**CITY OF WATERTOWN**
Department of Building Inspections
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# RESIDENTIAL DECK REQUIREMENTS

*This handout is only a **GUIDE** and does not contain all of the requirements of the Minnesota State Building Code or City Ordinances.*

**Building permits are required for any deck that is attached to a dwelling or is more than thirty (30) inches above grade, including freestanding decks.**

## REQUIRED INFORMATION WHEN APPLYING FOR A PERMIT:

1. **CERTIFICATE OF SURVEY/SITE PLAN:**
   Drawn to scale, indicating lot dimensions, deck location and setbacks from property lines.

2. **TWO (2) COPIES OF DECK PLAN, DRAWN TO SCALE:**
   PLAN REVIEW CROSS SECTION ELEVATIONS

   * Proposed deck size, location of stairs
   * Size, type and spacing of floor joists
   * Size & type of decking **(Plastic/Composite decking must be approved before installing)**
   * Size, type, location and spacing of posts, beams and headers
   * Height of structure from grade
   * Joist, hangers, flashings and fasteners
   * Diameter and depth of footings
   * Guardrail height and spacing of intermediate rails
   * If using a plan from a big box hardware store (Menards, Home Depot and Lowe's), compare information provided here in the handout to what they provide.

## DECK BUILDING REQUIREMENTS

1. **LOCATION:** Decks above grade are permitted in rear and side yards. Decks are not permitted in required side or corner side yards. Decks and patios at or below grade are permitted in all yards.

2. **SETBACKS:** Check with City Hall for setback requirements.

3. **LIVE LOAD:** All deck floor systems must be designed to support a live floor load of Forty (40) pounds psf, (Sixty (60) pounds for balconies) (IRC Table R301.5)

4. **FOOTINGS:** Frost footings must extend to at least 42" below grade for any deck that is attached to a dwelling or a garage that has frost footings. The diameter of the footings

should be at least 12", attached heated and non-heated (three-season or screen porches) additions will require larger footings. The future addition with a roof should be considered at the time of permit application. A positive mechanical connection between post and footings is required.

5. **WOOD REQUIRED:** All wood used in the construction of decks is required to be of approved naturally durable wood or treated wood. This includes posts, beams, joists, decking, guards and rails. All lumber shall bear the quality mark of an approved inspection agency. (MSBC 1300.0110 Subd. 13) Plastic/Composite deck materials must be **APPROVED** before installing; material must be installed and supports spaced O.C. or spans per ES report. Copy of report must be available for installer and inspector. A list of decking materials can be found at: www.10klakes.org and the ES reports can be found at: www.icc-es.org.

6. **FLASHING:** All connections between deck and dwelling must be flashed and weatherproof (IRC Sec. R703.8)

7. **LEDGER BOARD:** Siding must be removed to allow this member to be properly fastened. 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 inspections, decks shall be self-supporting. (IRC Sec.R502.2.2) Fasteners must be long enough to penetrate framing members. Decks shall not be supported by cantilevered floor framing without specific engineering.

8. **JOIST/BEAMS:** Joist spacing of 24 inches on center requires decking with a 2" nominal thickness, 5/4" decking material requires joist spacing no greater than 16 inches on center (decking installed perpendicular to the joists). Joists with cantilevers (see maximum joist span in handout), exceeding handout will require structural engineering. Beams that overhang posts by more than 12 inches from center of post (see handout). Beams that exceed the handout will require a structural engineering. Built-up beams (two or more members) are to be nailed together. A positive, mechanical connection between post and beam is required (see example in illustration). Beam splices must be over a post.

