

6 February 2024

State of Florida- Metal Building Component Product Approval
EQUIVALENCY LETTER
M&A Project No. 23176S

Steel Buildings and Structures, Inc.
P.O. Box 1287
Mount Airy, NC 27030

RE: AG Metal Roof Panel
FL22561-R1

Dear Mr. Estrada:

Per your request, Moore and Associates Engineering and Consulting, Inc. (M&A) has developed this letter to confirm that the subject AG metal roof panel complies with the 2023 8th Edition of the Florida Building Code (FBC). The 2023 FBC, in turn, references the latest edition of ASCE/SEI 7 which is ASCE/SEI 7-22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures regarding wind loading of components and cladding.

With regard to determining the equivalency of the subject roof panel, M&A reviewed the testing data developed by American Test Lab, Inc. in Brevard, NC. The roof panel specimens were tested to failure. The testing considered uplift and suction wind pressures on the panel as well as performance of connectors and perimeter cold formed steel tube framing. M&A then studied Chapter 16- Structural Design of the 2023 FBC and Chapter 30 Wind Loads: Components and Cladding of ASCE/SEI 7-22. Calculations were then performed to determine applicable panel wind pressures. These pressures were found to be less than the minimum ultimate (failure) pressures determined by testing when utilizing a minimum safety factor of 1.5 against failure. The actual safety factor against failure was determined to be 2.02.

Based on the above research and calculations, M&A has determined that the subject roof panel's performance under the 2023 FBC is equivalent to the roof panel's performance under the 2020 FBC.

Copies of reference materials as well as structural calculations are attached to this equivalency letter.

Please contact me at (803) 279-7799 or (336) 415-3540 if you have any questions or need additional information.

Sincerely,

MOORE AND ASSOCIATES ENGINEERING AND CONSULTING, INC.



Wayne S. Moore, MSCE, P.E, S.E.
Principal- Senior Civil/Structural Engineer
FL PE #57170



Wayne
S Moore

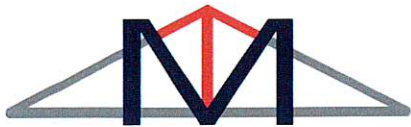
Digitally signed
by Wayne S
Moore
Date: 2024.02.06
13:16:06 -05'00'

Attachments

C: Project File

This item has been digitally signed and sealed
by Wayne S. Moore, PE. on the date adjacent to
the seal.

Printed copies of this document are not
considered signed and sealed and the signature
must be verified on any electronic copies.



MOORE AND ASSOCIATES
ENGINEERING AND CONSULTING

Client SGS

Job Name 2023 FBC

Subject ROOF

Job No. 231766

Sheet No. 15

Date 1

Computed by VGA

Checked By

$$V_w = 140 \text{ mph}$$

RISK CAT 1

EXP B

$$H_e = 20'$$

$$H_p = 21.875'$$

$$A_{TR} = (90'/2)(4') = 60'$$

$$GC_p (+) = 0.4$$

$$GC_p (-) = -2.2$$

$$P_w = q_h K_d [(GC_p) - (GC_{pi})]$$

$$= 16.38 \text{ #/ft}^2 (0.85) [(0.4) - (-2.2)]$$

$$= 36.2 \text{ #/ft}^2$$

$$\text{MIN. } P_w = 1.5 (36.2 \text{ #/ft}^2)$$

$$= 54.3 \text{ #/ft}^2$$

$$\text{MIN. } P_p = 73 \text{ #/ft}^2 > \text{MIN. } P_w \quad \underline{\text{ok}}$$

CHAPTER 30

WIND LOADS: COMPONENTS AND CLADDING

30.1 SCOPE

30.1.1 Building Types This chapter applies to the determination of wind pressures on components and cladding (C&C) on buildings.

1. Part 1 is applicable to an enclosed, partially enclosed, or partially open
 - Low-rise building (see definition in Section 26.2); or
 - Building with $h \leq 60$ ft (18.3 m).

The building has a flat roof, gable roof, multspan gable roof, hip roof, monoslope roof, stepped roof, or sawtooth roof, and the wind pressures are calculated from a wind pressure equation.

2. Part 2 is applicable to an enclosed, partially enclosed, or partially open
 - Building with $h > 60$ ft (18.3 m).

The building has a flat roof, pitched roof, gable roof, hip roof, mansard roof, arched roof, or domed roof, and the wind pressures are calculated from a wind pressure equation.

3. Part 3 is applicable to an open building of all heights that has a pitched free roof, monoslope free roof, or troughed free roof.
4. Part 4 is applicable to building appurtenances such as roof overhangs, parapets, and rooftop equipment.
5. Part 5 is applicable to non-building structures – circular bins, silos, and tanks; rooftop solar panels and roof pavers.
 - Circular bins, silos, and tanks with $h \leq 120$ ft (38.6 m);
 - Rooftop solar panels: Buildings of all heights with flat roofs or gable or hip roofs with roof slopes less than or equal to 7 degrees; and
 - Roof pavers: Buildings of all heights with roof slopes less than or equal to 7 degrees.

30.1.2 Conditions A building that has design wind loads determined in accordance with this chapter shall comply with all of the following conditions:

1. The building is a regular-shaped building as defined in Section 26.2; and
2. The building does not have response characteristics that make it subject to across-wind loading, vortex shedding, or instability caused by galloping or flutter; nor does it have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.

30.1.3 Limitations The provisions of this chapter take into consideration the load magnification effect caused by gusts in

resonance with along-wind vibrations of flexible buildings. The loads on buildings that do not meet the requirements of Section 30.1.2 or that have unusual shapes or response characteristics shall be determined using recognized literature documenting such wind load effects or shall use the wind tunnel procedure specified in Chapter 31.

30.1.4 Shielding There shall be no reductions in velocity pressure caused by apparent shielding afforded by buildings and other structures or terrain features.

30.1.5 Air-Permeable Cladding Design wind loads determined from Chapter 30 shall be used for air-permeable claddings, including modular vegetative roof assemblies, unless approved test data or recognized literature demonstrates lower loads for the type of air-permeable cladding being considered.

30.2 GENERAL REQUIREMENTS

30.2.1 Wind Load Parameters Specified in Chapter 26 The following wind load parameters are specified in Chapter 26:

- Basic wind speed, V (Section 26.5),
- Wind directionality factor, K_d (Section 26.6),
- Exposure category (Section 26.7),
- Topographic factor, K_{zt} (Section 26.8),
- Ground elevation factor, K_e (Section 26.9),
- Velocity pressure exposure coefficient, K_z or K_h (Section 26.10.1); Velocity pressure, q_z (Section 26.10.2),
- Gust-effect factor (Section 26.11),
- Enclosure classification (Section 26.12), and
- Internal pressure coefficient, (GC_{pi}) (Section 26.13).

30.2.2 Minimum Design Wind Pressures The design wind pressure for C&C of buildings shall not be less than a net pressure of 16 lb/ft² (0.77 kN/m²) acting in either direction normal to the surface.

30.2.3 Tributary Areas Greater than 700 ft² (65 m²) C&C elements with tributary areas greater than 700 ft² (65 m²) shall be permitted to be designed using the provisions for main wind force resisting systems.

