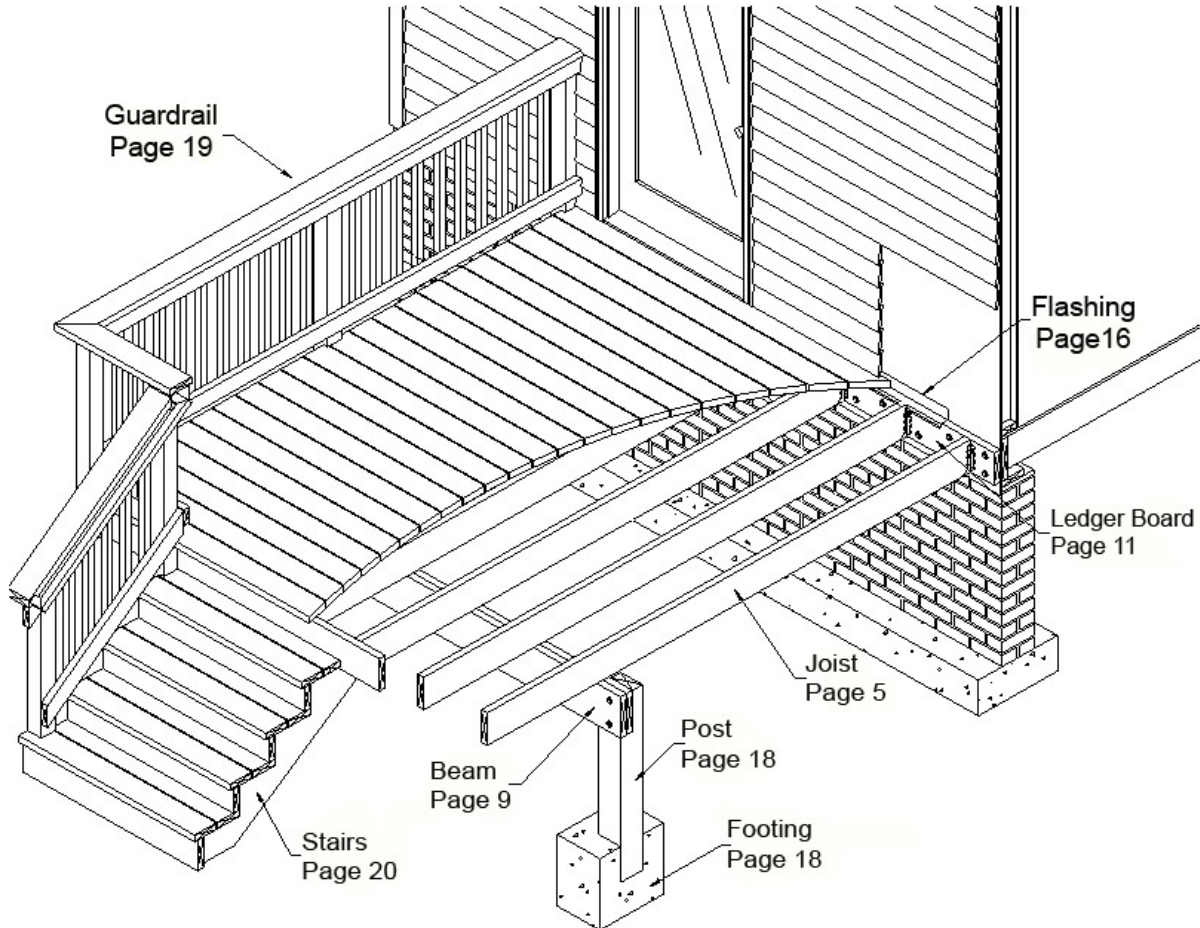




**CITY OF ALEXANDRIA**  
**CODE ENFORCEMENT BUREAU**  
301 King Street, Room 4200  
Alexandria, Virginia 22314

## Typical Deck Details Package

For One and Two Family Dwellings



L I

### MITATIONS:

This document is acceptable in lieu of submitting plans for single-level, single-span sun-decks (Decks) for one- and two-family dwellings that are **not located on problem (marine clay) soils**. Deviations from or conditions which do not comply with this document require plans to be submitted to Code Enforcement for review (see Appendix A). **This document or your approved plans must be on site, for review by the building inspector, for all inspections.**

Decks built using these guidelines are designed to support a 40 pound per square foot live load, a 10 pound per square foot dead load, and wet service conditions. Decks complying with this document are **not approved for hot tub installations**.

This document is based on the design requirements of the 2003 International Residential Code as amended by the 2003 Virginia Uniform Statewide Building Code (USBC). If there is any conflict between this document and the current USBC, then the requirements of USBC shall govern. **Other City agencies** may have additional requirements or restrictions that are not covered in this document (see Appendix B).

Decks shall not be occupied until the final inspection has been approved by the City Building Inspector.

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## **WARNING:**

As of January 1, 2004, Chromated Copper Arsenate (CCA) preservative is no longer used in pressure treated lumber for residential purposes. CCA has been replaced with alternative preservatives such as Amine Copper Quat (ACQ), and Copper Azole (CBA-A or CA-B). **Lumber in contact with the ground or concrete requires a higher level of preservative retention than lumber used above grade. The type of preservative used and the retention level is included on a tag stapled to the end of the treated lumber (end tag). The new preservatives are more corrosive.** A higher level of corrosion resistance for fasteners, connectors, and flashing is required. **The use of inadequately protected materials may result in failures which can cause serious injury.**

## **PROBLEM SOILS:**

If the City of Alexandria Dept. of Transportation and Environmental Services (T&ES) soils map indicates that problem soils (marine clay) are present at the location of the proposed deck or if problem soils are noted at the time of the footing inspection, a soils evaluation must be performed by a professional engineer licensed in the Commonwealth of Virginia. The soils evaluation must indicate what types of soils are present, the level of ground water (if present), the bearing capacity of the soils, the shrink/swell potential of the soils and the potential for differential settlement. A report detailing the findings of the soils evaluation must be attached to each set of plans. Note: at least one copy of the report must have the original seal and signature of the professional engineer. **If the report indicates that problem soils are present the deck foundation must be designed by a professional engineer licensed in the Commonwealth of Virginia.** See Appendix A for submittal requirements.

## **SUBMITTAL REQUIREMENTS:**

All decks built in the City of Alexandria require a permit issued by the City of Alexandria Code Enforcement Bureau (Code Enforcement). To build a deck complying with this document; submit a completed Construction Permit Application and 5 copies of the house location plat plan or approved subdivision site plan to Code Enforcement. The permit application must be completely filled out and **the project description must clearly indicate that the deck will comply with "COA Deck Details". The location, size, distances from property lines, and the height of the deck above grade must be indicated on the plat plan. If the proposed deck does not comply with all of the provisions of this document, or you wish to have your plans reviewed by the Code Enforcement Plans Examiner, a full plan submittal is required (see Appendix A).**

**GENERAL NOTES:**

1. **Lumber** - All Lumber shall be #2 grade southern pine or better, preservatively pressure-treated in accordance with the American Wood Products Association, or naturally decay resistant lumber such as cedar or redwood may be used. Lumber treated with Alkaline Copper Quat (ACQ-Types A, B and C), Amine Copper Quat (ACQ-D), Copper Azole-Type A (CBA-A), or Copper Azole-Type B (CA-B) shall comply with Table 1.

**Table 1 - Minimum Retention - pcf**

usage \ treatment type	ACQ	CBA-A	CA-B
Decking, railings, joists and beams not in contact with the ground or concrete.	0.25	0.20	0.10
All posts and columns, and any lumber in contact with the ground or concrete.	0.40	0.41	0.21

2. **Attachments- Hot-dip galvanized fasteners and connectors are acceptable** for use above grade. Hot-dip galvanized fasteners must comply with ASTM A153. Hot-dip galvanized connectors must comply with ASTM A653, Class G185 sheet with 1.85 ounces of zinc coating per square foot minimum, the “Zmax” line of fasteners by Simpson Strong Tie and the “Triple Zinc” line of fasteners by USP are acceptable. Fasteners and connectors used together shall be of the same type (e.g., hot-dip galvanized nails with hot-dip galvanized joist hangers). Type 304 and 316 **stainless steel products are recommended** for maximum corrosion resistance. **Aluminum products must not be used or come in contact with pressure treated lumber.**
3. **“Shall Not”** - Decks shall not be attached to or supported by bay windows, fireplaces or brick veneers. Decks shall not be supported by house overhangs or cantilevers.
4. **Decking Materials** - Decking materials shall be 2x6 or 5/4(five quarter)x6, bearing on at least 4 joists. The decking may run perpendicular to the joists, 45° to the joist or at an angle between perpendicular and 45° to the floor joist. Each deck board shall be attached to each joist with 2-8d nails or 2-#8 screws complying with general note 2.
5. **“Access” Inspection** - The **Permit holder is responsible** for requesting inspections. Inspections may be scheduled by calling the Automated Computerized Code Enforcement Scheduling System (Access) at 703-838-4900. Inspections requested prior to midnight will normally occur the next business day.
6. **Required Inspections** - Footing, framing and final inspections are required for all decks.
  - a. The footing inspection is required **PRIOR** to the placement of concrete. If problem soils are encountered see problem soils procedure on page 2. If concrete is poured before the footing is inspected, the footing must be exposed for inspection in order to verify the depth of the footing and bearing capacity of the soil. If the suitability of the footing cannot be verified, the conditions must be rectified and reinspected. Third party inspection reports are not accepted unless **prior** approval is obtained from the Building Official.
  - b. The framing and final inspection may be performed together if the bottom of the joists are 42 inches above grade and the underside of the deck is accessible.
1. **Other Materials** - If plastic or manufactured-wood-product decking or railing material is to be used, 5 copies of a current evaluation report from the International Code Council (ICC) of the proposed product must be provided to Code Enforcement for review with permit application. If the proposed material is approved a field copy of the evaluation report will be stamped by the plans examiner and returned with the building permit. The stamped approved field copy of the evaluation report and a copy of this document must be on site for review by the building inspector for all inspections.

