



Code Compliance Research Report

CCRR-0165

Subject to Renewal: 12/22/11
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Issued: 12/22/10
Revised: 02/04/11
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1.0 Subject

Guardrail Systems

AZEK Rail

- Premier
- Trademark Select
- Trademark Select Flat
- Trademark Reserve

2.0 Research Scope

2.1. Building codes

- 2009 International Building Code (IBC)
- 2009 International Residential Code (IRC)
- 2007 Florida Building Code (FBC) including, High Velocity Hurricane Zone (HVHZ)

2.2. Properties

- Structural Performance
- Durability
- Surface Burning
- Decay Resistance
- Termite Resistance

3.0 Description

3.1. General – *AZEK Rail* are guards and guardrails under the definitions of the referenced codes. They are intended for use at or near the open sides of elevated walking areas of buildings and walkways including stairs and ramps as required by the referenced codes.

3.2. Guardrail systems are an assemblage of top and bottom rails, vertical balusters and support posts.

3.2.1. Materials and Processes – Rails, balusters and post sleeves are a co-extruded Wood-Plastic Composite (WPC) material with a polymer cap layer produced in the following colors:

White	Redwood
Brownstone	Sand
Classic Grey	Slate Grey
Mahogany	Black
Clay	Kona

3.2.2. *AZEK Rail* recognized in this report are produced in four styles; Premier, Trademark Select, Trademark Select Flat and Trademark Reserve. See Figures 2 - 5.

3.2.3. Balusters for all systems except Trademark Reserve are 1¹/₄" square with beveled corners. Trademark Reserve Balusters are 1¹/₄" by 1³/₄" with beveled corners.

3.3. Guardrails have an installed height of 36" or 42" above the floor surface. See Table 1 for permissible spans based upon use.

4.0 Performance Characteristics

4.1. The *AZEK Rail* systems described in this report have demonstrated the capacity to resist the design loadings specified in Chapter 16 of the IBC, Section R301 of IRC, and FBC Chapter 16.

4.2. Structural performance has been demonstrated for a temperature range from -20°F to 125°F.

4.3. Materials used are deemed equivalent to preservative treated or naturally durable wood for resistance to weathering effects, decay, and attack from termites.

4.4. The polymer capped WPC material used in the manufacture of *AZEK Rail* has a flame spread index of 25 when tested in accordance with ASTM E 84.

5.0 Installation

Installation shall be in accordance with the manufacturer's installation instructions and this report. Where differences occur between this report and the manufacturer's installation instructions, this report shall govern.

5.1. Top rails of all systems consist of two components. A retainer rail, common to all systems includes 3/16" predrilled holes spaced 5.1" o.c for screw attachment to baluster ends. Profile top rails unique to each rail style are attached to the top of the retainer rail.

5.2. Bottom rails include 3/16" predrilled holes along the top side of the rail and 3/8" weeping holes predrilled along the bottom side of the rail spaced 5.1" o.c. for screw attachment to baluster ends.

5.3. A center support block consists of a 4^{3/8}" length of baluster extrusion attached to the bottom of the bottom rail with a stainless steel plate.

5.4. Top and bottom rails are attached to support posts with stainless steel brackets.

5.5. Polymer capped WPC Posts are utilized as a non-structural sleeve over a conventional 4x4 or 6x6 wood post or, as a structural support when installed with surface anchored steel post mounts. Post sleeve/post mount bracket combinations include:

16 Inch 4x4 post mounts consist of a 16" tall steel tube post-mount bracket with a 4x4 So. Pine wood post for the full rail assembly height and inserted the full 16 inch depth into the steel tube bracket. 4x4 wood post grade shall be No. 2 or better.

(32 or 42) Inch 4x4 post mount consisting of a 36" or 42" (full rail height) tall, 3-1/2" square steel tube post-mount bracket.

(32 or 42) Inch 6x6 post mount consisting of a 36" or 42" (full rail height) tall, 5-1/2" square steel tube post-mount bracket.

A 22.5° post sleeve with 22.5°, 36" or 42" (full rail height) tall steel tube post-mount bracket.

