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DIVISION: 05 00 00 – METALS

Section: 05 52 00 – Metal Railings

REPORT HOLDER:

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REPORT SUBJECT:

Westbury® Aluminum Railing

- *Tuscany Series* (Style C10, C101)
- *Riviera Series* (Styles C30, C301, C30R, C301R, C31, C311, C32, C321, C33, C331, C34 and C341)
- *Veranda Series* (Style C70)
- *VertiCable Series* (Style C80)
- *Liberty Series* (Style S10)

1.0 SCOPE OF EVALUATION

1.1 This Research Report addresses compliance with the following Codes:

- 2015 and 2012 *International Building Code®* (IBC)
- 2015 and 2012 *International Residential Code®* (IRC)
- 2017 *Florida Building Code* (see Section 9)
- 2017 *Florida Building Code Residential* (See Section 9)

1.2 *Westbury® Aluminum Railing* has been evaluated for the following properties (see Table 1):

- Structural Performance

1.3 *Westbury® Aluminum Railing* has been evaluated for the following uses (see Table 1):

- The *Westbury® Aluminum Railing* system is a guardrail under the definitions of the referenced codes. It is intended for use at or near the open sides of elevated walking areas of buildings and walkways as required by the codes.
- Guardrails are provided as level guardrails for level walking areas such as decks, balconies, and porches.

2.0 STATEMENT OF COMPLIANCE

Westbury® Aluminum Railing complies with the Codes listed in Section 1.1, for the properties stated in Section 1.2 and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in Section 6.

3.0 DESCRIPTION

3.1 Level guardrails are provided with rail lengths up to 96 inches in length (measured between the inside of support posts) and an installed height of up to 42 inches. See Table 2 for qualified configurations.

3.2 The *Westbury® Aluminum Railing* system is an assemblage of extruded aluminum top and bottom rails, balusters, structural aluminum posts, rail to post brackets and decorative moldings and post caps. Systems may include extruded PVC rail inserts, tempered glass panels, austenitic (300 series) stainless steel fasteners, and cast Zamak 3 bracket materials.

3.3 The system is available in various colors and architectural grade powder coated finishes.

3.4 The guardrail system includes a top rail, a mid-rail (*Riviera Series*), a bottom rail, vertical balusters, a structural aluminum post, rail-to-post brackets, a support block, and decorative moldings and post caps.

3.4.1 Rails - Each of the top, mid, and bottom aluminum rails are routed to accept various infill components described in Section 3.4.2 for the various railing systems as shown in Figure 1 through 11.

3.4.1.1 The *Tuscany, Riviera, Veranda* and *Liberty* top rails are extruded 6005-T5 aluminum rails with internal longitudinal ribs, and dimensions of 1.74 inches wide by 1.38 inches tall. The *Tuscany, Riviera* and *Liberty Series* use PVC rail inserts as a baluster retainer. The *Veranda Series* uses a rubber insert as a glass infill retainer. See Figures 12 and 16.



3.4.1.2 The *VertiCable* top rail is an extruded 6005-T5 aluminum rail with internal longitudinal ribs, dimensions of 1.74 inches wide by 1.38 inches tall and a 0.14 inch x 1-3/16 inch wide 6005-T5 aluminum plate that is drilled for the cable and baluster infills. See Table 3 for the cable fastening schedule and Figure 28 for cross sections of the *VertiCable* top rail sections.

3.4.1.3 The mid-rail is an extruded 6005-T5 aluminum rail with internal longitudinal ribs, dimensions of 1.74 inches wide by 1.25 inches tall. A PVC rail insert is used as a baluster retainer. See Figure 14.

3.4.1.4 The *Tuscany*, *Riviera*, *Veranda* and *Liberty* bottom rails are extruded 6005-T5 aluminum rails with internal longitudinal ribs and are 1.74 inches wide by 1.25 inches tall. A PVC rail insert is used as a baluster retainer. See Figure 13.

3.4.1.5 The *VertiCable* bottom rail is an extruded 6005-T5 aluminum rail with internal longitudinal ribs and is 1.74 inches wide by 1.25 inches tall. An 11/16 inch high x 1-1/2 wide x 0.09 inch thick U-profile, made from 6005-T5 aluminum is inserted into the bottom rail. This insert is drilled for the retaining of the cable and round baluster infills. See Table 3 for the cable fastening of the infills. See Figure 29 for a cross section of the *VertiCable* bottom rail.

3.4.2 The guardrail infills vary by guardrail style:

3.4.2.1 The *Tuscany* Series (Style C10 and C101) utilizes a square and round profile, 6063-T6 aluminum balusters in various lengths. See Figure 18 and Table 2 for applicable assemblies.

3.4.2.2 The *Liberty* Series uses a 6063-T6, 5/8 inch square aluminum baluster. Rails are routed to the shape of the baluster profile to receive balusters. See Figure 18.

3.4.2.3 The *Veranda* Series (Style C70) infill area of the railing system (see Figure 8) utilizes a 1/4 inch thick tempered glass panel in various sizes.

3.4.2.4 The *Riviera* Series (Styles C30, C301, C30R, C301R, C31, C311, C32, C321, C33, C331, C34 and C341) infill area of the railing system is configured with 6063-T6 aluminum balusters, square and round profiles and with tabbed 6063-T6 aluminum rings between the top and mid-rail. See Figure 2 through Figure 7, Figure 18 and Table 2 for applicable assemblies.

3.4.2.5 The *VertiCable* (Style C80) infill area utilizes 1/8" diameter, 1x19, S31600 stainless steel cables spaced at 3.75 inches (See Figure 9). Also, see Table 3 for cable fastening methods.

3.4.3 Structural Aluminum Posts:

3.4.3.1 Power Posts are a 2-1/2 inch square by 0.125 inch wall extruded 6005-T5 aluminum tube with internal screw slots. The tube is connected to a 4-1/2 inch square, 1/2 inch thick 6061-T6 aluminum base plate via both a 1/4 inch continuous fillet weld and six #14 by 2 inch flat-head screws. For the standard Power Post, see Table 3 and Figure 24. For the Power Post crossover assembly, see Table 3 and Figure 23.

3.4.3.2 The 4x4 aluminum post is a 4 inch square by 0.125 inch wall extruded 6063-T6 aluminum tube. The tube is permanently attached to a 6 inch square, 1/2 inch thick 6061-T6 aluminum base plate by a 1/4 inch continuous fillet weld. See Table 3 and Figure 25.

3.4.3.3 2 inch Alum Support Posts are a 2 inch square by 0.09 inch wall extruded 6005-T5 aluminum tube with internal screw slots. The tube is connected to a 3-7/8 inch square, 1/2 inch thick 6061-T6 aluminum base plate via both a 1/4 inch continuous fillet weld and two #14-14 by 2 inch flat-head screws. For the Alum Support Post, see Table 2 and Figure 26. For the 2" Post crossover assembly, see Table 3 and Figure 23.

3.4.3.4 Support blocks are installed between the lower rail and the deck surface midway between supports, with the exception of Westbury C-10 *Tuscany* railings that are 72 inches or less between posts. See Figure 20 and 21.

4.0 PERFORMANCE CHARACTERISTICS

4.1 The guardrail system described in this report has demonstrated the capacity to resist the design loadings specified in Chapter 16 of both the IBC and the FBC and Section R301 of the IRC when tested in accordance with ICC-ES AC273.



5.0 INSTALLATION

5.1 General:

Westbury® Aluminum Railing must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation.

5.2 Application: The top and bottom rails are attached directly to structural posts utilizing cast Zamak 3 mounting brackets via mechanical fasteners. See Figure 22 and Table 2.

5.3 Guardrails may be assembled in various configurations. Refer to Figure 1 through Figure 11 for overall assembly and Table 2 for the fastening schedule.

5.4 Infill components (aluminum balusters and aluminum rings) are inserted into routed holes in the aluminum rails and secured via PVC rail inserts that are installed internally to the rails. See Figure 15.

5.5 The infill component for the *Veranda* Series (Style C70) consists of a glass panel which is inserted into the top rail and slides up, to clear bottom rail. The glass panel is aligned with the bottom insert and pushed down into that insert.

5.6 The cable infill for the *VertiCable* consists of both 1/8 inch diameter stainless steel cables and 9/16 inch diameter aluminum balusters. The steel cables must be installed with the Zamak 3 cable tensioner below the bottom rail tensioned to 40 in-lbs of torque.

5.7 *Power Post* shim plates are 4-1/2 inches long by 3/4 inch wide by 1/16 inch thick austenitic (300 series) stainless steel plates. The 4x4 aluminum post shim plates are 6 inches long by 3/4 inch wide by 0.06 inch thick austenitic (300 series) stainless steel plates.

5.8 The 2" square aluminum posts must be installed with the two internal screw channels perpendicular with the rail line. See Figure 26. Two shim plates are utilized under the base of the 2 inch aluminum post mount. The shim plates line the perimeter of the post base. Shim plates are 3.88 inches long by 0.75 inches wide by 0.06 inch thick austenitic stainless steel plates.

6.0 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:

6.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict, this report governs.

6.2 Attachment of guardrail systems described herein to conventional wood supports is outside the scope of this report.

6.3 Austenitic stainless steel shim plates are used to prevent direct contact between the structural post base plate and the supporting structure. Compatibility of fasteners and other metallic components with the supporting structure, including chemically treated wood, is outside the scope of this report.

6.4 Shim plates must be used for all structural post installations as described in Section 5.6.

6.5 Anchorage of the structural post is not within the scope of this report and is subject to evaluation and approval by the building official. Anchors must satisfy the design load requirements specified in Chapter 16 of the building code and must meet the following minimum requirements:

6.5.1 A minimum of four anchor bolts must be used and located in the four pre-drilled holes in the structural post base plate.

6.5.2 The anchors must have a minimum nominal diameter equal to 3/8 inch.

6.5.3 When the supporting structure is a wood-framed deck, installation must include anchorage to suitable structural framing. Decking is not considered structural framing, and anchorage to decking alone is not an approved installation method.

