

TEST REPORT

Report No.: D0162.01-201-44

Rendered to:

TFC – A DIVISION OF CENTURION INDUSTRIES, INC.
Garrett, Indiana

PRODUCT TYPE: Pressure Equalized Rainscreen
SERIES/MODEL: 4 mm Composite Panel System

AAMA 508-07, *Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.*

Test Dates: 08/14/13
Through: 08/16/13
Report Date: 08/29/13
Test Record Retention Date: 08/29/17

1.0 Report Issued To: TFC – A Division of Centurion Industries, Inc.
1107 North Taylor Road
Garrett, Indiana 46738

2.0 Test Laboratory: Architectural Testing, Inc.
849 Western Ave. North
St. Paul, Minnesota 55117
651-636-3835

3.0 Project Summary:

3.1 Product Type: Pressure Equalized Rainscreen

3.2 Series/Model: 4 mm Composite Panel System

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test methods. Test specimen description and results are reported herein.

3.4 Test Dates: 08/14/2013 - 08/16/2013

3.5 Test Record Retention End Date: All test records for this report will be retained until August 29, 2017.

3.6 Test Location: Architectural Testing, Inc. test facility in St. Paul, Minnesota.

3.7 Test Sample Source: The test specimen was provided by the client. Representative samples of the test specimens will be retained by Architectural Testing for a minimum of four years from the test completion date.

3.8 Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimens reported herein. Test specimen construction was verified by Architectural Testing per the drawings located in Appendix B. Any deviations are documented herein or on the drawings.

3.9 List of Official Observers:

| <u>Name</u> | <u>Company</u> |
|------------------|-----------------------------|
| Karl Lips-Eakins | Architectural Testing, Inc. |

4.0 Test Methods:

AAMA 508-07, *Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.*

ASTM E 283-04, *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.* Testing was conducted at 75 Pa (1.57 psf) positive static air pressure difference.

ASTM E 1233-06 (Modified), *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Static Air Pressure Differential.* Testing was conducted for 100, three-second cycles from 240 Pa (5.0 psf) to 1200 Pa (25.0 psf) to 240 Pa (5.0 psf).

ASTM E 331-00, *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.* Testing was conducted at 300 Pa (6.24 psf) positive static air pressure difference for a 15 minute duration. Water was applied to the mock-up at a minimum rate of 5 gal/hr/ft².

AAMA 501.1-05, *Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure.* Testing was conducted with a dynamic pressure equivalent of 300 Pa (6.24 psf) for a 15 minute duration. Water was applied to the mock-up at a minimum rate of 5 gal/hr/ft².

ASTM E 330-02, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference.*

5.0 Test Specimen Description:

5.1 Product Sizes:

| Overall Area: 6.1 m ² (66.2 ft ²) | Width | | Height | |
|---|-------------|--------|-------------|--------|
| | millimeters | inches | millimeters | inches |
| Overall size | 2470 | 97-1/4 | 2489 | 98 |
| Panel size (x4) | 1225 | 48-1/4 | 1212 | 47-3/4 |

5.0 Test Specimen Description: (Continued)

5.2 Panel Construction: The wall system consisted of four composite panels that measured 4 mm (0.158") thick. The panels were constructed with a 0.118" thick plastic core and 0.020" thick aluminum interior and exterior skins, adhered to the plastic core. One 90° bend was utilized on all four sides of the panel with a 3/4" return leg. An aluminum extrusion was secured to the interior perimeter of the panel and secured with #6 x 1" screws. Extrusion corners were mitered and joined with a 4" x 4" piece of composite material. Horizontal joints, in the mid-field of the wall system, utilized a bent aluminum flashing to divert water towards the panel. The panels had 1/8" dia. weep holes along the bottom return leg spaced 6" from corners and mid-span.

3" long "F" shaped aluminum extrusions were utilized to secure the panels to the base wall, 2 per side, by fitting into the panel edge and screwed onto studs/sheathing with a #12 x 2" hex head screw. The perimeter of the wall system utilized an "L" shaped aluminum flashing. The intermediate joints of the wall panel system utilized an aluminum composite filler strip that slid into the panel backer extrusion.

