



COURSE 18180

Deck Code Changes Pt 2

Review Material

Uscontractorlicense LLC

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Summary Of This Course

Deck Code Changes Part 2

Approved by the

Wisconsin Department of Safety and Professional Services Safety and Buildings Division

Course Identification Number 18180

Educational Credit Hours: 6 Hours

Course Provider:

USCONTRACTORLICENSE LLC

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This course is Part 2 of the Deck Code changes and is designed to familiarize Contractors and Inspectors with the amendments to the deck codes required for building and remodeling decks, according to the Uniform Dwelling Code. Topics covered in this course include General Requirements, Footings and Post Connections, Posts and Post-to-Beam Connections, Beams, Joists, and Joist-to-Beam Connections.

This Course is approved for the following Registrations/Certifications or Licenses:

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

Course Outline

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

Chapters SPS 325 APPENDIX B

Joist Hangers

Ledger Attachments

Ledger-Board Fasteners

Free Standing Decks

Lateral Support

Decking

Guard and Posts

Stairs

Framing Plan

Appendix C and

Attachment of Residential Deck Ledger to Metal Plate Connected Wood Truss Floor System

Exam

180 questions related to the reference materials are used to test the attendee on their comprehension of the materials. A 70% score will need to be attained in order to pass this course.

Answer Sheet(s)

2 bubble style answer sheet(s) are included. When you are finished with the exam, you may return the answer sheets for grading to:

By Mail: Uscontractorlicense LLC

PO Box 268

Platteville, Wisconsin 53818

By Email: michael@uscontractorlicense.com

By Fax: 608-571-0096

Once we get the answer sheets back, we will grade them, enter your hours into the attendance portal and email or mail you back your certificate of completion(s). You will be responsible for renewing your license with the DSPS at www.license.wi.gov website.

Any questions, please contact us at 608.348.6688

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Chapters SPS 320 to 325 APPENDIX B

Deck Code Changes Part 2

Section

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- 15 FRAMING PLAN**

APPENDIX C

SECTION 7: JOIST HANGERS

Joist hangers must comply with all of the following:

1. The joist-hanger depth (d, as shown in Figure 9) must be at least 60 percent of the joist depth.
2. The manufactured width of the joist hanger must accommodate the number of plies being carried.
3. Do not bend hanger flanges to accommodate field conditions.
4. For joist hangers that are fastened to a ledger board, screws which are recommended by the manufacturer must be used. All other fasteners are permitted to be nails. The number of fasteners and the manner in which they are used must be as specified by the manufacturer.

5. Use joist hangers with inside flanges if clearances to the edge of the beam or ledger board dictate.
6. Clip-angles or brackets used to support framing members in lieu of joist hangers are prohibited.
7. Joists must not frame in from both sides of the same beam. Engineering analysis is needed if more beams are needed than are shown in Figures 5 to 7.
8. Each joist hanger must have the minimum capacity listed in Table 5.

Figure 9
JOIST HANGERS

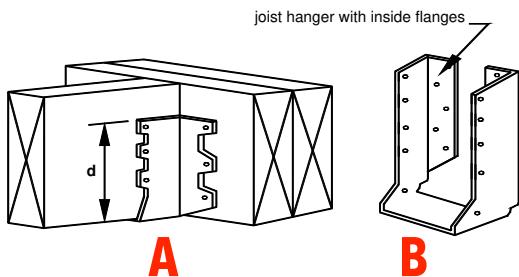


Table 5
JOIST HANGER DOWNLOAD

Joist Size	Minimum Capacity, lbs
2"x6"	500
2"x8"	500
2"x10"	600
2"x12"	700

SECTION 8: LEDGER ATTACHMENTS

General requirements. Ledger boards must be attached to the existing house in accordance with all of the following and section 9. Compliance is critical to ensure the safety and structural stability of your deck.

1. The ledger-board depth must be greater than or equal to the depth of the deck joists, but not less than a 2"x8".
2. The ledger board must be attached in accordance with one of the conditions shown in Figures 11 through 13 – except if metal-plate-connected wood floor trusses were used in the house, see the text below for manufactured wood trusses.
3. The existing band board on the house must be capable of supporting the deck. If this cannot be verified or if existing conditions differ from the details here, then a free-standing deck or an engineered design is required.
4. The top of the ledger board and the top of the deck joists must be at the same elevation.

Figure 10: WOOD I-JOISTS

Wood I-joists. Many homes are constructed with wood I-joists, as shown in Figure 10. Rather than utilize a 2x band board, these systems are often constructed with a minimum 1-inch-thick engineered wood product (EWP) band board capable of supporting a deck. If a minimum 1-inch EWP or 2x band board is not present, then a free-standing deck is required, as addressed in section 10.



Manufactured wood trusses. A metal-plate-connected wood truss (MPCWT) is an engineered, prefabricated structural component that is designed for each specific application. MPCWT systems that are used in residential floors are often installed with a 2"x4" lumber "ribbon" board at the ends of the trusses to tie the ends of the trusses together (see Detail 1 in Appendix C.). The ribbon board, by itself, is not intended to support the deck ledger and deck. Installing a residential deck where the floor for the house uses a MPCWT system must be in accordance with a standard detail provided by the truss designer, a corresponding detail in section 7 of Appendix C, or a full plan submission – unless the deck is free-standing as addressed in section 10.

Siding and flashing. Flashing must be installed in accordance with all of the following:

1. The exterior finish, such as house siding, must be removed in the area for the ledger board prior to the installation of the ledger board.
2. Continuous flashing with a drip edge, as shown in Figure 11, is required at a ledger board that is attached to wood-framed construction. Caulking is needed with the flashing at a threshold to prevent water intrusion due to splash from the deck or due to melting snow and ice.
3. Flashing must be a corrosion-resistant metal having a minimum nominal 0.019-inch thickness – such as galvanized steel coated with 1.85 ounces of zinc per square foot (G-185 coating), copper (attached using copper nails only), or stainless steel – or must be a UV-resistant plastic recommended by its manufacturer for this use. Do

not use aluminum in direct contact with lumber treated with preservatives that contain copper, such as ACQ, copper azole, or ACZA.

Figure 11
ATTACHMENT OF LEDGER BOARD TO BAND BOARD OR BAND JOIST

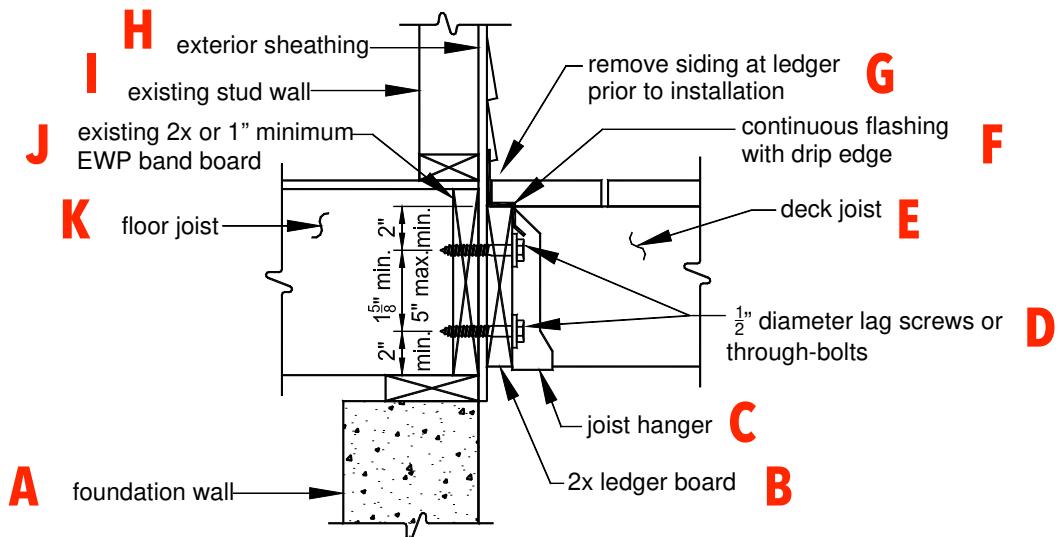


Figure 12
ATTACHMENT OF LEDGER BOARD TO SOLID FOUNDATION

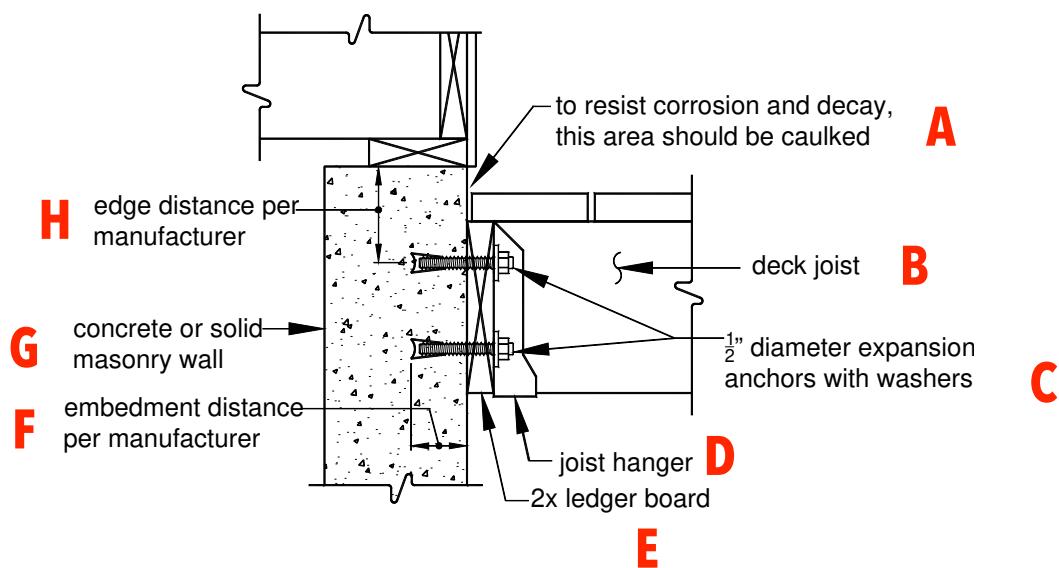
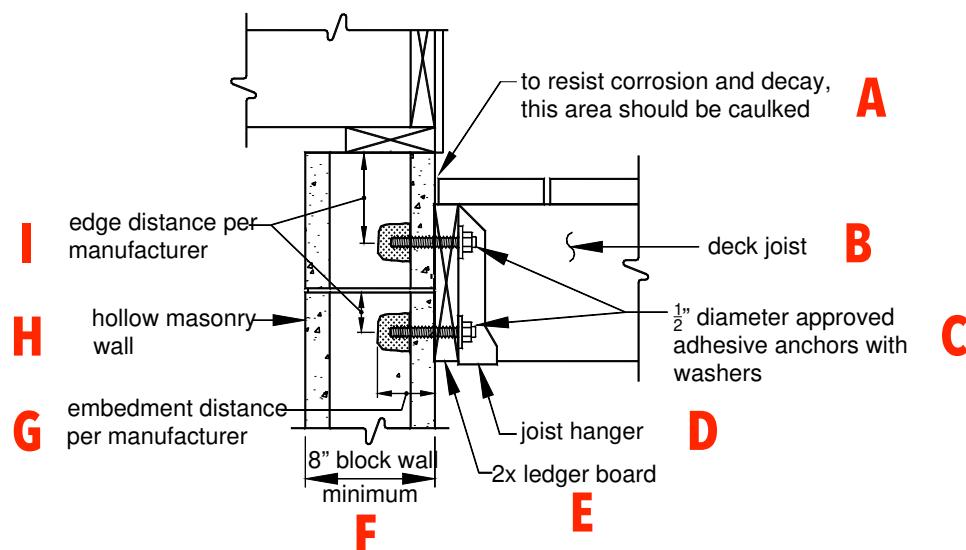
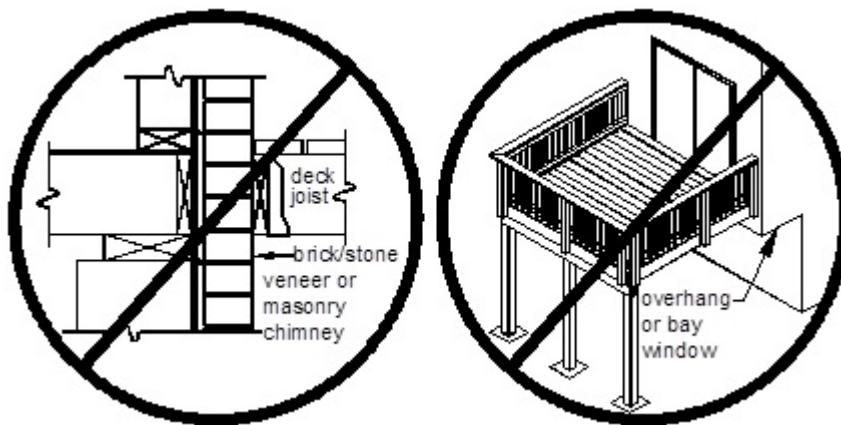


Figure 13
ATTACHMENT OF LEDGER BOARD TO HOLLOW FOUNDATION



Prohibited ledger attachments. Attaching a ledger board to or through an exterior veneer such as brick or stone, or to or through a masonry chimney, or to a house overhang – as shown below – are prohibited. In such cases, the deck must be free-standing, as addressed in section 10. Attaching a ledger board to a house overhang is allowed if supported by engineering.

Figure 14
PROHIBITED LEDGER ATTACHMENTS



SECTION 9: LEDGER-BOARD FASTENERS

General requirements. Ledger board fasteners must be installed in accordance with this section. Placement and spacing must be in accordance with Figure 15 and Table 6. Only the fastener types listed here are approved for use; lead anchors are prohibited. Adequacy of connections may be verified by local inspectors.

