

GENERAL NOTES:

1. BERTHA H.V. ACCORDION SHUTTER SYSTEM WITH H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3 SHOWN ON THIS PRODUCT EVALUATION DOCUMENT (P.E.D.) HAS BEEN VERIFIED FOR COMPLIANCE IN ACCORDANCE WITH THE 2023 (8th EDITION) OF THE FLORIDA BUILDING CODE. THIS ACCORDION SHUTTER SYSTEM SHALL NOT BE INSTALLED AT HIGH VELOCITY HURRICANE ZONES.

DESIGN WIND LOADS SHALL BE DETERMINED AS PER SECTION 1609 OF THE ABOVE MENTIONED CODE, FOR A BASIC WIND SPEED REQUIRED BY THE JURISDICTION WHERE SHUTTER WILL BE INSTALLED WITH A DIRECTIONALITY FACTOR $K_d=0.85$, USING ASCE 7-22 AND SHALL NOT EXCEED THE MAXIMUM (A.S.D.) DESIGN PRESSURE RATINGS INDICATED ON SHEETS 5, 6, 7, 8 & 18.

IN ORDER TO VERIFY THE ABOVE CONDITION, ULTIMATE DESIGN WIND LOADS DETERMINED PER ASCE 7-22 SHALL BE FIRST REDUCED TO A.S.D. DESIGN WIND LOADS BY MULTIPLYING THEM BY 0.6 IN ORDER TO COMPARE THESE W/ MAX. (A.S.D) DESIGN PRESSURE RATINGS INDICATED ON SHEETS 5, 6, 7, 8 & 18.

IN ORDER TO VERIFY THAT ANCHORS ON THIS P.E.D., AS TESTED, WERE NOT OVER STRESSED, A 33 % INCREASE IN ALLOWABLE STRESS FOR WIND LOADS WAS NOT USED IN THEIR ANALYSIS. HOWEVER, A WIND LOAD DURATION FACTOR $CD=1.60$ WAS USED FOR VERIFICATION OF FASTENERS SPACING IN WOOD, PER NDS 2018.

BERTHA H.V. ACCORDION SHUTTER SYSTEM WITH H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3 ADEQUACY FOR WIND AND IMPACT LOADS HAS BEEN VERIFIED IN ACCORDANCE WITH SECTION 1609.1.2 OF THE ABOVE MENTIONED CODE AS PER AMERICAN TEST LAB OF SOUTH FLORIDA REPORTS:

- ① H.V. BLADE #3 #0403.01-08 WITH ADDENDUMS #3 & #3A, DATED 4/30/14, AS PER PROTOCOLS TAS 201, 202 & 203 AND ASTM E-330, ASTM E-1886 AND E-1996 STANDARDS (MISSILE LEVEL D, WIND ZONES 1,2,3&4), 0825.01-10 (WITH ADDENDUM #2, DATED 4/30/14), 1220.01-10, 1209.01-10 & 0422.02-14, AS PER PROTOCOLS TAS-201, TAS 202 & TAS-203, LARGE MISSILE.
 - ① H.V. BLADE #3 WORKING IN UNISON WITH ①A H.V. WINDOW BLADE #3 #0829.01-08 WITH ADDENDUM #2, DATED 4/30/14, AS PER PROTOCOLS TAS-201, TAS 202 & TAS-203 AND ASTM E-330, ASTM E-1886 AND E-1996 STANDARDS (MISSILE LEVEL D, WIND ZONES 1, 2, 3 & 4).
 - ① H.V. BLADE #3 AND ①A H.V. WINDOW BLADE #3 ARE ENGINEERED TO WORK IN UNISON WITH EACH OTHER UNDER THE GENERAL LIMITATIONS AND CONDITIONS OF USE INDICATED ON SHEET 18.
2. BERTHA ACCORDION PINS ③③, ③④, ③⑤ OR ALTERNATE ③⑥, SHALL BE AS INDICATED ON SHEETS 3 & 4, USED AT BLADE'S KNUCKLE. ACCORDION PINS ③②, USED AT HV DIRECT MOUNT SHALL BE AS INDICATED ON SHEET 3. PINS SHALL BE 410-HT MINIMUM SERIES STAINLESS STEEL SCREWS WITH 173.6 KSI YIELD STRENGTH AND 187.4 KSI TENSILE STRENGTH. PINS SHALL BE COATED WITH BERTHA HV DACROSHIELD COATING SYSTEM AS MANUFACTURED BY APPROVED COATING APPLICATORS, REGISTERED WITH AMERICAN SHUTTER SYSTEMS ASSOCIATION.
3. ALL ALUMINUM EXTRUSIONS SHALL BE ALUMINUM ASSOCIATION 6063-T6 ALLOY AND TEMPER, WITH $F_y = 27.1$ ksi MINIMUM (UNLESS OTHERWISE NOTED). ALL ALUMINUM EXTRUSIONS IN CONTACT WITH DISSIMILAR MATERIALS SHALL COMPLY WITH SECTION III-6 OF THE 2020 ALUMINUM DESIGN MANUAL.
4. ALL SCREWS TO BE STAINLESS STEEL 304 OR 316 AISI SERIES OR CORROSION RESISTANT COATED CARBON STEEL AS PER DIN 50018 AND SECTION 2411.3.3.4 OF THE FLORIDA BUILDING CODE WITH 50 ksi YIELD STRENGTH AND 90 ksi TENSILE STRENGTH.
5. BOLTS TO BE ASTM A-307 GALVANIZED STEEL, OR AISI 304 SERIES STAINLESS STEEL WITH 35 ksi MINIMUM YIELD STRENGTH.
6. SEE SHEETS 6 & 8 FOR ANCHORS SPECIFICATIONS ON DIFFERENT SUBSTRATES.
7. THIS BERTHA H.V. ACCORDION SHUTTER SYSTEM BEARS A U.S. PATENT #6779582. COMPONENTS OF THIS APPROVAL ARE COVERED, IN WHOLE OR IN PART BY U.S. PATENT #5458179 ISSUED TO EASTERN METAL SUPPLY, INC.
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE SOUNDNESS OF THE STRUCTURE WHERE SHUTTER IS TO BE ATTACHED TO INSURE PROPER ANCHORAGE. CONTRACTOR TO SEAL/CAULK ALL SHUTTER COMPONENT EDGES WHICH REMAIN, THRU FASTENING IN CONTINUOUS CONTACT WITH THE BUILDING TO PREVENT WIND/RAIN INTRUSION.
9. EACH UNIT MUST BEAR PERMANENT LABEL IN A VISIBLE PLACE WITH WARNING NOTE: DURING PERIODS OF HURRICANE WARNINGS HOME OWNER, TENANT, OR OTHERS, MUST PROPERLY CLOSE ALL CENTERMATES AND ENGAGE OR LOCK ALL LOCKS.
10. SHUTTER MANUFACTURER'S LABEL SHALL BE LOCATED ON A READILY VISIBLE LOCATION AT ACCORDION SHUTTER IN ACCORDANCE WITH SECTION 1709.9.2 OF FLORIDA BUILDING CODE. ONE LABEL SHALL BE PLACED FOR EVERY OPENING.
11. BERTHA H.V. ACCORDION SHUTTER SYSTEM WITH H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3 INSTALLATION SHALL COMPLY WITH SPECS INDICATED IN THIS DRAWING PLUS ANY BUILDING AND ZONING REGULATIONS PROVIDED BY THE JURISDICTION WHERE PERMIT IS APPLIED TO.
12. (a) THIS P.E.D. PREPARED BY THIS ENGINEER IS GENERIC AND DOES NOT PROVIDE INFORMATION FOR A SITE SPECIFIC PROJECT; i.e. WHERE THE SITE CONDITIONS DEViate FROM THE P.E.D.
- (b) CONTRACTOR TO BE RESPONSIBLE FOR THE SELECTION, PURCHASE AND INSTALLATION INCLUDING LIFE SAFETY OF THIS PRODUCT, BASED ON THIS P.E.D., PROVIDED HE/SHE DOES NOT DEVIATE FROM THE CONDITIONS DETAILED ON THIS DOCUMENT. CONSTRUCTION SAFETY AT SITE IS THE CONTRACTOR'S RESPONSIBILITY.
- (c) THIS P.E.D. WILL BE CONSIDERED INVALID IF ALTERED BY ANY MEANS.
- (d) SITE SPECIFIC PROJECTS SHALL BE PREPARED BY A FLORIDA REGISTERED ENGINEER OR ARCHITECT WHICH WILL BECOME THE ENGINEER OF RECORD (E.O.R.) FOR THE PROJECT AND WHO WILL BE RESPONSIBLE FOR THE PROPER USE OF THE P.E.D. ENGINEER OF RECORD, ACTING AS A DELEGATED ENGINEER TO THE P.E.D. ENGINEER SHALL SUBMIT TO THIS LATTER THE SITE SPECIFIC DRAWINGS FOR REVIEW.
- (e) ORIGINAL P.E.D. SHALL BEAR THE DATE AND ORIGINAL SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER OF RECORD THAT PREPARED IT.

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THIS DRAWING SHALL ONLY BE USED TO OBTAIN PERMITS IN THE STATE OF FLORIDA

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

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West Palm Beach, FL 33407

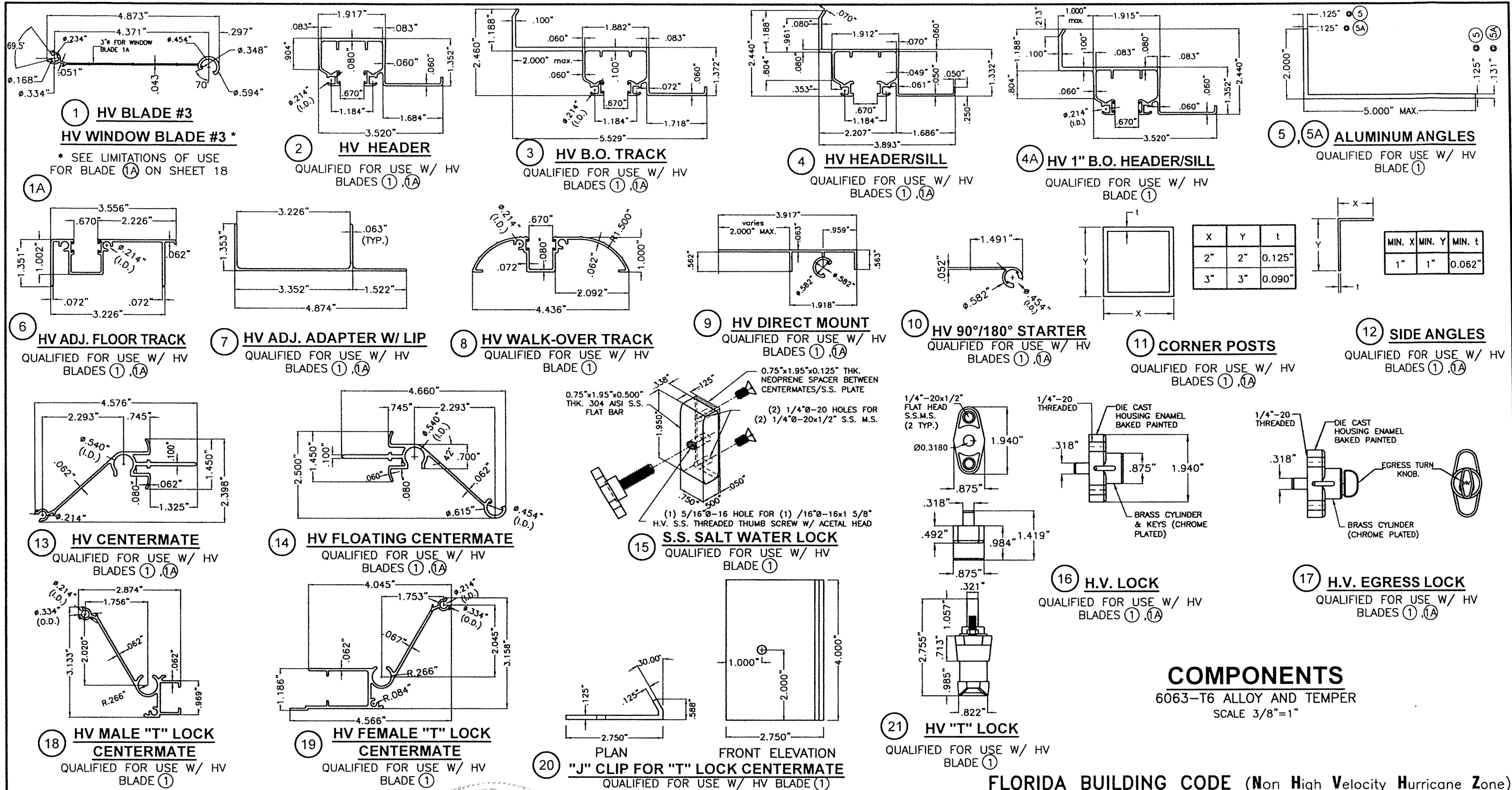
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BERTHA HV™
Accordion Shutter System

H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3

REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-133
SHEET
1 OF 18



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WALTER A. TILLIT JR.
 LICENSE
 No. 44167
 PROFESSIONAL ENGINEER
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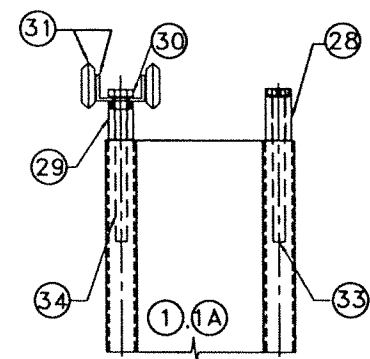
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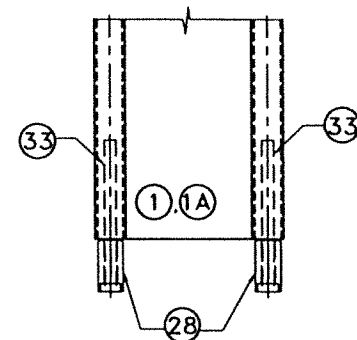
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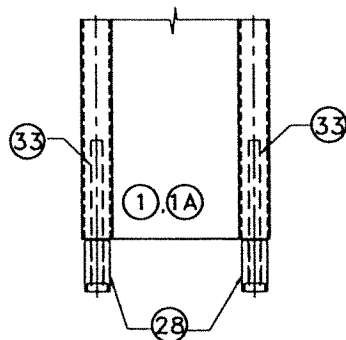
BERTHA HV™ Accordion Shutter System			
H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3			
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			
			DRAWING No 23-133
			SHEET 2 OF 18



EXTERIOR



EXTERIOR



ASSEMBLY AT (31).