## **DEFINITIONS:**

For the purposes of this document the following words and terms shall have the meanings indicated below.

**BEAM.** Two 2x6, 2x8, 2x10, or 2x12 boards fastened together used to support the joists and carry the load to posts.

**CUT STRINGER.** A stringer that has been cut to allow the stair treads to rest on top of the stringer.

**JOIST SPAN.** The distance between beams or ledgers supporting joists plus required 1½" bearing at each end.

**LEDGER BOARD.** A board anchored to the house and used to support a deck.

**POST.** A pressure treated vertical member (usually a 4x4 or 6x6) anchored to a concrete footing used to support a beam.

**RISER HEIGHT.** The vertical height measured from the top of one stair tread to the top of an adjacent stair tread.

**TREAD DEPTH.** The horizontal distance measured from the leading edge of a stair to the leading edge of an adjacent stair.

**SOLID STRINGER.** A stringer that has 2x4 blocks fastened on the inside that support the treads.

**STRINGER.** A 2x12 that spans between landings to support stairs

**STRINGER SPAN.** The horizontal distance between members supporting stringers.

**FOUNDATION. (FOOTING)** A foundation is the part of an engineered structure that transmits the structure's forces into the soil or rock that supports it.

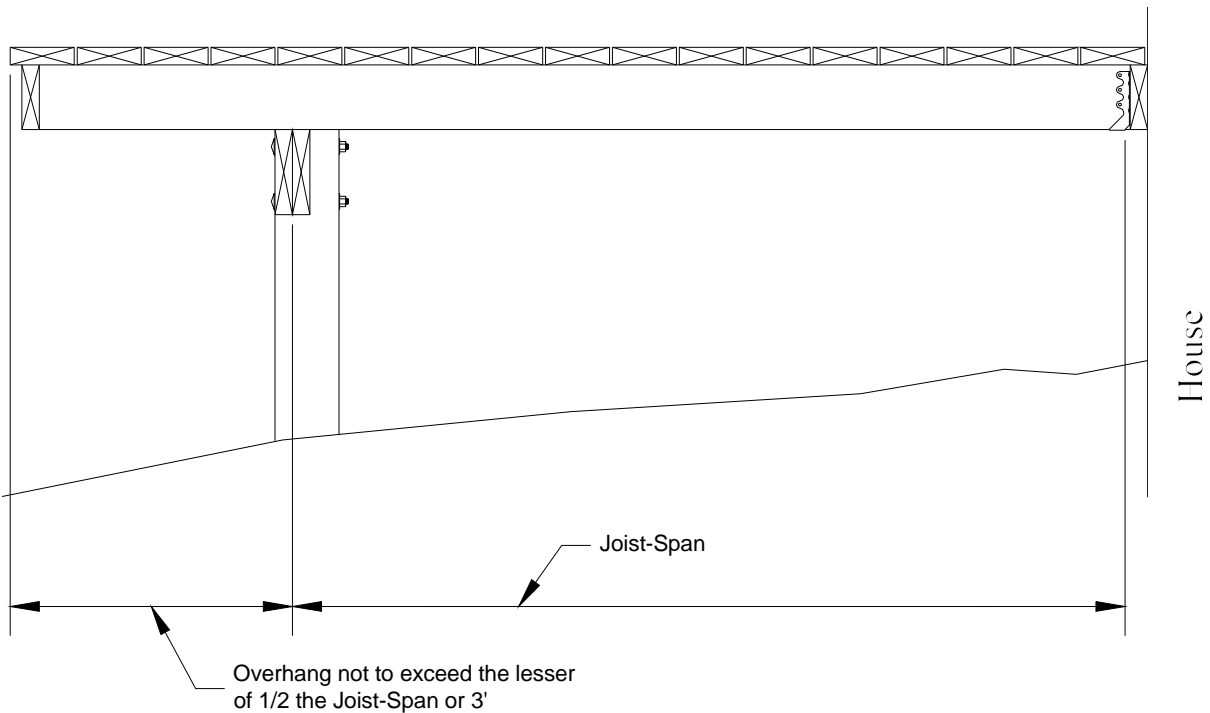
**JOIST REQUIREMENTS:**

The minimum joist size shall be based on the joist-span and shall comply with Table 2. It is acceptable to use a larger joist than the one specified in the table.

**Table 2: Maximum Joist Span**

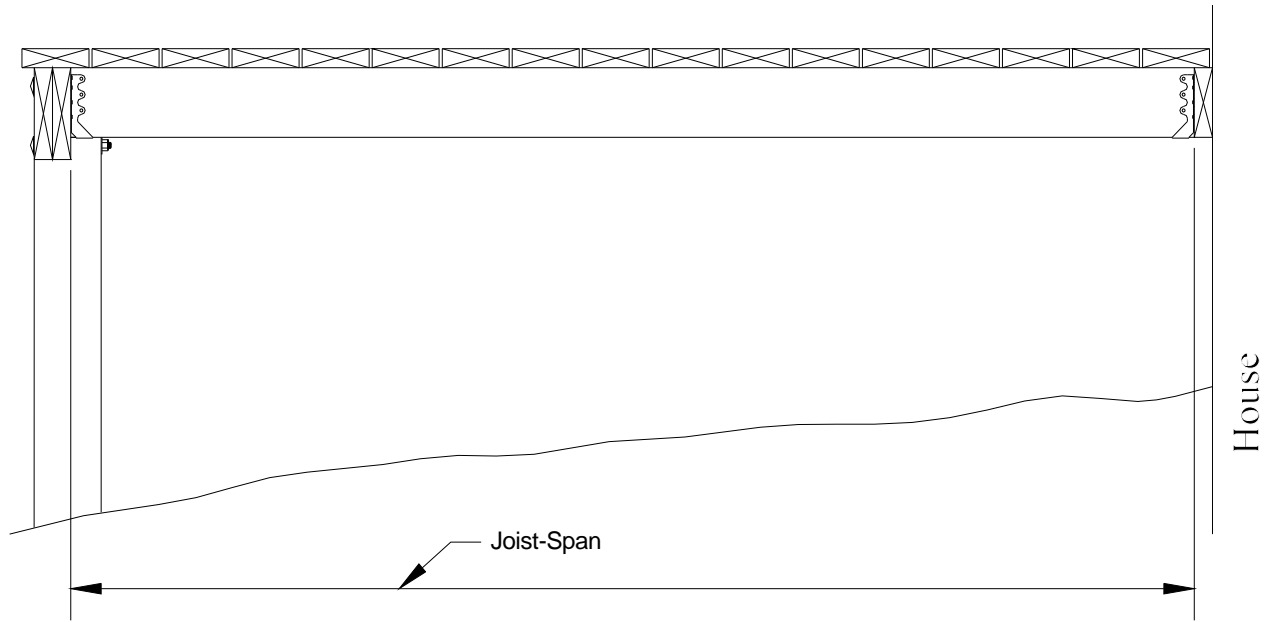
Joist Size	Joist Spacing	Joist Span
2x6	12" o.c.	10'-4"
	16" o.c.	9'-5"
	24" o.c.	7'-10"
2x8	12" o.c.	13'-8"
	16" o.c.	12'-5"
	24" o.c.	10'-2"
2x10	12" o.c.	17'-5"
	16" o.c.	15'-10"
	24" o.c.	13'-1"
2x12	12" o.c.	21'-2"
	16" o.c.	18'-10"
	24" o.c.	15'-5"

Figures 1 and 2 show typical joist-spans for decks attached to a house. Optional Overhang shall be not more than one-half the joist-span (a the overall length of the joist) and shall not exceed 36 inches.



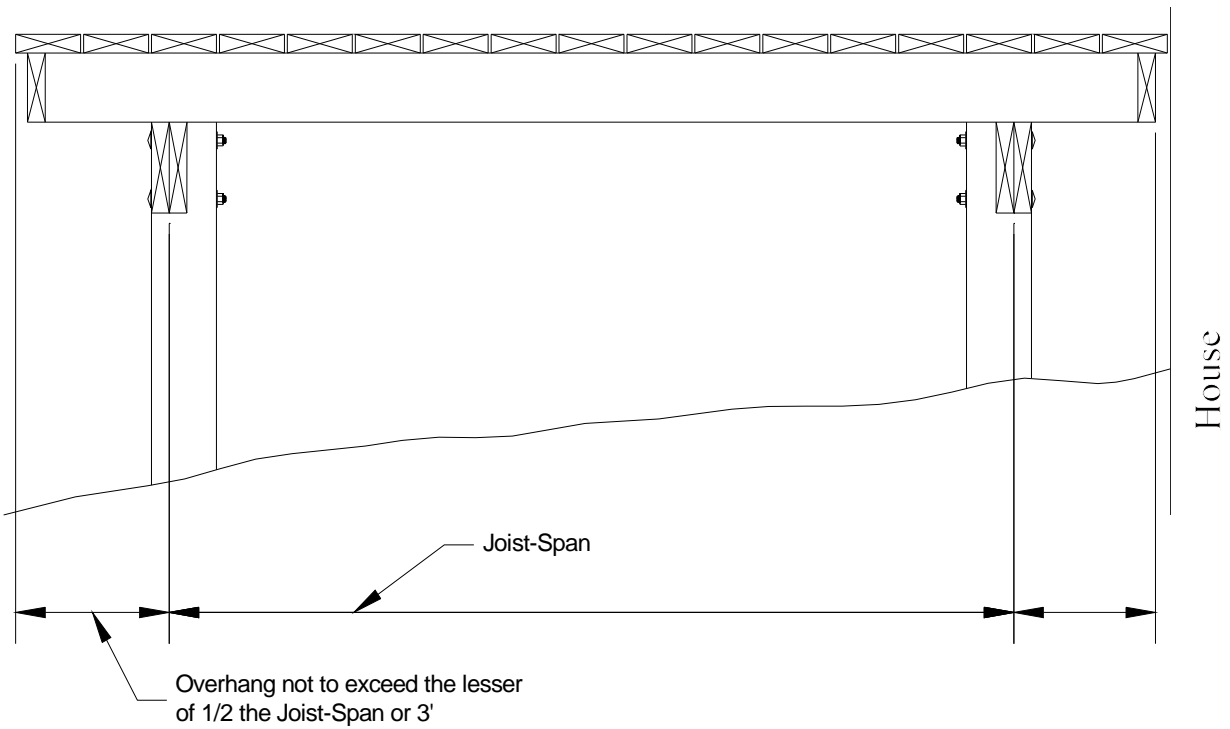
**FIGURE 1: Typical Deck with Overhang**

