Code Compliance Research Report
CCRR-0167

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Renewal Date: 07-31-2025

DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES
Section: 06 63 00 – Plastic Railings

REPORT HOLDER:

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www.superiorplasticproducts.com

Additional Listee:

Cardinal Building Products
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REPORT SUBJECT:

Superior Plastic Products Systems:

- *200 Series Professional Rail*
- *1000 Series T-Rail*
- *3000 Series Newport Rail*
- Beveled T-Rail
- 2 x 3.5 Rectangular Rail

Cardinal Building Products Systems:

- Sonic Beveled-S,R,T
- Sonic 24-S,R,T

1.0 SCOPE OF EVALUATION

1.1 This Research Report addresses compliance with the following Codes:

- 2024, 2021, 2018 *International Building Code®* (IBC)
- 2024, 2021, 2018 *International Residential Code®* (IRC)

NOTE: This report references the most recent Code editions cited. Section numbers in earlier editions may differ.

1.2 The Superior Plastic Products vinyl guard systems identified in this report have been evaluated for the following properties:

- Structural Performance
- Durability
- Surface Burning

1.3 The Superior Plastic Products vinyl guard systems identified in this report have been evaluated for the following uses:

- Guards under the definitions of the referenced codes
- Use on elevated walking areas of buildings and walkways as required by the referenced codes
- Guard systems recognized in this report may be used in One- and Two-Family Dwellings regulated by the IRC and all construction types regulated by the IBC in accordance with IBC Sections 705.2.2 and 705.2.1.1, Exceptions 2 and 3. Guards less than 42 inches high are limited to use in One- and Two-Family Dwellings (IRC). See Table 1 for additional restrictions based upon Use and Occupancy classification.

2.0 STATEMENT OF COMPLIANCE

The Superior Plastic Products vinyl guard systems identified in this report comply 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 6.0.

2.1 2024 IBC and IRC Evaluation Reports

The Intertek CCRR is an *Evaluation Report* for approval of an alternate material, design, or method of construction in accordance with Section 104.2.3.6.1 of the 2024 IBC and Section R104.2.2.6.1 of the 2024 IRC.

3.0 DESCRIPTION

3.1 Guard 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.

3.2 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 *200 Series* PVC components are produced in three colors: White, Clay and Black. The Sonic Beveled-S,R,T Railing, Sonic 24-S.R.T Railing, Beveled S,R,T-Rail, and 2x3.5 Rectangular rails are produced in four colors: White, Black, Clay and Almond. The systems consist of the following components:

3.2.1 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.

3.2.2 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 3.

3.2.3 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 4.

3.2.4 The Beveled S,R,T-Rail and *Sonic Beveled-T* top rail is a co-extruded PVC contoured profile with overall dimensions of 3.50 inches wide at the top by 3.50 inches tall with a nominal 0.110-inch wall thickness. See Figure 5.

3.2.5 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 2.

3.2.6 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 3.

3.2.7 The 2 x 3.5 Rectangular Rail and Sonic 24-S series bottom rail is a co-extruded PVC rectangular profile with overall dimensions of 2.00 inches wide by 3.50 inches tall with a nominal thickness of 0.11 inches. See Figure 6.

3.2.8 Baluster Styles and applicable systems can be found in Table 1, Table 2 and Table 3.

3.2.9 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 15.

3.2.10 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 15.

3.2.11 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 14.

3.2.12 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 14.

3.2.13 An extruded 6005-T5 aluminum "P" -oriented and shaped insert with a wall thickness of 0.070 inch is used to provide reinforcement for the Beveled S,R,T-Rail and *Sonic Beveled-S,R,T Series* PVC top rails. See Figure 16.

3.2.14 An extruded 6005-T5 aluminum "b" -oriented and shaped insert with a wall thickness of 0.070 inch is used to provide reinforcement for the 2 x 3.5 Rectangular Rail and the Sonic 24-S,R,T *Series* PVC bottom rails. See Figure 16

3.2.15 Top and bottom rails are connected to posts using molded PVC brackets secured to the posts with stainless steel screws. See Figure 20 through 23 and Table 4.

3.2.16 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 17.

4.0 PERFORMANCE CHARACTERISTICS

4.1 The guard 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 Formosan termites.

4.4 The PVC material used in the guard system has a flame spread index less than 200 when tested in accordance with ASTM E 84.

5.0 INSTALLATION

5.1 General:

The Superior Plastic Products vinyl guard systems identified in this report 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:

5.2.1 The baluster connections to the top and bottom rails are made by inserting the balusters into the routed openings in both rails.

5.2.2 The top and bottom rails are attached directly to structural supports utilizing molded PVC mounting brackets. See Figure 20 through Figure 23.

5.2.3 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.

5.2.4 For attachment to wood supports, see TABLE 4 for fastening methods of the guard system components.

5.2.5 4x4 conventional wood posts may be covered by a 4-inch square non-structural PVC post sleeve with decorative caps and moldings.

6.0 CONDITIONS OF USE

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 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.

6.3 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 guard systems; other methods of attachment are outside the scope of this report.

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

6.5 The Superior Plastic Products vinyl guard system identified in this report is manufactured under a quality control program with inspections by Intertek.

7.0 SUPPORTING EVIDENCE

7.1 Drawings and installation instructions submitted by the manufacturer.

7.2 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), revised December 2014, and ASTM D 7032-21 [17], Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails).

