RESIDENTIAL WOOD DECK CONSTRUCTION GUIDE

Based on the 2015 Michigan Residential Code
Revised May 17, 2016

The details in this document apply to residential decks only. Construction can not deviate from the details herein unless prior approval is obtained from the authority having jurisdiction. A copy of this document is required to be on the job site and available for each inspection.

The Following Organizations Support the use of this Guide:
**Cities:**

- City of Rochester Hills
- City of Sterling Heights
- City of Auburn Hills
- City of Bloomfield Hills
- City of Clawson
- City of Fenton
- City of Ferndale
- City of Garden City
- City of Grand Haven
- City of Inkster
- City of Lathrup Village
- City of Lincoln Park

- City of Livonia
- City of Madison Heights
- City of Muskegon
- City of New Baltimore
- City of Northville
- City of Norton Shores
- City of Novi
- City of Oak Park
- City of Orchard Lake
- City of Plymouth
- City of Troy
- City of Warren

- City of Wyoming
- City of Zeeland
- City of Marine City
- City of Battle Creek

---

**Townships:**

- Charter Township of Shelby
- Charter Township of Bloomfield
- Charter Township of Canton
- Charter Township of Clinton
- Charter Township of Grand Haven
- Charter Township of Groveland
- Charter Township of Macomb
- Charter Township of Milford
- Charter Township of Oakland
- Charter Township of Orion
- Charter Township of Port Huron
- Charter Township of Royal Oak

- Charter Township of White Lake
- Charter Township of Washington
- Charter Township of Plainfield

- Village of Holly
- Village of Leonard
- Village of Webberville

---

**Villages:**

- Autumn Wood Construction
- Horizon Builders Inc.
- Lars/David Inc.

- Dillman & Upton
1. This document applies to single level decks only.

2. The overall deck width at the house shall be equal to or greater than the distance the deck extends from the house.

3. All wood in contact with the ground shall be approved pressure treated wood suitable for ground contact.

4. All other wood not in contact with the ground shall be approved pressure treated, or naturally durable wood, such as; Redwood, Cedar, or other approved material.

5. Wood-Plastic Composite shall bear a label indicating the required performance levels and compliance to ASTM-D 7032. Wood-plastic composites shall be installed per the manufacturer’s instructions. All plastic composite materials shall have a flame spread index of 200 or less when tested in accordance with ASTM E84 or UL 723.

6. All screws, nails, bolts, washers, and nuts used with preservative treated wood shall be hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze, or copper.

7. Hardware and connectors (joist hangers, or post anchors) shall be protected in accordance with the manufacturer’s recommendations; minimum ASTM-A 653 Type G185 zinc-coated galvanized steel.

8. Information regarding permit, application, plan review, and inspection requirements can be found under “Community Specific Details.”

9. This document is not intended to preclude the use of other construction methods or materials not shown herein.

10. Wood Decks constructed near a pool or spa shall also comply with the 2015 International Swimming Pool and Spa code Sections 306 and 703.
DECKING

- Spacing for joist supporting decking shall be in accordance with Table A1.

- Decking shall be wood 2x4, 2x6, five quarter board, or Wood-Plastic Composite sizes per the manufacturer’s specifications.

- Wood decking shall be attached as shown in Figure 1. Decking should also be attached to the rim board with fasteners at 6” O.C.

- Each wood decking member must rest on three joists minimum.

- Wood-Plastic Composite Decking shall be installed in accordance with the manufacturer’s installation instructions.

- Wood-Plastic Composite Decking must be labeled and the manufacturer’s installation instructions shall be onsite for review by the inspector.

- A valid ICC Evaluation Report must be provided and approved by the local building official for any other decking products proposed.

<table>
<thead>
<tr>
<th>Material Type and Nominal Size</th>
<th>Maximum On-Center Joist Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perpendicular to Joist</td>
</tr>
<tr>
<td>1 1/4 inch thick plywood</td>
<td>16 inches</td>
</tr>
<tr>
<td>2 inch thick plywood</td>
<td>24 inches</td>
</tr>
<tr>
<td>Plastic Composite</td>
<td>In accordance with ASTM D7032 Label</td>
</tr>
</tbody>
</table>

a. Wood deck boards should not exceed an angle of 45 degrees from perpendicular.
- The joist span $L$ is the distance between the two points supporting the joist and does not include the length of the overhang (See Figures 2A, 2B, and 2C). Use Table 1 to determine allowable joist span $L_J$. Allowable overhang length is $L_O$ as noted in Table 1 or $L/4$; whichever is less.

**Figure 2A. Joist Span – Joist Attached at House and Bearing over Beam**

![Diagram of joist span with annotations](image)

**Figure 2B. Joist Span – Joists Attached at House and to Side of Beam**

![Diagram of joist span with annotations](image)

*Note: beam depth must be equal to or greater than joist depth if joist hangers are used*
**Figure 2C. Joist Span – Non-Ledger Deck**

![Diagram](image)

