

**NFRC U-FACTOR, SHGC, VT, &  
CONDENSATION RESISTANCE  
COMPUTER SIMULATION REPORT**

**Rendered to:  
WINDOW FILM DEPOT**

**SERIES/MODEL:  
Defense Lite Simulation Analysis - Storefront**

**Report Number: I8786.01-116-45  
Report Date: 09/18/18**



## NFRC U-FACTOR, SHGC, VT, & CONDENSATION RESISTANCE COMPUTER SIMULATION REPORT

Rendered to:  
WINDOW FILM DEPOT  
4939 Lower Roswell Road  
Marietta, Georgia 30068

Report Number: I8786.01-116-45  
Simulation Date: 09/18/18  
Report Date: 09/18/18

### Project Summary:

Architectural Testing, Inc., an Intertek Company (Intertek-ATI) was contracted to perform U-Factor, Solar Heat Gain Coefficient, Visible Transmittance, and Condensation Resistance\* computer simulations in accordance with the National Fenestration Rating Council (NFRC). The products were evaluated in full compliance with NFRC requirements to the standards listed

*\*NFRC's Condensation Resistance rating is NOT equivalent to a Condensation Resistance Factor (CRF) determined in accordance with AAMA 1503.*

### Standards:

*ANSI/NFRC 100-2017: Procedure for Determining Fenestration Product U-Factors*

*ANSI/NFRC 200-2017: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence*

*NFRC 500-2017: Procedure for Determining Fenestration Product Condensation Resistance Values*

### Software:

**Frame and Edge Modeling:** THERM 7.4.4  
**Center-of-Glass Modeling:** WINDOW 7.4.14  
**Total Product Calculations:** WINDOW 7.4.14  
**Spectral Data Library:** IGDB 62.0

### Simulations Specimen Description:

**Series/Model:** Defense Lite Simulation Analysis - Storefront  
**Type:** Glazed Wall System, Window Wall  
**Frame Material:** AL Aluminum (Non-thermally broken)  
**Sash Material:** NA Not Applicable  
**Standard Size:** 2000mm x 2000mm



**Modeling Assumptions/Technical Interpretations:**

- 1) To prevent air infiltration, tape was applied to all interior sash crack locations.

**Specialty Products Table:**

The specialty products method allow the manufacturer to determine the overall product SHGC and VT for any glazing option. The center of glass SHGC and/or VT must be determined using WINDOW 7.4.14. The method gives overall product SHGC and VT indexed on center of glass properties. All values used in the calculations are truncated to six decimal place precision.

<i>DG Base Option</i>	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.013872	0.017317	0.020546
SHGC1	0.897499	0.796766	0.702350
VT0	0.000000	0.000000	0.000000
VT1	0.883627	0.779449	0.681804

<i>DG w/ Defense Lite</i>	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.024284	0.027527	0.030559
SHGC1	0.845966	0.748859	0.658073
VT0	0.000000	0.000000	0.000000
VT1	0.821682	0.721332	0.627514

<i>SG Base Option</i>	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.012670	0.016152	0.019419
SHGC1	0.913496	0.811760	0.716340
VT0	0.000000	0.000000	0.000000
VT1	0.900826	0.795607	0.696921

<i>SG w/ Defense Lite</i>	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.025151	0.028440	0.031517
SHGC1	0.863360	0.765258	0.673476
VT0	0.000000	0.000000	0.000000
VT1	0.838209	0.736818	0.641959

$$SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0)$$

$$VT = VT0 + VTc (VT1 - VT0)$$

**Spacer Option Description**

		<i>Sealant</i>		
<i>Spacer Type</i>	<i>Primary</i>	<i>Secondary</i>	<i>Code</i>	
Aluminum Spacer	Silicone	PIB	A1-D	

**Grid Option Description**

<i>Grid Size</i>	<i>Grid Type</i>	<i>Grid Pattern</i>
None	-	-

**Reinforcement Option Description**

<i>Location</i>	<i>Material</i>
None	-

**Gas Filling Technique Description**

<i>Fill Type</i>	<i>Method</i>
None	-

**Edge-of-Glass Construction**

<i>Interior Condition</i>	EPDM gaskets between frame and glass
<i>Exterior Condition</i>	EPDM gaskets between frame and glass

**Weatherstripping**

<i>Type</i>	<i>Quantity</i>	<i>Location</i>
None	-	-

**Frame/Sash Materials Finish**

<i>Interior</i>	Painted aluminum
<i>Exterior</i>	Painted aluminum

**NFRC 100/200/500 Summary Sheet  
Defense Lite Simulation Analysis - Storefront**

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) <small>Grids (None / &lt;1 / &gt;=1)</small>					Visible Transmittance (VT) <small>Grids (None / &lt;1 / &gt;=1)</small>		Condensation Resistance	
1	Dual Glazed Base System: SB70XL on Starphire / air / clr (6mm/6mm) - 1" IG											
	0.223	0.500	0.225					AIR	0.018(#2)	CL	A1-D	N
	U-Factor 0.48			SHGC (N) 0.26					VT (N) 0.56		CR 17	
2	Elevation "C" (Dual Glazed w/ 0.236" Defense Lite (w/film), 1" x 0.125" Alum. Bar Trim)											
	0.235	1.500	0.223	0.500	0.225			AIR	0.018(#4)	CL	A1-D	N
	U-Factor 0.38			SHGC (N) 0.25					VT (N) 0.45		CR 27	
3	Elevation "D" (Dual Glazed w/ 0.236" Defense Lite (w/film), 1.125" Vinyl Trim)											
	0.235	1.500	0.223	0.500	0.225			AIR	0.018(#4)	CL	A1-D	N
	U-Factor 0.37			SHGC (N) 0.25					VT (N) 0.45		CR 29	
4	Single Glazed Base System: Energy Advantage (#2) (6mm)											
	0.222								0.157(#2)	CL	N	N
	U-Factor 0.75			SHGC (N) 0.65					VT (N) 0.74		CR 08	
5	Elevation "E" (Single Glazed w/ 0.236" Defense Lite (w/film), 1" x 0.125" Alum. Bar Trim)											
	0.235	1.500	0.222					AIR	0.157(#4)	CL	N	N
	U-Factor 0.49			SHGC (N) 0.58					VT (N) 0.59		CR 25	
6	Elevation "F" (Single Glazed w/ 0.236" Defense Lite (w/film), 1.125" Vinyl Trim)											
	0.235	1.500	0.222					AIR	0.157(#4)	CL	N	N
	U-Factor 0.49			SHGC (N) 0.58					VT (N) 0.59		CR 27	

**Note: 3M™ S40X applied film (exterior) on 0.236" Defense Lite**

The Condensation Resistance results obtained from this procedure are for controlled laboratory conditions and do not include the effects of air movement through the specimen, solar radiation, and the thermal bridging that may occur due to the specific design and construction of the fenestration system opening.

Ratings values included in this report are for submittals to an NFRC-licensed IA and are not meant to be used directly for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes. The ratings values were rounded in accordance to NFRC 601, NFRC Unit and Measurement Policy.

Intertek-ATI is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications. The values included in this report are not considered in compliance with ANSI/NFRC 100, ANSI/NFRC 200, and/or NFRC 500 unless the associated validation test requirements have been satisfied, as applicable.

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period. The test record retention end date for this report is September 17, 2023.

Results obtained are simulated 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 product simulated. This report may not be reproduced, except in full, without the written approval of Intertek-ATI

For INTERTEK-ATI:

SIMULATED BY:

REVIEWED BY:

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Eric S. Leitner  
Simulation Technician Team Leader  
Simulator-In-Responsible-Charge

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Michael J. Thoman  
Senior Director

ESL:esl

I8786.01-116-45

Attachments (pages):

This report is complete only when all attachments listed are included.

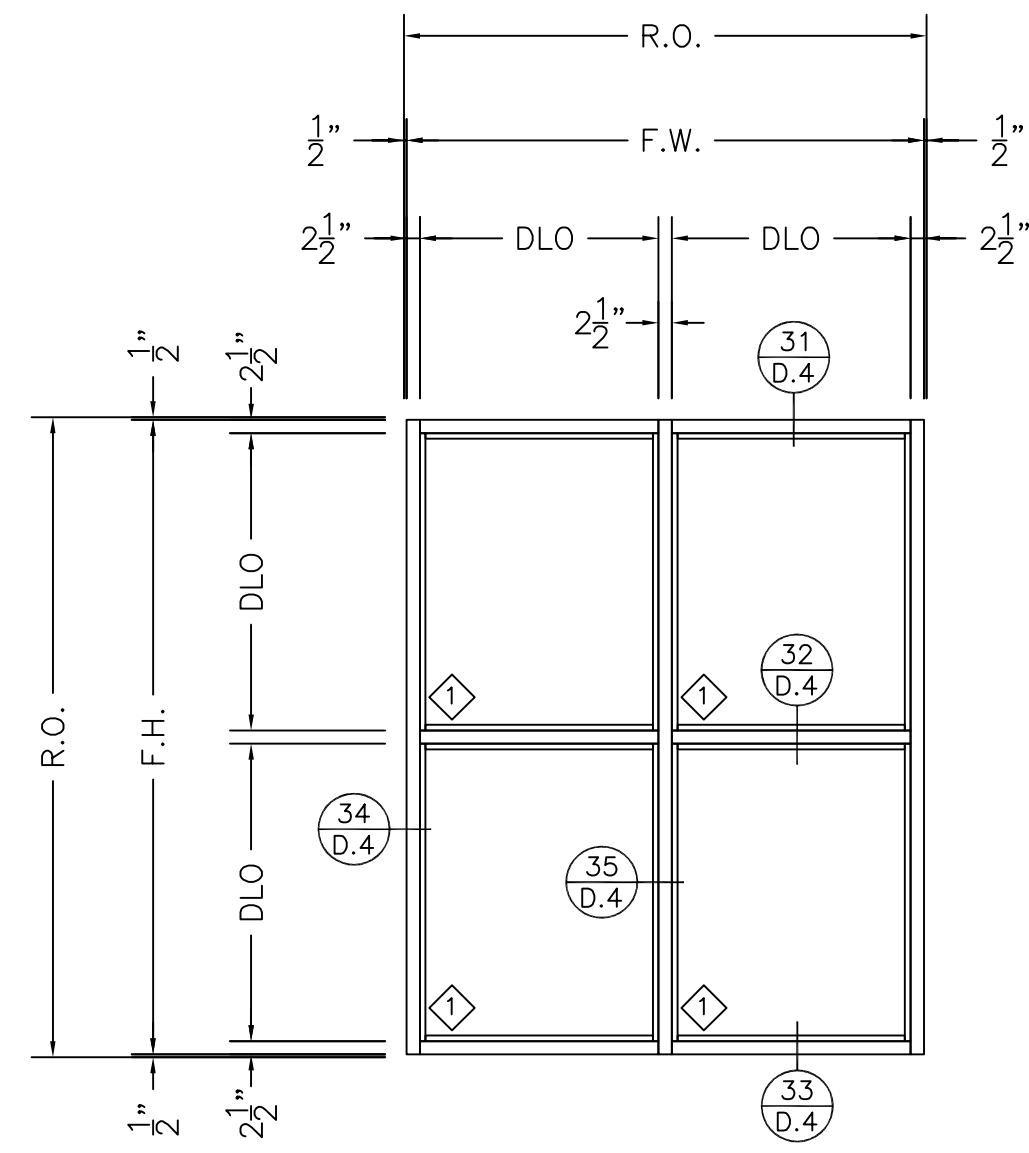
Appendix A: Drawings and Bills of Material (6)

### Revision Log

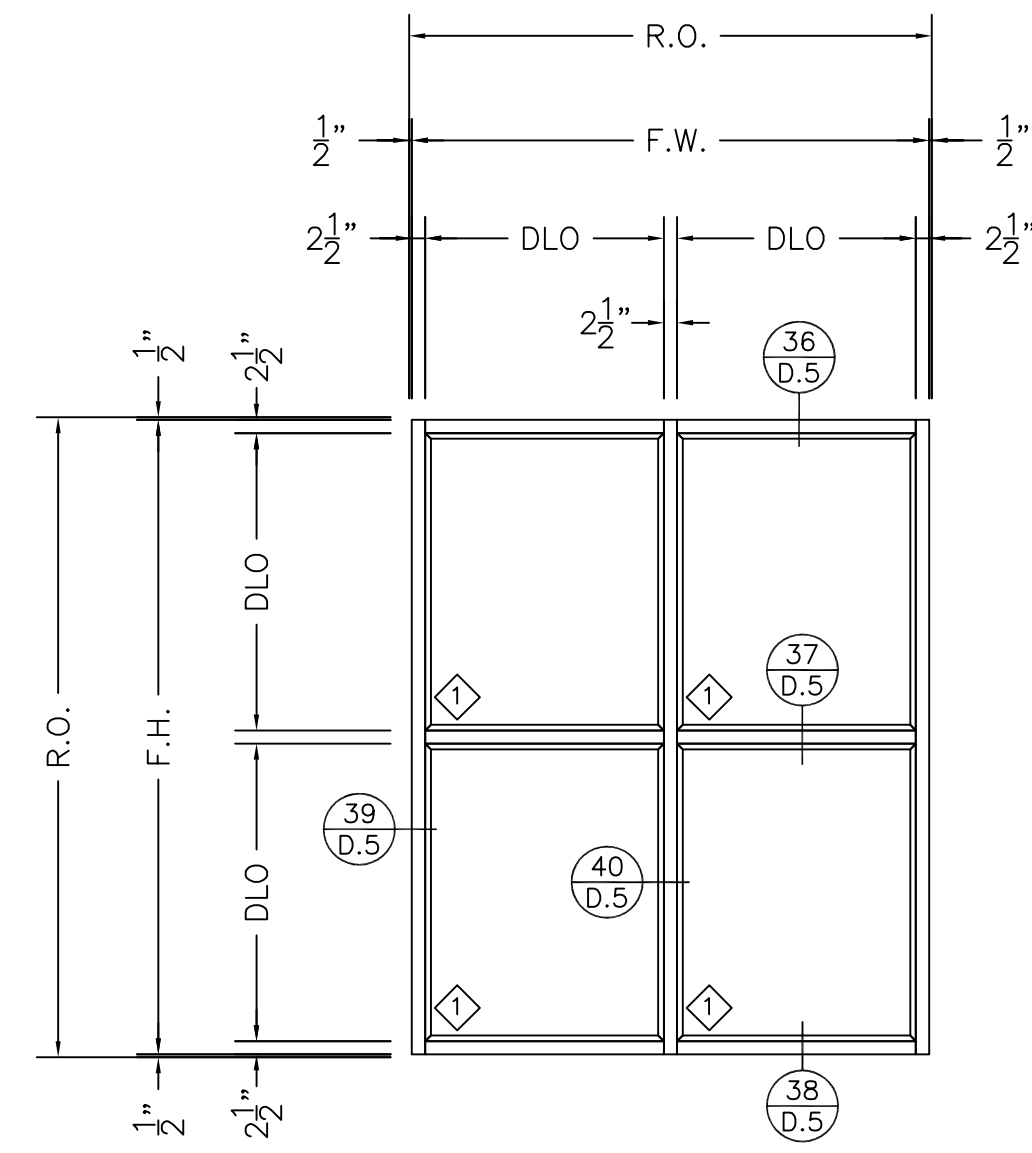
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.01R0	09/18/18	All	- Original report issue

All drawings and Bills of Material used to simulate this product are enclosed in this Appendix