30.2.4 External Pressure Coefficients Combined gust-effect factor and external pressure coefficients for C&C, (GC_p) , are given in the figures associated with this chapter. The pressure coefficient values and gust-effect factor shall not be separated.

PART 1: LOW-RISE BUILDINGS

User Note: Use Part 1 of Chapter 30 to determine wind pressures on C&C of *enclosed, partially enclosed, or partially open low-rise buildings* that have roof shapes as specified in the applicable figures. The provisions in Part 1 are based on the Envelope Procedure, with *wind pressures calculated using the specified equation* as applicable to each building surface. For buildings for which these provisions are applicable, this method generally yields the lowest wind pressures of all analytical methods contained in this standard.

30.3 BUILDING TYPES

The provisions of Section 30.3 are applicable to an enclosed, partially enclosed, or partially open

- Low-rise building (see definition in Section 26.2); or
- Building with $h \leq 60$ ft (18.3 m).

The building has a flat roof, gable roof, multspan gable roof, hip roof, monoslope roof, stepped roof, or sawtooth roof. The steps required for the determination of wind loads on C&C for these building types are shown in Table 30.3-1.

30.3.1 Conditions For the determination of the design wind pressures on the C&C using the provisions of Section 30.3.2, the conditions indicated on the selected figure(s) shall be applicable to the building under consideration.

30.3.2 Design Wind Pressures Design wind pressures on C&C elements of low-rise buildings and buildings with $h \leq 60$ ft (18.3 m) shall be determined from the following equation:

$$p = q_h K_d [(GC_p) - (GC_{pi})] (lb/ft^2) \quad (30.3-1)$$

$$p = q_h K_d [(GC_p) - (GC_{pi})] (N/m^2) \quad (30.3-1.SI)$$

where

q_h = Velocity pressure evaluated at mean roof height h as defined in Section 26.10;

K_d = Wind directionality factor, see Section 26.6; and
 (GC_p) = External pressure coefficients given in

- Figure 30.3-1 (walls),
- Figures 30.3-2A–G (flat roofs, gable roofs, and hip roofs) and 30.5.2 (pitched free roofs),
- Figure 30.3-3 (stepped roofs),
- Figure 30.3-4 (multispan gable roofs),
- Figure 30.3-5A–B (monoslope roofs),
- Figure 30.3-6 (sawtooth roofs),
- Figure 30.3-7 (domed roofs),
- Figure 30.3-8 (arched roofs),
- Figure 30.3-2A (bottom surfaces of elevated buildings).

(GC_{pi}) = Internal pressure coefficient given in Table 26.13-1.

30.3.2.1 Bottom Horizontal Surface of Elevated Buildings. Design wind pressures for C&C elements on the bottom flat horizontal surface of elevated buildings shall be determined using the roof pressure coefficients from Figure 30.3-2A with the following modifications:

1. h_B shall be the height above grade of the bottom surface of the elevated building, as depicted in Figure 30.3-1A. The value of h shall equal h_B for determining zone dimensions

Table 30.3-1. Steps to Determine C&C Wind Loads for Enclosed, Partially Enclosed, and Partially Open Low-Rise Buildings.

Step 1: Determine risk category; see Table 1.5-1.

Step 2: Determine the basic wind speed, V , for applicable risk category; see Figure 26.5-1.

Step 3: Determine the wind load parameters:

- Wind directionality factor, K_d ; see Section 26.6 and Table 26.6-1.
- Exposure Category B, C, or D; see Section 26.7.
- Topographic factor, K_z ; see Section 26.8 and Figure 26.8-1.
- Ground elevation factor, K_e ; Section 26.9 and Table 26.9-1.
- Enclosure classification; see Section 26.12.
- Internal pressure coefficient, (GC_{pi}) ; see Section 26.13 and Table 26.13-1.

Step 4: Determine velocity pressure exposure coefficient, K_h ; see Table 26.10-1.

Step 5: Determine velocity pressure, q_h , Equation (26.10-1).

Step 6: Determine external pressure coefficient, (GC_p) :

- Walls; see Figure 30.3-1.
- Flat roofs, gable roofs, hip roofs; see Figure 30.3-2.
- Stepped roofs; see Figure 30.3-3.
- Multispan gable roofs; see Figure 30.3-4.
- Monoslope roofs; see Figure 30.3-5.
- Sawtooth roofs; see Figure 30.3-6.
- Domed roofs; see Figure 30.3-7.
- Arched roofs; see Figure 30.3-8.
- Bottom horizontal surface of elevated buildings; see Section 30.3.2.1.

Step 7: Calculate wind pressure, p ; Equation (30.3-1).

from Figure 30.3-2A. For elevated buildings with a flat bottom horizontal building surface and situated on a slope h_B shall be taken as the maximum height between the slope and the bottom of the elevated building.

2. Areas of the horizontal surface above partially enclosed spaces and areas extending a_B perpendicular to wall beneath the elevated building with plan dimension greater than 4 ft (1.2 m), as shown in the shaded regions in Figure 30.3-1A, shall be designed to resist positive pressures equal to the Zone 4 wall pressures obtained using Figure 30.3-1. The value of a_B shall equal $0.4 h_B$ or the width of the wall, whichever is smaller for determining zone dimensions from Figure 30.3-1A.

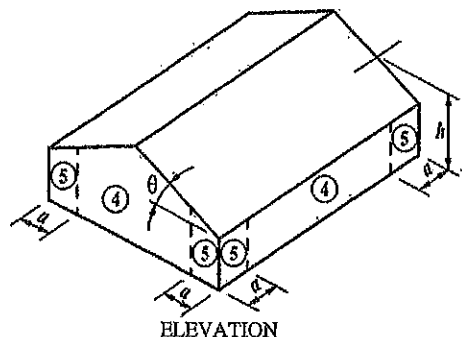
The loading convention shall denote downward loading on the bottom surface with negative pressure coefficients and upward loading on the bottom surface with positive pressure coefficients

EXCEPTION: The provisions of Section 30.3.2.1 do not apply to buildings with $h_B < 2$ ft (0.61 m).

PART 2: BUILDINGS WITH $h > 60$ ft ($h > 18.3$ m)

User Note: Use Part 2 of Chapter 30 for determining wind pressures for C&C of *enclosed, partially enclosed, or partially open buildings* with $h \leq 60$ ft (18.3 m) that have roof shapes as specified in the applicable figures. These provisions are based on the Directional Procedure with *wind pressures calculated from the specified equation* applicable to each building surface.

Diagram



Notation

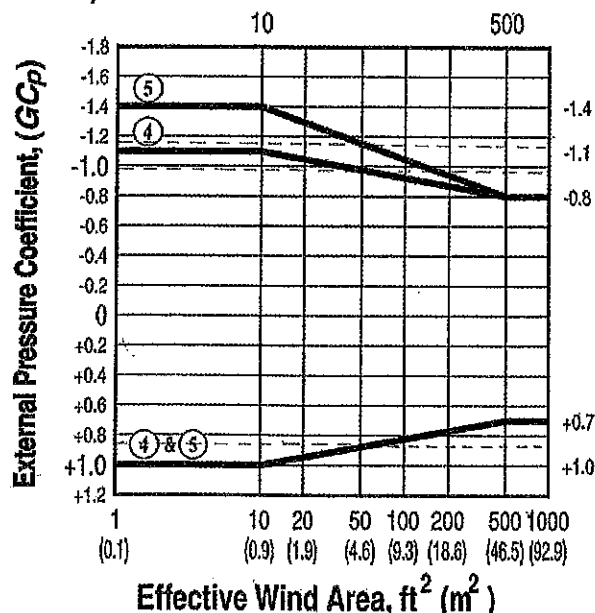
a = 10% of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).

