Architectural Testing

ASTM F 1642-04/GSA TS01
TEST REPORT

Rendered to:

UNITED STATES ALUMINUM

SERIES/MODEL: BW3250
PRODUCT TYPE: Aluminum Combination Fixed Window

	Summary of Results			
Title	**Test Specimen #1**	**Test Specimen #2**	**Test Specimen #3**	**Test Specimen #4**
ASTM Hazard Rating	Very Low Hazard	Very Low Hazard	Low Hazard	Low Hazard
GSA Performance Condition	4	2	4	4
Average Peak Blast Pressure	6.7 psi	6.6 psi	7.1 psi	7.2 psi
Average Positive Phase Impulse	47 psi-msec	45 psi-msec	47 psi-msec	46 psi-msec
Average Positive Phase Duration	13 sec	13 msec	14 msec	13 msec

This report contains in its entirety:

Cover Page:	1 page
Report Body:	9 pages
Test Facility:	1 page
Pressure-Time Plots:	8 pages
Photographs:	8 pages
Drawings:	20 pages

Digitally Signed by: Brady W. McNaughton
2011.05.05 16:26:46 -04'00'

Reference should be made to Architectural Testing, Inc. Report No. A8997.01-122-12 for complete test specimen description and data.

130 Derry Court
York, PA 17406-8405
phone: 717-764-7700
fax: 717-764-4129
www.archtest.com

Architectural Testing

ASTM F 1642-04/GSA TS01 TEST REPORT

Rendered to:

UNITED STATES ALUMINUM
200 Singleton Drive.
Waxahachie, Texas 75165

Report No.:	A8977.01-122-12
Test Dates:	04/20/11
Through:	04/25/11
Report Date:	05/05/11
Expiration Date:	04/25/15

Project Summary: Architectural Testing, Inc. was contracted by United States Aluminum to perform testing on four Series/Model BW3250 aluminum combination fixed windows. Test specimen descriptions and results are reported herein. The samples were provided by the client.

Test Specification: The test specimens were evaluated in accordance with:

> ASTM F 1642-04, *Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading.*
>
> GSA-TS01-2003, *US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.*

Test Facility: Architectural Testing, Inc.'s shock tube is housed in a 10,000 square foot state-of-the-art test facility located in York, Pennsylvania. Blast loadings are produced on the specimen to simulate the effects of a high explosive charge at a specified standoff distance. Shock waves are generated by the sudden rupturing of a thin aluminum membrane. The shock wave expands as it travels down the tube and impacts the target with a specific positive pressure and impulse. A photograph of the shock tube is provided in Figure #1 of Appendix A.

Data Acquisition: In accordance with ASTM F 1642-04 and GSA TS01, four reflective pressure transducers are utilized to record data at a 1MHz sample rate. Two reflective pressure transducers are located on the specimen holder at the top and right side (when viewed from the interior). A third pressure transducer is located on the shell to the exterior of the specimen, and a fourth is located in the witness chamber, directly to the interior of the specimen holder. A sketch of the specimen holder and corresponding reflective pressure sensor locations are provided in Figure #2 of Appendix A.

Drawing Reference: The attached drawings have been verified by Architectural Testing, Inc. and are representative of the samples tested. Drawings are provided in Appendix D.

130 Derry Court
York, PA 17406-8405
phone: 717-764-7700
fax: 717-764-4129
www.archtest.com

Test Specimen Description: The following descriptions apply to all specimens.

Test Series/Model: BW3250 System

Product Type: Combination Fixed Window

Overall Size: 82-3/4" wide by 82-3/4" high

Interior Top Left Fixed Daylight Opening: 23" wide by 69-1/2" high

Interior Top Right Fixed Daylight Opening: 52-1/2" wide by 69-1/2" high

Interior Bottom Left Fixed Daylight Opening: 23" wide by 6" high

Interior Bottom Right Fixed Daylight Opening: 52-1/2" wide by 6" high

Overall Area: 47.55ft^2

Reinforcement: No reinforcement was utilized.

Finish: Aluminum

Glazing Details: Each lite was glazed with a 1" thick insulating glass unit. The outboard lite was constructed of 1/4" thick clear annealed glass and the inboard lite was constructed of 1/4" thick clear laminated glass separated by an aluminum spacer system. The laminated glass was constructed of two sheets of 1/8" thick clear annealed glass separated by a 0.030" thick PVB Butacite® interlayer. The glazing was installed from the exterior onto a bed of silicone sealant with a rubber gasket spacer against the glass. The exterior side was secured with an aluminum pressure plate and rubber gasket. The pressure plate was secured to the screw race of the framing members with 1/4" x 1" hex head screws spaced approximately 9" on center. The glazing bite measured 5/8". An aluminum snap cover was installed over the pressure plate.

Note #1: The tested glazing represents the minimum allowable glazing thickness as per section B-3.1.1.1 and Table B-3.

Test Specimen Description: (Continued)

Frame Construction: All frame members were constructed of extruded aluminum, with coped and butted corners and sealed with silicone sealant. All horizontal to vertical connections utilized a shear block. Three 5/8" x 5" long bolts were used at each shear block connection to the vertical jambs and three 5/8" x 7" long bolts were used at all shear block connection to the intermediate mullion. Bolts extended through the vertical member and shear block and were secured with a washer and lock nut. Horizontal members were secured to the shear block with four #12 x 1" flat head screws extending through the horizontal into the shear block.

Hardware: No hardware was utilized.

Installation: Each specimen was installed into a C8 steel channel test buck. "F" and "T" style anchors were used at the head and sill of the intermediate vertical mullion and at the head and sill of each vertical jamb member. "F" style anchors were secured to the steel channel with four 1/2" grade 5 bolts in a 2" x 3" square pattern in the center of the "F" style anchor. "T" style anchors were secured to the steel channel with four 1/2" grade 5 bolts, two bolts on each side of the anchor, 1-1/4" in from each end spaced 3" apart.

Test Results: The results are tabulated as follows:

Test Specimen #1:

Description	Results
Ambient Temperature	63°F
Glazing Temperature	66°F
Peak Positive Pressure	
Top Pressure	6.7 psi
Right Pressure	7.1 psi
Shell Pressure	6.3 psi
Average Pressure	6.7 psi
Positive Phase Duration	
Top Duration	13 msec
Right Duration	14 msec
Shell Duration	11 msec
Average Duration	13 msec
Positive Phase Impulse	
Top Impulse	47 psi-msec
Right Impulse	47 psi-msec
Shell Impulse	46 psi-msec
Average Impulse	47 psi-msec

- No pressure rise was measured on the protected side of the specimen.

- Two 24" long tears in the laminate of the large lite and approximately 8" pull-out along the left jamb. One tear approximately 16" long on the large side lite. Total tears and pull-out for the large lite was greater than 20% of the sight perimeter.

- Fragments were observed in the witness area, with a sum total united dimension less than 10" in the 1m-3m area. Three impacts on the back wall were observed below the 24" line.

ASTM Hazard Rating: Very Low Hazard

GSA Performance Condition: 4

Pressure-time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

Test Results: (Continued)

Test Specimen #2:

Description	Results
Ambient Temperature	63°F
Glazing Temperature	64°F
Peak Positive Pressure	
Top Pressure	6.8 psi
Right Pressure	6.8 psi
Shell Pressure	6.2 psi
Average Pressure	6.6 psi
Positive Phase Duration	
Top Duration	13 msec
Right Duration	14 msec
Shell Duration	12 msec
Average Duration	13 msec
Positive Phase Impulse	
Top Impulse	46 psi-msec
Right Impulse	45 psi-msec
Shell Impulse	45 psi-msec
Average Impulse	45 psi-msec

- No pressure rise was measured on the protected side of the specimen.

- A 14-1/2" tear in the laminate was observed at the top center of the large lite and 43" of pull-out was observed along the right jamb of the large lite. Total tears and pull-out for the large lite was greater than 20% of the sight perimeter.

- Dusting of glass in the witness area. No fragments or damage to the back panel was observed.

ASTM Hazard Rating: Very Low Hazard

GSA Performance Condition: 2

Pressure-time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

Test Results: (Continued)

Test Specimen #3:

Description	Results
Ambient Temperature	64°F
Glazing Temperature	64°F
Peak Positive Pressure	
Top Pressure	7.3 psi
Right Pressure	7.4 psi
Shell Pressure	6.7 psi
Average Pressure	7.1 psi
Positive Phase Duration	
Top Duration	13 msec
Right Duration	14 msec
Shell Duration	14 msec
Average Duration	14 msec
Positive Phase Impulse	
Top Impulse	47 psi-msec
Right Impulse	47 psi-msec
Shell Impulse	46 psi-msec
Average Impulse	47 psi-msec

- No pressure rise was measured on the protected side of the specimen.

- A 43" long vertical tear in the laminate was observed at the center of the large lite. No pull-out was observed at the perimeter glazing.

- Multiple fragments were observed in the witness area with approximately 63" sum total united dimensions in the 1m-3m area. Thirteen indents were observed in the wall panel below the 24" line.

ASTM Hazard Rating: Low Hazard

GSA Performance Condition: 4

Pressure-time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

Test Results: (Continued)

Test Specimen #4:

Description	Results
Ambient Temperature	65°F
Glazing Temperature	67°F
Peak Positive Pressure	
Top Pressure	7.3 psi
Right Pressure	7.4 psi
Shell Pressure	6.8 psi
Average Pressure	7.2 psi
Positive Phase Duration	
Top Duration	13 msec
Right Duration	13 msec
Shell Duration	13 msec
Average Duration	13 msec
Positive Phase Impulse	
Top Impulse	46 psi-msec
Right Impulse	47 psi-msec
Shell Impulse	46 psi-msec
Average Impulse	46 psi-msec

- No pressure rise was measured on the protected side of the specimen.

- A 43" horizontal tear in the laminate was observed at the center of the large lite, 39-1/2" of pull-out was observed out along the mullion and 29-1/2" pull-out was observed along the left jamb of the large lite. Total tears and pull-out for the large lite was greater than 20% of the sight perimeter.

- Multiple fragments were observed in the witness area with approximately 14" sum total united dimensions in the 1m-3m area. One fragment indent was observed on the back witness panel, 1" from the floor.

ASTM Hazard Rating: Low Hazard

GSA Performance Condition: 4

Pressure-time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

List of Official Observers:

Name	Company
Brady W. McNaughton, P.E.	Architectural Testing, Inc.
Russell W. Clark	Architectural Testing, Inc.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, and other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four 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 specimens 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: Russell Clark

Russell W. Clark
Technician

Digitally Signed by: Brady W. McNaughton

Brady W. McNaughton, P.E.
Senior Project Engineer

RWC:ddr/cmd

Attachments (pages): This report is complete only when all attachments listed are included.
- Appendix-A: Test Facility (1)
- Appendix-B: Pressure-Time Plots (8)
- Appendix-C: Photographs (8)
- Appendix-D: Drawings (20)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	05/05/11	N/A	Original report issue

Appendix A

Test Facility

Figure #1
Shock Tube and Test Facility

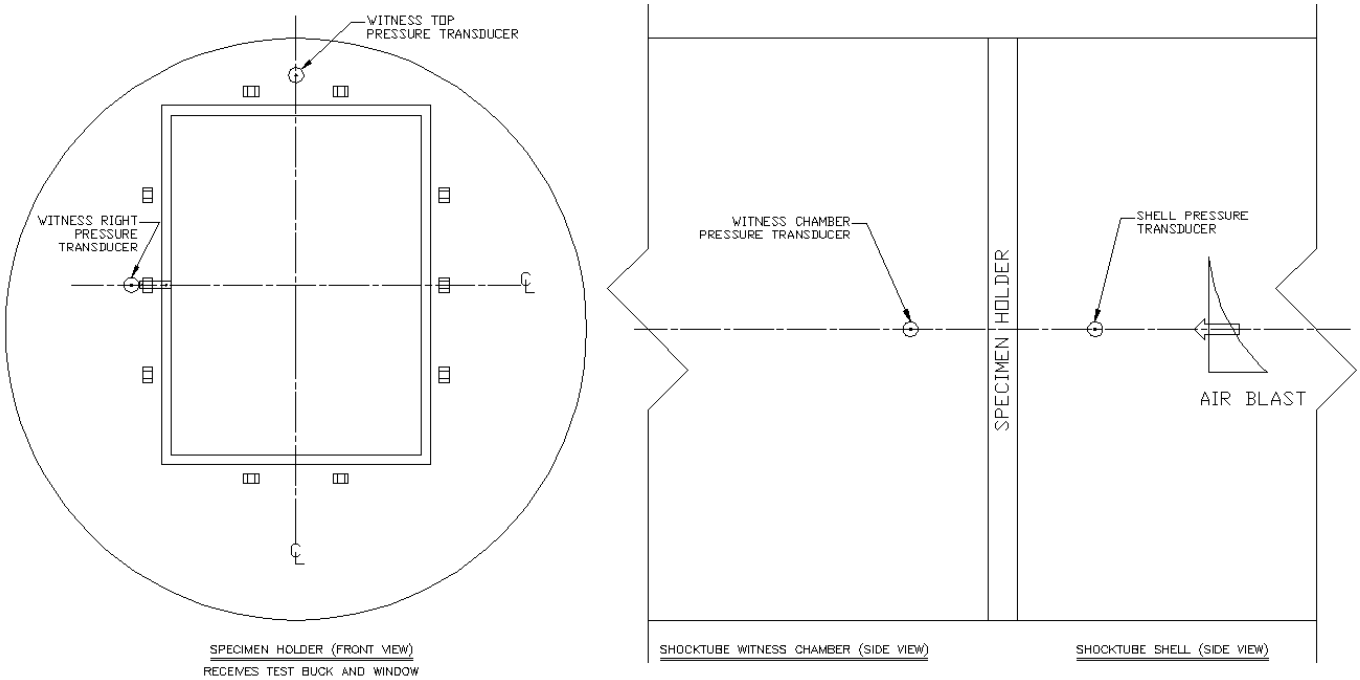
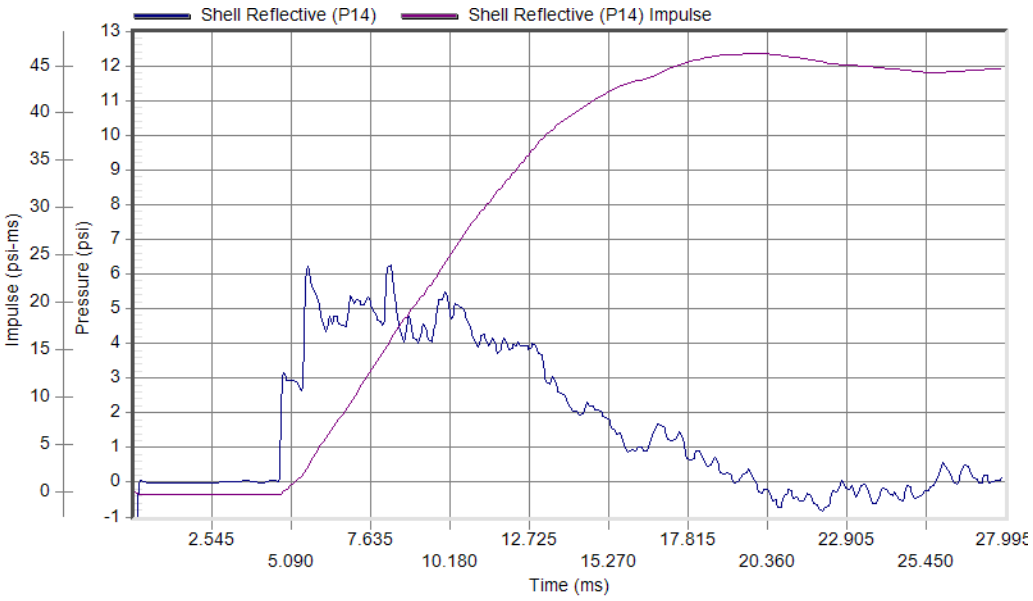


Figure #2
Pressure Sensor Locations

Appendix B

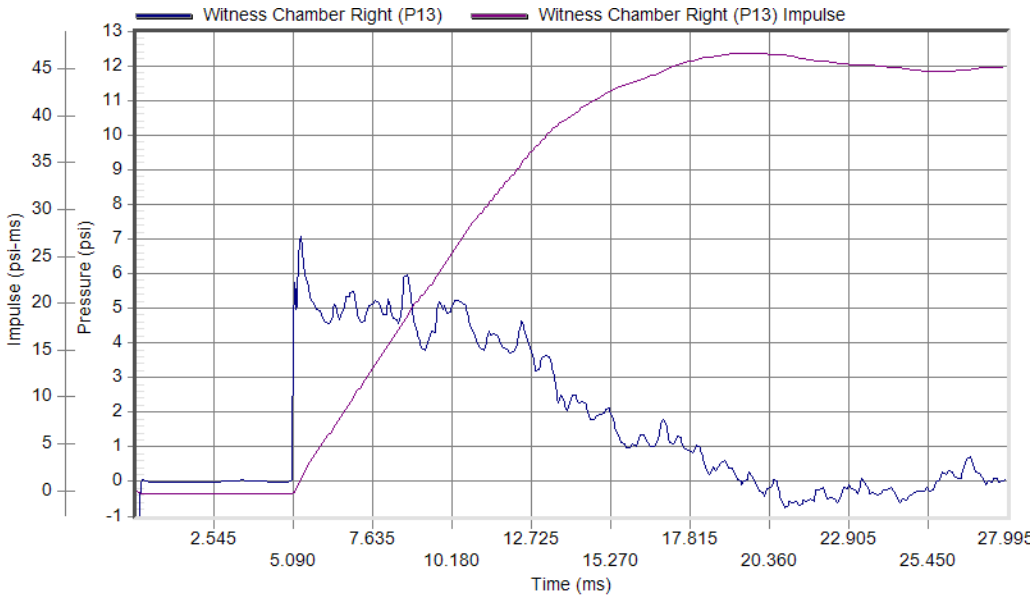
Pressure-Time Plots

Specimen #1



Peak Pressure: 6.28 psi at 8.26 ms
Duration: 10.99 ms

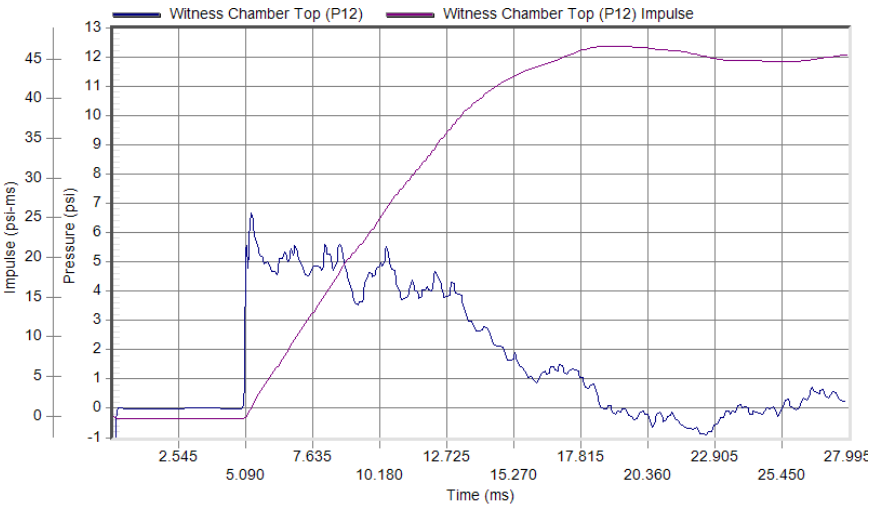
Test Date: 4/20/2011
Test Time: 11:41 am



