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**Summary
NFRC U-Factor Simulation Report**

Architectural Testing, Inc., 130 Derry Court, York PA 17402 - Fascimile 717-764-4129 Telephone 717-764-7700

Manufacturer: All Seasons Window, Inc. Street: 28 Edgeboro Road City, State, Zip: East Brunswick, New Jersey 08816	Product Information Series/Model: V 400 Product Type: Casement Window Frame Type: Vinyl Sash Type: Vinyl	Report #: 01-31854.23 Report Date: 01/21/99
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PRODUCT #	U-FACTOR			LAYER #1		GAP #1			LAYER #2		GAP #2			LAYER #3		GRID CAP #	GROUPINGS – G,F,S	NOTES	COMMENTS
	RESIDENTIAL	NON-RESIDENTIAL	NOMINAL OVERALL	THICKNESS	COATING	THICKNESS	SPACER TYPE	GAS FILL	THICKNESS	COATING	THICKNESS	SPACER TYPE	GAS FILL	THICKNESS	COATING				
C1	0.30	0.29	0.875	0.089		0.688	S4	ARG	0.089	0.043						G	1,2,3		
				0.129		0.625	S4	ARG	0.129	0.043						G			
C2	0.37	0.37	0.875	0.086		0.688	A1	ARG	0.086	0.324						G	1,2,3,4		
				0.129		0.625	A1	ARG	0.129	0.324						G			

For certification, any product with a U-Factor of 0.39 or better may be tested. The tested product will become baseline for future considerations. If size tested is more than ½” larger or smaller than standard sizes, consult simulator. The following products can be grouped for testing: 8100 casement, 8100 casement picture, 8110 awning, 9100 casement, 9100 casement picture, the 9110 awning window, the 9600 casement window and the 9600 awning window. One test will validate all product lines.

Notes: 1. Center-of-glass group leader

2. Simulation completed with Low e on surface #3.
3. Simulation completed with 90% argon.
4. This option was simulated with Allmetal Trimline aluminum spacer.

Summary (Page 2)
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A2	0.37	0.37	0.875	0.086		0.688	A1	ARG	0.086	0.324							G	1,2,3,4		
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- Notes:
1. Center-of-glass group leader
 2. Simulation completed with Low e on surface #3.

2. Simulation completed with 90% argon.
3. This option was simulated with Allmetal Trimline aluminum spacer.

**THERMAL PERFORMANCE
COMPUTER SIMULATION REPORT**

Rendered to:

ALL SEASONS WINDOW, INC.
28 Edgeboro Road
East Brunswick, New Jersey 08816

Report No: 01-31854.23
Simulation Date: 06/12/98
Report Date: 01/21/99
Expiration Date: 0 6/12/02

Project Summary: Architectural Testing, Inc., (ATI) was contracted by Chelsea Building Products to perform window U-factor computer simulations in accordance with the National Fenestration Rating Council (NFRC) 100-97, *Procedure for Determining Fenestration Product U-Factors*, using the currently approved Window 4.1 (NFRC Spectral Data Library #5) and Frame 4.0 modeling programs. The components were analyzed at the York, Pennsylvania, office using a IBM compatible 486/40M computer.

Simulation Specimen Description:

Series/Model: V 400

Type: Casement Window/ Fixed Window / Awning Window

Frame Material: Vinyl

Residential Size: 24" wide by 48" high / 48" wide by 48" high / 48" wide by 24" high

Non-Residential Size: 30" wide by 60"high / 48" wide by 72" high / 40" wide by 40" high

Reinforcement: Reinforcement in options noted

Technical Interpretations: None

Modeling Assumptions:

1. No continuous hardware was modeled.
2. No unusual boundary conditions were used in the modeling.
3. Double glazed options simulated with Low e may be manufactured with Low e on surface 2 or 3 without changing the product U-factor.
4. The 8100 casement window, 8100 casement picture window, 8110 awning window, 9100 casement window, 9100 casement picture window, 9110 awning window, 9600 casement window, and 9600 awning window can be combined for testing.

