Code Compliance Research Report CCRR-0163

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1.0 Subject

Westbury® Aluminum Railing

Tuscany Series (Style C10)

Riviera Series (Styles C30, C30R, C31, C32, C33, and C34)

Veranda Series (Style C70)

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) for *Tuscany* and *Riviera Series*;

excluding High Velocity Hurricane Zone (HVHZ) for *Veranda Series*

2.2. Properties:

Structural Performance

3.0 Description

3.1. General – The *Westbury*® Aluminum Railing system is a guard or 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.

3.2. Guard Assemblies – Guards are provided as level guards for level walking areas such as decks, balconies, and porches. Level guards are provided with rail lengths up to 96 inches in length (measured between the inside of support posts) and an installed height of 36 inches or 42 inches. See Table 1 for qualified configurations.

3.3. Materials and Processes – The *Westbury*® Aluminum Railing system is an assemblage of extruded aluminum materials, extruded PVC rail inserts, tempered glass panels, austenitic (300 series) stainless steel fasteners, and cast Zamak 3 bracket materials.

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

3.4. Components - 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 Figure 7.

3.4.1.1. The top rail is an extruded 6005-T5 aluminum rail with internal longitudinal ribs, dimensions of 1.74 inches wide by 1.38 inches tall. A PVC rail insert is used as a baluster retainer. See Figure 9 and Figure 13.

3.4.1.2. 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 11 and Figure 14.

3.4.1.3. The bottom rail is an extruded 6005-T5 aluminum rail with internal longitudinal ribs and is 1.74 inches wide by 1.25 inches tall. A PVC rail insert is used as a baluster retainer. See Figure 10 and Figure 13.

3.4.2. The infill area for all styles, except the Veranda Series, utilize 6063-T52 aluminum balusters in various lengths (See Figure 15). The infill area of the Veranda Series Style C70 railing system (see Figure 8) utilize a ¼ inch thick tempered glass panel in various sizes.

3.4.3. The infill area of the *Riviera Series* Style C30R railing system (see Figure 3) is configured with 6063-T52 aluminum balusters and with tabbed 6063-T6 aluminum rings. See Figure 15 and Figure 16.

3.4.4. *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 by 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

3.4.5. Table **2**, Figure 18, and Figure 19. For the Crossover *Power Post,* see Table 2 and Figure 20.

3.4.6. A support block is installed between the lower rail and the deck surface midway between supports. See Figure 12.

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

The guardrail system shall be installed in accordance with the Digger Specialties, Inc.'s installation instructions and this report. Where differences occur between this report and Digger Specialties, Inc.'s installation instructions, this report shall govern.

5.1.1. The top and bottom rails are attached directly to structural posts utilizing cast Zamak 3 mounting brackets via mechanical fasteners. See Figure 17 and

5.1.2. Table **2**.

5.2. Guards may be assembled in various configurations. Refer to Figure 1 through Figure 7 for overall assembly and

5.3. 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 13, Figure 14, Figure 15 and Figure 16.

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. Two shim plates are utilized under the base of the structural post. Each shim plate is oriented so that its length is parallel with the line of the rail. The hardware used to anchor the base of the *Power Post* to the supporting structure is installed so that it passes through the holes in the shim plates. Shim plates are 4-1/2 inches long by 3/4 inch wide by 1/16 inch thick austenitic (300 series) stainless steel plates. See Figure 18.

6.0 Supporting Evidence

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

6.2. Reports of testing demonstrating compliance with the performance requirements of ICC-ES AC273, Acceptance Criteria for Handrails and Guards, effective March 1, 2008with additional testing including increased test loads to address IBC and FBC Section 2407.1.1 for assemblies that utilize a glass in-fill panel.

6.3. A quality control manual that is in accordance with the ICC-ES AC10, Acceptance Criteria for Quality Documentation, effective March 1, 2009.

7.0 Conditions of Use

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

7.2. Shim plates must be used for all structural post installations as described in Section 5.55.

7.3. 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:

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

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

7.3.3. 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.

7.3.4. 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.

7.4. The austenitic (300 series) stainless steel shim plates are used to prevent direct contact between the structural post base plate and supporting structure. Compatibility of fasteners and other metallic components with the supporting structure, including chemically treated wood, is outside the scope of this report.

7.5. The glass infill panel of guards 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).

7.6. Guards utilizing 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.

7.7. Digger Specialties, Inc. manufactures the *Westbury*® Aluminum Railing system in Bremen, Indiana in accordance with an approved quality control system that includes independent third party inspections by NTA, Inc.

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. Name and/or trademark of Digger Specialties, Inc.

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

8.3. The Architectural Testing Code Compliance Research Report mark and number (CCRR-0163).

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 specific 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 Architectural Testing.

