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**DIVISION: 06—WOOD AND PLASTIC**  
**Section: 06500—Structural Plastics**  
**Section: 06610—Plastic Railings and Guards**

**REPORT HOLDER:**

**MIDWEST MANUFACTURING EXTRUSION**  
**5240 KANE ROAD**  
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**EVALUATION SUBJECT:**

**ULTRADECK™ DECK BOARDS AND RAILING**

**1.0 EVALUATION SCOPE**

**Compliance with the following code:**

2003 *International Residential Code*® (IRC)

**Properties evaluated:**

- Structural
- Durability
- Surface-burning characteristics

**2.0 USES**

The UltraDeck™ Deck Boards described in this report are limited to exterior use as deck boards for balconies, porches, decks, and stair treads; while the UltraDeck™ Railing described in this report is limited to guards for balconies, porches, and decks. The products described in this report are used in buildings classified as dwellings in accordance with the IRC.

**3.0 DESCRIPTION**

**3.1 General:**

UltraDeck™ products described in this report, except where noted otherwise, are wood thermoplastic composite lumber (WTCL) products consisting of approximately 35 percent HDPE (high density polyethylene plastic) and 60 percent wood filler, with the remaining 5 percent consisting of talc and other processing aids specified in the approved quality control document. The UltraDeck™ products are manufactured by an extrusion process.

**3.2 Deck Board:**

**3.2.1 General:** Two models of UltraDeck™ Deck Boards are available: UltraDeck Solid and UltraDeck Hollow/Reversible. The Solid deck board measures  $5\frac{3}{16}$  inches (20.7 mm) wide

by  $\frac{15}{16}$  inch (23.8 mm) thick. The Hollow/Reversible deck board has an overall board thickness of  $1\frac{1}{8}$  inches (28.6 mm), a width of  $5\frac{3}{16}$  inches (131.8mm), and a wall thickness of 0.20 inch (5.1 mm). Figure 1 of this report provides dimensioned cross-sectional profiles of each board type.

**3.2.2 Durability:** When subjected to weathering, insect attack, and other decaying elements, material used to manufacture the UltraDeck deck boards described in this report is equivalent in durability to code-complying preservative-treated or naturally durable lumber when used in locations described in Section 2.0 of this report. UltraDeck products have been evaluated for structural performance when exposed to temperatures from -20°F (-29°C) to 125°F (52°C).

**3.2.3 Surface-burning Characteristics:** When tested in accordance with ASTM E 84, the UltraDeck deck boards described in this report have a flame-spread index of less than 200.

**3.3 Guards:**

**3.3.1 General:** UltraDeck™ Railing is a guard consisting of post sleeves and caps, top and bottom rails, a top-rail steel insert, spindles (post-spindles and balusters), spindle spacer blocks, and a bottom-rail support block. The railing components are wood thermoplastic composite lumber (WTCL) as described in Section 3.1, except for the steel insert, which complies with ASTM A 653, CS Type B, with a G60 coating designation. The minimum yield and tensile strengths, and minimum base-metal thickness, of the steel insert are specified in the approved quality control document.

The height of the Railing assembly is 36 inches (914 mm) above the walking surface. The top and bottom rails are  $1\frac{1}{2}$  inches (38.1 mm) deep and  $2\frac{5}{8}$  inches wide, have a wall thickness of 0.45 inch (11.4 mm), and are available in 12-foot (3.66 m) lengths. The UltraDeck Spindles (balusters) have a solid  $1\frac{3}{16}$ -inch-square (30.2 mm) profile, and are 32 inches (813 mm) long, spaced 4 inches (102 mm) on center. The Post Sleeves are  $4\frac{1}{2}$  inches (114.3 mm) square and have a wall thickness of 0.20 inch (5 mm). Refer to Figure 2 of this report for dimensioned profiles of the post sleeves, top and bottom rails, top-rail metal insert, and spindles (balusters).

**3.3.2 Durability:** When subjected to weathering, insect attack, and other decaying elements, the material used to manufacture UltraDeck™ Railing is equivalent in durability to code-complying, preservative-treated or naturally durable lumber when used in locations described in Section 2.0 of this report. UltraDeck™ Railing has been evaluated for structural performance when exposed to temperatures from -20°F (-29°C) to 125°F (52°C).