Figure 15
LEDGER BOARD FASTENER SPACING AND CLEARANCES

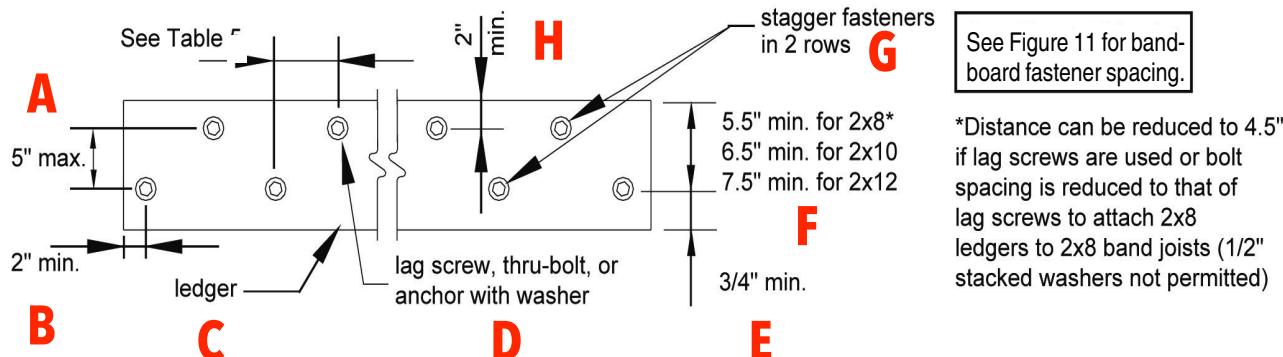


Table 6
LEDGER BOARD FASTENER SPACING, ON CENTER^{1,2,3}

Fastener	Band Board	Joist Span: less than or equal to						
		6'	8'	10'	12'	14'	16'	18'
Lag screws	1" EWP	24"	18"	14"	12"	10"	9"	8"
	1 1/8" EWP	28"	21"	16"	14"	12"	10"	9"
	2x Lumber	30"	23"	18"	15"	13"	11"	10"
Through-Bolts	1" EWP	24"	18"	14"	12"	10"	9"	8"
	1 1/8" EWP	28"	21"	16"	14"	12"	10"	9"
	2x Lumber	36"	36"	34"	29"	24"	21"	19"
Through-Bolts with 1/2" stacked washers ^{4,5}	2x Lumber	36"	36"	29"	24"	21"	18"	16"
Adhesive anchors	—	32"	32"	32"	24"	24"	16"	16"

¹These values are valid for deck ledgers consisting of douglas fir/larch, hem/fir, or southern pine; and for band boards consisting of douglas fir-larch, hem-fir, spruce-pine-fir, southern pine, or engineered wood product (EWP).

²Where solid-sawn pressure-preservative-treated deck ledgers are attached to engineered wood products (minimum 1" thick wood structural panel band joist or structural composite lumber including laminated veneer lumber), the ledger attachment must be designed in accordance with accepted engineering practice. These tabulated values are in accordance with that practice and are based on 300 lbs and 350 lbs for 1" and 1 1/8" EWP rim board, respectively.

³ The thickness of the sheathing over the band board must not exceed 15/32".

⁴ The maximum gap between the face of the ledger board and face of the wall sheathing is 1/2".

⁵ Wood structural panel sheathing, gypsum board sheathing, or foam sheathing is permitted between the ledger board and the band board. Stacked washers are permitted in combination with wood structural panel sheathing, but are not permitted in combination with gypsum board or foam sheathing. The maximum distance between the face of the ledger board and the face of the band board is 1".

Through-bolts. Through-bolts must have a diameter of 1/2 inch. Pilot holes for through-bolts must be 17/32 to 9/16 inches in diameter. Through-bolts must be equipped with washers at the bolt head and nut. Bolts should be tightened 6 to 12 months after construction due to drying and wood shrinkage.

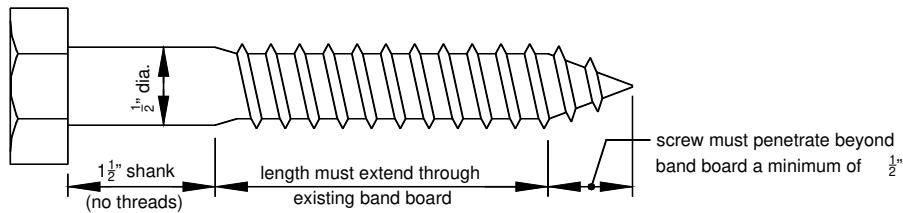
Expansion anchors. Expansion or adhesive anchors must be used for attaching a ledger board to a concrete or solid masonry wall, as shown in Figure 12. The bolt or threaded rod of expansion anchors must have a diameter of 1/2 inch, which in some cases may result in needing a 5/8 inch-diameter anchor. Expansion anchors must be installed in accordance with the manufacturer's instructions and must be equipped with washers.

Adhesive anchors. Approved adhesive anchors with a 1/2 inch-diameter threaded rod must be used for attaching a ledger board to hollow masonry, as shown in Figure 13. Examples of approved adhesive anchors include the Epcon Acrylic 7 by ITW Ramset/Red Head, and the HY-20 by Hilti. Adhesive anchors are also permitted with concrete or solid masonry installations. Adhesive anchors must be installed in accordance with the manufacturer's instructions and must be equipped with washers. Adhesive cartridges should remain on the jobsite for inspector verification.

Lag screws. The diameter, length, and shank of lag screws must comply with Figure 16. Lag screws must be equipped with washers and be installed in the following sequence:

1. Drill a 1/2 inch-diameter hole in the ledger board and a 5/16 inch-diameter pilot hole into the solid-connection material of the existing house.
2. Insert the lag screw through the ledger board and into the pilot hole by turning. Do not drive with a hammer. Use soap or a wood-compatible lubricant if needed to facilitate tightening.
3. Tighten each lag screw snugly, but do not over-tighten so as to cause wood damage.

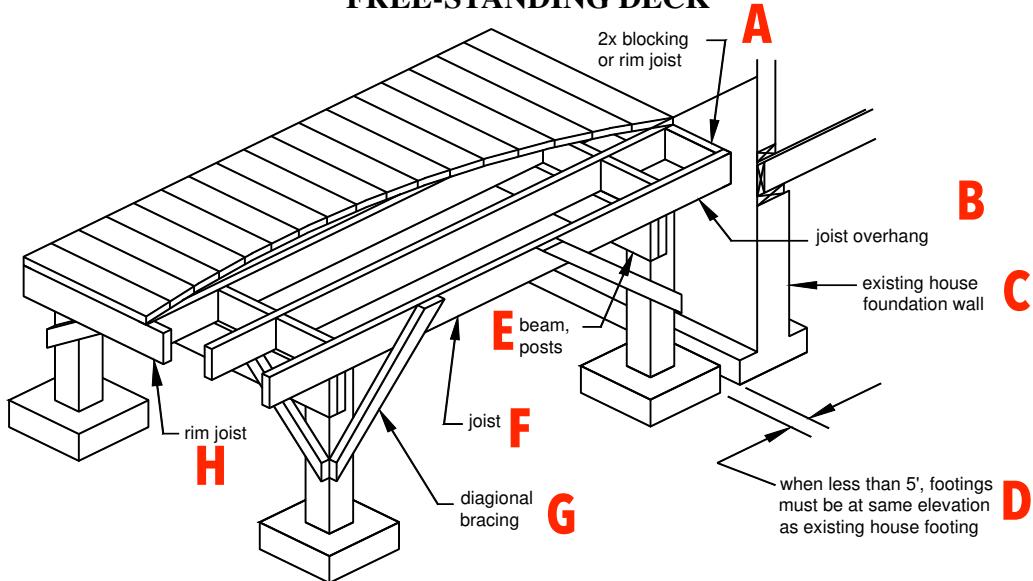
Figure 16
LAG SCREW



SECTION 10: FREE-STANDING

A deck that is free-standing does not utilize the exterior wall of the existing house to support vertical loads. Instead, an additional beam is provided at or offset from the existing house wall, as shown in Figure 17. If the edge of a deck footing is closer than 5 feet to an existing exterior house wall, the footing must bear at the same elevation as the existing wall footing as shown in Figure 17. For a house with a basement, a cylindrical footing (caisson) is recommended to minimize required excavation at the basement wall.

Figure 17
FREE-STANDING DECK



SECTION 11: LATERAL SUPPORT

A deck that is more than 24 inches above grade must resist lateral loads in accordance with the following:

Diagonal Bracing. Provide diagonal bracing both parallel and perpendicular to the beam at each post as shown in Figure 18. Where parallel to the beam, the bracing must be bolted to the post at one end and to the beam at the other. Where perpendicular to the beam, the bracing must be bolted to the post at one end and to a joist or blocking between joists at the other. Where a joist does not align with the bracing location, provide blocking between the adjacent joists.

Exceptions: Bracing is not required perpendicular to the house for a deck that is attached to the house with both a ledger board under sections 8 and 9 and the connection specified in either Figure 19 or 20. For a free-standing deck that is attached to the house as specified in Figure 21, bracing parallel to the house may be omitted at the beam adjacent to the house. All bracing may be omitted for a deck which is attached to the house in accordance with sections 8 and 9 or Figure 21 and which has all of its decking installed at a 45 degree angle to the deck joists.

Figure 18
DIAGONAL BRACING REQUIREMENTS

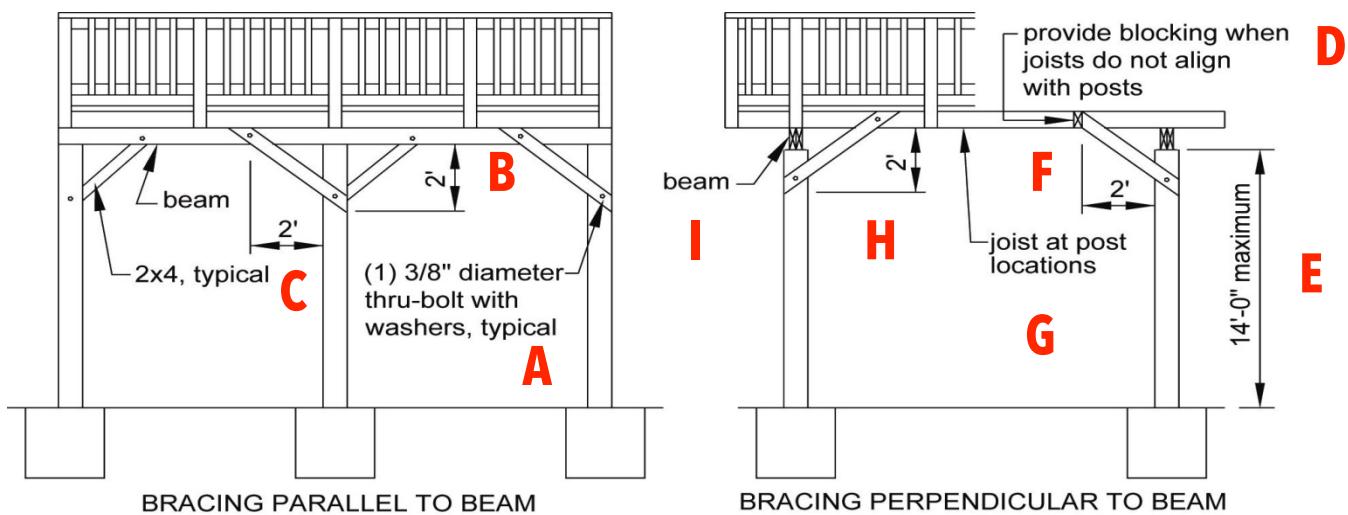
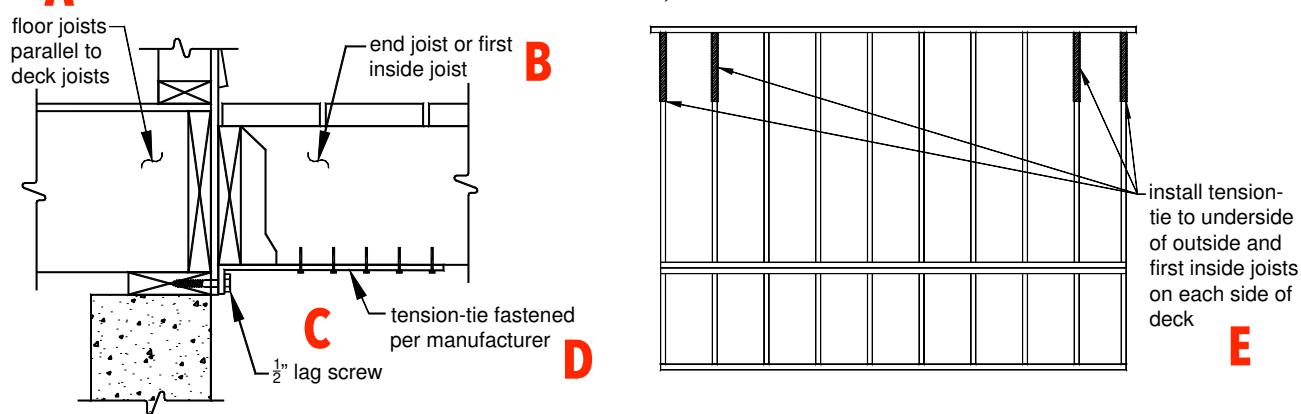


Figure 19
TENSION-TIE CONNECTION, WITH LEDGER BOARD



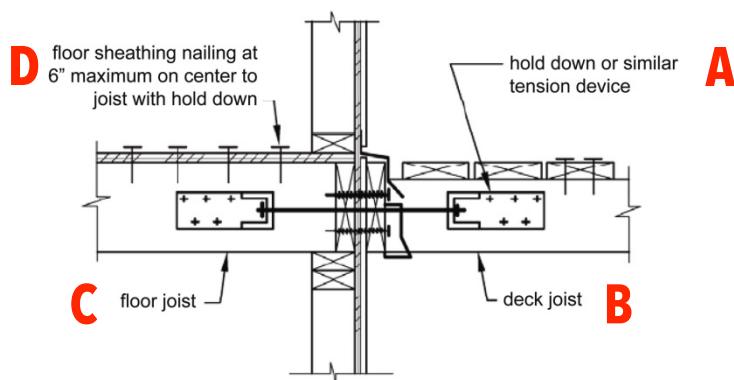
Tension-tie requirements. Tension ties, if used instead of perpendicular bracing as described above, must comply with all of the following, but are not permitted for free-standing decks:

1. The deck joists and floor joists must be parallel.
2. At least 4 ties must be installed, at the end joist and first inside joist at each end of the deck as shown in Figure 19. A set of tension-ties must be installed for each structurally independent section of a multi-level deck.
3. Approved tension-ties include the LTS19-TZ from USP or DTT1Z from Simpson Strong-Tie.