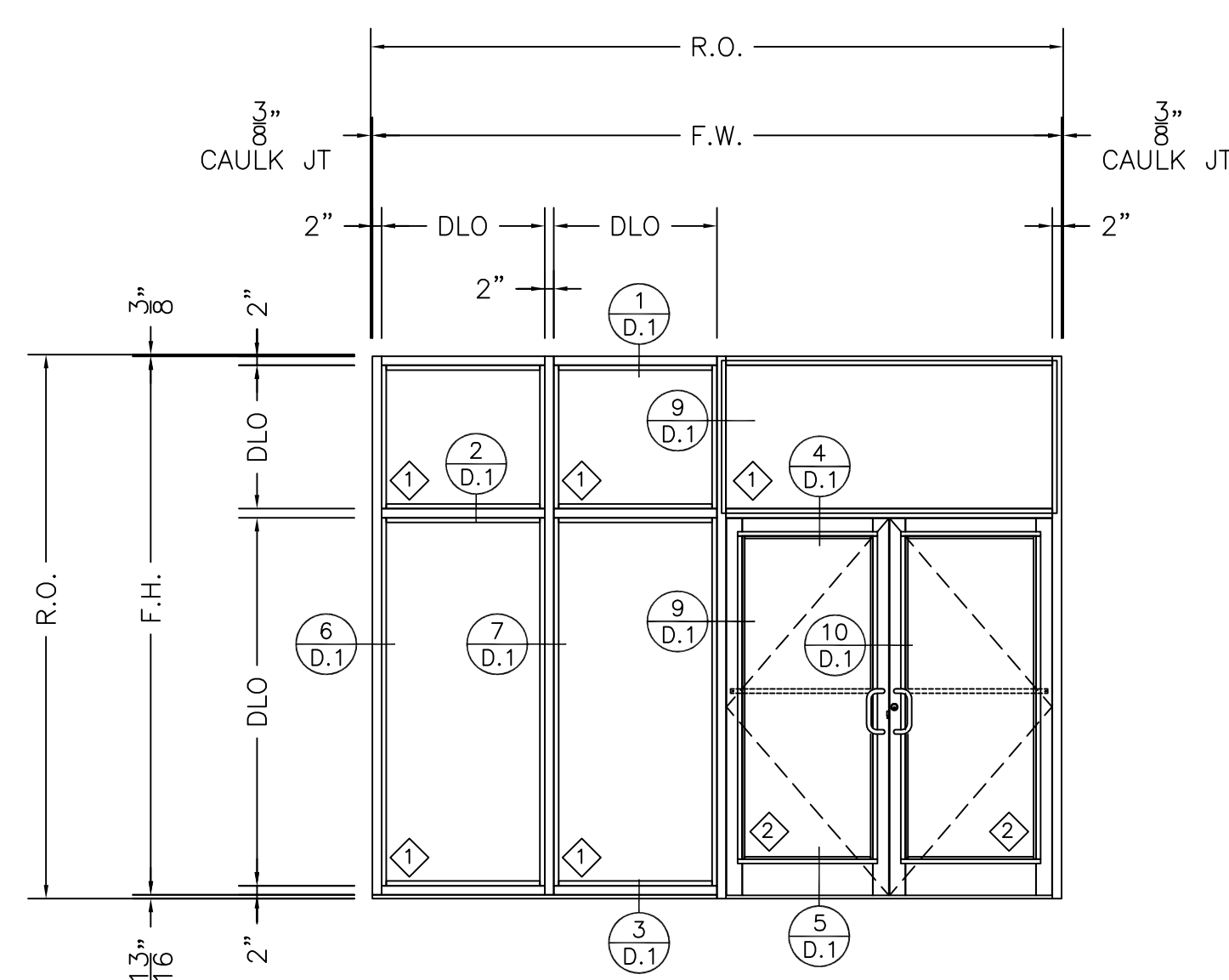




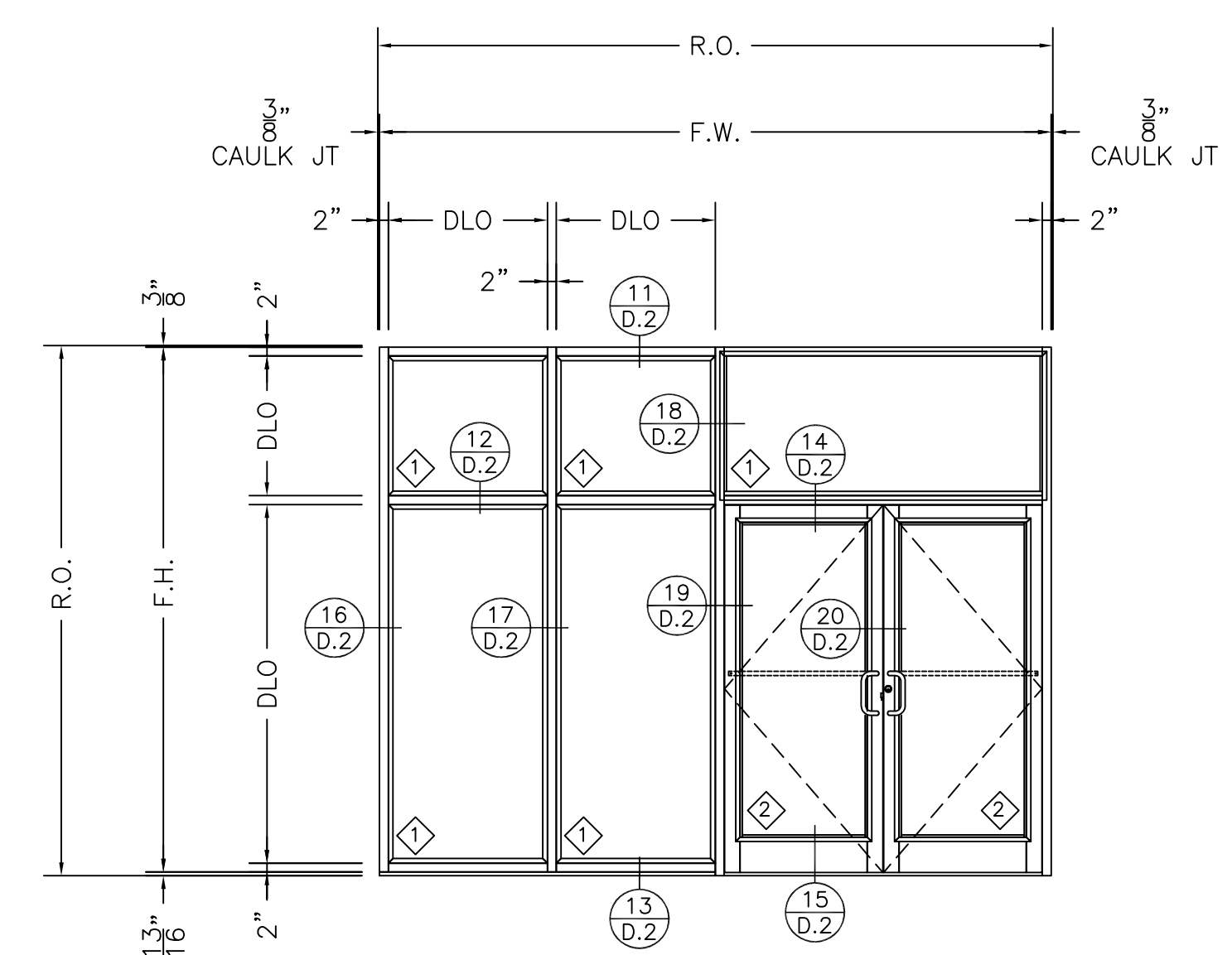
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.236 DEFENSE LITE WITH  
1" x .125 ALUM. BAR TRIM



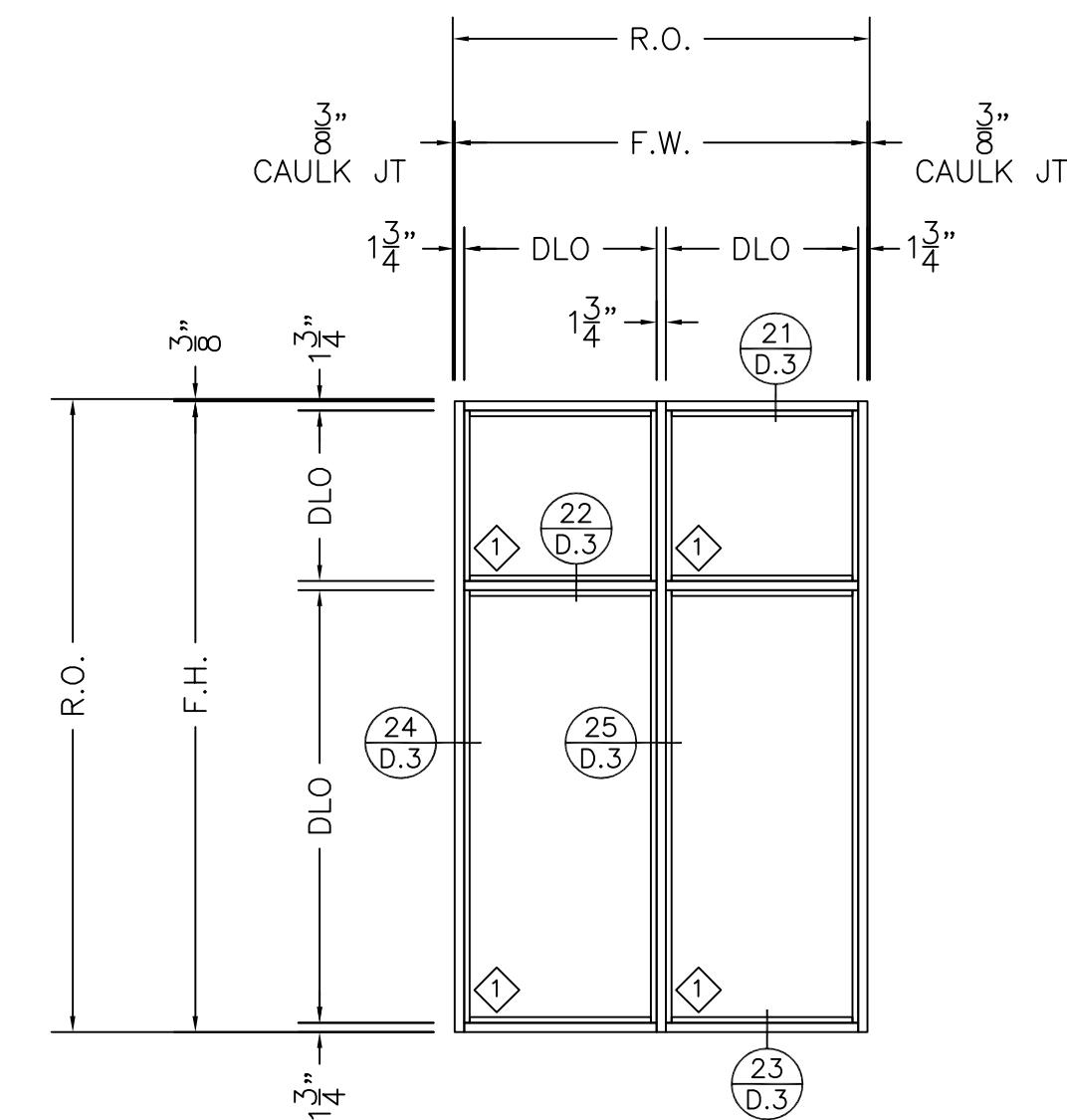
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.236 DEFENSE LITE WITH  
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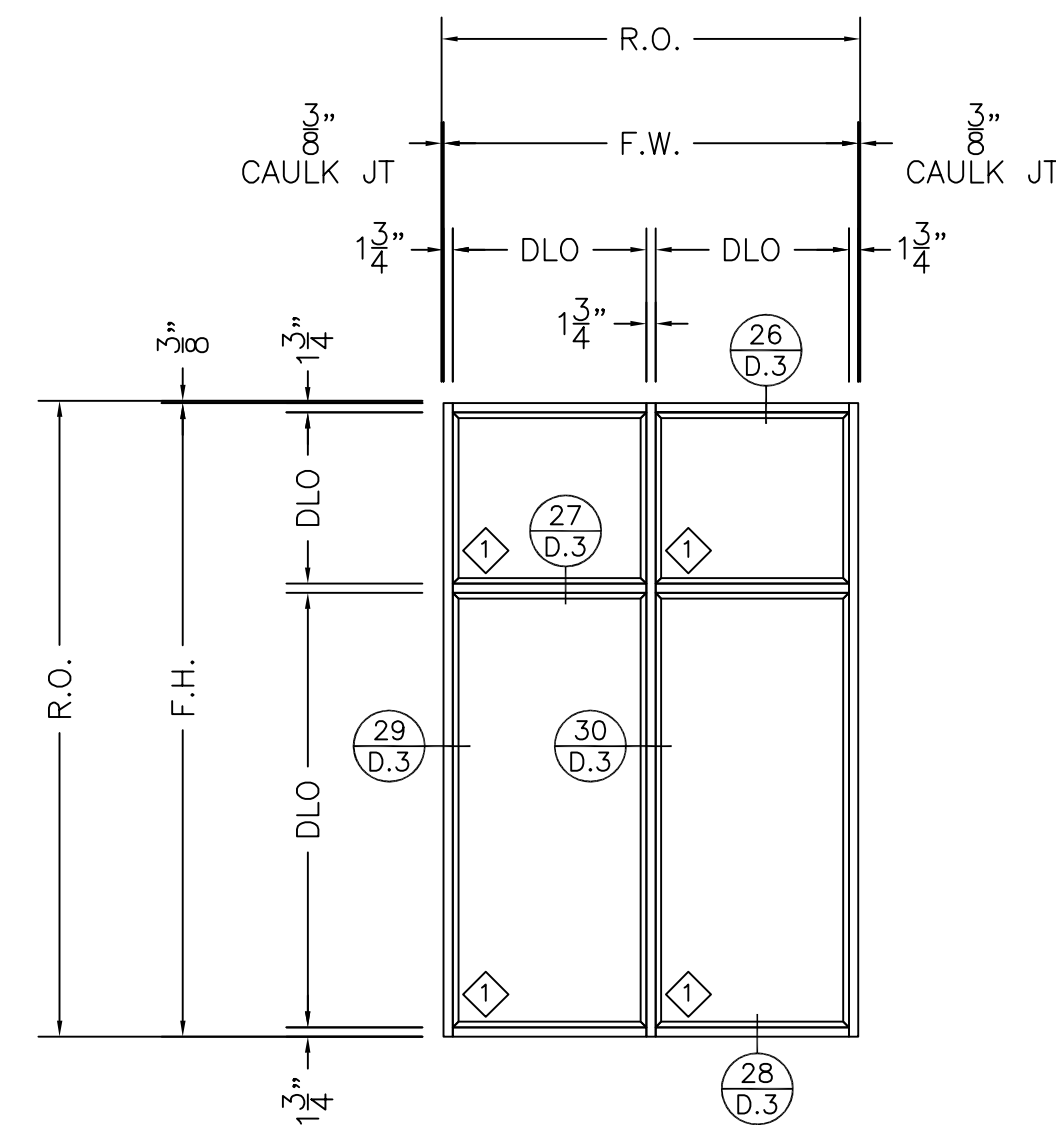
ELEVATION "C"  
STOREFRONT 2" x 4 1/2"  
.236 DEFENSE LITE WITH  
1" x .125 ALUM. BAR TRIM  
ALUMINUM DOOR WITH  
.375 DEFENSE LITE



ELEVATION "D"  
STOREFRONT 2" x 4 1/2"  
.236 DEFENSE LITE WITH  
1.125 VINYL TRIM  
ALUMINUM DOOR WITH  
.375 DEFENSE LITE



ELEVATION "E"  
STOREFRONT 1 3/4" x 4 1/2"  
.236 DEFENSE LITE WITH  
1" x .125 ALUM. BAR TRIM



ELEVATION "F"  
STOREFRONT 1 3/4" x 4 1/2"  
.236 DEFENSE LITE WITH  
1.125" VINYL TRIM

**WFD**

WINDOW FILM DEPOT  
4939 LOWER ROSWELL RD  
SUITE 100B  
MARIETTA, GEORGIA 30068  
678-801-9572  
678-547-3138 FAX

NO.	REVISION	ISSUE DATE	BY	CHK

PROJECT NAME AND LOCATION:  
ARCHITECT NAME AND LOCATION:  
CUSTOMER NAME AND LOCATION:

DEFENSE LITE  
DETAILS

DESCRIPTION: ELEVATION SHEET	
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DRAWN BY: BS	SHEET NO.:
JOB NUMBER:	E.1

**intertek** Total Quality. Assured.  
Report #: 18786-116-45  
Date: 9/18/2018  
Verified by: *[Signature]*

ISSUE DATE	
REVISION	
NO.	

