Code Compliance Research Report CCRR-0150

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1.0 Subject

Latitudes Intrepid Railing System

2.0 Research Scope

2.1. Building Codes:

2009 International Building Code (IBC)

2009 International Residential Code (IRC)

2.2. Properties:

Structural Performance

Durability

Surface Burning

Decay Resistance

Termite Resistance

3.0 Description

3.1. General – *Latitudes Intrepid Railing Systems* are 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 and sloped guards for open sides of stairways.

3.2.1. Level guards are provided with rail lengths up to 72 inches in length (measured between the inside of support posts) and an installed height of up to 42 inches. See Table 1 for qualified lengths and configurations.

3.2.2. Stair guards are provided with rail lengths up to 72 inches measured along the sloping length between the inside of supports and an installed height of up to 42 inches at the leading edge of the stair tread or landing. See Table 1 for qualified lengths and configurations.

3.3. Materials and Processes - *Latitudes Intrepid Railing Systems* are an assemblage of an extruded Wood-Plastic Composite (WPC) material along with other metal, glass and plastic parts. The WPC components are produced in four colors; Cedar, Redwood, Gray and Walnut.

3.4. The guard system includes a top rail, a bottom rail, vertical balusters, non-structural 4 inch by 4 inch post sleeves, rail to post brackets, support blocks, decorative moldings and post caps.

3.4.1. The top rail is an extruded WPC rail with overall nominal sectional dimensions of 4 inches wide by 2.15 inches tall. An inner rail of extruded WPC is used and the profile varies based on the guard configuration. See Figures 1, 2, 3 and 19 through 22.

3.4.2. The bottom rail is an extruded WPC rail and is either an identical assembly of the top rail or a 3.5 inch tall by 1.5 inch wide WPC rail based on the guard configuration. See Figures 1, 2, 3 and 19 through 22.

3.4.3. The infill area may be configured in multiple ways using WPC, glass, or aluminum balusters and a WPC rail based on the guard configuration. See Figures 19 through 22.

3.4.4. Top and bottom rails are attached directly to structural supports with Nylon/Glass Fiber or Steel mounting brackets. See Figures 5 through 8 and 18.

3.4.5. Balusters are provided in several styles, including glass, aluminum and WPC as outlined below.

- Glass (Frontier) – Fully Tempered
- Contour (Baroque) – 6061-T6511 or 6063-T6 Aluminum
- Traditional (Rectangular) – 6063-T5 or 6063-T6 Aluminum
- Arc (Arch) – 6063-T52 or 6063-T6 Aluminum
- Square (Estate) – 6063-T6 Aluminum
- Round (Classic) – 6063-T6 Aluminum
- 1.25 inch Square – Wood-Plastic Composite

See "Infill" Sections of Tables 2 and 3 and Figures 9 through 15.

3.4.6. Structural supports may be conventional wood framing. An extruded WPC post sleeve is utilized to sleeve a conventional 4x4 wood post. See Figure 4.

3.4.7. A support block is installed between the lower rail and the deck surface midway between supports.

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 the IBC and Section R301 of the IRC when tested in accordance with ICC-ES AC174.

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 WPC material used in the guardrail system has a flame spread index of 90 when tested according to ASTM E 84. The referenced criteria of AC174 requires the material to have a flame spread index not greater than 200 when tested according to ASTM E 84.

5.0 Installation

The guard system shall be installed 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. The top and bottom rails are attached directly to structural supports utilizing Nylon/Glass Fiber or Steel mounting brackets. See Figures 5 through 8 and 18.

5.2. The top and bottom rails may be attached to conventional wood supports. Conventional wood supports including wood posts are outside the scope of this report.

5.3. Guards may be assembled in various configurations. Refer to Table 2 for the fastening schedule for configurations where two 'U' rails and inserts are used (Figures 21 and 22). Refer to Table 3 for the fastening schedule for configurations where the 2X4 WPC component is used (Figures 19 and 20).

5.4. 4x4 conventional wood posts may be covered by a non-structural WPC post sleeve with decorative caps and moldings.

5.5. Round balusters are secured to the top and bottom rail via *FastBall*™ connectors. See Tables 2 and 3 and Figure 16.

5.6. Square aluminum balusters are secured to the top and bottom rail via Plastic connectors. See Tables 2 and 3 and Figure 17.

5.7. Glass, Contour, Rectangular, Arch and Square WPC balusters are connected using Stainless Steel Screws. See Tables 2 and 3.

5.8. The wood in the supporting structure including support posts shall have a specific gravity of 0.50 or greater (Southern Yellow Pine or better) and a minimum thickness to allow full penetration of the bracket mounting screws.

6.0 Supporting Evidence

6.1. Drawings and installation instructions submitted by the manufacturer.

6.2. Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ICC-ES Acceptance Criteria for Deck Board Span ratings and Guardrail Systems (Guards and Handrails), AC174, effective July 1, 2010 with additional testing employing increased test loads that address IBC Section 2407.1.1 for the systems that utilize glass balusters.

6.3. The 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. The reports of testing and engineering analysis demonstrating compliance with the performance requirements of ANSI Z97.1-2004, American National Standard for Safety Glazing Materials Used in Buildings, as required by Section 2406 of the IBC and Section R308 of the IRC.

6.5. A quality control manual that is in accordance with the ICC-ES AC10, Acceptance Criteria for Quality Documentation.

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. Conventional wood supports including support posts for guards 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 (See 5.8 under "Installation"). Where required by the building official, engineering calculations and details prepared by a licensed design professional shall be provided.

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

7.3. Glass used as balusters of guards is considered a hazardous location as defined by Section 2406.4 of the IBC and must be identified by permanent etching as required by Section 2406.3 of the IBC. Each section of glass must bear the manufacturer's name or mark and the applicable test standard. (Class A of ANSI Z97.1)

7.4. Guards utilizing glass balusters are not approved for use in wind-borne debris regions as defined by the IBC in accordance with Section 2407.1.4.

7.5. *Latitudes Intrepid Railing System* products made from Wood-Plastic Composites (WPC) are manufactured by Universal Consumer Products in Prairie Du Chien, WI. Manufacturing is in accordance with an approved quality control system and inspections by PFS Corporation (AA-652).

