



Hardin County

Planning and Development Commission

Building Code Clarification Handout, #2008.006, January 2008

Deck and Stair Guide

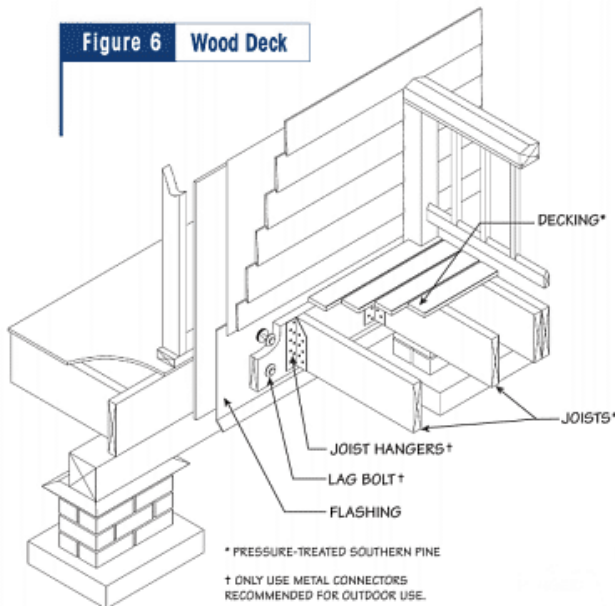
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Information in this handout is taken from the 2007 Kentucky Residential Code; 2006 International Residential Code; and the 2006 IRC Code and Commentary.

The following building code requirements are the current minimum code standards, required for decks and stairways, interior and exterior, in One and Two family dwellings, and based on Kentucky Amendments to the 2007 Kentucky Residential Code, Second Edition, May 15, 2007.

Disclaimer: This is not a listing of all code sections involving building or utilities which involve this subject, but only the sections most often questioned. Refer to the 2007 Kentucky Residential Code book for information not listed in this handout and for other requirements of the building code.

1. **Deck. (R202.)** An exterior floor system supported on at least two opposing sides by an adjoining structure and/or posts, piers, or other independent supports.
2. **Design. (R301.1)** The deck floor and support system including column posts, girders, beams, floor joist, deck planking, bracing, and stairs guardrails and handrails shall be designed to meet 90 mph wind loads and the required floor loads, snow loads, live loads, and dead loads imposed upon it as required in the tables and associated sections of the currently adopted Kentucky Residential Code. **Table R301.5 Minimum Uniformly Distributed Live Loads (in pounds per square foot): Deck 40 psf, Exterior Balconies 60 psf, Stairs 40 psf, Guardrails and Handrails 200 psf.** The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation.



