



STRUCTURAL PERFORMANCE TEST REPORT

Rendered to:

TUSCAN MANUFACTURING, LP

PRODUCT: Colonial & Classic Porch Post

Report No: 70255.03-119-16
Report Date: 06/27/07
Revision 1: 07/11/07

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TUSCAN MANUFACTURING, LP
1912 Grant Street
York, Nebraska 68467

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Project Summary: Architectural Testing, Inc. (ATI) was contracted by Tuscan Manufacturing, LP to evaluate the structural performance of their *Colonial* and *Classic* vinyl porch posts. The evaluation was for concentric axial loads in compression on all three post types and uplift resistance tests on *Colonial* posts.

Test Samples: All test samples were provided by Tuscan Manufacturing for testing. The *Classic* compression samples measured 104" in length and the *Colonial* samples measured 108". Each *Classic* sample was comprised of an aluminum reinforcing member (tube) inside of a vinyl porch post. The aluminum tube had a 0.060" wall thickness and an outside diameter of 3.25" for the 4.5 x 4.5 porch posts and the 4 x 4 *Colonial* had a 0.060" wall thickness and an outside diameter of 2.5" and the 5 x 5 *Colonial* had a 0.060" wall thickness with an outside diameter of 3.25". The 4.5 x 4.5 posts had stainless steel plate spacers 22" from the top and 40" from the bottom. The 4 x 4 and 5 x 5 posts had stainless steel plate spacers 26" from the top and 41" from the bottom. See drawings in Appendix A and photographs in Appendix B for additional description.

Equipment:

Axial Compression Load Test: The test fixture consisted of a flat steel support attached to a rigid steel column at the top. The bottom consisted of a hydraulic jack positioned on a leveling fixture, fitted with flat steel bearing plate and a 50,000 pound capacity load cell. Test duration, load, and deflection were recorded electronically throughout the test.

Uplift Load Test: The specimens were tested to ultimate capacity in tension utilizing a SATEC Model 50UD universal test machine.

Test Set-Up:

Axial Compression Load Test: The posts were installed into the compression fixture with no physical connections between the post and fixture. The compression fixture was plumbed using a "PLS-5" laser plumbing device, and the column was leveled with a 78" level, while applying a minimal preload to hold the specimen in place. Two electronic linear displacement transducers were positioned at the midpoints of two adjacent sides of the columns, to measure lateral displacements about the x- and y-axis of the column.

Uplift Load Test: The testing machine was fitted with pressure treated Southern Yellow Pine (SYP) wood boards at the top and bottom to accommodate anchorage of the column brackets. The end bracket for the 4 x 4 post was secured to the wood board with four (4) #14 by 1-1/2" flathead stainless steel screws. The post was then attached to each bracket with two (2) #10 by 2-3/8" pan-head stainless steel screws. The end bracket for the 5 x 5 post was secured to the wood board with four (4) #14 by 1-1/2" stainless steel screws. The post was then attached to each bracket with two (2) #10 by 2-3/8" pan-head stainless steel screws. Tests were run at a cross-head speed of 0.05 in./min. and all tests were conducted at lab ambient temperature (68°F ±4°F). Reference photographs in Appendix B for test setups.

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 the tests.

Axial Compression Load Test: Each test began with a small initial load and continued a uniform load increase until failure. Load, lateral displacements and time were recorded. The ultimate load and mode of failure were recorded for each test. Three tests were performed on each design.

Uplift Load Test: After securing each column into the test machine, the load was applied at a uniform rate (0.05 in. /min.) until failure. The test duration, ultimate test load and mode of failure were recorded for each test.

Axial Compression Load Test Results: Test loads were concentric axial compression. X- and Y-Axis displacements were measured at the column mid-height. Load/deflection curves were adjusted for the offset from the origin due to the initial load at the zero point of the deflection readings. X- and Y-Adjusted values are the X- and Y-Displacements plus the offset.

