

PERFORMANCE TEST REPORT

**PRL ALUMINUM
PR CW600/PR CW700
ALUMINUM CURTAIN WALL
10.0 psf**

CCLW JOB #11-5484-2

MAY 9, 2011

DATE OF TESTING

APRIL 25, 2011

TESTED FOR

**PRL ALUMINUM
14760 DON JULIAN ROAD
CITY OF INDUSTRY, CA 91746**

TESTED BY

**CONSTRUCTION CONSULTING LABORATORY WEST
4751 WEST STATE STREET; SUITE B
ONTARIO, CA 91762**

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INTRODUCTION

The following is a test report outlining the procedure, specimen and test results utilized and obtained during testing of a curtain wall mock up furnished and installed by PRL Aluminum at Construction Consulting Laboratory West, Ontario, California, on April 25, 2011. Testing was conducted in accordance with the current issue of the test standards and industry standards.

TEST SPECIMEN

The test specimen submitted for testing was a one story unitized curtain wall mock up consisting of two (2) standard systems, PR CW-600 and PR CW-700. The overall mock up measured 15'-10 1/2" wide by 11'-4" high.

For a complete description including anchorage, glass and framing details, see drawings (sheets 1 through 9) at the conclusion of this report. Drawings are furnished by PRL Aluminum.

WITNESSED BY (all or partial testing)

David Olague	PRL Aluminum
Frank Fisher	PRL Aluminum
Jack W. Jackson	Construction Consulting Laboratory West
Chad Jackson	Construction Consulting Laboratory West

TEST LOADS

Design loads (100%): **40.0 psf** Positive and **40.0 psf** Negative

All references to positive pressures are considered inward acting and negative is outward.

The mock up was tested in accordance with each applicable AAMA or ASTM standard.

TEST EQUIPMENT

The specimens were installed into a single test chamber constructed of structural shapes covered with steel and plywood bulkheads, accessible through a bulkhead door.

Air infiltration was measured with a Meriam laminar flow element and a Dwyer manometer.

Pressure differentials were measured with a Dwyer electronic manometer.

The pressure differential between the exterior and interior of the chamber was created by a positive and negative blower system.

Water was applied from a vertical spray rack mounted 24" from the specimen. The rack was equipped with swirl-type nozzles spaced two (2) feet on center, vertically and horizontally, which delivered five (5) gallons of water per hour per square foot of wall frontal area.

Structural deflections were measured with numerous dial indicator gages with follow-up hands.

Dynamic winds were generated by a Curtis Wright 3350 radial aircraft engine with a three (3) blade propeller, 14'-5" diameter, which formulates typical and atypical wind conditions.

TESTING AS FOLLOWS

April 25, 2011

PRELOAD per ASTM E 330-02

To set the specimen for testing, a positive pressure differential of **20.0 psf** was applied to the specimen while exhausting air in the air infiltration test. It was held for ten (10) seconds and then reduced to **6.24 psf** to complete the air infiltration test. No failure shall be allowed.

RESULTS

There was no indication of or visible signs of any failure.

AIR INFILTRATION TEST per ASTM E 283-04

The exterior face of the specimen was covered and then subjected to a positive static pressure differential of **6.24 psf**. Air infiltration was measured. This reading represents the air infiltration through the specimen and the chamber. The visqueen was removed and air infiltration again measured. The difference is the net air infiltration of the specimen.

ALLOWABLE

Air infiltration shall not exceed **0.06 cfm** per square foot of fixed wall area as determined by actual measurement.

Fixed Wall Area (179.9 s/f x 0.06) = **10.8 cfm** total allowed.

RESULTS

Specimen passed.

Gross air reading:	= 16.4 cfm	
Tare reading (chamber):	= <u>11.7 cfm</u>	
Total Net for Mock up	= <u>4.7 cfm</u>	< 10.8 cfm

STATIC WATER PENETRATION TEST per ASTM E 331-00

Water was applied to the exterior face of the total specimen, at a minimum rate of five (5) gallons per hour per square foot of wall frontal area, in such a way as to completely cover the exterior face of the specimen. At the same time, a positive differential static pressure of **10.0 psf** was applied to the face of the specimen. The application of pressure and water was maintained for a period of fifteen (15) minutes, with observers viewing the interior of the specimen.

ALLOWABLE

No uncontrolled water leakage. Water penetration is defined as the appearance of uncontrolled water, other than condensation, on any indoor face of any part of the exterior wall 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. Sources of water leakage will be identified.

RESULTS

Specimen passed.

There was no water leakage noted during or after the static water test.

DYNAMIC WATER PENETRATION TEST per AAMA 501.1-05

The specimen was subjected to a dynamic wind load pressure equivalent of **10.0 psf (62.5 mph wind speed)** with a water application of five (5) gallons per hour per square foot of wall frontal area for a duration of fifteen (15) minutes.

ALLOWABLE

There shall be no uncontrolled water leakage, same as the static water test above.

RESULTS

Specimen passed.

There was no water leakage noted during or after the dynamic water test.

UNIFORM STRUCTURAL DEFLECTION TEST @ DESIGN - ASTM E 330-02

The test specimen was subjected to a 50% positive design load of **20.0 psf**. The pressure was held for ten (10) seconds to set for positive testing and released. Indicators were set to zero.

The test specimen was subjected to a positive load of **40.0 psf**, 100% design load, held for ten (10) seconds and released. Indicators were read and all data was recorded.

The blower system, along with the measuring equipment, was then reversed. The test specimen was subjected to a negative 50% design load of **20.0 psf**. The pressure was held for ten (10) seconds to set for negative testing and released. Indicators were set to zero.

The test specimen was subjected to a negative load of **40.0 psf**, 100% design load, held for ten (10) seconds and released. Indicators were read and all data was recorded.

ALLOWABLE

Deflection of framing members in a direction normal to the wall plane is limited to **L/175**.

RESULTS

Specimen passed.

All measured spans complied with specified criteria. See elevation drawing, sheet 1 of 9, for dial indicator locations. See Charts #1 and #2 on page 6 for deflection and permanent set results (reference bold number - **xx/xx** for **deflection**). There was no glass breakage.

SEISMIC RACKING - LATERAL @ DESIGN (elastic) per AAMA 501.4-00

The bottom framing of the mockup was made to move in a parallel direction with the main wall face. The framing was moved laterally one direction **.75" (3/4")**, returned to zero, then racked in the opposite direction **.75" (3/4")** then returned to zero. This was repeated for a total of three (3) two-stroke cycles.

ALLOWABLE

No failures are allowed. Observations will be recorded.

Failure is defined as breakage including full disengagement or separation of parts or assemblies from the window wall system. Specimen shall remain weatherproof.