5.3 Test Wall Construction: The test wall was constructed of 16 gauge, 6" galvanized steel studs. The steel studs were spaced 16" on center inside a 2x10 wood buck. The stud wall was covered with 1/8" thick clear lexan, sealed and secured to the exterior of the wall to simulate an air/water barrier. The wall panel system was then installed onto the clear polycarbonate in a manner consistent with normal construction procedures for the system. The clear lexan was calibrated to a pre-determined air leakage rate by drilling 1/8" diameter holes on the backside in a uniform pattern, making sure to create an even pressure drop and leakage rate across the wall and in each quadrant. The exterior of the test unit was sealed to the wood buck with silicone.

5.4 Reinforcement: No panel reinforcement was utilized.

5.5 Installation: Installation of the tested product was performed by the client. The panels were installed in a bottom to top and left to right order. The perimeter of the wall assembly was sealed with silicone.

5.6 Cavity Depth: 38 mm (1-1/2 in.)

5.7 Air Cavity Volume to Vent Area Ratio: 1.6 m³/m² (55.8 ft³/ft²)

6.0 Test Results: The temperature during testing was 26°C (79°F). The results are tabulated as follows:

Air Leakage (Infiltration per ASTM E 283)

| Pressure | Results | Allowed | Note |
|------------------|---|--|------|
| 75 Pa (1.57 psf) | 0.6 L/s/m ² (0.12 cfm/ft ²) | 0.6 L/s/m ² (0.11 cfm/ft ²) min. 0.7 L/s/m ² (0.13 cfm/ft ²) max. | 1 |

Pressure Cycling (per ASTM E 1233)

100 cycles from 240 Pa (5 psf) to 1200 Pa (25 psf) to 240 Pa (5 psf)

| Compartment #1 | Results | Allowed | Note |
|---------------------------|-------------------|------------------------|------|
| Cycle Time Lag | 0.01 sec. | 0.08 sec. max. | 2, 3 |
| Cycle Pressure Difference | 4.8 Pa (0.10 psf) | 600 Pa (12.5 psf) max. | |
| PASS / FAIL | PASS | -- | |

Static Water Penetration (per ASTM E 331)

| Pressure | Results | Allowed | Note |
|-------------------|---|---|------|
| 300 Pa (6.24 psf) | <0.01 m ² (<0.01 ft ²) | 0.30 m ² (3.20 ft ²) | 4, 5 |
| | PASS | | |

Dynamic Water Penetration (per AAMA 501.1)

| Pressure | Results | Allowed | Note |
|-------------------|---|---|------|
| 300 Pa (6.24 psf) | <0.01 m ² (<0.01 ft ²) | 0.30 m ² (3.20 ft ²) | 4, 5 |
| | PASS | | |

7.0 Test Results: Optional Performance

Uniform Load Deflection (per ASTM E 330)

| Pressure | Results | Allowed | Note |
|----------------------|----------------|-------------|------|
| taken on panel edge | | | |
| +2880 Pa (+60.0 psf) | 3.8 mm (0.15") | | 6, 7 |
| -2880 Pa (-60.0 psf) | 0.3 mm (0.01") | Report Only | |

Uniform Load Structural (per ASTM E 330)

| Pressure | Results | Allowed | Note |
|----------------------|------------------|-------------|------|
| taken on panel edge | | | |
| +2880 Pa (+60.0 psf) | <0.3 mm (<0.01") | | 6, 7 |
| -2880 Pa (-60.0 psf) | <0.3 mm (<0.01") | Report Only | |

Note #1: The calibrated leakage was achieved with twelve, 1/8" diameter holes drilled through the polycarbonate. All holes were evenly distributed in each stud cavity and located 6" above the bottom and the midspan of the wall.

Note #2: Pressure tap was attached through the air barrier at center of wall.

Note #3: Reference Pressure Cycling graph in Appendix A.

Note #4: Water percolated at the bottom of the panel at the weeps. Water was visibly present on the polycarbonate.

Note #5: Water on the polycarbonate air/water barrier surface was in the form of mist or droplets.

Note #6: Loads were held for 10 seconds.

Note #7: Tape and film were not used to seal against air leakage during structural testing.

General Note: All testing was performed in accordance with the referenced standards. This report is not intended as a comprehensive evaluation of the system regarding performance and application to specific buildings.

