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Testing. Advising. Assuring.

**PERFORMANCE EVALUATION OF SUPERIOR PLASTIC PRODUCT'S
"5000 SERIES (VINTAGE) GUARDRAIL SYSTEM" IN ACCORDANCE WITH THE
NBCC 2010 / OBC 2006 GUARD REQUIREMENTS**

Report to:	Superior Plastic Products, Inc. 260 JayIn Drive New Holland, PA. 17557
Attention:	Mr. John Morrison
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Email:	jmorrison@superiorplastic.net
Report No.:	12-06-M0309-2 4 Pages, 1 Appendix
Proposal No.:	12-006-05222
Date:	November 11, 2012

1.0 INTRODUCTION

At the request of Superior Plastic Products, Inc., Exova was retained to conduct a performance evaluation of a guard system identified as the "5000 Series (Vintage) Guardrail System" in accordance with the National Building Code of Canada (NBCC) 2010 and the Ontario Building Code (OBC) 2006 requirements for guards as outlined in Proposal Number 12-006-05222.

Upon receipt, the sample was assigned the following Exova Sample Number:

Client Sample Description
3000 Series Guardrail System

Exova Sample No.
12-06-M0309-2

Style:	PVC, 2-Post, Single Upper Rail, Single Lower Rail
Baluster Type:	5000 Series Vintage Turned Baluster / Denver Square Baluster
Baluster Spacing:	133.35 mm O/C (Spacing Between Balusters)
Length of Upper Rail:	2450.0 mm
Rail Reinforcement:	6005-T Alloy Aluminium (Top & Bottom, Die No. OC-3545)
Spacing of Posts:	2670.0 mm (Between Posts O/C)
Post Type:	PVC surrounding a wood core, 203.2 mm (deep) x 203.2 mm (wide)
Post Height:	1371.6 mm (high)
Post Anchors Used:	19 mm x 254 mm Galvanized Steel Threaded Rod (1 anchor & 8 screws per post)
Setting Method:	Wood Joist (See Appendix A)

* Comparison flexure testing was conducted between the Vintage Turned Spindle and the Denver Square Baluster to determine the weakest baluster. The baluster with the weakest flexure properties (*Vintage Turned*) was used in all physical guard rail tests in the intent that the stronger baluster (*Denver Square Baluster*) will also comply with the loads required for the guardrail system to sustain the NBCC 2010 and OBC 2006 requirements as outlined in this report.

2.0 PROCEDURE

The Building Performance Centre at Exova evaluated the above guardrail systems in accordance with the loads and locations (including 1.5 x factored load requirements) as specified in NBCC 2010 / OBC 2006 codes:

- National Building Code of Canada Section 4.1.5.14.1 (c) , 4.1.5.14.2, 4.1.5.14.4
- Ontario Building Code Section 4.1.5.15.1(c), 4.1.5.15.2, 4.1.5.15.4

Note: All testing was performed in triplicate.

