DPS | Montgomery County
Department of Permitting Services
255 Rockville Pike, 2nd Floor
Rockville, MD 20850-4166
Phone: 311 in Montgomery County or (240)777-0311
Fax: (240)777-6262
http://www.montgomerycountymd.gov/permittingservices

Montgomery County Residential Deck Details

General Notes

1. The use of this package, in lieu of construction plans, applies to typical rectangular shaped decks which are single span, single level decks only (Figure 1).

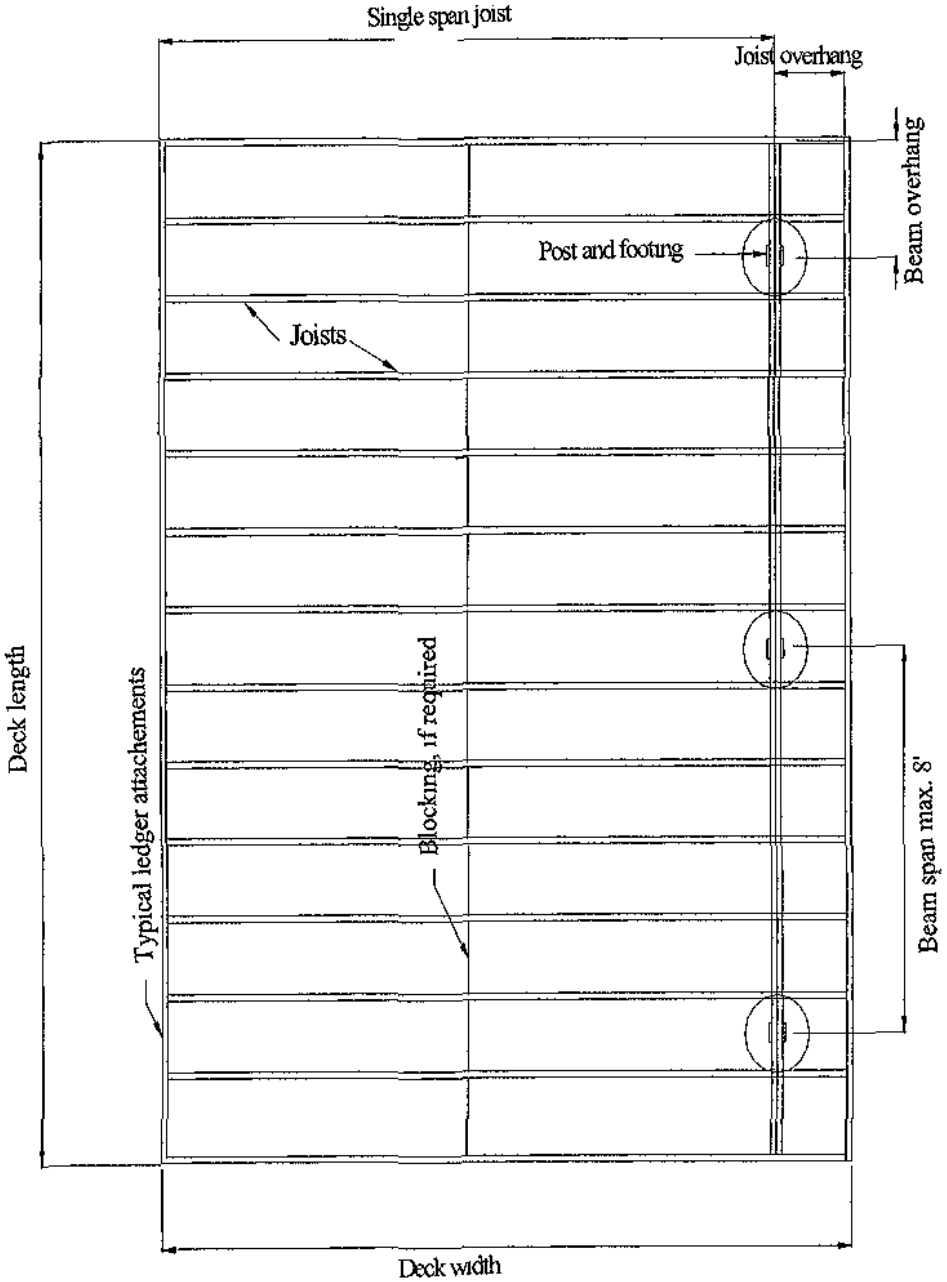


Figure 1: Framing plan for an attached deck

2. Decks constructed according to this handout are not approved for future hot tub installations.

3. Decks shall not be attached to house overhangs, bay windows, or chimneys.

4. Deck shall not be loaded with more than 50 psf (pounds per square foot) total load. Soil bearing capacity shall be minimum 2000 psf and the minimum compressive strength of concrete shall be 2500 psi (pounds per square inch).

5. All deck lumber shall be #2 Southern Pine or better. All lumber shall be pressure-treated – with an approved process and preservative in accordance with the American Wood Protection Association standard U1. All lumber in contact with the ground shall be approved preservative treated wood suitable for ground contact.

6. Fasteners (except one-half-inch or greater bolts) shall be hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Coating types and weights shall be in accordance with the manufacturer's recommendations or a minimum of ASTM A 653 type G 185 zinc-coated galvanized steel or equivalent shall be used. Fasteners other than nails and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coatings and weights in accordance with ASTM, Class 55.

7. Screws, spirally grooved and ring shanked nails shall be used for the deck surface and only manufacturer-specified fasteners shall be used to attach the connectors. Do not mix galvanized and stainless steel connectors.

8. Decks 30 inches or less above grade are not required to have a guardrail. Grade measurement is at any point within 36" horizontally.

9. A copy of this document is required to be on the jobsite and available for inspection.

10. All decks that are accessible from the inside of the dwelling shall have at least one receptacle outlet accessible from the deck. (NEC 210.52(e)3).

Framing Decks

The decking boards are supported by joists that are supported by beams. The beams transfer the loads to posts wherefrom the loads are transferred to footings and ground. The deck can be attached to the house or freestanding. If the deck is attached to the house, a ledger and fasteners are used to support that end of the deck. If the deck is freestanding, the structural support near the house is provided by an additional row of beams and posts. Bracing is used to provide the load path for lateral loads.

I) Decking Boards

Decking laid perpendicular to joists may consist of 2x6 inches structural lumber supported by joists spaced at maximum 24 inches or $1^{1/4}$ thick wood decking supported by joists spaced at maximum 16 inches. Manufactured decking systems (plastic, fiberglass, etc.) must be listed by an approved code agency in a current evaluation report.

II) Joists and Beams

Maximum joist span lengths are shown in Table 1. Joists may overhang per note b of the table; however, all overhangs require a minimum joist span length of 6 feet (Figure 2).

Maximum beam span lengths are shown in Table 2. The beams may overhang note b of the table. Beams must span continuously between posts and shall be spliced at interior post locations only (Figure 3).

Table 1 (TABLE R507.5):

Maximum allowable spans for wood deck joists (ft. - in.)

SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER [a] (inches)			SPACING OF DECK JOISTS WITH Cantilevers (inches)		
	12	16	24	12	16	24
2 × 6	9-11	9-0	7-7	6-8	6-8	6-8
2 × 8	13-1	11-10	9-8	10-1	10-1	9-8
2 × 10	16-2	14-0	11-5	14-6	14-0	11-5
2 × 12	18-0	16-6	13-6	18-0	16-6	13-6

Notes:

a. Cantilevered spans not exceeding the nominal depth of the joist are permitted for condition without cantilever.
b. Deck joists shall be permitted to cantilever not greater than one-fourth of the actual adjacent joist span.