8.0 Identification

The composite guard assemblies produced by Universal Consumer Products identified in this report, shall be identified with labeling on the individual components or the packaging and include the following;

8.1. Name and/or trademark of the manufacturer.

8.2. The identifying mark and/or name of the independent inspection agency, PFS (IAS AA-652).

8.3. The Architectural Testing Code Compliance Research Report mark and number (CCRR-0150).

8.4. The statement “ASTM D 7032 compliant. See ATI CCRR-0150 at www.ati-es.com for uses and performance levels.”

8.5. When applicable (see Table 1), the following statement: “For Use in One- and Two-Family Dwellings Only.”

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, Inc.

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

Latitudes® WPC Guardrail Systems [1]	Guardrail Type	Baluster Style	Code Occupancy Classification
72 in by 42 in "U" Rail with Insert	Level	3/4 in Diameter Round (Classic) Aluminum Baluster	IBC - All Use Groups
		1-1/4 in Square, Solid WPC Baluster	
72 in by 42 in "U" Rail, with Inner Rail, and 2x4 Offset	Level	1/4 in Thick by 1 in Wide Contour (Baroque) Aluminum Balusters	
		1-1/4 in Square, Solid WPC Baluster	
72 in by 42 in "U" Rail, with Inner Rail, and 2x4 Centered	Level	1-1/4 in Square, Solid WPC Baluster	
		3/4 in Diameter Round (Classic) Aluminum Baluster	
		3/4 in Square (Estate) Aluminum Baluster	
72 in by 36 in "U" Rail, with Inner Rail, and 2x4 Offset	Level	5/16 in Thick by 4 in Wide Tempered Glass (Frontier) Balustrade	IRC One- and Two-Family Dwellings
		3/16 in Thick by 1 in Wide Arch (Arc) Aluminum Baluster	
		1/2 in Thick by 1 in Wide Rectangular (Traditional) Aluminum Baluster	
72 in by 36 in "U" Rail, with Inner Rail, and 2x4 Centered	Level	3/4 in Square (Estate) Aluminum Baluster	IRC One- and Two-Family Dwellings
72 in by 42 in by 32° "U" Rail with Insert	Stair	3/4 in Diameter Round (Classic) Aluminum Baluster	IBC - All Use Groups
		1-1/4 in Square, Solid WPC Baluster	
72 in by 42 in by 32° "U" Rail, with Inner Rail, and 2x4 Centered	Stair	3/4 in Diameter Round (Classic) Aluminum Baluster	IBC - All Use Groups
		1-1/4 in Square, Solid WPC Baluster	

Table 1 (Continued)

Latitudes® WPC Guardrail Systems [1]	Guardrail Type	Baluster Style	Code Occupancy Classification
72 in by 42 in by 32° "U" Rail, with Inner Rail, and 2x4 Offset	Stair	1/4 in Thick by 1 in Wide Contour (Baroque) Aluminum Balusters 1-1/4 in Square, Solid WPC Baluster	IBC - All Use Groups
72 in by 36 in by 32° "U" Rail, with Inner Rail, and 2x4 Offset	Stair	3/16 in Thick by 1 in Wide Arch (Arc) Aluminum Baluster 1/2 in Thick by 1 in Wide Rectangular (Traditional) Aluminum Baluster	IRC One- and Two-Family Dwellings
72 in by 36 in by 32° "U" Rail, with Inner Rail, and 2x4 Centered	Stair	3/4 in Square (Estate) Aluminum Baluster	IRC One- and Two-Family Dwellings

[1] Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in the referenced Code Occupancy Classification.

Table 2

***Latitudes*® "U" Rail with "U" Rail Insert WPC Guardrail (Level / Stair)**

Connection	**Fastener**
"U" Rail Insert to "U" Rail (Top)	Three #10 x 1-3/4" pan-head, stainless-steel screws fastened from the underside of the "U" rail insert, one at 6" from each end and one located at the approximate mid-span
"U" Rail (Bottom) to "U" Rail Insert	Two #8 x 2-1/2" bugle-head, stainless-steel screws fastened through the fifth *FastBall*™ connector in from each end of the "U" rail
Top / Bottom Bracket to Rail	Four #8 x 1" bugle-head, stainless-steel screws
Top / Bottom Bracket to Post	Two #10 x 2" bugle-head, stainless-steel screws
Support Block to Bottom Rail	One #10 x 1-3/4" pan-head, stainless-steel screw
In-Fill	**Fastener**
3/4" Diameter Round (Classic) Aluminum Baluster	Two *FastBall*™ connectors with #8 x 1-1/2" bugle-head, stainless-steel screws
1-1/4" Square, Solid WPC Baluster	Two #10 x 1-3/4" pan-head, stainless-steel screws

Table 3

***Latitudes*® "U" Rail, with Insert, and 2x4 Offset or Centered WPC Guardrail (Level / Stair)**

Connection	Fastener
Inner Rail to "U" Rail (Top)	Four #10 x 1-3/4" pan-head, stainless-steel screws toe nailed through inner rail into "U" rail, one at 6" and 25-1/2" from each end
Inner Rail to 2x4	Four #10 x 1-3/4" pan-head, stainless steel screws through top of inner rail into 2x4, one at 1-1/2" and 24" from each end. Screw placement is offset 5/8" from one side for the *Latitudes*® "U" rail, with inner rail, and 2x4 Offset WPC guardrail system
Top / Bottom Nylon/Glass Fiber Bracket to Rail	Three #8 x 1-1/8" bugle-head, stainless-steel screws and one #10 x 2" bugle-head, stainless-steel screw toe nailed through the top of the 2x4 into the Nylon/Glass Fiber drop-in bracket
Top / Bottom Nylon/Glass Fiber Bracket to Post	Two #10 x 2" bugle-head, stainless-steel screws
Support Block to Bottom Rail	One #10 x 1-1/2" stainless steel, dowel screw
In-Fill	**Fastener**
1/4" Thick by 1" Wide Contour (Baroque) Aluminum Baluster [1]	Four #8 x 1-1/2" bugle-head, stainless-steel screws
1-1/4" Square, Solid WPC Baluster	Two #10 x 1-3/4" pan-head, stainless-steel screws
5/16" Thick by 4" Wide Tempered Glass (Frontier) Baluster [1]	Four #8 x 1-1/2" bugle-head, stainless-steel screws
3/16" Thick by 1" Wide Arch (Arc) Aluminum Baluster [1]	Four #8 x 1-1/2" bugle-head, stainless-steel screws
1/2" Thick by 1" Wide Rectangular (Traditional) Aluminum Baluster [1]	Four #10 x 1-1/2" bugle-head, stainless-steel screws with 1/2" non-threaded shank
3/4" Diameter Round (Classic) Aluminum Baluster [2]	Two *FastBall*™ connectors with #8 x 1-1/2" bugle-head, stainless-steel screws
3/4" Square (Estate) Aluminum Baluster [2]	Two plastic connectors with #8 x 1-1/2" bugle-head, stainless-steel screws

