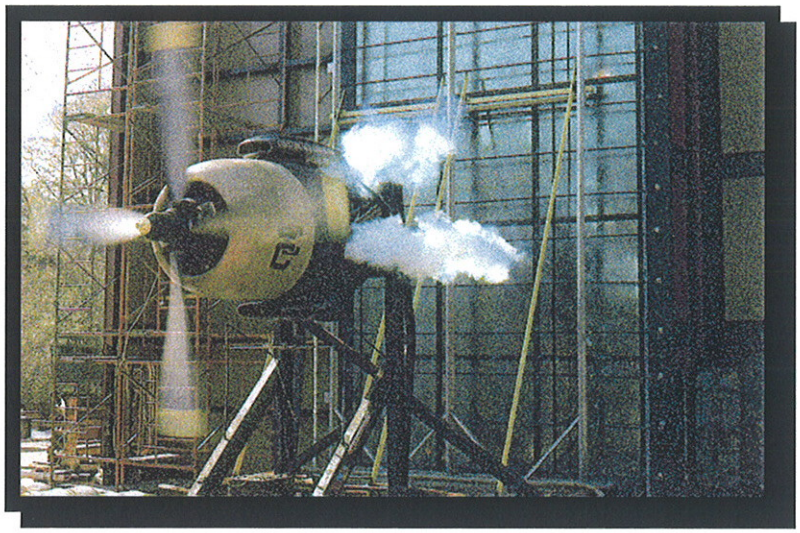
CONSTRUCTION CONSULTING LABORATORY, *INTERNATIONAL*



TEST REPORT:

AAMA 501-05 CURTAIN WALL MOCK-UP TESTING
U.S.ALUMINUM SERIES HP 3253 CURTAIN WALL
REPORT #CCLI-10-087

April 12, 2010

Prepared for:

UNITED STATES ALUMINUM CORPORATION
200 Singleton Drive
Waxahachie, TX 75165

1601 Luna Road
Carrollton, Texas 75006

S- UNITED, INC.
A Quality Control Company

Office: (972) 242-0556
FAX: (972) 245-6047

TABLE OF CONTENTS

1. PROJECT DATA 1
2. MOCK-UP DESCRIPTION 1
3. TEST EQUIPMENT 3
4. TESTING ALLOWABLES 3
5. TESTING SEQUENCE 4
6. TESTING and RESULTS 5
7. CONCLUSION 8

APPENDIXES

APPENDIX A: HP 3253 CURTAIN WALL MOCK-UP DRAWINGS
This report is not complete unless these drawings are stamped and initialed by **CCLI** as illustrated below

Sheet	Detail	Date	Stamped as Illustrated
2.01	Elevation	3/20/10	
3.01	Head & Horizontals	3/20/10	
3.02	Horizontal & Splice	3/20/10	
3.03	Sill	3/20/10	
3.04	Wind Load Anchor	3/20/10	
3.05	Dead Load Anchor	3/20/10	
3.06	Wind Load anchor & Horizontal	3/20/10	
3.07	Jamb & Vertical Mullion	3/20/10	
3.08	Jamb	3/20/10	
3.09	Jamb & Vertical Mullion	3/20/10	
3.10	Jamb	3/20/10	
3.11	Jamb Splice	3/20/10	
3.12	Jamb Splice	3/20/10	
3.13	Jamb Anchor	3/20/10	
3.14	Mullion Anchor	3/20/10	
3.15	Jamb Anchor	3/20/10	

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

APPENDIX B: PHOTOGRAPHS

1. PROJECT DATA

Project: AAMA 501 Curtain Wall Mock-Up Performance Testing
United States Aluminum Series HP 3253 Curtain Wall

Date Completed: March 26, 2010
Tested By: Construction Consulting Laboratory, *International* in Carrollton, TX

Tested For: United States Aluminum
200 Singleton Drive
Waxahachie, Texas 75165

Witnessed By: (All or Partial Viewing)

United States Aluminum	Terry Hopgood		
Construction Consulting Laboratory, *International*	Juvenal Azua	Jeffrey Crump	Wesley Wilson

2. MOCK-UP DESCRIPTION

PRODUCT TYPE: Aluminum Curtain Wall, **Product Drawings, Appendix A**
SERIES/MODEL: HP 3253 Curtain Wall, **Photograph 1, Appendix C**
CURTAIN WALL OVERALL: 15'-2½" x 31'-8½"
CONFIGURATION: Elevation, **Sheet 2.01, Appendix A**

GENERAL DESCRIPTION: The test specimen is identified as a United States Aluminum Series HP 3253 curtain wall system. Outside Glazed Screw Shear block Curtain Wall System" with a tested overall dimension of 15'-2½" x 31'-8½". The vertical elements of the mock-up were twin span mullions with splices at appropriate locations. The glazing included 1" and 2" outside glazed lites of vision and spandrel glass. The curtain wall system was designed, manufactured, and installed by United States Aluminum.

CURTAIN WALL WEEP ARRANGEMENT: 1 ¾" x ¼" weep located 4" from each end of horizontal pressure plate two (2) per DLO. $^{5}/_{16}$" diameter weep hole on the underside of face cap spaced 6" from each end, two (2) per DLO, **Photograph 2, Appendix C.**

GLASS: Vision units are 2" overall thickness sealed insulating glass constructed of ¼" tempered glass. Exterior ¼" clear with $^{5}/_{8}$" airspace, center ¼" clear with $^{5}/_{8}$" airspace with interior ¼" clear. Spandrel units are 1" overall thickness sealed insulating glass constructed of ¼" tempered glass. Exterior ¼" clear with $^{5}/_{8}$" airspace with interior ¼" clear.

CURTAIN WALL GLAZING: Glass is zone dammed exterior glazed with pressure plate mechanically fastened to the verticals and horizontals with #1/4-20 Grade 5 x 1" HWHCS screws with a min/max torque of 50-60 In-Lbs spaced on 9" centers. EPDM sponge gasket part #NP-420 located at the interior of glass and EPDM dense gasket part # NP-430 exterior of glass with a PVC thermal gasket part # VS-300 at the interior face of pressure plate in-line with the frame fastener race. Snap-in glazing pocket reducers part # PC-331 at the 1" visions and spandrel units at the exterior of frame members sealed with DC-795 silicone at the interior groove and at interior vertical to horizontal connection during installation.

SEALANT: Curtain wall was perimeter sealed at the head and sill with backer rod and Dow Corning 795 silicone and the frame jambs were sealed with 6" Tremco Silicone tape bedded in Dow Corning 795 silicone at chamber jamb steel and lateral edge of frame jambs. Foam joint plug and Dow Corning 795 silicone applied at the ends of the horizontal-to-vertical connections. Intermediate vertical members are sealed 6" up from bottom at sill horizontal and splice. Vertical glazing adapters sealed to horizontal glazing adapters. Glass pocket zone plugs sealed at the horizontal to vertical connection both at the top and bottom of plug, **photograph 3, Appendix C**. Face of vertical mullions sealed with silicone and bond–breaker tape applied to splice at live-load connections.

CURTAIN WALL ANCHORAGE: Vertical mullions are anchored at frame head with Aluminum T and F clips attached to chamber steel with two (2) $^{3}/_{8}$" x 2" Grade 5 bolts with flat washers and nuts per clip at each side of each vertical mull. Frame sill anchored to chamber steel with two (2) $^{3}/_{8}$" x 2" Grade 5 bolts with flat washers and nut at each side of each vertical mull. Vertical mullions are inserted between two (2) L6 x 3" x $^{3}/_{8}$" thick steel angles and are through bolted to angle at floor line with two (2) ½" x 5" Grade 5 bolts with hex nut and flat washers per anchor, **Photograph 4, Appendix C**.

SPLICES: Vertical members are slipped onto extruded aluminum splice part # CW945 x 12" length inserted into lower vertical mullions and sit on one #8 x ¾" fastener stop.

OTHER FEATURES: Frame members are pour and skip de-bridged with two (2) thermal cavities. Horizontal to vertical members are shear block connected extruded aluminum shear block attached to vertical members with two (2) #12 x 2" PH SMS screws and to horizontals with one #8 x ¾" screw at each end.

3. TEST EQUIPMENT

3.1 Test chamber consisted of structural steel beams, columns, and bulkheads and were accessible through bulkhead doors.

3.2 Pressure differentials were created with reversible pumps for positive/negative loading.

3.3 Pressure differentials between the specimen interior and the atmosphere were measured with manometers.

3.4 Air infiltration was measured with a Meriam laminar flow element and inclined manometers. Chamber pressure was measured with a Dwyer inclined manometer.

3.5 Water was applied to the specimen from a spray rack equipped with swirl-type nozzles spaced two feet on center in vertical and horizontal directions, which under controlled pressure delivered a minimum of five gallons per square foot per hour on the specimen.

3.6 Dynamic winds were generated by a Curtiss Wright 3350 Radial Aircraft Engine with a four (4) bladed 13'-6" diameter propeller, which generates typical and a-typical wind conditions.

3.7 Structural variations were measured with dial indicator gauges with maximum movement hands located throughout the test specimen.

4. TESTING ALLOWABLES

4.1 **AIR INFILTRATION:** Total amount of air infiltration shall not exceed **.06 CFM** per square foot (psf) of the exterior wall tested.

MAXIMUM ALLOWABLE
Mock-Up: 15'2 ½" x 31'8 ½" = 482.2 Ft^2 x .06 Cfm =28.93 Cfm.

4.2 **STATIC WATER PENETRATION:** There shall be no uncontrolled water penetration during or at the conclusion of this test at the static pressure of 15 psf.

Note: "Uncontrolled water" is defined as any water that appears on any normally exposed interior surfaces, that is not contained or drained back to the exterior, or that can cause damage to adjacent materials or finishes. Water contained within drained flashings, gutters, and sills is not considered water leakage. The collection of up to one half (½) ounce of water (14.8 cc) in a fifteen (15) minute test period on top of any interior stop or stool integral with the wall system shall not be considered water leakage.

4.3 **DYNAMIC WATER PENETRATION:** There shall be no uncontrolled water penetration during or at the conclusion of this test at the slipstream velocity of 76 mph.

4.4 **DESIGN LOAD DEFLECTIONS:** There shall be no system failure and deflection of aluminum members at 100% of design load and shall not exceed L/175 for spans up to 13'-6" and L/240 + .250" for spans that exceed 13'-6"

Spliced Vertical Span: (L): 204" Horizontal Span (L): 57.5"/175
Vertical Span Allowable = 1.100" Horizontal Span Allowable = 0.329"

Non-Spliced Vertical Span: (L): 156"
Vertical Span Allowable = 0.891"

4.5 **PROOF LOAD RESIDUAL:** The permanent deformation of the aluminum members shall not exceed 2% of span at 150% of design load.

Spliced Vertical Span (L): 204" / 500" Horizontal Span (L): 57.5 / 500"
Vertical Span Allowable = .408" Horizontal Span Allowable = 0.115"

Non-Spliced Vertical Span (L): 156" / 500"
Vertical Span Allowable = .312"

5. TESTING SEQUENCE

As used throughout this report, positive pressure applied to the test specimen is considered to be **inward** acting and negative pressure is considered to be **outward** acting. All location references or comments are as viewing the test specimen from the interior (room side) of the test chamber and wall system.

Positive Design Load = +40 psf Negative Design Load = -40 psf

	United States Aluminum Series HP 3253	TEST STANDARD
1	Pre Load Positive 20 psf	ASTM E 330-02
2	Static Pressure Air Infiltration Test @ 6.24 psf	ASTM E 283-04
3	Static Pressure Water Penetration Test @ 15 psf	ASTM E 331-00
4	Dynamic Water Penetration @ 76 mph (approximate 20.0psf)	AAMA 501.1-05
5	Structural Load by Static Pressure Test @ 50% & 100% of Design Loads	ASTM E 330-02
6	Static Pressure Air Infiltration Test @ 6.24 psf	ASTM E 283-04
8	Static Pressure Water Penetration Test @ 15 psf	ASTM E 331-00
9	Structural Load by Static Pressure Test @ 150% of Design Load	ASTM E 330-02

6. TESTING and RESULTS

6.1 Preload Positive Pressure in accordance with ASTM E 330-02 and job specifications.

Subject the test specimen to a static pressure differential of **20.0 psf**. This load was maintained for 10 seconds and released. An inspection was made to determine if any failure occurred.

Results: No visible differences were observed within the specimen or test chamber.

6.2 Static Pressure Air Infiltration Test @ 6.24 psf per ASTM E 283-04

The specimen and perimeter sealant joints were completely covered with an impervious 4 mm plastic material and duct tape, thus allowing no movement of air through the specimen. The exterior face of the specimen was subjected to a positive pressure differential of 6.24 psf to obtain a leakage rate for the test chamber. The plastic bag was removed and the total chamber and specimen infiltration was measured. The chamber infiltration was subtracted from the total air infiltration resulting in the infiltration rate of the test specimen, **Photograph 5, Appendix B**.

MAXIMUM ALLOWABLE
Mock-Up: 15'2 ½" x 31'8 ½" = 482.2 Ft^2 x .06 Cfm =28.93 Cfm.