**JOIST REQUIREMENTS (cont.):**



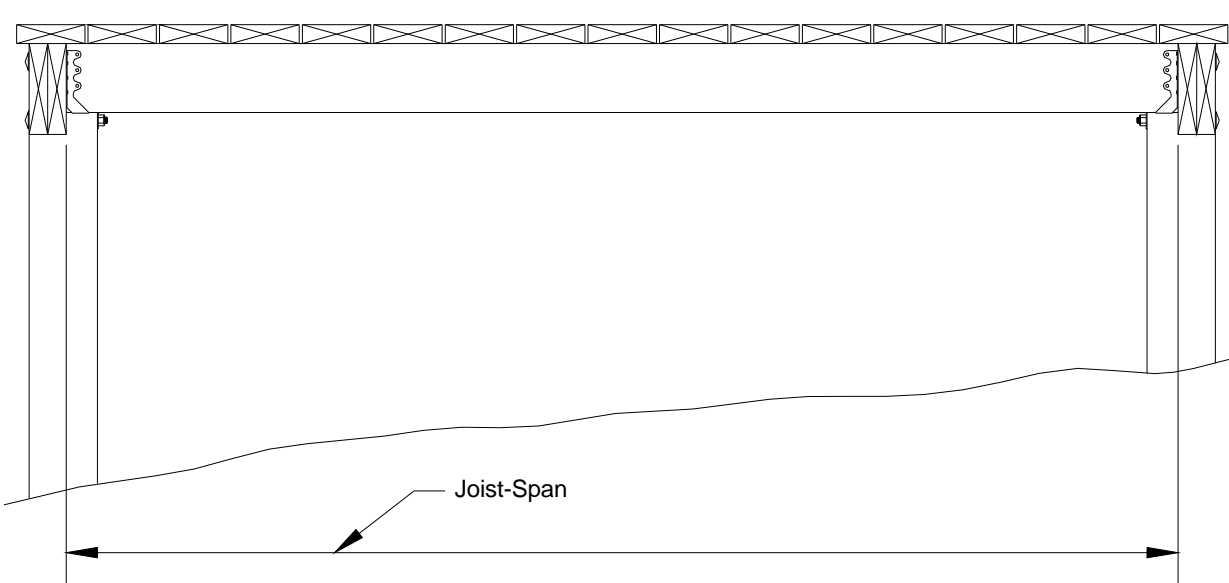
**FIGURE 2: Typical Deck without Overhang Joists**

Figures 3 and 4 show typical joist-spans for free-standing decks. Optional Overhang shall be not more than one half the joist span (a the overall length of the joist) and shall not exceed 36 inches.



**FIGURE 3: Free-standing Deck with Overhang Joists**

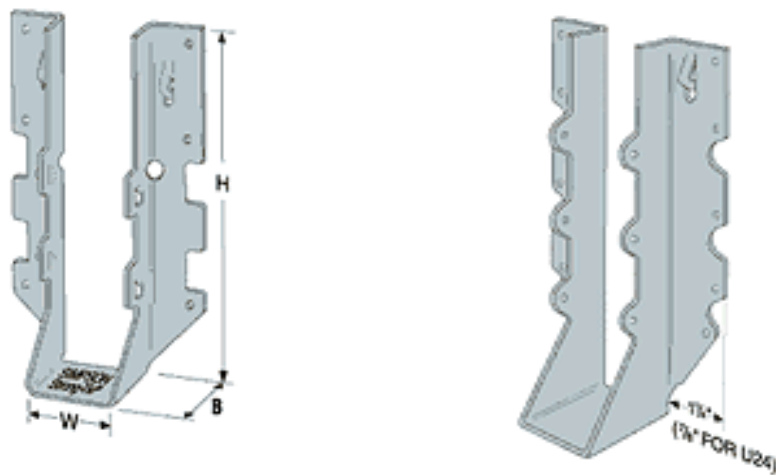
## JOIST REQUIREMENTS (cont.):



**FIGURE 4: Free-standing Deck without Overhang Joists**

## JOIST-HANGERS:

Joist-hangers shall comply with General Note 2 and have a minimum capacity of 1000 lbs. Joist hangers shall be manufactured for their intended use and lumber size. See Figure 5 for typical joist hangers. On the left is a double-shear joist-hanger, on the right is a standard joist-hanger. If a double-shear joist-hanger is used 10n hot dipped galvanized nails may be used on the flange against the beam or ledger, 10d hot dipped galvanized nails must be tow-nailed thru the joist into the beam or ledger for the flange against the joist. If a standard joist hanger is used, 10n hot dipped galvanized nails may be used in the beam or ledger and the joist.

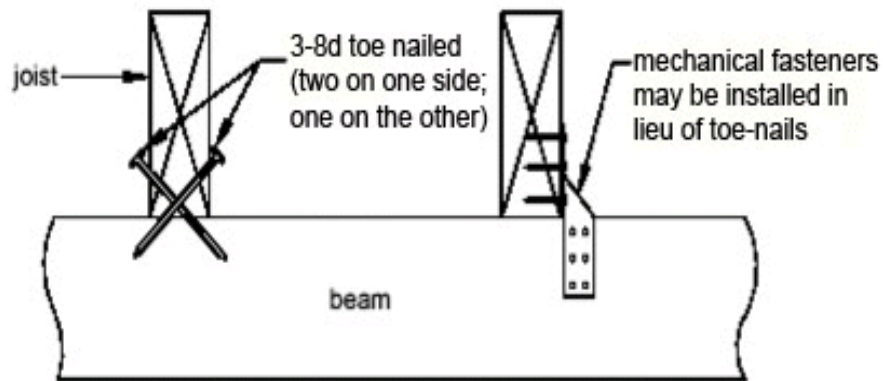


**FIGURE 5: Typical Joist-hangers**

**JOIST REQUIREMENTS (cont.):**

**JOIST-TO-BEAM CONNECTIONS:**

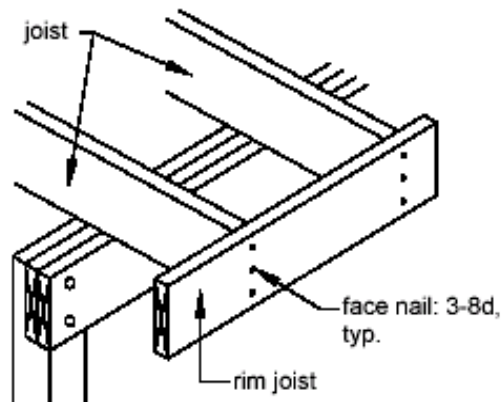
When the optional joist-overhang is used, each joist shall be fastened to the beam with three 8d nails or a mechanical connector complying with General Note 2 (see Figure 6).



**FIGURE 6: Joist to Beam Connections**

**RIM JOIST REQUIREMENTS:**

A continuous rim joist must attach to the ends of joists with three 8d nails as shown in Figure 7. If the deck is free-standing a rim joist is required at both ends of the joists. The rim joist shall be no smaller than the joist.



**FIGURE 7: Rim Joist Attachment**

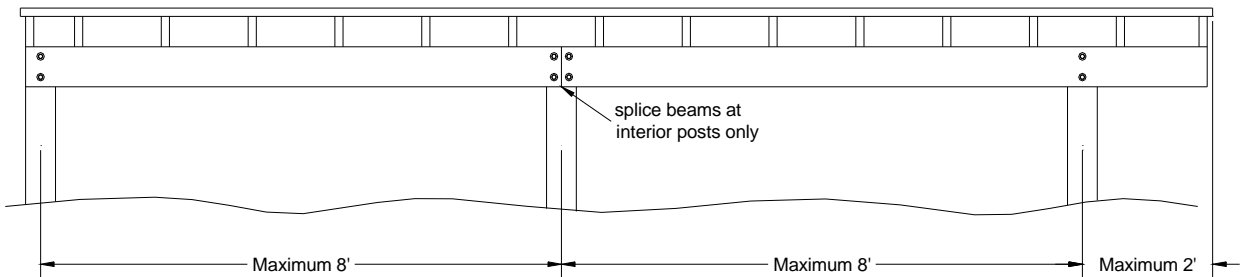
**BEAM REQUIREMENTS:**

**Beam Sizing:**

The minimum beam size is based on the joist-span and whether or not the joists overhang the beam. If the proposed deck will have the optional joist overhang, the minimum beam size shall comply with Table 3. If the proposed deck will not have the optional joist overhang, the minimum beam size shall comply with Table 4. It is acceptable to use a beam larger than the one specified in the table. See figure 8 and 9 for typical beam configurations.