[1] *Not utilized in the Latitudes*® "U" rail, with insert, and 2x4 Centered WPC guardrail
[2] *Not utilized in the Latitudes*® "U" rail, with insert, and 2x4 Offset WPC guardrail

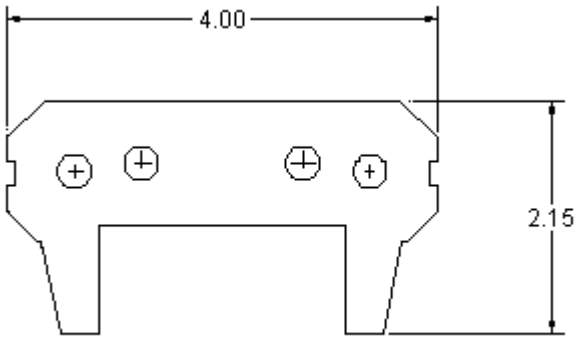

Figure 1 – Outer 'U' Rail Profile

Small Insert **Large Insert**

Figure 2 – Inner Rail Profile

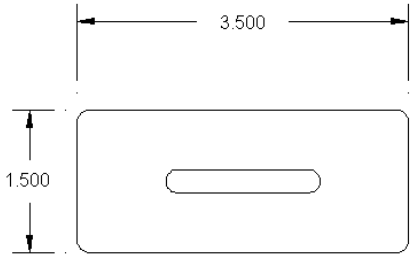

Figure 3 – WPC 2X4 Profile

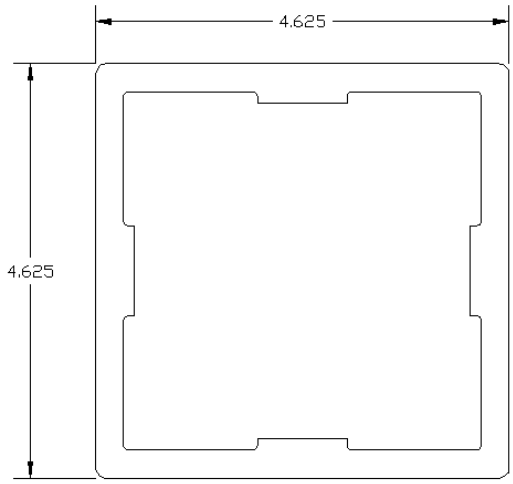

Figure 4 – Post Sleeve

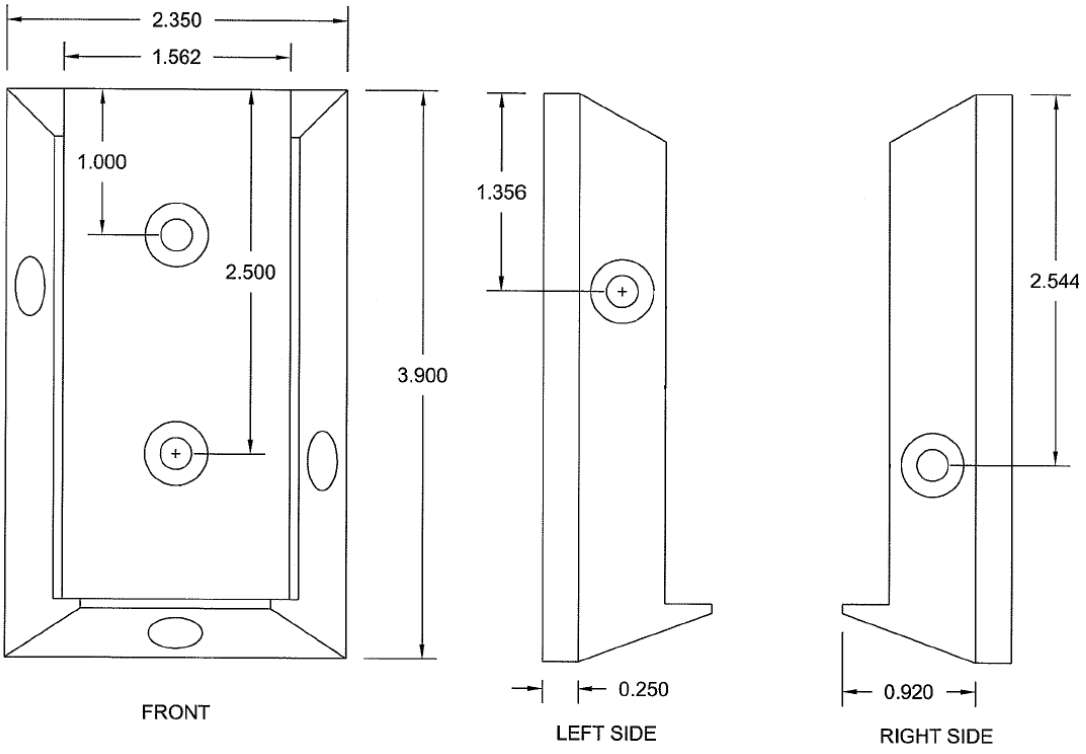

Figure 5 – Nylon Glass Fiber Drop In Bracket - Level

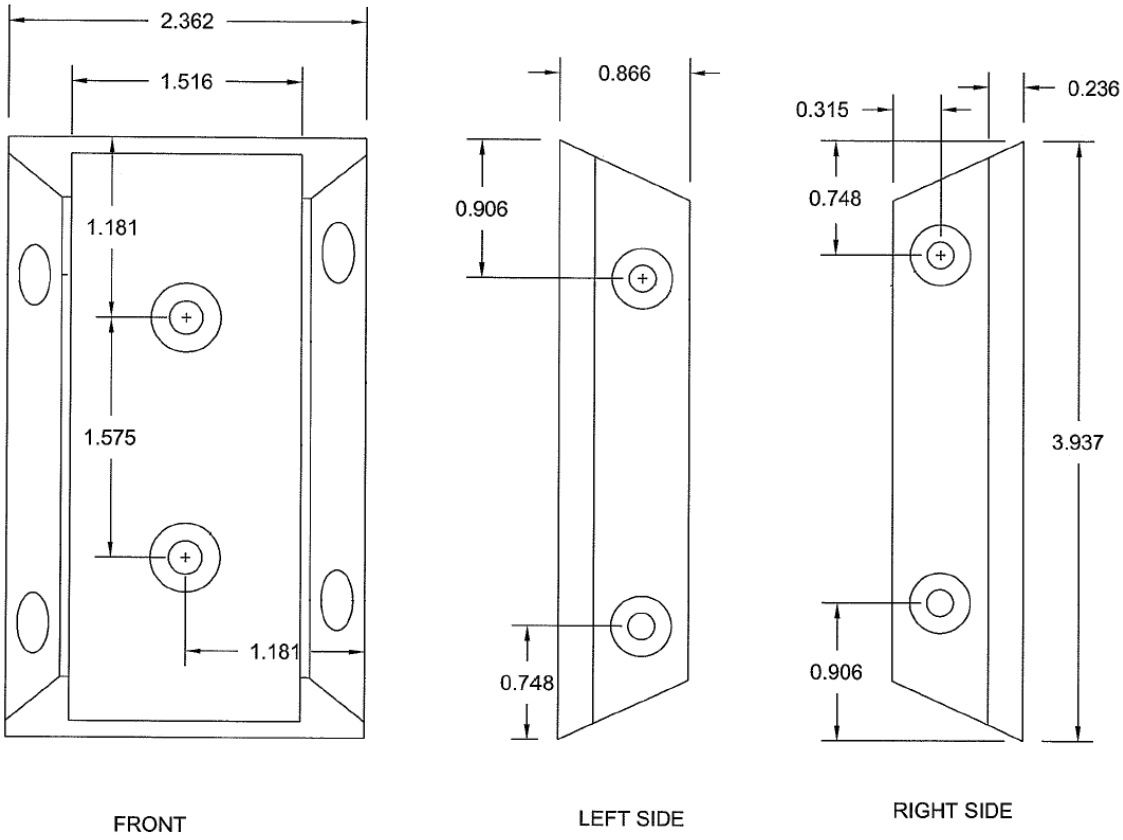

Figure 6 – Nylon Glass Fiber Drop In Bracket - Stair

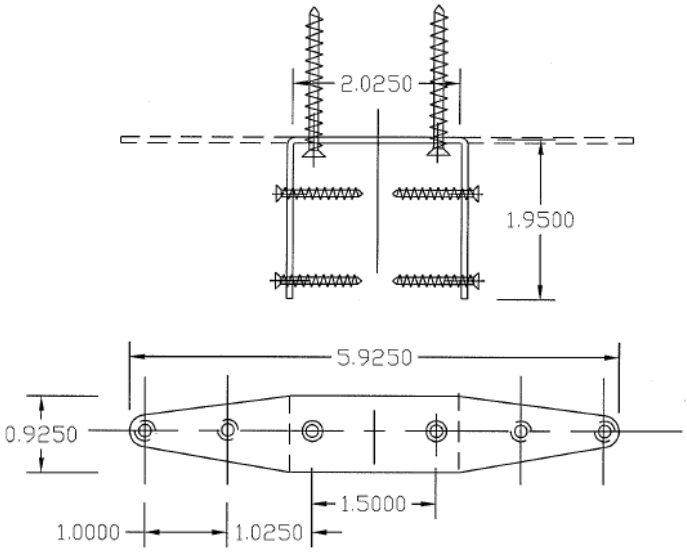

