TEST REPORT

TAS 201-94
TAS 202-94
TAS 203-94

REPORT NO.: 1996.03-106-11

RENDERED TO: REVIVAL SASH
New York, New York

PRODUCT TYPE: Triple Wood Fixed Window

 SERIES / MODEL: 1100

This report contains in its entirety:
   Cover Page: 1 page
   Body of Report: 10 pages
   Sketches: 2 pages
   Photograph: 1 page
   Drawings: 7 pages

2019.09.19 13:48:44 -04'00'

Test Date:  8/26/2019
Through:    8/27/2019
Report Date: 9/19/2019
Retention End Date: 8/27/2029
Miami-Dade Notification No.: MMO-2003

WWW.MOLIMO.NET
PROJECT SUMMARY:

PRODUCT TYPE:  Triple Wood Fixed Window
SERIES/MODEL:  1100

Molimo, LLC was contracted to perform testing on the above referenced product. Testing was conducted using Test Protocols TAS 201, TAS 202, and TAS 203 in accordance with the Florida Building Code for the High Velocity Hurricane Zone and Miami-Dade County requirements. The specimens tested met the performance requirements set forth in the referenced test protocols. The test results are summarized in the table below.

<table>
<thead>
<tr>
<th>Specimen #</th>
<th>Test Protocol</th>
<th>Design Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TAS 202</td>
<td>±75.0 psf</td>
</tr>
<tr>
<td></td>
<td>TAS 201 / TAS 203 (Large Missile)</td>
<td></td>
</tr>
</tbody>
</table>

PROJECT DETAILS:

Miami-Dade County Notification No.:  MMO-2003
Test Dates:  8/26/2019 – 8/27/2019
Test Record Retention End Date:  8/27/2029
Test Location:  Molimo, LLC test facility in York, Pennsylvania.
PROJECT SUMMARY: (Continued)

PROJECT DETAILS:
Test Specimen Source: The test specimens were provided by the client. Representative samples of the test specimen will be retained by Molimo for a minimum of ten years from the test completion date.

Drawing Reference: The test specimen drawings were supplied by the client. The test specimen construction was verified by Molimo and was found to be representative of the products tested. Test specimen drawings are located in Appendix C of this report. Any deviations are documented herein or on the drawings.

WITNESSES:
The following representatives witnessed all or part of the testing.

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael D. Stremmel, P.E.</td>
<td>Molimo, LLC</td>
</tr>
<tr>
<td>Joseph W. Enriquez</td>
<td>Molimo, LLC</td>
</tr>
</tbody>
</table>

TEST PROTOCOLS:

TAS 201-94 – Impact Test Procedures

TAS 202-94 – Criteria for Testing Impact and Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure

TAS 203-94 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading

TEST SPECIMEN DESCRIPTION:

PRODUCT SIZES:
- Overall Size: 188" wide x 110" high
- Overall Area: 143.6 ft²
- Individual Window Size (3): 62" wide x 110" high
- Mullion Size (2): 1/2" wide x 110" high

FRAME CONSTRUCTION:
- Material: Milled mahogany wood
- Corner Details: Coped and butted, secured with glue and two #9 x 3" SS flat head wood screws per corner
- Other Details: The frame was constructed of two milled pieces of wood. The exterior glazing stop was secured to the main frame with glue and #9 x 2" wood screws spaced 12" on center.
TEST SPECIMEN DESCRIPTION: (Continued)

**VERTICAL MULLION CONSTRUCTION:**

Material: Steel

**Assembly Details:** The vertical mullion was constructed from 1/2" thick x 6" deep steel plate. Each end of the mullion utilized a 6" x 6" x 1/4" thick steel anchor plate, fully welded to the vertical mullion.

Each adjacent window was secured to the mullion with 1/4"-20 x 2" long flat head machine screws, located within 6" from each end and spaced 16" on center.