Results: 7.78 Cfm = 0.02 Cfm/ft^2

6.3 Static Pressure Water Penetration Test @ 15 psf per ASTM E 331-00

Water was applied to the exterior face of the specimen at a minimum rate of five (5) gallons per square foot per hour of wall area, in such a way as to continuously and completely cover the exterior face of the specimen. Simultaneously, a positive **inward** differential static pressure of **15 psf** was applied against the face. The application of pressure and water was maintained for a period of fifteen (15) minutes, with observers inside the chamber checking for water penetration, **Photograph 6, Appendix B**.

Results: Passed with no water penetration observed.

6.4 **Dynamic Water Penetration @ 76 mph Slipstream Velocity per AAMA 501.1-05**

Water was applied to the exterior face of the specimen at a minimum rate of five (5) gallons per square foot per hour of wall area, in such a way as to completely and continuously covers the face of the specimen. Simultaneously, the wall was subjected to sufficient airflow from an aircraft engine with a four-bladed propeller, approximately 13'-6" in diameter, approximately 20' in front of the specimen. The application of airflow and water was maintained for a period of fifteen (15) minutes, with observers inside the chamber checking for water penetration, **Photograph 7, Appendix B.**

Results: Passed with no water penetration observed.

6.5 **Uniform Structural Load @ 50% & 100% of Design Loads per ASTM E 330-02**

Allowable: Spliced Vertical Span = 1.100" Horizontal Span = .329"

Dial indicators were installed to measure deflection and residuals at ends and midspan of typical horizontal and vertical members, **Dial Indicator Location Diagram, Appendix B.**

Test: With the specimen set in a positive mode, all indicators were set on zero. A positive pressure of **20 PSF (inward)** equal to 50% of the design load was applied and held for ten (10) seconds, then released. The indicators were read and the data was recorded. At the conclusion of the 50% test load, a positive pressure of **40 PSF (inward)** equal to 100% of the design load was applied and held for ten (10) seconds, then released.

The vacuum/blower pumps were reversed and set to perform in a negative mode. The test specimen was subjected to a negative pressure of **-20 PSF (outward)** equal to 50% of design load to set the specimen in a negative mode. The pressure was held for ten (10) seconds and released.

Test: With the specimen set in a negative mode, all indicators were set on zero. A negative pressure of **–20 PSF (outward)** equal to 50% of the design load was applied and held for ten (10) seconds, then released. The indicators were read and the data was recorded. At the conclusion of the 50% test load, a negative pressure of **-40 PSF (outward)** equal to 100% of the design load was applied and held for ten (10) seconds, then released.

Results: Passed with all net deflections below the allowable.

Typical Lower Vertical (1-2-5) Splice (3-4) Upper Vertical (6-7-8) H-Spandrel (9-10-11)
H- Vision (12-13-14) T-Clip anchor (15)

50% & 100% DESIGN STRUCTURAL DEFLECTION TABLE

	+20.0 Psf			+40.0 Psf			-20.0 Psf			-40.0 Psf			
Ind.	Total	Set	Net	Total	Set	Net	Total	Set	Net	Total	Set	Net	Allowable
1	.01	.00		.04	.01		.10	.09		.07	.04		
2	.04	.04	.02	.06	.03	.03	.30	.09	.25	.34	.06	.25	1.100
3	.09	.04		.16	.06		.06	.01		.25	.10		
4	.05	.00		.13	.00		.07	.02		.11	.00		
5	.02	.00		.02	.01		.00	.00		.00	.01		
6	.02	.00		.05	.04		.01	.00		.04	.02		
7	.20	.02	.18	.45	.02	.38	.10	.00	.08	.40	.03	.33	.891
8	.02	.00		.10	.00		.02	.00		.10	.00		
9	.01	.00		.02	.00		.01	.00		.02	.00		
10	.01	.00	.01	.00	.00	.02	.01	.00	.01	.02	.00	.02	.329
11	.00	.00		.00	.00		.00	.00		.00	.00		
12	.00	.00		.00	.00		.00	.00		.00	.00		
13	.00	.00	.00	.02	.00	.01	.00	.00	.00	.04	.02	.02	.329
14	.00	.00		.01	.00		.00	.00		.02	.00		
15	.02	.00		.02	.00		.00	.00		.00	.00		

6.6 Static Pressure Air Infiltration Test @ 6.24 psf per ASTM E 283-04

The exterior face of the specimen was again subjected to a positive pressure differential of 6.24 psf to obtain a total leakage rate for the test chamber and the specimen.

MAXIMUM ALLOWABLE
Mock-Up System #1: 20'-2½" x 27'-0" = 545.625 ft² x .06 = 32.73 total CFM.

Results: No change in reading

6.7 Static Pressure Water Penetration Test @ 15.0 psf per ASTM E 331-00

Water was applied to the exterior face of the specimen at a minimum rate of five (5) gallons per square foot per hour of wall area, in such a way as to completely and continuously cover the face of the specimen. Simultaneously, a positive **inward** differential static pressure of **15 psf** was applied against the face. The application of pressure and water was maintained for a period of fifteen (15) minutes, with observers inside the chamber checking for water penetration.

Results: Passed with no water penetration observed.

6.8 Uniform Structural Load @ 150% of Design Loads per ASTM E 330-02

Vertical Span Set Allowable = .324" Horizontal Span Set Allowable = 0.115"

Test: With the specimen set in a positive mode, midspan indicators were set on zero. A positive pressure of **60 PSF (inward)** equal to 150% of the design load was applied and held for ten (10) seconds, then released.

Test: With the specimen set in a negative mode, midspan indicators were set on zero. A negative pressure of **60 PSF (outward)** equal to 150% of the design load was applied and held for ten (10) seconds, then released. The indicators were read and the data was recorded.

Typical Lower Vertical (1-2-5) Splice (3-4) Upper Vertical (6-7-8) H-Spandrel (9-10-11)
H- Vision (12-13-14) T-Clip anchor (15)

50% & 100% DESIGN STRUCTURAL DEFLECTION TABLE

	+40.0 Psf			+60.0 Psf			-40.0 Psf			-60.0 Psf			
Ind.	Total	Set	SNet	Total	Set	SNet	Total	Set	SNet	Total	Set	SNet	Allowable
1	.04	.01		.07	.01		.07	.04		.10	.05		
2	.06	.03	.00	.55	.09	.05	.34	.06	.00	.58	.06	.00	.324
3	.16	.06		.35	.09		.25	.10		.35	.05		
4	.13	.00		.22	.09		.11	.00		.11	.01		
5	.02	.01		.07	.05		.00	.01		.08	.00		
6	.05	.04		.11	.06		.04	.02		.06	.02		
7	.45	.02	.00	.80	.10	.04	.40	.03	.01	.50	.04	.00	.324
8	.10	.00		.20	.06		.10	.00		.18	.06		
9	.02	.00		.03	.00		.02	.00		.01	.00		
10	.00	.00	.00	.04	.00	.00	.02	.00	.00	.02	.00	.01	.115
11	.00	.00		.01	.00		.00	.00		.01	.00		
12	.00	.00		.01	.00		.00	.00		.01	.00		
13	.02	.00	.00	.07	.00	.00	.04	.02	.00	.08	.02	.02	.115
14	.01	.00		.01	.00		.02	.00		.01	.00		
15	.02	.00		.01	.00		.00	.00		.05	.00		

7. CONCLUSION

The tested specimen United States Aluminum Series HP 3253 Curtain Wall System performed within the specified criteria.

Respectfully submitted,

CONSTRUCTION CONSULTING LABORATORY, ***INTERNATIONAL***

JEFFREY CRUMP
TESTING MANAGER

WESLEY WILSON
LABORATORY MANAGER

APPENDIX A

UNITED STATES ALUMINUM
SERIES HP 3253CURTAIN WALL MOCK-UP DRAWINGS

Sheet	Detail	Date
2.01	Elevation	3/20/10
3.01	Head & Horizontals	3/20/10
3.02	Horizontal & Splice	3/20/10
3.03	Sill	3/20/10
3.04	Wind Load Anchor	3/20/10
3.05	Dead Load Anchor	3/20/10
3.06	Wind Load anchor & Horizontal	3/20/10
3.07	Jamb & Vertical Mullion	3/20/10
3.08	Jamb	3/20/10
3.09	Jamb & Vertical Mullion	3/20/10
3.10	Jamb	3/20/10
3.11	Jamb Splice	3/20/10
3.12	Jamb Splice	3/20/10
3.13	Jamb Anchor	3/20/10
3.14	Mullion Anchor	3/20/10
3.15	Jamb Anchor	3/20/10

TESTING SCHEDULE

TEST STANDARD	TEST	RESULT
ASTM E330-02	PRELOAD @ 12.5psf (.60kPa)	....
ASTM E283-04	AIR INFILTRATION TEST @ 6.24psf (.30kPa)	....
ASTM E331-00	STATIC WATER TEST @ 15.0psf (.72kPa)	....
AAMA 501.1-05	DYNAMIC WATER PENETRATION TEST @ 15.0psf (.72kPa)	....
ASTM E330-02	UNIFORM STRUCTURAL TEST @ 50% & 100% OF DESIGN LOAD	....
ASTM E283-04	AIR INFILTRATION TEST @ 6.24psf (.30kPa)	....
ASTM E331-00	STATIC WATER TEST @ 15.0psf (.72kPa)	....
ASTM E330-02	STRUCTURAL PROOF LOADING TEST @ 150% OF DESIGN LOAD	....

TEST LOADS

TEST STANDARD	POSITIVE (INWARD)	NEGATIVE (OUTWARD)
DESIGN LOAD	40.0psf (1.92kPa)	40.0psf (1.92kPa)
PROOF LOAD	60.0psf (2.87kPa)	60.0psf (2.87kPa)

PRODUCT SIZE

4.6355M (182½") X 9.6647M (380½")

GLAZING SCHEDULE

TYPE	DESCRIPTION
1	VISION GLASS (TRIPLE GLAZED) – 2" INSULATED GLASS: BOTH LITES FULLY TEMPERED ¼" CLEAR / ⅜" AIR SPACE / ¼" CLEAR / ⅜" AIR SPACE / ¼" CLEAR
2	SPANDREL GLASS – 1" INSULATED GLASS: BOTH LITES FULLY TEMPERED ¼" CLEAR / ½" AIR SPACE / ¼" CLEAR

TYPICAL GLASS SIZE

TYPE	GLASS SIZE	GLASS WEIGHT	I REQUIRED*
1	58½" X 52½"	216 LBS	0.2781
2	58½" X 52½"	144 LBS	0.1854

* SETTING BLOCKS LOCATED 8" FROM END OF HORIZONTALS

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

BILL OF MATERIALS

PART	DIE DRAWING	MATERIAL
PT305 VERTICAL MULLION	61563	6063 T6 ALUMINUM
PT325 OPEN BACK HORIZONTAL	61573	6063 T6 ALUMINUM
PC331 1" POCKET REDUCER	61574	6063 T5 ALUMINUM
PC342 PERIMETER PRESSURE BAR	61575A1	6063 T5 ALUMINUM
CW945 SPLICE	31496	6063 T5 ALUMINUM
CW950 FLAT FILLER	31805	6063 T5 ALUMINUM
AP955 SHEAR BLOCK	60698E1/ USA2384	6063 T6 ALUMINUM
CW933 PRESSURE BAR	31464B1	6063 T5 ALUMINUM
CW901 FACE CAP	31465	6063 T5 ALUMINUM
SB910 SETTING BLOCK – 1" GLASS	USA 1045C	SHORE 85±5 EPDM, BLACK
SB933 SETTING BLOCK – 2" GLASS	USA3102	SHORE 85±5 EPDM, BLACK
NP420 INTERIOR FOAM GASKET	USA1254	SPONGE EPDM
NP430 EXTERIOR GASKET	USA1256	DENSE EPDM
AW901 EDGE BLOCK	USA1112	SHORE 60±5 EPDM, BLACK
MS222 PRESSURE BAR SCREW		
HD885 2' WATER DIVERTER	USA3105	NYLON
AP965 T-ANCHORS	31513D/ USA1090C	6063 T6 ALUMINUM
AP975 F-ANCHORS	37418/ USA1501B	6063 T6 ALUMINUM
CP885 END CAP	USA3113	NYLON
ST269 SHEAR BLOCK SCREW		
VSJ00 SPACER	3200-3	SHORE 85±5 PVC, BLACK
ST19303 SHEAR BLOCK SCREW		
UNC 16-⅜"X2" HEX HEAD BOLT – GS WITH PLAIN WASHERS & LOCK NUT		
UNC 13-½"X5" HEX HEAD BOLT – GS WITH PLAIN WASHERS & LOCK NUT		