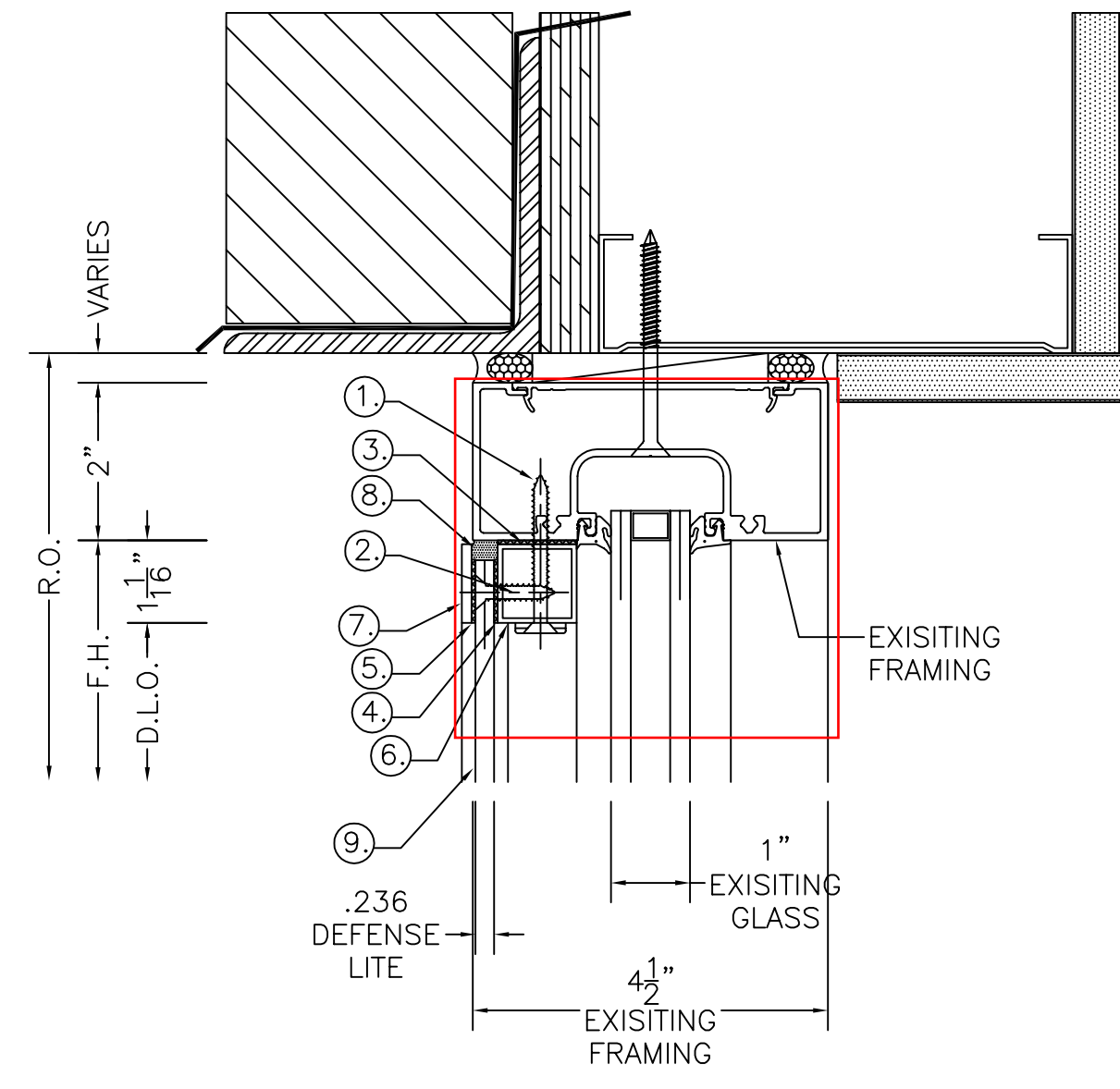
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CUSTOMER NAME AND LOCATION	

PROJECT NAME AND LOCATION	
DEFENSE LITE DETAILS	

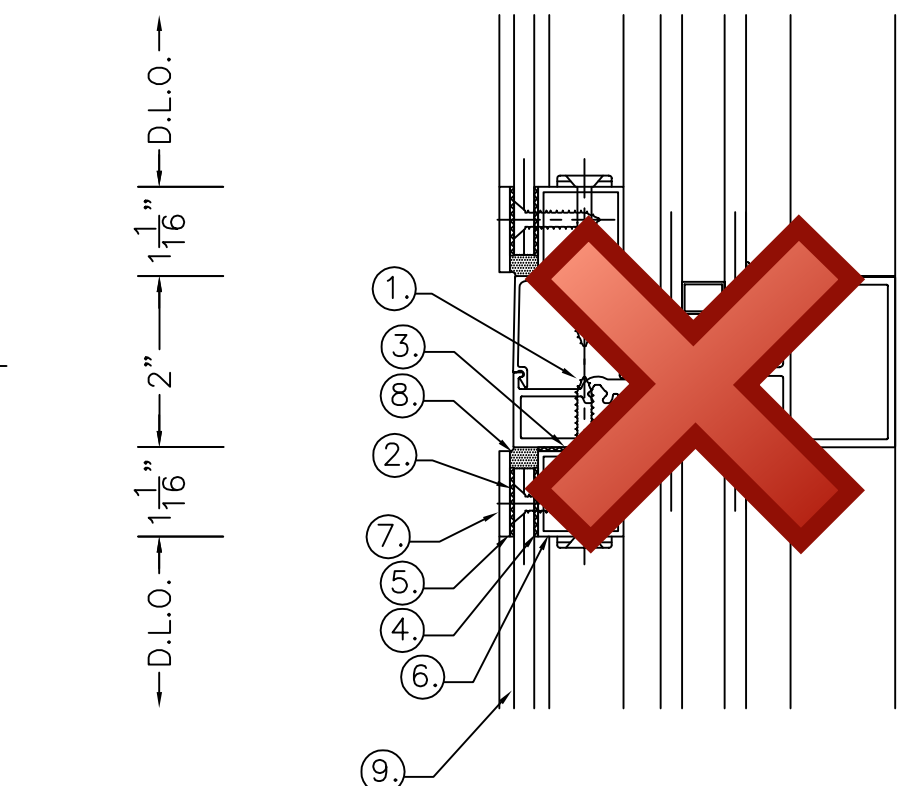
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JOB NUMBER:	D.1

- PARTS DESCRIPTION**
- #12 x 2" S.S. WITH SECURITY TIP & CSK WASHER  
4" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.
  - #12 x 1" S.S. WITH SECURITY TIP  
3" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.  
REQUIRES 1/8" HOLE DRILLED IN .236 DEFENSE LITE.
  - 1" WIDE HIGH BOND TAPE  
1" TUBE TO EXISTING FRAMING.
  - 3/4" WIDE HIGH BOND TAPE  
1" TUBE TO NEW .236 DEFENSE LITE.
  - 3/4" WIDE HIGH BOND TAPE  
NEW 1" FLAT BAR TO NEW .236 DEFENSE LITE.
  - 1" x 1" x .063 (6063) ALUM. TUBE
  - 1" x .125 (6061) FLAT ALUM. BAR
  - DOW 995 PERIMETER SEALANT
  - .236 DEFENSE LITE

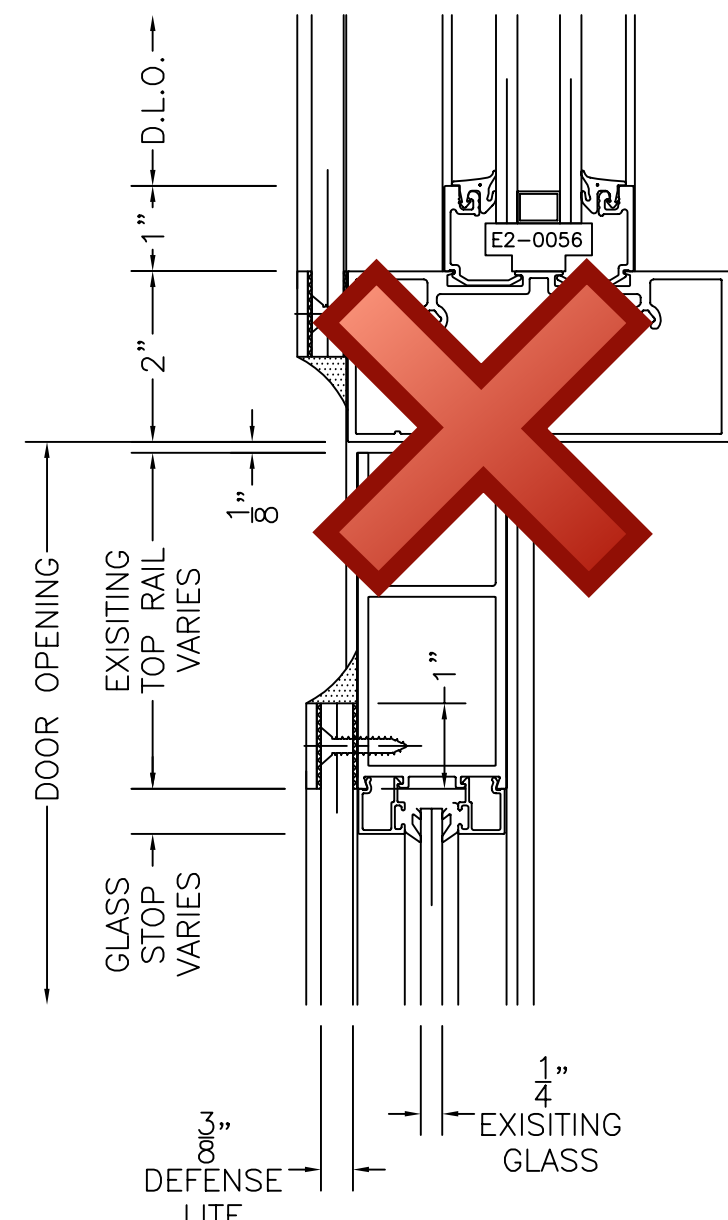
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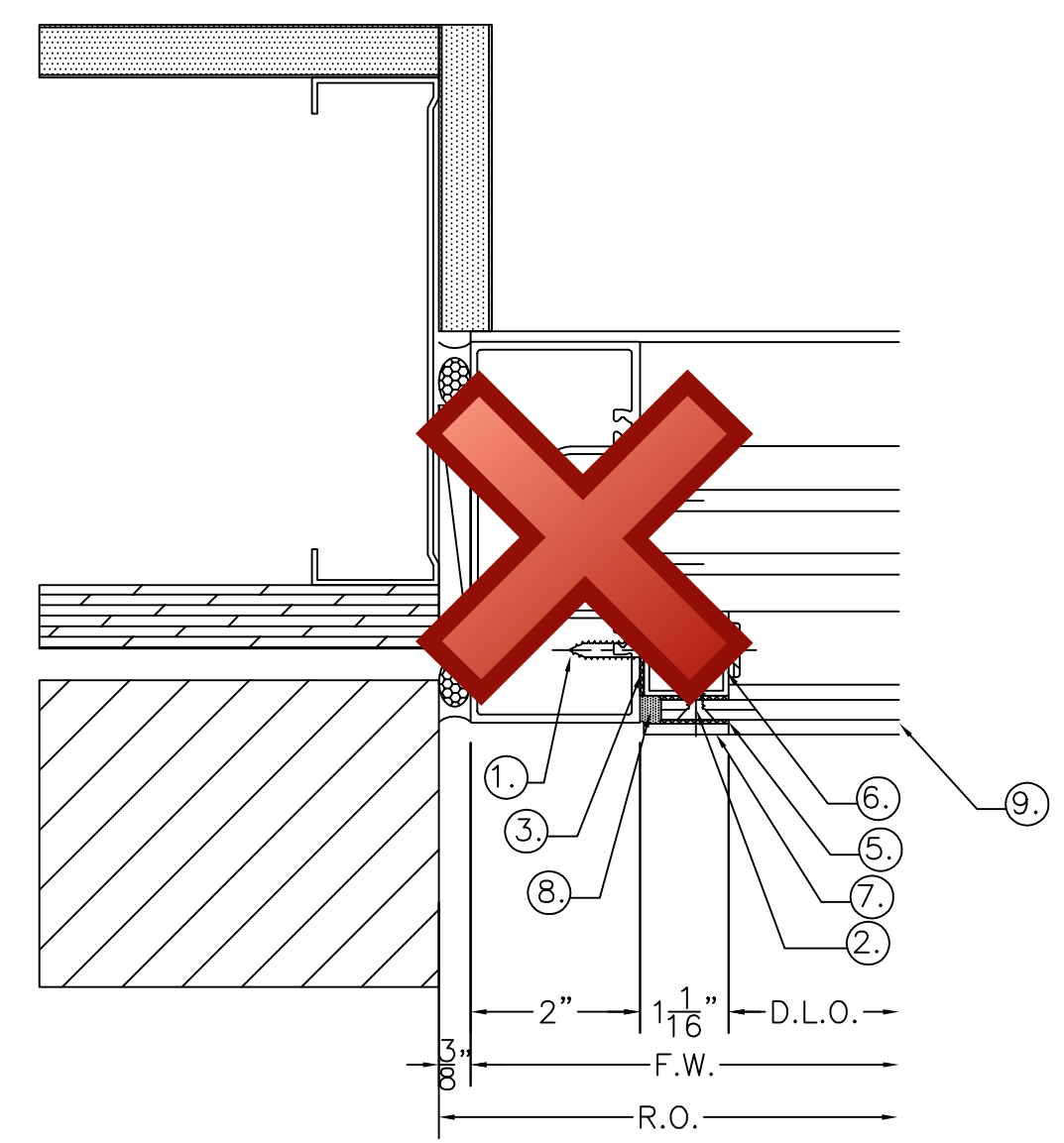
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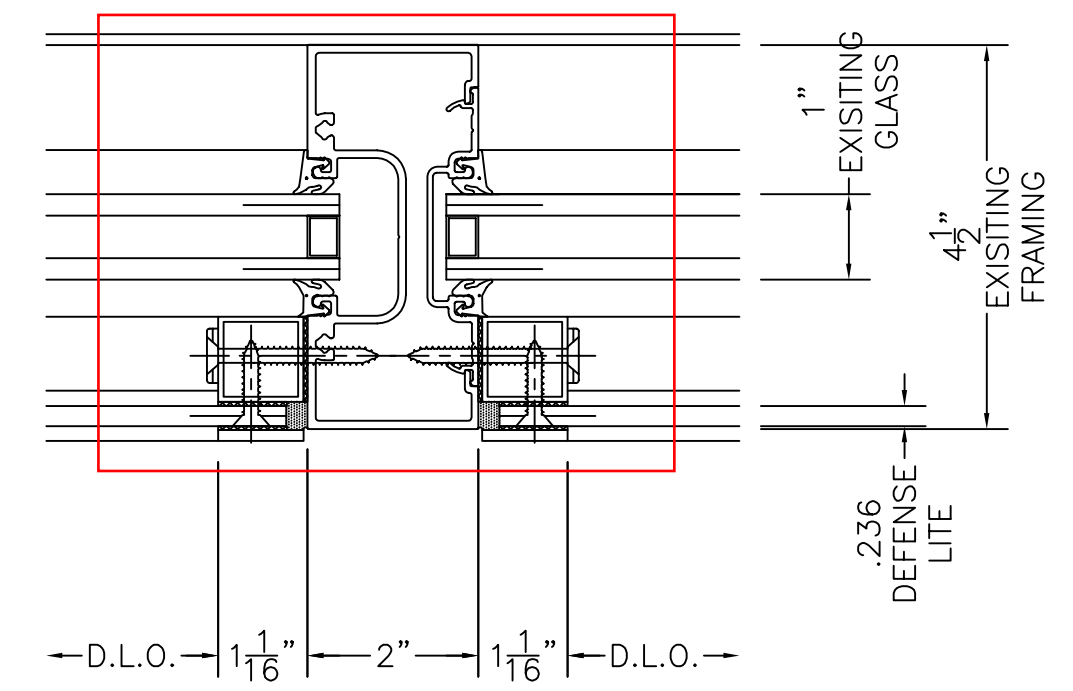
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**6 JAMB**  
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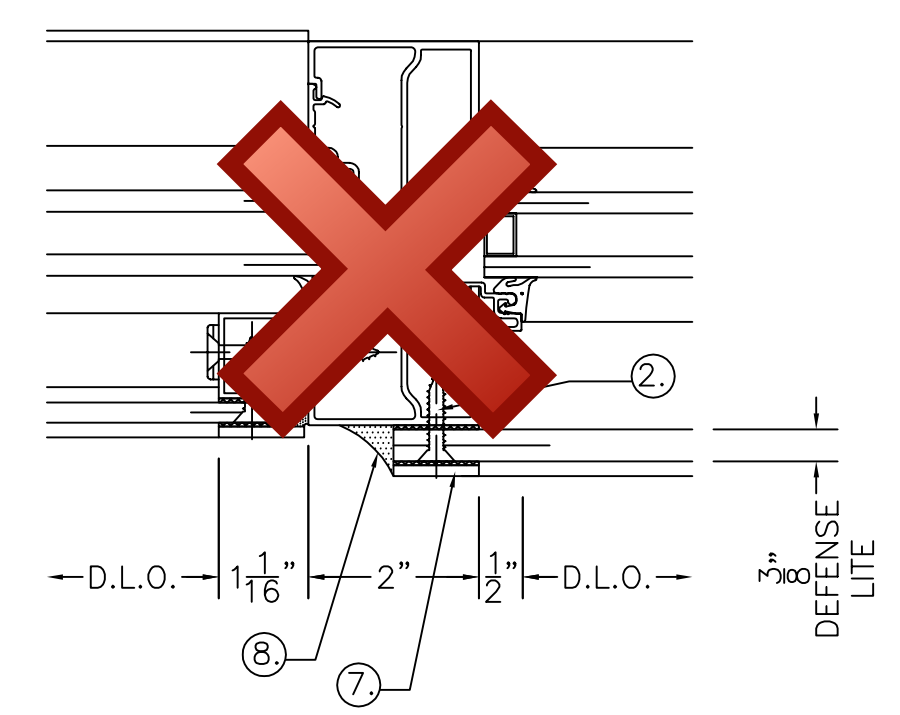


