 connections similar to Simpsons DTT1Z, as shown above or not less than 2 connectors similar to those shown below – Which must be able to achieve total allowable stress design capacity of 3000 lbs..

The hold-down tension device manufacturer prescribes alternate methods for attaching to engineered or manufactured wood floor systems and for achieving floor sheathing attachment where floor covering already in place.



## FOOTINGS

Deck footings should be sized according to the following table. Footings must extend *at least 42 inches below grade* (frost line) except for decks that are not connected to a dwelling. *The minimum compressive strength of concrete used for deck footings is 5000 psi.*

### DECK FOOTING SIZES (1500 psf soils) –NOT FOR USE WITH HOT TUBS

Max. Area of Deck Supported in Sq Ft	Footing Diameter Required in Inches	Max. Area of Deck Supported in Sq Ft	Footing Diameter Required in Inches	Max. Area of Deck Supported in Sq Ft	Footing Diameter Required in Inches	Max. Area of Deck Supported in Sq Ft	Footing Diameter Required in Inches
10	8	23	12	41	16	65	20
13	9	27	13	47	17	72	21
16	10	32	14	53	18	79	22
19	11	36	15	59	19	86	23

## BEAMS

Construct beams using two or more 2 inch nominal pieces of lumber. Nail beams together using 10d nails at 32 inches o.c. along each edge of the beam and staggered. A spacer may be used to fir the beam to a 3½ -inch width. Beams should be installed with any arch or crown facing up. Attachments to columns should be with post caps designed for such use. Splices must occur over columns.

Beam Sizes (Based on No. 2 or better Ponderosa Pine and Southern Pine Treated for weather and/or ground exposure)

**X = Joist Length**

X	Species	Post Spacing										
		4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'
6'	SYP	2-2x6	2-2x6	2-2x6	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10
	P P	2-2x6	2-2x6	2-2x8	2-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10
7'	SYP	2-2x6	2-2x6	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10	2-2x12
	P P	2-2x6	2-2x6	2-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10	2-2x12	3-2x10	3-2x10
8'	SYP	2-2x6	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12
	P P	2-2x6	2-2x6	2-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10	3-2x10	3-2x10	3-2x12
9'	SYP	2-2x6	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10
	P P	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10	3-2x10	3-2x10	3-2x12	3-2x12
10'	SYP	2-2x6	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10
	P P	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x10	3-2x10	3-2x12	3-2x12	Eng Bm
11'	SYP	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12
	P P	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm
12'	SYP	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x10	3-2x12
	P P	2-2x6	2-2x6	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm
13'	SYP	2-2x6	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x12	3-2x12
	P P	2-2x6	2-2x6	2-2x8	2-2x10	2-2x12	2-2x12	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm
14'	SYP	2-2x6	2-2x6	2-2x6	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x12	3-2x12	3-2x12
	P P	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm
15'	SYP	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm
	P P	2-2x6	2-2x8	2-2x8	2-2x10	3-2x10	3-2x10	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm
16'	SYP	2-2x6	2-2x6	2-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm
	P P	2-2x6	2-2x8	2-2x10	2-2x10	3-2x10	3-2x10	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm

Joist sections cantilevered over beams must be calculated as (2x length) for beam sizing.

SYP= Southern Yellow Pine

P P= Ponderosa Pine

## JOIST DETAILS

Joists shall be the same size or smaller than the ledger. Joists must bear on a beam, ledger strip, or joist hangers. Joist hangers must be installed in accordance with the manufacturers recommendations. Fill all nail holes in joist hangers. Joist spacing is determined by the type of decking used.

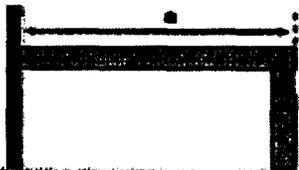
## Joist Span

Based on No. 2 or better wood grades.  
(Design Load = 40#LL + 10#DL, Deflection = L/360)

	Ponderosa Pine			Southern Pine			Western Cedar		
	12"OC	16"OC	24"OC	12"OC	16"OC	24"OC	12"OC	16"OC	24"OC
2x6	9-2	8-4	7-0	10-9	9-9	8-6	9-2	8-4	7-3
2x8	12-1	10-10	8-10	14-2	12-10	11-0	12-1	11-0	9-2
2x10	15-4	13-3	10-10	18-0	16-1	13-5	15-5	13-9	11-3
2x12	17-9	15-5	12-7	21-9	19-0	15-4	18-5	16-0	13-0

## Sample Calculations for Using Joist Span, Beam Size and Footing Size Tables

### CASE I SOLUTION:



Refer to tables for joist, beam and footing size requirements.

Example:  $a = 12'$ ; Post Spacing = 8'

Use the **Joist Span** table to find the acceptable joist sizes for a 12' span, 2x8s at 12" O.C., 2x10s at 16" O.C. or 2x12s at 24" O.C.

Use the **Beam and Footing Sizes** table and find the 8' post spacing column. With a 12' deck span, the beam may be either two 2x8s or two 2x10s, depending on wood used. Depending on the type of soil, the footing diameter at the base must be a minimum of 12", 10" or 9" for the corner post and 17", 14" or 12" for all intermediate posts.

Use "a" to determine joist size and " $a + 2b$ " to determine beam and footing sizes. The length of "b" is restricted by both the length of "a" and the size of the joists.

Example:  $a = 8'$ ,  $b = 2'$ , Post Spacing = 10'

Refer to the **Joist Span** table. For an 8' joist span, either 2x8s at 24" O.C. or 2x8s at 16" O.C. are acceptable.

For sizing the beam, use a joist length of 12' ( $8' + 4'$ ) and a post spacing of 10'. The **Beam and Footing Sizes** table indicates that the beam may be either two 2x10s or two 2x12s, depending on wood used. Depending on the type of soil, the footing diameter at the base must be a minimum of 15", 12" or 11" for the corner post and 20", 17" or 15" for all intermediate posts. Note that because of the 2' cantilever all footing sizes were increased by 1" as required by footnote 2 at the end of the table.

Use "a" or "b", whichever is greater, to determine joist size. Use " $a + b$ " to determine the size of Beam 1 and the post footing size for the posts supporting Beam 1. Use joist length "b" to determine both the size of Beam 2 and the post footing size for the posts supporting Beam 2.

Example:  $a = 6'$ ,  $b = 7'$ , Post Spacing = 9'

Joist size is determined by using the longest span joist (7'). The **Joist Span** table indicates that 2x6s at 24" O.C. would be adequate for this span.

For Beam 1 and footings, use a joist length of 13' ( $6' + 7'$ ) and a post spacing of 9'. The **Beam and Footing Sizes** table indicates that the beam may be two 2x10s or two 2x12s, depending on the wood used. Depending on the type of soil, the footing diameters for Beam 1 posts shall be 13", 11" or 9" for the corner (outside) post and 19", 15" or 13" for all intermediate posts. For Beam 2 and footings use a joist length of 7' and post spacing of 9'. The beam may be two 2x8s or two 2x10s, depending on wood used. Depending on the type of soil, the footing diameters for Beam 2 shall be 10", 8" or 7" for the corner posts, and 14", 11" or 10" for all intermediate posts.