TABLE OF CONTENTS

SHEET	DESCRIPTION
1.01	COVER / SCHEDULES
2.01	PRODUCT ELEVATION / SECTION VIEWS
3.01-3.15	PRODUCT DETAILS

NO.	REVISIONS	DATE
1		
2		
3		
4		

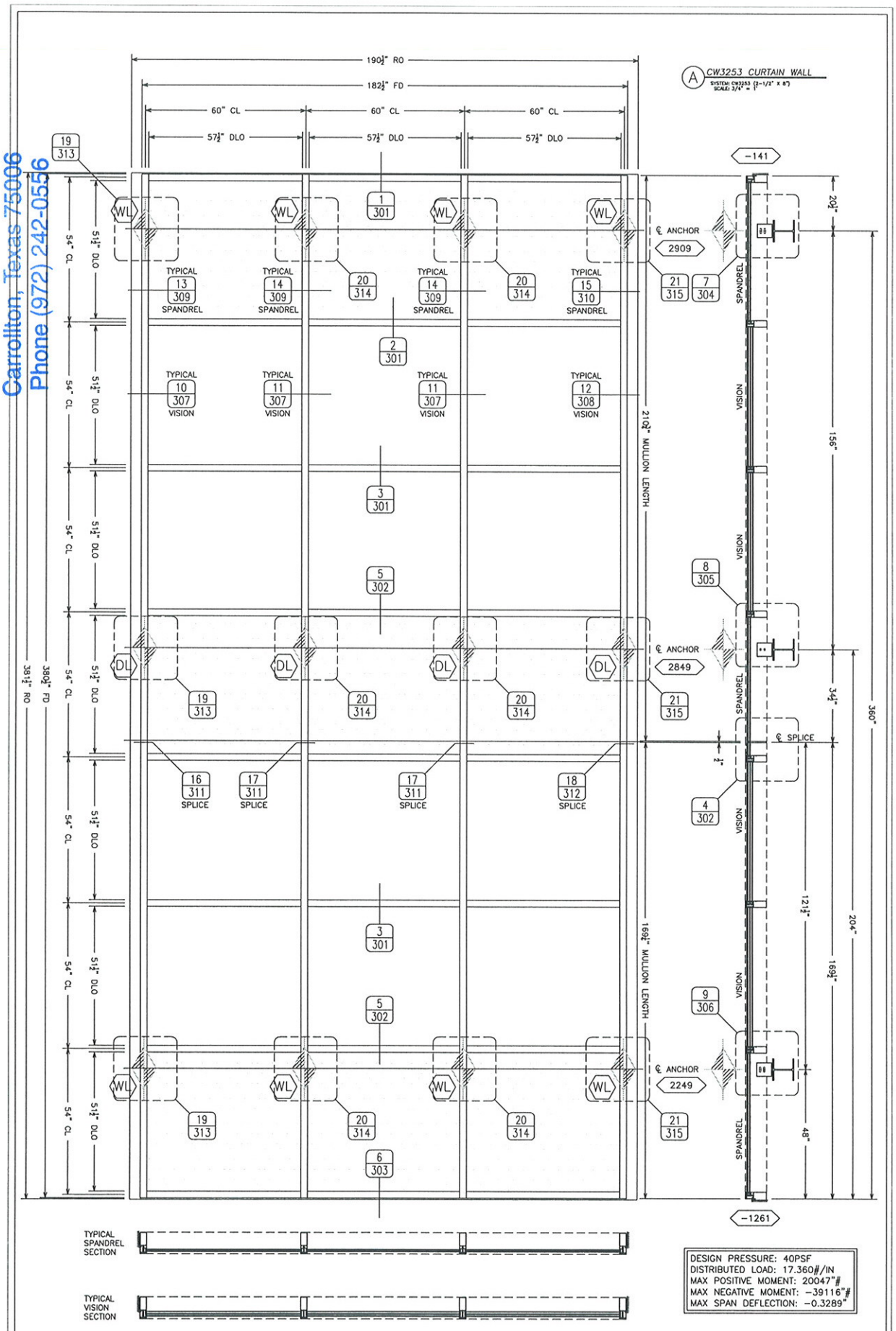
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
2001 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

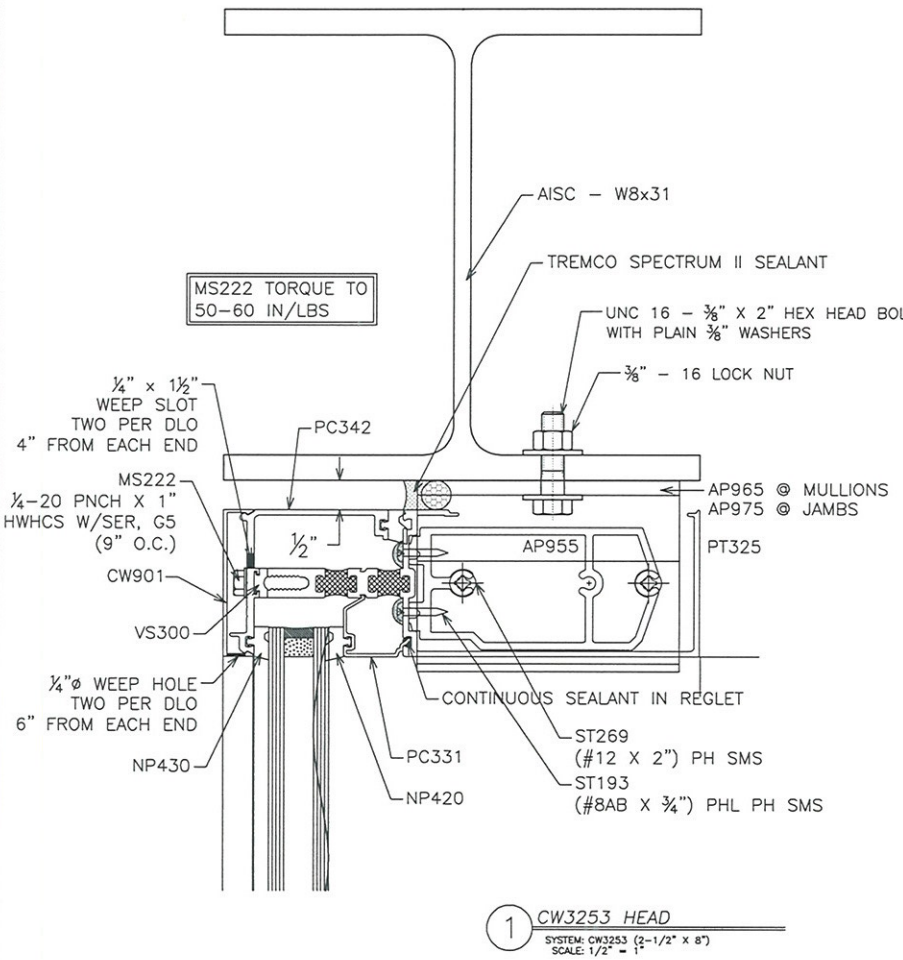
DRAWN BY: JSM
DATE: 3-20-10
SHEET: 1.01

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

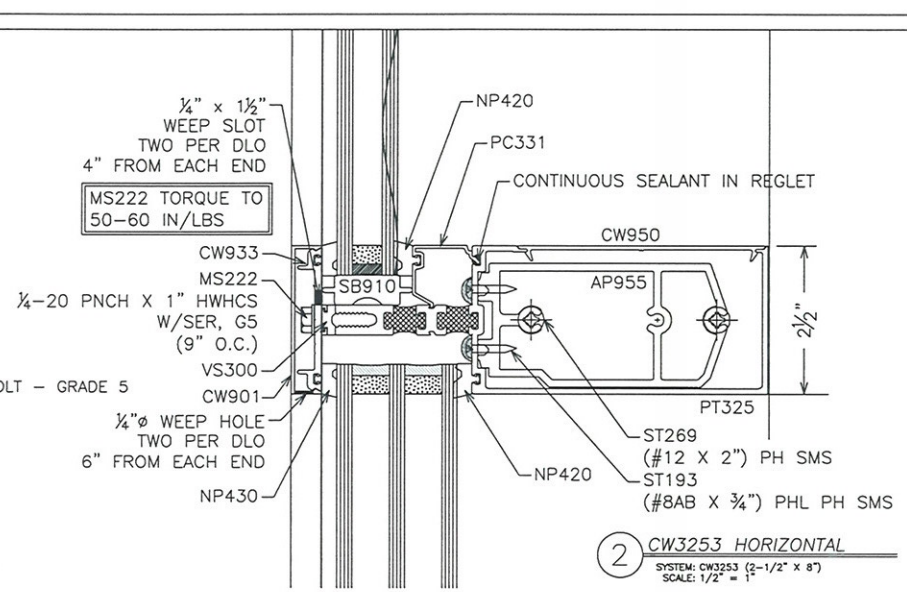


SHEET: 2.01	DATE: 3-20-10	DRAWN BY: JSM	United States ALUMINUM Commercial Products Group	UNITED STATES ALUMINUM 200 SINGLETON DRIVE WAXAHACHIE, TEXAS 75165 PHONE: 800-627-6440 FAX: 972-937-5467	PROJECT 3253 CURTAIN WALL AIR/WATER TESTING

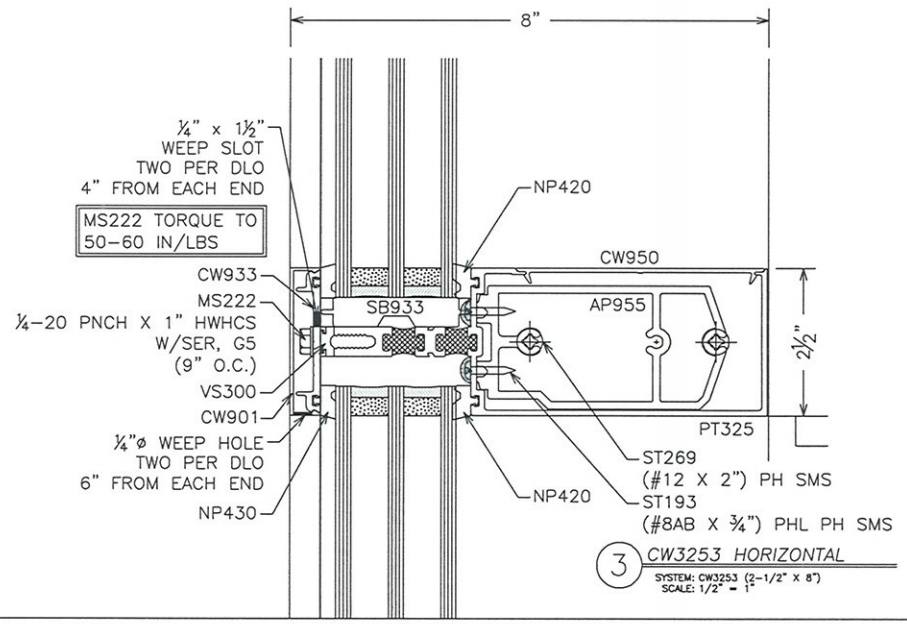
NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.



1 CW3253 HEAD
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"



2 CW3253 HORIZONTAL
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"



3 CW3253 HORIZONTAL
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

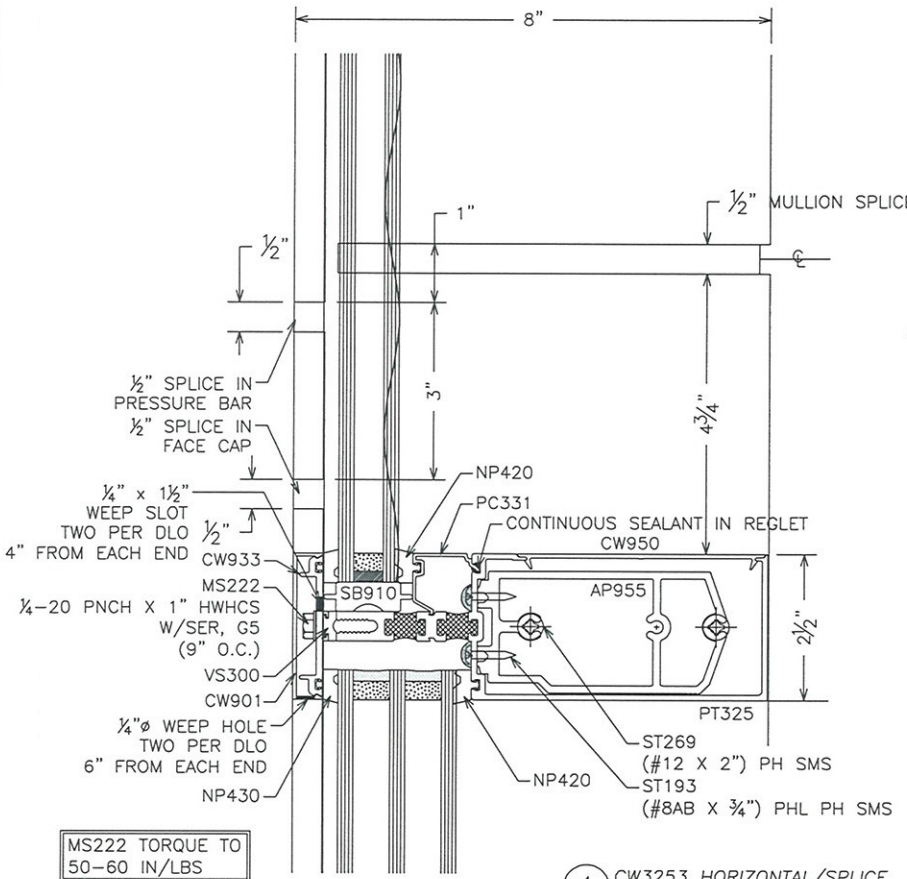
NO.	REVISIONS	DATE
1		
2		
3		
4		

PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

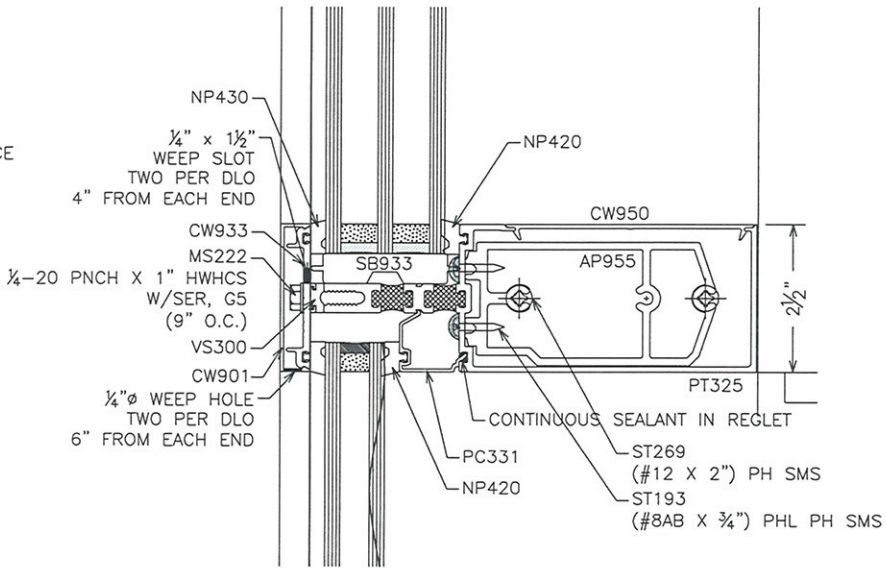
UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3–20–10
SHEET: 3.01