6.5.4 For post installation on concrete or other rigid supports such as structural steel, the installation uses four 3/8 inch diameter anchor bolts located in the pre-drilled holes in the structural post base plate. The type and length of the anchor bolts is dependent upon the material and



condition of the supporting structure and is not within the scope of this report.

6.5.5 The structural wood framing detailed in Figure 24 is an acceptable mounting method for the 2" square aluminum post limited to the 2012 & 2015 IRC or FBC Residential only.

Exception: *The Westbury® Veranda Series Style C70 Glass Railing System* is not approved for use with this mounting method.

6.5.6 Where required by the building official, engineering calculations and details shall be provided. The calculations shall verify that the anchorage and supporting structure complies with the building code for the type and condition of the supporting construction.

6.6 The glass infill panel of guardrails is considered a hazardous location as defined by Sections 2406.4 of the IBC and 2406.3 of the FBC. Glass must be identified by permanent etching as required by Sections 2406.3 of the IBC and 2406.2 of the FBC. Each section of glass must bear the manufacturer's name or mark and the applicable test standard. (Class A of ANSI Z97.1 and Category II of 16 CFR 1201).

6.7 Guardrails with glass infill are not approved for use in wind-borne debris regions as defined by the IBC in accordance with Section 2407.1.4. Thus, glass balusters are also not approved for use in the High Velocity Hurricane Zone (HVHZ) under the FBC.

7.0 SUPPORTING EVIDENCE

7.1 Drawings and installation instructions submitted by Digger Specialties, Inc.

7.2 Data demonstrating compliance with the performance requirements of ICC-ES AC273, Acceptance Criteria for Handrails and Guards, revised March 2016 with additional testing including increased test loads to address IBC and FBC Section 2407.1.1 for assemblies that utilize a glass in-fill panel.

7.3 Documentation of an Intertek approved quality control system for the manufacturing of products recognized in this report.

8.0 IDENTIFICATION

The *Westbury® Aluminum Railing* guardrail assemblies that are described in this report shall be identified with labeling on the individual components and/or the packaging such that the product is identifiable at the point of use. The label shall include at least the following information:

8.1 The manufacturer's name (Digger Specialties, Inc.)

8.2 Address and telephone number

8.3 The product name (*Westbury® Aluminum Railing*),

8.4 The name and/or identifying mark of the independent inspection agency (NTA, Inc.),

8.5 For 36" high guardrail systems, the label shall also include the phrase, "For Use in One- and Two- Family Dwellings Only."

8.6 The Intertek Mark as shown below, and the Code Compliance Research Report number (CCRR-0163).



9.0 FLORIDA BUILDING CODE

9.1 Scope of Evaluation:

The *Westbury® Aluminum Railings* were evaluated for compliance with the 2017 *Florida Building Code – Building*.

9.2 Conclusion:

The *Westbury® Aluminum Railings*, described in Sections 2.0 through 7.0 of this Research Report, comply with the 2014 *Florida Building Code* subject to the following conditions:

- *Westbury® Tuscany, Riviera, Liberty and VertiCable Series* comply with the 2017 *Florida Building Code* including High-Velocity Hurricane Zone (HVHZ) provisions.





- *Veranda* model complies with the 2017 Florida Building Code excluding the High-Velocity Hurricane Zones (HVHZ).
- Intertek is a quality assurance entity approved by the Florida Building Commission.

10.0 CODE COMPLIANCE RESEARCH REPORT USE

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

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

10.3 Reference to the <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.

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TABLE 1 – PROPERTIES EVALUATED

PROPERTY	2015/2012 IBC SECTION	2015/2012 IRC SECTION	2017 FBC - Building	2017 FBC- Residential
Structural Performance	1607.8	R301.5	1607.8	R301.5

TABLE 2 – GUARDRAIL SYSTEMS AND USE CATEGORIES

<u>Westbury® Aluminum Guardrail System</u>	<u>Guardrail Type</u>	<u>Maximum Guardrail Dimensions¹</u>	<u>Support Post Mount System</u>	<u>Code Occupancy Classification</u>
<i>Tuscany Series & Riviera Series</i>	Level	8' x 42"	2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC IRC and FBC-Residential
		8' x 36"	2" Square Aluminum Post, 2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC (limited) ² IRC / FBC-Residential Only ^{2,4}
<i>Tuscany (no center support under bottom rail)</i>	Level	6' x 42"	2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC IRC and FBC-Residential
		6' x 36"	2" Square Aluminum Post, 2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC (limited) ² IRC / FBC-Residential Only ²
<i>VertiCable Series</i>	Level	6' x 42"	2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC IRC and FBC-Residential
		8' x 36"	2" Square Aluminum Post, 2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC (limited) ² IRC / FBC-Residential Only ²
<i>Veranda Series</i>	Level	6' x 42"	2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC ^{3,4} IRC and FBC-Residential ^{3,4}
		6' x 36"	2" Square Aluminum Post, 2-1/2" Power Post, or 4" Square Aluminum Post	IBC and FBC (limited) ^{2,3,4} IRC / FBC-Residential Only ^{2,3,4}
<i>Liberty S10 Series</i>	Level	8' x 42"	2 inch Aluminum Post Mount	IBC (limited) ² IRC Only ²

¹ Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in the referenced Code Occupancy Classification. Guardrail lengths are actual railing lengths, i.e. clear space between supports for level rails. Guardrail height is walking surface to top of top rail. Minimum installed height shall be 36 inches.

² The use of this product shall be limited to exterior use as a guardrail system for balconies and porches for one- and two-family dwellings (IBC, FBC) construction in accordance with the IRC or FBC-Residential.

³ Excluding wind-borne-debris regions

⁴ Excluding High-Velocity-Hurricane-Zone (HVHZ)



TABLE 3 – FASTENER SCHEDULE

<u>Westbury® Guardrail</u>	<u>Connection</u>	<u>Fastener</u>
<i>Riviera Tuscany Veranda VertiCable</i>	Rail Brackets to Post	Two #10-16 x 5/8 in pan-head, self-drilling, 18-8, 300 Series screws ²
	Crossover Assemblies to Top Rail	
	Top Rail and Mid-Rail Bracket to Rail	Two #10-15 x 1 in flat-head, self-drilling, 18-8, 300 Series screws ² (one through each side hole)
	Support Block Screw to Bottom Rail	One #8-18 x 3/4 in pan-head, self-drilling, zinc-plated 18-8, 300 Series screw ²
	Power Post Base Plate to 2-1/2" Structural Post Tube	Six #14-14 x 2 in flat-head, self-drilling, 18-8, 300 Series screws ^{1, 2}
	Base Plate to 2" Alum Support Post	Two #14-14 x 2 in trim head, Phillips-drive, 18-8, 300 Series screws ^{1, 2}
<i>Riviera</i>	Square Baluster to Rails	Inserted into 0.8 inch square routed hole and held snug with PVC Rail Insert
	Round Baluster to Rails	Inserted into 0.79 inch diameter routed hole and held snug with PVC Rail Insert
	Bottom Rail Bracket to Rail	No mechanical fastener
<i>Tuscany</i>	Square Baluster to Rails	Inserted into 0.8 inch square routed hole and held snug with PVC Rail Insert
	Round Baluster to Rails	Inserted into 0.79 inch diameter routed hole and held snug with PVC Rail Insert
	Bottom Rail Bracket to Rail	No mechanical fastener
<i>Veranda</i>	Glass Panel to Rails	EPDM gasket retaining glass panel in slotted top and bottom rails
	Bottom Rail Bracket to Rail	No mechanical fastener
<i>VertiCable</i>	Aluminum Baluster to Rails	Inserted into 9/16 round routed hole
	Cable Infill to Top Rail Insert	One 0.23 in diameter (OD) hollow 18-8 stainless steel cable stop sleeve, crimp fit to each cable
	Cable Infill to Bottom Rail Insert	One 0.23 in diameter (OD) hollow 18-8 stainless steel cable stop sleeve, crimp fit to each cable and one 3/8 in wide by 7/8 in long threaded (20 TPI) Zamak 3 cable tensioner with 1/2 in 18-8 stainless steel nut per cable
	Bottom Rail Bracket to Rail	Two #10-15 x 1 in flat-head, self-drilling, 18-8, 300 Series screws ² (one through each side hole)
<i>Liberty S10</i>	Top/Bottom Bracket to Post	Four #10-16 x 5/8 inch (0.133 inch minor diameter), pan-head, self-drilling, stainless ⁽²⁾ steel screws
	Top Rail Bracket to Rail ⁽²⁾	One #10-16 x 5/8 inch (0.133 inch minor diameter), pan-head, self-drilling, stainless ⁽²⁾ steel screw
	Rail Support to Bottom Rail	Two #10-16 x 5/8 inch (0.133 inch minor diameter), pan-head, self-drilling, stainless ⁽²⁾ steel screws

¹ Power Posts and 2" Alum Support Posts are supplied with fasteners pre-installed.

² Permissible grades of the 300 Series stainless steel material include: 304, 305, 316, 384, and/or XM7 (30430), which are all Austenitic Stainless Steel – Cold Worked materials.