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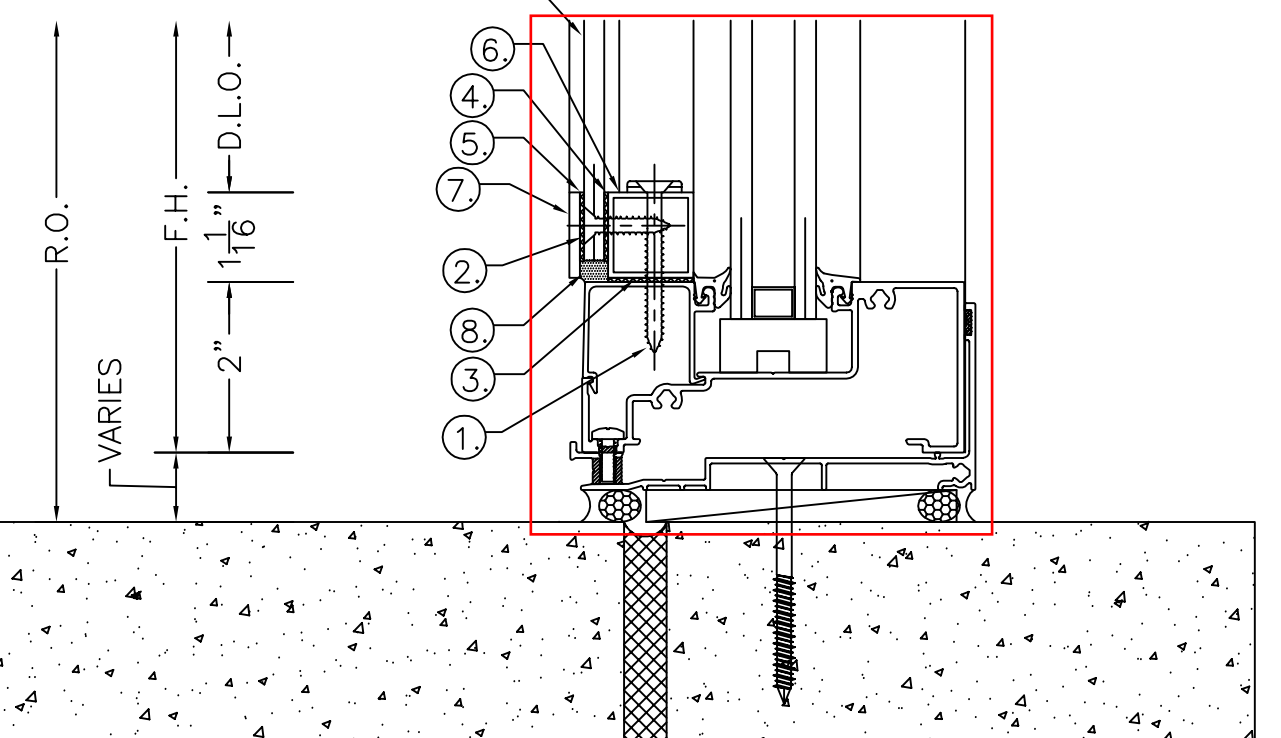
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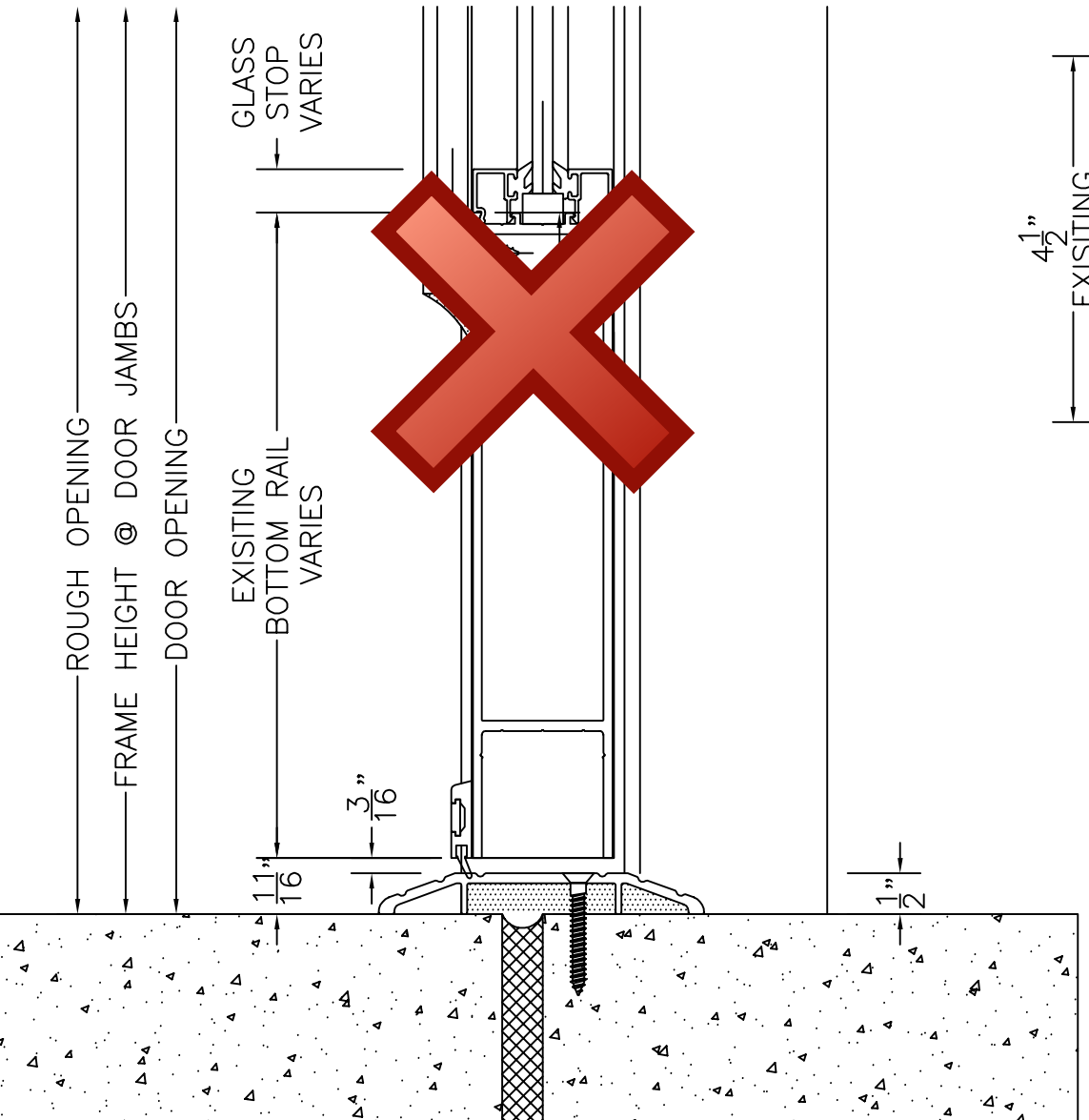