4 *CW3253 HORIZONTAL/SPLICE*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"



5 *CW3253 HORIZONTAL*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

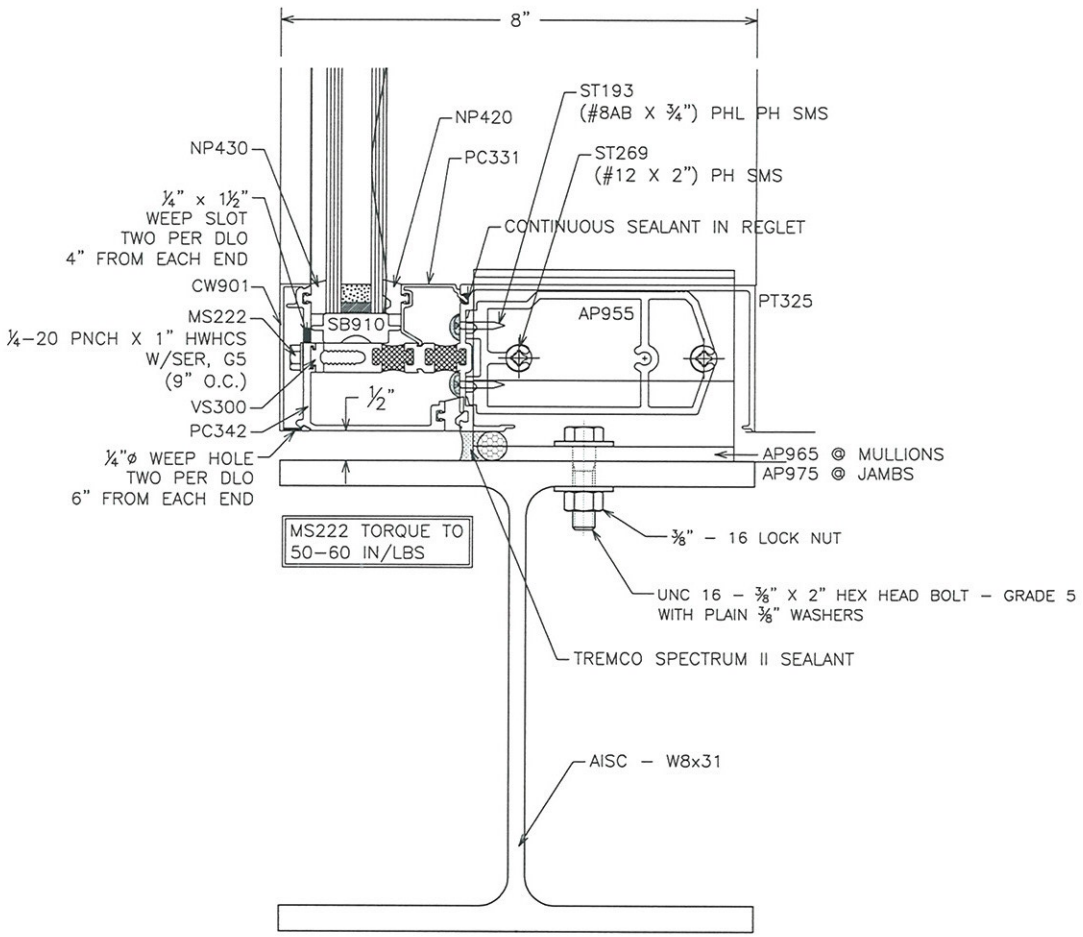
NO.	REVISIONS	DATE
1		
2		
3		
4		

PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.02



6 CW3253 SILL

SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.

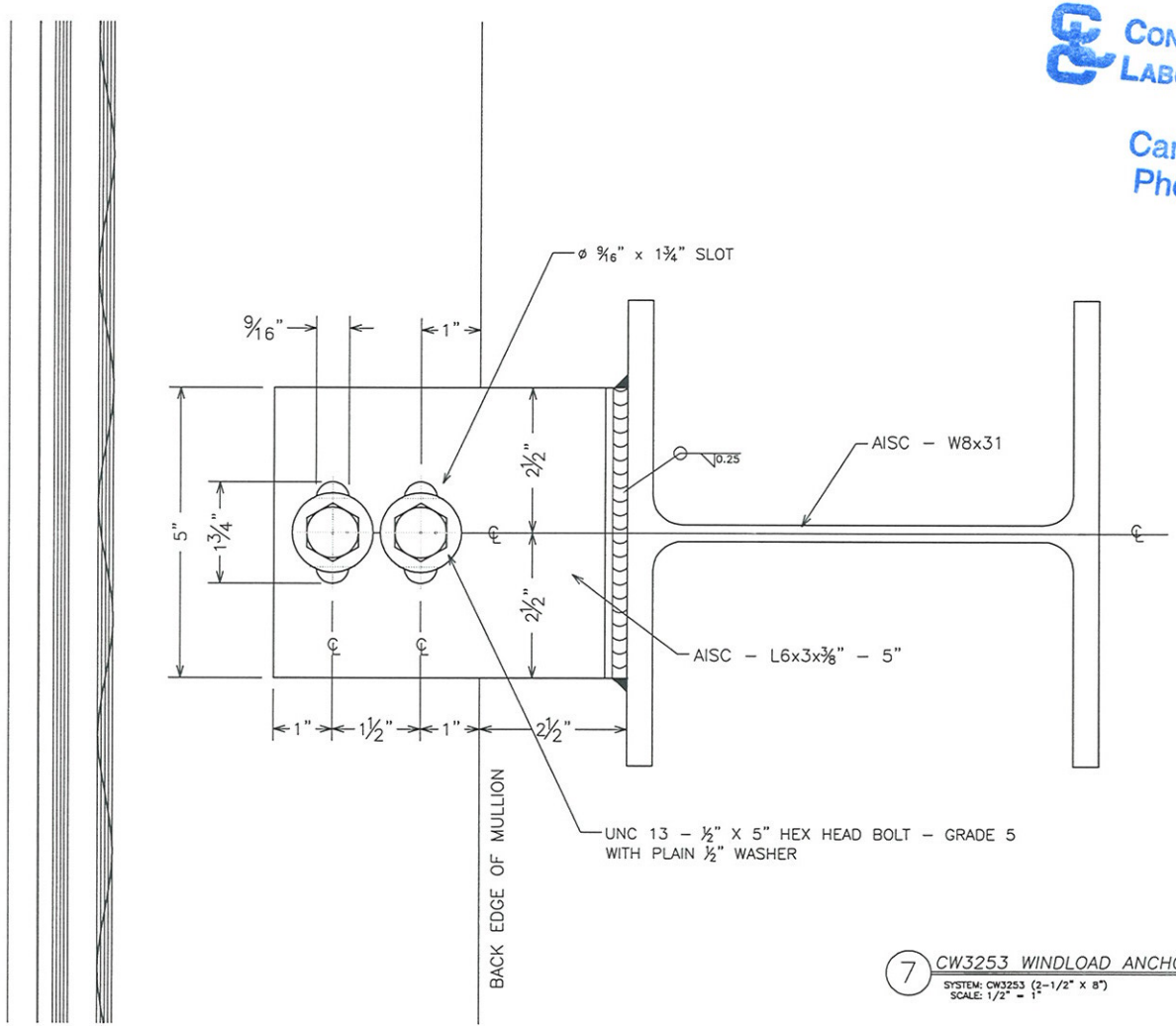
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.03

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



7 *CW3253 WINDLOAD ANCHOR*
SYSTEM: CW3253 (2-1/2" x 8")
SCALE: 1/2" = 1"