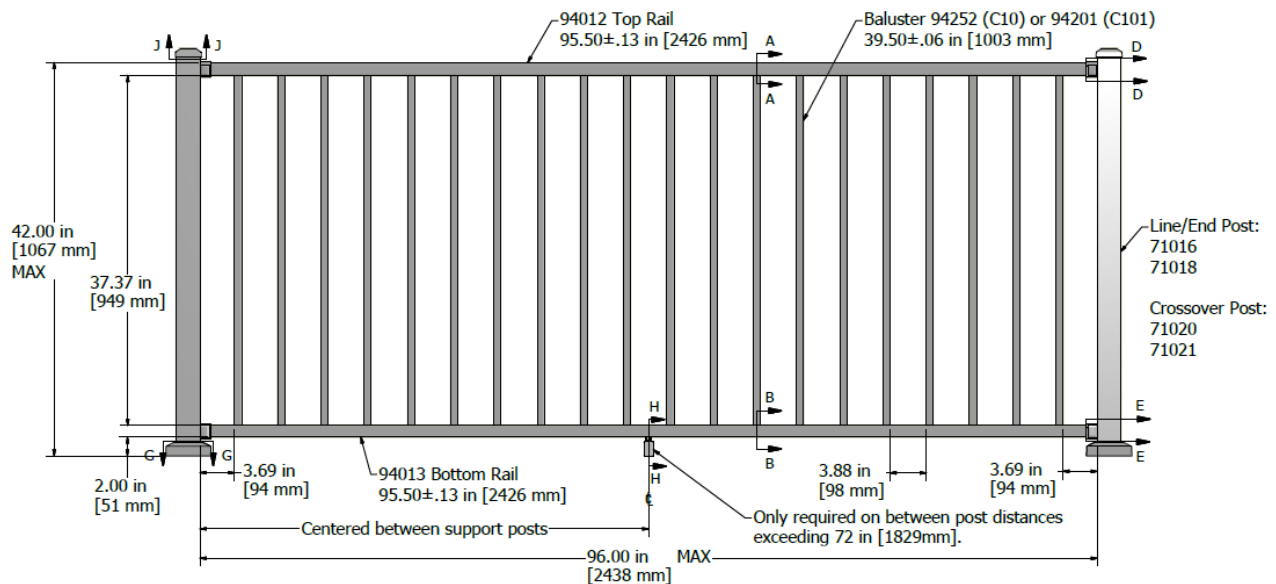


FIGURE 1 - WESTBURY® TUSCANY SERIES STYLE C10/C101 ALUMINUM RAILING SYSTEM

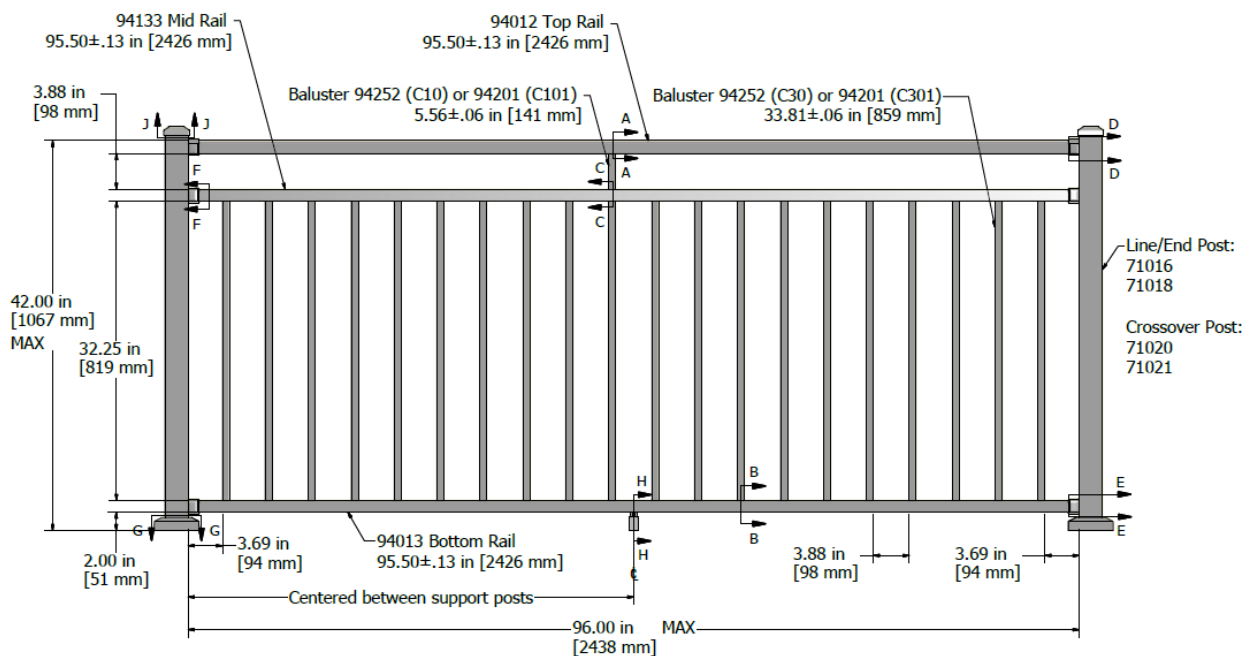


FIGURE 2 - WESTBURY® RIVIERA SERIES STYLE C30/301 ALUMINUM RAILING SYSTEM

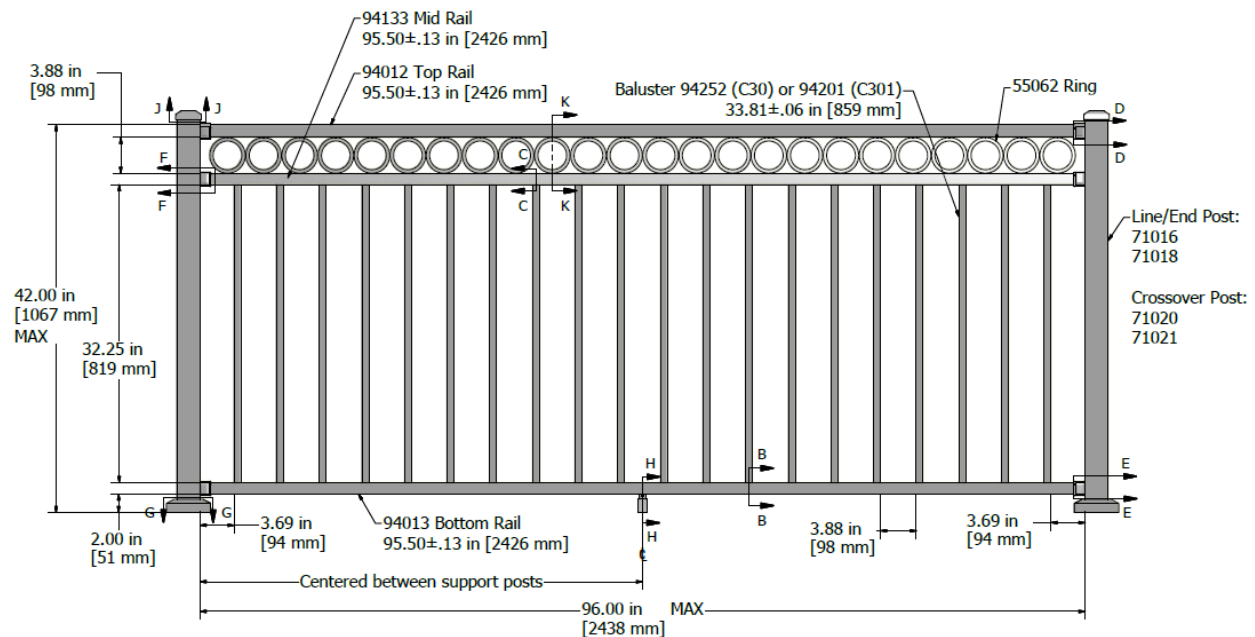


FIGURE 3 - WESTBURY® RIVIERA SERIES STYLE C30R/C301R ALUMINUM RAILING SYSTEM

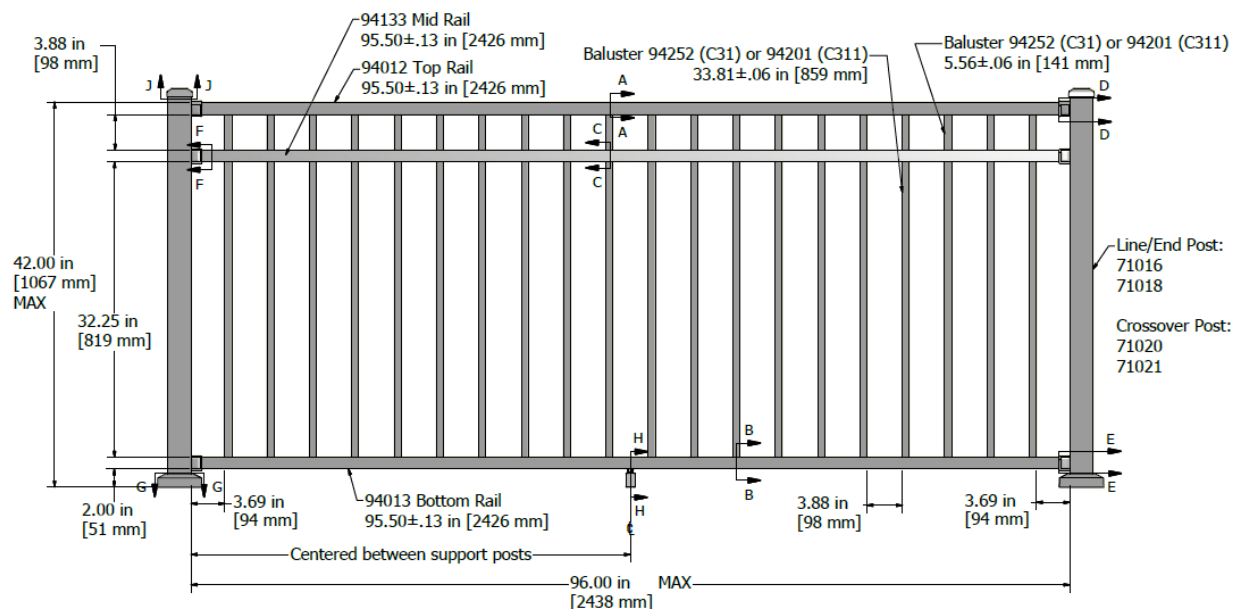


FIGURE 4 - WESTBURY® RIVIERA SERIES STYLE C31/C311 ALUMINUM RAILING SYSTEM



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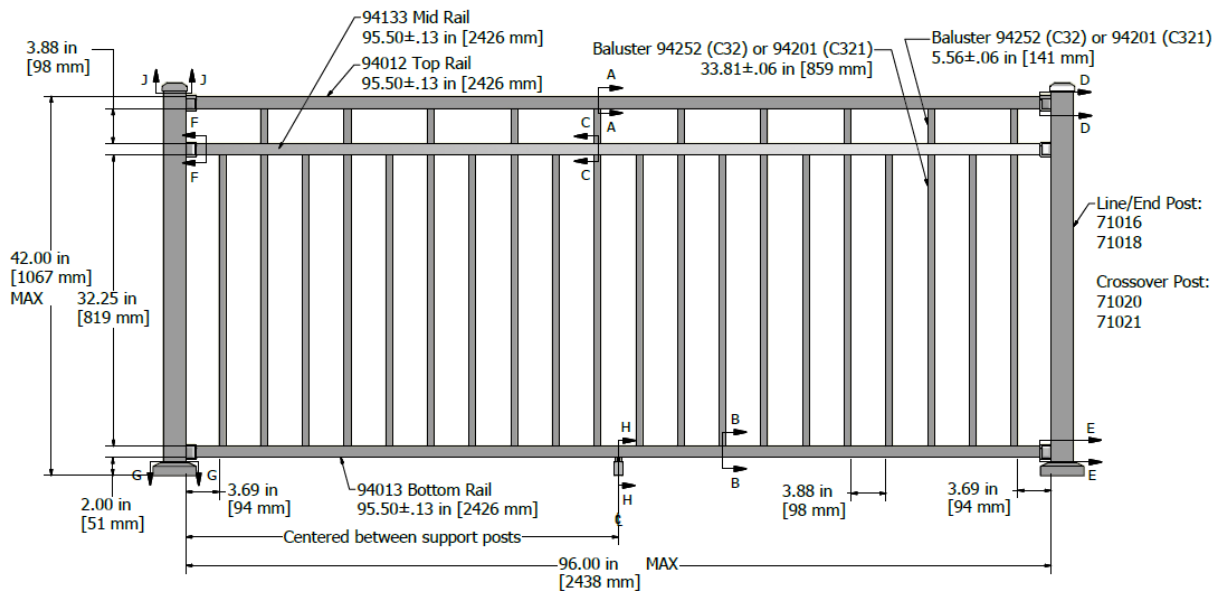