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

7.4 Intertek Listing Report "Superior Plastic Products - Vinyl Guardrail Systems", on the Intertek Directory of Building Products.

8.0 IDENTIFICATION

The Superior Plastic Products vinyl guard systems identified in this report are identified with the manufacturer's name (Superior Plastic Product Systems), the product name, (see Report Subject) the Intertek Mark as shown below, the Intertek Control Number, and the Code Compliance Research Report number (CCRR-0167).

9.0 OTHER CODES

This section is not applicable.

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.

TABLE 1 - GUARD SYSTEMS FOR USE IN IBC / ALL USE GROUP CLASSIFICATIONS

Guard System	Type	Maximum Rail Dimensions (length by height) [1]	Baluster(s) (described in Table 3)
1000 Series & *3000 Series*	Level	96 inches by 42 inches	Heritage, Kinzer, Madison, Model, Traditional, and York
200 Series	Level	72 inches by 42 inches	Model and York
2 x 3.5 Rectangular Rail & Beveled T-Rail	Level	96 inches by 42 inches	Portland and York
Sonic 24-S,R,T & *Sonic Beveled-S.R.T*	Level	96 inches by 42 inches	Turned(T), Round Aluminum (R) and Square (S)

[1] Length is clear space between supports.

TABLE 2 - GUARD SYSTEMS FOR USE IN IRC / ONE- AND TWO-FAMILY DWELLINGS [1]

Guard 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, Model, Traditional, and York
	Level	120 inches by 36 inches	Heritage, Kinzer, Madison, Model, Traditional, and York
200 Series	Level	120 inches by 42 inches	Model and York
2 x 3.5 Rectangular Rail & Beveled T-Rail	Level	120 inches by 36 inches	Portland and York
Sonic 24 S,R,T & *Sonic Beveled-S,R,T*	Level	120 inches by 36 inches	Turned(T), Round Aluminum (R) and Square (S)

[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 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 7
Kinzer		FIGURE 10
Madison		FIGURE 11
Model	1.3-inch square PVC baluster with an 0.06-inch wall thickness	FIGURE 12
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 8
Portland and Square	1.5-inch square PVC baluster with 0.06-inch wall thickness	FIGURE 13
York 3/4" Round Aluminum	Round, painted 6063-T6 aluminum baluster with a 0.75 inch outside diameter with 0.039-inch wall thickness	FIGURE 9
3/4" Square Aluminum	0.75-inch square, 6063-T6 aluminum baluster with 0.045-inch wall thickness	FIGURE 9

TABLE 4 – FASTENING SCHEDULE

System	Connection	Fastener	Qty.
200 Series Professional Rail	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
1000 Series T-Rail	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
3000 Series Newport Rail	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
Beveled T-Rail, 2 x 3.5 Rectangular Rail, *Sonic Beveled-T*, & *Sonic 24-S*	Top Rail Bracket to Post	#8 x 1-1/2 in self-starting pan head stainless steel screws	4
	Bottom Rail Bracket to Post	#8 x 1-1/2 in self-starting pan head stainless steel screws	4
	Top and Bottom Rail Bracket to Rail	#10 x ¾ in self-starting pan head stainless steel screws	3

