

ICC-ES Evaluation Report

ESR-2388

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This report is subject to re-examination in two years.

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

REPORT HOLDER:

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EVALUATION SUBJECT:

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

1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 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 and Lifecycle Basics® deck boards are limited to use as flooring for exterior balconies, porches, and 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®, MoistureShield® 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 comparable lumber-sized members in a range of sizes up to a nominal thickness of 2 inches (51 mm) for decking (Figures 3, 4, 5 and 6) and 6 inches (152 mm) for guardrail components (Figures 7 and 8). The products are available in ten colors (Redwood, Gray, Dark Cherry, Earthtone, Cape Cod Gray, Seasoned Mahogany, Rustic Cedar, Woodtone, Sanddtone and Classic). ChoiceDek®, MoistureShield® and Lifecycle Basics® railing components must be supported by structural framing in accordance with applicable code requirements.

ChoiceDek® FR and MoistureShield® FR are WTCL products manufactured in a continuous extrusion process in accordance with the approved quality control manual. The products are comparable lumber-sized members with nominal thicknesses of 5/4 and 2 inches (52 mm) and a nominal width of 6 inches (152 mm). ChoiceDek® FR and MoistureShield® FR are available in four colors (Earthtone, Gray, Seasoned Mahogany and Redwood).

3.2 Deck Board:

3.2.1 ChoiceDek®, MoistureShield® and Lifecycle Basics®: The ChoiceDek®, MoistureShield® and Lifecycle Basics® decking members are manufactured in nominal sizes as shown in Table 1, and are fastened to supporting construction with standard nails or screws as described in Section 4.2.4. When used as a decking member or stair tread, ChoiceDek®, MoistureShield® and Lifecycle Basics® are installed over supporting construction such as wood joist framing members in accordance with Footnote 3 in Table 1, at maximum spacing as shown in Table 1 and Table 2. Additional installation instructions provided by the manufacturer are required per Section 4.3.

3.2.2 ChoiceDek® FR and MoistureShield® FR: The ChoiceDek® FR and MoistureShield® FR decking members are manufactured in nominal sizes as shown in Table 1, and are fastened to supporting construction with standard nails or screws as described in Section 4.2.4 of this report. When used as a decking member or stair tread, ChoiceDek® FR and MoistureShield® FR are installed over supporting construction such as wood joist framing members in accordance with Footnote 3 in Table 1, at maximum spacing as shown in Table 1 and Table 2. Additional installation instructions provided by the manufacturer are required per Section 4.3.

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

3.2.4 Surface-burning Characteristics: When tested in accordance with ASTM E 84, ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics® deck boards have a flame-spread index no greater than 200.

3.3 Guardrail:

3.3.1 General: ChoiceDek®, MoistureShield® and Lifecycle Basics® 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. The first configuration is composed of top rail, bottom rail, balusters and posts which are assembled in accordance with Figure 1; the second configuration is composed of 2-by-4, 2-by-6, balusters and posts which are assembled in accordance with Figure 2. 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 ChoiceDek®, MoistureShield® and Lifecycle Basics® 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 ChoiceDek®, MoistureShield® and Lifecycle Basics® guardrails are equivalent in durability to preservative-treated or naturally durable lumber when used in locations described in Section 2.0. ChoiceDek®, MoistureShield® and Lifecycle Basics® 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, ChoiceDek®, MoistureShield® and Lifecycle Basics® guardrails have a flame-spread index of no greater than 200.

4.0 DESIGN AND INSTALLATION

4.1 General:

Installation of the ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics® decking, and the ChoiceDek®, MoistureShield® and Lifecycle Basics® 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: ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics®, when used as decking, have an allowable capacity when installed at a maximum center-to-center spacing of the supporting construction as prescribed in Tables 1 and 2.

4.2.2 Stair Treads: ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics®, when used as stair treads, 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.