5.5.1. Surface mount post brackets may be anchored to a concrete surface with approved anchors (not included in the scope of this report) or to a wood deck through structural blocking as shown in Figure 8.

5.5.2. Conventional wood posts and the wood in the supporting structure shall have a specific gravity of 0.50 or greater (Southern Yellow Pine or better).

6.0 Supporting Evidence

6.1. Drawings and installation instructions submitted by the manufacturer.

6.2. Reports of testing demonstrating compliance with ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails), AC174 effective June 1, 2009.

6.3. Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ASTM D 7032-07, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)

6.4. Quality control manual in accordance with ICC-ES Acceptance Criteria for Quality Control Documents AC10, revised July 2008.

7.0 Conditions of Use

The guardrail assemblies identified in this report are deemed to comply with the intent of the provisions of the referenced building codes subject to the following conditions.

7.1. Guardrails recognized in this report and regulated by the IBC or IRC are limited to exterior use. Scope of exterior use includes all construction types where wood is permitted in accordance with Section 1406.3 of the IBC and in One and Two Family Dwellings regulated by the IRC.

7.2. Conventional wood posts used as supports for guardrails are not within the scope of this report and are subject to evaluation and approval by the building official. Supports must satisfy the design load requirements specified in Chapter 16 of the IBC and must provide suitable material for anchorage of the rail brackets. Where required by the building official, engineering calculations and details shall be provided.

7.3. Compatibility of fasteners, and other metallic components with the supporting structure, including chemically treated wood, is not within the scope of this report

7.4. Concrete anchorage or other railing system attachments not specifically addressed in this report shall be designed by a licensed design professional. Where required by the building official, engineering calculations and details shall be provided. The calculations shall verify that the anchorage complies with the building codes for the type and condition of the supporting construction.

7.5. AZEK Rail is manufactured in Toronto, Ontario, Canada in accordance with the manufacturer's approved quality control system with inspections by Intertek Testing Services NA LTD.

8.0 Identification

The AZEK Rail guardrail assemblies identified in this report, shall be identified with labeling on the individual components or the railing system packaging and include the following:

8.1. Name of the manufacturer and the manufacturers address.

8.2. The name and/or registered mark of the independent inspection agency, Intertek Testing Services NA LTD.

8.3. The ATI-ES Code Compliance Research Report Number (CCRR-0165) and the following statement:

"See CCRR-0165 at www.ati-es.com for uses and performance levels."

9.0 Code Compliance Research Report Use

9.1. Approval of building products and/or materials can only be granted by a building official having legal authority in the jurisdiction where approval is sought.

9.2. Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by ATI.

9.3. Reference to the Architectural Testing internet web site address at www.archtest.com is recommended to ascertain the current version and status of this report.

Table 1 - Azek Rail Systems Building Code Recognition

Installed Height ⁽¹⁾	Building Code Recognition and Maximum Allowed Guardrail Length ⁽²⁾		
	IBC	IRC ³	FBC ⁴
36" Level Rail	96" Limited Use ⁽⁵⁾	96"	93" Limited Use ⁽⁵⁾
42" Level Rail	72"	96"	72"
	96" with limited use ⁽⁵⁾		93" with limited use ⁽⁵⁾
36" and 42" Stair Rail	58" / Horizontal projected length between supports All Uses		

1. Railing height is the installed height from walking surface to top of top rail.

2. Railing lengths are maximum clear length between supports.

3. Limited to use in One- and Two-Family Dwellings (IRC).

4. Including the High Velocity Hurricane Zone (HVHZ)

5. Use Limited to the following conditions;

- Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade in height with a separate means of egress.
- Residential use Group R-3 adult and child care facilities that are within a single-family home.
- Residential use Group R-4 and the building is protected by an automatic sprinkler system.