Exception: For buildings with $\theta = 0^\circ$ to 7° and a least horizontal dimension greater than 300 ft (90 m), dimension a shall be limited to a maximum of $0.8h$.

h = Mean roof height, ft (m), except that eave height shall be used for $\theta \leq 10^\circ$.

θ = Angle of plane of roof from horizontal, degrees.

External Pressure Coefficient, (GC_p) - Walls

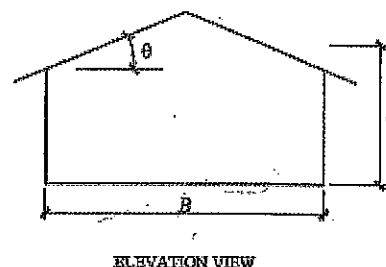
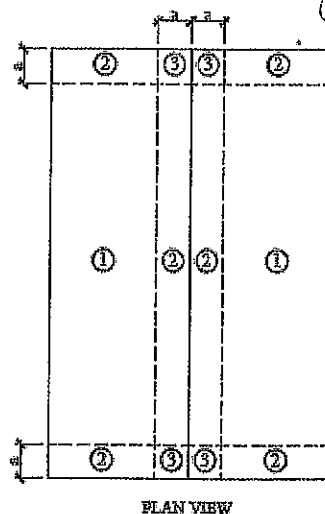


Notes

1. Vertical scale denotes (GC_p) to be used with qh .
2. Horizontal scale denotes effective wind area A , ft² (m²).
3. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Values of (GC_p) for walls shall be reduced by 10% when $\theta \leq 10^\circ$.

Figure 30.3-1. Components and cladding, $h \leq 60$ ft (18.3 m): external pressure coefficients (GC_p) for enclosed, partially enclosed, and partially open buildings—walls.

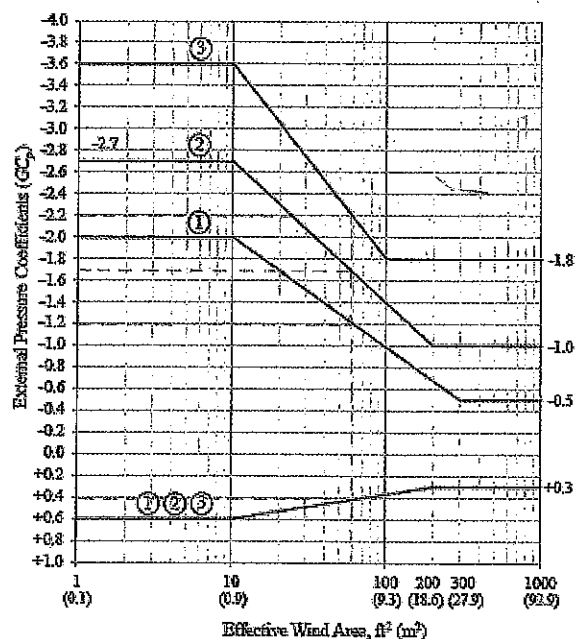
Diagrams



Notation

- a = 10% of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang dimensions.
- B = Horizontal dimension of building measured normal to wind direction, ft (m).
- h = Mean roof height, in ft (m), except that eave height shall be used for $\theta \leq 10^\circ$.
- θ = Angle of plane of roof from horizontal, degrees.

External Pressure Coefficients (GC_p)



Notes

1. Vertical scale denotes (GC_p) to be used with q_h .
2. Horizontal scale denotes effective wind area A , ft² (m²).
3. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Values of (GC_p) for roof overhangs to be determined in accordance with Section 30.7 Roof Overhangs.

Figure 30.3-2B. Components and cladding [$h \leq 60$ ft ($h \leq 18.3$ m)]: external pressure coefficients, (GC_p), for enclosed partially enclosed, and partially open buildings—gable roofs, $7^\circ < \theta \leq 20^\circ$.



American Test Lab, Inc
1122 Calvert Road Brevard, NC 28712
828-884-3700
atlnc@comporium.net atlnc.com

ATLNC # 0321.01-17

Report Date: 04/05/17

Test Dates: 03/21/17 – 03/23/17

Miami Dade Certification # 16-0526.01
FL Organizational # TST 1555
IAS Certification # TL-423

Test Requested By: Steel Building And Structures Inc.
820 Reeves Drive
Mount Airy, NC 27030
Phone 877-272-8276, Fax 336-551-3449

Test Standard: ASTM E 1592-05

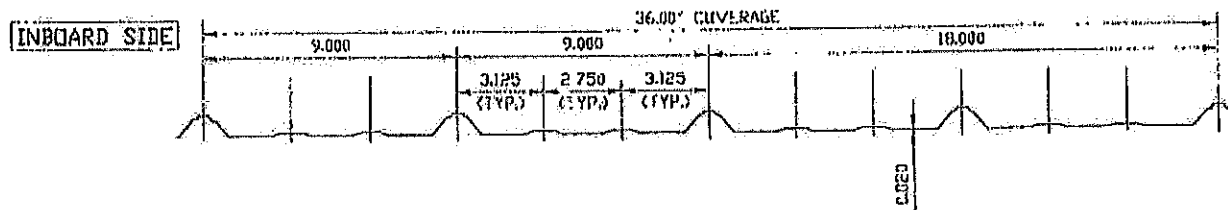
Test Conditions: 65 - 75 degrees F

Description of products tested:

Specimens A, F 29 gauge Galvalume AG Metal Roof and Wall Panels as shown in Steel Building and Structures drawings SK-1, SK-3, SK-4, SK-5, SK-6. Panels attached to 2-1/2" x 2-1/2" x 14 ga. rafters/ post with 12-14" x 3/4" self drilling screws at 6" oc.

Specimen B, D 29 gauge Galvalume AG Metal Roof and Wall Panels as shown in Steel Building and Structures drawing SK-1, SK-3, SK-4, SK-5, SK-6 over 2-5/16" wide Hat Channel attached to 2-1/2" x 2-1/2" x 14 ga. rafter/post. Hat Channel was attached to each rafter with (2) 12-14 x 3/4" self drilling screws, panels to Hat Channels with 12-14 x 3/4" self drilling screws at 6" OC.

Specimen C, E 29 gauge Galvalume AG Metal Roof and Wall Panels as shown in Steel Building and Structures drawing SK-1, SK-3, SK-4, SK-5, SK-6 over 2-1/2" x 14 ga sq galvanized steel girth attached to 2-1/2" x 2-1/2" x 14 ga. rafter/post. Girth was attached to each rafter with 2" x 2" x 14 ga angle with (4) 12-14 x 3/4" self drilling screws, panels attached to girth with 12-14 x 3/4" self drilling screws at 6" OC.



Configuration:

Specimen A, (3) 4' purlin spans, 3 panels wide mounted horizontally.

Specimen B, (3) 4' purlin spans, 4' Hat Channel spans 3 panels wide mounted horizontally.