4.2.3 Guardrail: When installed in accordance with this report, ChoiceDek®, MoistureShield® and Lifecycle Basics® 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: ChoiceDek®, ChoiceDek® FR, MoistureShield® and MoistureShield® FR 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: ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics® boards must be installed perpendicular to the supporting construction, which must be limited to a maximum spacing as prescribed in Tables 1 and 2. ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics® 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. ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR and Lifecycle Basics® 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: ChoiceDek®, MoistureShield® and Lifecycle Basics® guardrail assemblies can be installed in two configurations. The first configuration is composed of top rail, bottom rail, baluster, and post components, which are assembled in accordance with Table 3 and Figure 1; and the second configuration is composed of 2-by-4, 2-by-6, balusters and post components, which are assembled in accordance with Table 3 and Figure 2. 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 ChoiceDek®, MoistureShield® and Lifecycle Basics® guardrails are fastened to posts or to a structure other than the posts described in this report, they must comply 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 ChoiceDek®, ChoiceDek® FR, MoistureShield®, MoistureShield® FR 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 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 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.
- 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 ChoiceDek[®], ChoiceDek[®] FR, MoistureShield[®], MoistureShield[®] FR and Lifecycle Basics[®] 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 The top rail component is not permitted to be used as a handrail for stairways or ramps.
- 5.6 The ChoiceDek[®], ChoiceDek[®] FR, MoistureShield[®], MoistureShield[®] FR and Lifecycle Basics[®] decking, and the ChoiceDek[®], MoistureShield[®] and Lifecycle Basics[®] guardrail systems, 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.
- 5.7 ChoiceDek[®], ChoiceDek[®] FR, MoistureShield[®], MoistureShield[®] FR and Lifecycle Basics[®] must not be used in framing applications, as for components of trusses, or as joists, rafters, studs, beams, columns, or axially loaded posts.
- 5.8 The ChoiceDek[®], ChoiceDek[®] FR, MoistureShield[®], MoistureShield[®] FR and Lifecycle Basics[®] decking and guardrail components 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 February 2007.

7.0 IDENTIFICATION

Each deck board 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 ChoiceDek[®], ChoiceDek[®] FR, MoistureShield[®], MoistureShield[®] FR or Lifecycle Basics[®]; the name of the inspection agency (PFS, Inc.); and the ICC-ES evaluation report number (ESR-2388).

The ChoiceDek[®], MoistureShield[®] and Lifecycle Basics[®] guardrail system described in this report is identified by a stamp, on each individual piece or on the packaging, bearing the name of Advanced Environmental Recycling Technologies, Inc. (A.E.R.T.); the product type; the name of the inspection agency (PFS, Inc.); 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 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:

ChoiceDek[®], ChoiceDek[®] FR, MoistureShield[®], MoistureShield[®] FR and Lifecycle Basics[®] deck boards are limited to use as flooring for exterior balconies, porches, and decks and stair treads.

The ChoiceDek[®], MoistureShield[®] and Lifecycle Basics[®] 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 RATINGS

PRODUCT NAME	UNIFORM LIVE LOADING (ALLOWABLE CAPACITY)			
	60 psf	100 psf	150 psf	200 psf
	MAXIMUM ALLOWABLE MEMBER SPAN (inches)			
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 1 x 5	16	12	--	--
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 5/4 by 6; Oval Fluted; Square Fluted; Solid	--	18	16	12
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 2 x 4	--	20	18	16
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 2 x 6; Square Fluted	--	20	18	16
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 2 x 6; Solid	--	24	18	16
ChoiceDek [®] FR and MoistureShield [®] FR 5/4 by 6; Solid	--	16	--	--
ChoiceDek [®] FR and MoistureShield [®] FR 2 x 6; Solid	--	24	--	--

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

NOTES:

- ¹Tabulated span values are for members used as planking (flatwise bending).
- ²Allowable member span is measured center-to-center of the supporting construction.
- ³Members shall be installed perpendicular to the supports, shall be supported by a minimum of three joists, and shall be fastened at each joist.
- ⁴Allowable capacity is adjusted for durability. No further increases are permitted.
- ⁵Tabulated spans are based on a deflection limit of L/180.
- ⁶ChoiceDek[®], MoistureShield[®] and Lifecycle Basics[®] are trade names for the same board. ChoiceDek[®] FR and MoistureShield[®] FR are trade names for the same board.