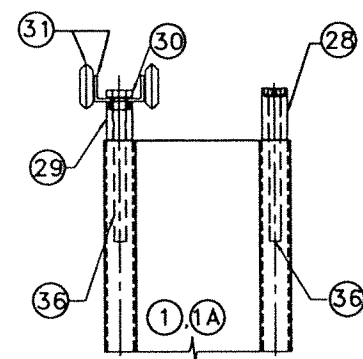
(31) GO EVERY OTHER INTERIOR KNUCKLE)

ASSEMBLY IN BETWEEN (31).

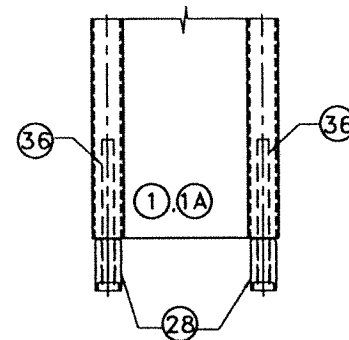
TYPICAL SHUTTER ASSEMBLY WHEN 2 $\frac{3}{4}$ " LONG NOMINAL PINS ARE USED *

SCALE: 1/4" = 1"

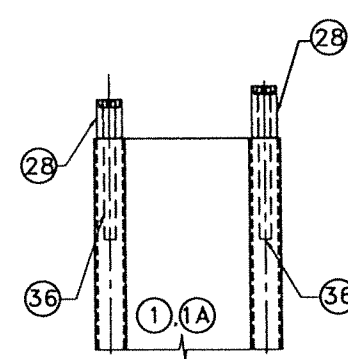
* THE HV PINS & BUSHINGS ARE PRE-ASSEMBLED. TO KEEP BUSHINGS ON THE PIN A NOMINAL 0.275" O.D. x 0.130" I.D. x 0.072" THK. RUBBER RING IS PLACED OVER THE END OF THE SCREW, THE RING IS LEFT ON THE PIN WHEN INSTALLED INTO THE KNUCKLE'S SCREW BOSS.



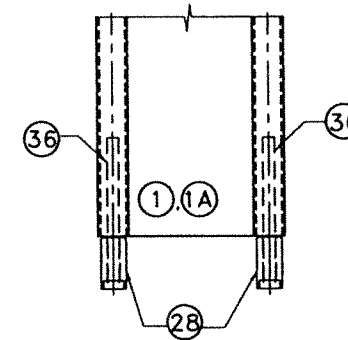
EXTERIOR



ASSEMBLY AT (31).
(31) GO EVERY OTHER INTERIOR KNUCKLE)



EXTERIOR

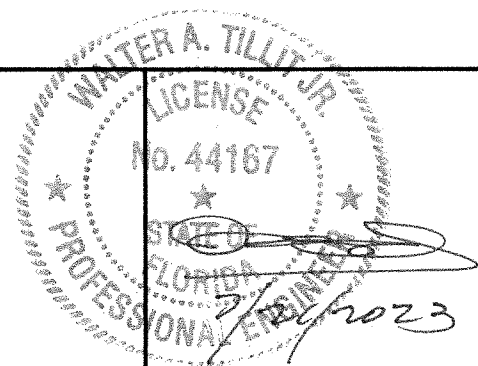


ASSEMBLY IN BETWEEN (31).

TYPICAL SHUTTER ASSEMBLY WHEN 3" LONG NOMINAL PINS ARE USED

SCALE: 1/4" = 1"

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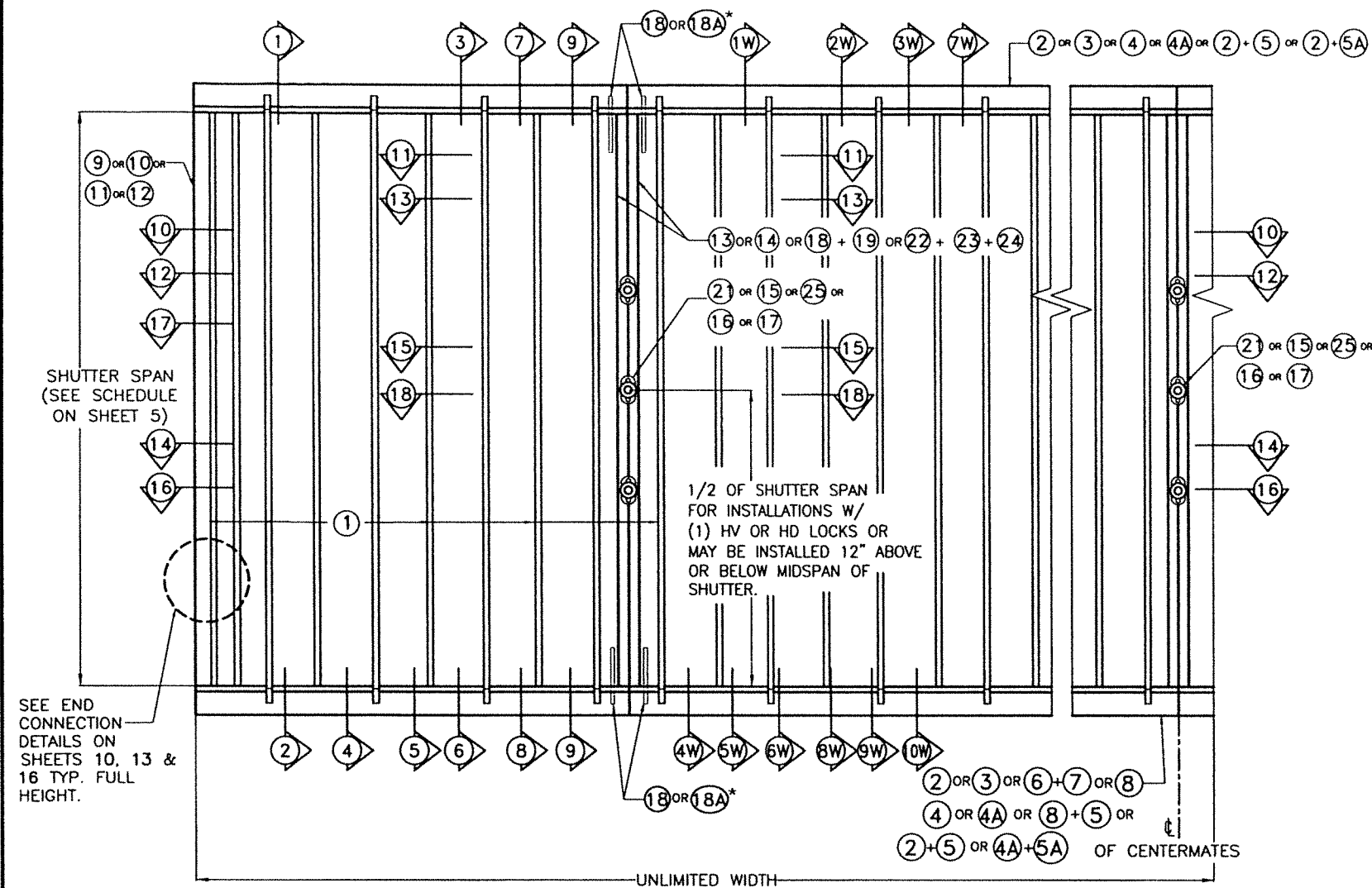


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REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133
3			
4			SHEET 3A OF 18
5			
6			



TYPICAL ① H.V. BLADE #3 SHUTTER ELEVATION
N.T.S.

SEE LIMITATIONS OF USE FOR
BLADE ①A ON SHEET 18.

NOTES ON HV, HV "T" AND HD LOCKS AND CENTERMATES:
VALID ONLY FOR INSTALLATIONS W/ HV ① BLADE

* APPLICATION W/ HV LOCKS AND CENTERMATES:

- MANDATORY CONDITION #1:** ONE HV LOCK ⑮ or ⑯ or ⑰ SHALL BE USED AT 1/2 OF SHUTTER SPAN FOR ANY SPAN OR 12" ABOVE OR BELOW 1/2 OF SHUTTER SPAN FOR SPANS UP TO 156", AND FOR INSTALLATIONS AT ANY ELEVATION EXCEPT FOR INSTALLATIONS INTO METAL STUDS. HV LOCK ⑮ or ⑯ or ⑰ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK, ATTACHED TO ⑬ or ⑭ CENTERMATES W/ (2) 1/4"-20 x 1/2" LONG FLAT HEAD S.S. M.S. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION. USE OF LOCKING RODS ⑳ W/ ㉑ AND ㉒A IS COMPLETELY OPTIONAL.
- MANDATORY CONDITION #2 FOR INSTALLATIONS INTO METAL STUDS:** ONE HV LOCK ⑮ or ⑯ or ⑰ SHALL BE USED AT 1/2 OF SHUTTER SPAN FOR ANY SPAN OR 12" ABOVE OR BELOW 1/2 OF SHUTTER SPAN FOR SPANS UP TO 156", AND FOR INSTALLATIONS AT ANY ELEVATION EXCEPT FOR INSTALLATIONS INTO METAL STUD. HV LOCK ⑮ or ⑯ or ⑰ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK, ATTACHED TO ⑬ or ⑭ CENTERMATES W/ (2) 1/4"-20 x 1/2" LONG FLAT HEAD S.S. M.S. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION. USE OF LOCKING RODS ㉒A W/ ㉑ OR ㉒A TOP AND BOTTOM IS COMPLETELY MANDATORY.
- MANDATORY CONDITION #3 FOR KEYSTONE MOUNTING INSTALLATIONS:** ONE HV LOCK 15 or 16 or 17 SHALL BE USED AT 1/2 OF SHUTTER SPAN FOR ANY SPAN OR 12" ABOVE OR BELOW 1/2 OF SHUTTER SPAN FOR SPANS UP TO 96", AND FOR INSTALLATIONS AT ANY ELEVATION. HV LOCK 15 or 16 or 17 MAY BE USED AS AN INSIDE OR OUTSIDE LOCK, ATTACHED TO 13 or 14 SYMMETRICAL CENTERMATES W/ (2) 1/4"-20 x 1/2" LONG FLAT HEAD S.S. M.S. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION. USE OF LOCKING RODS 26A W/ 27 OR 27A TOP AND BOTTOM IS COMPLETELY MANDATORY.
- OPTIONAL CONDITION #1:** IF DESIRED, FOR BETTER PERFORMANCE OR FOR SECURITY PURPOSES, UP TO TWO HV LOCKS ⑮, ⑰ OR ⑱ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. CONNECTION OF LOCKS TO CENTERMATES ⑬ OR ⑭ SHALL BE AS INDICATED ON NOTE (1) ABOVE. LOCATION OF LOCKS SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION.

* APPLICATION W/ HV "T" LOCKS AND CENTERMATES:

- SECOND ALTERNATE TO MANDATORY CONDITION #1 VALID ONLY FOR HV "T" LOCK ㉑, AND CENTERMATES ⑬ AND ⑭:** ONE ALTERNATE HV "T" LOCK ㉑ MAY BE INSTALLED IN LIEU OF OTHER LOCKS FOR ANY SPAN AND INSTALLATION AT ANY ELEVATION. ALTERNATE LOCK ㉑ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF LOCK ㉑ INCLUDES USING "J" CLIP ㉒, AS SHOWN ON SECTION 15, SHEET 12, WHICH MUST BE CONNECTED TO CENTERMATES ⑬ AND ⑭ W/ 1/4" ϕ-20x1" S.S.M.S. INTO A 1/4" ϕ x 5/8" RIVNUT. LOCK MAY BE INSTALLED AT MIDSPAN OR 12" MAXIMUM ABOVE AND BELOW MIDSPAN. USE OF TWO LOCKING RODS ㉒ or ㉒A TOP AND BOTTOM IS MANDATORY.

* APPLICATION W/ HD LOCKS & CENTERMATES:

- THIRD ALTERNATE TO MANDATORY CONDITION #1 VALID FOR HD LOCK ㉓ W/ (2) HD CENTERMATES ㉔ OR ㉕ OR ㉖ + ㉗ W/ ㉘:** ONE ALTERNATE HD LOCK ㉓ MAYBE USED IN LIEU OF OTHER LOCKS FOR ANY SPAN AND INSTALLATIONS AT ANY ELEVATION. ALTERNATE HD LOCK ㉓ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF HD LOCK ㉓ TO ㉔ IS W/ (3) #8 x 3/8" F.H. S.S.M.S., AND INCLUDES REINFORCEMENT INSERT ㉙ AS SHOWN ON SECTION 18, SHEET 12. LOCK MAY BE INSTALLED AT MIDSPAN OR 12" MAXIMUM BELOW OR ABOVE MIDSPAN. USE OF LOCKING RODS ㉚ or ㉚A IS COMPLETELY OPTIONAL.