Peak Pressure: 7.07 psi at 5.32 ms
Duration: 14.04 ms

Test Date: 4/20/2011
Test Time: 11:41 am

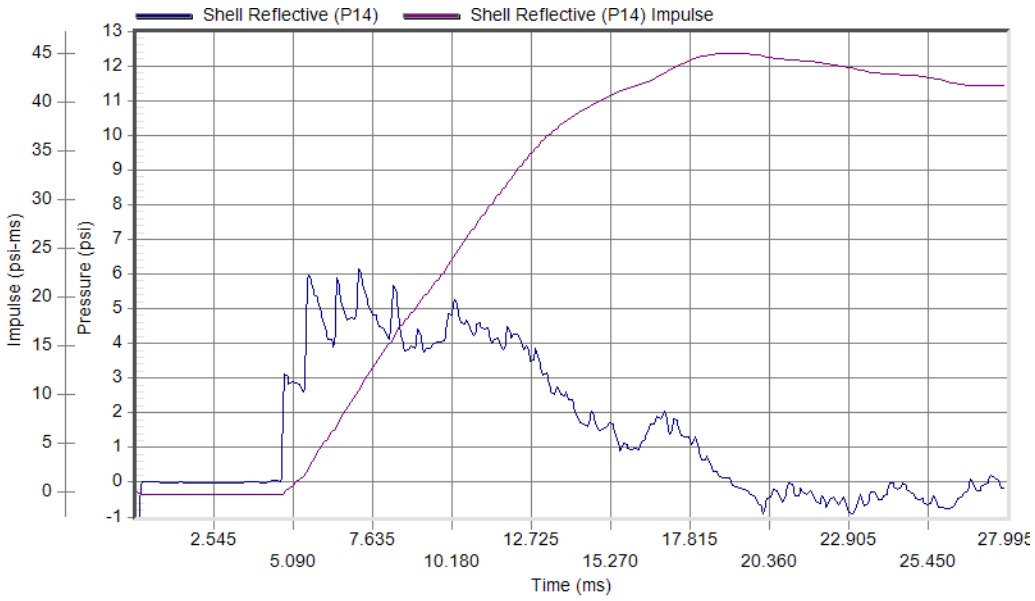
Specimen #1: (Continued)



Peak Pressure: 6.69 psi at 5.30 ms
Duration: 13.25 ms

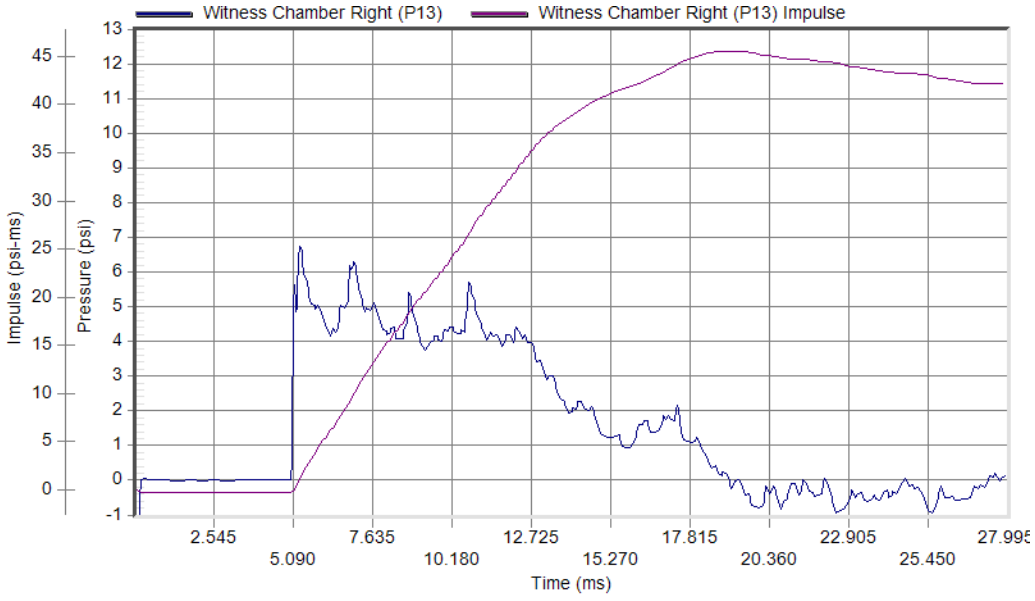
Test Date: 4/20/2011
Test Time: 11:41 am

Specimen #2



Peak Pressure: 6.21 psi at 7.21 ms
Duration: 11.92 ms

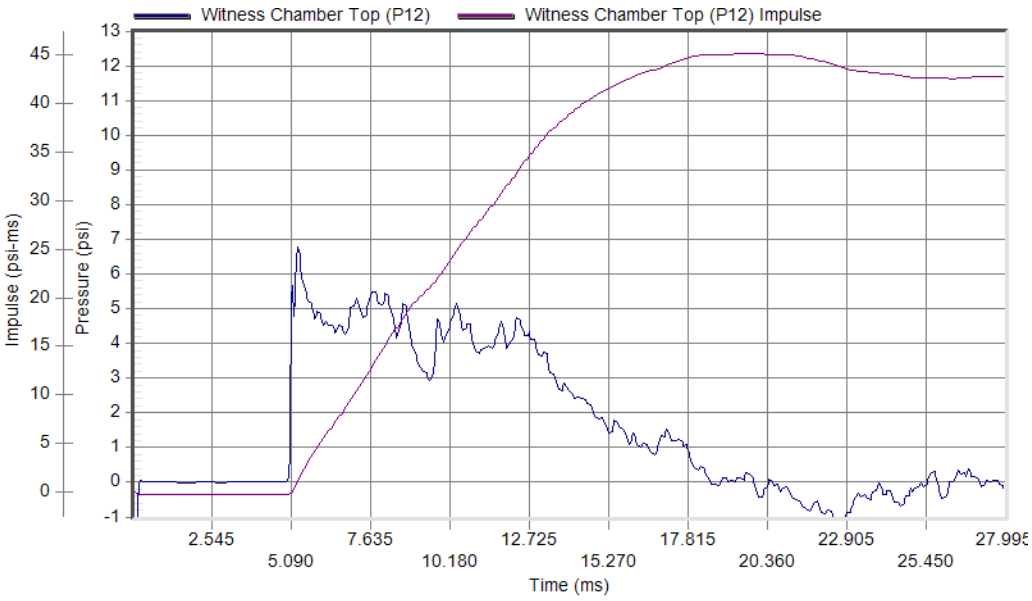
Test Date: 4/21/2011
Test Time: 12:24 pm



Peak Pressure: 6.83 psi at 5.31 ms
Duration: 13.76 ms

Test Date: 4/21/2011
Test Time: 12:24 pm

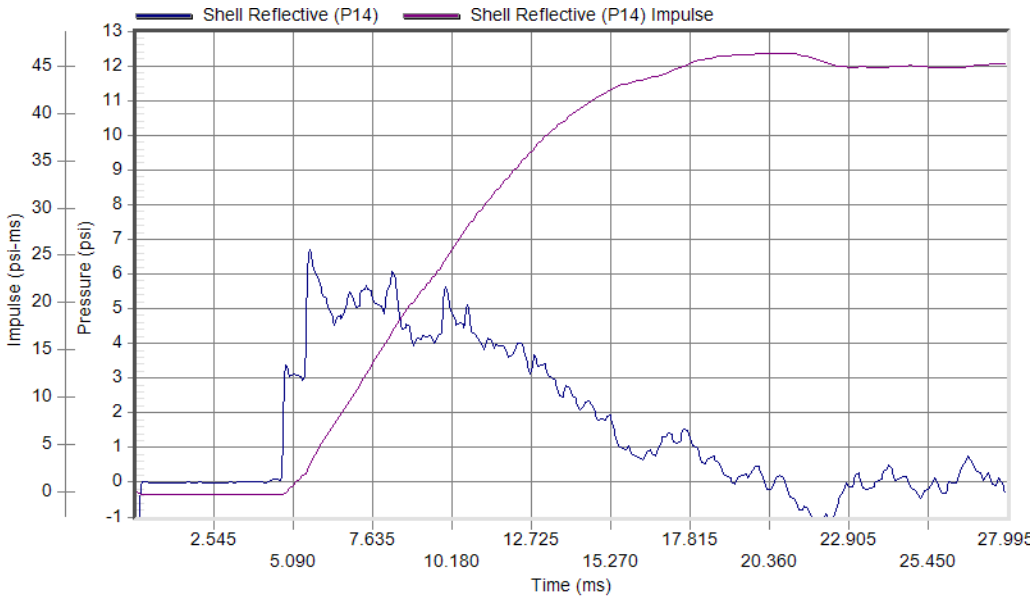
Specimen #2: (Continued)



Peak Pressure: 6.77 psi at 5.31 ms
Duration: 13.20 ms

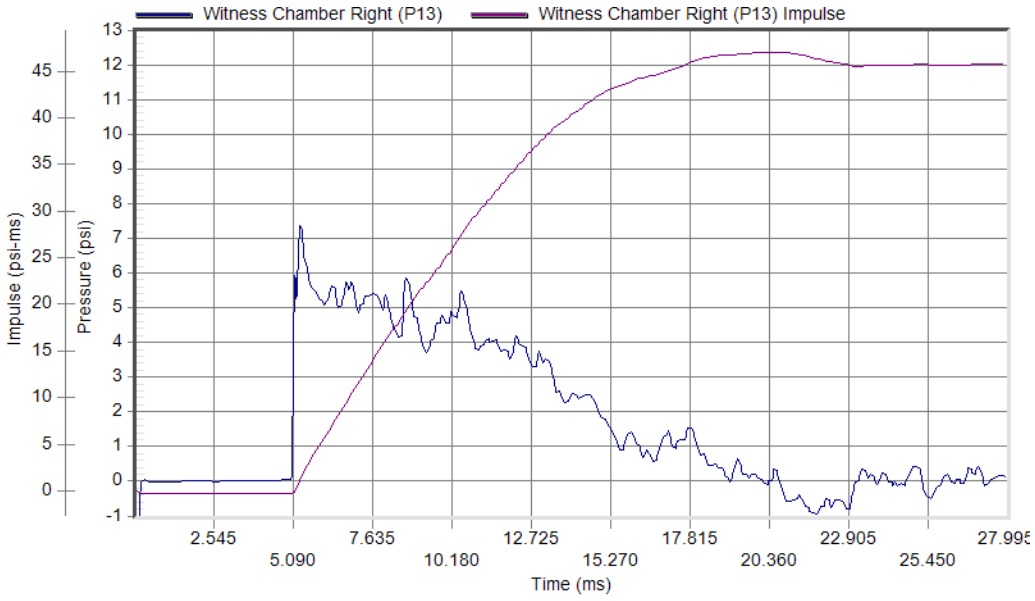
Test Date: 4/21/2011
Test Time: 12:24 pm

Specimen #3



Peak Pressure: 6.70 psi at 5.61 ms
Duration: 13.53 ms

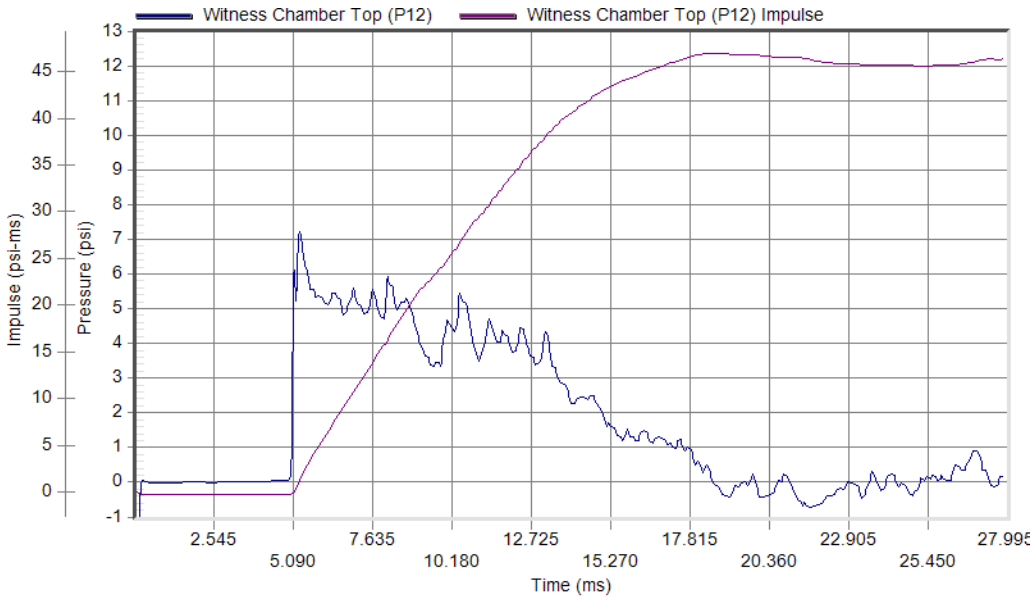
Test Date: 4/21/2011
Test Time: 4:26 pm



Peak Pressure: 7.43 psi at 5.33 ms
Duration: 13.73 ms

Test Date: 4/21/2011
Test Time: 4:26 pm

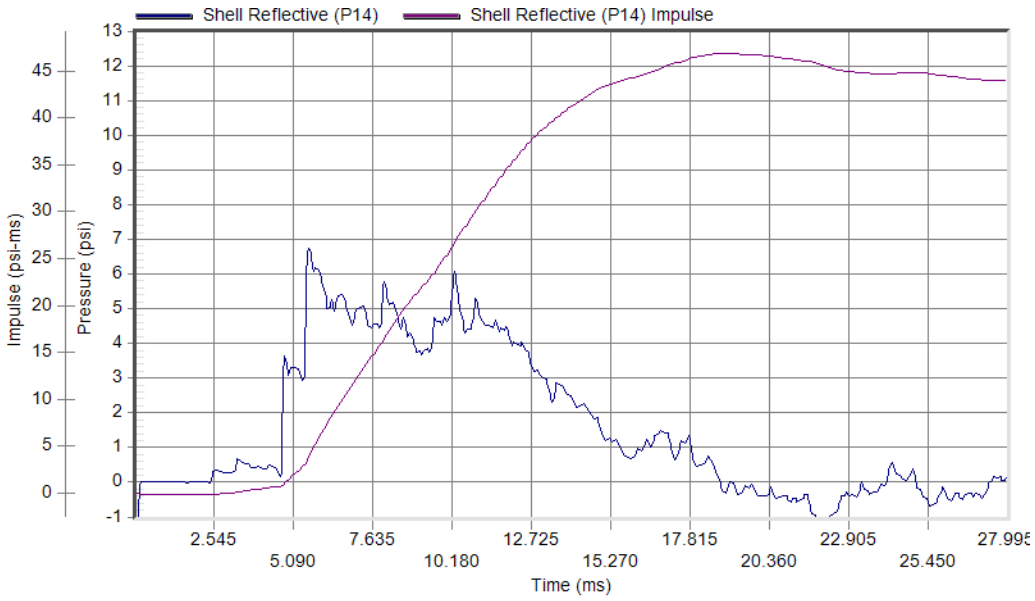
Specimen #3: (Continued)