**Table 3: Minimum Beam Size For Decks with OVERHANG**

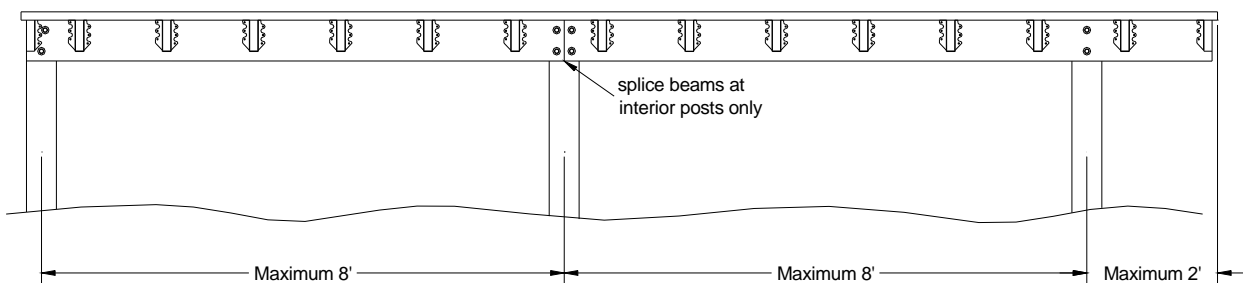
Joist Span	Beam Size
0 to 6'-0"	(2) 2x8
6'-0" to 12'-8"	(2) 2x10
12'-8" to 18'-9"	(2) 2x12



**FIGURE 8: Typical Beam Configuration for Decks with Joist-overhang**

**Table 4: Minimum Beam Size For Decks with NO OVERHANG**

Joist Span	Beam Size
0 to 6'-8"	(2) 2x6
6'-8" to 11'-2"	(2) 2x8
11'-2" to 16'-0"	(2) 2x10
16'-0" to 18'-9"	(2) 2x12

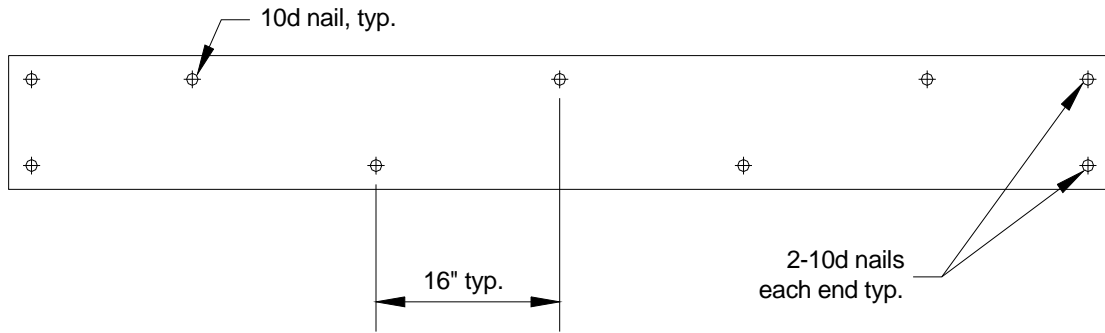


**FIGURE 9: Typical Beam Configuration for Decks without Joist-overhang**

**BEAM REQUIREMENTS (cont.):**

**Beam Assembly:**

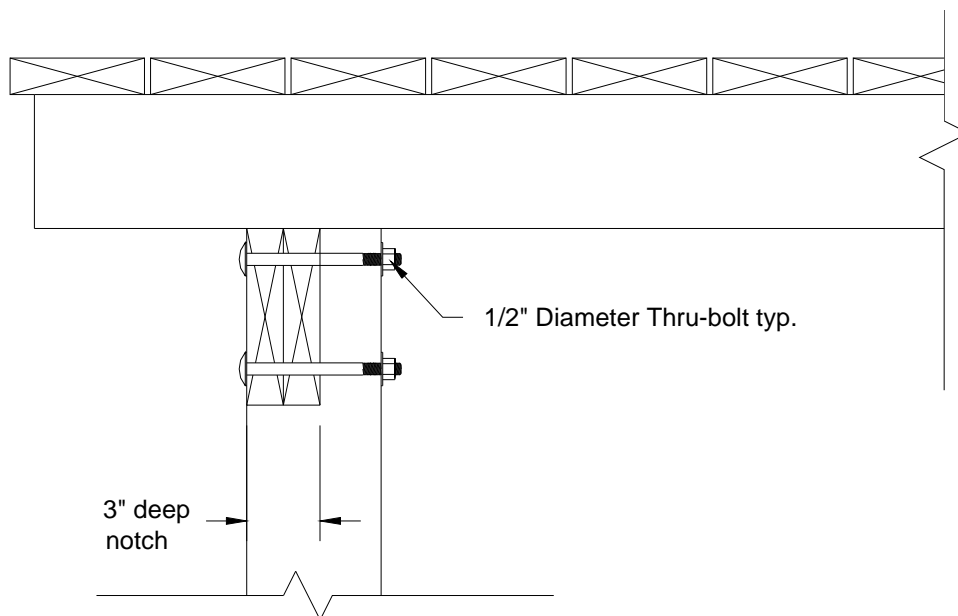
Beams shall be nailed together with two 10d nails at each end and one 10d nail every 16" staggered top and bottom in accordance with Figure 10. It is acceptable to splice a single layer of the beam over an interior post.



**FIGURE 10: Beam Assembly**

**Post-to-Beam Connections:**

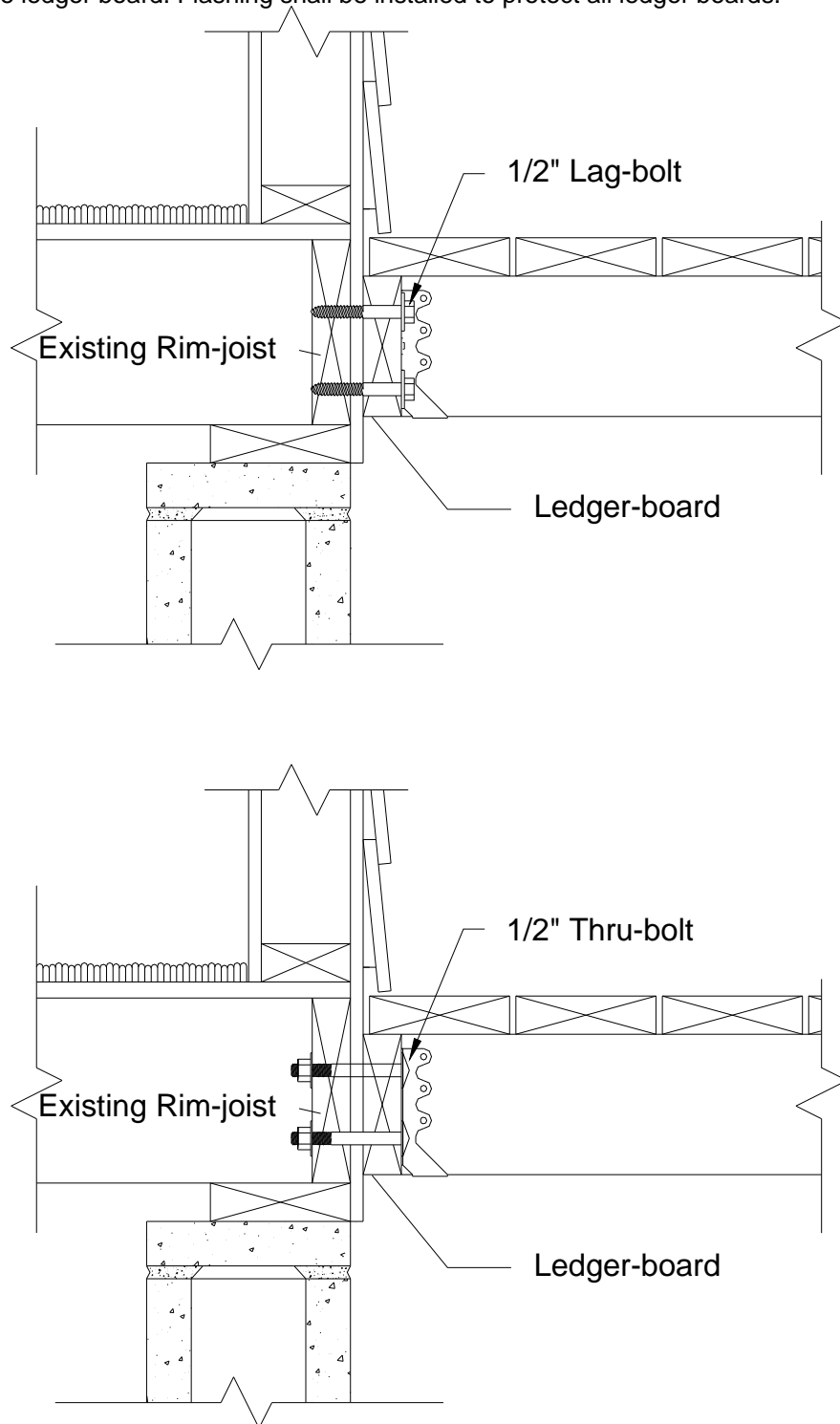
The 6x6 posts shall be notched to a depth of 3" and the full height of the beam. The beam shall be set in the notch and bolted to the posts with two 1/2" diameter thru bolts (see thru-bolts on Page 15) at each post. See Figure 11 for typical beam attachment detail.