3.0 RESULTS

Table 1 – Summarized Guard Testing Results Exova Sample Number: 12-06-M0309-2				
Loading Description	Specified Load	Minimum Design Load Required	1.5 x Factored Load Required	Test Result (Pass / Fail)
Ontario Building Code (2006) Section 4.1.5.15.1(c) / NBCC (2010) 4.1.5.14.1(c) – 0.75kN/m or 1.0kN Applied at Any Point				
Concentrated load applied at the midpoint of the rail in a horizontal direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (338 lbf)	Pass
Concentrated load applied at end of the rail in horizontal direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (338 lbf)	Pass
Concentrated load applied at the midpoint of the rail in vertical down direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (338 lbf)	Pass
Concentrated load applied at the end of the rail in vertical down direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the midpoint of the rail in vertical up direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (338 lbf)	Pass
Concentrated load applied at the end of the rail in vertical up direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (338 lbf)	Pass
Uniformly distributed load applied in the vertical direction	0.75 kN/m (51 lbs/ft)	0.75 kN/m (51 lbs/ft)	612 lbf	Pass
Uniformly distributed load applied in the horizontal direction	0.75 kN/m (51 lbs/ft)	0.75 kN/m (51 lbs/ft)	612 lbf	Pass
Ontario Building Code (2006) Section 4.1.5.15.2 / NBCC (2010) 4.1.5.14.2 – 0.5 kN/100 mm² Applied to Elements Within the Guard				
Concentrated load applied to individual spindles (balusters)	0.5 kN (113 lbf)	0.5 kN (113 lbf)	0.75 kN (170 lbf)	Pass
Ontario Building Code (2006) Section 4.1.10.1.4 / NBCC (2010) 4.1.5.14.4 – 1.5 kN/m Applied Vertically at the Top of Every Guard				
Uniformly distributed load applied in vertical down direction	1.5 kN/m (103 lbf/ft)	2.90 kN (652 lbf)	1236 lbf	Pass
Uniformly distributed load applied in vertical up direction	1.5 kN/m (103 lbf/ft)	2.90 kN (652 lbf)	1236 lbf	Pass

Note: A "pass" is given if there are no cracks, breaks or permanent deformation to the element tested after the factored loads were released. Each load was maintained for 1 minute.

4.0 MODIFICATIONS

No modifications were made to Exova Sample Number: 12-06-M0309-2 to achieve the results stated in this report.

5.0 CONCLUSIONS

Based on the results of the testing summarised in Table 1, the "5000 Series (Vintage) Guardrail System" (Exova Sample No.: 12-06-M0309-2) met the following requirements:

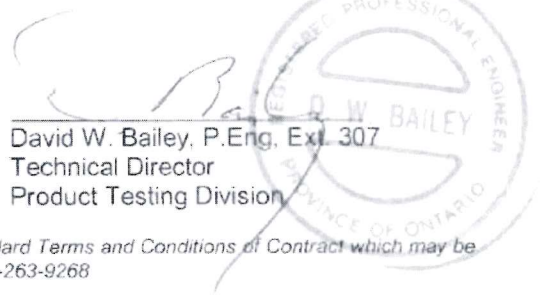
National Building Code of Canada Section 4.1.5.14.1 (c) , 4.1.5.14.2, 4.1.5.14.4
Ontario Building Code Section 4.1.5.15.1(c), 4.1.5.15.2, 4.1.5.15.4

Reported by:



Jordan M. Church, B.Tech, Technologist, Ext. 546
Supervisor, Fenestration / Walls
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Reviewed & Authorized by:



DAVID W. BAILEY
PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

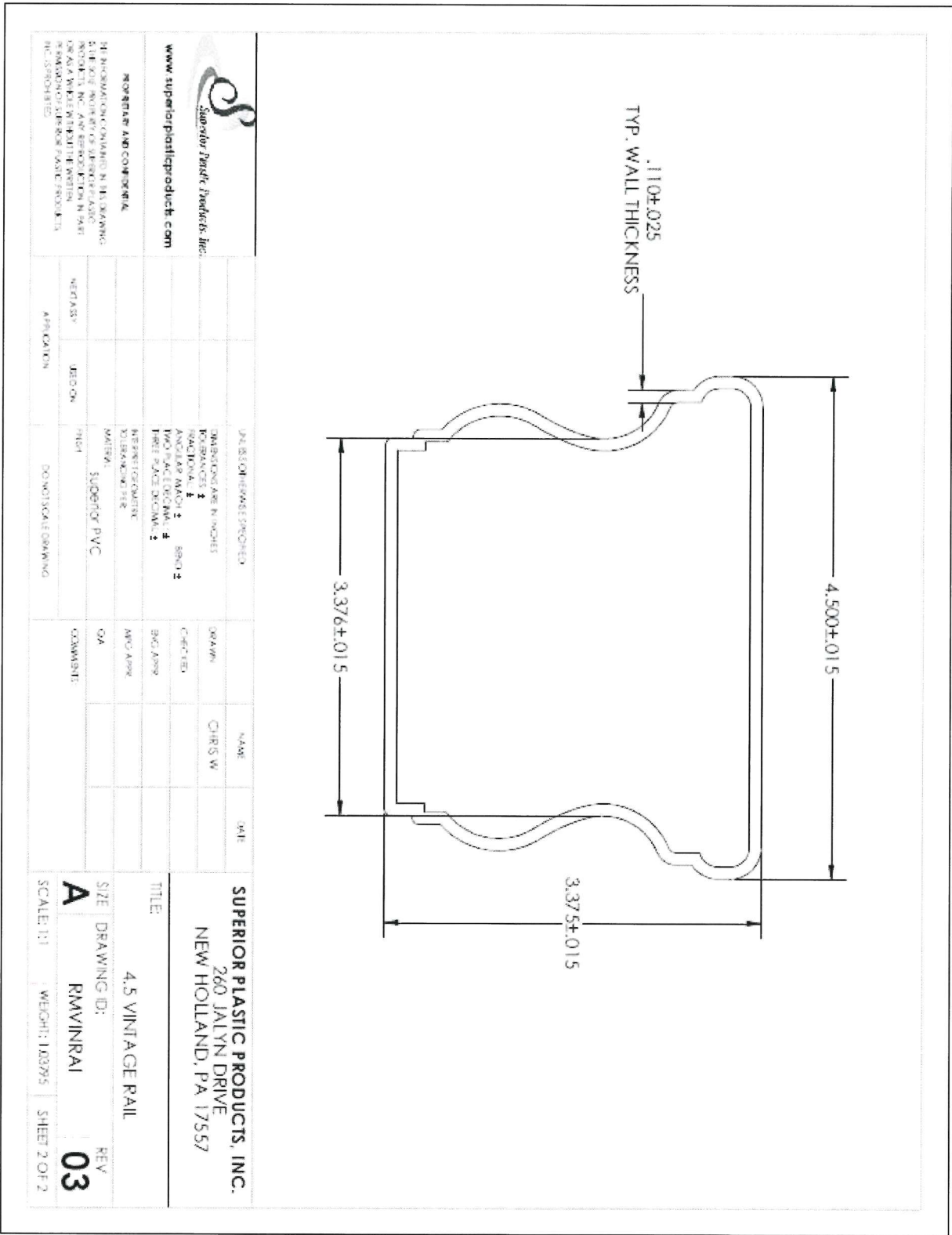
David W. Bailey, P.Eng, Ext. 307
Technical Director
Product Testing Division

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APPENDIX A

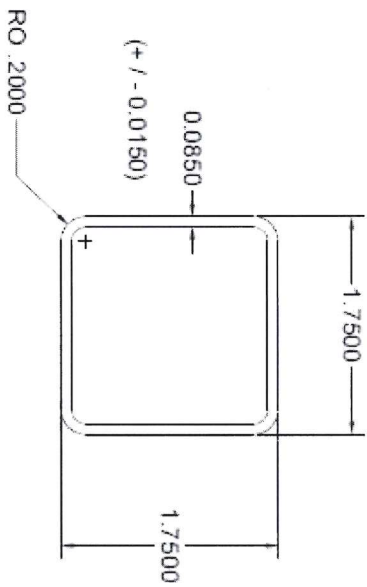
System and Setup Details for the "5000 Series (Vintage) Guardrail System"

(10 Pages)