Figure 7 – Metal "U" Bracket – Level

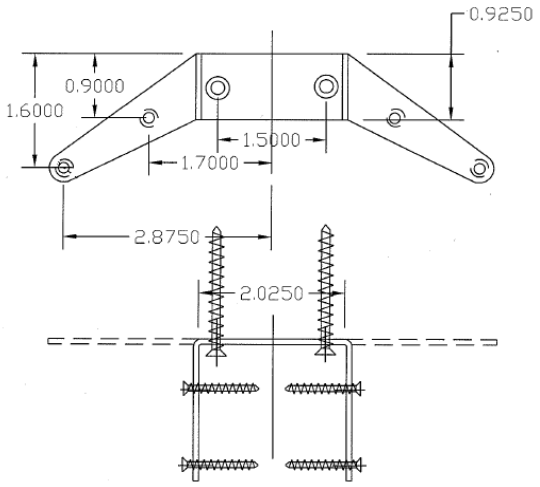

Figure 8 – Metal "U" Bracket – Stair

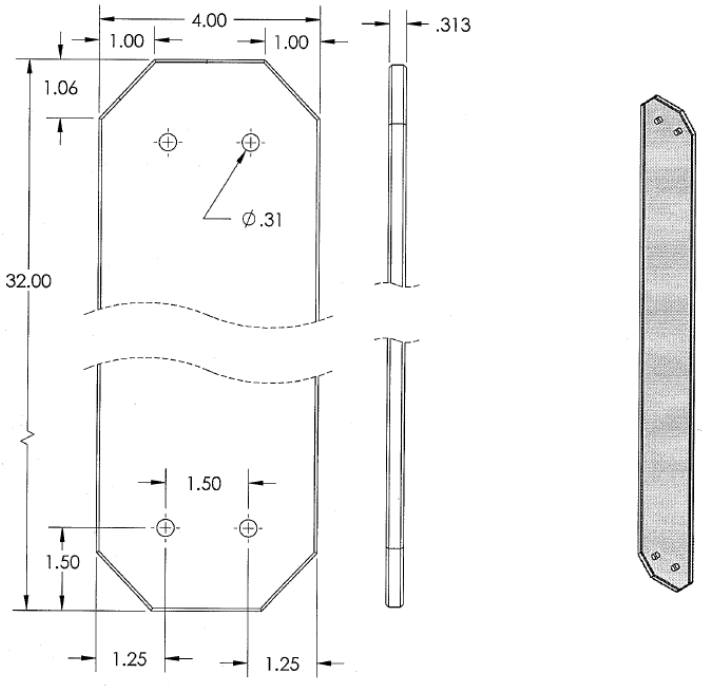

Figure 9 – Glass (Frontier) Baluster

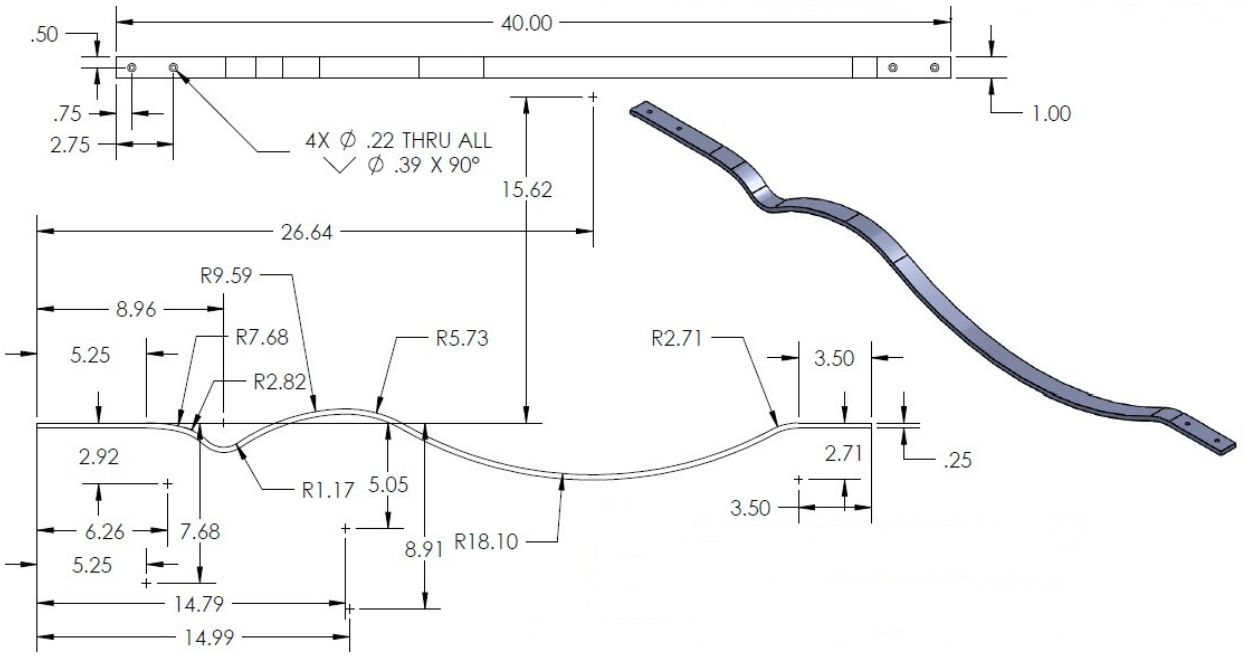

Figure 10 – Contour (Baroque) Baluster

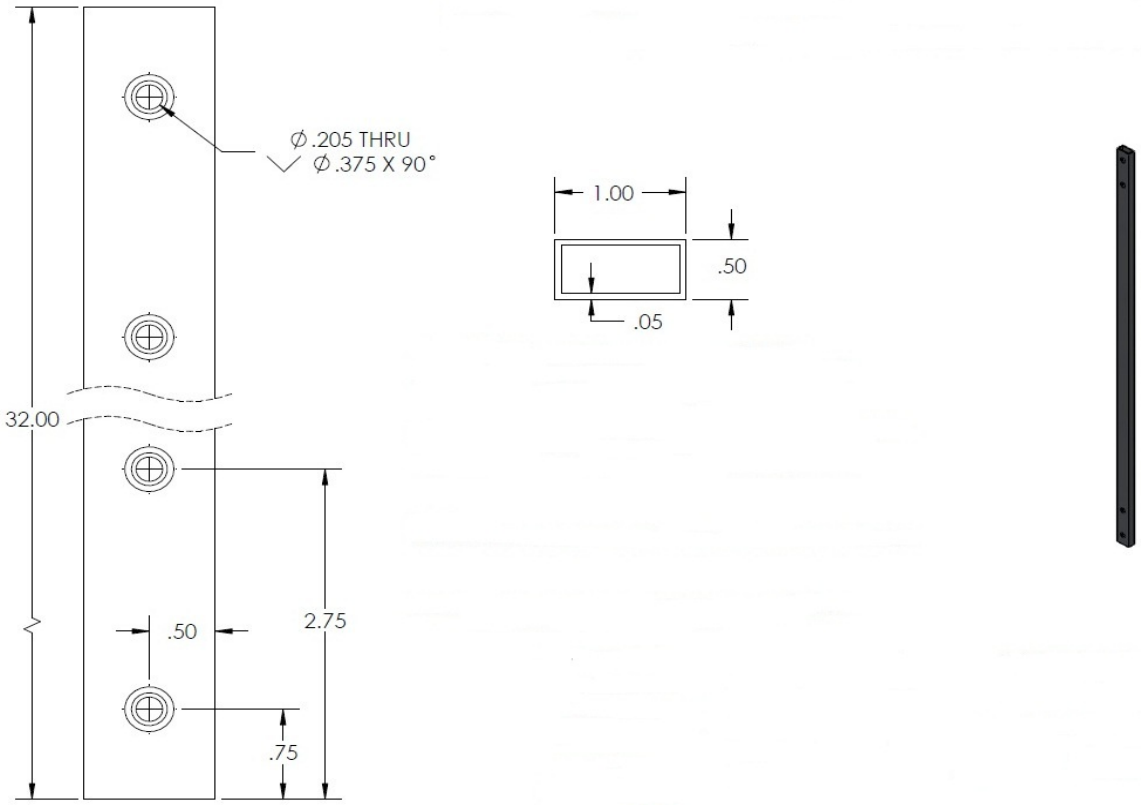