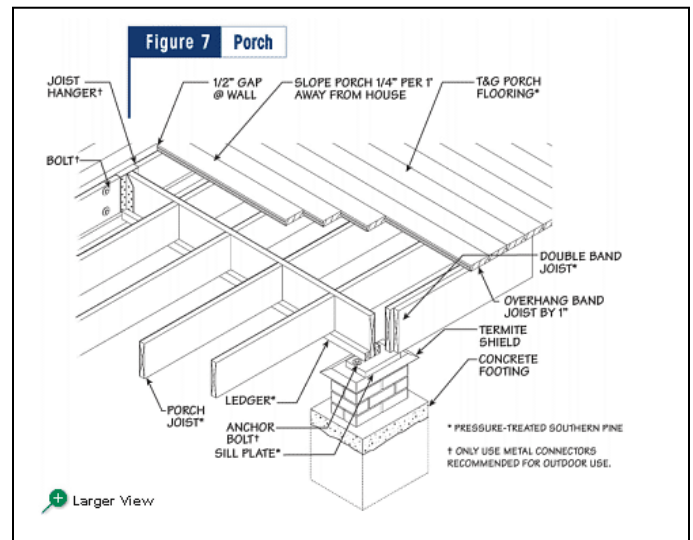
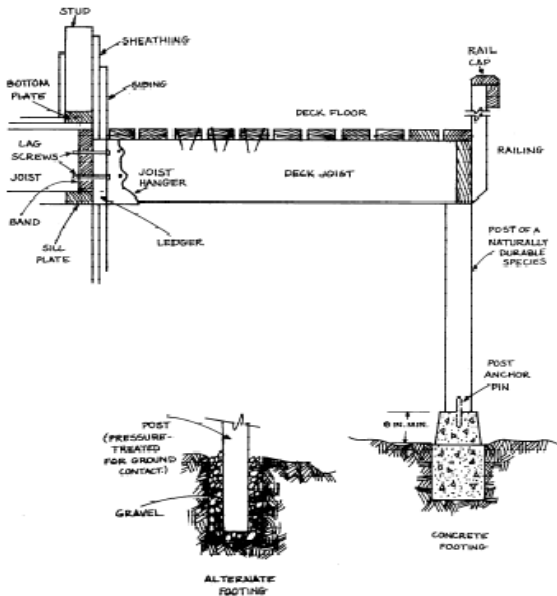
3. **Protection Against Decay. (R504.1.)** Approved naturally durable or pressure preservative treated wood shall be used for the following members: 1. Horizontal members including girders, joists, and decking. 2. Vertical members including posts, poles, and columns. 3. Both horizontal and vertical members comprising the rest of the structure.
4. **Quality Mark. (R502.1), (R319.2)** Lumber and plywood required to be pressure preservative treated shall bear the quality mark of an approved inspection agency that has been approved by an accreditation body that complies with the requirements of the American Lumber Standard Committee Treated Wood Program.
5. **Fasteners. (R319.3)** Fasteners for pressure preservative treated wood shall be of hot-dipped galvanized steel, stainless steel, silicon bronze or copper. Exception: ½ inch diameter or greater steel bolts.
6. **Wood Grade. (R502.1)** All load-bearing lumber shall be identified by the grade mark of a lumber grading or inspection agency which has been approved by an accreditation body that complies with DOC PS 20. (**Non-graded, rough-sawn lumber cut at local sawmills or by the homeowner is not approved.**)
7. **Remove all vegetation below your deck.** Backfill next to the home, and slope final grade of ground 6" drop in ten feet away from the home. Recommendation: As a minimum installing a landscape fabric (to prevent weeds) at top of ground and adding a 2" depth of pea gravel or small clean gravel will help to maintain the area.
8. **KY. Amendments, (R403.1.4) Minimum Depth.** (The posts, poles, and columns supporting a deck structure are considered the footing and foundation system of the deck structure.) All exterior footings shall be placed at least 24 inches below the undisturbed ground into virgin soil. The bottom of the deck support posts, poles, and columns shall be 24 inches below finished grade.

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- 9. **Decks and porches adjacent to mobile homes and manufactured homes must be self-supporting and not attached to the structure of the home.** *Note: The manufacturer did not design the home to carry the extra weight of a deck or porch. (State Manufactured Home Ordinance, Date 07-13-04).*
- 10. **Decks. (R502.2.2)** Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads as applicable. *Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. (Combination through bolts or lag screws is the acceptable fastener method.)* Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.4 acting on the cantilevered portion of the deck. *Do not exceed 24 inch maximum cantilever overhang length.*
- 11. **Allowable Joist Spans. (R502.3)** Spans for floor joists shall be in accordance with Tables R502.3.1(1) and R502.3.1(2). The design live load shall not exceed 40 psf and the design dead load shall not exceed 10 psf. (All beams and joist size and span must meet minimum requirements listed in the building code.)

