

ICC-ES Evaluation Report

ESR-2388*

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 53 00—Plastic Decking
Section: 06 63 00—Plastic Railings
REPORT HOLDER:
ADVANCED ENVIRONMENTAL RECYCLING TECHNOLOGIES, INC. (A.E.R.T.)

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EVALUATION SUBJECT:

**CHOICEDEK®, CHOICEDEK® FR,
 MOISTURESHIELD®, MOISTURESHIELD® FR,
 MOISTURESHIELD® ELITE COLLECTION®,
 MOISTURESHIELD® VANTAGE COLLECTION®,
 MOISTURESHIELD® VANTAGE COLLECTION® FR,
 MOISTURESHIELD® ESSENTIAL COLLECTION®,
 MOISTURESHIELD® MODERNVIEW™ AND
 LIFECYCLE® BASICS DECKING**

**CHOICEDEK®, MOISTURESHIELD® AND LIFECYCLE®
 BASICS GUARDRAIL SYSTEMS**

1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2009 and 2006 *International Building Code*® (IBC)
- 2009 and 2006 *International Residential Code*® (IRC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Structural
- Durability
- Surface-burning characteristics

2.0 USES

ChoiceDek, ChoiceDek FR, MoistureShield, MoistureShield FR, MoistureShield Essential Collection, MoistureShield Elite Collection, MoistureShield Vantage Collection, MoistureShield Vantage Collection FR, MoistureShield ModernView and Lifecycle Basics deck boards are limited to use as flooring for exterior balconies, porches, decks and stair treads. The ChoiceDek, MoistureShield and Lifecycle Basics guardrail systems

described in this report are limited to exterior use as guards for balconies, porches, and decks. The products described in this report are used in exterior applications in any occupancy group in buildings of Type V-B (IBC) construction or in buildings constructed in accordance with the IRC. The guards may be used in other types of construction in applications where untreated wood is permitted by IBC Section 1406.3.

3.0 DESCRIPTION
3.1 General:

ChoiceDek, ChoiceDek FR, MoistureShield, Moisture FR, MoistureShield Essential Collection, MoistureShield Elite Collection, MoistureShield Vantage Collection, MoistureShield Vantage Collection FR, MoistureShield ModernView and Lifecycle Basics, are wood thermoplastic composite lumber (WTCL) products manufactured in a continuous extrusion process in accordance with the approved quality control manual. The products are available in comparable lumber-sized members (see Figures 2 through 10) and are available in ten colors (Redwood, Gray, Dark Cherry, Earthtone, Cape Cod Gray, Seasoned Mahogany, Rustic Cedar, Woodtone, Sanddtone and Classic), with the exception of the FR products. ChoiceDek FR, MoistureShield FR and MoistureShield Vantage collection FR are available in four colors (Earthtone, Cape Cod Gray, Seasoned Mahogany and Redwood). ChoiceDek®, MoistureShield® and Lifecycle Basics guardrail assembly components must be supported by structural framing in accordance with applicable code requirements.

3.2 Deck Board:

3.2.1 ChoiceDek, ChoiceDek FR, MoistureShield, MoistureShield FR, MoistureShield Essential Collection, MoistureShield Elite Collection, MoistureShield Vantage Collection, MoistureShield ModernView and Lifecycle Basics Deck Boards (Also Used as Stair Treads): The decking is fastened to supporting construction as described in Section 4.2.4. The decking is installed over supporting construction such as wood joist framing members in accordance with Table 1. Additional installation instructions provided by the manufacturer are required per Section 4.3.

3.2.2 Durability: When subjected to weathering, insect attack, and other decaying elements, material used to manufacture the deck boards are equivalent in durability to preservative-treated or naturally durable lumber when used in locations described in Section 2.0. The deck boards have been evaluated for a temperature range from -20°F to 125°F (-29°C to 52°C).

***Revised July 2011**

3.2.3 Surface-burning Characteristics: When tested in accordance with ASTM E 84, the deck boards have a flame-spread index no greater than 200.

3.3 Guardrail:

3.3.1 ChoiceDek, MoistureShield and Lifecycle Basics Guardrail Assembly: The guardrail assemblies are 42 inches (1067 mm) or 36 inches (914 mm) high and 64 inches (1626 mm) or 72 inches (1829 mm) long, and are installed in two configurations, System No.1 and System No. 2. System No. 1 and System No. 2 must be constructed in accordance with Table 3. Each system consists of a top guardrail, bottom guardrail, balusters and post. See Figures 1 and 2 for details of System No. 1 and System No. 2, respectively. The posts are designed to be installed with or without a reinforcing pipe. The reinforcing pipe is an ASTM A 53, Grade A material that is nominally 1¹/₄ inches (32 mm) in diameter, a minimum of 0.140 inch (3.6 mm) thick (Schedule 40), and a minimum of 18 inches (457 mm) long. The pipe must project at least 10³/₄ inches (273 mm) above the top of the joist. When installed in accordance with this report, the guardrail assemblies resist the minimum design loads specified by the applicable code.

