QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

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CLIENT: **Wall Panel Systems, Inc.**
421 Business Center Court
Redlands, CA 92373
909-307-8888

Test Report No: RJ4204-1	Date: September 30, 2015

SAMPLE ID: The test specimens were identified by the client as:

A) Six ES-400 Thru-Faced Fastener Exterior Cladding System.
B) Six ES-500 Concealed Fastener Exterior Cladding System.

SAMPLING DETAIL: Test specimens were submitted to the laboratory directly by the client. The specimen preparation was processed by QAI personal at the QAI Laboratory.

DATE OF RECEIPT: Specimens were received at QAI on August 25, 2015.

TESTING PERIOD: September 18 thru 28, 2015.

AUTHORIZATION: Testing authorized by Brian Sanders under QAI Proposal # MB-2015-021901R1.

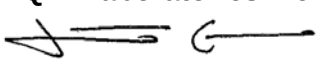
TEST REQUESTED: Uniform Load Test per ASTM E 330/ E 330M-14, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*.

TEST RESULTS: Test results are provided on pages 3 thru 6 of this report.

Prepared By

Larry Burmer
Project Leader-Physical Testing

Signed for and on behalf of QAI Laboratories Inc.



Jose Elias
Operations Manager

UNIFORM LOAD TEST PER ASTM E 330

Test Panel Construction

Three positive and three negative test specimens for each of the two systems were constructed by the Client for the tests. Each wall panel system was installed over nominal 2 x 4 wood framing and measured 4' x 8' overall. Detailed drawings of the two systems are provided in the appendix of this report.

Test Procedure

Testing was performed in accordance with ASTM E 330-14, Procedure B. Dial indicators were placed at the mid-span of the specimen in between attachment points.

For positive load tests, a load of 15 psf was applied to the test assembly and then increased in 15 psf increments up to a load of 90 psf. The load was then increased in 30 psf up to a test load of 210 psf. The load was held for a minimum of 10 seconds at each increment while deflection readings were recorded. The load was released after each increment and permanent set recorded in not less than one or more than five minutes after the removal of the load.

For negative load tests, a load of 15 psf was applied to the test assembly and then increased in 15 psf increments until failure. The load was held for a minimum of 10 seconds at each increment while deflection readings were recorded. The load was released after each increment and permanent set recorded in not less than one or more than five minutes after the removal of the load.

For positive load tests, 6-mil thick plastic was placed over the exterior side of the test assembly and using a reversible controllable blower system, a vacuum applied to the test chamber.

For negative load tests, an up-lift load was applied uniformly to the interior side of the test assembly through 6-mil thick plastic bag using the same reversible controllable blower system.

The test load was measured using a digital manometer with an accuracy of ± 0.5%.

Deflection readings were recorded using a calibrated dial indicators within a tolerance of ± 0.001 inches.

Photographs of both the positive and negative test assemblies are provided in the appendix of this report.

UNIFORM LOAD TEST PER ASTM E 330 (CONT.)

Test Results

ES-500 Concealed Fastener System Positive Load Test			
Applied Load (psf)	Deflection Under Load (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.031	0.042	0.045
30	0.064	0.083	0.098
45	0.077	0.096	0.115
60	0.088	0.107	0.131
75	0.101	0.128	0.148
90	0.115	0.149	0.165
120	0.162	0.228	0.196
150	0.295	0.319	0.257
180	0.418	0.487	0.449
210	0.454	0.563	0.678

ES-500 Concealed Fastener System Positive Load Test			
Applied Load (psf)	Permanent Set (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.000	0.000	0.001
30	0.001	0.000	0.001
45	0.001	0.001	0.002
60	0.002	0.001	0.002
75	0.002	0.001	0.003
90	0.002	0.001	0.003
120	0.006	0.004	0.005
150	0.008	0.006	0.008
180	0.010	0.008	0.009
210	0.013	0.009	0.011

Observations

All three specimens withstood a test load of 210 psf without failure. No damage to the aluminum brackets or edge trim was observed. All fasteners remained intact.

UNIFORM LOAD TEST PER ASTM E 330 (CONT.)

Test Results (Cont.)

ES-500 Concealed Fastener System Negative Load Test			
Applied Load (psf)	Deflection Under Load (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.094	0.044	0.045
30	0.229	0.091	0.242
45	* * *	0.241	* * *

ES-500 Concealed Fastener System Negative Load Test			
Applied Load (psf)	Permanent Set (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.004	0.008	0.006
30	0.039	0.020	0.042
45	* * *	0.041	* * *

Observations

Specimen No.1

At an ultimate test load of 45 psf, the panel fasteners (screws) that attach the panel clips to the back of the exterior panel pulled out of the panel. No damage to the aluminum clips or edge trim was observed.