Specimen No. 1: 4 x 4 x 108" Colonial Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
512	0.000	0.000
1090	0.040	0.124
1638	0.054	0.178
2209	0.056	0.223
2682	0.058	0.267
3240	0.058	0.302
3892	0.058	0.360
4560	0.074	0.463
5195	0.087	0.561
5912	0.103	0.701
6567	0.113	0.815
7151	0.131	0.982
7900	0.198	1.508
7900	<i>Ultimate Load</i>	

Test Results: (Continued)

Specimen No. 2: 4 x 4 x 108" Colonial Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
344	0.000	0.000
921	-0.008	0.079
1411	-0.012	0.164
1949	-0.020	0.229
2539	-0.030	0.306
3256	-0.048	0.389
3901	-0.040	0.548
4605	-0.037	0.675
5575	-0.038	0.830
6165	-0.038	0.952
6830	-0.035	1.108
7391	-0.020	1.328
7774	0.025	1.649
7774	<i>Ultimate Load</i>	

Specimen No. 3: 4x 4 x 108" Colonial Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
341	0.000	0.000
629	0.002	0.046
1168	0.009	0.120
1644	0.014	0.164
2277	0.024	0.235
2873	0.028	0.288
3577	0.033	0.360
4378	0.040	0.462
5108	0.004	0.612
5951	0.008	0.762
6785	0.021	0.956
7365	0.035	1.117
7975	0.063	1.461
7975	<i>Ultimate Load</i>	

Test Results: (Continued)

Specimen No. 1: 5 x 5 x 108" Colonial Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
328	0.000	0.000
1326	0.030	0.089
2293	0.028	0.162
3259	0.014	0.218
4245	0.002	0.276
5231	-0.009	0.331
6266	-0.021	0.405
7284	-0.030	0.464
8254	-0.042	0.525
9116	-0.057	0.598
10054	-0.068	0.680
11098	-0.090	0.961
11098	<i>Ultimate Load</i>	

Specimen No. 2: 5 x 5 x 108" Colonial Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
363	0.000	0.000
1330	-0.001	0.125
2277	-0.002	0.236
3331	0.006	0.295
4297	0.017	0.346
5221	0.027	0.390
6159	0.041	0.446
7151	0.082	0.528
8111	0.107	0.595
9146	0.134	0.673
10089	0.162	0.761
11027	0.199	0.885
11899	0.296	1.144
11899	<i>Ultimate Load</i>	

Test Results: (Continued)

Specimen No. 3: 5 x 5 x 108" Colonial Vinyl Porch Post
Test Date: 1/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
412	0.000	0.000
1424	-0.022	0.120
2387	-0.040	0.219
3263	-0.044	0.294
4300	-0.041	0.355
5212	-0.028	0.405
6444	-0.008	0.462
7391	0.008	0.509
8134	0.062	0.599
9288	0.139	0.720
10436	0.207	0.879
11717	0.369	1.301
11717	<i>Ultimate Load</i>	

Specimen No. 1: 4.5 x 4.5 x 104" Classic Vinyl Porch Post
Test Date: 1/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
295	0.000	0.000
1622	-0.102	0.160
2941	-0.159	0.235
4313	-0.192	0.286
5546	-0.214	0.326
6836	-0.239	0.368
8176	-0.270	0.415
9596	-0.361	0.526
10774	-0.425	0.614
12081	-0.505	0.729
13452	-0.780	1.148
13452	<i>Ultimate Load</i>	

Test Results: (Continued)

Specimen No. 2: 4.5 x 4.5 x 104" Classic Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
328	0.000	0.000
1641	-0.047	0.106
2971	-0.088	0.175
4368	-0.121	0.221
5685	-0.146	0.263
6895	-0.169	0.304
8192	-0.216	0.430
9499	-0.255	0.516
10705	-0.299	0.618
12113	-0.369	0.800
12843	-0.452	1.041
12843	<i>Ultimate Load</i>	

Specimen No. 3: 4.5 x 4.5 x 104" Classic Vinyl Porch Post
Test Date: 01/03/07

Test Load (lb)	Displacement (inch) - Origin Offset Adjustment	
	X-Adjusted	Y-Adjusted
0	0.000	0.000
337	0.000	0.000
1670	-0.046	0.183
2948	-0.075	0.240
4232	-0.082	0.276
5562	-0.092	0.314
7008	-0.102	0.357
8143	-0.115	0.407
9635	-0.144	0.575
10699	-0.169	0.715
11737	-0.199	0.850
12739	-0.290	1.259
12739	<i>Ultimate Load</i>	

Summary of Axial Compression Load Test Results: Results are ultimate load capacity of individual specimens and should not be used as safe working values or design load values. Three (3) specimens were tested for each specific post type and an average was obtained.