60 DETAILS FOR CONVENTIONAL WOOD FRAME CONSTRUCTION

Figure 67. Wood Deck



- 12. **Where can the deck be located?** There are several restrictions that govern the location of a deck on a lot, (Hardin County, KY Development Guidance System; Development Standards Residential Districts), these are as follows:
 - 12.1 Decks shall not extend beyond side or the rear yard building setback lines.
 - 12.2 Elevated decks or porches shall not be located within the building setback lines of the front yard.
 - 12.3 Decks shall not be located within any easement.
 - 12.4 Decks shall not be located within the septic tank lateral field restricted area of the yard, nor above the septic tank or its cleanout.
 - 12.5 The only crawl space access opening cannot be located below the deck.
 - 12.6 **“Call before you dig”.** Caution shall be used by the homeowner and/or builder in digging for the deck support system. **Contact “Call Before You Dig” #811 for buried cable and other underground utilities prior to digging.** This is the responsibility of every homeowner.
- 13. **Joist Framing. (R502.6.2)** Joist framing into the side of a wood girder shall be supported by approved framing anchors, or on ledger strips not less than nominal 2 inches by 2 inches.
- 14. **Floor Systems. (R502.6.1)** Joist framing from opposite sides over a bearing support shall lap a minimum of 3 inches and shall be nailed together with a minimum of three 10d face nails.

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15. **Bearing. (R502.6).** The ends of each joist, beam or girder shall have not less than 1.5 inches of bearing on wood or metal and not less than 3 inches on masonry or concrete except where supported on a 1 inch by 4 inch ribbon strip and nailed to the adjacent stud or by the use of approved joist hangers.

Table 10 Nailing Schedule for Floor Framing		
Joint Description	Number and Size of Common Nails	Nail Spacing
Joist to Sill, Top Plate or Girder (toe-nailed)	4- 8d	per joist
Bridging to Joist (toe-nailed)	2- 8d	each end
Blocking to Joist (toe-nailed)	2- 8d	each end
Blocking to Sill or Top Plate (toe-nailed)	3- 16d	each block
Ledger Strip to Beam (face-nailed)	3- 16d	each joist
Joist on Ledger to Beam (toe-nailed)	3- 8d	per joist
Band Joist to Joist (end-nailed)	3- 16d	per joist
Band Joist to Sill or Top Plate (toe-nailed)	2- 16d ¹	per joist

Source: Wood Frame Construction Manual, 2001 Edition, American Wood Council, Table 3.1.
 1 Nailing requirements are based on wall sheathing nailed 6" on-center at the panel edge. If wall sheathing is nailed 3" on-center at the panel edge to obtain higher shear capacities, nailing requirements for structural members shall be doubled, or alternate connectors, such as shear plates, shall be used to maintain the load path.

Figure 17. Joist Supported on Ledger

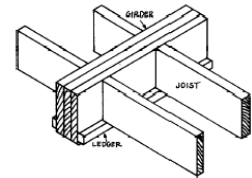
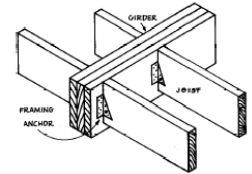


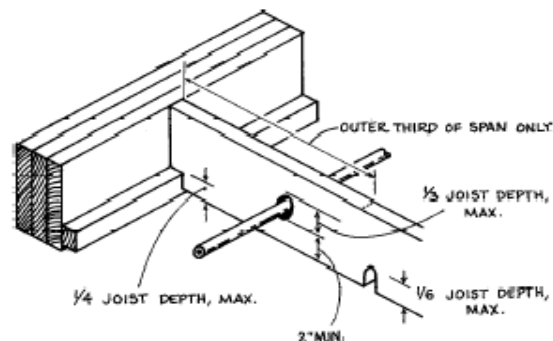
Figure 18. Joist Supported by Metal Framing Anchors



16. **Fastening. (R502.9)** Floor framing shall be nailed in accordance with Table R602.3(1). Where post and beam or girder construction is used to support floor framing, positive connections shall be provided to ensure against uplift and lateral displacement.

17. **Drilling and Notching. (R502.8)** Structural floor members shall not be cut, bored or notched in excess of the limitations specified in this section. See figure below.

