Architectural Testing

TAS 201, TAS 202 AND TAS 203
TEST REPORT

Rendered to:

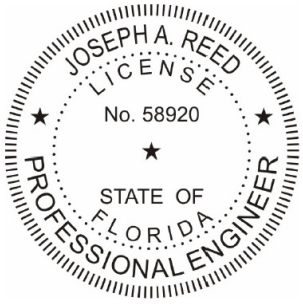
FLEETWOOD WINDOWS & DOORS

SERIES/MODEL: Kona 3800 Intersection TDL
PRODUCT TYPE: Fixed Window

This report contains in its entirety:

Cover Page:	**1 page**
Report Body:	**14 pages**
Test Equipment:	**1 page**
Sketches:	**4 pages**
Drawings:	**3 pages**

Secure Electronic Seal
for Electronic Submittal



Joseph A. Reed

Digitally Signed by: Joseph A. Reed

Date: 2010.07.01 16:15:53 -04'00'

Report No.:	**94551.03-301-18**
Test Dates:	**11/10/09**
Through:	**06/19/10**
Report Date:	**07/01/10**
Expiration Date:	**06/19/20**

2524 E. Jensen Ave
Fresno, CA 93706
phone: 559-233-8705
fax: 559-233-8360
www.archtest.com

Architectural Testing

TAS 201, TAS 202 AND TAS 203 TEST REPORT

Rendered to:

FLEETWOOD WINDOWS & DOORS
395 Smitty Way
Corona, California 92879

Report No.:	94551.03-301-18
Test Dates:	11/10/09
Through:	06/19/10
Report Date:	07/01/10
Expiration Date:	06/19/20

Project Summary: Architectural Testing, Inc. was contracted by Fleetwood Windows & Doors to perform testing per Florida Building Code, Test Protocols for High Velocity Hurricane Zone, Protocols TAS 201-94, TAS 202-94 and TAS 203-94 on three Series/Model Kona 3800 Intersecting TDL, three lite fixed windows. The samples tested met the performance requirements set forth in the protocols for a ±50 psf *Design Pressure* rating. Test specimen description and results are reported herein. The samples were provided by the client.

Test Procedures: The test specimens were evaluated in accordance with the following:

TAS 201-94, *Impact Test Procedures*.

TAS 202-94, *Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading*.

TAS 203-94, *Criteria for Testing Products Subject to Cyclic Wind Pressure Loading*.

Drawing Reference: The test specimen drawings have been reviewed and verified by Architectural Testing and are representative of the samples tested.

Test Specimen Description:

Series/Model: Kona 3800 Intersecting TDL

Product Type: Fixed Window

Overall Size: 3048 mm (120") wide by 3048 mm (120") high

Daylight Opening Size (4): 1454 mm (57-1/4") wide by 1454 mm (57-1/4")

2524 E. Jensen Ave
Fresno, CA 93706
phone: 559-233-8705
fax: 559-233-8360
www.archtest.com

Test Specimen Description: (Continued)

Screen Size: N/A

Finish: Anodized Aluminum

Glazing Details: The specimen utilized 1-1/4" thick insulating glass units fabricated from two 3/16" thick heat strengthened sheets, a 0.090" thick SentryGlas® Plus interlayer, a 5/8" airspace and one 3/16" thick heat strengthened sheet to the exterior. The glass was set from the exterior against a vinyl bulb gasket and Tremco silicone at the interior. An aluminum glazing stop and a vinyl bulb gasket was applied from the exterior. The glass bite was 1/2".

Weatherstripping: No weatherstripping was utilized.

Frame Construction: The vertical frame members corners were routed to fit the horizontal framing members and fully sealed with silicone. The frame corners were attached using three #10 x 1" stainless steel Phillips head screws. The intermediate vertical and horizontals were attached with two #10 x 1" stainless steel Phillips head screws at each end. All frame members were thermally improved with a poured-and-debridged thermal break.

Screen Construction: No screen was utilized.

Hardware: No hardware was utilized.