9. **JOIST HANGERS:** Joists framing into the side of a beam or ledger shall be supported by approved framing anchors such as joist hangers. (IRC Sec R502.6)

10. **FASTENERS:** Fasteners for pressured-preservative wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153. (IRC Sec 319.3)

11. **GUARDS:** All open sides of decks, landings, balconies and porches which are more than 30" above grade or floor below, must be protected by a guard not less than 36" in height. Open sides of stairs with a total rise of more than 30" above the floor or grade below shall have guards not less than 34" in height measured vertically from the nosing of the treads. Required guards shall have intermediate rails or ornamental closures that do not allow passage of a sphere 4" in diameter (4 3/8" for guards on open sides of stairways). The

triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway may be of such size that a sphere 6 inches in diameter cannot pass through. (IRC Sec R312).

12. **STAIRS:** Stairways shall not be less than 36 inches in width. The maximum riser height shall be 7 3/4" (3/8 inch maximum variation in riser heights) and the minimum tread depth shall be 10" (3/8 inch maximum variation in tread depths). Open risers are permitted, provided that the openings between treads does not permit the passage of a 4 inch diameter sphere. (IRC Sec. R311.5.3.3) All stair stringers must be a minimum of 2 x 12. For minimum width stairs, a minimum of three stringers is required. If 5/4" decking material is used for treads, stringers shall be spaced a maximum of 16" O.C. (For plastic/composite material see the ICC ES report for the product.)

13. **HANDRAILS:** A handrail shall be provided on at least one side of all stairways having four (4) or more risers. Handrails shall be placed not less than 34" or more than 38" above the nosing of treads and be continuous the full length of the stairs. Handrails projecting from a wall or guardrail must have a space of not less than 1 ½" between the wall or guardrail and the handrail. The handgrip portion of handrails shall have a cross section of 1 ¼" minimum to 2" maximum in cross-sectional dimension and must have a smooth surface with no sharp corners. Handrail ends shall be returned or shall terminate in newel posts. (IRC Sec R311.5.6)

**REQUIRED INSPECTIONS:**

1. **FOOTINGS:** After the holes are dug, but before concrete is poured.

2. **FINAL/FRAMING:** In most instances the framing can be inspected at the final inspection. If your deck is less than three feet above the ground, a separate framing inspection will be required before the decking is installed.

**PLEASE NOTE:**

**If you plan to use plastic/composite materials to build your deck, you must provide an Evaluation Services Report and the manufacturer's installation instructions at the time of permit application (this report must remain on the job for all inspections). Each ES report is unique to the manufacturer and will include requirements for DECKING, STAIR TREADS or RAILING SYSTEMS. If they are not included in the report then it cannot be used for installation.**

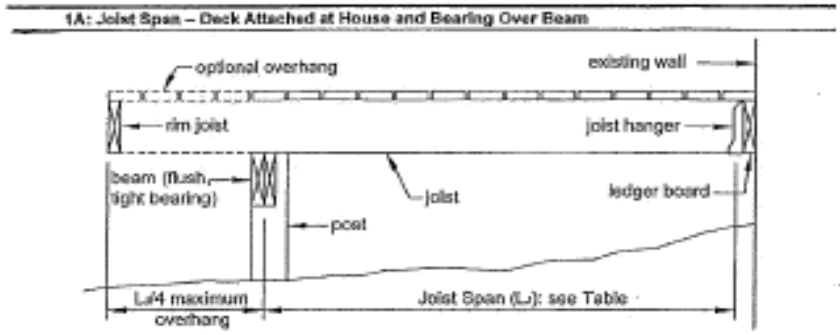
**Maximum Joist Span ($L_J$)[1]** (American Wood Council and American Forest & Paper Association)

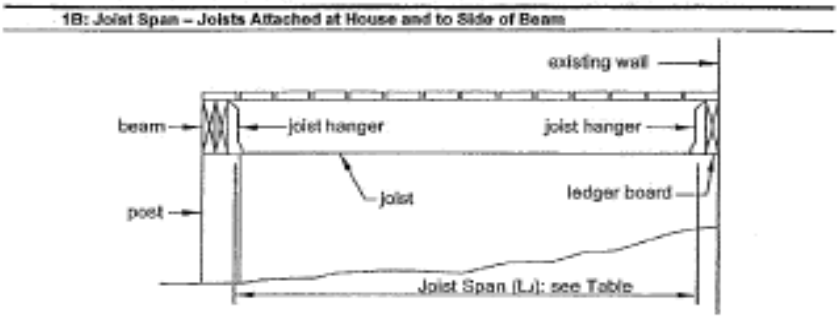
The span of a joist is measured from the centerline of bearing at one end of the joist to the centerline of bearing at the other end of the joist and does not include the length of the overhangs. Use the table below to determine joist span based on lumber size and joist spacing. See drawings 1A&1B and 2 for joist span types.