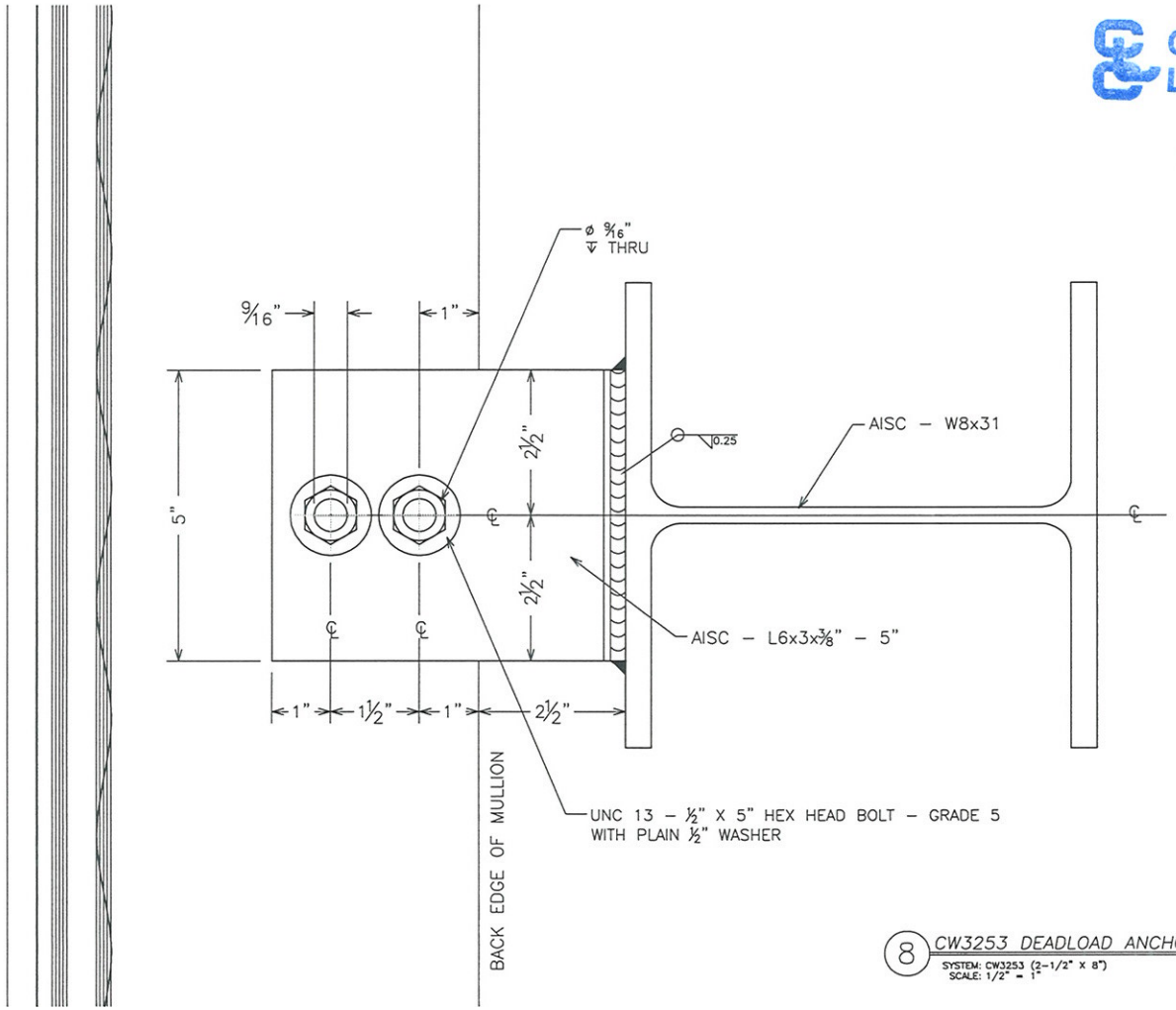
NO.	REVISIONS	DATE
1		
2		
3		
4		

PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.04



8 CW3253 DEADLOAD ANCHOR
SYSTEM: CW3253 (2-1/2" x 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

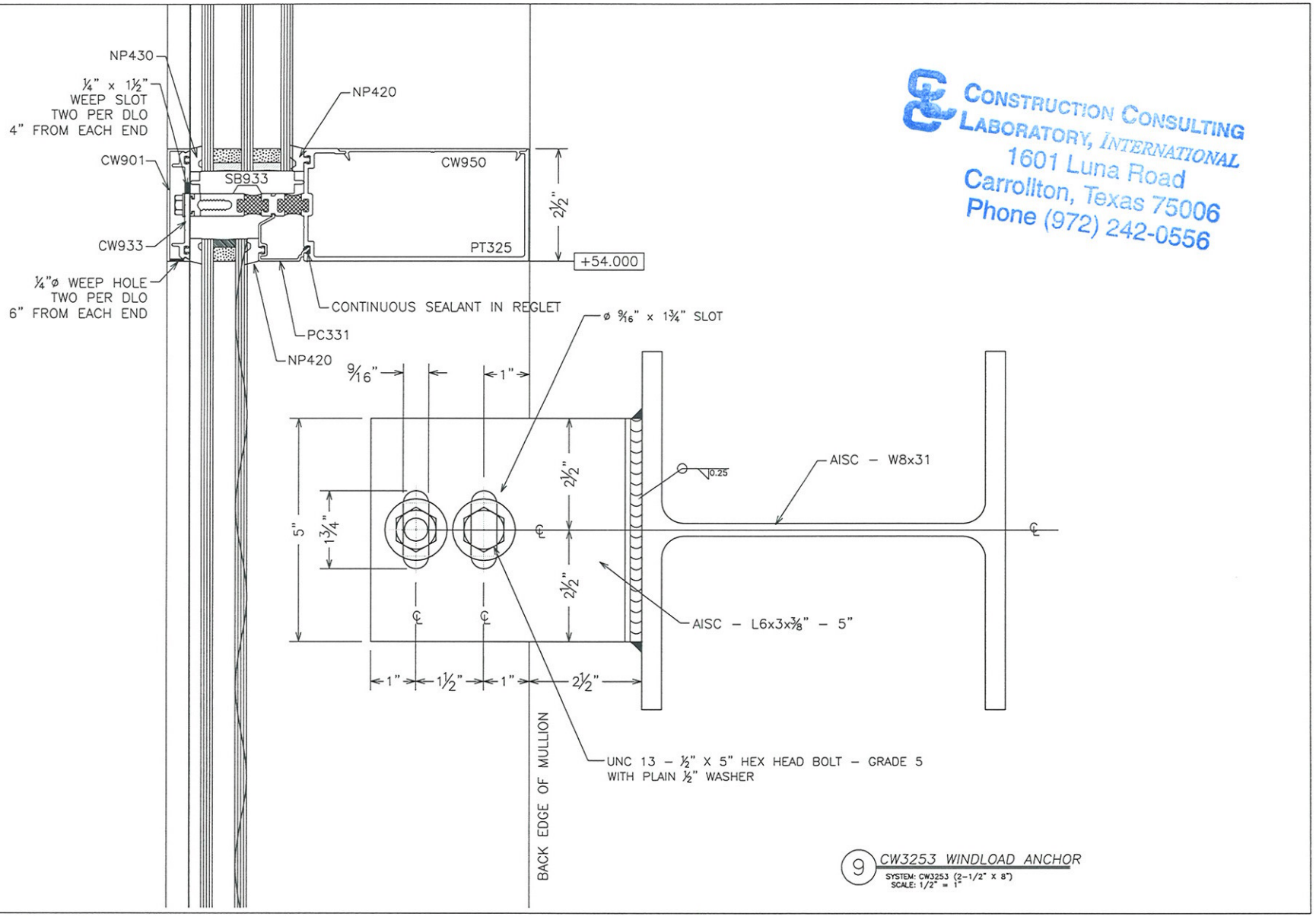
NO.	REVISIONS	DATE
1		
2		
3		

PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-8440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.05



9 CW3253 WINDLOAD ANCHOR
SYSTEM: CW3253 (2-1/2" x 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.

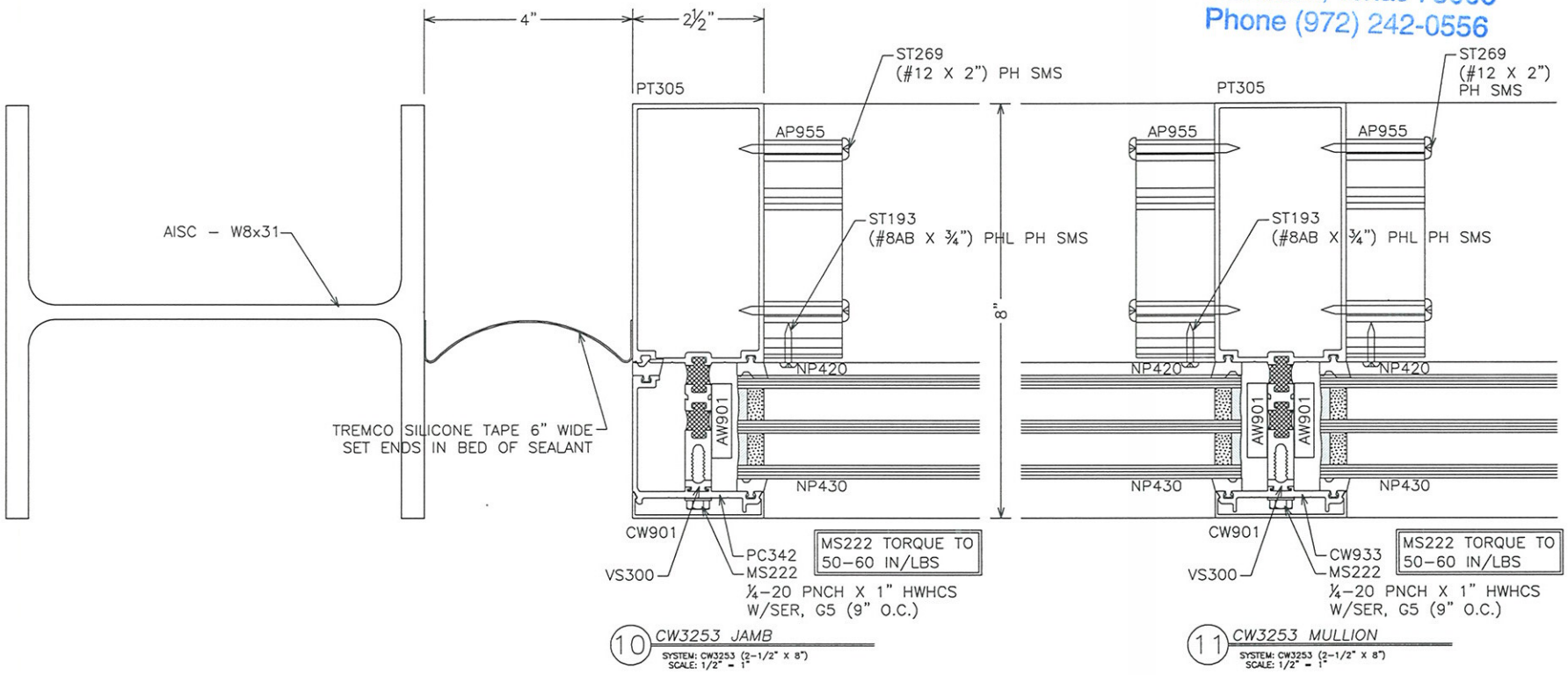
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.06

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



10 CW3253 JAMB
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

11 CW3253 MULLION
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.

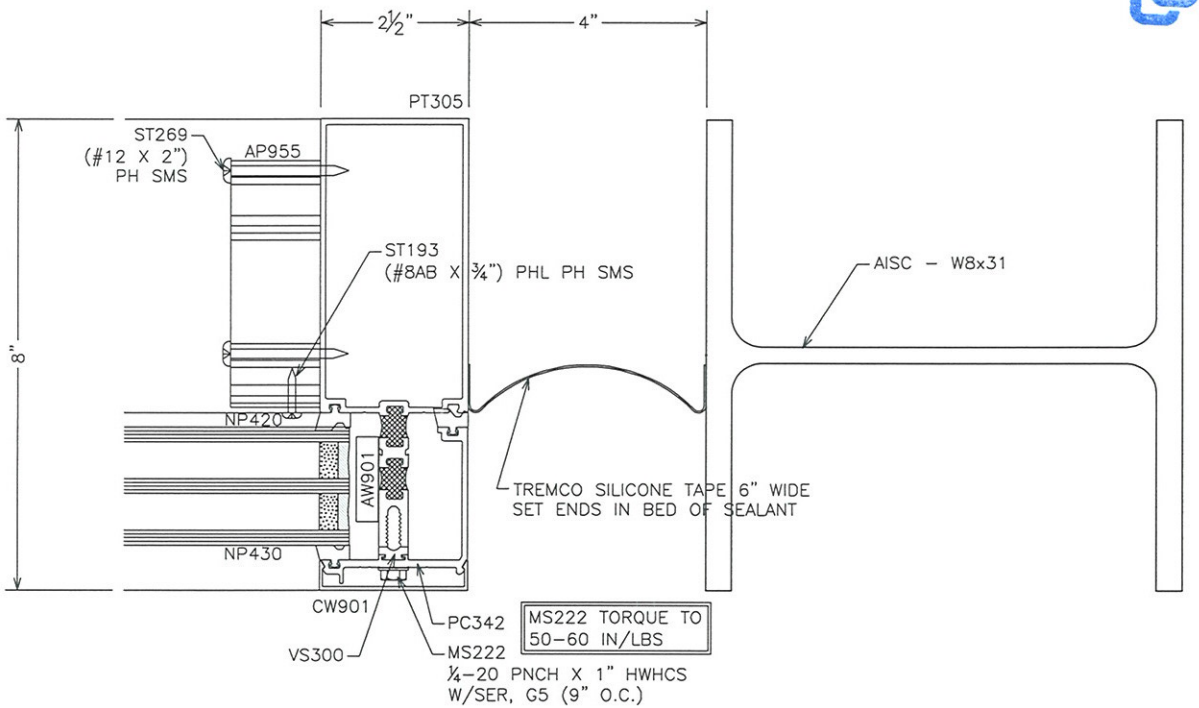
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-8440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.07

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



12 CW3253 JAMB
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.

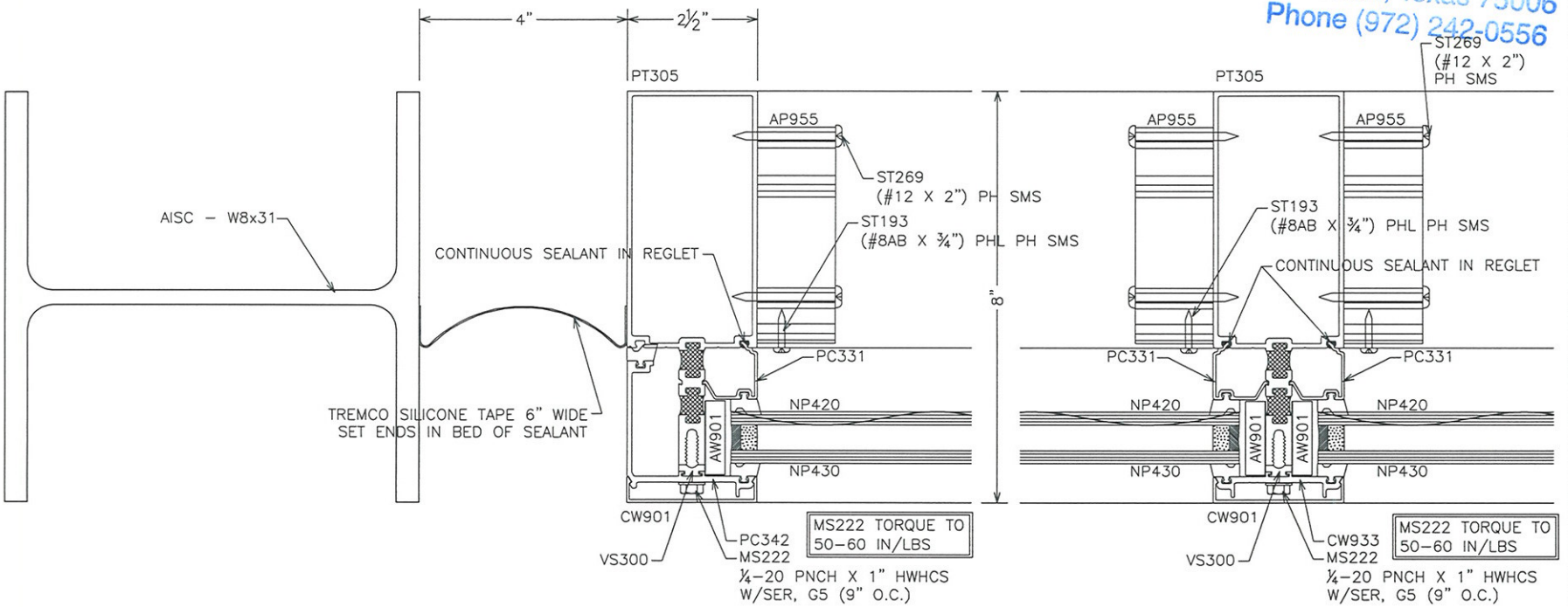
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-8440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.08

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



13 *CW3253 JAMB*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

14 *CW3253 MULLION*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.