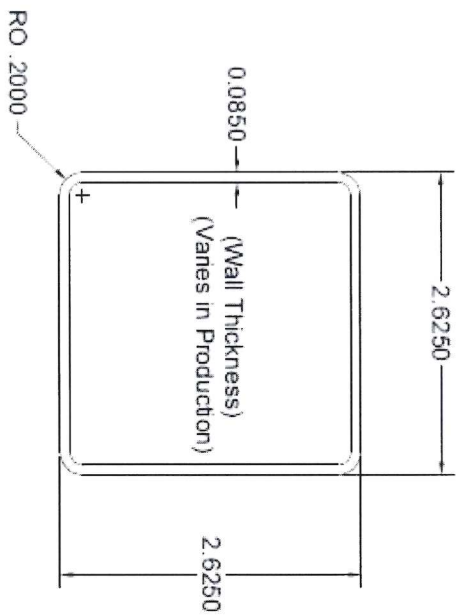


#5000 Series Vintage Balusters

Denver Square



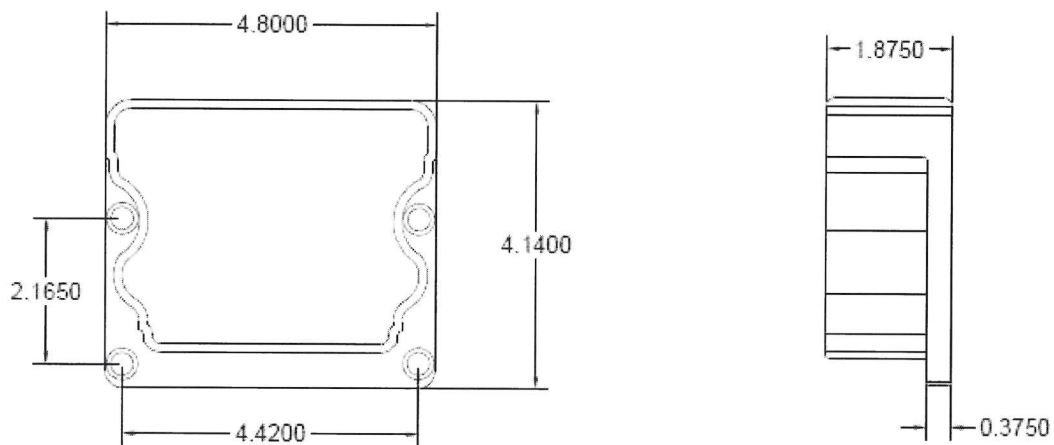
Vintage Turned



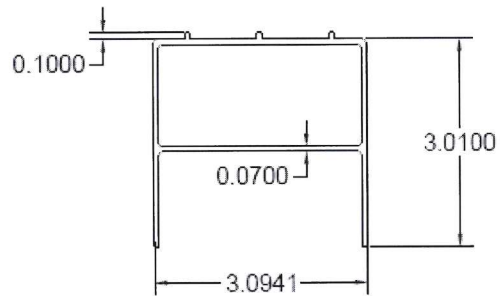
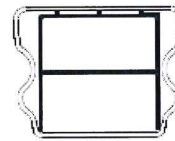
36 in. Rail Height = 30" Baluster Length
42 in. Rail Height = 36" Baluster Length