FIGURE 5 - WESTBURY® RIVIERA SERIES STYLE C32/C321 ALUMINUM RAILING SYSTEM

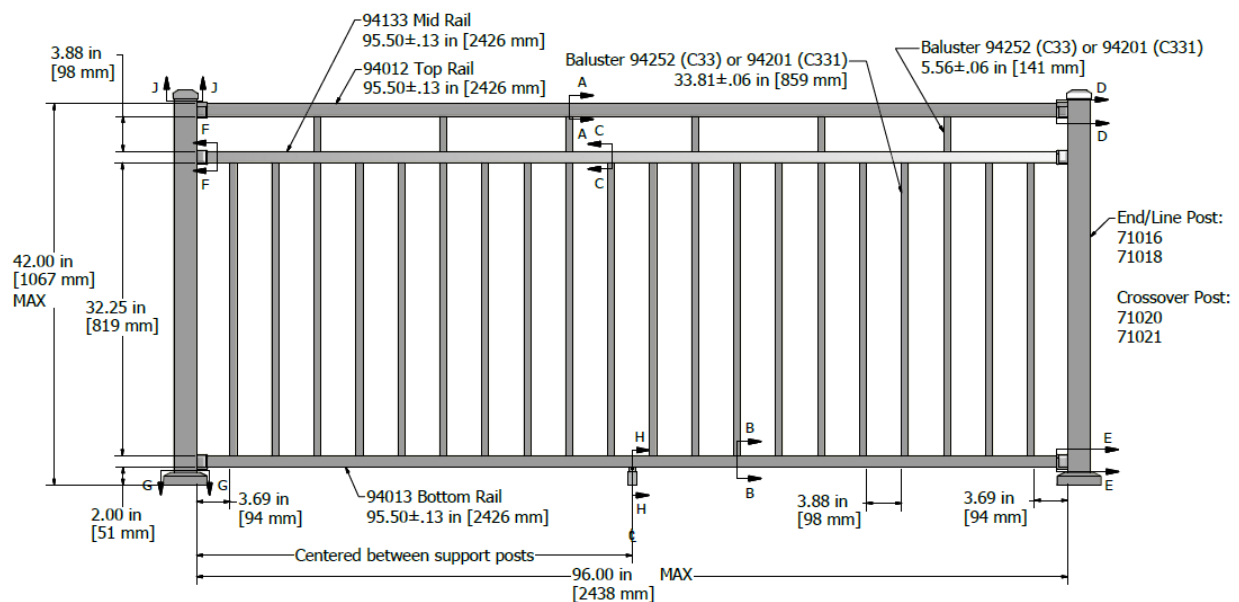


FIGURE 6 - WESTBURY® RIVIERA SERIES STYLE C33/C331 ALUMINUM RAILING SYSTEM

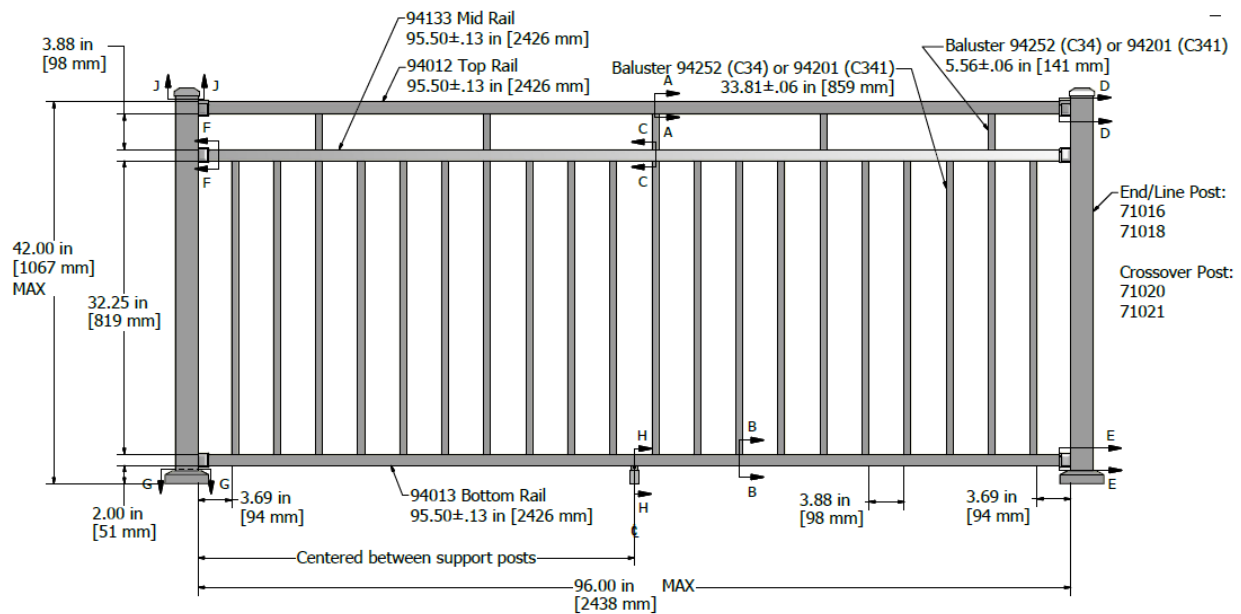


FIGURE 7 - WESTBURY® RIVIERA SERIES STYLE C34/C341 ALUMINUM RAILING SYSTEM

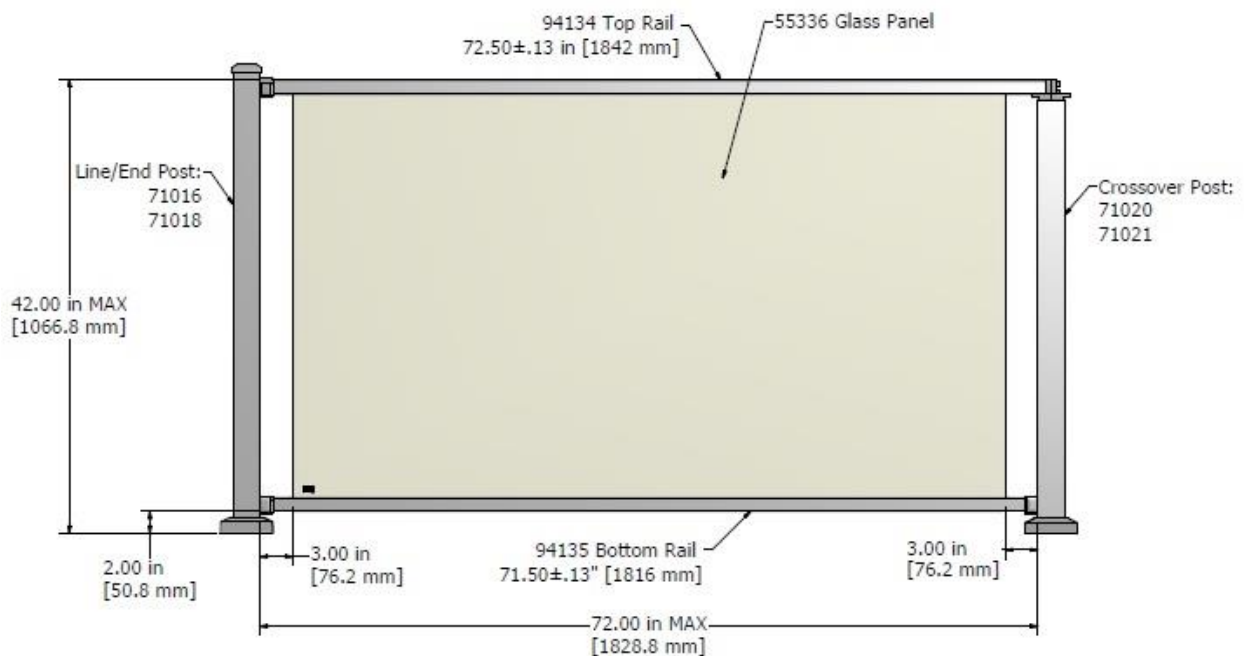


FIGURE 8 - WESTBURY® VERANDA SERIES STYLE C70 GLASS RAILING SYSTEM

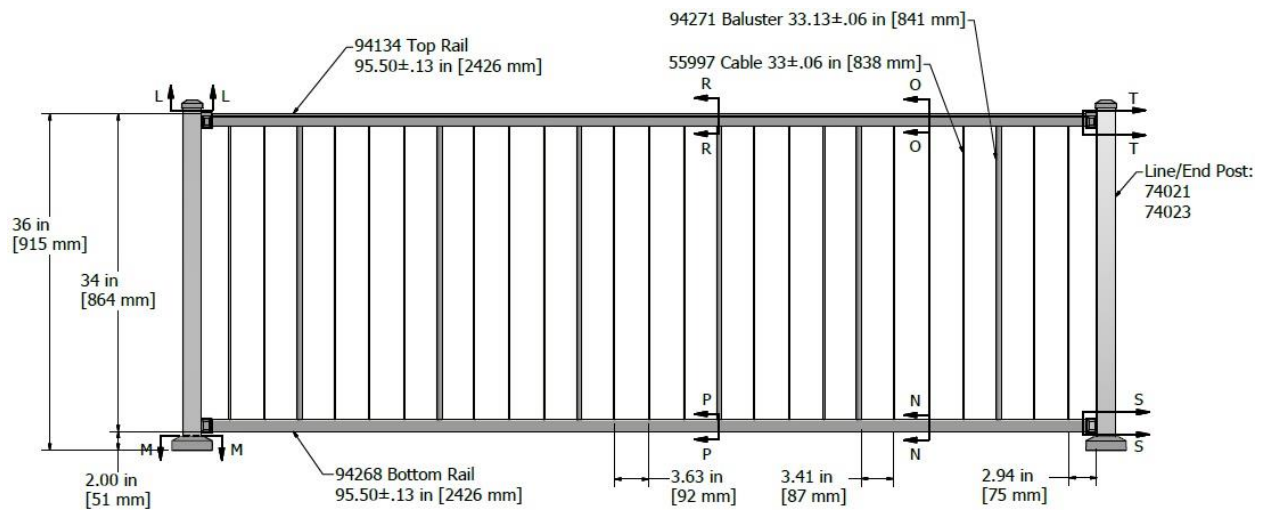


FIGURE 9 - WESTBURY® VERTICABLE SERIES STYLE C80 ALUMINUM RAILING SYSTEM (36" TALL)

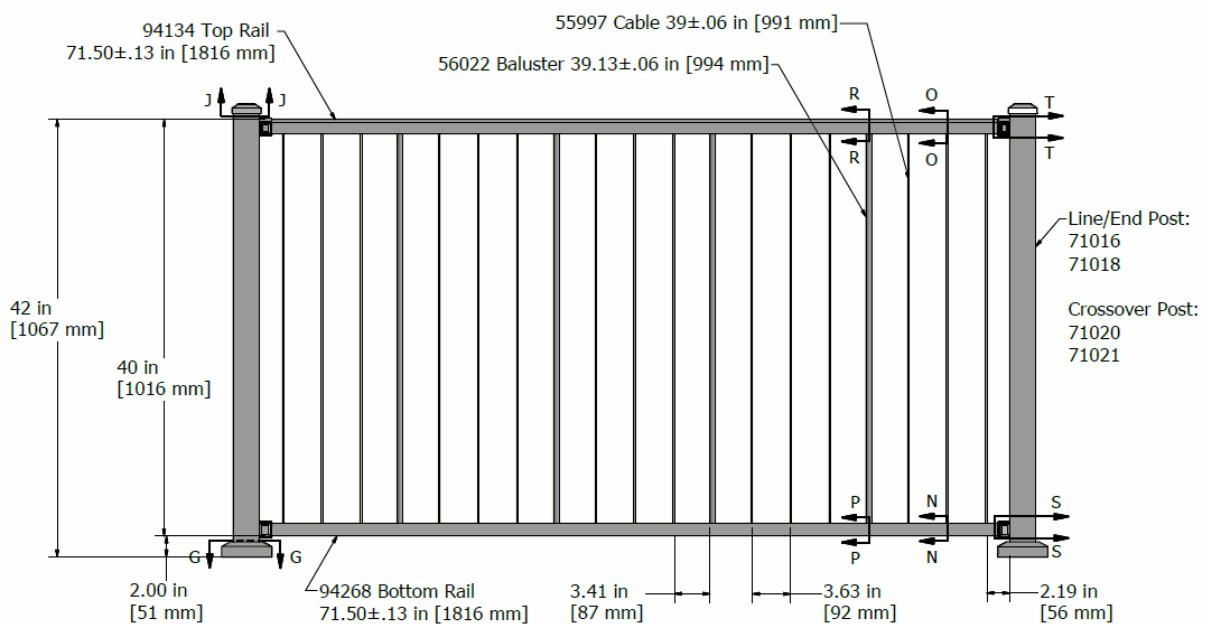


FIGURE 10 - WESTBURY® VERTICABLE SERIES STYLE C80 ALUMINUM RAILING SYSTEM (42" TALL)

