



Code Compliance Research Report

CCRR-0167

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800 Series PVC components are produced in three colors: White, Clay, and Almond. The 200 Series PVC components are produced in three colors: White, Clay and Black. The systems consist of the following components:

1.0 Subject

Vinyl Guardrail Systems:

- 200 Series Professional Rail*
- 800 Series 2x4 Rail*
- 1000 Series T-Rail*
- 3000 Series Newport Rail*

3.3.1 The *200 Series Professional Rail* top rail is a co-extruded PVC "T" profile with overall dimensions of 3.16 inches wide at the top and 1.75 inches wide at the bottom by 2 inches tall with a nominal 0.085 inch wall thickness. See Figure 2.

3.3.2 The *800 Series 2x4 Rail* top rail is a co-extruded PVC rectangular profile with overall dimensions of 2.0 inches wide by 3.5 inches tall with a nominal 0.110 inch wall thickness. See Figure 4.

2.0 Research Scope

2.1 Building Codes:

- 2012 International Building Code (IBC)
- 2012 International Residential Code (IRC)

3.3.3 The *1000 Series T-Rail* top rail is a co-extruded PVC "T" profile with overall dimensions of 3.0 inches wide at the top and 1.75 inches wide at the bottom by 3.5 inches tall with a nominal 0.110 inch wall thickness. See Figure 5.

2.2 Properties:

- Structural Performance
- Durability
- Surface Burning

3.3.4 The *3000 Series Newport Rail* top rail is a co-extruded PVC contoured profile with overall dimensions of 3.0 inches wide at the top by 3.22 inches tall with a nominal 0.110 inch wall thickness. See Figure 6.

3.0 Description

3.1 General – The Superior Plastic Products vinyl guardrail systems identified in Section 1.0 are guardrails (guards) under the definitions of the referenced codes and are intended for use on elevated walking areas of buildings and walkways as required by the referenced codes.

3.3.5 The *200 Series Professional Rail* bottom rail is a co-extruded PVC rectangular profile with overall dimensions of 1.775 inches wide by 2.775 inches tall with a nominal 0.075 inch wall thickness. See Figure 3.

3.2 Guardrail Assemblies – Railing systems are provided as level guards for level walking areas such as decks, balconies, and porches. Guards are provided in lengths up to 120 inches between supports and overall installed height of 36 inches to 42 inches. See Figure 1, Table 1, and Table 2.

3.3.6 The *800 Series 2x4 Rail* bottom rail is a co-extruded PVC rectangular profile with overall dimensions of 2.0 inches wide by 3.5 inches tall with a nominal 0.110 inch wall thickness. See Figure 4.

3.3 Materials and Processes - Railings are an assemblage of co-extruded and molded components utilizing Poly Vinyl Chloride (PVC) material, and aluminum reinforcements. The *3000 Series PVC components are produced in five colors: White, Tan, Clay, Almond and Black.* The *1000 Series* PVC components are produced in four colors: White, Tan, Clay, and Almond. The

3.3.7 The *1000 Series T-Rail* and *3000 Series Newport Rail* bottom rail is a co-extruded PVC rectangular profile with overall dimensions of 1.75 inches wide by 3.5 inches tall with a nominal 0.110 inch wall thickness. See Figure 7.

3.3.8 Balusters are supplied in the eight styles identified in Table 3.

3.3.9 An extruded 6005-T5 aluminum "A"-shaped insert with an inner web thickness of 0.135 inch is used to provide reinforcement for

the *1000 Series* and *3000 Series* PVC top rails. See Figure 18.

3.3.10 An extruded 6005-T5 aluminum inverted "A"-shaped insert with an inner web thickness of 0.070 inch is used to provide reinforcement for the *1000 Series* and *3000 Series* PVC bottom rails. See Figure 18.

3.3.11 An extruded 6005-T5 aluminum "A"-shaped insert with an inner web thickness of 0.130 inch is used to provide reinforcement for the *800 Series* PVC top rails. See Figure 17.

3.3.12 An extruded 6063-T5 aluminum inverted "A"-shaped insert with a wall thickness of 0.070 inch is used to provide reinforcement for the *800 Series* PVC bottom rails. See Figure 17.

3.3.13 An extruded 6063-T5 aluminum "A"-shaped insert with an inner rib thickness of 0.105 inch is used to provide reinforcement for the *200 Series* PVC top rails. See Figure 15.

3.3.14 An extruded 6063-T5 aluminum inverted "H"-shaped insert with a wall thickness of 0.070 inch is used to provide reinforcement for the *200 Series* PVC bottom rails. See Figure 16.

3.3.15 Top and bottom rails are connected to posts using molded PVC brackets secured to the posts with stainless steel screws. See Figure 20 through Figure 25 and Table 4.

3.3.16 Railing systems are attached to conventional wood supports which are outside the scope of this report. A 4 inch square with a nominal wall thickness of 0.150 inch co-extruded PVC post sleeve is used to sleeve a conventional 4x4 wood post. See Figure 19.

4.0 Performance Characteristics

4.1 The guardrail systems described in this report have 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 PVC material used in the guardrail system has a flame spread index less than 200 when tested in accordance with 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 baluster connections to the top and bottom rails are made by inserting the balusters into the routed openings in both rails.

5.2 The top and bottom rails are attached directly to structural supports utilizing molded PVC mounting brackets. See Figure 20 through Figure 25.

5.3 The top and bottom rails may be attached to conventional wood supports. The wood in the supporting structure, including conventional posts, shall have a specific gravity of 0.50 (southern yellow pine) or greater.

5.3.1 For attachment to wood supports, see Table 4 for fastening methods of the guardrail system components.

5.3.2 4x4 conventional wood posts may be covered by a 4 inch square non-structural PVC post sleeve with decorative caps and moldings.

6.0 Supporting Evidence

6.1 Drawings and installation instructions submitted by the manufacturer.

6.2 The reports of testing and engineering analysis demonstrating compliance with the performance requirements of ICC-ES AC174, *Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)*, approved January 2012, and ASTM D 7032-07, *Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)*. Within the scope of this report, ASTM D 7032-07 has been deemed equivalent to ASTM D 7032-08.

6.3 A quality control manual in accordance with ICC-ES AC10, *Acceptance Criteria for Quality Documentation*, dated June 2011.