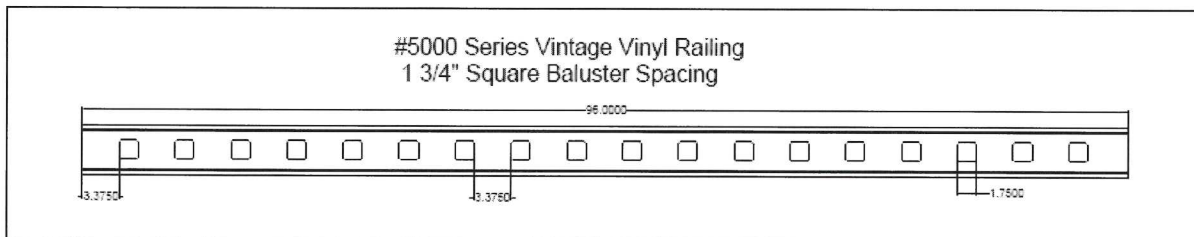
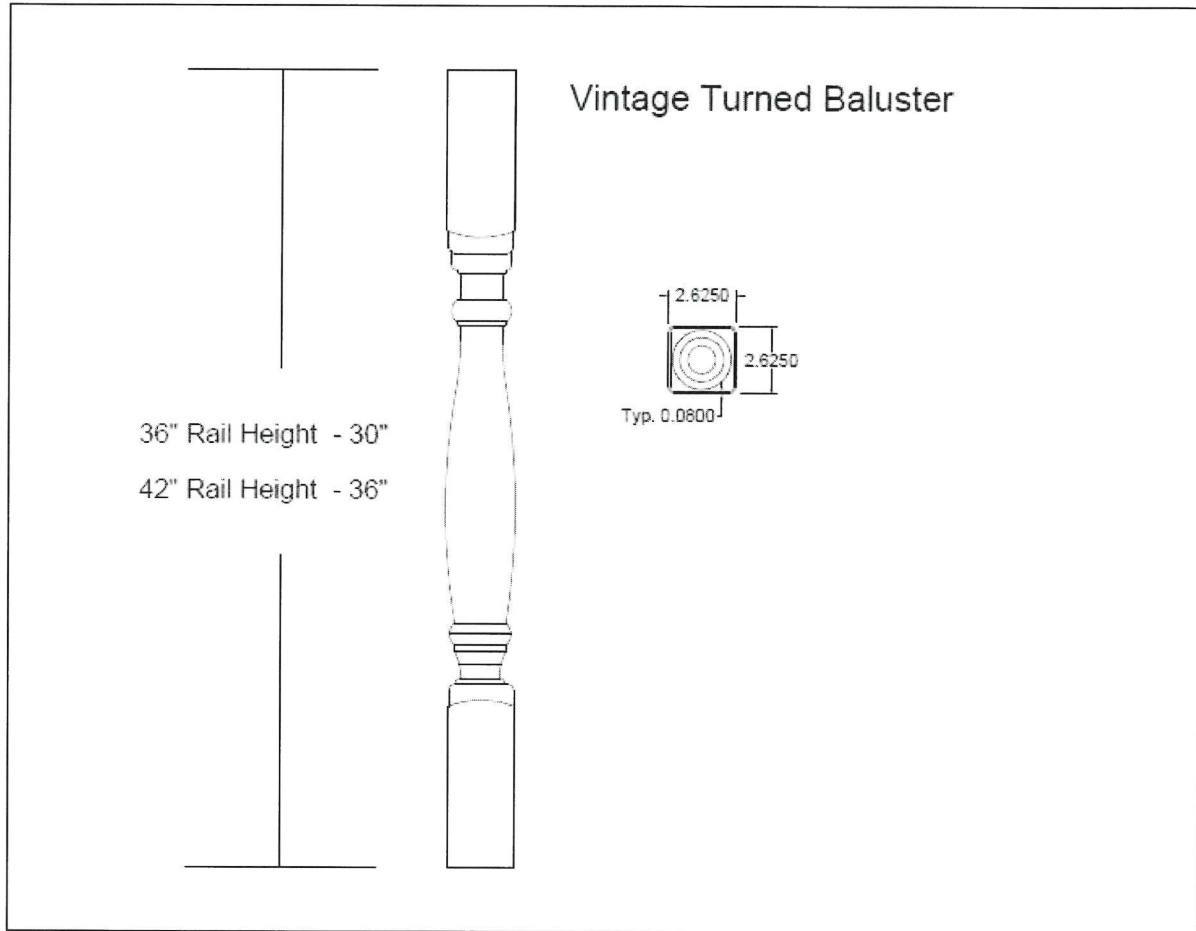
Plus / Minus 0.0625 to 0.1250

Vintage Top & Bottom Mounting Brackets



Vintage Top & Bottom Aluminum Insert
#6005-T Alloy Aluminum
Wall Thickness +/- .00500





5000 Series Balustrade

5236 = 36" High Vintage
5242 = 42" High Vintage
5324 = 24" High Denver Sq.
5336 = 36" High Denver Sq.
5342 = 42" High Denver Sq.

