

GENERAL NOTES:

1. BERTHA H.V. ACCORDION SHUTTER SYSTEM SHOWN ON THIS PRODUCT EVALUATION DOCUMENT (P.E.D.) HAS BEEN VERIFIED FOR COMPLIANCE IN ACCORDANCE WITH THE 2026 (9th 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 THE SHUTTER WILL BE INSTALLED WITH A DIRECTIONALITY FACTOR Kd=0.85, USING ASCE 7-22 AND SHALL NOT EXCEED THE MAXIMUM (A.S.D.) DESIGN PRESSURE RATINGS INDICATED ON SHEETS 11 THRU 15, 19 & 20.

IN ORDER TO VERIFY THE ABOVE CONDITION, ULTIMATE DESIGN WIND LOADS DETERMINED PER ASCE 7-22 SHALL FIRST BE REDUCED TO A.S.D. DESIGN WIND LOADS BY MULTIPLYING THEM BY 0.6 IN ORDER TO COMPARE THESE WITH MAX. (A.S.D) DESIGN PRESSURE RATINGS INDICATED ON SHEETS 11 THRU 15, 19 & 20.

IN ORDER TO VERIFY THAT COMPONENTS AND 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 DURATION FACTOR CD=1.60 WAS USED FOR VERIFICATION OF FASTENERS IN WOOD, PER ANSI/AWC NDS-24. BERTHA H.V. ACCORDION SHUTTER SYSTEM'S ADEQUACY FOR WIND AND LARGE MISSILE IMPACT LOAD HAS BEEN VERIFIED IN ACCORDANCE WITH SECTION 1609.1.2 OF THE ABOVE MENTIONED CODE AS PER ATL REPORTS:

-HV BLADE 1 #0214.01-03, #0715.01-03, #1004.01-05, #1214.01-05, #0317.02-06, #0609.01-10 AND #0210.01-11 AS PER TAS-201, TAS-202 AND TAS-203 PROTOCOLS AND ASTM E-1886 AND E-1996 STANDARDS (MISSILE LEVEL D, WIND ZONES 1, 2 & 3) & #1220.01-10 AS PER TAS 201, 203 & 203 PROTOCOLS LARGE MISSILE.

-HV WINDOW BLADE A #0505.01-08 AS PER ASTM E-1886 AND E-1996 (MISSILE LEVEL D, WIND ZONES 1, 2, 3) BASIC PROTECTION ONLY AND # 0725.01-88 AS PER TAS 202 PROTOCOL.

2. HV BLADE 1 AND HV WINDOW BLADE A ARE ENGINEERED TO WORK IN UNISON WITH EACH OTHER UNDER THE GENERAL LIMITATIONS AND CONDITIONS OF USE INDICATED ON SHEET 19

3. BERTHA H.V. ACCORDION PINS (HV SCREWS), USED AT BLADES KNUCKLE AND FOR DIRECT MOUNT CONNECTION TO TRACKS SHALL BE #14x2.75" AND #14x1.75" RESPECTIVELY, 410-HT MINIMUM SERIES STAINLESS STEEL SCREWS WITH 135.0 ksi YIELD STRENGTH AND 180 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. PINS MUST BEAR THE HV MARKING ON THEIR HEAD.

4. ALL ALUMINUM EXTRUSIONS SHALL BE ALUMINUM ASSOCIATION ALLOY AND TEMPER AS INDICATED ON SHEETS 2 AND 3. MINIMUM YIELD STRENGTH FOR 6063-T6 ALLOY IS 30.0 ksi AND 35.7 ksi FOR 6005-T5 ALLOY. ALL ALUMINUM EXTRUSIONS IN CONTACT WITH DISSIMILAR MATERIALS SHALL COMPLY WITH SECTION III-6 OF THE 2020 ALUMINUM DESIGN MANUAL.

5. ALL SCREWS SHALL BE STAINLESS STEEL 304 OR 316 AISI SERIES OR CORROSION RESISTANT COATED CARBON STEEL AS PER DIN 50018 WITH 50 ksi MIN. YIELD STRENGTH AND 90 ksi MIN. TENSILE STRENGTH. AND SHALL COMPLY W/ FLORIDA BUILDING CODE SECTIONS 2411.3.3.4 & 1711.

6. BOLTS SHALL BE ASTM A-307 GALVANIZED STEEL, OR AISI 304 OR 316 SERIES STAINLESS STEEL WITH 35 ksi MINIMUM YIELD STRENGTH.

7. SEE THE FOLLOWING SHEETS FOR ANCHOR SPECIFICATIONS: HV BLADE 1 : 12,13,14,15 AND 20

HV BLADE 1 & A WORKING IN UNISON: 12, 13 & 15

8. THIS BERTHA H.V. ACCORDION SHUTTER SYSTEM BEARS A U.S. PATENT #6'779,582. COMPONENTS OF THIS APPROVAL ARE COVERED, IN WHOLE OR IN PART BY U.S. PATENT #5'458,179 ISSUED TO EASTERN METAL SUPPLY, INC.

9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE SOUNDNESS OF THE STRUCTURE WHERE THE SHUTTER IS TO BE ATTACHED TO ENSURE PROPER ANCHORAGE. THE CONTRACTOR IS TO SEAL/CAULK ALL SHUTTER COMPONENT EDGES WHICH REMAIN, THRU FASTENING IN CONTINUOUS CONTACT WITH THE BUILDING TO PREVENT WIND/RAIN INTRUSION.

10. EACH UNIT MUST BEAR A PERMANENT LABEL IN A VISIBLE PLACE WITH WARNING NOTE: DURING PERIODS OF HURRICANE WARNINGS HOME OWNER, TENANT, OR OTHERS, MUST PROPERLY CLOSE ALL HV AND HD CENTERMATES AND ENGAGE OR LOCK ALL HV AND HD LOCKS.

11. SHUTTER MANUFACTURER'S LABEL SHALL BE LOCATED AT A READILY VISIBLE LOCATION ON THE ACCORDION SHUTTER IN ACCORDANCE WITH SECTION 1709.9.3 OF FLORIDA BUILDING CODE. ONE LABEL SHALL BE PLACED FOR EVERY OPENING. LABELING TO COMPLY WITH SECTION 1709.9.2 OF THE FLORIDA BUILDING CODE.

12. BERTHA H.V. ACCORDION SHUTTER SYSTEM'S INSTALLATION SHALL COMPLY WITH SPECS INDICATED IN THIS DRAWING PLUS ANY BUILDING AND ZONING REGULATIONS PROVIDED BY THE JURISDICTION WHERE A PERMIT IS APPLIED FOR.

13. (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) THE CONTRACTOR IS 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 WHO 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 THE 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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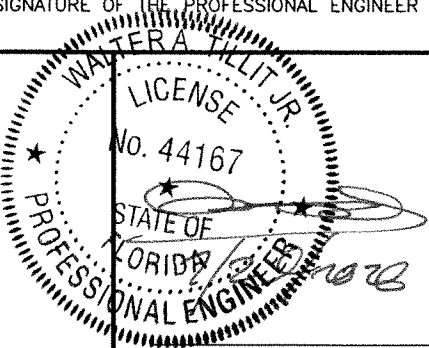
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THIS DRAWING SHALL ONLY BE USED TO OBTAIN PERMITS IN THE STATE OF FLORIDA

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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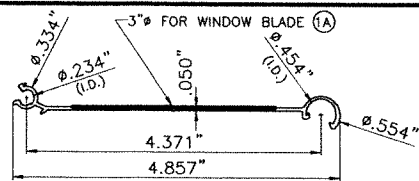
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BERTHA HV
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			
3			
4			
5			
6			