**FIGURE 11: Typical Beam Attachment**

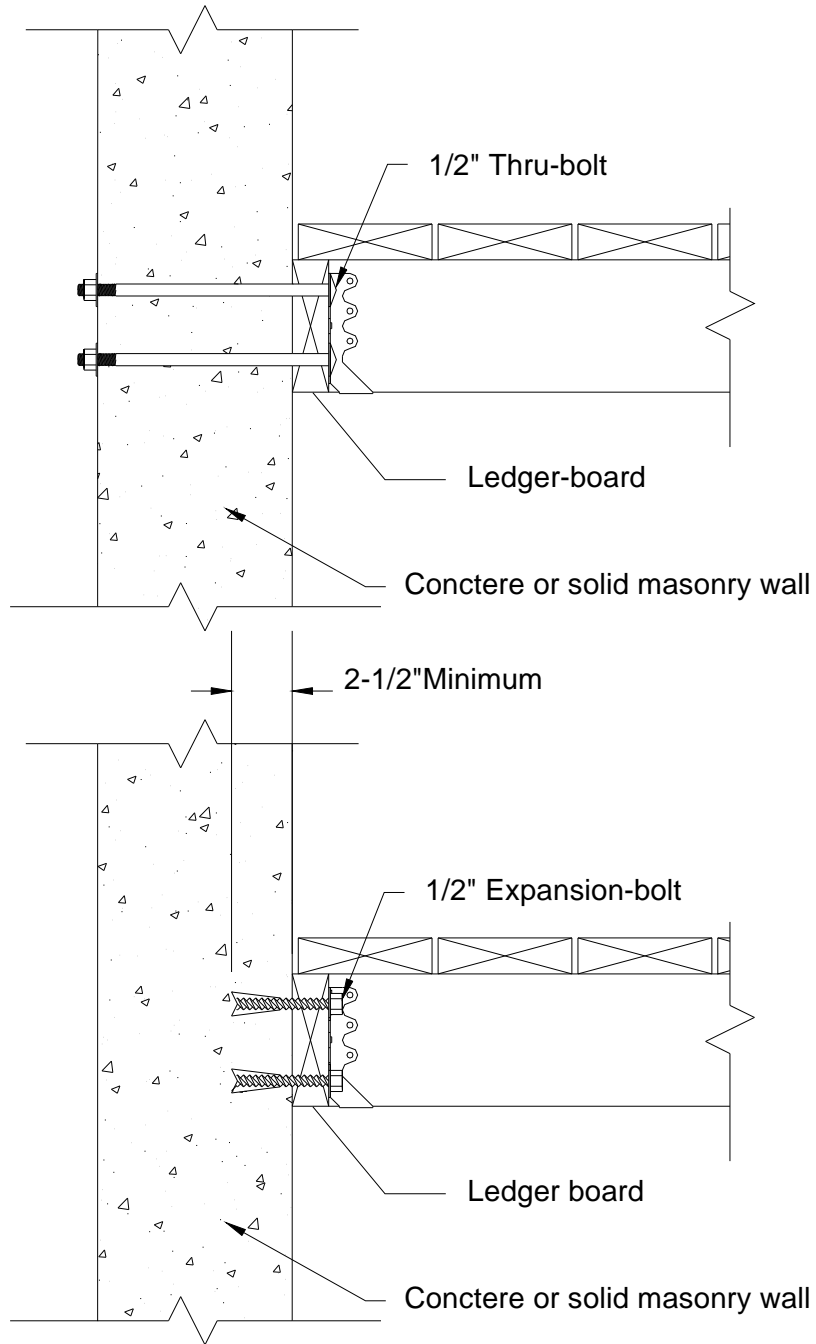
## **LEDGER REQUIREMENTS:**

Ledger board attachments shall comply with Figures 12-15 and shall be verified by the City Inspector during the framing inspection. Verification of ledger attachments may require access to the inside of the house and removal of interior finishes. If the ledger attachment cannot be verified to be capable of supporting the deck, the deck must be constructed as a free-standing deck. Siding or exterior finish must be removed prior to the installation of the ledger board. Flashing shall be installed to protect all ledger boards.



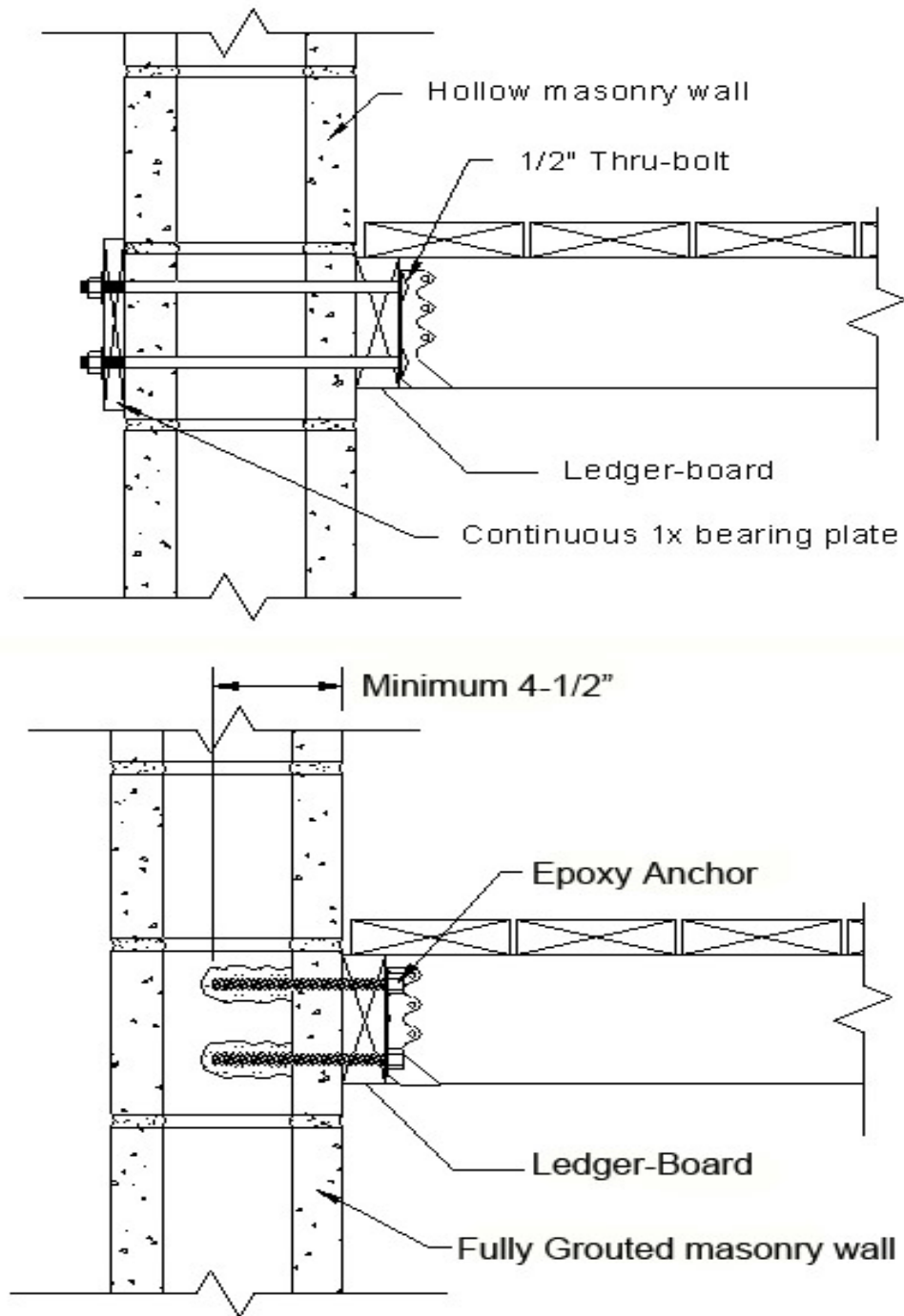
**FIGURE 12: Ledger Attachment to House Rim-joint**  
(Flashing requirements see page 16)

**LEDGER REQUIREMENTS (cont.):**



**FIGURE 13: Ledger Attachments to Concrete or Solid Masonry Walls**  
(Flashing requirements see page 16)

**LEDGER REQUIREMENTS (cont.):**

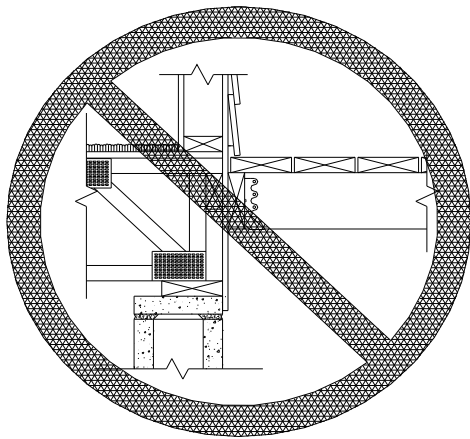


**FIGURE 14: Ledger Attachment to Masonry Wall**  
(Flashing omitted for clarity see page 16)

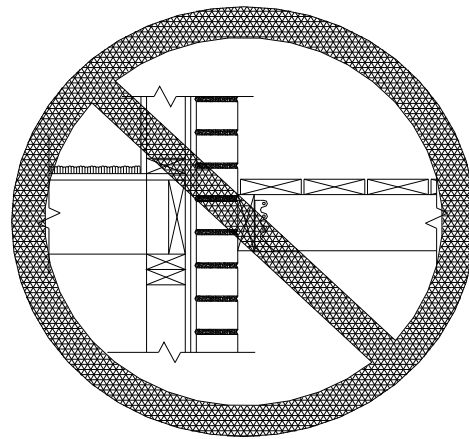
**LEDGER REQUIREMENTS (cont.):**

**Prohibited Ledger Attachments:**

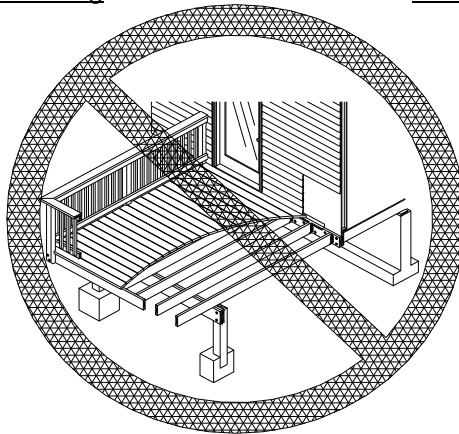
Ledger-boards shall not be attached to open-web-joists, brick veneers, bay windows or house over hangs. When these conditions exist, decks must be constructed as free standing decks.