TABLE 2—MAXIMUM STAIR TREAD SPANS

PRODUCT	MAXIMUM SPAN (inches)
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 1 x 5	9
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 5/4 by 6; Oval Fluted; Square Fluted; Solid	12
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 2 x 4	14
ChoiceDek [®] , MoistureShield [®] and Lifecycle Basics [®] 2 x 6; Square Fluted or Solid	16
ChoiceDek [®] FR and MoistureShield [®] FR 5/4 by 6; Solid	12
ChoiceDek [®] FR and MoistureShield [®] FR 2 x 6; Solid	18

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

NOTE: Maximum span is measured center-to-center of the supporting construction.

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

PRODUCT NAME	APPLICABLE BUILDING CODE				MAXIMUM SPAN (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 (without 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.

- ¹The ability of the supporting construction to resist the reactionary loads shall 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.

TABLE 4—GUARDRAIL ASSEMBLY¹

COMPONENT		INSTALLATION REQUIREMENTS ^{2,3}	
		Figure 1	Figure 2
Baluster		ChoiceDek® 2 x 2 baluster spaced a maximum of 4" between the inside openings	ChoiceDek® 2 x 2 baluster spaced a maximum of 4" between the inside openings
Railings	Top Guardrail Cap	ChoiceDek® 3½" Top Guardrail Cap (optional, see Figure 1)	ChoiceDek® 2 x 6
	Top Rail	ChoiceDek® 3 ⁷ / ₈ " x 2 ⁷ / ₈ "	ChoiceDek® 2 x 4
	Bottom Rail	ChoiceDek® 3 ⁷ / ₈ " x 2 ⁷ / ₈ "	ChoiceDek® 2 x 4
Posts		ChoiceDek® 4 x 4 Post – Standard (Unreinforced) ⁴	ChoiceDek® 4 x 4 Post – Standard (Unreinforced) ⁴
		ChoiceDek® 4 x 4 Post – Reinforced ⁴	ChoiceDek® 4 x 4 Post – Reinforced ⁴

For SI: 1 inch = 25.4 mm, 1 foot = 308mm.

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

²Standard guardrail components shall be connected as follows (see FRAMING CONNECTION NOTE below):

- a. Post-to-post-block connection: Minimum of two ³/₈-inch-diameter (10 mm) bolts on each post. Baluster-to-top rail connection: Minimum of one No. 7 by 2¼-inch-long (57 mm) screw through each baluster.
- b. Top-rail-to-top-plate connection: Minimum of one No. 7 by 2¼-inch-long (57 mm) screw into each baluster.
- c. Top-rail- and top-guardrail-cap-to-post connection: Minimum of four No. 7 by 2¼-inch-long (57 mm) screws placed diagonally into the post, one on each side.

³The minimum height of the guardrail assembly shall be 36 inches (914 mm) from the deck boards. The minimum opening under the bottom rail shall be 1½ inches (38 mm). The maximum opening under the bottom rail shall be 4 inches (102 mm),

⁴Reinforced posts need to be used when the center-to-center post spacing is 72 inches (1829 mm).

