



TEST REPORT

Rendered to:

LMT – MERCER GROUP INC.

For:

Post Mount Systems

2 in Square (thin wall) and *Blu-Mount* Post Mounts

Report No.: F8366.01-119-19

Report Date: 09/15/16

Test Record Retention Date: 07/14/20



TEST REPORT

F8366.01-119-19
September 15, 2016

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TEST REPORT

Rendered to:

LMT – MERCER GROUP INC.
690 Puritan Avenue
Lawrenceville, New Jersey 08648

Report No.: F8366.01-119-19
Test Dates: 05/09/16
Through: 07/14/16
Report Date: 09/15/16
Test Record Retention Date: 07/14/20

1.0 General Information

1.1 Product

Post Mount Systems - 2 in Square (thin wall) and *Blu-Mount* Post Mounts

1.2 Project Description

Architectural Testing, Inc., an Intertek company (“Intertek-ATI”), was contracted by LMT – Mercer Group Inc. to perform structural testing on their 2 in square (thin wall) and *Blu-Mount* post mount systems. The purpose of the testing is preliminary evaluation in accordance with the minimum requirements of Section 5.1, *Guardrail System Test Requirements*, of the following criteria:

ICC-ES™ AC174 (approved January, 2012, editorially revised December 2014), *Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)*

ICC-ES™ AC174-12 was developed by the ICC Evaluation Service, Inc. (ICC-ES™) as acceptance criteria to evaluate compliance with the following building codes:

2015 *International Building Code*®, International Code Council

2015 *International Residential Code*®, International Code Council

1.3 Limitations

Anchorage of support post to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

1.4 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). Intertek-ATI is accredited to perform all testing reported herein.

1.5 Product Description

Post mount systems are comprised of a square steel tube with base plate and were tested with PVC inserts and post sleeve. Drawings are included in Appendix A to verify the overall dimensions and other pertinent information of the tested product, its components, and any constructed assemblies.

1.6 Product Sampling

All specimens utilized for testing reported herein were provided to Intertek-ATI by LMT-Mercer Group Inc. and were not independently sampled by an independent inspection agency.

1.7 Witnessing

Mr. Brad Lynn of LMT was present on 5/9/16 to witness the following tests:

- Structural performance testing of assembled post mount systems

1.8 Conditions of Testing

Unless otherwise indicated, all testing reported herein was conducted in a laboratory set to maintain temperature in the range of 68 ± 4 °F and humidity in the range of $50 \pm 5\%$ RH. All test specimen materials were stored in the laboratory environment for no less than 40 hours prior to testing.

2.0 Referenced Standard

ASTM D7032-08, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)

3.0 Structural Performance Testing of Assembled Railing Systems

Re: ICC-ES™ AC174, Section 5.1

3.1 General

Post mount assemblies were tested in a self-contained structural frame designed to accommodate anchorage of a post mount 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. Deflections were measured to the nearest 0.01 in using electronic linear displacement transducers.

3.2 Post Mount Assembly Description

The post mount systems consisted of square steel tube welded to a base plate. PVC post stabilizers were placed over the steel tube to support a 4 in post sleeve. Post mount system was attached to a steel channel (simulated concrete application) in accordance with manufacturer's installation instructions. Drawings are included in Appendix A to verify the overall dimensions and other pertinent information of the tested product, its components, and any constructed assemblies.

3.3 Component Descriptions

The scope of testing performed and reported herein was intended to evaluate the post mount systems consisting of the following components (see Appendix A for drawings):

Post Sleeves - 4 in square (0.130 in wall), hollow, co-extruded PVC sleeve, installed over post mount

Post Mounts - Galvanized (thin wall) - 2 in square galvanized steel tube with 0.073 in thick wall welded to a 3-1/2 in square by 0.300 in thick galvanized steel base plate with a 3/16 in fillet weld all around - four 0.40 in diameter holes were located at each corner of the plate, with the center of the holes 0.40 in from each edge and 2.70 in apart; one 0.59 in diameter hole was located at the center of the base plate.

- Blu-Mount - 2 in square steel tube with 0.152 in thick wall welded to a 3-9/16 in square by 0.623 in thick steel base plate with a 3/16 in fillet weld all around - four 0.38 in diameter holes were located at each corner of the plate, with the center of the holes 0.39 in from each edge and 2.78 in apart; four 0.27 in diameter holes were located at the center of each face of the plate, with the center of the holes 0.34 in from the edge; one 2 in square hole was located at the center of the base plate.