8.0 Test Equipment:

- Computerized control panel to run positive pressures, cyclic pressures, and measure air leakage rates.
- Structural test chamber to mount the test wall, as to evaluate the performance of the wall panel system for static and cyclic pressures, as well as water penetration. The wall was situated such that the interior side of the test wall was accessible to observe air and water leakage.
- Dynamic wind generator to create a wind pressure to test the wall panel system for dynamic water penetration.
- Computerized data management equipment to read, log, and graph differential pressures.

The service life of this report will expire on the stated Test Record Retention End Date, at which time such materials as drawings, data sheets, samples of test specimens, copies of this report, and any other pertinent project documentation, shall be discarded without notice.

If test specimen contains glazing, no conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimens can be made. 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 Architectural Testing, Inc.

For ARCHITECTURAL TESTING, Inc.

Karl A. Lips-Eakins
Senior Technician

Daniel A. Johnson
Director, Regional Operations

KLE/jb

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

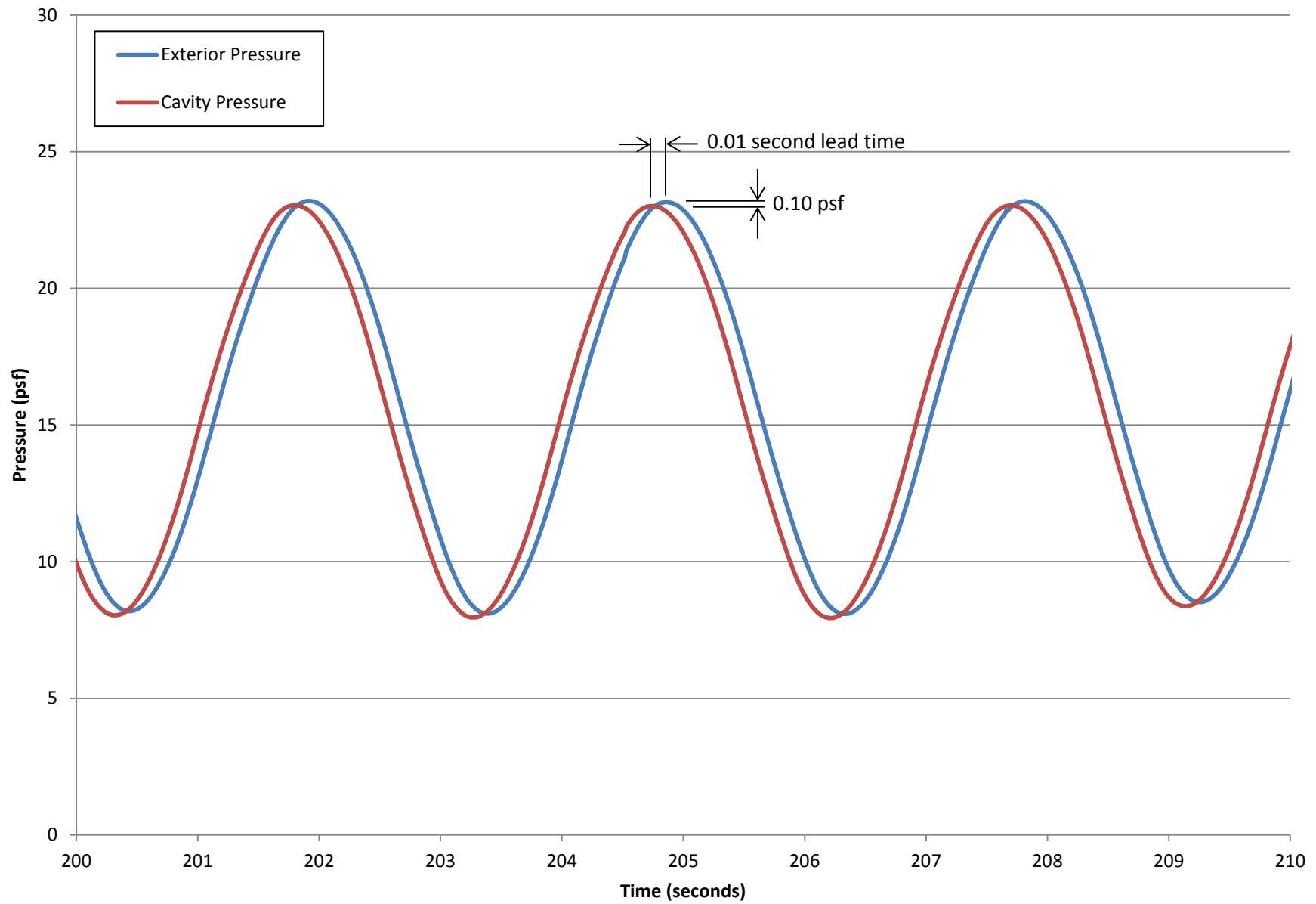
Appendix-A: Graph (1)