DRAWING No
26-103

SHEET
1 OF 20

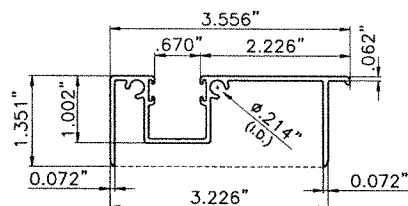


1 HV SOLID BLADE

COVERED UNDER US PATENT # 5458179

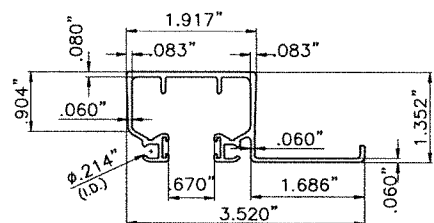
1A HV WINDOW BLADE*

*SEE LIMITATIONS OF USE OF BLADE 1A ON SHEET 19
6063-T6 ALLOY AND TEMPER



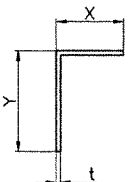
6 HV ADJ. FLOOR TRACK

QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER



11 HV CEILING HEADER

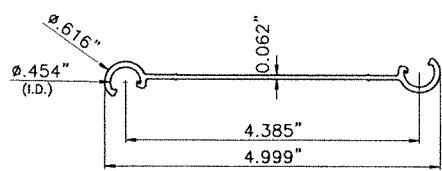
QUALIFIED FOR USE W/ HV BLADE 1 ONLY,
SEE SECTIONS FOR VALIDITY.
6063-T6 ALLOY AND TEMPER



16 SIDE ANGLES

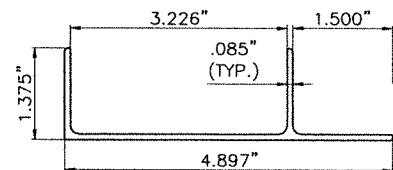
QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER

MIN. X	MIN. Y	MIN. t
1"	1"	0.062"



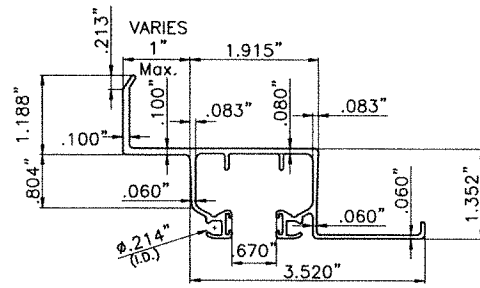
3 HV UNIVERSAL FLOATER

QUALIFIED FOR USE W/ HV BLADE 1
6005-T5 ALLOY AND TEMPER



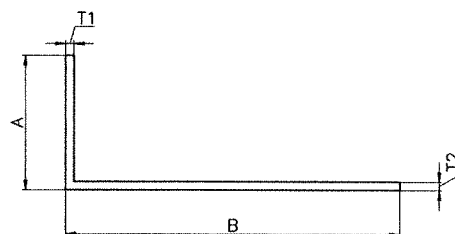
7 HV ADJ. ADAPTER W/LIP

QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER



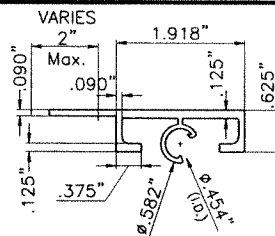
12 HV HEADER/SILL

QUALIFIED FOR USE W/ HV BLADE 1 ONLY
6063-T6 ALLOY AND TEMPER



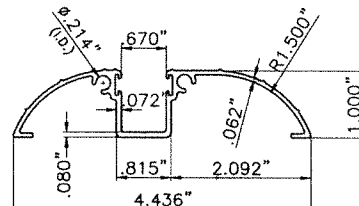
ALUMINUM ANGLES

QUALIFIED FOR USE W/ HV
BLADE 1 ONLY.
6063-T6 ALLOY AND TEMPER



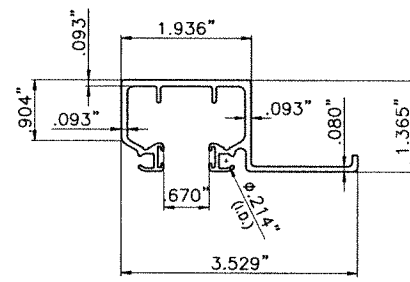
4 HV DIRECT MOUNT

QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER



8 HV WALK-OVER TRACK

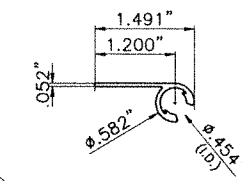
QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER



13 HD CEILING HEADER/SILL

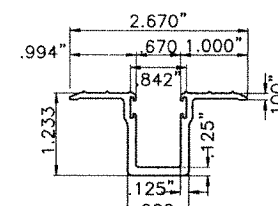
QUALIFIED FOR USE W/ HV BLADE 1
SEE SECTIONS FOR VALIDITY.
6063-T6 ALLOY AND TEMPER

COMPONENT	A	B	T1	T2
17	2"	5" MAX.	1/8"	1/8"
18	2"	5" MAX.	0.192"	0.192"
19	2.5"	7" MAX.	0.190"	0.190"
5A	2"	5" MAX.	0.139"	0.131"



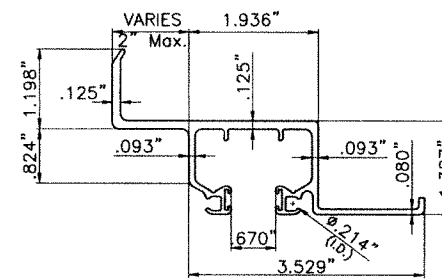
5 HV 90°/180° STARTER

QUALIFIED FOR USE W/
HV BLADE 1
6063-T6 ALLOY AND TEMPER



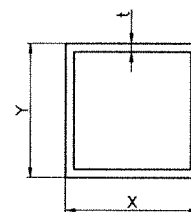
9 HV TRENCH TRACK

QUALIFIED FOR USE W/ HV
BLADE 1 ONLY.
6063-T6 ALLOY AND TEMPER



14 HD WALL HEADER/SILL

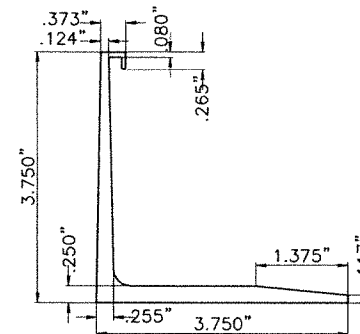
QUALIFIED FOR USE W/ HV
BLADE 1 ONLY.
6063-T6 ALLOY AND TEMPER



20 CORNER POSTS

QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER

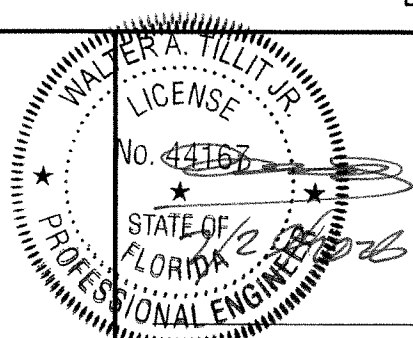
X	Y	t
2"	2"	0.125"
3"	3"	0.090"



10 HV RAINGUARD

QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER

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BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			
3			
4			
5			
6			