Peak Pressure: 7.26 psi at 5.30 ms
Duration: 13.22 ms

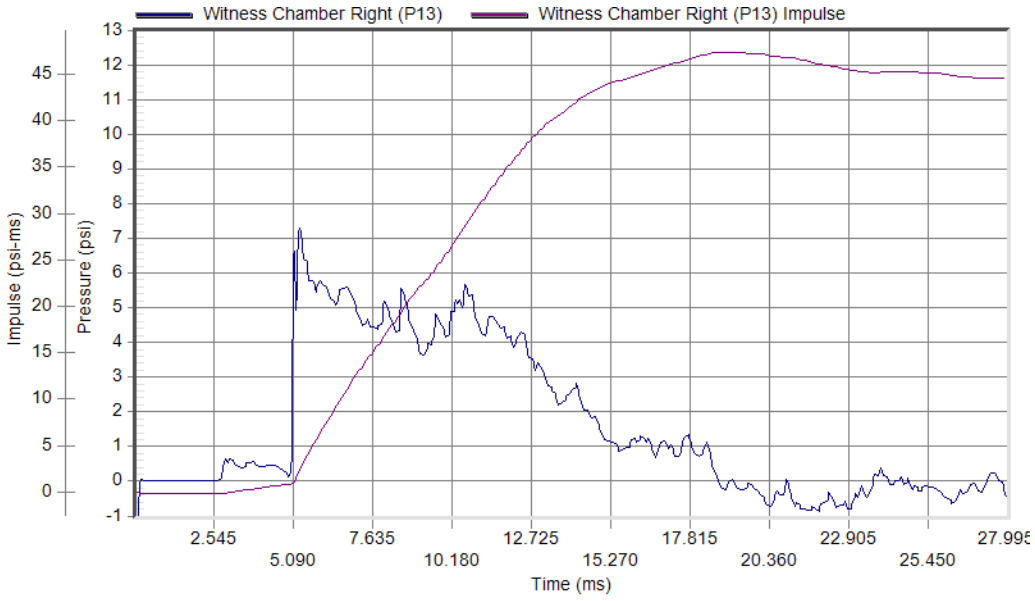
Test Date: 4/21/2011
Test Time: 4:26 pm

Specimen #4



Peak Pressure: 6.76 psi at 5.58 ms
Duration: 13.20 ms

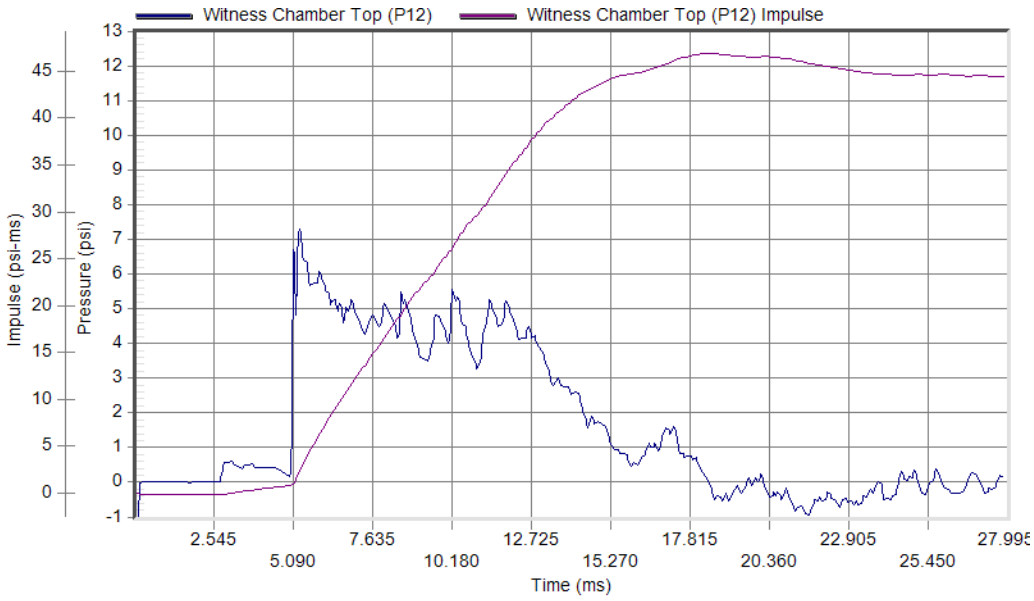
Test Date: 4/25/2011
Test Time: 11:26 am



Peak Pressure: 7.38 psi at 5.30 ms
Duration: 13.43 ms

Test Date: 4/25/2011
Test Time: 11:26 am

Specimen #4: (Continued)



Peak Pressure: 7.32 psi at 5.29 ms
Duration: 13.13 ms

Test Date: 4/25/2011
Test Time: 11:26 am

Appendix C

Photographs

Photo No. 1
Pre-test Specimen #1, Interior

Photo No. 2
Post-test Specimen #1, Interior

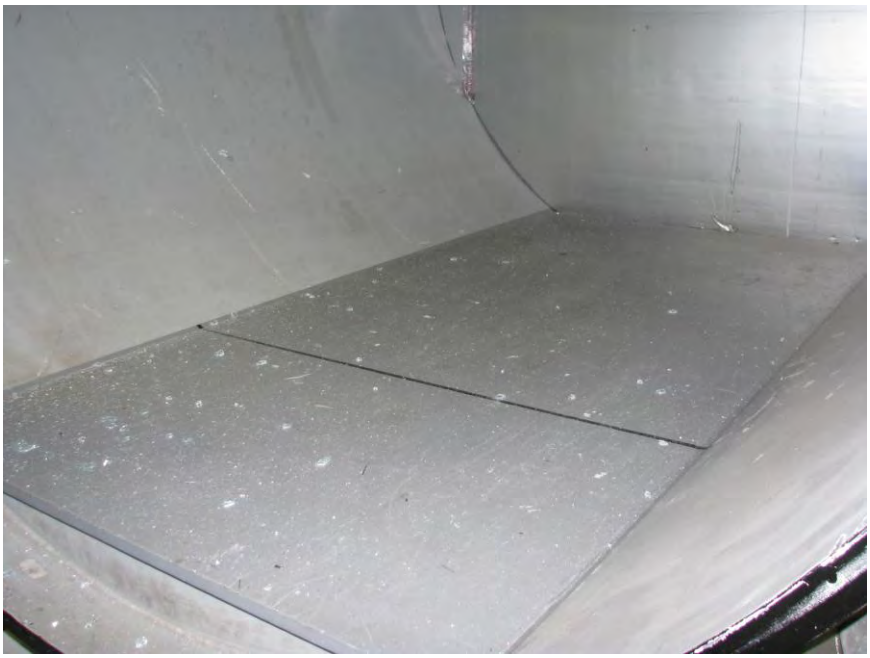


Photo No. 3
Post-test Specimen #1, Witness Chamber

Photo No. 4
Pre-test Specimen #2, Interior

Photo No. 5
Post-test Specimen #2, Interior

Photo No. 6
Post-test Specimen #2, Witness Chamber

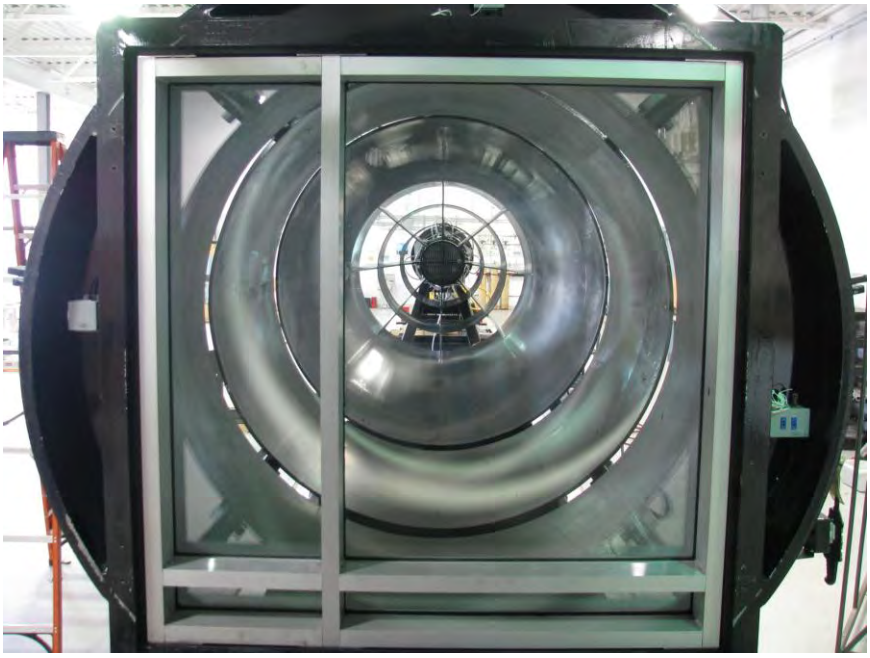


Photo No. 7
Pre-test Specimen #3, Interior

Photo No. 8
Post-test Specimen #3, Interior

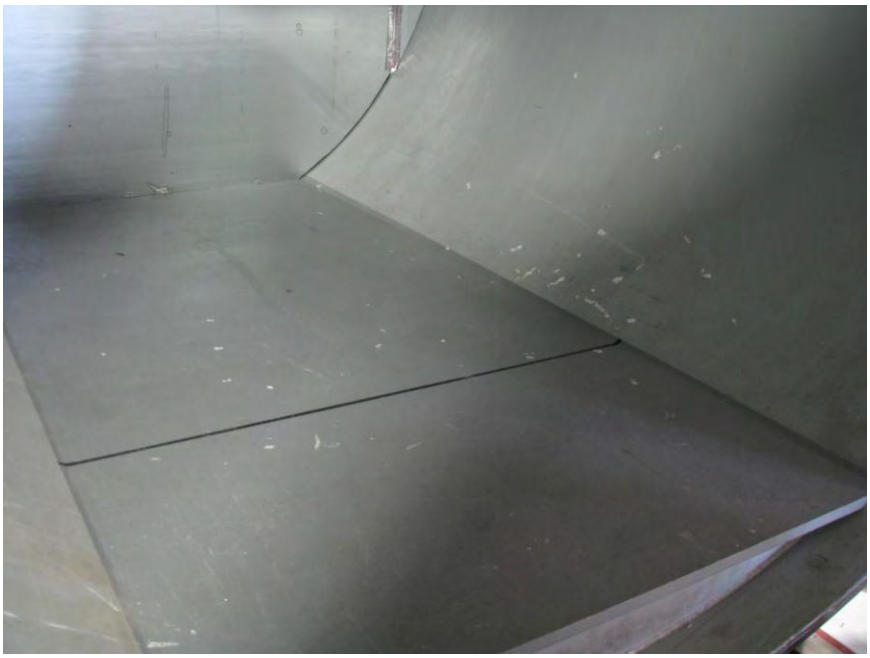


Photo No. 9
Post-test Specimen #3, Witness Chamber

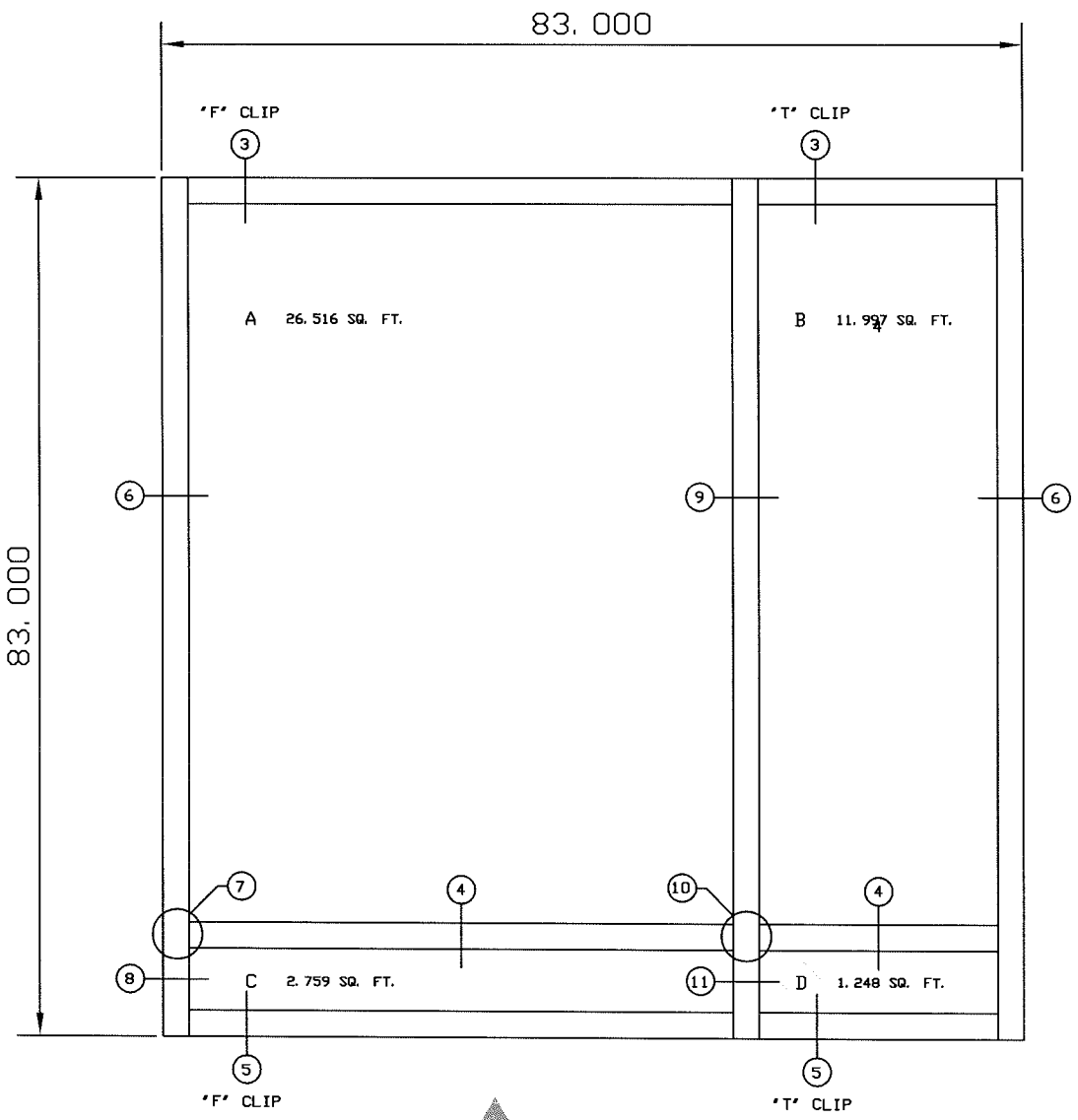
Photo No. 10
Pre-test Specimen #4, Interior

Photo No. 11
Post-test Specimen #4, Interior

Photo No. 12
Post-test Specimen #4, Witness Chamber

Appendix D

Drawings



BILL OF MATERIALS

P/N	DESCRIPTION	QTY	LENGTH
BW464	HORIZONTAL MULLION	3	52 1/2"
		3	23"
BW463	HORIZONTAL FILLER	1	52 15/32"
		1	22 31/32"
CW933	PRESSURE BAR	1	52 1/4"
		1	22 3/4"
BW477	PERI. PRESSURE BAR	2	52 1/4"
		2	22 3/4"
CW901	PRESSURE BAR COVER	3	52 15/32"
		3	22 31/32"
BW464	VERTICAL MULLION	3	83"
CW933	PRESSURE BAR	1	82 3/4"
BW477	PERI. PRESSURE BAR	2	82 3/4"
CW901	PRESSURE BAR COVER	3	82 31/32"
AC462	'T' ANCHOR @ VERT.	2	5"
AC461	'F' CLIP	4	5"
	5/8-11 x 1 1/2" GR5 BOLT	24	---
	5/8" NARROW WASHER	36	---
	5/8-11 NUT	12	---
	5/8" LOCK WASHER	12	---
AP465	SHEAR BLOCK PACKAGE AT JAMB	6	(4. 4 psi)
	5/8-11 x 5" GR5 BOLT	12	---
	5/8-11 NUT	12	---
	5/8" NARROW WASHER	12	---
	5/8" LOCK WASHER	12	---
ST277	#12x1" PHIL FH SMS	12	---
AP464	SHEAR BLOCK PACKAGE AT AT VERTICAL MULLION	3	(4. 4 psi)
	5/8-11 x 5" GR5 BOLT	6	---
	5/8-11 NUT	6	---
	5/8" NARROW WASHER	12	---
	5/8" LOCK WASHER	6	---
ST277	#12x1" PHIL FH SMS	12	---
AP465	SHEAR BLOCK PACKAGE AT AT JAMB	6	(10. 8 psi)
	5/8-11 x 5" GR5 BOLT	18	---
	5/8-11 NUT	18	---
	5/8" NARROW WASHER	18	---
	5/8" LOCK WASHER	18	---
ST277	#12x1" PHIL FH SMS	12	---
AP467	SHEAR BLOCK PACKAGE AT AT VERTICAL MULLION	6	(10. 8 psi)
	5/8-11x6 1/2" GR5 BOLT	18	---
	5/8-11 NUT	18	---
	5/8" NARROW WASHER	18	---
	5/8" LOCK WASHER	18	---
ST277	#12x1" PHIL FH SMS	12	---
SP250	INTERIOR GASKET	A/R	500' COIL
NP430	EXTERIOR GASKET	A/R	500' COIL
HD975	END DAM	12	---
SB910	SETTING BLOCKS	8	4"
AW901	EDGE BLOCKS	8	4"
MS222	1/4-20x1" HWH M PRESSURE BARS	A/R	---