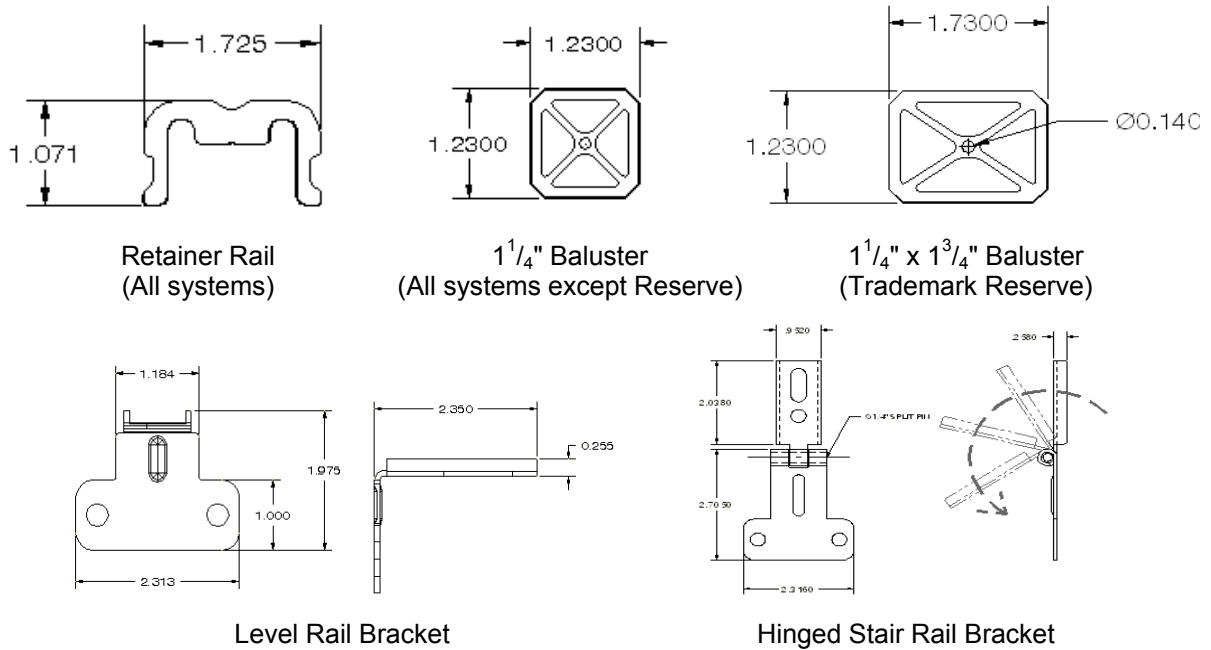
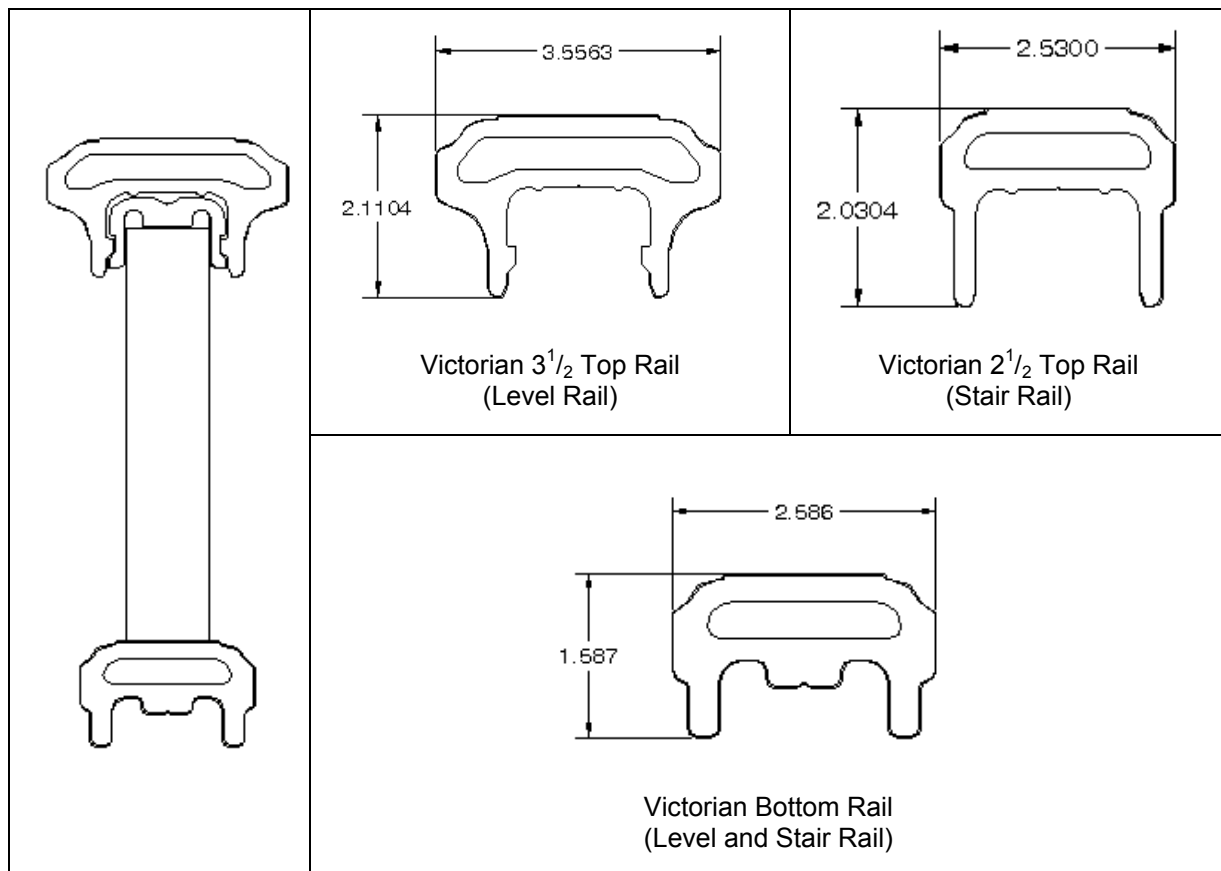
Table 2 - Support Posts - Allowable Spacing