Drainage:

Description	Quantity	Location
1/2" by 1/4" weep slots	4	6" from all corners in the sill face
2" by 1/2" weep slots	4	6" from all sill corners in the glazing stop leg
1" weep notch	4	6" from corners in center leg of sill

Reinforcement: The intersection between the vertical (continuous) and horizontal members was reinforced with a 1/4" thick by 48" long aluminum bar. The vertical member had 2" deep reinforcement which was routed to accept the 1-1/2" deep horizontal reinforcement centered in the meeting point. Each reinforcement was secured to the member with sixteen #8 x 1/2" flat head Phillips screws. The fasteners in the vertical reinforcement were arranged in eight rows 1" apart, 1" from the intersection and spaced 12" apart. The fasteners in the horizontal reinforcement were arranged in eight rows 3/4" apart, 1" from the intersection and spaced 12" apart.

Test Specimen Description: (Continued

Installation: The test specimens were installed into a nominal 2 x 8 Douglas Fir test buck. Eight #10 x 2" wood screws were located in each perimeter frame member located 6" from each corner and 16" on center.

Test Results: The following results have been recorded:

Protocol TAS 202-94, *Static Air Pressure Tests*

Test Unit #1
Design Pressure: ±50.0 psf

Title of Test	Results		
Air Infiltration			
1.57 psf (25 mph)	<0.01 cfm/ft^2		
6.24 psf (50 mph)	0.01 cfm/ft^2		
	Indicator Readings (inch)		
Structural Loads	#1	#2	#3
50% of Test Pressure (+37.5 psf)			
Maximum Deflection	0.10	0.88	0.08
Permanent Set	0.04	0.17	0.03
Design Pressure (+50.0 psf)			
Maximum Deflection	0.13	1.28	0.11
Permanent Set	0.04	0.15	0.04
50% of Test Pressure (-37.5 psf)			
Maximum Deflection	0.21	0.99	0.24
Permanent Set	0.06	0.09	0.07
Design Pressure (-50.0 psf)			
Maximum Deflection	0.15	1.47	0.17
Permanent Set	0.06	0.20	0.07
Water Infiltration			
+12.0 psf	No Penetration		
Test Pressure (+75.0 psf)			
Maximum Deflection	0.22	2.26	0.25
Permanent Set	0.04	0.22	0.02
Test Pressure (-75.0 psf)			
Maximum Deflection	0.20	2.12	0.14
Permanent Set	0.08	0.10	0.06

***Note**: See Architectural Testing Sketch #1 for indicator locations.*

Test Results: (Continued)

Protocol TAS 201-94*, Impact Test Procedures*

Missile Weight: 9.0 lbs
Muzzle Distance from Test Specimen: 17 ft.

Test Unit #1

Impact #1: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

Impact Area: Center of lower right lite
Observations: Missile hit target area; no penetration
Results: Pass

Impact #2: Missile Velocity: 15.1 m/s (49.7 fps); orientation within ±5° of horizontal

Impact Area: Upper right corner of lower right lite
Observations: Missile hit target area; no penetration
Results: Pass

Impact #3: Missile Velocity: 15.2 m/s (49.8 fps); orientation within ±5° of horizontal

Impact Area: Lower left corner of lower left lite
Observations: Missile hit target area; no penetration
Results: Pass

Impact #4: Missile Velocity: 15.1 m/s (49.7 fps); orientation within ±5° of horizontal

Impact Area: Center of lower left lite
Observations: Missile hit target area; no penetration
Results: Pass

Test Results: (Continued)

Protocol TAS 201-94*, Impact Test Procedures* (Continued)

Test Unit #1 (Continued)

Impact #5: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

Impact Area: Upper right corner of upper right lite
Observations: Missile hit target area; no penetration
Results: Pass

Impact #6: Missile Velocity: 15.1 m/s (49.8 fps); orientation within ±5° of horizontal

Impact Area: Center of vertical/horizontal intersection
Observations: Missile hit target area; no penetration
Results: Pass

Impact #7: Missile Velocity: 15.0 m/s (49.3 fps); orientation within ±5° of horizontal

Impact Area: Center of glass of upper left lite
Observations: Missile hit target area; no penetration
Results: Pass

Impact #8: Missile Velocity: 15.0 m/s (49.2 fps); orientation within ±5° of horizontal

Impact Area: Lower right corner of upper left lite
Observations: Missile hit target area; no penetration
Results: Pass

***Note**: See Architectural Testing Sketch #2 for impact locations.*

Test Results: (Continued)

Protocol TAS 203-94, *Cyclic Wind Pressure Loading*

Test Unit #1

Design Pressure: ±50.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator (inch)		
			#1	#2	#3
10 to 25	3500	2.84	0.08	0.65	0.05
0 to 30	300	4.86	0.13	0.77	0.07
25 to 40	600	3.04	0.17	0.98	0.09
15 to 50	100	4.95	0.21	1.27	0.12
			Permanent Set (inch)		
			0.02	0.05	0.01