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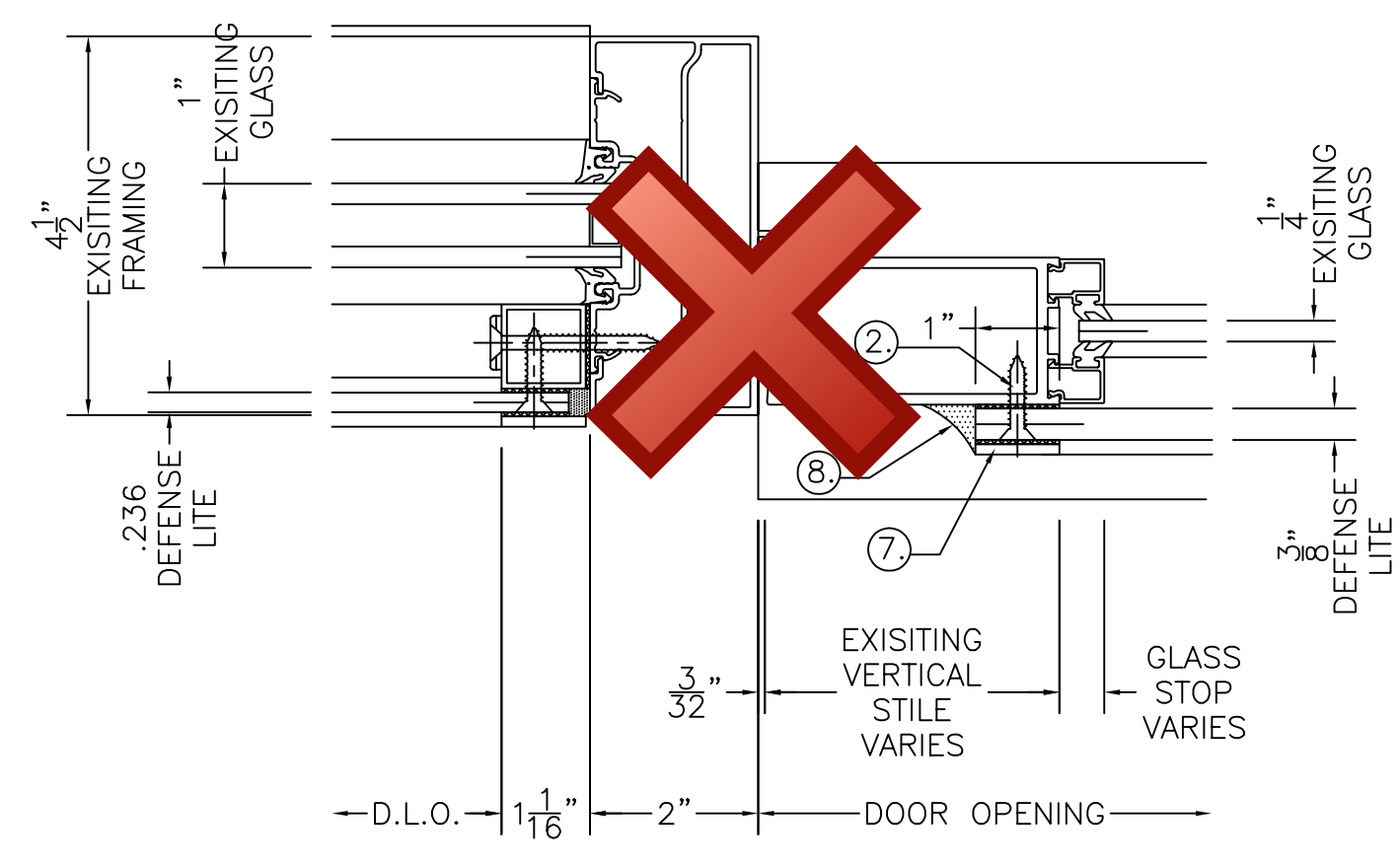
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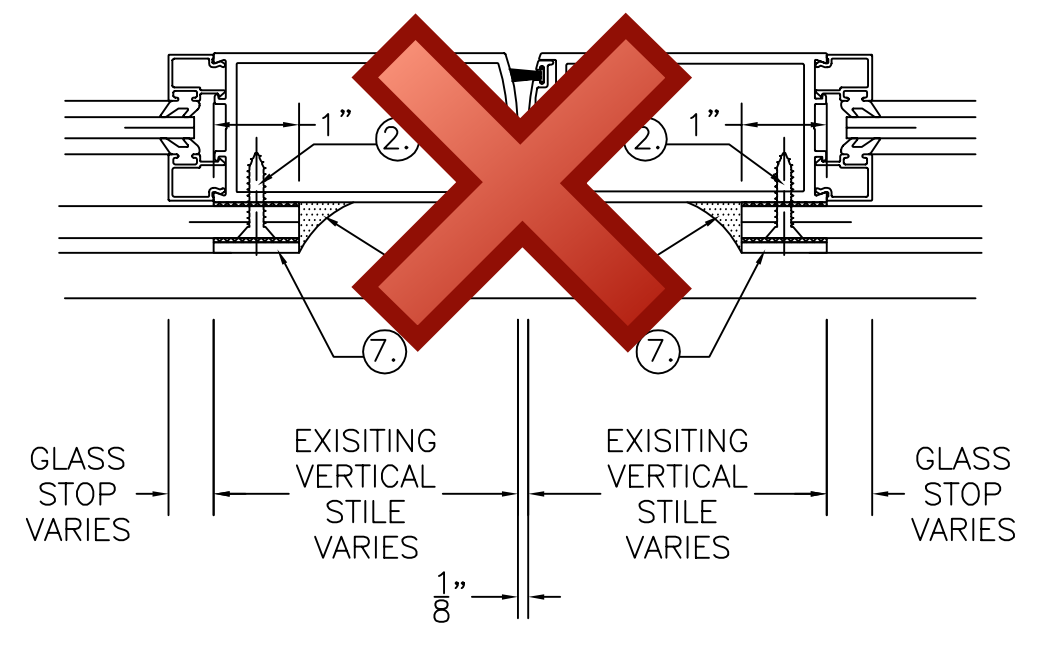
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**9 DOOR JAMB**  
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**10 MEETING**  
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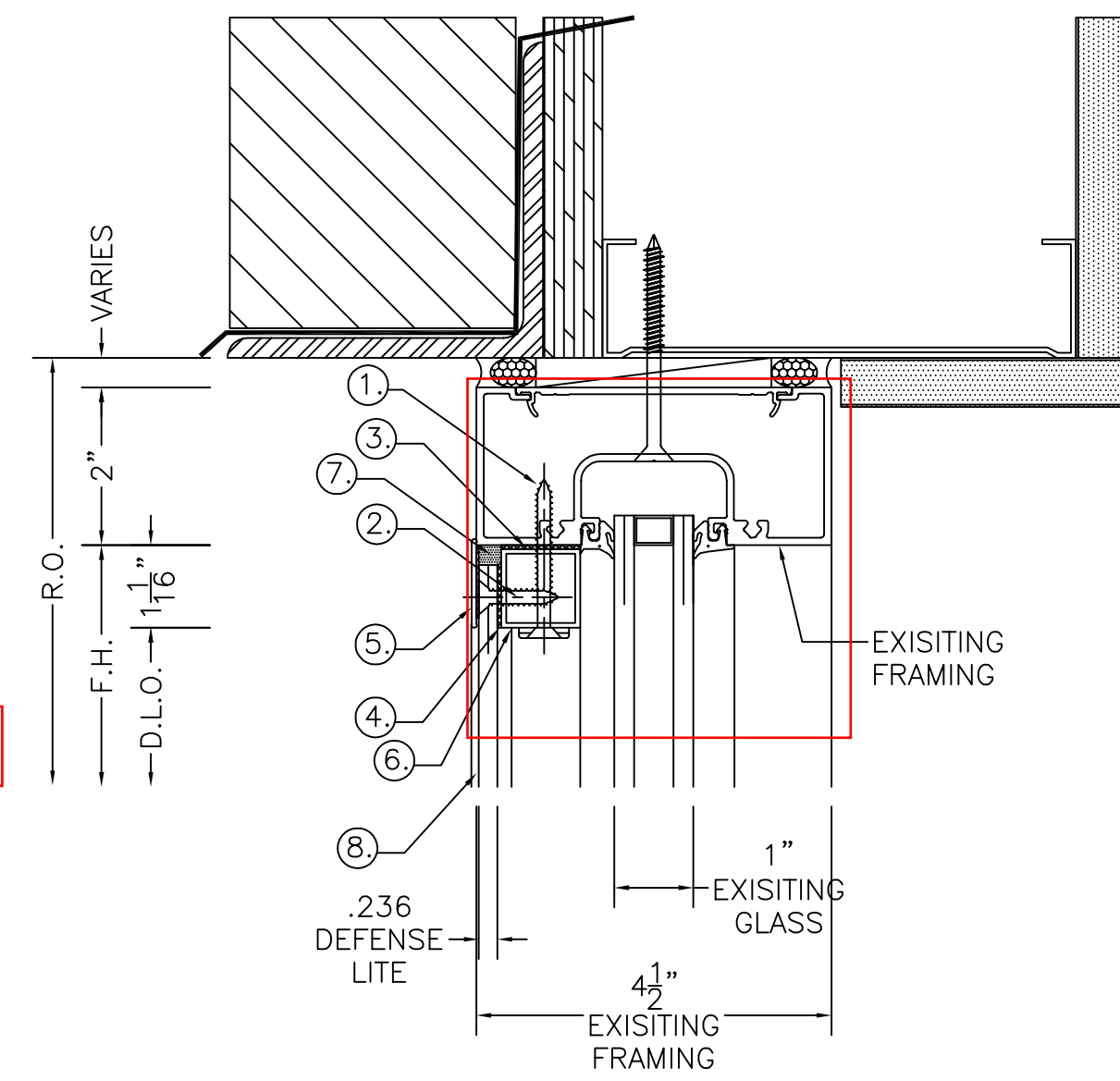


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 Total Quality Assured. Date: 9/18/2018  
 Verified by: *[Signature]*

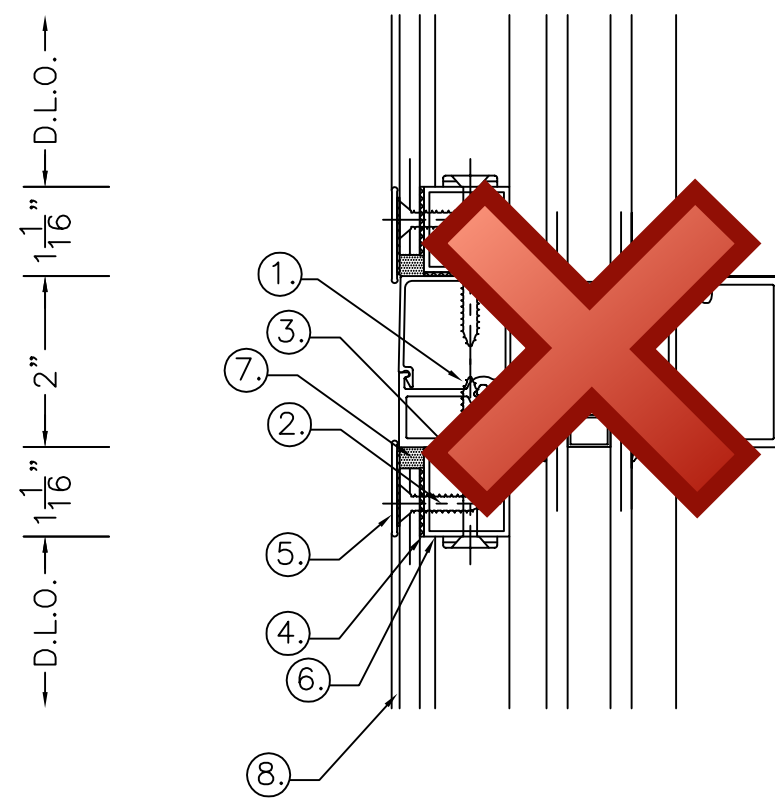
PARTS DESCRIPTION

- ① #12 x 2" S.S. WITH SECURITY TIP & CSK WASHER  
4" FROM EACH END & 12" O.C FOR STANDARD SYSTEM.  
6" O.C FOR THE HIGH CRIME SYSTEM.
- ② #12 x 1" S.S. WITH SECURITY TIP  
3" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.  
REQUIRES 1/4" HOLE DRILLED IN .236 DEFENSE LITE.
- ③ 1" WIDE HIGH BOND TAPE  
1" TUBE TO EXISTING FRAMING.
- ④ 3/4" WIDE HIGH BOND TAPE  
1" TUBE TO NEW .236 DEFENSE LITE.
- ⑤ VINYL BEAUTY STRIP WITH DOUBLE SIDED ACRYLIC BASED TAPE  
(COLOR DEPENDS ON JOB.)
- ⑥ 1" x 1" x .063 (6063) ALUM. TUBE
- ⑦ DOW 995 PERIMETER SEALANT
- ⑧ .236 DEFENSE LITE

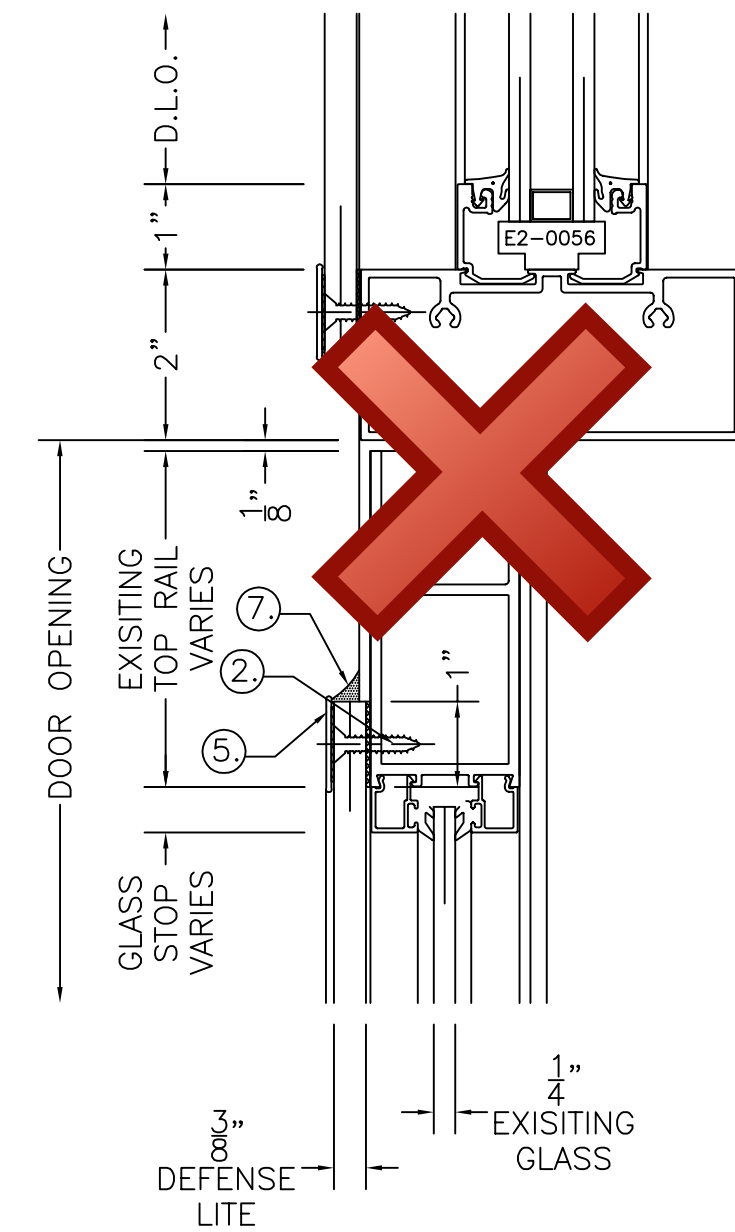
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**TYP. HEAD**



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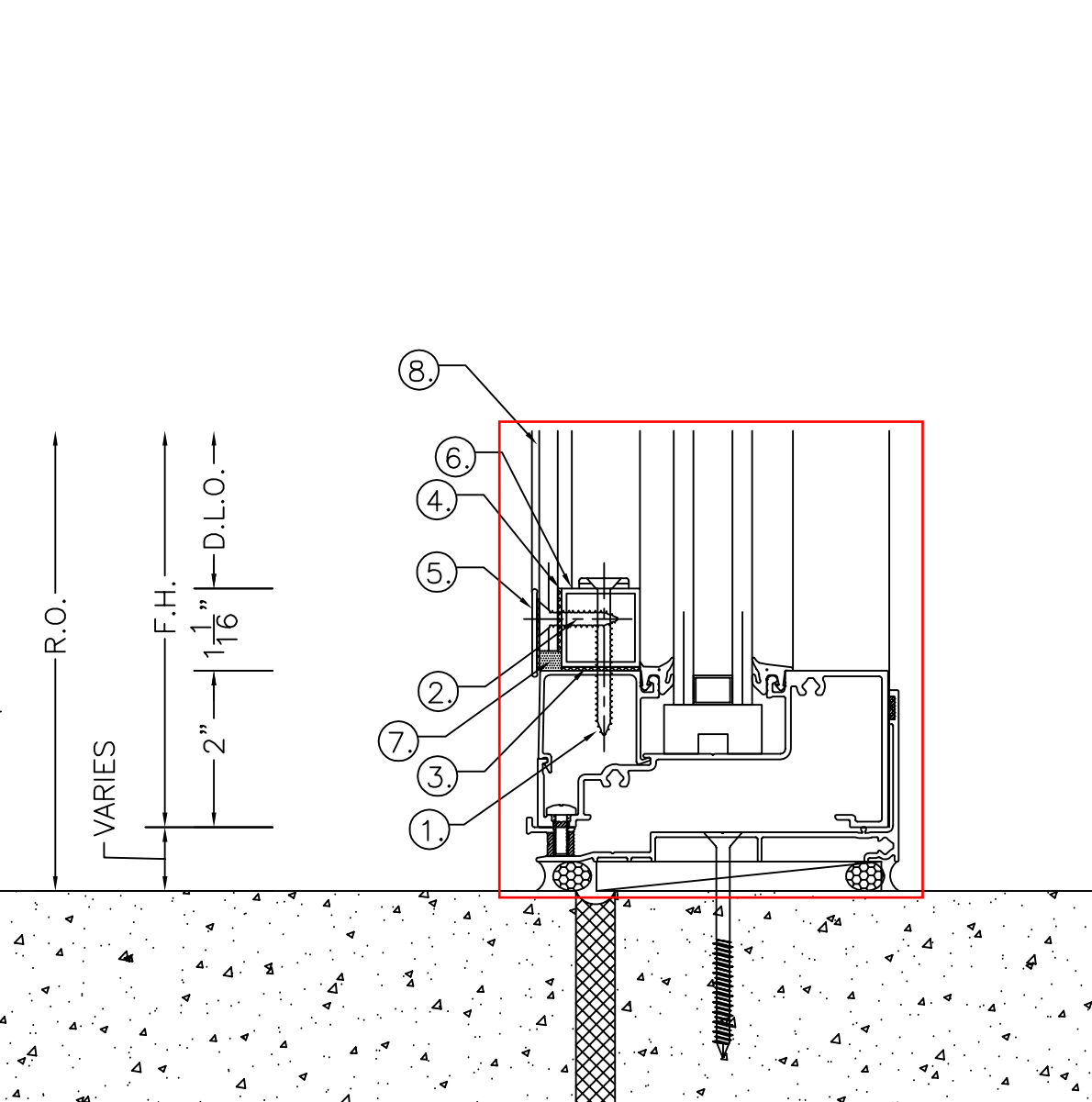


