Intertek | Architectural Testing

TEST REPORT

Rendered to:

FAIRWAY BUILDING PRODUCTS, LLC

For:

SlimLine
Level Aluminum Railing System

Report No.: F8503.01-119-19
Report Date: 06/16/16
Test Record Retention Date: 05/10/20

130 Derry Court
York, PA 17406

www.archtest.com • www.intertek.com/building

p. 717.764.7700
f. 717.764.4129

TEST REPORT

F8503.01-119-19
June 16, 2016

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TEST REPORT

Rendered to:

FAIRWAY BUILDING PRODUCTS, LLC
53 Eby Chiques Road
P.O. Box 37
Mount Joy, Pennsylvania 17552

Report No.:	F8503.01-119-19
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1.0 General Information

1.1 Product

SlimLine - 8 ft Wide by 42 in High Level Aluminum Railing System

1.2 Project Description

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted by Fairway Building Products, LLC to conduct structural performance tests on their 8 ft wide by 42 in high *SlimLine* level aluminum guardrail system. The system was evaluated for the design load requirements of the following building codes:

2015 *International Building Code*®, International Code Council

2015 *International Residential Code*®, International Code Council

Structural tests were performed according to Chapter 17 (Structural Tests and Special Inspections) of IBC 2015.

1.3 Qualifications

Intertek-ATI in York, Pennsylvania has demonstrated compliance with ISO/IEC International Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. (IAS).

1.4 Witnessing

Travis Scott and Craig Barkume of Fairway Building Products, LLC were present on 05/10/16 to witness the following tests and/or test setups:

- Structural performance testing of assembled railing systems

1.5 Limitations

All tests performed were to evaluate structural performance of the guardrail / handrail assembly to carry and transfer imposed loads to the supporting structure. The test specimens evaluated included the rails, rail connections and support posts. Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

The system tested herein qualifies for single span applications only.

The aluminum support shall have a minimum wall thickness of 0.090 in.

Testing conducted on post mounts surface mounted on rigid steel channels evaluated the post mount and bearing condition on concrete only.

1.6 Product Description

Fairway Building Products, LLC provided the railing system with the following details:

Top Sub Rail / Bottom Rail: 1-1/4 in high by 1-5/16 in wide by 0.07 in wall "U" shaped aluminum (6063-T6) extrusion

Top Rail Cap: 2 in high by 2-7/16 in wide by 0.07 in wall contoured (bread loaf) aluminum (6063-T6) extrusion

Baluster: 3/4 in square by 0.045 in wall aluminum (6063-T6) extrusion with 0.02 in high by 0.19 in wide internal longitudinal ribs running the length of the baluster on each face and notched ends for securing to top and bottom rails

Post: 3 in square by 0.090 in wall aluminum (6063-T5) tube welded to a 5 in by 5-5/16 in, 3/8 in thick aluminum (6063-T5) base plate with four 7/16 in diameter holes - the continuous fillet weld connecting the tube to the base plate was approximately 5/16 in.

Brackets:
- Top Rail: 1.35 in high by 1.88 in wide by 1.24 long cast zinc (Z3) collar bracket
- Bottom Rail: 1.2 in high by 1.5 in wide by 1.15 in long cast zinc (Z3) collar bracket

Bottom Rail Support: 1 in wide by 1-5/16 in deep by 0.198 in wall by appropriate length T-shaped cast zinc (Z3) at mid-span bottom rail

Fasteners:
- Top and bottom rail bracket to post: Two #8-18 x 1-1/2 in (0.107 in minor diameter), flat head, square drive, stainless steel screws
- Top rail bracket to rail: Two #8-18 x 3/4 in (0.110 in minor diameter) pan head, square drive, stainless steel screws
- Bottom rail bracket to rail: Two #8-18 x 3/4 in (0.110 in minor diameter) flat head, square drive, stainless steel screws
- Bottom rail support to bottom rail: One #8-18 x 3/4 in (0.110 in minor diameter) pan head, square drive screw, self-drilling, stainless steel screws

See drawings in Appendix A for additional details.