PVC Post Stabilizer: - Top Stabilizer: 3-9/16 in square by 7-3/8 in long with 0.120 in wall

- Top Stabilizer (internal component): 1-3/4 in square by 0.092 in thick by 2-1/8 in long body with 2 in square by 0.150 in thick head; 2-1/4 in overall length
- Bottom Stabilizer: 3-9/16 in square by 6 in long with 0.110 in wall

3.4 Fastening Schedule

Connection	Fastener
Top Stabilizer to Post Sleeve	Two #10-10 x 1-1/2" (0.120 in minor diameter) pan head, Phillips drive, self-drilling, coated carbon steel screw
Post Mount to Top Stabilizer (internal component)	One #10-16 x 1" (0.140 in minor diameter) pan head, Phillips drive, self-drilling, coated carbon steel screw
Top Stabilizer (internal component) to Top Stabilizer	One 1/4-20 x 1-1/4" hex head stainless steel bolt with double nut, plate washer and lock washer
Bottom Stabilizer to Post Sleeve	Two #10-10 x 1-1/2" (0.120 in minor diameter) pan head, Phillips drive, self-drilling, coated carbon steel screw
Bottom PVC Post Stabilizer to Post Mount	Slip fit – No mechanical connection
Post Mount to Steel Channel	Four 3/8-16 x 2" Grade 8 hex bolt with washer and nut

3.5 Test Setup

The post mount was installed and tested by directly securing (surface-mounting) the base of the post mount to a steel channel fastened to a rigid steel test frame. A transducer mounted to an independent reference frame was located to record movement of a reference point on the post mount to determine component deflections. See photographs in Appendix B for test setups.

3.6 Test Procedure

Testing and evaluation was performed in accordance with Section 5.1 of ICC-ES™ AC174. 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. One specimen was used for all load tests which were performed in the order reported. Each design load test was performed using the following procedure:

1. Zeroed transducers and load cell at zero load; and
2. Increased load to specified test load in no less than ten seconds.
3. Load specimen to failure.

3.7 Test Results

Unless otherwise noted, all loads and displacement measurements were normal to the post mount (horizontal). The test load adjustment factor remained at 2.5 x design load for all load tests.

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target)

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure

Test Series No. 1
42 in Tall Blu-Mount Post Mount with Top PVC Spacer NOT Inverted
IBC - All Use Groups / ICC-ES AC174

Test No. 1 - Test Date: 05/09/16			
Concentrated Load at Top of a Stand-Alone Post (42 in high)			
Design Load: 50 plf x (116 in Rail Length + 4 in Post Width ÷ 12 in/ft) = 500 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	202	00:12	0.54
1250 lb (2.5 x D.L.)	1253	00:55	Result: Withstood load equal to or greater than 1250 lb without failure
<u>Deflection Evaluation:</u>			
Maximum post deflection at 202 lb = 0.54 in			
Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.54" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.54" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

Test No. 2 - Test Date: 05/09/16			
Concentrated Load at Top of a Stand-Alone Post (42 in high)			
Design Load: 50 plf x (116 in Rail Length + 4 in Post Width ÷ 12 in/ft) = 500 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	205	00:26	0.66
1250 lb (2.5 x D.L.)	1259	00:54	Result: Withstood load equal to or greater than 1250 lb without failure
<u>Deflection Evaluation:</u>			
Maximum post deflection at 205 lb = 0.66 in			
Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.66" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.66" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

3.7 Test Results (Continued)

Test Series No. 1 (Continued)

Test No. 3 - Test Date: 05/09/16 Concentrated Load at Top of a Stand-Alone Post (42 in high) Design Load: 50 plf x (116 in Rail Length + 4 in Post Width ÷ 12 in/ft) = 500 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	212	00:32	0.56
1250 lb (2.5 x D.L.)	1255	01:02	Result: Withstood load equal to or greater than 1250 lb without failure
<u>Deflection Evaluation:</u> Maximum post deflection at 212 lb = 0.56 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.56" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.56" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

3.7 Test Results (Continued)

Test Series No. 2
36 in Tall Galvanized (thin wall) Post Mount with Top PVC Spacer Inverted
IRC – Residential Use Only / ICC-ES AC174

Test No. 1 - Test Date: 05/09/16			
Concentrated Load at Top of a Stand-Alone Post (42 in high)			
Design Load = 200 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	203	00:26	1.02
500 lb (2.5 x D.L.)	503	00:42	Result: Withstood load equal to or greater than 500 lb without failure
Ultimate Load:	506	00:43	Mode of Failure: Post buckled at base
Deflection Evaluation:			
Maximum post deflection at 203 lb = 1.02 in			
Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 1.02" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 1.02" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