RESULTS

Specimen passed.

No permanent displacement, deformation, or failure and no glass breakage was noted.

REPEAT STATIC WATER PENETRATION TEST per ASTM E331-00

Same procedure and allowable criteria as previous static water test (10.0 psf).

RESULTS

Specimen passed.

There was no uncontrolled water leakage noted during or after the static water test.

UNIFORM STRUCTURAL PROOF LOAD TEST per ASTM E 330-02

The test specimen was subjected to a positive load of **30.0 psf** (75% design load), held for ten (10) seconds and released. Indicators were set to zero.

The test specimen was subjected to a positive load of **60.0 psf** (150% design load), held for ten (10) seconds and released. Indicators were read and all data was recorded.

The blower system, along with the measuring equipment, was reversed. The test specimen was subjected to a negative load of **30.0 psf** (75% design load). The pressure was held for ten (10) seconds and released. Indicators were then set to zero.

The test specimen was subjected to a negative load of **60.0 psf** (150% design load), held for ten (10) seconds and released. Indicators were read and all data was recorded.

ALLOWABLE

There shall be no failures or permanent deformation in excess of L/500 of clear span.

RESULTS

Specimen passed.

All measured spans complied with specified criteria. See elevation drawings, sheet 1 of 9, for dial indicator locations. See Charts #3 and #4 on page 7 for deflection and permanent set results (reference bold number - xx/xx for **permanent set**). There was no glass breakage.

END OF TESTING

STRUCTURAL READINGS
100% DESIGN LOAD

PR CW-600 & PR CW-700
CCLW REPORT: 11-5484-2

CHART 1 OF 4

TEST PRESSURE = 40.0 PSF POSITIVE

DIAL IND.	MEMBER	D'TL	REF.	POSITION	GROSS READ	NET READ	ALLOW BELOW	SPAN
1	VERT. MULL. - CW700			BOTTOM	03/00	-		-
2	VERT. MULL. - CW700		(1&3)	MID SPAN	32/01	29/01	77	135"
3	VERT. MULL. - CW700			TOP	03/00	-		-
4	VERT. MULL. - CW600			BOTTOM	02/00	-		-
5	VERT. MULL. - CW600		(4&6)	MID SPAN	25/00	22/00	59	104"
6	VERT. MULL. - CW600			TOP	04/01	-		-

CHART 2 OF 4

TEST PRESSURE = 40.0 PSF NEGATIVE

DIAL IND.	MEMBER	D'TL	REF.	POSITION	GROSS READ	NET READ	ALLOW BELOW	SPAN
1	VERT. MULL. - CW700			BOTTOM	06/02	-		-
2	VERT. MULL. - CW700		(1&3)	MID SPAN	42/00	37/-01	77	135"
3	VERT. MULL. - CW700			TOP	04/00	-		-
4	VERT. MULL. - CW600			BOTTOM	04/00	-		-
5	VERT. MULL. - CW600		(4&6)	MID SPAN	27/02	23/01	59	104"
6	VERT. MULL. - CW600			TOP	05/01	-		-

READINGS ARE IN HUNDRETHS OF INCH
 READINGS ARE **DEFLECTION**/PERMANENT SET

DEFL. LIMIT = L/175 or 3/4" MAX.

**STRUCTURAL READINGS
150% PROOF LOAD**

**PR CW-600 & PR CW-700
CCLW REPORT: 11-5484-2**

CHART 3 OF 4

TEST PRESSURE = 60.0 PSF POSITIVE

DIAL IND.	MEMBER	D'TL	REF.	POSITION	GROSS READ	NET READ	ALLOW L/500	SPAN
1	VERT. MULL. - CW700			BOTTOM	08/02	-		
2	VERT. MULL. - CW700		(1&3)	MID SPAN	57/02	50/01	27	135"
3	VERT. MULL. - CW700			TOP	07/00	-		
4	VERT. MULL. - CW600			BOTTOM	06/02	-		
5	VERT. MULL. - CW600		(4&6)	MID SPAN	51/01	43/01	21	104"
6	VERT. MULL. - CW600			TOP	10/01	-		

CHART 4 OF 4

TEST PRESSURE = 60.0 PSF NEGATIVE

DIAL IND.	MEMBER	D'TL	REF.	POSITION	GROSS READ	NET READ	ALLOW BELOW	SPAN
1	VERT. MULL. - CW700			BOTTOM	12/03	-		
2	VERT. MULL. - CW700		(1&3)	MID SPAN	61/03	50/02	27	135"
3	VERT. MULL. - CW700			TOP	09/00	-		
4	VERT. MULL. - CW600			BOTTOM	11/04	-		
5	VERT. MULL. - CW600		(4&6)	MID SPAN	52/04	42/02	21	104"
6	VERT. MULL. - CW600			TOP	10/01	-		

READINGS ARE IN HUNDRETHS OF INCH
READINGS ARE DEFLECTION/PERMANENT SET

PERM. SET LIMIT = L/500.

TESTING COMPLETED

As built mock-up drawings, furnished by PRL Aluminum, Inc., are reviewed and stamped by the laboratory and attached to the report. They should accompany and are a part of this report.