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator (inch)		
			#1	#2	#3
15 to 50	50	4.93	0.19	1.24	0.19
25 to 40	1050	2.71	0.15	1.01	0.17
0 to 30	50	4.82	0.14	0.81	0.15
10 to 25	3350	2.71	0.12	0.77	0.14
			Permanent Set (inch)		
			0.09	0.10	0.03

Result: Pass

***Note**: Refer to Architectural Testing Sketch #1 for indicator locations.*

Test Results: (Continued)

Missile Weight: 9.0 lbs
Muzzle Distance from Test Specimen: 17 ft.

Test Unit #2

Impact #1: Missile Velocity: 15.1 m/s (49.6 fps); orientation within ±5° of horizontal

Impact Area: Lower left hand corner of lower right lite
Observations: Missile hit target area; no penetration
Results: Pass

Impact #2: Missile Velocity: 15.2 m/s (49.8 fps); orientation within ±5° of horizontal

Impact Area: Center of lower right lite
Observations: Missile hit target area; no penetration
Results: Pass

***Note**: See Architectural Testing Sketch #3 for impact locations.*

Test Results: (Continued)

Protocol TAS 203-94, *Cyclic Wind Pressure Loading*

Test Unit #2

Design Pressure: ±50.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator (inch)		
			#1	#2	#3
10 to 25	3500	2.67	0.09	0.54	0.03
0 to 30	300	4.23	0.12	0.65	0.04
25 to 40	600	3.09	0.18	0.91	0.06
15 to 50	100	4.29	0.22	1.17	0.09
			Permanent Set (inch)		
			0.05	0.02	0.01

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator (inch)		
			#1	#2	#3
15 to 50	50	4.55	0.17	1.22	0.15
25 to 40	1050	2.77	0.13	1.01	0.15
0 to 30	50	3.56	0.08	0.84	0.13
10 to 25	3350	2.33	0.07	0.83	0.13
			Permanent Set (inch)		
			0.06	0.04	0.03

Result: Pass

***Note**: Refer to Architectural Testing Sketch #1 for indicator locations.*

Test Results: (Continued)

Missile Weight: 9.0 lbs
Muzzle Distance from Test Specimen: 17 ft.

Test Unit #3

Impact #1: Missile Velocity: 15.0 m/s (49.3 fps); orientation within ±5° of horizontal

Impact Area: Upper right corner of lower right light
Observations: Missile hit target area; no penetration
Results: Pass

Impact #2: Missile Velocity: 15.1 m/s (49.6 fps); orientation within ±5° of horizontal

Impact Area: Center of vertical/horizontal intersection
Observations: Missile hit target area; no penetration
Results: Pass

***Note**: See Architectural Testing Sketch #4 for impact locations*

Test Results: (Continued)

Protocol TAS 203-94, *Cyclic Wind Pressure Loading*

Test Unit #3

Design Pressure: ±50.0 psf

POSITIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator (inch)		
			#1	#2	#3
10 to 25	3500	2.33	0.10	0.51	0.06
0 to 30	300	4.23	0.13	0.77	0.07
25 to 40	600	2.98	0.15	0.96	0.08
15 to 50	100	4.55	0.20	1.22	0.10
			Permanent Set (inch)		
			0.02	0.04	0.02

NEGATIVE PRESSURE

Pressure Range (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator (inch)		
			#1	#2	#3
15 to 50	50	4.33	0.18	1.27	0.17
25 to 40	1050	2.65	0.15	1.04	0.15
0 to 30	50	4.77	0.13	0.91	0.13
10 to 25	3350	3.21	0.08	0.74	0.12
			Permanent Set (inch)		
			0.05	0.05	0.02

Result: Pass

***Note**: Refer to Architectural Testing Sketch #1 for indicator locations.*

Test Equipment: (See Appendix A)

Cannon: Steel pipe barrel utilizing compressed air to propel the missile

Missile: 2x4 Southern Pine

Timing Device: Electronic Beam Type

Cycling Mechanism: Computer controlled centrifugal blower with electronic pressure measuring device

Deflection Measuring Device: Linear transducers

Laboratory Compliance Statements: The following are provided as required by the protocols for the testing reported herein.

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

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

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

Tape and film were used to seal against air leakage during structural testing. In our opinion, the tape and film did not influence the results of the test.