**3.3.3 Surface-burning Characteristics:** When tested in accordance with ASTM E 84, UltraDeck™ Railing has a flame-spread index of less than 200.

\*Corrected June 2005

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## 4.0 DESIGN AND INSTALLATION

### 4.1 General:

Installation of the UltraDeck™ Deck Boards and Railing described in this report shall comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions shall be available at the jobsite at all times during installation. When the manufacturer's published installation instructions differ from this report, this report shall govern.

### 4.2 Deck Boards:

**4.2.1 General:** The UltraDeck Solid and UltraDeck Hollow/Reversible deck boards shall be installed perpendicular to the supporting structural members. Deck board edge spacing (gap between the sides of the boards) shall be a minimum of  $\frac{3}{16}$  inch (4.8 mm), and deck board end spacing shall be a minimum of  $\frac{1}{16}$  inch (0.06 mm) for every 16-foot (4.88 m) length of board for every 20°F (6.7°C) temperature difference between the temperature at time of installation and the maximum temperature that can be expected.

Each deck board shall be attached to each supporting structural wood member with two No. 10 by 2 $\frac{1}{2}$ -inch-long (63.5 mm) wood screws, complying with ANSI/ASME Standard B18.6.1. Fasteners for preservative-treated wood shall be hot-dipped galvanized steel or stainless steel in accordance with IRC Section R319.3.

A  $\frac{1}{8}$ -inch (3.2 mm) pilot hole shall be drilled through the deck board, and then the screw shall be installed and countersunk.

Minimum edge and end distances of screws shall comply with the following:

- UltraDeck Solid Deck Boards: Both minimum edge and end distances of screws installed in the UltraDeck Solid deck boards shall be  $\frac{3}{4}$  inch (19.1 mm). Refer to Figure 3 of this report for details.
- UltraDeck Hollow/Reversible Deck Boards: Screws shall be installed through the Hollow/Reversible deck boards where the smaller interior voids are located. This results in a  $1\frac{3}{4}$ -inch (44.5 mm) edge distance. Refer to Figure 4 of this report for details. A slight indented groove is provided along the length of the UltraDeck Hollow/Reversible deck board to facilitate screw installation into the smaller interior voids. The minimum end distance for a screw installed in the UltraDeck Hollow/Reversible deck boards shall be  $\frac{3}{4}$  inch (19.1 mm).

Each board shall be fully supported along its width at each supporting structural member. The maximum allowable cantilever of the Solid and Hollow/Reversible deck boards past a structural support is 6 inches (152 mm).

### 4.2.2 Structural:

**4.2.2.1 Deck Boards:** The UltraDeck Solid and UltraDeck Hollow/Reversible deck boards described in this report have an allowable capacity when installed at a maximum center-to-center spacing of the supporting construction as prescribed in Table 1 of this report.

**4.2.2.2 Deck Boards Used as Stair Treads:** UltraDeck Solid and UltraDeck Hollow/Reversible deck boards described in this report, when used as stair treads, are satisfactory to resist the code-prescribed concentrated load of 300 lbf (1.33 kN) when installed at a maximum center-to-center spacing of the supporting construction as shown in Table 2 of this report.

### 4.3 Guards:

**4.3.1 General:** Refer to Table 3 of this report for installation details concerning the UltraDeck Railing. Refer to Figure 5 of this report for typical post base installation requirements, and to Figure 6 of this report for a typical UltraDeck™ Railing installation.

**4.3.2 Structural:** UltraDeck™ Railing is satisfactory to resist the loads specified in Table R301.5 of the IRC when installed at a maximum 6-foot (1829 mm), center-to-center post spacing. When the railing is supported on one or both ends by the supporting construction, the maximum distance shall be measured from center-of-post to edge-of-structure or edge-of-structure to edge-of-structure.