SYM	REVISION	DATE	BY

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

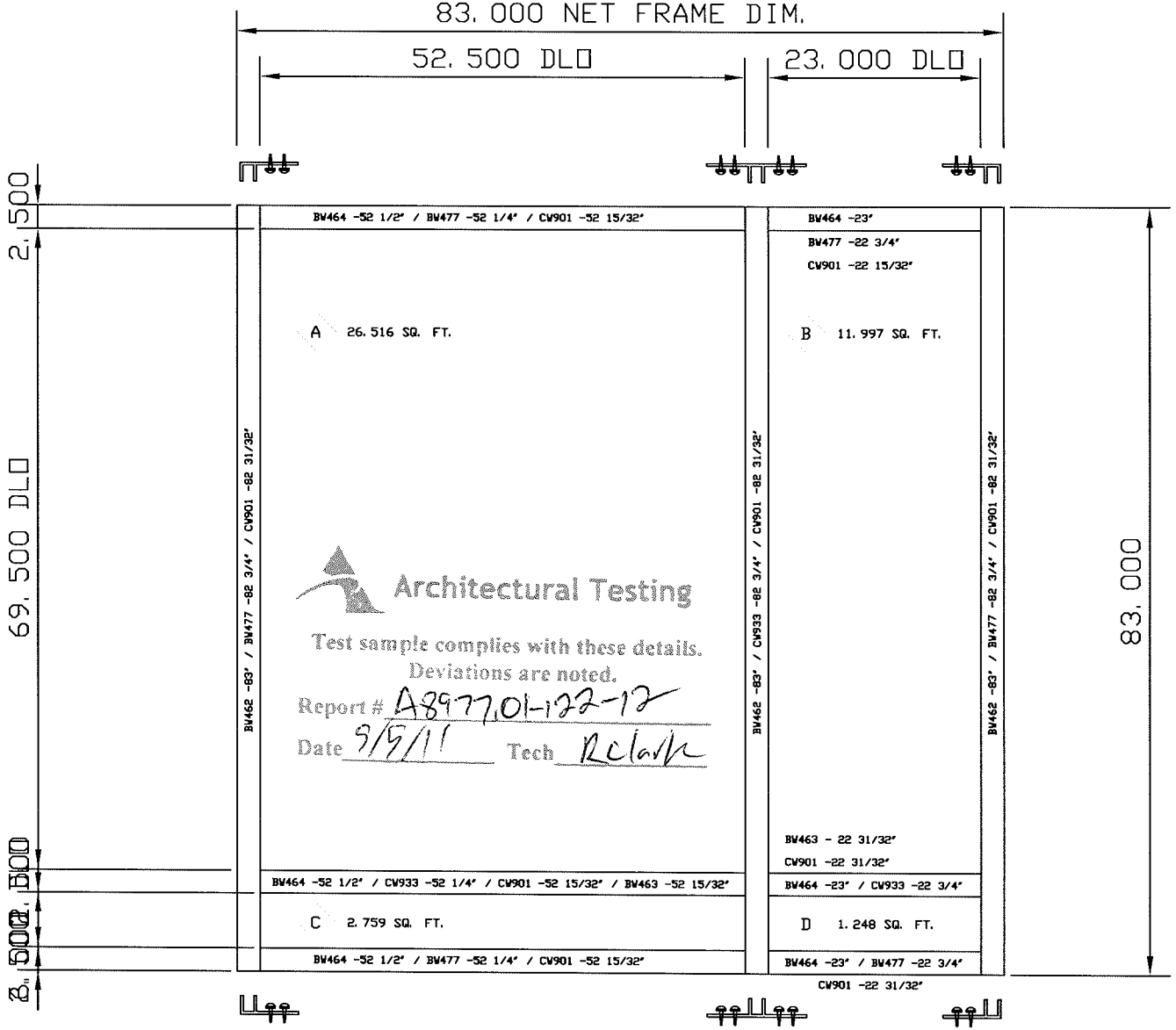
Date 5/5/11 Tech R Clark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum

- 720 Cel-River Road Rock Hill, SC 29730
- 200 Singleton Drive Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM 1" LAM. GLAZING
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: ELEVATION & BILL OF MATERIALS
SCALE: NO SCALE	DRAWING NO: USA-3145
	SHEET: 1 OF 20



SYM	REVISION	DATE	BY

PERIMETER ANCHORS

SYMBOL	DESCRIPTION	QTY
	AC462 'T' CLIP @ 5' LONG	2
	AC461 'F' CLIP @ 5' LONG	4
	1/2-13 x 1 1/2" GR5 BOLT	24
	1/2-13 x 1 1/2" GR5 BOLT	36
	1/4-20 X 3/4" FH GR2 MS	24
	1/4-20 X 3/4" FH GR2 MS	12

GLASS = DLO + 1. 375

UFC 01-040-01 B-3. 1. 2. 3

CONNECTIONS

1. 10. 8 PSI FOR LESS THAN 10. 8 SQ. FT.
2. 4. 4 PSI FOR GREATER THAN 10. 8 SQ. FT. BUT LESS THAN 32 SQ. FT.

6 PSI LOAD

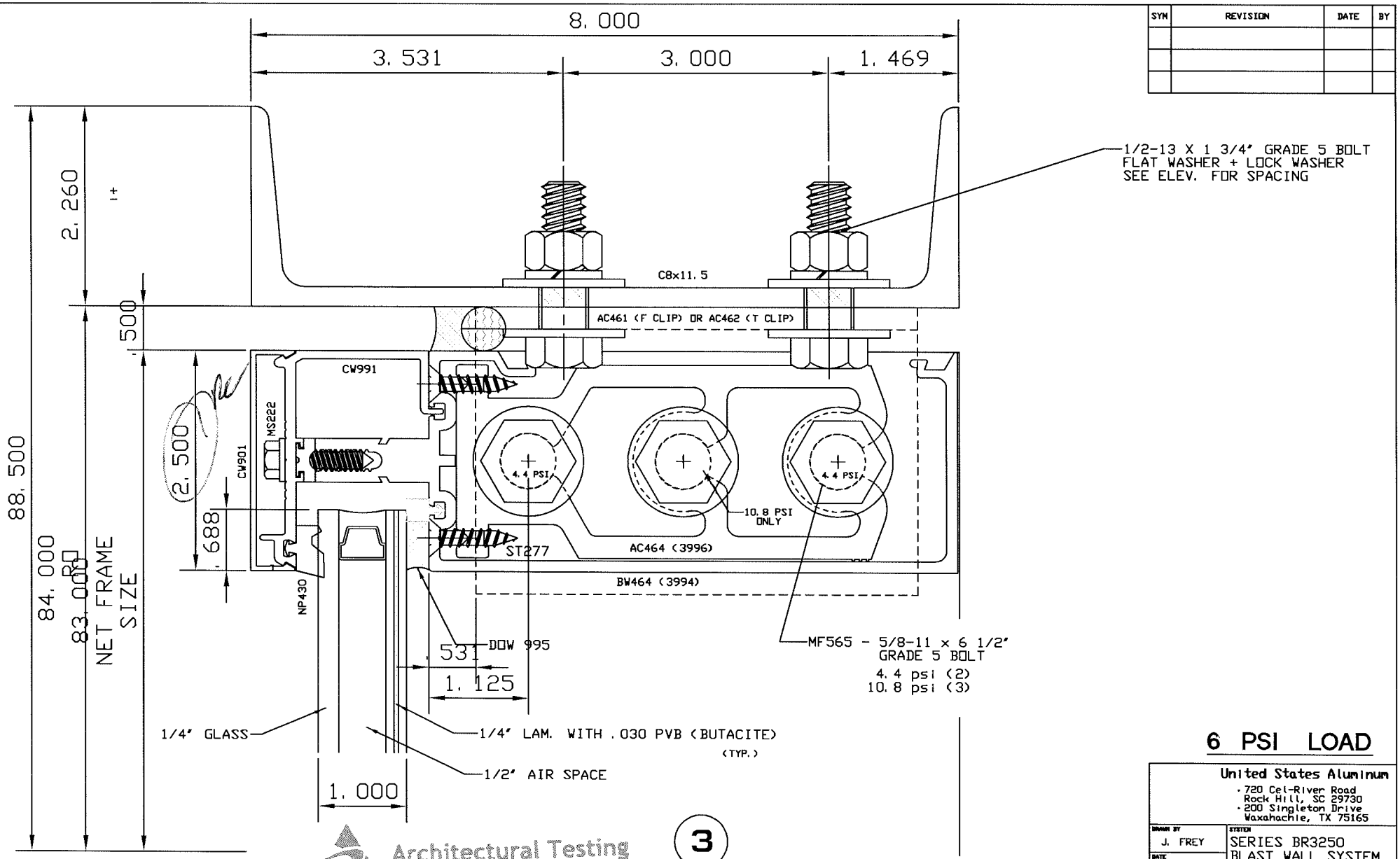
SYMBOL	DESCRIPTION	QTY	COMMENTS
A	53 7/8" X 70 7/8"	1	1" IG- 1/4" ANNEALED + 1/2" AIR + 1/8" ANNEALED + .030 BUTACITE + 1/8" ANNEALED
B	24 3/8" X 70 7/8"	1	1" IG- 1/4" ANNEALED + 1/2" AIR + 1/8" ANNEALED + .030 BUTACITE + 1/8" ANNEALED
C	53 7/8" X 7 3/8"	1	1" IG- 1/4" ANNEALED + 1/2" AIR + 1/8" ANNEALED + .030 BUTACITE + 1/8" ANNEALED
D	24 3/8" X 7 3/8"	1	1" IG- 1/4" ANNEALED + 1/2" AIR + 1/8" ANNEALED + .030 BUTACITE + 1/8" ANNEALED

SCL . 08333

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
· 720 Cel-River Road
Rock Hill, SC 29730
· 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 02/28/11	
APPVD BY:	DESCRIPTION: ELEVATION & ANCHORS
SCALE: 1" = 1'0"	DRAWING NO.: USA-3145 SHEET: 2 OF 20



SYM	REVISION	DATE	BY

6 PSI LOAD

3

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

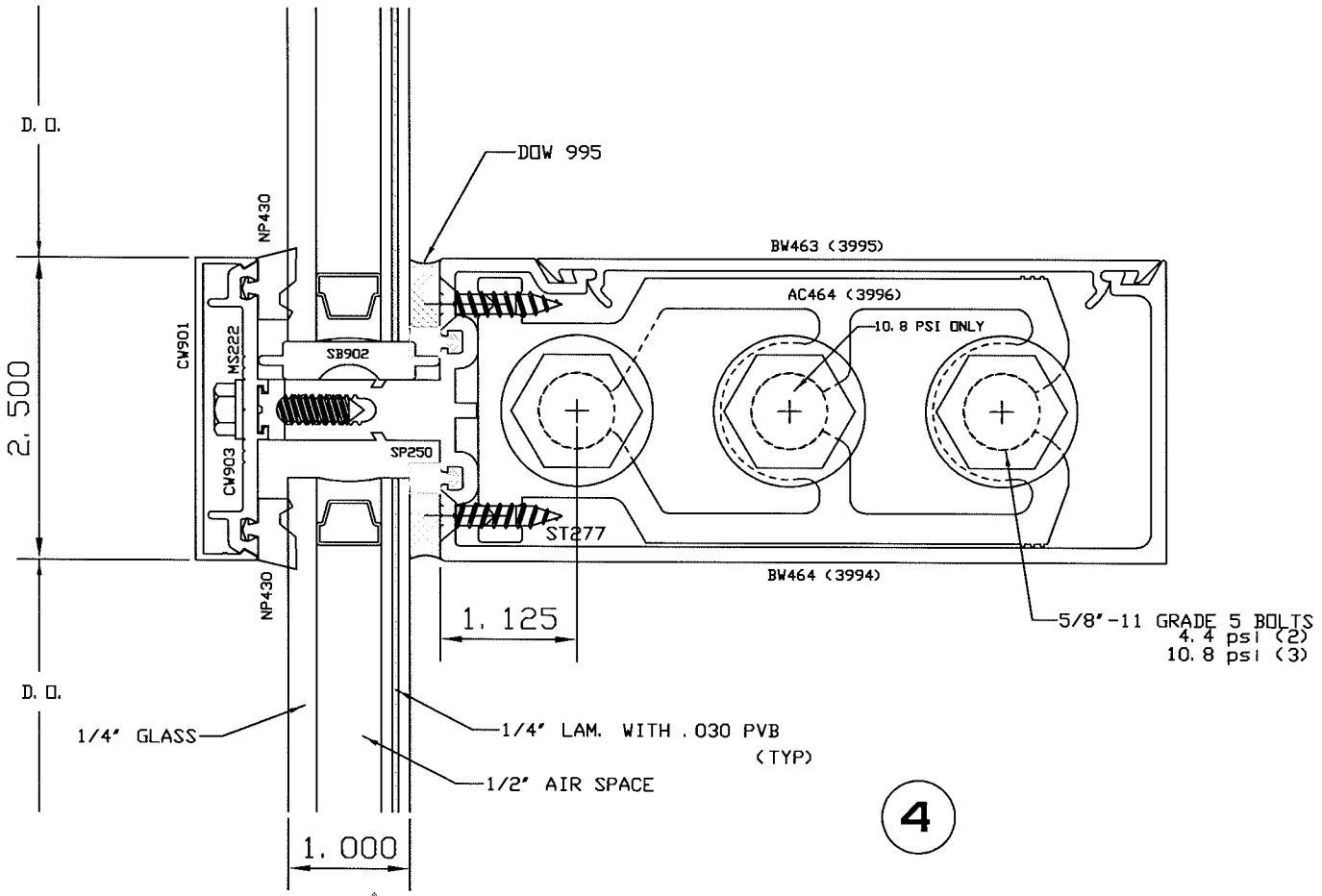
Date 5/5/11 Tech RClark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
· 720 Cel-River Road
Rock Hill, SC 29730
· 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 02/28/11	
APPVD BY:	DESCRIPTION: DETAILS (HEAD)
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 3 OF 20

SYM	REVISION	DATE	BY



4

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-1212

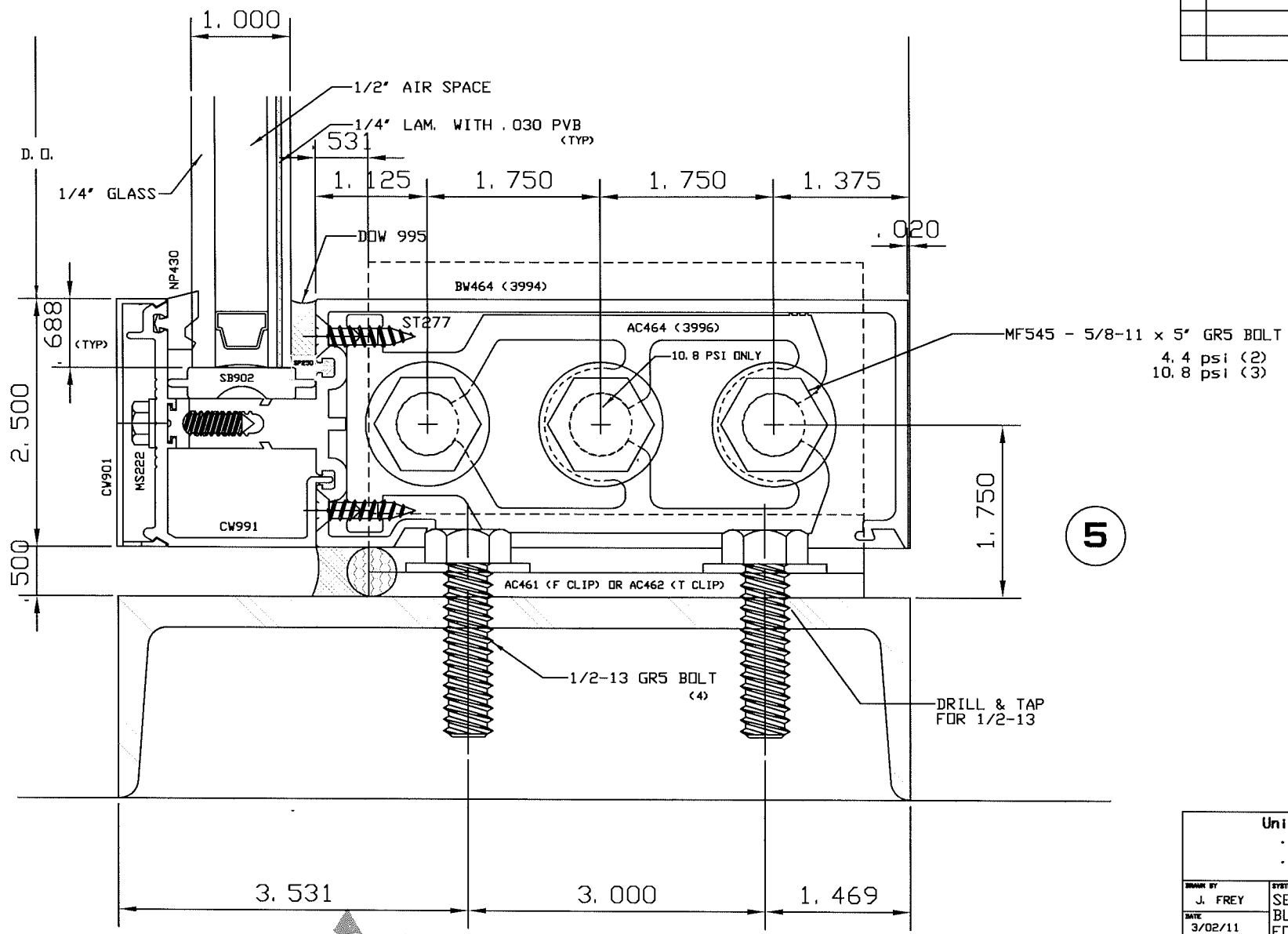
Date 5/5/11 Tech RClark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS (HOR MULL)
SCALE: FULL SIZE	DRAWING NO: USA-3145 — SHEET: 4 OF 20