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

Table 1

Westbury® Aluminum Railing System	Guardrail Type	Code Occupancy Classification [1]			
		IBC	IRC [2]	FBC	FBC Residential
Tuscany Series & Riviera Series	Level	8' x 42"	8' x 36" 8' x 42"	8' x 42"	8' x 36" 8' x 42"
Veranda Series	Level	6' x 42" [3]	6' x 36" [3] 6' x 42" [3]	6' x 42" [3, 4]	6' x 36" [3, 4] 6' x 42" [3, 4]

[1] Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in the referenced Code Occupancy Classification.
[2] One-and Two-Family Dwellings
[3] Excluding wind-borne-debris regions
[4] Excluding High-Velocity-Hurricane-Zone (HVHZ)

Table 2

Connection	Fastener
All Rail Brackets to Post	Two #10-16 x 5/8 in pan-head, self-drilling, 18-8, 300 Series screws [2]
Top Rail and Mid-Rail Bracket to Rail	
Crossover Assembly to Top Rail	
Bottom Rail Bracket to Rail	No mechanical fastener
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 Structural Post Tube	Six #14-14 x 2 in flat-head, self-drilling, 18-8, 300 Series screws [1, 2]

[1] *Power 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.

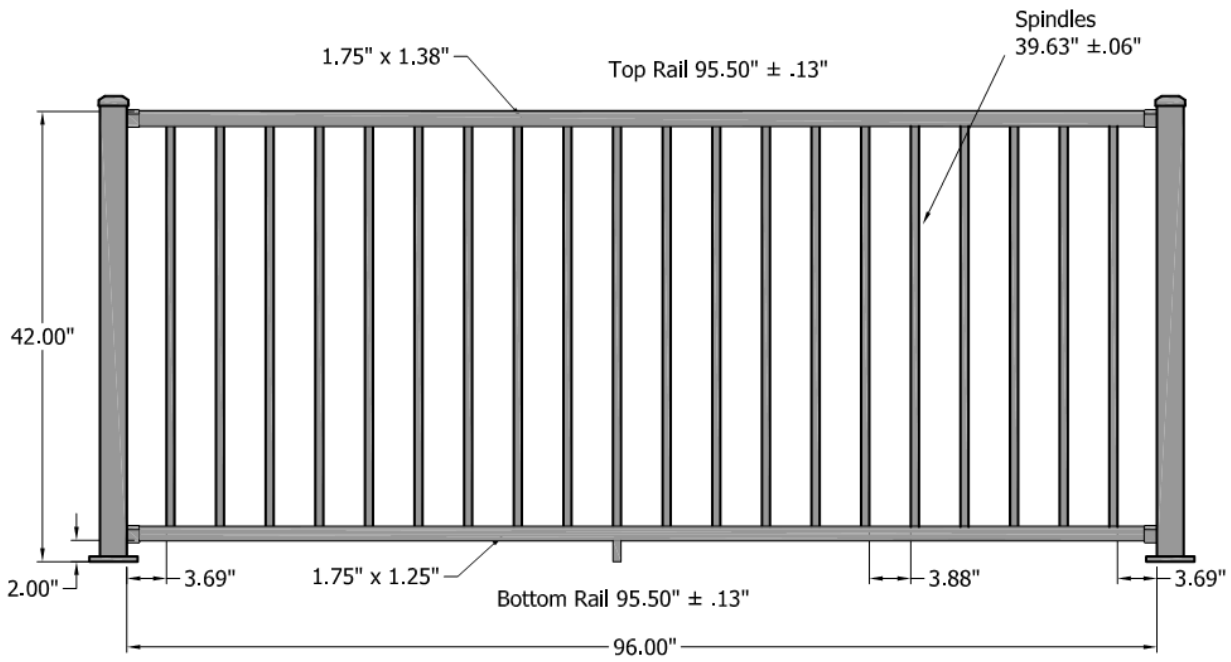

Figure 1
***Westbury® Tuscany Series* Style C10 Aluminum Railing System**

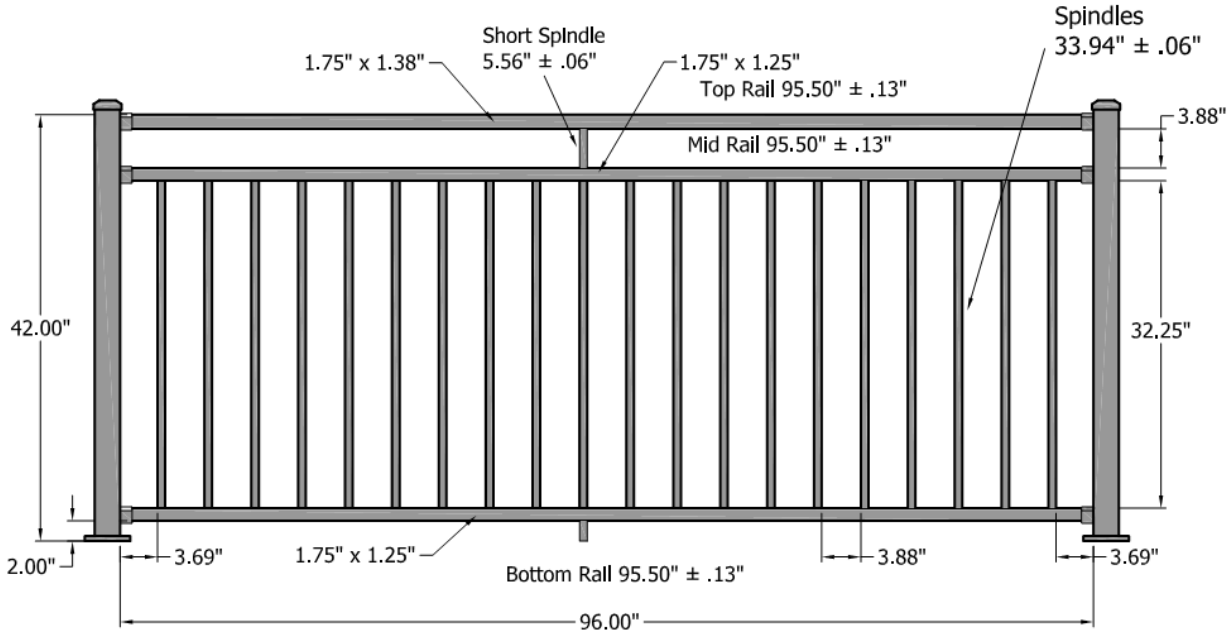

Figure 2
***Westbury® Riviera Series* Style C30 Aluminum Railing System**

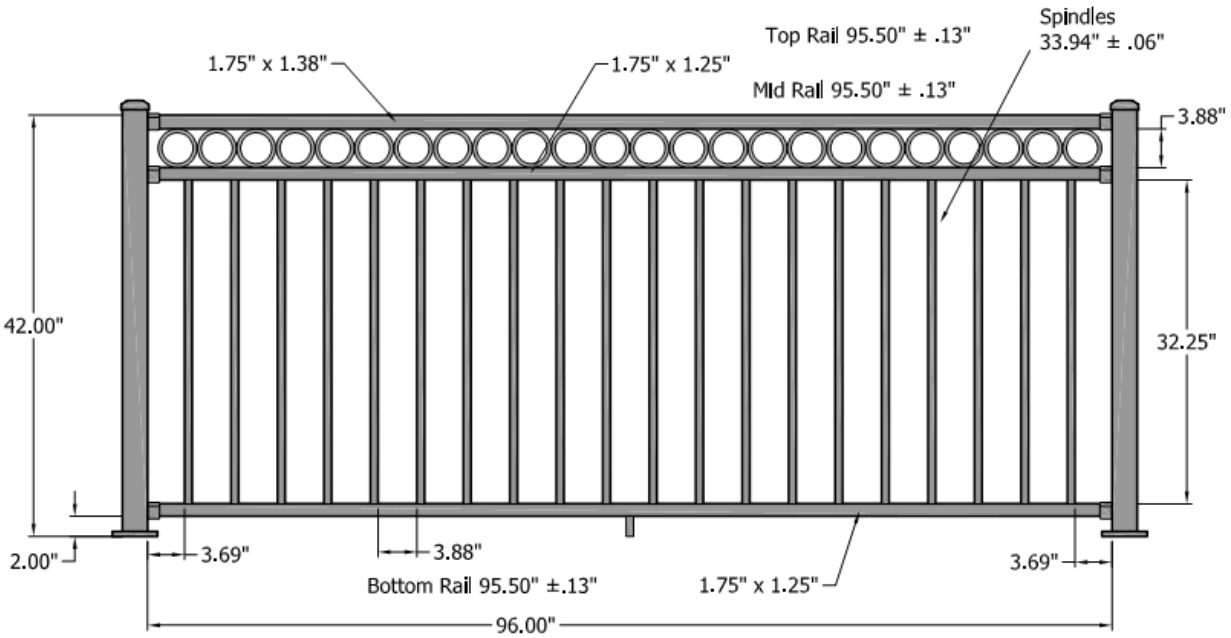

Figure 3