Appendix-B: Drawings (2)

Appendix A

Graph

ASTM E 1233 Pressure Equalization Testing



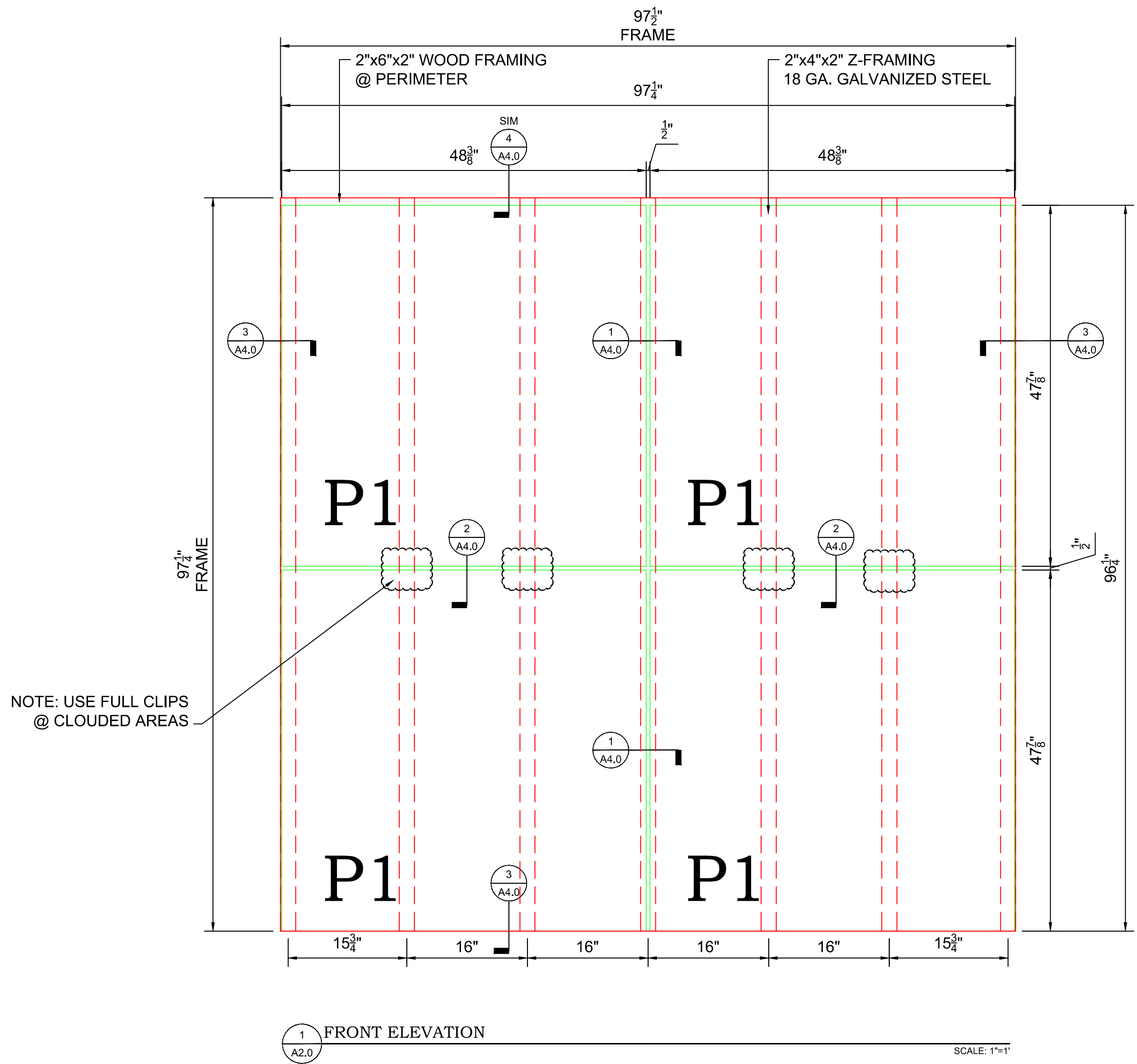


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Appendix B

Drawings

APPROVED FOR FABRICATION & CONSTRUCTION
 THIS DESIGN IS BASED ON APPROVAL DRAWINGS AND T.F.C.'S PROJECT SCOPE OF WORK.
 DTLR: _____ DATE: _____
 P. M.: _____ DATE: _____