Figure 11 – Rectangular (Traditional) Baluster

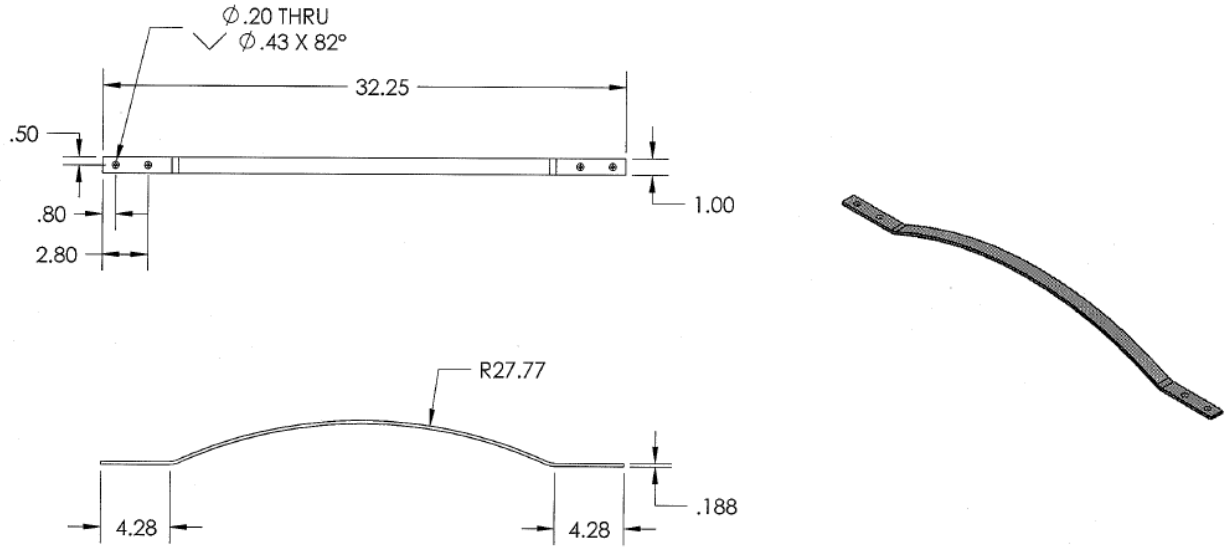

Figure 12 – Arch (Arc) Baluster

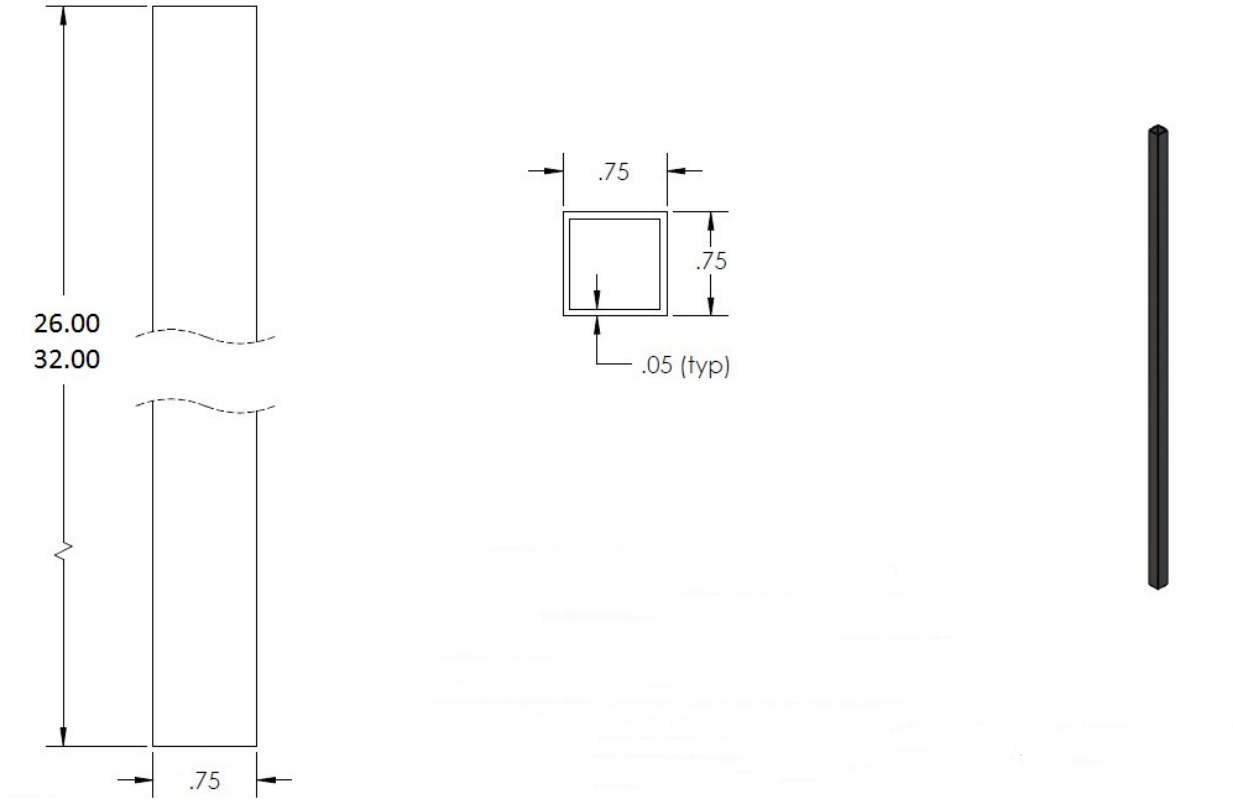

Figure 13 – Square (Estate) Baluster – 26” and 32” Long

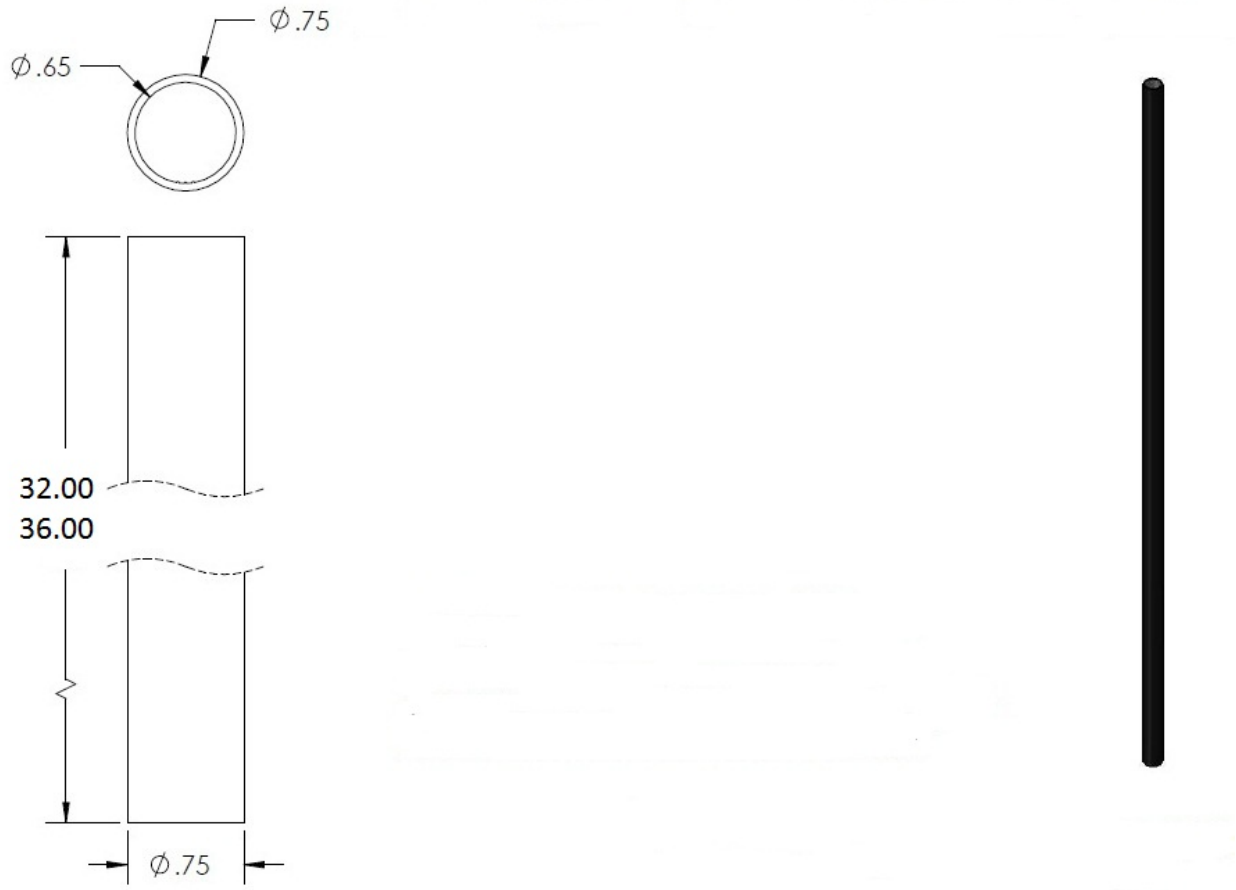

Figure 14 – Round (Classic) Baluster – 32” and 36” Long