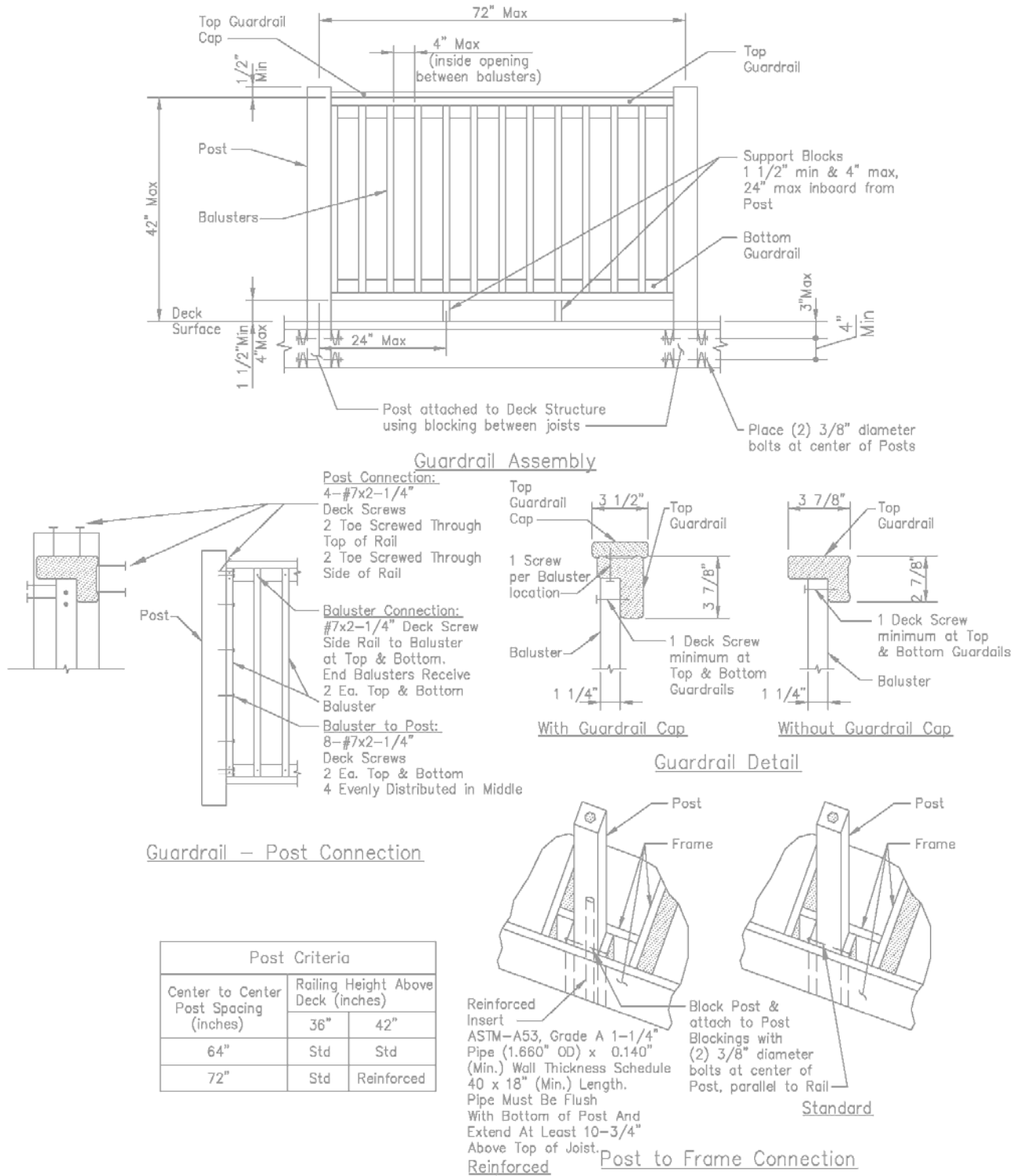
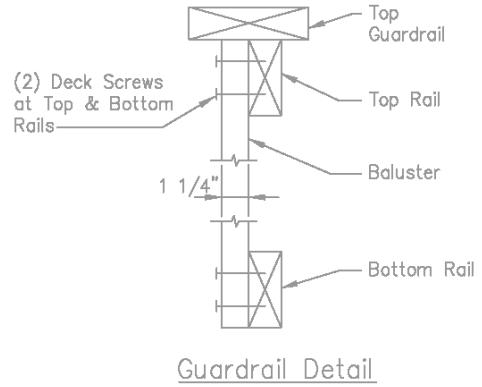