Figure 26. Notching and Boring of Joists

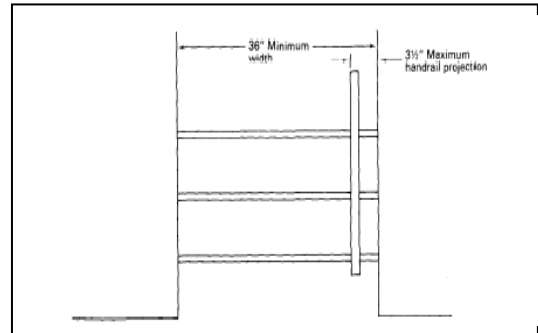


18. **Drilling and Notching of Sawn Lumber. (R502.8.1)** Notches in solid lumber joists, rafters, and beams shall not exceed one-sixth of the depth of the member, shall not be longer than one-third of the member and shall not be located in the middle one-third of the span.
- Notches at the ends of the members shall not exceed one-fourth the depth of the member.
 - The tension side of members 4 inches or greater in nominal thickness shall not be notched except at the ends of the members.
19. **Holes Bored in Sawn Lumber. (R502.8.1).** The diameter of holes bored or cut into members shall not exceed one-third the depth of the member.
- Holes shall not be closer than 2 inches to the top or bottom of the member, or to any other hole located in the member.
 - Where the member is also notched, the hole shall not be closer than 2 inches to the notch.
20. **Engineered Wood Products. (R502.8.2).** Cuts, notches, and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional. *Note: Structural composite lumber is a generic term which encompasses a variety of engineered composite wood products including: laminated veneer lumber (LVL); laminated strand lumber (LSL); parallel strand lumber (PSL), and oriented strand lumber (OSL). The prohibitions in this section apply to all of these products.*

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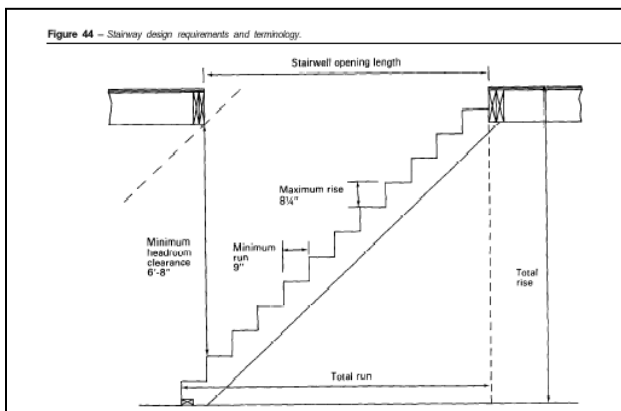
- 21. **Lateral Restraint At Supports. (Blocking of Joists) (R502.7).** Joists shall be supported laterally at the ends by full depth solid blocking not less than 2 inches nominal thickness; or by attachment to a header, band, or rim joist, or to an adjoining stud; or shall be otherwise provided with lateral support to prevent rotation.
- 22. **Bridging of Joists. (R502.7.1)** Joists exceeding a nominal 2" by 12" shall be supported laterally by solid blocking, diagonal bridging (wood or metal), or a continuous 1" by 3" strip nailed across the bottom of joists perpendicular to joists at intervals not exceeding 8 feet.
- 23. **Stairways. Width. (R311.5.1)** Stairways shall not be less than 36 inches in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31.5 inches where a handrail is installed on one side and no less than 27 inches where handrails are provided on both sides.

- 24. **Stairways. Treads and Risers. (R311.5.3).** The maximum riser height shall be 8 ¼ inches and the minimum tread depth shall be 9 inches (plus the required ¾ inch but not more than 1 ¼ inch nosing profile). The riser height shall be measured vertically between leading edges of the adjacent treads. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of the adjacent treads and at a right angle to the tread's leading edge. The walking surface of treads and landings of a stairway shall be sloped no steeper than one unit vertical in 48 units horizontal (2 percent slope). The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch.



HANDRAIL ILLUSTRATION DRAWING

- 25. **Stairway Profile. (R311.5.3.3)** The radius of curvature at the leading edge of the tread shall be no greater than 9/16 inch.
 - 13. A nosing not less than ¾ inch but not more than 1 ¼ inches shall be provided on stairways with solid risers.
 - Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch-diameter sphere.
 - **Exceptions:** 1. A nosing is not required where the tread depth is a minimum of eleven inches. 2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches or less.
- 26. **Stairway Headroom. (R311.5.2).** The minimum headroom in all parts of the stairway shall be not less than 6'-8" measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform.