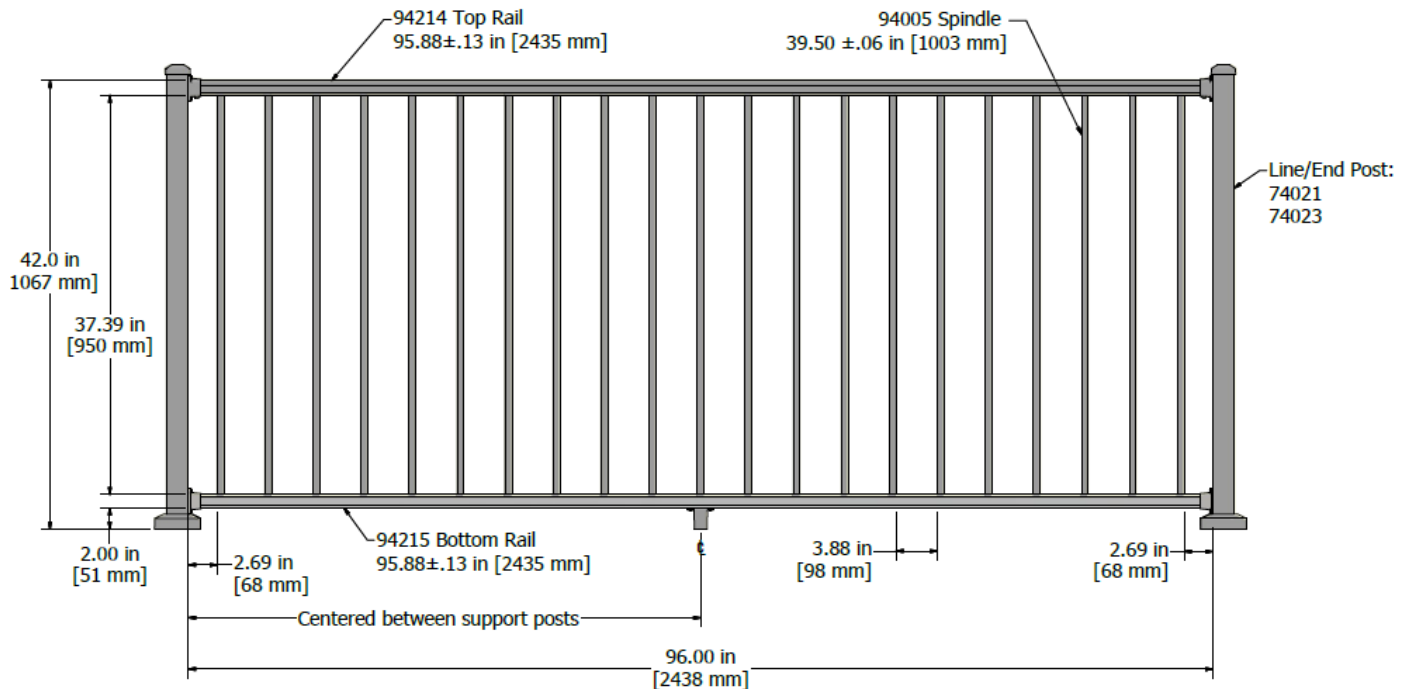


FIGURE 11 - WESTBURY® LIBERTY S10 ALUMINUM RAILING

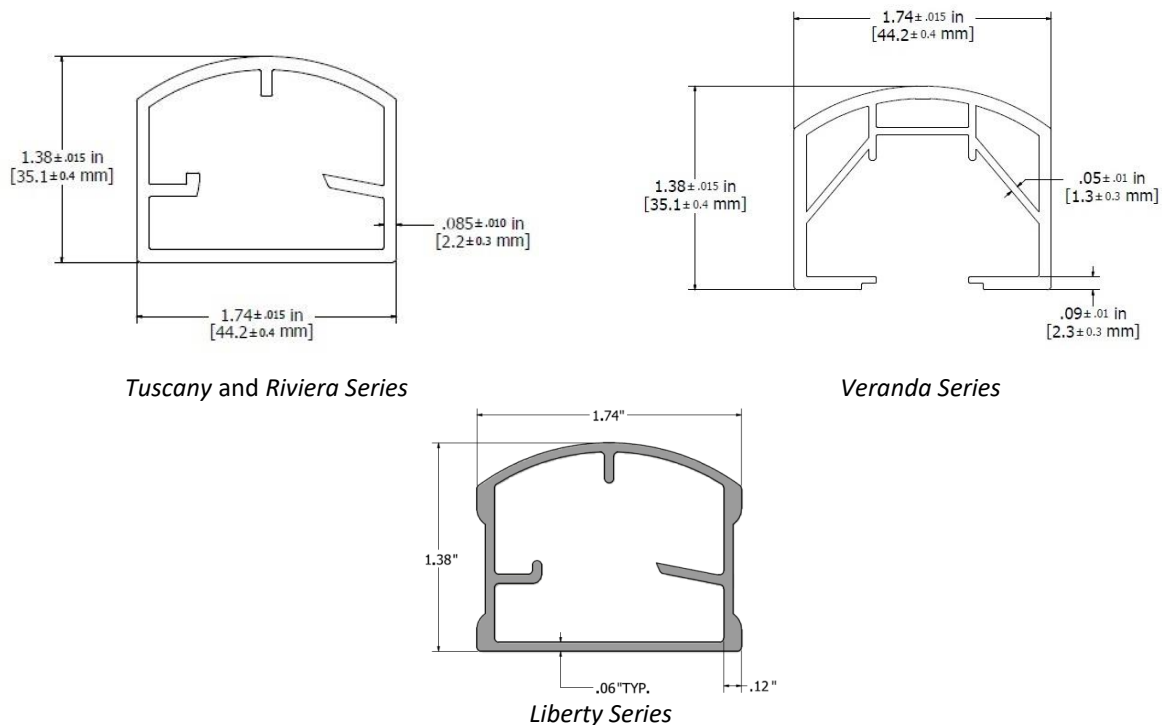


FIGURE 12 – TOP RAIL PROFILES

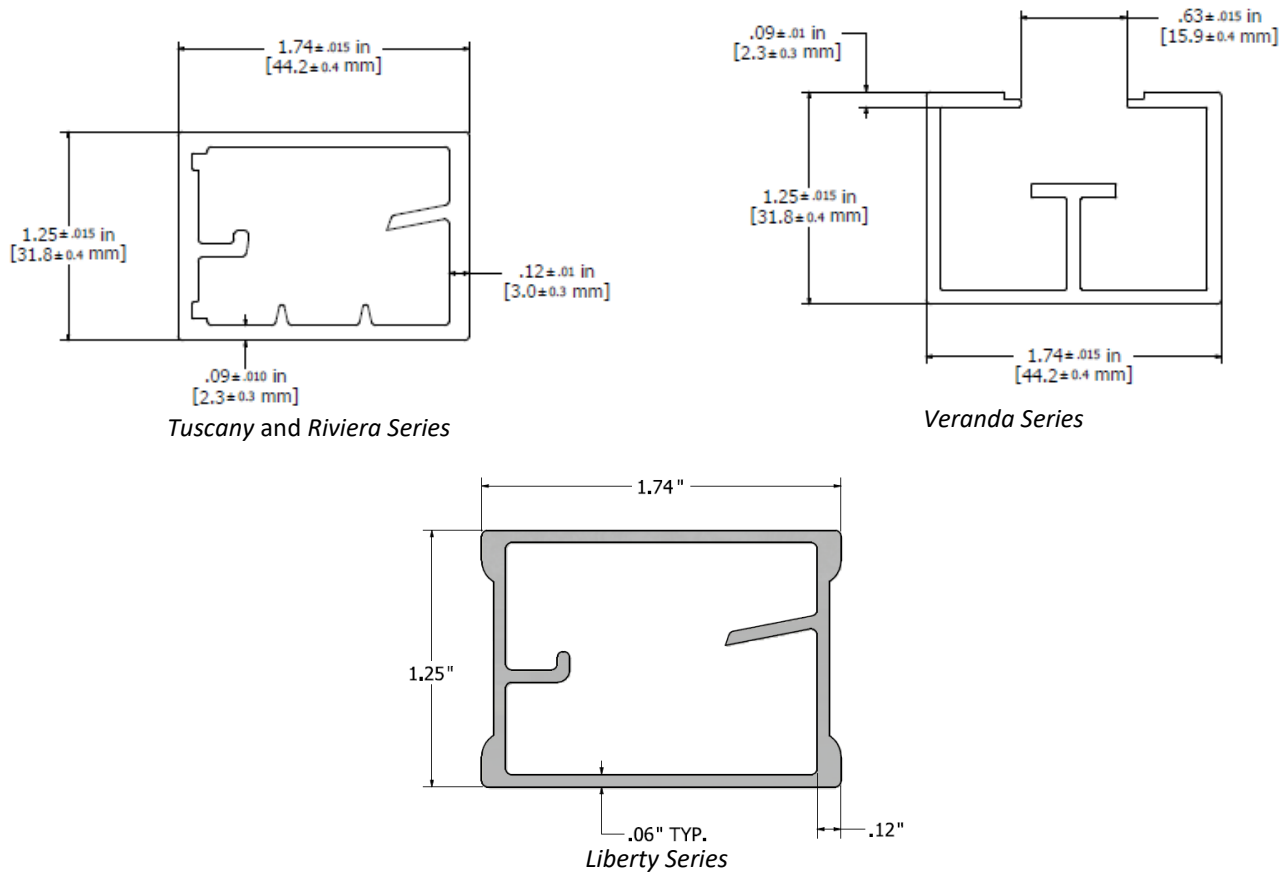


FIGURE 13 – BOTTOM RAIL PROFILES

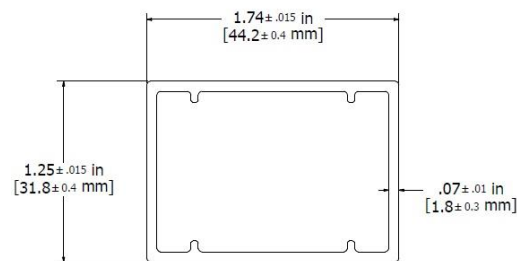


FIGURE 14 – MID-RAIL PROFILE (RIVIERA SERIES ONLY)

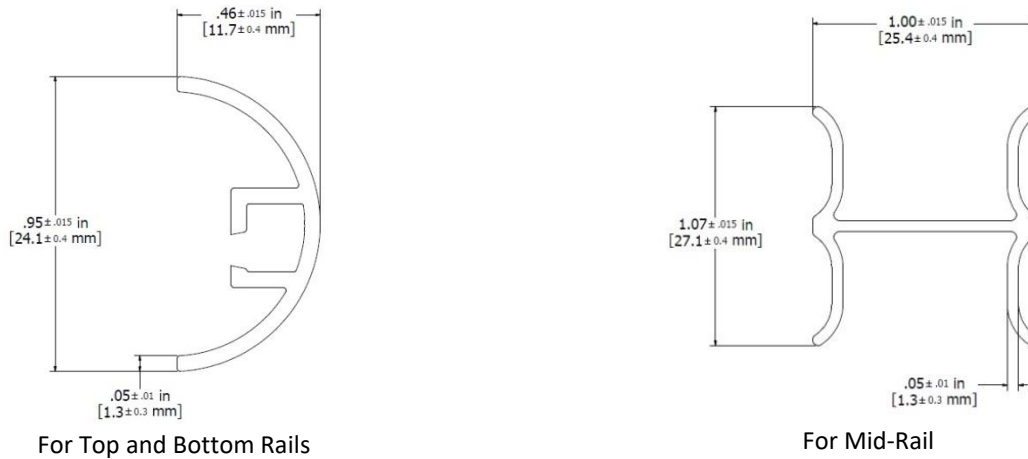


FIGURE 15 – TUSCANY AND RIVIERA SERIES PVC INSERTS FOR ALUMINUM BALUSTERS

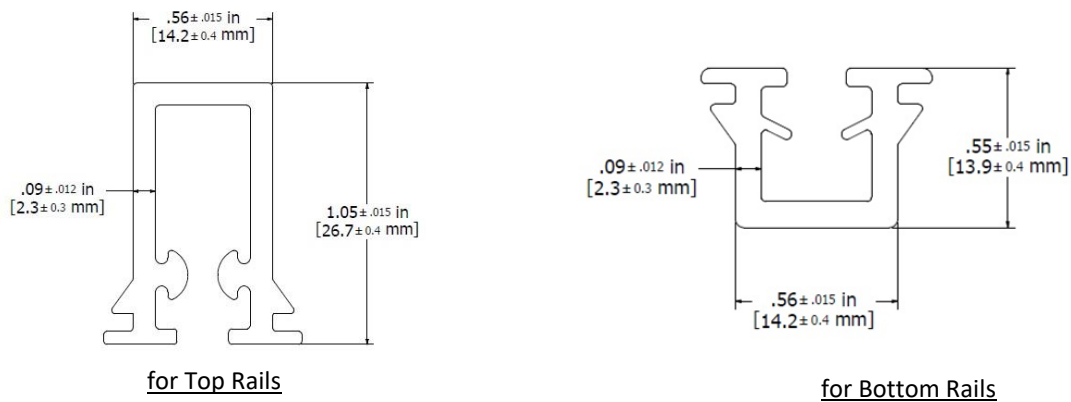


FIGURE 16 – VERANDA SERIES RUBBER INSERTS FOR GLASS INFILL

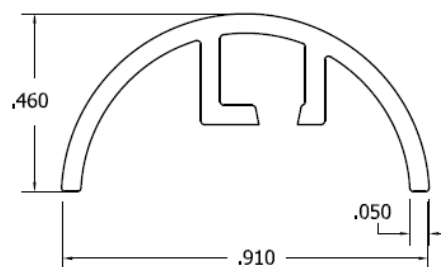


FIGURE 17- LIBERTY PVC INSERTS FOR TOP AND BOTTOM RAIL

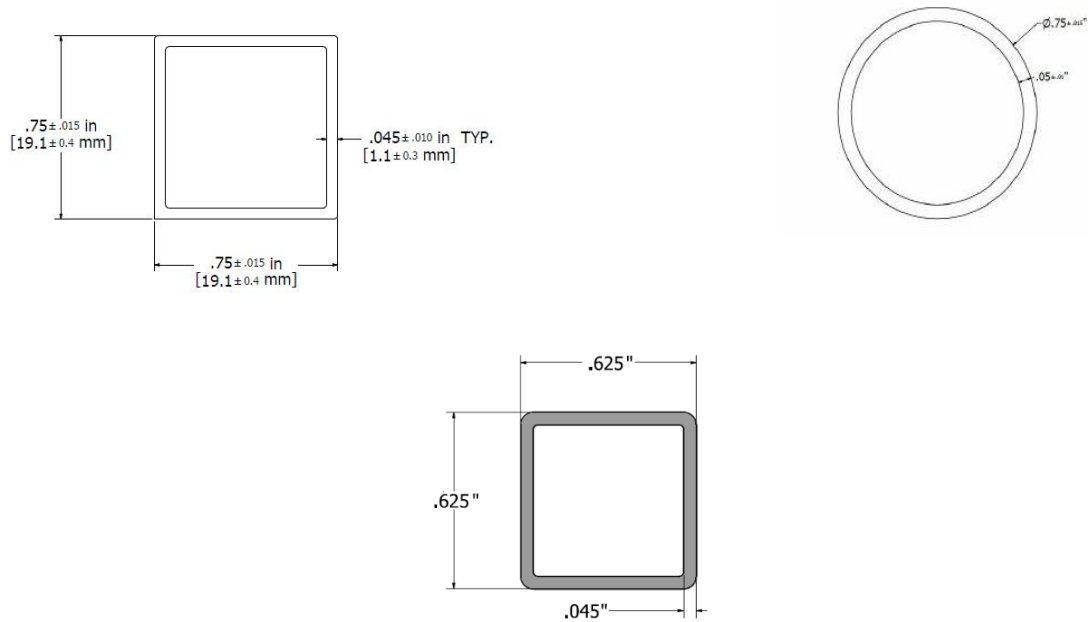


FIGURE 18 – ALUMINUM BALUSTERS

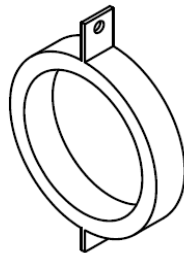


FIGURE 19 – TABBED RING (RIVIERA SERIES)