Specimen No.2

At an ultimate test load of 60 psf, the panel fasteners (screws) that attach the panel clips to the back of the exterior panel pulled out of the panel. No damage to the aluminum clips or edge trim was observed.

Specimen No.3

At an ultimate test load of 45 psf, the panel fasteners (screws) that attach the panel clips to the back of the exterior panel pulled out of the panel. No damage to the aluminum clips or edge trim was observed.

A photograph showing the results of the negative load test is provided in the appendix of this report.

UNIFORM LOAD TEST PER ASTM E 330 (CONT.)

Test Results (Cont.)

ES-400 Thru-Faced Fastener System Positive Load Test			
Applied Load (psf)	Deflection Under Load (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.057	0.051	0.058
30	0.111	0.101	0.116
45	0.145	0.135	0.140
60	0.181	0.167	0.164
75	0.257	0.246	0.241
90	0.332	0.310	0.319
120	0.375	0.362	0.367
150	0.408	0.412	0.427
180	0.442	0.503	0.515
210	0.499	0.566	0.579

ES-400 Thru-Faced Fastener System Positive Load Test			
Applied Load (psf)	Permanent Set (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.000	0.000	0.001
30	0.000	0.001	0.001
45	0.001	0.001	0.002
60	0.001	0.001	0.002
75	0.002	0.002	0.003
90	0.002	0.002	0.003
120	0.003	0.003	0.006
150	0.004	0.007	0.009
180	0.006	0.009	0.011
210	0.010	0.012	0.013

Observations

All three specimens withstood a test load of 210 psf without failure. No damage to the aluminum edge trim was observed. All fasteners remained intact.

UNIFORM LOAD TEST PER ASTM E 330 (CONT.)

Test Results (Cont.)

ES-400 Thru-Faced Fastener System Negative Load Test			
Applied Load (psf)	Deflection Under Load (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.020	0.017	0.016
30	0.030	0.033	0.030
45	0.045	0.052	0.048
60	0.073	0.079	0.079
75	0.106	0.113	0.118
90	0.217	0.173	0.195
105	0.233	* * *	* * *

ES-400 Thru-Faced Fastener System Negative Load Test			
Applied Load (psf)	Permanent Set (in)		
	Specimen No.1	Specimen No.2	Specimen No.3
0	0.000	0.000	0.000
15	0.001	0.001	0.001
30	0.001	0.002	0.002
45	0.002	0.003	0.004
60	0.004	0.006	0.006
75	0.007	0.008	0.010
90	0.009	0.012	0.013
105	0.013	* * *	* * *

Observations

Specimen No.1

At an ultimate test load of 109 psf, the through-face panel fasteners (screws) pulled out of the aluminum edge trim. No damage to the aluminum edge trim was observed.