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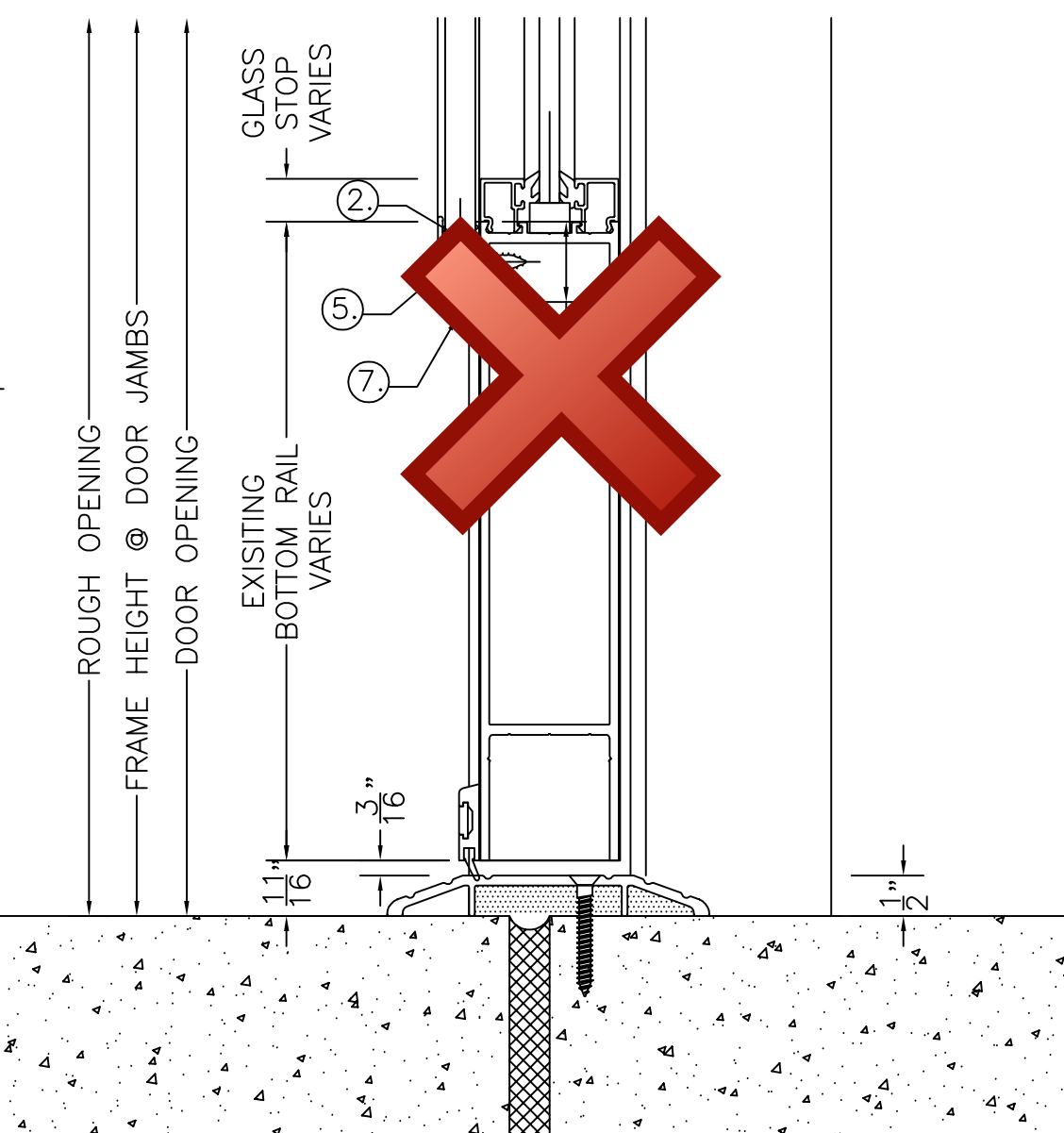


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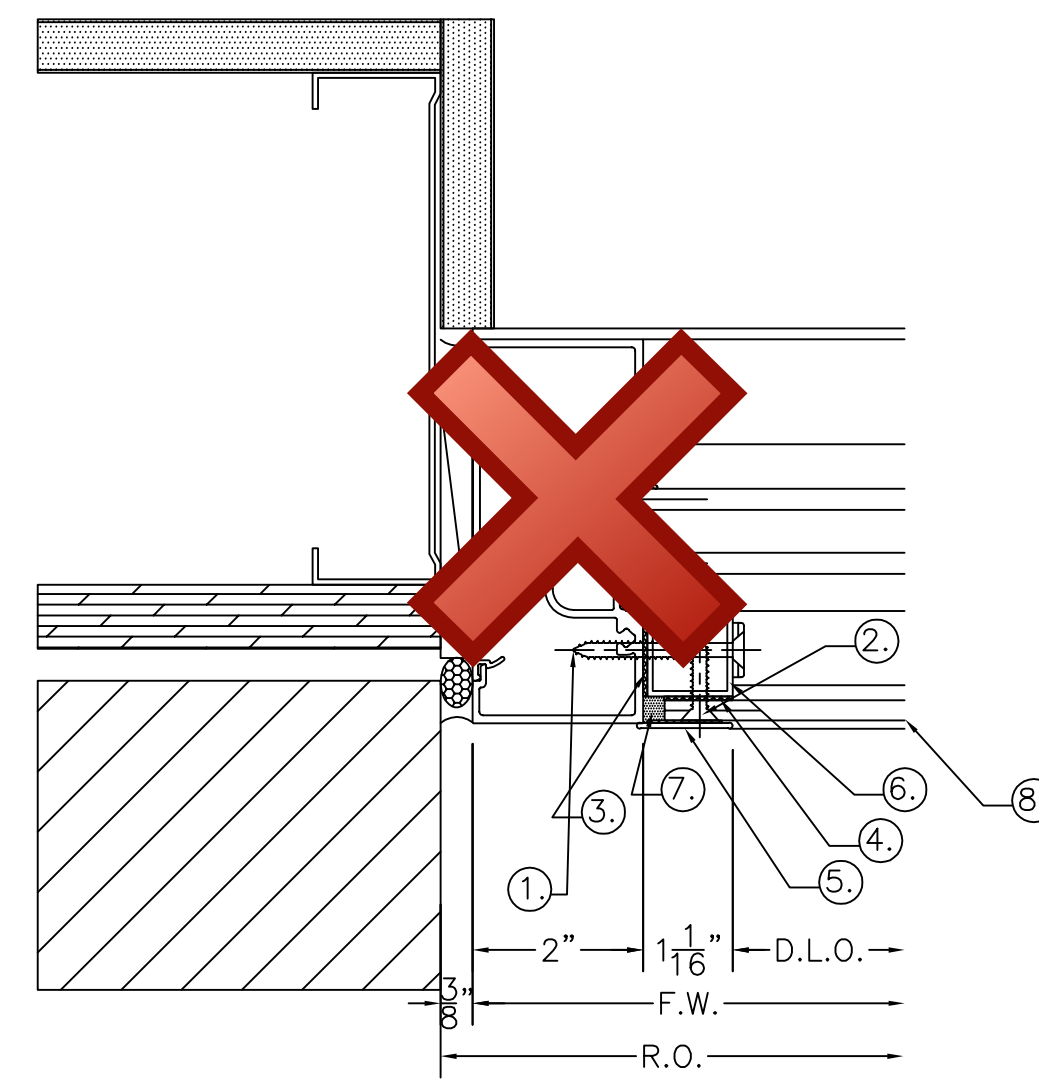
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15 DOOR  
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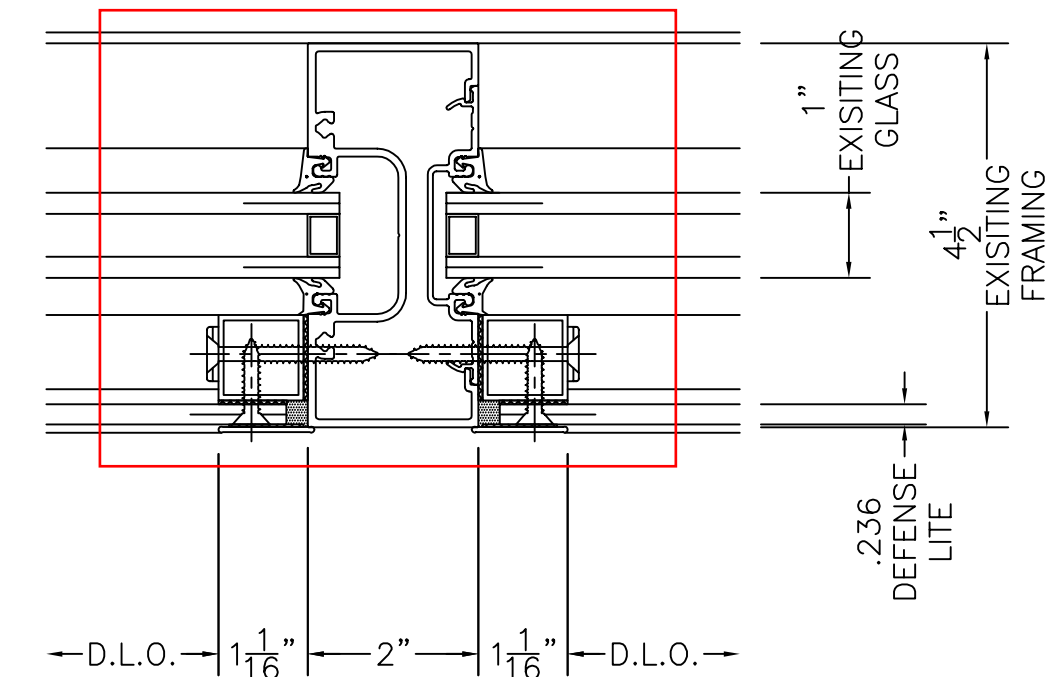


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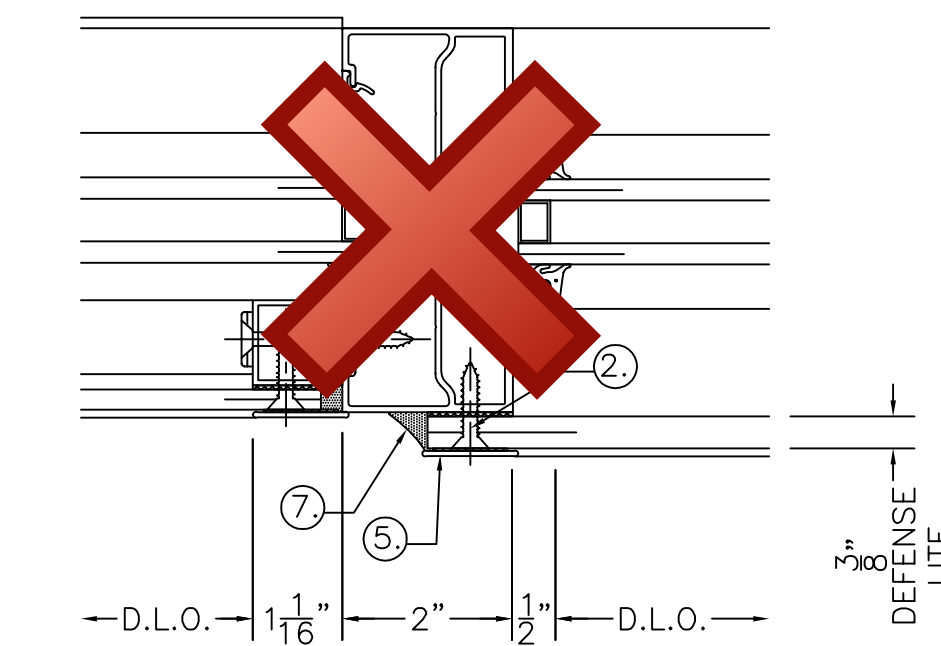


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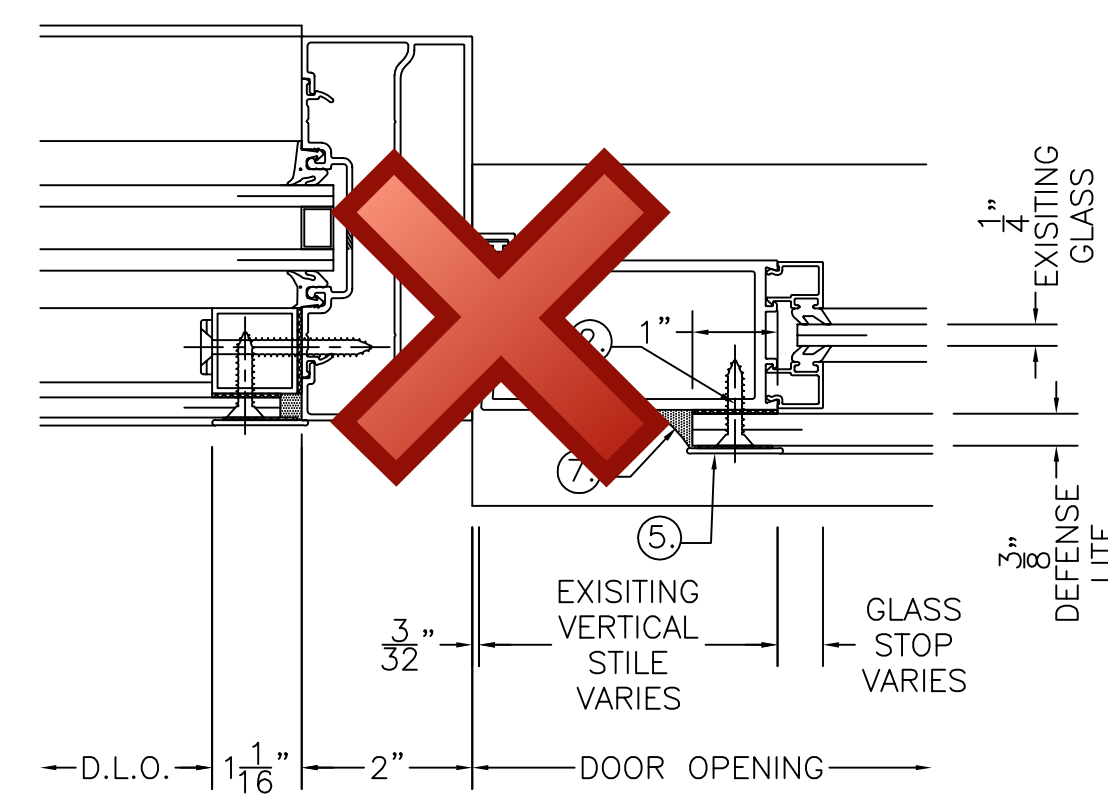
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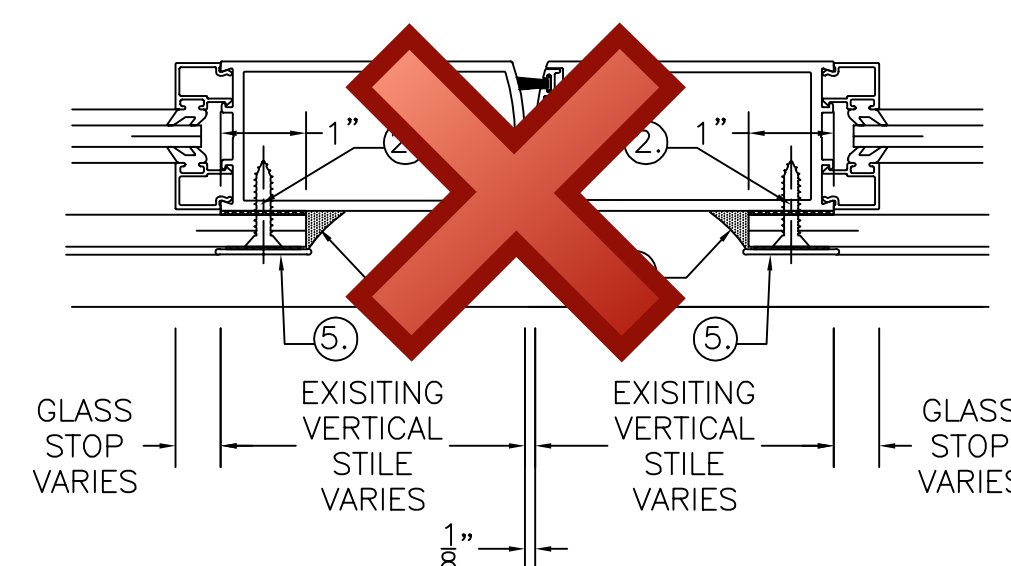


19 DOOR JAMB  
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ARCH. SHEET REF.:



20 MEETING  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:

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Total Quality. Assured. Date: 9/18/2018  
Verified by: *[Signature]*



CRD BY	
ISSUE DATE	
REVISION	
NO.	