Specimen C, (3) 4' purlin spans, 4' girth spans with 2-1/2" tubes, 3 panels wide mounted horizontally.

Specimen D, 5' purlin spans, 4' Hat Channel spans 3 panels wide mounted horizontally.

Specimen E, (3) 5' purlin spans, 5' girth spans with 2-1/2" tubes, 3 panels wide mounted horizontally.

Specimen F, (3) 5' purlin spans, 3 panels wide mounted horizontally.

Rafter/Post/Girth Construction- 2-1/2" x 2-1/2" x 14 ga tube

Rafter Spacing- Specimen A B, C, 3 spans 48" OC with 12" overhang.
Specimen D, E, F, 3 spans 60" OC, with 12" overhang.

Hat Channel Spacing: Specimen B, 3 spans 48" OC with 12" overhang, rafter spacing 48" OC.
Specimen D, 3 spans 48" OC with 12" overhang, rafter spacing 60" OC.

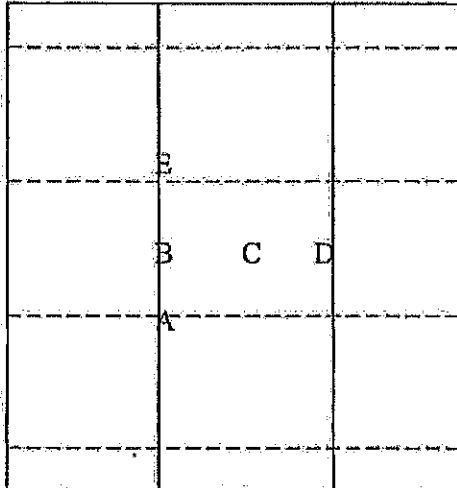
2-1/2" Tube Girth Spacing: Specimen C, 3 spans 48" OC with 12" overhang, rafter spacing 48" OC.
Specimen D, 3 spans 60" OC with 12" overhang, rafter spacing 60" OC.

Rafter/Post Attachment- Each rafter/post was attached the chamber.

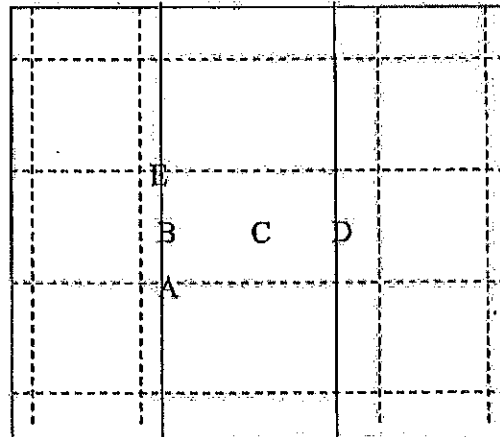
Test Specimens

Indicator Locations

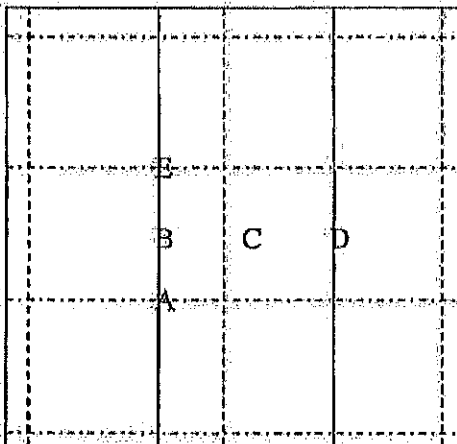
Specimens A, F



Specimens B, C,



Specimens D, E



Specimen A

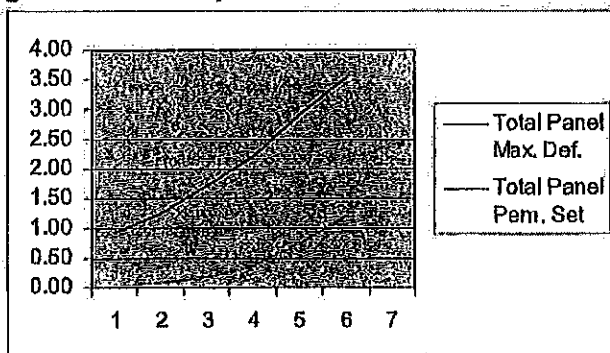
Deflections in inches

Pressure Increments psf Negative	Time (sec)	Purlin Rib (A)	Perm. Set	Mid-Span Rib (B)	Perm. Set	Mid-Span (C)	Perm. Set
20	60	.75"	.02"	.83"	.03"	.93"	.03"
30	60	1.04"	.05"	1.12"	.07"	1.26"	.08"
40	60	1.45"	.15"	1.52"	.17"	1.73"	.20"
50	60	1.84"	.30"	1.92"	.33"	2.22"	.39"
60	60	2.35"	.55"	2.47"	.64"	2.90"	.76"
70	60	2.86"	.84"	2.97"	.99"	3.53"	1.22"
80	60						
90	60						
100	60						
110	60						
120	60						

Deflections in inches

Pressure Increments psf Negative	Time (sec)	Mid Span Rib (D)	Perm Set	Purlin Rib (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
20	60	.80"	.02"	.81"	.02"	.93"	.03"
30	60	1.09"	.06"	1.06"	.06"	1.26"	.08"
40	60	1.50"	.17"	1.47"	.16"	1.73"	.20"
50	60	1.90"	.32"	1.86"	.30"	2.22"	.39"
60	60	2.46"	.63"	2.40"	.58"	2.90"	.76"
70	60	2.97"	.97"	2.87"	.89"	3.53"	1.22"
80	60						
90	60						
100	60						
110	60						
120	60						

Note: C Indicator reading is used as Total Panel Deflection and Permanent Set. Indicators removed after 70 psf to prevent damage. Failure occurred at approximately 124 psf.

Negative Side Graph

Observations- Deflections increased as pressure increased. Screws pulled through panel.

Specimen B

Deflections In Inches

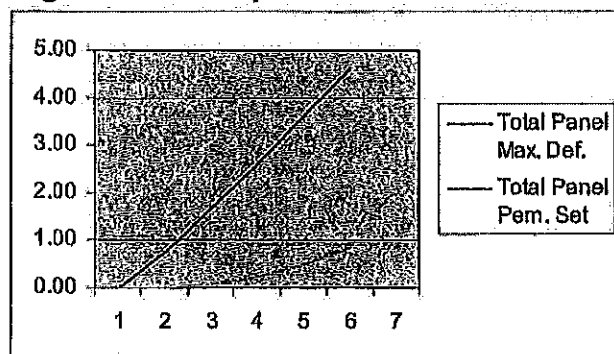
Pressure Increments psf Negative	Time (sec)	Purlin Rib (A)	Perm. Set	Mid-Span Rib (B)	Perm. Set	Mid-Span (C)	Perm. Set
0	60	0"	0"	0"	0"	0"	0"
20	60	.58"	.01"	.60"	0.0	.75"	.01"
30	60	1.34"	.07"	1.45"	.08"	.169"	.08"
40	60	2.07"	.21"	2.29"	.21"	2.57"	.22"
50	60	2.97"	.44"	3.03"	.46"	3.58"	.49"
60	60	3.89"	.75"	4.36"	.80"	4.62"	.86"
70	60						
80	60						

Deflections In Inches

Pressure Increments psf Negative	Time (sec)	Mid Span Rib (D)	Perm Set	Purlin Rib (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
0	60	0"	0"	0"	0"	0"	0"
20	60	.61"	0.0	.56"	0.0	.75"	.01"
30	60	1.60"	.08"	1.30"	.06"	.169"	.08"
40	60	2.37"	.24"	2.06"	.18"	2.57"	.22"
50	60	3.36"	.48"	2.92"	.39"	3.58"	.49"
60	60	4.38"	.83"	3.83"	.69"	4.62"	.86"
70	60						
80	60						

Note: C indicator reading is used as Total Panel Deflection and Permanent Set. Indicators removed after 70 psf to prevent damage. Failure occurred at approximately 82 psf.

