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## **Guide for Constructing Residential Decks**

### **Building Permits**

Building permits are required for any deck built in the City of Hudson. A building permit application shall include:

1. Site plan (showing distance from deck to all property lines)
2. Deck plan (identifying all construction details)
3. Completed application form

### **Deck Design**

All decks shall be designed to support 40 pounds per square foot live load and all appropriate dead loads. Decks must be designed so that no support comes from existing cantilevers or overhanging floors. Any decks intended to support hot tubs or roofs shall be designed to carry the additional weight. Weight and capacity of hot tubs shall be identified on plans.

### **Cantilevers – Overhanging Joists and Beams**

Decks shall not be supported by overhanging floors, such as bays or cantilevers. Deck joists shall not overhang beams by more than 2 feet, nor shall beams overhang posts by more than 2 feet, but overhanging beams shall not be allowed when roofs are supported by the deck.

### **Inspections**

1. Footing Inspections: Traditional concrete footings required to be inspected before placement of concrete. Diamond Pier footings may be inspected with framing or final. Setbacks are verified with footing inspection.
2. Framing Inspections:
  - a. For decks less than 2 feet from grade – Framing inspection required prior to installation of decking material.
  - b. For decks more than 2 feet from grade – Framing inspection can be done before or after installation of decking material.
3. Final Inspections: Required upon completion of deck.

### **Frost Footings**

Footings are required to support any deck serving as an exit from a structure. Footings shall be designed to adequately support loads and be a minimum of 48" deep. Diamond Pier footings may be used as long as manufacturer's installation instructions are followed. Only DP50 type Diamond Piers are approved for Wisconsin's frost depth.

### **Resistance to Decay**

All exposed wood shall be naturally resistant to decay (redwood, cedar, etc) or approved pressure treated wood. This includes posts, beams, joists, decking, guardrails and handrails.

**Flashing**

All connections between the deck and adjoining walls shall be weatherproof. Flashing shall be corrosive-resistant material.

**Fasteners**

Use only stainless steel, high strength aluminum, or hot-dipped galvanized. Joist hangers shall be secured per manufacturers specifications.

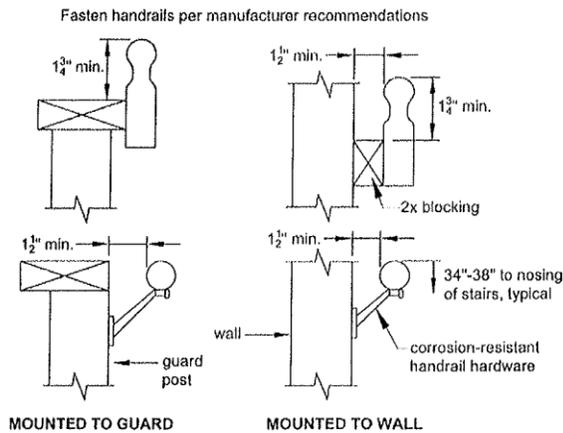
**Guardrails**

Guardrails are required for all decks more than 24" above grade or stairs exceeding three risers. When required, guardrails shall be a minimum of 36" above the decking. Openings in guardrails shall have rails or an ornamental pattern such that a 4-inch sphere cannot pass through.

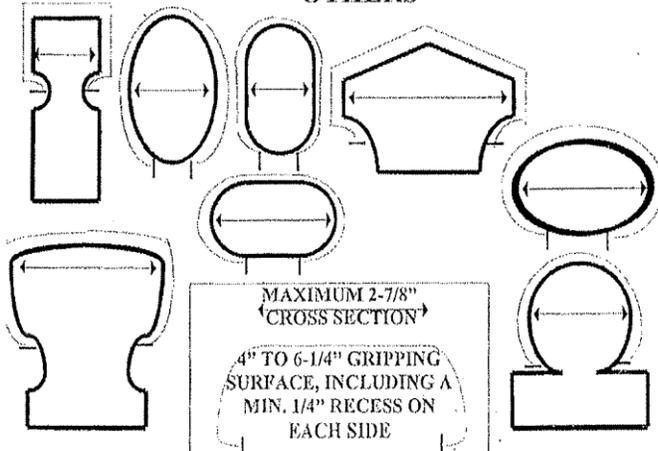
**Handrails**

Stairs with more than three risers shall be provided with at least one handrail for the full length of stairs. Handrails shall be located between 30 – 38 inches above the nosing of the treads. See attached for example of acceptable handrails.