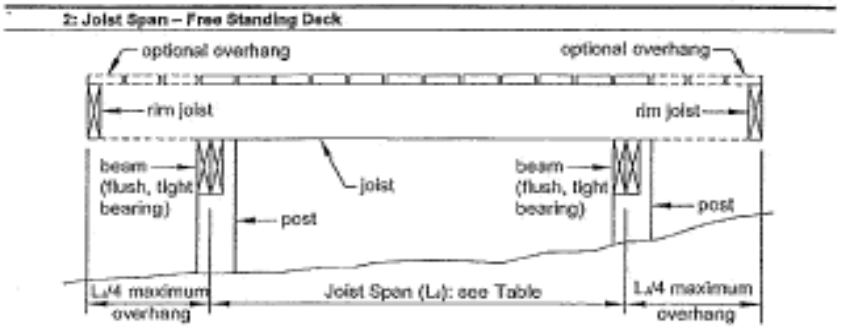
**Maximum Joist Span ($L_J$)[1]**

| | Ponderosa Pine[2,4] | | | Southern Pine[4] | | | Western Cedar[4] | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12"oc | 16"oc | 24"oc | 12"oc | 16"oc | 24"oc | 12"oc | 16"oc | 24"oc |
| 2 x 8[3] | 8'-4" | 8'-4" | 8'-4" | 10'-6" | 10'-6" | 10'-2" | 8'-4" | 8'-4" | 8'-4" |
| 2 x 10[3] | 12'-0" | 12'-0" | 10'-7" | 15'-2" | 15'-2" | 13'-1" | 12'-0" | 12'-0" | 10'-7" |
| 2 x 12[3] | 16'-1" | 15'-1" | 12'-3" | 18'-0" | 18'-0" | 15'-5" | 16'-1" | 15'-1" | 12'-3" |

1. Assumes 40psf live load, 10psf dead load, L/180 cantilever deflection with 230 lb point load, No. 2 grade, and wet service conditions. See span calculator at www.awc.org for simple span conditions without cantilevers.
2. Design values based on northern species with no incising assumed.
3. Joist may bear on the beam and extend past the beam centerline up to $L_J/4$.
4. **5/4 decking used at a 45° angle to the joist. The joist must be spaced a maximum of 12"oc.**




American Wood Council

## Beam Size Requirements

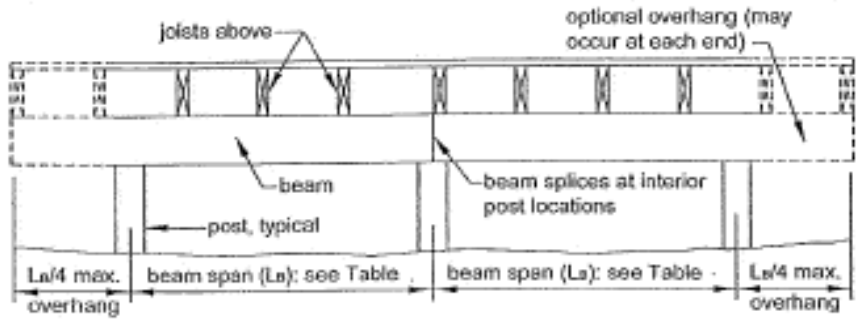
Deck beams spans shall be in accordance with the table below and can extend past the post centerline up to $L_B/4$ as shown in drawings. Joist may bear on the beam and extend past the beam centerline up to $L_J/4$ as shown in drawings 1A and 2, or the joist may attach to the side of the beam with joist hangers as shown in drawing 1B of **Maximum Joist Spans** (if possible, joist shall not be attached to the opposite sides of the same beam).