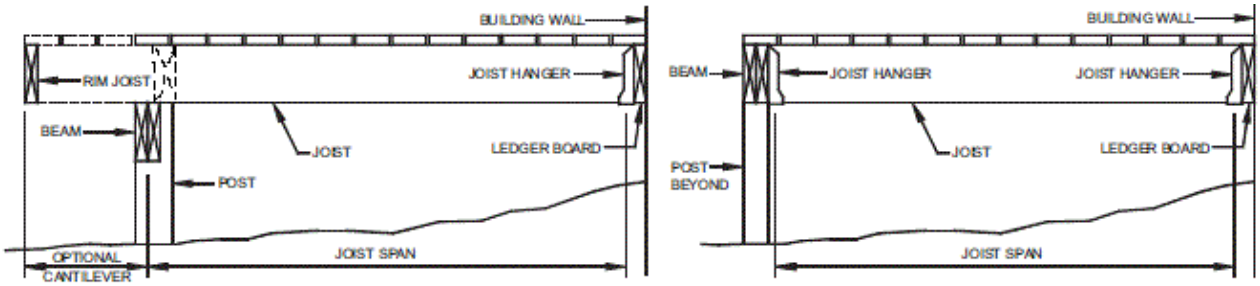
Table 2 (TABLE R507.6):

Maximum allowable spans for wood deck beams [a, b, c] (ft. - in.)

SIZE[d]	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
	6	8	10	12	14	16	18
2 – 2 x 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
2 – 2 x 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
2 – 2 x 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
2 – 2 x 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
3 – 2 x 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
3 – 2 x 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
3 – 2 x 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
3 – 2 x 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10

Notes:

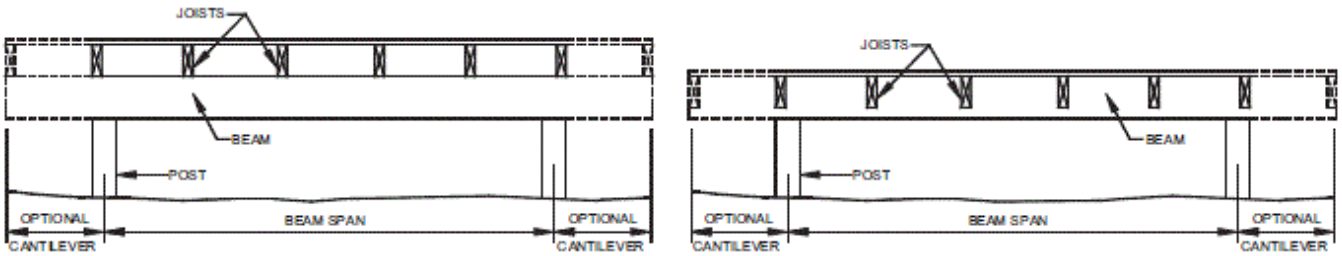
a. Beams supporting deck joists from one side only.
b. Beam plies shall be fastened with two rows of 10d (3-inch x 0.128-inch) nails minimum at 16 inches on center along each edge.
c. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span.



Joists with Dropped Beam

Joists with Flush Beam

Figure 2: Typical Deck Joist Spans



Dropped Beam

Flush Beam

Figure 3: Typical Beam Spans

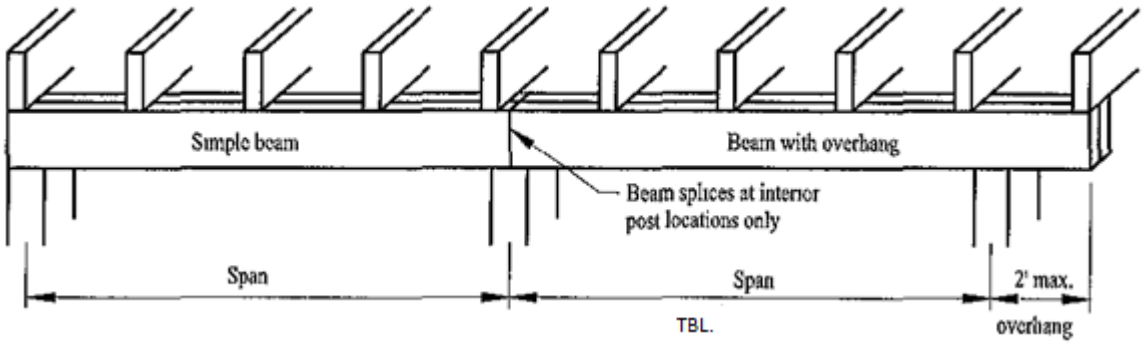


Figure 4: Beam Splices

Note:

a. Beams must span continuously between posts and shall be spliced at interior post locations only.
b. Spans are measured between the centerline of bearings or supports.

III) Posts

All posts shall be 4x4 inches up to a height of 8 feet and 6x6 inches beyond that. However, maximum post height is limited to 10 feet. It is recommended to use 6x6 inches posts in all situations because they are stronger and more durable than 4x4 inches posts. The height of the post is measured from the footing to the post attachment to the beam (Figure 5).
Decks less than 4' high (grade to bottom of beam) do not require post to beam bracing.

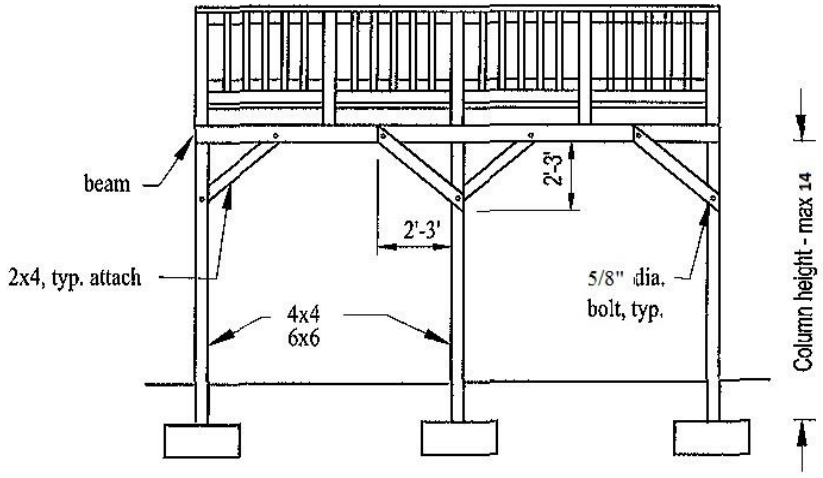


Figure 5: Deck posts

IV) Footings

Footings shall be minimum 20 inches square or 22 inches diameter (Figure 6). Bottom of footings shall be a minimum of 30 inches below grade and shall bear on solid ground. For freestanding decks, the footings close to the house must be installed as shown in Figure 8. Distances to the edges to the footing and embedment of connectors must be in accordance with the manufacturer's recommendations.

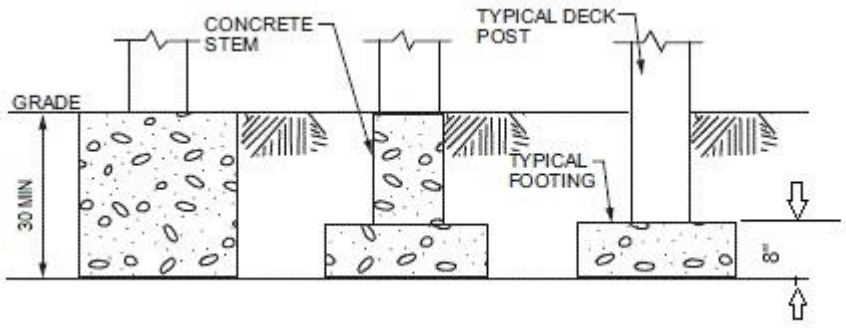
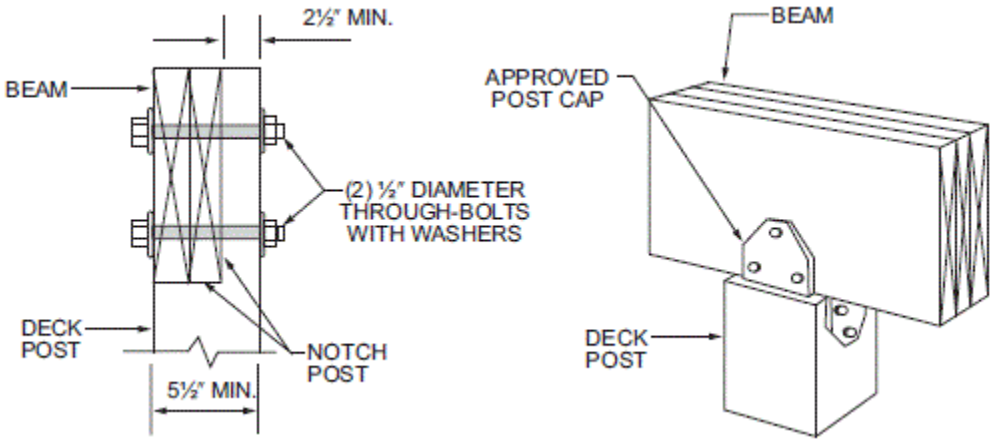


Figure 6: Typical Deck Posts to Deck Footings

Notes:

a. Posts shall be restrained to prevent lateral displacement at the bottom support. Connector and its attachment recommended by manufacturer.
b. Cut ends of posts shall be field treated with an approved preservative.