STAIRWELL ILLUSTRATION DRAWING
 Note: Minimum Tread Depth 9 3/4" including 3/4" required nosing profile.

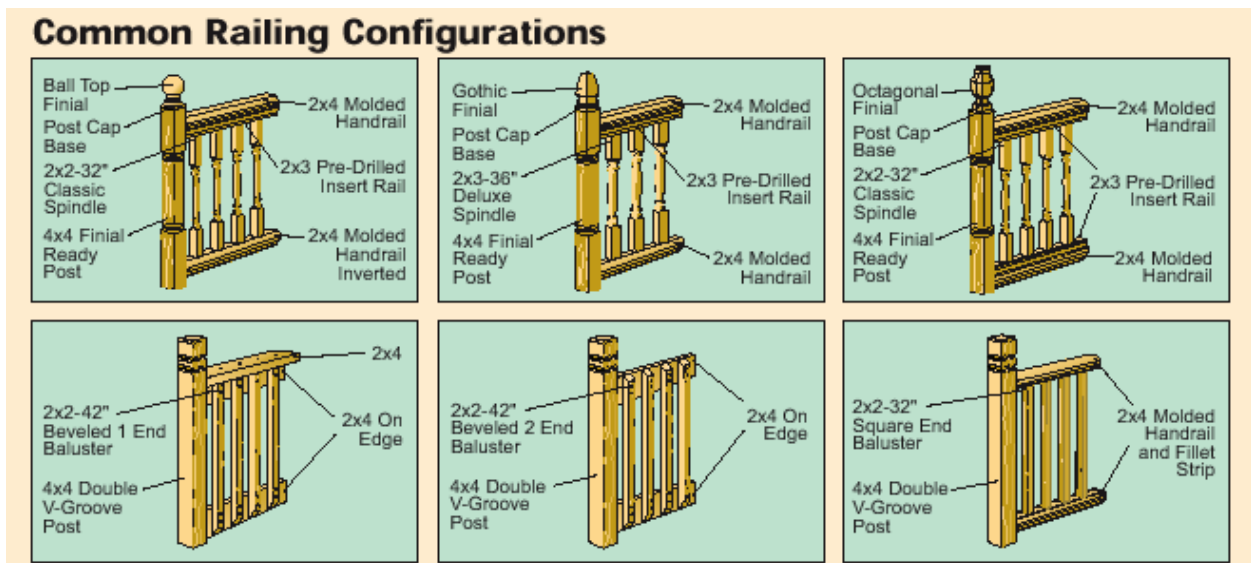
- 27. **Stairway Winders. (R311.5.3.2).** Winders are permitted, provided that the width of the tread at a point not more than 12 inches from the side where the treads are narrower is not less than 10 inches and the minimum width of any tread is not less than 6 inches. The continuous handrail required by Section R315.1 shall be located on the side where the tread is narrower.
- 28. **Stairway Handrails. (R311.5.6)** Handrails having minimum heights of 34" and maximum heights of 38", measured vertically from the nosing of the treads, shall be provided on at least one side of stairways.
- 29. **Handrails Required.** Handrails shall be provided on at least one side of each continuous run of treads or flight with 4 or more risers. All required handrails shall be continually graspable the full length of the stairs with four (4) or more

risers from a point directly above the top riser of a flight to a point directly above the lowest riser of the flight. Handrails adjacent to a wall shall have a space of not less than 1 ½ inch measured between the wall and the handrail.

- 30. **Ends shall be returned** or shall terminate in newel posts or safety terminals. **Exceptions:** 1. Handrails shall be permitted to be interrupted by a newel post at a turn. 2. The use of a volute, turnout, or starting easing shall be allowed over the lowest tread.