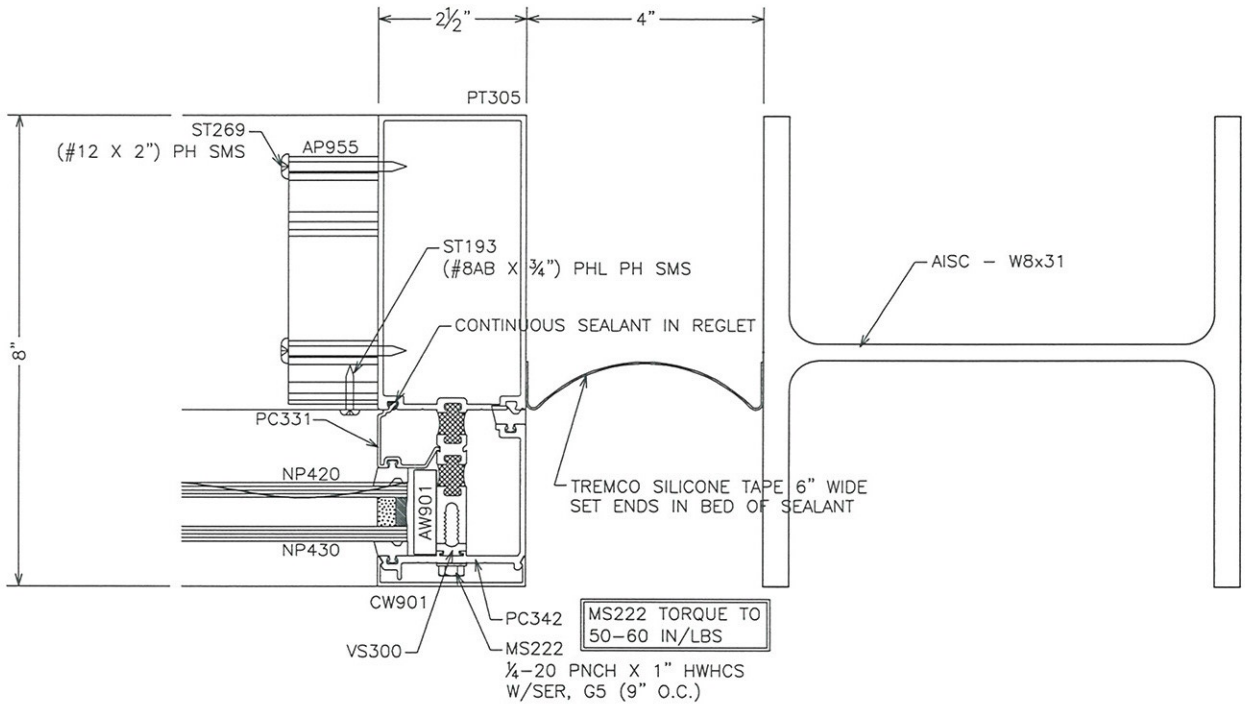
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-8440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.09

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



15 CW3253 JAMB
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

NO.	REVISIONS	DATE
1	.	.
2	.	.
3	.	.
4	.	.

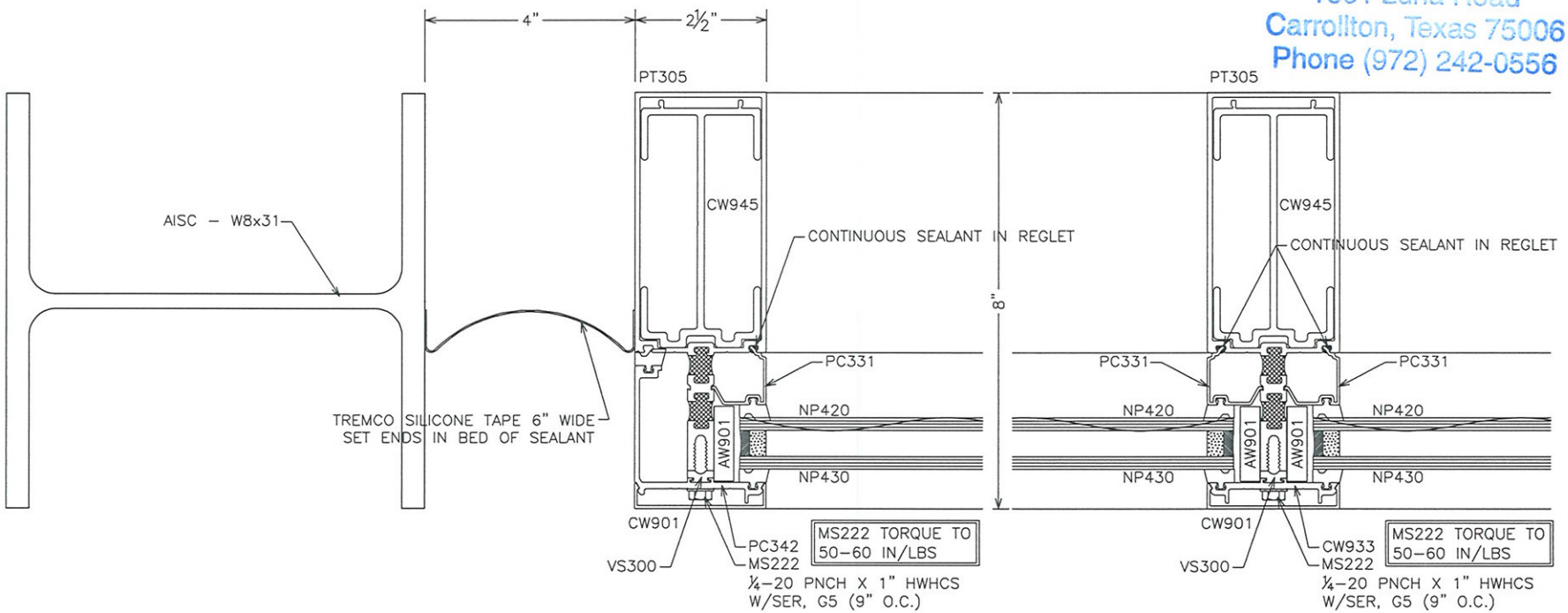
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-8440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY:
JSM
DATE:
3-20-10
SHEET:
3.10

CONSTRUCTION CONSULTING
LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



16 *CW3253 JAMB/SPLICE*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

17 *CW3253 MULLION/SPLICE*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

NO.	REVISIONS	DATE
1		
2		
3		
4		

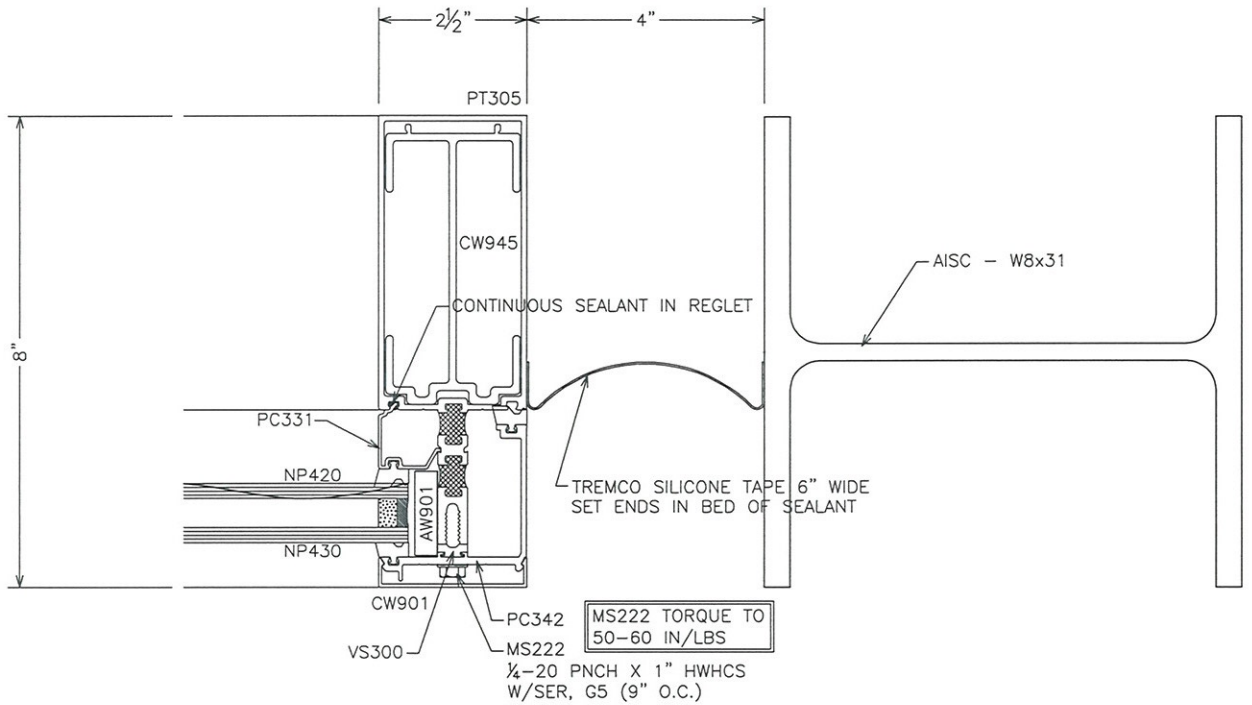
PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-8440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.11