Figure 5: Typical footing detail



Notched Post Post Cap

Figure 7: Deck Beam to Deck Post

Notes: All bots shall have washers under the head and nut.

Table 3: Deck Post Height (measured to underside of the beam)

DECK POST SIZE	MAXIMUM HEIGHT
4 x 4	8'
4 x 6	8'
6 x 6	10'

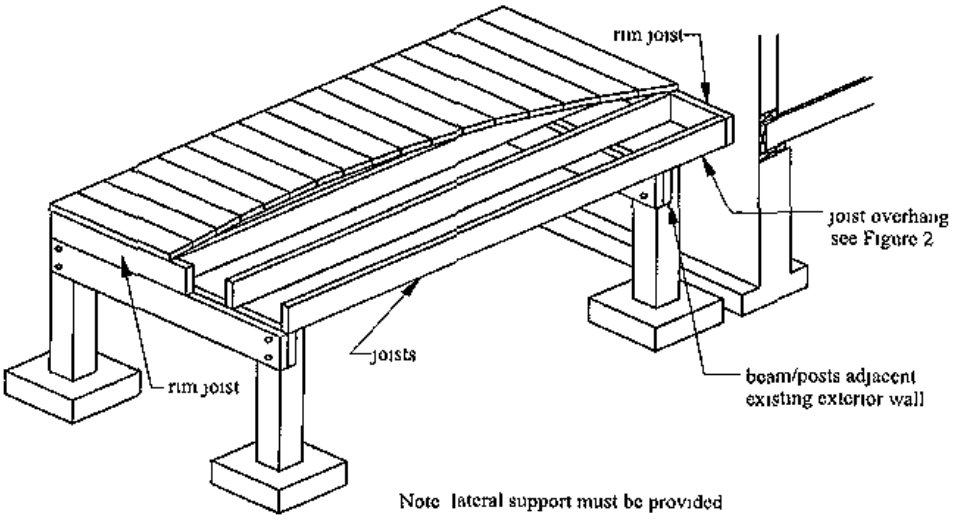


Figure 8: Self-Supported Deck

Attached Decks

Ledger board attachments to the exterior wall shall be constructed as indicated in Figure 10, Figure 11 and Figure 12. When required, flashing is not shown for clarity. These details are applicable for cases where there is no sheathing between ledger and band joist or engineered rim board but the lag screw is ½ inch shorter. **If the conditions at the house are not represented in this document, a plan submission is required** or **the deck must be self-supported**. It is assumed that the band joist and its connection to house are as strong as required to support the loads imposed by the deck.

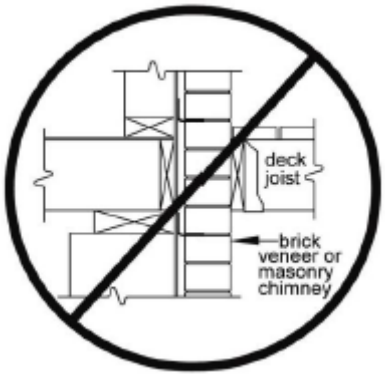


Figure 9: No Attachment to or Through Exterior Veneers (Brick, Masonry, Stone)

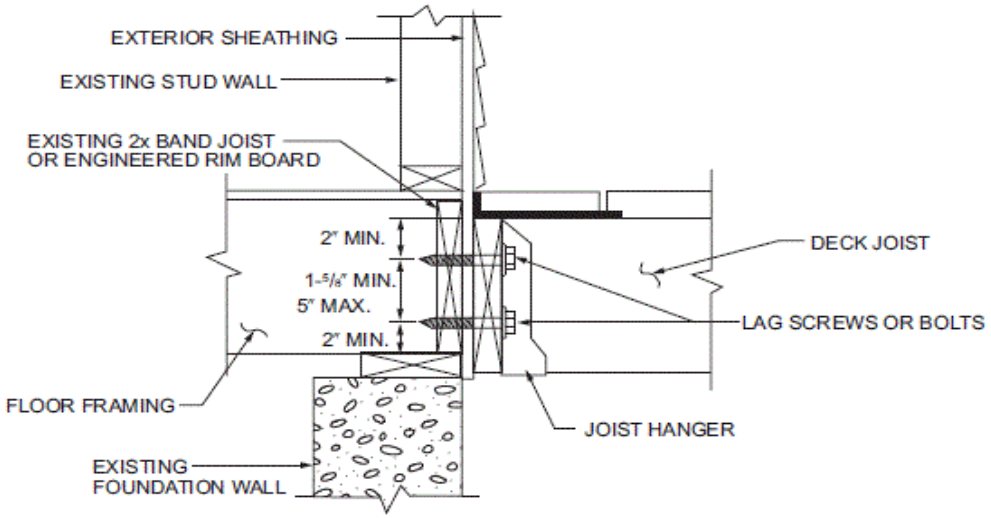


Figure 10: Ledger Board-to-Band Board Attachment

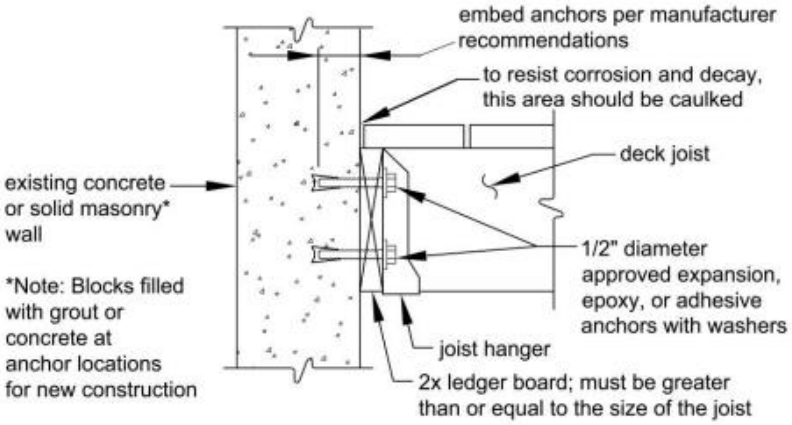


Figure 11: Deck Ledger Board-to-Concrete or Solid Masonry Wall

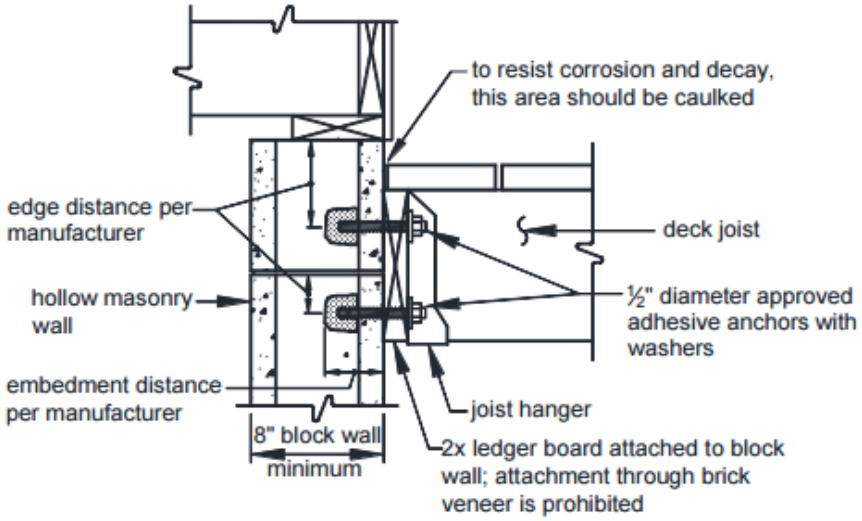


Figure 12: Ledger Board-to-Hollow Concrete Masonry Wall.