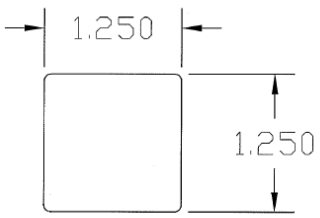

Figure 15 – Square WPC Baluster

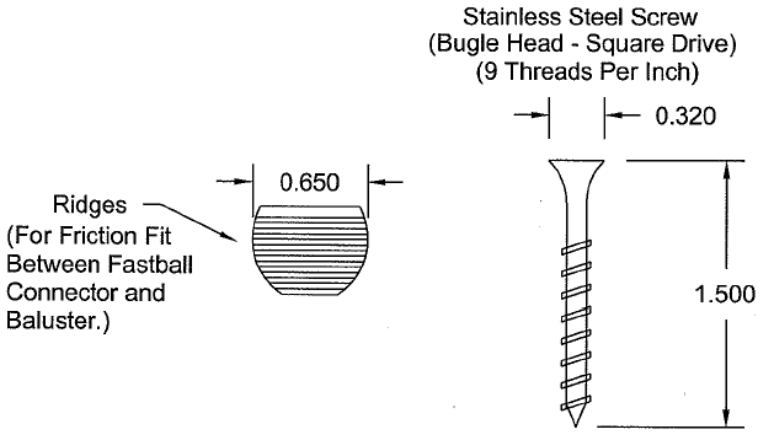

Figure 16 – *FastBall*™ Baluster Connector

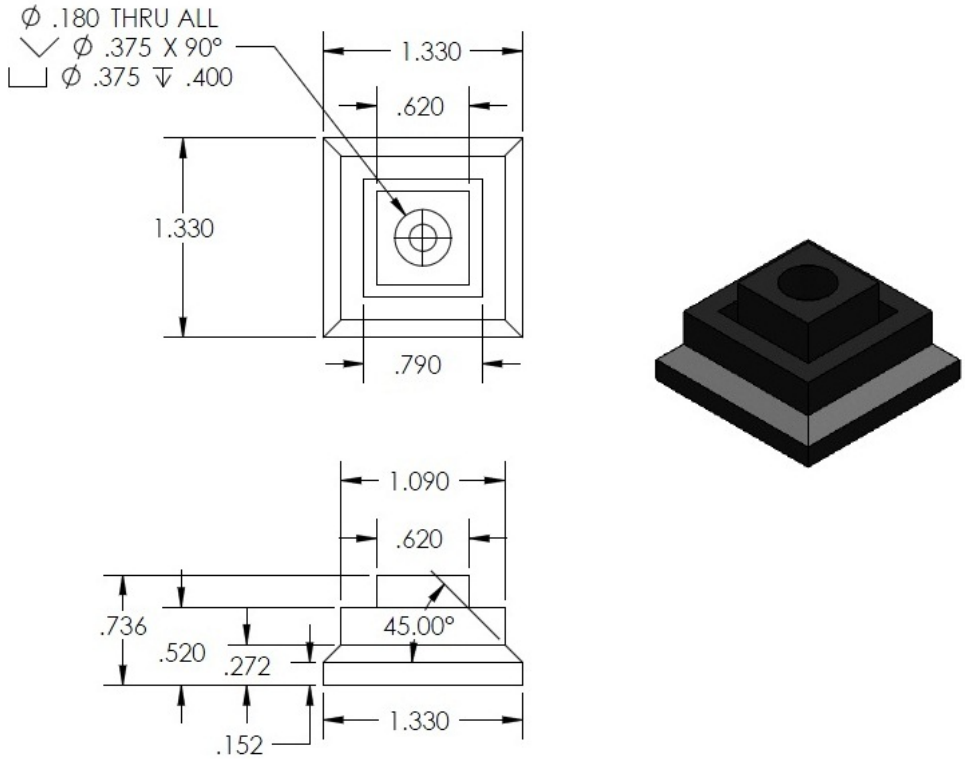

Figure 17 – Square Baluster Connector

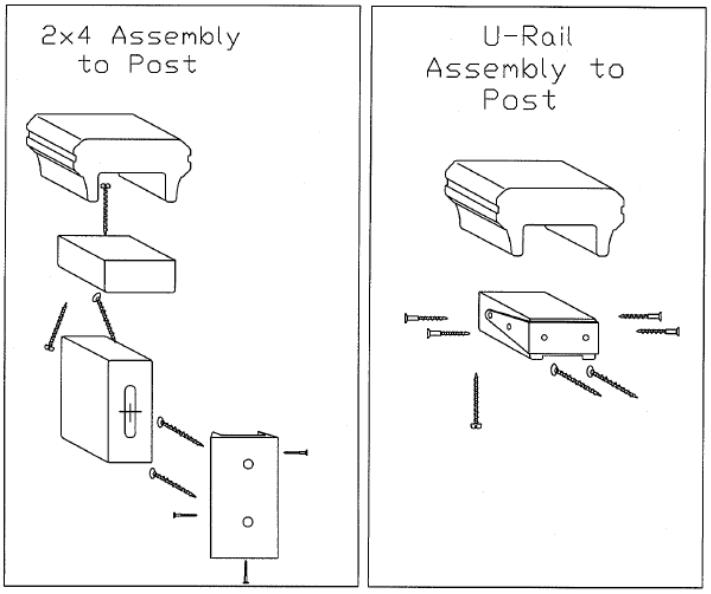

Figure 18 – Rail Connection Details

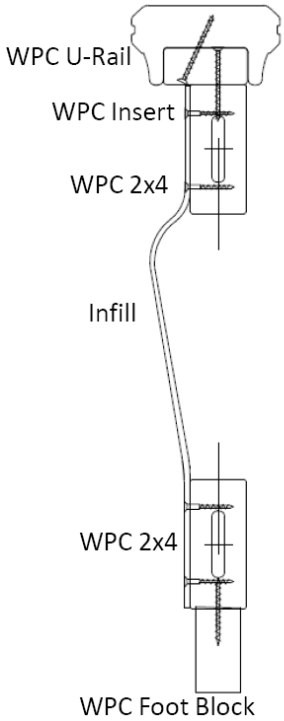