## 5.0 CONDITIONS OF USE

The UltraDeck™ Deck Boards and Railing described in this report comply with, or are suitable alternatives to what is specified in, the code shown in Section 1.0 of this report, subject to the following conditions:

- 5.1** The UltraDeck™ Deck Boards described in this report are limited to exterior use as deck boards for balconies, porches, decks, and stair treads; and the UltraDeck™ Railing described in this report is limited to guards for balconies, porches, and decks. The products described in this report are used in buildings classified as dwellings in accordance with the IRC.
- 5.2** Installation complies with this report, the manufacturer's published installation instructions and the IRC. Only those fasteners and fastener configurations described in this report have been evaluated for the installation of the UltraDeck Deck Boards and Railing.
- 5.3** The use of the UltraDeck Deck Boards as a component of a fire-resistance rated assembly is outside the scope of this report.
- 5.4** Adjustment factors outlined in the NDS-01 and the IRC shall not apply to the allowable capacity and maximum spans for UltraDeck Deck Boards and Railing.
- 5.5** UltraDeck Deck Boards and Railing shall be directly fastened to supporting construction. Where required by the code official, engineering calculations and construction documents consistent with this report shall be submitted for approval. The calculations shall verify that the supporting construction complies with IRC requirements and is adequate to resist the loads imparted upon it by the products and systems discussed in this report. The documents shall contain details of the attachment to the supporting structure consistent with the requirements of this report. The documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.6** UltraDeck Deck Boards and Railing are produced by Midwest Manufacturing Extrusion at their plant located in Eau Claire, Wisconsin, under a quality control program with inspections by Southern Pine Inspection Bureau (AA-680).

## 6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails) (AC174), dated April 2002 (editorially revised July 2004).
- 6.2** A quality control manual.
- 6.3** Manufacturer's published installation instructions.

## 7.0 IDENTIFICATION

The UltraDeck Deck Boards and Railing components described in this report shall be identified by a label on each individual piece or article of packaging bearing the manufacturer's name (Midwest Manufacturing Extrusion) and/or trademark, the product type, the name of the inspection agency (Southern Pine Inspection Bureau), the evaluation report number (ESR-1674), and the statement "For Use in One- and Two-Family Dwelling Only."

TABLE 1—ULTRADECK DECK BOARD SPAN RATINGS

DECK BOARD PRODUCT NAME	MAXIMUM SPAN <sup>1</sup> (inches)	ALLOWABLE VERTICAL LOAD <sup>2,3,4</sup> (lbf/ft <sup>2</sup> )
UltraDeck Solid	19	100
UltraDeck Hollow/Reversible	19	100

For SI: 1 inch = 25.4 mm; 1 lbf/ft<sup>2</sup> = 0.0479 kN/m<sup>2</sup>.

<sup>1</sup>Maximum span is measured center-to-center of the supporting construction.

<sup>2</sup>Maximum allowable vertical load is both gravity and uplift, and is adjusted for durability. No further increases are permitted.

<sup>3</sup>Each deck board shall be installed in accordance with Section 4.2 of this report.

<sup>4</sup>Allowable pull-through values of one No. 10 by 2<sup>1</sup>/<sub>2</sub>-inch-long (63.5 mm) galvanized deck screw installed in the UltraDeck Solid and Hollow/Reversible deck boards are, respectively, 185 lbf and 100 lbf (823 N and 445 N).

TABLE 2—MAXIMUM STAIR TREAD SPANS FOR ULTRADECK DECK BOARD

ULTRADECK DECK BOARDS USED AS STAIR TREADS	MAXIMUM SPAN <sup>1,2</sup> (inches)
UltraDeck Solid	12
UltraDeck Hollow/Reversible	12

For SI: 1 inch = 25.4 mm; 1 lbf/ft<sup>2</sup> = 0.0479 kN/m<sup>2</sup>.

<sup>1</sup>Maximum span is measured center-to-center of the supporting construction.

<sup>2</sup>Based on a minimum 2-span installation.