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H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3			
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			
			DRAWING No 23-133
			SHEET 4 OF 18

MAXIMUM SHUTTER SPAN "L+" OR "L-"* (ft.)
FOR INSTALLATIONS W/ ① HV BLADE. Δ

MAXIMUM A.S.D. PRESSURE RATING (psf) (+ or -)	POURED CONCRETE, CONCRETE BLOCK † AND WOOD INSTALLATIONS ♣						
	WALL MOUNTING		FLOOR / CEILING MOUNTING		MIN. SEPARATION TO GLASS		
	L+ (FT)	L- (FT)	L+ (FT)	L- (FT)	WIND ZONES 1, 2 & 3	WIND ZONE 4	
						KNUCKLE	LOCK/ CENTERMATE
35	12' - 7"	13' - 0"	12' - 7"	13' - 0"	1"	4 11/16"	5 1/2"
40	11' - 10"	12' - 3"	11' - 10"	12' - 3"	1"	4 11/16"	5 1/2"
45	11' - 9"	11' - 11"	11' - 9"	11' - 11"	1"	4 11/16"	5 1/2"
50	11' - 5"	11' - 6"	11' - 5"	11' - 6"	1"	4 11/16"	5 1/2"
55	11' - 4"	11' - 4"	11' - 4"	11' - 4"	1"	4 11/16"	5 1/2"
60	10' - 6"	10' - 6"	10' - 6"	10' - 6"	1"	4 11/16"	5 1/2"
65	8' - 8"	8' - 8"	8' - 8"	8' - 8"	1"	3 5/8"	5 1/8"
70	8' - 3"	8' - 3"	8' - 3"	8' - 3"	1"	3 5/8"	5 1/8"
75	7' - 9"	7' - 9"	7' - 9"	7' - 9"	1"	3 5/8"	5 1/8"
80	7' - 3"	7' - 3"	7' - 3"	7' - 3"	1"	3 5/8"	5 1/8"
85	6' - 10"	6' - 10"	6' - 10"	6' - 10"	1"	3 5/8"	5 1/8"
90	5' - 7"	5' - 7"	5' - 7"	5' - 7"	1"	3 5/8"	5 1/8"
95	5' - 6"	5' - 6"	5' - 6"	5' - 6"	1"	3 5/8"	5 1/8"
100	5' - 5"	5' - 5"	5' - 5"	5' - 5"	1"	3 5/8"	5 1/8"
105	5' - 3"	5' - 3"	5' - 3"	5' - 3"	1"	3 5/8"	5 1/8"
110	5' - 2"	5' - 2"	5' - 2"	5' - 2"	1"	3 5/8"	5 1/4"

† EXCEPT THAT MAXIMUM SHUTTER SPAN "L+" OR "L-" AND MAXIMUM A.S.D. DESIGN PRESSURE RATING FOR INSTALLATIONS INTO CONCRETE OR CONCRETE BLOCK SHALL BE LIMITED AS FOLLOWS:
1- CONNECTIONS TO KEYSTONE MOUNTING LIMITED TO +64,-72 p.s.f. AND 7'-6" SPAN, SEE SECTION 9 ON SHEET 10.

♣ EXCEPT THAT MAXIMUM SHUTTER SPAN "L+" OR "L-" AND MAXIMUM A.S.D. DESIGN PRESSURE RATING FOR INSTALLATIONS INTO WOOD SHALL BE LIMITED AS FOLLOWS:
1- CONNECTIONS TO PLYWOOD LIMITED TO ±62 p.s.f. AND 8'-11" SPAN, SEE SECTION 5W ON SHEET 14.
2- CONNECTIONS TO HOLLOW CEILING LIMITED TO ±62 p.s.f. AND 8'-0" SPAN, SEE SECTION 2W ON SHEET 14.

MAXIMUM SHUTTER SPAN "L+" OR "L-"* (ft.)
FOR INSTALLATIONS W/ ① HV BLADE. Δ

MAXIMUM A.S.D. PRESSURE RATING (psf) (+ or -)	FOR METAL STUD IN INSTALLATIONS ■						
	WALL MOUNTING		FLOOR / CEILING MOUNTING		MIN. SEPARATION TO GLASS		
	L+ (FT)	L- (FT)	L+ (FT)	L- (FT)	WIND ZONES 1, 2 & 3	WIND ZONE 4	
						KNUCKLE	LOCK/ CENTERMATE
64	7' - 0"	7' - 0"	-	-	1"	3 7/16"	5 1/8"
72	6' - 7"	6' - 7"	-	-	1"	3 7/16"	5 1/8"

■ SEE SECTION ⑩ ON SHEET 10A.

MAXIMUM SHUTTER SPAN "L+" OR "L-"* (ft.) FOR
INSTALLATIONS W/ ① & ①A HV BLADES. Δ

MAXIMUM A.S.D. PRESSURE RATING (psf) (+ or -)	POURED CONCRETE, CONCRETE BLOCK AND WOOD INSTALLATIONS						
	WALL MOUNTING		FLOOR / CEILING MOUNTING		MIN. SEPARATION TO GLASS		
	L+ (FT)	L- (FT)	L+ (FT)	L- (FT)	WIND ZONES 1, 2 & 3	WIND ZONE 4	
						KNUCKLE	LOCK/ CENTERMATE
55	9' - 6"	9' - 6"	9' - 6"	9' - 6"	1"	4 3/8"	4 1/4"
62	8' - 11"	8' - 11"	8' - 11"	8' - 11"	1"	4 3/8"	4 1/4"

◆ SEE LIMITATIONS OF USE FOR
BLADE ①A ON SHEET 18.

* NOTES:

- (1) L+: MAXIMUM ALLOWABLE SPAN FOR A GIVEN POSITIVE A.S.D. DESIGN PRESSURE RATING.
L-: MAXIMUM ALLOWABLE SPAN FOR A GIVEN NEGATIVE A.S.D. DESIGN PRESSURE RATING.
- (2) PROCEDURE TO DETERMINE MAXIMUM SPAN FOR WALL MOUNTINGS (TOP/BOTTOM) OR FLOOR/CEILING:

GIVEN A POSITIVE A.S.D. DESIGN PRESSURE RATING, DETERMINE MAXIMUM SPAN "L+" FROM SCHEDULES.
GIVEN A NEGATIVE A.S.D. DESIGN PRESSURE RATING, DETERMINE MAXIMUM SPAN "L-" FROM SCHEDULES.

FINAL MAXIMUM ALLOWABLE SPAN IS EQUAL TO THE MINIMUM DETERMINED SPAN BETWEEN "L+" AND "L-".
- (3) PROCEDURE TO DETERMINE MAXIMUM SPAN FOR COMBINATIONS IN BETWEEN WALL MOUNTINGS W/ FLOOR/CEILING MOUNTINGS:

FOR A GIVEN POSITIVE A.S.D. DESIGN PRESSURE RATING:
DETERMINE:
L1+= MAX. SPAN FOR WALL MOUNTING INSTALLATIONS.
L2+= MAX. SPAN FOR FLOOR/CEILING MOUNTING INSTALLATIONS.

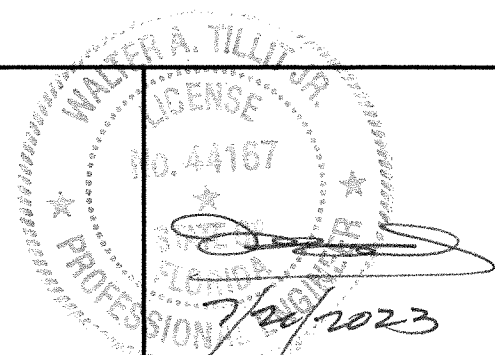
FOR A GIVEN NEGATIVE A.S.D. DESIGN PRESSURE RATING:
DETERMINE:
L1-= MAX. SPAN FOR WALL MOUNTING INSTALLATIONS.
L2-= MAX. SPAN FOR FLOOR/CEILING MOUNTING INSTALLATIONS.

FINAL MAXIMUM ALLOWABLE SPAN IS EQUAL TO THE MINIMUM BETWEEN "L1+", "L2+", "L1-" AND "L2-".
- (4) GO TO ANCHOR SCHEDULE ON SHEETS 6 & 7 FOR CONCRETE AND BLOCK, SHEET 8 FOR WOOD AND TO SECTION ON SHEET 10 FOR KEYSTONE MOUNTINGS AND SHEET 10A FOR METAL STUDS WITH FINAL MAXIMUM ALLOWABLE SPAN AND NEGATIVE DESIGN LOAD TO DETERMINE MAXIMUM ANCHOR SPACING.
- (5) MINIMUM SEPARATION TO GLASS SHALL BE THE GREATEST MEASURED FROM EITHER REAR OF KNUCKLES OR REAR OF LOCKS/CENTERMATES (AS APPLICABLE) TO GLASS.

Δ INSTALLATION LEGEND APPLICABLE FOR ① HV AND ①A HV BLADES

SUBSTRATES MOUNTINGS	CONCRETE & MASONRY	METAL STUD	WOOD
WALL	1, 2, 3, 4, 5 & 9	10	1W, 3W, 4W 7W, 9W & 10W
FLOOR/CEILING	6, 7 & 8	---	2W, 3W, 6W & 8W

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)



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WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167

A.S.S.A.
American Shutter Systems
Association, Inc.
4268 Westroads Drive
West Palm Beach, FL 33407

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BERTHA HV™ Accordion Shutter System H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3			
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133 SHEET 5 OF 18
3			
4			
5			
6			

(SEE MOUNTINGS 1, 2, 3, 4 & 5 ON SHEET 9)

MAXIMUM SPAN (ft)	POURED CONCRETE																													
	① & ② WALL MOUNTINGS W/ ③ , ④ OR ④A										③ & ④ WALL MOUNTING W/ ② + ⑤										⑤ WALL SILL MOUNTING W/ ⑧ + ⑤									
	A.S.D. DESIGN NEGATIVE LOAD (psf)										A.S.D. DESIGN NEGATIVE LOAD (psf)										A.S.D. DESIGN NEGATIVE LOAD (psf)									
	30	40	50	60	70	80	90	100	110	30	40	50	60	70	80	90	100	110	30	40	50	60	70	80	90	100	110			
3'-0" OR LESS	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9			
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
4'-0"	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	9	9	9	9	9	8	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
5'-0"	9	9	9	9	9	9	9	7.5	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	9	9	9	8	5.5	4.5	3.5	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
	9	9	9	9	9	9	8.5	7	5.5	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9				
6'-0"	9	9	9	9	9	8.5	6.5	5	-	9	9	9	9	9	9	9	9	-	9	9	9	9	9	9	9	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	9	9	6.5	4.5	4	3	-	9	9	9	9	9	9	9	9	-	9	9	9	9	9	9	9	-				
	9	9	9	9	9	7.5	5.5	4.5	-	9	9	9	9	9	9	9	9	-	9	9	9	9	9	9	9	-				
7'-0"	9	9	9	9	8	6	4.5	-	-	9	9	9	9	9	9	9	-	-	9	9	9	9	9	9	9	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	9	6.5	4.5	3.5	3.5	-	-	9	9	9	9	9	9	9	-	-	9	9	9	9	9	9	9	-				
	9	9	9	9	7	5.5	4	-	-	9	9	9	9	9	9	9	-	-	9	9	9	9	9	9	9	-				
8'-0"	9	9	9	8.5	6	4.5	-	-	-	9	9	9	9	9	9	-	-	-	9	9	9	9	9	9	-	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	8	4.5	3.5	-	-	-	-	9	9	9	9	9	9	-	-	-	9	9	9	9	9	9	-	-				
	9	9	9	7.5	5.5	4	-	-	-	9	9	9	9	9	9	-	-	-	9	9	9	9	9	9	-	-				
9'-0"	9	9	9	6.5	4.5	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	9	5.5	3.5	-	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
	9	9	8.5	5.5	4	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
10'-0"	9	9	7.5	5	4	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	8	4.5	3	-	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
	9	9	7	4.5	-	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
11'-0"	9	9	6	4.5	3.5	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9	6	3.5	-	-	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
	9	9	5.5	4	-	-	-	-	-	9	9	9	9	9	-	-	-	-	9	9	9	9	9	-	-	-				
12'-0"	9	8.5	5	3.5	-	-	-	-	-	9	9	9	9	-	-	-	-	-	9	9	9	9	-	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
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	9	7.5	4.5	-	-	-	-	-	-	9	9	9	9	-	-	-	-	-	9	9	9	9	-	-	-	-				
13'-0"	9	7	-	-	-	-	-	-	-	9	9	-	-	-	-	-	-	-	9	9	-	-	-	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	8.5	4	-	-	-	-	-	-	-	9	9	-	-	-	-	-	-	-	9	9	-	-	-	-	-	-				
	9	6	-	-	-	-	-	-	-	9	9	-	-	-	-	-	-	-	9	9	-	-	-	-	-	-				

ACTUAL EDGE DISTANCE E.D.	FACTOR						
	TAPCON	TAPCON WITH ADVANCED THREADFORM TECHNOLOGY		ALL POINTS SOLID SET	BLUE TAP WITH CAP	TAPPER +	
						MIN. SPACING	
		MIN. SPACING = 3"	MIN. SPACING = 3"			MIN. SPACING = 3 1/2"	MIN. SPACING = 3"
	POURED CONCRETE & CONCRETE BLOCK MIN. E.D. = 3"	POURED CONCRETE MIN. E.D. = 3 1/2"	CONCRETE BLOCK MIN. E.D. = 2 1/2"	POURED CONCRETE & CONCRETE BLOCK MIN. E.D. = 3 1/2"	POURED CONCRETE & CONCRETE BLOCK MIN. E.D. = 3"	POURED CONCRETE MIN. E.D. = 3 1/2"	CONCRETE BLOCK MIN. E.D. = 2 1/2"
3"	1.0	0.90	1.0	0.78	1.0	0.84	1.0
2 1/2"	—	0.81	1.0	—	—	0.67	1.0
2"	—	0.71	—	—	—	0.51	—
1 3/4"	—	0.91	—	—	—	0.43	—
1 1/2"	0.35	—	—	—	—	0.35	—

① HV BLADE #3 OR ① HV BLADE #3 W/
①A HV WINDOW BLADE WORKING IN UNISON◆

◆ SEE LIMITATIONS OF
USE FOR BLADE (1A)
ON SHEET 18.

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

BERTHA HVTM

Accordian Shutter System

H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3

REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133
3			
4			
5			
6			SHEET 6 OF 18

TAPCON OR TAPCON W/ ADVANCED THREADFORM TECHNOLOGY
ALL POINTS SOLID-SET
BLUE TAP WITH CAP
TAPPER +

① HV BLADE #3 OR ① HV BLADE #3 W/ ①A HV WINDOW BLADE WORKING IN UNISON ◆

* SEE ANCHOR SPECIFICATIONS ON SHEET 6

◆ SEE LIMITATIONS OF
USE FOR BLADE (1A)
ON SHEET 18.