Direct to Exterior Sheathing



Direct to Masonry Veneer



Direct to Existing Cantilevers

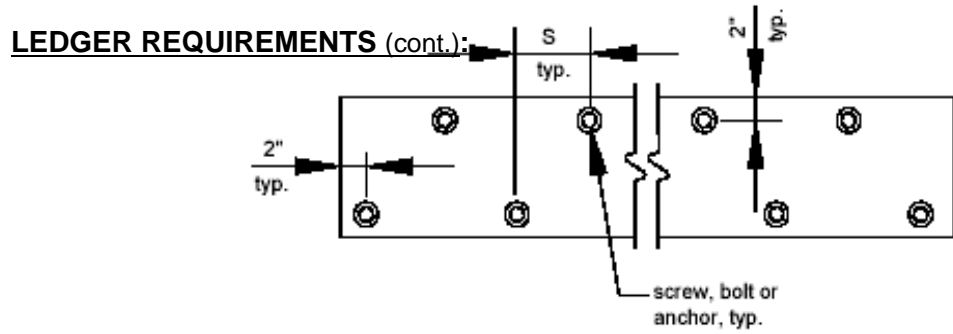
**FIGURE 15: Prohibited Ledger Attachments**

**Ledger-Board Fasteners:**

Ledger board anchors shall be spaced to comply with Table 5 and Figure 16. All fasteners shall be installed with washers complying with General Note 2 and must be thoroughly tightened. The adequacy of connections shall be verified by the City Building Inspector at the time of the framing inspection. If a ladder is required to access the ledger board, **the permit holder shall have a ladder available on site for the City Building Inspector.**

Table 5: Ledger Board Fastener Spacing

Joist Span	6' or less	6'-1" to 8'	8'-1" to 10"	10'-1" to 12'	12'-1" to 14'	14'-1" to 16'	16'-1" to 18'
<b>Bolt Type</b>	<b>on-center spacing of bolts (S) Minimum / Recommended</b>						
½"x 4" lag screws	30" / 16"	23" / 12"	18" / 10"	15" / 9"	13" / 8"	11" / 7"	10" / 6"
½" Bolt with washers	36" / 16"	36" / 12"	34" / 10"	29" / 9"	24" / 8"	21" / 7"	19" / 6"



**FIGURE 16: Ledger Board Typical Anchor Layout**

Thru-Bolts

1/2" diameter or larger, hex head or carriage bolts complying with General Note 2 are acceptable. The pilot hole shall be 1/32" to 1/16" larger than shank diameter of the bolt (17/32" to 9/16" for 1/2" diameter bolts). A washer shall be used on both the bolt head and the nut for hex head bolts and on the nut for carriage bolts.

Epoxy Anchors

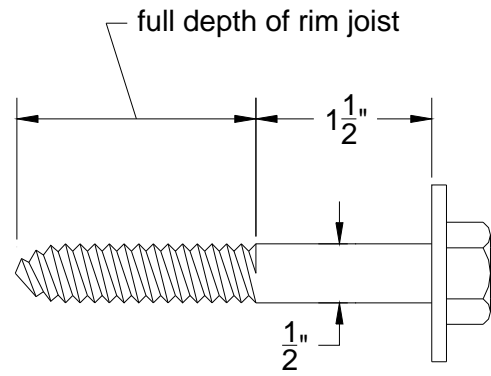
Epoxy anchors may be used when attaching a ledger board to an unfilled hollow masonry wall. The anchors shall have a minimum embedment length of 4 1/2" into the masonry wall, and shall be installed per the manufacturer's installation instructions.

**Table 6: Example Epoxy Anchors**

Manufacturer	Product
ITW Rameset/Red Head	Epcon Acrylic 7
Hilti	HY-20

Lag Screws

Lag screws are only acceptable when attaching a ledger board to nominal 2" rim joist or a 1 1/4" manufactured rim joist. Lag screws shall comply with Figure 17 and General Note 2 on Page 3 of this document.



**FIGURE 17: Lag-Bolt Detail**

When installing a lag screw, drill a 1/2" leader hole in the ledger board and a 5/16" pilot hole into the house rim joist. Thread (DO NOT HAMMER) the lag screw with washer into the lead hole, then fully tighten the lag screw and washer to the ledger board (soap or other wood-compatible lubricant may be used to facilitate tightening).

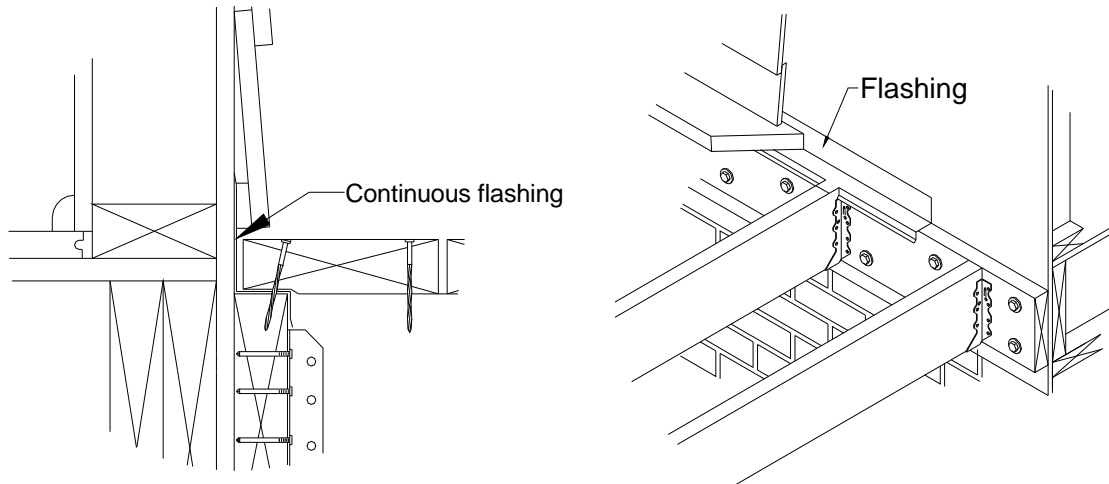
Expansion Anchors

Expansion anchors are acceptable when attaching the ledger board to a concrete or solid masonry wall. Anchors shall be at least ½" diameter and shall comply with General Note 2 on Page 3.

## **LEDGER REQUIREMENTS (cont.):**

### **FLASHING:**

Flashing shall be installed on **all** ledger boards and rim joists anchored to wood framed construction. The flashing shall be UV resistant vinyl or vinyl coated aluminum (uncoated aluminum or copper are subject to corrosion from the pressure treated lumber or fasteners and are not acceptable). See Figure 18 for details for flashing installation.



**FIGURE 18: Flashing Details**

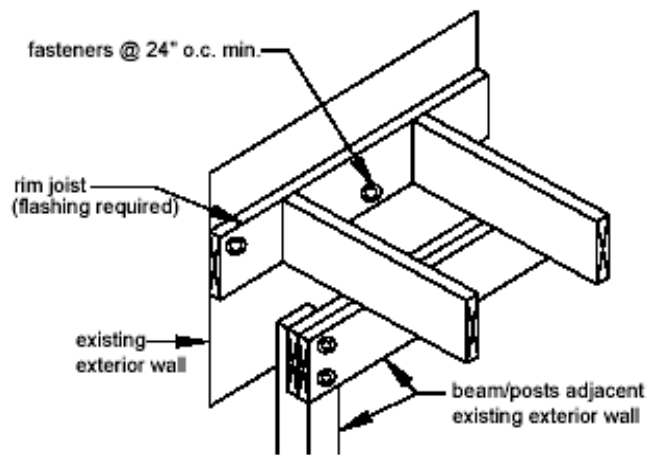
## **FREE STANDING DECKS:**

A free-standing deck is a deck with a beam and posts close to the house rather than a ledger board attached directly to the existing house to support the vertical loads on the deck. When the ability of the existing house in order to safely carry the additional deck load cannot be verified, the deck must be constructed as free-standing deck.

### **Lateral Support:**

Free-standing decks that are more than 2 feet above grade shall be braced to resist lateral loading.

If the existing house has exterior sheathing consisting of 3/8" structural wood panels or better, lateral support may be provided by attaching the deck rim joist to the existing house. The fasteners shall be 1/2" lag screws or bolts with washers, complying with General Note 2 on Page 3, staggered top and bottom as set out in table 5 and see figure 19.

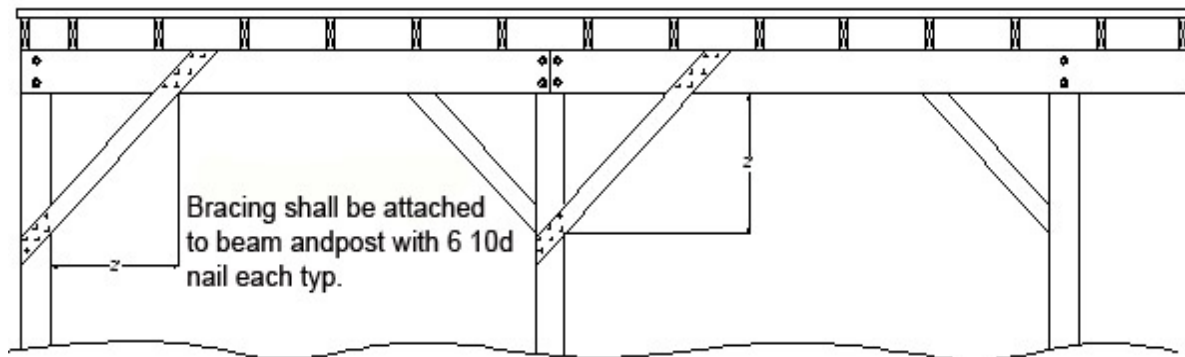


**Figure 19: Attachment to House for Lateral Support**

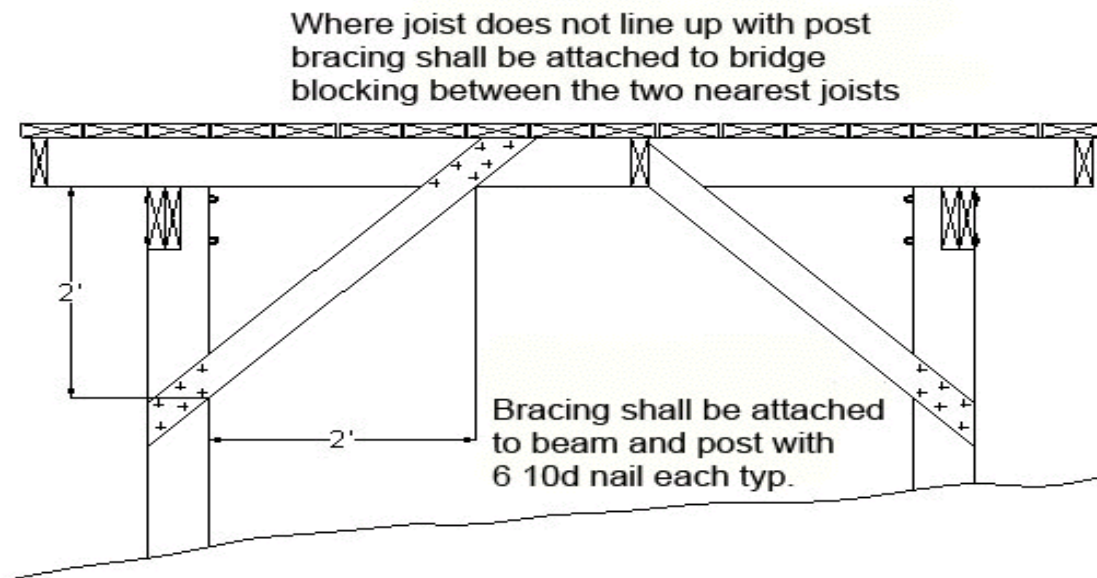
**FREE STANDING DECKS (cont.):**

**Diagonal Bracing:**

Diagonal bracing shall be bolted to the beam and post as shown. Diagonal bracing shall also be bolted to the post and joist above the post location (see figures 20 and 21).