**Table 1. Maximum Joist Spans and Overhangs**

<table>
<thead>
<tr>
<th>Species</th>
<th>Size</th>
<th>Allowable Span² (L_J)</th>
<th>Allowable Overhang³ (L_o)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Southern Pine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x6⁵</td>
<td>9'-11&quot;</td>
<td>9'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>2x8</td>
<td>13'-1&quot;</td>
<td>11'-10&quot;</td>
<td>1'-10&quot;</td>
</tr>
<tr>
<td>2x10</td>
<td>16'-2&quot;</td>
<td>14'-0&quot;</td>
<td>3'-1&quot;</td>
</tr>
<tr>
<td>2x12</td>
<td>18'-0&quot;</td>
<td>16'-6&quot;</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td><strong>Douglas Fir-Larch, Hem-Fir, Spruce-Pine-fire</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x6⁵</td>
<td>9'-6&quot;</td>
<td>8'-4&quot;</td>
<td>0'-11&quot;</td>
</tr>
<tr>
<td>2x8</td>
<td>12'-6&quot;</td>
<td>11'-1&quot;</td>
<td>1'-8&quot;</td>
</tr>
<tr>
<td>2x10</td>
<td>15'-8&quot;</td>
<td>13'-7&quot;</td>
<td>2'-10&quot;</td>
</tr>
<tr>
<td>2x12</td>
<td>18'-0&quot;</td>
<td>15'-9&quot;</td>
<td>4'-4&quot;</td>
</tr>
<tr>
<td><strong>Redwood, Western Cedars, Ponderosa Pine, Red Pine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x6⁵</td>
<td>8'-10&quot;</td>
<td>8'-0&quot;</td>
<td>0'-9&quot;</td>
</tr>
<tr>
<td>2x8</td>
<td>11'-8&quot;</td>
<td>10'-7&quot;</td>
<td>1'-5&quot;</td>
</tr>
<tr>
<td>2x10</td>
<td>14'-11&quot;</td>
<td>13'-0&quot;</td>
<td>2'-5&quot;</td>
</tr>
<tr>
<td>2x12</td>
<td>17'-5&quot;</td>
<td>15'-1&quot;</td>
<td>3'-7&quot;</td>
</tr>
</tbody>
</table>

1. Assumes 40 psf live load, 10 psf dead load, No. 2 stress grade, and wet service conditions.
2. Assumes L/360 deflection.
3. Maximum allowable overhang cannot exceed L/4 or ⅓ of actual main span. Assumes cantilever length/180 deflection with 220 point load (See Figure 2A and 2C).
5. Design Values based on northern species with no incising assumed.
6. Ledger shall be a minimum of 2x8 nominal. Where guards are required, outside joists and rim joists shall be a minimum length of 2x8 nominal.
7. Joist length prescriptively limited to 18'-0" for footing design.

Courtesy of American Wood Council - Leesburg, VA
- Beam span is measured between the supporting posts and does not include the overhang. See Figure 3.
- Beam size is determined by using Table 2A for joist framing from one side only. Joists may bear on the beam and extend past the beam centerline up to the lesser of \( L_o \) or \( L/4 \), as shown in Figures 2A and 2C.
- Use Table 2B for joist framing from both sides.
- Beam may overhang past the supporting post up to one-fourth the beam span as indicated in Figure 3.
- Beams with multiple members shall be assembled in accordance with Figure 4.

![Figure 3. Beam Span Types](image1)

![Figure 4. Beam Assembly Details](image2)
<table>
<thead>
<tr>
<th>Species</th>
<th>Size</th>
<th>Joist Spans (L) Less Than or Equal to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6'</td>
</tr>
<tr>
<td><strong>Southern Pine</strong></td>
<td>2-2x6</td>
<td>6'-11&quot;</td>
</tr>
<tr>
<td></td>
<td>2-2x8</td>
<td>8'-9&quot;</td>
</tr>
<tr>
<td></td>
<td>2-2x10</td>
<td>10'-4&quot;</td>
</tr>
<tr>
<td></td>
<td>2-2x12</td>
<td>12'-2&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x6</td>
<td>8'-2&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x8</td>
<td>10'-10&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x10</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x12</td>
<td>15'-3&quot;</td>
</tr>
<tr>
<td><strong>Douglas Fir</strong>, <strong>Larch</strong>, <strong>Hem-Fir</strong>, <strong>Spruce-Pine-Fir</strong>, <strong>Redwood</strong>, <strong>Western Cedars</strong>, <strong>Ponderosa Pine</strong>, <strong>Red Pine</strong></td>
<td>3x6 or 2-2x6</td>
<td>5'-5&quot;</td>
</tr>
<tr>
<td></td>
<td>3x8 or 2-2x8</td>
<td>6'-10&quot;</td>
</tr>
<tr>
<td></td>
<td>3x10 or 2-2x10</td>
<td>8'-4&quot;</td>
</tr>
<tr>
<td></td>
<td>3x12 or 2-2x12</td>
<td>9'-8&quot;</td>
</tr>
<tr>
<td></td>
<td>4x6</td>
<td>6'-5&quot;</td>
</tr>
<tr>
<td></td>
<td>4x8</td>
<td>8'-5&quot;</td>
</tr>
<tr>
<td></td>
<td>4x10</td>
<td>9'-11&quot;</td>
</tr>
<tr>
<td></td>
<td>4x12</td>
<td>11'-5&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x6</td>
<td>7'-4&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x8</td>
<td>9'-8&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x10</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x12</td>
<td>13'-11&quot;</td>
</tr>
</tbody>
</table>