DRAWING No
26-103

SHEET
2 OF 20

SHUTTER ASSEMBLY SCHEDULE FOR
HV ①, HV ①A

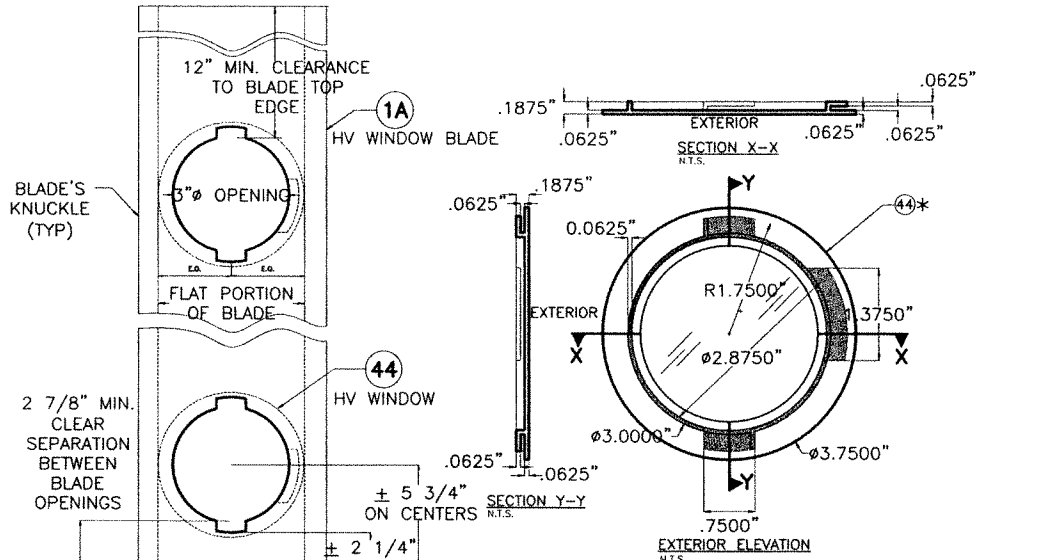
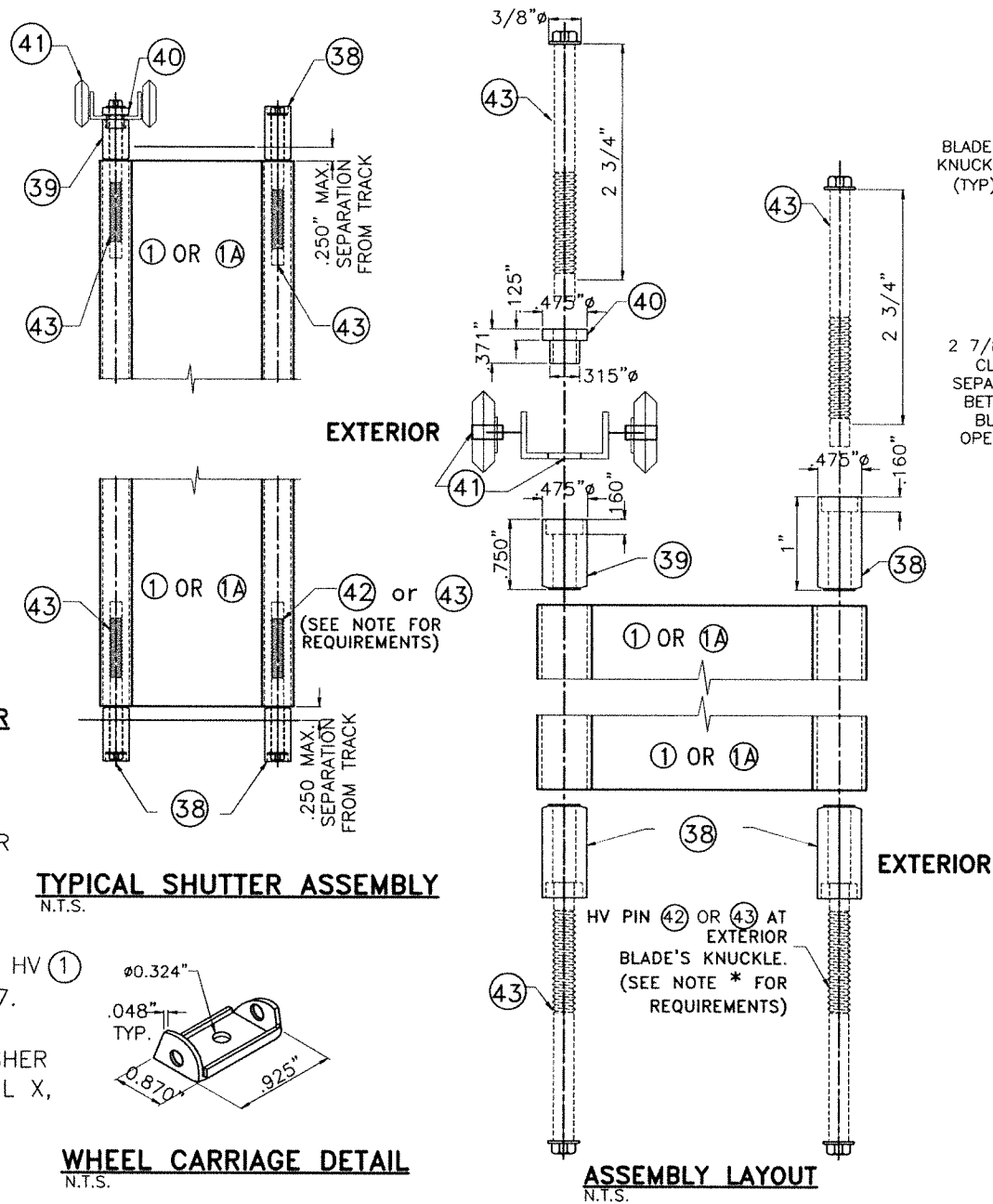
①	HV BLADE 1
①A	HV BLADE 1A
③8	HV LONG RECESSED NYLON BUSHING
③9	HV SHORT RECESSED NYLON BUSHING
④0	HV NYLON HAT WASHER
④1	HV WHEEL CARRIAGE AISI 302-303 SERIES ø.870"x3/16" THICK NYLON WHEEL. 0.188"ø AISI 302 SERIES S.S. RIVETS
④2	HV 1 3/4" ACCORDION PIN W/ #8 HEAD *
④3	HV 2 3/4" ACCORDION PIN W/ #8 HEAD *
④4	POLYCARBONATE IMPACT RESISTANT HV WINDOW

* HV PIN REQUIREMENTS AT EXTERIOR BLADE KNUCKLE FOR
HV ① HV ①A

(1) HV PIN ④3 SHALL ALWAYS BE USED AT ALL EXTERIOR
BOTTOM KNUCKLES OF HV ACCORDION SYSTEM W/ HV ① OR
HV ①A BLADE.

(2) HV PIN ④2 MAY BE USED IN LIEU OF ④3 AND ONLY AT
EXTERIOR BOTTOM KNUCKLES OF HV ACCORDION SYSTEM W/ HV ①
BLADE WHEN CORRESPONDING TO INSTALLATION "11", SHEET 7.

(3) HV PIN ④2 OR ④3 W/ 1/2" O.D. 1/16" THICK S.S. WASHER
SHALL BE USED FOR DIRECT MOUNT INSTALLATION PER DETAIL X,
SHEET ⑩



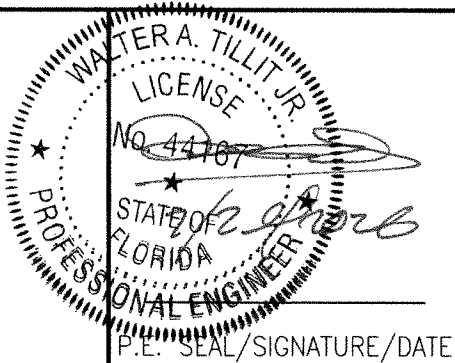
TYPICAL HV WINDOW BLADE ①A AND
POLYCARBONATE HV WINDOW DETAIL

* POLYCARBONATE IMPACT RESISTANT HV WINDOW
BAYER MAKROLON 3103 POLYCARBONATE
RESINS, UV-STABILIZED GRADE OR SABIC
INNOVATIVE PLASTIC LEXAN 103 RESIN
(SEE NOTE "F" ON SHEET 19).