***Westbury® Riviera Series* Style C30R Aluminum Railing System**

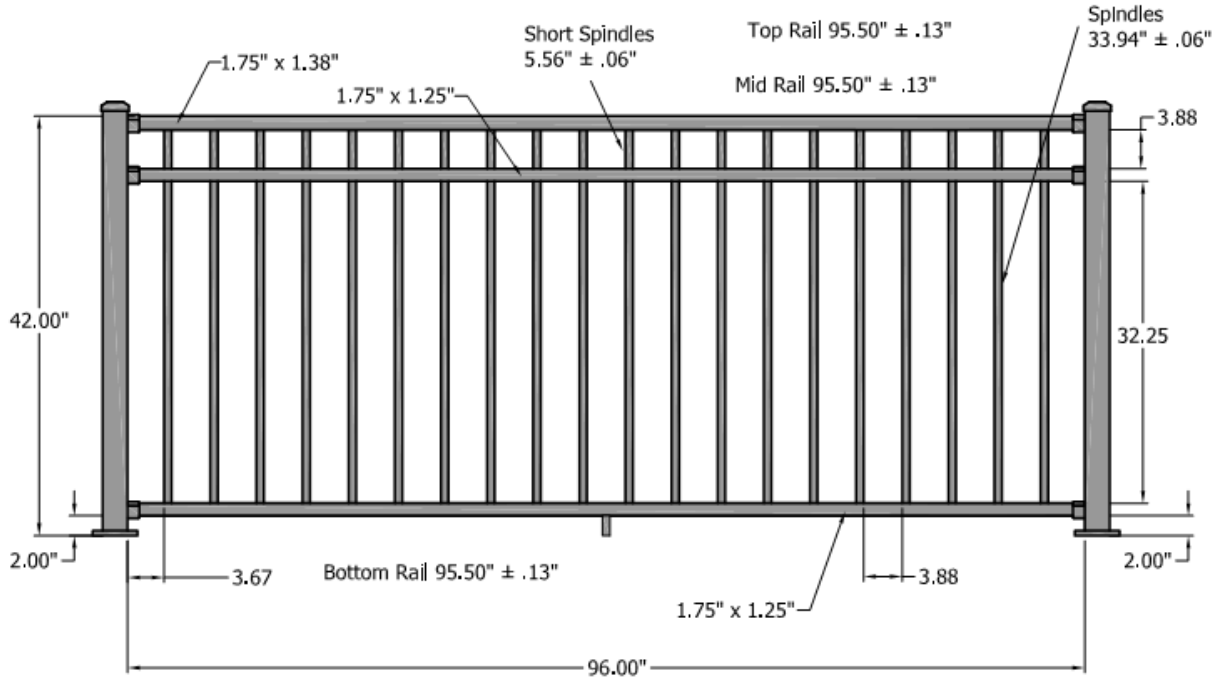

Figure 4
***Westbury® Riviera Series* Style C31 Aluminum Railing System**

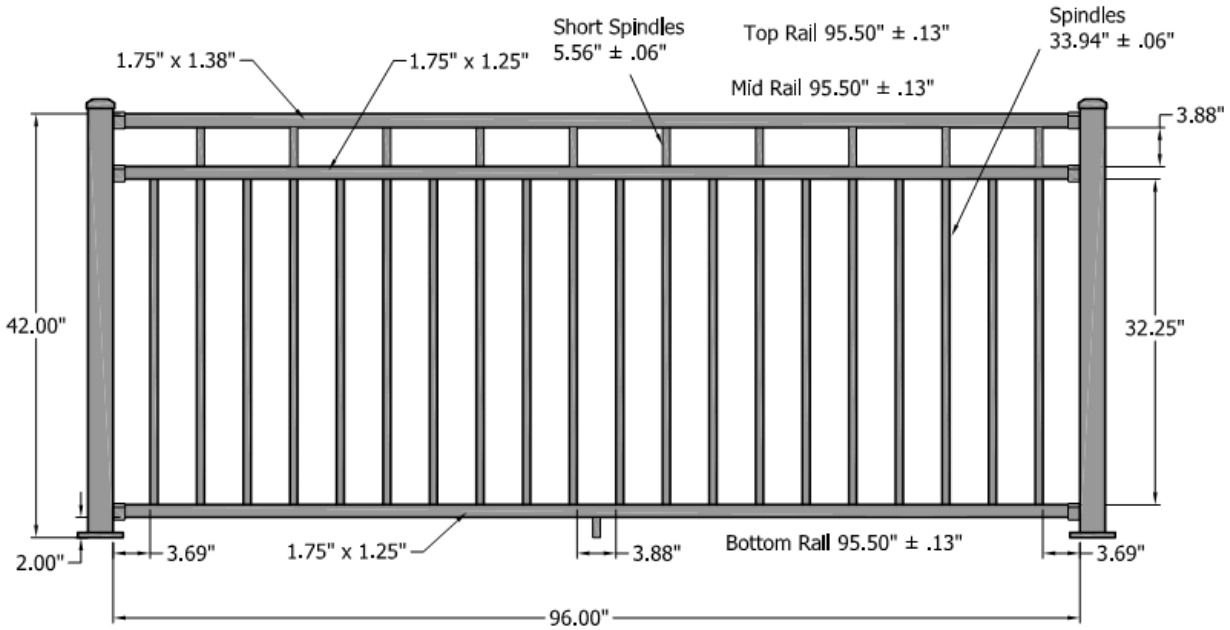

Figure 5
***Westbury® Riviera Series* Style C32 Aluminum Railing System**

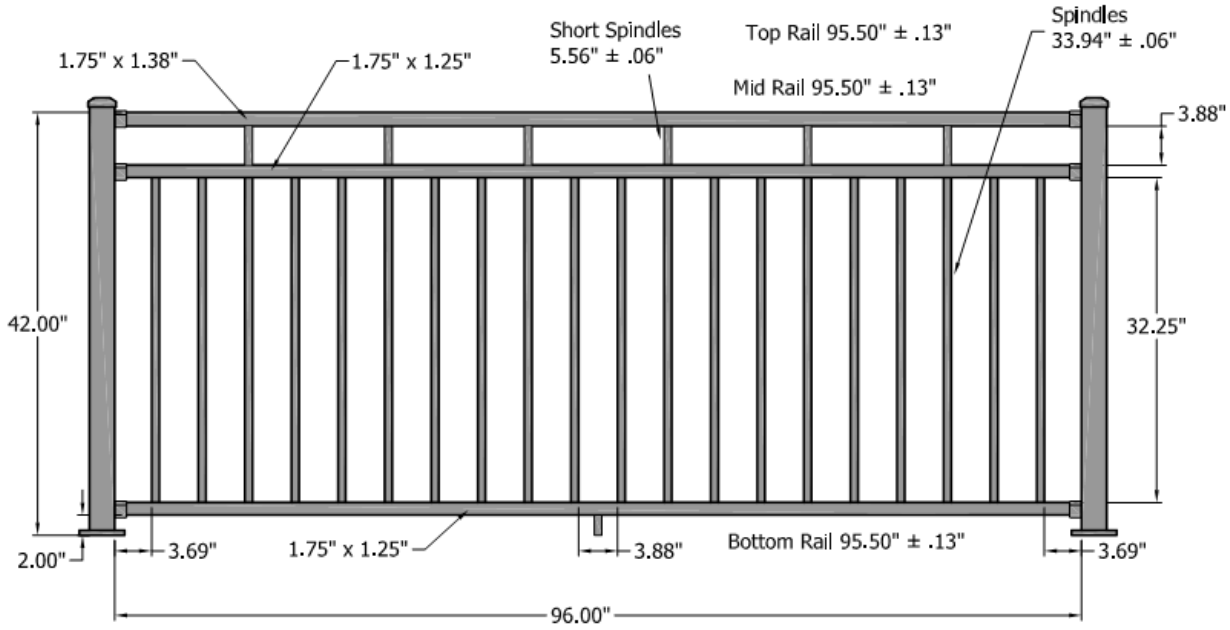

Figure 6
***Westbury® Riviera Series* Style C33 Aluminum Railing System**

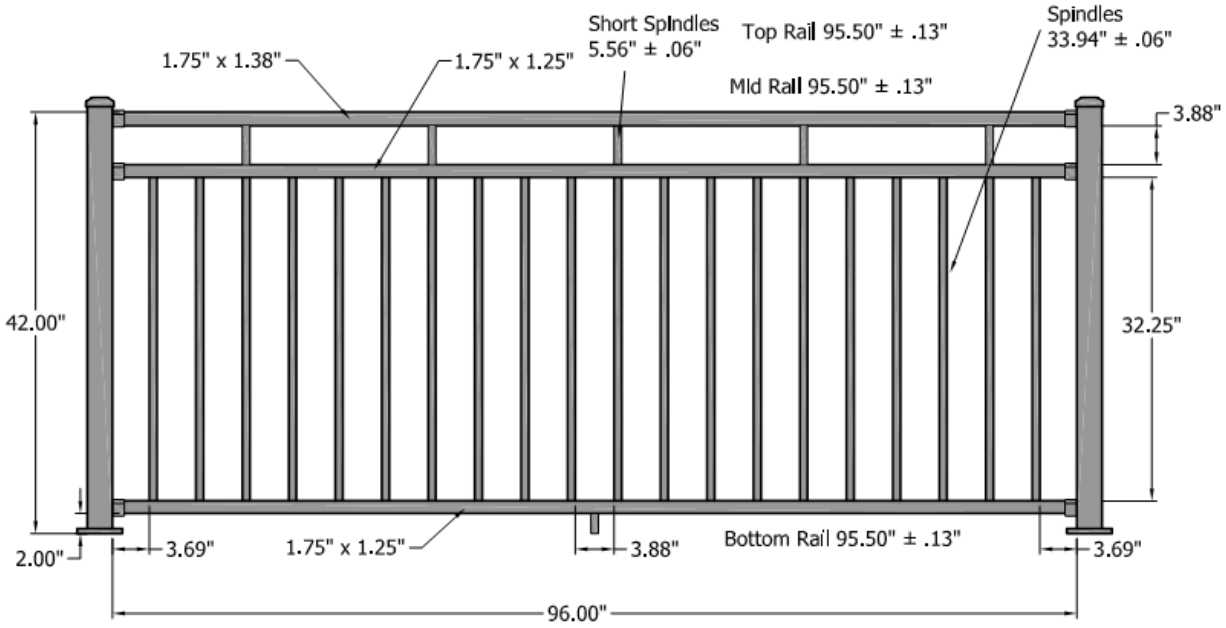

Figure 7