1. Assumes 40 psf live load, 10 psf dead load, L/360 simple span beam deflection limit, cantilever length/180 deflection limit, No. 2 stress grade, and wet service conditions.
3. Design values based on northern species with no incising assumed.
4. Beam depth must be equal to or greater than joist depth if joist hangers are used (see Figure 5, option 3).
<table>
<thead>
<tr>
<th>Species</th>
<th>Size</th>
<th>6'</th>
<th>8'</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Southern Pine</strong></td>
<td>2-2x6</td>
<td>5'-8&quot;</td>
<td>4'-11&quot;</td>
<td>4'-5&quot;</td>
<td>4'-0&quot;</td>
<td>3'-9&quot;</td>
<td>3'-6&quot;</td>
</tr>
<tr>
<td></td>
<td>2-2x8</td>
<td>7'-2&quot;</td>
<td>6'-3&quot;</td>
<td>5'-7&quot;</td>
<td>5'-4&quot;</td>
<td>4'-8&quot;</td>
<td>4'-5&quot;</td>
</tr>
<tr>
<td></td>
<td>2-2x10</td>
<td>8'-7&quot;</td>
<td>7'-5&quot;</td>
<td>6'-8&quot;</td>
<td>6'-1&quot;</td>
<td>5'-7&quot;</td>
<td>5'-3&quot;</td>
</tr>
<tr>
<td></td>
<td>2-2x12</td>
<td>10'-2&quot;</td>
<td>8'-10&quot;</td>
<td>7'-11&quot;</td>
<td>7'-2&quot;</td>
<td>6'-8&quot;</td>
<td>6'-3&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x6</td>
<td>7'-6&quot;</td>
<td>6'-6&quot;</td>
<td>5'-9&quot;</td>
<td>5'-3&quot;</td>
<td>4'-11&quot;</td>
<td>4'-7&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x8</td>
<td>9'-5&quot;</td>
<td>8'-2&quot;</td>
<td>7'-4&quot;</td>
<td>6'-8&quot;</td>
<td>6'-2&quot;</td>
<td>5'-9&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x10</td>
<td>11'-4&quot;</td>
<td>9'-9&quot;</td>
<td>8'-9&quot;</td>
<td>8'-0&quot;</td>
<td>7'-5&quot;</td>
<td>6'-11&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x12</td>
<td>13'-5&quot;</td>
<td>11'-7&quot;</td>
<td>10'-4&quot;</td>
<td>9'-6&quot;</td>
<td>8'-9&quot;</td>
<td>8'-2&quot;</td>
</tr>
<tr>
<td><strong>Douglas Fir-Larch</strong>,</td>
<td>2-2x6</td>
<td>5'-5&quot;</td>
<td>4'-8&quot;</td>
<td>4'-2&quot;</td>
<td>3'-10&quot;</td>
<td>3'-6&quot;</td>
<td>3'-4&quot;</td>
</tr>
<tr>
<td><strong>Hem-Fir</strong>,</td>
<td>2-2x8</td>
<td>6'-11&quot;</td>
<td>5'-11&quot;</td>
<td>5'-4&quot;</td>
<td>4'-10&quot;</td>
<td>4'-6&quot;</td>
<td>4'-2&quot;</td>
</tr>
<tr>
<td><strong>Spruce-Pine-Fir</strong>,</td>
<td>2-2x10</td>
<td>8'-5&quot;</td>
<td>7'-3&quot;</td>
<td>6'-6&quot;</td>
<td>5'-11&quot;</td>
<td>5'-6&quot;</td>
<td>5'-1&quot;</td>
</tr>
<tr>
<td><strong>Redwood</strong>,</td>
<td>2-2x12</td>
<td>9'-9&quot;</td>
<td>8'-5&quot;</td>
<td>7'-6&quot;</td>
<td>6'-10&quot;</td>
<td>6'-4&quot;</td>
<td>5'-11&quot;</td>
</tr>
<tr>
<td>**Western Cedars,</td>
<td>3-2x6</td>
<td>7'-2&quot;</td>
<td>6'-2&quot;</td>
<td>5'-6&quot;</td>
<td>5'-0&quot;</td>
<td>4'-8&quot;</td>
<td>4'-4&quot;</td>
</tr>
<tr>
<td><strong>Ponderosa Pine</strong>,</td>
<td>3-2x8</td>
<td>9'-1&quot;</td>
<td>7'-10&quot;</td>
<td>7'-0&quot;</td>
<td>6'-4&quot;</td>
<td>5'-11&quot;</td>
<td>5'-6&quot;</td>
</tr>
<tr>
<td><strong>Red Pine</strong></td>
<td>3-2x10</td>
<td>11'-1&quot;</td>
<td>9'-7&quot;</td>
<td>8'-6&quot;</td>
<td>7'-9&quot;</td>
<td>7'-3&quot;</td>
<td>6'-9&quot;</td>
</tr>
<tr>
<td></td>
<td>3-2x12</td>
<td>12'-10&quot;</td>
<td>11'-1&quot;</td>
<td>9'-11&quot;</td>
<td>9'-1&quot;</td>
<td>8'-4&quot;</td>
<td>7'-10&quot;</td>
</tr>
</tbody>
</table>

1. Assumes 40 psf live load, 10 psf dead load, L/360 simple span beam deflection limit, L/180 cantilever deflection limit, No. 2 grade, and wet service conditions.
3. Design values based on northern species with no incising assumed.
4. Beam depth must be equal to or greater than joist depth if joist hangers are used.
5. Loading based on joist span L on each side of beam x ½ x (10 psf dead load + 40 psf live load).
6. Joist span in table based on joist span on each side of beam x ½. Example: Joist span L between Beams A and B = 10 ft and joist span L between Beams B and C = 6 ft. 10ft + 6ft = 16ft x ½ = 8. (Joist span used in Table 2B).
JOIST TO BEAM CONNECTION

- Attach joist to beam using one of the options shown in Figure 5. Blocking is required between the joists at the beam when the joist overhangs past the beam.
- Hurricane clips or mechanical fasteners used for option 2 must have a minimum capacity of 100lbs in both uplift and lateral load directions. Must be installed per manufacturer’s requirements.