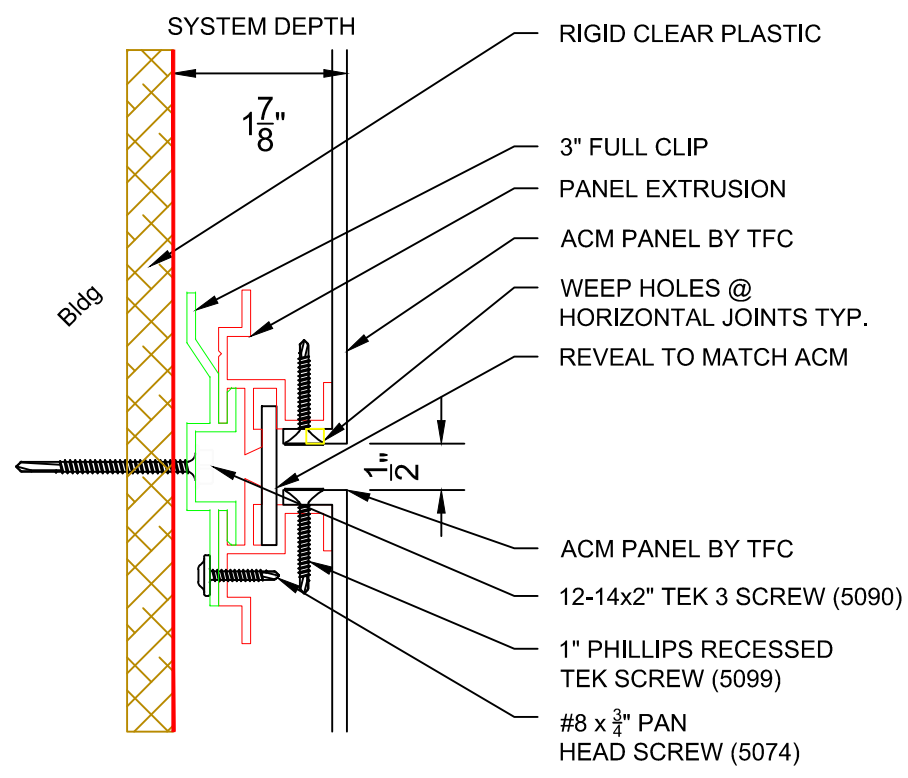


| REV. # | DESCRIPTION | DATE | DTL. | REV. # | DESCRIPTION | DATE | DTL. |
|--------|----------------------|---------|------|--------|-------------|------|------|
| * | FAB AND CONSTRUCTION | 7-24-13 | DF | | | | |