Negative Side Graph



Observations- Deflections increased as pressure increased. Hat channel screws disengaged from rafter/post.

Specimen C

Deflections in inches

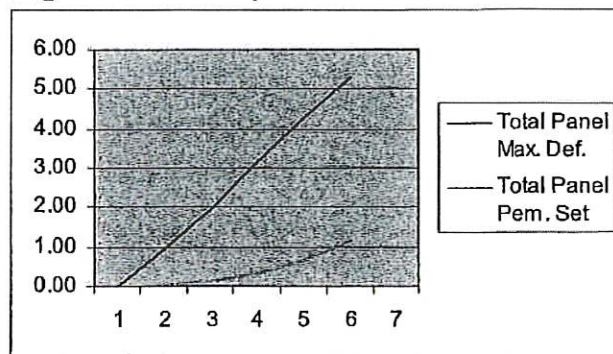
Pressure Increments psf Negative	Time (sec)	Purlin Rib (A)	Perm. Set	Mid-Span Rib (B)	Perm. Set	Mid-Span (C)	Perm. Set
0	60	0"	0"	0"	0"	0"	0"
10	60	.70"	.04"	.82"	.05"	.96"	.06"
20	60	1.53"	.08"	1.72"	.10"	1.99"	.12"
30	60	2.41"	.22"	2.68"	.24"	3.15"	.32"
40	60	3.18"	.44"	3.57"	.49"	4.26"	.66"
50	60	3.97"	.75"	4.41"	.84"	5.30	1.16"
60	60						
70	60						
80	60						
90	60						
100	60						

Deflections in inches

Pressure Increments psf Negative	Time (sec)	Mid Span Rib (D)	Perm Set	Purlin Rib (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
0	60	0"	0"	0"	0"	0"	0"
10	60	.93"	.05"	.71"	.03"	.96"	.06"
20	60	1.90"	.11"	1.49"	.07"	1.99"	.12"
30	60	2.94"	.28"	2.36"	.20"	3.15"	.32"
40	60	3.89"	.56"	3.10"	.44"	4.26"	.66"
50	60	4.79"	.96"	3.92	.78"	5.30	1.16"
60	60						
70	60						
80	60						
90	60						
100	60						

Note: C indicator reading is used as Total Panel Deflection and Permanent Set. Indicators removed after 50 psf to prevent damage. Failure occurred at approximately 105 psf.

Negative Side Graph



Observations- Deflections increased as pressure increased. Screws pulled through panel.

Specimen D

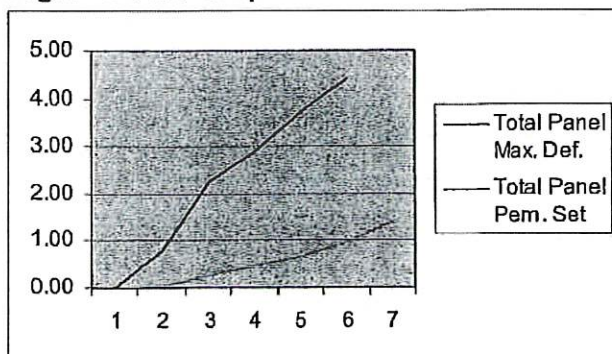
Deflections in inches

Pressure Increments psf Negative	Time (sec)	Purlin Rib (A)	Perm. Set	Mid-Span Rib (B)	Perm. Set	Mid-Span (C)	Perm. Set
0	60	0"	0"	0"	0"	0"	0"
7	60	.54"	.02"	.69"	.02"	.78"	.02"
14	60	1.70"	.29"	2.18"	.36"	2.26"	.28"
21	60	2.20"	.47"	2.81"	.57"	2.90"	.45"
28	60	2.83"	.63"	3.61"	.78"	3.72"	.67"
35	60	3.32"	.88"	4.27"	1.13"	4.43"	.99"
42	60	4.11"	1.22"	5.14"	1.56"	5.28"	1.40"
49	60						
56	60						
63	60						
70	60						

Deflections in inches

Pressure Increments psf Negative	Time (sec)	Mid Span Rib (D)	Perm Set	Purlin Rib (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
0	60	0"	0"	0"	0"	0"	0"
7	60	.76"	.02"	.75"	.02"	.78"	.02"
14	60	2.08"	.22"	2.35"	.37"	2.26"	.28"
21	60	2.65"	.37"	3.01"	.58"	2.90"	.45"
28	60	3.37"	.56"	3.89"	.81"	3.72"	.67"
35	60	3.88"	.81"	4.62"	1.20"	4.43"	.99"
42	60	4.56"	1.10"	5.63"	1.71"	5.28"	1.40"
49	60						
56	60						
63	60						
70	60						

Note: C indicator reading is used as Total Panel Deflection and Permanent Set. Indicators removed after 42 psf to prevent damage. Failure occurred at approximately 73 psf.

Negative Side Graph

Observations- Deflections increased as pressure increased. Screws pulled through panel.

Specimen E

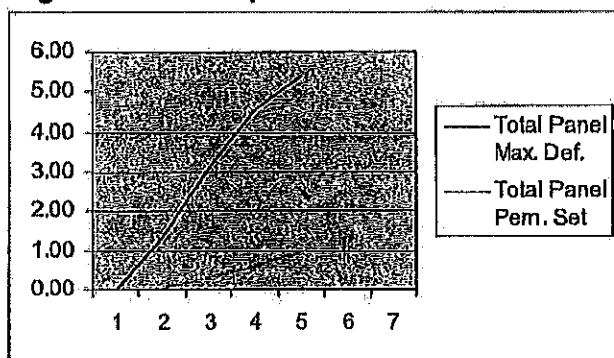
Deflections in Inches

Pressure Increments psf Negative	Time (sec)	Purlin Rib (A)	Perm. Set	Mid-Span Rib (B)	Perm. Set	Mid-Span (C)	Perm. Set
0	60	0"	0"	0"	0"	0"	0"
10	60	1.13"	.10"	1.22"	.07"	1.38"	.07"
20	60	2.49"	.30"	2.72"	.30"	3.12"	.31"
30	60	3.56"	.51"	3.90"	.53"	4.56"	.60"
40	60	4.45"	.80"	4.71"	.87"	5.37"	.98"
50	60						
60	60						
70	60						
80	60						
90	60						

Deflections in Inches

Pressure Increments psf Negative	Time (sec)	Mid Span Rib (D)	Perm Set	Purlin Rib (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
0	60	0"	0"	0"	0"	0"	0"
10	60	1.40"	.08"	1.09"	.07"	1.38"	.07"
20	60	3.08"	.30"	2.42"	.25"	3.12"	.31"
30	60	4.46"	.59"	3.44"	.42"	4.56"	.60"
40	60	5.43"	.99"	4.33"	.71"	5.37"	.98"
50	60						
60	60						
70	60						
80	60						
90	60						

Note: C indicator reading is used as Total Panel Deflection and Permanent Set. Indicators removed after 40 psf to prevent damage. Failure occurred at approximately 95 psf.