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4. The minimum capacity of each tension-tie is 750 pounds.
5. Tension ties which are not available in a G-185 zinc coating require a barrier membrane separating the tension tie and the preservative-treated joist. The barrier membrane must be recommended for this location by its manufacturer.
6. Tension-ties must be attached to the underside of the joists in accordance with the manufacturer's instructions. Tension-ties must be attached to the exterior wall with lag screws as shown in Figure 19. Lag screws must penetrate a minimum of 3 inches into the sill plate or top plate of a wood-framed wall.
7. Where attaching to a concrete wall, lags screws may be replaced with adhesive or expansion anchors and a 1/2 inch threaded rod, with a withdrawal capacity of at least 750 pounds. The anchor must be installed in accordance with the manufacturer's instructions.

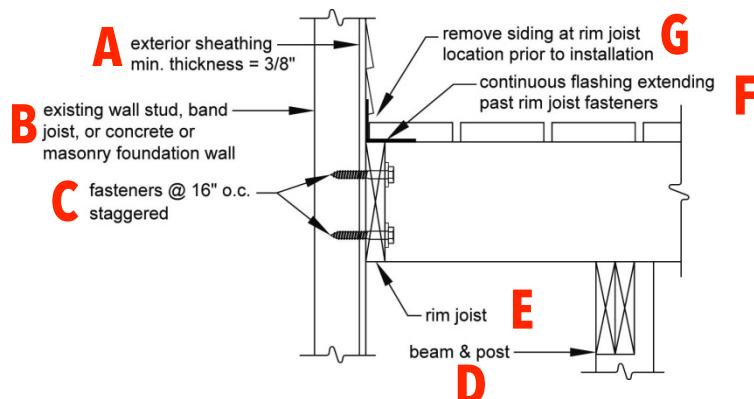
Figure 20
HOLD-DOWN TENSION DEVICE, WITH LEDGER BOARD



Hold-down tension devices. Hold-down tension devices, if used instead of perpendicular bracing as described above, must be provided in at least 2 locations per deck, and each device must have an allowable-stress-design capacity of at least 1,500 pounds.

Free-standing deck – attachment to house. Attach the deck's rim joist to the existing house exterior wall as shown in Figure 21 for a free-standing deck, if diagonal bracing parallel to the house is omitted, as described above. The wall must be sheathed with minimum 3/8 inch wood structural panel sheathing. Use lag screws or through-bolts if fastening to an existing band joist or wall stud; and use expansion or adhesive anchors if fastening to concrete or masonry. Do not attach to brick veneers. Verify this condition in the field prior to utilizing this method. Fasteners must be 16 inches on center and staggered in 2 rows. Flashing over the rim joist is required and must be installed in accordance with the flashing provisions in section 8.

Figure 21
ATTACHMENT OF FREE-STANDING DECK TO HOUSE FOR LATERAL SUPPORT



SECTION 12: DECKING

All decking materials must be wood or a wood-plastic composite and must comply with all of the following:

1. Wood decking must be 2x4s, 2x6s, or five-quarter span-rated decking boards. Wood-plastic-composite sizes must be in accordance with the manufacturer's instructions. Plastic decking may be used if it is approved by a professional testing organization for supporting a live load of 40 psf and is installed according to the manufacturer's instructions.
2. Decking must be attached in accordance with Figure 22, and may be placed at an angle of 45 to 90 degrees to the joists unless disallowed in the manufacturer's instructions. If the decking is wet, place it with no gap so that after drying, a $\frac{1}{8}$ -inch gap is created.
3. Decking may overhang a joist by up to 3 inches unless disallowed in the manufacturer's instructions.
4. The center-to-center joist spacing may be up to 24 inches for wood decking, but may not exceed 16 inches for wood-plastic-composite decking unless specified otherwise by the manufacturer.
5. Each wood decking member must bear on a minimum of 4 joists or intermediate blocking between joists.
6. Placement and attachment of wood-plastic composites must be in accordance with the manufacturer's instructions.
7. Attach the decking to the rim joist in accordance with Figure 23.

Figure 22
TYPICAL DECKING

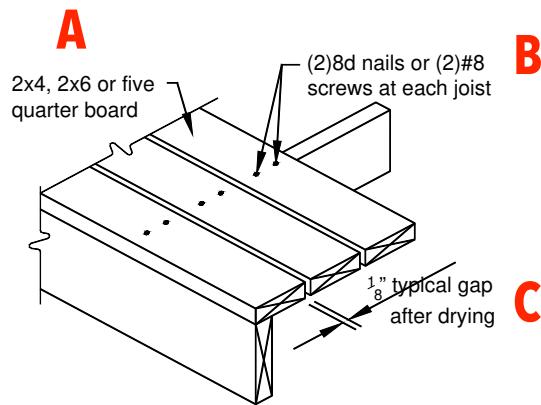
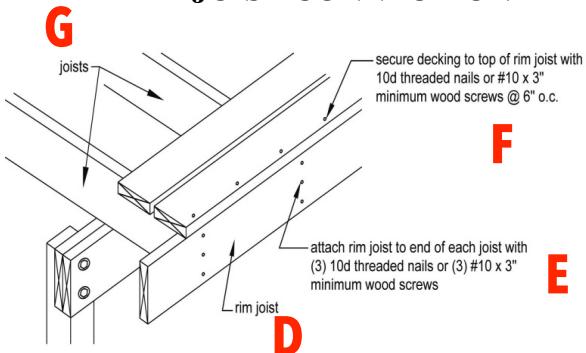


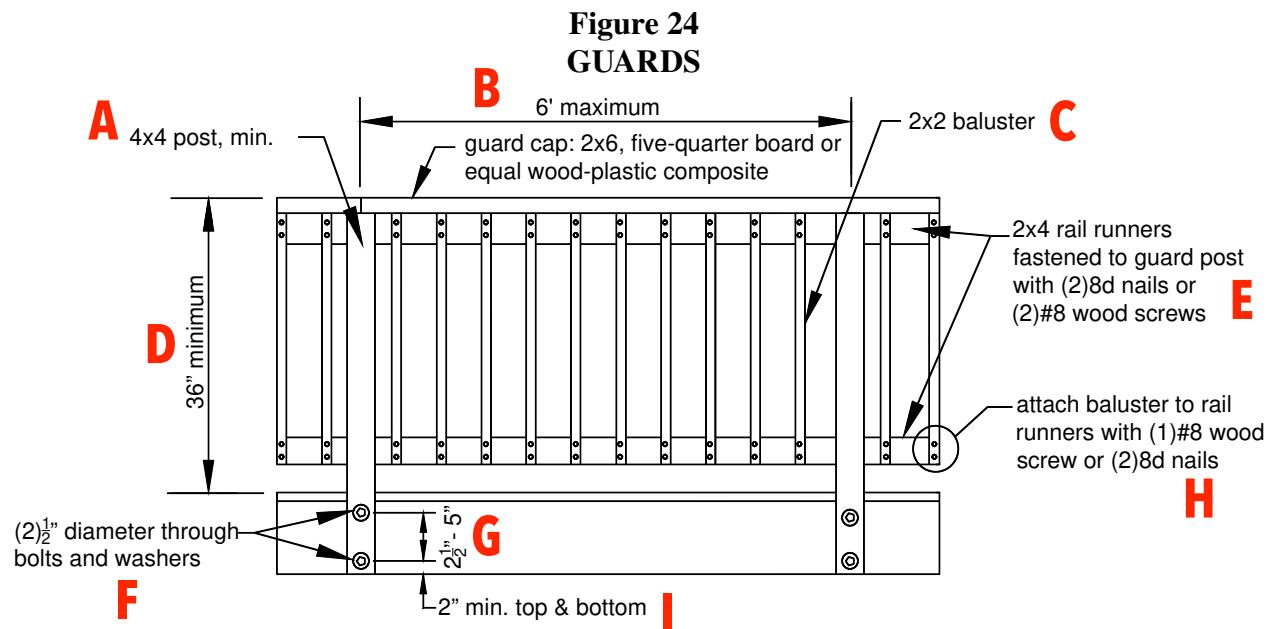
Figure 23
RIM JOIST CONNECTION



SECTION 13: GUARD AND POSTS

All open sides of a deck area that is more than 24 inches above grade – at any point within 36 inches beyond the edge of the deck – must have a guard that complies with Figure 24 and with all of the following:

1. Required horizontal guards shall not have openings from the walking surface to the required guard height which allow passage of a sphere 4 inches in diameter, when applying a force of 4 pounds.
2. Required guards at stairs shall not have openings which allow passage of a sphere 4 3/8 inches in diameter, when applying a force of 4 pounds, other than the triangular opening at the side of an open stair formed by the riser, tread, and bottom rail of a guard, which shall not allow passage of a 6 inch sphere, when applying a force of 4 pounds.
3. Wet lumber must be spaced such that when shrinkage due to drying occurs, a compliant opening is maintained.
4. Rope, cable, or a similar non-rigid material may be used instead of balusters if it is strung with maximum openings of 3 1/2 inches and with vertical supports no more than 4 feet apart.
5. The guard and posts must withstand a 200-pound load applied in any direction.
6. Guard-infill components, such as balusters and panel fillers, must withstand a horizontally applied, perpendicular load of 50 pounds on any one-foot-square area.
7. Wood-plastic composites of equivalent dimensions may be substituted for the guard cap and infill elements shown in Figure 24 if the manufacturer's instructions permit this use.



Guard posts. Guard posts must be attached to the deck structure in accordance with all of the following:

Notching guard posts, as shown in Figure 25, is prohibited.

1. Notching guard posts, as shown in Figure 25, is prohibited.
2. Hold-down anchors must have a minimum capacity of 1,800 pounds.
3. Guard posts may be attached to either side of the end joist or rim joist.
4. Bolt holes for a post must be at least 2 inches from the wood edge, at least 2½ inches apart, and no more than 5 inches apart.
5. Hold-down anchors, as shown in Figures 26 and 27, must be used to attach the guard post to the end joist and rim joist, respectively.

**Figure 25
POST NOTCHING PROHIBITED**

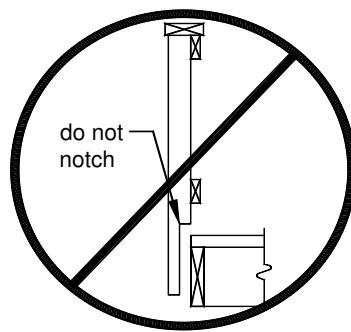


Figure 26
GUARD POST TO END JOIST

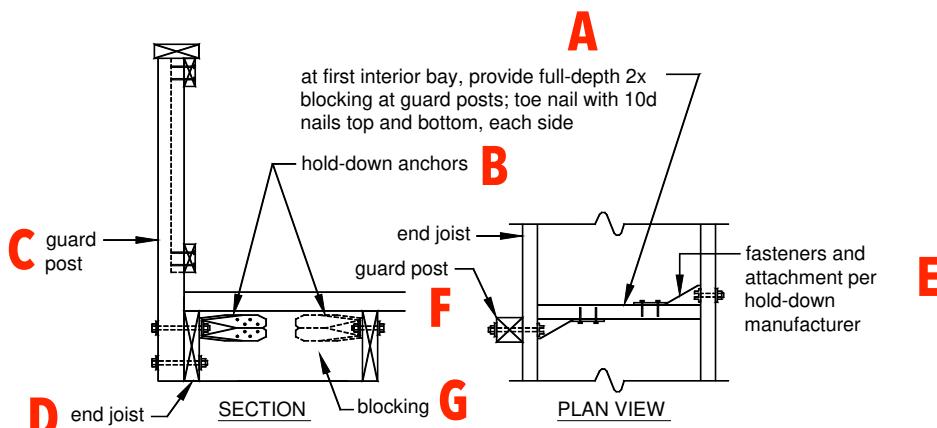
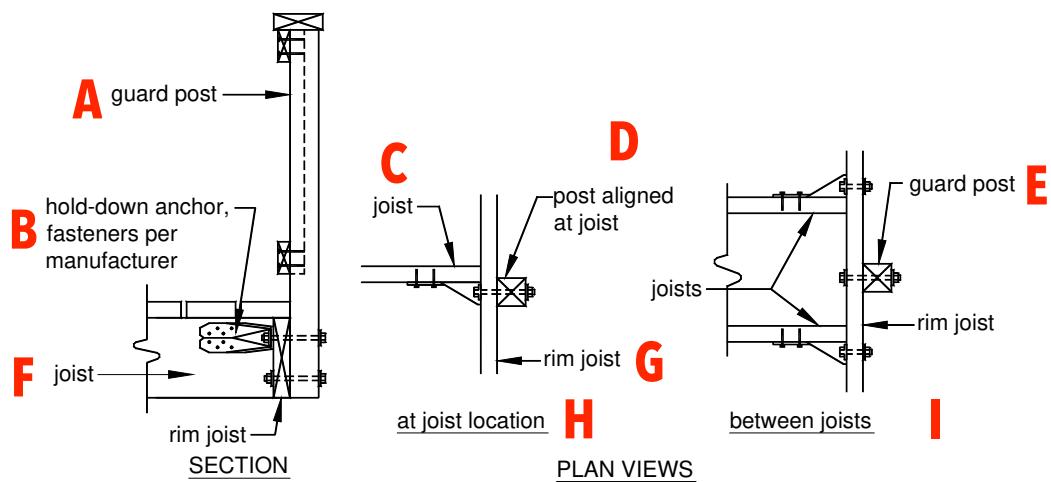


Figure 26
GUARD POST TO RIM JOIST

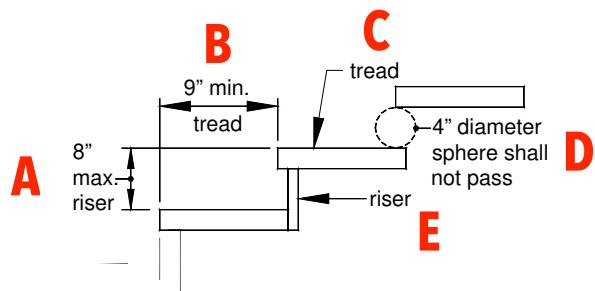


SECTION 14: STAIRS

Stair dimensions. Stair dimensions must comply with all of the following:

1. The minimum width of a stairway is 36 inches.
2. Handrails and associated trim may project a maximum of 4 1/2 inches into the required width at each side of the stairway. The minimum clear width at and below the handrail, including at treads and landings, cannot be less than 31 1/2 inches where a handrail is installed on one side, and 27 inches where handrails are provided on both sides.
3. Stair geometry and openings must be as shown in Figure 27.