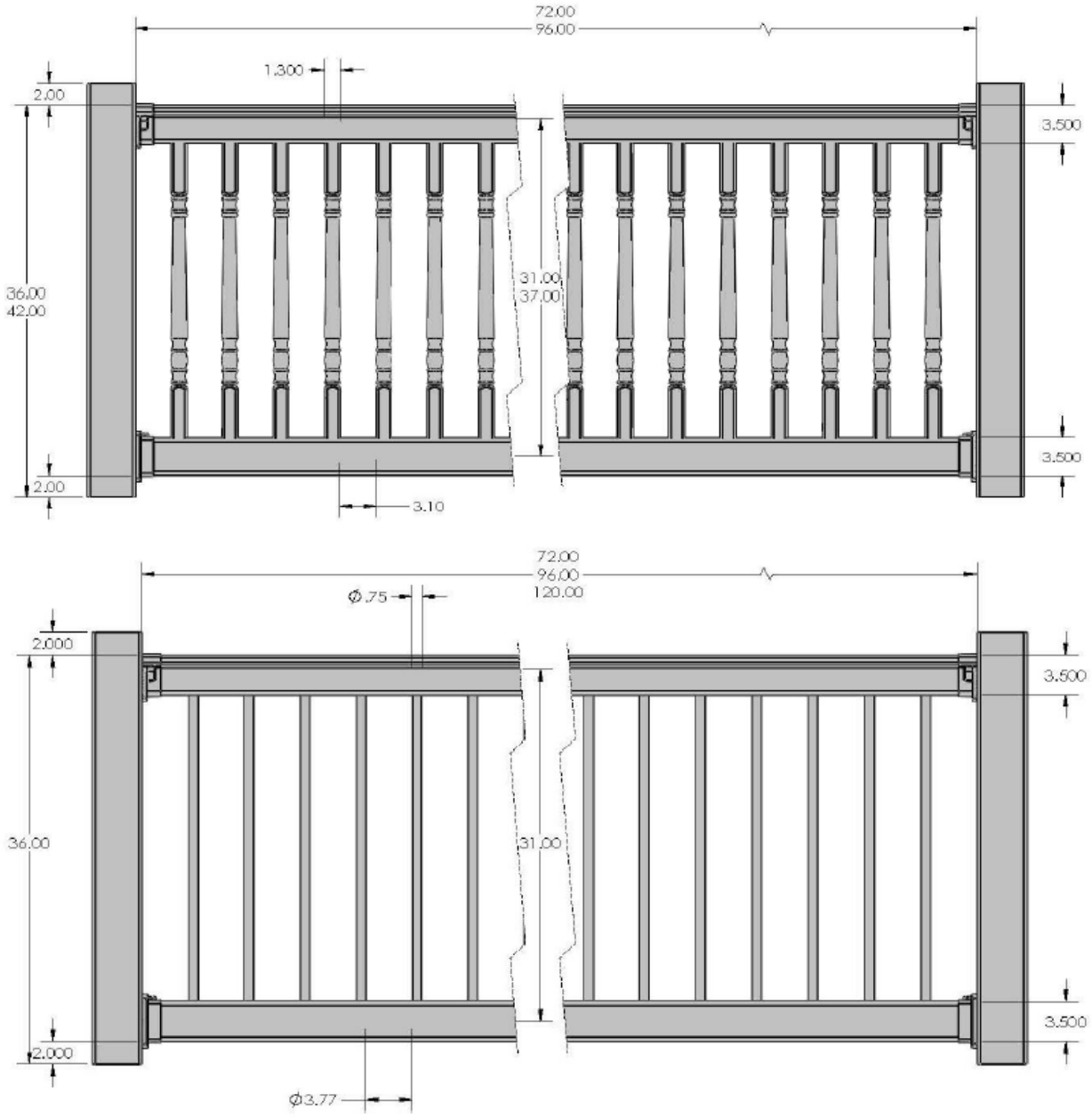
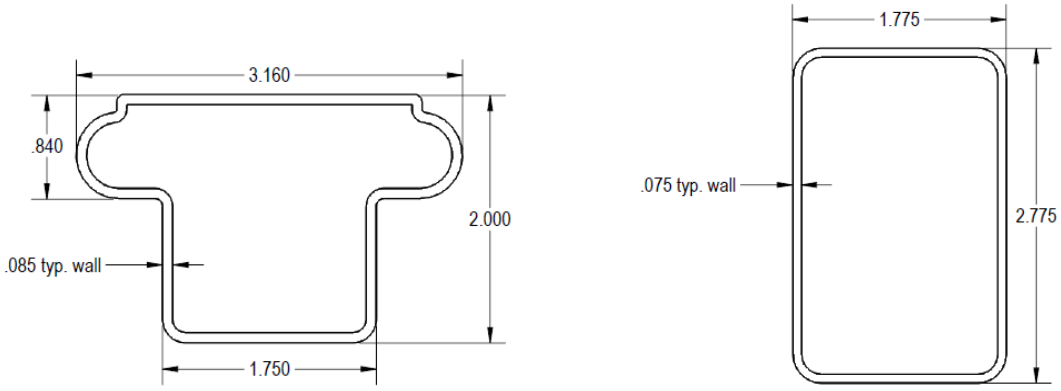
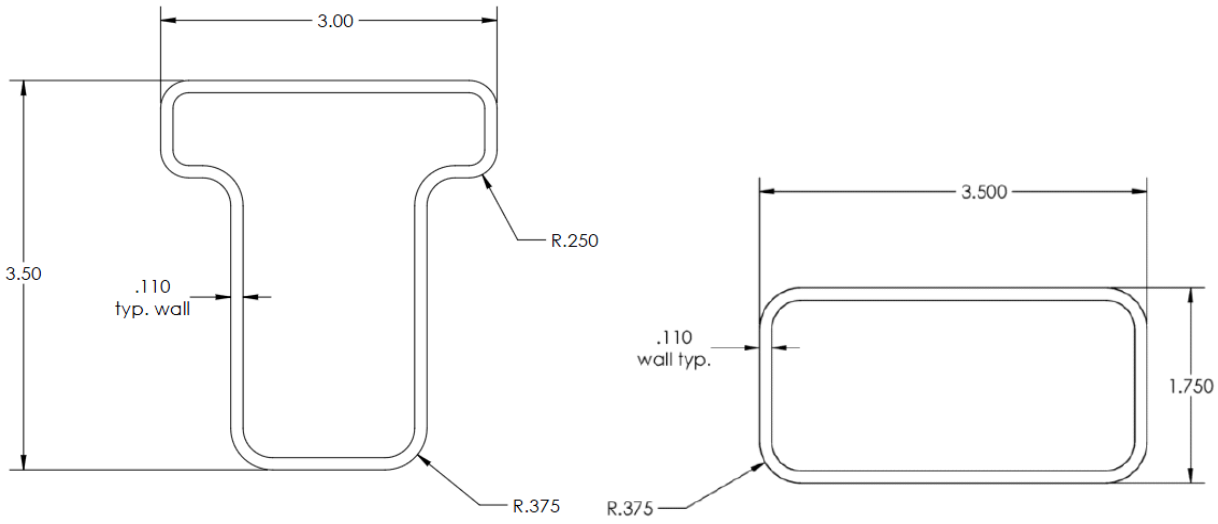