## Deck Beam Spans ($L_B$)[1] (American Wood Council and American Forest & Paper Association)

| | | Joist Spans ($L_J$) Less Than or Equal to: | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Species | Size | ≤6' | ≤8' | ≤10' | ≤12' | ≤14' | ≤16' | ≤18' |
| Southern Pine | 2-2x6 | 7'-1" | 6'-2" | 5'-6" | 5'-0" | 4'-8" | 4'-4" | 4'-1" |
| | 2-2x8 | 9'-2" | 7'-11" | 7'-1" | 6'-6" | 6'-0" | 5'-7" | 5'-3" |
| | 2-2x10 | 11'-10" | 10'-3" | 9'-2" | 8'-5" | 7'-9" | 7'- 3" | 6'-10" |
| | 2-2x12 | 13'-11" | 12'-0" | 10'-9" | 9'-10" | 9'-1" | 8'-6" | 8'-0" |
| | 3-2x6 | 8'-7" | 7'-8" | 6'-11" | 6'-3" | 5'-10" | 5'-5" | 5'-2" |
| | 3-2x8 | 11'-4" | 9'-11" | 8'-11" | 8'-1" | 7'-6" | 7'-0" | 6'-7" |
| | 3-2x10 | 14'-5" | 12'-10" | 11'-6" | 10'-6" | 9'-9" | 9'-1" | 8'-7" |
| | 3-2x12 | 17'-5" | 15'-1" | 13'-6" | 12'-4" | 11'-5" | 10'-8" | 10'-1" |
| Western Cedar & Ponderosa Pine[2] | 2-2x6 | 5'-5" | 4'-8" | 4'-2" | 3'-10" | 3'-6" | 3'-1" | 2'-9" |
| | 2-2x8 | 6'-10" | 5'-11 | 5'-4" | 4'-10" | 4'-6" | 4'-1" | 3'-8" |
| | 2-2x10 | 8'-4" | 7'-3" | 6'-6" | 5'-11" | 5'-6" | 5'-1" | 4'-8" |
| | 2-2x12 | 9'-8" | 8'-5" | 7'-6" | 6'-10" | 6'-4" | 5'-11" | 5'-7" |
| | 3-2x6 | 7'-4" | 6'-8" | 6'-0" | 5'-6" | 5'-1" | 4'-9" | 4'-6" |
| | 3-2x8 | 9'-8" | 8'-6" | 7'-7" | 6'-11" | 6'-5" | 6'-0" | 5'-8" |
| | 3-2x10 | 12'-0" | 10'-5" | 9'-4" | 8'-6" | 7'-10" | 7'-4" | 6'-11" |
| | 3-2x12 | 13'-11" | 12'-1" | 10'-9" | 9'-10" | 9'-1" | 8'-6" | 8'-1" |

1. Assumes 40psf live load, 10psf dead load, L/360 simple span beam deflection limit, L/180 cantilever deflection limit, No. 2 grade, and wet service conditions.
2. Design values based on northern species with no incising assumed