SYM	REVISION	DATE	BY



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

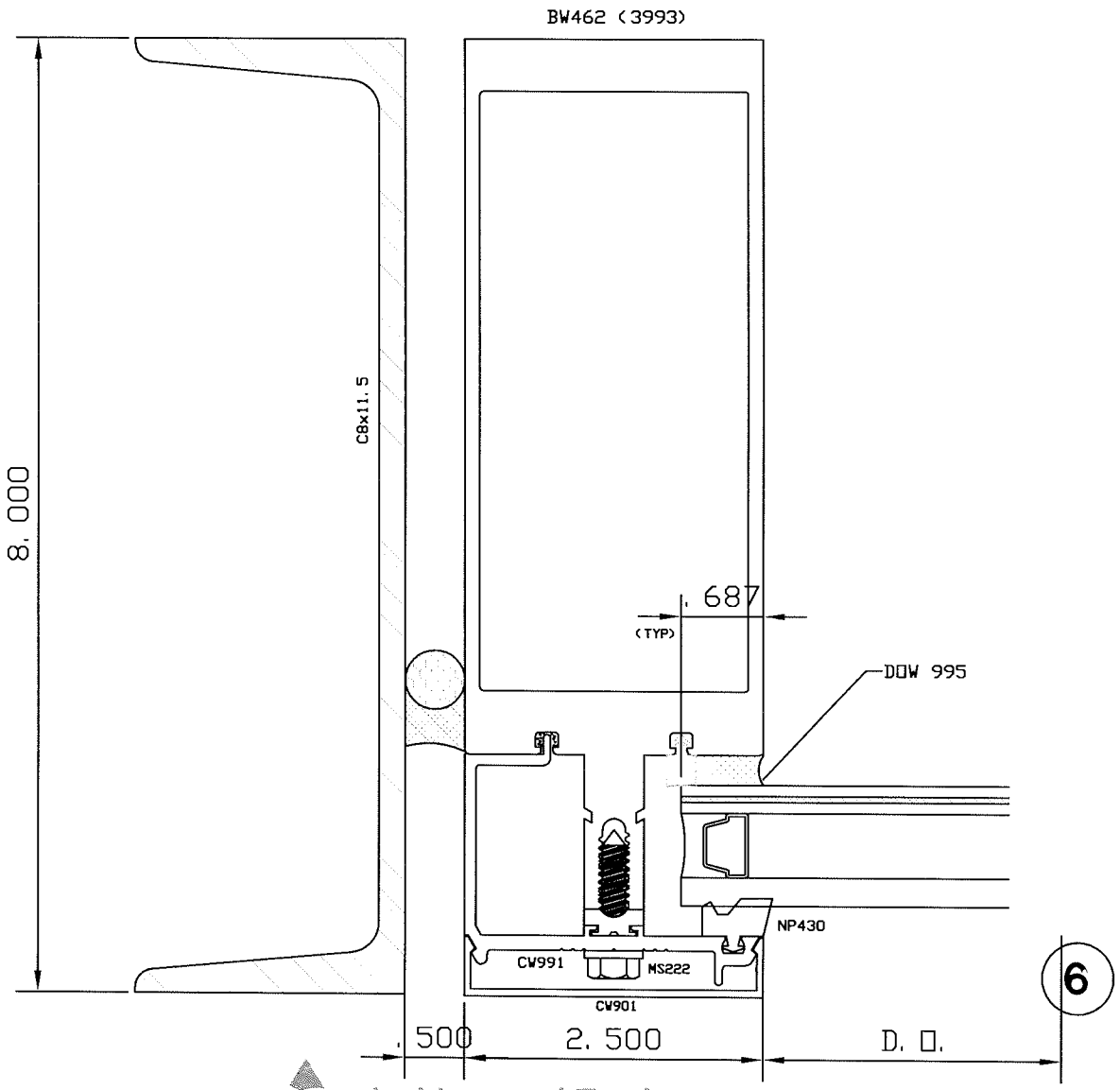
Date 5/9/11 Tech RClark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road Rock Hill, SC 29730
- 200 Singleton Drive Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS (SILL)
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 5 OF 20

SYM	REVISION	DATE	BY



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

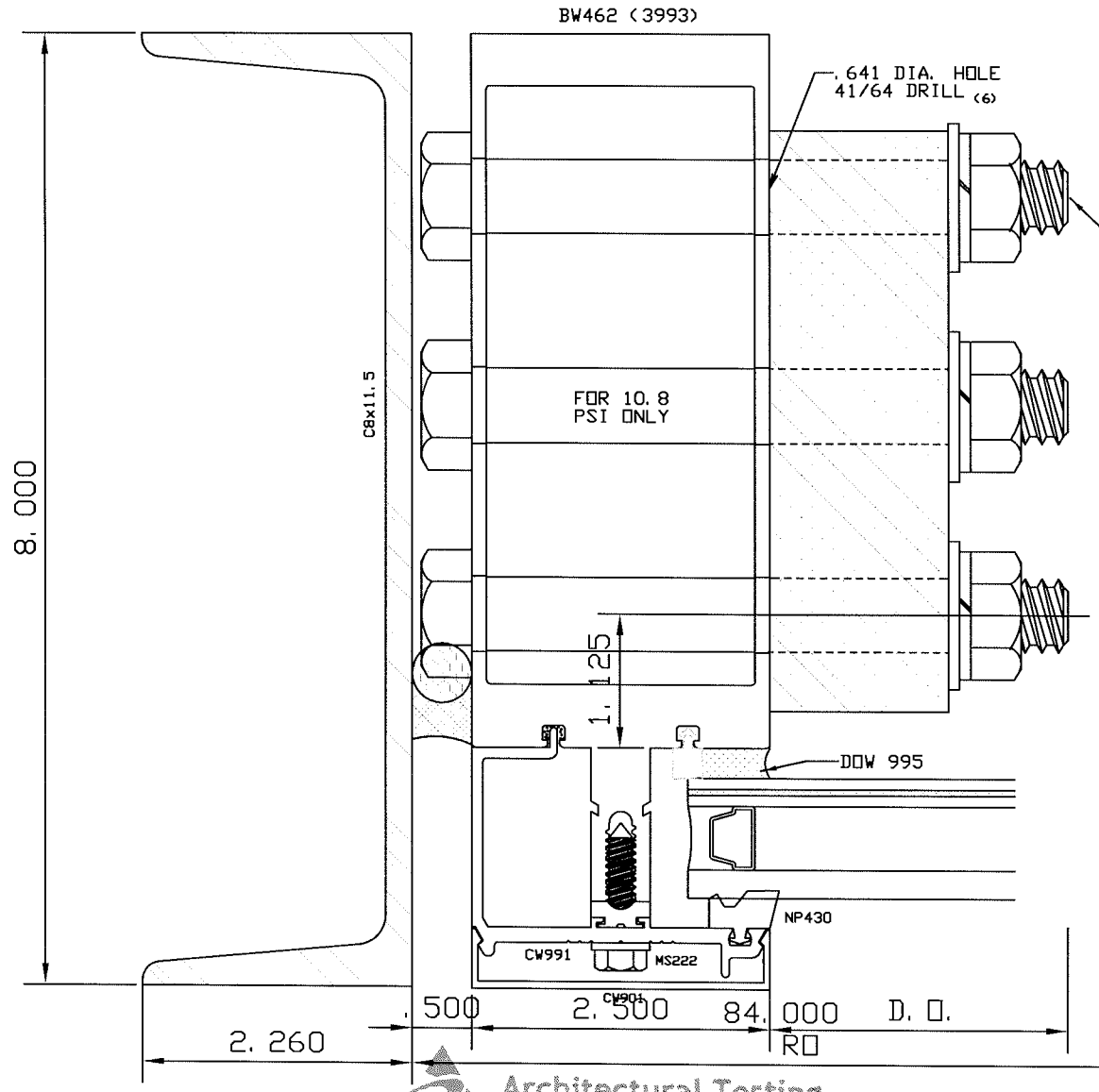
Date 5/5/11 Tech RClark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS VERT. MULLION AT JAMB
SCALE: FULL SIZE	DRAWING NO.: USA-2869 SHEET: 6 OF 20

SYM	REVISION	DATE	BY



MF565 - 5/8-11 X 5" GR5 BOLT
4.4 psi (2)
10.8 psi (3)
MF255 - 5/8 NARROW FLAT WASHER
4.4 psi (2)
10.8 psi (3)
MF256 - LOCK WASHER, SPLIT
4.4 psi (2)
10.8 psi (3)
MF219 - 5/8-11 HEX NUT, NYLOC
4.4 psi (2)
10.8 psi (3)

7

Architectural Testing

Test sample complies with these details.
Deviations are noted.

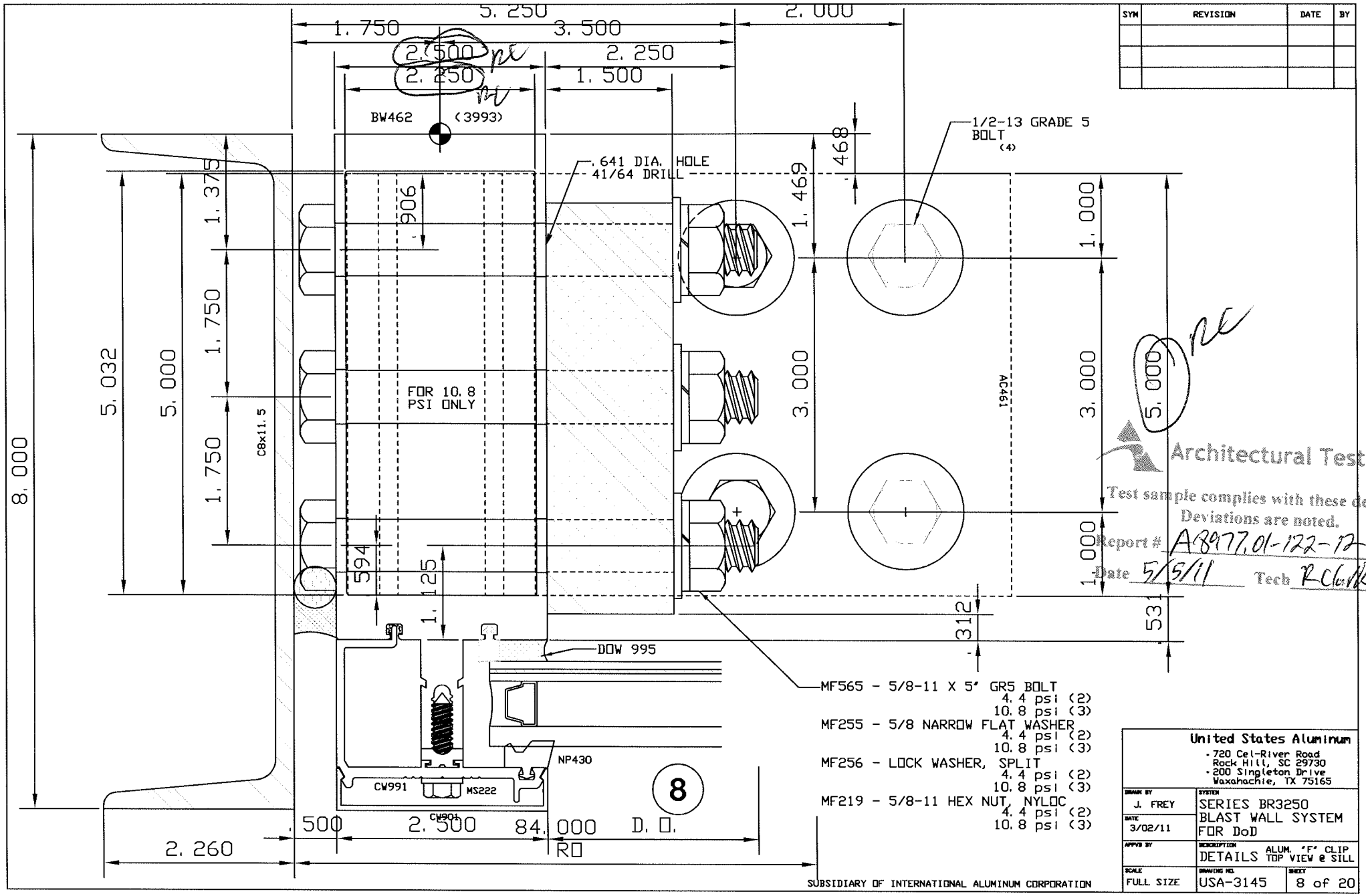
Report # A8977.01-122-12

Date 5/9/11 Tech RClark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
• 720 Cel-River Road
Rock Hill, SC 29730
• 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS SHEAR BLOCK
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 7 of 20



SYM	REVISION	DATE	BY

Architectural Testin

Test sample complies with these deta
Deviations are noted.

Report # A8977.01-122-12

Date 5/5/11 Tech RClark

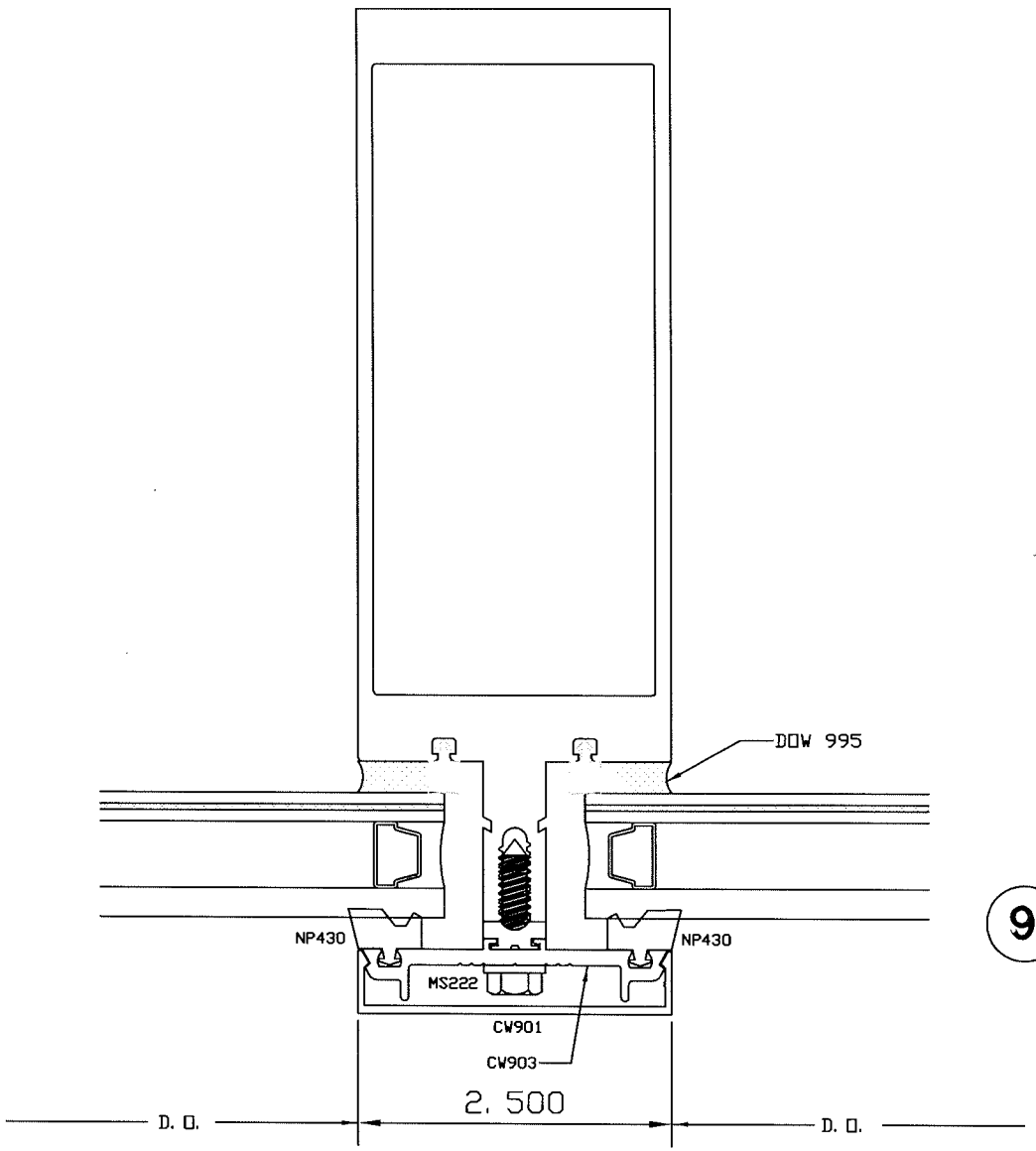
SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS ALUM. 'F' CLIP TOP VIEW & SILL
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 8 of 20

SYM	REVISION	DATE	BY

BW462 (3993)



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 5/5/11 Tech RClark

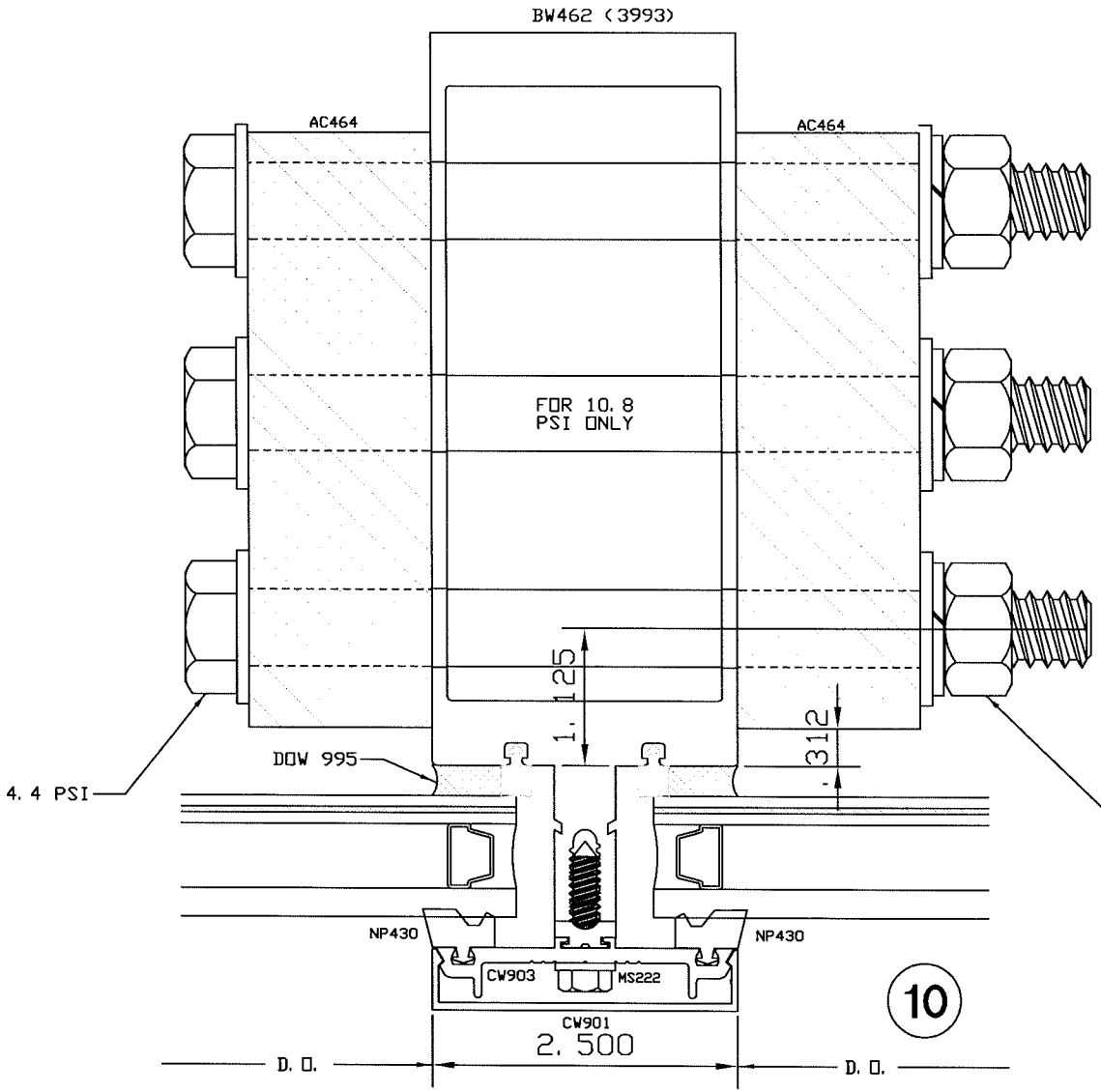
9

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road Rock Hill, SC 29730
- 200 Singleton Drive Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS VERT. MULLION
SCALE: FULL SIZE	DRAWING NO.: USA-3145 SHEET: 9 OF 20