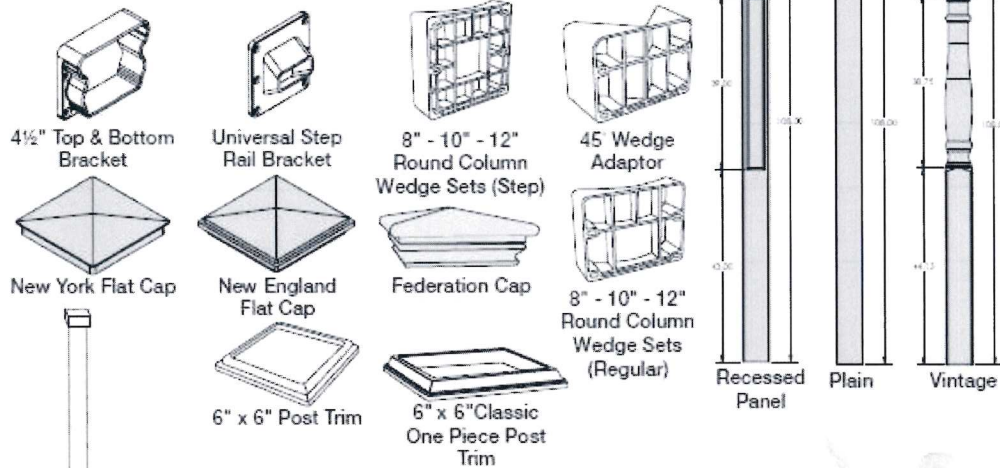


Denver

3/4" spacing
1 1/4" square

With 2 5/8" sq. turned balusters, 6" Newel posts and 4 1/2" wide top and bottom rails, it is perfect for installations requiring larger railing systems. The 6" square Newel posts come in three styles, turned, plain, or recessed panel, and are available in lengths of 38" and 54" long. Available in up to 10' section length. Colors available: White, Tan, Clay

6" x 108" Porch Post Options
Load Rated 20,000 lbs. (max.)
Uplift 1,275 (max.)



37" or 43" Galvanized Pipe w/ S.S. Base Plate Available for 4" & 5" Plain and Design Newel Posts

S.S. Balustrade Bracket (37" High)

Step Rail Brackets
8" - 10" - 12" Round Column Wedge Sets (Regular)
8" - 10" - 12" Round Column Wedge Sets (Step)
45 Wedge Sets
8" 1-pcs. Trim
Stainless Steel Bracket