**Beam Span Types**




American Forest & Paper Association

## Footings [R403]

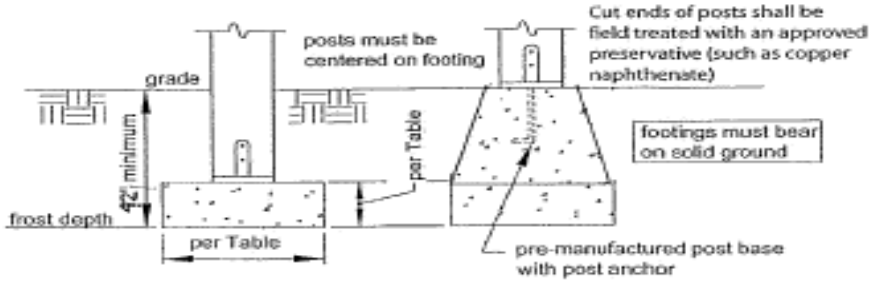
See drawings and Table for footing size, footing thickness and post attachment options and requirements. All footings shall bear on solid ground and shall be placed at least 42" below grade for any deck that is attached to a dwelling or garage that has frost footings. The minimum diameter of the footings is 12". Heated and non-heated additions will require larger diameter footings. (If a future addition is planed it should be considered at the time of permit application.) A positive mechanical connection between post and footings is required.

## Footing Sizes[2]

| Beam Span, $L_o$ | Joist Span | Round[1] Footing Diameter | | Footing Thickness[3] |
|---|---|---|---|---|
| | | Corner | Intermediate | |
| 6' | ≤10' | 12" | 14" | 8" |
| | ≤14' | 12" | 16" | 8" |
| | ≤18' | 14" | 20" | 10" |
| 8' | ≤10' | 12" | 16" | 8" |
| | ≤14' | 14" | 18" | 10" |
| | ≤18' | 16" | 22" | 12" |
| 10' | ≤10' | 12" | 17" | 10" |
| | ≤14' | 15" | 21" | 12" |
| | ≤18' | 18" | 24" | 12" |
| 12' | ≤10' | 14" | 18" | 10" |
| | ≤14' | 16" | 23" | 12" |
| | ≤18' | 20" | 26" | 12" |
| 14' | ≤10' | 15" | 21" | 12" |
| | ≤14' | 17" | 24" | 12" |
| | ≤18' | 20" | 28" | 12" |
| 16' | ≤10' | 16" | 22" | 12" |
| | ≤14' | 19" | 26" | 12" |
| | ≤18' | 21" | 30" | 12" |
| 18' | ≤10' | 17" | 24" | 12" |
| | ≤14' | 20" | 28" | 12" |
| | ≤18' | 23" | 32" | 14" |

1. Square footings are permitted to have widths 2" less than the given diameter of round footings.
2. Assumes 1,500psf soil bearing capacity.
3. Assumes 2,500 psi compressive strength of concrete coordinated footing thickness with post base and anchor requirements.
4. **Requirements for future heated and non heated additions:**
   a. Increase corner footing size shown by 90%.
   b. Beam sizes indicated need not be altered.
   c. Locate all footings at extremities of deck (no cantilevers).
   d. Increase center footing size shown by 55%.

**Typical Footing Options**




American Forest & Paper Association

# Department of Building Safety

## New requirements in effect for pressure treated wood, fasteners

A change has developed in how pressure treated wood is being manufactured for residential uses. For years the wood industry has used a product called CCA to produce treated lumber products. As of December 2004, CCA will no longer be sold for any residential use.

The new product designation tags on lumber are:

- ACQ - Alkaline Copper Quarternary.
- CBA - Copper Azole.
- SBX - Sodium Borate. *(Sodium Borate may not be used for outdoor applications. It may be used in areas protected from the elements, i.e, sill-plates, joists completely protected from direct moisture, etc.)*