Test No. 2 - Test Date: 05/09/16			
Concentrated Load at Top of a Stand-Alone Post (42 in high)			
Design Load = 200 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	203	00:25	1.23
500 lb (2.5 x D.L.)	502	00:36	Result: Withstood load equal to or greater than 500 lb without failure
Ultimate Load:	502	00:36	Mode of Failure: Post buckled at base
Deflection Evaluation:			
Maximum post deflection at 203 lb = 1.23 in			
Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 1.23" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 1.23" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

3.7 Test Results (Continued)

Test Series No. 2 (Continued)

Test No. 3 - Test Date: 05/09/16 Concentrated Load at Top of a Stand-Alone Post (42 in high) Design Load = 200 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	206	00:38	0.70
500 lb (2.5 x D.L.)	505	00:48	Result: Withstood load equal to or greater than 500 lb without failure
Ultimate Load:	510	00:49	Mode of Failure: Post buckled at base
<u>Deflection Evaluation:</u> Maximum post deflection at 206 lb = 0.70 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.70" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.70" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

3.7 Test Results (Continued)

Test Series No. 3
36 in Tall Blu-Mount Post Mount with Top PVC Spacer Inverted
IBC - All Use Groups / ICC-ES AC174

Test No. 1 - Test Date: 07/14/16			
Concentrated Load at Top of a Stand-Alone Post (42 in high)			
Design Load: 50 plf x (92 in Rail Length + 4 in Post Width ÷ 12 in/ft) = 400 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	200	00:22	0.80
1000 lb (2.5 x D.L.)	1004	00:51	Result: Withstood load equal to or greater than 1000 lb without failure
Ultimate Load:	1086	00:56	Mode of Failure: Weld broke
Deflection Evaluation:			
Maximum post deflection at 200 lb = 0.80 in			
Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.80" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.80" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

Test No. 2 - Test Date: 07/14/16			
Concentrated Load at Top of a Stand-Alone Post (42 in high)			
Design Load: 50 plf x (92 in Rail Length + 4 in Post Width ÷ 12 in/ft) = 400 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	203	00:13	0.92
1000 lb (2.5 x D.L.)	1001	00:49	Result: Withstood load equal to or greater than 1000 lb without failure
Ultimate Load:	1099	00:55	Mode of Failure: Top plastic spacer broke
Deflection Evaluation:			
Maximum post deflection at 203 lb = 0.92 in			
Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.92" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.92" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

3.7 Test Results (Continued)

Test Series No. 3 (Continued)

Test No. 3 - Test Date: 07/14/16 Concentrated Load at Top of a Stand-Alone Post (42 in high) Design Load: 50 plf x (92 in Rail Length + 4 in Post Width ÷ 12 in/ft) = 400 lb			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	209	00:15	0.66
1000 lb (2.5 x D.L.)	1000	00:32	Result: Withstood load equal to or greater than 1000 lb without failure
Ultimate Load:	1250	00:46	Mode of Failure: Top plastic spacer broke
<u>Deflection Evaluation:</u> Maximum post deflection at 209 lb = 0.66 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.66" \therefore \text{ok}$ $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.66" \therefore \text{ok}$			

¹ Deflection limit calculation based on 36 in and 42 in railing height for One- and Two-Family Dwelling requirements.

4.0 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:

Adam J. Schrum
Lead Technician

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

AJS:vtm/jas

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix A - Drawings (6)

Appendix B - Photographs (2)