3.3.2 Durability: When subjected to weathering, insect attack, and other decaying elements, material used to manufacture the guardrails are equivalent in durability to preservative-treated or naturally durable lumber when used in locations described in Section 2.0. The guardrails have been evaluated for a temperature range from -20°F to 125°F (-29°C to 52°C).

3.3.3 Surface-burning Characteristics: When tested in accordance with ASTM E 84, the guardrails have a flame-spread index of no greater than 200.

4.0 DESIGN AND INSTALLATION

4.1 General:

Installation of the decking and guardrail assemblies, must comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions must be available at the jobsite at all times during installation. When the manufacturer's published installation instructions differ from this report, this report governs.

4.2 Design:

4.2.1 Deck Boards: The deck boards have an allowable capacity when installed at a maximum center-to-center spacing of the supporting construction as prescribed in Table 1.

4.2.2 Stair Treads: Deck boards installed as stair treads are capable of resisting 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.

4.2.3 Guardrail: When installed in accordance with this report, the guardrail assemblies comply with the structural load requirements specified in Section 1607.7.1 of the IBC and Table R301.5 of the IRC.

4.2.4 Fasteners: The deck boards have been tested for wind uplift and have an uplift rating of 35 psf (1676 Pa) when installed with 16d casing nails, 8d box nails or No. 7 wood screws through the board, or with Phantom and InvisiFast hidden fasteners in the grooved boards.

4.3 Installation:

4.3.1 Deck Boards and Deck Boards Used as Stair Treads: The decking must be installed perpendicular to the supporting construction, which must be limited to a maximum spacing as prescribed in Tables 1 and 2. The decking must be installed with a minimum gap of ³/₁₆ inch (5 mm) between parallel boards, to permit adequate drainage, and a minimum ¹/₈-inch (3 mm) space must be provided at each end in accordance with the manufacturer's published installation instructions. The ends of the boards must come together over a double joist to provide adequate support and embedment of fasteners. The decking must not be attached to any solid surface or watertight flooring system, such as sheathing, waterproof membrane, concrete, roof deck or patio.

4.3.2 Guardrail: The guardrail assemblies can be installed in two configurations, as described in Section 3.3.1. The 64-inch-long (1626 mm) assemblies, which may be either 36 inches (914 mm) or 42 inches (1067 mm) high, and the 72-inch-long (1829mm) assembly, which is 36 inches (914 mm) high, do not require post reinforcement. The 72-inch-long (1829 mm) assembly that is 42 inches (1067 mm) high, requires post reinforcement. When the guardrails are fastened to posts or to a structure other than the posts described in this report, they must be designed and installed in accordance with the applicable code. The 64-inch and 72-inch (1626 mm and 1829 mm) assemblies are measured from center-of-post to center-of-post.

5.0 CONDITIONS OF USE

The decking and guardrail assemblies, as described in this report, comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** These products are limited to exterior uses as deck boards and guards for balconies, porches, decks and stair treads and similar appendages of any occupancy group of Type V-B (IBC) construction and structures constructed in accordance with the IRC. The guards may be used in other types of construction in applications where untreated wood is permitted by IBC Section 1406.3.
- 5.2** Installation must comply with this report, the manufacturer's published instructions and the applicable code. When the manufacturer's published installation instructions differ from this report, this report governs.
- 5.3** Use of the decking as a component of a fire-resistance-rated assembly is outside the scope of this report.
- 5.4** The compatibility of the fasteners with the supporting construction, including chemically treated wood, is outside the scope of this report.
- 5.5** Only those types of fasteners and fastening methods described in this report for the installation of deck boards and guardrail assemblies, have been evaluated. Post-to-frame connections are outside the scope of this report.
- 5.6** The top rail component is not permitted to be used as a handrail for stairways or ramps.
- 5.7** Deck boards must be installed in a minimum of a two-span condition. Deck boards used as stair treads must be installed in a minimum of a two-span condition.

- 5.8** The decking and guardrail assemblies, must be directly fastened to supporting construction. Where required by the code official, engineering calculations and construction documents consistent with this report must be submitted for approval. The calculations must verify that the supporting construction complies with the applicable building code requirements and is adequate to resist the loads imparted upon it from the products and systems discussed in this report. The documents must contain details of the attachment to the supporting structure consistent with the requirements of this report. The documents must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.9** The decking and guardrail assemblies must not be used in framing applications, as for components of trusses, or as joists, rafters, studs, beams, columns, or axially loaded posts.
- 5.10** Adjustment factors outlined in the AF&PA *National Design Specification* and applicable codes do not apply to the allowable capacity and maximum spans for the deck boards and guardrail systems.
- 5.11** The deck boards and guardrails are produced in Springdale, Arkansas, and Junction, Texas, under a quality control program with inspections by PFS (AA-652).