Figure 27
TREADS AND RISERS



4. Within a stairway flight, the largest tread depth may not exceed the smallest tread depth by more than 3/8 inch, and the largest riser height may not exceed the smallest riser height by more than 3/8 inch.
5. If the total vertical height of a stairway exceeds 12 feet, an intermediate landing is required and must be constructed as a free-standing deck with flush beams and with posts.
6. Any landing width must equal or exceed the total width of the stairway it serves.

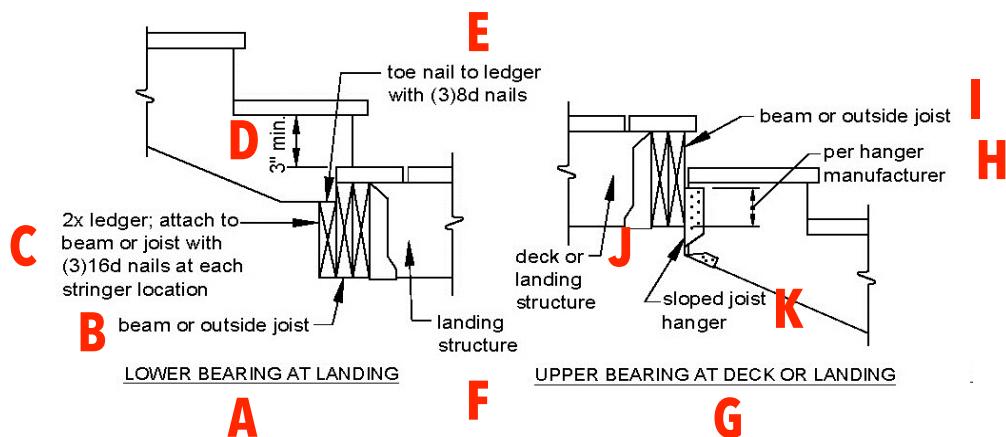
Stair stringers. Stringers must comply with all of the following:

1. Stringers must be sawn or solid 2" x 12" complying with the above tread and riser dimensions.
2. Cut stringers must be spaced no more than 18 inches on center.
3. Stringers must bear on a solid surface, a minimum of 3 1/2 inches thick and 8 inches in diameter, and attach to the deck or a landing in accordance with Figure 28. Prior to placement of solid surface, all loose or organic material shall be removed.
4. Stringer-span length is measured using the horizontally projected distance between the centerlines of bearing at each end.
5. The span length of a cut stringer must not exceed 6 feet-0 inches, and the throat size of cut stringers must not be less than 5 inches, as shown in Figure 29.

Solid-stringer exception: Stringers for a stairway that has a width of 36 inches may have a horizontally projected span of up to 13 feet 3 inches if the stairway is framed solely with 2 solid stringers.

Intermediate-supported stringers: If the total stringer length exceeds the above dimensions, a 4" x 4" post may be provided to support the stringer and shorten its span length. The 4" x 4" post must be notched and bolted to the stringer in accordance with Figure 2. The post must bear over the middle one-third of a footing that is constructed in accordance with Figure 29 and must be attached as shown in Figure 2. An intermediate landing as described above may also be provided to shorten the stringer span.

Figure 28
STRINGER BEARING



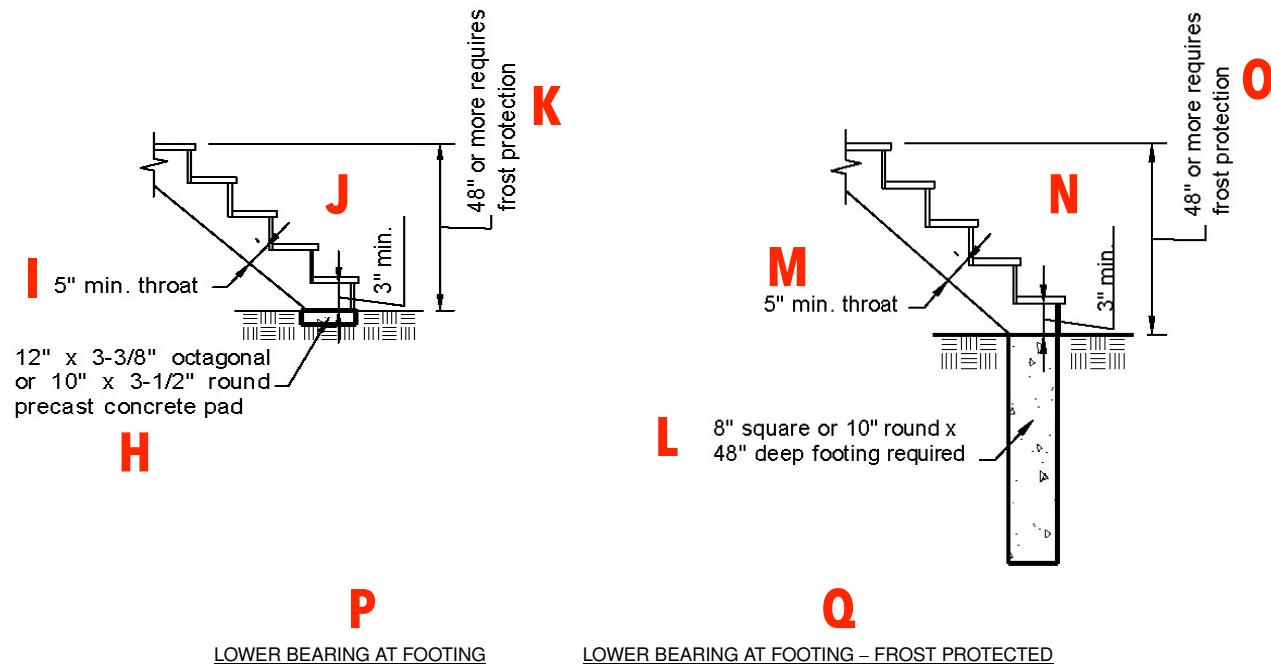


Figure 29

STRINGER BEARING

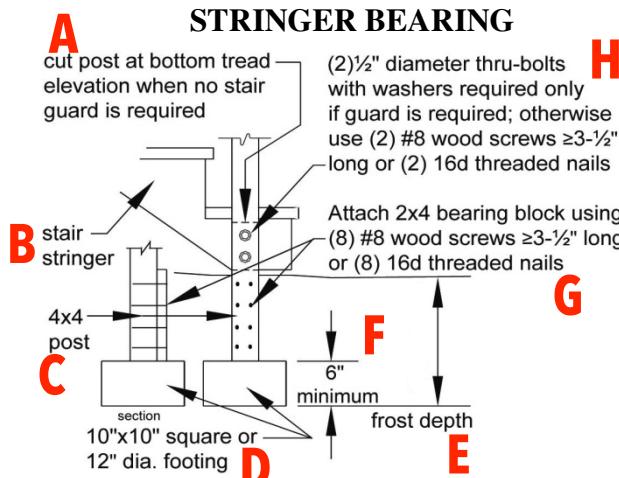
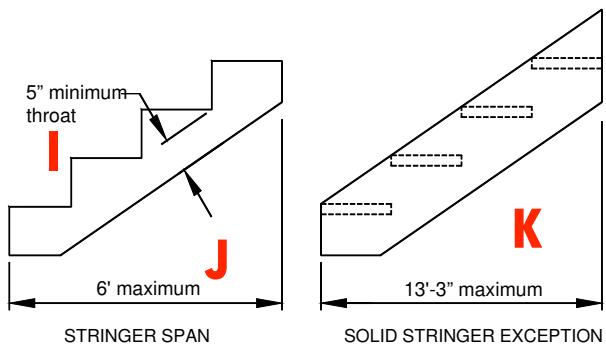


Figure 30

STRINGER SPAN LENGTH

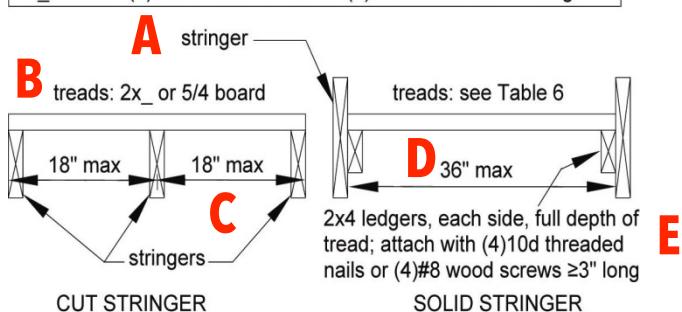


Tread and riser material. Treads and risers must comply with all of the following:

1. Tread material must be equivalent to the decking specified in section 12 and be attached in accordance with Figure 31, except wood-plastic composites must be attached in accordance with the manufacturer's instructions.
2. Stairs constructed using the solid-stringer exception noted above must have treads constructed of 2x wood material only and be attached in accordance with Figure 30.
3. Risers that are not open (as shown in Figure 27) must be framed with 1x lumber minimum or an manufacturer recommended wood-plastic composite.

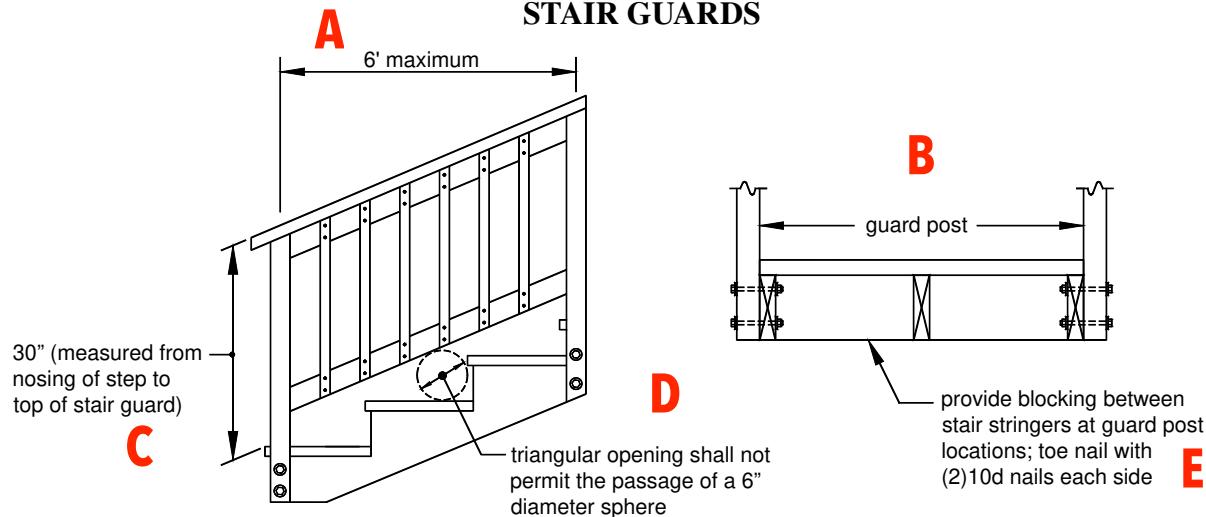
Figure 31
STAIRWAY TREADS

Attachment per tread at each stringer or ledger:
2x_ or 5/4 treads - (2)8d threaded nails or (2)#8 screws \geq 2-1/2" long
3x_ treads - (2)16d threaded nails or (2)#8 screws \geq 3-1/2" long



Stair guards. Guards must be provided on all open sides of stairs consisting of more than 3 risers. Stair guards must comply with section 13 and Figure 32.

Figure 32
STAIR GUARDS



Stair handrails. A flight of stairs with more than 3 risers must have at least one handrail that complies with all of the following:

1. The handrail must be located at least 30 inches, but no more than 38 inches above the nosing of the treads – except that a volute, turnout, starting easing, or transition fitting may depart from these dimensions. Measurement must be taken from the nosing to the top of the rail.
2. The handrail must be attached to a stair guard or exterior wall acting as a barrier as shown in Figure 33.
3. The handrail and connecting hardware must be decay- and corrosion-resistant.
4. The handrail must have a smooth surface with no sharp corners and must be graspable, as shown in Figure 34. Recessed sections may be shaped from a 2"x6" or five-quarter board, as shown there.
5. Handrails must run continuously from a point directly over the lowest riser to a point directly over the highest riser.
6. Handrails may be interrupted by guard posts.