SYM	REVISION	DATE	BY



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

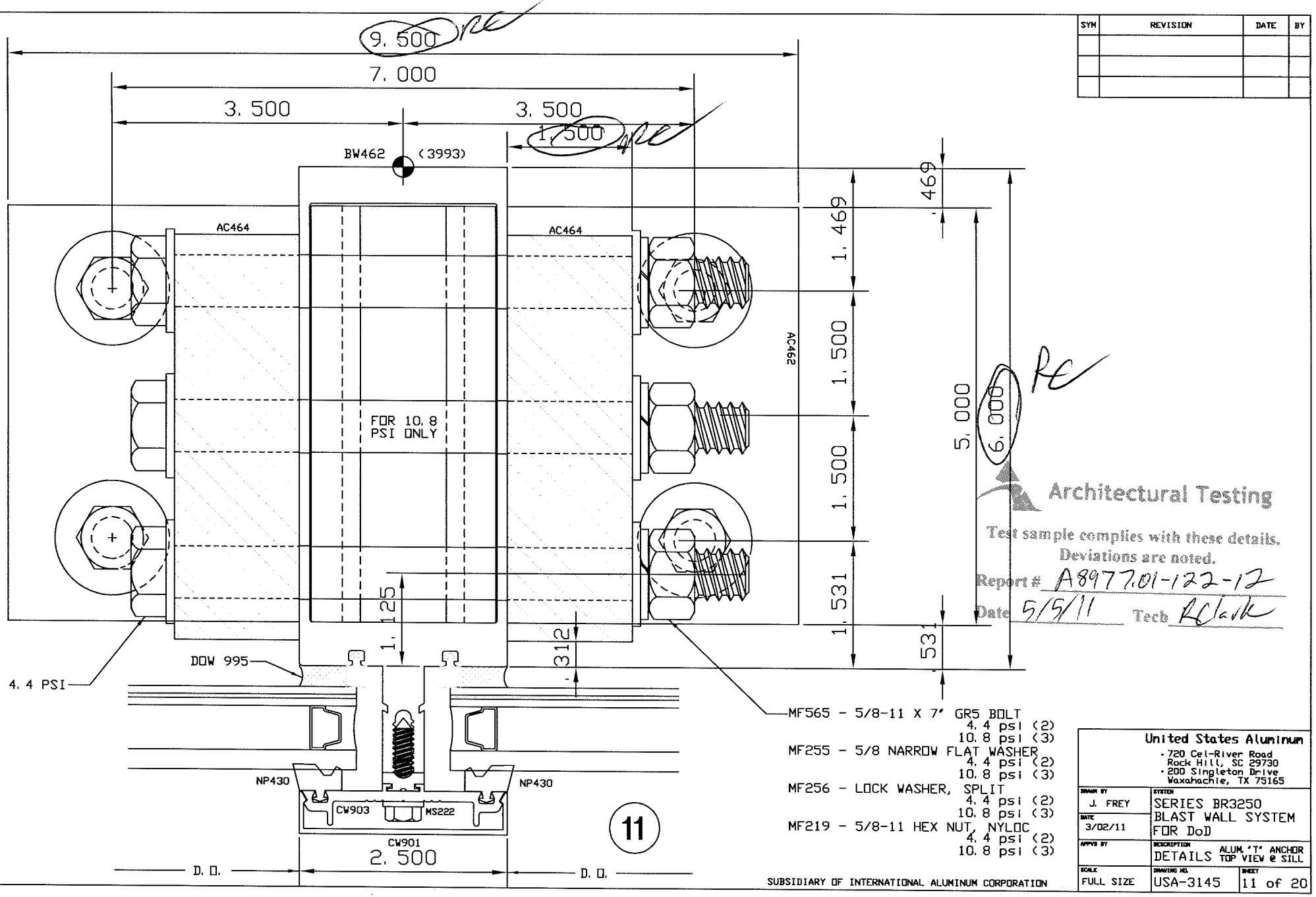
Date 5/9/11 Tech RC

MF565 - 5/8-11 X 7" GR5 BOLT
4.4 psi (2)
10.8 psi (3)
MF255 - 5/8 NARROW FLAT WASHER
4.4 psi (4)
10.8 psi (6)
MF256 - 5/8 LOCK WASHER, SPLIT
4.4 psi (2)
10.8 psi (3)
MF219 - 5/8-11 HEX NUT, NYLOC
4.4 psi (2)
10.8 psi (3)

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road Rock Hill, SC 29730
- 200 Singleton Drive Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS SHEAR BLOCK AT VERTICAL
SCALE: FULL SIZE	DRAWING NO.: USA-3145 SHEET: 10 of 20



SYM	REVISION	DATE	BY

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

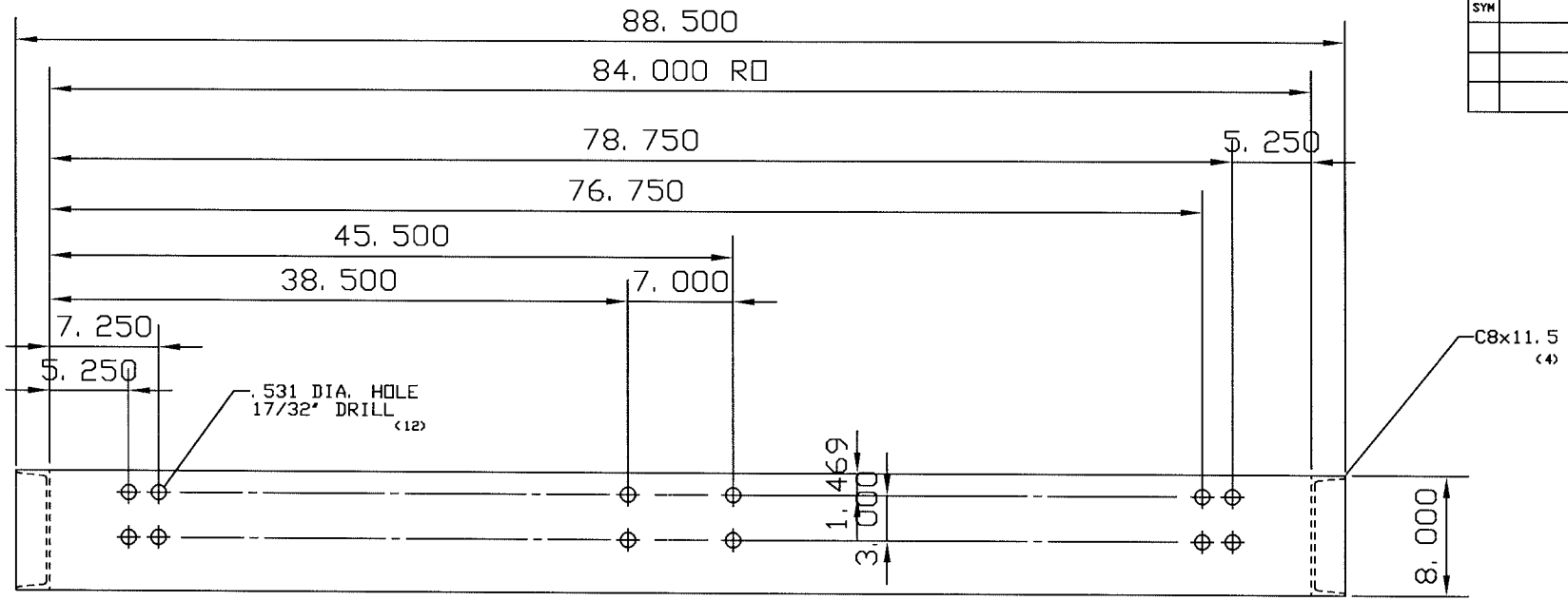
Date 5/5/11 Tech RClark

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

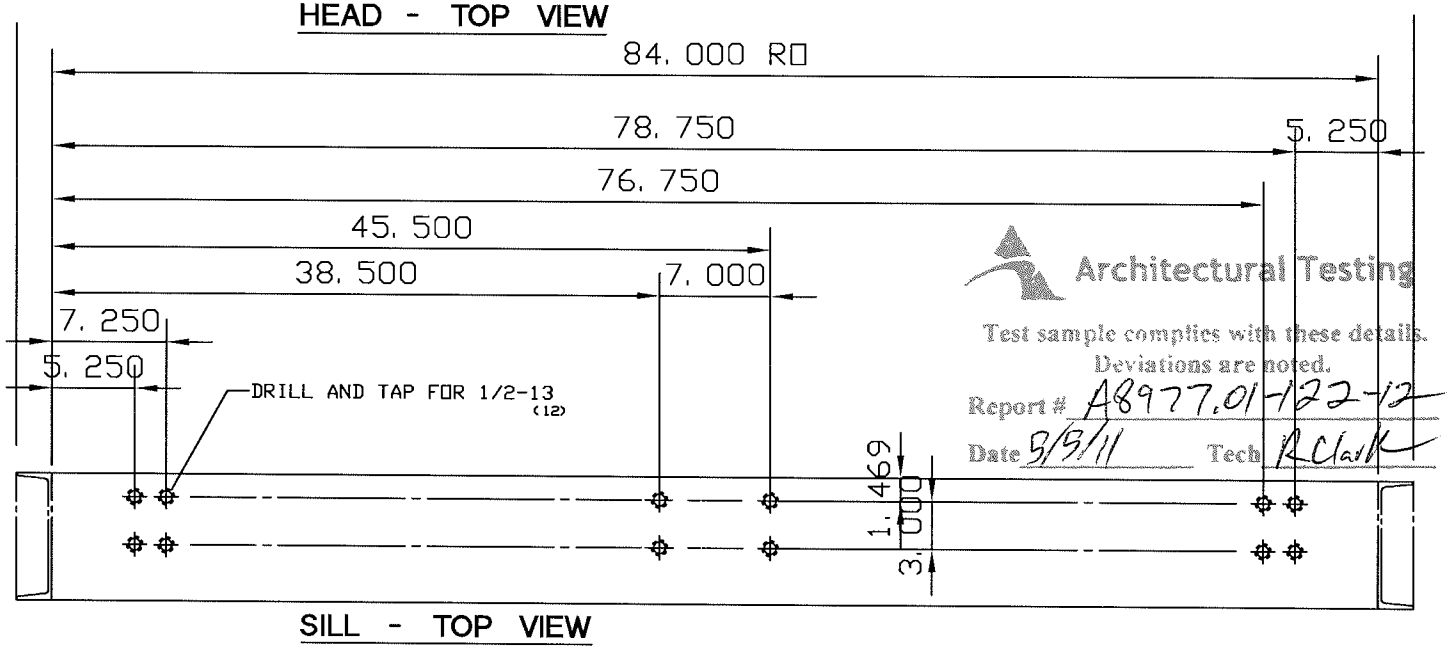
United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 3/02/11	
APPVD BY:	DESCRIPTION: DETAILS ALUM. 'T' ANCHOR TOP VIEW & SILL
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 11 of 20

SYM	REVISION	DATE	BY



HEAD - TOP VIEW



SILL - TOP VIEW

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 5/5/11 Tech RClark

6 PSI LOAD

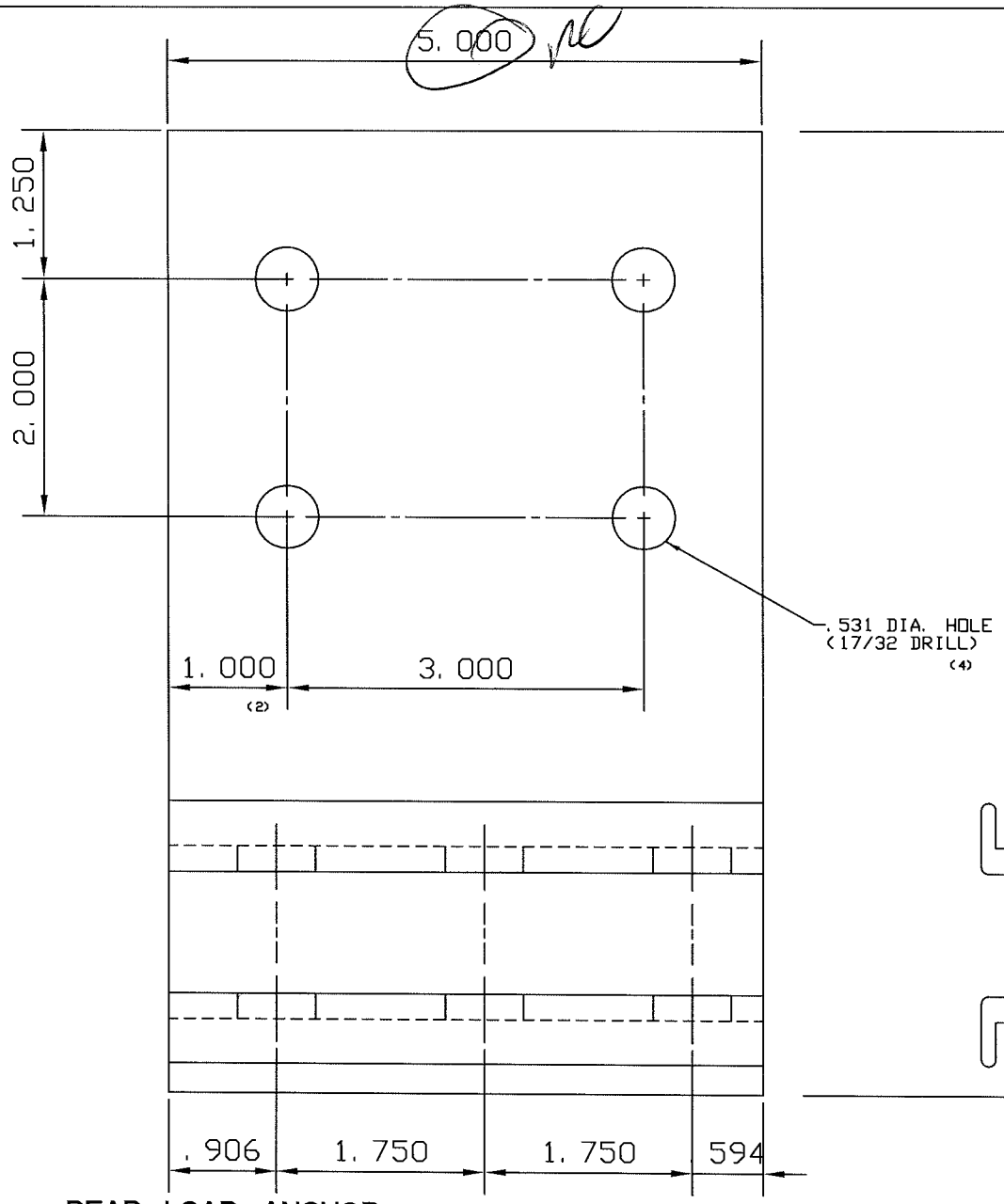
SCL . 125

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

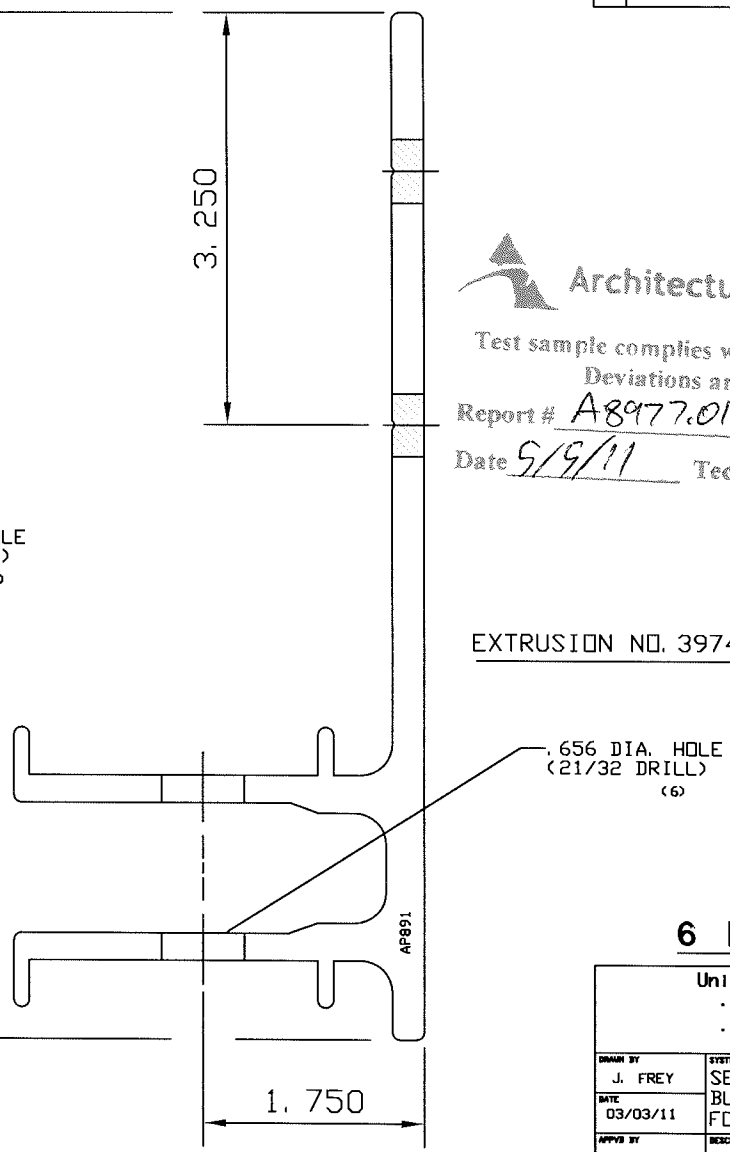
DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 02/28/11	
APPVD BY:	DESCRIPTION: STEEL FRAME DETAIL
SCALE: 1/8" = 1'0"	DRAWING NO.: USA-3145
	SHEET: 12 OF 20

SYM	REVISION	DATE	BY



DEAD LOAD ANCHOR
1 REQ.