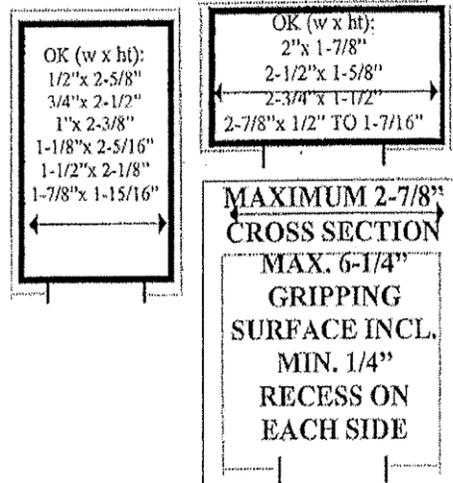
**Handrail Mounting Examples**



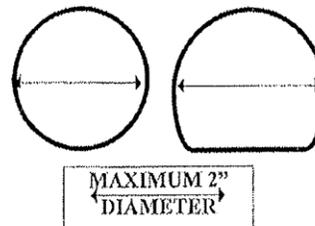
**OTHERS**



**RECTANGULAR**



**ROUND**



# Joist Span, Beam and Footing Sizes

Based on No. 2 or better (Treated for weather and/or ground exposure)

(Design Load = 40#LL+10#DL, Deflection = L/360)