MAXIMUM ANCHOR * SPACING (in.) SCHEDULE FOR A GIVEN MAX. SHUTTER SPAN, A.S.D. DESIGN NEGATIVE PRESSURE RATING AND A CORRESPONDING MOUNTING TYPE FOR CONCRETE OR CONCRETE BLOCK INSTALLATIONS

(SEE MOUNTINGS 1 THRU 8, SEE SHEETS 9 & 10)

[illegible]

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)



TILTECO INC.

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FLORIDA Lic. # 44167

A.S.S.A.
American Shutter Systems
Association, Inc.
4268 Westroads Drive
West Palm Beach, FL 33407

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BERTHA HV™
Accordion Shutter System
 H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3

REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133
3			
4			
5			
6			SHEET 7 OF 18

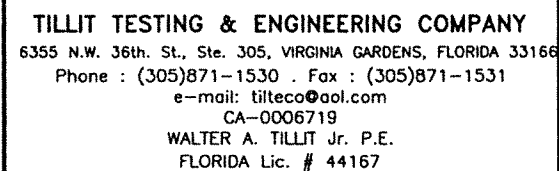
(SEE MOUNTINGS ON SHEETS 14 & 15).

† NOTES ON ANCHORS REQUIREMENTS: WOOD SUBSTRATES.

1. ANCHORS TO WALL, FLOOR OR SOLID WOOD SOFFIT SHALL BE AS FOLLOWS:
 - 1/4" Ø TAPCON OR TAPCON W/ ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDEX W/ MINIMUM PENETRATION OF THREADED AREA AS INDICATED AT EACH SECTION ON SHEETS 14 & 15.EXCEPTION: SEE NOTE 2 BELOW.
2. ANCHORS TO HOLLOW CEILING SHALL BE AS PER MOUNTING TYPE 2W, SHEET 14 AND SHALL CONSIST OF LAG SCREWS AS PER NDS 2018 SPECIFICATIONS.
3. SUBSTRATE SHALL CONSIST OF THE FOLLOWING:
 - SOUTHERN PINE No. 2 W/ G=0.55 (N.D.S)
 - DOUGLAS FIR W/ G=0.50 (N.D.S.)
 - SPRUCE PINE FIR NORTH W/ G=0.43 (N.D.S.)
 - SPRUCE PINE FIR SOUTH W/ G=0.36 (N.D.S.)
 - MIN. 1/2" CDX PLYWOOD (1986 APA)
4. ANCHORS SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS PER NDS 2015

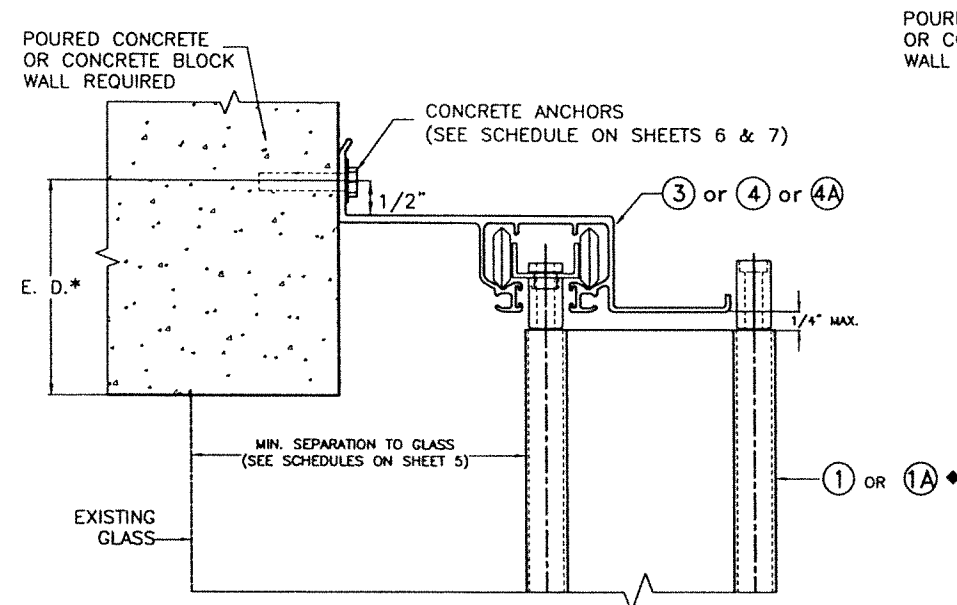
◆ SEE LIMITATIONS OF USE FOR
BLADE (1A) ON SHEET 18.

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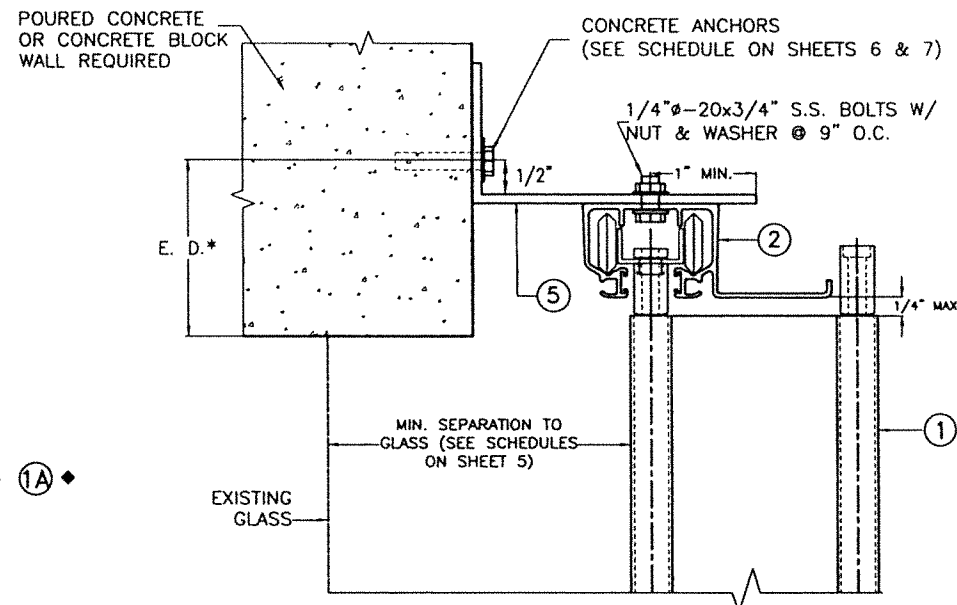


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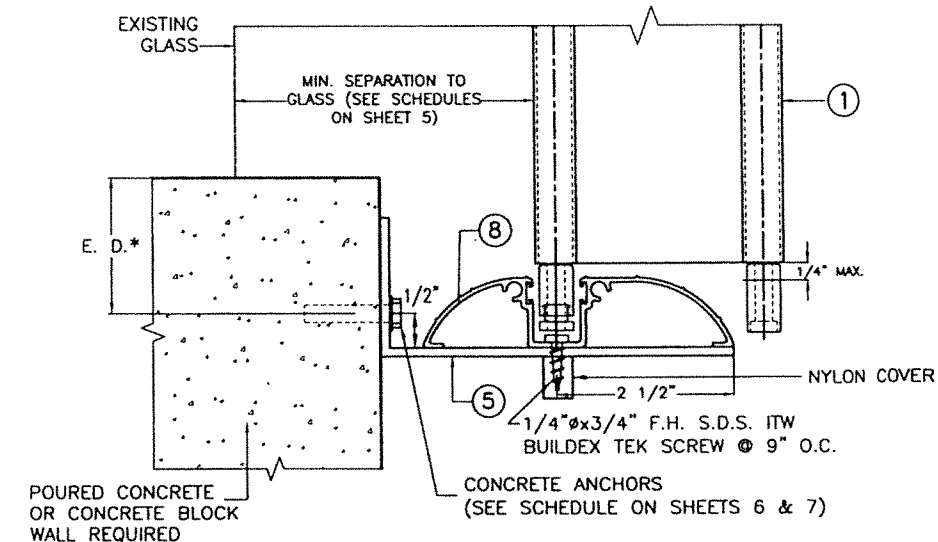
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133
3			
4			
5			SHEET
6			8 OF 18



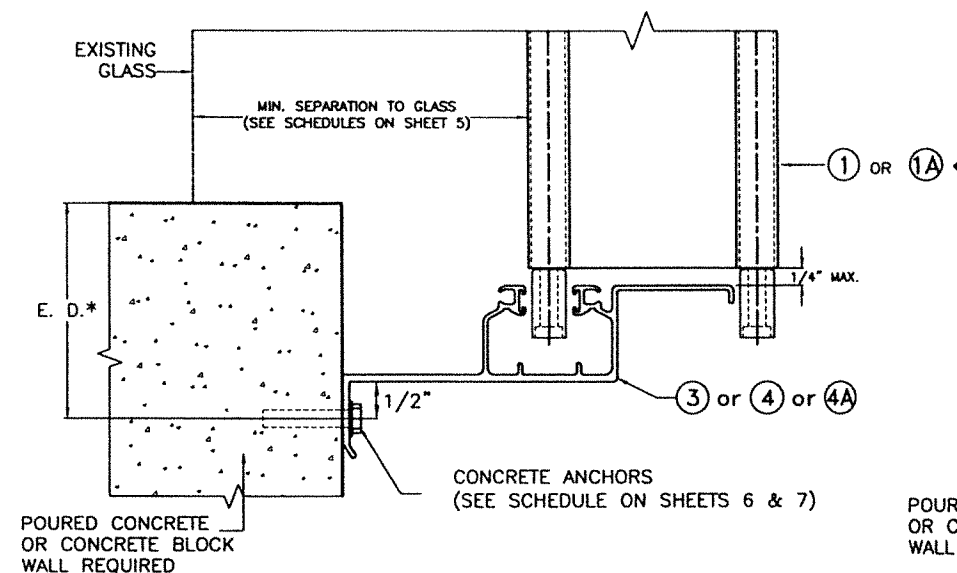
① WALL MOUNTING INSTALLATION



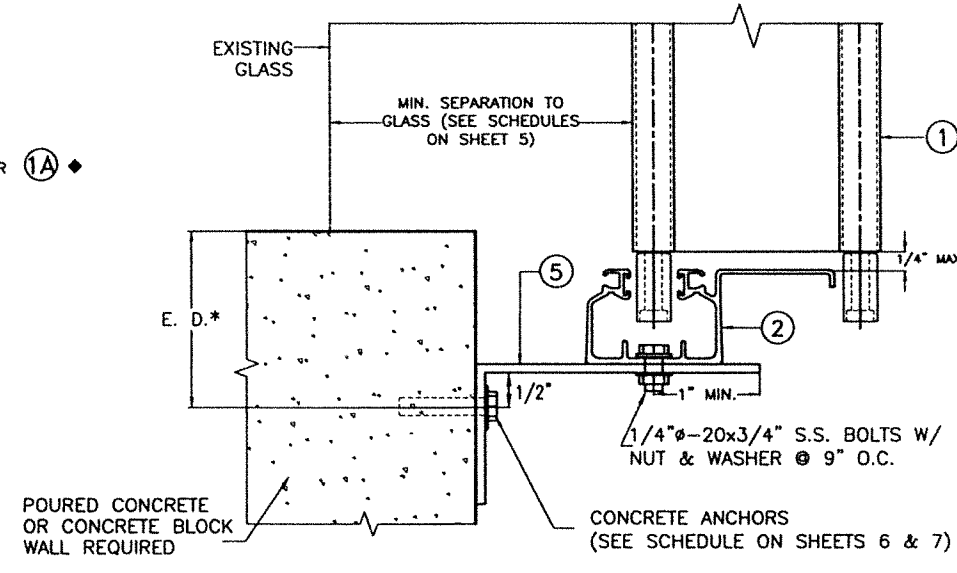
③ WALL MOUNTING INSTALLATION



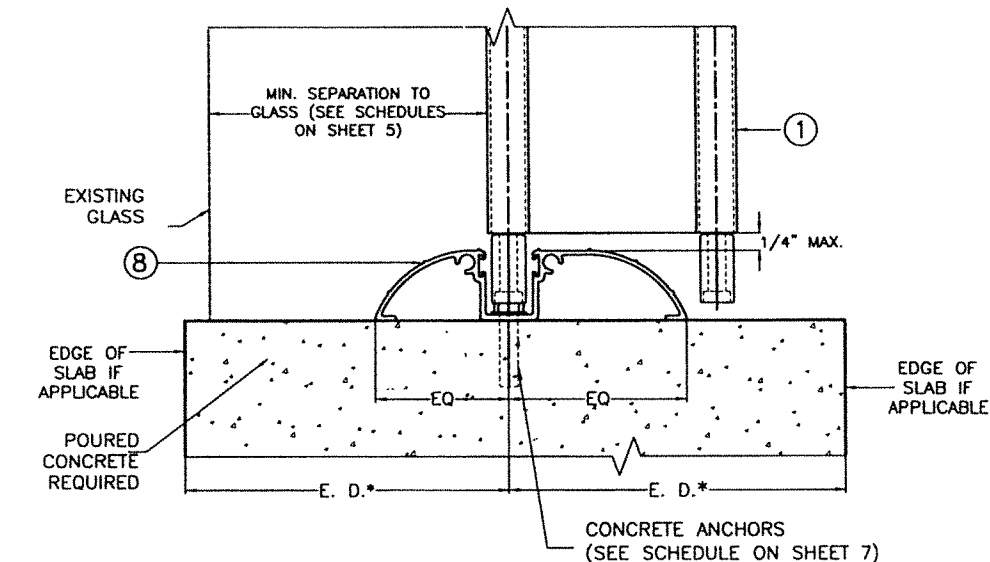
⑤ WALL MOUNTING INSTALLATION



② WALL MOUNTING INSTALLATION



④ WALL MOUNTING INSTALLATION



⑥ FLOOR MOUNTING INSTALLATION

NOTE FOR COMBINATION OF SECTIONS:

- 1- SEE SHEET 3 FOR TYPICAL SHUTTER ASSEMBLY
- 2- MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

* E.D. = EDGE DISTANCE
(SEE NOTES & SCHEDULE ON SHEET 7)

◆ SEE LIMITATIONS OF USE FOR
BLADE 1A ON SHEET 18.