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 Guards recognized in this report and regulated by the IBC or IRC are limited to exterior use in 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 supports 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. 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. Only those types of fasteners and fastening methods described in this report have been evaluated for the installation of the vinyl guardrail systems; other methods of attachment are outside the scope of this report.

7.4 The vinyl guardrail systems reported herein are manufactured by Superior Plastic Products, Inc. in New Holland, Pennsylvania. Manufacturing is in accordance with an approved quality control system and inspections by Architectural Testing (IAS AA-676).

8.0 Identification

The vinyl guardrail assemblies produced by Superior Plastic Products, Inc. identified in this report shall be identified with labeling on the individual components or the packaging that includes:

8.1 Name and/or trademark of Superior Plastic Products, Inc.;

8.2 Architectural Testing Code Compliance Research Report mark and number (CCRR-0167); and

8.3 The following statement: "See CCRR-0167 at www.ati-es.com for uses and performance levels." For guardrail systems recognized in Table 2, the label shall also include the phrase, "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.

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 - Guardrail Systems for Use in IBC / All Use Group Classifications

Guardrail System	Type	Maximum Rail Dimensions (length by height) ¹	Baluster(s) (described in Table 3)
<i>1000 Series & 3000 Series</i>	Level	96 inches by 42 inches	Heritage, Kinzer, Madison, Model, Traditional, Victorian, and York
<i>800 Series</i>	Level	96 inches by 42 inches	Model and York
<i>200 Series</i>	Level	72 inches by 42 inches	Model and York

¹ Length is clear space between supports.

Table 2 - Guardrail Systems for Use in IRC / One- and Two-Family Dwellings ¹

Guardrail System	Type	Maximum Rail Dimensions (length by height) ²	Baluster(s) (described in Table 3)
1000 Series & 3000 Series	Level	96 inches by 42 inches	Heritage, Kinzer, Madison, Oxford, Model, Traditional, Victorian, and York
	Level	120 inches by 36 inches	Heritage, Kinzer, Madison, Oxford, Model, Traditional, Victorian and York
200 Series & 800 Series	Level	120 inches by 42 inches	Model and York

¹ The use of this product shall be limited to exterior use as a guard system for balconies and porches for one- and two-family dwellings of Type V-B (IBC) construction and structures constructed in accordance with the IRC.

² Length is clear space between supports.

Table 3 – Baluster Styles

Baluster Style	Description	Cross-Reference
Heritage	1.3-inch square-ended thermoformed PVC spindle with an 0.08 inch wall thickness measured at its ends	Figure 8
Kinzer		Figure 11
Madison		Figure 12
Oxford ¹		Figure 14
Model	1.3-inch square PVC baluster with an 0.06 inch wall thickness	Figure 13
Traditional	1.5 inches by 0.875 inch rectangular-ended thermoformed PVC spindle with an 0.08 inch wall thickness measured at its ends	Figure 9
Victorian	1.5 inches by 0.875 inch rectangular-ended PVC baluster with an 0.08 inch wall thickness	Figure 15
York	Round, painted 6063-T6 aluminum picket with a 0.75 inch outside diameter with 0.055 inch wall thickness	Figure 10

¹ Used in 36 inch high railing systems only.

Table 4 – Fastening Schedule

System	Connection	Fastener	Qty.
<i>200 Series Professional Rail</i>	Top Rail Bracket to Post	#14 x 1-1/2 in self-starting pan-head stainless steel screws	4
	Top Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screws	2
	Bottom Rail Bracket to Post	#14 x 1-1/2 in self-starting pan-head stainless steel screws	4
	Bottom Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screw	1
<i>800 Series 2x4 Rail</i>	Top Rail Bracket to Post	#10 x 1-1/2 in self-starting pan-head stainless steel screws	4
	Top Rail Bracket to Rail	#10 x 1 in self-drilling pan-head stainless steel screws	2
	Bottom Rail Bracket to Post	#10 x 1-1/2 in self-starting pan-head stainless steel screws	4
	Bottom Rail Bracket to Rail	#10 x 1 in self-drilling pan-head stainless steel screws	2
<i>1000 Series T-Rail</i>	Top Rail Bracket to Post	#8 x 1 in self-starting pan-head stainless steel screws	6
	Top Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screws	2
	Bottom Rail Bracket to Post	#8 x 1 in self-starting pan-head stainless steel screws	6
	Bottom Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screw	1
<i>3000 Series Newport Rail</i>	Top Rail Bracket to Post	#14 x 1-1/2 in self-starting pan-head stainless steel screws	4
	Top Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screws	2
	Bottom Rail Bracket to Post	#8 x 1 in self-starting pan-head stainless steel screws	6
	Bottom Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screw	1