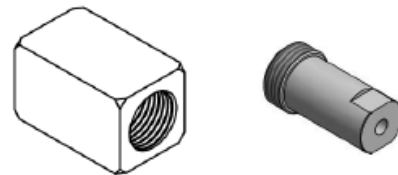


FIGURE 20 - SUPPORT BLOCK COMPONENT

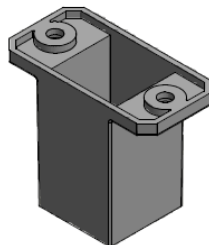
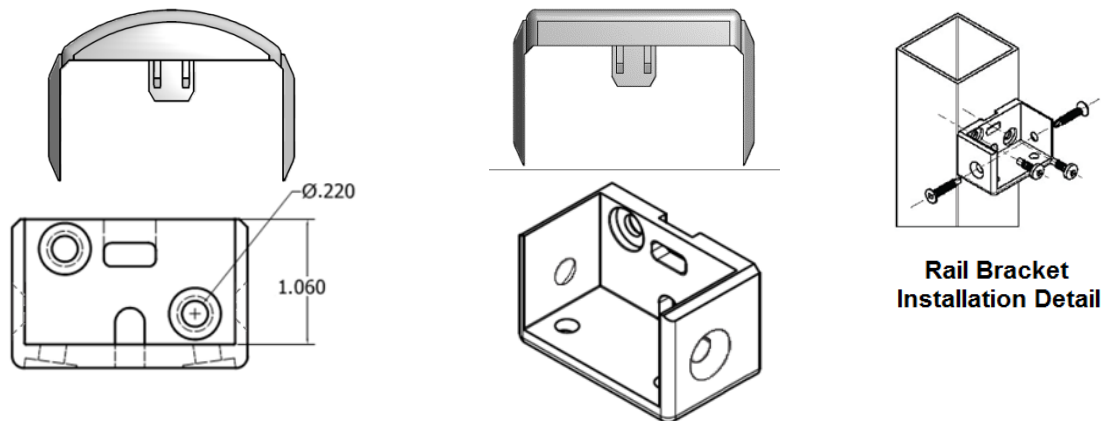
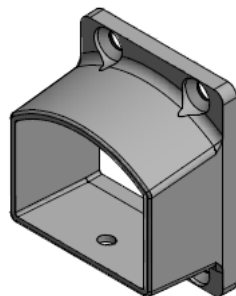


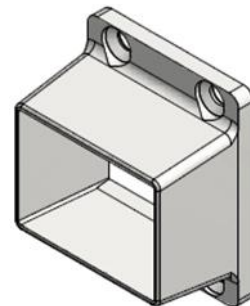
FIGURE 21 – LIBERTY SERIES RAIL SUPPORT BLOCK