Jack W. Jackson

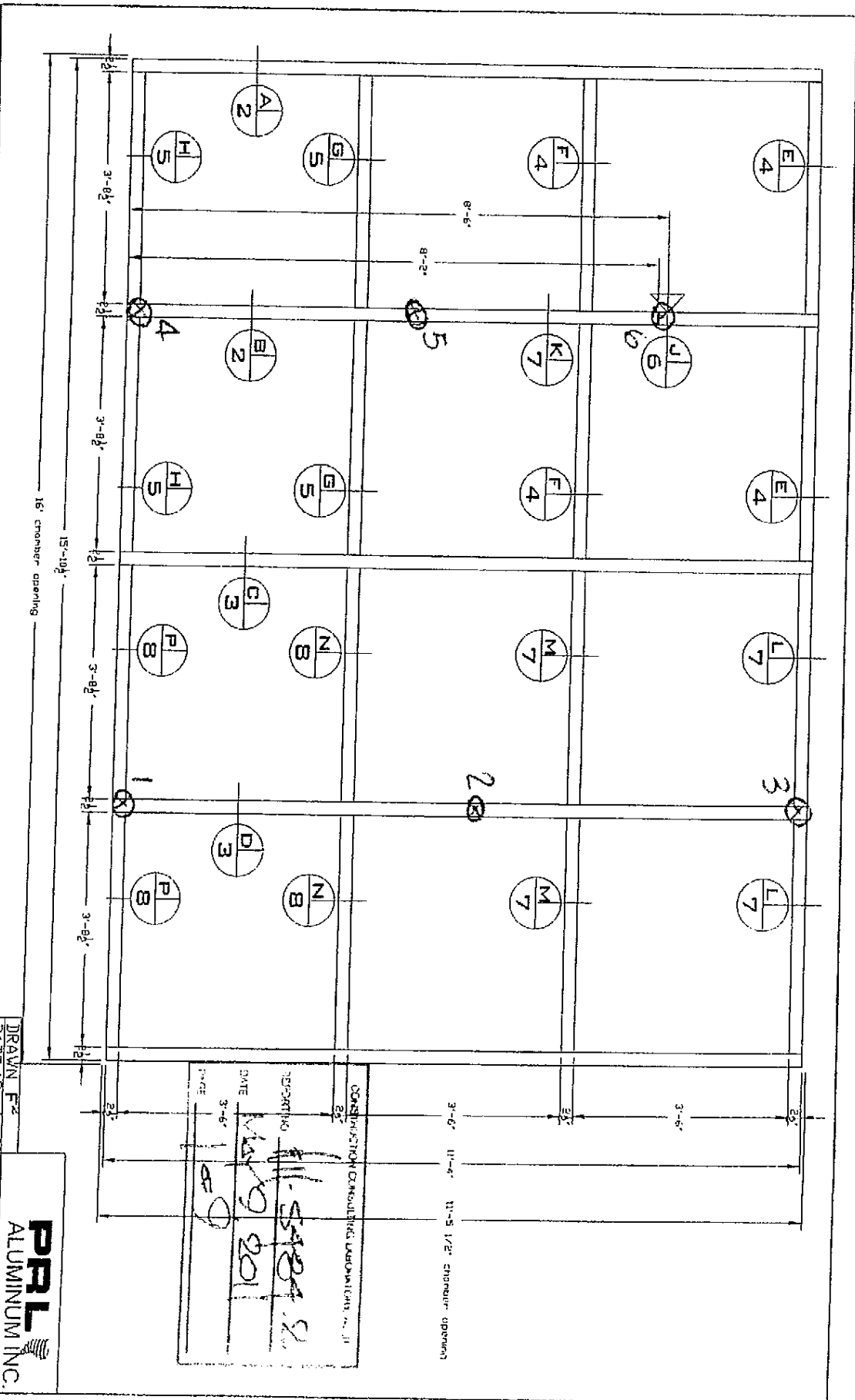
CONSTRUCTION CONSULTING LABORATORY WEST
JACK/W. JACKSON

PRESIDENT/MANAGER OF TESTING

Francis Pickell, Sr.

FRANCIS PICKELL, SR.
PROFESSIONAL ENGINEER

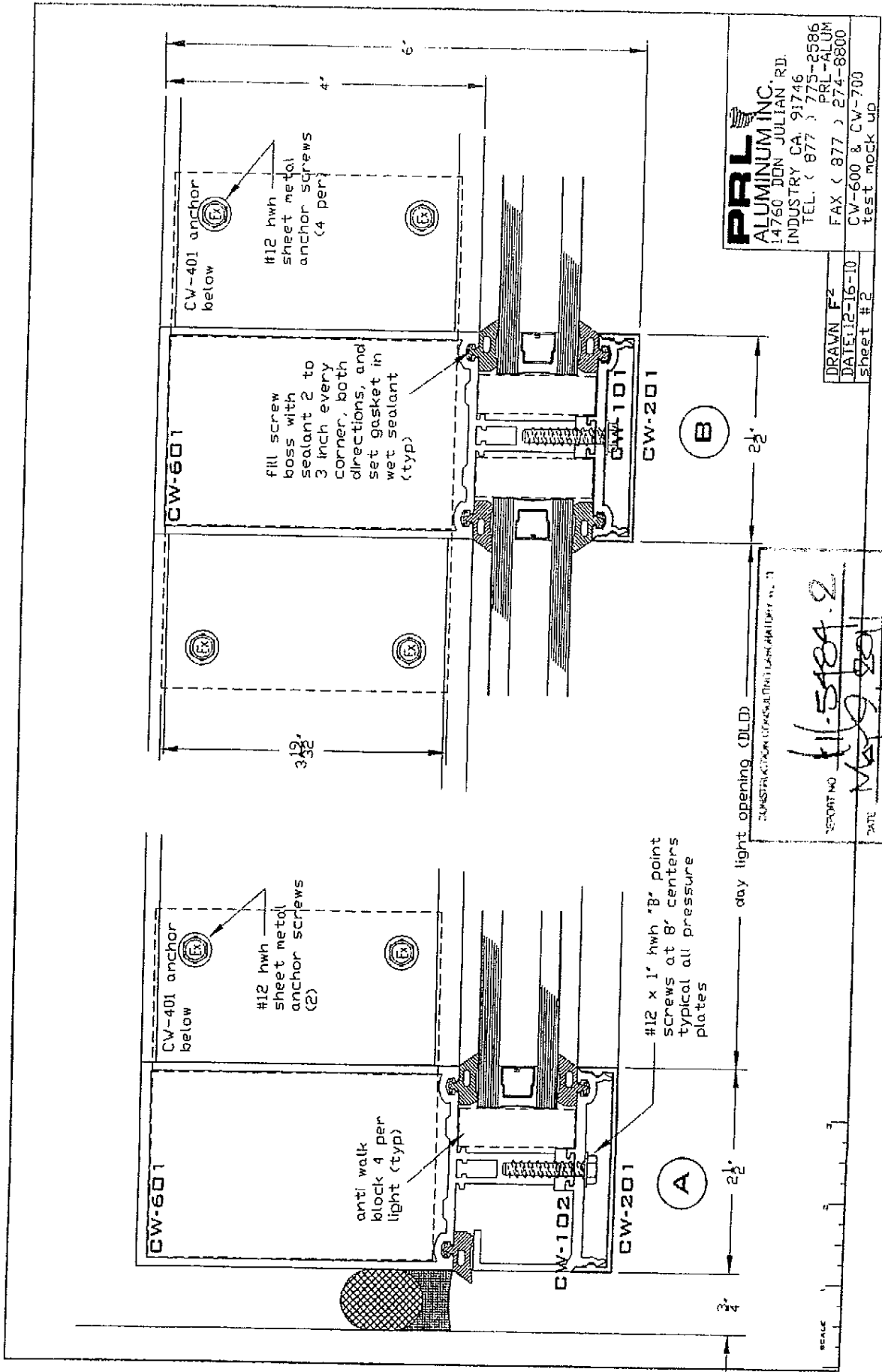




DRAWN Fz
 DATE 12-16-10
 Sheet # 1

PRL
 ALUMINUM INC.
 CV-600 & CV-700
 Test mock up

CONSTRUCTION CONSULTING LABORATORIES, INC.
 25'
 DEPARTMENT
 11-54284 S
 DATE 3-6-11
 11-54284 S
 11-5 1/2" member opening