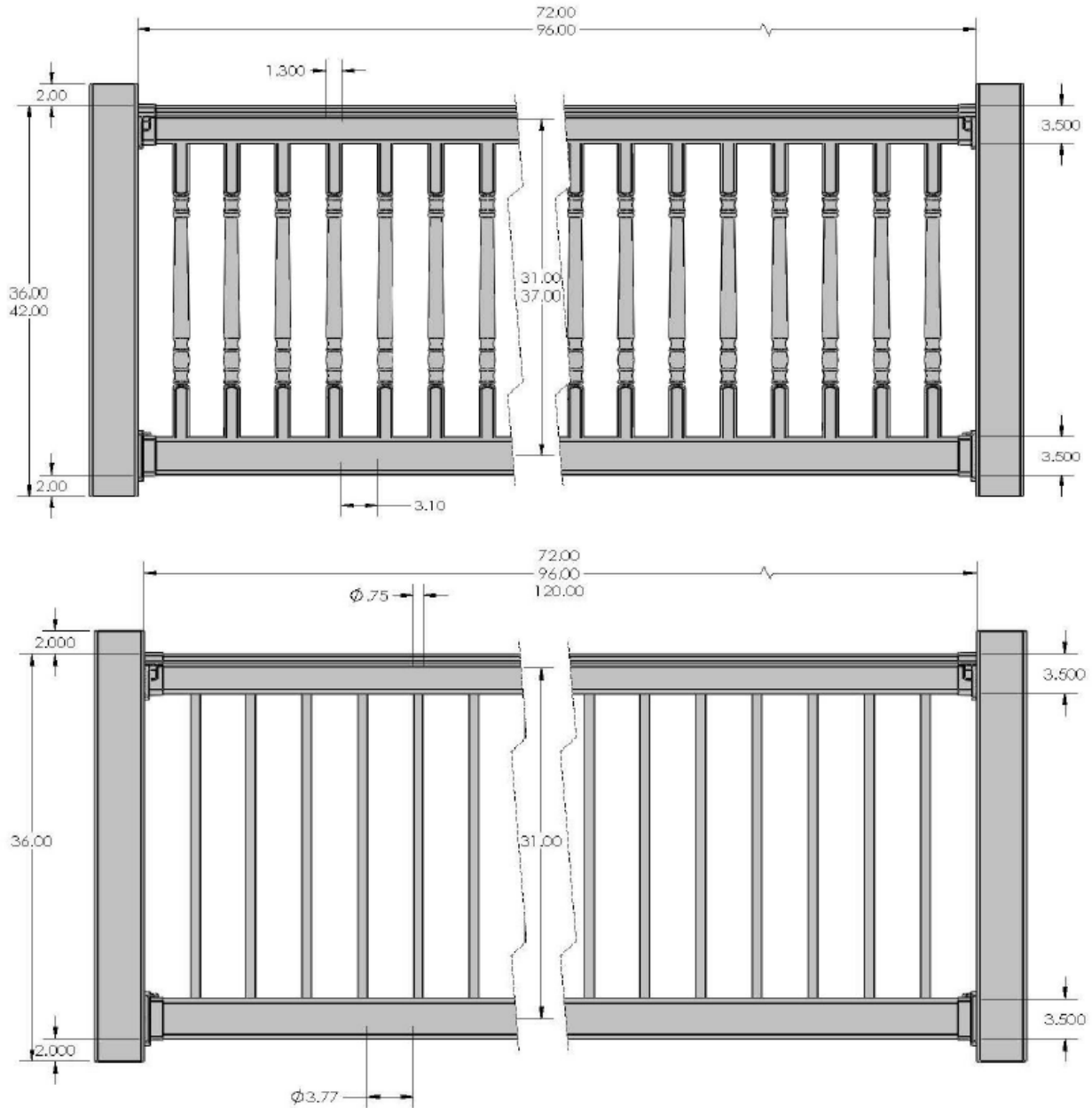
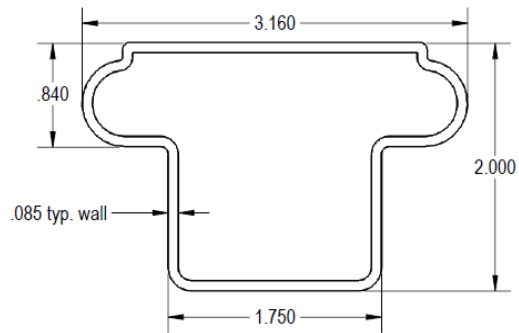
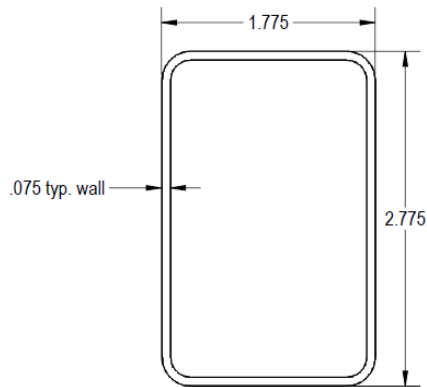
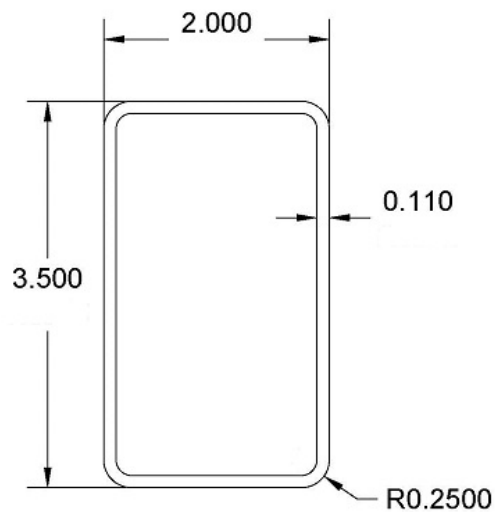


Figure 1 – Vinyl Railing Systems

**Figure 2 – 200 Series Professional Rail Top Rail****Figure 3 – 200 Series Professional Rail Bottom Rail****Figure 4 – 800 Series Top and Bottom Rail**