EXTERIOR



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 5/9/11 Tech RClark

EXTRUSION NO. 3974 (AP891)

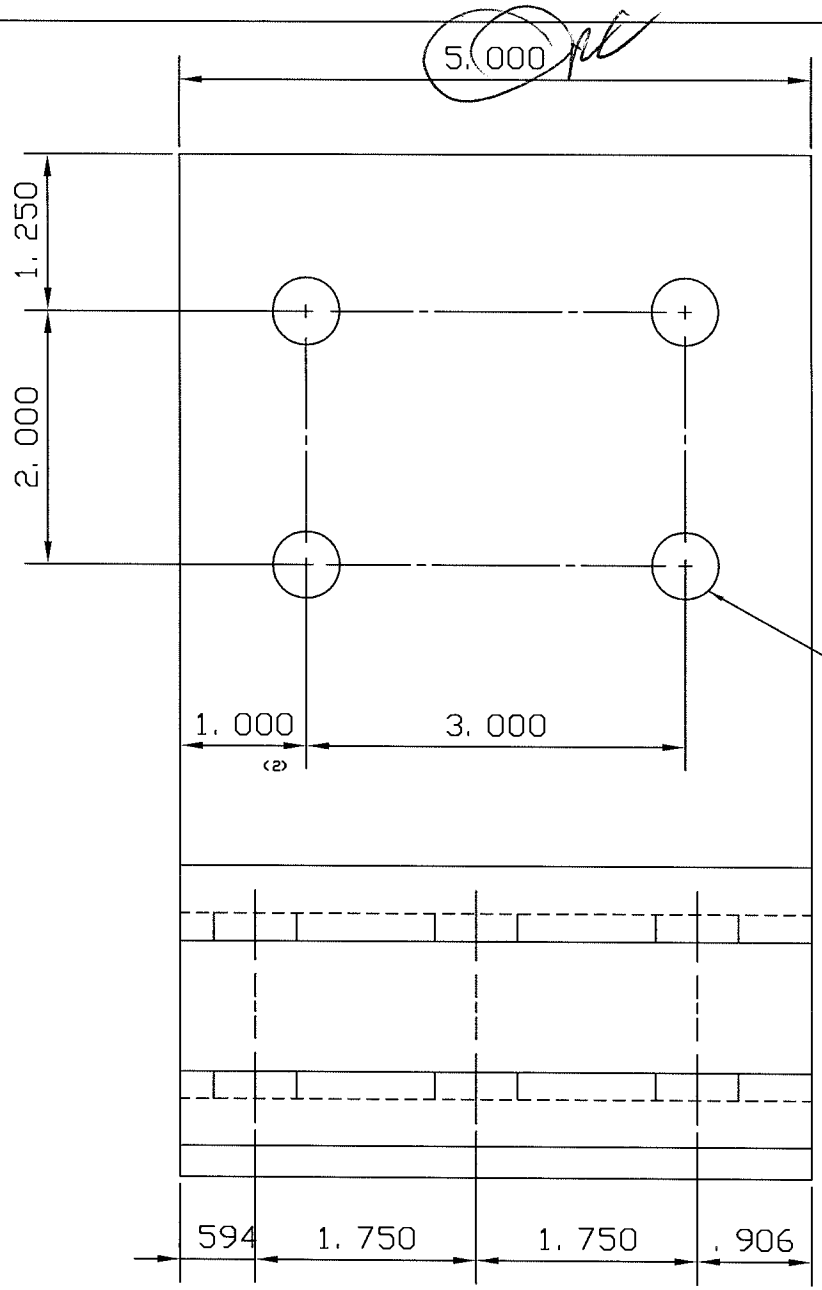
6 PSI LOAD

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

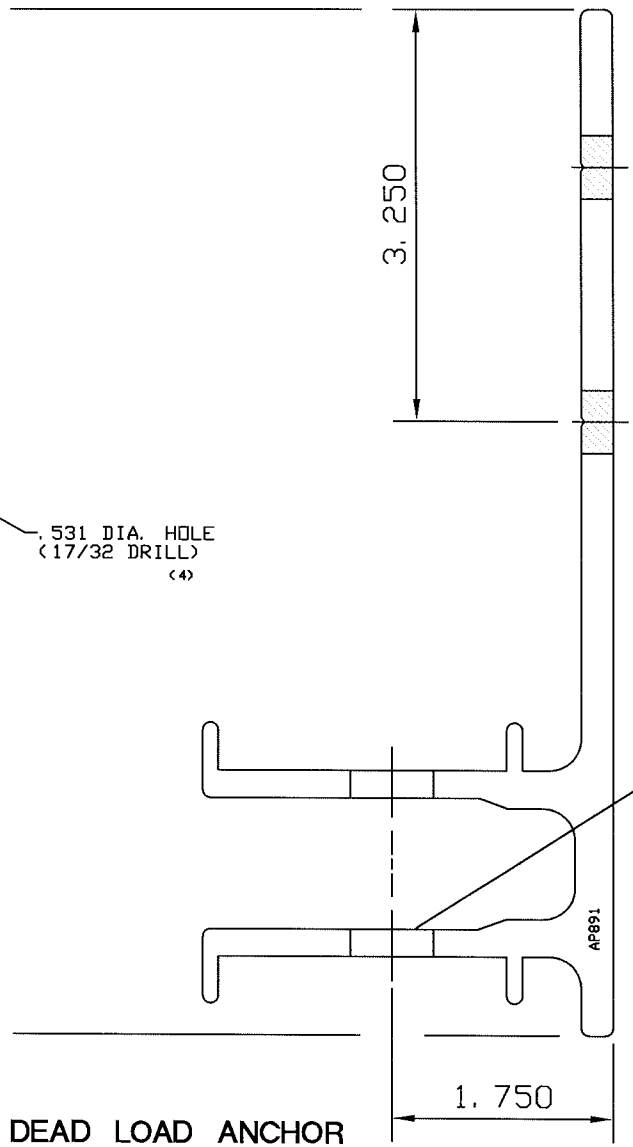
United States Aluminum
· 720 Cel-River Road
Rock Hill, SC 29730
· 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: F CLIP - LOWER LEFT CORNER
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 13 OF 20

SYM	REVISION	DATE	BY



EXTERIOR



DEAD LOAD ANCHOR

1 REQD.

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-17

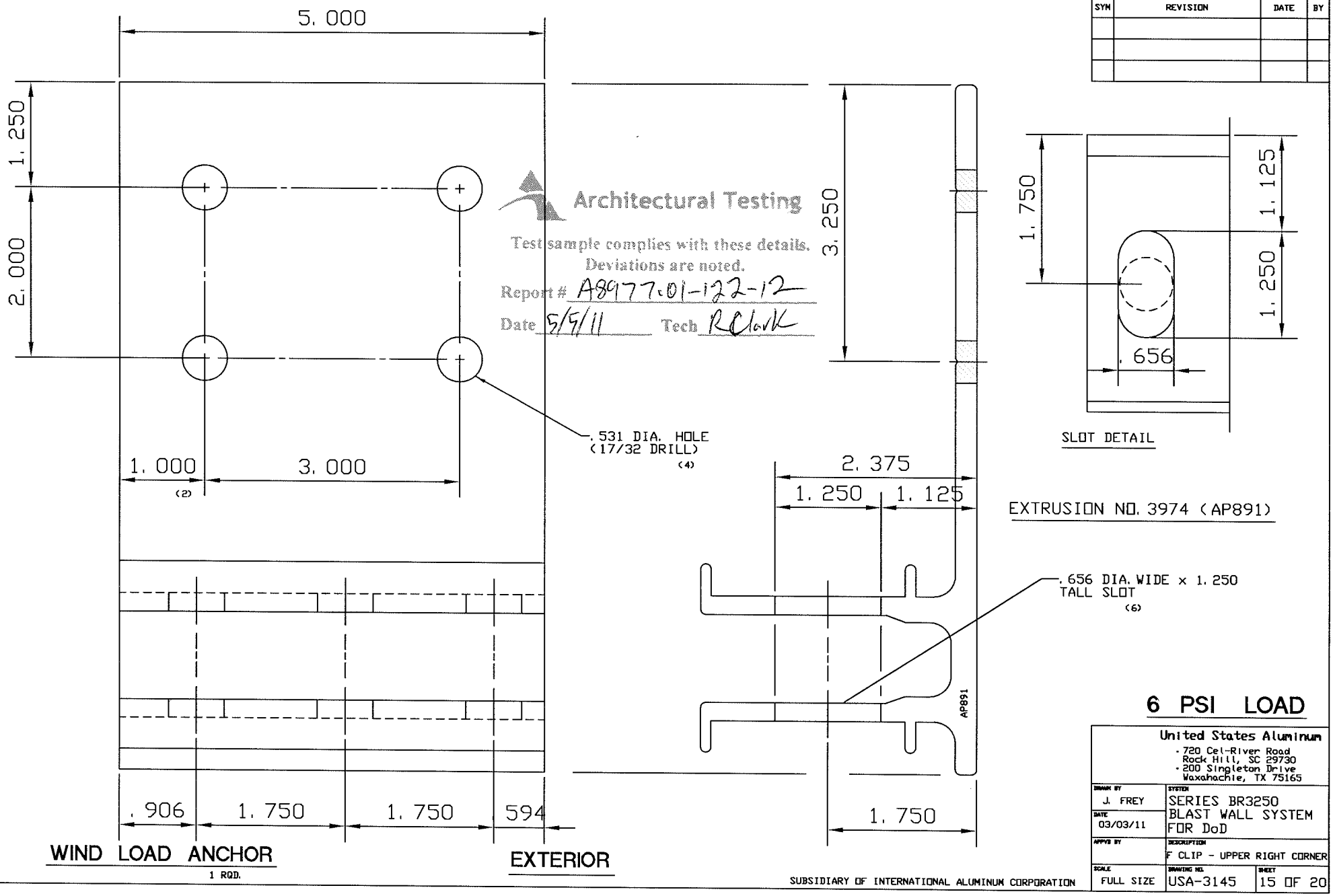
Date 5/5/11 Tech RClark

EXTRUSION NO. 3974 (AP891)

6 PSI LOAD

United States Aluminum
· 720 Cel-River Road
Rock Hill, SC 29730
· 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: F CLIP - LOWER RIGHT CORNER
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 14 OF 20



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 5/5/11 Tech RClark

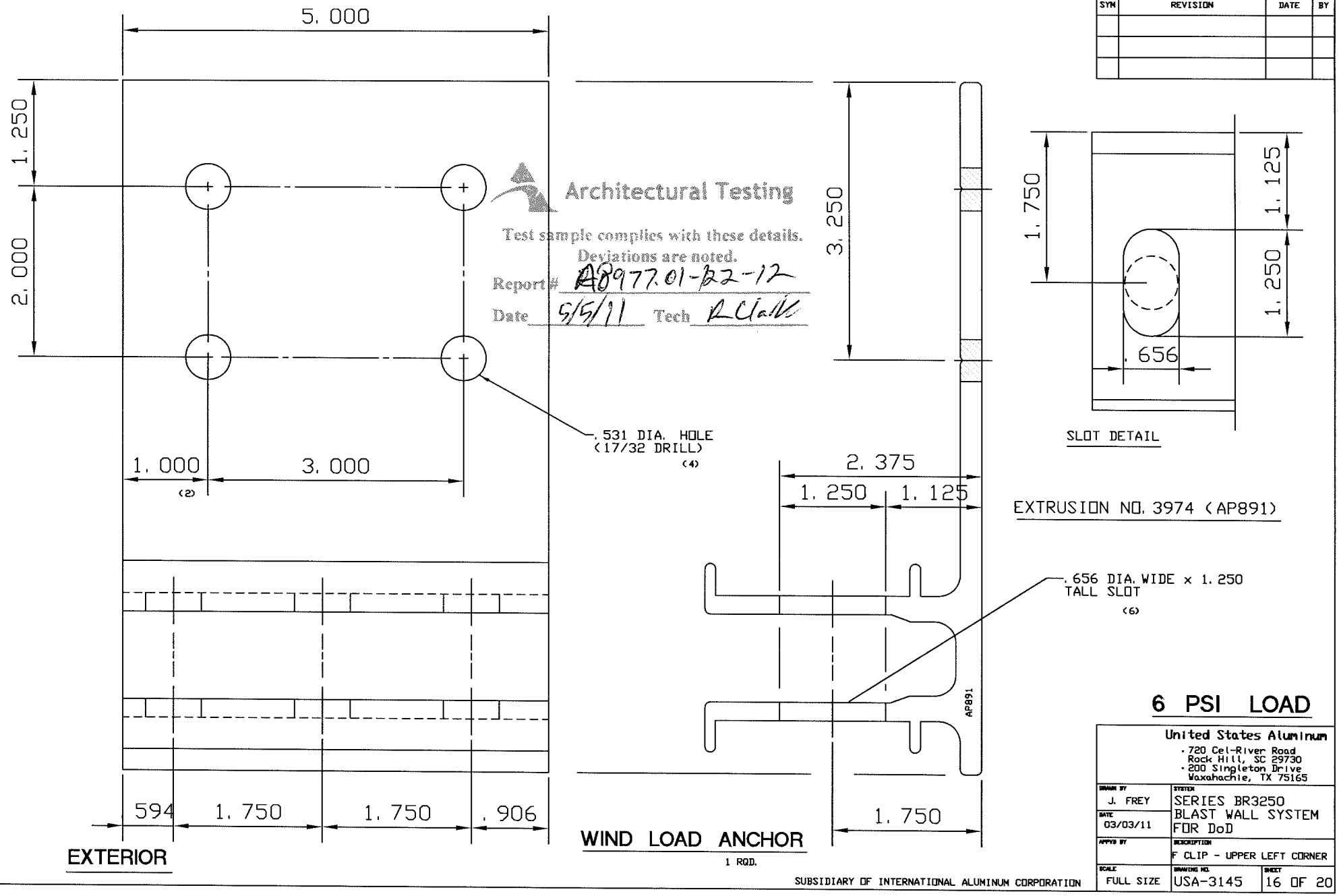
SYM	REVISION	DATE	BY

6 PSI LOAD

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: F CLIP - UPPER RIGHT CORNER
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 15 OF 20



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# AP8977.01-22-12

Date 5/5/11 Tech RClark

SYM	REVISION	DATE	BY

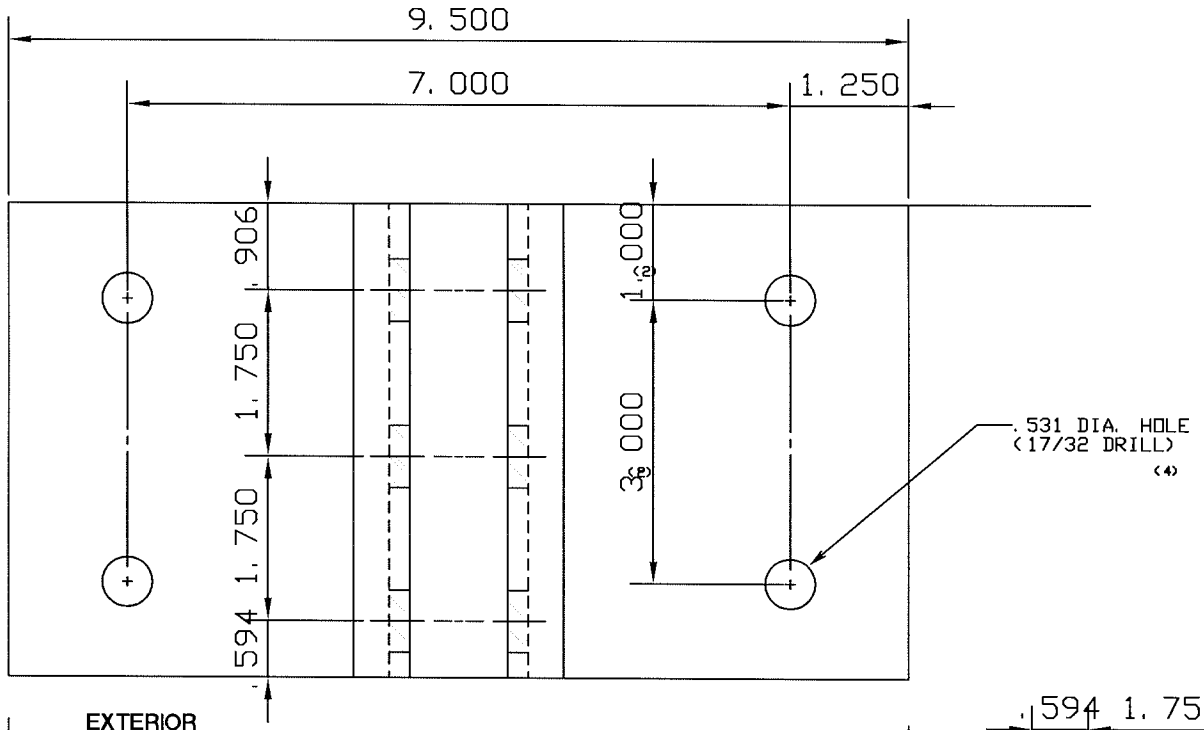
6 PSI LOAD

United States Aluminum
· 720 Cel-River Road
Rock Hill, SC 29730
· 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: F CLIP - UPPER LEFT CORNER
SCALE: FULL SIZE	DRAWING NO.: USA-3145
	SHEET: 16 OF 20