TABLE 3—ULTRADECK RAILING INSTALLATION REQUIREMENTS<sup>1,2,3,4,5</sup>

COMPONENT	INSTALLATION REQUIREMENTS	
Posts	Railing posts shall consist of preservative-treated 4-by-4 solid-sawn wood, having a minimum specific gravity of 0.50. Maximum post spacing shall be 6 feet on center. The UltraDeck Post Sleeve slides over the wood post. The post connection to the supporting structure shall be designed. See Figure 5 for a typical railing post connection detail.	
Railing system	Post spindle	A spindle shall be attached to the wood-post sleeve assembly and is called the "post spindle" since it provides the load path from the railing system to the wood posts. The post spindle is installed with a minimum of three No. 9 by 3-inch-long wood screws: one screw shall be located <sup>5</sup> / <sub>8</sub> inch from the top of the spindle, the second screw shall be located 3 inches from the top of the spindle, and the last screw shall be located 3 inches up from the bottom of the spindle.
	Top rail	The top rail is the 1 <sup>1</sup> / <sub>2</sub> -by-2 <sup>5</sup> / <sub>8</sub> -inch handrail member reinforced with the steel insert for its full length. The maximum span of the reinforced top rail shall be 6 feet. The reinforced top rail shall be attached to a post spindle with two No. 8 by 1 <sup>5</sup> / <sub>8</sub> -inch-long wood screws, one on each side of the rail.
	Bottom rail	The bottom rail is an inverted 1 <sup>1</sup> / <sub>2</sub> -by-2 <sup>5</sup> / <sub>8</sub> -inch handrail member without steel reinforcement. The bottom rail shall be attached to a post spindle with two No. 8 by 1 <sup>5</sup> / <sub>8</sub> -inch-long wood screws, one on each side of the rail. Bottom-rail-support blocks shall be provided to ensure that the maximum unsupported span of the bottom rail is 3 feet. A 1-inch-long wood screw shall be installed from inside the groove of the bottom rail into the support block.
	Spindles	Spindle spacer blocks shall be installed in the groove of the top and bottom rails. A spindle is inserted between the top and bottom rail. Each spacer block shall be attached to the rails with one 1-inch-long wood screw. The length of the spacer block shall ensure the spacing of the spindles is a maximum of 4 inches on center.

For SI: 1 inch = 25.4 mm.

<sup>1</sup>Evaluation of the framing members supporting the guardrail assembly is beyond the scope of this evaluation report.

<sup>2</sup>All fasteners shall be installed in predrilled <sup>1</sup>/<sub>8</sub>-inch-diameter holes, and shall be countersunk.

<sup>3</sup>Screws used to attach the railing to the supporting structural wood posts shall comply with ANSI/ASME Standard B18.6.1, and shall be hot-dipped galvanized steel or stainless steel in accordance with IRC Section R319.3 when the wood posts are required to be preservative-treated.

<sup>4</sup>The height of the guardrail assembly is 36 inches above the deck surface.

<sup>5</sup>Refer to Figure 5 for a detail of typical post connection to the supporting framing members, and to Figure 6 for a detail of a typical railing installation.