PRL
 ALUMINUM INC.
 14760 DON JULIAN RD.
 INDUSTRY CA 91746
 TEL: (877) 775-2586
 PRL-ALUM
 FAX (877) 274-8800
 CW-600 & CW-700
 test mock up

DRAWN FZ
 DATE: 12-16-10
 sheet # 2

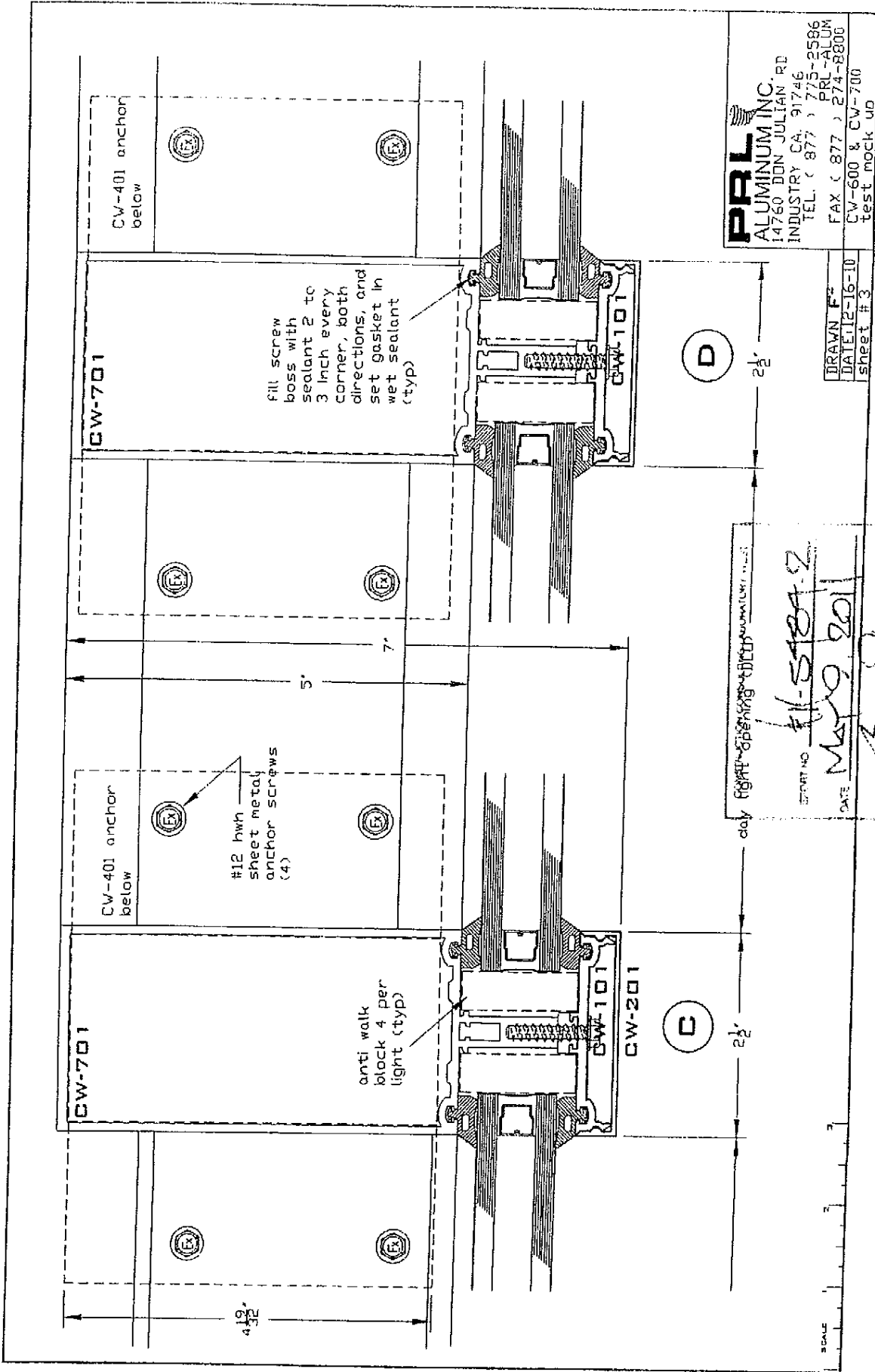
CONSTRUCTION CONSULTING GROUP, INC.

REPORT NO. 11-5184.2

DATE May 9, 2011

NO. 2 of 2

SCALE



PRL
 ALUMINUM INC.
 14760 DON JULIAN RD
 INDUSTRY CA 91746
 TEL (877) 775-2596
 FAX (877) 274-8800
 PRL-ALUM
 CW-600 & CW-700
 test mock up

DRAWN F
 DATE 12-16-10
 sheet # 3

day right opening - top number 11587-2
 START NO 11-5187-2
 DATE May 9, 2011
 NAME BOE

fill screw
 boss with
 sealant 2 to
 3 inch every
 corner, both
 directions, and
 set gasket in
 wet sealant
 (typ)

#12 hwh
 sheet metal
 anchor screws
 (4)

anti walk
 block 4 per
 light (typ)

SCALE
 1" = 1/4"

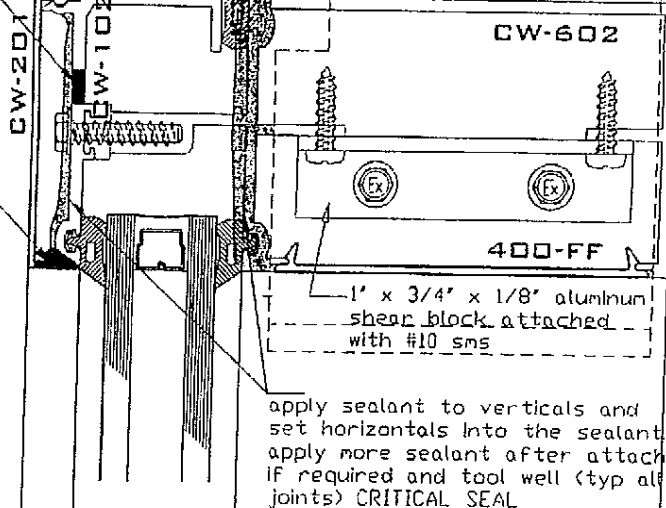
2 1/2 x 2 3/4 x .004 closer plate at top of mullions. set on bed of sealant and secure with #10 x 1/2 sms