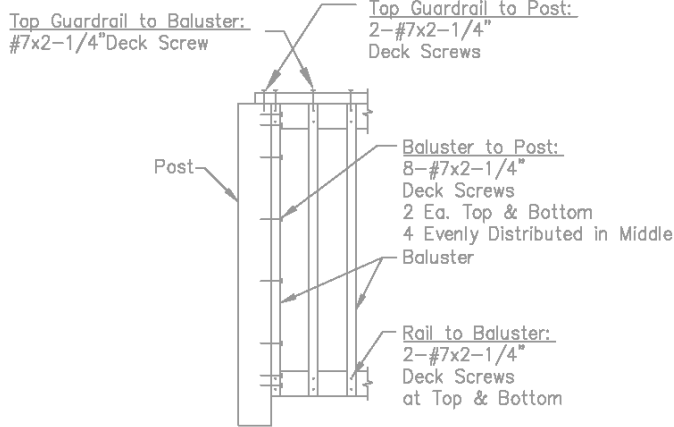
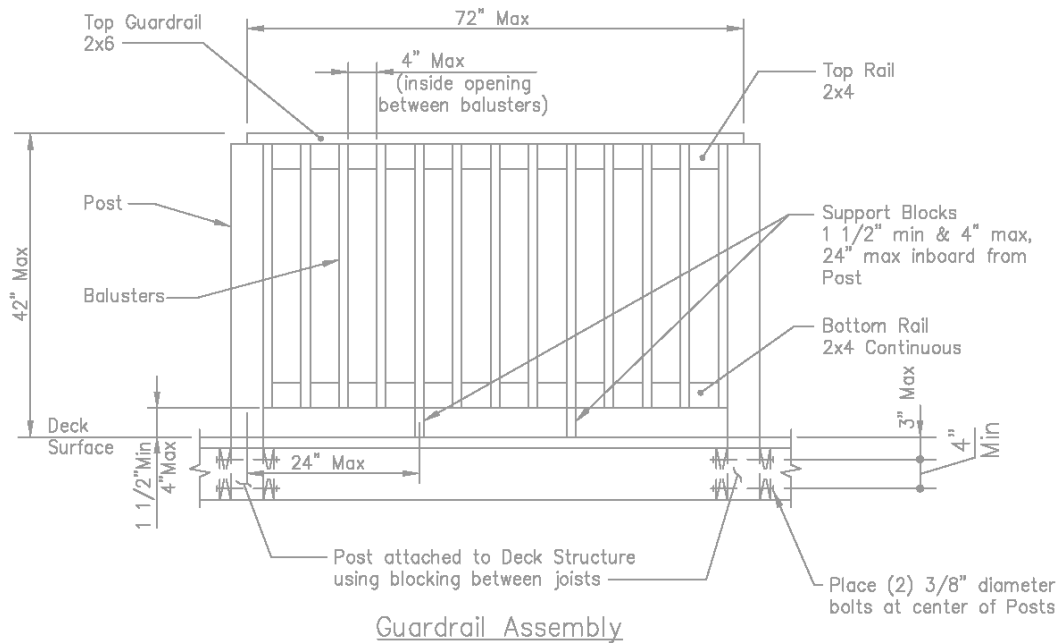