6.0 EVIDENCE SUBMITTED

Data in accordance with applicable portions of the ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails) (AC174), dated July 2010.

7.0 IDENTIFICATION

Each deck board or guardrail described in this report must be identified by a label bearing the name and address of Advanced Environmental Recycling Technologies, Inc. (A.E.R.T.); the name of the deck board or guardrail; the performance level (span rating of the deck boards or allowable span for the stair treads and guardrail assemblies); the name of the inspection agency (PFS); and the ICC-ES evaluation report number (ESR-2388).

8.0 OTHER CODES:

8.1 Evaluation Scope:

In addition to the codes referenced in Section 1.0, the products described in this report were evaluated for compliance with the requirements of the following codes:

- 1997 *Uniform Building Code*™ (UBC)
- BOCA® *National Building Code/1999* (BNBC)

The ChoiceDek, ChoiceDek FR, MoistureShield, MoistureShield FR, MoistureShield Essential Collection, MoistureShield® Elite Collection, MoistureShield Vantage Collection, MoistureShield Vantage Collection FR, MoistureShield ModernView and Lifecycle Basics decking, and the ChoiceDek, MoistureShield and Lifecycle Basics guardrail systems, as described in this report, comply with, or are suitable alternatives to what is specified in, those codes listed above, subject to the provisions of Section 8.2 through 8.7.

8.2 Uses:

The deck boards are limited to use as flooring for exterior balconies, porches, and decks and stair treads.

The guardrail systems are limited to exterior use as guards for balconies, porches, and decks. The products described in this report are used in exterior applications in any occupancy group in buildings of Type V-N construction under the UBC, or Type 5B construction under the BNBC.

8.3 Description:

See Section 3.0.

8.4 Installation:

See Section 4.0.

8.5 Conditions of Use:

See Section 5.0, except replace the wording in Section 5.1 with the following:

These products are limited to exterior use as deck boards and guards for balconies, porches, decks and stair treads, and similar appendages of any occupancy group of Type V-N (UBC) construction or Type 5B (BNBC) construction.

8.6 Evidence Submitted:

See Section 6.0.

8.7 Identification:

See Section 7.0.

TABLE 1—DECK BOARD SPAN RATINGS¹

PRODUCT NAME ⁶	PROFILE	NOMINAL SIZE (inch)	SHAPE	UNIFORM LIVE LOADING (ALLOWABLE CAPACITY) ²		
				100 psf	150 psf	200 psf
				MAXIMUM ALLOWABLE MEMBER SPAN (inches) ^{3,4,5}		
ChoiceDek [®] , MoistureShield [®] Essential Collection [®] , MoistureShield [®] ModernView [™] and Lifecycle [®] Basics	Figure 4	1x5	Oval Fluted; Solid; Grooved	16	--	--
MoistureShield [®] Vantage Collection [®]	Figure 5	1x5 ^{1/2}	Solid; Grooved	16	--	--
ChoiceDek, MoistureShield [®] and Lifecycle [®] Basics	Figure 6	⁵ / ₄ x6	Square Fluted; Oval Fluted;	18	16	12
MoistureShield [®] Elite Collection [®]	Figure 6	⁵ / ₄ x6	Solid	18	16	12
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics	Figure 7	2x4	Solid	20	18	16
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics	Figure 8	2x6	Square Fluted	20	18	16
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics	Figure 8	2x6	Solid	24	18	16
MoistureShield [®] Vantage Collection [®] FR	Figure 5	1x5 ^{1/2}	Solid	16	--	--
ChoiceDek [®] FR and MoistureShield [®] FR	Figure 6	⁵ / ₄ x6	Solid	16	--	--
ChoiceDek [®] FR and MoistureShield [®] FR	Figure 8	2x6	Solid	24	--	--

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m².

NOTES:

- ¹Members must be installed perpendicular to the supports, must be installed in a minimum two-span condition, and must be fastened at each joist.
- ²Allowable capacity is adjusted for durability. No further increases are permitted.
- ³Maximum allowable member span values are for members used as planking (flatwise bending).
- ⁴Maximum allowable member span is measured center-to-center of the supporting construction.
- ⁵Tabulated spans are based on a deflection limit of L/180.
- ⁶Product names within the same cell are trade names for the same board.