#12 hwh sheet metal anchor screws

CW-401 anchor

5/16 DIA WEEP HOLES, 2 PER 9' FROM END

E



WEEP HOLES ACHIEVED BY CUTTING OFF LEG AT ENDS OF EXTRUSION AT 45° (APPROX 7/16)

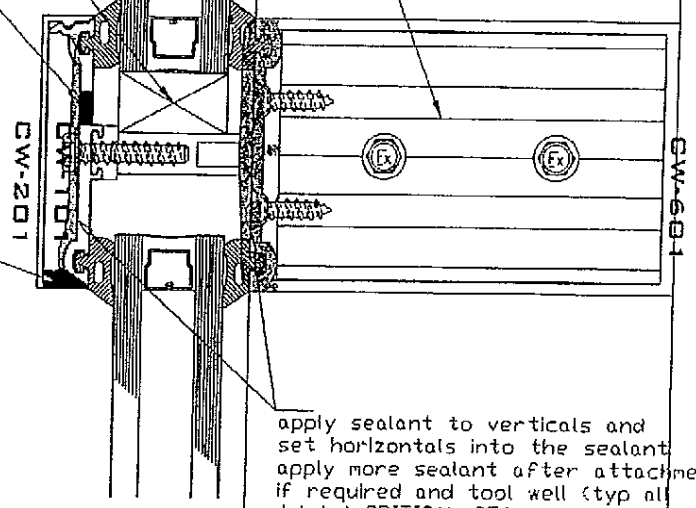
apply sealant to verticals and set horizontals into the sealant apply more sealant after attachment if required and tool well (typ all joints) CRITICAL SEAL

4' long x 80 duro setting blocks. 2 per light @ 1/4 points

CW-301 shear block attached to mullion with (2) #10 x 3/4' hwh sms. horizontal fastens with (2) #10 x 3/4' FH sms

5/16 DIA WEEP HOLES, 2 PER 9' FROM END

F



1/4' x 1/2' long weep holes. 2 per 3' from end.

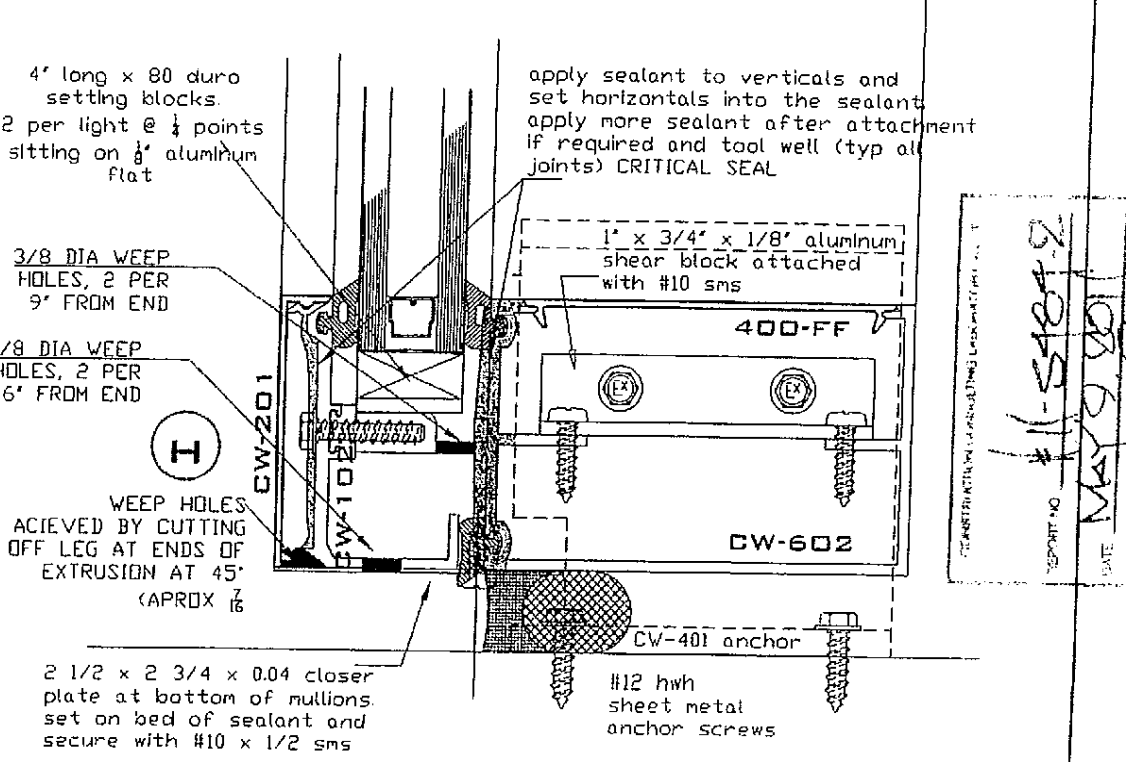
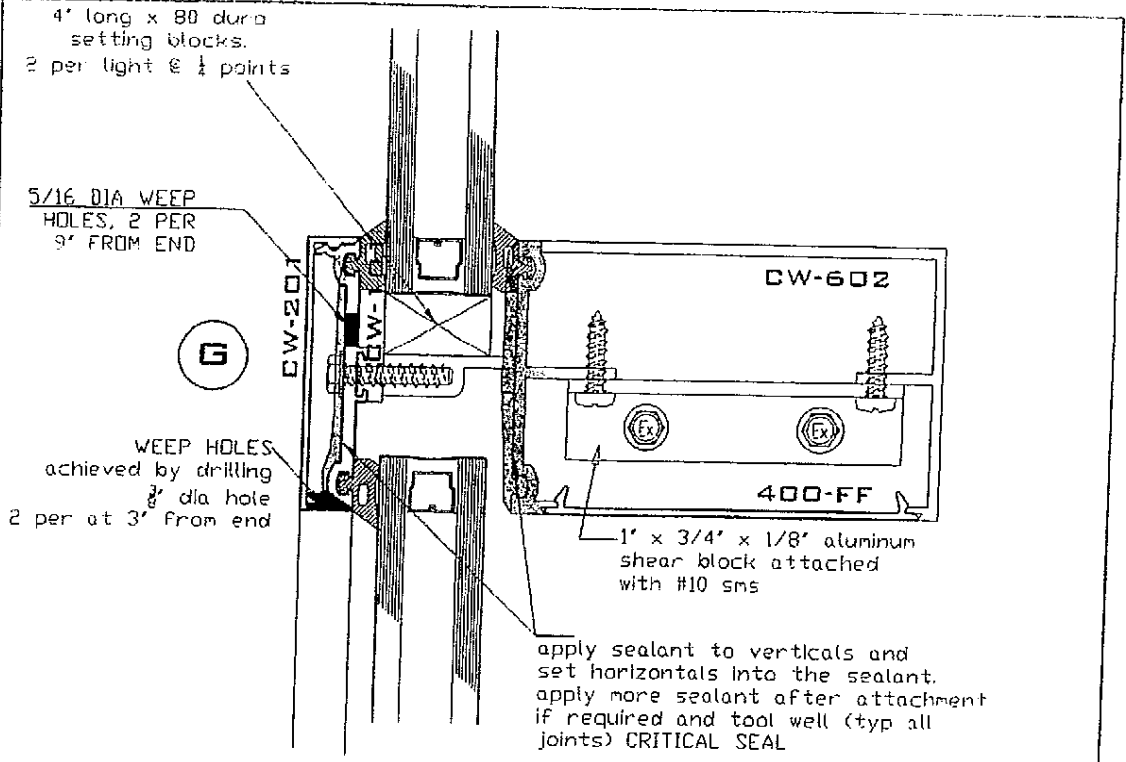
apply sealant to verticals and set horizontals into the sealant apply more sealant after attachment if required and tool well (typ all joints) CRITICAL SEAL