**Sealant Details:** The exterior side of the mullion was sealed to the adjacent window frames with a bead of sealant.

**REINFORCEMENT:** No reinforcement was utilized.

**GLAZING DETAILS:** No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen can be made.

<table>
<thead>
<tr>
<th>Description</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Type</td>
<td>1-1/8&quot; IG</td>
</tr>
<tr>
<td>Glazing Construction (exterior to interior)</td>
<td>1/4&quot; thick annealed glass  &lt;br&gt;0.100&quot; Kuraray SGP interlayer  &lt;br&gt;1/4&quot; thick annealed glass  &lt;br&gt;1/2&quot; aluminum box type spacer system  &lt;br&gt;3/16&quot; thick tempered glass</td>
</tr>
<tr>
<td>Glazing Method</td>
<td>Set from the interior against a bead of DOW 995 silicone sealant and secured with wood glazing beads glazing beads. The glazing beads were secured to the frame with brad nails, spaced 12&quot; on center.</td>
</tr>
<tr>
<td>Glazing Bite</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>Daylight Opening Fixed area (3):</td>
<td>58-1/2&quot; x 106-1/2&quot;</td>
</tr>
</tbody>
</table>
TEST SPECIMEN DESCRIPTION: (Continued)

WEATHERSTRIPING: No weatherstripping was utilized.

DRAINAGE: No drainage was utilized.

HARDWARE: No hardware was utilized.

INSTALLATION: The specimen was installed into a Spruce-Pine-Fir wood lined structural steel test buck. The rough opening allowed for a 3/8” shim space. The exterior perimeter of the specimen was sealed with sealant.

<table>
<thead>
<tr>
<th>Location</th>
<th>Anchor Description</th>
<th>Anchor Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and left jamb</td>
<td>#14 x 3” flat head wood screw, through the frame into the wood buck</td>
<td>Located within 6” from each corner and spaced a maximum of 16” on center</td>
</tr>
<tr>
<td>Sill and right jamb</td>
<td>1-1/4” x 1-1/4” x 3” long, 1/8” thick aluminum angle clip, secured to the window frame with two #10 x 1-1/2” long flat head wood screws and secured to the wood buck with two #10 x 1-1/2” flat head wood screws</td>
<td>Located within 6” from each corner and spaced a maximum of 16” on center</td>
</tr>
<tr>
<td>Mullion ends</td>
<td>#14 x 3” long wood screws through pre-drilled holes in the mullion anchor plate into the wood test buck</td>
<td>6 screws located at each end of all vertical mullions</td>
</tr>
</tbody>
</table>
TEST RESULTS:

TAS 202-94, *Uniform Static Air Pressure*

The temperature during testing was 85 °F.

**Test Specimen #1:**

*Air infiltration tests were conducted per ASTM E 283 in accordance with TAS 202-94.*

<table>
<thead>
<tr>
<th>Title of Test</th>
<th>Results</th>
<th>Allowable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Infiltration at 1.57 psf</td>
<td>&lt;0.01 cfm/ft²</td>
<td>0.30 cfm/ft²</td>
</tr>
<tr>
<td>Air Infiltration at 6.24 psf</td>
<td>&lt;0.01 cfm/ft²</td>
<td>Report Only</td>
</tr>
</tbody>
</table>

*Static Pressure tests were conducted per ASTM E 330 in accordance with TAS 202-94. All pressures were maintained for a duration of 30 seconds.*

<table>
<thead>
<tr>
<th>Title of Test</th>
<th>Indicator #</th>
<th>Deflection (in)</th>
<th>Permanent Set (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Measured</td>
<td>Allowed</td>
</tr>
<tr>
<td>+56.25 psf (50% of Test Pressure)</td>
<td>1</td>
<td>0.03</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>&lt;0.01</td>
<td>N/A</td>
</tr>
<tr>
<td>+75.0 psf (Design Pressure)</td>
<td>1</td>
<td>0.06</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>&lt;0.01</td>
<td>0.09</td>
</tr>
<tr>
<td>-56.25 psf (50% of Test Pressure)</td>
<td>1</td>
<td>0.11</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.01</td>
<td>N/A</td>
</tr>
<tr>
<td>-75.0 psf (Design Pressure)</td>
<td>1</td>
<td>0.18</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.05</td>
<td>0.09</td>
</tr>
</tbody>
</table>

*Water Penetration tests were conducted per ASTM E 331 in accordance with TAS 202-94.*

<table>
<thead>
<tr>
<th>Title of Test</th>
<th>Test Pressure</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Penetration at 15% of Positive Design Pressure</td>
<td>11.28 psf</td>
<td>PASS</td>
</tr>
</tbody>
</table>
TEST RESULTS: (Continued)

TAS 202-94, Uniform Static Air Pressure

Test Specimen #1:

Static Pressure tests were conducted per ASTM E 330 in accordance with TAS 202-94.
All pressures were maintained for a duration of 30 seconds.