|     |                         | Post Spacing                       |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|-----|-------------------------|------------------------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----|----|----|----|----|----|----|----|----|
|     |                         | 4'                                 | 5'    | 6'     | 7'     | 8'     | 9'     | 10'    | 11'    | 12'    | 13'    | 14'    |        |        |    |    |    |    |    |    |    |    |    |
| 6'  | Min. Joist Size/Spacing | 2x6 @ 24" O.C.                     |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 1-2x6                              | 1-2x6 | 1-2x8  | 2-2x8  | 2-2x8  | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x12 | 2-2x12 | 3-2x10 |        |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 6                                  | 5     | 7      | 6      | 7      | 6      | 8      | 7      | 9      | 7      | 9      | 7      | 10     | 8  | 10 | 8  | 10 | 9  | 11 | 9  | 11 | 9  |
|     | Intermediate Footing    | 9                                  | 8     | 10     | 8      | 10     | 9      | 11     | 9      | 12     | 10     | 13     | 10     | 14     | 11 | 14 | 12 | 15 | 12 | 15 | 13 | 16 | 13 |
| 7'  | Min. Joist Size/Spacing | 2x6 @ 24" O.C.                     |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 1-2x6                              | 1-2x6 | 1-2x8  | 2-2x8  | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x12 | 3-2x10 | 3-2x10 |        |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 7                                  | 5     | 7      | 6      | 8      | 7      | 9      | 7      | 9      | 8      | 10     | 8      | 10     | 8  | 11 | 9  | 11 | 9  | 12 | 10 | 12 | 10 |
|     | Intermediate Footing    | 9                                  | 8     | 10     | 8      | 11     | 9      | 12     | 10     | 13     | 11     | 14     | 11     | 15     | 12 | 15 | 13 | 16 | 13 | 17 | 14 | 17 | 14 |
| 8'  | Min. Joist Size/Spacing | 2x6 @ 16" O.C. or 2x8 @ 24" O.C.   |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 1-2x6                              | 2-2x6 | 2-2x8  | 2-2x8  | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 3-2x10 | 3-2x10 | 3-2x12 |        |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 7                                  | 6     | 8      | 6      | 9      | 7      | 9      | 8      | 10     | 8      | 10     | 8      | 11     | 9  | 11 | 9  | 12 | 10 | 13 | 10 | 13 | 11 |
|     | Intermediate Footing    | 10                                 | 8     | 11     | 9      | 12     | 10     | 13     | 11     | 14     | 11     | 15     | 12     | 16     | 13 | 16 | 13 | 17 | 14 | 18 | 15 | 18 | 15 |
| 9'  | Min. Joist Size/Spacing | 2x8 @ 16" O.C. or 2x10 @ 24" O.C.  |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 1-2x6                              | 2-2x6 | 2-2x8  | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 3-2x10 | 3-2x10 | 3-2x12 | 3-2x12 |        |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 7                                  | 6     | 8      | 7      | 9      | 7      | 10     | 8      | 10     | 9      | 11     | 9      | 12     | 10 | 12 | 10 | 13 | 10 | 13 | 11 | 14 | 11 |
|     | Intermediate Footing    | 10                                 | 9     | 12     | 10     | 13     | 10     | 14     | 11     | 15     | 12     | 16     | 13     | 17     | 14 | 17 | 14 | 18 | 15 | 19 | 15 | 20 | 16 |
| 10' | Min. Joist Size/Spacing | 2x8 @ 16" O.C. or 2x10 @ 24" O.C.  |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 1-2x6                              | 1-2x6 | 2-2x8  | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm |        |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 8                                  | 6     | 9      | 7      | 10     | 8      | 10     | 8      | 11     | 9      | 12     | 10     | 12     | 10 | 13 | 11 | 14 | 11 | 14 | 12 | 15 | 12 |
|     | Intermediate Footing    | 11                                 | 9     | 12     | 10     | 14     | 11     | 15     | 12     | 16     | 13     | 17     | 14     | 17     | 14 | 18 | 15 | 19 | 16 | 20 | 16 | 21 | 17 |
| 11' | Min. Joist Size/Spacing | 2x8 @ 12" O.C. or 2x10 @ 16" O.C.  |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 2-2x6                              | 2-2x6 | 2-2x8  | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm |        |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 8                                  | 7     | 9      | 7      | 10     | 8      | 11     | 9      | 12     | 9      | 12     | 10     | 13     | 11 | 14 | 11 | 14 | 12 | 15 | 12 | 15 | 13 |
|     | Intermediate Footing    | 12                                 | 9     | 13     | 11     | 14     | 12     | 15     | 12     | 16     | 13     | 17     | 14     | 17     | 14 | 18 | 15 | 19 | 16 | 20 | 16 | 21 | 17 |
| 12' | Min. Joist Size/Spacing | 2x8 @ 12" O.C. or 2x10 @ 16" O.C.  |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 2-2x6                              | 2-2x6 | 2-2x8  | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 2-2x10 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm | Eng Bm |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 9                                  | 7     | 10     | 8      | 10     | 9      | 11     | 9      | 12     | 10     | 13     | 10     | 14     | 11 | 14 | 12 | 15 | 12 | 15 | 13 | 16 | 13 |
|     | Intermediate Footing    | 12                                 | 10    | 14     | 11     | 15     | 12     | 16     | 13     | 17     | 14     | 18     | 15     | 19     | 16 | 20 | 16 | 21 | 17 | 22 | 18 | 23 | 18 |
| 13' | Min. Joist Size/Spacing | 2x10 @ 16" O.C.                    |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 2-2x6                              | 2-2x6 | 2-2x8  | 2-2x10 | 2-2x12 | 2-2x12 | 2-2x12 | 2-2x12 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm | Eng Bm |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 9                                  | 7     | 10     | 8      | 11     | 9      | 12     | 10     | 13     | 10     | 13     | 11     | 14     | 12 | 15 | 12 | 15 | 13 | 16 | 13 | 17 | 14 |
|     | Intermediate Footing    | 13                                 | 10    | 14     | 12     | 15     | 13     | 17     | 14     | 18     | 15     | 19     | 15     | 20     | 16 | 21 | 17 | 22 | 18 | 23 | 19 | 24 | 19 |
| 14' | Min. Joist Size/Spacing | 2x10 @ 12" O.C. or 2x12 @ 16" O.C. |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 2-2x6                              | 2-2x8 | 2-2x8  | 2-2x10 | 2-2x12 | 3-2x10 | 3-2x10 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm | Eng Bm | Eng Bm |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 9                                  | 8     | 10     | 8      | 11     | 9      | 12     | 10     | 13     | 11     | 14     | 11     | 15     | 12 | 15 | 13 | 16 | 13 | 17 | 14 | 17 | 14 |
|     | Intermediate Footing    | 13                                 | 11    | 15     | 12     | 16     | 13     | 17     | 14     | 18     | 15     | 20     | 16     | 21     | 17 | 22 | 18 | 23 | 18 | 24 | 19 | 24 | 20 |
| 15' | Min. Joist Size/Spacing | 2x10 @ 12" O.C. or 2x12 @ 16" O.C. |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 2-2x6                              | 2-2x8 | 2-2x8  | 2-2x10 | 3-2x10 | 3-2x10 | 3-2x10 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm | Eng Bm | Eng Bm |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 10                                 | 8     | 11     | 9      | 12     | 10     | 13     | 10     | 14     | 11     | 14     | 12     | 15     | 12 | 16 | 13 | 17 | 14 | 17 | 14 | 18 | 15 |
|     | Intermediate Footing    | 14                                 | 11    | 15     | 12     | 17     | 14     | 18     | 15     | 19     | 16     | 20     | 17     | 21     | 17 | 22 | 18 | 23 | 19 | 24 | 20 | 25 | 21 |
| 16' | Min. Joist Size/Spacing | 2x12 @ 12" O.C.                    |       |        |        |        |        |        |        |        |        |        |        |        |    |    |    |    |    |    |    |    |    |
|     | Beam                    | 2-2x6                              | 2-2x8 | 2-2x10 | 2-2x10 | 3-2x10 | 3-2x10 | 3-2x10 | 3-2x10 | 3-2x12 | 3-2x12 | Eng Bm | Eng Bm | Eng Bm |    |    |    |    |    |    |    |    |    |
|     | Corner Footing          | 10                                 | 8     | 11     | 9      | 12     | 10     | 13     | 11     | 14     | 11     | 15     | 12     | 16     | 13 | 16 | 13 | 17 | 14 | 18 | 15 | 18 | 15 |
|     | Intermediate Footing    | 14                                 | 11    | 16     | 13     | 17     | 14     | 18     | 15     | 20     | 16     | 21     | 17     | 22     | 18 | 23 | 19 | 24 | 20 | 25 | 21 | 26 | 21 |