REPORT NO. #11-5809-2
DATE May 9, 89
PAGE 4 of 9

PRL
ALUMINUM INC.
14760 DON JULIAN RD.
INDUSTRY CA. 91746
TEL. (877) 775-2586
PRL-ALUM
FAX (877) 274-8800
CW-600 & CW-700
test mock up

DRAWN F2
DATE: 12-16-10
sheet # 4

SCALE 1 2 3



CONSTRUCTION MANUFACTURING LOCK MATTERS, INC.

REPORT NO. #11-51809-2

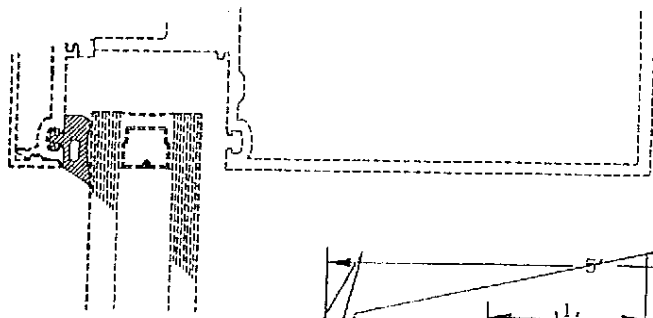
DATE MAY 9 2011

DRAWN BY S DE

PRL
ALUMINUM INC.
 14760 DON JULIAN RD.
 INDUSTRY CA. 91746
 TEL. (877) 775-2586
 PRL-ALUM
 FAX (877) 274-8900
 CW-600 & CW-700
 test mock up

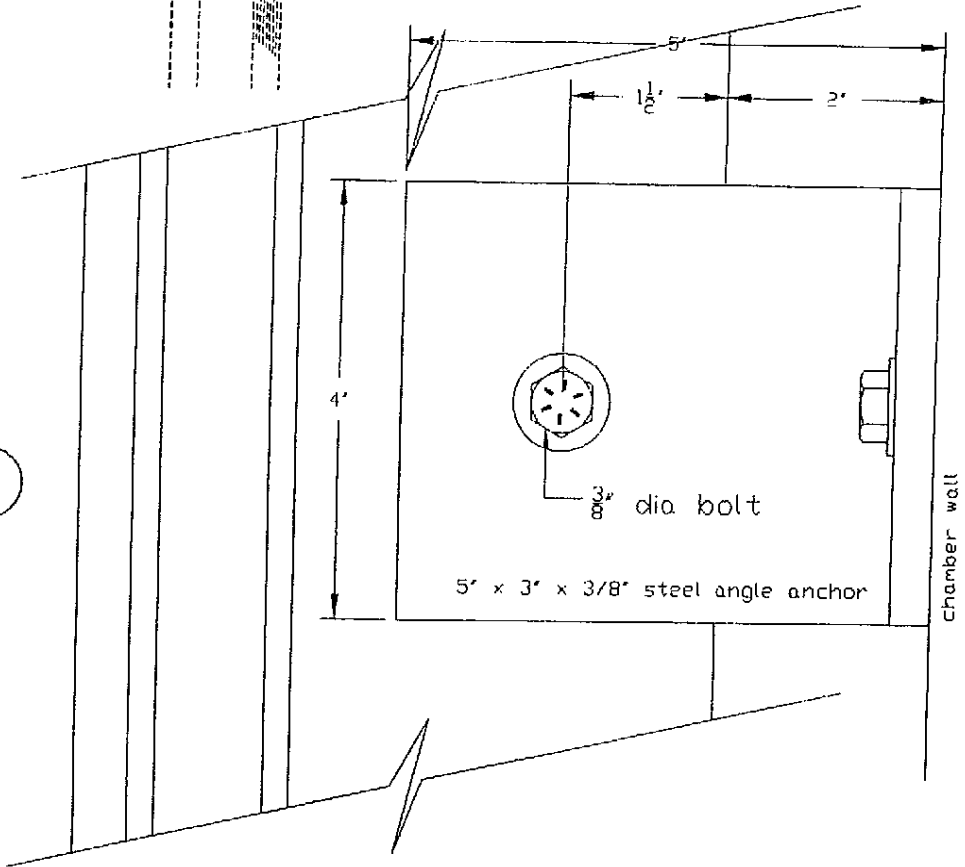
DRAWN F²
 DATE: 12-16-10
 sheet # 5

SCALE 1" = 3'