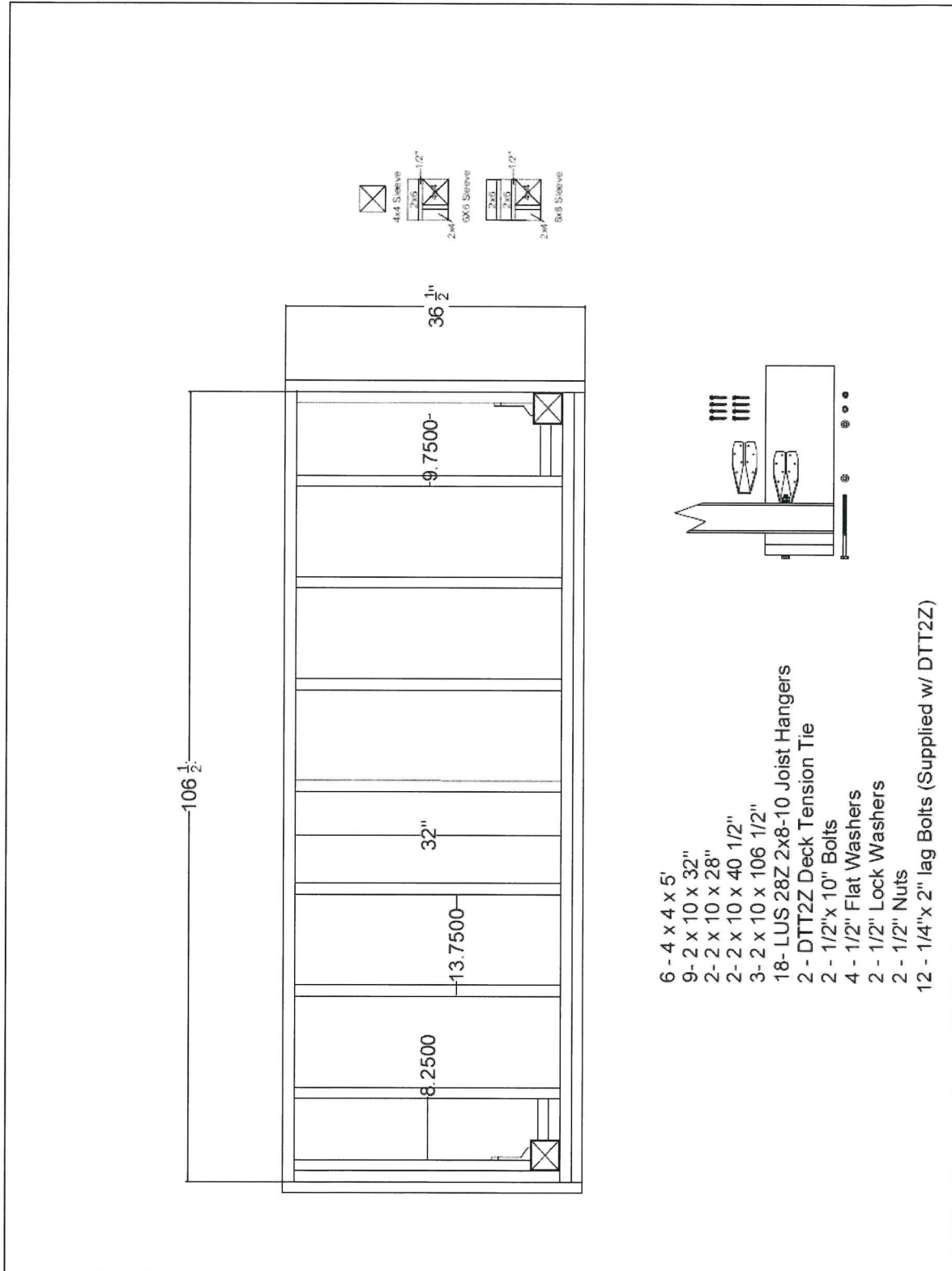
Note: Step railing sections include Sleeve-Over Trim cut to the angle of your step pitch.