Figure 5. Joist-to-Beam Detail

- Joist hanger shall have a depth of at least 60% of the joist depth. See Figure 6.
- Joist hangers shall be sized properly to accommodate the load and number of plies being carried.
- Hangers shall not be bent to accommodate field conditions.
- Brackets or clip angles are not allowed for joist connections.
- Fasten joist hangers per manufacturer’s recommendation.
- Joist hangers with inside flanges shall be used as field conditions dictate.
POST REQUIREMENTS

- Post size and maximum height shall be in accordance with Table 3.
- Post height is measured from grade or top of the footing to the underside of the beam.
- Cut ends of posts shall be field treated with an approved preservative (such as Copper Napthenate).

**Table 3 – Maximum Post Height**

<table>
<thead>
<tr>
<th>Post Size</th>
<th>Maximum Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x4</td>
<td>8'-0&quot;</td>
</tr>
<tr>
<td>4x6</td>
<td>8'-0&quot;</td>
</tr>
<tr>
<td>6x6</td>
<td>14'-0&quot;</td>
</tr>
</tbody>
</table>
POST TO BEAM CONNECTIONS

- Beams shall be attached to the post by one of the acceptable methods shown in Figure 7.
- 6x6 post minimum required where post supports a beam splice.
- Attachment of the beam to the side of the post is prohibited.

Figure 7. Post to Beam Connection

Notched Post

Post Cap

Prohibited Connection

Two-or three-ply beam

Post

Two-ply beam only

Beam must bear on notch

6x6 or 4x6 post
(Posts supporting beam splices shall be 6x6 only)

(2) ½ " diameter through-bolts; at beam splice, provide two bolts at each beam end

Notch post for flush beam bearing

6" Dimension

5 ½ Actual

Courtesy of American Wood Council - Leesburg, VA
- Concrete shall have a minimum compressive strength of 2,500 lbs per square inch.
- Footing size and thickness shall be in accordance with Table 4 for 1,500 psf soil bearing capacity and Table 4A for 2,000 psf soil bearing capacity.
- See Figure 8 for typical footing options.
- Post shall be centered on the footing.
- All footings shall bear on undisturbed soil at least 42” below grade. Footing inspection is required prior to placement of concrete.
- Footings closer than 5'-0" to an existing house foundation wall must bear on undisturbed soil at the same elevation as the house foundation.
<table>
<thead>
<tr>
<th>Beam Span L_b</th>
<th>Joist Span One side</th>
<th>Joist Span Two sides</th>
<th>Round Footing Diameter</th>
<th>Square Footing Dimension</th>
<th>Footing Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' L ≤ 10'</td>
<td>14' 18'</td>
<td>16''</td>
<td>14''</td>
<td>7''</td>
<td></td>
</tr>
<tr>
<td>6'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>19''</td>
<td>17''</td>
<td>7''</td>
</tr>
<tr>
<td>8'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>18''</td>
<td>16''</td>
<td>7''</td>
</tr>
<tr>
<td>8'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>22''</td>
<td>20''</td>
<td>9''</td>
</tr>
<tr>
<td>10'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>20''</td>
<td>18''</td>
<td>8''</td>
</tr>
<tr>
<td>10'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>25''</td>
<td>22''</td>
<td>10''</td>
</tr>
<tr>
<td>12'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>22''</td>
<td>20''</td>
<td>9''</td>
</tr>
<tr>
<td>12'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>27''</td>
<td>24''</td>
<td>11''</td>
</tr>
<tr>
<td>14'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>24''</td>
<td>21''</td>
<td>10''</td>
</tr>
<tr>
<td>14'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>29''</td>
<td>26''</td>
<td>12''</td>
</tr>
<tr>
<td>16'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>25''</td>
<td>23''</td>
<td>10''</td>
</tr>
<tr>
<td>16'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>31''</td>
<td>28''</td>
<td>14''</td>
</tr>
<tr>
<td>18'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>31''</td>
<td>33''</td>
<td>16''</td>
</tr>
<tr>
<td>18'</td>
<td>L &lt; 10'</td>
<td>10' 14' 18'</td>
<td>37''</td>
<td>34''</td>
<td>17''</td>
</tr>
</tbody>
</table>

1. Assumes 1,500 psf soil bearing capacity
2. Assumes 2,500 psi compressive strength of concrete
3. Assumes 40 psf live load and 10 psf dead load
4. Assumes the following joist cantilever:
   a. 18" for joist span ≤ 10'
   b. 30" for joist span ≤ 14'
   c. 36" for joist span ≤ 18'
Table 4A. Footing Sizes\(^{1,2,3,4}\)  
*Note: Table 4A may be used when approved by the local Building Official based on soil conditions.*