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- 31. Handrail Grip Size. (R311.5.6.3)** The handgrip portion of handrails shall have a circular cross section of 1 ¼ inches minimum to 2 5/8 inches maximum.
- Other handrail shapes, including those complying with Figure 315.2 (A-F), that provide an equivalent grasping surface are permissible.
 - Edges shall have a minimum radius of 1/8 inch.
- 32. Stair Handrails. (R311.5.6)** Stair handrails shall be permitted to be discontinuous between the top and the bottom of a flight of stairs where the ends of the discontinued rail are returned to a wall or post and the maximum distance between the ends of discontinued rails is not greater than 4 inches.
- 33. Guards Required. (R312.1).** Porches, balconies, or raised floor surfaces (decks), located more than 30 inches above the floor or grade below shall have guards not less than 36 inches in height.
- Open sides of stairs with a total rise of more than 30 inches above the floor or grade below shall have guards not less than 34 inches in height measured vertically from the nosing of the treads.
 - Porches and decks which are enclosed with insect screening shall be equipped with guards where the walking surface is located more than 30 inches above the floor or grade below.



TYPICAL STAIR GUARDRAIL CONFIGURATIONS

- 34. Guard Opening Limitations. (R312.2)** Required guards on open sides of stairways, raised floor areas, decks, balconies and porches shall have intermediate rails or ornamental closures that do not allow passage of a sphere 4 inches in diameter. **Exception: 1.** Openings for required guards on the sides of stair treads shall not allow a sphere 4 3/8 inches in diameter to pass through. **Exception: 2.** The triangular openings formed by the stair riser, stair tread, and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches cannot pass through.

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35. Landings. (R311.5.4) There shall be a floor or landing at the top and bottom of each stairway.

There shall be a floor or landing or stairs on each side of each exterior door. The floor or landing at a door shall not be more than 1.5 inches lower than the top of the threshold.

- **Exception:** The landing at an exterior doorway shall not be more than 8 ¼ inches below the top of the threshold, provided the door other than an exterior storm or screen door, does not swing over the landing. Required egress doors shall have landings.

36. Landing Size. (R311.5.4) The width of each landing shall not be less than the stairway or door served. Every landing shall have a minimum dimension of 36 inches measured in the direction of travel.

37. Pressure preservative treated wood floors on ground. (R504). Pressure-preservative treated-wood basement floors and floors on ground shall be designed to withstand axial forces and bending moments resulting from lateral soil pressures at the base of the exterior walls and floor live and dead loads. Floor framing shall be designed to meet joist deflection requirements in accordance with Section R301.

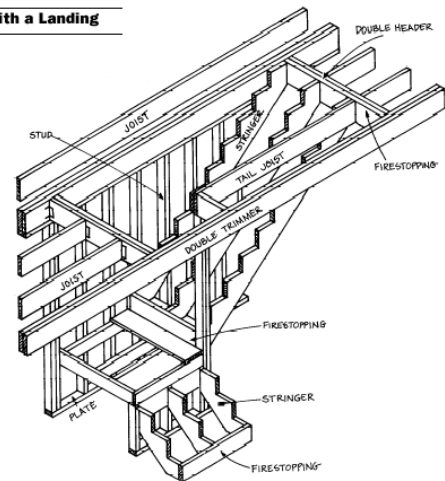
38. Site preparation. (R504.2) The area within the foundation walls shall have all vegetation, topsoil, and foreign material removed, and any fill material that is added shall be free of vegetation and foreign material. The fill shall be compacted to assure uniform support of the pressure-preservative treated wood sleepers.

39. Base. (R504.2.1) A minimum 4-inch thick granular base of gravel having a minimum size of ¾ inch or crushed stone having a maximum size of ½ inch shall be placed over the compacted earth.

40. Moisture Barrier. (R504.2.2) Polyethylene sheeting of minimum 6-mil thickness shall be placed over the granular base. Joints shall be lapped 6 inches and left unsealed. The polyethylene membrane shall be placed over the pressure-preservative treated wood sleepers and shall not extend beneath the footing plates of the exterior walls.

41. Materials. (R504.3) All framing materials including sleepers, joists, blocking and plywood subflooring, shall be pressure-preservative treated and dried after treatment in accordance with AWPA U1 and shall bear the label of an accredited agency.