Specimen No.2

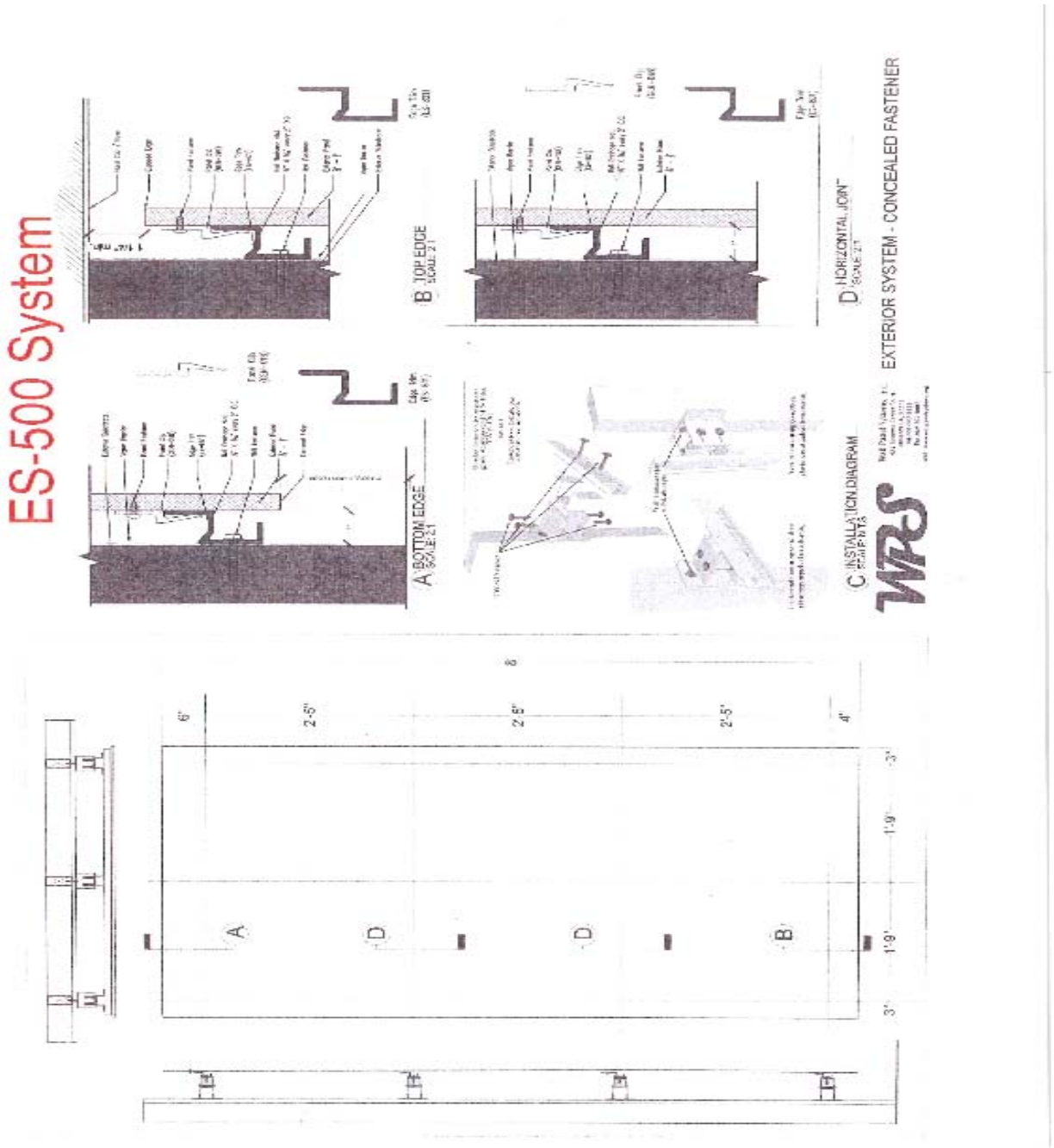
At an ultimate test load of 99 psf, the through-face panel fasteners (screws) pulled out of the aluminum edge trim. No damage to the aluminum edge trim was observed.

Specimen No.3

At an ultimate test load of 104 psf, the through-face panel fasteners (screws) pulled out of the aluminum edge trim. No damage to the aluminum edge trim was observed.