CUSTOMER NAME AND LOCATION:

PROJECT NAME AND LOCATION:

DESCRIPTION: DETAIL SHEET	
SCALE: 1:2	ISSUE DATE: 08/22/18
DRAWN BY: BS	SHEET NO.:
JOB NUMBER:	D.2

DEFENSE LITE  
DETAILS

CRD	BT	BY	DATE	REVISION	NO.

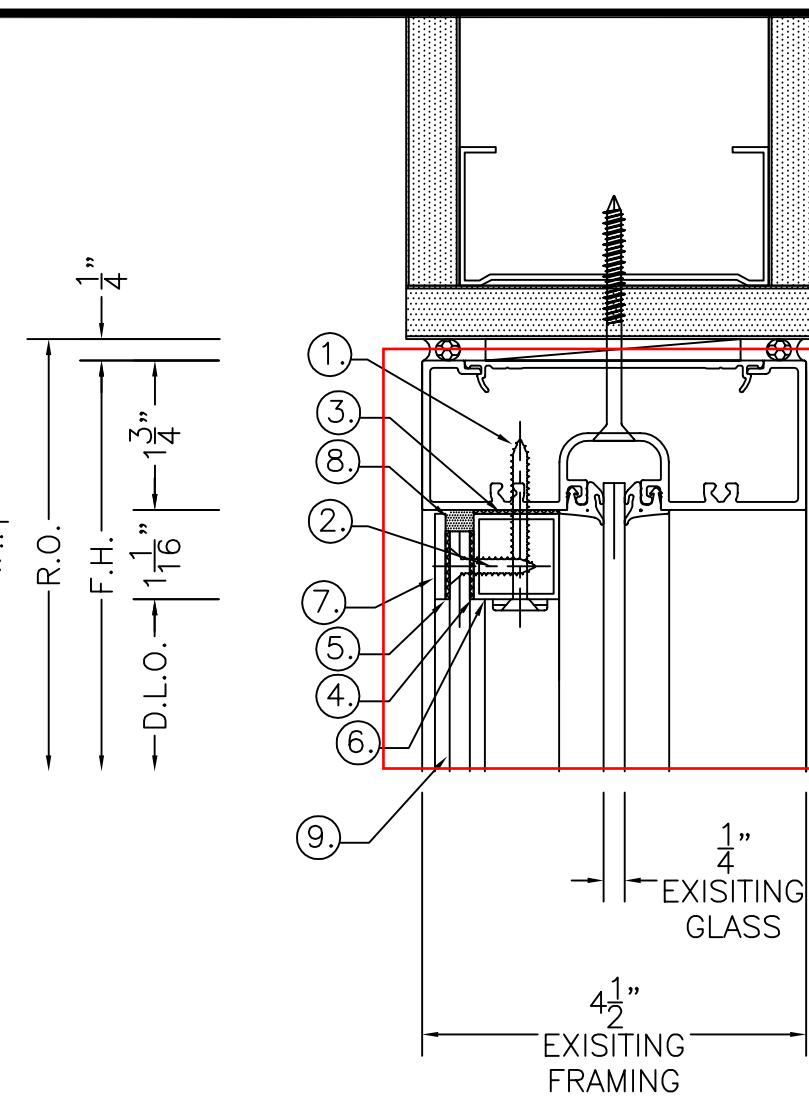
ARCHITECT NAME AND LOCATION:

CUSTOMER NAME AND LOCATION:

PROJECT NAME AND LOCATION:  
**DEFENSE LITE  
DETAILS**

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JOB NUMBER:	D.3

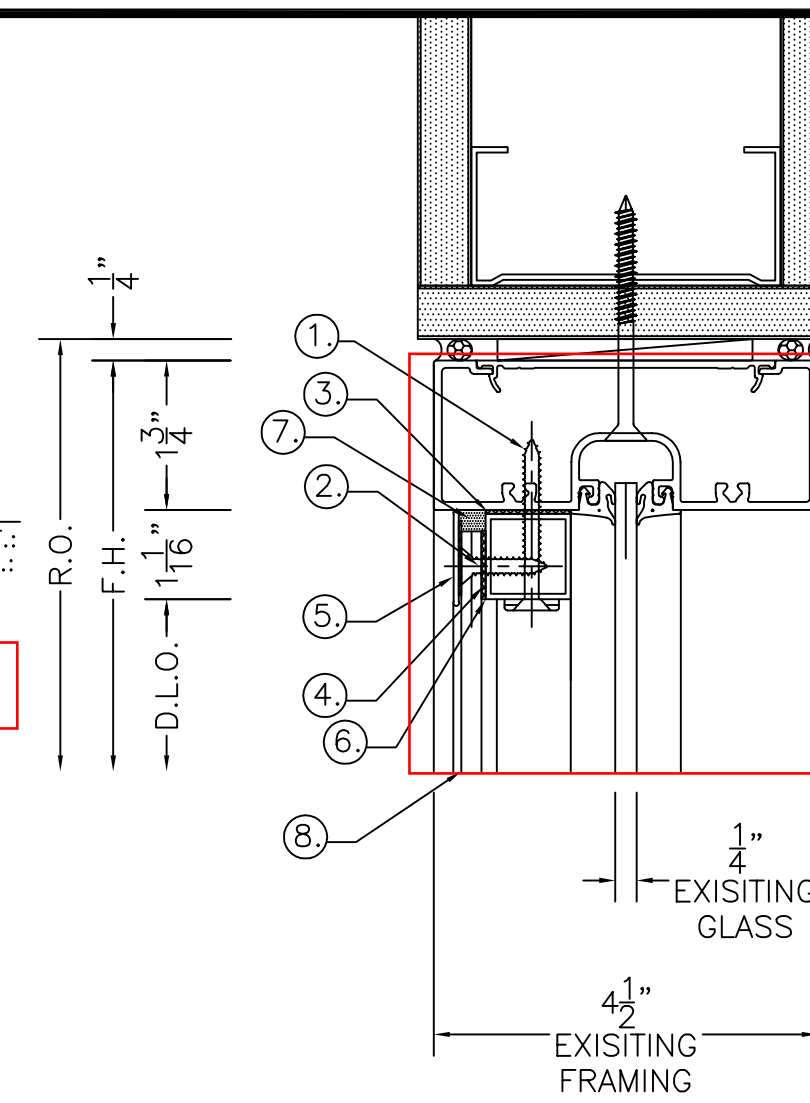
21 HEAD  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:  
**TYP. HEAD**



PARTS DESCRIPTION

- ① #12 x 2" S.S. WITH SECURITY TIP & CSK WASHER  
4" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.
- ② #12 x 1" S.S. WITH SECURITY TIP  
3" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.  
REQUIRES 3/4" HOLE DRILLED IN .236 DEFENSE LITE.
- ③ 1" WIDE HIGH BOND TAPE  
1" TUBE TO EXISTING FRAMING.
- ④ 3/4" WIDE HIGH BOND TAPE  
1" TUBE TO NEW .236 DEFENSE LITE.
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NEW 1" FLAT BAR TO NEW .236 DEFENSE LITE.
- ⑥ 1" x 1" x .063 (6063) ALUM. TUBE
- ⑦ 1" x .125 (6061) FLAT ALUM. BAR
- ⑧ DOW 995 PERIMETER SEALANT
- ⑨ .236 DEFENSE LITE

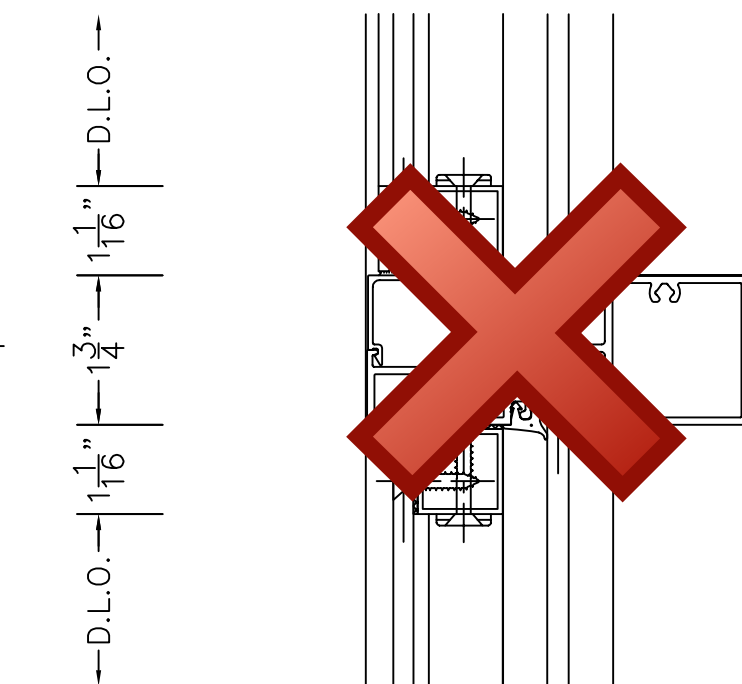
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ARCH. SHEET REF.:  
**TYP. HEAD**



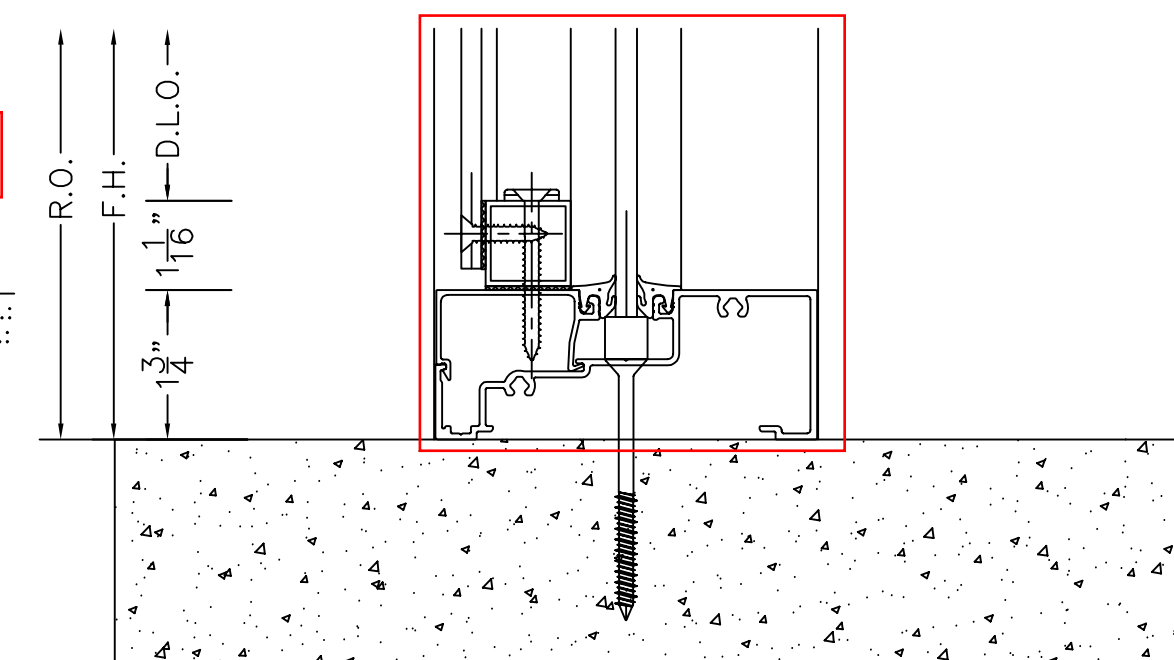
PARTS DESCRIPTION

- ① #12 x 2" S.S. WITH SECURITY TIP & CSK WASHER  
4" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.
- ② #12 x 1" S.S. WITH SECURITY TIP  
3" FROM EACH END & 12" O.C. FOR STANDARD SYSTEM.  
6" O.C. FOR THE HIGH CRIME SYSTEM.  
REQUIRES 3/4" HOLE DRILLED IN .236 DEFENSE LITE.
- ③ 1" WIDE HIGH BOND TAPE  
1" TUBE TO EXISTING FRAMING.
- ④ 3/4" WIDE HIGH BOND TAPE  
1" TUBE TO NEW .236 DEFENSE LITE.
- ⑤ VINYL BEAUTY STRIP WITH DOUBLE SIDED ACRYLIC BASED TAPE  
(COLOR DEPENDS ON JOB.)
- ⑥ 1" x 1" x .063 (6063) ALUM. TUBE
- ⑦ DOW 995 PERIMETER SEALANT
- ⑧ .236 DEFENSE LITE

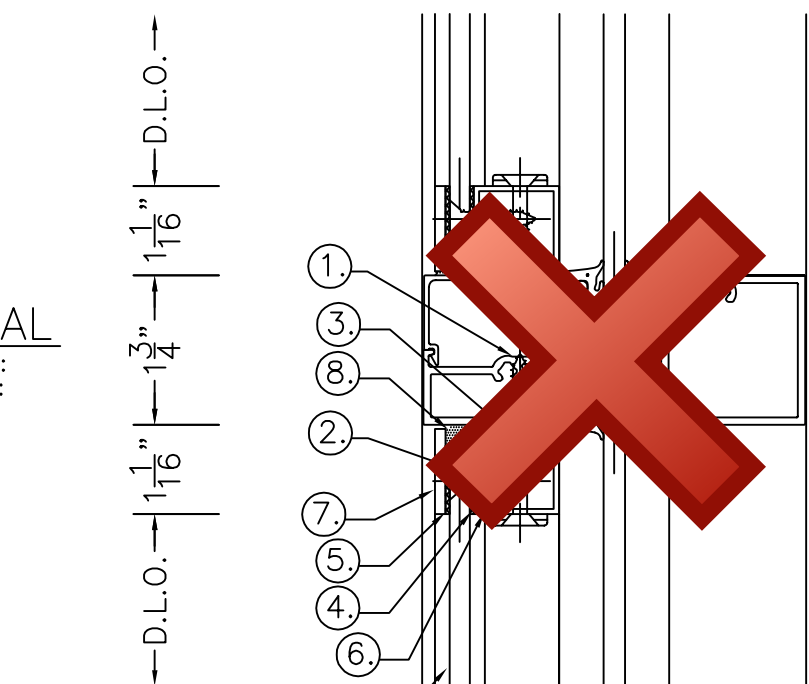
27 HORIZONTAL  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:  
**TYP. SILL**