**FIGURE 20: Diagonal Bracing at Beam**



**FIGURE 21: Diagonal Bracing at Joist**

## POSTS:

All posts shall be minimum 6x6 pressure treated in accordance with General Note 1. The maximum height shall be 14'-0" above grade.

## FOOTINGS:

Footings shall be a minimum of 24" below grade, 8" thick and shall be 16" by 16" square or 18" round. Footing shall bear on solid undisturbed soil (see General Note 6 on page 3 for problem soils). The size and depth of the footing hole, and suitability of the soil must be verified by the City Inspector before placement of concrete. The posts must be anchored to the footings with a pre-manufactured 6x6 post anchor designed for use in its location and complying with General Note 2 on Page 3, or the bottom 8" of the post must be encased in concrete (see Figure 22). **Do not place footings over utility lines or enclosed meters. Call Miss Utility at 1-800-552-7001 before you dig.**

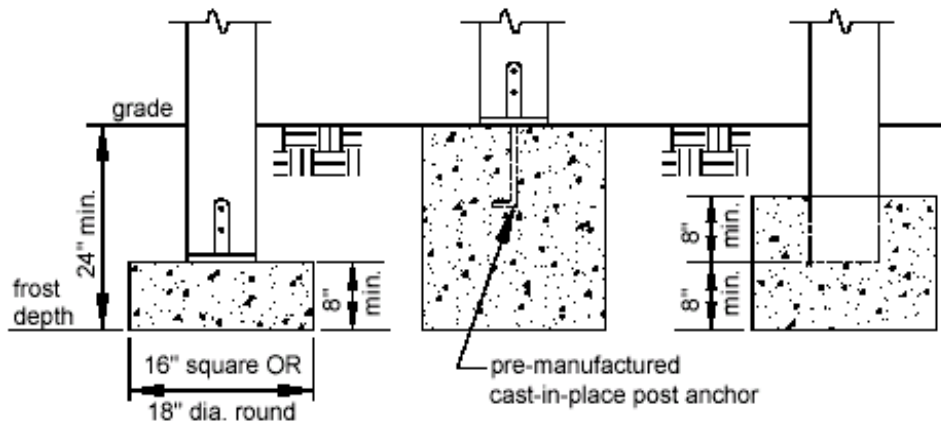


FIGURE 22: Footing Details

## HANDRAIL REQUIREMENTS:

All stairs with 4 or more risers must have a graspable handrail located 34 to 38 inches above the nosing of the treads (see Figure 23). The hand rail shall have a cross section no smaller than 1 1/4" and no larger than 2". The handrail shall be returned to the post both ends.

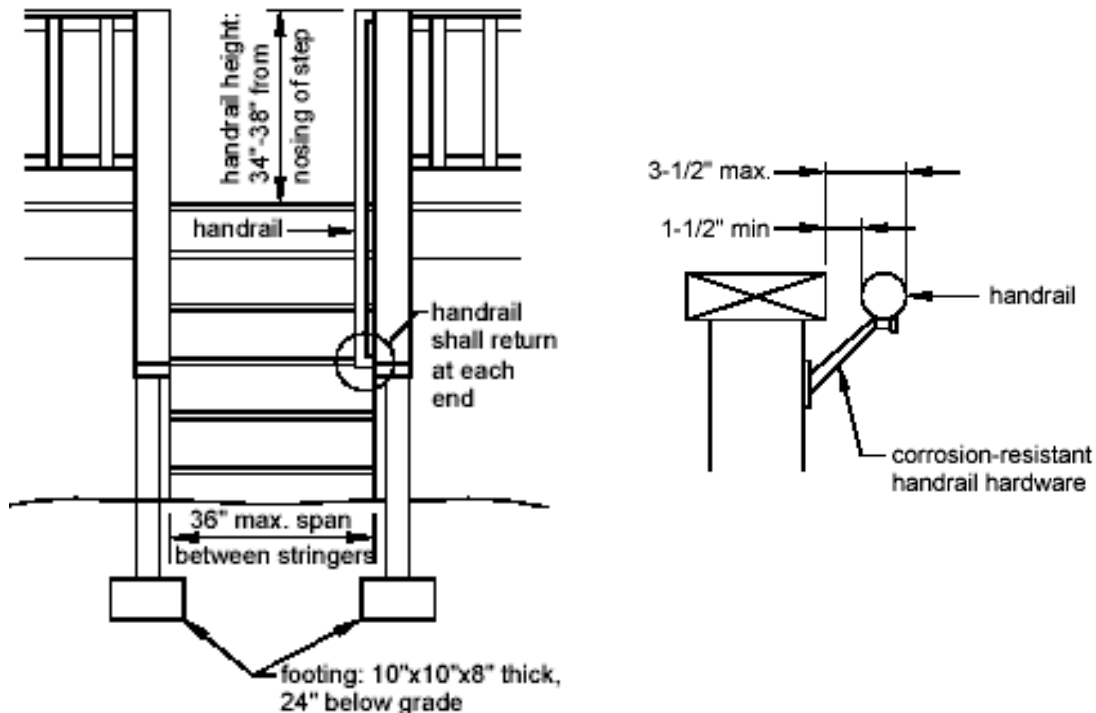


FIGURE 23: Handrail Details

**GUARDRAIL REQUIREMENTS:**

All decks 30" or more above grade require a guardrail complying with Figure 24. If a guardrail is installed on a deck less than 30" above grade, it must also comply with Figure 24. Any deviations from Figure 24 will require plans to be submitted to Code Enforcement for review (see Appendix A). If a plastic or manufactured rail is to be used see General Note 7 on Page 3.