FIGURE 1 – VINYL RAILING SYSTEMS



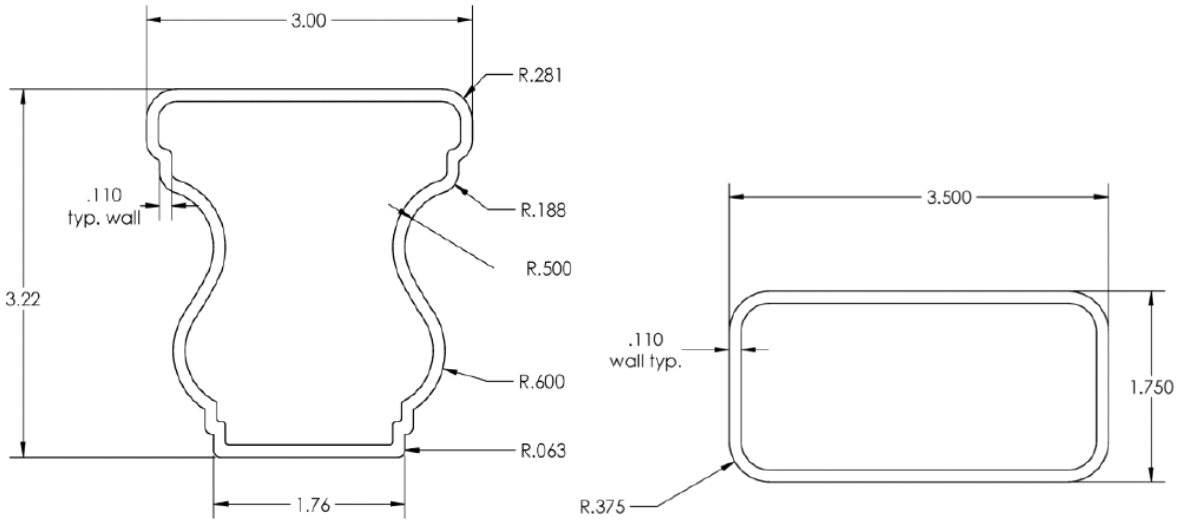
Top Rail Bottom Rail

FIGURE 2 – *200 SERIES PROFESSIONAL RAIL* TOP AND BOTTOM RAILS



Top Rail Bottom Rail

FIGURE 3 – *1000 SERIES T-RAIL* TOP AND BOTTOM RAILS



Top Rail Bottom Rail

FIGURE 4 – *3000 SERIES NEWPORT RAIL* TOP AND BOTTOM RAILS

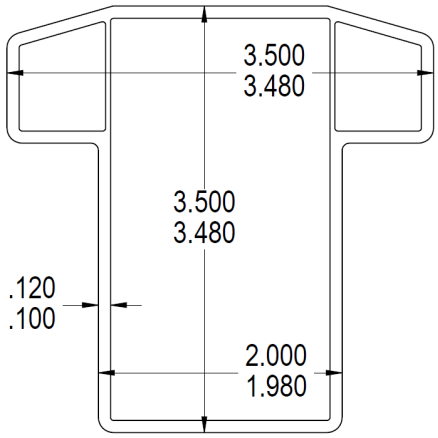