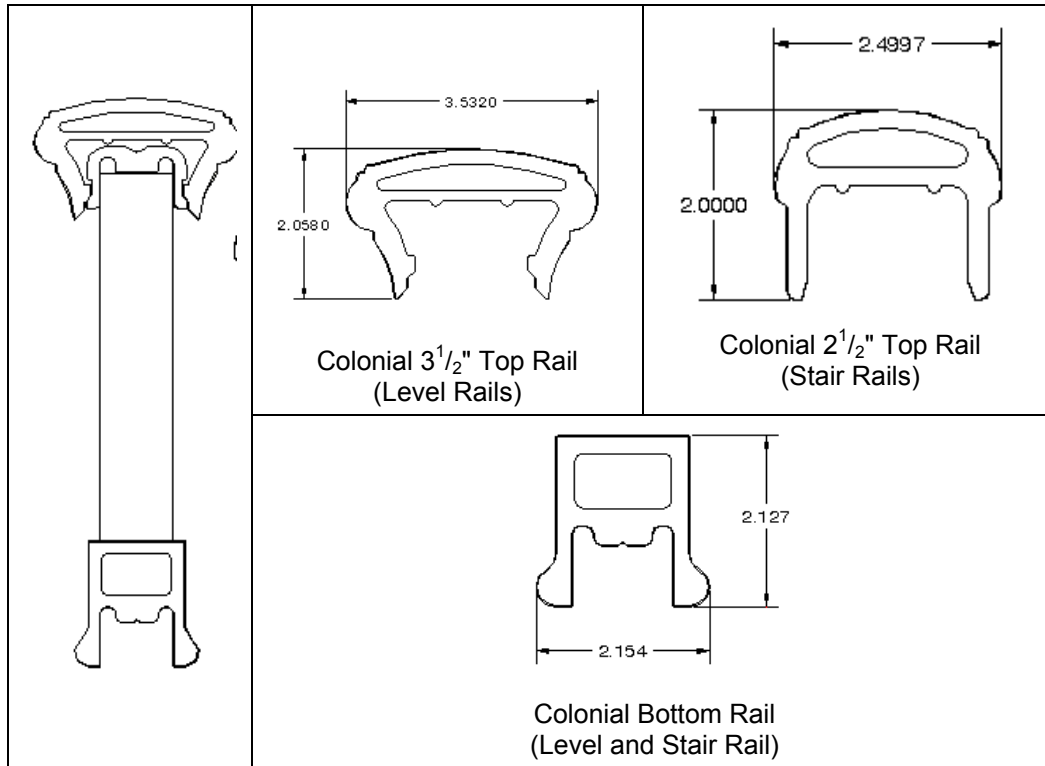
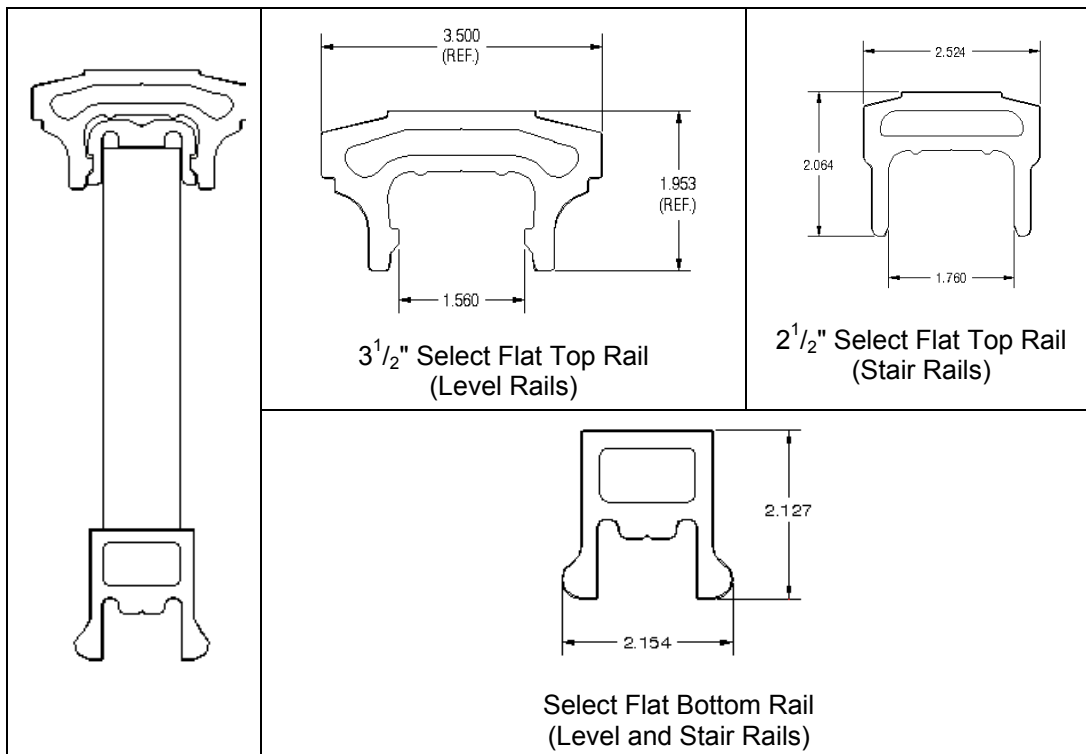
Surface-Mounted Support Posts (See Figure 7)	Supporting Structure	Maximum Post Center Spacing and Code Occupancy Classification
<ul style="list-style-type: none"> ▫ 16 inch 4x4 Steel post mount with 4x4 (36" or 42")¹ tall wood post² ▫ (36" or 42") 4x4 Steel post mount ▫ (36" or 42") 6x6 Steel post mount ▫ (36" or 42") 22-1/2° Steel post mount 	Concrete	74-1/2 inches / IBC
		96 inches IRC only (One- and Two- Family Dwellings)
	Wood Deck (See Fig.8)	74-1/2 inches IRC only (One- and Two- Family Dwellings)