2.0 Structural Performance Testing of Assembled Railing Systems

2.1 Test Equipment

The guardrail assembly was tested in a self-contained structural frame designed to accommodate anchorage of the rail assembly and application of the required test loads. The specimen was loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables, nylon straps, and load distribution beams were used to impose test loads on the specimen. Applied load was measured using an electronic load cell located in-line with the loading system. Electronic linear displacement transducers were used to measure deflections. Deflections were measured to the nearest 0.01 in using electronic linear displacement transducers.

2.2 Test Setup

The test specimen was inspected prior to testing to verify size and general condition of the materials, assembly and installation. No potentially compromising defects were observed prior to testing. The guardrail had an overall top rail length (inside of post to inside of post) of 96-1/2 in with an overall rail height (top of top rail to bottom of bottom rail) of 40-1/2 in. Anchorage of the specimen was accomplished by bolting the post base plate to a rigid steel test fixture (i.e. simulated concrete) using 3/8 hex head Gr 8 steel bolts with nut and washers. Transducers mounted to independent reference frames were located to record guardrail system deflection at the point(s) of loading. See photographs in Appendix B for individual test setups.

2.3 Test Procedure

Each test specimen was inspected prior to testing to verify size and general condition of the materials, assembly, and installation. No potentially compromising defects were observed prior to testing. An initial load, not exceeding 50% of design load, was applied and transducers were zeroed. Load was then applied at a steady uniform rate until reaching 2.0 times design load in no less than 10 seconds. After reaching 2.0 times design load, the load was released. After allowing a minimum period of one minute for stabilization, load was reapplied to the initial load level used at the start of the loading procedure, and deflections were recorded and used to analyze recovery. Load was then increased at a steady uniform rate until reaching 2.5 times design load or until failure occurred. The testing time was continually recorded from the application of initial test load until the ultimate test load was reached.

2.4 Test Results

The following tests were performed on the test specimens in accordance with the test load requirements of the referenced standards.

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target). Where more than one value is reported, the test load was the range (min.-max.) that was held during the time indicated in the test.

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure. Where more than one value is reported, the time was the range (start-end) that the designated load level was reached and sustained.

Test No. 1 - 05/10/16 Design Load: 50 lb / 1 Square Ft at Center of In-Fill (on 2 Pickets)						
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**			
			End	**Mid**	**End**	**Net [1]**
Initial Load	10	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	101	00:08	0.37	0.71	0.40	0.33
Initial Load	13	01:31	0.03	0.08	0.11	0.01
97% Recovery from 2.0 x Design Load						
2.5x Design Load	131	01:46	Achieved Load without Failure			

[1] Net displacement was the infill displacement relative to its top and bottom.

Test No. 2 - 05/10/16 Design Load: 50 lb / 1 Square Ft at Bottom of In-Fill (on 2 Pickets)						
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**			
			End	**Mid**	**End**	**Net [1]**
Initial Load	10	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	102	00:10	0.08	1.11	0.08	1.03
Initial Load	10	02:00	0.00	0.01	0.00	0.01
99% Recovery from 2.0 x Design Load						
2.5x Design Load	138	02:12	Achieved Load without Failure			

[1] Net displacement was the bottom rail displacement relative to its ends.

2.4 Test Results (Continued)

Test No. 3 - 05/10/16 Design Load: 200 lb Concentrated Load at Midspan of Top Rail						
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Rail Displacement (in)**			
			End	**Mid**	**End**	**Net [1]**
Initial Load	40	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	408	00:15	0.50	2.75	0.58	2.21
Initial Load	42	01:44	0.01	0.13	0.04	0.11
95% Recovery from 2.0 x Design Load						
2.5x Design Load	502	02:06	Achieved Load without Failure			

[1] Net displacement was mid-rail displacement relative to the rail at the support posts.