Table 7
MINIMUM TREAD SIZES¹

Species	Cut Stringer	Solid Stringer
Douglas Fir/Larch, Hem/Fir, SPF ²	2x4 or 5/4	2x8 or 3x4
Southern Pine	2x4 or 5/4	2x8
Redwood, Western Cedars, Ponderosa Pine ³ , Red Pine ³	2x4 or 5/4	2x10 or 3x4

¹ Assumes 300 lb concentrated load, L/288 deflection limit, No. 2 grade, and wet service conditions.

² Incising assumed for refractory species including Douglas fir-larch, hem-fir, and spruce-pine-fir.

³ Design values based on northern species with no incising assumed.

Figure 33
STAIR HANDRAILS

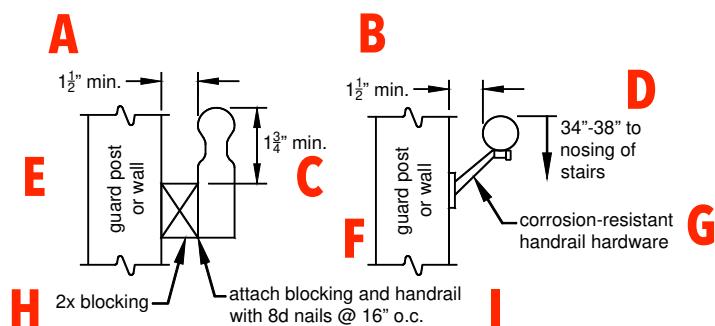
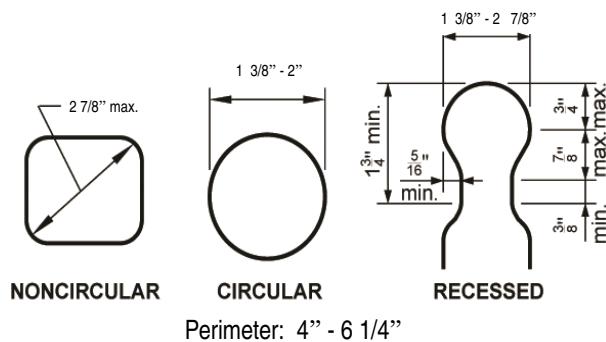


Figure 34
HANDRAIL GRASPABILITY

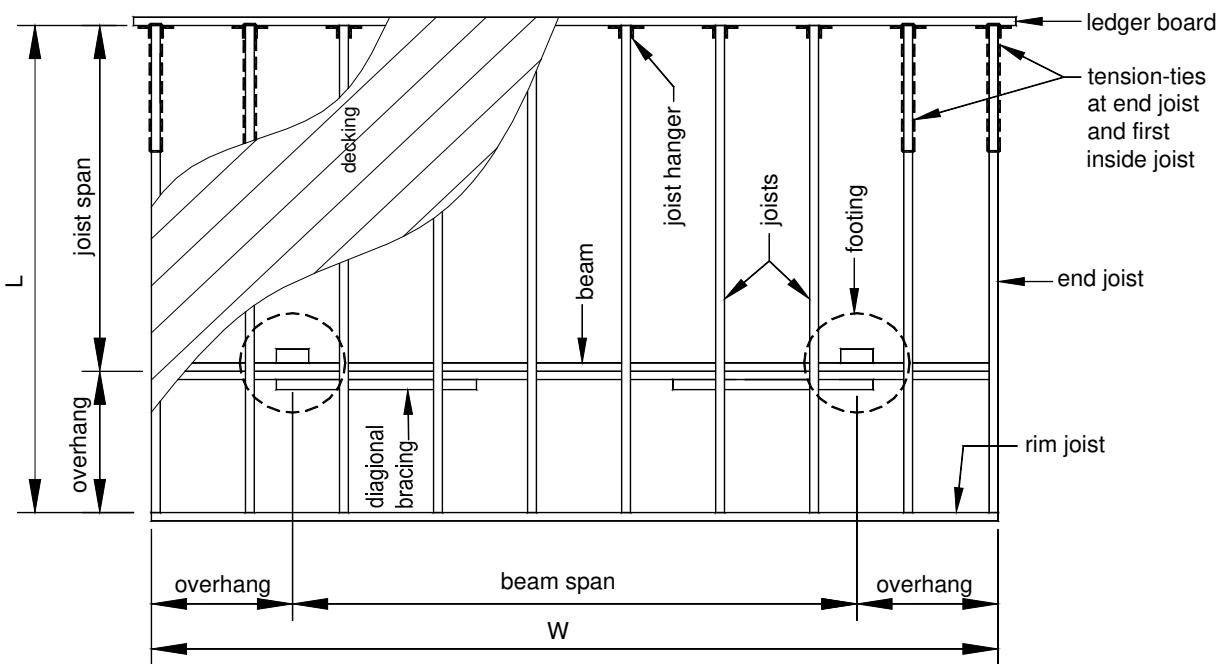


Spiral stairs. Stair dimensions above are for standard stairs secured in accordance with methods shown in this appendix. Spiral stairs are allowed at decks when designed in accordance with the provisions of Chapter SPS 321.04. Connection of spiral stairs to decks and the supporting load path shall be designed in accordance with accepted engineering practices and with applicable provisions of the Uniform Dwelling Code.

SECTION 15: FRAMING PLAN

A typical framing plan shows a bird's-eye or plan view of the joist and beam layout; the location of the ledger board, diagonal bracing or hold-down devices, posts, and footings; and the type, size, and spacing of the ledger board fasteners. You can use the sample typical deck framing plan shown on the next page in combination with the requirements in this document to complete your deck.

Figure 35
TYPICAL DECK FRAMING PLAN



Decking: 2x4 2x6 five-quarter board wood-plastic composite (per ASTM D 7032)
 Other decking, evaluation report number: _____

Joists: size: 2x6 2x8 2x10 2x12 spacing: 12 in. 16 in. 24 in.

joist span dimension: _____ ft. - _____ in.

overhang: Yes No overhang dimension: _____ ft. - _____ in.

rim joist: 2x6 2x8 2x10 2x12

Beam(s): number of plies: 2 3 size: 2x6 2x8 2x10 2x12

overhang: Yes No overhang dimension: _____ ft. - _____ in.

Posts: size: 4x4 4x6 6x6 height: _____ ft. - _____ in.

Footings: size: _____ in. square round thickness: _____ in.

Ledger: ledger board size: 2x8 2x10 2x12 Not applicable (free-standing deck)

fastener: Through bolt Lag screw Wood screw

Expansion anchor Adhesive anchor

Lateral support: Tension-tie Diagonal bracing, size: 2x
 (not permitted for free-standing deck)

Deck size: L= _____ ft. - _____ in. W= _____ ft. - _____ in.

Chapters [SPS 320](#) to [325](#)**APPENDIX C**

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2 Sources of design values	236	5 Framing around a chimney or bay window.....	245
3 Joist spans for alternate wood species.....	237	6 Attachment of ledger boards to metal-plate-connected wood floor trusses.....	246

1. Wood preservatives for ground contact. The following Table lists common pressure-preserved treatments and retention levels, in pounds per cubic foot, for sawn lumber in ground contact – based on the American Wood Protection Association's *Book of Standards*.

Table C-1
PRESERVATIVE TREATMENTS AND RETENTION LEVELS FOR
GROUND CONTACT (IN POUNDS PER CUBIC FOOT)

Species	ACQ-B	ACQ-C	ACQ-D	CA-B	CuN-W
Southern Pine	0.40	0.40	0.40	0.21	0.11
Douglas Fir-Larch	0.40	0.40	NR	0.21	0.11
Hem-Fir	0.40	0.40	0.40	0.21	0.11
Ponderosa Pine	0.40	0.40	0.40	0.21	0.11
Red Pine	0.40	0.40	0.40	0.21	0.11
Spruce-Pine-Fir	NR ¹	0.40	NR	NR	NR
Redwood	NR	NR	NR	NR	NR

¹NR = treatment not recommended.

2. Sources of design values. The sources of the design values in Appendix B are as follows:

Table 1 – Minimum footing sizes: The Building Inspectors Association of Southeast Wisconsin, December 2014.

Table 2 – Maximum post heights: *Typical Deck Details, Based on the 2009 International Residential Code*, Fairfax County, Virginia, July 2013.

Tables 3A and 3B – Maximum beam spans: *Design for Code Acceptance 6*, American Wood Council, May 2013.

Table 4 – Maximum joist spans: *Design for Code Acceptance 6* (DCA 6), American Wood Council, May 2013; except for the 2x6 values, which are from the Building Inspectors Association of Southeast Wisconsin, December 2014.

Table 5 – Minimum joist-hanger download capacity: *Design for Code Acceptance 6*, American Wood Council, May 2013; except for the 2x6 values, which are repeated from the 2x8 values.

Table 6 – Ledger-board-fastener spacing: *Design for Code Acceptance 6*, American Wood Council, May 2013.

Figure 29 – Stringer span length, and Table 7 – Minimum tread sizes: *Design for Code Acceptance 6*, American Wood Council, May 2013.

Table C-2 – Maximum joist spans for redwood, western cedars, ponderosa pine, and red pine: *Design for Code Acceptance 6*, American Wood Council, May 2013; except for the 2x6 values, which are from the Building Inspectors Association of Southeast Wisconsin, December 2014. Table C-3 – Trimmer joist download capacity: *Design for Code Acceptance 6*, American Wood Council, May 2013.

3. Joist spans for alternate wood species. The following Table lists maximum joist-span lengths for redwood, western cedars, ponderosa pine, and red pine.

Table C-2
**MAXIMUM JOIST-SPAN LENGTH¹ FOR REDWOOD,
 WESTERN CEDARS, PONDEROSA PINE², AND RED PINE²**

Joist Spacing (on center)	Joist Size	Without Overhang	With Overhangs
12"	2x6	8'-5"	7'-3"
	2x8	11'-8"	8'-6"
	2x10	14'-11"	12'-3"
	2x12	17'-5"	16'-5"
16"	2x6	7'-8"	7'-3"
	2x8	10'-7"	8'-6"
	2x10	13'-0"	12'-3"
	2x12	15'-1"	15'-1"
24"	2x6	6'-7"	6'-7"
	2x8	8'-8"	8'-6"
	2x10	10'-7"	10'-7"
	2x12	12'-4"	12'-4"

¹Spans are based on 40 psf live load, 10 psf dead load, normal loading duration, wet service conditions and deflections of $\Delta=L/360$ for main span and $L/180$ for overhang with a 220-lb. point load.

²Design values based on northern species with no incising assumed.

4. Alternate beam and joist spans. The table on the following two pages lists alternate beam and joist spans and corresponding footing sizes from the Southeast Wisconsin Building Inspectors Association that can be used instead of the values in Appendix B.

Beam and Footing Sizes with Overhangs												
		Post Spacing (Measured Center to Center)										
Joist Length (JL) ¹		4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'
6'	Southern Pine Beam	1-2x6	1-2x6	1-2x8	2-2x6	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x12
	Douglas Fir-Larch Beam	1-2x6	1-2x8	1-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12
	Ponderosa Pine Beam	1-2x6	1-2x8	1-2x8	2-2x8	2-2x8	2-2x10	2-2x10	2-2x12	2-2x12	3-2x10	3-2x12
	Corner Footing	8	7	6	9	8	7	10	8	7	11	10
	Intermediate Footing	10	8	7	11	9	8	12	10	9	14	12
	Footing Thickness	6	6	6	6	6	6	6	6	6	6	8