TABLE 2—MAXIMUM SPANS FOR DECK BOARDS USED AS STAIR TREADS^{1,2}

PRODUCT ³	PROFILE	NOMINAL SIZE (inch)	SHAPE	MAXIMUM SPAN (inches)
ChoiceDek [®] , MoistureShield [®] Essential Collection [®] , MoistureShield [®] ModernView [™] and Lifecycle [®] Basics	Figure 4	1x5	Oval Fluted; Solid; Grooved	9
MoistureShield [®] Vantage Collection	Figure 5	1x5 ^{1/2}	Solid; Grooved	9
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics	Figure 6	⁵ / ₄ x6	Square Fluted; Oval Fluted	12
MoistureShield [®] Elite Collection [®]	Figure 6	⁵ / ₄ x6	Solid	12
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics	Figure 7	2x4	Solid	14
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics	Figure 8	2x6	Square Fluted; Solid	16
MoistureShield [®] Vantage Collection [®] FR	Figure 5	1x5 ^{1/2}	Solid	9
ChoiceDek [®] FR and MoistureShield [®] FR	Figure 6	⁵ / ₄ x6	Solid	12
ChoiceDek [®] FR and MoistureShield [®] FR	Figure 8	2x6	Solid	18

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m².

NOTE:

- ¹Maximum span is measured center-to-center of the supporting construction.
- ²Deck boards used as stair treads must be installed in a minimum of a two-span condition.
- ³Product names within the same cell are trade names for the same board.

TABLE 3—MAXIMUM GUARDRAIL SPANS^{1,2,3,4,5,6}

PRODUCT NAME ⁹	APPLICABLE BUILDING CODE				MAXIMUM SPAN ⁸ (ft-in)
	IBC	IRC	UBC	BNBC	
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics, 36 inches high (without post reinforcing)	--	Yes	Yes ⁷	Yes ⁷	5' – 4"
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics, 36 inches high (with post reinforcing)	--	Yes	Yes ⁷	Yes ⁷	6' – 0"
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics, 42 inches high (without post reinforcing)	Yes	Yes	Yes	Yes	5' – 4"
ChoiceDek [®] , MoistureShield [®] and Lifecycle [®] Basics, 42 inches high (with post reinforcing)	Yes	Yes	Yes	Yes	6' – 0"

For **SI**: 1 inch = 25.4 mm; 1 foot = 305 mm.

NOTES:

¹The ability of the supporting construction to resist the reactionary loads must be justified to the satisfaction of the code official.

²Indicates compliance with the respective building codes.

³Maximum span is measured from center-of-post to center-of-post.

⁴Maximum allowable span has been adjusted for durability. No further increases are permitted.

⁵Applicable to guardrail systems described in Figure 1 and Figure 2.

⁶ChoiceDek[®], MoistureShield[®] and Lifecycle[®] Basics are trade names for the same guardrail system.

⁷See exception for 36-inch-high guards in Section 1021.2 of the BNBC and Section 509.2 of the UBC.

⁸Maximum span based on the guardrail assembly listed in Table 4.

⁹Height of guardrails is measured from the top of decking.

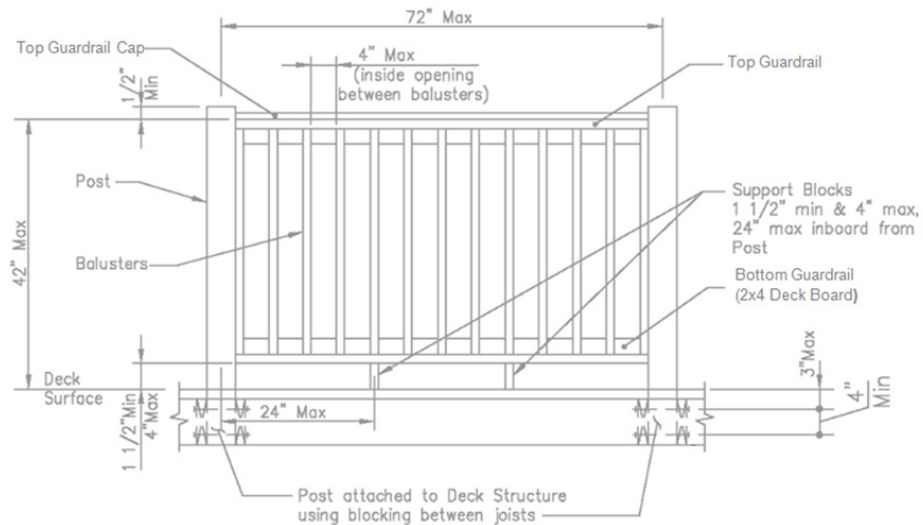
TABLE 4—GUARDRAIL ASSEMBLY^{1,2}

COMPONENT		INSTALLATION REQUIREMENTS		Profile
		Figure 1 (System No. 1)	Figure 2 (System No. 2)	
Baluster		2 x 2 baluster spaced a maximum of 4" between the inside openings	2 x 2 baluster spaced a maximum of 4" between the inside openings	Figure 9
Railings	Top Guardrail Cap	3½" Top Guardrail Cap (optional)	2 x 6	Figure 1
	Top Rail	3 ⁷ / ₈ " x 2 ⁷ / ₈ "	2 x 4	Figure 10
	Bottom Rail	3 ⁷ / ₈ " x 2 ⁷ / ₈ "	2 x 4	Figure 10
Posts		4 x 4 Post – Standard (Unreinforced)	4 x 4 Post – Standard (Unreinforced)	Figure 9
		4 x 4 Post – Reinforced	4 x 4 Post – Reinforced	