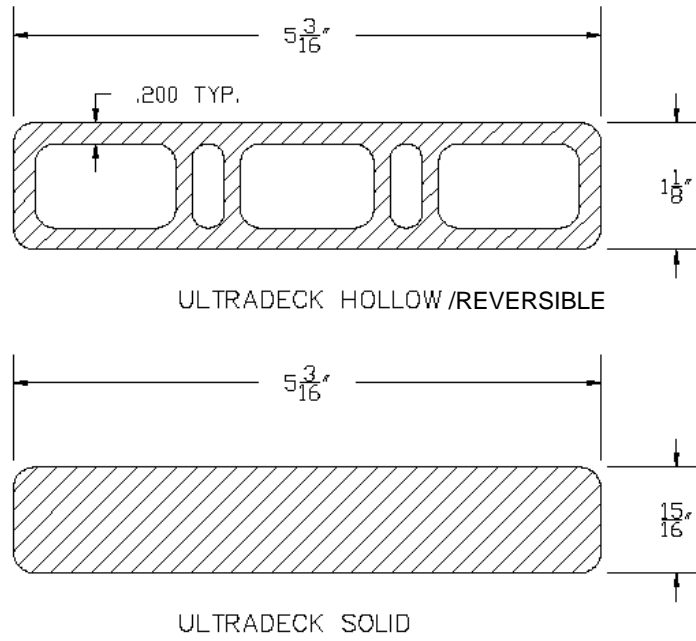


FIGURE 1—DECK BOARD PROFILES

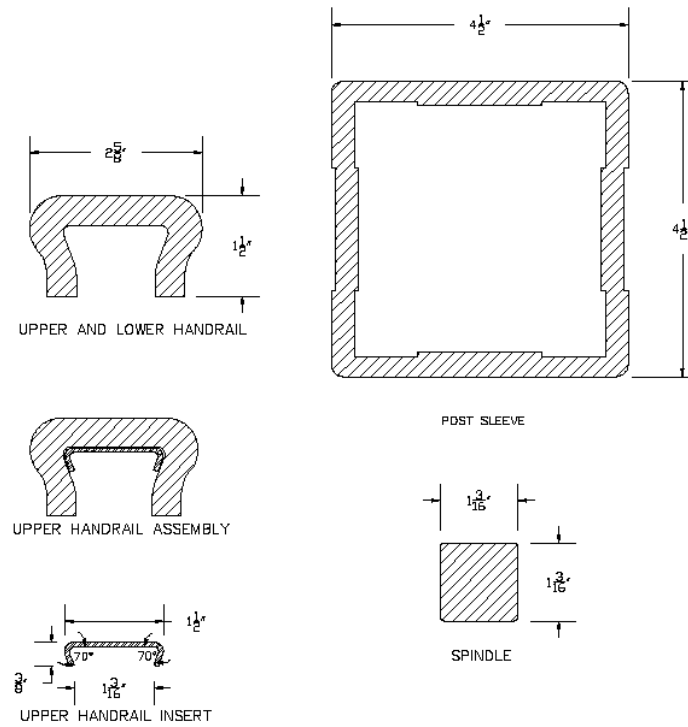


FIGURE 2—RAILING COMPONENTS

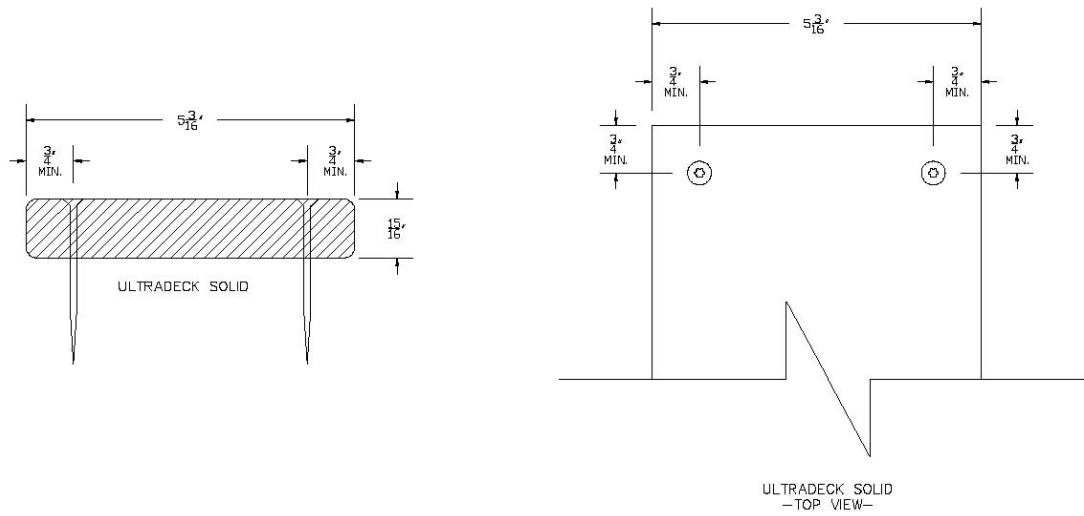