INSTALLATION DETAILS

SCALE 3/8"=1"

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

WALTER A. TILLIT JR.
LICENSE
7/24/2023
P.E. SEAL/SIGNATURE/DATE

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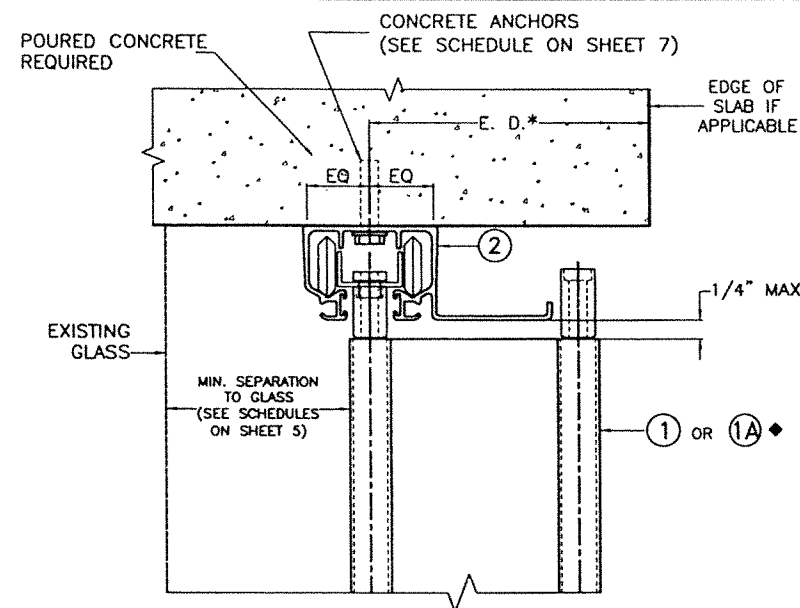
BERTHA HV™
Accordion Shutter System
H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3

REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

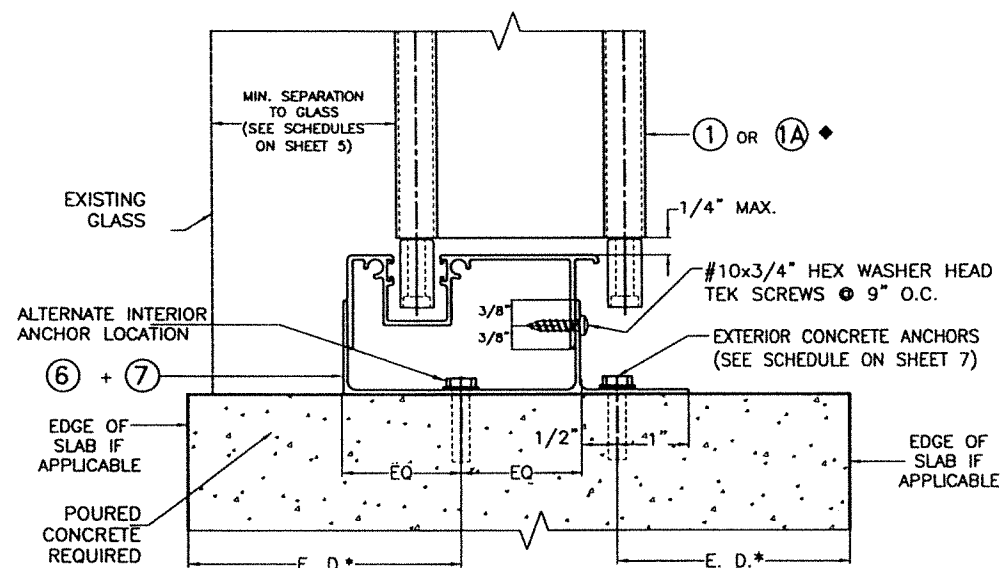
DRAWING No
23-133
SHEET
9 OF 18



H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3			
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133
3			
4			
5			
6			SHEET 10A OF 18



⑦ CEILING MOUNTING INSTALLATION



⑧ FLOOR MOUNTING INSTALLATION

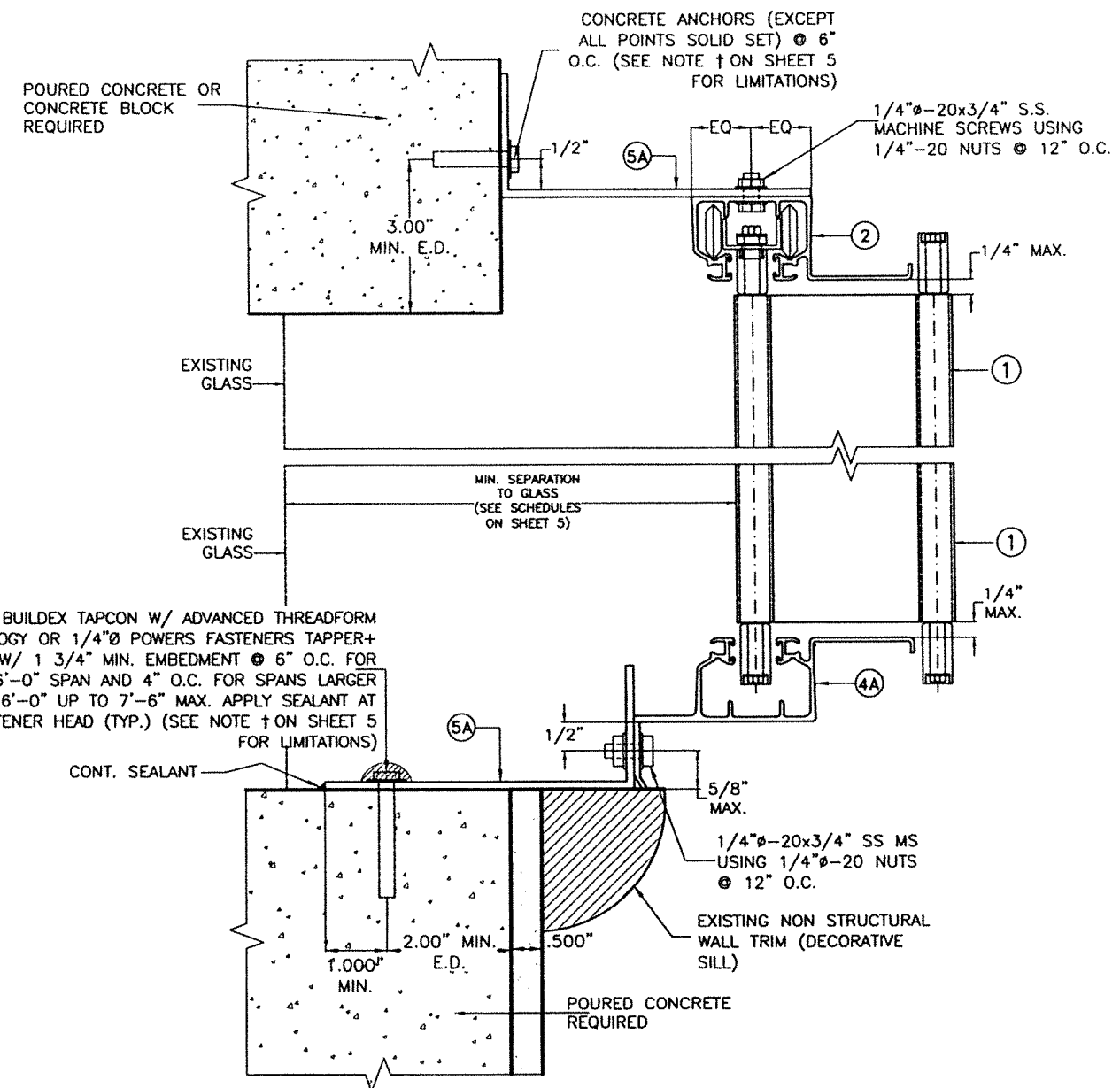
NOTE: THIS INSTALLATION SHALL BE REMOVABLE WHEN PERFORMED ADJACENT TO AN OPERABLE EXIT OR ENTRANCE

* E.D. = EDGE DISTANCE (SEE NOTES & SCHEDULE ON SHEET 7)

NOTE FOR COMBINATION OF SECTIONS:

1- SEE SHEET 3 FOR TYPICAL SHUTTER ASSEMBLY
2- MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

SEE LIMITATIONS OF USE FOR BLADE ①A ON SHEET 18.



⑨ KEYSTONE MOUNTING INSTALLATION

MAXIMUM A.S.D. DESIGN PRESSURE: +64, -72 psf
MAXIMUM SHUTTER SPAN 7'-6"

INSTALLATION DETAILS (CONTINUED)

SCALE 3/8"=1"

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF FLORIDA
PROFESSIONAL ENGINEER
5/24/2023

P.E. SEAL/SIGNATURE/DATE

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BERTHA HV™ Accordian Shutter System			
H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3			
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-133
3			
4			
5			SHEET 10 OF 18
6			

SEE END WALL CONNECTION
DETAILS ON SHEETS 10A, 13 & 16

INSTALLATION WITH ① OR ①A ♦ HV BLADE W/ HV CENTERMATES ⑬ & ⑭

SCALE 3/8"=1"

* SEE NOTES ON HV LOCK ⑮ AND
ALTERNATE LOCKS ⑯ OR ⑰
ON SHEET 4.

♦ SEE LIMITATIONS OF USE FOR
BLADE ①A ON SHEET 18.

SEE END WALL
CONNECTION
DETAILS ON SHEETS
10A, 13 & 16

SEE END WALL CONNECTION
DETAILS ON SHEETS 10, 13 & 16

2"x2"x1/8"x0'-2"
(6063-T6 ALLOY) ALUM. ANGLE
W/(2) 1/4" TAPCON ANCHORS
TO CONCRETE (TOP/BOTTOM) &
(4) #10x1/2" S.M.S. TO TUBE
AT EACH ANGLE. (TYP.)

1/2" 1" 1/2"
1/2" 1" 1/2"
1/2" 1" 1/2"

⑩ SECTION AT END (DIRECT MOUNT)

⑪ SECTION AT SYMMETRICAL CENTERMATES W/ LOCK ⑯ OR ⑰*

⑪ SECTION AT OPPOSING CENTERMATES W/ LOCK ⑯ OR ⑰*

SEE END WALL
CONNECTION
DETAILS ON SHEETS
10A, 13 & 16

⑫ SECTION AT CORNER POST

⑬ SECTION AT OPPOSING CENTERMATES W/ LOCK ⑮*

⑬ SECTION AT SYMMETRICAL CENTERMATES W/ LOCK ⑮*

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CA-0006719
WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167

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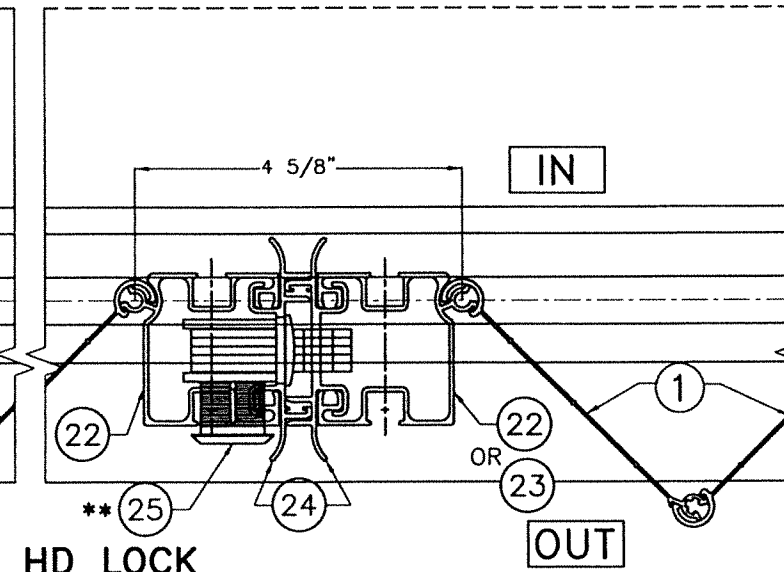
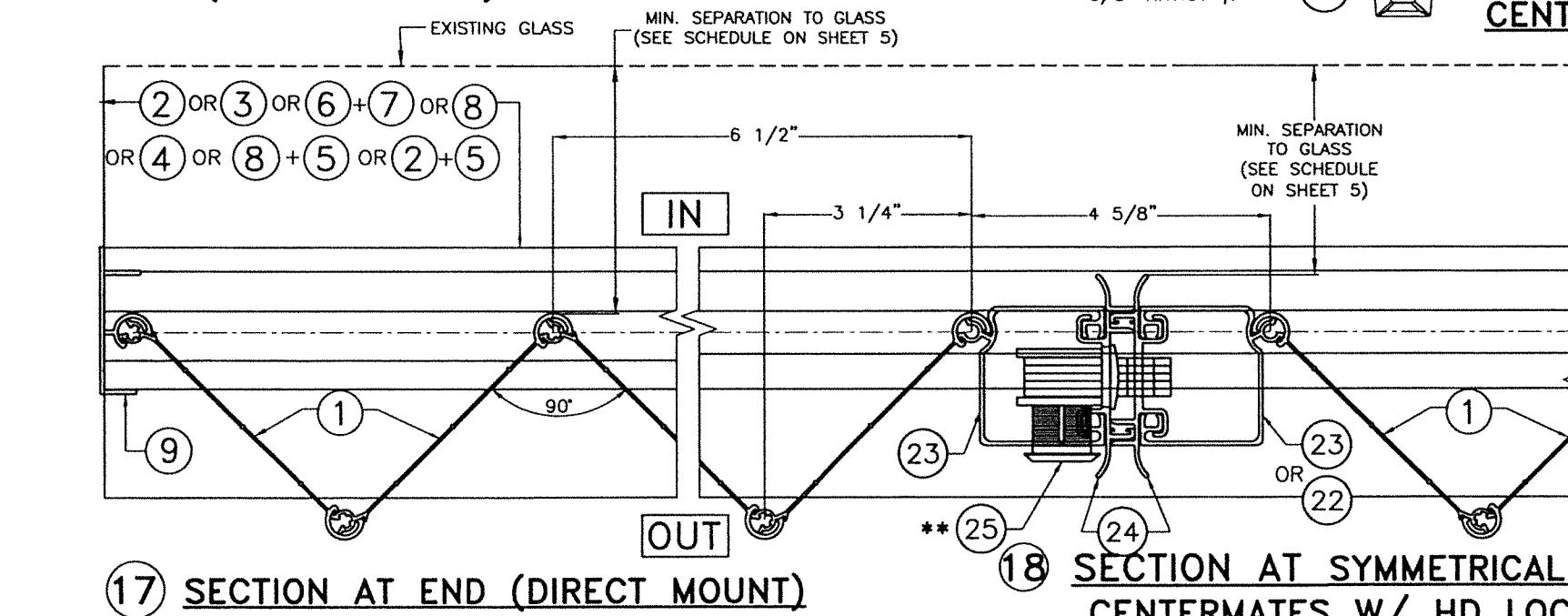
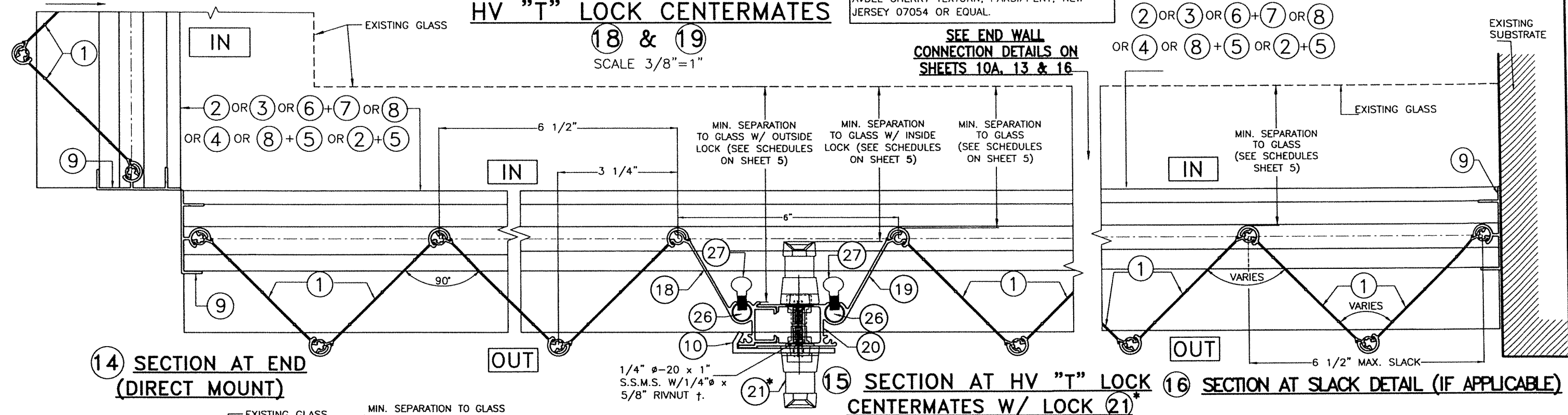
BERTHA HV™ Accordion Shutter System			
H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3			
REV. No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-165	7/21/23	DATE: 7/21/2023
2			DRAWING No
3			23-133
4			SHEET
5			11 OF 18
6			