Option #C1: 8100 Casement Window

Gas Fill: 90% Argon

Filling Technique: Single Probe Timed

Option Description:

	Layer #1	Gap #1	Layer #2	Gap #2	Layer #3
Thickness	* 0.089" 0.129"	0.688" 0.625"	0.089" 0.129"		
Low e Coating	No		E= 0.043		
Coating Surface #			3		
Spacer		Tin Plate Intercept			

**Center-of-Glass Group Leader*

Glass Surface Temperatures: $T_1 = 3.6^\circ\text{F}$ $T_2 = 3.9^\circ\text{F}$ $T_3 = 56.1^\circ\text{F}$ $T_4 = 56.4^\circ\text{F}$

Desiccant: Yes

Muntins: May have internal grid

Primary Sealant: Butyl

Muntin Pattern:

Secondary Sealant:

Modeling Results:

Data File	Cross Section	Frame Height	U-Edge	U-Frame
1854SIR5	Head / Jambs / Sill	3.16	0.35	0.31

Area Weighting Results:

	Model Size AA		Model Size BB	
	Area (Ft²)	U-Value (Btu/hr*ft²*F)	Area (Ft²)	U-Value (Btu/hr*ft²*F)
Center-Glass	3.23	0.26	6.32	0.26
Edge-Glass	1.89	0.35	2.51	0.35
Frame	2.88	0.31	3.67	0.31
TOTAL WINDOW	8.00	0.30	12.50	0.29

Option #C2: 8100 Casement Window

Gas Fill: 90% Argon

Filling Technique: Single Probe Timed

Option Description:

	Layer #1	Gap #1	Layer #2	Gap #2	Layer #3
Thickness	* 0.089" 0.129"	0.688" 0.625"	0.089" 0.129"		
Low e Coating	No		E= 0.324		
Coating Surface #			3		
Spacer		Allmetal Trimline Aluminum			

**Center-of-Glass Group Leader*

Glass Surface Temperatures: $T_1 = 4.9^\circ\text{F}$ $T_2 = 5.3^\circ\text{F}$ $T_3 = 51.9^\circ\text{F}$ $T_4 = 52.3^\circ\text{F}$

Desiccant: Yes

Muntins: May have internal grid

Primary Sealant: Butyl

Muntin Pattern:

Secondary Sealant:

Modeling Results:

Data File	Cross Section	Frame Height	U-Edge	U-Frame
1854SI42	Head / Jambs / Sill	3.16	0.45	0.32

Area Weighting Results:

	Model Size AA		Model Size BB	
	Area (Ft²)	U-Value (Btu/hr*ft²*F)	Area (Ft²)	U-Value (Btu/hr*ft²*F)
Center-Glass	3.23	0.36	6.32	0.36
Edge-Glass	1.89	0.45	2.51	0.45
Frame	2.88	0.32	3.67	0.32
TOTAL WINDOW	8.00	0.37	12.50	0.37

Option #A1: 8100 Awning Window

Gas Fill: 90% Argon

Filling Technique: Single Probe Timed

Option Description:

	Layer #1	Gap #1	Layer #2	Gap #2	Layer #3
Thickness	* 0.089" 0.129"	0.688" 0.625"	0.089" 0.129"		
Low e Coating	No		E= 0.043		
Coating Surface #			3		
Spacer		Tin Plate Intercept			

*Center-of-Glass Group Leader

Glass Surface Temperatures: $T_1 = 3.6^\circ\text{F}$ $T_2 = 3.9^\circ\text{F}$ $T_3 = 56.1^\circ\text{F}$ $T_4 = 56.4^\circ\text{F}$

Desiccant: Yes

Muntins: May have internal grid

Primary Sealant: Butyl

Muntin Pattern:

Secondary Sealant:

Modeling Results:

Data File	Cross Section	Frame Height	U-Edge	U-Frame
1854SIR5	Head / Jambs / Sill	3.16	0.35	0.31

Area Weighting Results:

	Model Size AA		Model Size BB	
	Area (Ft ²)	U-Value (Btu/hr*ft ² *F)	Area (Ft ²)	U-Value (Btu/hr*ft ² *F)
Center-Glass	3.23	0.26	5.72	0.26
Edge-Glass	1.89	0.35	2.17	0.35
Frame	2.88	0.31	3.23	0.31
TOTAL WINDOW	8.00	0.30	11.11	0.29

Option #A2: 8100 Awning Window

Gas Fill: 90% Argon

Filling Technique: Single Probe Timed

Option Description:

	Layer #1	Gap #1	Layer #2	Gap #2	Layer #3
Thickness	* 0.089" 0.129"	0.688" 0.625"	0.089" 0.129"		
Low e Coating	No		E= 0.043		
Coating Surface #			3		
Spacer		Allmetal Trimline Aluminum			

**Center-of-Glass Group Leader*

Glass Surface Temperatures: $T_1 = 4.9^\circ\text{F}$ $T_2 = 5.3^\circ\text{F}$ $T_3 = 51.9^\circ\text{F}$ $T_4 = 52.3^\circ\text{F}$

Desiccant: Yes

Muntins: May have internal grid

Primary Sealant: Butyl

Muntin Pattern:

Secondary Sealant:

Modeling Results:

Data File	Cross Section	Frame Height	U-Edge	U-Frame
1854SI42	Head / Jambs / Sill	3.16	0.45	0.32

Area Weighting Results:

	Model Size AA		Model Size BB	
	Area (Ft²)	U-Value (Btu/hr*ft²*F)	Area (Ft²)	U-Value (Btu/hr*ft²*F)
Center-Glass	3.23	0.36	5.72	0.36
Edge-Glass	1.89	0.45	2.17	0.45
Frame	2.88	0.32	3.23	0.32
TOTAL WINDOW	8.00	0.37	11.11	0.37

This report is reissued in the name of All Seasons Window, Inc. through written authorization of Chelsea Building Products to whom the original report was rendered. The original Chelsea Building Products report number is 01-31854.21.

Detailed drawings, simulation data disks, and a copy of this report will be retained by ATI for a period of four years. The above results are the exclusive property of the client so named herein and are applicable to the sample simulated. ATI is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures/specifications. The NFRC procedure requires that the computational results be verified through actual test results. This report does not constitute an opinion or endorsement by this laboratory. This report may not be reproduced except in full without the approval of ATI.

For ARCHITECTURAL TESTING, INC.:

Description Table Abbreviations

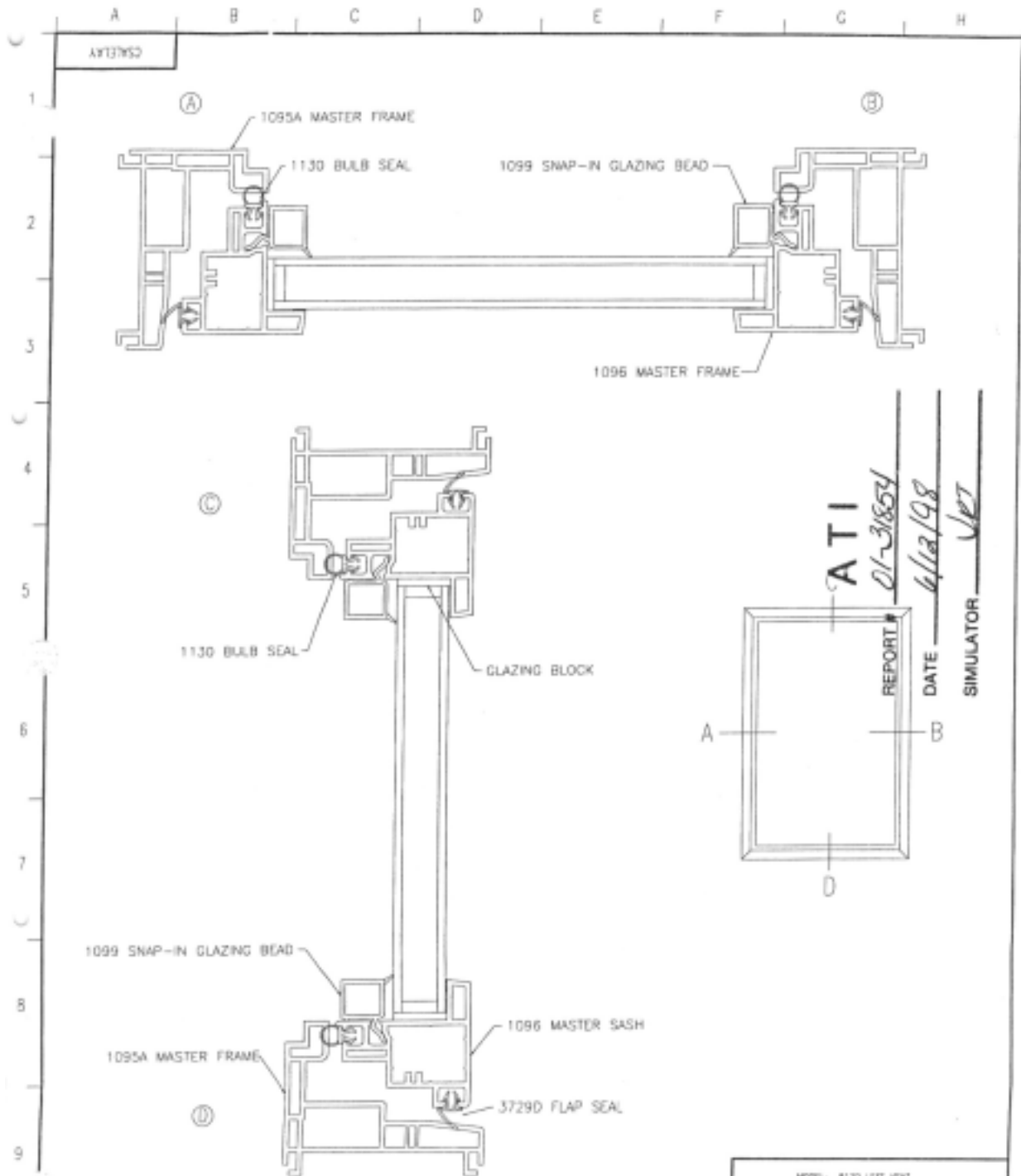
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A1	Aluminum w/ vinyl inserts	Vinyl inserts employed in aluminum frame sash members
AL	Aluminum	No thermally broken frame / sash components
AP	Aluminum w/ thermal breaks - partial	Some frame / panel members thermally broken
AT	Aluminum w/ thermal breaks - all members	All members contain thermal breaks
AV	Aluminum vinyl composite	Aluminum members combined with vinyl members
AW	Aluminum clad wood	Aluminum cladding covering primary wood members
FG	Fiberglass	Fiber reinforced frame / panel members
OT	Other	Material not described in this lookup table
ST	Steel	Steel alloy members
VA	Vinyl w/ reinforcing - all members	Some frame / panel members contain reinforcement
VC	Vinyl clad aluminum	Vinyl cladding covering primary aluminum members
VH	Vinyl w/ reinforcing - horizontal members only	Only horizontal panel members contain reinforcing
VI	Vinyl w/ reinforcing - interlock only	Only panel interlock members contain reinforcing
VP	Vinyl w/ reinforcing - partial	Only specific members contain reinforcing
VV	Vinyl w/ reinforcing - vertical members only	Only vertical panel members contain reinforcing
VW	Vinyl clad wood	Vinyl cladding covering primary wood members
VY	Vinyl	Vinyl members with no reinforcing
WA	Aluminum / wood composite	Aluminum members combined with wood members
WD	Wood	All members are solid wood
WV	Vinyl / wood composite	Vinyl members combined with wood members

CODE	INTERSPACE GAS FILL
AIR	Air
AR2	Argon / Krypton mixture
AR3	Argon / Krypton / Air mixture
ARG	Argon
CO2	Carbon Dioxide
KRY	Krypton
OT	Other
ST6	Sulphur Hexafluoride
	Unknown

CODE	THERMAL BREAK MATERIAL
F	Foam
O	Other
U	Urethane
V	Vinyl

CODE	SPACER TYPE	DEFINITION
A1	Aluminum	Aluminum spacer system
A2	Aluminum - thermally broken	Aluminum spacer with urethane thermal break
A3	Aluminum - reinforced polymer	Polymer spacer with aluminum substance
A4	Aluminum / wood	Aluminum / wood composite
A5	Aluminum reinforced butyl	Butyl spacer with aluminum substrate
A6	Aluminum / foam / aluminum	Two aluminum spacers separated by foam
A7	Aluminum U-shaped	U shaped aluminum spacer embedded in sealant
FG	Fiberglass	Fiberglass spacer
GL	Glass	Glass spacer system
PU	Polyurethane foam	Polyurethane foam
S1	Steel	Stainless steel spacer system
S2	Steel - thermally broken	Stainless steel spacer with urethane thermal break
S3	Steel / foam / steel	Two steel spacers separated by foam
S4	Steel U shaped	U shaped stainless steel spacer system
S5	Steel reinforced butyl	Butyl spacer with steel substrate