4 x 4 Colonial Vinyl Porch Post

Test Date: 01/03/07

Specimen No.	Ultimate Load (lb)	Deviation From Average	Failure Mode
1	7900	0%	Yielded to Load ¹
2	7774	1%	Yielded to Load ¹
3	7975	1%	Yielded to Load ¹
Average:	7883		

¹Specimens were marked "Yielded to Load" by testing Technician, but upon inspection the aluminum inside the PVC did buckle and the PVC bowed.

5 x 5 Colonial Vinyl Porch Post

Test Date: 01/03/07

Specimen No.	Ultimate Load (lb)	Deviation From Average	Failure Mode
1	11,098	4%	Yielded to Load ¹
2	11,899	3%	Yielded to Load ¹
3	11,717	1%	Yielded to Load ¹
Average	11,571		

¹Specimens were marked "Yielded to Load" by testing Technician, but upon inspection the aluminum inside the PVC did buckle and the PVC bowed.

4.5 x 4.5 Classic Vinyl Porch Post

Test Date: 01/03/07

Specimen No.	Ultimate Load (lb)	Deviation From Average	Failure Mode
1	13,452	3%	Localized Buckling
2	12,843	1%	Localized Buckling
3	12,739	2%	Localized Buckling
Average	13,011		

Uplift Load Test Results: Results are ultimate load capacity of individual specimens and should not be used as safe working values or design load values.

4 x 4 Colonial Vinyl Porch Post

Test Date: 01/03/07

Specimen No.	Ultimate Load (lb)	Percent Deviation From Average	Failure Mode
1	1632	0.3%	Plate Cracked
2	1648	0.7%	Plate Cracked
3	1631	0.4%	Plate Cracked
Average	1637		

5 x 5 Colonial Vinyl Porch Post

Test Date: 01/03/07

Specimen No.	Ultimate Load (lb)	Percent Deviation From Average	Failure Mode
1	1854	0%	Plate Cracked
2	1945	5%	Plate Cracked
3	1762	5%	Plate Cracked
Average	1854		

See photographs in Appendix B for mode of failure.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this test report, and all other supporting evidence will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, said materials shall be discarded without notice, and the service life of this report by Architectural Testing, Inc. shall expire. Results obtained are tested values and were secured using the designated test methods. This report neither constitutes certification of this product nor expresses an opinion or endorsement by this laboratory; it is the exclusive property of the client so named herein and relates only to the tested specimens. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.:

Matthew D. Freeborn
Technician

David H. Forney, P.E.
Senior Project Engineer

APO:apo/nlb

This report is complete only when all attachments listed are included.

Attachments (pages)

Appendix A - Drawings (1)

Appendix B - Photographs (4)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	06/22/07	N/A	Original report issue
1	07/11/07	Title Page, 1, 3-6, 8-9	Changed "Metro" to "Colonial"
		1	Changed "Prestige" to "Classic"

APPENDIX A

Drawings

Tuscan Manufacturing, LP
Colonial Porch Post

03/30/07



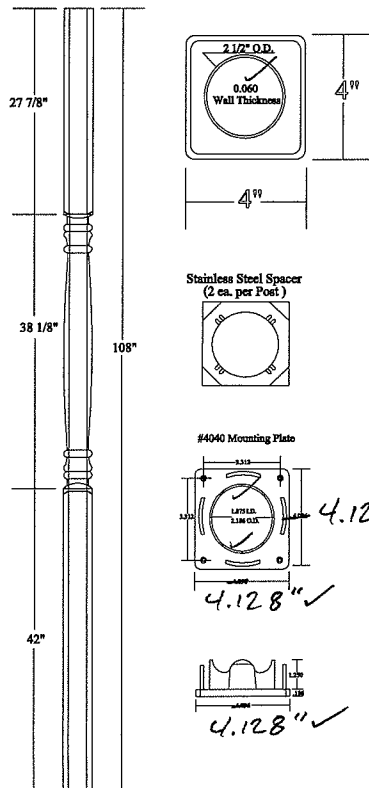
Test sample complies with these details.
Deviations are noted.