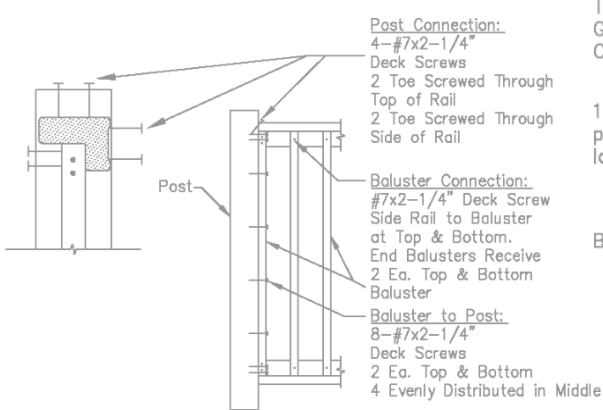
For **SI**: 1 inch = 25.4 mm.

¹Evaluation of framing members supporting the guardrail assembly is outside the scope of this evaluation report.

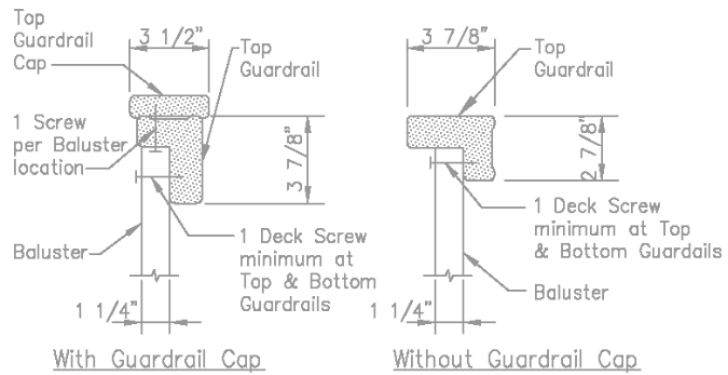
²Components consist of ChoiceDek[®], MoistureShield[®] and Lifecycle[®] Basics which are trade names for the same guardrail assembly.