**Heavier fastening devices necessary**

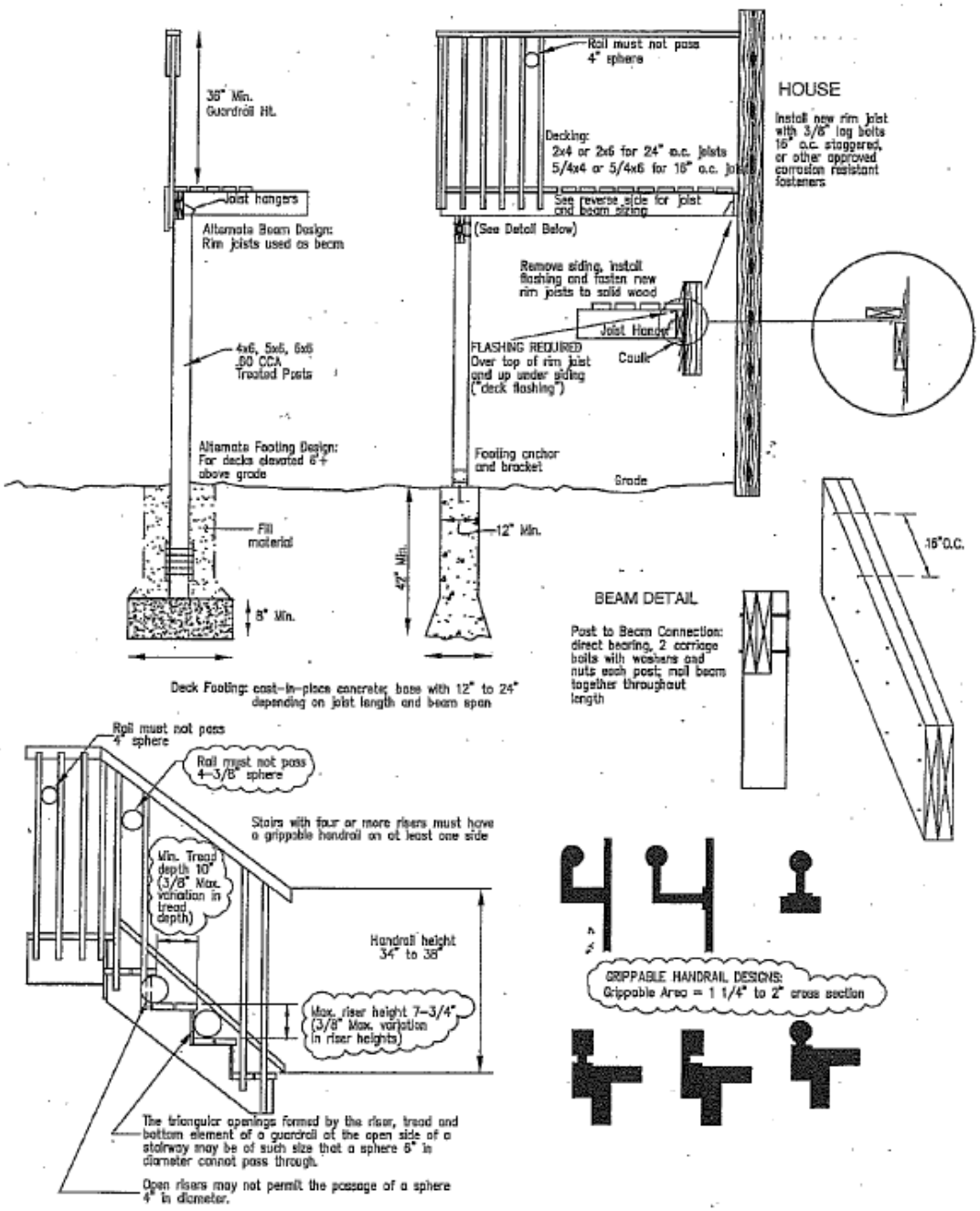
These new wood treatments are more corrosive in nature and must have a heavier galvanized or stainless steel product used for all the fastening devices, such as the bolts, nails, screws, brackets and joist hangers.

Lumber suppliers are taking a pro-active stance and posting notifications of the changes by the lumber and fastener sections in their businesses.

Some of the fastener designations you should look for are:

- Triple zinc.
- G-185.
- G-90.
- Post hot-dip galvanized - HDG.
- 304 and 316 stainless steel.

# DECK DESIGN DETAILS




ALL LUMBER SHALL BE OF NATURALLY DURABLE WOOD OR OF APPROVED TREATED WOOD (40 OR .60 CCA TREATED OR EQUAL); SEE ITEM #9 FOR FASTENERS

THIS HANDOUT IS BASED ON THE 2006 IRC