FIGURE 5 – *BEVELED T-RAIL AND SONIC BEVELED-T TOP RAIL*

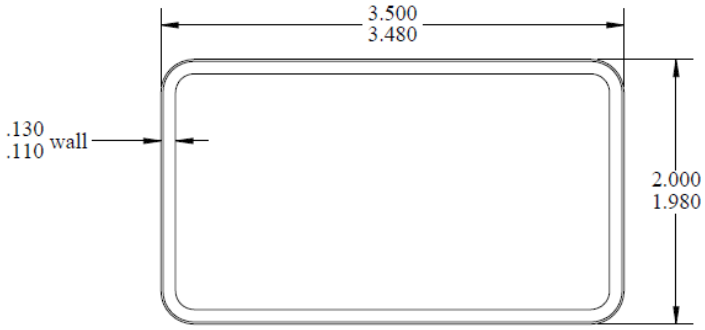


FIGURE 6 – *2 X 3.5 RECTANGULAR RAIL AND SONIC 24-S*

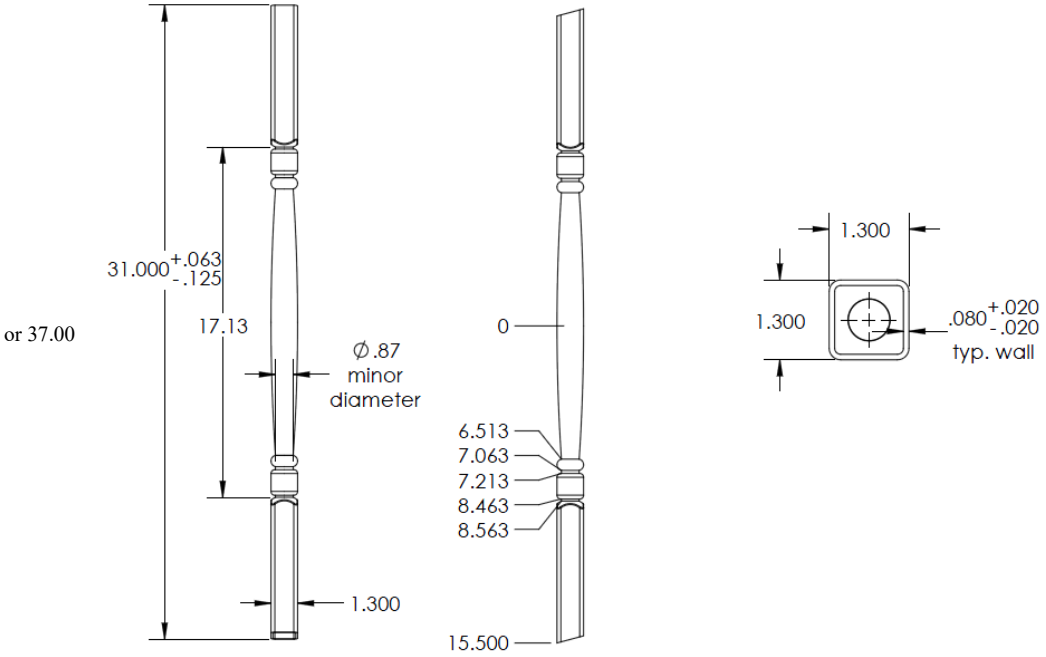


FIGURE 7 –*HERITAGE* PVC SPINDLE

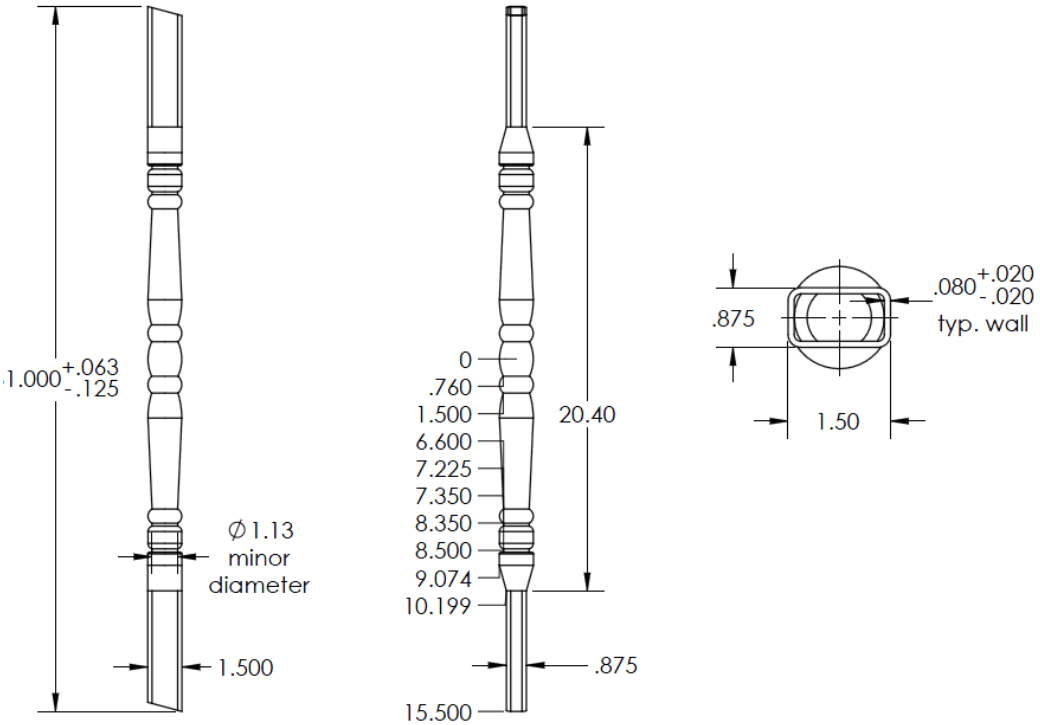
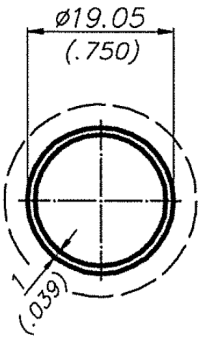
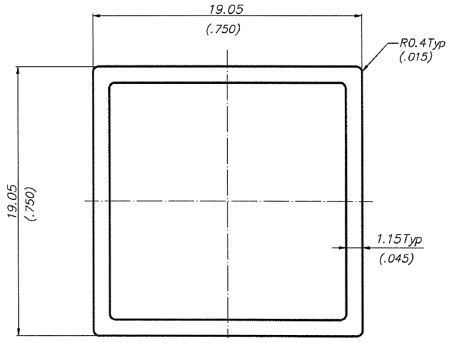