Report# 70255.02

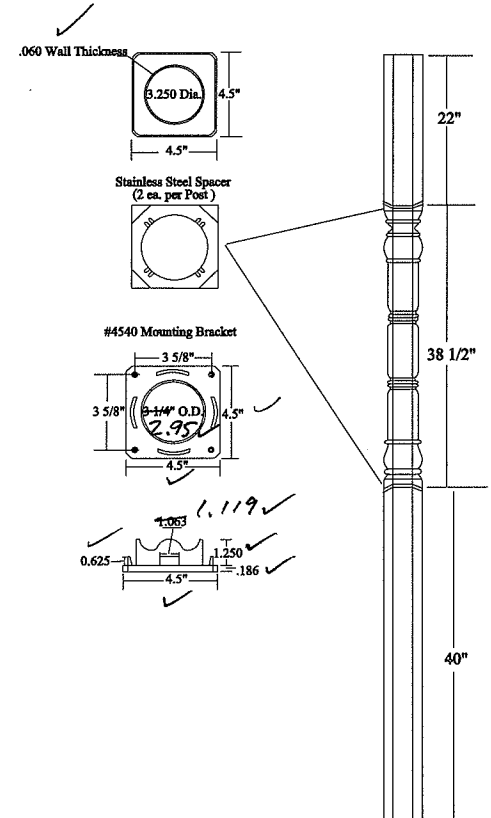
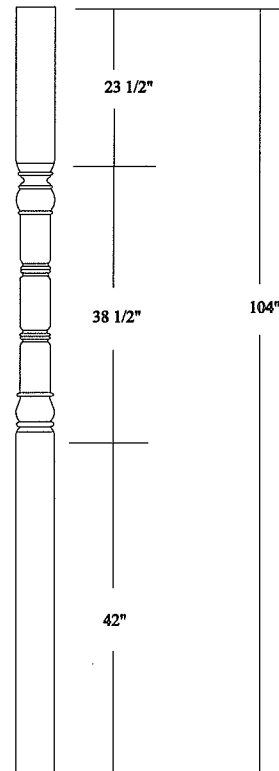
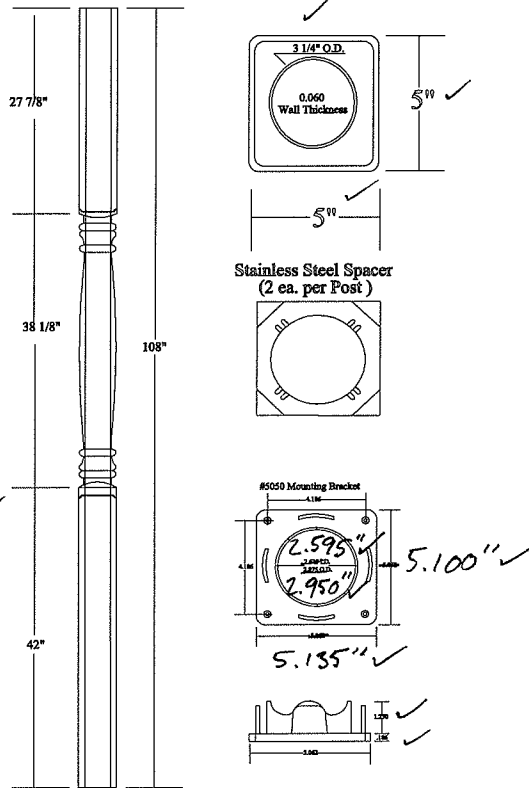
Date 4/5/07 Tech 716

Tuscan Manufacturing, LP
Classic Porch Post

4"x 4"x 108"