POLYCARBONATE SOURCES FOR ④4			
TYPICAL PROPERTIES	APPLICABLE STANDARD REFERENCE	RESULT	
		BAYER MATERIAL / SCIENCE LLC.MAKROLON 3103	SABIC INNOVATIVE PLASTIC LEXAN 103 RESIN
PHYSICAL:			
SPECIFIC GRAVITY	ASTM D792	0.043 lb/in ³	0.043 lb/in ³
MECHANICAL:			
TENSILE YIELD STRENGTH	ASTM D638	9,400 p.s.i.	9,500 p.s.i.
FLEXURAL STRENGTH AT YIELD	ASTM D790	12,500 p.s.i.	13,400 p.s.i.
FLEXURAL MODULUS	ASTM D790	340,000 p.s.i.	345,000 p.s.i.
IMPACT:			
NOTCHED IZOD	ASTM D256	18 FT-lb/in	17 FT-lb/in
FIRE BURNING CHARACTERISTICS:			
SMOKE DENSITY	ASTM D2843	47.2 %	64.5 % MAX
RATE OF BURNING	ASTM D635	C-1 CLASS	C-1 CLASS
SELF IGNITION	ASTM D1929	1040 °F	980 °F
WEATHERING:	ASTM G155		
TENSILE STRENGTH AFTER WEATHERING	ASTM 638	9302 p.s.i.	8840 p.s.i.
TENSILE STRESS BEFORE WEATHERING	ASTM 638	8461 p.s.i.	8880 p.s.i.

① HV BLADE SOLID & ①A HV WINDOW BLADE DETAILS
N.T.S.

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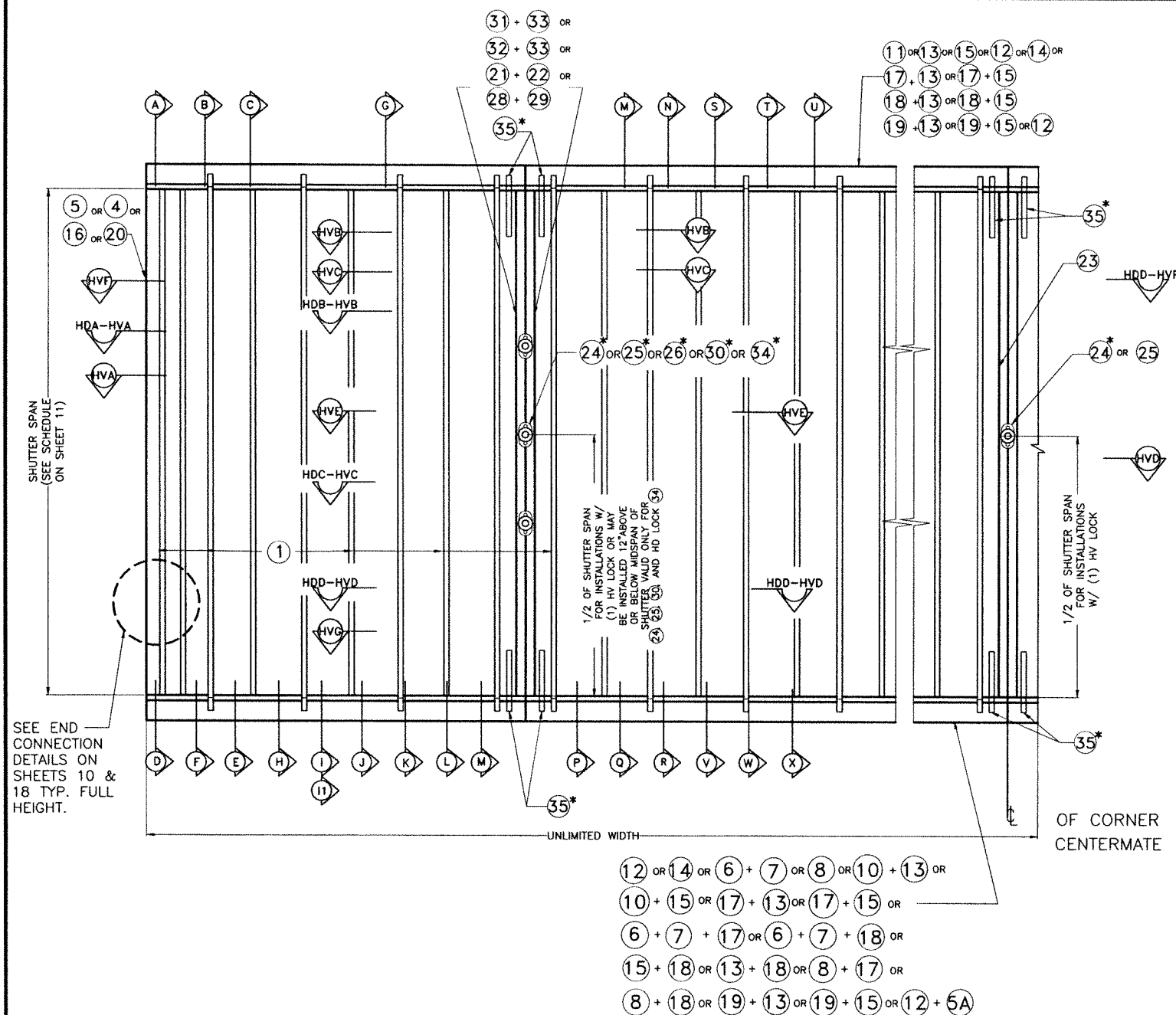
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H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

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2			
3			
4			
5			
6			

DRAWING No
26-103
SHEET
4 OF 20



* NOTES ON HV LOCKS AND CENTERMATES:

1. MANDATORY CONDITION #1: ONE HV LOCK (24) or (25) 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 105", AND FOR INSTALLATIONS AT ANY ELEVATION. HV LOCK (24) or (25) MAY BE USED AS AN INSIDE OR OUTSIDE LOCK, ATTACHED TO (21) OR (22) CENTERMATES W/(2) 1/4"Ø-20 x 1/2" LONG FLAT HEAD S.S. M.S. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION.
2. OPTIONAL CONDITION #1: IF DESIRED, FOR BETTER PERFORMANCE OR FOR SECURITY PURPOSES, UP TO TWO HV LOCKS (24), (25) OR (26) MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. CONNECTION OF LOCKS TO CENTERMATES (21) OR (22) SHALL BE AS INDICATED ON NOTE (1) ABOVE. LOCATION OF LOCKS SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION.
3. OPTIONAL CONDITION #2 (VALID ONLY WHEN MANDATORY CONDITION #1 OR LIMITED MANDATORY CONDITION #2 IS USED W/TWO H.V. LOCKS): LOCKING RODS (35) ARE NOT REQUIRED AT HURRICANE POSITION, BUT MAY BE USED IF DESIRED TO ENHANCE SHUTTER PERFORMANCE. LOCKING RODS (35) OR AN ALTERNATIVE DEVICE MAY ALSO BE USED AT STACKING POSITION (NON HURRICANE POSITION).
4. MANDATORY CONDITION #2: ONE HV LOCK (24) or (25) SHALL BE USED AT CORNER CENTERMATES FOR ANY SPAN AND INSTALLATIONS AT ANY ELEVATION. HV LOCK (24) or (25) SHALL BE USED AS AN OUTSIDE OR INSIDE LOCK, ATTACHED TO (23) CORNER CENTERMATE W/(2) 1/4"Ø-20 x 1/2" LONG FLAT HEAD S.S. M.S. TWO LOCKING RODS (35) AT TOP & BOTTOM SHALL BE USED. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION. MAXIMUM SHUTTER SPAN SHALL BE DETERMINED AS PER SCHEDULES SHOWN ON SHEET 12.
5. FIRST ALTERNATE TO MANDATORY CONDITION #1 VALID ONLY FOR HV LOCK (26) W/ SYMMETRICAL CENTERMATES (21) OR (22): ONE ALTERNATE HV LOCK (26) MAY BE USED IN LIEU OF HV LOCK (24) or (25) FOR ANY SPAN AND INSTALLATIONS AT ANY ELEVATION. ALTERNATE LOCK (26) MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF 1/4"Ø-20x3/4" S.S. THUMSCREW TO (21) OR (22) CENTERMATES SHALL BE MADE W/ 1/4"Ø-20x3/4" ALUM. RIVNUT AS SHOWN ON SECTION HVE, SHEET 8. ONE LOCK SHALL BE USED AT 1/2 OF SHUTTER SPAN OR TWO LOCKS AT 1/3 OF SHUTTER SPAN.
6. MANDATORY CONDITION #3 FOR KEYSTONE MOUNTING INSTALLATIONS: ONE HV LOCK (24) or (25) or (26) 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 (24) or (25) or (26) MAY BE USED AS AN INSIDE OR OUTSIDE LOCK, ATTACHED TO (21) or (22) 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 (35) W/ (36) OR (37) TOP AND BOTTOM IS COMPLETELY MANDATORY.