FIGURE 8 – *TRADITIONAL* PVC SPINDLE



York 3/4" Aluminum Round Baluster



3/4" Aluminum Square Baluster

FIGURE 9 – ALUMINUM BALUSTERS

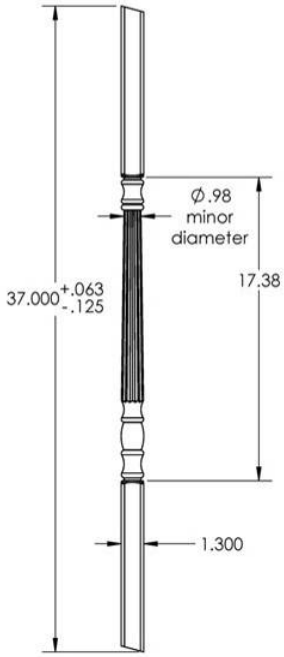


FIGURE 10 – *KINZER* PVC SPINDLE

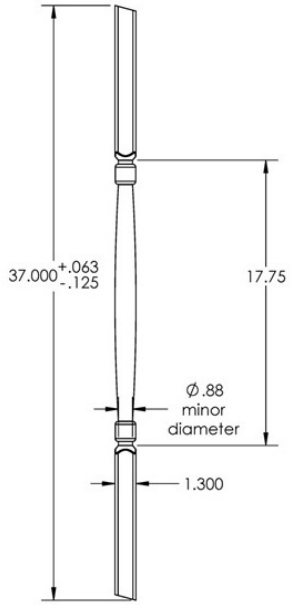


FIGURE 11 - *MADISON* PVC SPINDLE

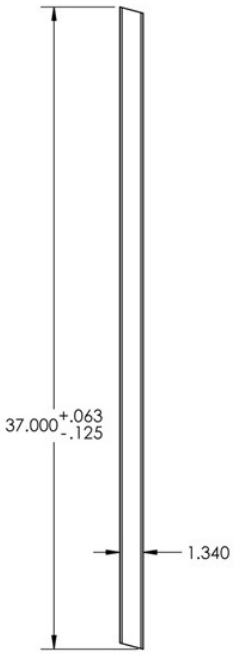


FIGURE 12 – *MODEL* PVC BALUSTER

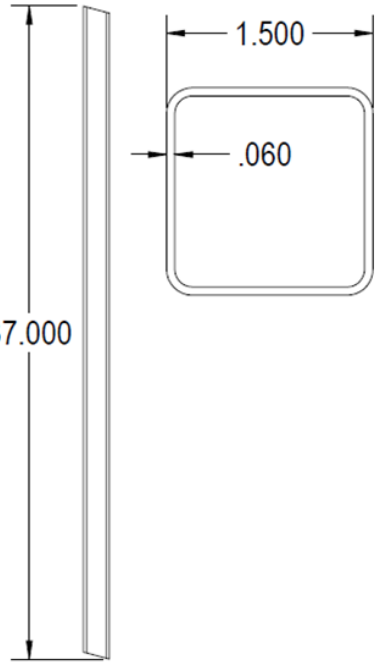


FIGURE 13 – PORTLAND PVC BALUSTER SPINDLE AND SQUARE BALUSTER (S)

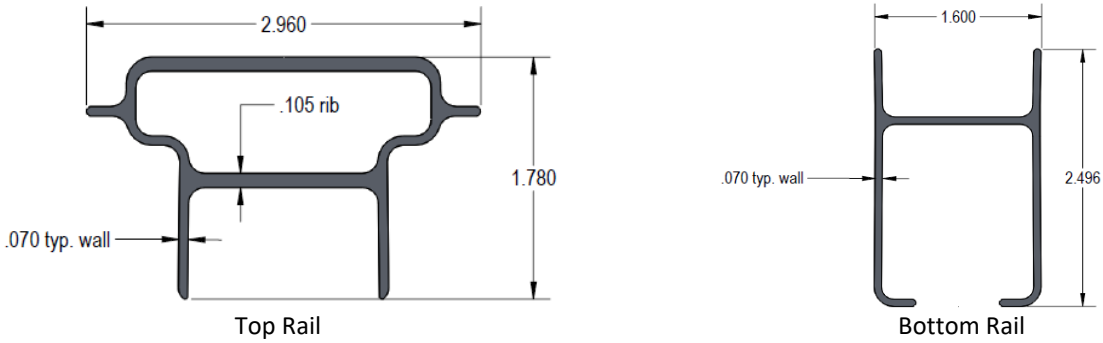
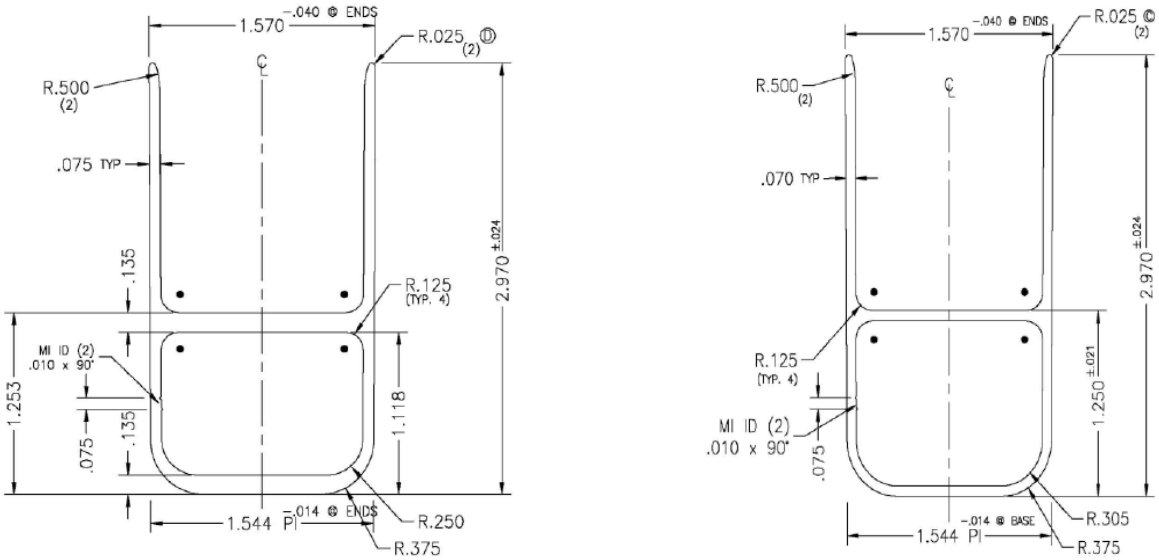