Riviera, Tuscany, and Veranda Brackets

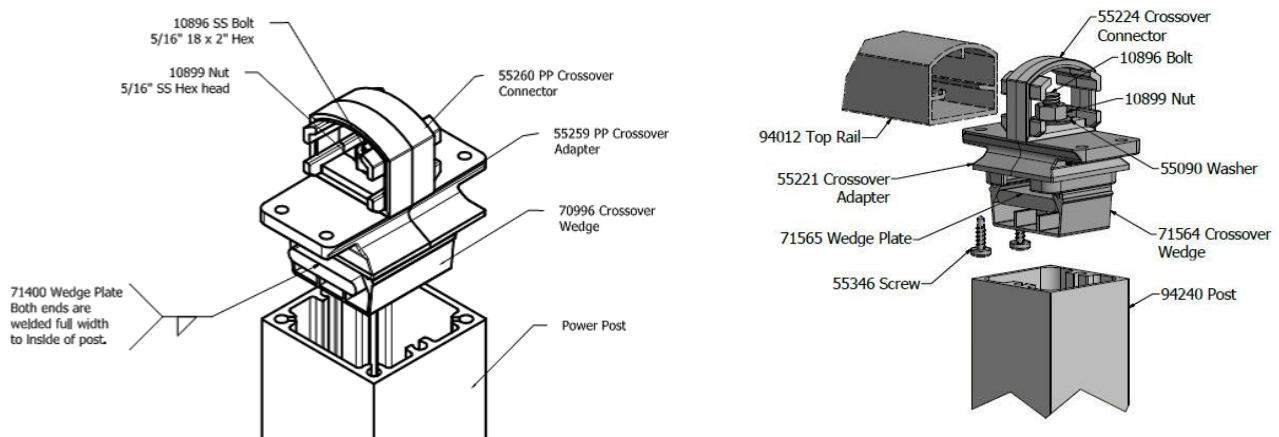


Liberty Top Bracket



Liberty Bottom Bracket

FIGURE 22 – ZAMAK 3 CAST BRACKET COMPONENTS



2 ½" Power Post Crossover

2" Alum Support Crossover

FIGURE 23 –CROSSOVER ASSEMBLIES

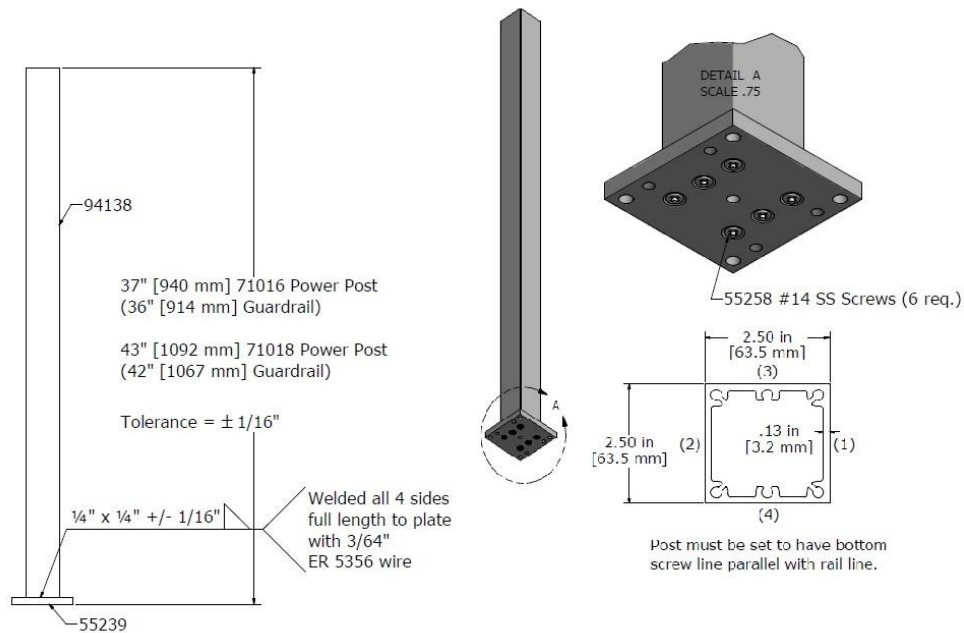


FIGURE 24 – 2-1/2" POWER POST ASSEMBLY

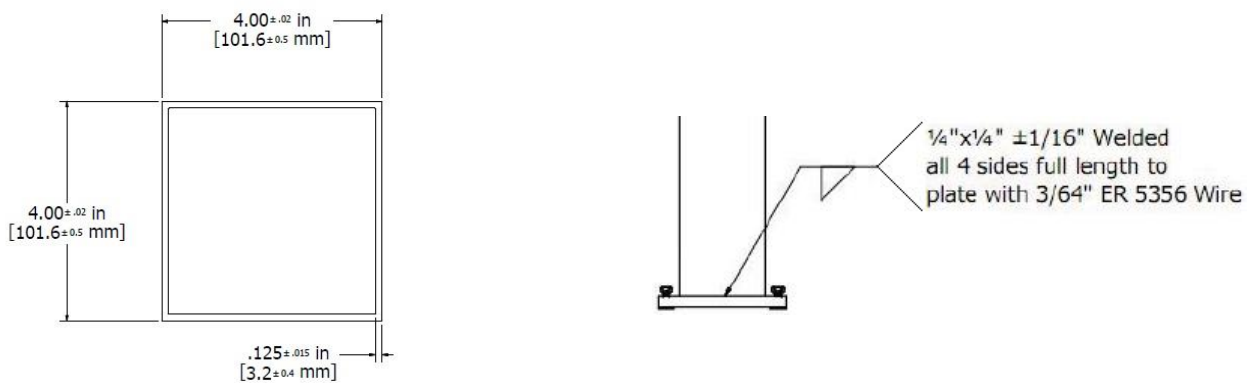


FIGURE 25 – 4X4 ALUMINUM POST ASSEMBLY

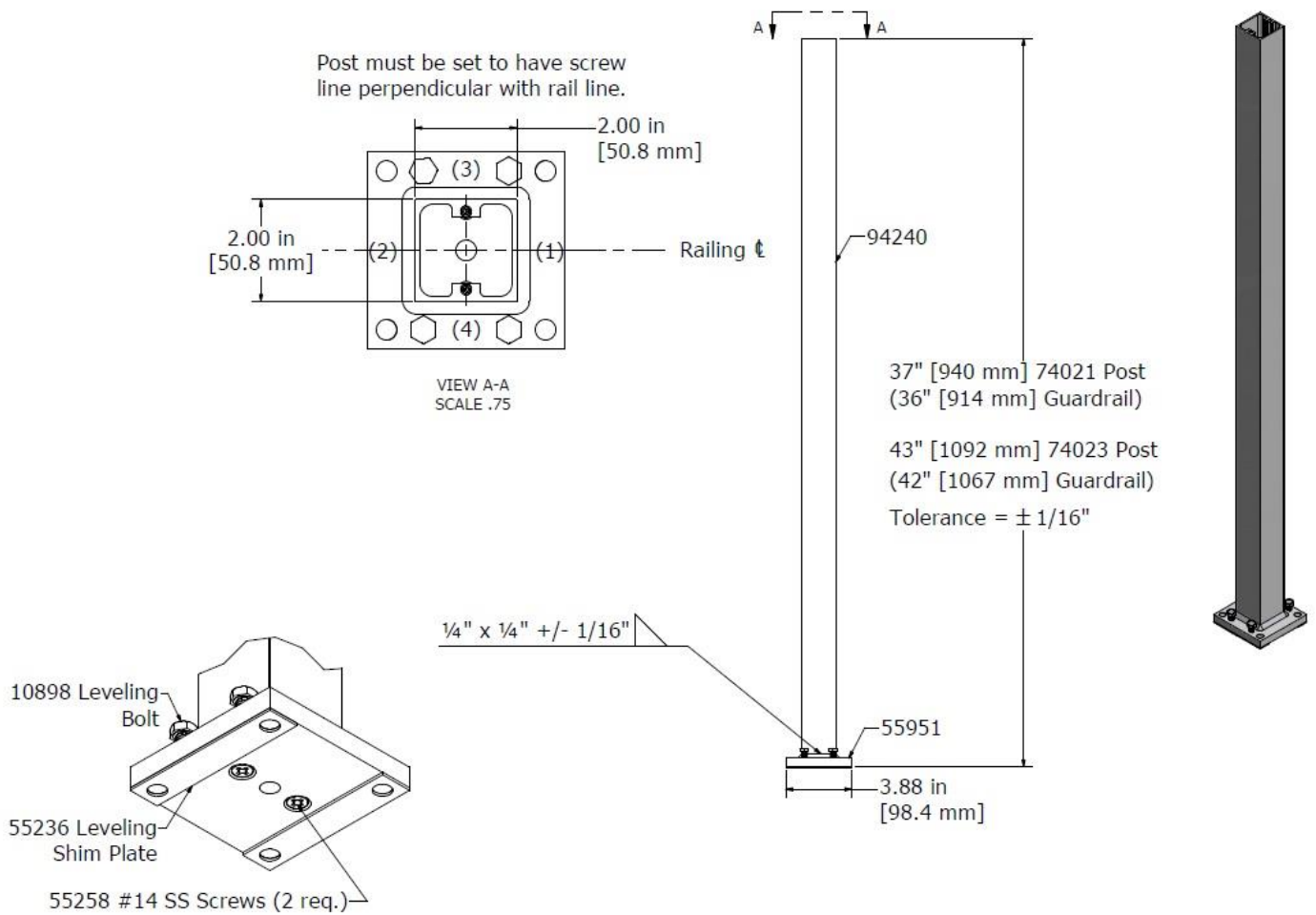