V1	Vinyl U shaped	U shaped spacer system embedded in sealant
WD	Wood	Wood
ZF	Silicone foam	Silicone foam

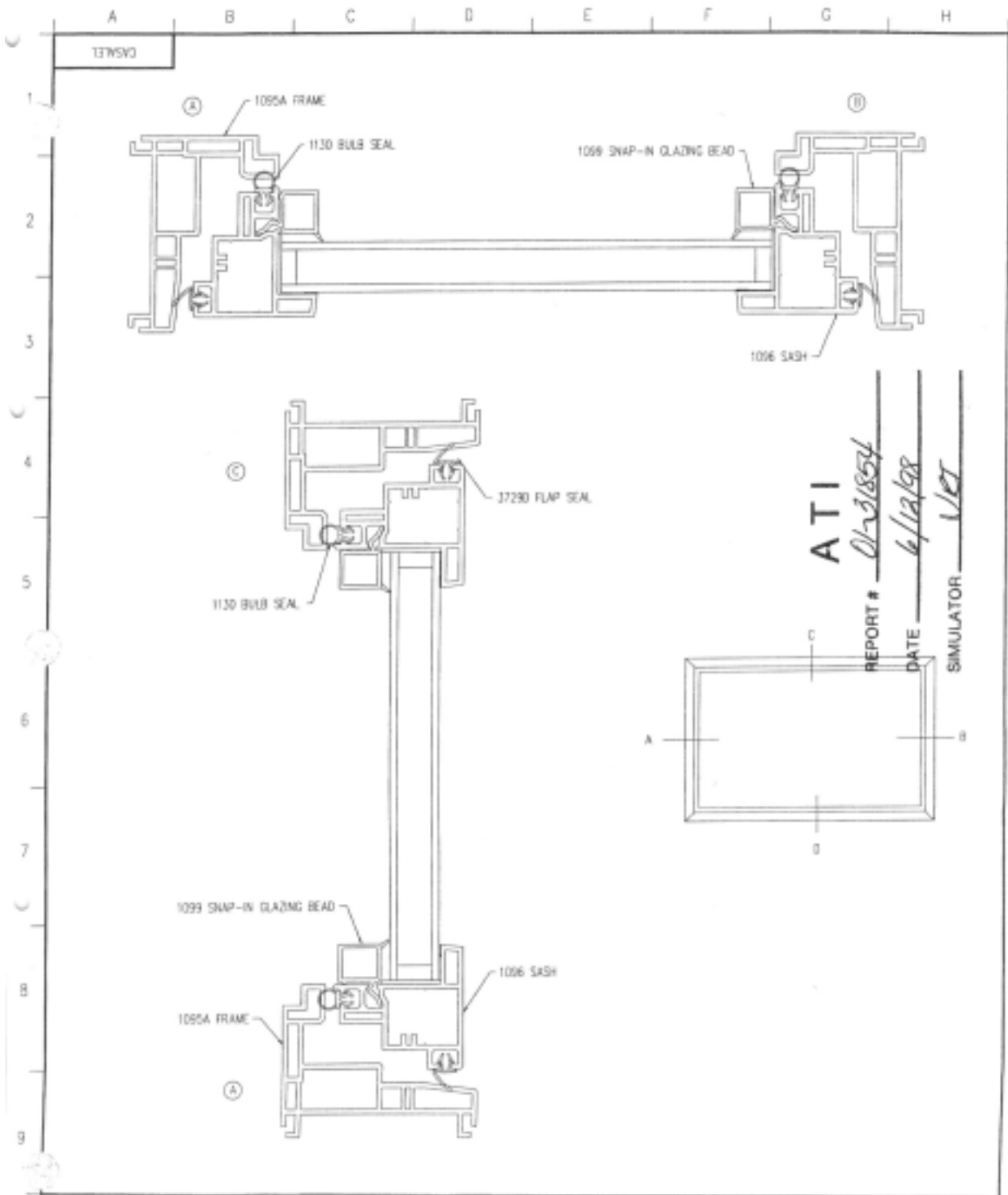


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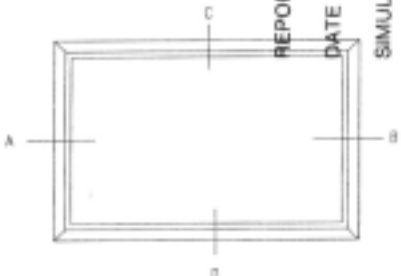