Test No. 4 - 05/10/16 Design Load: 200 lb Concentrated Load at Ends of Top Rail (Brackets)				
Load Level [1]	**Test Load (lb)**	**E.T. (min:sec)**	**Rail Displacement (in)**	
			Rail End #1	**Rail End #2**
Initial Load	81	00:00	0.00	0.00
2.0x Design Load	803	00:24	1.19	1.33
Initial Load	84	01:56	0.07	0.09
94% (End #1) / 93% (End #2) Recovery from 2.0 x Design Load				
2.5x Design Load	1024	02:18	Achieved Load without Failure	

[1] A spreader beam was used to impose loads on both *ends of the railing system; therefore, loads were doubled.*

Test No. 5 - 05/10/16 Design Load: 125 plf Uniform Load on Top Rail - Horizontal [2]						
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Rail Displacement (in)**			
			End	**Mid**	**End**	**Net [1]**
Initial Load	82	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	801	00:28	1.02	4.46	1.16	3.37
Initial Load	84	02:10	0.00	0.24	0.00	0.24
93% Recovery from 2.0 x Design Load						
2.5x Design Load	1026	02:45	Achieved Load without Failure			

[1] Net displacement was mid-rail displacement relative to the rail at the support posts.

[2] Uniform load was simulated with quarter point loading.

2.4 Test Results (Continued)

Test No. 6 - 05/10/16 Design Load: 125 plf Concentrated Load at Top of Stand-Alone [1] Post (42" high)			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Post Displacement (in)**
Initial Load	83	00:00	0.00
2.0x Design Load	*700* [2]	--	--
Initial Load	--	--	--
-- % Recovery from 2.0 x Design Load			
2.5x Design Load	--	--	A weld failure occurred prior to reaching the 2.0x Design Load.

[1] *Post was conservatively tested without a railing attached.*

[2] *Target load was 829 lb for 2.0 Design Load.*

2.5 Summary and Conclusions

Using performance criteria of 75% deflection recovery from 2.0 times design load and withstanding an ultimate load of 2.5 times design load, the test results substantiate compliance with the design load requirements of the referenced building codes, in a single span ONLY (no multi-span assemblies), for the 8 ft wide by 42 in high *SlimLine* railing assembly and 42 in high support post reported herein. Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

3.0 Closing Statement

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period.

Results obtained are tested values and were secured using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:

Digitally Signed by: Steve Neff

Steven A. Neff
Technician

Digitally Signed by: Virgal Thomas Mickley, Jr.

V. Thomas Mickley, Jr., P.E.
Senior Project Engineer

SAN:vtm/jas

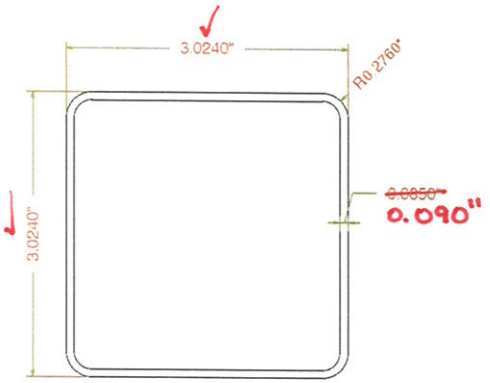
Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A - Drawings (4)
Appendix B - Photographs (3)