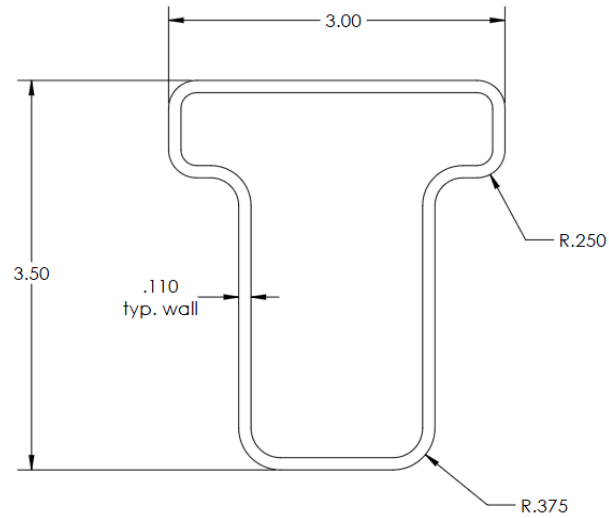


Figure 5 – 1000 Series T-Rail Top Rail

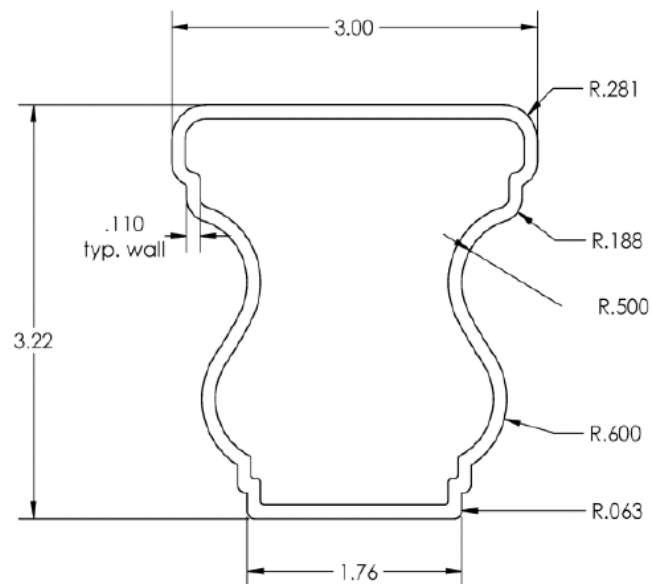
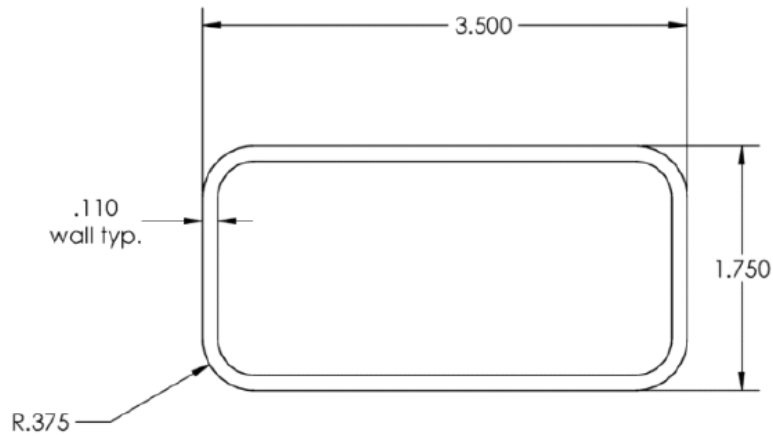
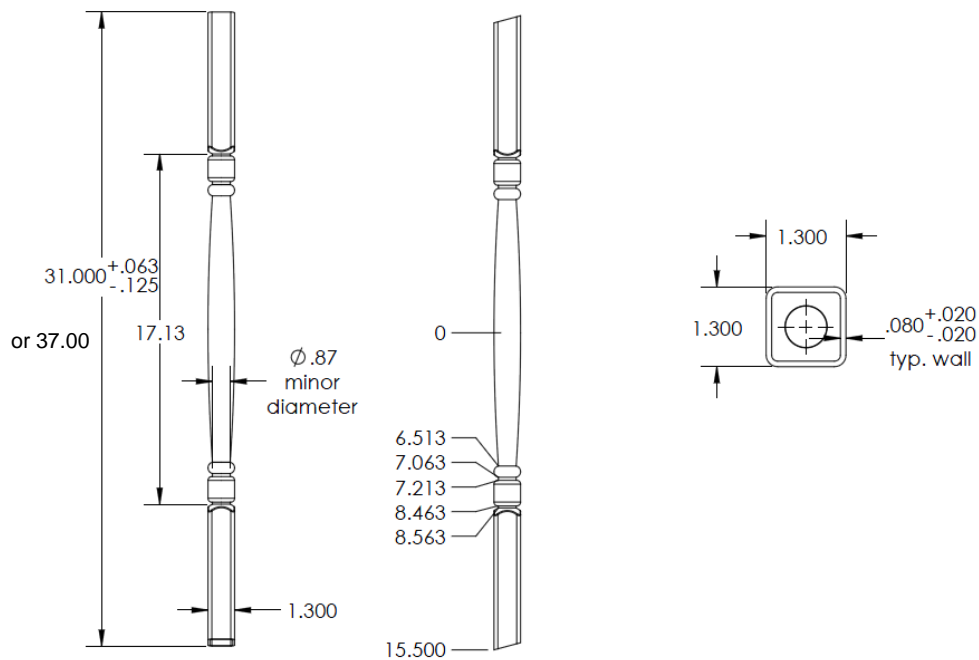