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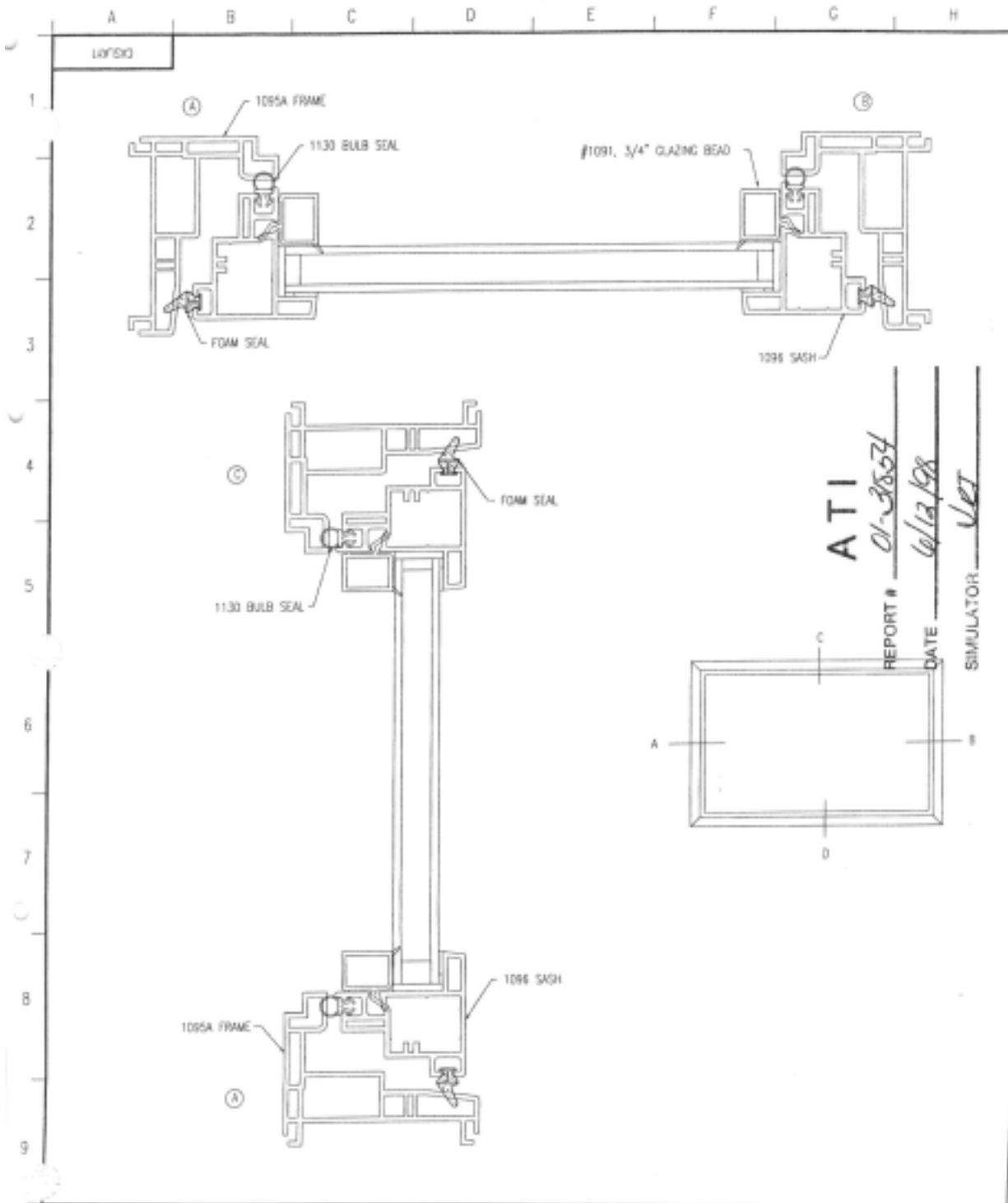
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COORDINATE BY:	DATE:
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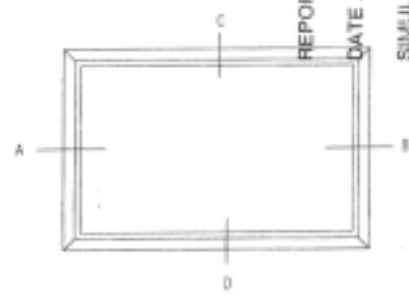