*NOTES ON HV "T" LOCKS AND CENTERMATES:

1. SECOND ALTERNATE TO MANDATORY CONDITION #1 VALID ONLY FOR HV "T" LOCK 30, AND CENTERMATES 28 AND 29; ONE ALTERNATE HV "T" LOCK 30 MAY BE INSTALLED IN LIEU OF HV LOCKS 24 OR 25 FOR ANY SPAN AND INSTALLATION AT ANY ELEVATION. ALTERNATE LOCK 30 MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF LOCK 30 INCLUDES USING REINFORCING LOCKER 27, AS SHOWN ON SECTION HVG, SHEET 9, WHICH MUST BE CONNECTED TO CENTERMATES 28 AND 29 W/ 1/4"Ø-20 x 1 1/2" LONG S.S. THREADED BOLT W/ 7/8"Ø x 3/32" WINGNUT OR W/ 1/4"Ø-20x1" S.S.M.S. INTO A 1/4"Ø x 5/8" RIVNUT. LOCK MAY BE INSTALLED AT MIDSPAN OR 12" MAXIMUM ABOVE AND BELOW MIDSPAN. USE OF TWO LOCKING RODS 35 TOP AND BOTOM IS MANDATORY.

***NOTES ON HD LOCKS & CENTERMATES:**

1. HD LOCK (34) W/ HD CENTERMATES (31) OR (32) W/ (33) : ONE ALTERNATE HD LOCK (34) MAYBE USED IN LIEU OF HV LOCKS (24) OR (25) FOR ANY SPAN AND INSTALLATIONS AT ANY ELEVATION. ALTERNATE HD LOCK (34) MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF HD LOCK (34) TO (33) IS W/ 3 #8 x 3/8" F.H. S.S.M.S., AND INCLUDES REINFORCEMENT INSERT (33) AS SHOWN ON SECTIONS HDB-HVB AND HDC-HVC, SHEET 10. LOCK MAY BE INSTALLED AT MIDSPAN OR 12" MAXIMUM BELOW OR ABOVE MIDSPAN. USE OF LOCKING RODS (35) IS COMPLETELY OPTIONAL.

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REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			DRAWING No 26-103
3			
4			
5			SHEET
6			5 OF 20

A circular professional engineer seal for Walter A. Tillman, License No. 44167, State of Florida. The seal features the text "WALTER A. TILLMAN" at the top, "LICENSE" in the center, "No. 44167" below the license word, and "STATE OF FLORIDA" and "PROFESSIONAL ENGINEER" at the bottom. The seal is stamped over a document with a grid and a signature.

P.E. SEAL/SIGNATURE/DATE

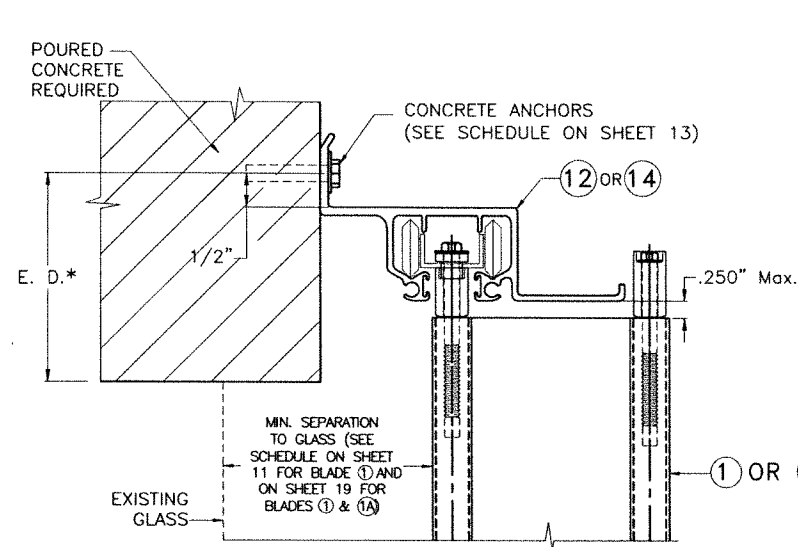
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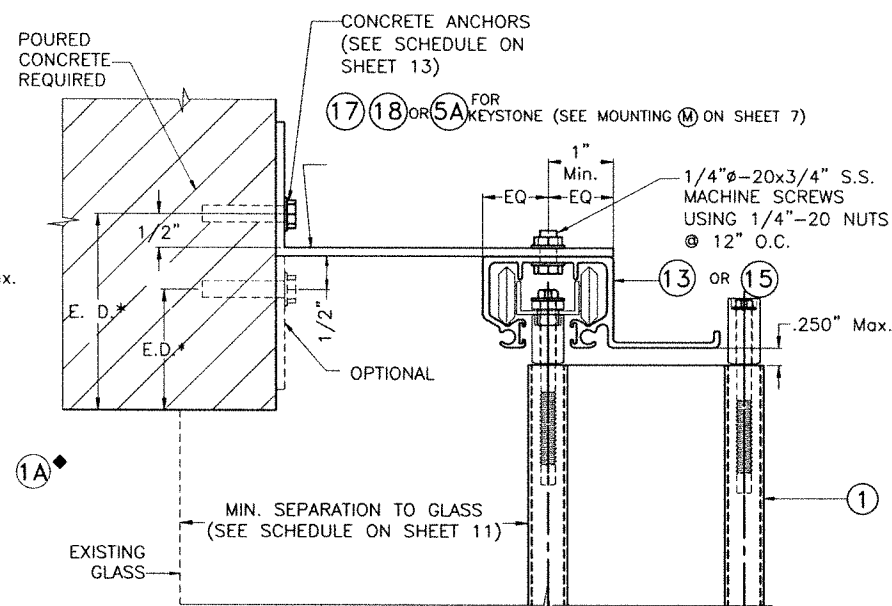
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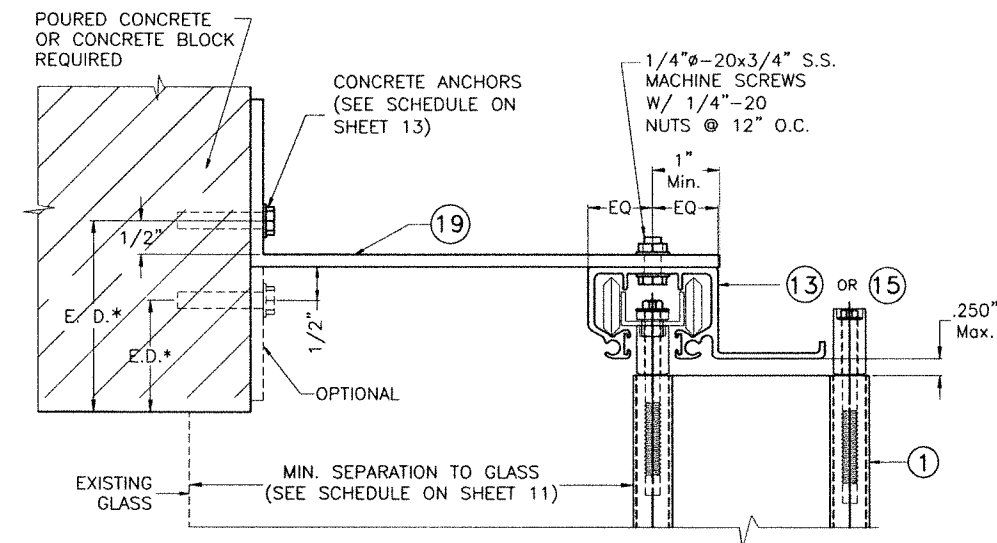
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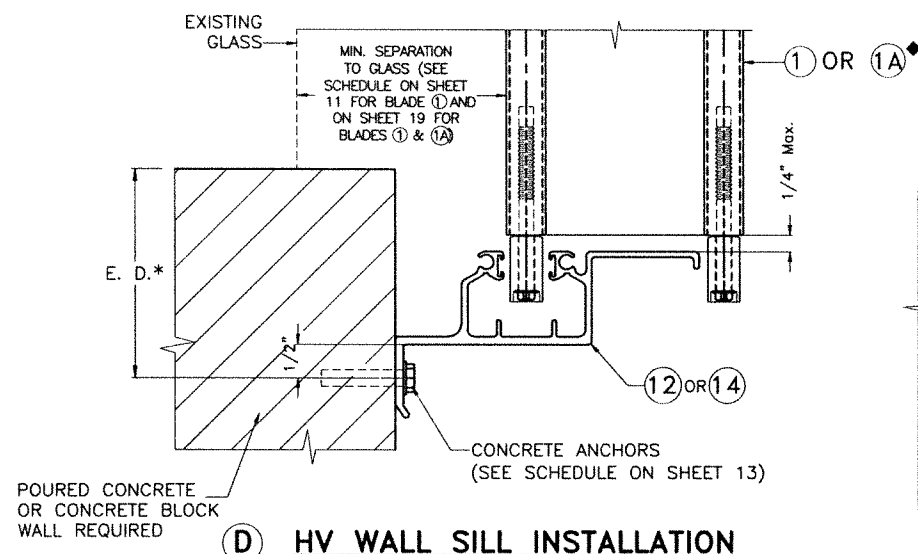
A HV WALL HEADER INSTALLATION