11-51801-02
 DATE 11/19/01
 6080

J

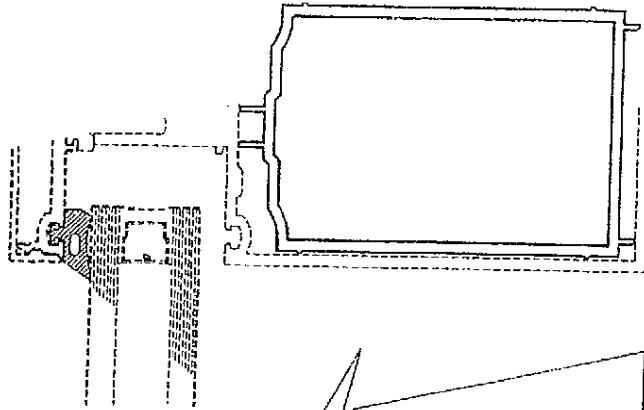


ANCHOR DETAIL

SCALE 1 2 3

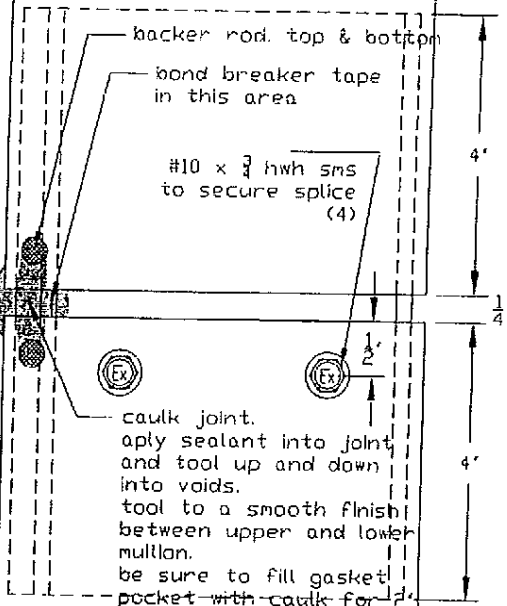
DRAWN F2
 DATE 12-16-10
 sheet # 6

PRL
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 14760 DON JULIAN RD.
 INDUSTRY CA, 91746
 TEL. (877) 775-2586
 PRL-ALUM
 FAX (877) 274-8800
 CW-600 & CW-700
 test mock up



11-5184-9
 May 9, 2011
 78

K



caulk joint.
 apply sealant into joint
 and tool up and down
 into voids.
 tool to a smooth finish
 between upper and lower
 mullion.
 be sure to fill gasket
 pocket with caulk for
 above and below. set
 gasket in wet sealant
 and tool well.
CRITICAL SEAL

MULLION SPLICE DETAIL

SCALE 1 2 3

DRAWN F²
 DATE: 12-16-10
 sheet # 7

PRL
 ALUMINUM INC.
 14760 DON JULIAN RD.
 INDUSTRY CA. 91746
 TEL (877) 775-2586
 PRL-ALUM
 FAX (877) 274-8800
 CW-600 & CW-700
 test mock up

2 1/2 x 2 3/4 x 0.04 closer plate at top of mullons. set on bed of sealant and secure with #10 x 1/2 sms

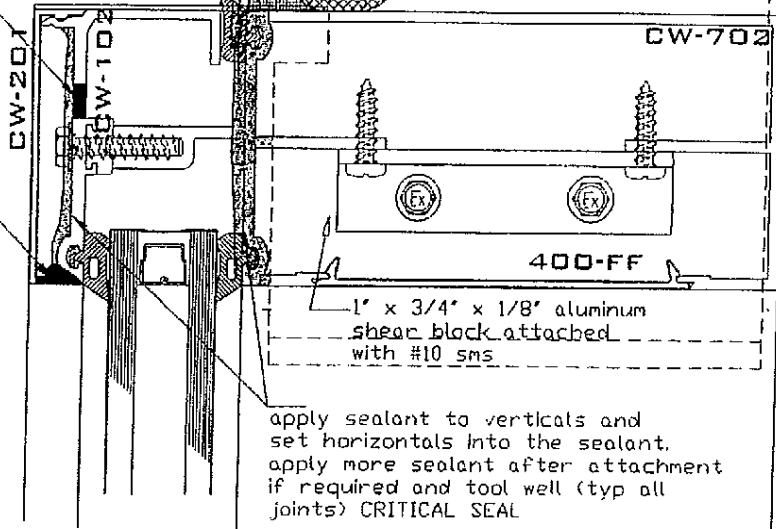
#12 hwh sheet metal anchor screws

5/16 DIA WEEP HOLES, 2 PER 9" FROM END

CW-401 anchor

CW-702

(L)



WEEP HOLES ACIEVED BY CUTTING OFF LEG AT ENDS OF EXTRUSION AT 45° (APRDX 2/16)

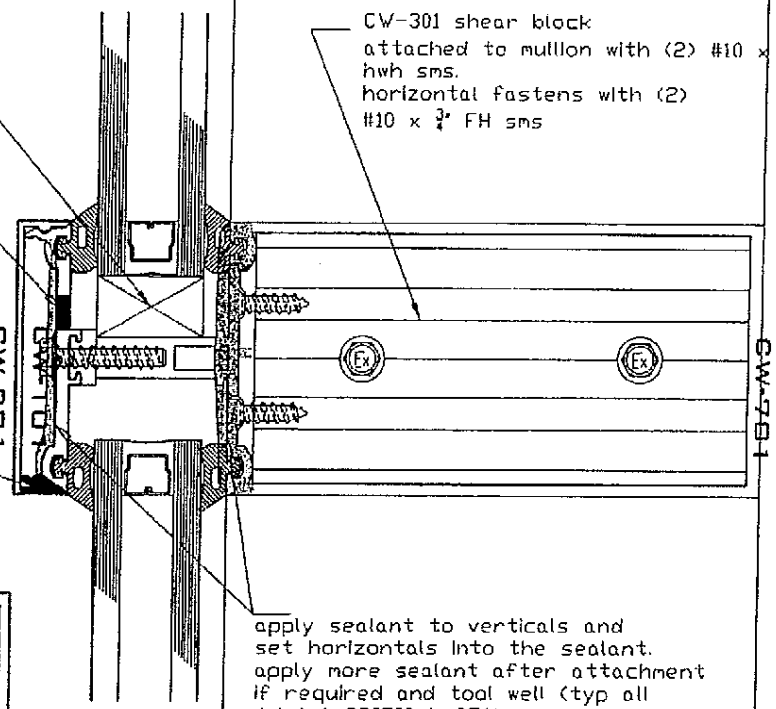
apply sealant to verticals and set horizontals into the sealant. apply more sealant after attachment if required and tool well (typ all joints) CRITICAL SEAL

4' long x 80 duro setting blocks. 2 per light @ 1/2 points

CW-301 shear block attached to mullion with (2) #10 x 3/4 hwh sms. horizontal fastens with (2) #10 x 3/4 FH sms

5/16 DIA WEEP HOLES, 2 PER 9" FROM END

(M)