FIGURE 26 – 2" SQUARE ALUMINUM SUPPORT POST ASSEMBLY

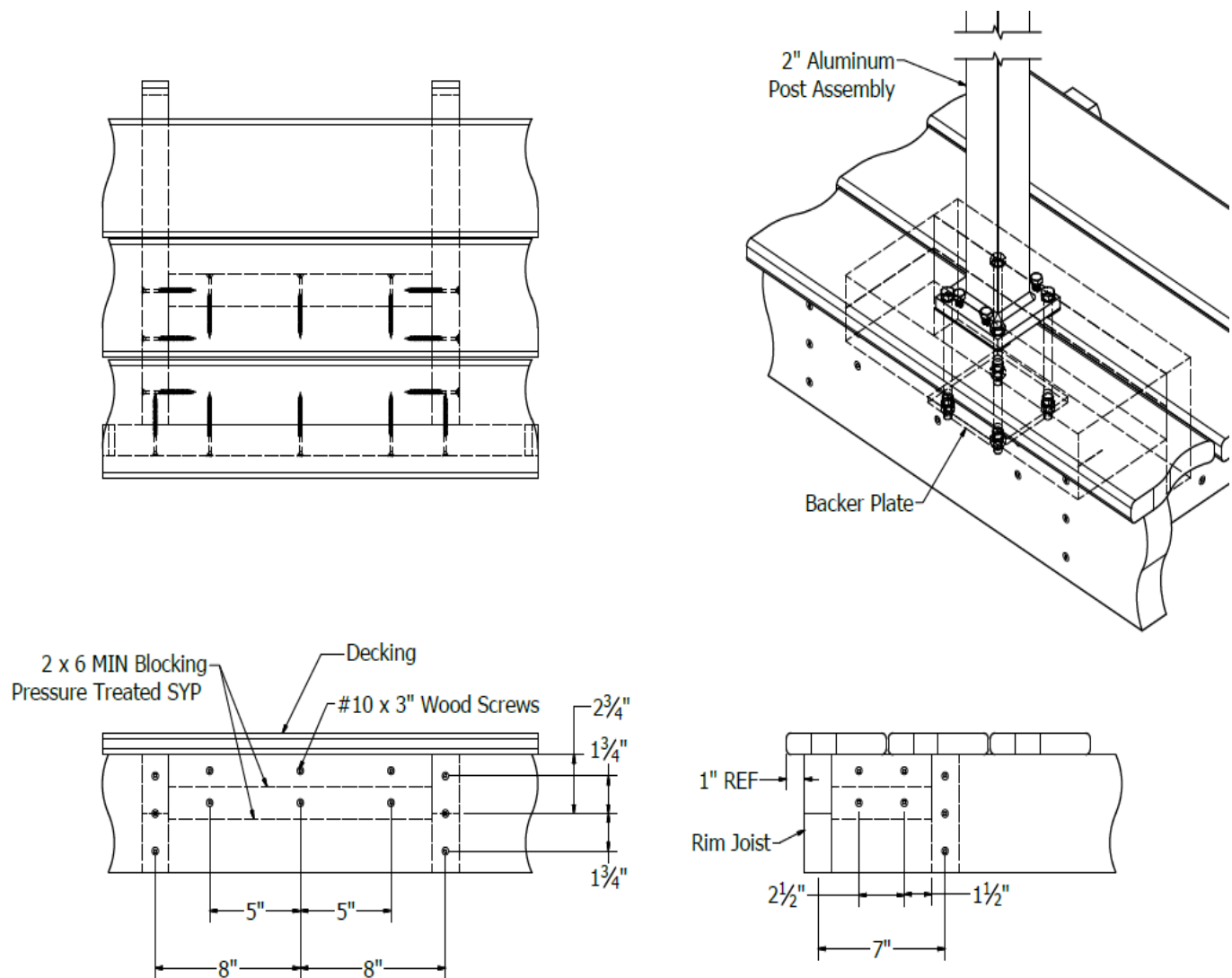


FIGURE 27– STRUCTURAL WOOD FRAMING 2" POST MOUNT

Limited to IRC and FBC Residential
Not Permitted For Use with
Westbury® Veranda Series Style C70 Glass Railing System

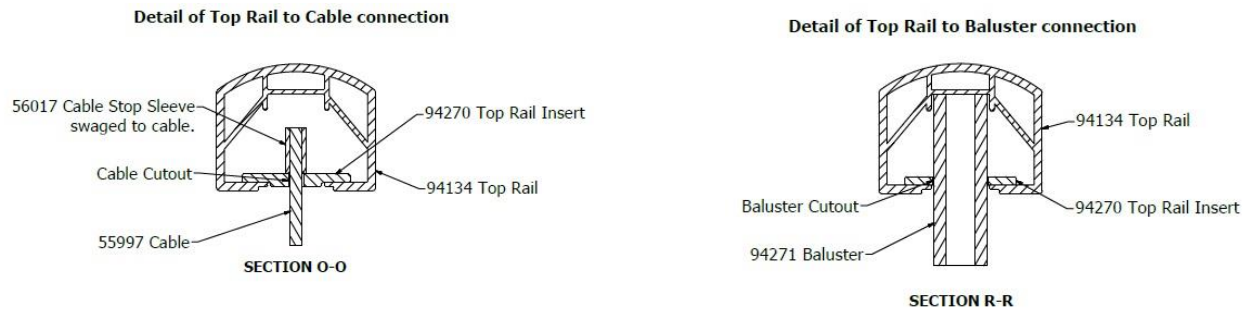


FIGURE 28 – WESTBURY® VERTICABLE SERIES C80 TOP RAIL PROFILES

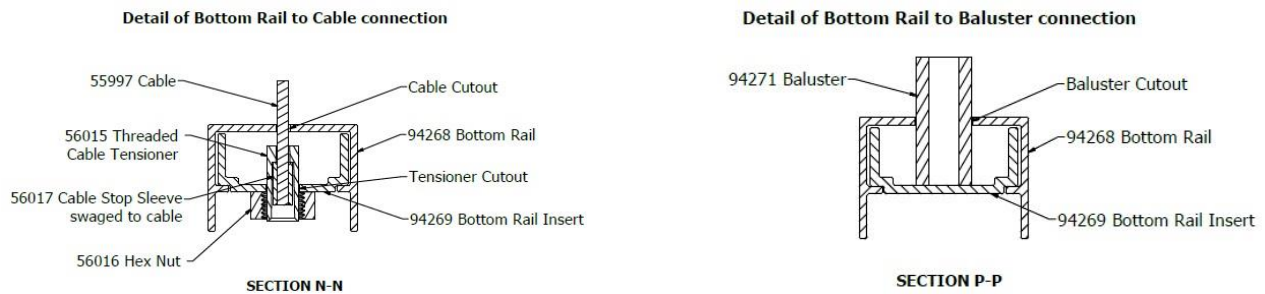


FIGURE 29 – WESTBURY® VERTICABLE SERIES C80 BOTTOM RAIL PROFILES