Testing was conducted at the Architectural Testing, Inc. laboratory located in Fresno, California.

List of Official Observers:

Name	Company
Dennis Janzen	Architectural Testing, Inc.
Mason Kelly	Architectural Testing, Inc.
Joseph A. Reed, P.E.	Architectural Testing, Inc.
Tyler Westerling, P.E.	Architectural Testing, Inc.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of ten years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by 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 specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Digitally Signed by: Tyler Westerling

Tyler Westerling, P.E.
Project Engineer

Digitally Signed by: Joseph A. Reed

Joseph A. Reed, P.E.
Director - Engineering and Product Testing

TW:cmd

Attachments (pages): This report is complete only when all attachments listed are included.
- Appendix-A: Test Equipment (1)
- Appendix-B: Sketches (4)
- Appendix-C: Drawings (3)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	07/01/10	N/A	Original report issue

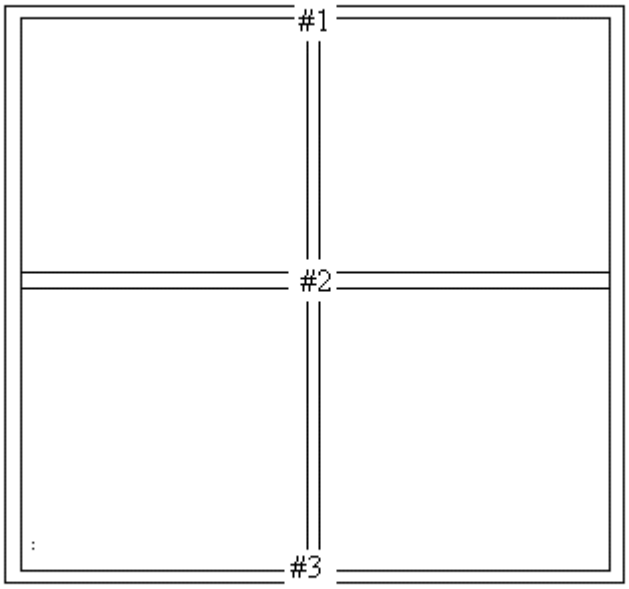
Appendix A

Test Equipment

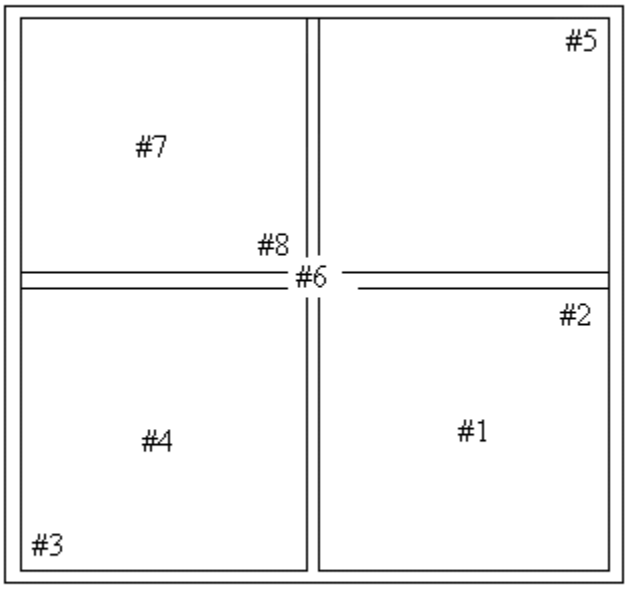
Instrument	Manufacturer	Asset #
Control Panel	Architectural Testing, Inc.	005062
2 x 4 Cannon	Architectural Testing, Inc.	003575
Spray Rack	Architectural Testing, Inc.	Mockup
Operating Force Gauge	Chatillon	005554
Linear Transducer	Celesco	003431
Linear Transducer	Celesco	004485
Linear Transducer	Celesco	003428
Linear Transducer	Celesco	004486
Linear Transducer	Celesco	005283
Linear Transducer	Celesco	004487
Spring Scale	Pelouze	62406
Dial Indicator	Ames	003574