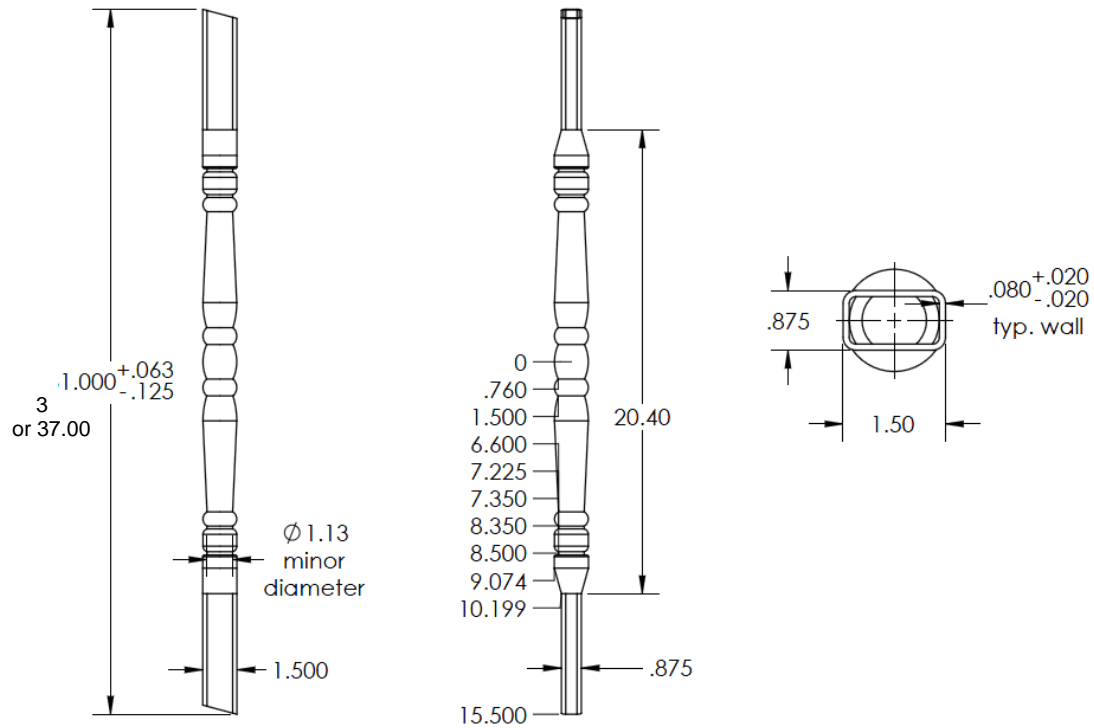
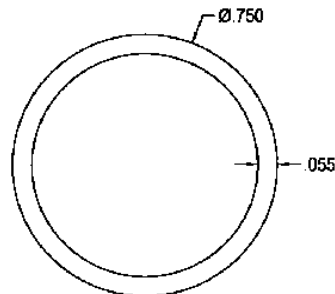
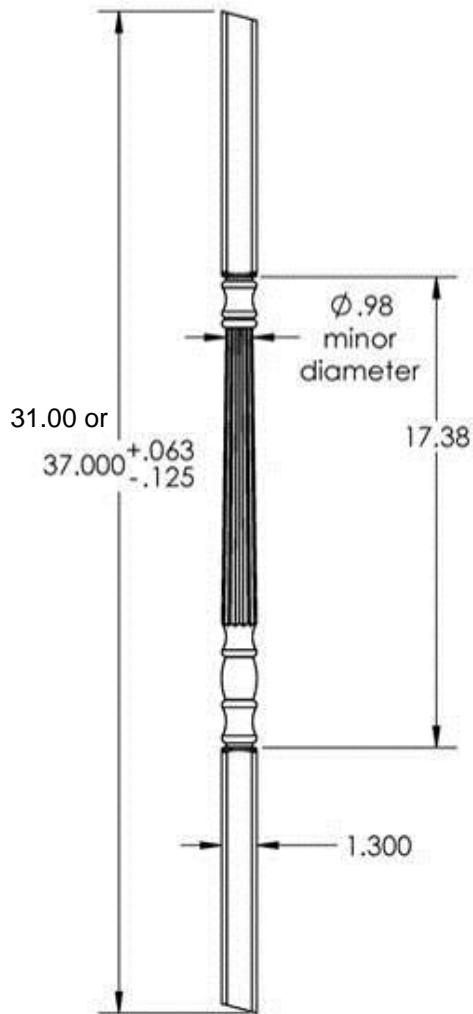
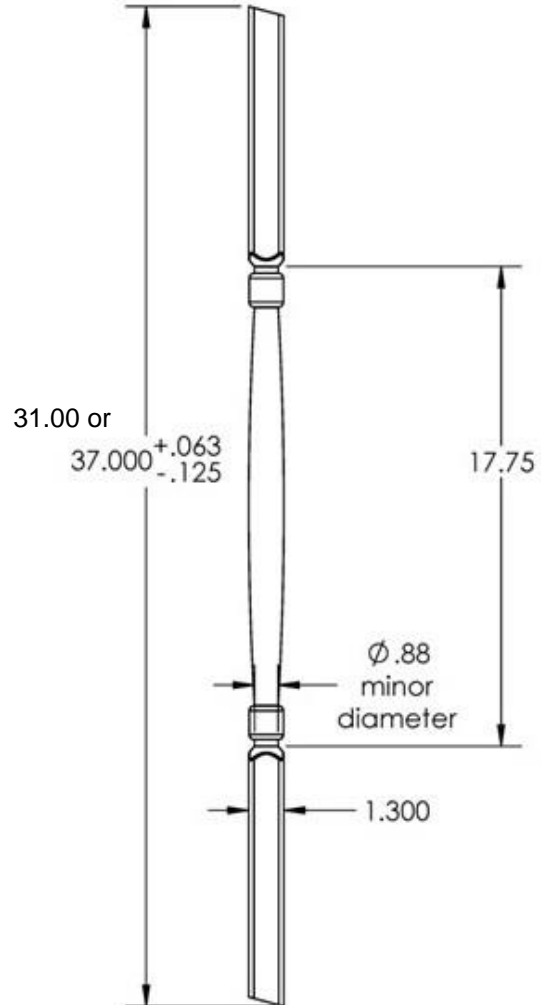