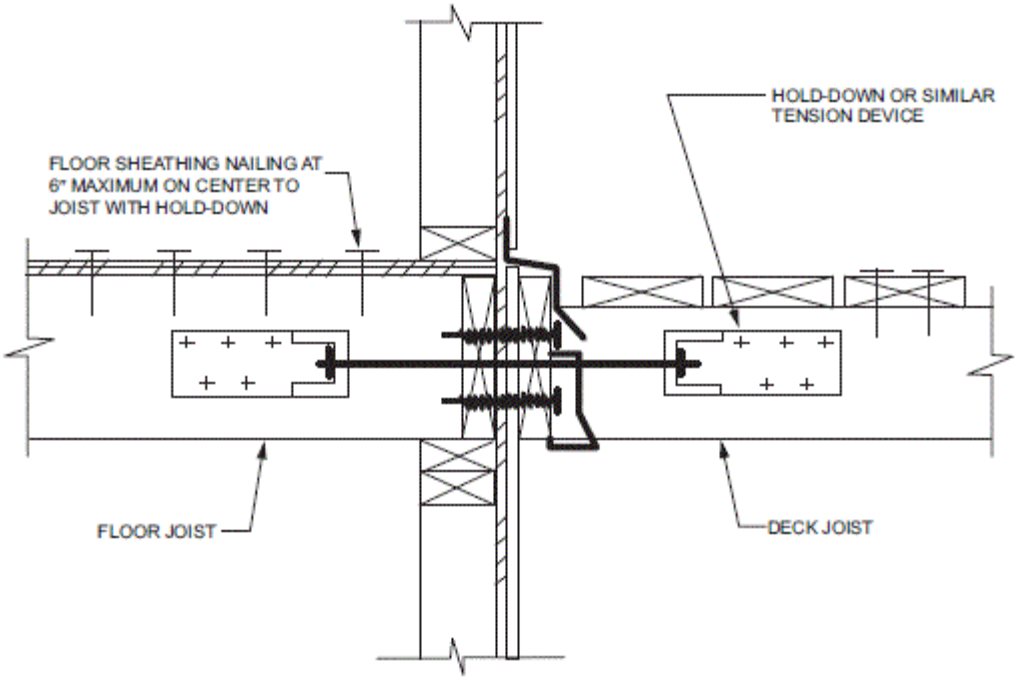


Figure 13: (Option 1) Deck Attachment for Lateral Loads – Joists Parallel to Deck Joists (Two tension devices within 24" of each end of deck).

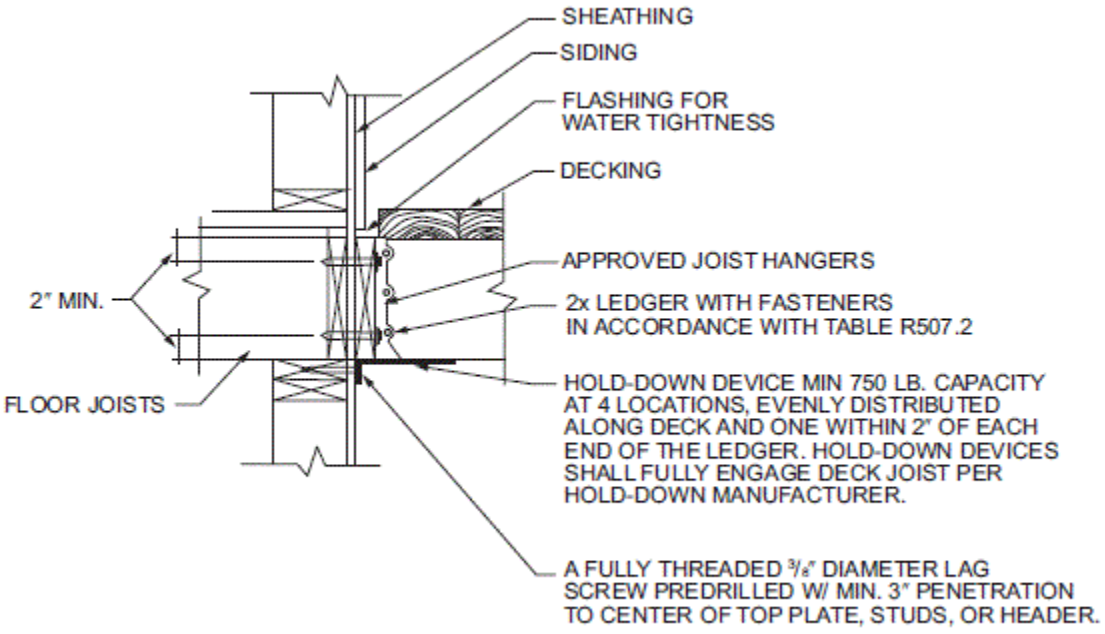


Figure 14: (Option 2) Deck Attachment for Lateral Loads - Four angles connect the base of the deck to house structure.

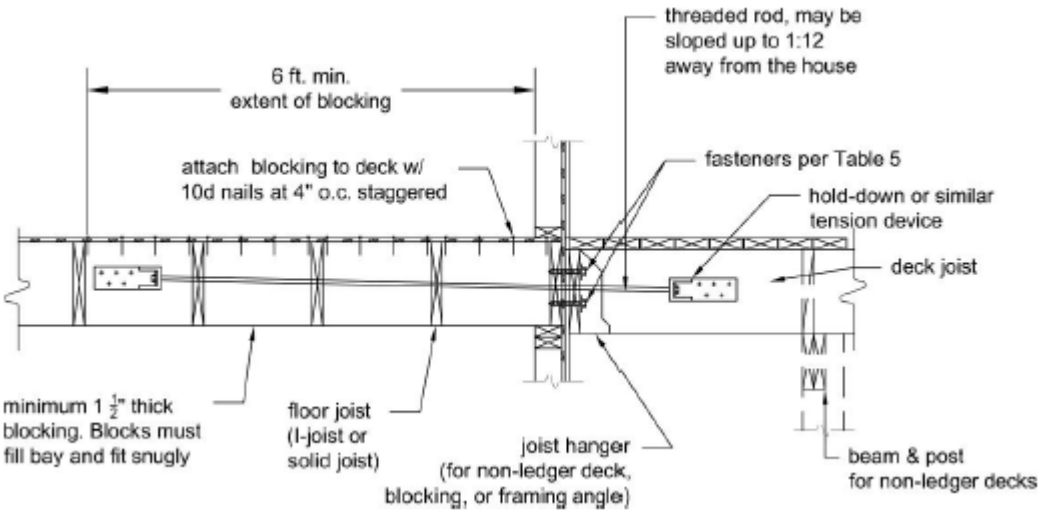


Figure 15: Lateral Load Device with Joists Perpendicular to Deck Joists

Framing at Chimney or Bay Window

When a chimney or bay window is wider than 6'-0", one or more 6x6 posts may be added to reduce header spans to less than 6'-0". In such cases, the post footing must meet the requirements in the Footing section. Headers shall be located no more than 3'-0" from the end of the trimmer joist.
Joist hangers shall each have a minimum vertical capacity in accordance with Table below. Bolts, screws, or lag screws used to attach the hanger to the ledger shall fully extend through the ledger into the 2-inch nominal lumber band joist (1-1/2" actual) or EWP rim joist.