FIGURE 14 – *200 SERIES* RAIL ALUMINUM INSERTS



Top Rail Bottom Rail

FIGURE 15 – *1000 SERIES* AND *3000 SERIES* RAIL ALUMINUM INSERTS

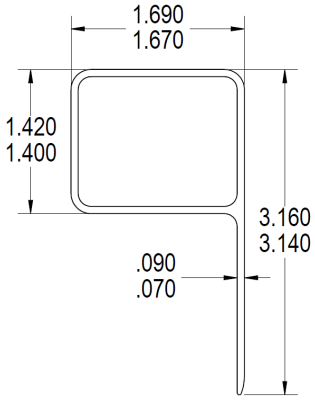


FIGURE 16 – *BEVELED T-RAIL AND SONIC BEVELED-T* ALUMINUM INSERTS

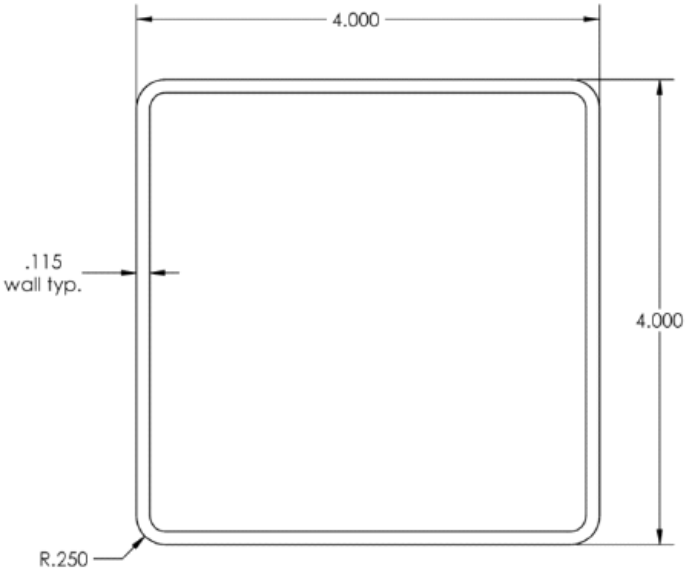
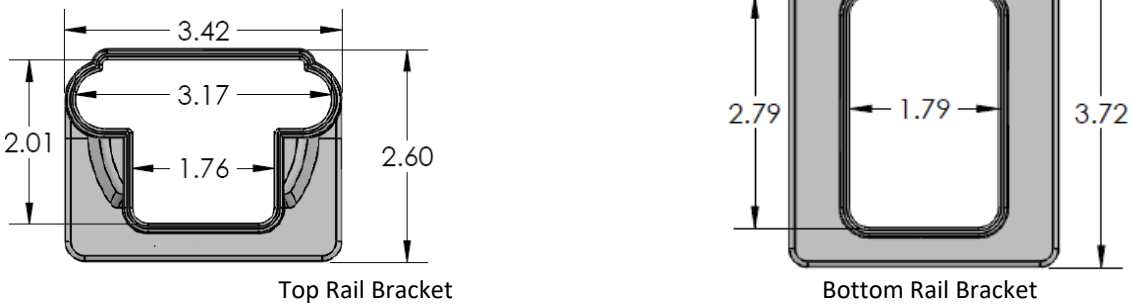
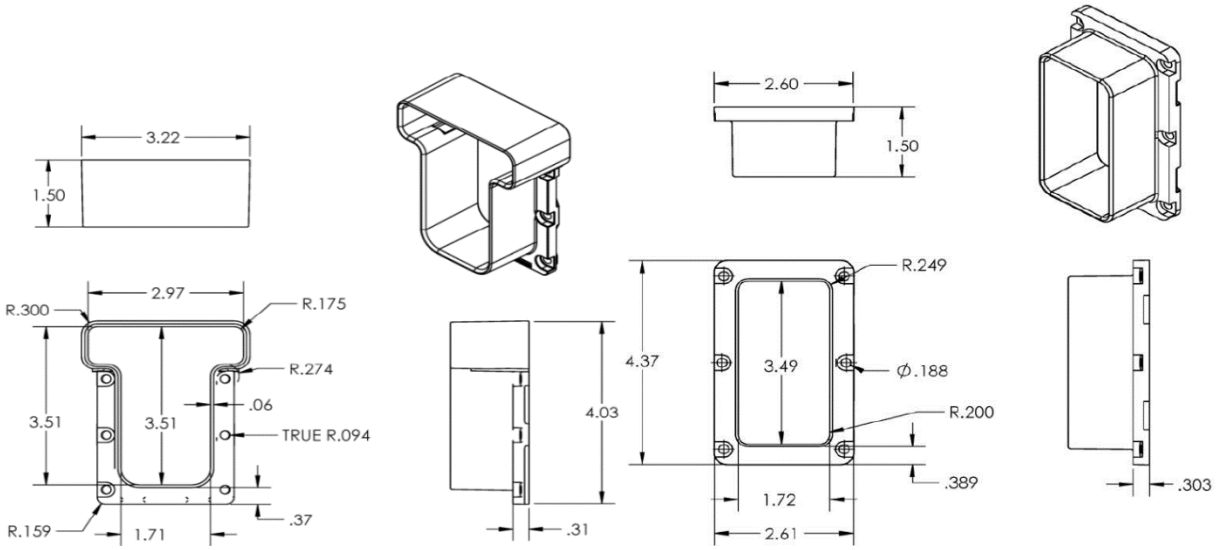