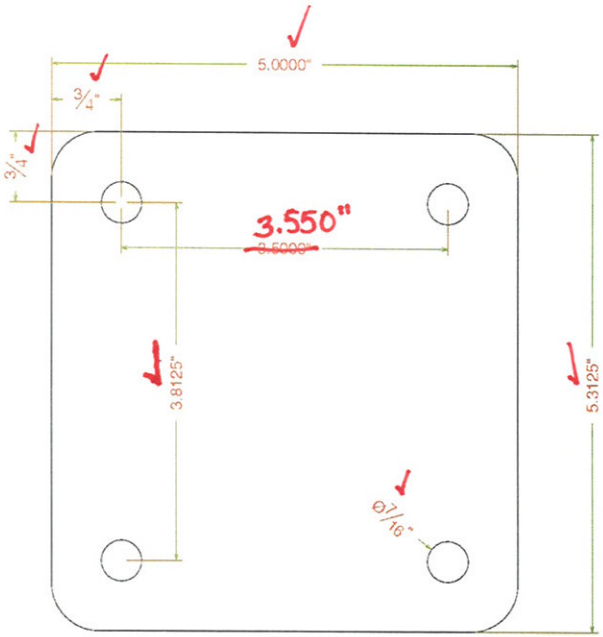
Revision Log

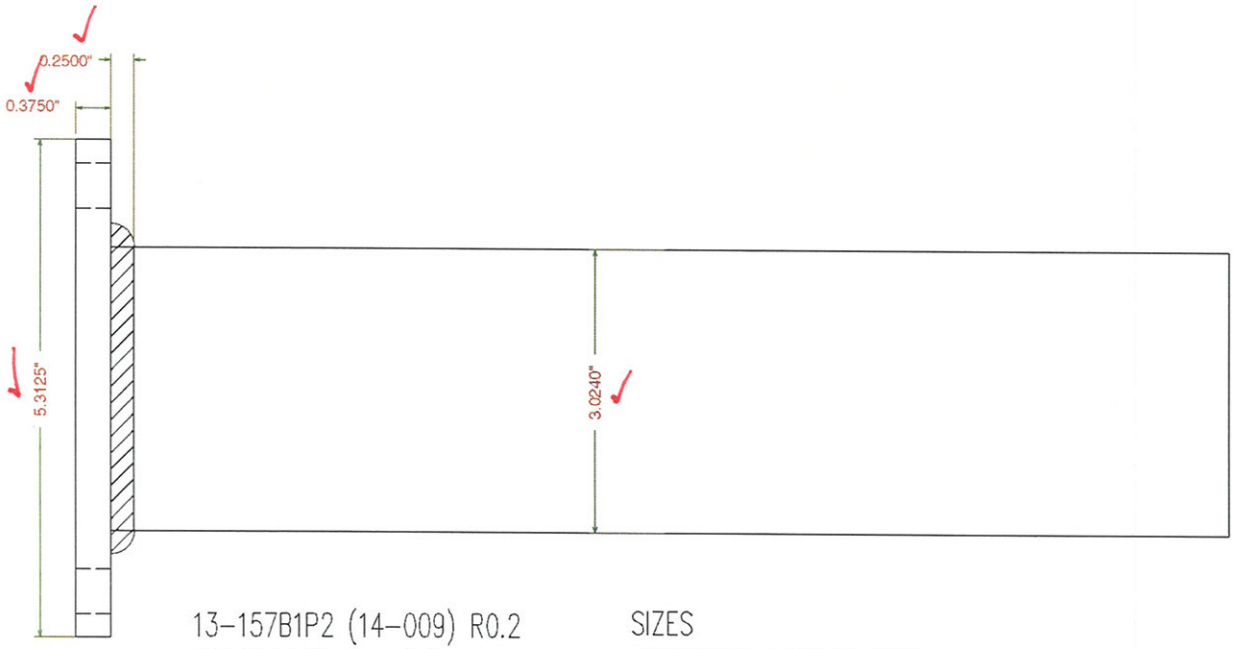
Rev. #	Date	Page(s)	Revision(s)
0	06/16/16	N/A	Original report issue

APPENDIX A

Drawings







Architectural Testing

Test sample complies with these details.
Deviations are noted.