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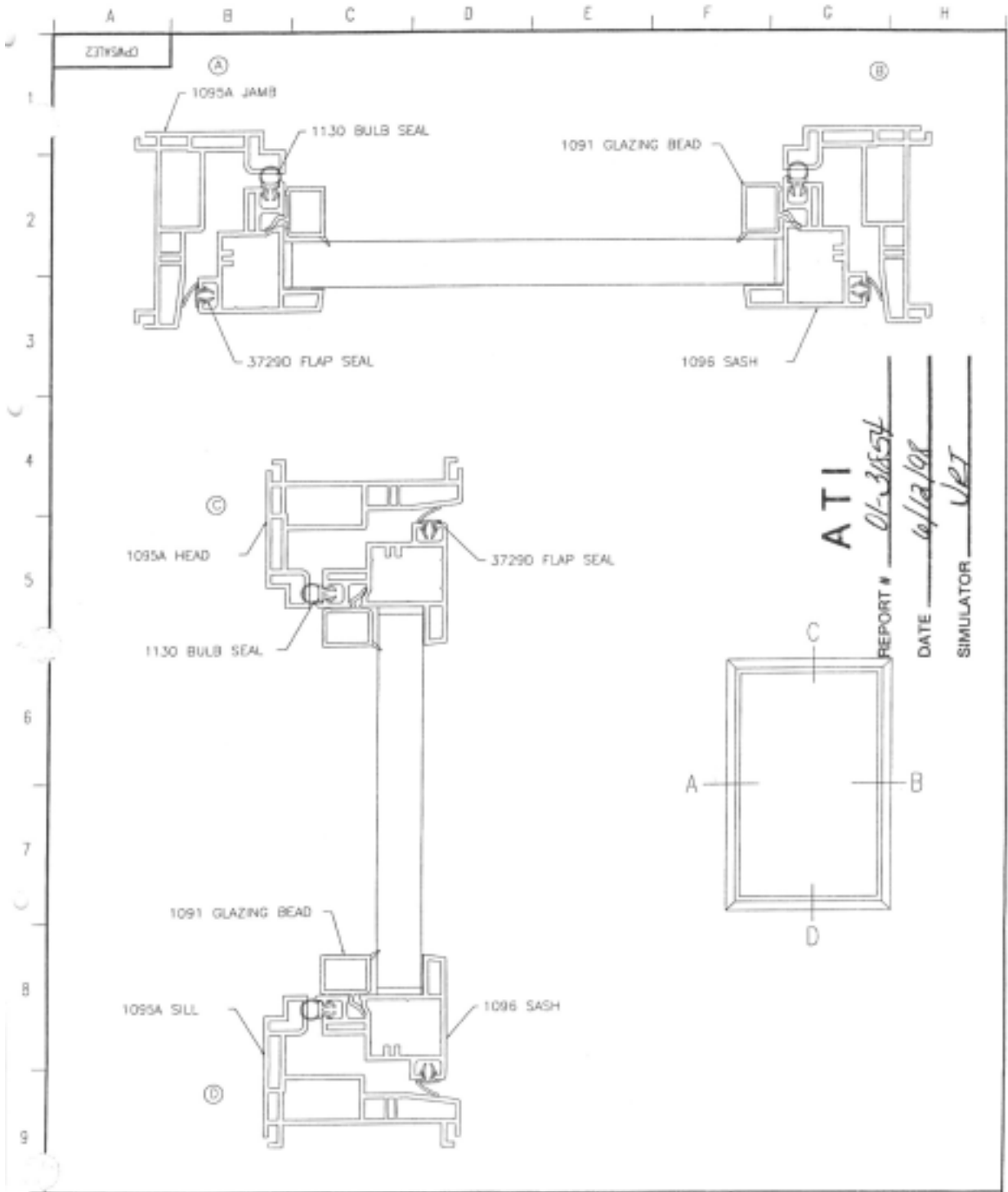
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						CHECKED BY: 		APPROVED BY: 		DRAWING No. CASLAP1	



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