Appendix B

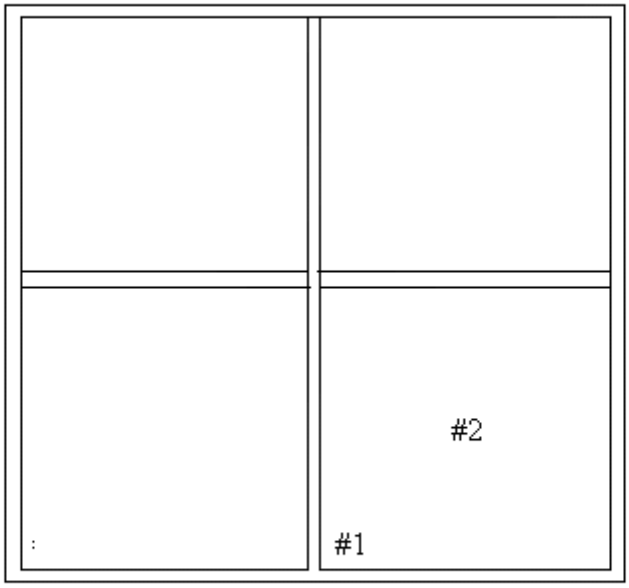
Sketches



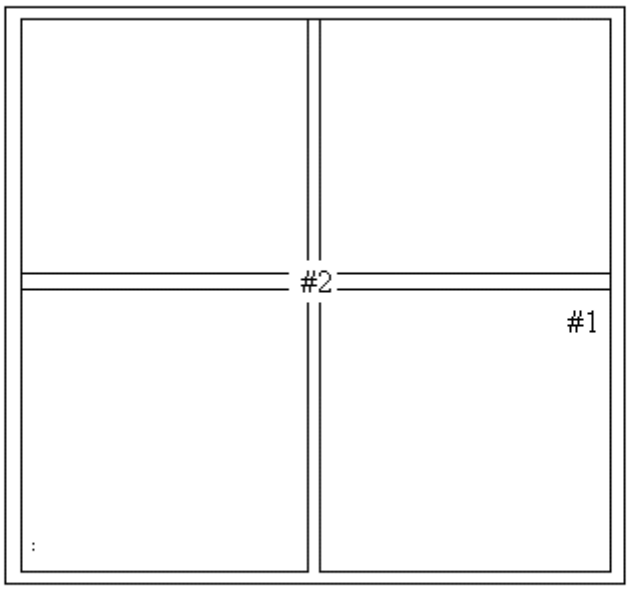
Sketch #1 Linear Transducer Locations



;Sketch #2 Impact Locations



Sketch #3 Specimen #2 Impact Locations



Sketch #4 Specimen #3 Impact Locations

Appendix C

Drawings

TABLE OF CONTENTS

GENERAL NOTES

1. THESE SYSTEMS HAVE BEEN TESTED, ANALYZED AND APPROVED FOR DESIGN PRESSURES NOT TO EXCEED THOSE SHOWN IN THE "ALLOWABLE DESIGN LOAD" TABLE.

2. BUCKING OPENINGS & BUCKING FASTENERS MUST BE PROPERLY DESIGNED & INSTALLED TO TRANSFER LOADS TO THE STRUCTURE AND TO BE REVIEWED BY BUILDING OFFICIAL.

3. ALL HARDWARE & FASTENERS SHALL BE IN ACCORDANCE WITH THESE DRAWINGS & MAY NOT VARY UNLESS SPECIFICALLY MENTIONED ON THE DRAWINGS.

4. THE DETAILS & SPECIFICATIONS SHOWN HEREIN REPRESENT THE PRODUCTS TESTED & PROPOSED FOR WATER, AIR, IMPACT, CYCLIC & UNIFORM STATIC AIR PRESSURE TESTING IN CONFORMANCE WITH AAMA AND FBC PROTOCOLS TAS 201, 202 & 203 FOR LARGE MISSILE IMPACT AND ASTM 1886/1998.

5. THESE SYSTEMS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE (FBC) INCLUDING HIGH VELOCITY HURRICANE ZONES (HVHZ).

6. ALL ANCHORS SHALL BE INSTALLED AS SPECIFIED ON THESE DRAWINGS. SPECIFIED EMBEDMENT TO BASE MATERIAL SHALL BE BEYOND WALL FINISH OR STUCCO.

7. MATERIALS, INCLUDING BUT NOT LIMITED TO STEEL SCREWS, THAT COME INTO CONTACT WITH OTHER DISSIMILAR MATERIALS SHALL MEET THE REQUIREMENTS OF AAMA AND FLORIDA BUILDING CODE.