Figure 32. Stairway With a Landing



ILLUSTRATIONS SUMMARY LISTING:

- Page 1, Figure 6 Wood Deck: <http://www.raisedfloorliving.com/decks.shtml#fig6>, Southern Pine Council
- Page 2, Figure 67 Wood Deck: <http://www.raisedfloorliving.com/decks.shtml#fig6>, Southern Pine Council
- Page 2, Figure 7 Porch: <http://www.raisedfloorliving.com/decks.shtml#fig6>, Southern Pine Council
- Page 3, Table 10, Nailing Schedule for Floor Framing: Wood Frame Construction Manual, 2001 Edition, American Wood Council, Table 3.1
- Page 3, Figure 17, Joist Supported on Ledger: <http://www.awc.org/pdf/WCD1-300.pdf>, American Wood Council
- Page 3, Figure 18, Joist Supported By Metal Framing Anchors: <http://www.awc.org/pdf/WCD1-300.pdf>, American Wood Council
- Page 3, Figure 26, Notching and Boring of Joists: <http://www.awc.org/pdf/WCD1-300.pdf>, American Wood Council
- Page 4, Handrail Illustration Drawing: <http://www.fpl.fs.fed.us/documnts/usda/ah73/ah73chapter3.pdf>
- Page 4, Stairwell Illustration Drawing: Figure 44 – Stairwell Design and Terminology, <http://www.fpl.fs.fed.us/documnts/usda/ah73/ah73chapter3.pdf>
- Page 5, Figure 32, Stairway with a Landing: <http://www.awc.org/pdf/WCD1-300.pdf>, American Wood Council
- Page 5, Common Railing Configurations: <http://www.ufpi.com/product/wdeck/railconfig.htm>, Universal Forest Products

What inspections are required?

1. Post Holes – After pier holes are excavated, before the posts are installed, before dirt or concrete backfilling is done, and before pouring the concrete.
2. Framing Inspection/Final Inspection. – After framing is complete, decking is installed, stairs are complete, and handrails and guardrails are complete. Prior to using and loading the deck.
3. If the deck or porch is covered with a roof, the framing inspection is required prior to installing any ceiling or wall finishes.

Other Inspection Related Information:

- Inspections are scheduled Monday through Friday by contacting the Hardin County Planning & Development Commission at (270) 769-5479 before 4:00 PM on the previous day before the inspection is needed. The homeowner is responsible for calling to request the inspection.
- Provide the name the permit was issued in and the street location of the project, and the phone number of a contact person when calling in for inspections.
- If the inspector needs to return to the site for the same inspection, a \$25.00 Reinspection fee is required to be paid before the Reinspection can be scheduled.
- No Reinspection on the same phase of construction shall be done in the same 24-hour period.
- **Expiration. (R105.3.2)** Every permit issued shall become invalid unless the work is started within 180 days after its issuance, or if the work authorized on the site by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced.
- **Placement of Permit. (R105.7)** The building permit or copy shall be kept on site of the work until the completion of the project. (The Building Permit shall be posted where it is visible from the street.)
- **Access required to project is to be furnished by Owner (R109.3),** It shall be the duty of the permit holder to provide access to and means for inspection of such work for the required inspections. It shall be the duty of the permit holder or their agent to notify the building official that such work is ready for inspection.

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Building Code Clarification Handouts Available Listing, 03-25-08

- | | |
|---|---|
| 2008.001, Crawlspace & Basement Requirements | 2008.008, Egress Windows and Window Wells |
| 2008.002, Energy Efficiency Requirements | 2008.009, 2007 Top Residential Code Requirements (Booklet) |
| 2008.003, Accessory Structure on Residential Lots | 2008.010, Inspection Checklist |
| 2008.004, Dryer Vent Requirements | 2008.011, Ramps, Landings, etc. for the Physically Challenged |
| 2008.005, Footing Inspection Checklist | 2008.012, Swimming Pools |
| 2008.006, Deck and Stair Guide | 2008.013, Floodplain Requirements |
| 2008.007, Windows & Doors- Safety Glazing | |