<table>
<thead>
<tr>
<th>Title of Test</th>
<th>Indicator #</th>
<th>Deflection (in)</th>
<th>Permanent Set (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Measured</td>
<td>Allowed</td>
</tr>
<tr>
<td>+112.5 psf (Test Pressure)</td>
<td>1</td>
<td>0.14</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>-112.5 psf (Test Pressure)</td>
<td>1</td>
<td>0.26</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Results: The test specimen displayed no signs of failure during or upon completion of TAS 202 testing; as such the test specimen(s) satisfy the requirements of TAS 202.
TEST RESULTS: (Continued)

TAS 201-94, Large Missile Impact Procedures

The temperature during testing was 81 °F.

Missile Weight: 9.19 lb  
Missile Length: 96-5/8"  

TEST SPECIMEN #1:

<table>
<thead>
<tr>
<th>Impact #</th>
<th>Missile Speed (ft/s)</th>
<th>Observations</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49.1</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>2</td>
<td>49.4</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>3</td>
<td>49.4</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>4</td>
<td>50.1</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>5</td>
<td>50.4</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>6</td>
<td>50.3</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>7</td>
<td>50.6</td>
<td>Fractured the exterior laminated glass and the interior tempered glass. No penetration.</td>
<td>PASS</td>
</tr>
<tr>
<td>8</td>
<td>50.3</td>
<td>Fractured the exterior laminated glass. No penetration.</td>
<td>PASS</td>
</tr>
</tbody>
</table>

Missile Weight: 9.20 lb  
Missile Length: 98-5/8"

Note: Reference Sketch #2 for impact locations.

RESULTS: The large missiles impacted each target location. Each impact location was carefully inspected, and no signs of penetration, rupture, or opening were observed after the missile impact test; as such each test specimen satisfies the large missile requirements of TAS 201.
TEST RESULTS: (Continued)

TAS 203-94, Cyclic Wind Pressure Loading

The temperature during testing was 81 °F.

Test Specimen #2:

Design Pressure: ±75.0 psf

POSITIVE PRESSURE LOADING SEQUENCE

<table>
<thead>
<tr>
<th>Loading Sequence</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Range (psf)</td>
<td>15.0 – 37.5</td>
<td>0 – 45.0</td>
<td>37.5 – 60.0</td>
<td>22.5 – 75.0</td>
</tr>
<tr>
<td>Number of Cycles</td>
<td>3500</td>
<td>300</td>
<td>600</td>
<td>100</td>
</tr>
<tr>
<td>Average Cycle Time (seconds)</td>
<td>3.7</td>
<td>6.0</td>
<td>4.0</td>
<td>6.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Maximum Deflection (in)</th>
<th>Permanent Set (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>0.01</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

NEGATIVE PRESSURE LOADING SEQUENCE

<table>
<thead>
<tr>
<th>Loading Sequence</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Range (psf)</td>
<td>22.5 – 75.0</td>
<td>37.5 – 60.0</td>
<td>0 – 45.0</td>
<td>15.0 – 37.5</td>
</tr>
<tr>
<td>Number of Cycles</td>
<td>50</td>
<td>1050</td>
<td>50</td>
<td>3350</td>
</tr>
<tr>
<td>Average Cycle Time (seconds)</td>
<td>6.0</td>
<td>4.5</td>
<td>6.5</td>
<td>4.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator #</th>
<th>Maximum Deflection (in)</th>
<th>Permanent Set (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.19</td>
<td>0.10</td>
</tr>
<tr>
<td>2</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Note: Reference Sketch #1 for indicator locations. The deflection/permanent set reported is the overall deflection between three points (longest unsupported span).