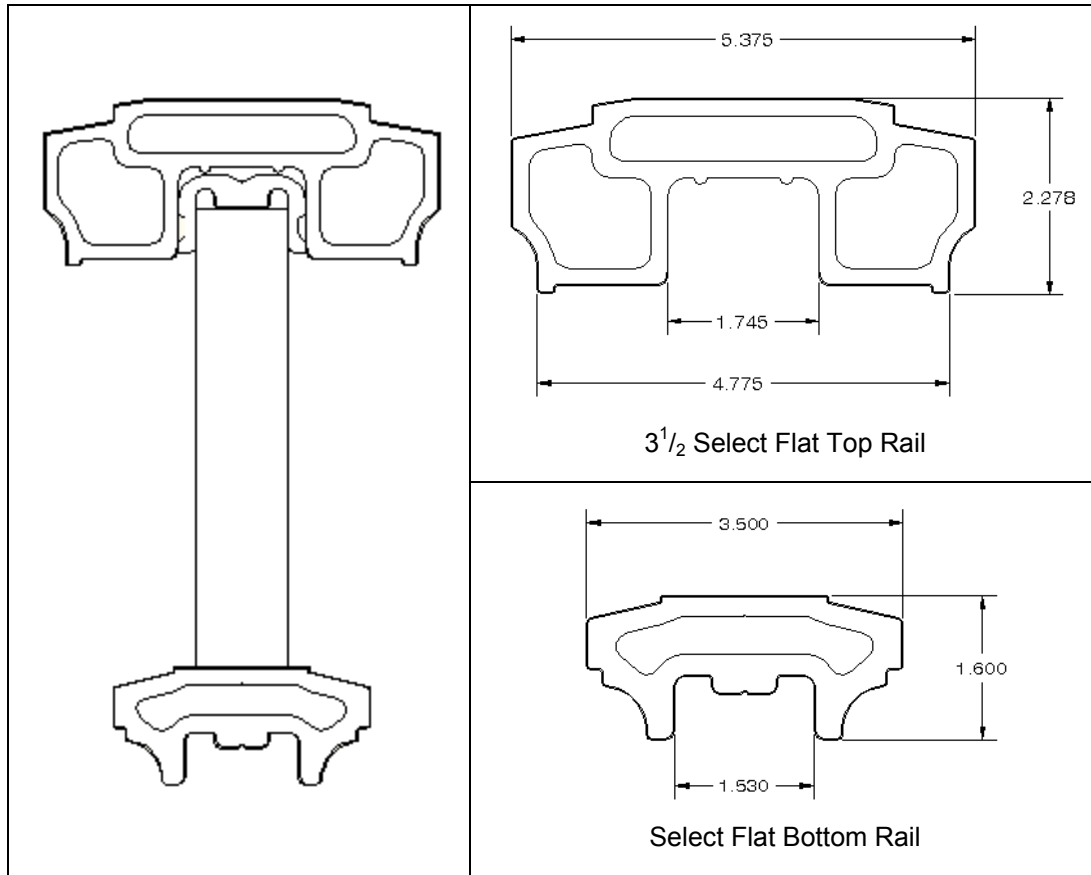
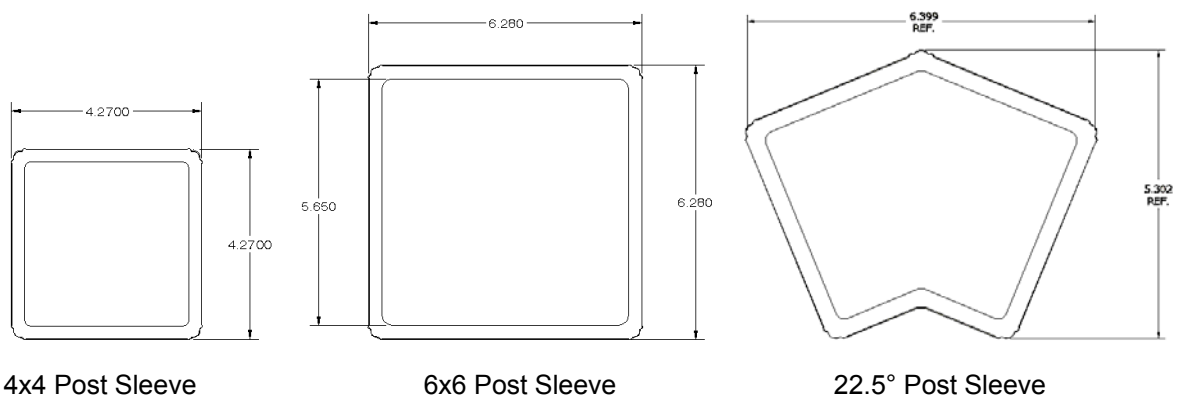
1. Posts are full height of supported rail assembly.
2. No. 2 Southern Pine or better.