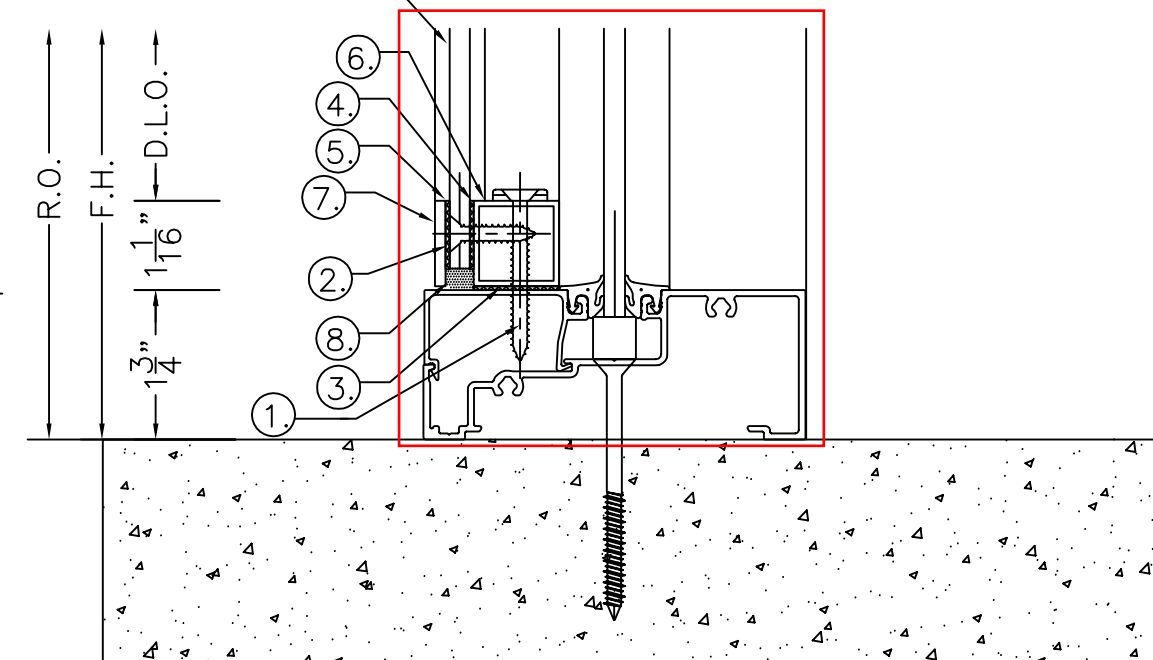
28 SILL  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:  
**TYP. SILL**



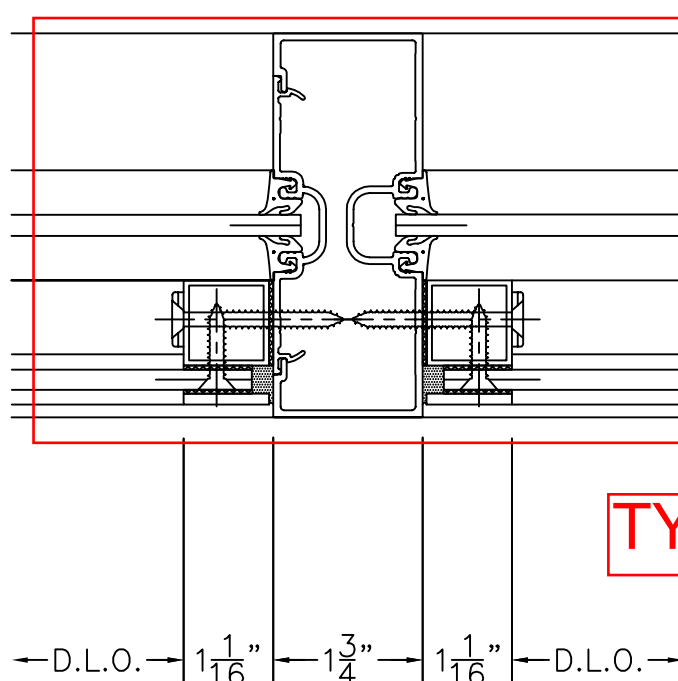
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ARCH. SHEET REF.:  
**TYP. SILL**



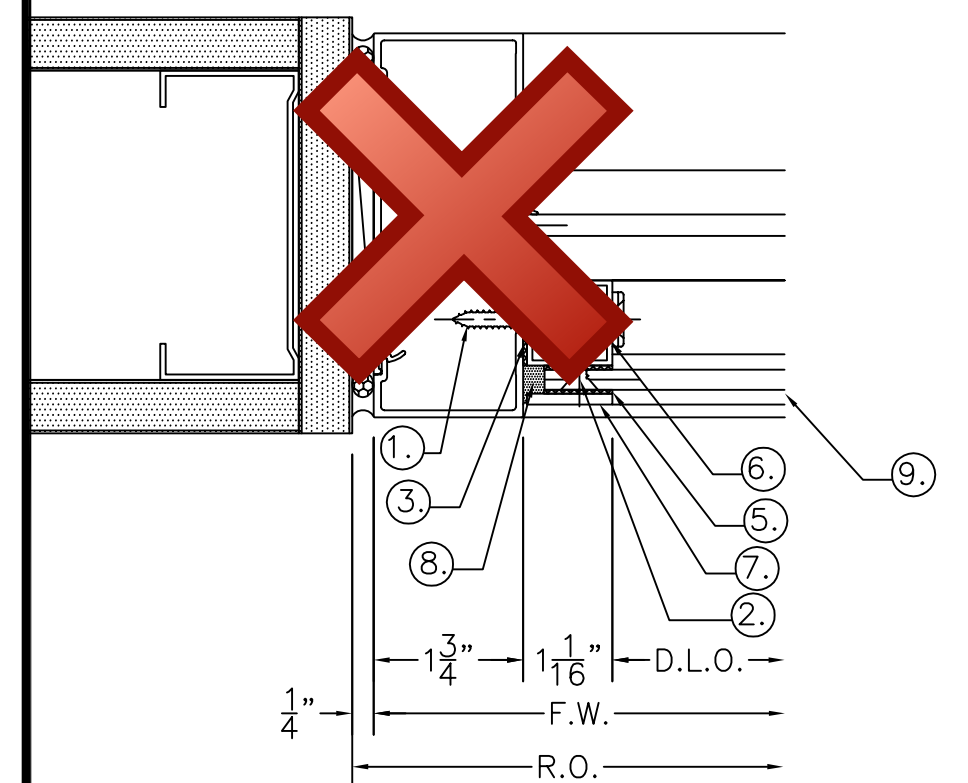
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**TYP. SILL**



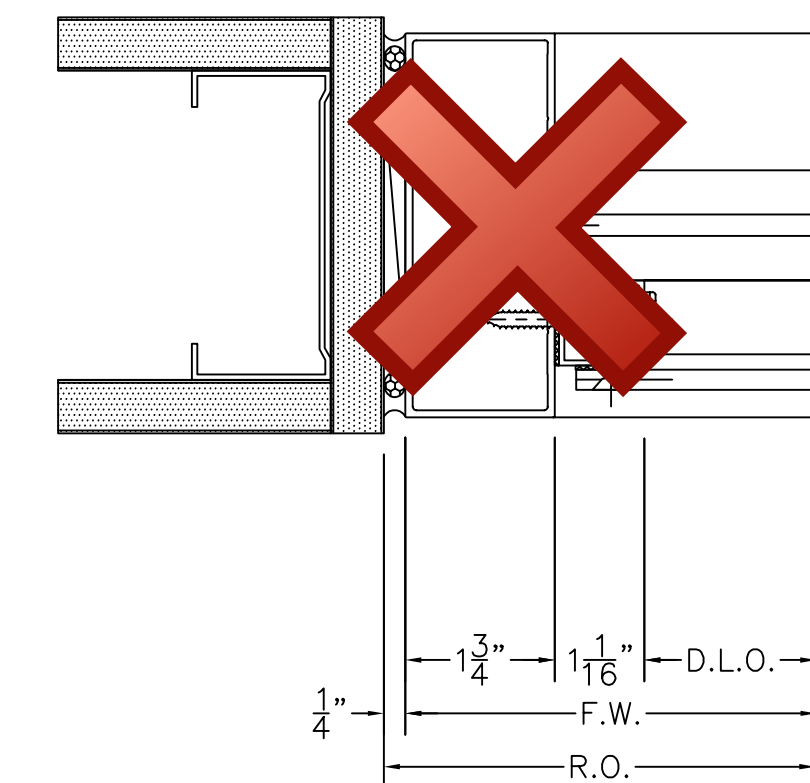
25 VERTICAL  
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ARCH. SHEET REF.:  
**TYP. VERTICAL**



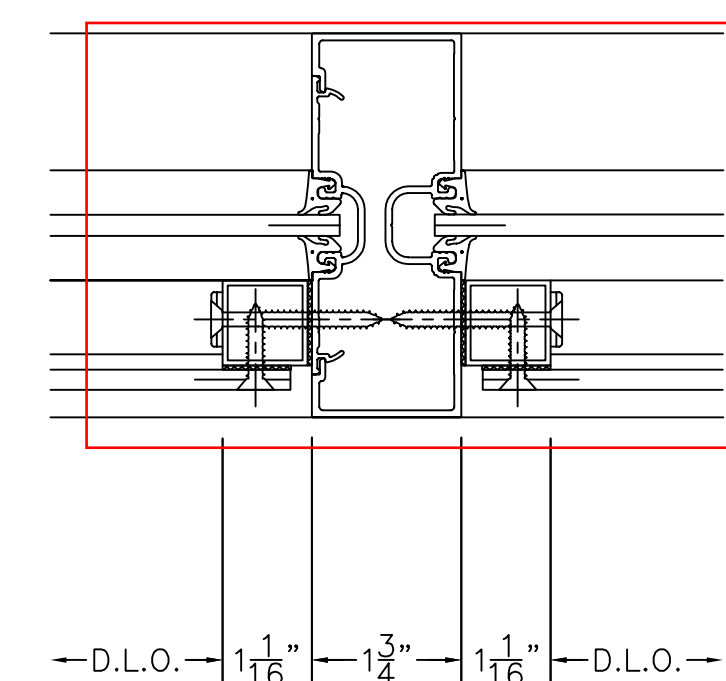
24 JAMB  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:  
**TYP. VERTICAL**



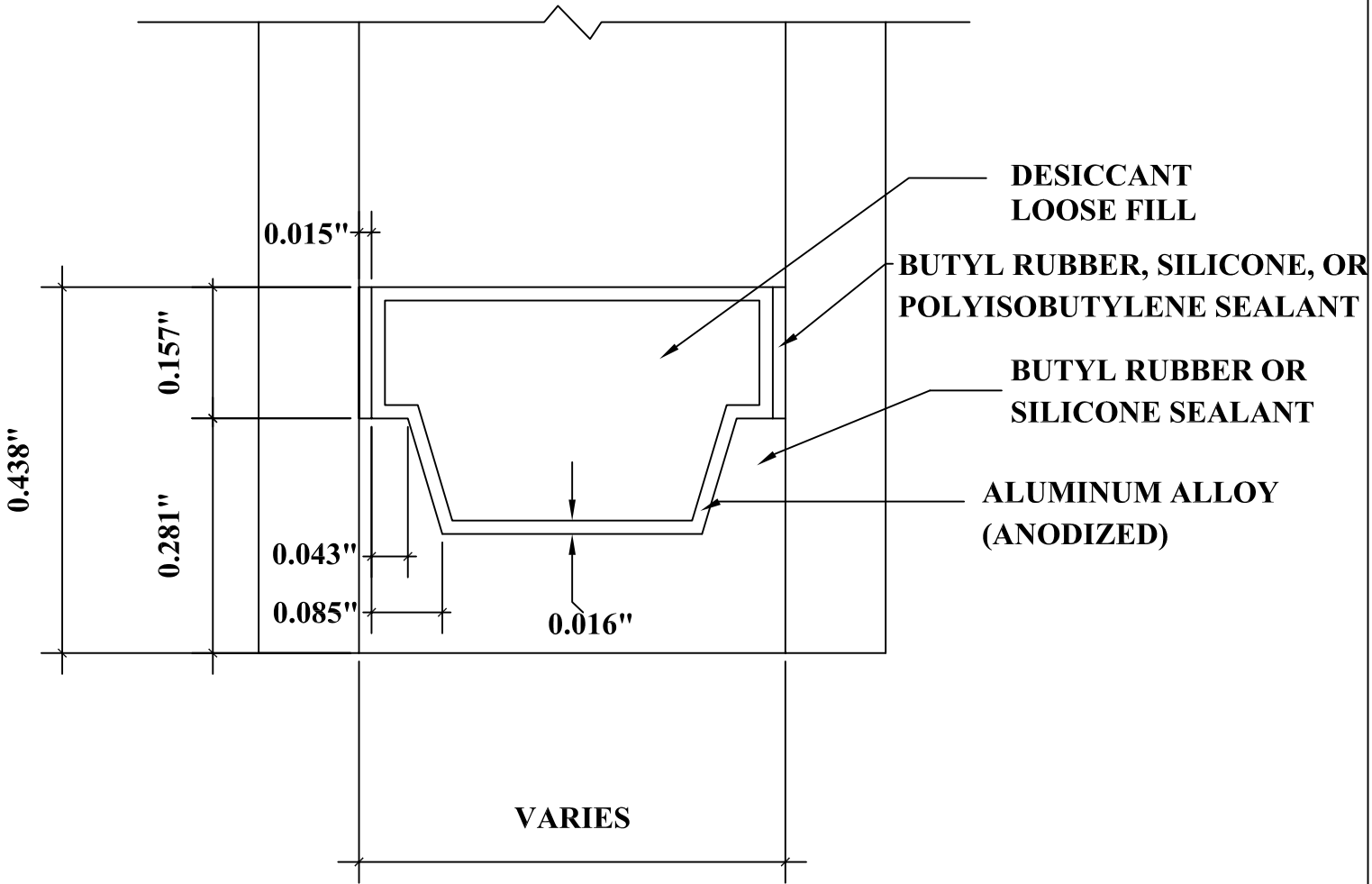
29 JAMB  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:  
**TYP. VERTICAL**



30 VERTICAL  
ARCH. DETAIL REF.:  
ARCH. SHEET REF.:  
**TYP. VERTICAL**



**intertek** Report #: 18786-116-45  
Total Quality Assured. Date: 9/18/2018  
Verified by: *[Signature]*



DETAIL FOR THERMAL MODELING OF  
ALUMINUM SPACER (A1-D)

COG Data for Storefront (I8786.01-116-45)

ID	IG Name	Overall IG Thickness (in)	Ufactor COG (Btu/h*ft <sup>2</sup> *F)	SHGC (COG)	RHG (Btu/h*ft <sup>2</sup> )	Tsol	Routsol	Rinsol	VLT (COG)	Rinvis	Routvis	Tuv	Tdw-K	Tdw-ISO
1	Single Glazed: Energy Advantage (#2) (6mm)	0.22	0.6436	0.7042	168.80	0.6615	0.0997	0.1130	0.8186	0.1082	0.1016	0.4939	0.5563	0.7117
2	Dual Glazed: SB70XL on Starphire / air / clr (6mm/6mm)	0.95	0.2850	0.2753	66.98	0.2447	0.5227	0.3747	0.6381	0.1264	0.1174	0.0572	0.2191	0.4289
3	0.236" Defense Lite (w/film) over Single Glazed	1.96	0.3443	0.6591	155.70	0.5512	0.1259	0.1439	0.7076	0.1536	0.1442	0.0000	0.1717	0.4324
4	0.236" Defense Lite (w/film) over Dual Glazed	2.68	0.1992	0.2798	67.14	0.2071	0.4403	0.3839	0.5521	0.1540	0.1560	0.0000	0.1241	0.3243

 <p><b>intertek</b> Total Quality. Assured.</p>	Report #:	<u>18786-116-45</u>
	Date:	<u>9/18/2018</u>
	Verified by:	<u></u>