<table>
<thead>
<tr>
<th>Beam Span (L_B)</th>
<th>Joist Span One side (L)</th>
<th>Joist Span Two sides (L)</th>
<th>Round Footing Diameter</th>
<th>Square Footing Dimension</th>
<th>Footing Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>10'</td>
<td>14' 18'</td>
<td>13''</td>
<td>12''</td>
<td>6''</td>
</tr>
<tr>
<td></td>
<td>17''</td>
<td>20''</td>
<td>15''</td>
<td>14''</td>
<td>6''</td>
</tr>
<tr>
<td>6'</td>
<td>10'</td>
<td>14' 18'</td>
<td>17''</td>
<td>20''</td>
<td>15''</td>
</tr>
<tr>
<td></td>
<td>20''</td>
<td>22''</td>
<td>17''</td>
<td>20''</td>
<td>8''</td>
</tr>
<tr>
<td>8'</td>
<td>10'</td>
<td>14' 18'</td>
<td>16''</td>
<td>14''</td>
<td>6''</td>
</tr>
<tr>
<td></td>
<td>19''</td>
<td>21''</td>
<td>17''</td>
<td>19''</td>
<td>7''</td>
</tr>
<tr>
<td>8'</td>
<td>10'</td>
<td>14' 18'</td>
<td>19''</td>
<td>23''</td>
<td>8''</td>
</tr>
<tr>
<td></td>
<td>23''</td>
<td>26''</td>
<td>20''</td>
<td>23''</td>
<td>9''</td>
</tr>
<tr>
<td>10'</td>
<td>10'</td>
<td>14' 18'</td>
<td>17''</td>
<td>15''</td>
<td>7''</td>
</tr>
<tr>
<td></td>
<td>21''</td>
<td>24''</td>
<td>19''</td>
<td>21''</td>
<td>8''</td>
</tr>
<tr>
<td>10'</td>
<td>10'</td>
<td>14' 18'</td>
<td>21''</td>
<td>19''</td>
<td>9''</td>
</tr>
<tr>
<td></td>
<td>25''</td>
<td>29''</td>
<td>22''</td>
<td>25''</td>
<td>10''</td>
</tr>
<tr>
<td>12'</td>
<td>10'</td>
<td>14' 18'</td>
<td>19''</td>
<td>17''</td>
<td>7''</td>
</tr>
<tr>
<td></td>
<td>23''</td>
<td>26''</td>
<td>20''</td>
<td>23''</td>
<td>9''</td>
</tr>
<tr>
<td>12'</td>
<td>10'</td>
<td>14' 18'</td>
<td>23''</td>
<td>21''</td>
<td>10''</td>
</tr>
<tr>
<td></td>
<td>28''</td>
<td>31''</td>
<td>25''</td>
<td>28''</td>
<td>12''</td>
</tr>
<tr>
<td>14'</td>
<td>10'</td>
<td>14' 18'</td>
<td>21''</td>
<td>18''</td>
<td>8''</td>
</tr>
<tr>
<td></td>
<td>25''</td>
<td>28''</td>
<td>22''</td>
<td>25''</td>
<td>10''</td>
</tr>
<tr>
<td>14'</td>
<td>10'</td>
<td>14' 18'</td>
<td>25''</td>
<td>22''</td>
<td>10''</td>
</tr>
<tr>
<td></td>
<td>30''</td>
<td>34''</td>
<td>27''</td>
<td>30''</td>
<td>13''</td>
</tr>
<tr>
<td>16'</td>
<td>10'</td>
<td>14' 18'</td>
<td>22''</td>
<td>20''</td>
<td>9''</td>
</tr>
<tr>
<td></td>
<td>27''</td>
<td>30''</td>
<td>24''</td>
<td>27''</td>
<td>11''</td>
</tr>
<tr>
<td>16'</td>
<td>10'</td>
<td>14' 18'</td>
<td>27''</td>
<td>24''</td>
<td>11''</td>
</tr>
<tr>
<td></td>
<td>32''</td>
<td>36''</td>
<td>28''</td>
<td>32''</td>
<td>14''</td>
</tr>
<tr>
<td>18'</td>
<td>10'</td>
<td>14' 18'</td>
<td>23''</td>
<td>21''</td>
<td>10''</td>
</tr>
<tr>
<td></td>
<td>28''</td>
<td>32''</td>
<td>25''</td>
<td>28''</td>
<td>12''</td>
</tr>
<tr>
<td>18'</td>
<td>10'</td>
<td>14' 18'</td>
<td>29''</td>
<td>25''</td>
<td>12''</td>
</tr>
<tr>
<td></td>
<td>34''</td>
<td>38''</td>
<td>30''</td>
<td>34''</td>
<td>15''</td>
</tr>
<tr>
<td></td>
<td>38''</td>
<td>42''</td>
<td>34''</td>
<td>38''</td>
<td>17''</td>
</tr>
</tbody>
</table>

1. Assumes 2,000 psf soil bearing capacity  
2. Assumes 2,500 psf compressive strength of concrete  
3. Assumes 40 psf live load and 10 psf dead load  
4. Assumes the following joist cantilever:  
   a. 18'' for joist span \(\leq 10'\)  
   b. 30'' for joist span \(\leq 14'\)  
   c. 36'' for joist span \(\leq 18'\)
LEDGER BOARD ATTACHMENTS

General requirements
- Ledger board depth shall be greater than or equal to the depth of the deck joists, but not less than a 2x8.
- The ledger board shall be attached in accordance with one of the conditions shown in Figures 10 and 11.
- The existing band board shall be capable of supporting the deck. If this cannot be verified or existing conditions differ from the details herein, then a free-standing deck or an engineered design is required.
- The top of the ledger board and top of the deck joists shall be at the same elevation.