SEE END WALL
CONNECTION DETAILS ON
SHEETS 10A, 13 & 16

INSTALLATION WITH
① HV BLADE W/
HV "T" LOCK CENTERMATES
18 & 19
SCALE 3/8"=1"

† SERIES 9444 ALUMINUM
(2024-T3 ALLOY) LARGE FLANGE THIN SHEET
NUTSERT, PART # 0820, AS MANUFACTURED BY
AVDEL CHERRY TEXTORN, PARSIPPENY, NEW
JERSEY 07054 OR EQUAL.

* SEE NOTES ON HV "T" LOCKS ② ON
SHEET 4.



INSTALLATION WITH
① HV BLADE W/
HD CENTERMATES
22, 23, 24
SCALE 3/8"=1"

**SEE NOTES ON HD LOCKS ㉕ ON SHEET 4.

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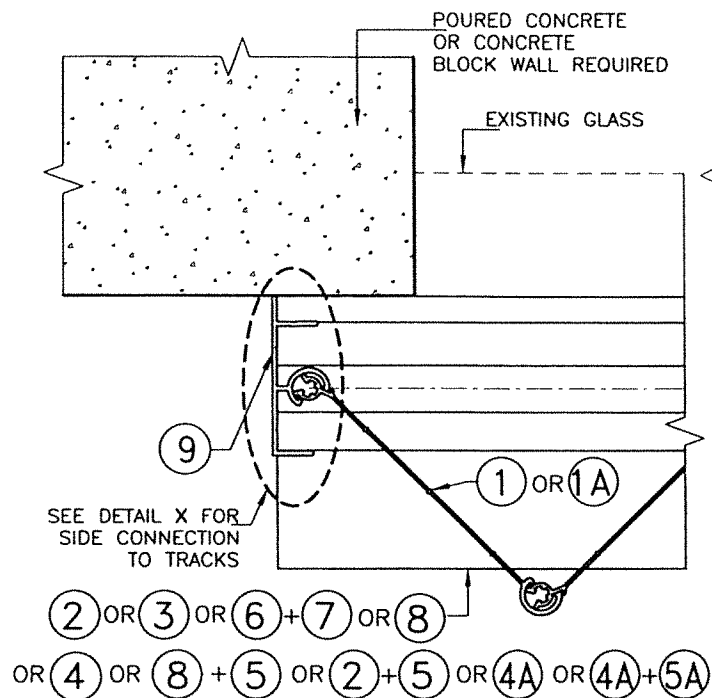
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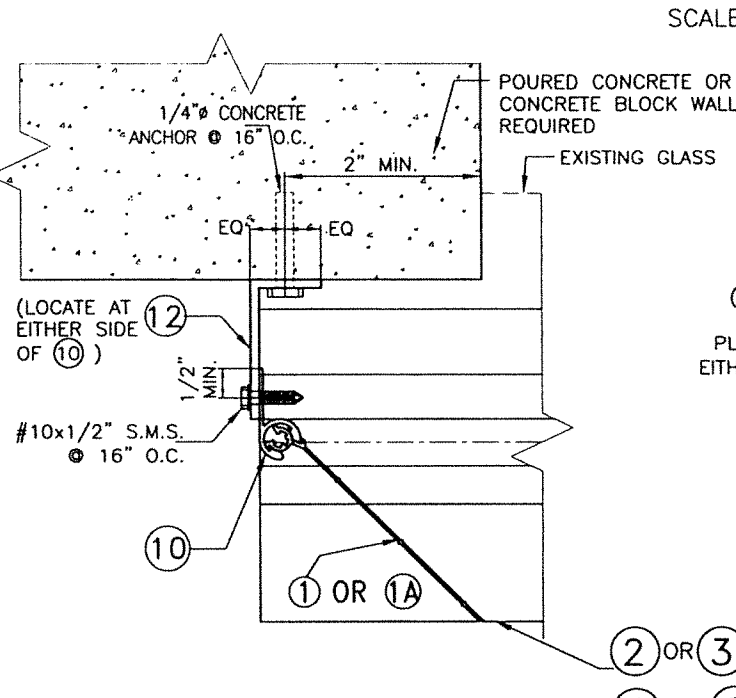
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Accordion Shutter System			
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3			
4			
5			
6			
			DRAWING No
			23-133
			SHEET
			12 OF 18

END INSTALLATION INTO CONCRETE OR CONCRETE BLOCK WALL ♦

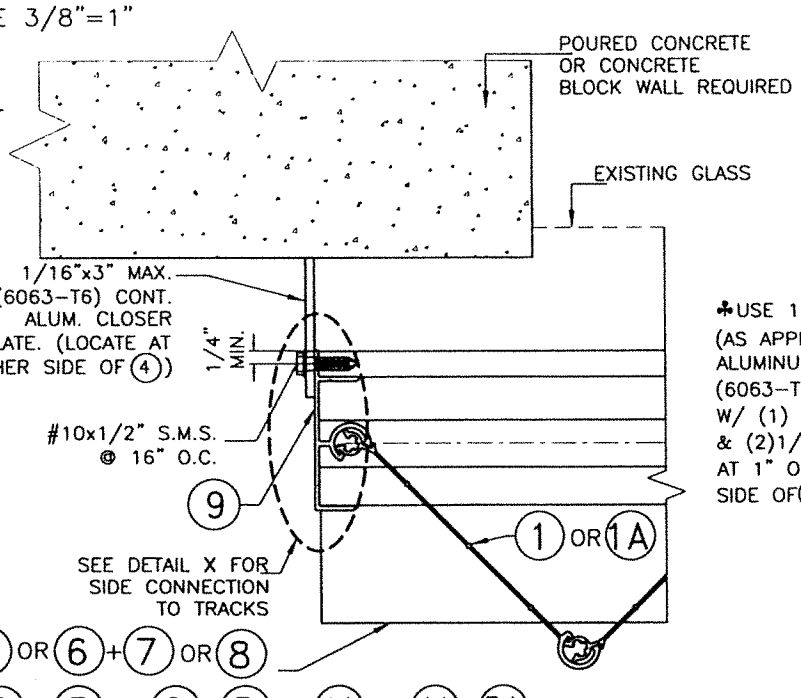
SCALE 3/8"=1"