**Notes:**

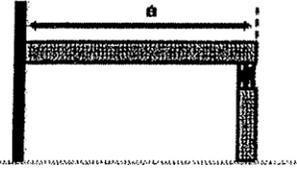
- Joist length is total length of joist, including any cantilevers.
- When joist extends (cantilevers) beyond support beam by 18" or more, add 1" to footing dimensions shown.
- Requirements for future 3-season porches or screen porches:
  - Increase corner footing size shown by 90%.
  - Increase center footing size shown by 55%.
  - Locate all footings at extremities of deck (no beam cantilevers).
  - Beam sizes indicated need not be altered.

- All footing sizes above are base diameters (in inches) and are selected for ON-SITE SOIL CONDITIONS:

|                      | Clay | Sand |
|----------------------|------|------|
| Corner Footing       | 10   | 8    |
| Intermediate Footing | 14   | 11   |

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

### CASE I SOLUTION:

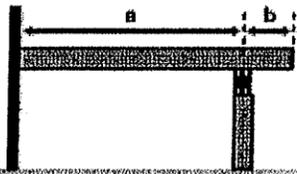


Refer to tables for joist, beam and footing size requirements.

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.

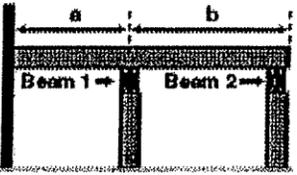


Use "a" to determine joist size and "a" + "b" to determine beam and footing sizes. The length of "b" is restricted by both the length of "a" and the size of the joists.

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 2x6s at 16" O.C. are acceptable.

For sizing the beam, use a joist length of 10' ( $8' + 2'$ ) 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 13", 11" or 10" for the corner post and 18", 15" or 13" 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.



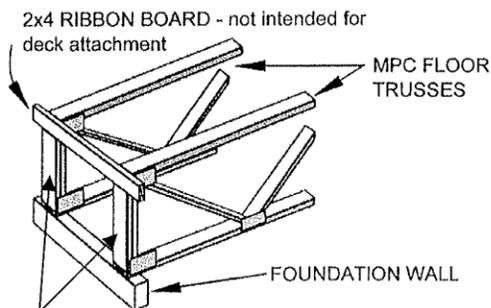
Use "a" or "b", whichever is greater, to determine joist size. Use "a" + "b" to determine the size of Beam 1 and the post footing size for the posts supporting Beam 1. Use joist length "b" to determine both the size of Beam 2 and the post footing size for the posts supporting Beam 2.

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.