***Westbury® Riviera Series* Style C34 Aluminum Railing System**

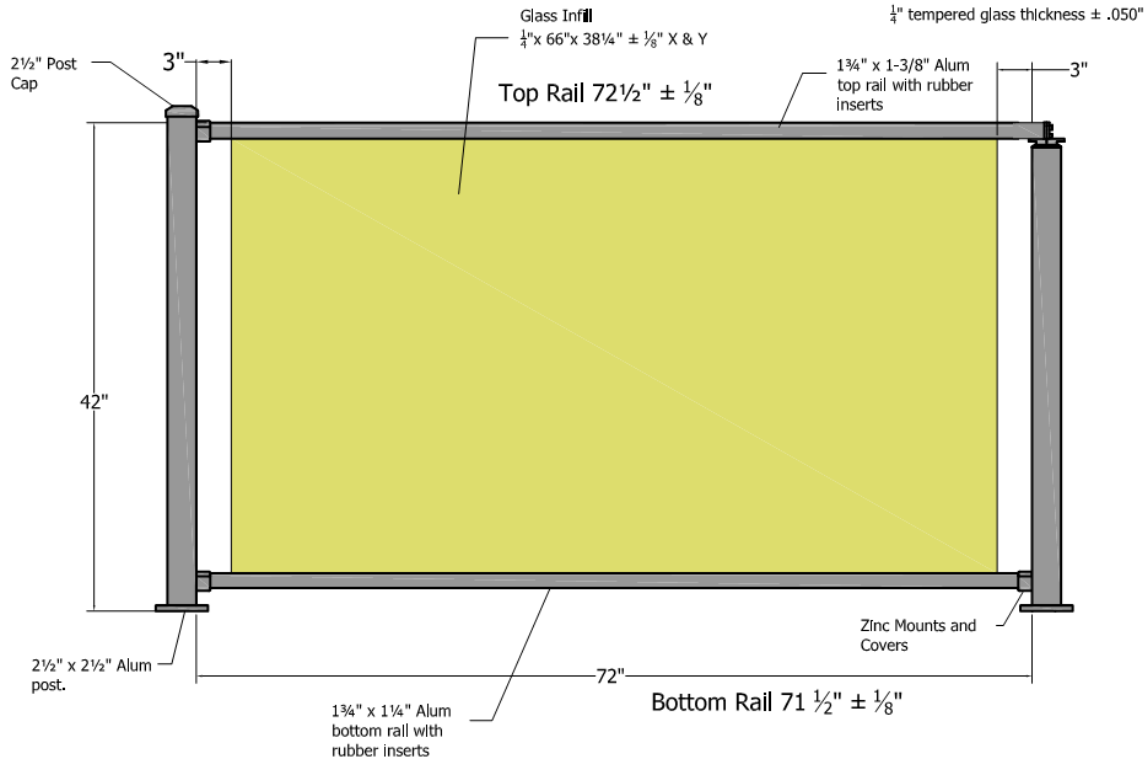

Figure 8

***Westbury® Veranda Series* Style C70 Glass Railing System**

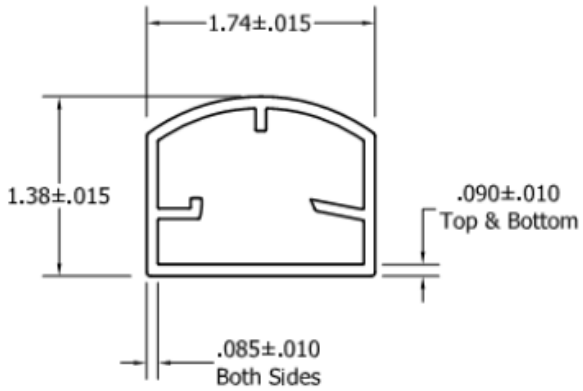

Figure 9
Top Rail

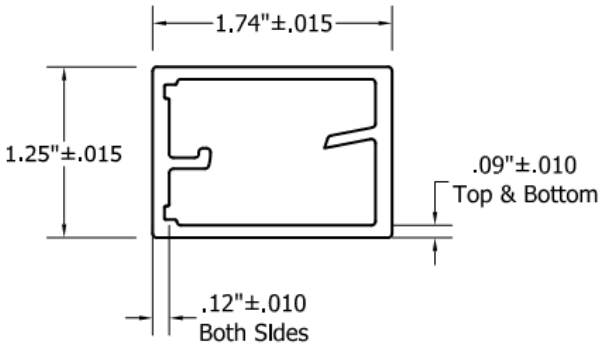

Figure 10
Bottom Rail

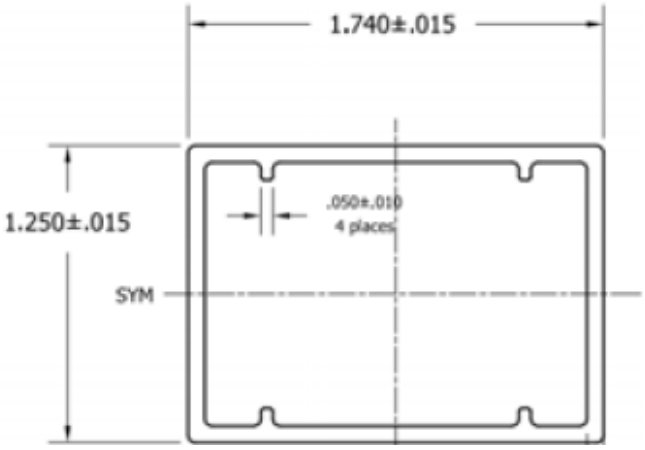

Figure 11
Mid-Rail

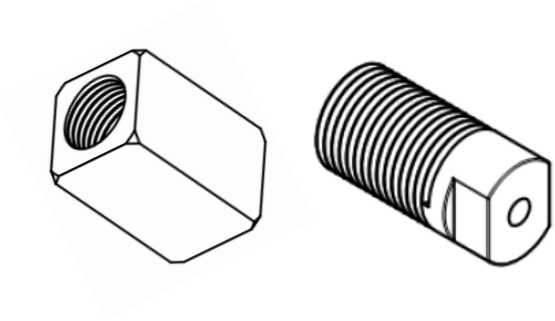

Figure 12
Support Block Components

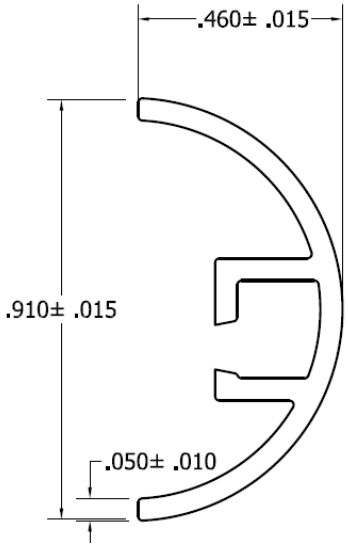

Figure 13