Figure 6 – 3000 Series Newport Rail Top Rail


Figure 7 – 1000 Series and 3000 Series Bottom Rail

Figure 8 –Heritage PVC Spindle


Figure 9 – Traditional PVC Spindle

Figure 10 – York 6063-T6 Aluminum Round Tube Picket


Figure 11 – Kinzer PVC Spindle

Figure 12 - Madison PVC Spindle

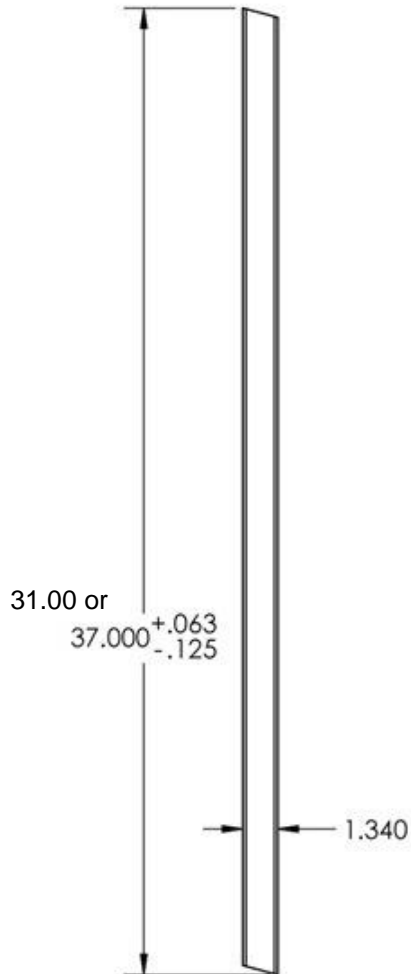


Figure 13 – Model PVC Baluster

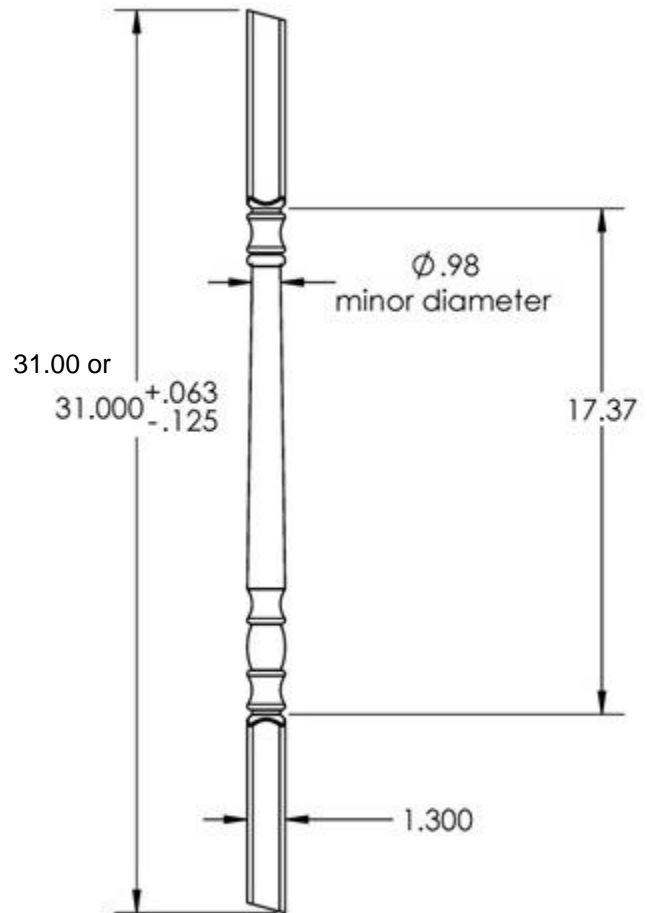


Figure 14 – Oxford PVC Spindle