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Date 5/19/16 Tech SAN

13-157B1P2 (14-009) R0.2
3IN Weld Post and Base
ALUMINUM 6063-5 Powder Coating

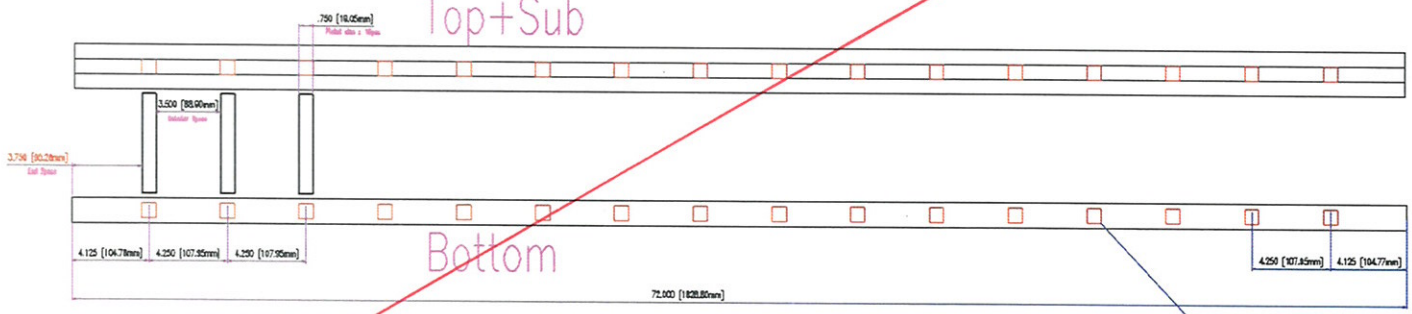
SIZES
3"X3"X39 5/8" FLANGE MOUNTING POST
3"X3"X44 5/8" FLANGE MOUNTING POST
3"X3"X54 5/8" FLANGE MOUNTING POST

CARFARO
a division of FAIRWAY

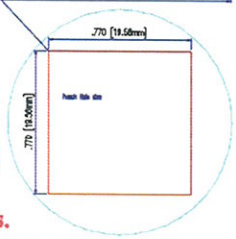
12-212 Thailand Rail

All holes must be punched on subrail and bottom rails.

Top+Sub

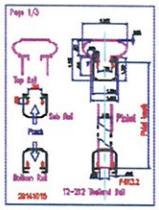


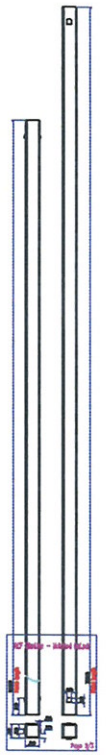
Bottom



6 Foot Rail with 16 picket

REF Thailand Rail 20140813





REF SlimLine – Notched Bal.pdf

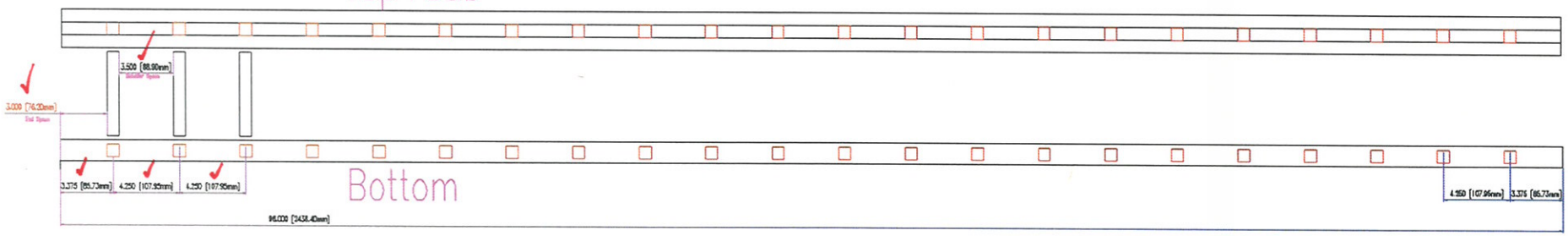
Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5803.01-119-19