GLAZING TYPES

	ASTM 1886/1998 TAS 201, 202,203 LARGE MISSILE IMPACT AND CYCLIC WIND LOADING
OA: 1": (5MM-ANNEALED, 0.625 AIR, 5MM-ANNEALED.	NO
OA: 1-1/4" INSULATING LAMINATED GLASS COMPRISED OF: 6MM TEMPERED- 5/8" AIRSPACE - 5MM HEAT STRENGTHENED - 90 MIL SENTRY GLASS® 5MM HEAT STRENGTHENED	YES

ALLOWABLE DESIGN LOAD

MAXIMUM DESIGN PRESSURE:	+50 PSF	-50 PSF
MAXIMUM FRAME SIZE WITH TDL BARS:	120" X 120"	
MAXIMUM FRAME SIZE WITHOUT TDL BARS:	120" X 60"	
MAXIMUM TDL BAR LENGTH:	120"	
	GLAZING DAYLIGHT OPENING	
MAXIMUM GLAZING SIZE	120" X 60"	
WITH NON-INTERSECTING TDL BARS	120" X 60"	
WITH INTERSECTING TDL BARS	60" X 60"	

*FRAME ANCHOR REQUIREMENTS TABLE

OPENING TYPE (SUBSTRATE)	FRAME TO OPENING FASTENER TYPE	MINIMUM EMBEDMENT	MINIMUM EDGE DIST.
2X_ WOOD FRAME OR BUCK	(1)NO. 10 SMS SCREW	1 1/2"	3/4"
MIN. 18 GA. 33 KSI STEEL STUD	(1)NO. 10 SMS SCREW	FULL	3/8"
CMU/CONCRETE	(2)3/16" CONCRETE SCREWS	1 1/4"	2 5/8"

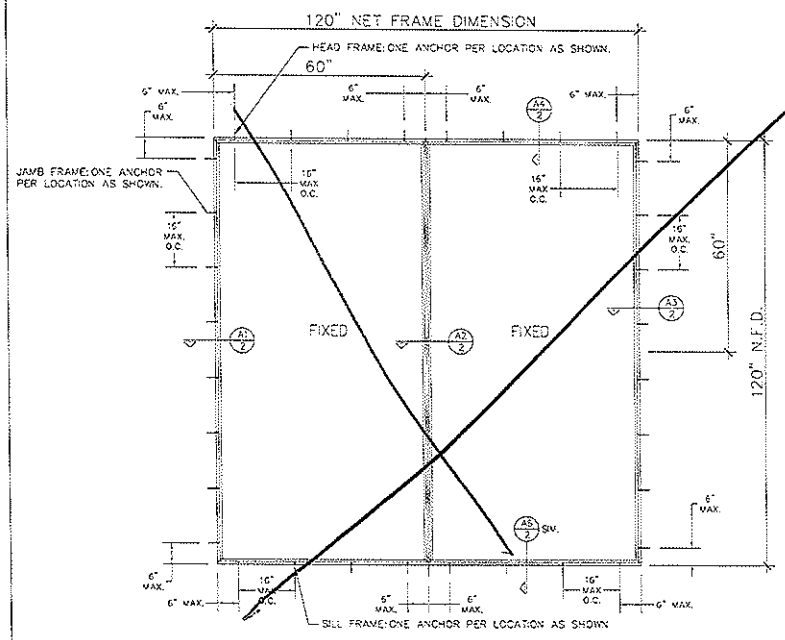
(1)SMS SCREWS GRADE 5
(2)CONCRETE SCREWS SHALL BE 3/16" ITW TAPCON OR EQUIVALENT