Negative Side Graph

Observations- Deflections increased as pressure increased. Screws pulled through panel.

Specimen F

Deflections in inches

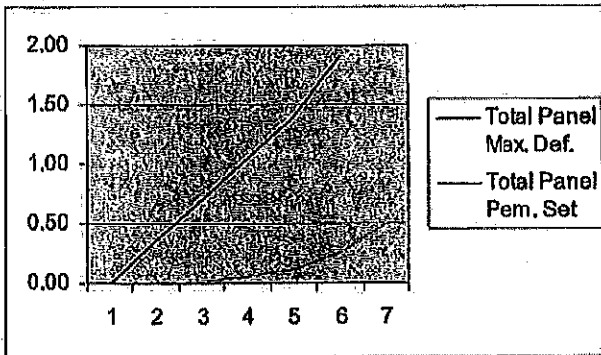
Pressure Increments psf Negative	Time (sec)	Purlin Rib (A)	Perm. Set	Mid-Span Rib (B)	Perm. Set	Mid-Span (C)	Perm. Set
0	60	0"	0"	0"	0"	0"	0"
7	60	.23"	.0"	.27"	.01"	.36"	.02"
14	60	.49"	.0"	.56"	.02"	.71"	.02"
21	60	.74"	.03"	.84"	.04"	1.05"	.06"
28	60	1.06"	.09"	1.12"	.10"	1.39"	.13"
25	60	1.41"	.20"	1.52"	.21"	1.90"	.27"
42	60	1.77"	.37"	1.52"	.40"	2.40"	.50"
49	60	2.27"	.63"	2.40"	.70"	2.93"	.86"
56	60	2.81"	1.00"	2.99"	1.11"	3.66"	1.38"
63	60	3.43"	1.48"	3.79"	1.61"	4.70"	2.06"
70	60						
77							
84							

Deflections in inches

Pressure Increments psf Negative	Time (sec)	Mid Span Rib (D)	Perm Set	Purlin Rib (E)	Perm. Set	Total Panel Deflection	Total Panel Perm. Set
0	60	0"	0"	0"	0"	0"	0"
7	60	.28"	.01"	.24"	.0"	.36"	.02"
14	60	.60"	.02"	.52"	.01"	.71"	.02"
21	60	.90"	.05"	.80"	.04"	1.05"	.06"
28	60	1.19"	.11"	1.09"	.09"	1.39"	.13"
25	60	1.59"	.23"	1.44"	.19"	1.90"	.27"
42	60	2.01"	.41"	1.81"	.35"	2.40"	.50"
49	60	2.49"	.70"	2.26"	.60"	2.93"	.86"
56	60	3.08"	1.12"	2.78"	.98"	3.66"	1.38"
63	60	3.87"	1.64"	3.39"	1.45"	4.70"	2.06"
70	60						

Note: C indicator reading is used as Total Panel Deflection and Permanent Set. Indicators removed after 63 psf to prevent damage. Failure occurred at approximately 95 psf.

Negative Side Graph



Observations- Deflections increased as pressure increased. Screws pulled through panel.

Note: 2 mil or 4 mil polyethylene film was used for the ASTM 1592 test, it is the opinion of the undersigned that it had no influence on the results of the test.

Technician: Keith Owen

Observers-

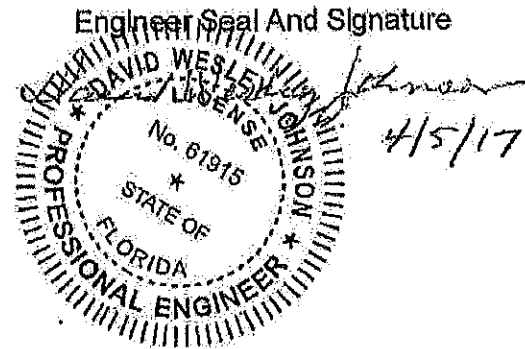
Keith Owen, Ashley Poplin, / ATL
Sam Poplin, Keith Owen Jr., Ronald Anders / ATL
David W. Johnson, P.E

Keith Owen, Lab Director
American Test Lab, Inc.

Keith Owen
4/5/17

All Tests Witnessed and Certified by:

David Johnson P. E.
1122 Calvert Rd.
Brevard, NC 28712
Florida P.E. # 61915



Certificate of Independence: The witnessing engineer has no equity interest in American Test Lab of North Carolina, Steel Building and Structures or their parts vendors. Witnessing engineer is in complete compliance of Florida Statue 9B-72, Section 72.110

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STEEL BUILDINGS AND STRUCTURES, INC. TS2.5x2.5 RAFTER/POST/PURLIN/GIRT MEMBERS HIGH WIND SPEED AND LOW WIND SPEED		SCALE: AS NOTED	DRAWN BY: JRS CHECKED BY: PDR	DATE: 3-14-17
MOORE AND ASSOCIATES ENGINEERING AND CONSULTING 1009 East Avenue North Augusta, South Carolina 29841 (803) 279-7789 / FAX (803) 278-3848 www.moore-inc.com		NO. DATE 0 9/16/17	REVISION ISSUED FOR PRODUCT TESTING/REPROVAL	APPROVAL BY: CK VSH

AMERICAN TEST LAB NORTH
 DATE 04/05/17
 REPORT NO. ATLNC0321.01-17

Heath Owen
 ATL INSPECTOR

PROPERTIES

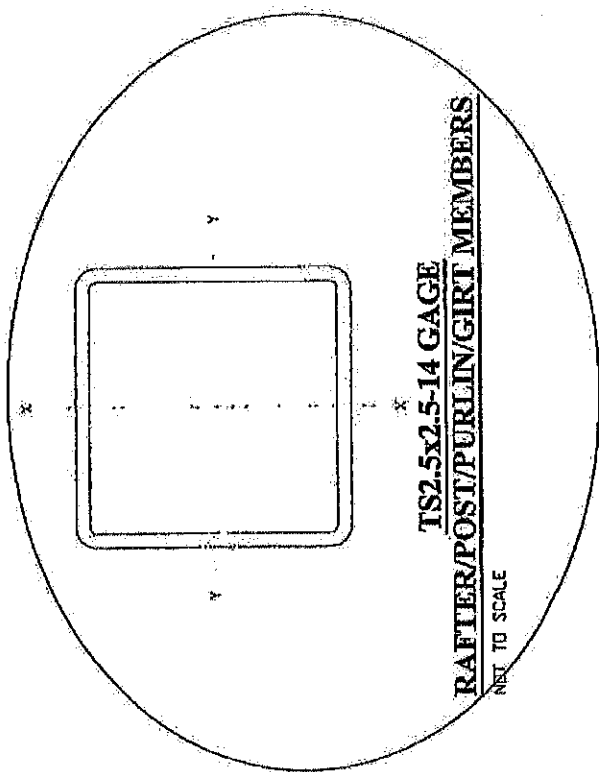
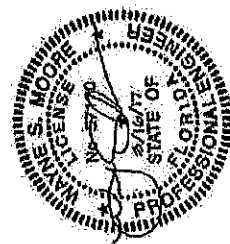
AREA = 0.727 IN²
 S_x = 0.570 IN³
 S_y = 0.570 IN³
 I_x = 0.713 IN⁴
 I_y = 0.713 IN⁴
 r_x = 0.950 IN
 r_y = 0.950 IN