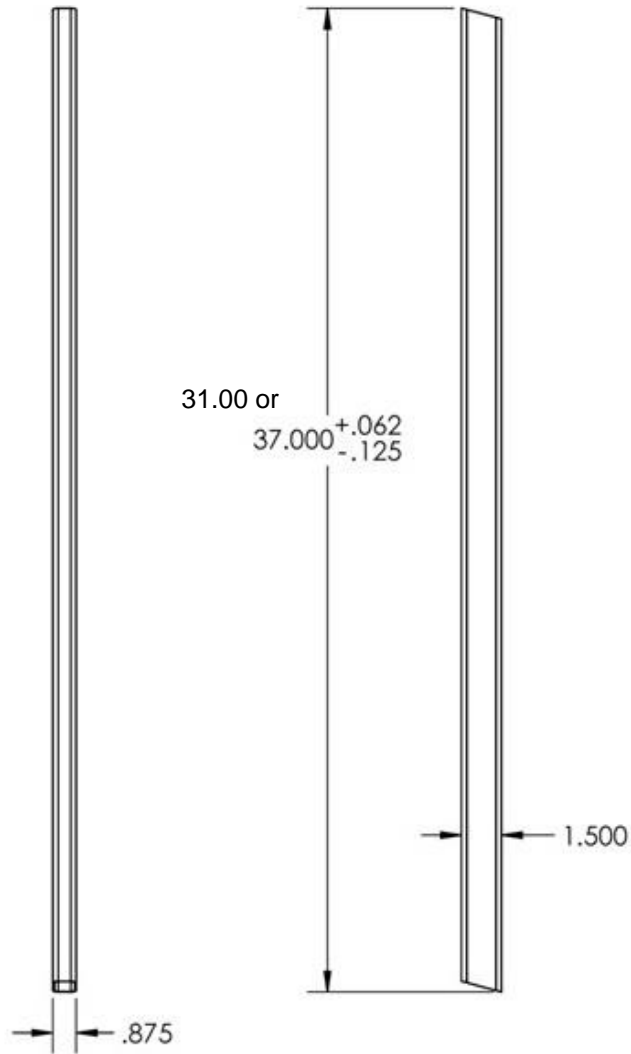


Figure 15 – Victorian PVC Baluster

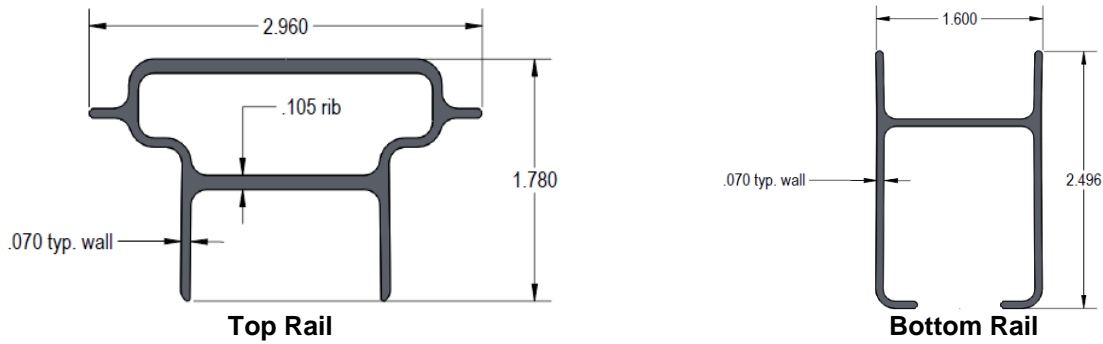


Figure 16 – 200 Series Rail Aluminum Inserts

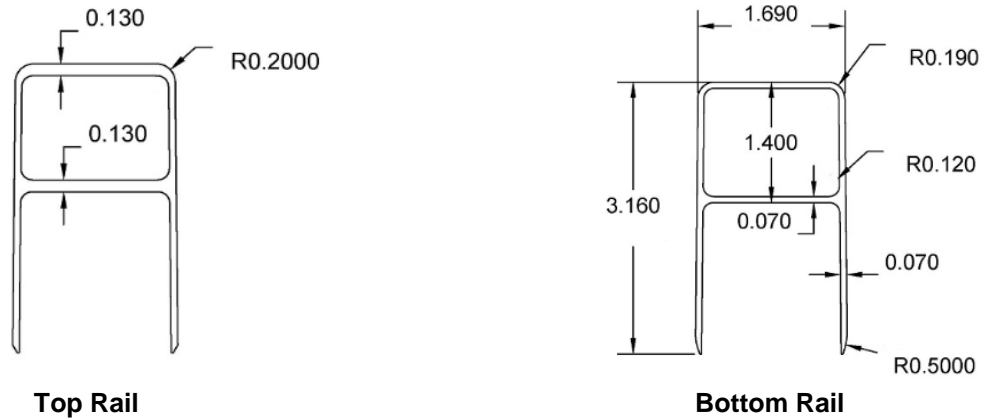


Figure 17 – 800 Series Rail Aluminum Inserts

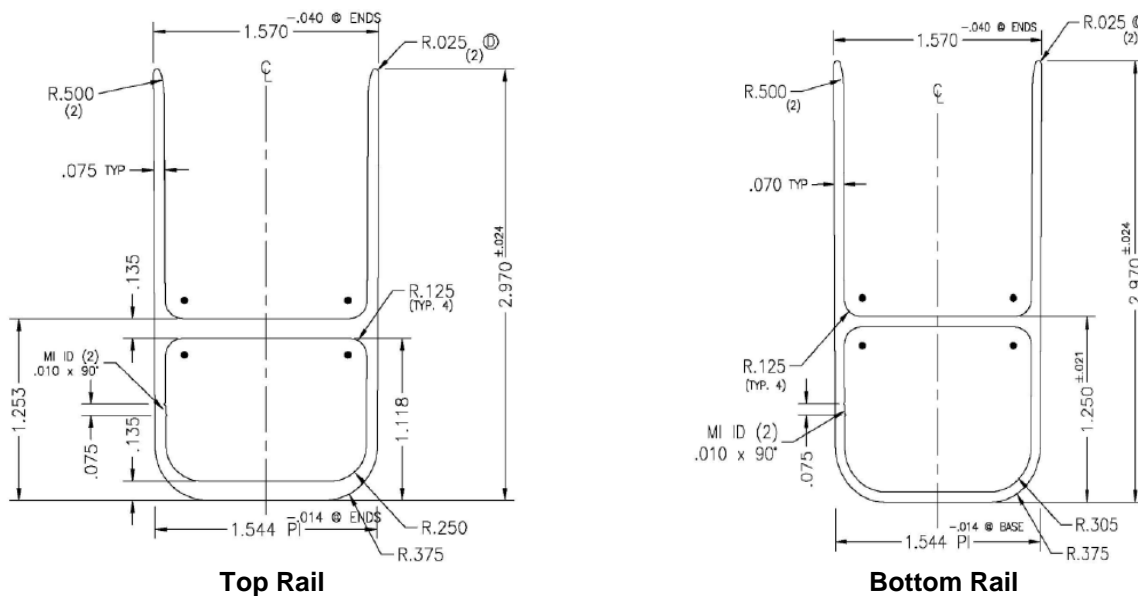
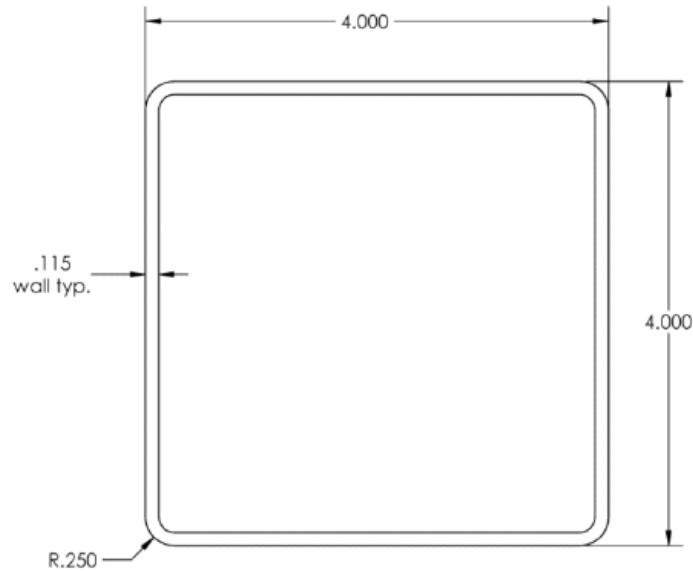
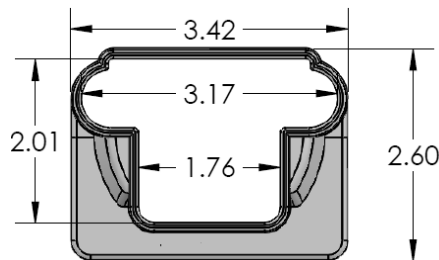
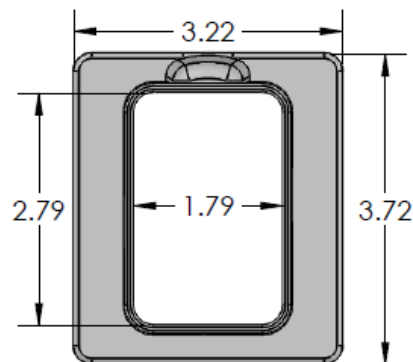