Table 4: Trimmer Joist Hanger Vertical Capacity

JOIST SIZE	MINIMUM CAPAICTY, LBS
2x6	870
2x8	1155
2x10	1420
2x12	1575

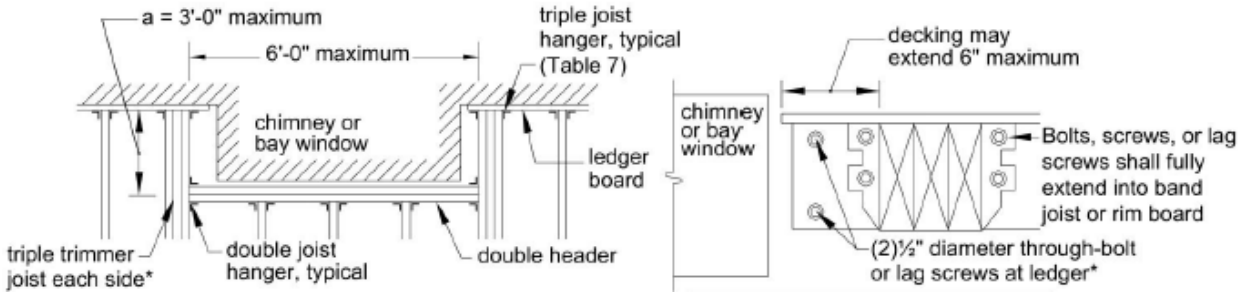


Figure 16: Detail for Framing around a Chimney or Bay Window

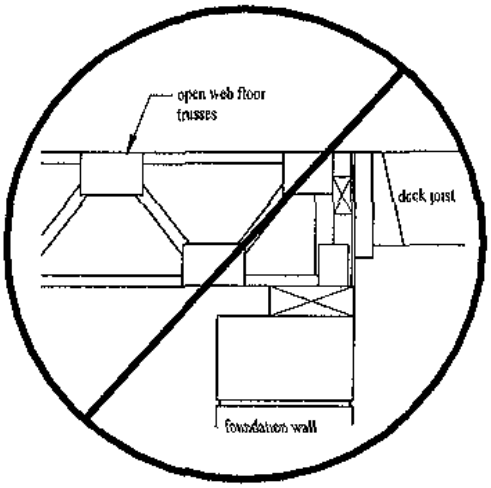


Figure 17: Attachment to open web trusses is prohibited

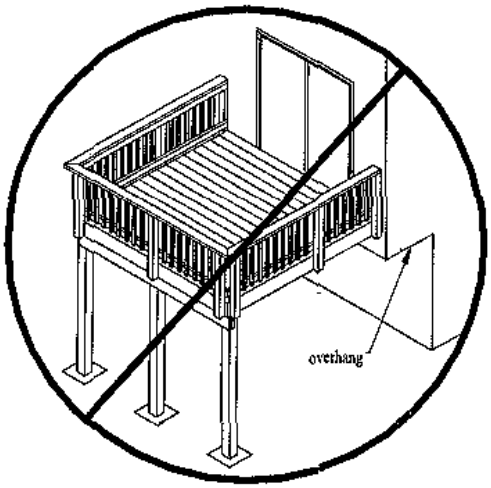


Figure 18: Attachment to house overhang is prohibited

When attaching the ledger to **single** band joists or **single** engineered rim board (Figure 10), ½ inch diameter **lag screws** shall be installed with the spacing, S, shown in Figure 13, given in Table 5.

Pilot holes for the threaded portion of the lag screws shall be 40% to 70% of the shank diameter. All lag screws shall be installed with standard cut washers. The threaded portion of the lag screw shall be inserted into the lead hole by turning. Use soap or a wood-compatible lubricant to facilitate tightening. A test on the lag screw installation is recommended before the ledger attachment.

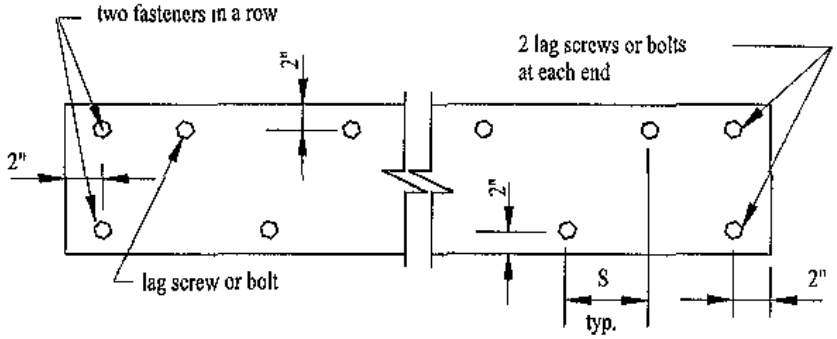


Figure 19: Placement of fasteners on ledger board

Table 5: Lag screws installed in single band joist

Number in a row	Size	Length in.	Max. spacing S – in.	Max. joist span - feet
1	1/2"	4	12	8
			9	10
			7	12
			6	14
			5	16
			5	18
			4	20

When attaching the ledger to **single** band joists (Figure 10), ½ inch diameter **through bolts** can be installed instead of the lag bolts with the spacing, S, given in Table 6. Pilot bolt holes shall be drilled no more than 1/16 inch larger than the bolt diameter. All bolts shall be installed with standard cut washers under the head of the bolt and under the nut. **Carriage bolts are not acceptable**.

Through Bolts-acceptable to use

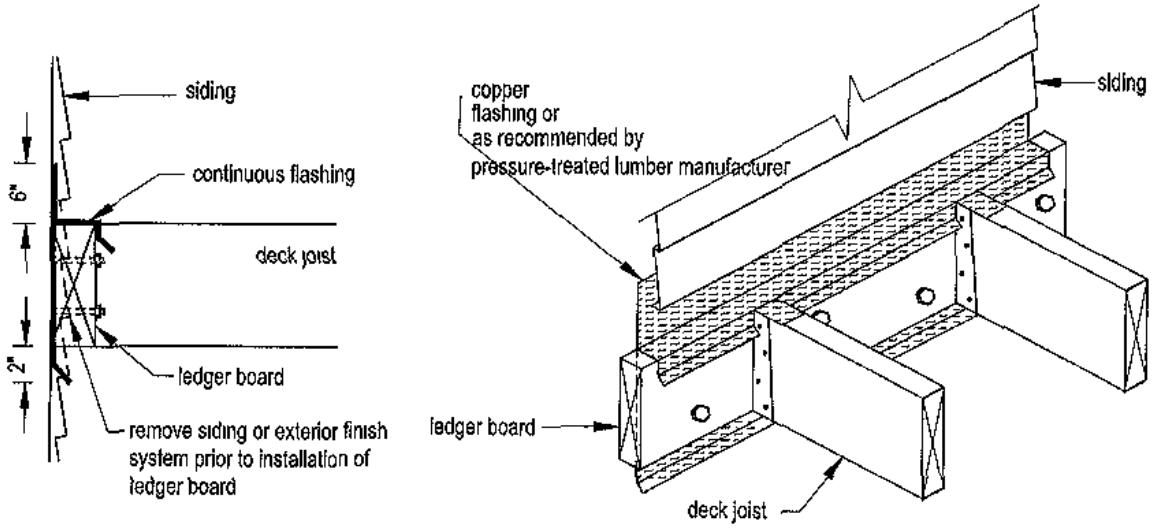
Carriage Bolts-NOT acceptable to use

Each bolt and lag screw shall be tightened, retightened after a year, and checked yearly thereafter. The preferred method of attachment is with bolts as it requires fewer penetrations and there is more control during installation.

Table 6: Through-bolts installed in single band joist, masonry or concrete foundation wall

Number in a row	Size	Length in.	Max. spacing S – in.	Max. joist span - feet
1	1/2"	As required	14	8
			13	10
			11	12
			9	14
			8	16
			8	18
			7	20

Flashing is required at any ledger board connection to a wall of wood frame construction. Flashing shall be corrosion resistant and shall be installed as shown in Figure 20 or as per manufacturer's recommendations.