Revision Log

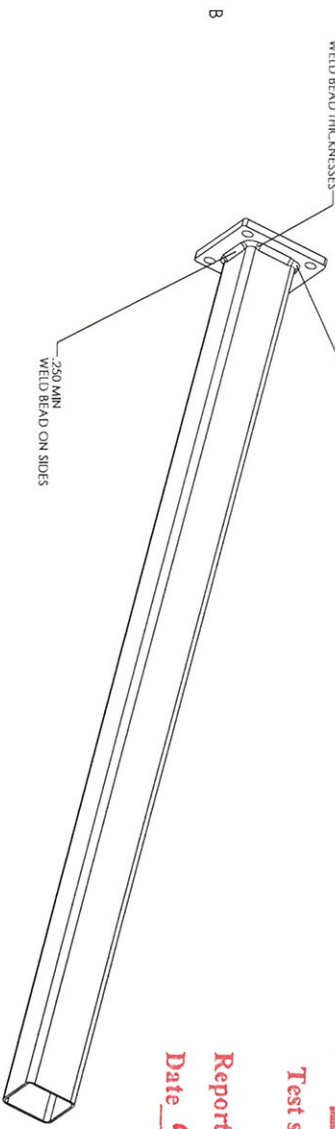
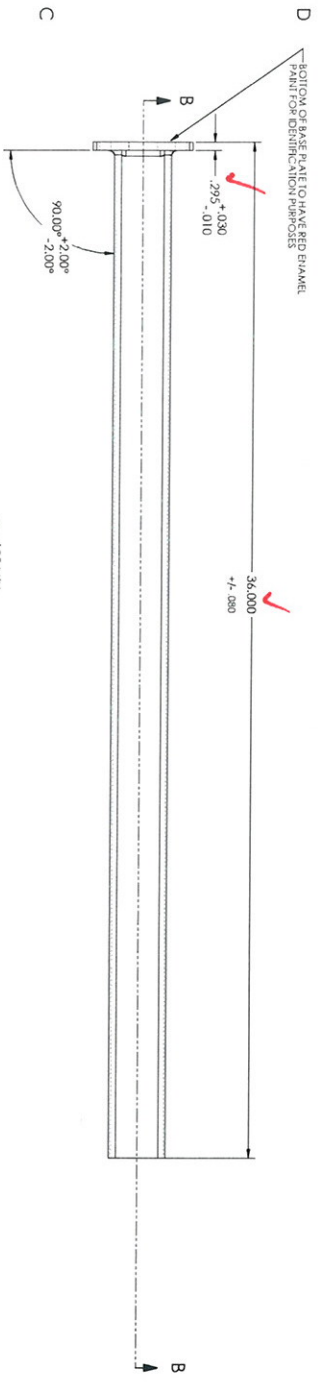
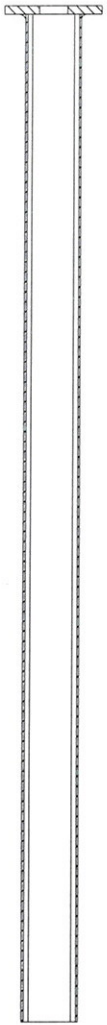
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F8366.01-119-19

APPENDIX A

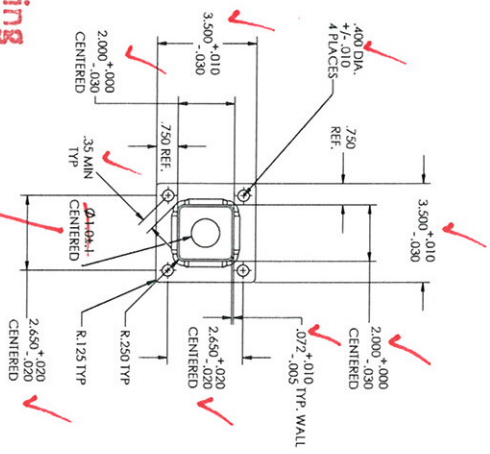
Drawings



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F8366.01-119-19
Date 9/15/16 Tech SAW



NOTE: ALL DIMENSIONS ARE AFTER GALVANIZATION

MATERIAL: ALUMINUM STEEL

TUBE: C193 STEEL

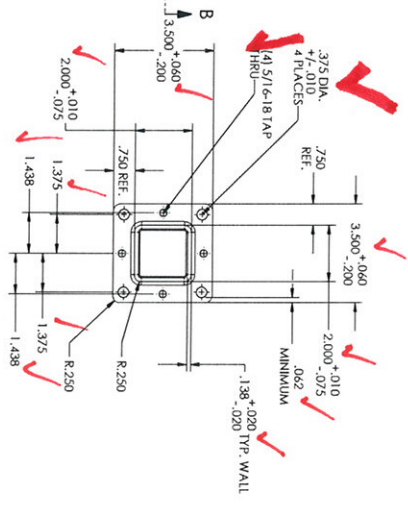
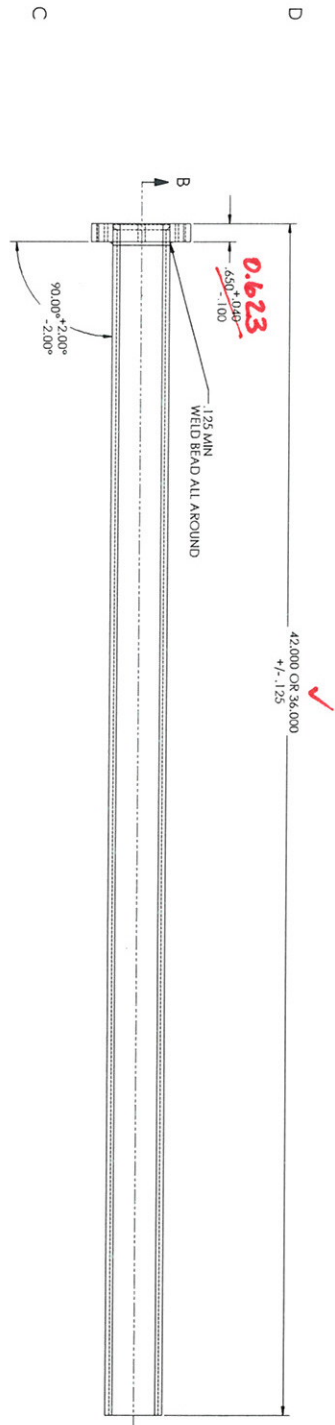
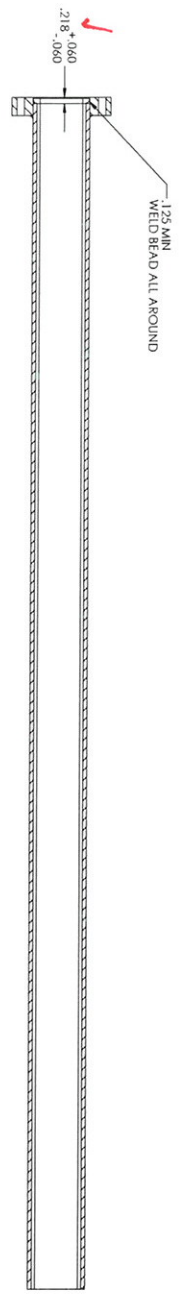
WELD: G01R10-95 E8504