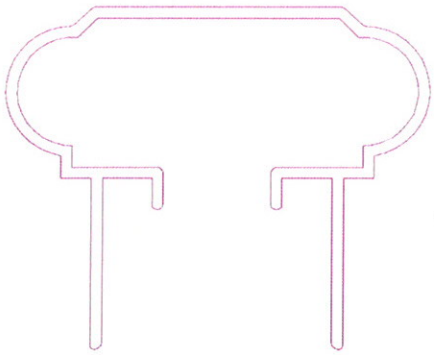
Date 5/19/16 **Tech** SAN

Top+Sub

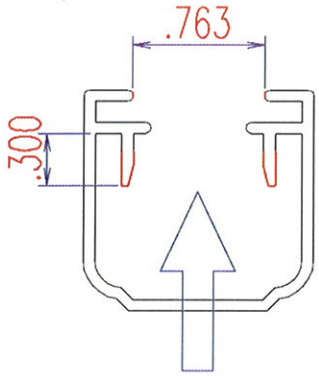


Bottom

8 Foot Rail with 22 pickets

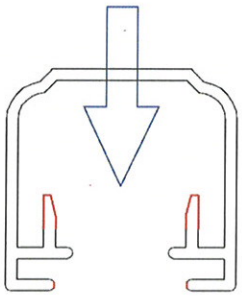


Top Rail



Sub Rail

Punch



Bottom Rail

Architectural Testing

Test sample complies with these details.
Deviations are noted.