PVC Rail Insert for
Top and Bottom Rails

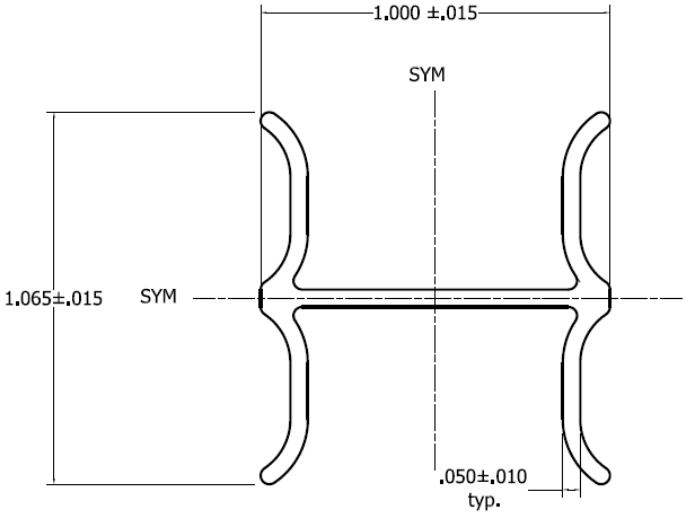

Figure 14
PVC Rail Insert for Mid-Rail

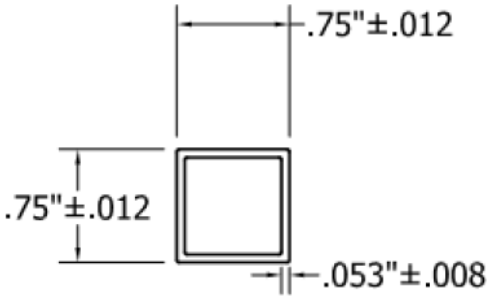

Figure 15
Baluster (Infill)

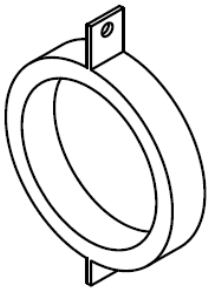

Figure 16
Tabbed Ring (Infill)

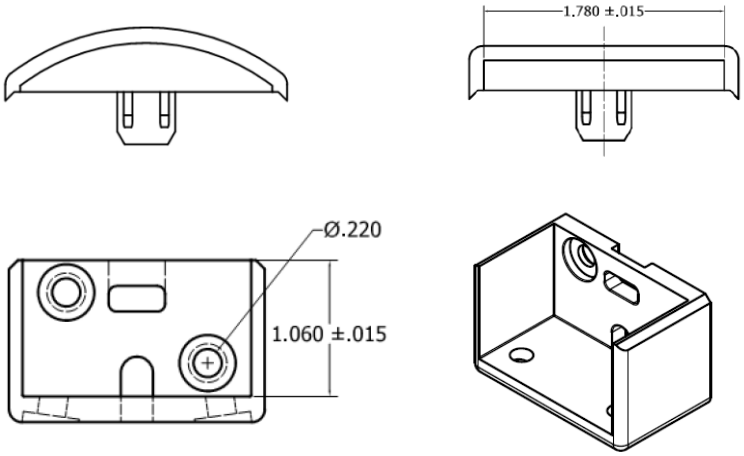

Figure 17
Zamak 3 Cast Bracket Components

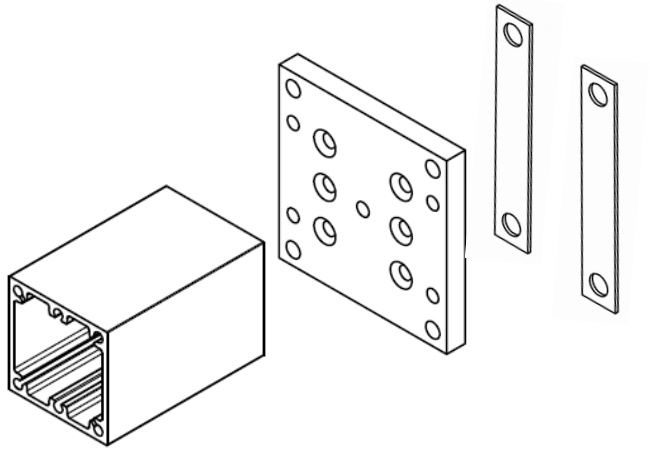

Figure 18
***Power Post* Components**
(Left to Right: Tube, Plate, Shims)