GUARDRAIL ASSEMBLY



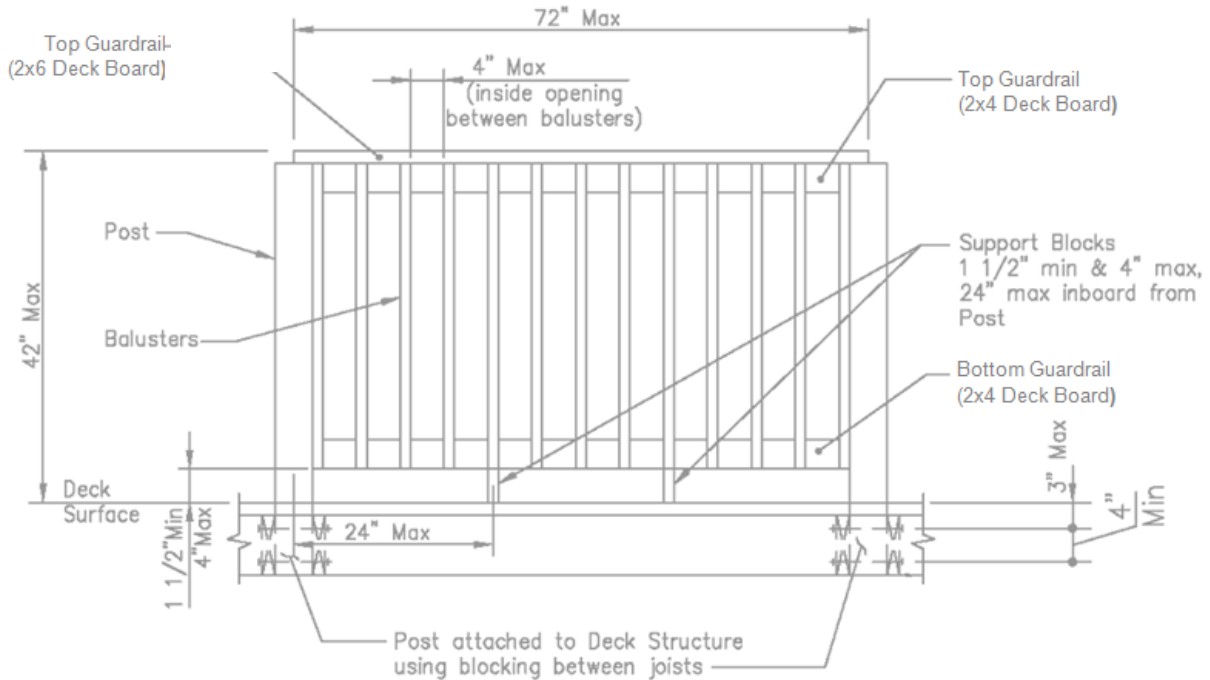
GUARDRAIL POST CONNECTION



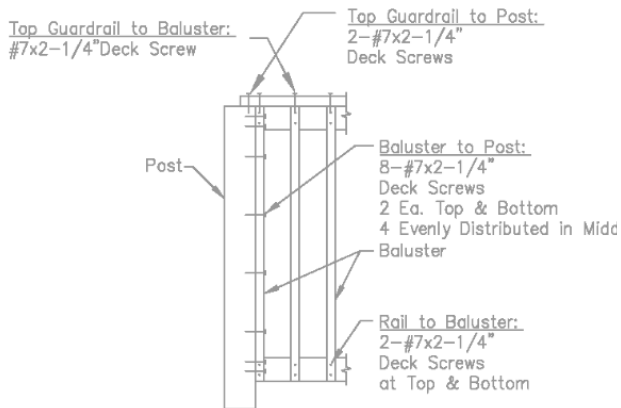
GUARDRAIL DETAIL

POST CRITERIA		
CENTER TO CENTER POST SPACING	RAILING HEIGHT ABOVE DECK	
	36"	42"
64"	NON-REINFORCED	NON-REINFORCED
72"	NON-REINFORCED	REINFORCED

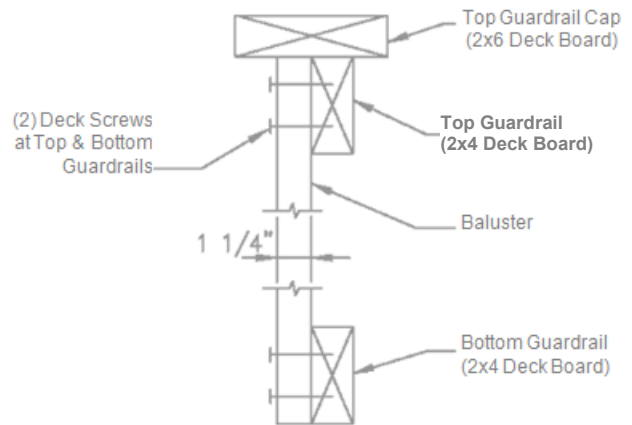
FIGURE 1—CHOICEDEK, MOISTURESHIELD AND LIFECYCLE BASICS GUARDRAIL SYSTEM NO. 1