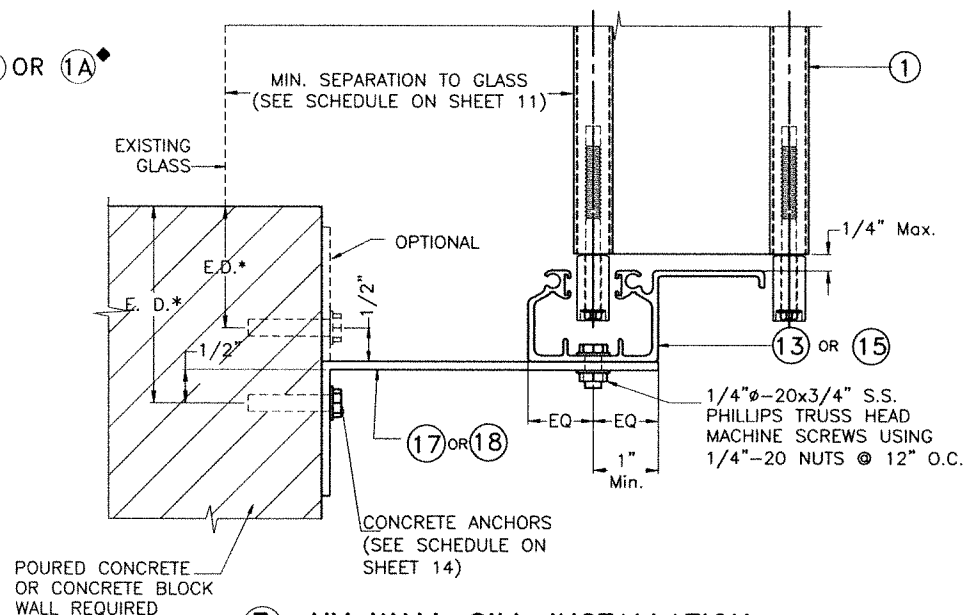
B HV WALL HEADER INSTALLATION + KEYSTONE



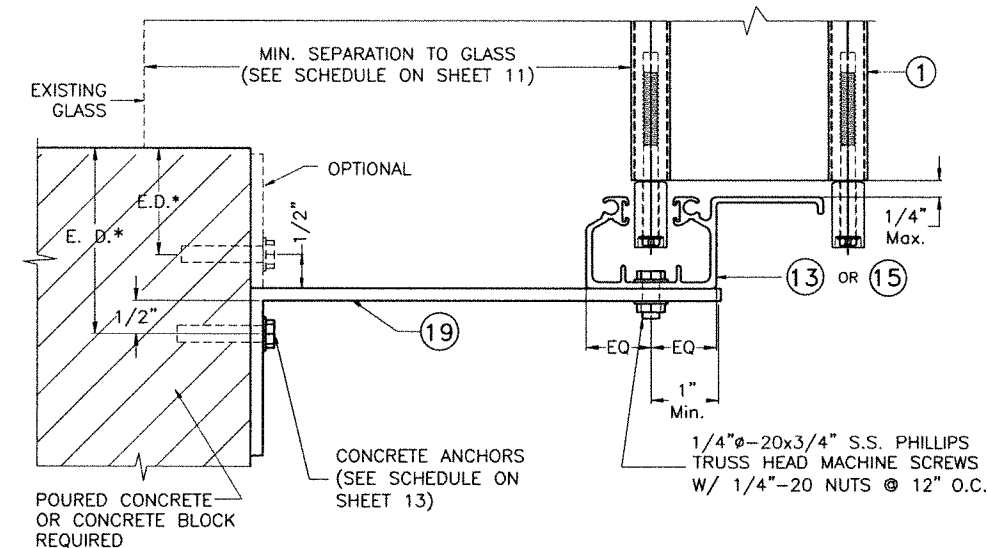
C HV WALL HEADER INSTALLATION



D HV WALL SILL INSTALLATION



E HV WALL SILL INSTALLATION



F HV WALL SILL INSTALLATION

INSTALLATION DETAILS W/ ① HV BLADE

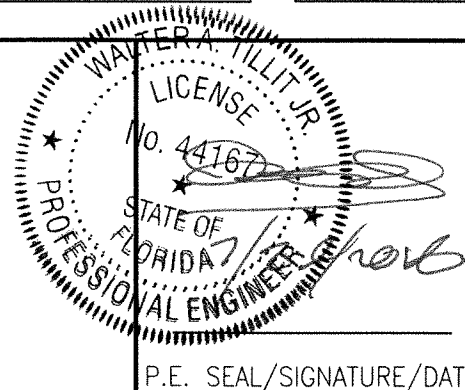
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NOTE FOR COMBINATION OF SECTIONS:

1- SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY
2- MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

* E. D. = EDGE DISTANCE
(SEE SPECIFICATIONS ON SHEET 13)