FIGURE 3—MINIMUM FASTENER EDGE AND END DISTANCES FOR THE ULTRADECK SOLID DECK BOARD

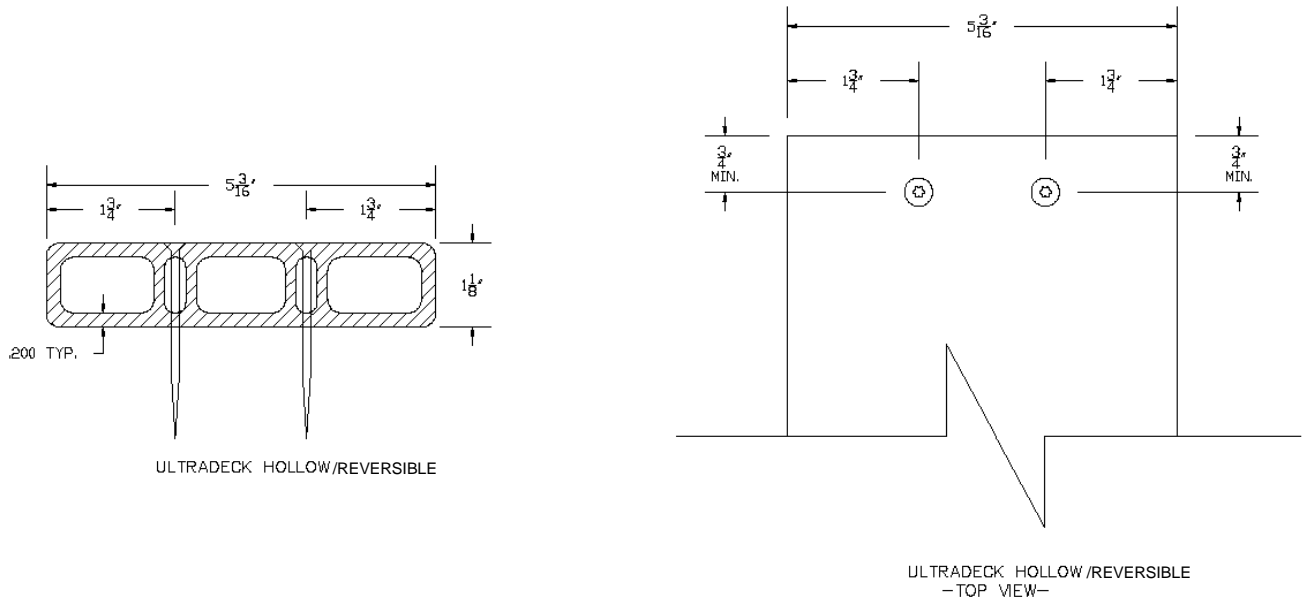


FIGURE 4—MINIMUM FASTENER END DISTANCE AND EXACT FASTENER EDGE DISTANCE FOR