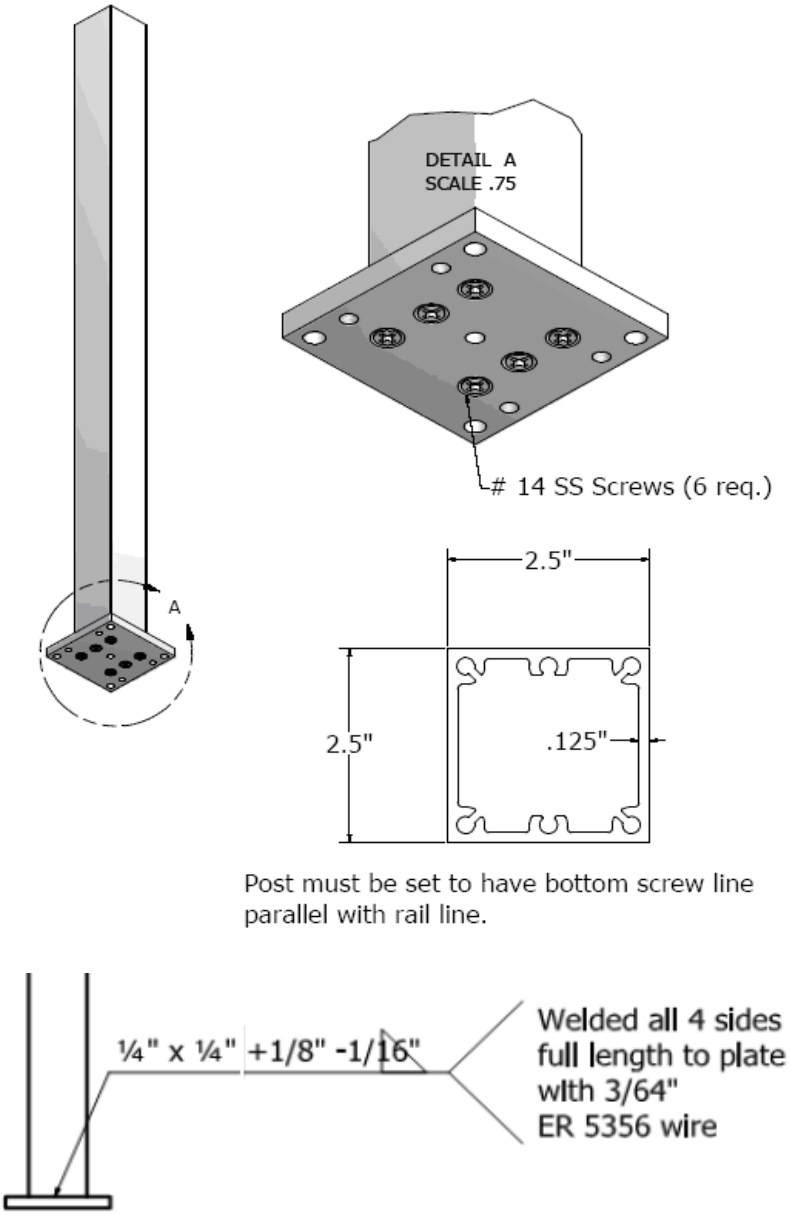

Figure 19

***Power Post* Assembly**

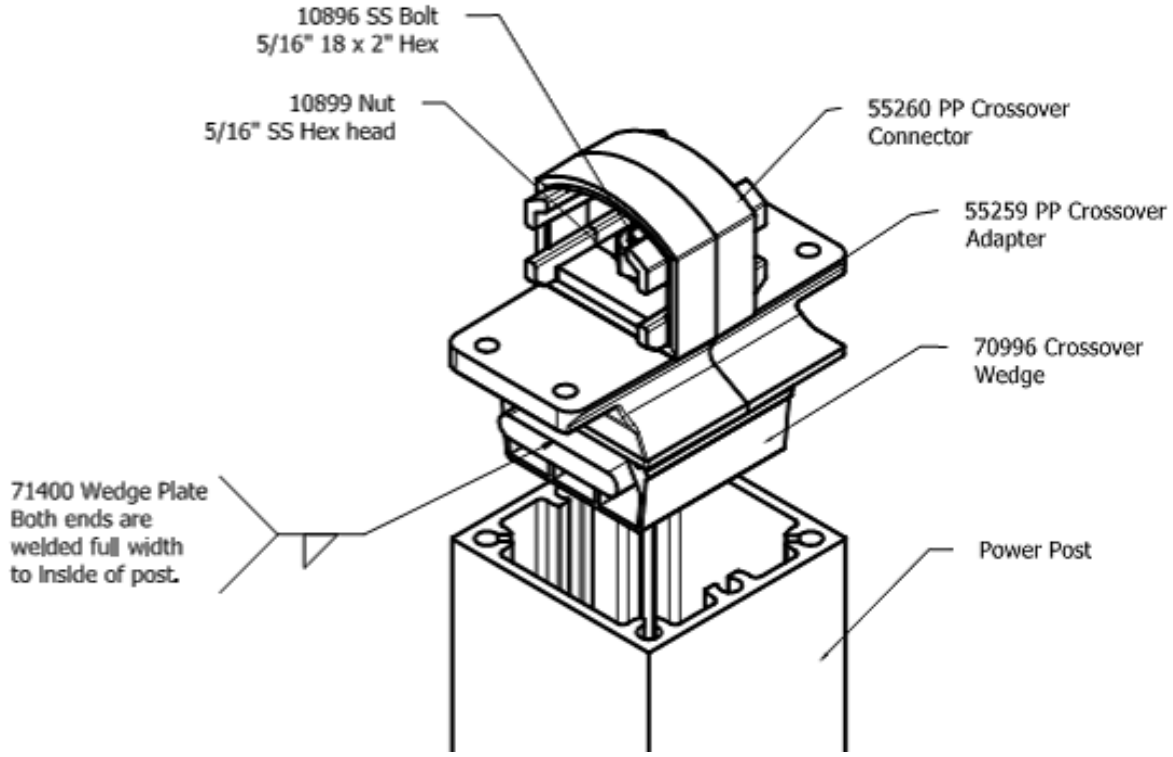

Figure 20

***Power Post* Crossover Assembly**