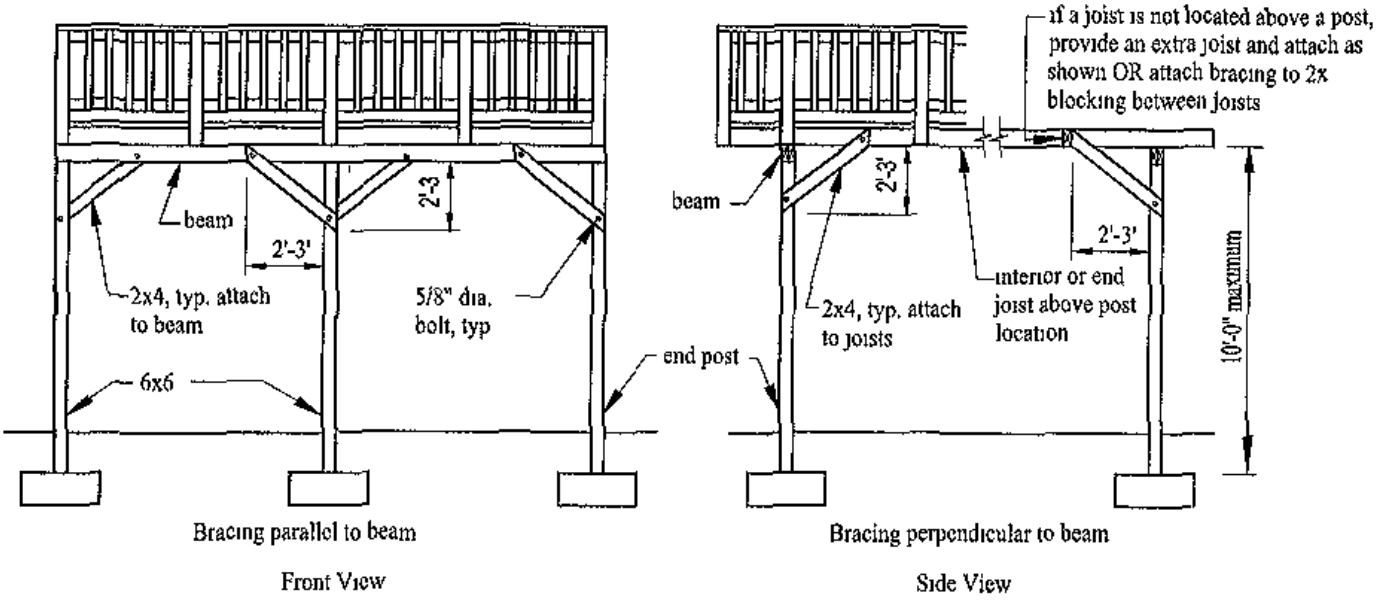
Note: Consult siding manufacturer for securing edges of siding to the wall

Figure 20 : Flashing requirements

Decks that are up to 4 feet high above the ground do not need bracing. Decks that are above 4 feet, need bracing at least parallel to the house (Figure 5). Although posts can be set on concrete footings at the ground level or below ground (embedded posts) as shown in Figure 8, the latter solution is recommended for added deck stability.

Freestanding Decks

Freestanding decks regardless of height above ground shall resist vertical loading, lateral loading and movement by providing 6x6 inches posts inches and diagonal bracing as illustrated in Figure 21. It is recommended to embed the posts into soil to resist lateral loads and uplift. One set of diagonal bracing shall be located between posts and beams or parallel to the house. Another set of diagonal bracing shall be located perpendicular to beams and house in the end spans. This bracing shall be bolted to the post and joist above the post location. If the joist spacing is such that a joist does not align over a post location an extra joist shall be added to facilitate connection of the diagonal bracing.



Note: Filler blocks may be required at the beams and joists

Figure 21: Bracing for freestanding decks

Connections

When designing the connections, including ledger attachments, use a minimum number of fasteners.

Ledger to the house

See Attached Decks section.

Joist to beam

Each joist shall bear directly on the beam (Figure 22). Alternatively, different types of connectors or joist hangers compatible with the intended lumber and having a minimum capacity of 1000 pounds can be used (Figure 23).

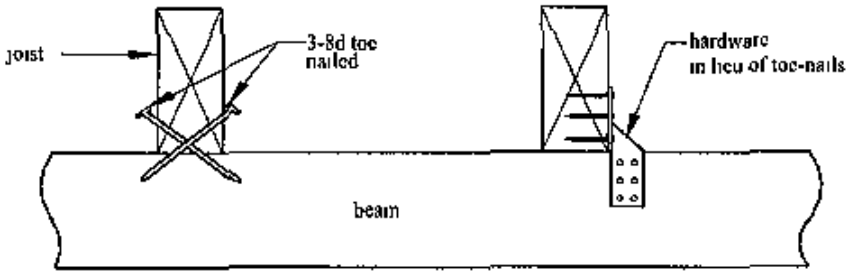


Figure 22: Joist to beam detail

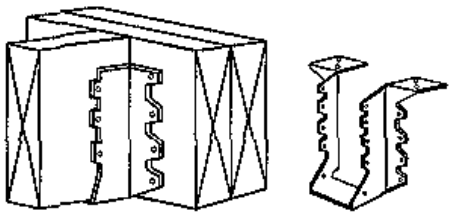


Figure 23: Joist to beam connection

Rim Joist to Joists

A continuous rim joist shall be attached to the ends of joists (Figure 24). Rim joists are required at both ends of joists with overhangs. Minimum rim joist dimensions shall be equal to those of the joists.

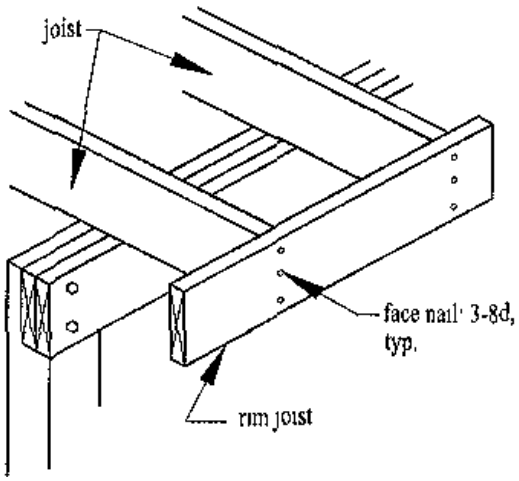


Figure 24: Rim joist connection

Built-up beam

Built-up beams shall be assembled in accordance with Figure 19. For triple member beams, provide the nailing pattern shown to the outside member on each side; however staggered rows shall be offset so as not to occur in the same location.

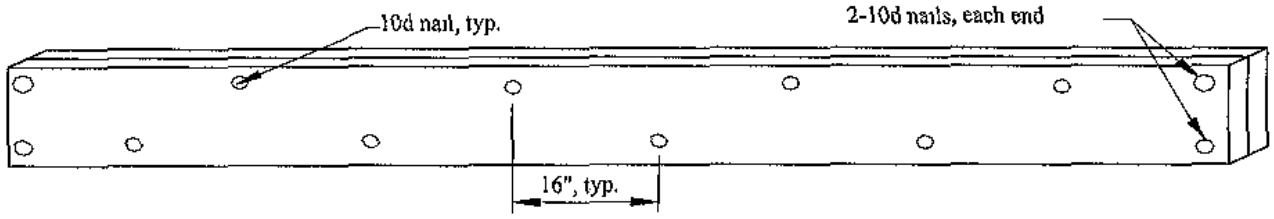


Figure 25: Built-up connection detail

Beam-to-post

Typical post-to-beam connections for 4x4 inches posts are shown in Figure 26. Same connection for 6x6 inches posts is shown in Figure 27.