COATING: GALVANIZED AFTER FABRICATION

FINISH: ALUMINUM

COATING GRADE: S296 (3.5 MILS)

TOLERANCES UNLESS SPECIFIED		LMT-MERCER GROUP	
FINISH	±.005	REV	
POSITION	±.010	DATE	
ANGLE	±.127	BY	
SIZE	±.005	CHK	
FORM	±.010	APP	
DRILL	±.010	DATE	
WELD	±.010	BY	
COATING	±.010	CHK	
FINISH	±.010	APP	
SCALE	1/2	DATE	
SHEET 1 OF 1			



MATERIAL:
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 WELD: 6011/1255 ER504

Architectural Testing
 Test sample complies with these details.
 Deviations are noted.

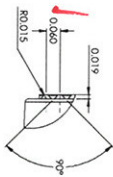
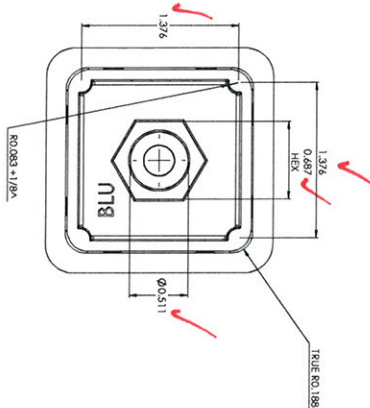
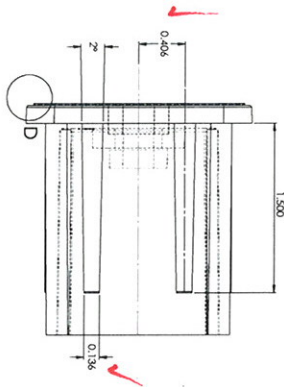
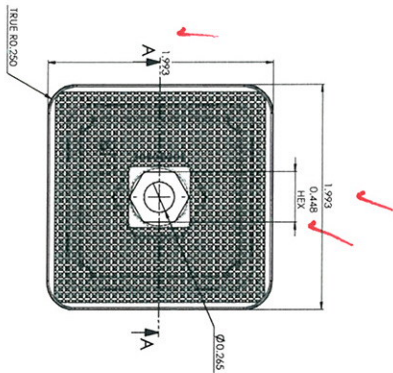
Report # F8366.01-119-19
 Date 9/15/16 Tech SAW

LMT-MERCER GROUP

DESIGNER: J. J. MERCER
 CHECKER: J. J. MERCER
 DATE: 9/15/16
 SCALE: 1/2" = 1'-0"

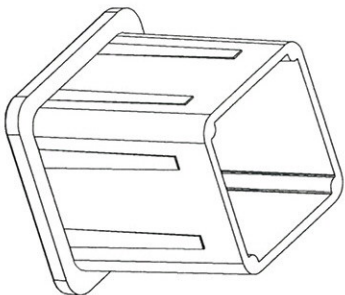
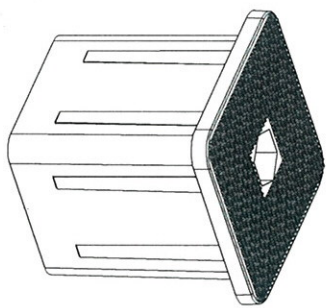
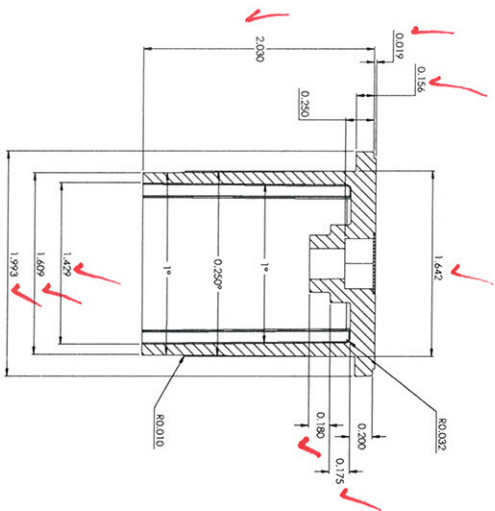
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 SHEET: [REDACTED]