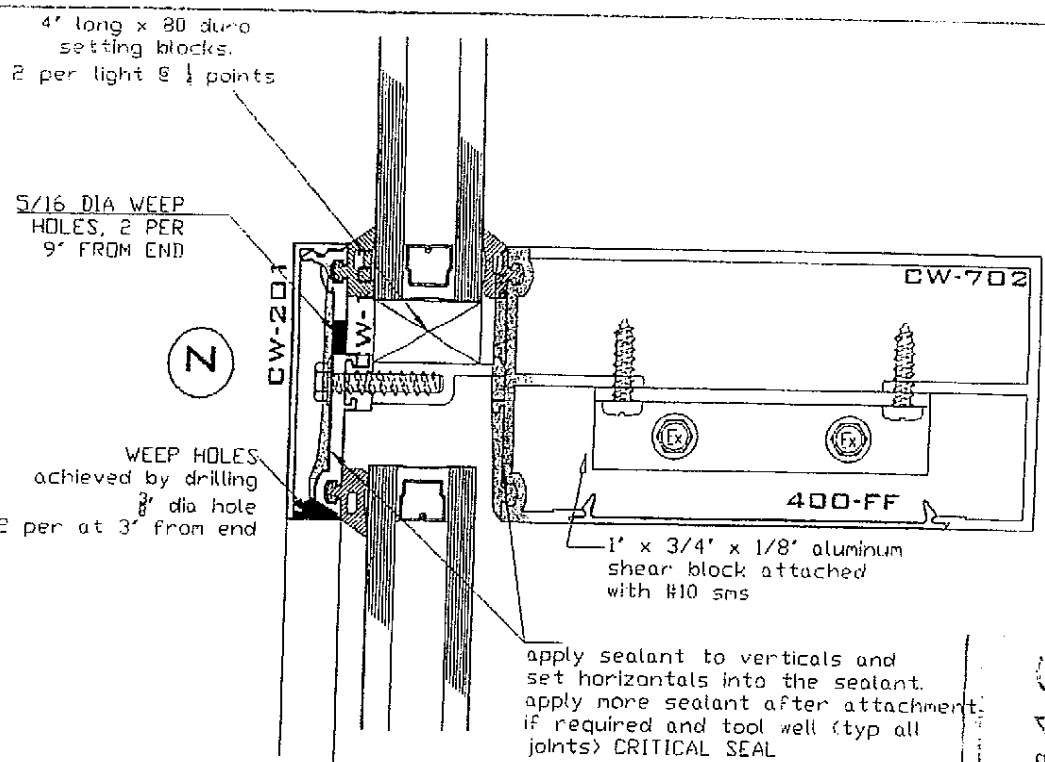
1/4' x 1/2' long weep holes. 2 per 3' from end.

apply sealant to verticals and set horizontals into the sealant. apply more sealant after attachment if required and tool well (typ all joints) CRITICAL SEAL

REVISIONS
 11-15-10
 DATE
 11-15-10
 11-15-10
 11-15-10

PRL
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 PRL-ALUM
 FAX (877) 274-8800
 CW-600 & CW-700
 Rest mock up

DRAWN F2
 DATE 12-15-10
 sheet #8



4' long x 80 duro
setting blocks.
2 per light @ 1/4 points

5/16 DIA WEEP
HOLES, 2 PER
9' FROM END

Z

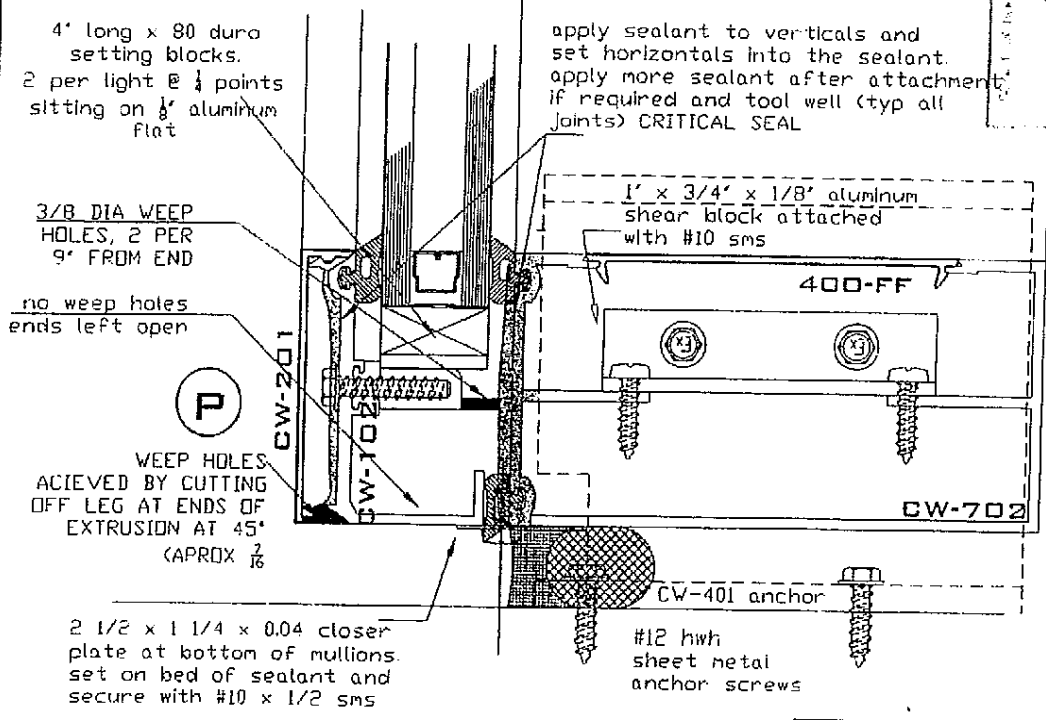
WEEP HOLES
achieved by drilling
3/8" dia hole
2 per at 3" from end

CW-702

400-FF

1' x 3/4' x 1/8" aluminum
shear block attached
with #10 sms

apply sealant to verticals and
set horizontals into the sealant.
apply more sealant after attachment
if required and tool well (typ all
joints) CRITICAL SEAL



4' long x 80 duro
setting blocks.
2 per light @ 1/4 points
sitting on 1/8" aluminum
flat

3/8 DIA WEEP
HOLES, 2 PER
9' FROM END

no weep holes
ends left open

P

WEEP HOLES
ACIEVED BY CUTTING
OFF LEG AT ENDS OF
EXTRUSION AT 45°
(APROX 2/16)

apply sealant to verticals and
set horizontals into the sealant.
apply more sealant after attachment
if required and tool well (typ all
joints) CRITICAL SEAL

1' x 3/4' x 1/8" aluminum
shear block attached
with #10 sms

400-FF

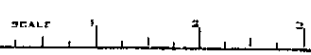
CW-702

CW-401 anchor

#12 hwh
sheet metal
anchor screws

2 1/2 x 1 1/4 x 0.04 closer
plate at bottom of mullions.
set on bed of sealant and
secure with #10 x 1/2 sms

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DATE May 9 2011
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CW-600 & CW-700
test mock up

DRAWN FZ
DATE: 12-16-10
sheet # 9