Figure 18 – 1000 Series and 3000 Series Rail Aluminum Inserts


Figure 19 – PVC Post Sleeve

Figure 20 – 200 Series Professional Rail Top Rail Mounting Bracket

Figure 21 – 200 Series Professional Rail Bottom Rail Mounting Bracket

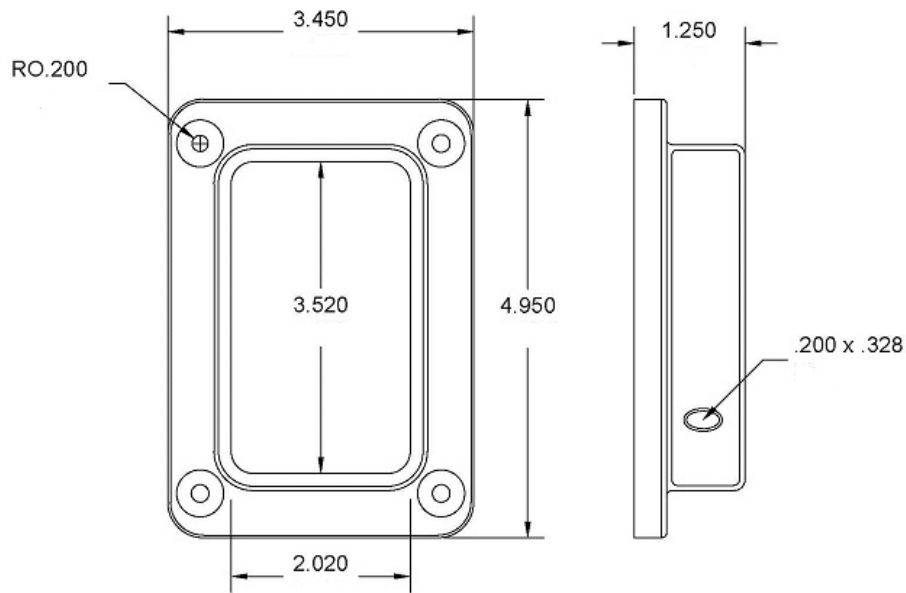


Figure 22 – 800 Series Top and Bottom Rail Mounting Bracket

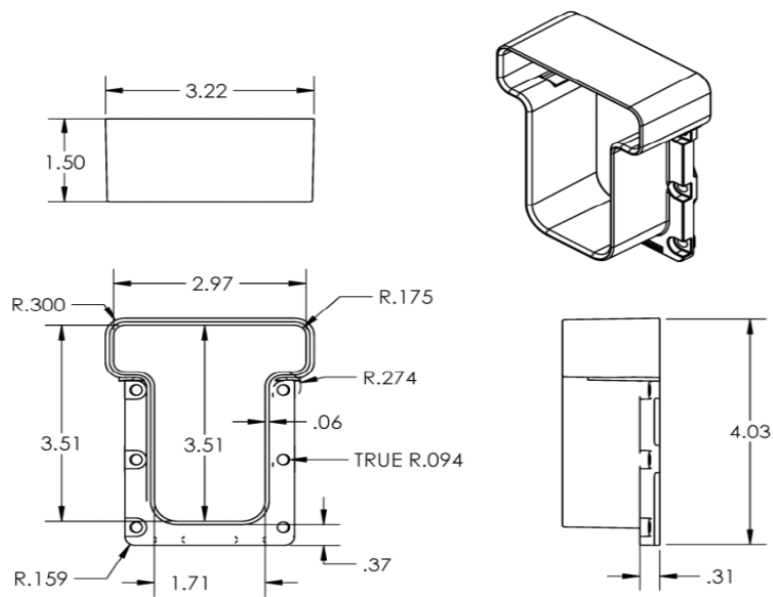


Figure 23 – 1000 Series T-Rail Top Rail Mounting Bracket

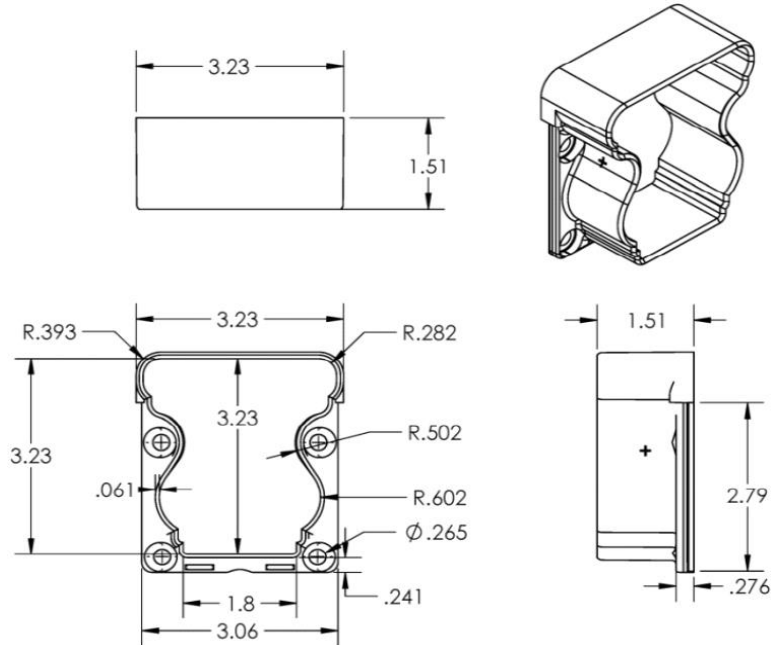


Figure 24 – 3000 Series Newport Rail Top Rail Mounting Bracket

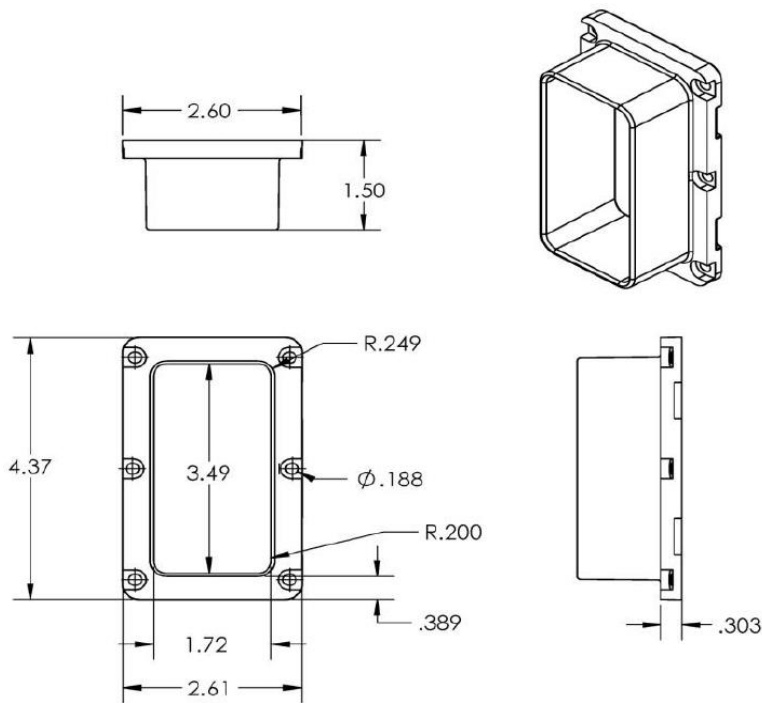


Figure 25 – 1000 Series and 3000 Series Bottom Rail Mounting Bracket