5"x 5"x 108"



APPENDIX B

Photographs



Photo No. 1
Axial Compression Load Test Set-Up



Photo No. 2
Axial Compression Load Test in Progress

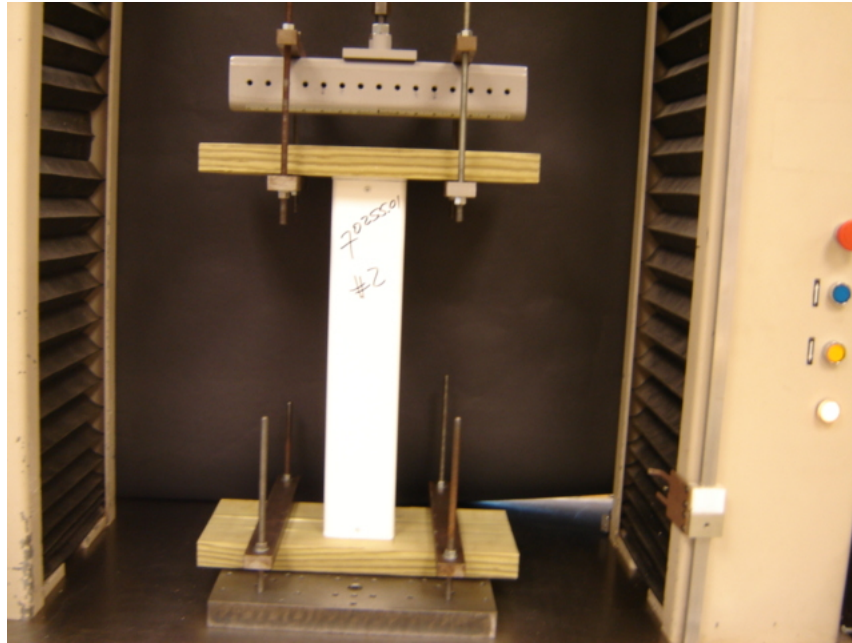


Photo No. 3
Uplift Resistance Test Setup



Photo No. 4
Uplift Resistance Tests - Plate Failure

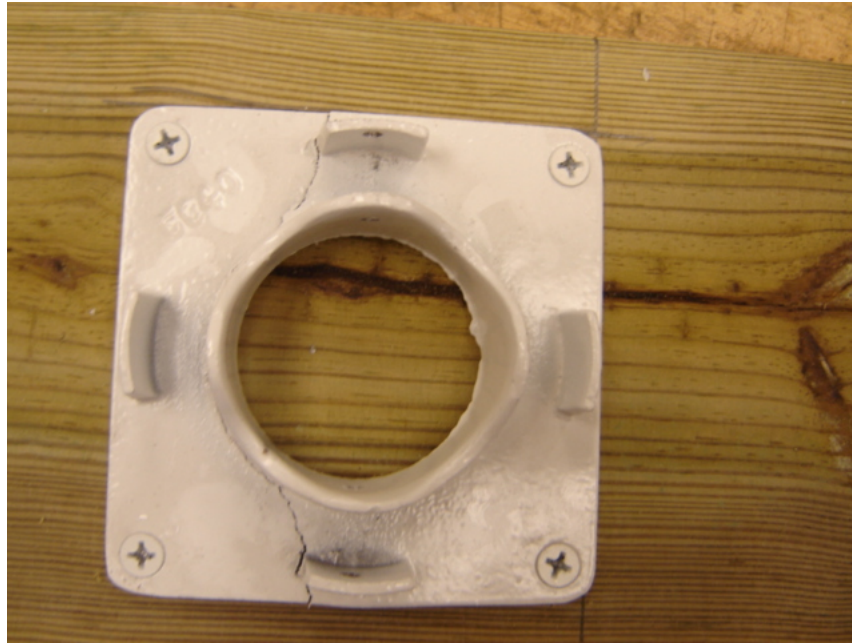


Photo No. 5
Uplift Resistance Tests - Plate Failure



Photo No. 6
Uplift Resistance Tests - Circular Tubing in Center of Column