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

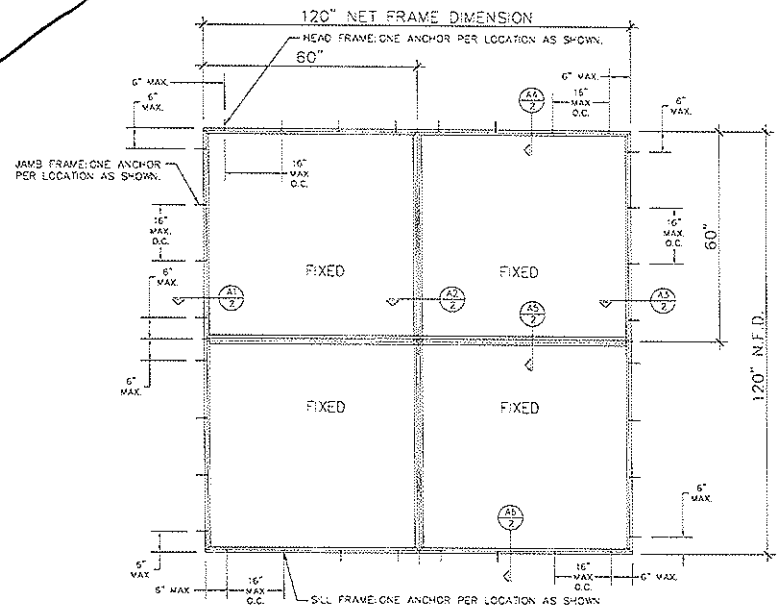
94550 Report#

JAN 05 2010 Date

Tech



SPECIMEN 1: VERTICAL TDL



SPECIMEN 2: INTERSECTING TDL

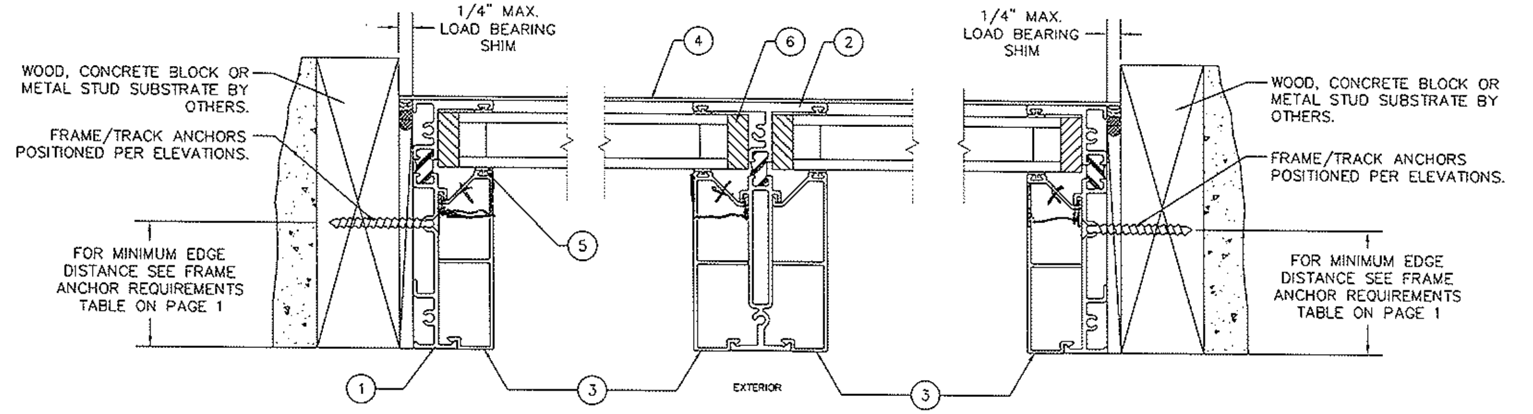
VALIDATOR INITIAL

COMMENTS	DRAWN BY	DATE	REVISIONS

DATE: 09/17/2009
DRAWN BY: KEVIN
JOB NUMBER: 253595
TITLE: KONA 3800 AAMA, FBC, ASTM 1886/1998 CERTIFICATION
CUSTOMER: FLEETWOOD WINDOWS AND DOORS
JOB NAME: KONA 3800 CERTIFICATION