THE ULTRADECK/REVERSIBLE DECK BOARDS

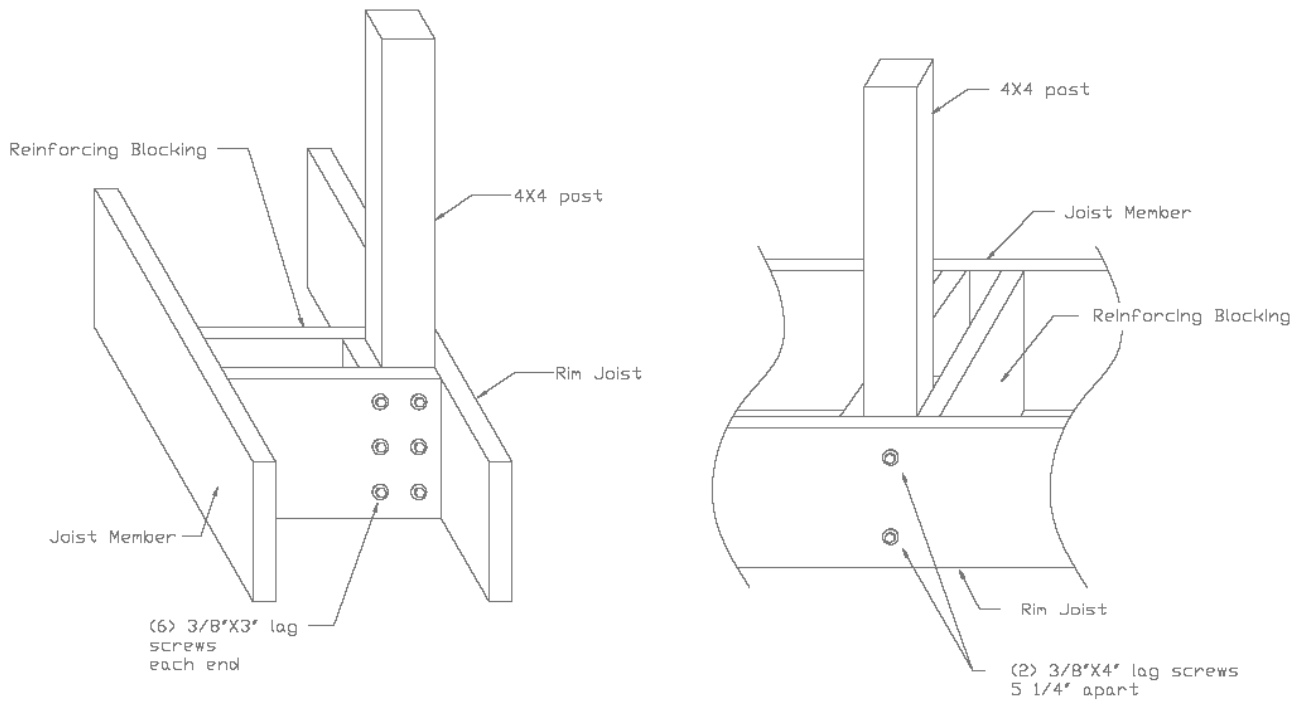


FIGURE 5—RAILING POST INSTALLATION

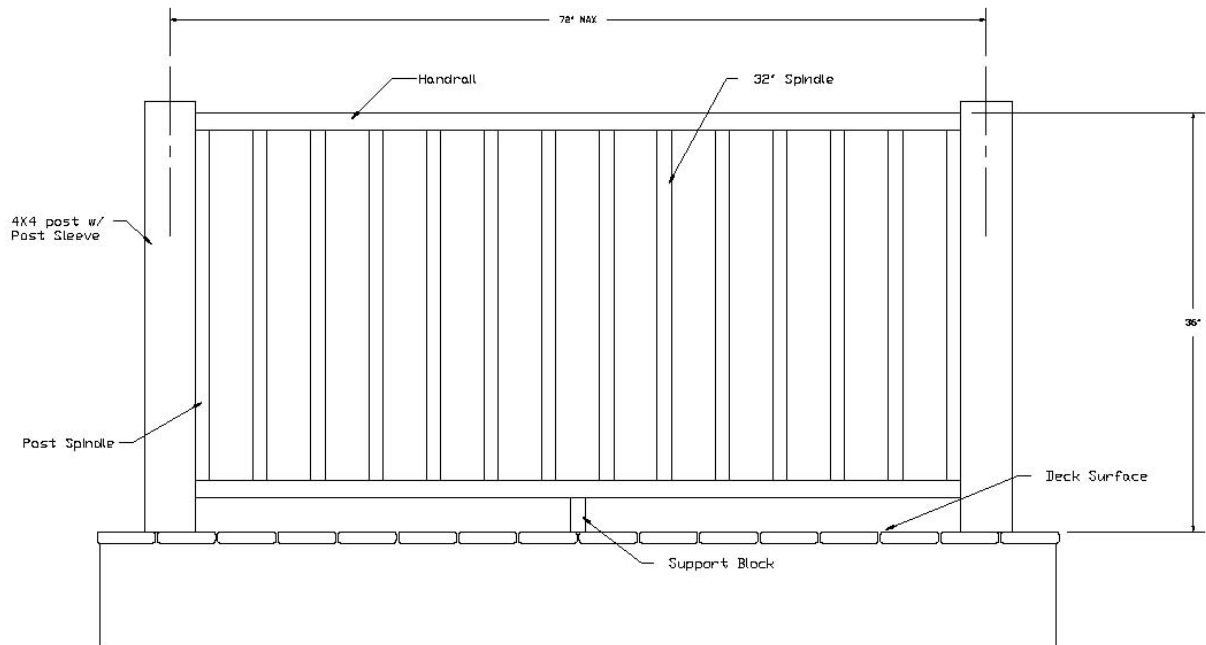


FIGURE 6—TYPICAL RAILING CONFIGURATION