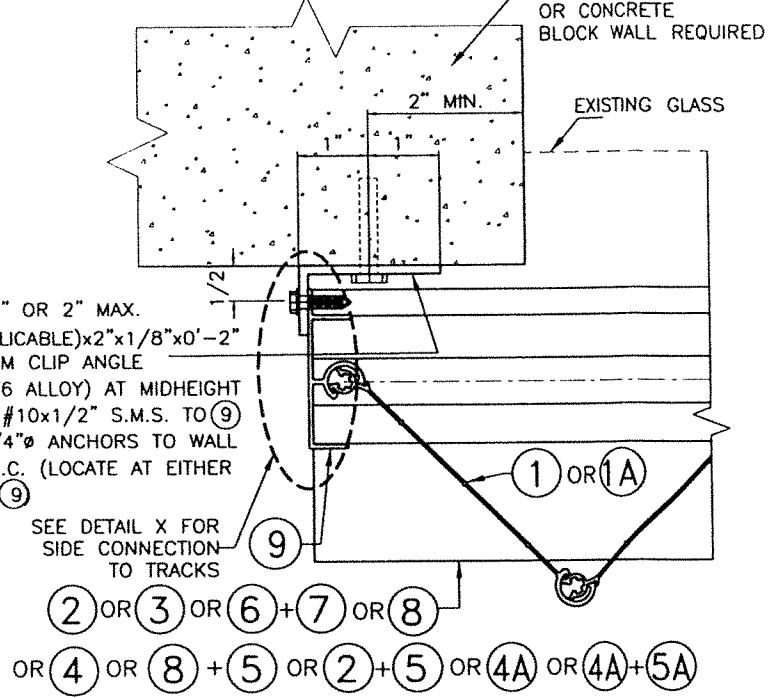
1 END CONNECTION DETAIL



2 END CONNECTION DETAIL

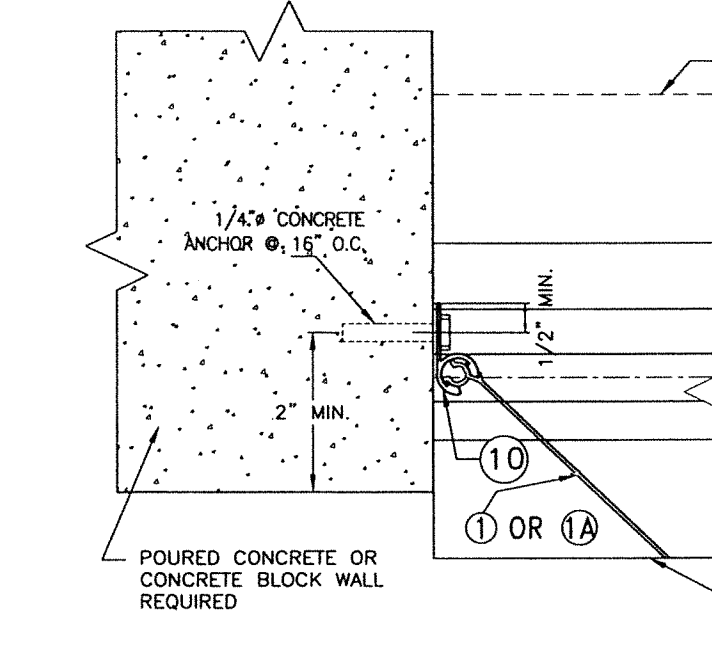


3 END CONNECTION DETAIL

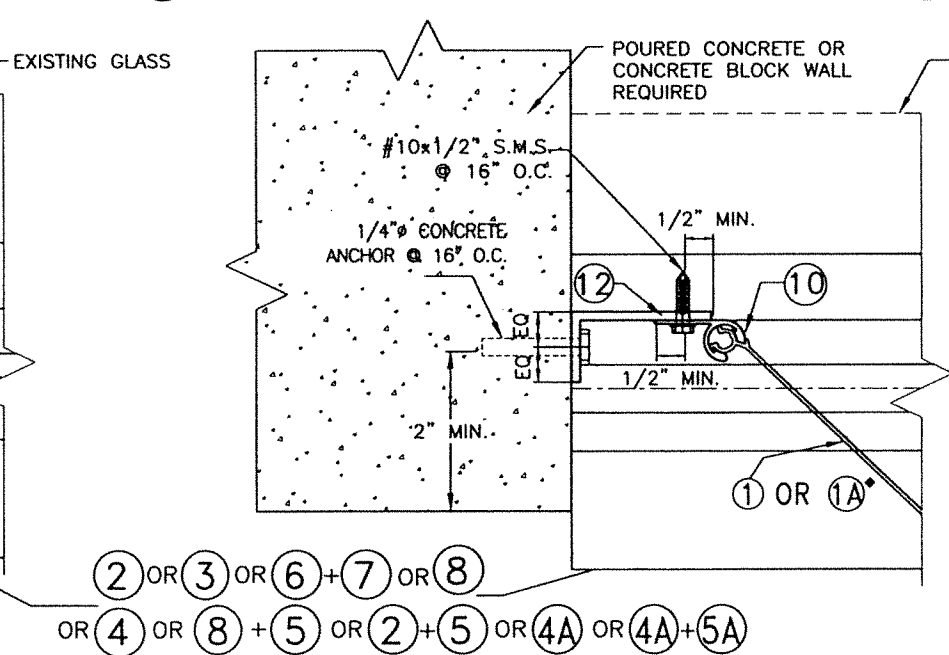


4 END CONNECTION DETAIL

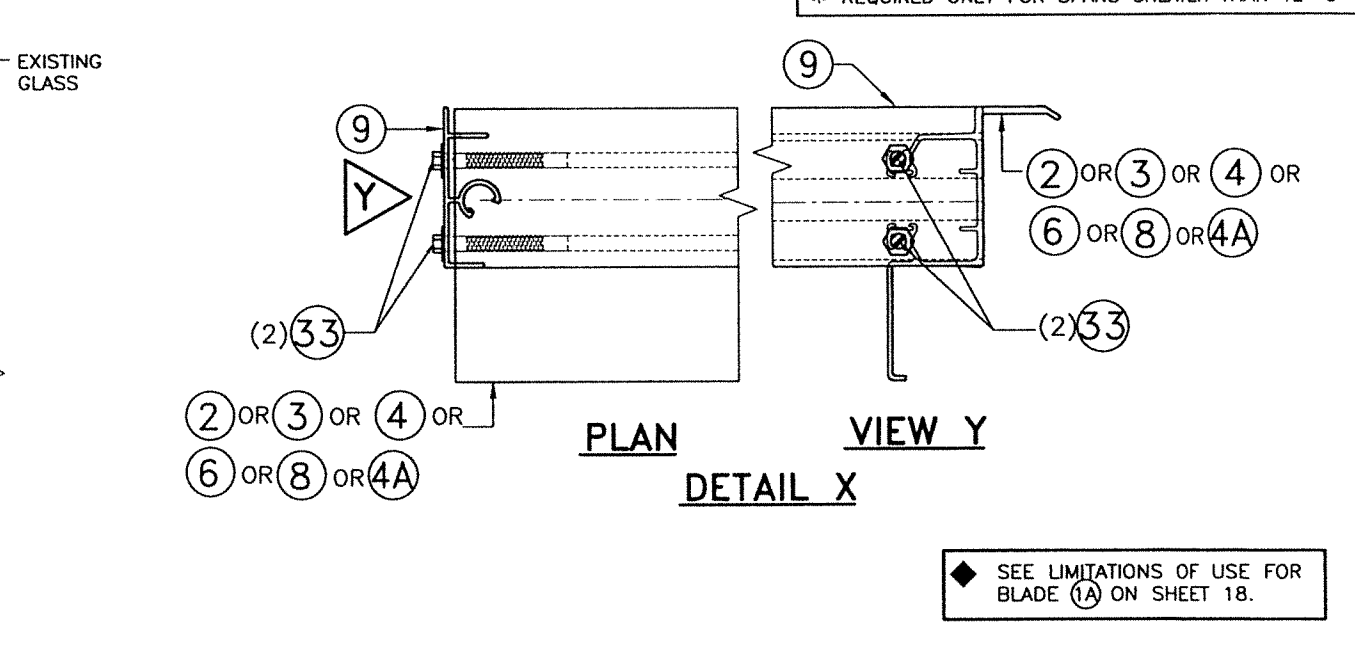
♦ REQUIRED ONLY FOR SPANS GREATER THAN 12'-0"



5 END CONNECTION DETAIL



6 END CONNECTION DETAIL



♦ SEE LIMITATIONS OF USE FOR BLADE (1A) ON SHEET 18.

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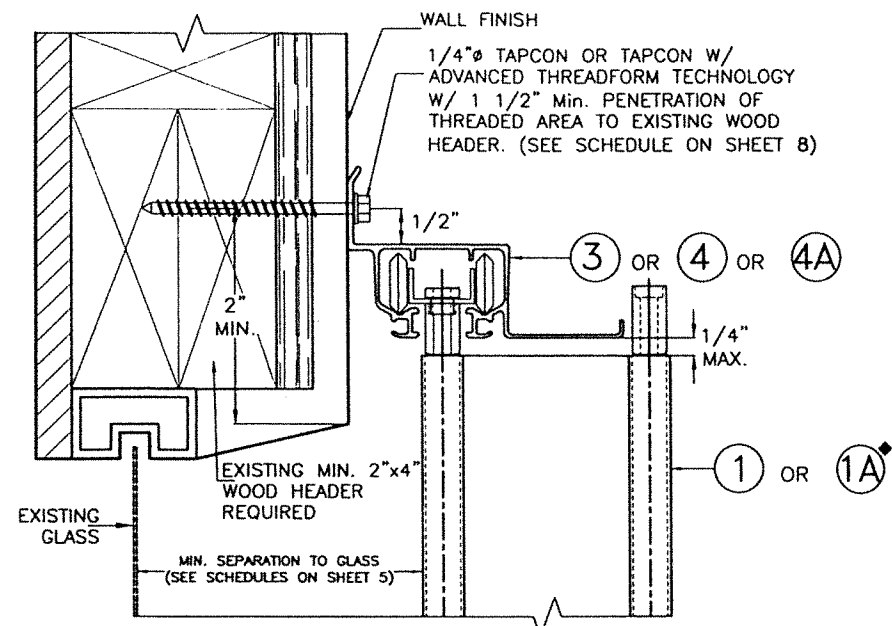
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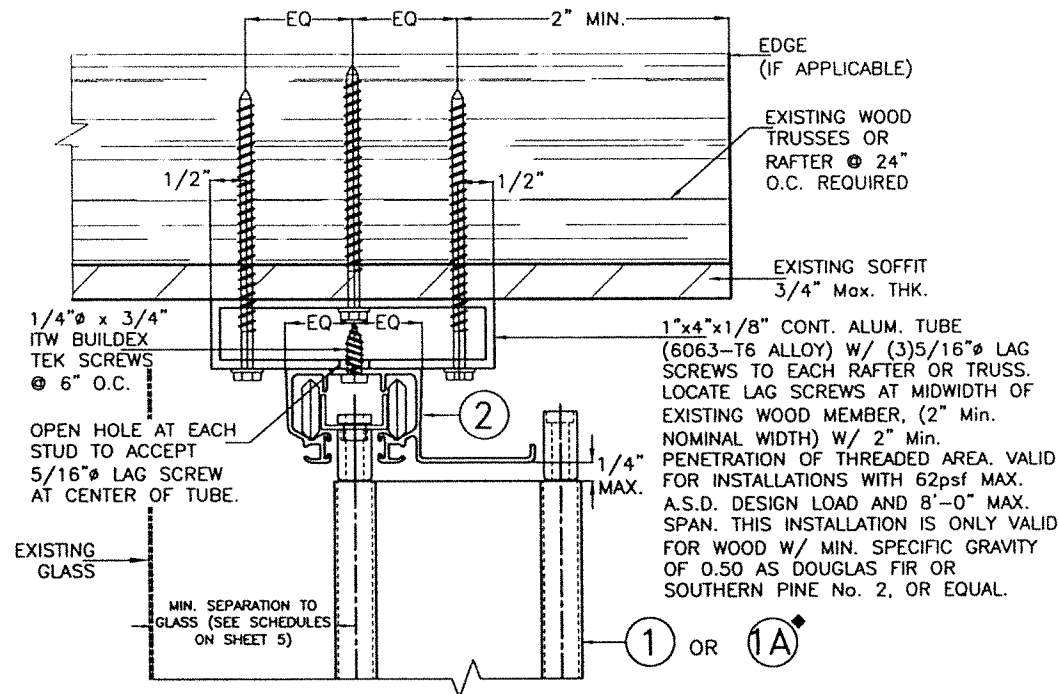
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Accordion Shutter System
H.V. BLADE #3 W/ OR W/O H.V. WINDOW BLADE #3

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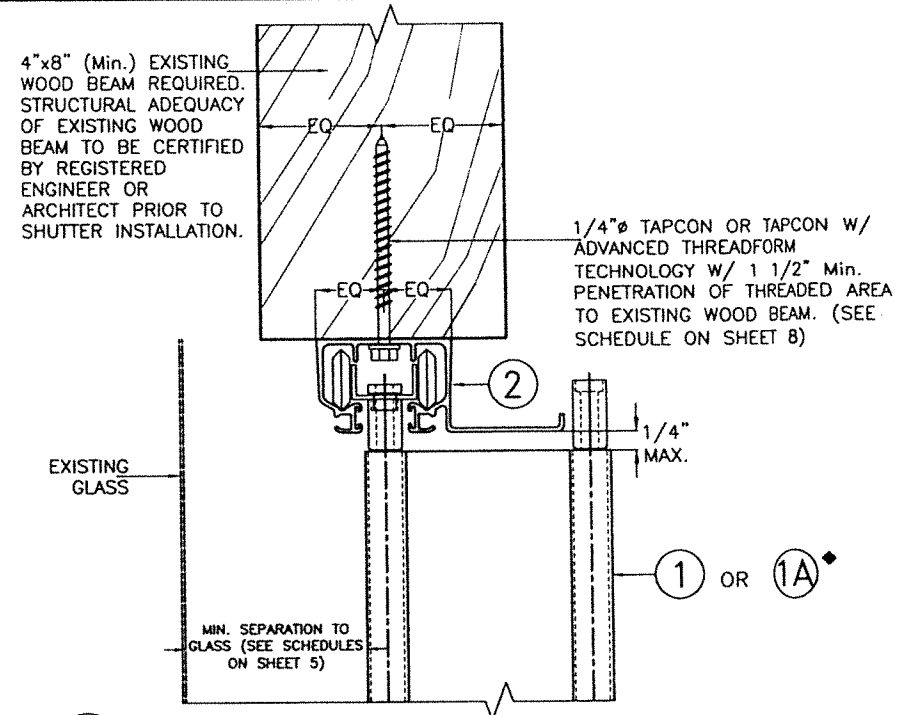
DRAWING No
23-133
SHEET
13 OF 18