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556



18 *CW3253 JAMB/SPLICE*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

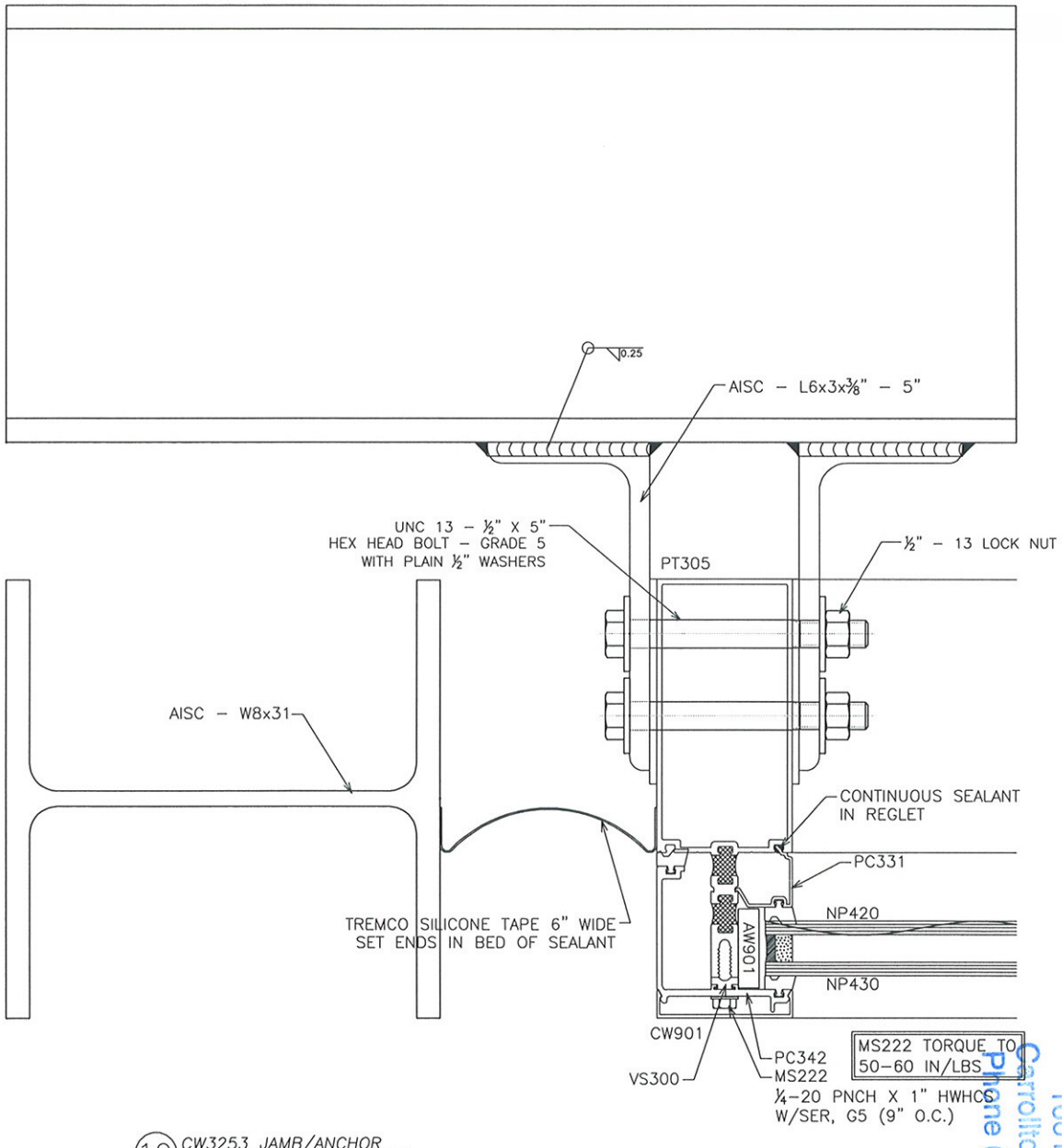
NO.	REVISIONS	DATE
1		
2		
3		
4		

PROJECT
3253 CURTAIN WALL
AIR/WATER TESTING

UNITED STATES ALUMINUM
200 SINGLETON DRIVE
WAXAHACHIE, TEXAS 75165
PHONE: 800-627-6440
FAX: 972-937-5467

United States ALUMINUM
Commercial Products Group

DRAWN BY: JSM
DATE: 3-20-10
SHEET: 3.12



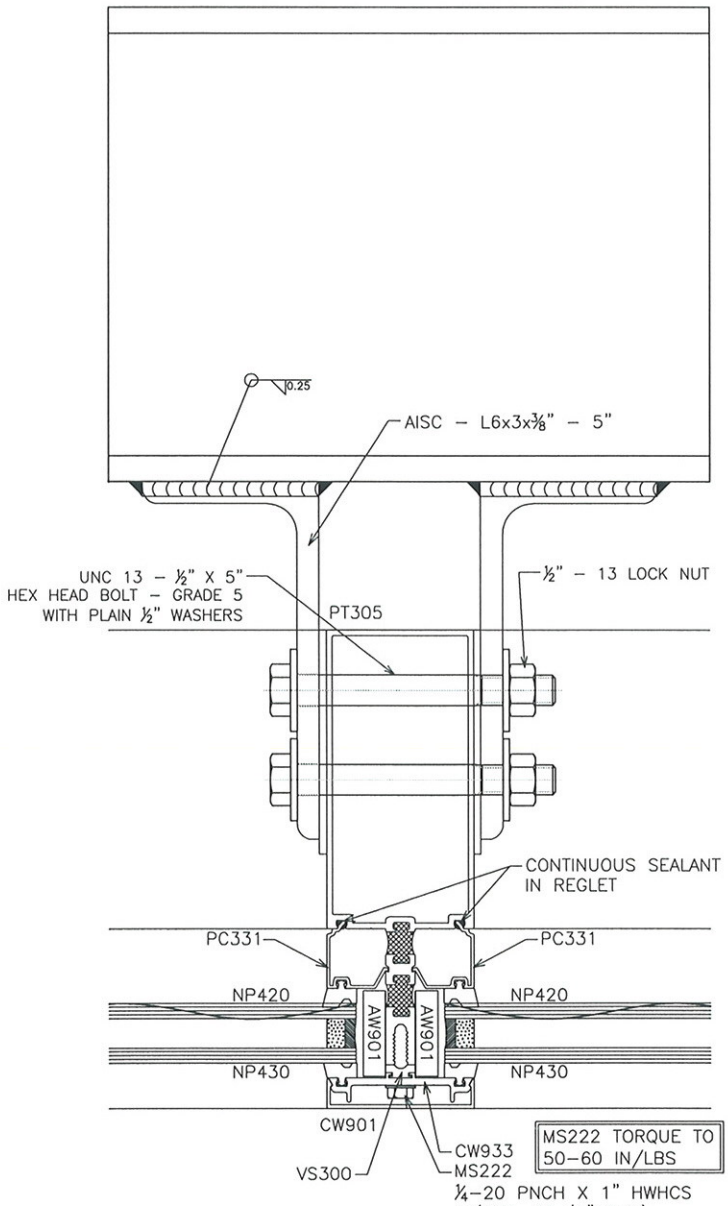
19 *CW3253 JAMB/ANCHOR*

SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

SHEET:	DATE:	DRAWN BY:			
3.13	3-20-10	JSM	United States ALUMINUM Commercial Products Group	UNITED STATES ALUMINUM 200 SINGLETON DRIVE WAXAHACHIE, TEXAS 75165 PHONE: 800-627-6440 FAX: 972-937-5467	PROJECT 3253 CURTAIN WALL AIR/WATER TESTING

NO.	REVISIONS	DATE
1		
2		
3		
4		

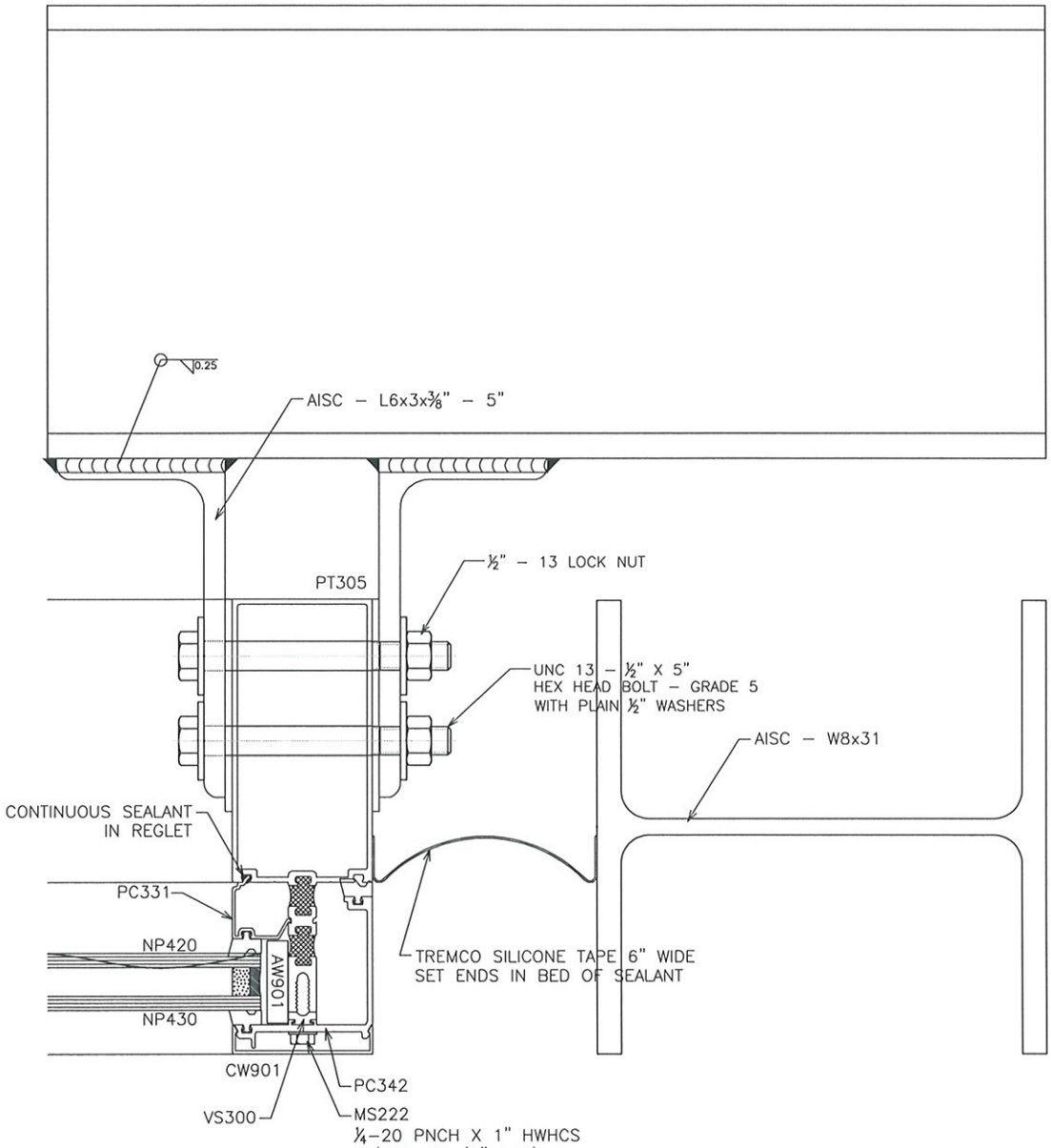


20 *CW3253 MULLION/ANCHOR*

SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

SHEET: 3.14	DATE: 3-20-10	DRAWN BY: JSM	United States ALUMINUM Commercial Products Group	UNITED STATES ALUMINUM 200 SINGLETON DRIVE WAXAHACHIE, TEXAS 75165 PHONE: 800-627-6440 FAX: 972-937-5467	PROJECT 3253 CURTAIN WALL AIR/WATER TESTING	NO. / REVISIONS / DATE



MS222 TORQUE TO
50–60 IN/LBS

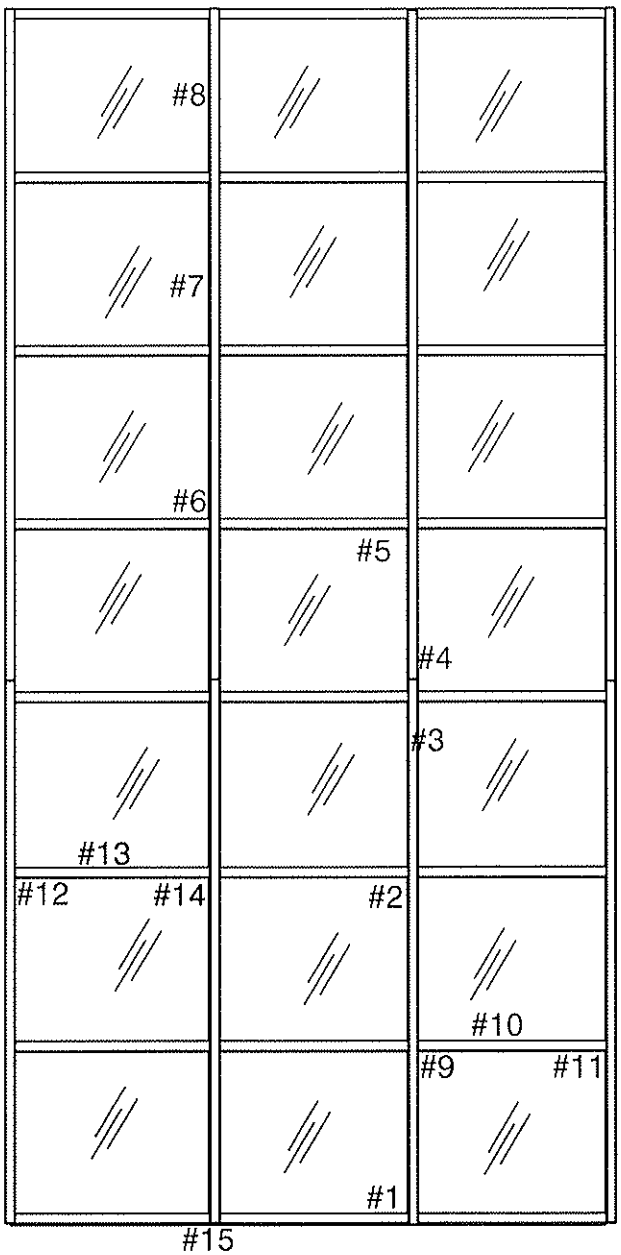
21 *CW3253 JAMB/ANCHOR*
SYSTEM: CW3253 (2-1/2" X 8")
SCALE: 1/2" = 1"

CONSTRUCTION CONSULTING LABORATORY, INTERNATIONAL
1601 Luna Road
Carrollton, Texas 75006
Phone (972) 242-0556

SHEET: 3.15	DATE: 3-20-10	DRAWN BY: JSM	United States ALUMINUM Commercial Products Group	UNITED STATES ALUMINUM 200 SINGLETON DRIVE WAXAHACHIE, TEXAS 75165 PHONE: 800-627-6440 FAX: 972-937-5467	PROJECT 3253 CURTAIN WALL AIR/WATER TESTING	NO. / REVISIONS / DATE

APPENDIX B

Dial Indicator Location Diagram



Typical Lower Vertical (1-2-5) Splice (3-4) Upper Vertical (6-7-8) H-Spandrel (9-10-11)
H- Vision (12-13-14) T-Clip anchor (15)