DATE	
TIME	
REVISION	
BY	
CHECKED	



DETAIL D
SCALE 4 : 1

SECTION A-A



Architectural Testing

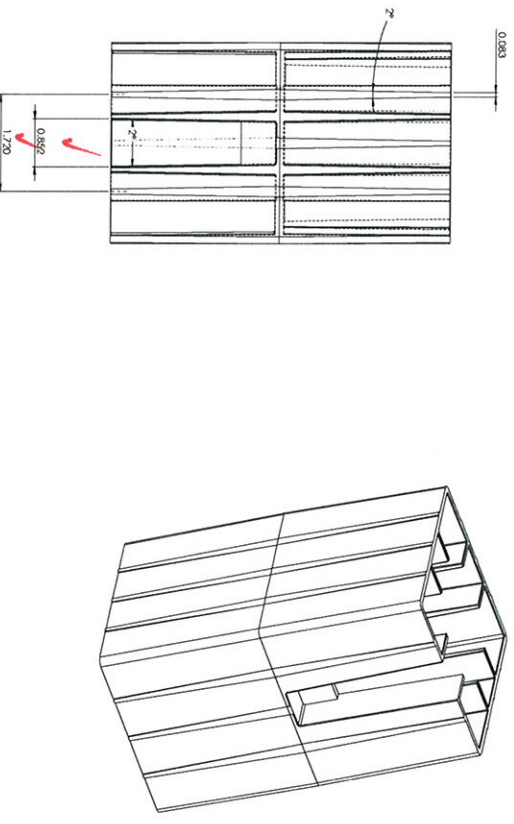
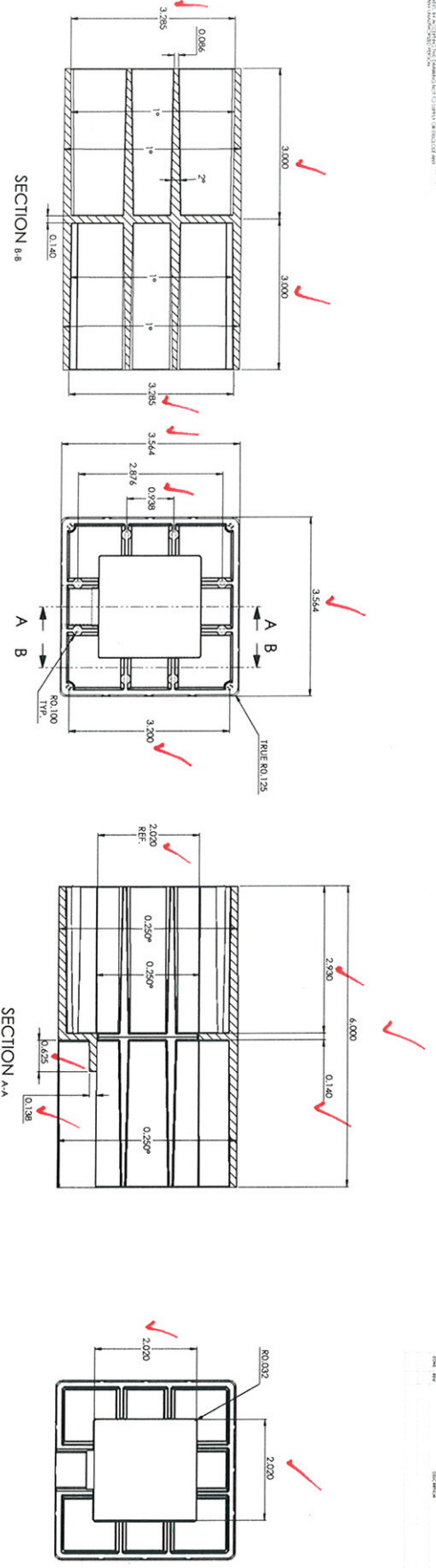
Test sample complies with these details.
Deviations are noted.