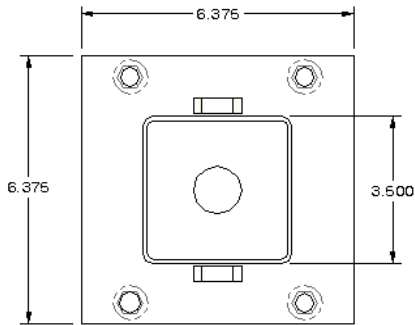
Table 3 - Fastening Schedule

Connection	Fastener	Quantity
Rail-to-Post (Rail Brackets)	<u>Bracket to Top Retainer Rail or to Bottom Rail:</u> 1/4-20 x 1/2" pan-head, stainless steel machine screw, into 1/4-20 x 1/2" flanged screw-in threaded insert. (threaded insert requires two-step pre-drilling: 3/16" followed by 3/8" pre-drill)	Two
	<u>Bracket to Post:</u> #14 x 2" pan-head, Type A point, stainless steel screws (1/4" pre-drill in post sleeve and 7/32" pre-drill into steel mounts)	Two
Baluster to Bottom Rail	#8-10 x 3" flat head, square-drive, Type A point, stainless steel screw	One
Baluster (top) to Retainer Rail	#8-10 x 1-3/4 in, flat head, square-drive, Type A point, stainless steel screw	One
Center Support Block to Bottom Rail	<u>Center Support Plate to Center Support Block:</u> #8-10 x 1-3/4 in, flat head, square-drive, Type A point, stainless steel screw	One
	<u>Center Support Plate to Bottom Rail:</u> #6-9 x 1 in, Philips pan head, stainless steel TEK screws	Two
Top Rail to Retainer Rail	#6-9 x 1 in, Philips pan head, stainless steel TEK screws	Three
Post Mount to Wood Deck	3/8-16 x 7 in, Grade 8 Hex-Head Steel Cap Screw with 3/8 in steel fender washer, 3/8 in SAE steel flat washer, and 3/8 in steel hex nut, under deck	Four
Post Mount to Concrete	3/8" Anchor Bolts (Length and type as required for type and condition of the supporting structure) <u>Concrete anchors are not within the scope of this report</u>	Four

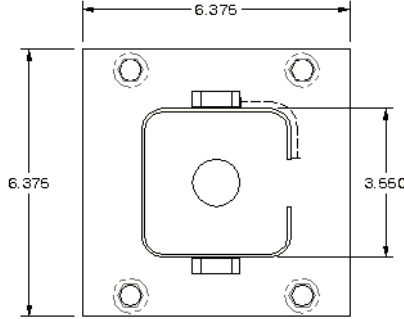

Figure 1 - Rail Components

Figure 2 - Victorian/Premier


Figure 3 – Colonial/Select

Figure 4 - Select Flat

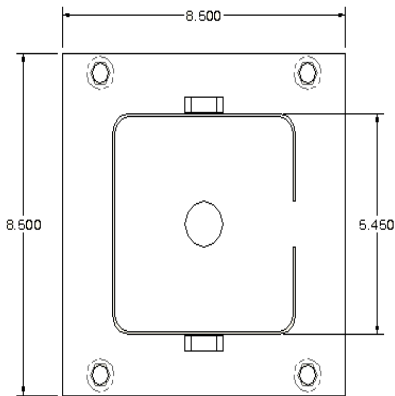

Figure 5 – Trademark Reserve

Figure 6 – Polymer Capped, WPC Post Sleeves



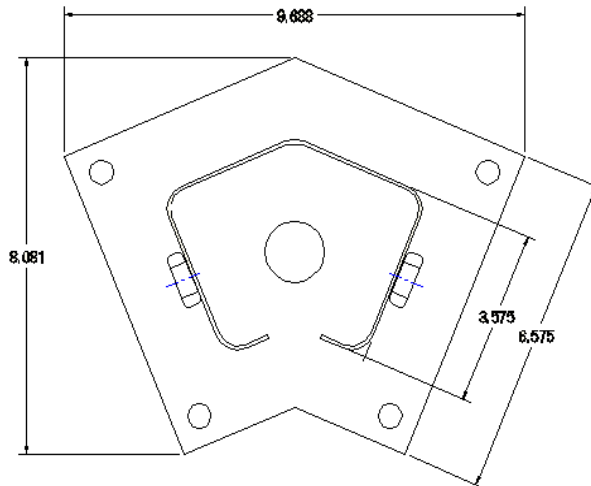
4x4 Post Mount
16 Inch Height



4x4 Post Mount
Full Rail Height (36" or 42")