FIGURE 1—CHOICEDEK/MOISTURESHIELD GARDRAIL SYSTEM NO. 1



Guardrail - Post Connection

Center to Center Post Spacing (inches)	Post Criteria	
	Railing Height Above Deck (inches)	
	36"	42"
64"	Std	Std
72"	Std	Reinforced

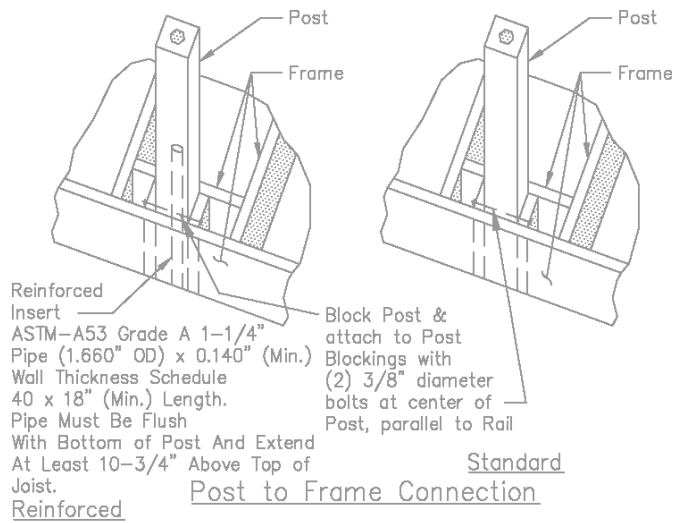


FIGURE 2—CHOICEDEK/MOISTRESHIELD GUARDRAIL SYSTEM NO. 2

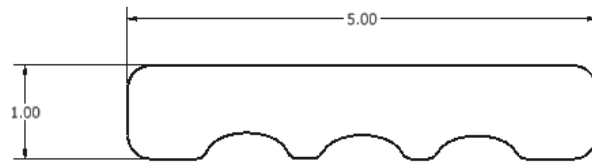


FIGURE 3—1 X 5 DECKING PROFILE

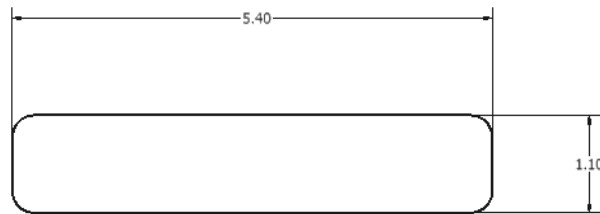
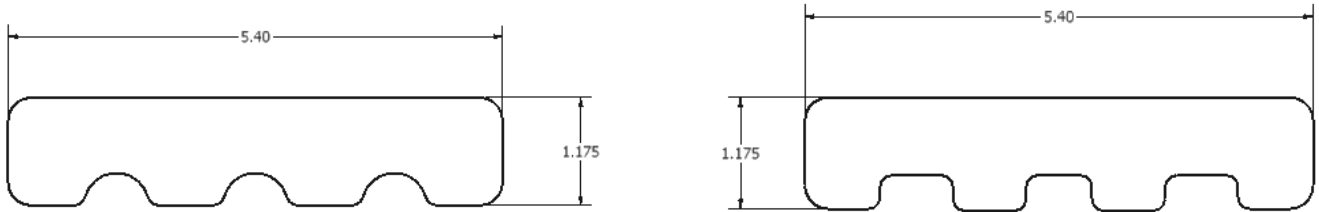