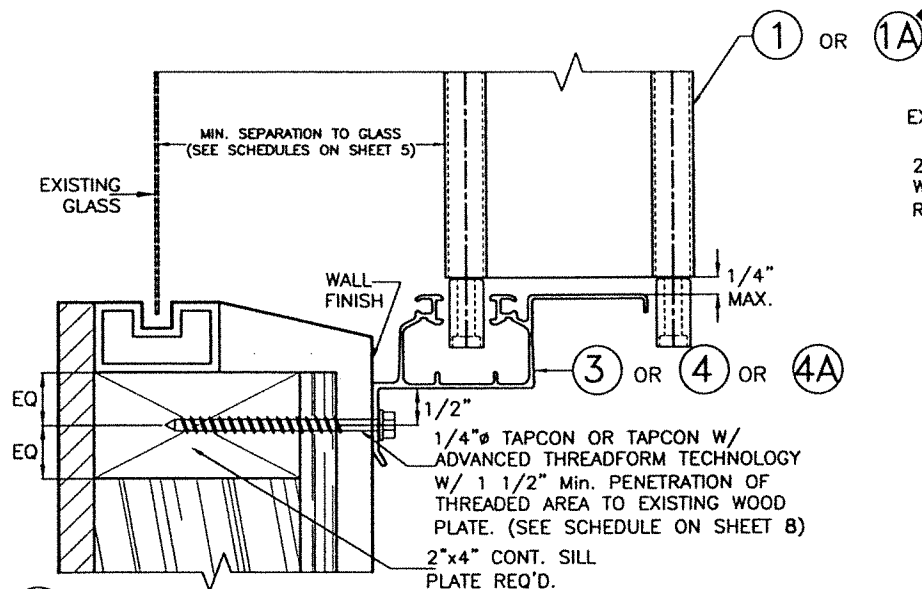
1W WALL CONNECTION AT TOP



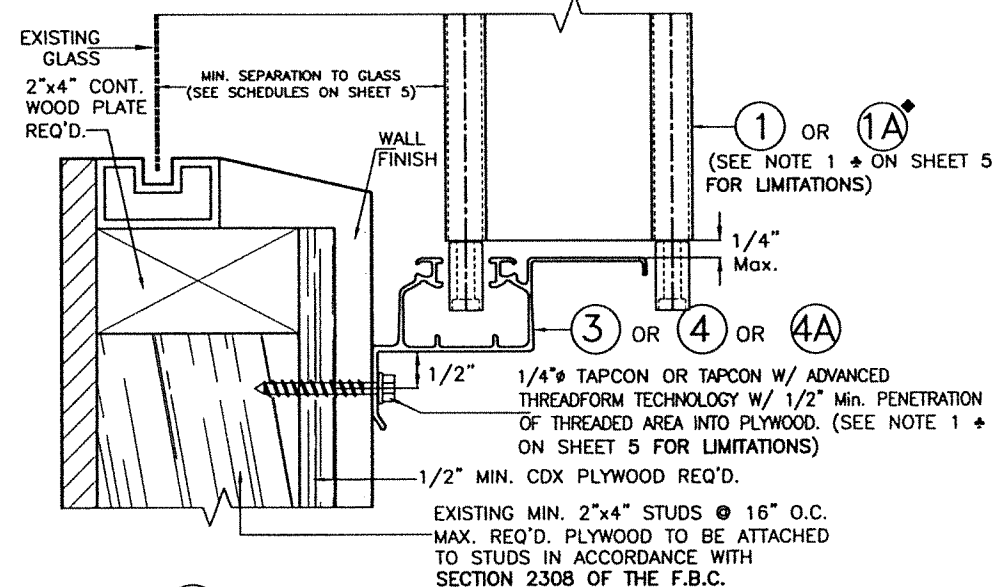
2W HOLLOW CEILING MOUNTING INSTALLATION



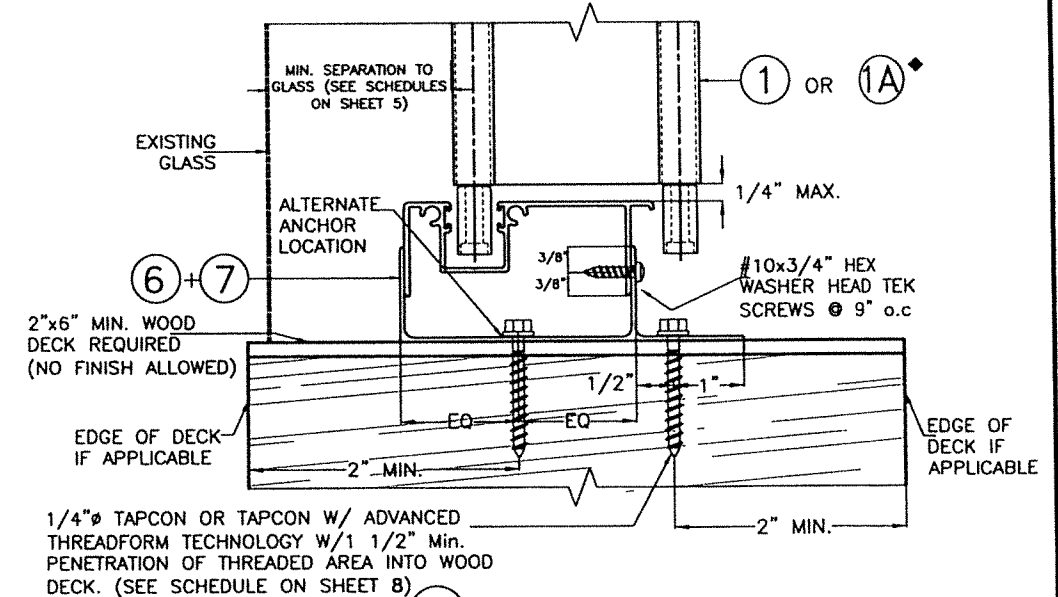
3W SOFFIT MOUNTING INSTALLATION



4W WALL CONNECTION AT BOTTOM



5W WALL CONNECTION AT BOTTOM



6W FLOOR CONNECTION

NOTE:
1-SEE SHEET 3 FOR TYPICAL SHUTTER ASSEMBLY
2-MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

♦SEE LIMITATIONS OF USE FOR BLADE 1A ON SHEET 18.

INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS

SCALE 3/8"=1"

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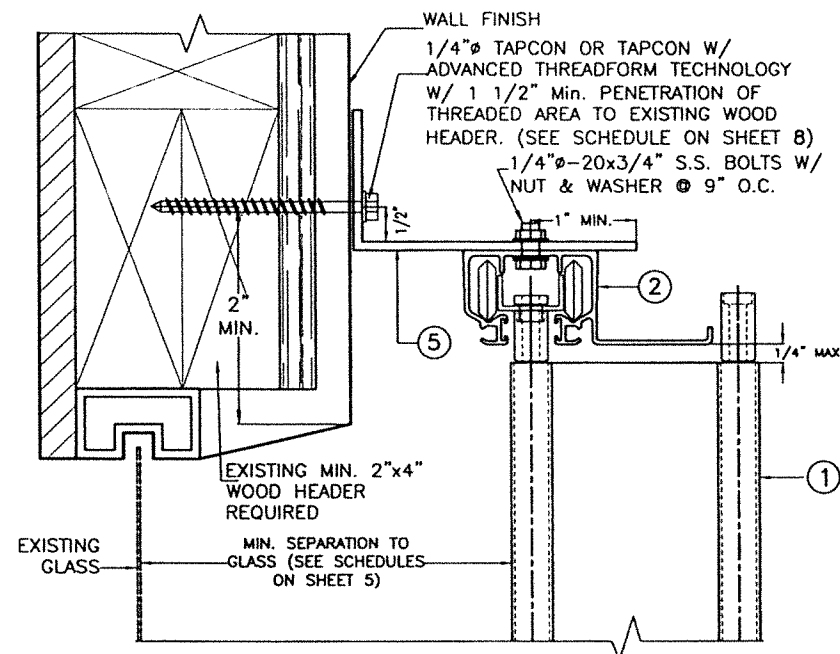
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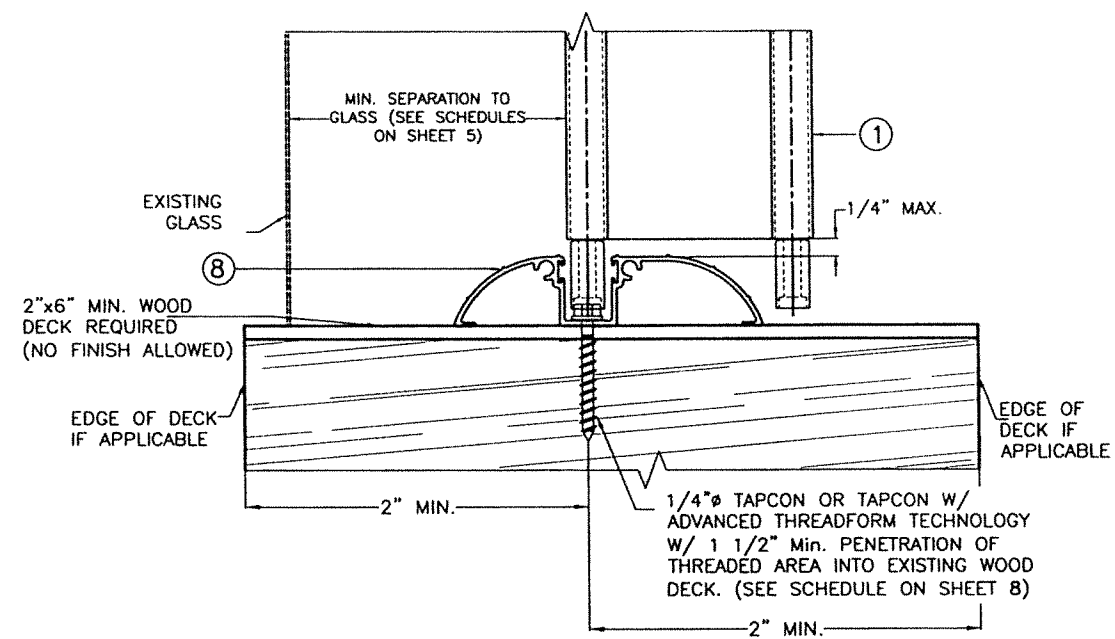
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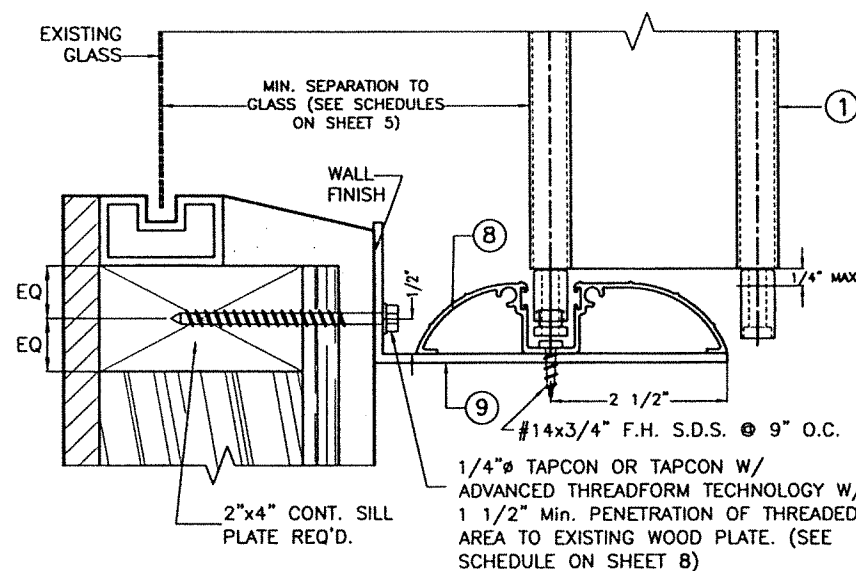
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4			SHEET
5			14 OF 18
6			



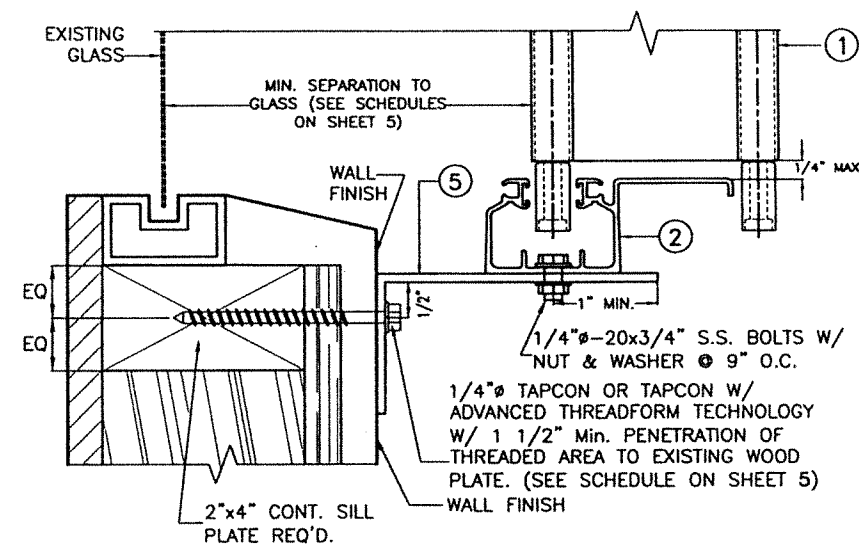
7W WALL MOUNTING INSTALLATION



8W FLOOR CONNECTION



9W WALL MOUNTING INSTALLATION



10W WALL MOUNTING INSTALLATION

NOTE:
1-SEE SHEET 3 FOR TYPICAL SHUTTER ASSEMBLY
2-MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS

SCALE 3/8"=1"

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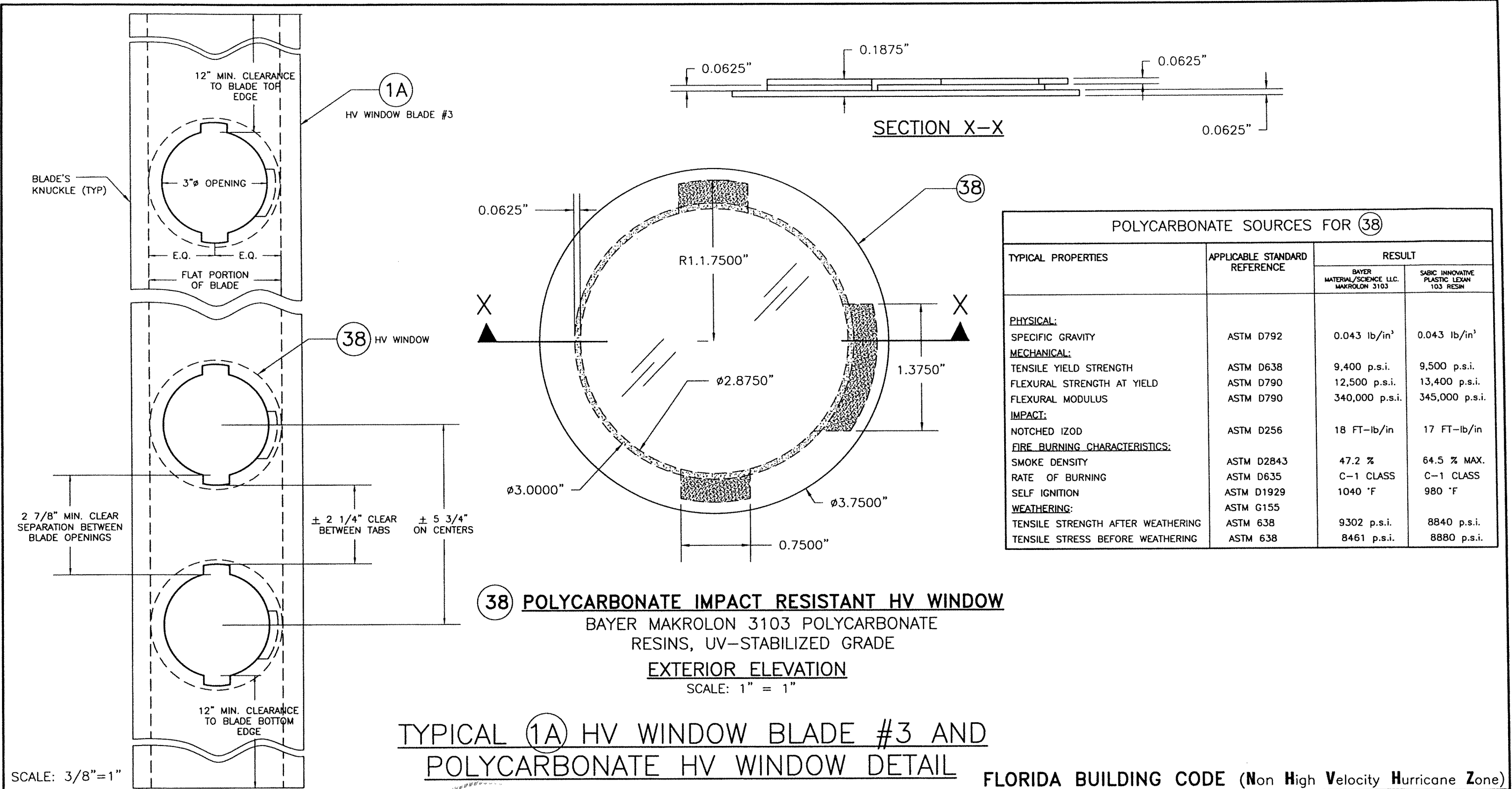


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3			
4			SHEET 15 OF 18
5			
6			



TYPICAL 1A HV WINDOW BLADE #3 AND
POLYCARBONATE HV WINDOW DETAIL

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3			
4			SHEET 17 OF 18
5			
6			