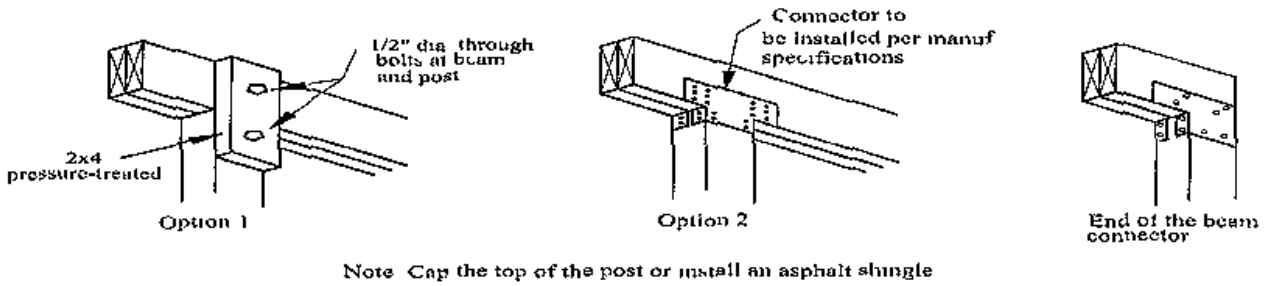


Figure 26: 4x4 inches post-to-beam connection

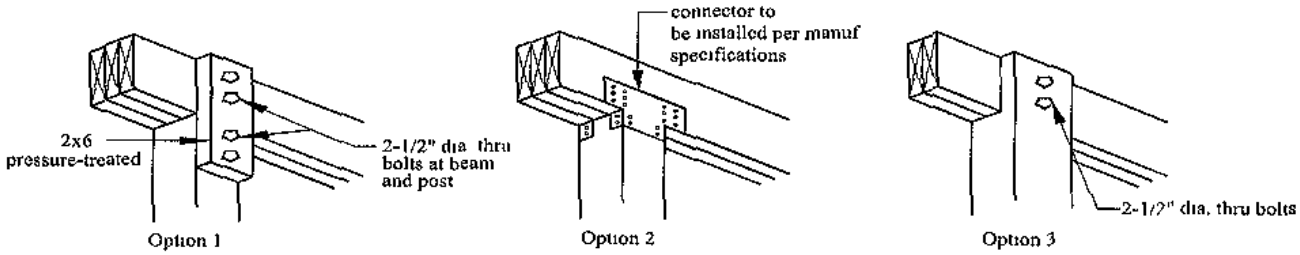


Figure 27: 6x6 inches post-to-beam connection

Lateral Bracing

Two ⅜ inch bolts shall be used at each connection between bracings posts, beams, and joists when 4x4 inches posts are used. One ⅝ inch bolt shall be used at each connection between bracings posts, beams, and joists when 6x6 inches posts are used.

Guardrail Requirements

Guardrails shall be constructed as shown in Figure 28 and Figure 29. The guardrail posts can be attached to the exterior of the rim joist (Figure 30), or the interior of the rim joists (Figure 31). Installation of the through bolts and lag bolts follow same rules as outlined above. Lag bolts can be replaced with connectors installed at the top and bottom of joists – such as hurricane ties or similar bracket capable to withstand 600 pounds per tie. A manufactured guardrail system requires a construction plan submission accompanied by a product specific evaluation report that is currently listed with an approved code agency.

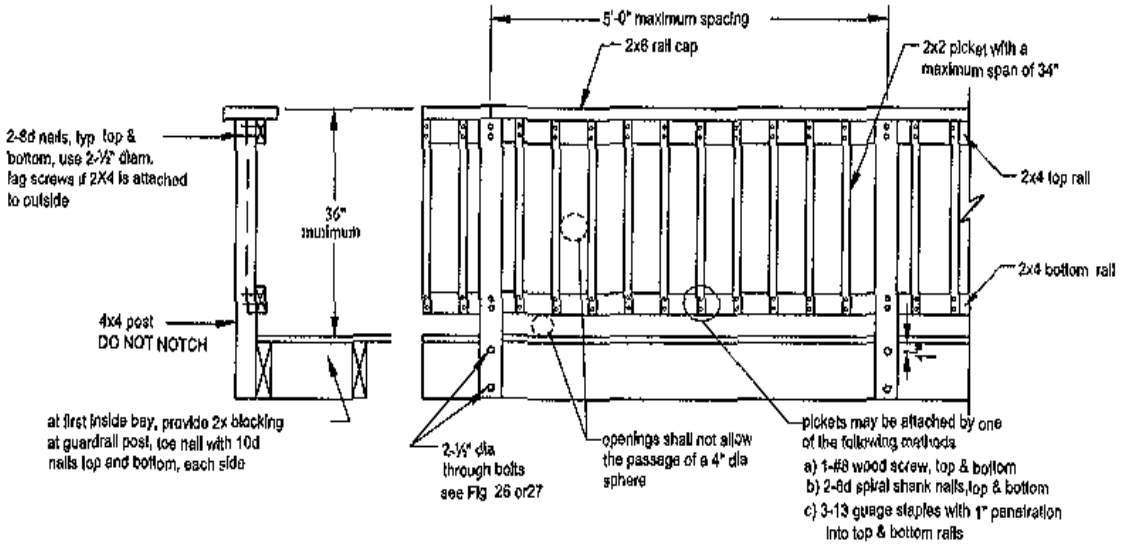


Figure 28: Typical guardrail details

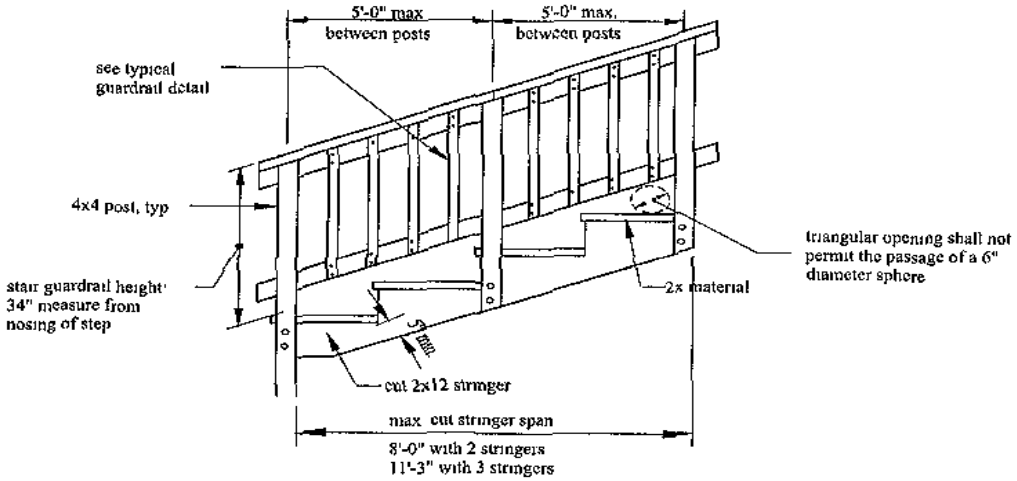


Figure 29: Guardrail and cut stringer detail

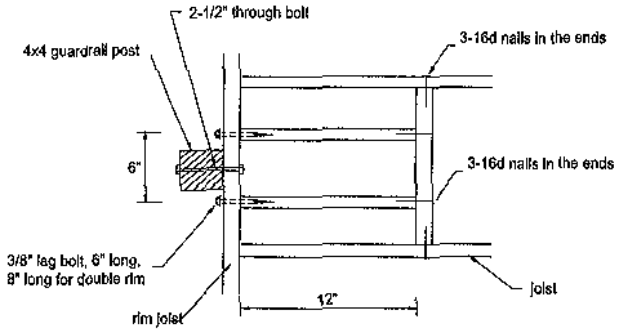


Figure 30: Plan (top) view-Exterior guardrail post

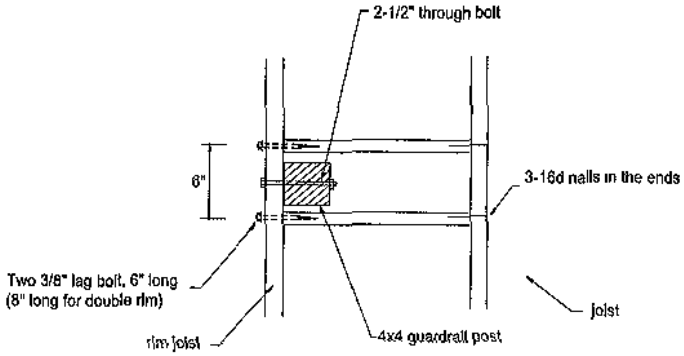
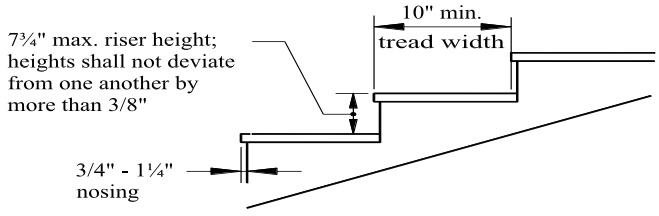