Report # F8366.01-119-19
Date 9/15/16 Tech SAN

DESIGNER	ARCHITECT	SCALE	DATE
DATE	PROJECT	REVISION	BY
PROJECT	DESCRIPTION	DATE	BY
DESCRIPTION	DATE	BY	BY

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8 7 6 5 4 3 2



Architectural Testing

Test sample complies with these details.
Deviations are noted.

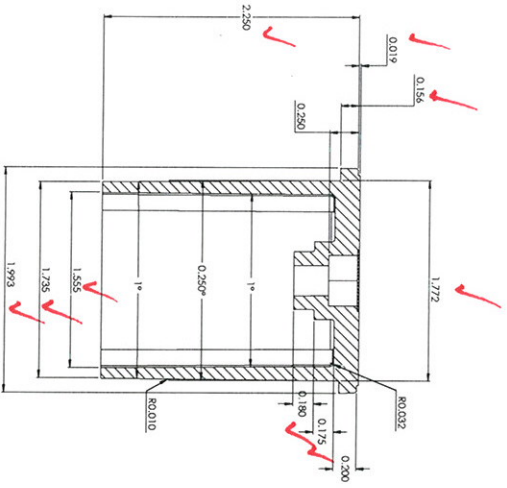
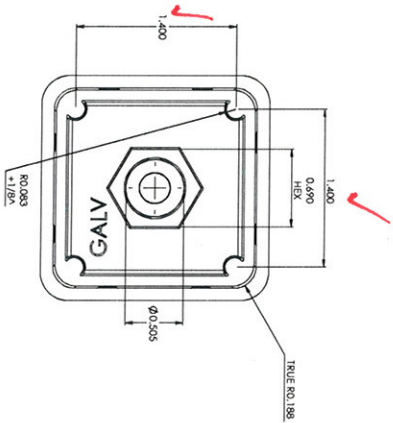
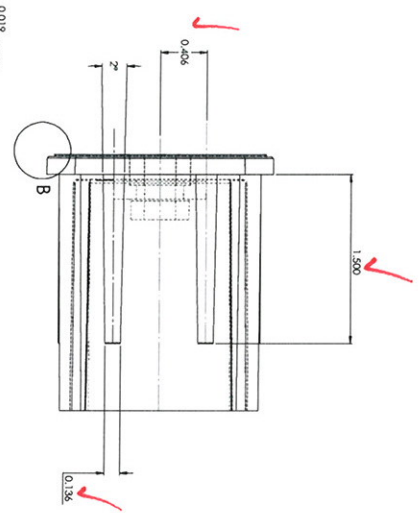
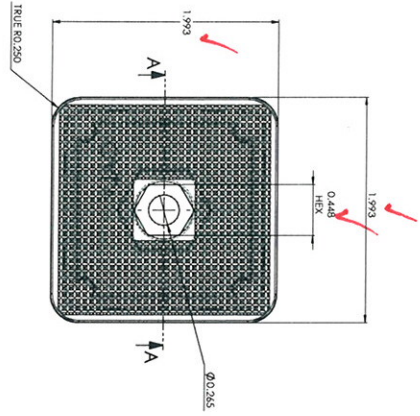
Report # F8366.01-119-19

Date 9/15/16 Tech SAN

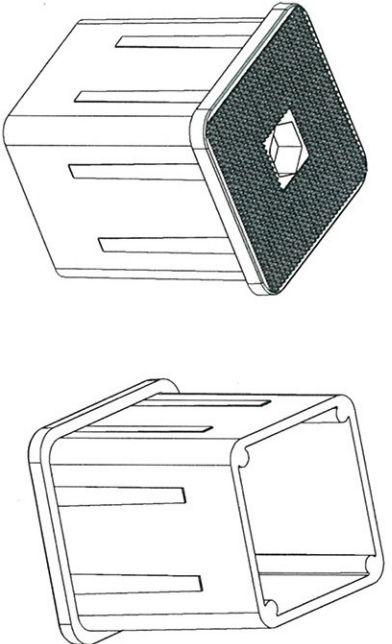
LMT-MERCER GROUP
 LMT-MERCER GROUP INC.
 1000 WEST 10TH AVENUE
 DENVER, CO 80202
 TEL: 303.733.0000
 FAX: 303.733.0001
 WWW.LMT-MERCER.COM