Result: No signs of failure in any area of the test specimens were observed during the cyclic loading tests; as such the test specimens satisfy the cyclic loading requirements of TAS 203.
LABORATORY COMPLIANCE STATEMENTS: The following are provided as required by the referenced protocols for the testing reported

Upon completion of testing, the specimens tested in accordance with TAS 201-94 met the requirements of Section 1626 of the Florida Building Code, Building.

Upon completion of testing, the specimens tested in accordance with TAS 202-94 met the requirements of Section 1620 of the Florida Building Code, Building.

Upon completion of testing, the specimens tested in accordance with TAS 203-94 met the requirements of Section 1626 of the Florida Building Code, Building.

Tape and film were not used to seal against air leakage during cyclic pressure loading.
A copy of this report, detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Molimo, LLC for the entire test record retention period. At the end of this retention period, the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. This test 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 specimen(s) tested. This report may not be reproduced, except in full, without the written permission of Molimo, LLC.

For MOLIMO, LLC:

Joseph W. Enriquez  
Project Manager

Michael D. Stremmel, P.E.  
Senior Project Engineer

Attachments (pages): This report is complete only when all attachments listed are included.
   Appendix-A: Sketches (2)
   Appendix-B: Photograph (1)
   Appendix-C: Drawings (7)

This report was produced from controlled document template MMO-00043, Rev 2, 8/28/2018.
Appendix A

Sketches
Appendix B

Photograph

Photo #1
Triple Fixed Window (exterior view)
Appendix C

Drawings
ANCHOR LAYOUT (ALL METHODS)

FIXED GLAZE TO FRAME

6" MAX FRAME SIZE

6" MAX FROM CORNERS

6" MAX O.C.

TYPICAL

16" MAX O.C.

TYPICAL

110" MAX FRAME SIZE

6" MAX FROM CORNERS

6" MAX FROM CORNERS

6" MAX FROM CORNERS

6" MAX FROM CORNERS

6" MAX FROM CORNERS
ALL ELEVATIONS ARE VIEWED FROM THE EXTERIOR

ANCHOR LAYOUT
COMBO Qty: 1

Aluminum Angle Install at Right Side

1/2" Mullion
Qty: 2

Drill and tap for 1/4-20 screws (typ.)

Exterior View

Thru screw install at Top
Thru screw install at Left Side

Aluminum Angle Install at Bottom

110 3/4" OVERALL ROUGH OPENING

1/4" End plate
1/4" End plate

189 1/4" OVERALL ROUGH OPENING

1/4" End plate
1/4" End plate

6 1/8"
7 1/8"
23 1/8"
24 1/8"
39 1/8"
40 1/8"
55 1/8"
56 1/8"
71 1/8"
72 1/8"
87 1/8"
88 1/8"
104 1/8"
105 1/8"

6 1/8"
7 1/8"
23 1/8"
24 1/8"
39 1/8"
40 1/8"
55 1/8"
56 1/8"
71 1/8"
72 1/8"
87 1/8"
88 1/8"
104 1/8"
105 1/8"

3/8"
3/8"
3/8"
3/8"

1 1/4" 1 1/4" 1 1/4" 1 1/4"

1/2" Mullion Qty: 2

Thru screw install at Top

Drill and tap for 1/4-20 screws (typ.)

Exterior View

Thru screw install at Left Side

Aluminum Angle Install at Bottom
2 X 10 WOOD BUCK THROUGH FRAME

2 X 10 WOOD BUCK FLAT STRAP ANCHOR

2 X 10 WOOD ALUMINUM ANGLE ANCHOR

Not Tested
<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Remarks/Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frame</td>
<td>Mahogany</td>
</tr>
<tr>
<td>2</td>
<td>Exterior glass stop</td>
<td>Mahogany</td>
</tr>
<tr>
<td>3</td>
<td>Interior glass stop</td>
<td>Mahogany</td>
</tr>
<tr>
<td>4</td>
<td>#10 x 2&quot; Stainless Steel Screw</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Structural silicone</td>
<td>DOW Corning</td>
</tr>
</tbody>
</table>

**Fixed Transom**

1. Frame
2. Exterior Glass Stop
3. Interior Glass Stop