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

SYM	REVISION	DATE	BY

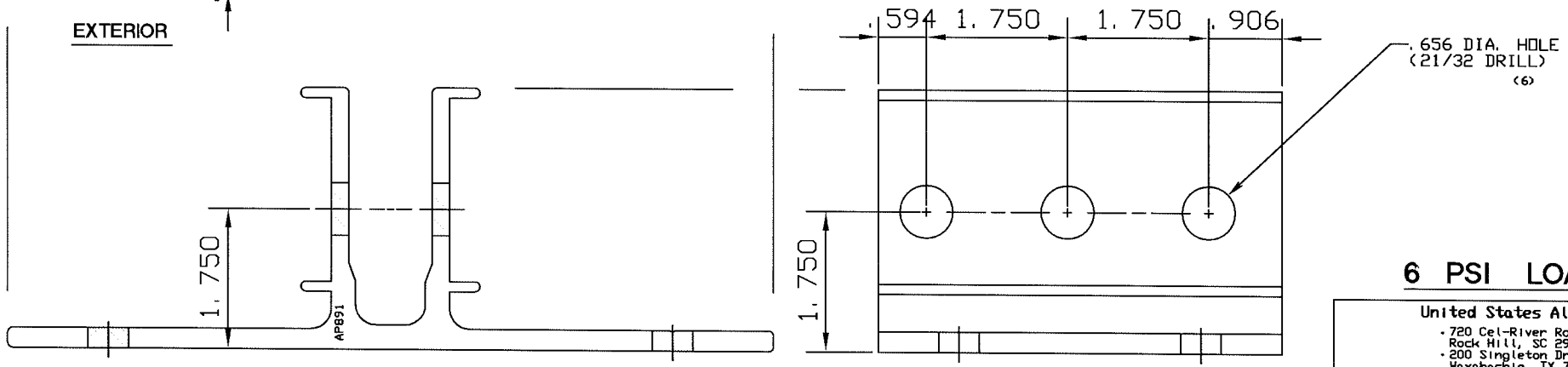


Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 5/5/11 Tech R Clark



EXTRUSION NO. 3973 (AC462)

DEAD LOAD ANCHOR

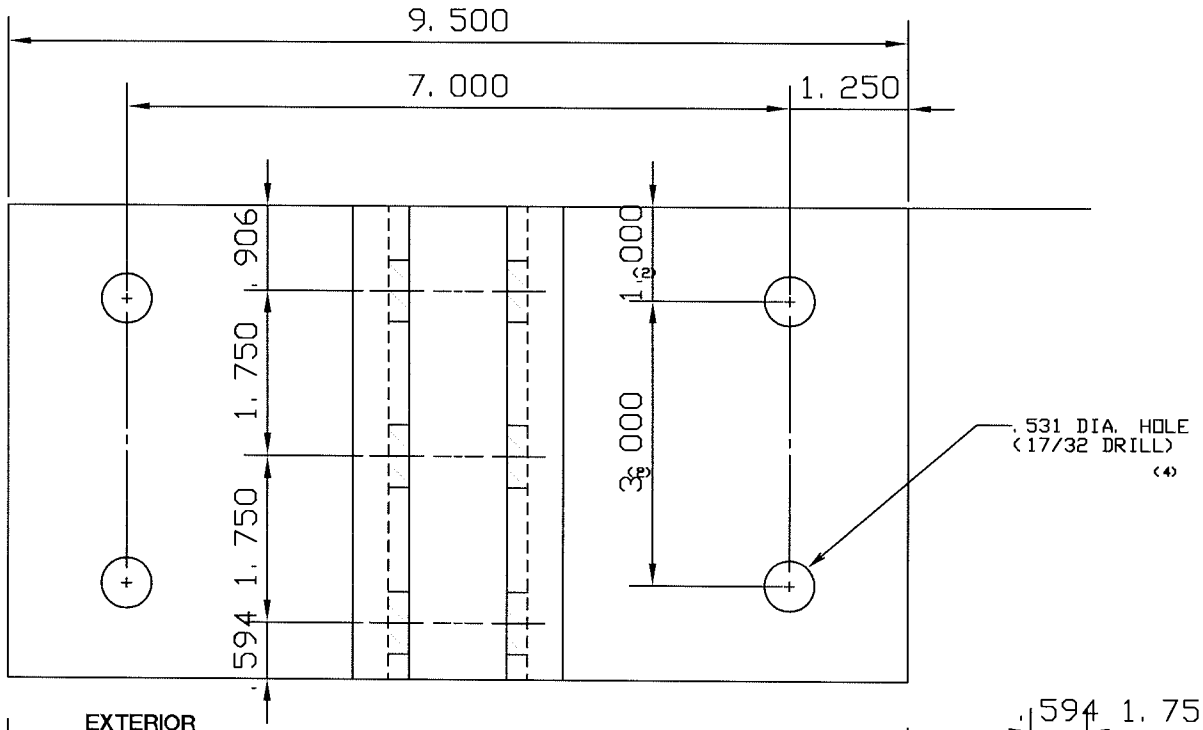
1 REQ.

6 PSI LOAD

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: T CLIP - LOWER CENTER MULL
SCALE: 3/4 SIZE	DRAWING NO.: USA-3145
	SHEET: 17 OF 20

SYM	REVISION	DATE	BY



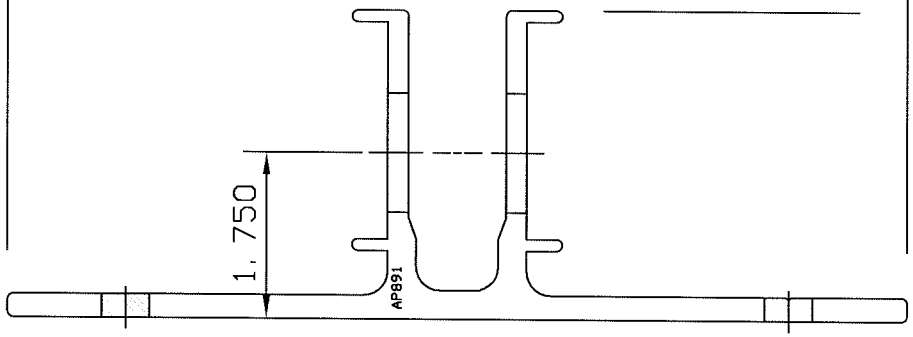
Architectural Testing

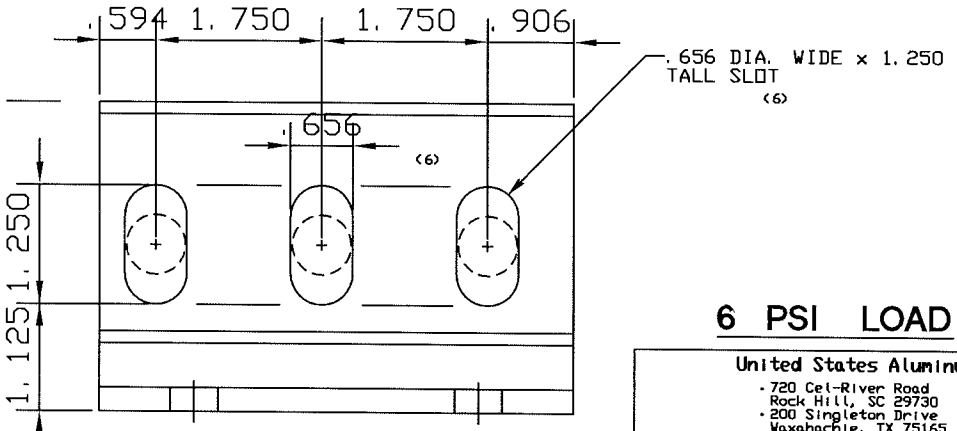
Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 5/5/11 Tech R Clark

EXTERIOR





EXTRUSION NO. 3973 (AC462)

WIND LOAD ANCHOR

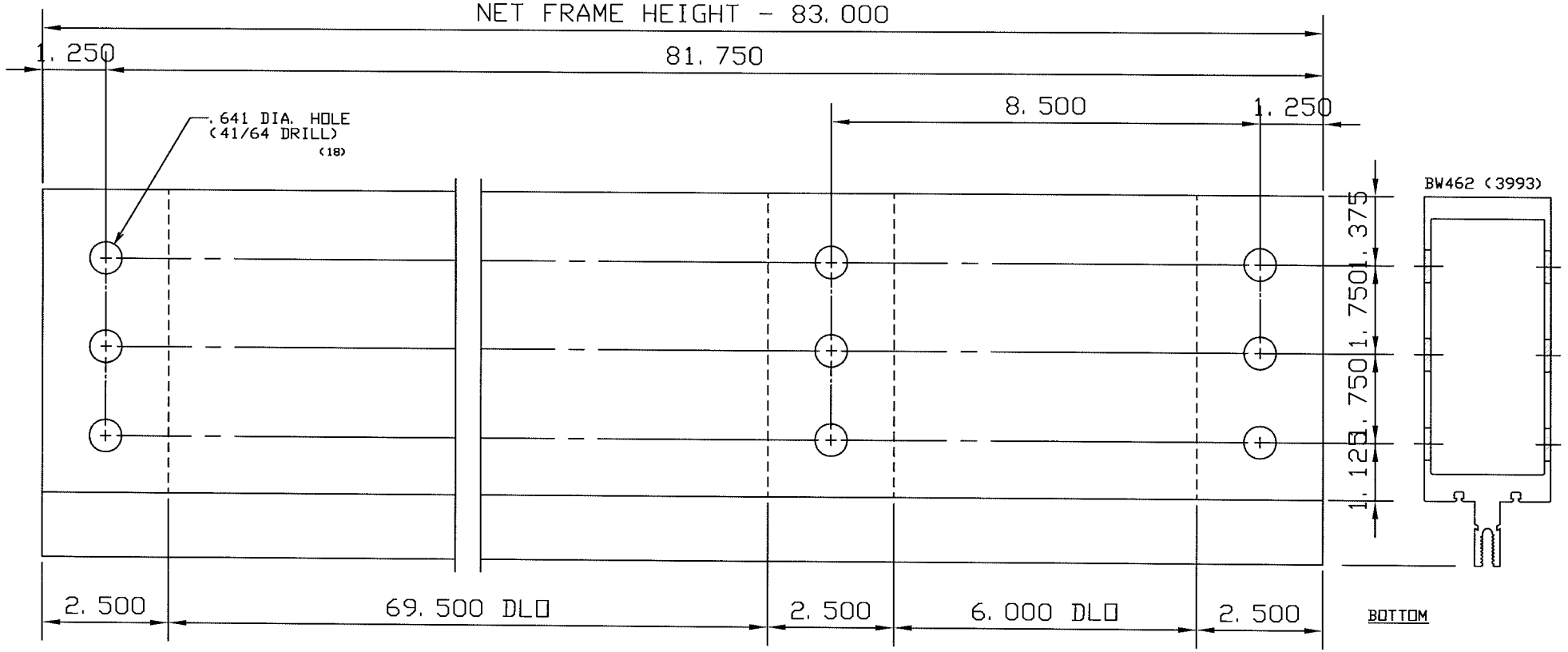
1 RQD.

6 PSI LOAD

United States Aluminum
- 720 Cel-River Road
Rock Hill, SC 29730
- 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: T CLIP - UPPER CENTER MULL
SCALE: 3/4 SIZE	DRAWING NO.: USA-3145
	SHEET: 18 OF 20

SYM	REVISION	DATE	BY



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-17

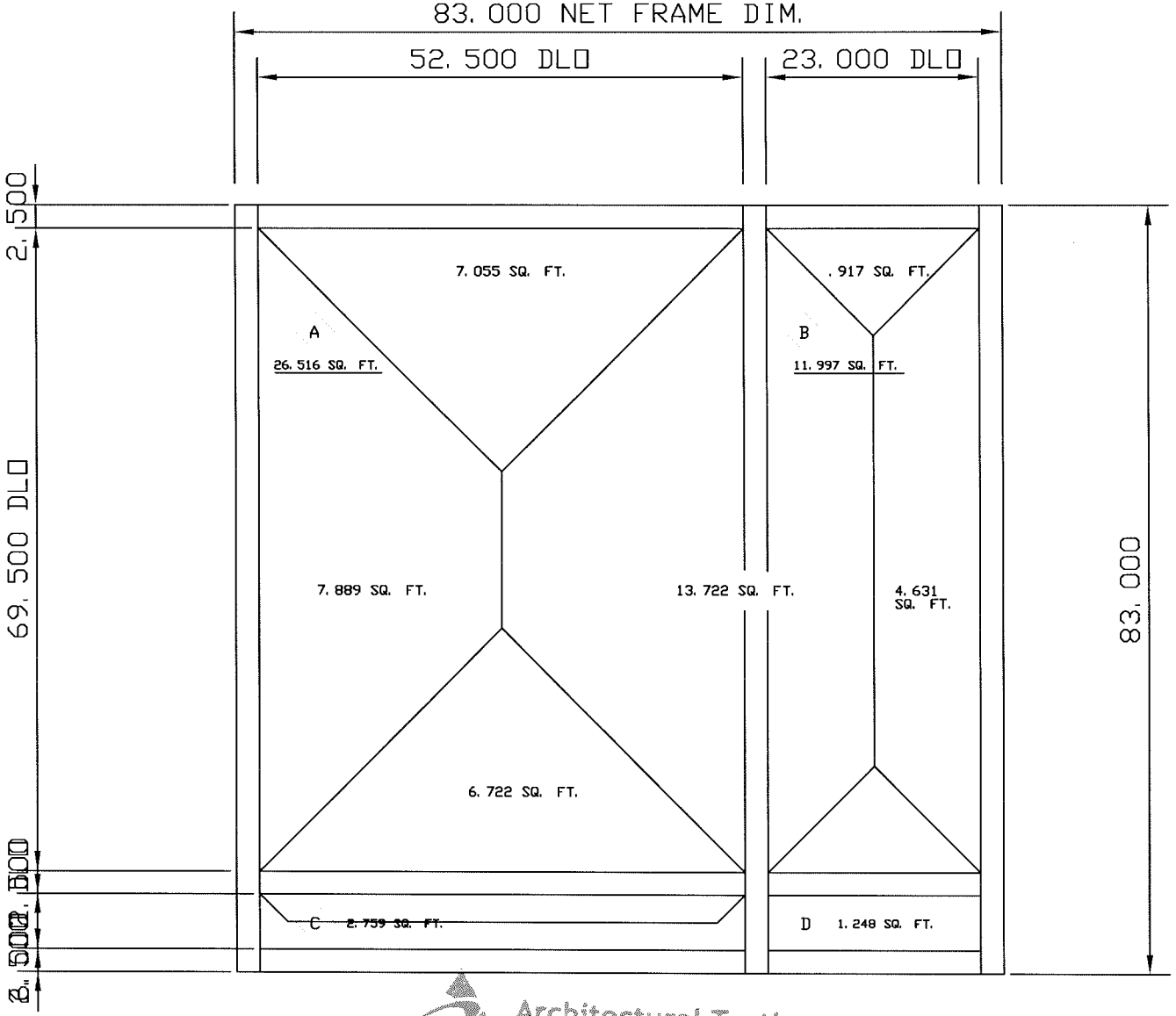
Date 5/5/11 Tech R Clark

6 PSI LOAD

United States Aluminum
· 720 Cel-River Road
Rock Hill, SC 29730
· 200 Singleton Drive
Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DoD
DATE: 03/03/11	
APPVD BY:	DESCRIPTION: VERTICAL MULLION
SCALE: 1/2 SIZE	DRAWING NO.: USA-3145
	SHEET: 19 OF 20

SYM	REVISION	DATE	BY



UFC 01-040-01 B-3.1.2.3

CONNECTIONS

1. 10.8 PSI FOR LESS THAN 10.8 SQ. FT.
2. 4.4 PSI FOR GREATER THAN 10.8 SQ. FT. BUT LESS THAN 32 SQ. FT.

6 PSI LOAD

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # A8977.01-122-12

Date 9/9/11 Tech R Clark

SCL . 08333

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION

United States Aluminum
- 720 Cel-River Road Rock Hill, SC 29730
- 200 Singleton Drive Waxahachie, TX 75165

DRAWN BY: J. FREY	SYSTEM: SERIES BR3250 BLAST WALL SYSTEM FOR DOD
DATE: 02/28/11	
APPVD BY:	DESCRIPTION: ELEVATION & SQUARE FOOTAGE
SCALE: 1" = 1'0"	DRAWING NO.: USA-3145
	SHEET: 20 OF 20