◆ SEE LIMITATIONS OF USE FOR
BLADE ①A ON SHEET 19



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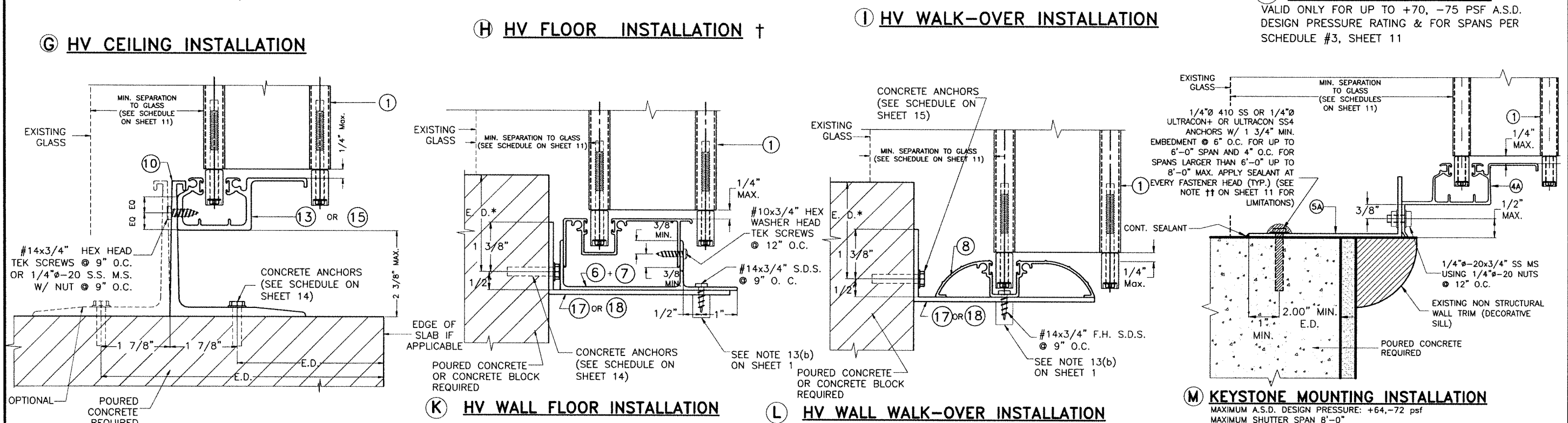
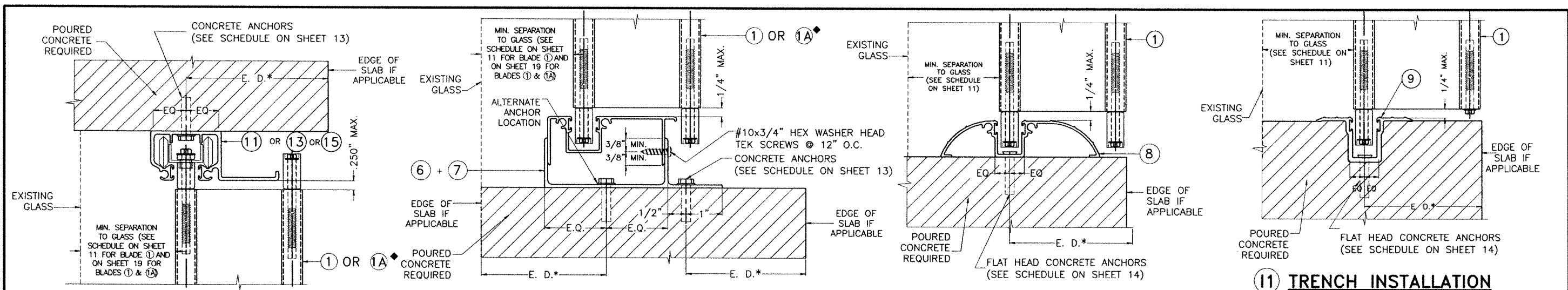
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2			
3			
4			
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6			

DRAWING No
26-103

SHEET
6 OF 20



NOTE FOR COMBINATION OF SECTIONS:

1- SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY

2- MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

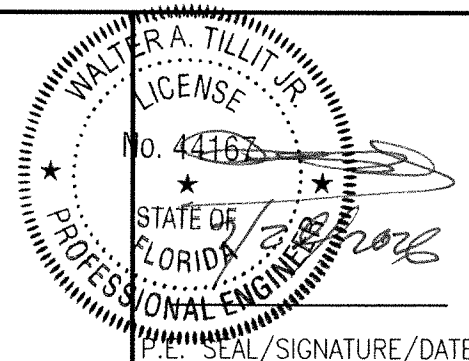
* E. D. = EDGE DISTANCE (SEE SPECIFICATIONS ON SHEET 13)

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

♦ SEE LIMITATIONS OF USE FOR BLADE ①A ON SHEET 19

INSTALLATION DETAILS W/ ① HV BLADE

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REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
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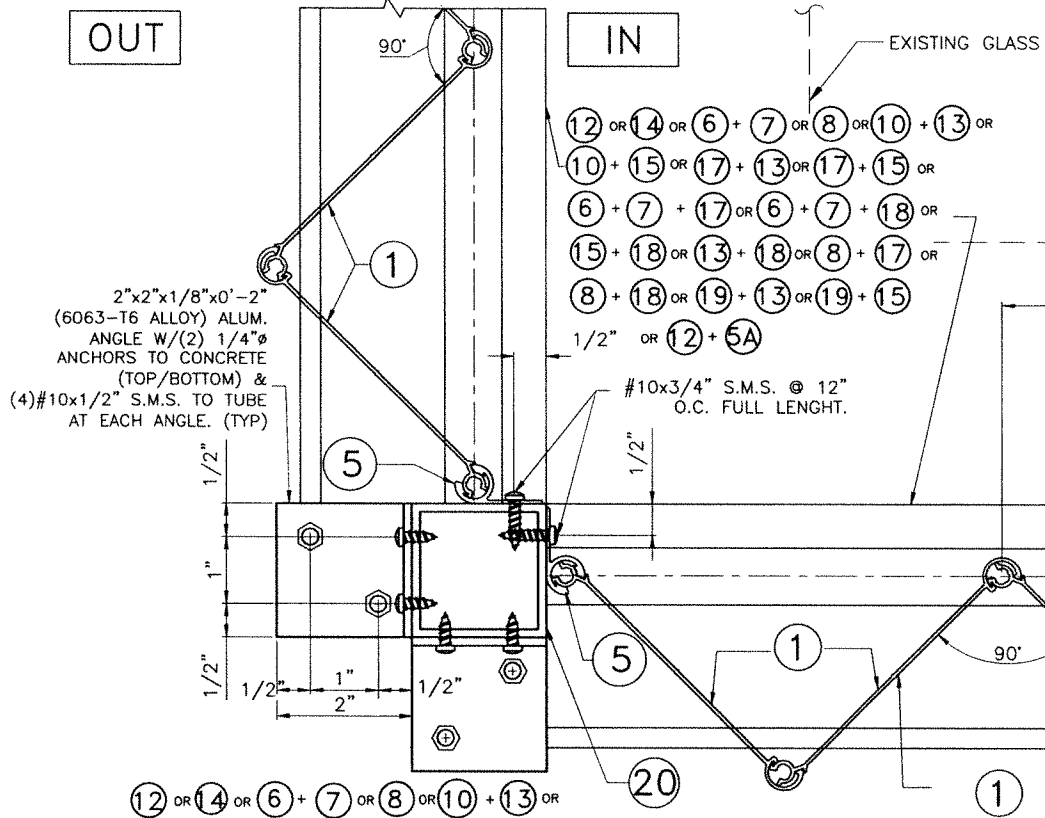
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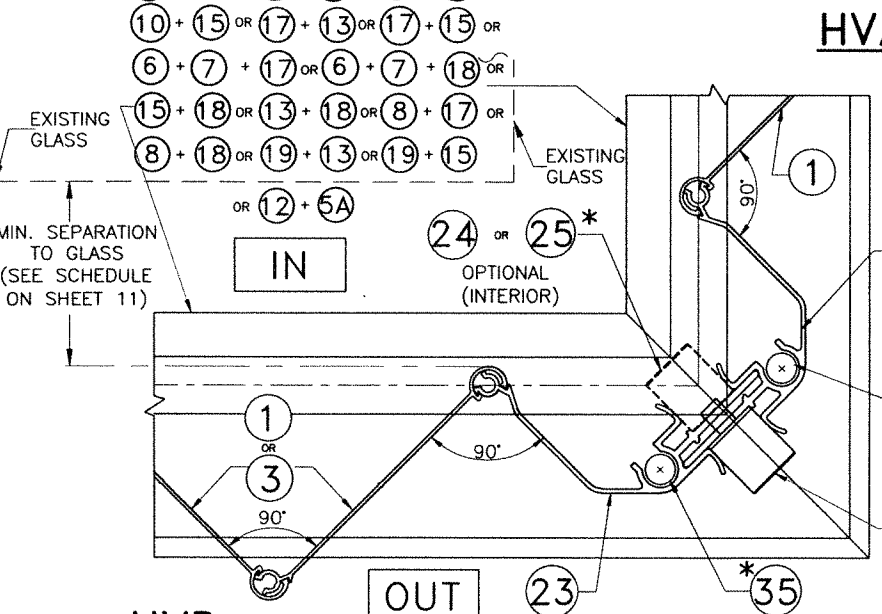
SHEET