Wood I-Joists as shown in Figure 9, located inside the house, must have a 2x band board, or a minimum 1-inch thick engineered wood product (EWP) band board capable of supporting a deck. If a minimum 1-inch EWP or 2x band board is not present, then a free-standing deck is required.

Siding and Flashing
- The exterior finish, i.e., house siding, must be removed prior to the installation of the ledger board.
- Continuous flashing with a drip edge, as shown in Figure 10, is required at the ledger board when attached to wood-framed construction.
- Flashing shall be copper (attached using copper nails only), stainless steel, UV resistant plastic or galvanized steel coated with 1.85 ounces of zinc per square foot (G-185 coating).
- Flashing at a door threshold shall be installed to prevent water intrusion from rain or melting snow.

Figure 10. General Attachment of Ledger Board to Band Joist or Rim Board

Courtesy of American Wood Council - Leesburg, VA
The ledger board attachments shown in Figure 12 are prohibited. These conditions require a free-standing deck design.

Courtesy of American Wood Council - Leesburg, VA
- Spacing and placement of fasteners shall be in accordance with **Figure 14** and **Table 5**.
- Lead anchors are prohibited.
- See General Information #6.
- **Thru-Bolts** shall have a diameter of \( \frac{1}{2} \)”. Washers are required at the bolt head and nut.
- **Expansion and Adhesive Anchors**: Use approved expansion or adhesive anchors when attaching a ledger board to a concrete or solid masonry wall, as shown in **Figure 11**. Expansion and adhesive anchor bolts shall have a diameter of \( \frac{1}{2} \)”, be equipped with washers, and installed per manufacturer’s instructions.
- **Lag Screws** shall have a diameter of \( \frac{1}{2} \)”. Lag screws may be used only when the field conditions conform to those shown in **Figure 10**. See **Figure 13** for lag screw requirements. Lag screws shall be installed with washers.

---

**Figure 13. Lag Screw Requirements**

![Lag Screw Requirements](image)

*Courtesy of American Wood Council - Leesburg, VA*

**Figure 14. Ledger Fastener Spacing and Clearances**

![Ledger Fastener Spacing and Clearances](image)

*Distance can be reduced to 4.5” if lag screws are used or bolt spacing is reduced to that of lag screws to attach 2x8 ledgers to 2x8 band joists (1/2” stacked washers not permitted)*

*Courtesy of American Wood Council - Leesburg, VA*
Table 5. Fastener Spacing for a Southern Pine, Douglas-Fir-Larch, or Hem-Fir Deck Ledger and a 2-inch Nominal Solid-Sawn Spruce-Pine-Fir Band Joist or EWP Rim Board

(Deck Live Load = 40 psf, Deck Dead Load = 10 psf)

<table>
<thead>
<tr>
<th>Joist Span</th>
<th>6'-0&quot; and less</th>
<th>6'-1&quot; to 8'-0&quot;</th>
<th>8'-1&quot; to 10'-0&quot;</th>
<th>10'-1&quot; to 12'-0&quot;</th>
<th>12'-1&quot; to 14'-0&quot;</th>
<th>14'-1&quot; to 16'-0&quot;</th>
<th>16'-1&quot; to 18'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Details</td>
<td>On-Center Spacing of Fasteners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2&quot; diameter lag screw1 with 15/32&quot; maximum sheathing</td>
<td>1&quot; EWP</td>
<td>24&quot;</td>
<td>18&quot;</td>
<td>14&quot;</td>
<td>12&quot;</td>
<td>10&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td></td>
<td>1-1/8&quot; EWP</td>
<td>28&quot;</td>
<td>21&quot;</td>
<td>16&quot;</td>
<td>14&quot;</td>
<td>12&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td></td>
<td>1-1/2&quot; Lumber</td>
<td>30&quot;</td>
<td>23&quot;</td>
<td>18&quot;</td>
<td>15&quot;</td>
<td>13&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>1/2&quot; diameter bolt with 15/32&quot; maximum sheathing</td>
<td>1&quot; EWP</td>
<td>24&quot;</td>
<td>18&quot;</td>
<td>14&quot;</td>
<td>12&quot;</td>
<td>10&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td></td>
<td>1-1/8&quot; EWP</td>
<td>28&quot;</td>
<td>21&quot;</td>
<td>16&quot;</td>
<td>14&quot;</td>
<td>12&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td></td>
<td>1-1/2&quot; Lumber</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>34&quot;</td>
<td>29&quot;</td>
<td>24&quot;</td>
<td>21&quot;</td>
</tr>
<tr>
<td>1/2&quot; diameter bolt with 15/32&quot; maximum sheathing and 1/2&quot; stacked washers2,7</td>
<td>1-1/2&quot; Lumber</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>29&quot;</td>
<td>24&quot;</td>
<td>21&quot;</td>
<td>18&quot;</td>
</tr>
</tbody>
</table>

1. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
2. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½".
3. Ledgers shall be flashed or caulked to prevent water from contacting the house band joist (see Figures 10, 16, and 17).
4. Lag screws and bolts shall be staggered per Figure 14.
5. Deck ledgers shall be minimum 2x8 pressure-preservative-treated No.2 grade lumber, or other approved materials as established by standard engineering practice.
6. When solid-sawn pressure-preservative-treated deck ledgers are attached to engineered wood products (minimum 1" thick wood structural panel band joist or structural composite lumber including laminated veneer lumber), the ledger attachment shall be designed in accordance with accepted engineering practice. Tabulated values based on 300 lbs and 350 lbs for 1" and 1-1/8" EWP rim board, respectively.
7. Wood structural panel sheathing, gypsum board sheathing, or foam sheathing not exceeding 1" thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1".
8. Fastener spacing also applies to southern pine, Douglas fir-larch, and hem-fir band joists.