Figure 19 – Contour, Arch, Rectangular and Glass Baluster Assembly

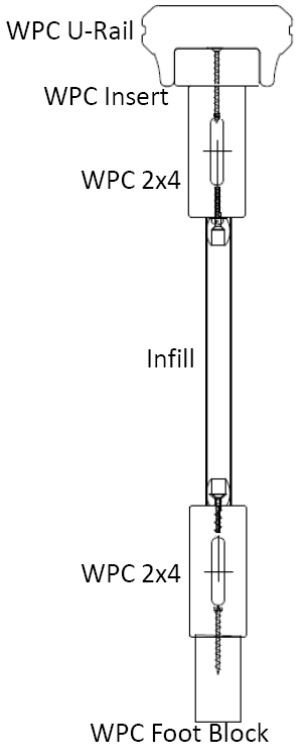

Figure 20 – Round and Square Baluster Assembly

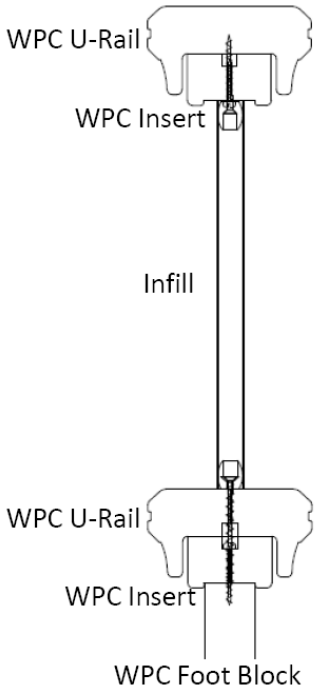

Figure 21 – Round and Square Baluster Assembly

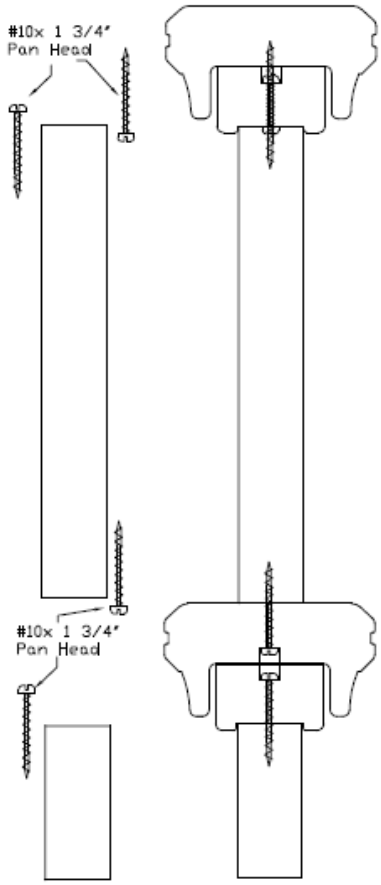

Figure 22 – Square WPC Baluster Assembly