APPLICATION:

ALL 30'-0", 40'-0", 50'-0" AND
 60'-0" WIDE STRUCTURES

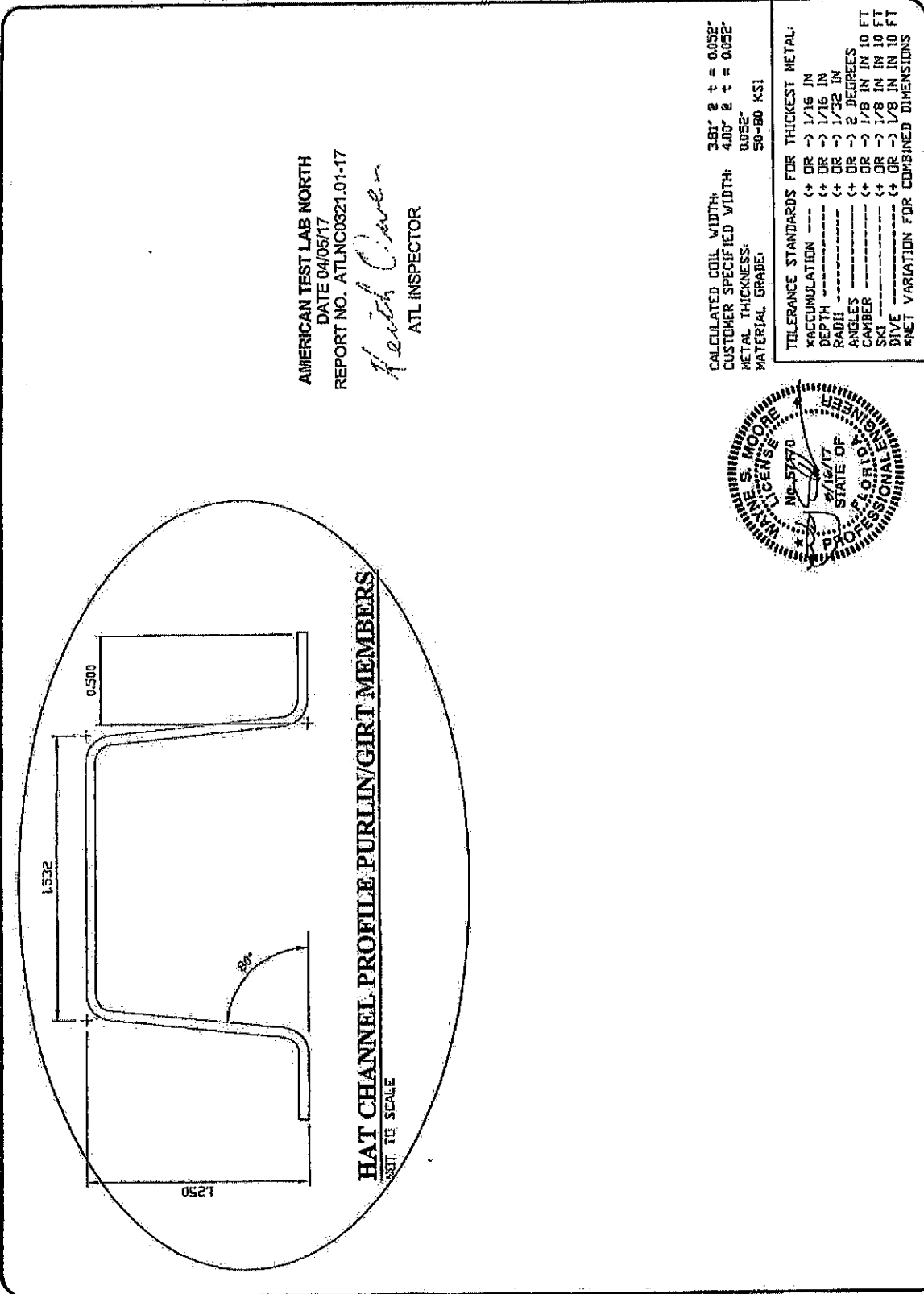
CALCULATED COIL WIDTH: 3.81" @ t = 0.052"
 CUSTOMER SPECIFIED WIDTH: 4.00" @ t = 0.052"
 METAL THICKNESS: 0.052"
 MATERIAL GRADE: 50-80 KSI

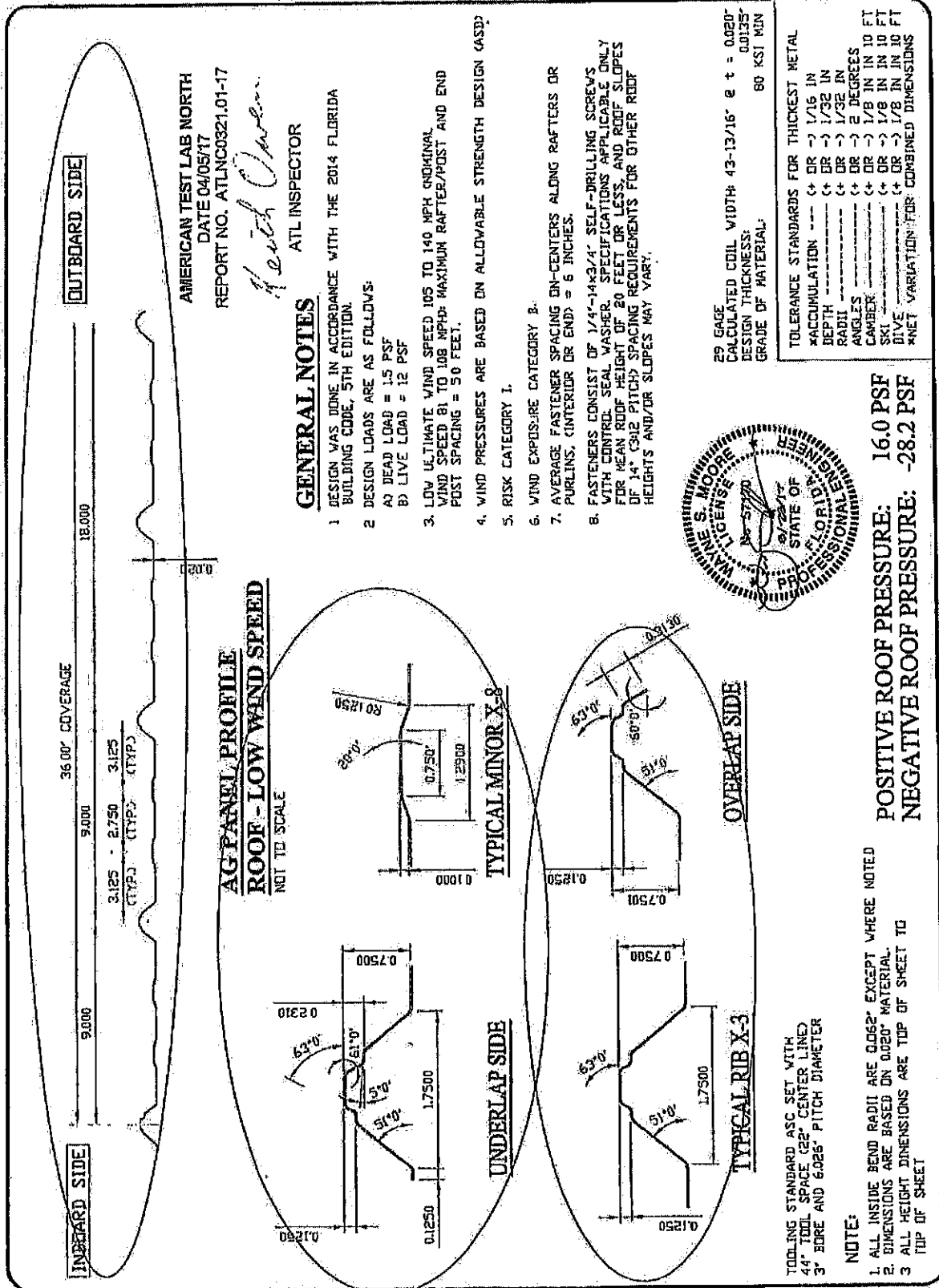
TOLERANCE STANDARDS FOR THICKEST METAL:
 ACCUMULATION --- (+) DR -> 1/16 IN
 DEPTH --- (+) DR -> 1/16 IN
 RADI --- (+) DR -> 1/32 IN
 ANGLES --- (+) DR -> 2 DEGREES
 CAMBER --- (+) DR -> 1/8 IN IN 10 FT
 SKI --- (+) DR -> 1/8 IN IN 10 FT
 DIVE --- (+) DR -> 1/8 IN IN 10 FT
 NET VARIATION FOR COMBINED DIMENSIONS