SUBJECT DESCRIPTION:
 CUSTOMER: LAM
 PART NUMBER: 1127M
 SCALE: 1/16
 SHEET: 1 OF 1

DESIGNER: JMM
CHECKER: JMM
DATE: 9/15/16



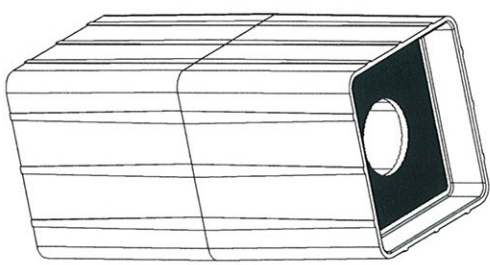
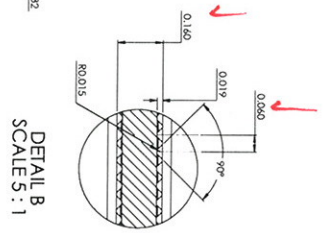
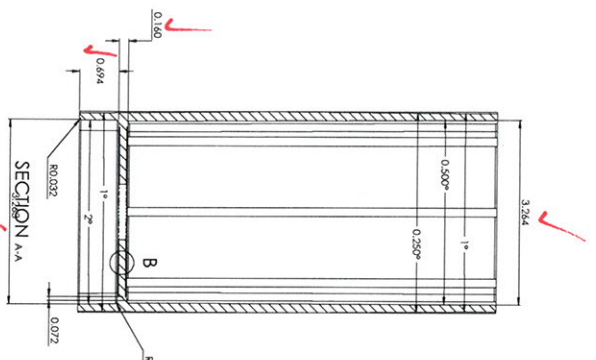
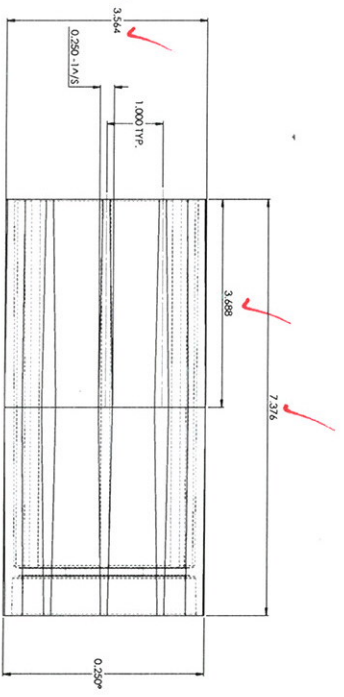
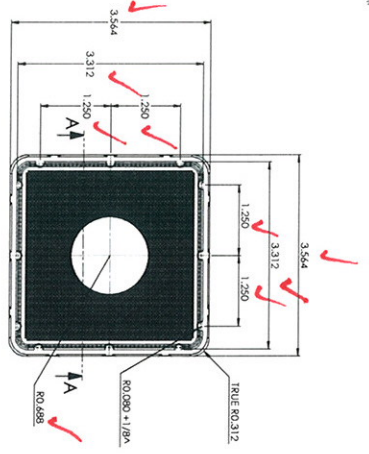
DETAIL B
SCALE 4:1



Architectural Testing
 Test sample complies with these details.
 Deviations are noted.
 Report # F8366.01-119-19
 Date 9/15/16 Tech SAN

TOLERANCES UNLESS SPECIFIED		LMT-MERCER GROUP	
FINISH	3.00	DATE TESTED	9/15/16
ANGULAR	XX	TESTER	SA
LINE	0.25	QUALITY CONTROL	SA
SIZE	1.00	DESIGNED BY	SA
XXX	0.250	PART NUMBER	IMP-CAL-217
		DESIGNED BY	SA
		SCALE	2:1
		APPROVED	SA
		FIELD DATE	9/15/16
		SCALE	2:1
		APPROVED	SA
		FIELD DATE	9/15/16
		SCALE	2:1
		APPROVED	SA

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7
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Architectural Testing
 Test sample complies with these details.
 Deviations are noted.
 Report # **F8366-01-119-19**
 Date **9/15/16** Tech **SN**

REV	DESCRIPTION
A	ISSUED FOR ORDER
B	ISSUED FOR ORDER
C	ISSUED FOR ORDER
D	ISSUED FOR ORDER
E	ISSUED FOR ORDER

LMT-MERCER GROUP
 MANUFACTURING GROUP, INC.
 1000 W. 10TH ST.
 SUITE 100
 WICHITA, KS 67202
 TEL: 316.261.1000
 FAX: 316.261.1001
 WWW.LMTMERCER.COM

SHEET DESCRIPTION: **MANUFACTURING GROUP, INC.**
 CUSTOMER: **MANUFACTURING GROUP, INC.**
 PART NUMBER: **198-119**
 DRAWN: **SN**
 CHECKED: **SN**
 APPROVED: **SN**
 RELEASE DATE: **9/15/16**
 SCALE: **1:1**
 SHEET: **1 OF 1**

8
7
6
5
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3
2



F8366.01-119-19

APPENDIX B

Photographs



Photo No. 1
Post Mount with Applied Load



Photo No. 2
Inverted Top PVC Insert



Photo No. 3
Galvanized Post Mount Installed in Simulated Concrete