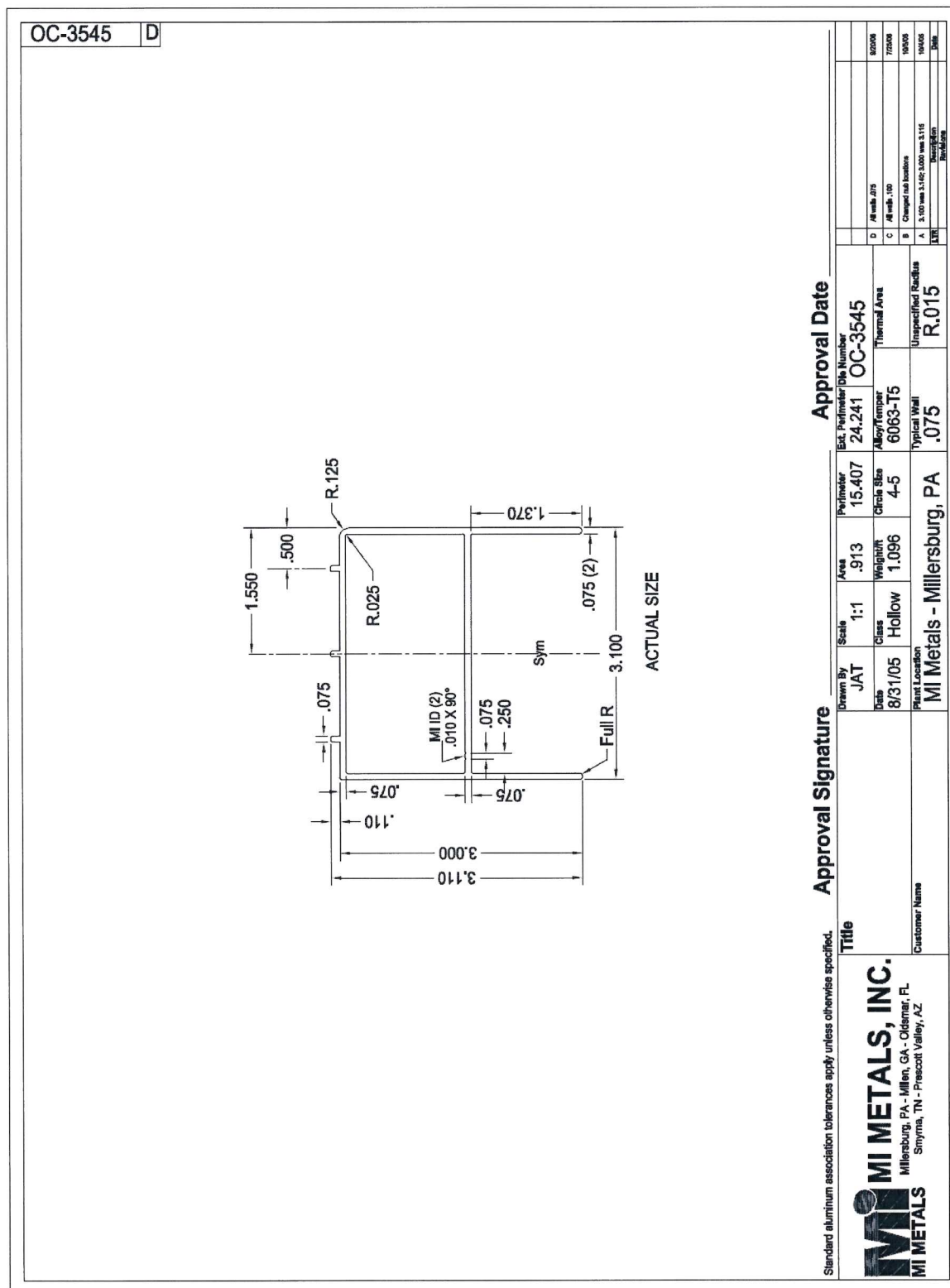
Available in 4' Radius Sections, See price sheet. Also Special Radiuses Available.

Top

Bottom

External Step Brackets
32 - 36





Superior Plastic Products, Inc.			
Bracket Attachment Fastening Schedule			
Systems	Connections	Fasteners	Qty.
#3000 Series Newport Rail	Top Rail Brk.		
	To Post	#14 x 1 in. Self- Starting Pan-Head S.S. Screws	4 ea.
	Top Rail Brk.		
	To Rail	#8 x 1 in. Self-Starting Pan-Head S.S. Screw	2 ea.
	Bottom Rail		
#5000 series Vintage Top & Bottom Brk.	Brk. To Post	#8 x 1 in. Self-Starting Pan-Head S.S. Screw	6 ea.
	Bottom Rail		
#7000 series Belmont Top & Bottom Brk.	Brk. To Rail	#8 x 1 in. Self-Starting Pan-Head S.S. Screw	1 ea.
	Top & Bottom		
#5000 series Vintage Top & Bottom Brk.	Brk. To Post	#14 x 1 in. Self- Starting Pan-Head S.S. Screws	4 ea.
	Top & Bottom		
#7000 series Belmont Top & Bottom Brk.	Brk. To Rail	#8 x 1 in. Cap-Head S.S. Screw	2 ea.
	Top & Bottom		
#7000 series Belmont Top & Bottom Brk.	Brk. To Post	#14 x 1 in. Self- Starting Pan-Head S.S. Screws	4 ea.
	Top & Bottom		
#7000 series Belmont Top & Bottom Brk.	Brk. To Rail	#8 x 1 in. Cap-Head S.S. Screw	2 ea.
	Top & Bottom		