APPENDIX C

PHOTOGRAPHS

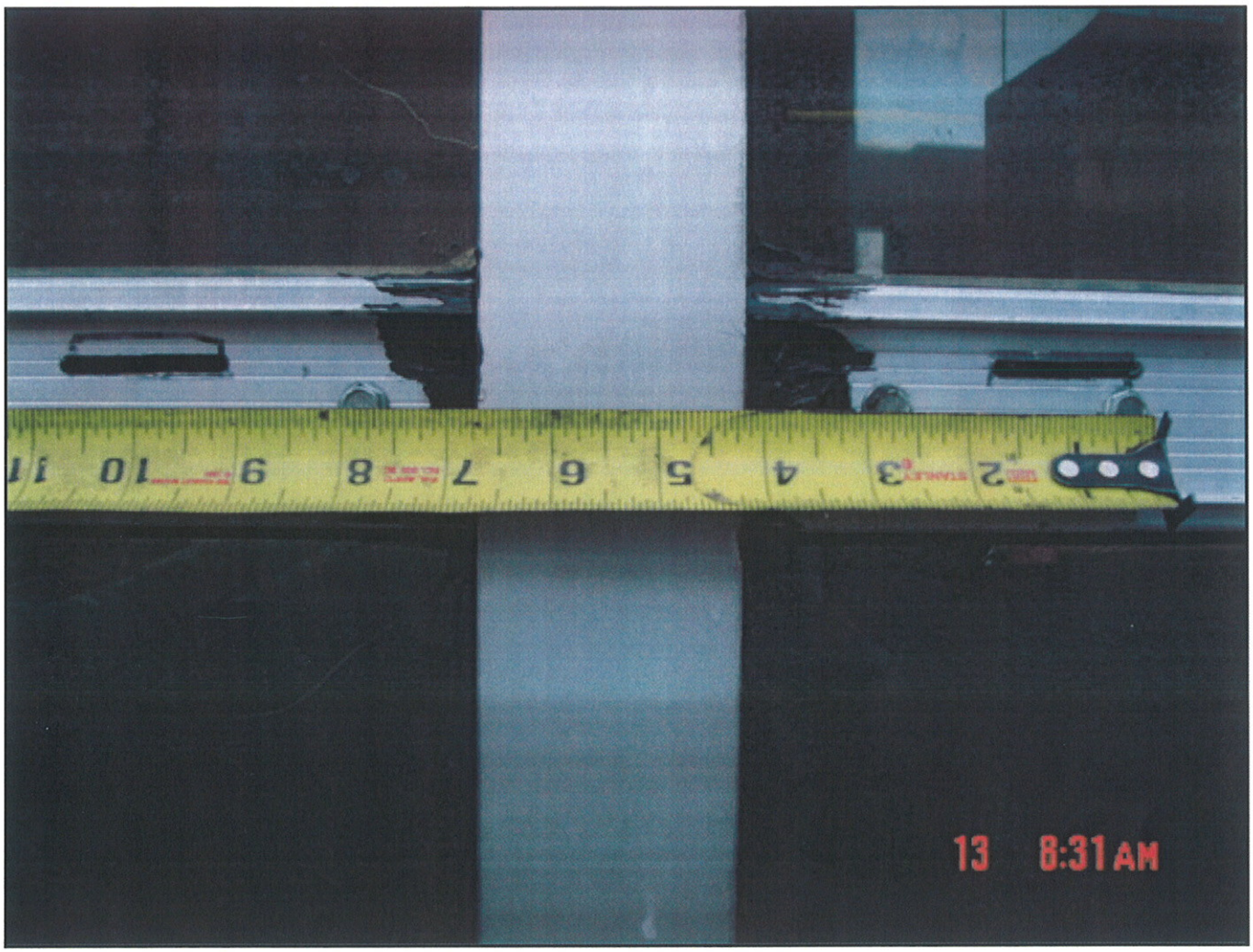
AAMA 501-05 CURTAIN WALL MOCK-UP TESTING
UNITED STATES ALUMINUM
SERIES HP 3253 CURTAIN WALL
REPORT #CCLI-10-087

April 12, 2010



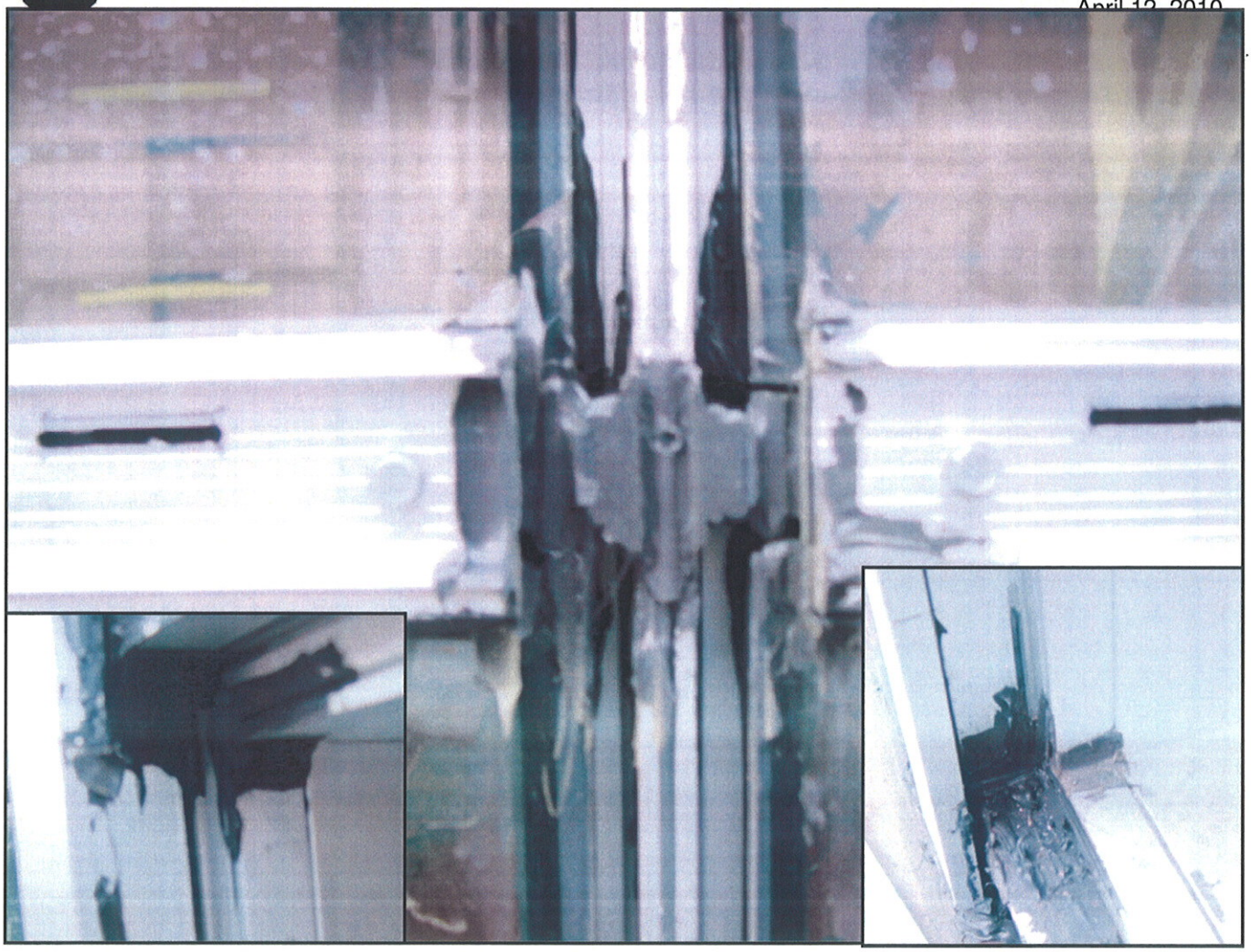
PHOTOGRAPH 1

PRODUCT TYPE:	Aluminum Curtain Wall
SERIES/MODEL:	HP 3253 Curtain Wall
CURTAIN WALL OVERALL:	15'-2½" x 31'-10 ½"
CONFIGURATION:	Elevation



PHOTOGRAPH 2

CURTAIN WALL WEEP ARRANGEMENT: 1 ¾" x ¼" weep located 4" from each end of horizontal pressure plate two (2) per DLO. 5/16" diameter weep hole on the underside of face cap spaced 6" from each end, two (2) per DLO.



PHOTOGRAPH 3

SEALANT: Curtain wall was perimeter sealed at the head and sill with backer rod and Dow Corning 795 silicone and the frame jambs were sealed with 6" Tremco Silicone tape bedded in Dow Corning 795 silicone at chamber jamb steel and lateral edge of frame jambs. Foam joint plug and Dow Corning 795 silicone applied at the ends of the horizontal-to-vertical connections. Intermediate vertical members are sealed 6" up from bottom at sill horizontal and splice. Vertical glazing adapters sealed to horizontal glazing adapters. Glass pocket zone plugs sealed at the horizontal to vertical connection both at the top and bottom of plug Face of vertical mullions sealed with silicone and bond–breaker tape applied to splice at live-load connections.



PHOTOGRAPH 4

CURTAIN WALL ANCHORAGE: Vertical mullions are anchored at frame head with Aluminum T and F clips attached to chamber steel with two (2) $^{3}/_{8}$" x 2" Grade 5 bolts with flat washers and nuts per clip at each side of each vertical mull. Frame sill anchored to chamber steel with two (2) $^{3}/_{8}$" x 2" Grade 5 bolts with flat washers and nut at each side of each vertical mull. Vertical mullions are inserted between two (2) L6 x 3" x $^{3}/_{8}$" thick steel angles and are through bolted to angle at floor line with two (2) ½" x 5" Grade 5 bolts with hex nut and flat washers per anchor.



PHOTOGRAPH 5

Static Pressure Air Infiltration Test @ 6.24 psf per ASTM E 283-04

The specimen and perimeter sealant joints were completely covered with an impervious 4 mm plastic material and duct tape, thus allowing no movement of air through the specimen. The exterior face of the specimen was subjected to a positive pressure differential of 6.24 psf to obtain a leakage rate for the test chamber. The plastic bag was removed and the total chamber and specimen infiltration was measured. The chamber infiltration was subtracted from the total air infiltration resulting in the infiltration rate of the test specimen, **Photograph , Appendix B**.

MAXIMUM ALLOWABLE
Mock-Up: 15'2 ½" x 31'8 ½" = 482.2 Ft^2 x .06 Cfm =28.93 Cfm.
Results: 7.78 Cfm = 0.02 Cfm/ft^2

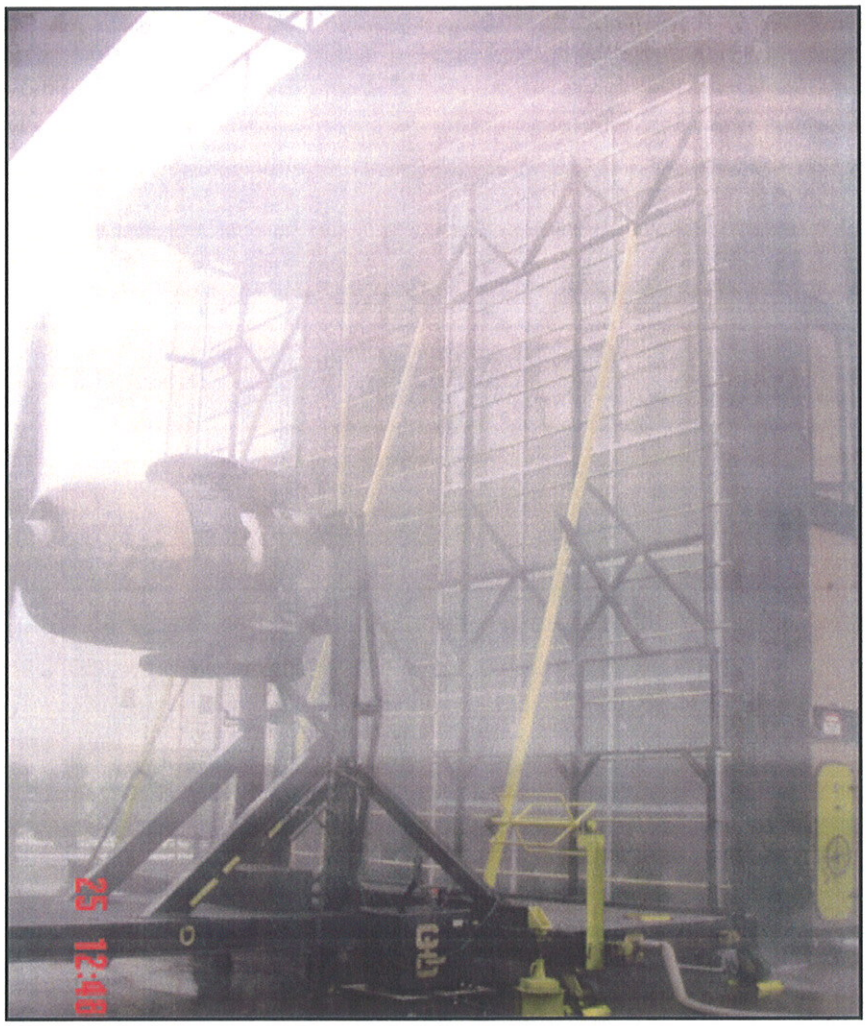


PHOTOGRAPH 6

Static Pressure Water Penetration Test @ 15 psf per ASTM E 331-00

Water was applied to the exterior face of the specimen at a minimum rate of five (5) gallons per square foot per hour of wall area, in such a way as to continuously and completely cover the exterior face of the specimen. Simultaneously, a positive **inward** differential static pressure of **15 psf** was applied against the face. The application of pressure and water was maintained for a period of fifteen (15) minutes, with observers inside the chamber checking for water penetration.

Results: Passed with no water penetration observed.



PHOTOGRAPH 7

Dynamic Water Penetration @ 76 mph Slipstream Velocity per AAMA 501.1-05

Water was applied to the exterior face of the specimen at a minimum rate of five (5) gallons per square foot per hour of wall area, in such a way as to completely and continuously covers the face of the specimen. Simultaneously, the wall was subjected to sufficient airflow from an aircraft engine with a four-bladed propeller, approximately 13'-6" in diameter, approximately 20' in front of the specimen. The application of airflow and water was maintained for a period of fifteen (15) minutes, with observers inside the chamber checking for water penetration.

Results: Passed with no water penetration observed.

- END OF REPORT -