**DECK STABILITY**

- Decks greater than 2 feet above grade shall be provided with diagonal bracing.

**Diagonal Bracing**

- Diagonal bracing shall be provided parallel to the beam at each corner post as shown in Figure 15.
- Diagonal bracing is prohibited on center posts.
- The bracing shall be bolted to the post at one end and beam at the other.
- Provide blocking between the adjacent joists, when a joist does not align with the bracing location.
- Decks attached to the house as shown in Figure 17 or 17A do not require diagonal bracing perpendicular to the house.
- Diagonal bracing parallel to the house may be omitted at the beam and posts adjacent to the house for a free-standing deck attached as shown in Figure 16.
Diagonal Bracing Option

- Diagonal bracing as shown in Figures 15A and 15B, is only allowed when the deck is supported by a ledger attached to the house as indicated in Figures 10 and 11; and lateral load connections as shown in Figure 17 or 17A, are provided near the outside edge of the deck on each side.
- Bracing material must be 2x6 preservative treated wood.
- Bracing must be attached with 3-16D nails at each joist.
- Nails shall be hot dipped zinc coated galvanized steel or stainless steel.
Figure 15A. Diagonal Bracing Attached to Underside of Joist on Single Span Deck

Lateral load device required as shown in Figure 17 or 17A.

2x6 Lateral V bracing nailed to the underside of the deck joist with 3-16D nails in each joist.

Figure 15B. Diagonal Bracing Attached to Underside of Joists on Double Span Deck

Lateral load device required as shown in Figure 17 or 17A.

2x6 Lateral V bracing nailed to the underside of the deck joist with 3-16D nails in each joist.

Optional layout for braces shown dashed
**Free Standing Deck Attachment to House**

- Attach the deck rim joist to the existing house exterior wall as shown in **Figure 16** for a free-standing deck.
- The wall must be sheathed with minimum 3/8" wood structural panel sheathing.
- Use lag screws or thru-bolts when fastening to an existing band joist or wall stud.
- Use expansion anchors or epoxy anchors when fastening to concrete or masonry.
- **DO NOT ATTACH TO BRICK VENEERS.**
- Fasteners shall be 16" on center and staggered in 2 rows for free standing decks.
- Lashing is required over the rim joist. See “Ledger Board Attachment” for flashing details.

---

**Figure 16. Attachment of Free-Standing Deck to House for Deck Stability**

![Diagram of Free-Standing Deck Attachment](image)

Courtesy of American Wood Council - Leesburg, VA

---

**Deck Supported by Ledger - Attachment to House**
- Where supported by attachment to an exterior wall ([Figures 10 or 11]), decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads as applicable.
- The lateral load connection required shall be permitted to be in accordance with Figure 17 or 17A.
- Hold down tension devices shall be provided in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1,500 lbs or hold down devices with an allowable stress design capacity of not less than 750 lbs shall be installed per the manufacturers installation instructions in not less than four locations per deck evenly distributed along deck and one within 2” of each end of the ledger.

**Figure 17. Lateral Load Device with Joists Parallel to Deck Joists**

![Diagram of lateral load device with joists parallel to deck joists]

*Courtesy of American Wood Council - Leesburg, VA*

**Figure 17A. Lateral Load Device with Joists Perpendicular to Deck Joists**

![Diagram of lateral load device with joists perpendicular to deck joists]

*Courtesy of American Wood Council - Leesburg, VA*
GUARDS

- A guard is required when a deck is greater than 30 inches above grade at any point within 36 inches of the deck edge.

- Wood-plastic composites used in guard systems shall be labeled, indicating the performance level and demonstrating compliance with ASTM D 7032. Wood-plastic composites shall be installed in accordance with the manufacturer's instructions.

- Alternative guard systems with a valid ICC Evaluation Service Report must be submitted to the building official for evaluation and approval prior to installation.

- Guards shall be no less than 36 inches above the adjacent walking surface.

- Stair guards shall have a height no less than 34 inches measured vertically from a line connecting the leading edges of the trends. See Figure 26.

- Openings in guards shall not allow the passage of a 4-inch diameter sphere through any opening from the walking surface to the required guard height.

Figure 18. Example Guard Detail
Guard posts shall be 4x4 minimum.

Notching of guard posts; as shown in Figure 19, is prohibited.

Guard posts shall be attached as shown in Figures 20 and 21.

Hold down anchors shall have a minimum capacity of 1,800 lbs and must be installed in accordance with the manufacturer’s instructions.