FLEETWOOD
WINDOWS AND DOORS
355 SMITH AVE CORCORAN, CALIFORNIA 93280 - (559) 992-5535

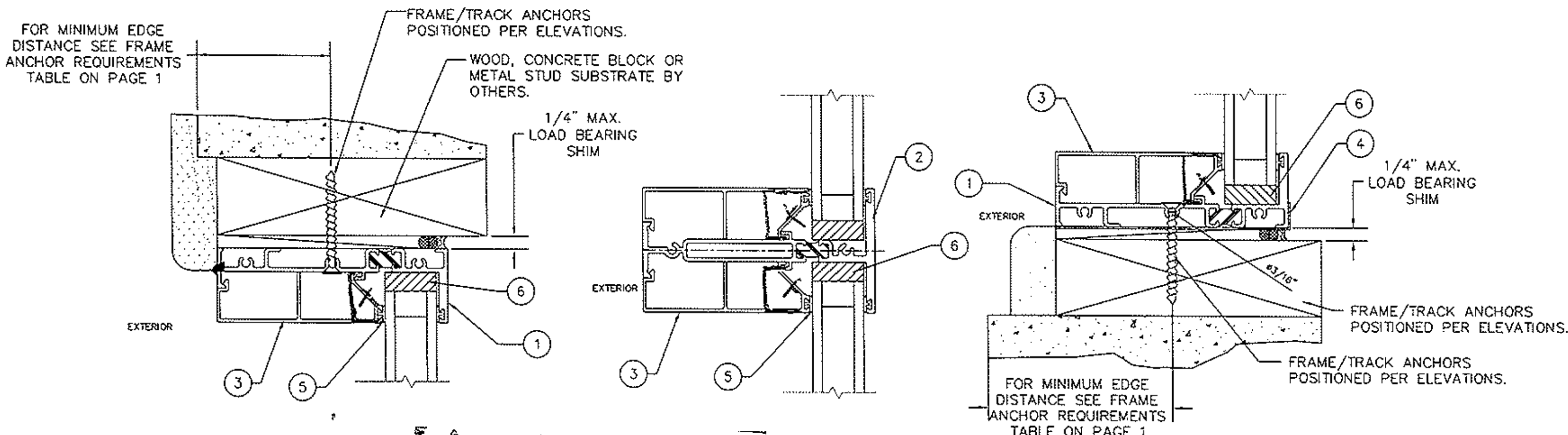
SCALE : 1:16
DRAWING NO. : CERT-3800 - 09
SHEET : 1 OF 3



A1/2 JAMB — SCALE: FULL

A2/2 V. MULLION — SCALE: FULL

A3/2 JAMB — SCALE: FULL



A4/2 HEAD — SCALE: FULL

A5/2 H. MULLION — SCALE: FULL

A6/2 SILL — SCALE: FULL

VALIDATOR INITIAL

TITLE: KONA 3800 - AAMA FRC. ASTM 1886/1996 CERTIFICATION

CUSTOMER: FLEETWOOD WINDOWS AND DOORS

JOB NAME: KONA 3800 CERTIFICATION

DRAWN BY: KEVIN | DATE: 09/17/2009 | JOB NUMBER: 253635

REVISIONS | DATE | DRAWN BY | COMMENTS

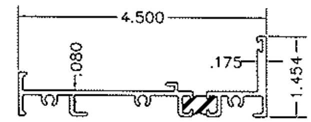
FLEETWOOD WINDOWS AND DOORS

395 SMITTY AVE CORONA, CALIFORNIA 92880 - www.fleetwoodusa.com

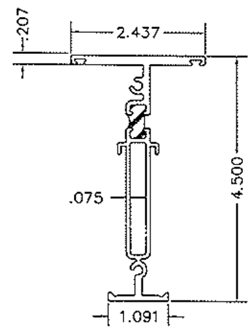
SCALE: 1:1

DRAWING NO.: CERT 3800-09

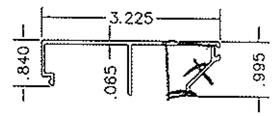
SHEET: 2 of 3



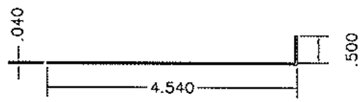
(1) SILL, HEAD & JAMB



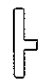
(2) MULLION



(3) GLASS STOP

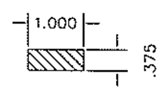


(4) SILL PAN



(SCALE 4X)

(5) SANOPRENE BULB



(6) EDGE BLOCK

ITEM #	PART	ITEM DESCRIPTION
		EXTRUSIONS
1	3805	SILL, HEAD JAMB
2	3806	MULLION
3	3801	GLASS STOP
4	3822	SILL PAN
5	OVP04	SANOPRENE BULB
6	FW-1006	EDGE BLOCK

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

94550 JAN 05 2010

Report# Date

Tech

VALIDATOR INITIAL

COMMENTS	
DRAWN BY	
DATE	
REVISIONS	
DRAWN BY: KEVIN	DATE: 09/17/2009
JOB NUMBER: 253895	
TITLE: KONA 3800 - AAMA, FBC, ASTM 1886/1996 CERTIFICATION	
CUSTOMER: FLEETWOOD WINDOWS AND DOORS	
JOB NAME: KONA 3800 CERTIFICATION	

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SCALE: 1:1
DRAWING NO.: CERT 3800-09
SHEET: 3 of 3