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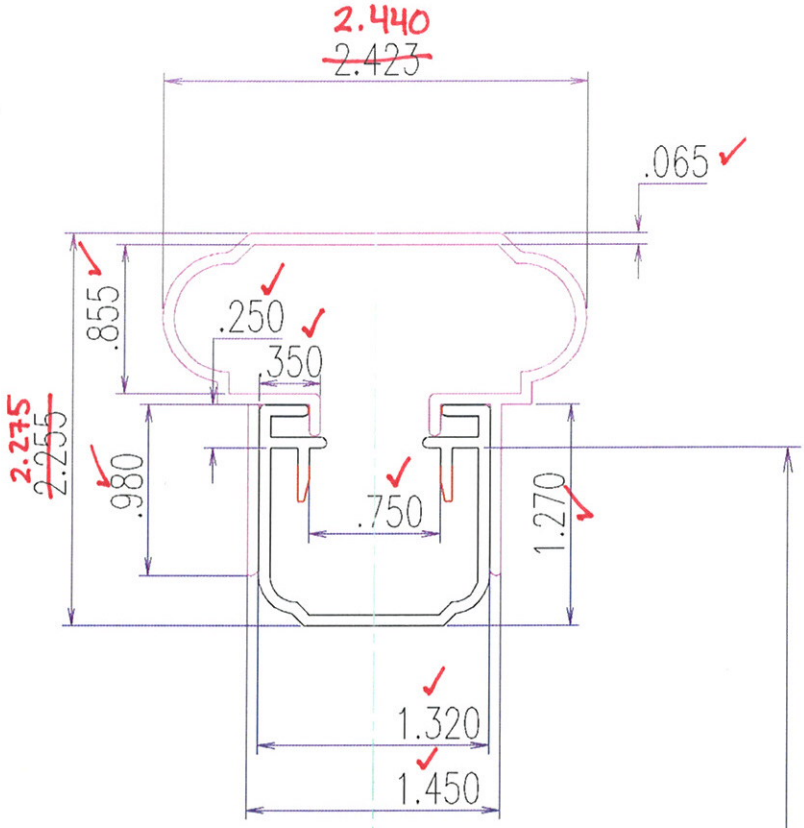
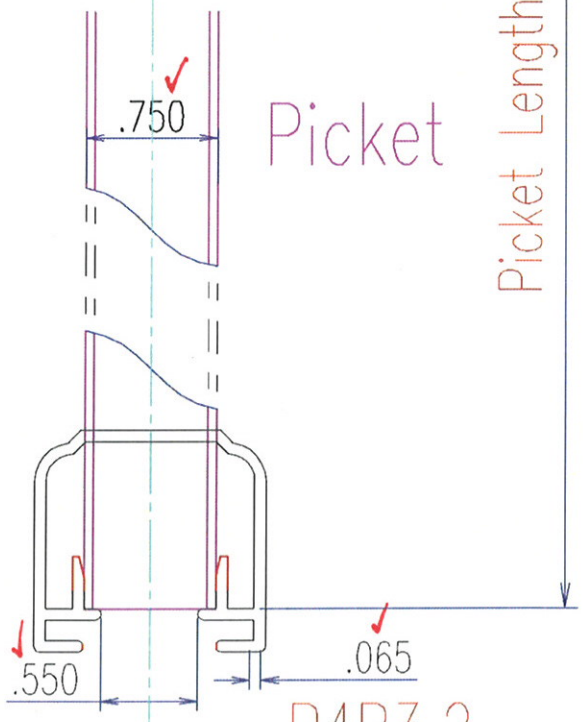
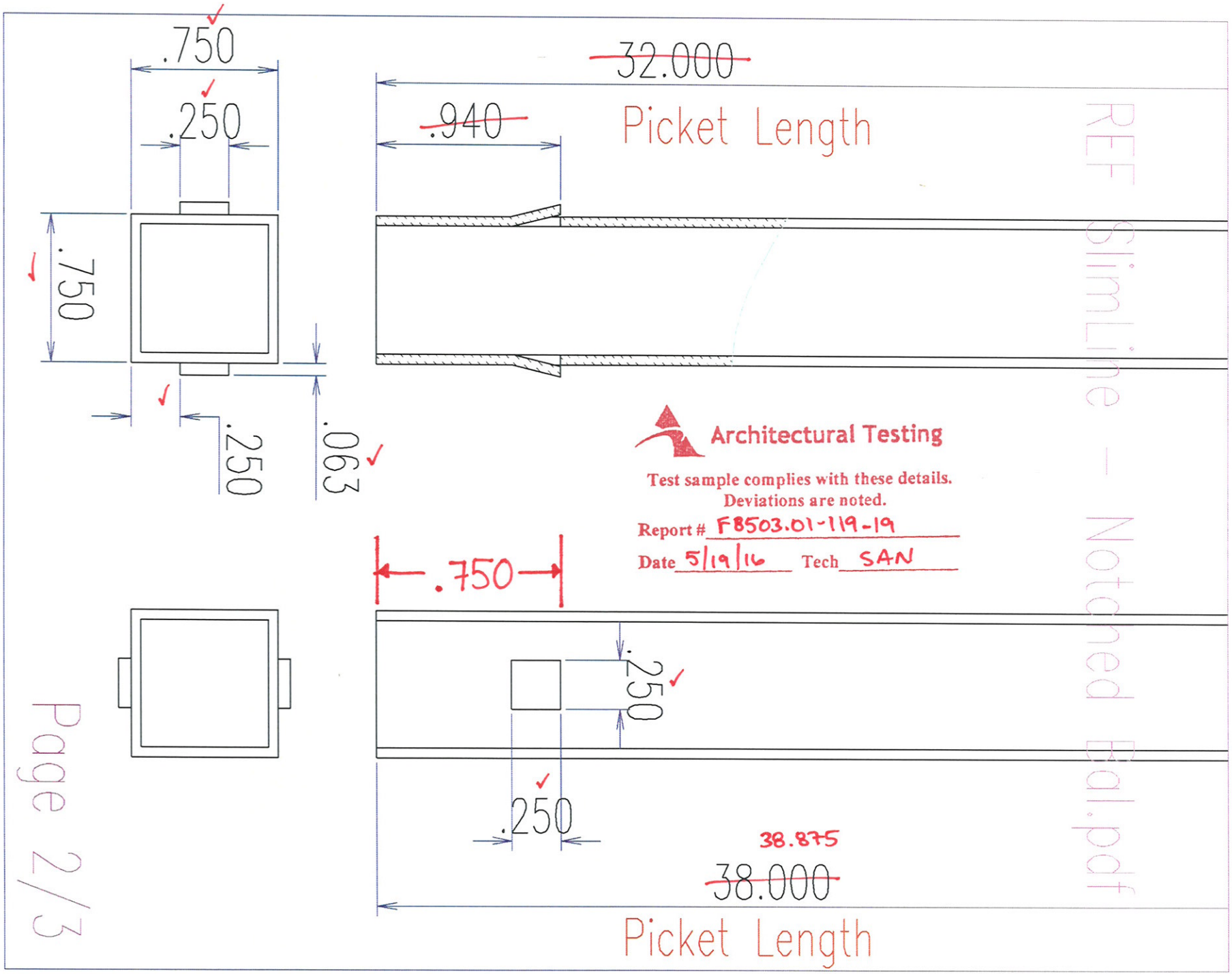