GUARDRAIL ASSEMBLY



GUARDRAIL POST



GUARDRAIL DETAIL

POST CRITERIA		
CENTER TO CENTER POST SPACING	RAILING HEIGHT ABOVE DECK	
		36"
64"	NON-REINFORCED	NON-REINFORCED
72"	NON-REINFORCED	REINFORCED

FIGURE 2—CHOICEDEK, MOISTURESHIELD AND LIFECYCLE BASICS GUARDRAIL SYSTEM NO. 2

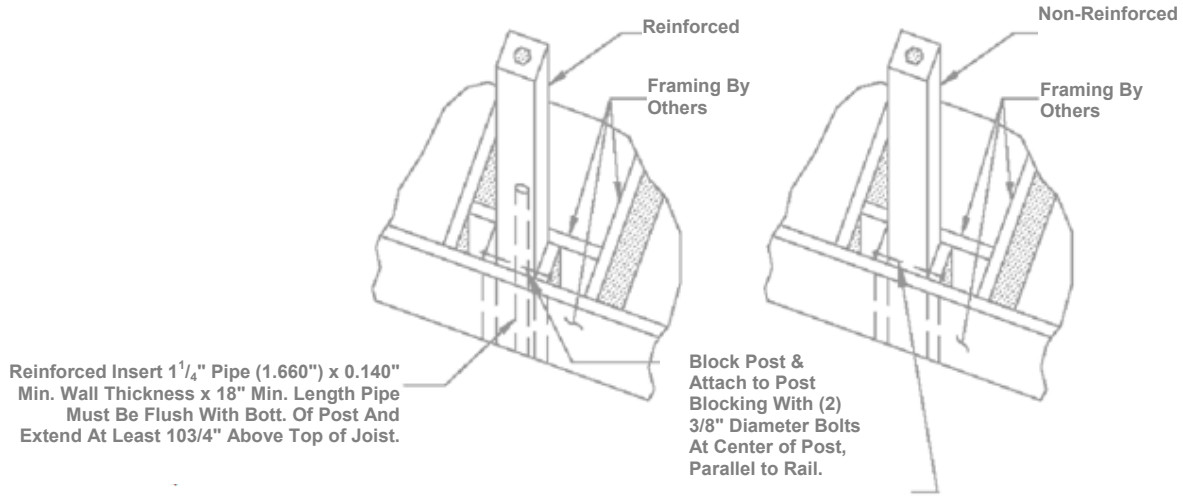
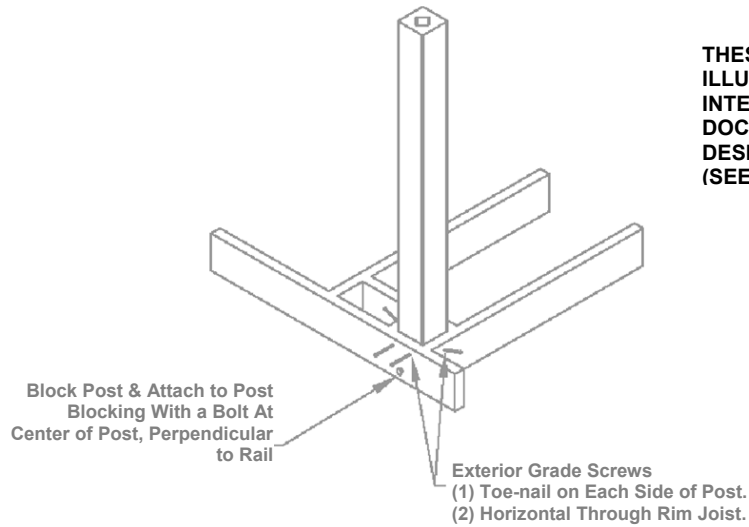