FIGURE 4—5/4 x 6 DECK PROFILES

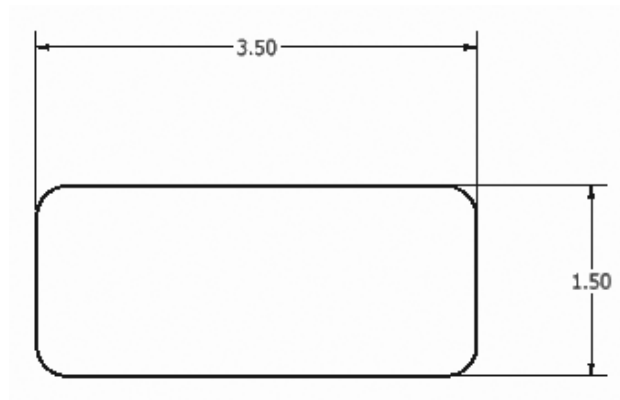


FIGURE 5—2 x 4 DECK PROFILE

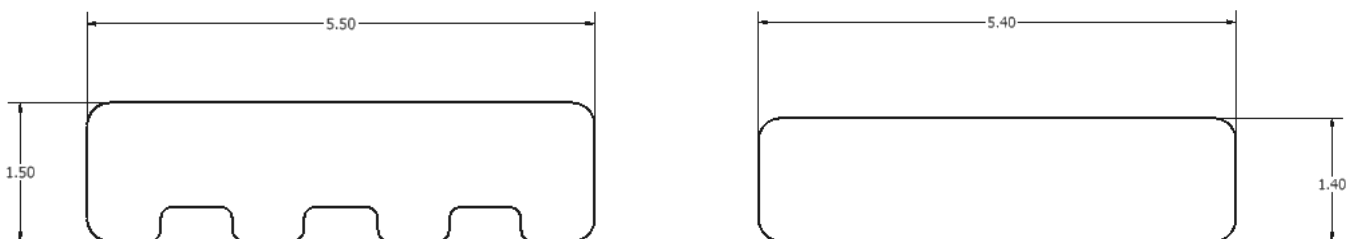


FIGURE 6—2 x 6 DECK PROFILES

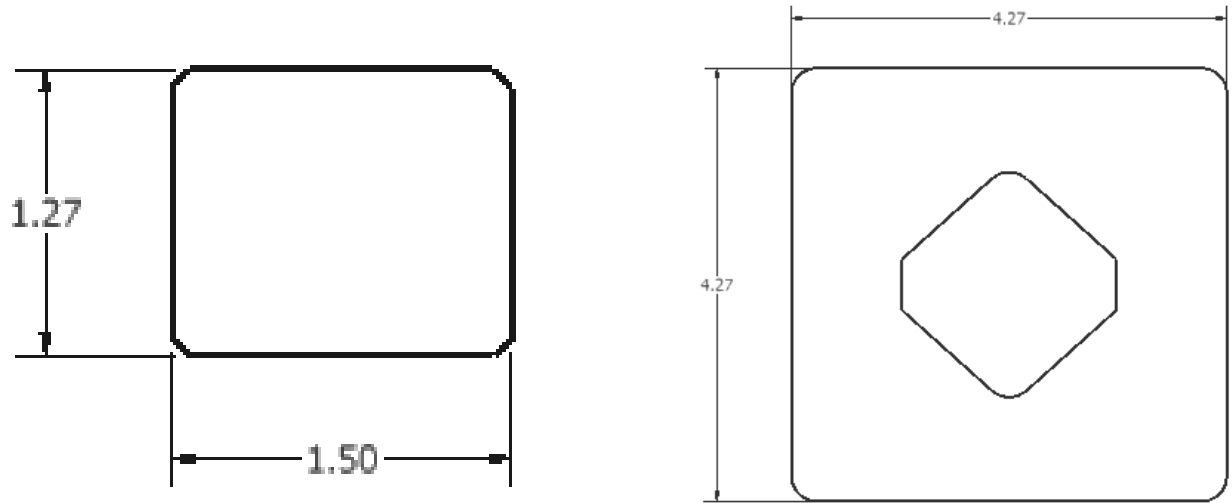


FIGURE 7—POST AND BALUSTER PROFILES

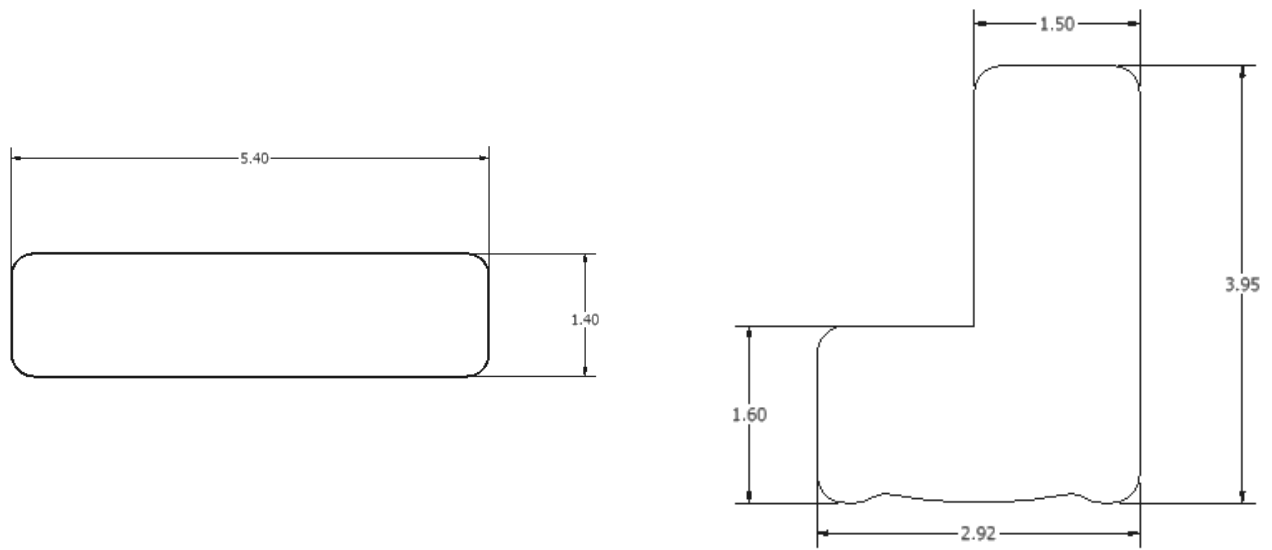


FIGURE 8—RAIL PROFILES