P4R3.2

12-212 Thailand Rail

20141015


.750
.250
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.063
32.000
Picket Length
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Architectural Testing
Test sample complies with these details.
Deviations are noted.
Report # F8503.01-119-19
Date 5/19/16 Tech SAN
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Picket Length
REF SlimLine – Notched Rail.pdf
Page 2/3

APPENDIX B

Photographs

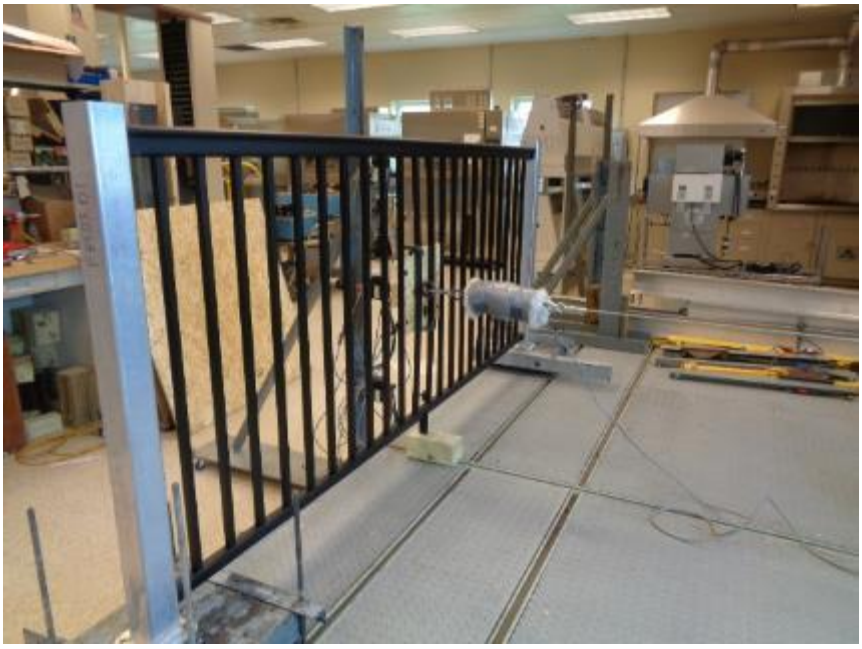

Photo No. 1
Infill Loading at Center of Two Pickets

Photo No. 2
Infill Loading at Bottom of Two Pickets

Photo No. 3
Horizontal Uniform Load on Top Rail

Photo No. 4
Horizontal Concentrated Load at Mid-Span of Top Rail

Photo No. 5
Horizontal Concentrated Load on Top Rail Adjacent to End Post

Photo No. 6
Horizontal Concentrated Load at Top of Post
(Simulated Concrete)