ILLUSTRATION OF POST TO FRAME CONNECTION: OPTION 1



THESE DRAWINGS ARE FOR ILLUSTRATION ONLY. THEY ARE NOT INTENDED FOR USE AS CONSTRUCTION DOCUMENTS FOR THE PURPOSE OF DESIGN, FABRICATION, OR ERECTION. (SEE SECTION 5.8)



ILLUSTRATION OF POST TO FRAME CONNECTION: OPTION 2

FIGURE 3—ILLUSTRATION OF POST TO FRAME CONNECTION SEE FIGURES 1 AND 2 FOR POST CRITERIA.

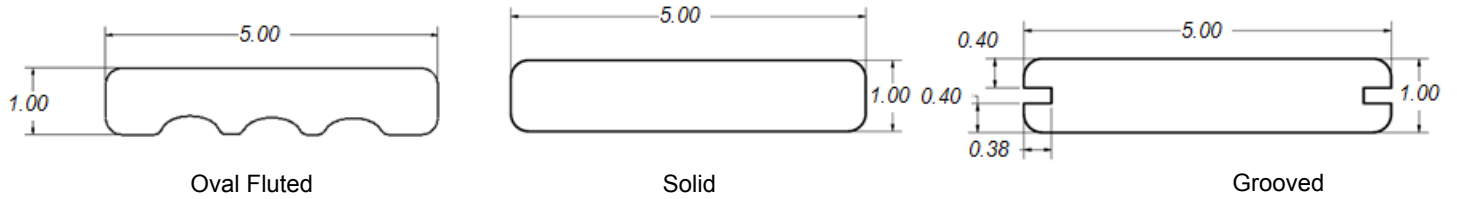


FIGURE 4—1X5 DECK BOARD PROFILES

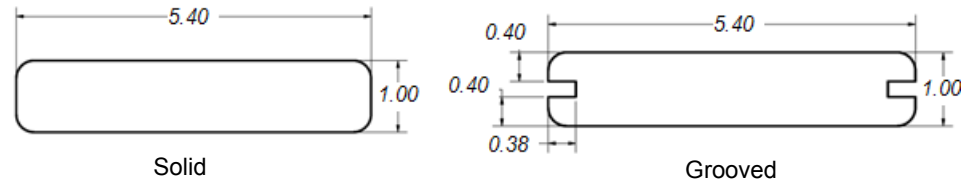


FIGURE 5—1X5¹/₂ DECK BOARD PROFILES

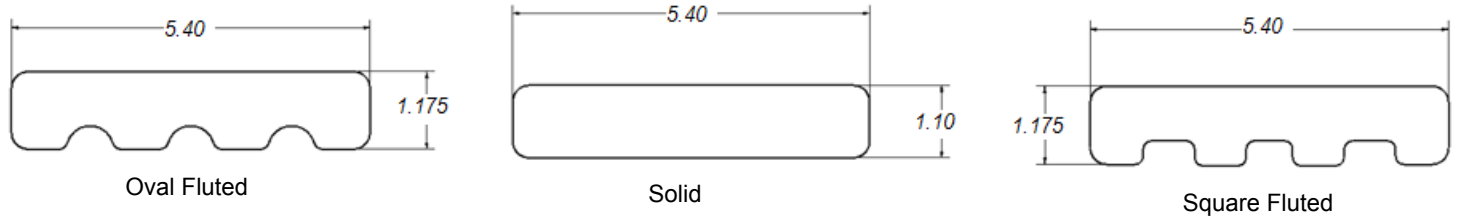


FIGURE 6—⁵/₄X6 DECK BOARD PROFILES

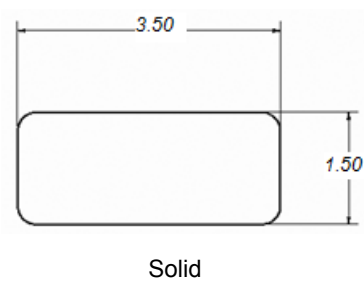


FIGURE 7—2X4 DECK BOARD OR GUARDAIL PROFILE

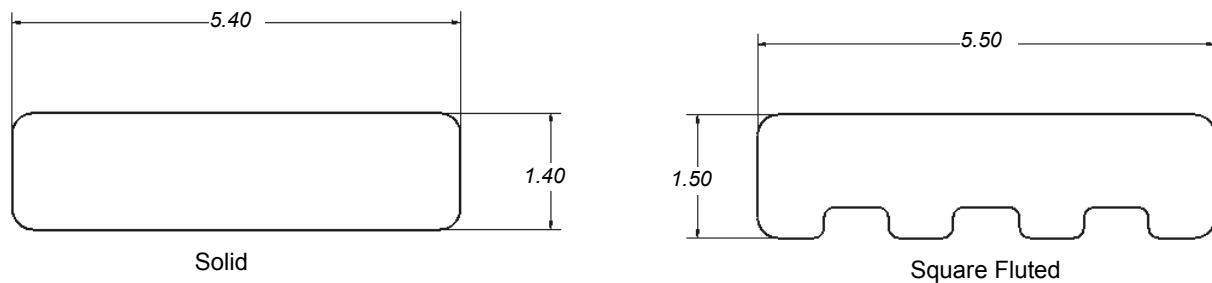


FIGURE 8—2X6 DECK BOARD PROFILES

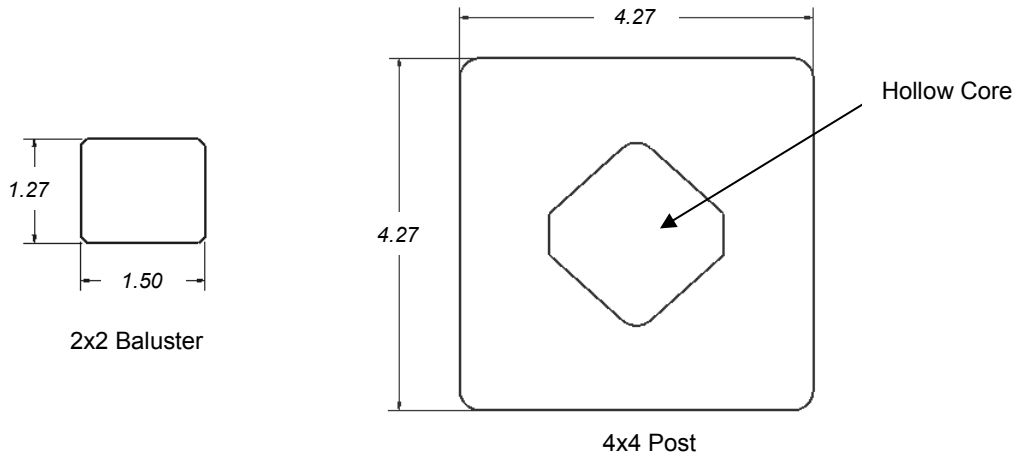


FIGURE 9—POST AND BALUSTER

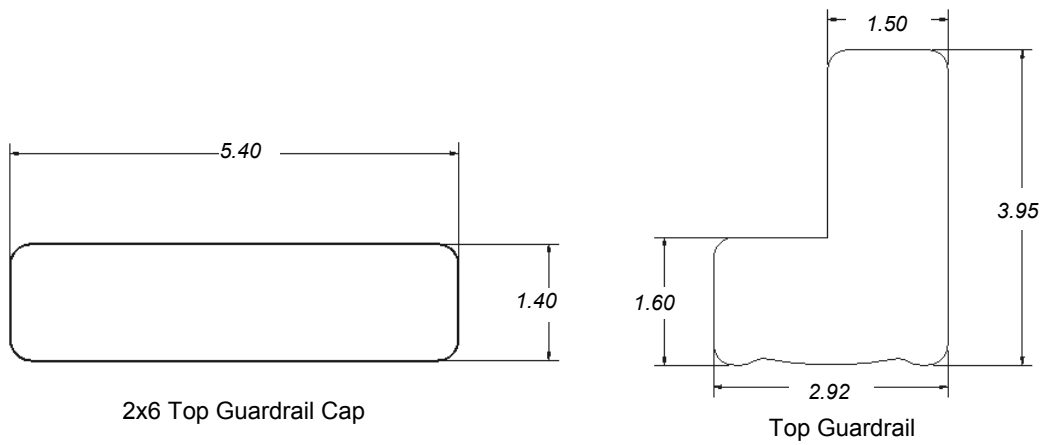


FIGURE 10—TOP GUARDRAIL PROFILES