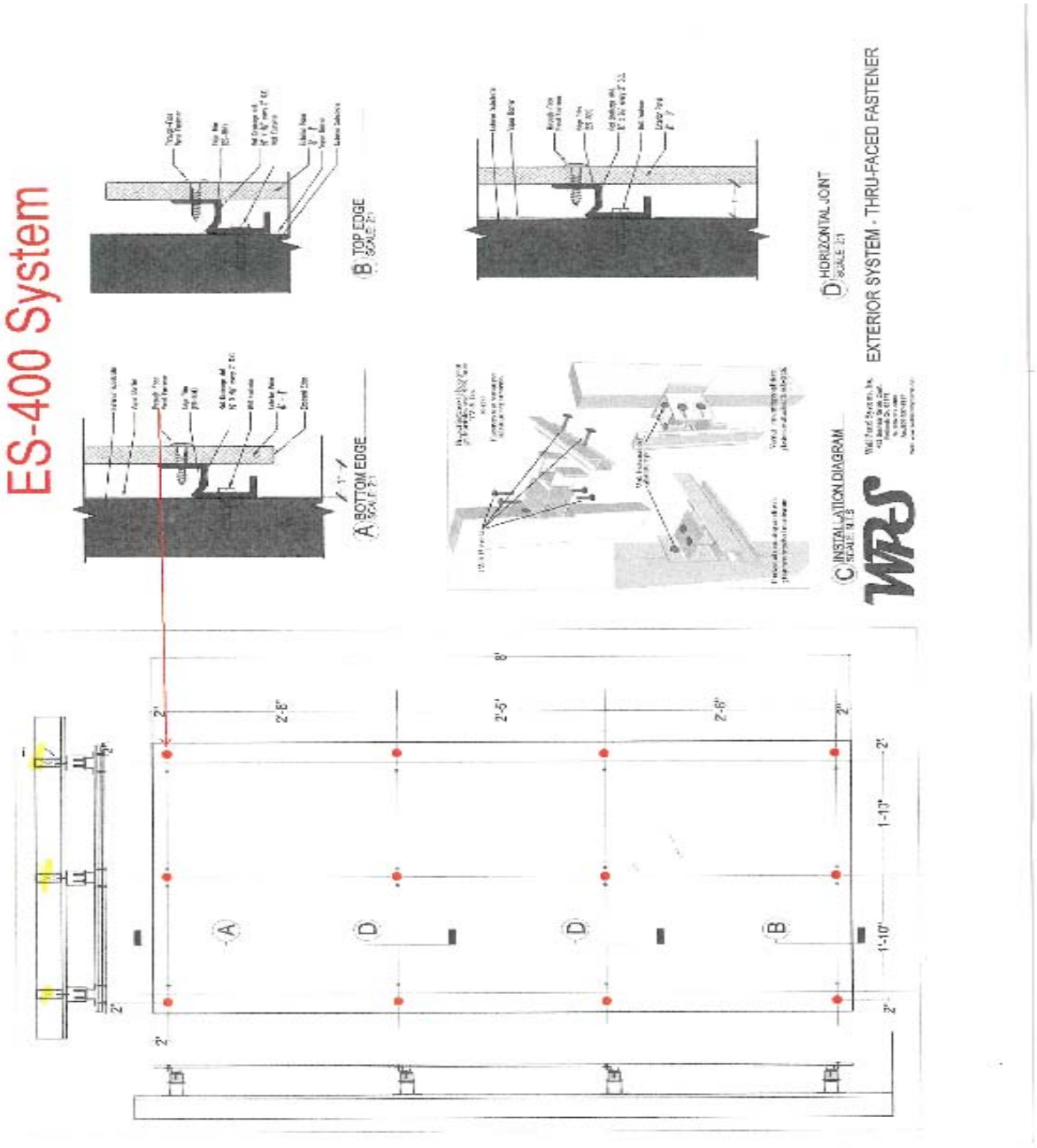
A photograph showing the results of the negative load test is provided in the appendix of this report.

APPENDIX



Drawing No.1
ES-500 Concealed Fastener Exterior Cladding System

APPENDIX



Drawing No.2
ES-400 Thru-Faced Fastener Exterior Cladding System

APPENDIX

Photograph No.1
ES-500 negative load test setup.

APPENDIX

Photograph No.2
ES-500 positive load test setup.

APPENDIX

Photograph No.3
ES-400 negative load test setup.