Figure 31: Plan (top) view-Interior guardrail post

Stair Requirements

Stairs shall meet the requirements shown in Figure 32, Figure 33 and Figure 34. All stairs shall be provided



with an artificial light source located at the top landing of the stairway which will adequately illuminate the stairs. The minimum stringer depth shall be 5".

Figure 32: Tread and riser detail

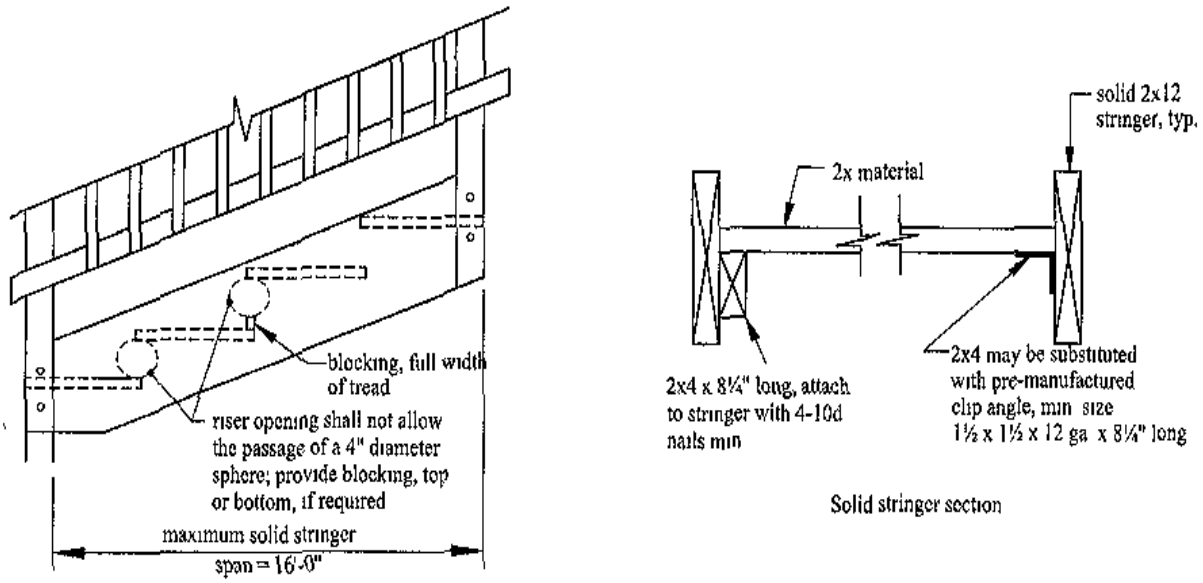


Figure 33: Solid stair stringer detail

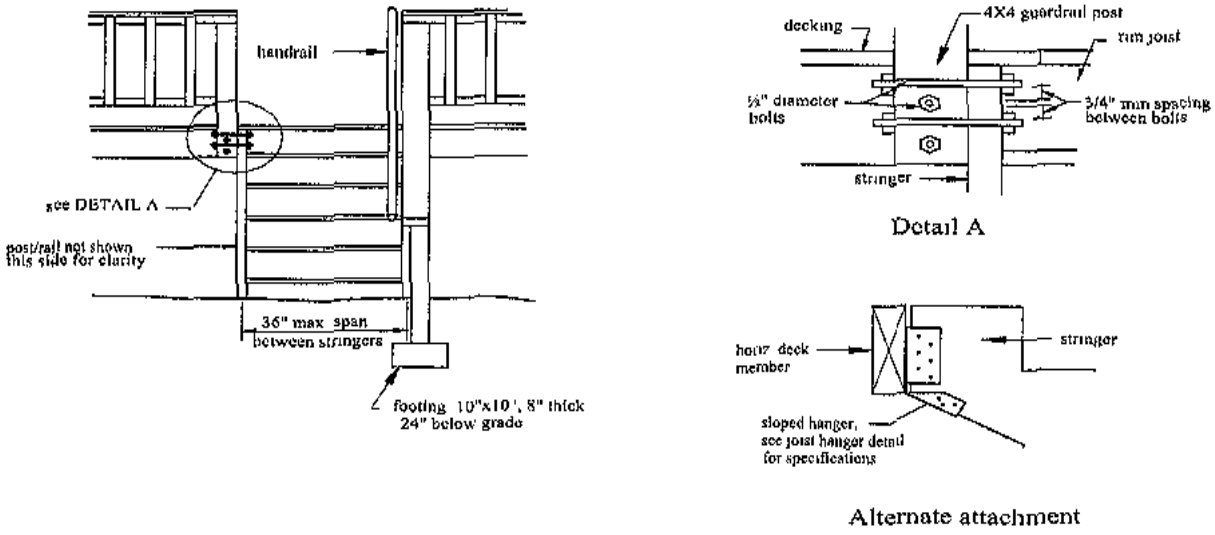


Figure 34: Stair connection requirements

Handrail

All stairs with two or more risers shall have a handrail on one side. Handrails shall be graspable and shall be composed of decay-resistant and/or corrosion resistant material. The hand grip portion shall be between 1¼ inches and 2 inches diameter or the shape shall provide an equivalent smooth gripping surface with no sharp corners (Figure 35).

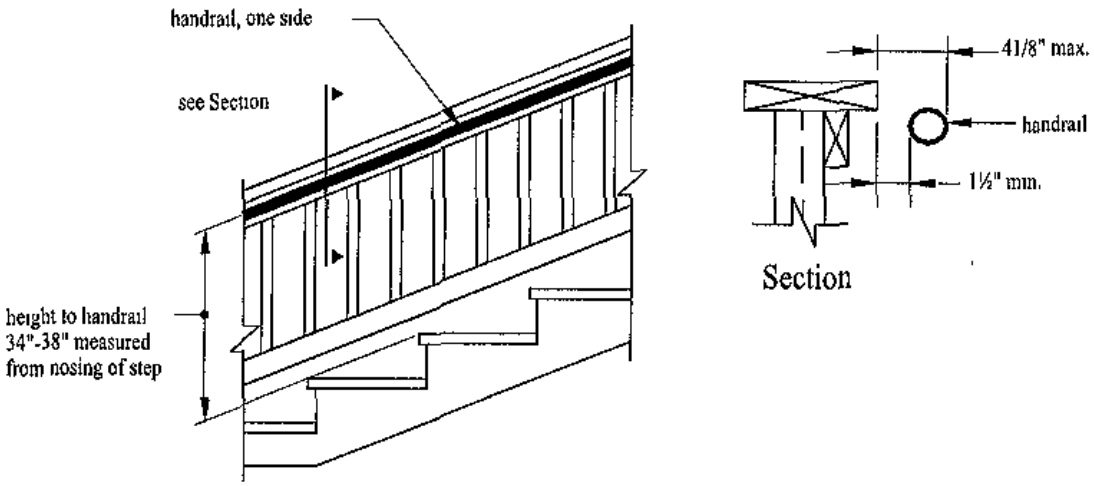


Figure 35: Stair handrail detail