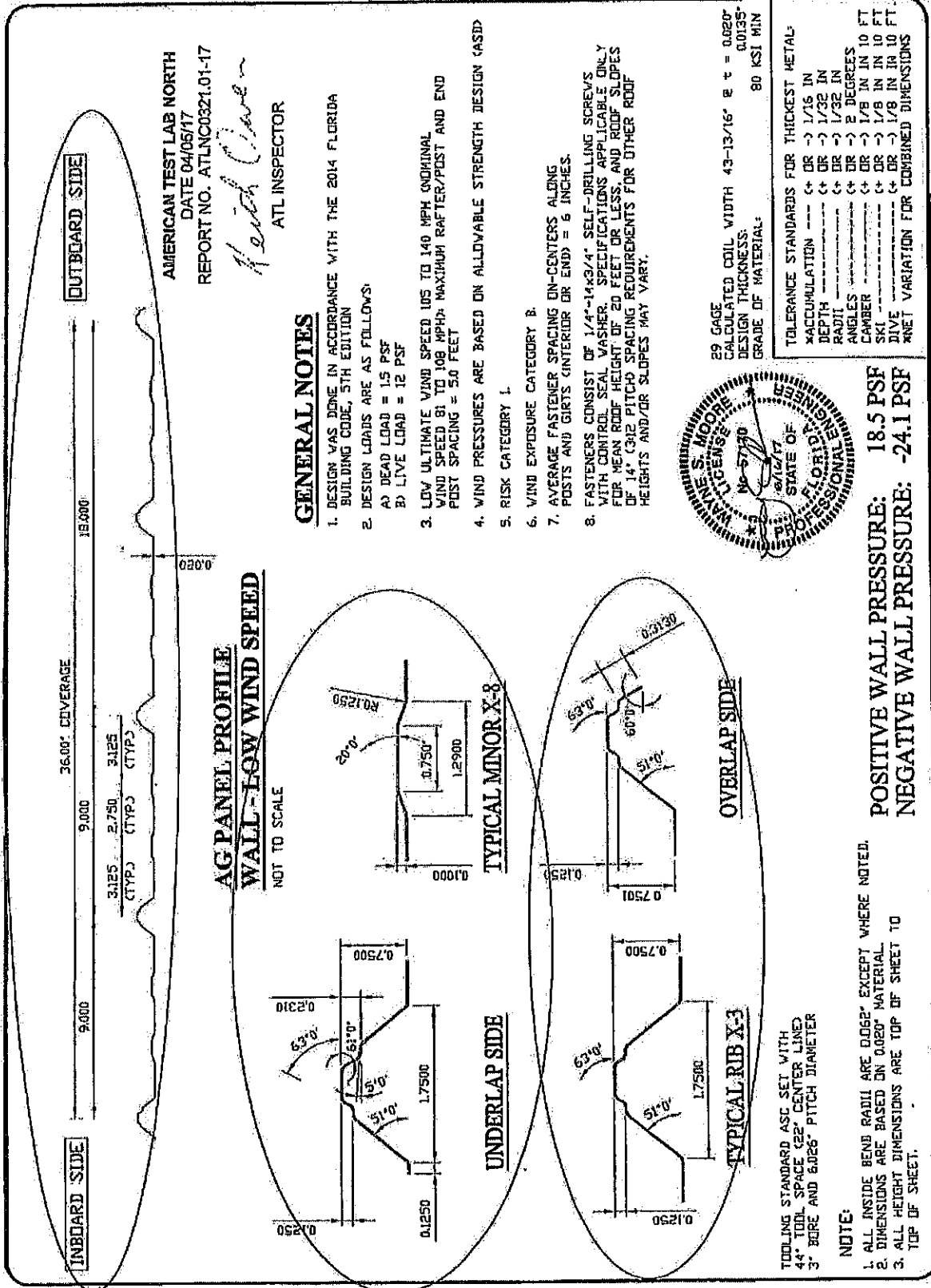
TS2.5x2.5-14 GAGE
RAFTER/POST/PURLIN/GIRT MEMBERS
 NET TO SCALE

SK-2 SHEET NO.		REV. 0 DATE: 3-14-17
STEEL BUILDINGS AND STRUCTURES, INC. HAT CHANNEL PURLIN/GIRT MEMBERS HIGH WIND SPEED AND LOW WIND SPEED		SCALE: AS NOTED HSA JOB NO. 161925 CHECKED BY: PDI
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NO. 0 DATE: 3/16/17	REVISION BY: CK APVD: VSN	ISSUED FOR PRODUCT TESTING/APPRAVAL HSA PDI





SK-5 SHEET NO.		REV. 0 DATE 3-14-17	
SCALE AS NOTED		DRAWN BY JMS	
LOW WIND SPEED WALL ASC STANDARD GRA AG PANEL STEEL BUILDINGS AND STRUCTURES, INC.		CHECKED BY PDI MNA JOB NO. 161928	
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REVISION NO. DATE 0 3/16/17 ISSUED FOR PRODUCT TESTING/ APPROVAL		BY CH. APVD. VSH. PDI.	
MOORE AND ASSOCIATES 1009 East Avenue North Augusta, South Carolina 29081 (803) 279-7788 / FAX (803) 279-3440 www.moore-inc.com			



SK-6 SHEET NO.		REV. 0 SCALE HIGH WIND SPEED	DRAWN BY: JRS AS NOTED CHECKED BY: PMH	DATE: 3-14-17
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