Beam and Footing Sizes with Overhangs (Continued)																																		
		Post Spacing (Measured Center to Center)																																
Joist Length (JL) ¹		4'		5'		6'		7'		8'		9'		10'		11'		12'		13'		14'												
7'	Southern Pine Beam	1-2x6		1-2x8		1-2x8		2-2x8		2-2x8		2-2x10		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12												
	Douglas Fir-Larch Beam	1-2x6		1-2x8		2-2x6		2-2x8		2-2x8		2-2x10		2-2x10		2-2x12		3-2x10		3-2x12		3-2x12												
	Ponderosa Pine Beam	1-2x6		1-2x8		2-2x6		2-2x8		2-2x8		2-2x10		2-2x12		2-2x12		3-2x10		3-2x12		Eng Bm												
	Corner Footing	9	7	7	10	8	7	11	9	8	11	9	8	12	10	9	13	11	9	13	11	10	14	12	10	15	12	11	16	13	11			
	Intermediate Footing	11	9	8	12	10	9	13	11	9	14	12	10	15	12	11	16	13	11	17	14	12	17	14	12	18	15	13	19	15	13	19	16	14
	Footing Thickness	6		6		6		6		6		6		6		6		8		8		8												
8'	Southern Pine Beam	1-2x6		1-2x8		2-2x6		2-2x8		2-2x8		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm												
	Douglas Fir-Larch Beam	1-2x6		1-2x8		2-2x8		2-2x8		2-2x10		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm												
	Ponderosa Pine Beam	1-2x6		1-2x8		2-2x8		2-2x8		2-2x10		2-2x10		2-2x12		3-2x10		3-2x12		3-2x12		Eng Bm												
	Corner Footing	10	8	7	10	9	8	11	9	8	12	10	9	13	11	9	14	11	10	14	12	10	15	12	11	15	13	11	16	13	12	17	14	12
	Intermediate Footing	12	10	8	13	11	9	14	12	10	15	12	11	16	13	11	17	14	12	18	15	13	19	15	13	19	16	14	20	16	14	21	17	15
	Footing Thickness	6		6		6		6		6		6		8		8		8		8		8												
9'	Southern Pine Beam	1-2x6		1-2x8		2-2x8		2-2x8		2-2x10		2-2x12		2-2x12		3-2x10		3-212		Eng Bm		Eng Bm												
	Douglas Fir-Larch Beam	1-2x8		1-2x8		2-2x8		2-2x8		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm												
	Ponderosa Pine Beam	1-2x8		2-2x6		2-2x8		2-2x8		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm												
	Corner Footing	10	8	7	11	9	8	12	10	9	13	11	9	14	11	9	14	12	10	15	12	11	16	13	11	16	13	12	17	14	12	18	14	13
	Intermediate Footing	12	10	9	14	11	10	15	12	11	16	13	11	17	14	12	18	15	13	19	15	13	20	16	14	20	17	15	21	17	15	22	18	16
	Footing Thickness	6		6		6		6		6		8		8		8		8		8		8												
10'	Southern Pine Beam	1-2x6		1-2x8		2-2x8		2-2x8		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm												
	Douglas Fir-Larch Beam	1-2x8		2-2x6		2-2x8		2-2x10		2-2x10		2-2x12		3-2x10		3-2x12		3-2x12		Eng Bm		Eng Bm												
	Ponderosa Pine Beam	1-2x8		2-2x6		2-2x8		2-2x10		2-2x10		2-2x12		3-2x10		3-2x12		Eng Bm		Eng Bm		Eng Bm												
	Corner Footing	10	9	8	12	10	8	12	10	9	13	11	10	14	12	10	15	12	11	16	13	11	16	14	12	17	14	12	18	15	13	18	15	13
	Intermediate Footing	13	11	9	14	12	10	15	13	11	17	14	12	18	15	13	19	15	13	20	16	14	21	17	15	21	18	15	22	18	16	23	19	16
	Footing Thickness	6		6		6		6		8		8		8		8		8		8		10												
11'	Southern Pine Beam	1-2x8		2-2x6		2-2x8		2-2x10		2-2x10		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm		Eng Bm												
	Douglas Fir-Larch Beam	1-2x8		2-2x8		2-2x8		2-2x10		2-2x10		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm		Eng Bm												
	Ponderosa Pine Beam	1-2x8		2-2x6		2-2x8		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm		Eng Bm												
	Corner Footing	11	9	8	12	10	9	13	11	9	14	12	10	15	12	11	16	13	11	16	14	12	17	14	12	18	15	13	19	15	13	19	16	14
	Intermediate Footing	13	11	10	15	12	11	16	13	12	17	14	12	19	15	13	20	16	14	21	17	15	22	18	15	22	18	16	23	19	17	24	20	17
	Footing Thickness	6		6		6		6		8		8		8		8		8		10		10												
	Southern Pine Beam	1-2x8		2-2x6		2-2x8		2-2x10		2-2x12		2-2x12		3-2x12		3-2x12		Eng Bm		Eng Bm		Eng Bm												

Beam and Footing Sizes with Overhangs (Continued)

Based on No. 2 or better Southern Pine, Douglas Fir-Larch2, and Ponderosa Pine

		Post Spacing (Measured Center to Center)													
Joist Length (JL) ¹		4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'			
12'	Douglas Fir-Larch Beam	1-2x8	2-2x8	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm			
	Ponderosa Pine Beam	1-2x8	2-2x8	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Corner Footing	11 9 8 12 10 9 14 11 9 15 12 10				15 13 11 16 13 12 17 14 12 18 15 13				19 15 13 19 15 13 19 16 14	20 17 14				
	Intermediate Footing	14 12 10 15 13 11 17 14 12 18 15 13				19 16 14 20 17 15 21 18 15 22 18 16				23 19 17 24 20 17 25 21 18					
	Footing Thickness	6 6 6			8	8	8	8	8	10	10	10			
13'	Southern Pine Beam	1-2x8	2-2x8	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Douglas Fir-Larch Beam	1-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x10	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Ponderosa Pine Beam	1-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Corner Footing	12 10 8 13 11 9 14 12 10 15 12 11				16 13 12 17 14 12 18 15 13 19 15 13				19 16 14 20 17 14 21 17 15 22 18 16	23 19 17 24 20 17 25 21 18 26 21 19				
	Intermediate Footing	14 12 10 16 13 12 17 14 13 19 15 13				20 16 14 21 17 15 22 18 16 23 19 17				24 20 17 25 21 18 26 21 19 27 22 19					
	Footing Thickness	6 6 6			8	8	8	8	10	10	10	10			
14'	Southern Pine Beam	1-2x8	2-2x8	2-2x8	2-2x10	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Douglas Fir-Larch Beam	1-2x8	2-2x8	2-2x10	2-2x10	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Ponderosa Pine Beam	1-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Corner Footing	12 10 9 13 11 10 15 12 10 16 13 11				17 14 12 18 15 13 18 15 13 19 16 14				20 17 14 21 17 15 22 18 15 23 19 16	24 20 17 25 21 18 26 21 19 27 22 19	28 23 20			
	Intermediate Footing	15 12 11 17 14 12 18 15 13 19 16 14				21 17 15 22 18 16 23 19 16 24 20 17				25 21 18 26 21 19 27 22 19 28 23 20					
	Footing Thickness	6 6 8			8	8	8	10	10	10	10	10			
15'	Southern Pine Beam	1-2x8	2-2x8	2-2x10	2-2x12	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Douglas Fir-Larch Beam	2-2x6	2-2x8	2-2x10	2-2x12	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Ponderosa Pine Beam	2-2x6	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Corner Footing	12 10 9 14 11 10 15 12 11 16 13 12				17 14 12 18 15 13 19 16 14 20 16 14				21 17 15 22 18 15 23 19 16 24 20 17	25 21 18 26 21 19 27 22 19 28 23 20	29 24 21			
	Intermediate Footing	15 13 11 17 14 12 19 15 13 20 17 14				21 18 15 23 19 16 24 20 17 25 21 18 26 21 19 27 22 19 28 23 20				25 21 18 26 21 19 27 22 19 28 23 20					
	Footing Thickness	6 6 8			8	8	10	10	10	10	10	10			
16'	Southern Pine Beam	1-2x8	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Douglas Fir-Larch Beam	2-2x6	2-2x8	2-2x10	2-2x12	3-2x10	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Ponderosa Pine Beam	2-2x6	2-2x8	2-2x10	2-2x12	3-2x12	3-2x12	Eng Bm	Eng Bm	Eng Bm	Eng Bm	Eng Bm			
	Corner Footing	13 11 9 14 12 10 15 13 11 17 14 12				18 15 13 19 15 13 20 16 14 20 17 15				21 18 15 22 18 16 23 19 17 24 20 18	25 20 18 26 21 18 27 22 19 28 23 20	29 24 21			
	Intermediate Footing	16 13 11 18 15 13 19 16 14 21 17 15				22 18 16 23 19 17 25 20 18 26 21 18 27 22 19 28 23 20				27 22 19 28 23 20 29 24 21					
	Footing Thickness	6 8 8			8	8	10	10	10	10	10	12			

Notes:

Published under s. 35.93, Stats. Updated on the first day of each month. Entire code is always current. The Register date on each page is the date the chapter was last published.

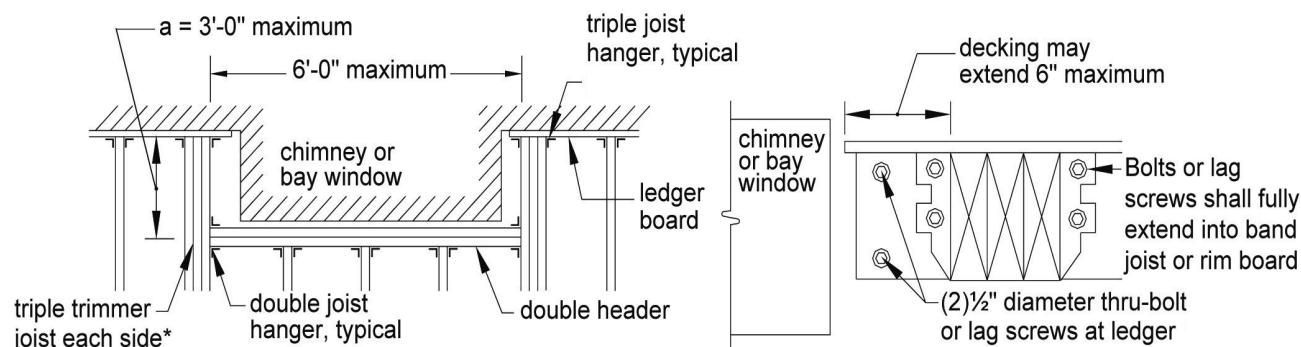
1. Joist Length (J_L) is Joist Span (L_J) plus any cantilever at the beam that is being sized.
2. Incising assumed for refractory species Douglas Fir-Larch.
3. All footing sizes above are base diameters (in inches) and are listed for THREE SOIL CAPACITIES. Soil capacity is based on the requirements of State of Wisconsin SPS 321.15 (3).⁴
4. For square footings, insert the diameter (d) into the following formula: $\sqrt{(d/2)^2 \times \pi}$. This number will give you the square dimension and shall be rounded up to the nearest inch.

↓	≤	≤	≤ 2000 psf Soil ³
↓	↓	≤	≤ 3000 psf Soil ³
↓	↓	↓	≤ 4000 psf Soil ³
↓	↓	↓	
Corner Footing	0	0	0
Intermediate Footing	0	0	0

5. **Framing around a chimney or bay window.** All members at a chimney or bay window must be framed in accordance with Figure C-1. Headers may span a maximum of 6'-0". Where 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 section 2 of Appendix B. Plan submittal and approval is required for headers with a span length greater than 6'-0". Headers must be located no more than 3'-0" from the end of the trimmer joist.

Triple trimmer joists are required on each side of the header if joist spacing is 12" or 16" on center or if the trimmer joist span exceeds 8'-6"; otherwise, double trimmer joists are permitted. Trimmer joists may bear on the beam and extend past the beam centerline up to $L_J/4$ as shown in Figures 5 and 7 in Appendix B, or the trimmer joist may attach to the side of the beam with joist hangers as shown in Figure 6 in Appendix B. Joist hangers must each have a minimum download capacity in accordance with Table C-3. Bolts or lag screws used to attach the hanger to the ledger must fully extend through the ledger into the 2-inch nominal lumber band joist (1 1/2" actual) or the EWP rim board. See Figure 15 in Appendix B for fastener spacing, and edge and end distances. Otherwise a free-standing deck is required.

Figure C-1
DETAIL FOR FRAMING AROUND A CHIMNEY OR BAY WINDOW



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

PLAN VIEW

SECTION

Table C-3
TRIMMER JOIST HANGER DOWNLOAD CAPACITY

Joist Size	Minimum Capacity, lbs
2x8	1050
2x10	1380
2x12	1500

6. Attachment of ledger boards to metal-plate-connected wood floor trusses. The research report on the following pages shows acceptable methods for attaching a ledger board to a metal-plate-connected wood-floor-truss system.

Attachment of Residential Deck Ledger to Metal Plate Connected Wood Truss Floor System

SRR No. 1408-01

Prepared for SBCA

Report Written by:

Jim Vogt, P.E.

October 1, 2014

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Introduction:

This research report provides construction details for residential deck ledger attachment to metal plate connected wood truss floor systems. The applicable codes and standards follow the *2009 and 2012 International Building Code (IBC)* and the *2009 and 2012 International Residential Code (IRC)*. Proper attachment of the deck ledger to the house is critical for ensuring that an “attached” deck is safely and securely supported at this location. This report provides details for attaching a 2” nominal lumber deck ledger to residential floor systems constructed with metal plate connected wood (MPCW) floor trusses.

Key Definitions:

Deck Ledger – A horizontal lumber beam attached to an existing wall and used to tie in construction elements such as porch roofs and decks. A deck ledger is installed as part of the deck frame construction and supports one end of the deck joists.

Truss – An engineered structural component, assembled from wood members, metal connector plates and other mechanical fasteners, designed to carry its own weight and superimposed design loads. The truss members form a semi-rigid structural framework and are assembled such that the members form triangles.

Wood Structural Panel (WSP) – A panel manufactured from wood veneers, strands or wafers or a combination of veneer and wood strands or wafers bonded together with waterproof synthetic resins or other suitable bonding systems. Examples include: plywood, Oriented Strand Board (OSB), waferboard and composite panels.

Background:

The *2009 and 2012 IRC* include prescriptive provisions for attaching a 2” nominal lumber deck ledger to a 2” nominal lumber band joist bearing directly on a sill plate or wall plate using 1/2”-diameter bolts or lag screws. AF&PA’s American Wood Council, in cooperation with the International Code Council, has also developed *Design for Code Acceptance No. 6 (DCA6) – Prescriptive Residential Deck Construction Guide*, available at awc.org.

The prescriptive provisions for the deck ledger connection to the band joist in the *IRC* and *DCA6* are based on the results from a series of ultimate load tests conducted at Virginia Polytechnic Institute and State University (VT) Department of Wood Science and Forest Products, and Washington State University (WSU) Wood Materials and Engineering Laboratory. This testing evaluated the capacity 2” nominal pressure-preserved-treated (PPT) Hem-Fir (HF) and Southern Pine (SP) ledgers attached to either 2” nominal Spruce-Pine-Fir (SPF) or 1” net Douglas-Fir (DF) laminated veneer lumber (LVL) band joists, through $\frac{15}{32}$ ”-thick oriented strand board (OSB) sheathing, with 1/2”-diameter hot-dipped galvanized (HDG) bolts or lag screws, meeting the requirements of *ANSI/ASME Standard B18.2.1*.

The deck ledger assemblies evaluated at VT and WSU were deemed to represent commonly accepted means of connecting deck ledgers to band joints that cannot be evaluated using the provisions of the *National Design Specification® for Wood Construction (NDS®)* because:

1. The ledger is not in direct contact with the band joist (i.e., separated by $\frac{15}{32}$ " OSB sheathing).
2. The minimum required penetration depth of four diameters (4D) is not met when using 1/2"-diameter lag screws into an $1\frac{1}{2}$ "-thick band joist.