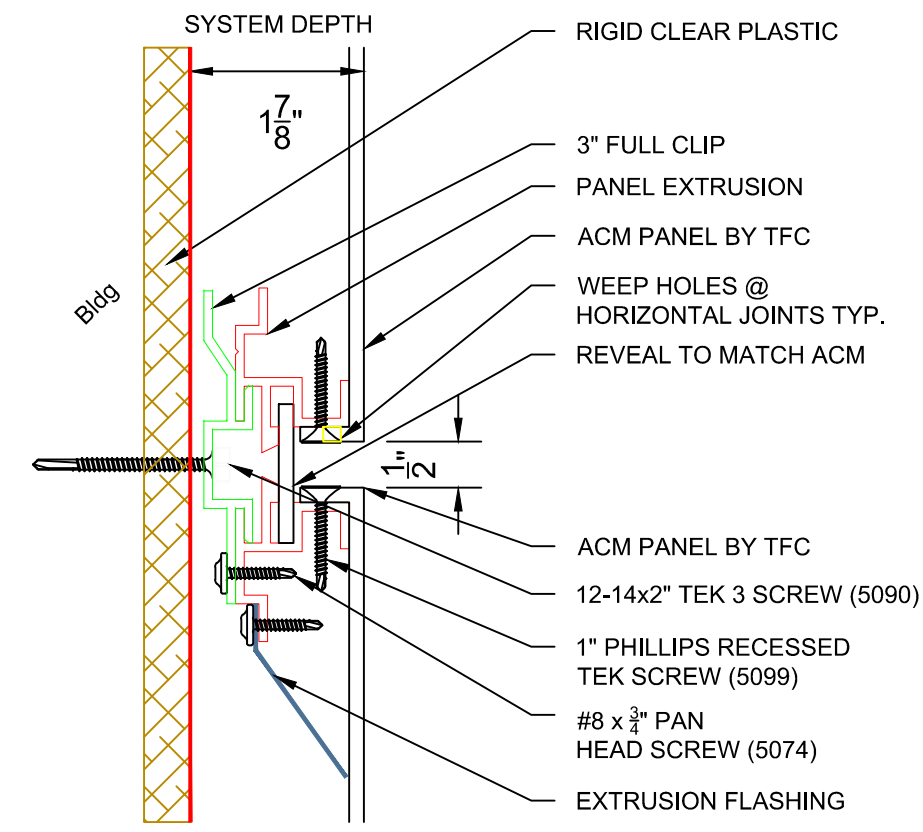
509 TEST PANEL'S WALL

ELEVATION
 JOB#: 509 TEST PANELS
 DATE: 7-24-13
 SCALE: 1" = 1'
 DRAWN BY: DF

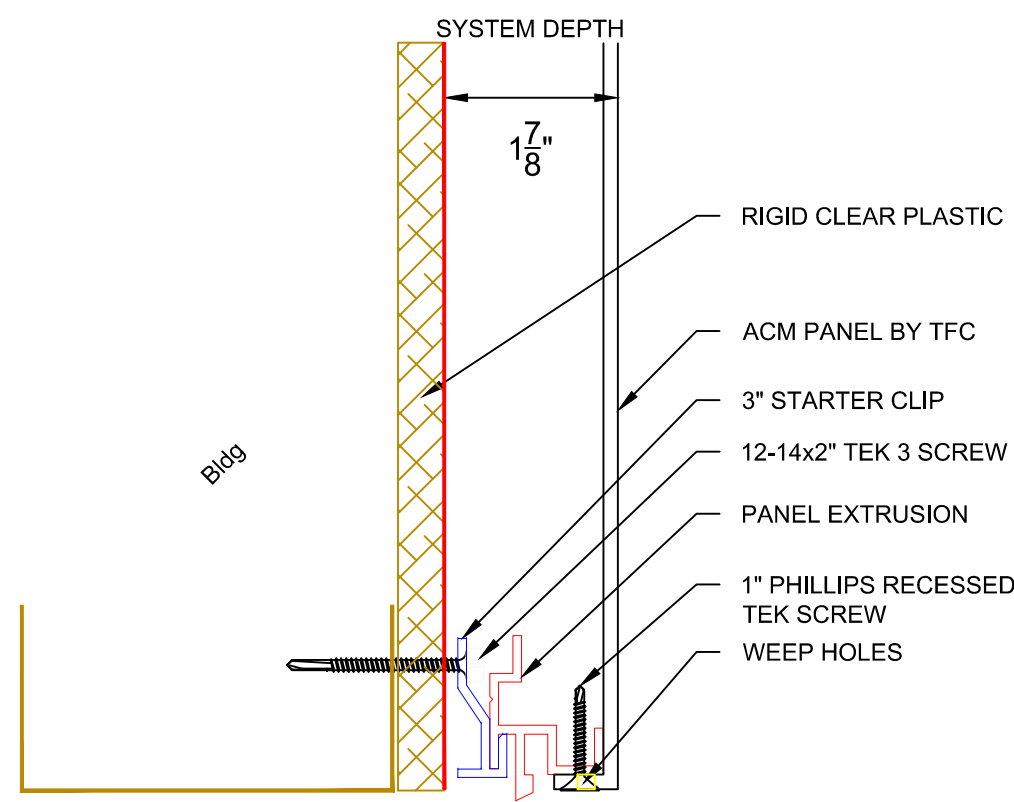
A2.0



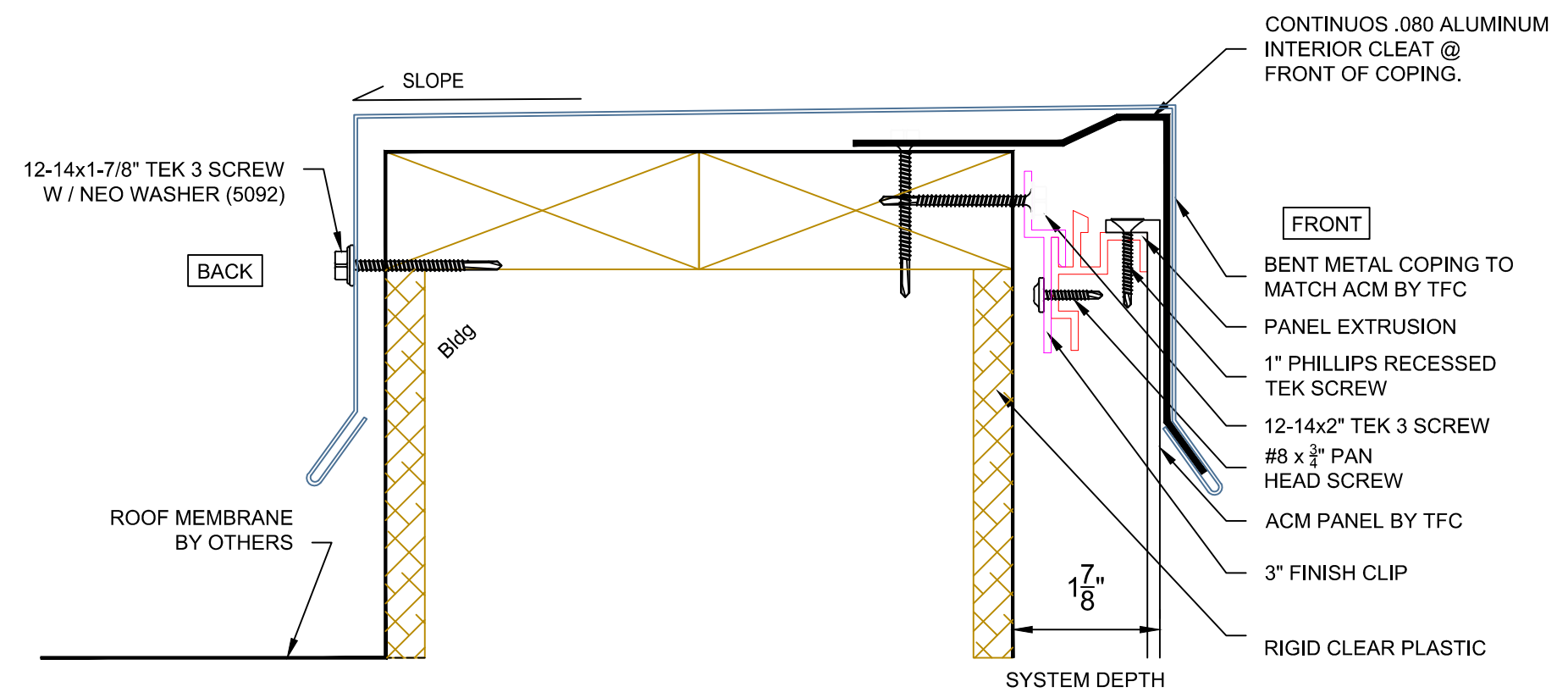
1 TYPICAL DETAIL @ JOINT/VERTICAL
 A4.0 SCALE: 6"=1'-0"



2 TYPICAL DETAIL @ JOINT/ HORIZONTAL
 A4.0 SCALE: 6"=1'-0"



3 DETAIL @ BASE / END DETAIL
 A4.0 SCALE: 6"=1'-0"



4 DETAIL @ BENT METAL COPING
 A4.0 SCALE: 6"=1'-0"

APPROVED FOR FABRICATION & CONSTRUCTION
 THIS DESIGN IS BASED ON APPROVAL DRAWINGS AND T.F.C.'S PROJECT SCOPE OF WORK.
 DTLR: _____ DATE: _____
 P. M.: _____ DATE: _____

| REV. # | DESCRIPTION | DATE | DTL. |
|--------|----------------------|---------|------|
| 1 | FAB AND CONSTRUCTION | 7-24-13 | DF |
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509 TEST PANEL'S WALL

DETAILS
 JOB#: 509 TEST PANELS
 DATE: 7-24-13
 SCALE: 6" = 1'
 DRAWN BY: DF