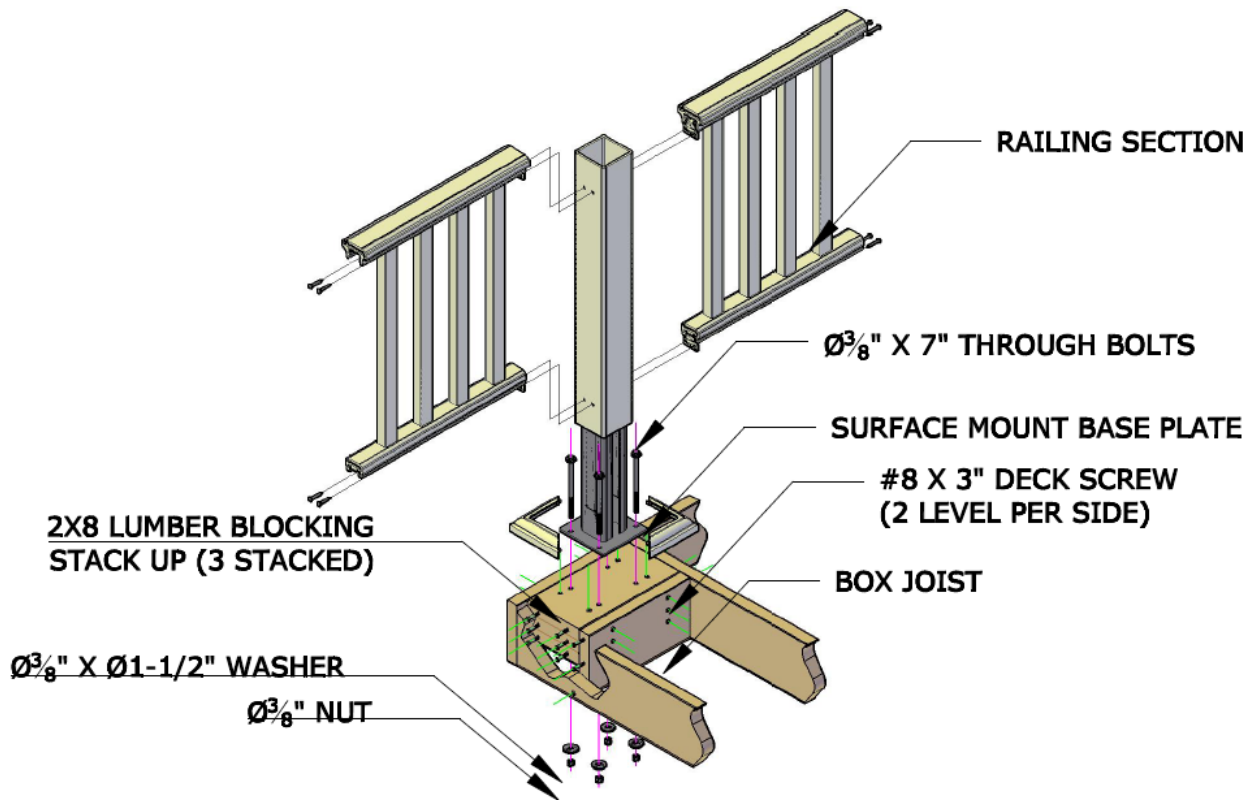


6x6 Post Mount
Full Rail Height (36" or 42")



22.5° Post Mount
Full Rail Height (36" or 42")

Figure 7 – Steel Post-Mount Brackets



Note: Cross supports and reinforcement shown are 2x8 Southern Pine (treated) or approved equivalent fastened with #8 x 3" deck screws (3 per side and 3 per end in each of the three blocking members)

Figure 8 – Post-Mount Installation on Wood Deck