### Metal Plate Connected (MPC) Wood Floor Trusses with a 2x4 Lumber "Ribbon" at the Ends of the Trusses

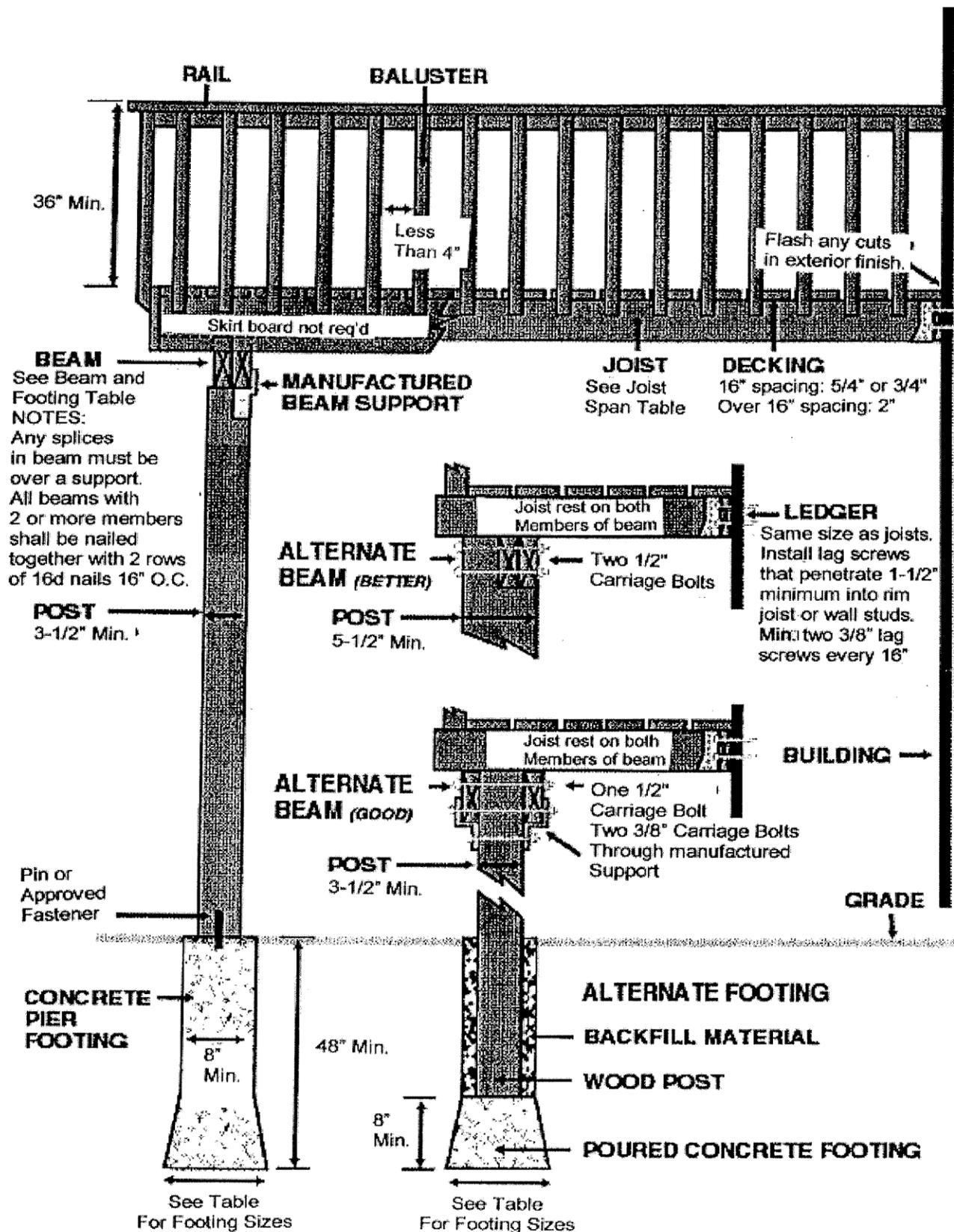


Attach deck ledger here

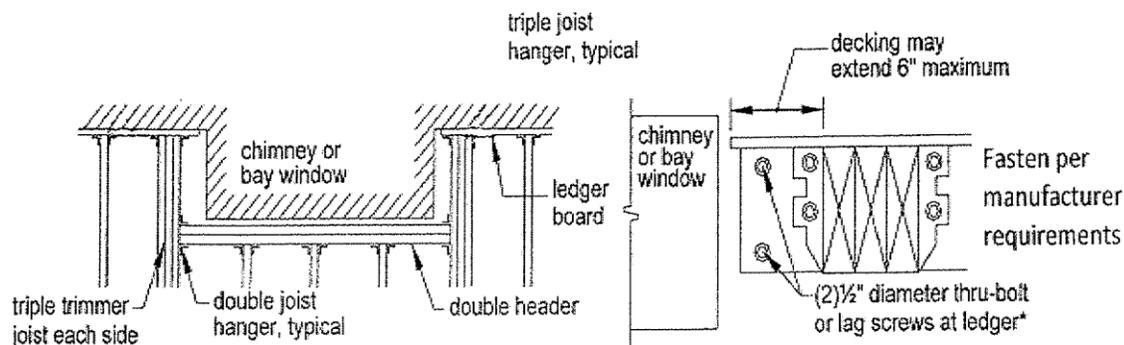
### No Support from House Overhang\*



\*See last page for framing details



**Detail for Framing Around a Chimney or Bay Window**



**Joist-to-Beam Detail**