Application:

The details and fastener spacing tables provided in this report for connecting a 2" nominal lumber deck ledger to a residential floor system constructed with MPCW trusses use a single shear reference lateral design value, Z, of 710 lbs. for a 1/2"-diameter bolt and 375 lbs. for a 1/2" x 6" lag screw. These lateral design values were developed from the VT and WSU testing, and assume the fasteners are installed in accordance with the *NDS* requirements for clearance holes, lead holes, edge distance and end distance.

Detail 1 includes construction information for attaching 2" nominal lumber deck ledgers to the ends of MPCW floor trusses spaced no more than 24" o.c. Table 1 provides the maximum on-center spacing for each 1/2"-diameter bolt or 1/2" x 6" lag screw used to attach the ledger to the floor truss system for deck joist spans up to 18', assuming a design deck load of 40 psf live load (or 40 psf snow load) and 10 psf dead load. Table 2 includes similar information as Table 1, except for a design deck load of 60 psf live load (or 60 psf snow load) and 10 psf dead load.

Detail 2 includes construction information for attaching 2" nominal lumber deck ledgers to the side of a MPCW floor ladder frame with 4x4 vertical webs spaced no more than 16" o.c. provides the maximum on-center spacing for each 1/2"-diameter bolt and 1/2" x 6" lag screw used to attach the ledger to the ladder frame for deck joist spans up to 18', assuming a design deck load of 40 psf live load (or 40 psf snow load) and 10 psf dead load. Table 4 includes similar information as Table 3Detail 3, except for a design deck load of 60 psf live load (or 60 psf snow load) and 10 psf dead load.

Detail 3 includes deck lateral load connection options capable of resisting the 1500 lbf lateral load requirement specified in 2009 and 2012 IRC Section 507.

Support of concentrated loads from deck beams of girders are beyond the scope of this report. Deck ledgers shall not be supported on stone or masonry veneer.

Installation:

The following is a summary of the minimum requirements and limitations for installing a 2" nominal lumber deck ledger with residential floor systems constructed with MPCW floor trusses.

1. Ledger must be 2x10 or 2x12 PPT or code-approved decay-resistant lumber with a specific gravity, G ≥ 0.43 . Ledger shall be identified by the grade mark of, or certificate of inspection issued by, an approved lumber grading or inspection bureau or agency. PPT material must be pressure-treated with an approved process in accordance with American Wood Protection Association standards
2. Install ledger directly over wood structural sheathing ($\frac{15}{32}$ " maximum thickness) fastened to the wall per the building code.
3. Attach ledger through wood structural sheathing into 2-ply 2x4 truss end vertical, 4x4 vertical web or key-block with 1/2" x 6" lag screws or 1/2"-diameter bolts with washers and nuts.
 - .1 Only one (1) fastener into each truss member or key-block.
 - .2 Install each fastener through the centerline of the truss member or key-block and position so as not to interfere with bottom and top chord joints and connector plates. Refer to Detail 1 and Detail 2 for spacing requirements
 - .3 Lag screws and bolts shall be installed according to 2005 *NDS* requirements. A "test" installation is recommended before drilling the lead holes, to ensure that the lead holes are neither too small nor too large.

1/2" x 6" lag screws:

Lead holes for the threaded portion shall be $\frac{5}{16}$ ".

Clearance holes shall be 1/2" and the same depth of penetration as the length of un-threaded shank.

1/2" -diameter bolts:

Holes shall be a minimum of $\frac{17}{32}$ " to a maximum of $\frac{9}{16}$ ".

All fasteners used with PPT wood shall be hot-dip zinc-coated galvanized steel, stainless steel, silicon bronze, or copper. Fasteners to be hot-dipped galvanized shall meet the requirements of *ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*, Class D, for fasteners $\frac{3}{8}$ " diameter and smaller or Class C for fasteners with diameters over $\frac{3}{8}$ ". Lag screws, bolts, nuts and washers are permitted to be mechanically deposited zinc-coated steel with coating weights in accordance with *ASTM B695*, Class 55, minimum.

All hardware (e.g., joist hangers, hold-down devise, etc.) shall be galvanized or shall be stainless steel. Hardware to be hot-dipped prior to fabrication shall meet *ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*, G-185 coating. Hardware to be hot-dipped galvanized after fabrication shall meet *ASTM A123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*.

Fasteners and hardware exposed to saltwater or located within 300' of a salt water shoreline shall be stainless steel grade 304 or 316.

Fasteners and hardware shall be of the same corrosion-resistant material.

Other coated or non-ferrous fasteners or hardware shall be as approved by the authority having jurisdiction.

4. Install flashing at top of ledger for water tightness. Flashing shall be corrosion-resistant metal of minimum nominal 0.019" thickness or an approved non-metallic material. Do not use aluminum flashing in direct contact with lumber treated with preservatives containing copper, such as ACQ, Copper Azole or ACZA.
5. Two-ply 2x4 truss end verticals, 4x4 truss vertical webs and key-blocks connected to ledger with lag screws or bolts shall have a specific gravity, G = 0.42 (includes DF, HF, SP and SPF).

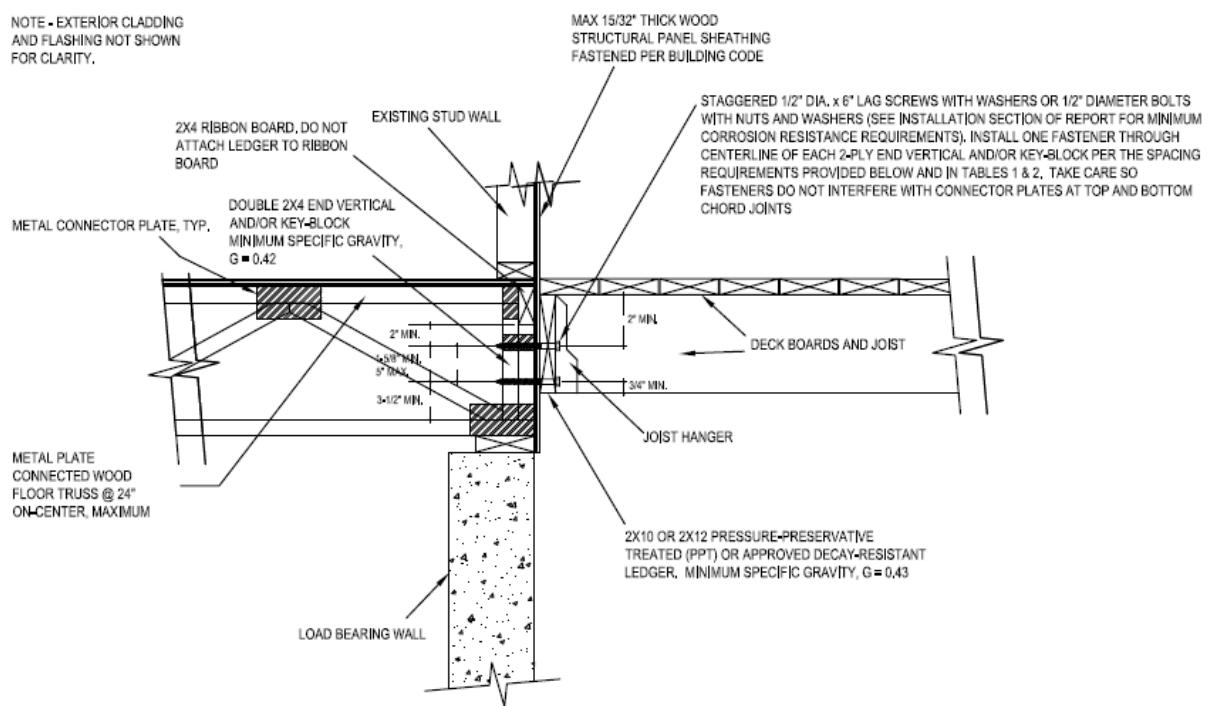
Construct key-blocks with minimum 2x4 No. 2 or better lumber.

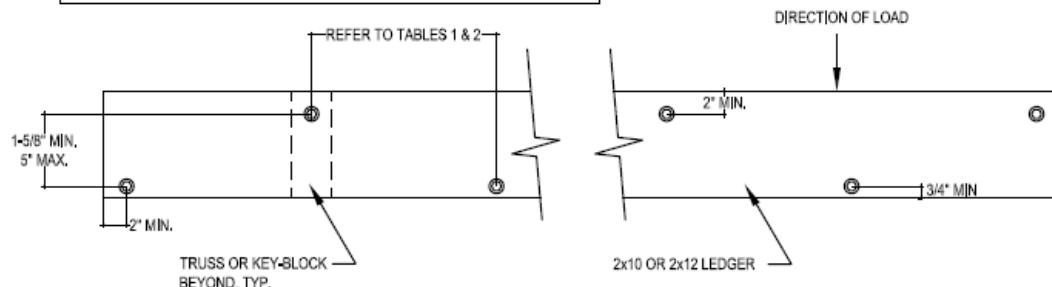
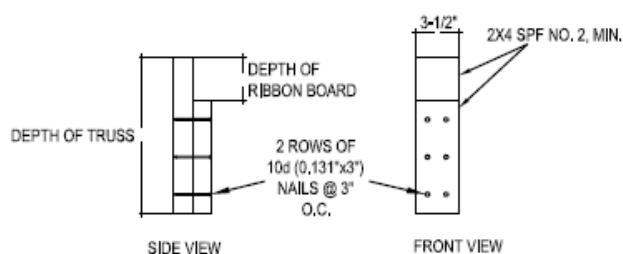
Install key-blocks at required locations. Cut to fit tight.

Refer to Detail 1 and Detail 2 for additional information concerning key-block construction and attachment.

WALL SECTION

NOTE - EXTERIOR CLADDING AND FLASHING NOT SHOWN FOR CLARITY.



PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGER**KEY-BLOCK DETAIL FOR LEDGER ATTACHED TO END OF TRUSSES**

ATTACH TOP OF KEY-BLOCK TO INSIDE FACE OF RIBBON BOARD WITH 2 - 10d (0.131" x 3") THROUGH NAILS AND 2 - 10d TOE-NAILS. ATTACH BOTTOM OF KEY-BLOCK TO SILL PLATE WITH 4 - 10d TOE-NAILS

Detail 1: Attachment of Deck Ledger to Floor System with MPCW Trusses

Joist Span	≤ to 6'	6'-1" to 8'	8'-1" to 10'	10'-1" to 12'	12'-1" to 14'	14'-1" to 16'	16'-1" to 18'
Connection Details	On-center Spacing of Fasteners (in.) ⁴						
1/2"x 6" lag screw with 15/32", max., wood structural panel sheathing	24	12 ^b	12 ^b	12 ^b	12 ^b	8 ^b	8 ^b
1/2" diameter bolt with 15/32", max., wood structural panel sheathing	24	24	24	24	24	12 ^b	12 ^b

5. Ledgers shall be flashed in accordance with applicable building code requirements to prevent water from contacting the exposed wood structural sheathing and floor truss.

6. Snow load shall not be assumed to act concurrently with live load.

7. Ledgers must be 2x10 or 2x12 PPT or code-approved decay-resistant lumber with specific gravity, $G \geq 0.43$. Truss 2-ply 2x4 end verticals and key-blocks must have a $G \geq 0.42$.

8. Stagger lag screws and bolts as shown in Detail 1.

9. Requires key-blocks at 24" o.c., maximum. Attach ledger to 2-ply end vertical of each truss with one (1) fastener and to each key-block with one (1) fastener. Refer to Detail 1 for key-block construction and installation information.

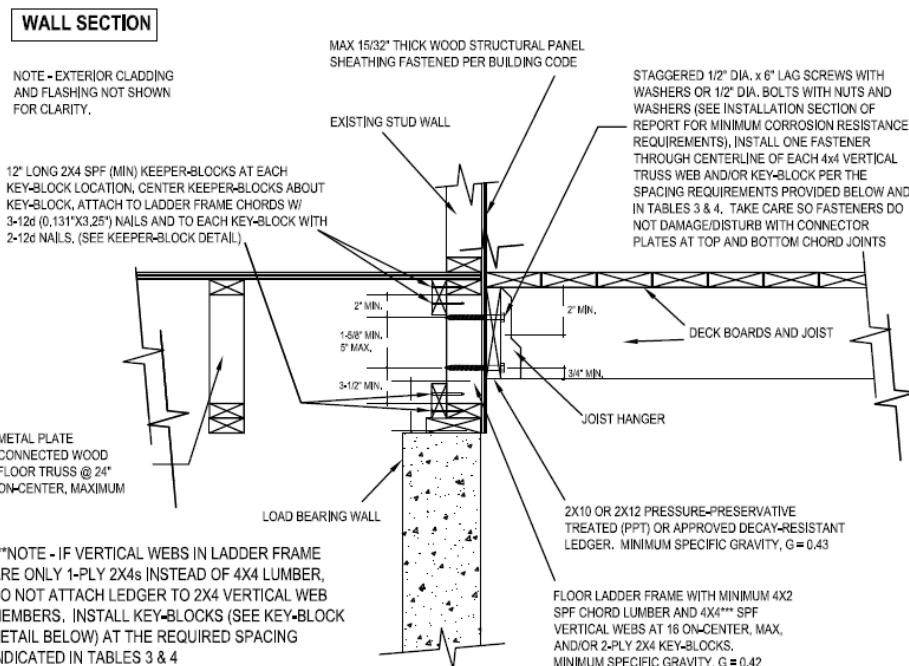
10. Requires two (2) key-blocks at 8" o.c., maximum, between each truss. Attach ledger to 2-ply end vertical of each truss with one (1) fastener and to each key-block with one (1) fastener. Refer to Detail 1 for key-block construction and installation information.