FIGURE 17 – PVC POST SLEEVE



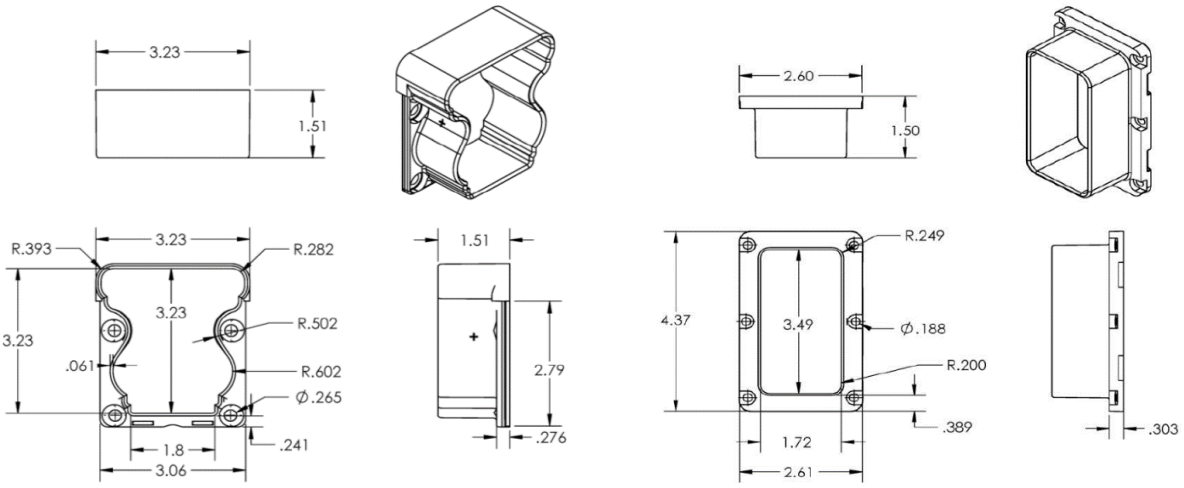
Top Rail Bracket Bottom Rail Bracket

FIGURE 18 – *200 SERIES PROFESSIONAL RAIL* MOUNTING BRACKETS



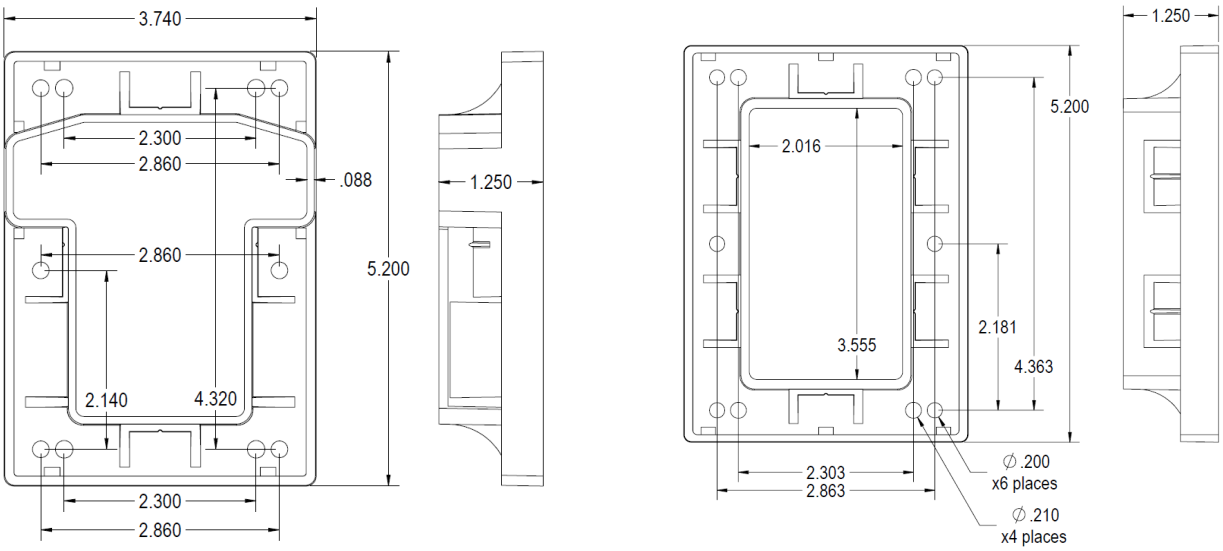
Top Rail Bracket Bottom Rail Bracket

FIGURE 19 – *1000 SERIES* MOUNTING BRACKETS



Top Rail Bracket Bottom Rail Bracket

FIGURE 20 – *3000 SERIES NEWPORT RAIL* MOUNTING BRACKETS



Top Rail Bracket Bottom Rail Bracket

FIGURE 21 – SONIC BEVELED-S,R,T AND *SONIC 24-S,R,T* MOUNTING BRACKETS