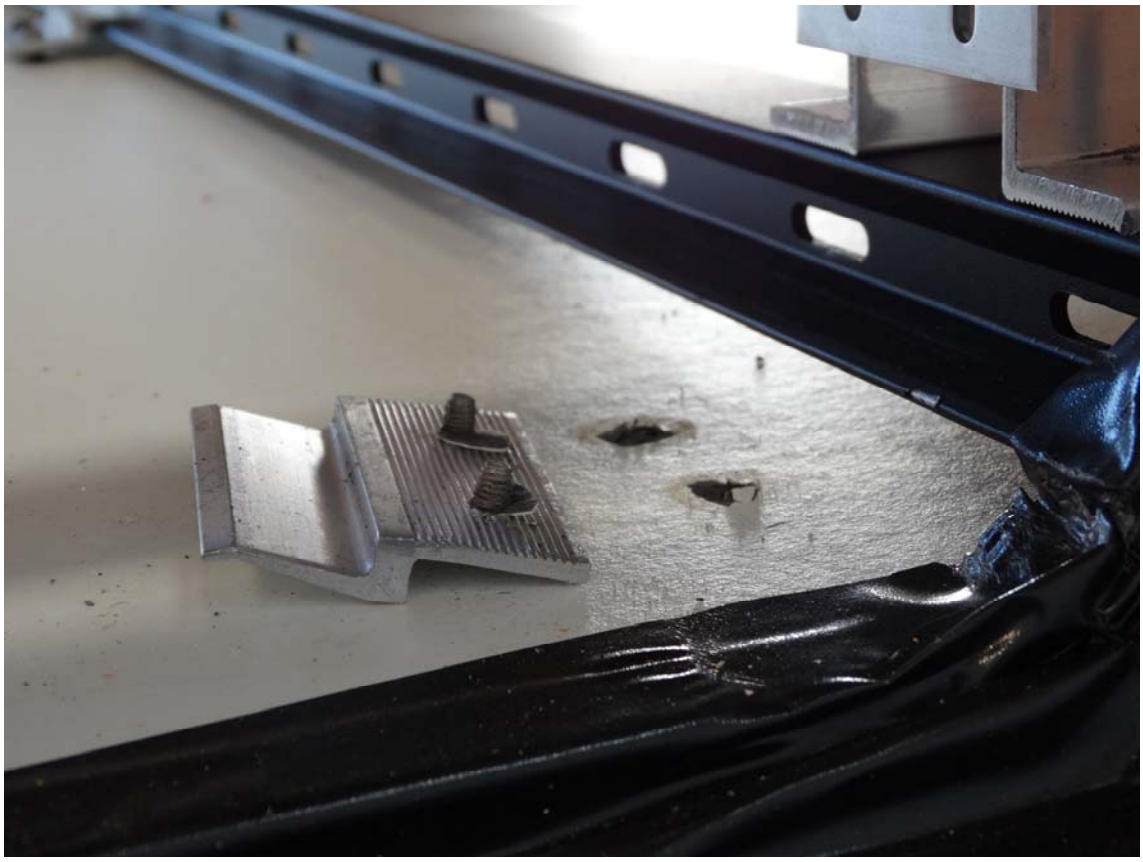
APPENDIX

Photograph No.4
ES-400 positive load test setup.

APPENDIX

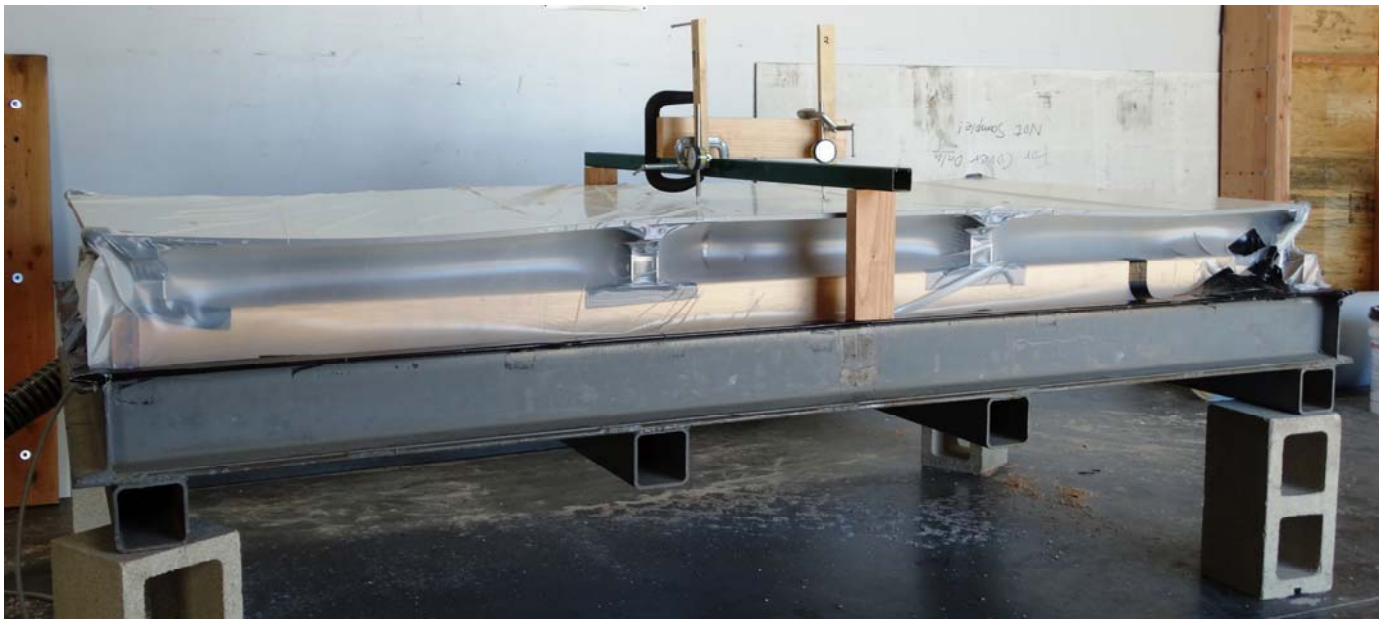
Photograph No.5
ES-500 positive load test

APPENDIX



Photograph No.6
Typical results on negative load test on ES-500 cladding systems.
The panel fasteners (screws) that attach the panel clips to the back of the exterior panel pulled out of the panel

APPENDIX



Photograph No.7
ES-400 positive load test

APPENDIX

Photograph No.8
Typical results on negative load test on ES-400 cladding systems.
The through-face panel fasteners (screws) pulled out of the aluminum edge trim

*******End of Report*******