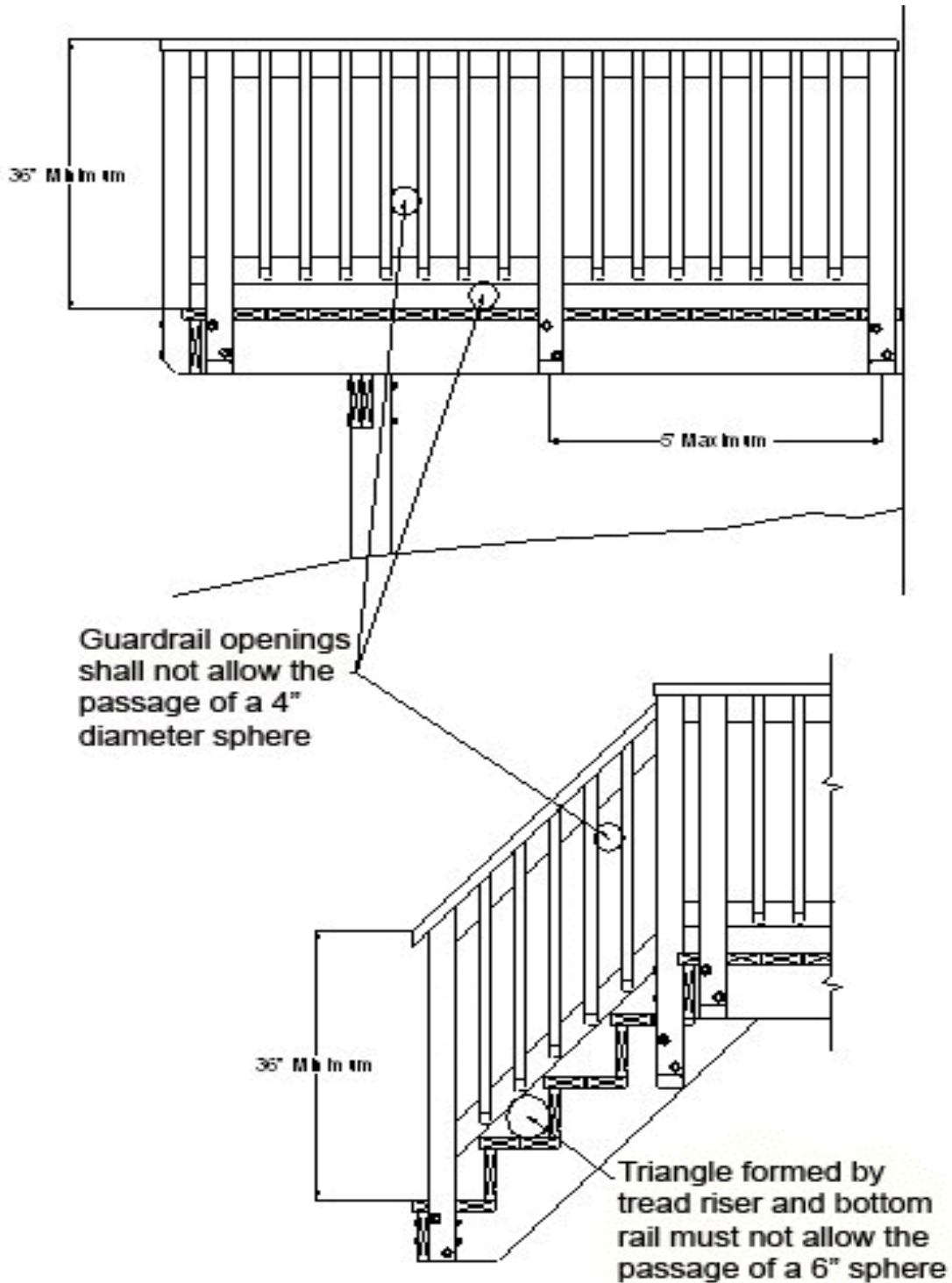


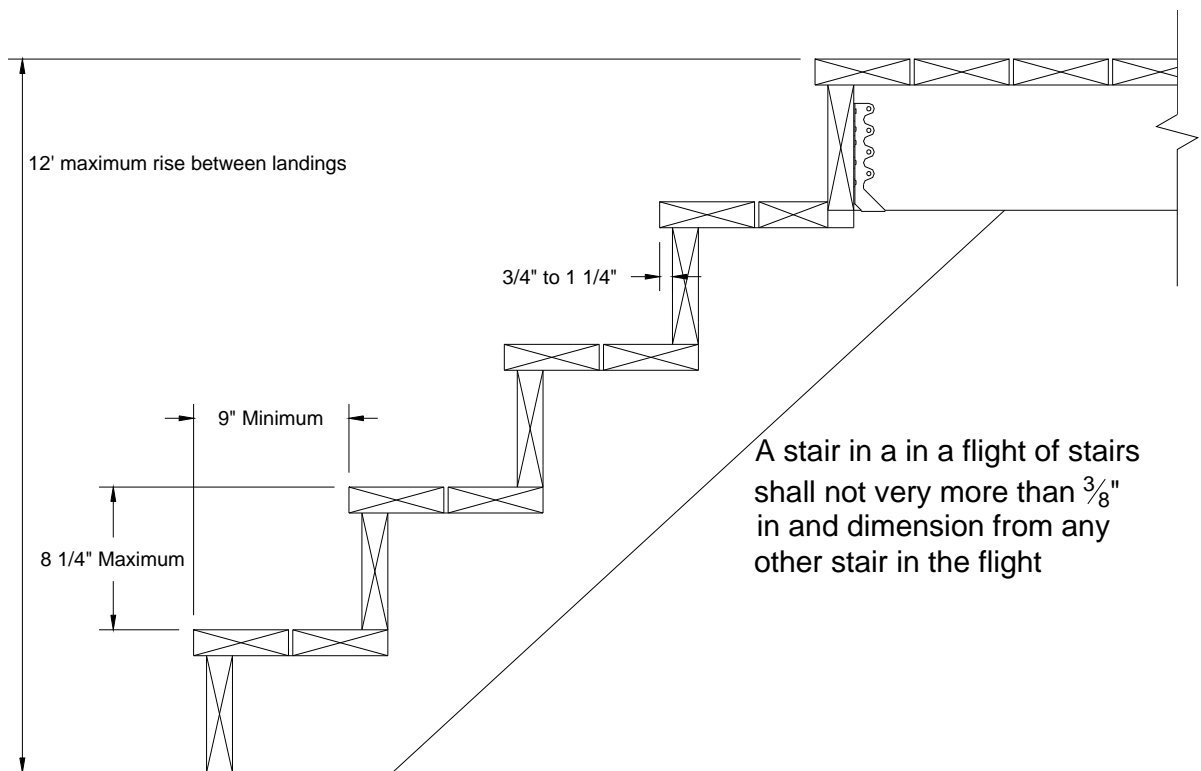
FIGURE 24: Guardrail Dimensions

**STAIR REQUIREMENTS:**

Stairs, stair stringers, and stair guardrail shall meet the requirements of the current USBC, as shown in Figures 25. The maximum riser height is 8¼" the minimum tread depth is 9". Stairs treads, risers and nosing shall not vary more than 3/8" . **All stringers** shall be 2x12s. The stringer span shall comply with Table 7 and Figure 25. All Windows within 60" of the stairway landings shall be safety glazed (i.e. if a deck is built on a house and the stairs for the deck are within 60 inches of a new or existing window the window must have tempered glass per R308.4).

**Table 7: Maximum Stringer Spans**

	Cut Stringer	solid stringer
2 stringers	8'-0"	16'-6"
3 stringers	11'-3"	N/A



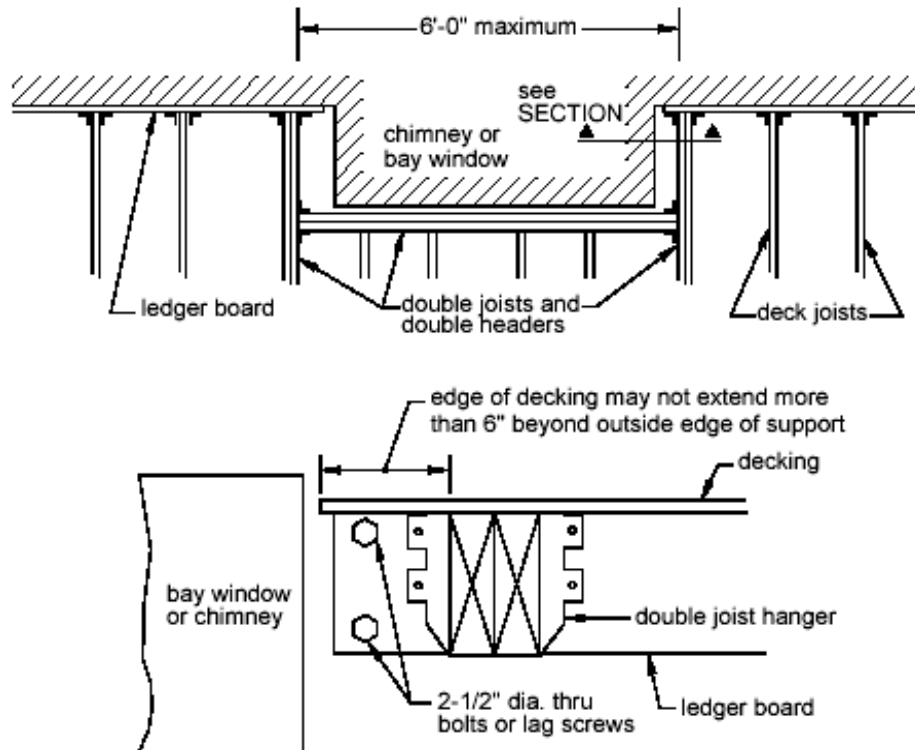
**FIGURE 25: Stair Dimensions**

**STAIR ILLUMINATION:**

A light shall be placed at the top stairway landing to illuminate all treads and landings. The light shall be controlled by a switch located inside the house.

## FRAMING AT A CHIMNEY OR BAY WINDOW:

**Decks** shall not be attached to or supported by a chimney or bay window, and combustible decking materials shall not be within 2" of a **chimney**. Framing around chimneys and bay windows may be accomplished by doubling the joist within 6" of the chimney or bay window on either side and placing a header between the doubled joists. The header shall be made of 2 pieces the joist material and shall not exceed 6 feet. If a header longer than 6 feet is required plans must be submitted to code enforcement for review (see Figure 26).



**FIGURE 26: Framing Around a Chimney or Bay Window**

## **APPENDIX A: Requirements for decks not complying with the City of Alexandria Typical Deck Details**

When a proposed deck does not fully comply with the City of Alexandria Typical Deck Details (TDD), then 5 copies of fully dimensioned plans clearly showing all details must be submitted to Code Enforcement for review. The plans must be in ink, on paper, no smaller than 8½" by 11", and no larger than 24" by 36". The preferred scale is ¼" = 1'-0".

Along with your plans you must include 5 copies of the house location plat plan or approved subdivision site plan for the house with the proposed deck sketched, to scale, on the plat or site plan.

The plans shall indicate the:

1. Size shape and location of the deck on the property,
2. Size and location of all footings,
3. Size and type of all lumber used for:
  - a. Posts
  - b. Railings
  - c. Joists
  - d. Decking
  - e. Ledger
  - f. And any other structural, safety, or decorative elements of the deck.
4. Type of fasteners and connectors used for:
  - a. Ledger
  - b. Railings
  - c. Posts
  - d. Decking
  - e. Joist
  - f. And any other structural, safety, or decorative elements of the deck.
5. Height of the finished floor above grade.
6. Distances from property lines.
7. The construction of any building used to support the deck or within 24 inches of the deck.
8. The location of all structures in relation to the deck.
9. The location of any windows, doors, exhaust outlets, stairs, areaways, utilities, or other similar items within 10 feet of the deck.
10. The location of all stair or ramps serving the deck.
11. Handrail and guard rail construction.
12. Stair construction including:
  - a. Material used for stringers
  - b. Riser height and tread depth of stairs
  - c. Width of stairs
  - d. Number of risers
13. If the deck is located in problem soils (marine clay) or on a steep grade, then the deck may need to be designed by a registered design professional licenced in the Commonwealth of Virginia.

## **APPENDIX B: CONTACT INFORMATION**

City of Alexandria Code Enforcement Bureau  
301 King Street, Room 4200  
Alexandria, Virginia 22314  
703-838-4360

24 hour automated inspections request ACCESS line.  
City of Alexandria Automated Computerized Code Enforcement Scheduling System (ACCESS) [for inspectors]  
703-838-4900

City of Alexandria Dept. of Transportation and Environmental Services (T&ES)  
301 King Street, Room 4130  
Alexandria, Virginia 22314  
703-838-4328

City of Alexandria Dept. of Planing and Zoning  
301 King Street, Room 2100  
Alexandria, Virginia 22314  
703-838-4666

City of Alexandria Board of Architectural Review (BAR)  
301 King Street, Room 2100  
Alexandria, Virginia 22314  
703-838-4666

"Miss Utility"  
1-800-552-7001

Land Records Office  
City of Alexandria Court House  
520 King Street - Suite 307  
Alexandria Virginia 22314  
703-838-4066