Table 1: Deck Ledger Connection to Ends of MPCW Floor Trusses Spaced 24" o.c., Max.^{1,2,3}
(Deck Live Load = 40 psf, Deck Dead Load = 10 psf, Snow Load \leq 40 psf)

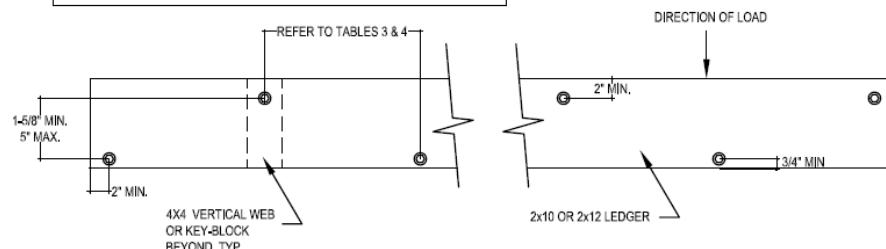
Joist Span	\leq to 6'	6'-1" to 8'	8'-1" to 10'	10'-1" to 12'	12'-1" to 14'	14'-1" to 16'	16'-1" to 18'
Connection Details	On-center Spacing of Fasteners (in.) ⁴						
1/2" x 6" lag screw with $\frac{15}{32}$ ", max., wood structural sheathing	12 ^b	12 ^b	12 ^b	8 ^b	8 ^b	8 ^b	Use bolted connection
1/2" diameter bolt with $\frac{15}{32}$ ", max., wood structural sheathing	24	24	24	12 ^b	12 ^b	12 ^b	12 ^b

1. Ledgers shall be flashed in accordance with applicable building code requirements to prevent water from contacting the exposed wood structural sheathing and floor truss.
 2. Snow load shall not be assumed to act concurrently with live load.
 3. Ledgers must be 2x10 or 2x12 PPT or code-approved decay-resistant lumber with specific gravity, $G \geq 0.43$. Truss 2-ply 2x4 end verticals and key-blocks must have a $G \geq 0.42$.
 4. Stagger lag screws and bolts as shown in Detail 1.
 5. Requires key-blocks at 24" o.c., maximum. Attach ledger to 2-ply end vertical of each truss with one (1) fastener and to each key-block with one (1) fastener. Refer to Detail 1 for key-block construction and installation information.
 6. Requires two (2) key-blocks at 8" o.c., maximum, between each truss. Attach ledger to 2-ply end vertical of each truss with one (1) fastener and to each key-block with one (1) fastener. Refer to Detail 1 for key-block construction and installation information.

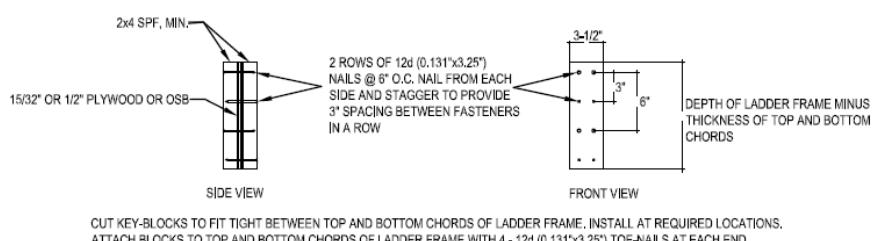
Table 2: Deck Ledger Connection to Ends of MPCW Floor Trusses Spaced 24" o.c., Max.^{1,2,3}
(Deck Live Load = 60 psf, Deck Dead Load = 10 psf, Snow Load \leq 60 psf)



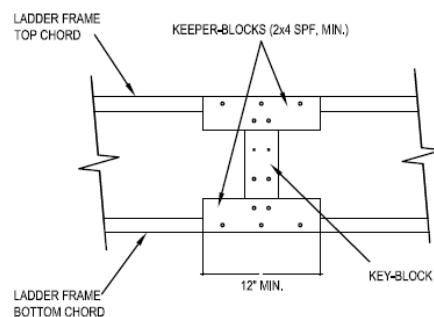
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGER



KEY-BLOCK DETAIL FOR LEDGER ATTACHED TO SIDE OF FLOOR LADDER FRAME



KEEPER-BLOCK DETAIL FOR LEDGER ATTACHED TO SIDE OF FLOOR LADDER FRAME



Detail 2: Attachment of Deck Ledger to Floor System with MPCW Trusses,
When Ledger is Installed Parallel to Truss Span & Spacing of Screws is Less Than the Spacing of the Verticals

Joist Span	< 6' to 8'	8'-1" to 10'	10'-1" to 12'	12'-1" to 14'	14'-1" to 16'	16'-1" to 18'
Connection Details	On-center Spacing of Fasteners (in.) ⁴					
1/2" x 6" lag screw with 15/32", max., wood structural sheathing	16	16	8 ⁵	8 ⁵	8 ⁵	8 ⁵
1/2" diameter bolt with 15/32", max., wood structural sheathing	32	32	16	16	16	16
1. Ledgers shall be flashed in accordance with applicable building code requirements to prevent water from contacting the exposed wood structural sheathing and floor truss. 2. Snow load shall not be assumed to act concurrently with live load. 3. Ledgers must be 2x10 or 2x12 PPT or code-approved decay-resistant lumber with specific gravity, G > 0.43. Truss 4x4 vertical web and key-blocks must have a G > 0.42. 4. Stagger lag screws and bolts as shown in Detail 2. 5. Requires key-blocks at 16" o.c., maximum. Attach ledger to each 4x4 vertical web with one (1) fastener and to each key-block with one (1) fastener. Refer to Detail 2 for key-block construction and installation information.						

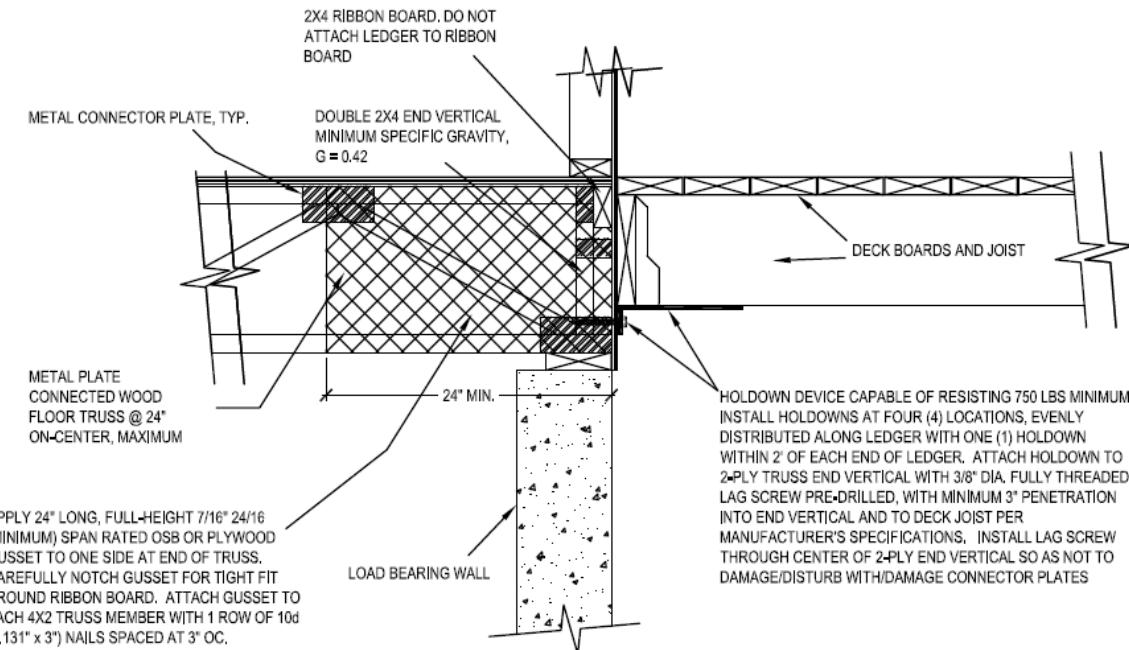
Table 3: Deck Ledger Connection to Side of MPCW Floor Ladder Frame with 4s4 Vertical Webs Spaced at 16" o.c., Max.^{1,2,3}
(Deck Live Load = 40 psf, Deck Dead Load = 10 psf, Snow Load \leq 40 psf)

Joist Span	< 6' to 8'	8'-1" to 10'	10'-1" to 12'	12'-1" to 14'	14'-1" to 16'	16'-1" to 18'
Connection Details	On-center Spacing of Fasteners (in.) ⁴					
1/2" x 6" lag screw with 15/32", max., wood structural sheathing	16	8 ⁵	8 ⁵	8 ⁵	8 ⁵	Use bolted connection
1/2" diameter bolt with 15/32", max., wood structural sheathing	32	16	16	16	8 ⁵	8 ⁵
1. Ledgers shall be flashed in accordance with applicable building code requirements to prevent water from contacting the exposed wood structural sheathing and floor truss. 2. Snow load shall not be assumed to act concurrently with live load. 3. Ledgers must be 2x10 or 2x12 PPT or code-approved decay-resistant lumber with specific gravity, G > 0.43. Truss 4x4 vertical web and key-blocks must have a G > 0.42. 4. Stagger lag screws and bolts as shown in Detail 2. 5. Requires key-blocks at 16" o.c., maximum. Attach ledger to each 4x4 vertical web with one (1) fastener and to each key-block with one (1) fastener. Refer to Detail 2 for key-block construction and installation information.						

Table 4: Deck Ledger Connection to Side of MPCW Floor Ladder Frame with 4x4 Vertical Webs Spaced at 16" o.c., Max.^{1,2,3}
(Deck Live Load = 60 psf, Deck Dead Load = 10 psf, Snow Load \leq 60 psf)

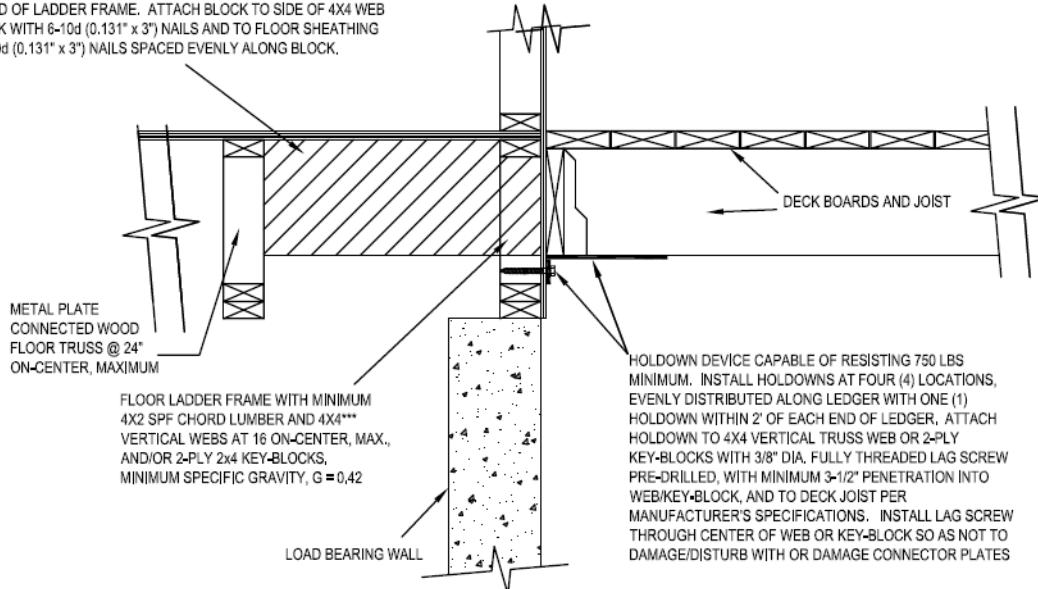
LEDGER ATTACHED TO ENDS OF TRUSSES

REFER TO DETAIL 1 FOR
ADDITIONAL INFORMATION

**LEDGER ATTACHED TO SIDE OF FLOOR LADDER FRAME**

REFER TO DETAIL 2 FOR
ADDITIONAL INFORMATION

APPLY MINIMUM 2x₆ SPF BLOCK OF SAME DEPTH AS DECK JOISTS TO ONE SIDE OF EACH 4X4 VERTICAL WEB OR KEY-BLOCK TO WHICH THE HOLDOWN IS ATTACHED. CUT BLOCK TO FIT TIGHT BETWEEN EXTERIOR SHEATHING AND SIDE OF FIRST INTERIOR FLOOR TRUSS. CAREFULLY NOTCH BLOCK FOR TIGHT FIT AROUND TOP CHORD OF LADDER FRAME. ATTACH BLOCK TO SIDE OF 4X4 WEB OR 2-PLY KEY-BLOCK WITH 6-10d (0.131" x 3") NAILS AND TO FLOOR SHEATHING WITH 1-ROW OF 7-10d (0.131" x 3") NAILS SPACED EVENLY ALONG BLOCK.



Detail 3: Deck Lateral Load Connection Capable of Resisting the 1500 lbf Lateral Load Requirement

Specified in 2009 & 2012 IRC Section 507

Published under s. 35.93, Stats. Updated on the first day of each month. Entire code is always current. The Register date on each page is the date the chapter was last published.

Findings:

Nailing deck ledgers to metal plate connected wood truss floor systems is not sufficient. The deck ledger must be attached to the truss or key-block with lag screws or bolts. Various options and connection details for achieving the connection of the deck ledger to the metal plate connected wood truss floor system are provided in this report, which may be referred to by the building designer to achieve a code-conforming deck ledger connection.

IBC Section 104.11 and IRC Section R104.11 (IFC Section 104.9 is similar) state:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ... Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.

This research report is subject to periodic review and revision. For the most recent version of this report, visit sbcindustry.com. For information on the current status of this report, contact SBCA.

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NO_KEY The last sentence is adopted language in the 2015 codes.

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