Figure 20. Guard Post to Outside Joist Example

Figure 21. Guard Post to Rim Joist Example
**STAIR REQUIREMENTS**

- **Stair Dimensions**
  - Stairs shall have a minimum clear width of 36 inches.
  - Stair trends, risers, nosing, and opening limitations shall meet the requirements shown in Figure 22. All tread, riser, and nosing dimensions shall not deviate from one another by more than 3/8" in any flight of stairs.
  - Each landing shall be 36” minimum in the direction of travel.
  - Stairs with a vertical height exceeding 12'0" are required to have an intermediate landing.
  - A landing, with a width no less than the stair, is required at the top and bottom of each stairway.

- **Stair Stringers**
  - Stair stringers shall be 2x12 minimum.
  - Stair stringers shall not span more than the dimensions shown in Figure 23 for cut and solid stringers.
  - Stair stringers shall be 18” on center maximum.
Treads

- Tread material shall be equivalent to the decking material specified on page 2.
- Stairs constructed with solid stringers shall have treads of 2x wood material. See Figure 25.

**Figure 25. Tread Connection Requirements**

<table>
<thead>
<tr>
<th>Treads</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Pine</td>
<td>2x6</td>
</tr>
<tr>
<td>Doug Fir Larch, Hem Fir, Spruce</td>
<td>2x8</td>
</tr>
<tr>
<td>Redwood, Western Cedars, Ponderosa,</td>
<td>2x10</td>
</tr>
<tr>
<td>Pine, Red Pine</td>
<td></td>
</tr>
</tbody>
</table>

![Tread Diagram](image1)

**Figure 26. Stair Guard Requirements**

- Stair guard is required for stair with a total rise of 30” or more; see GUARDS for more information
- Stair guard height: 34” min. measured from nosing of step
- Openings for required guards on the sides of stair treads shall not allow a sphere 4-3/8” to pass through.
- Triangular opening shall not permit the passage of a 6” diameter sphere.

![Guard Diagram](image2)

Courtesy of American Wood Council - Leesburg, VA
Stair Handrails

- Stairs with four or more risers shall have a handrail on at least one side at a height between 34 and 38 inches.
- Handrail height shall be measured vertically from a line connecting the leading edges of the treads. See Figure 26.
- Handrails shall be graspable and made of decay-resistant and/or corrosion resistant material. See Figures 27 and 28.
- Handrails shall have a smooth surface with no sharp corners.
- Handrails shall run continuously from a point directly over the lowest riser to a point directly over the higher riser and shall return to the guard at each end. See Figure 29.
- Handrails may be interrupted by guard posts at a turn in the stair.

Figure 27. Handrail Grip Size

Figure 28. Handrail Mounting Examples

Figure 29. Miscellaneous Stair Requirements
STAIR FOOTING

- Stair stringers shall be attached to the stair guard posts as shown in Figure 30.
- Stair guard posts footing shall bear on solid, undisturbed soil 42” below grade minimum.
- Stringers shall rest on 2x4 bearing block as shown in Figure 30.

**Figure 30. Stair Footing Detail**

![Diagram of stair footing detail with annotations](image)

STAIR LIGHTING

- Stairways shall have a light source at the top landing that provides light to the stairs and landings.
- The light switch shall be controlled from the inside of the house. Motion detectors or timed switches are acceptable.

FRAMING AT CHIMNEY OR BAY WINDOW

- Framing at chimney or bay window shall be in accordance with Figure 31.
- Header plies shall be equal to the deck joist size.
- Header may span 6’0” maximum.
**Figure 31: Detail for Framing Around Chimney or Bay Window**

- **PLAN VIEW**
  - Minimum 1" Clearance required between wood and chimney

- **SECTION**
  - decking may extend 6" maximum
  - (2) ½" diameter thru-bolt or lag screws at ledger
  - Bolts or lag screws shall fully extend into band joist or rim board

*Trimmer joist may be double if joists are spaced 24" o.c. or if trimmer length is 8'-6" or less

---

**Figure 32. Typical Deck Framing Plan**

- lumber species:
- chimney or bay window

- 2x joists at 12", 16", or 24" o.c.
- 6x6 post
- 2x joist hanger, typical
- double or triple x trimmer (see Figure 31)
- rim joist
- round or square footing: see Table 4 or 4A

- beam span (La): see Table 2A or 2B
- double or triple x: La = _" - _"
- stair stringers: cut or solid span: _" - _"

---

Courtesy of American Wood Council - Leesburg, VA
1. **Post Hole and Ledger Board Inspection—After Post Holes are dug and Ledger Board is Installed**
   - Inspection of all post holes prior to placement of concrete.
   - Approved plans and a copy of this guide must be available to the inspector onsite.
   - All post holes shall be dug to solid, undisturbed soil at least 42” below grade.
   - All post holes within 5’ of the house wall must be dug to undisturbed soil at the same elevation as the house foundation.
   - Inspection of ledger board attachment (if applicable) to the house bond or foundation wall.
   - The inspector will need access to the inside of the house to verify proper attachment of the ledger board. An adult needs to be present for the inspector to enter the house.

2. **Open Joist Inspection—Before Decking is Installed**
   - An open joist inspection is required on decks with less than 4’ clearance between the deck floor joist and grade, or when special framing conditions are present.

3. **Final Inspection—After Deck is Complete**
   - Approved plans and a copy of this guide must be available to the inspector onsite.
   - The inspector will verify compliance with the building code and the requirements noted in this document.

---

**Note:**

This Guide Book is only intended to be a guide for Wood Deck Construction and is not all inclusive of the Building Code Requirements. For complete details of all requirements please see the Michigan Residential Code 2015. The information in this guide is subject to change without notice.