7 OF 20

SEE END WALL CONNECTION DETAILS ON SHEETS 10 & 18

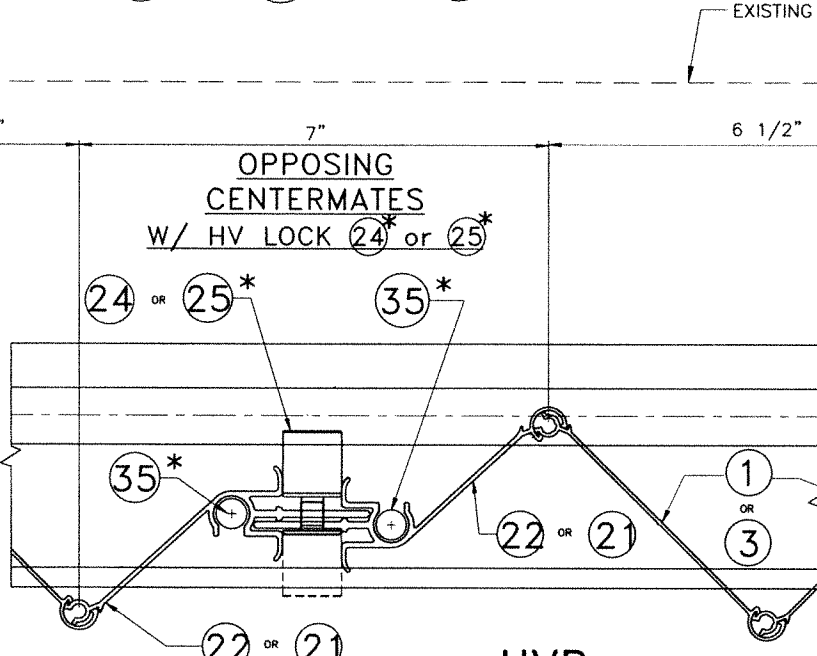


HVA

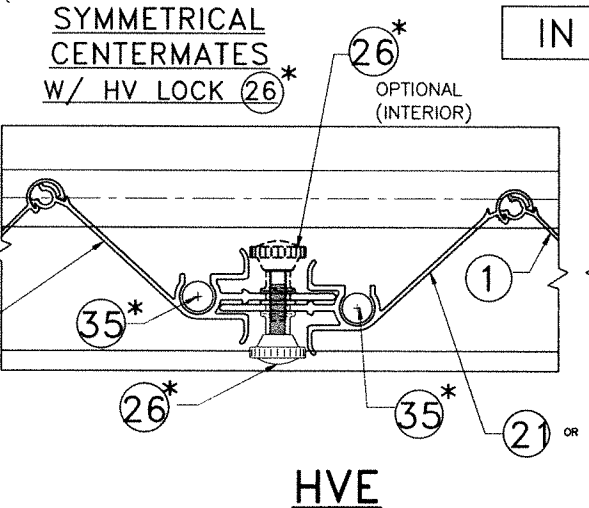


HVD

INSTALLATIONS W/ ① HV
BLADE W/ HV CENTERMATES
②①, ②② OR ②③



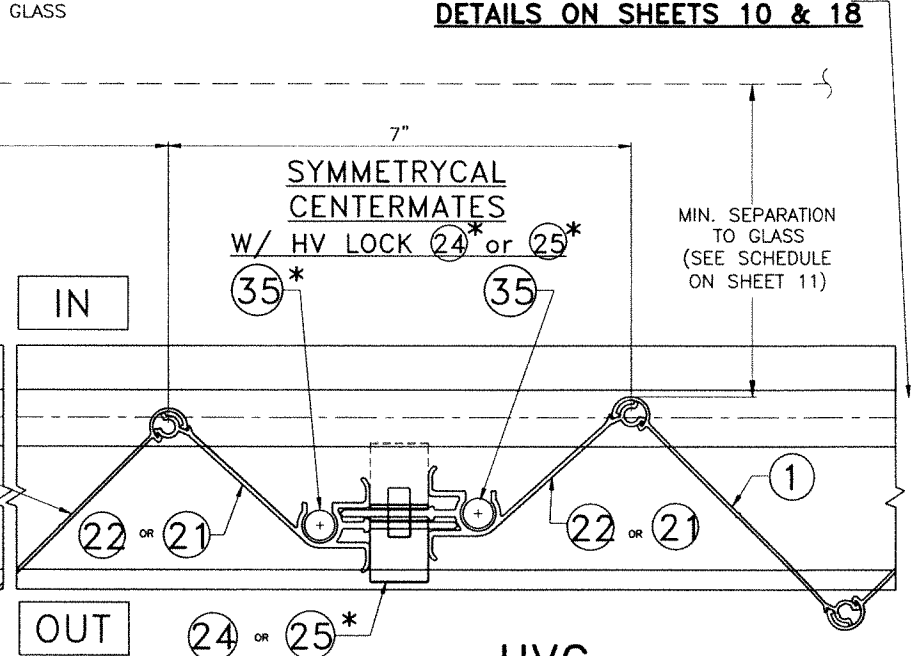
HVB



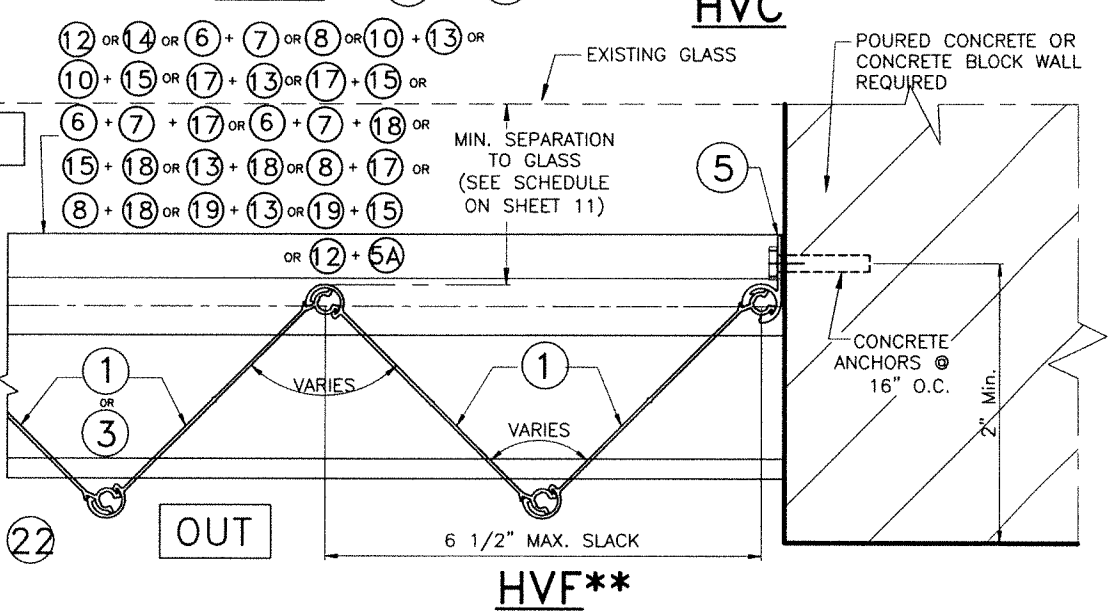
HVE

* SEE NOTES ON LOCKING RODS ③③, HV LOCKS ②④ OR ②⑤
AND ALTERNATE HV LOCK ②⑥ ON SHEET 5.
** BLADE SLACK DETAIL H.V. IS VALID FOR ALL
CENTERMATES APPLICATION WITH BLADE ①

SEE END WALL CONNECTION
DETAILS ON SHEETS 10 & 18



HVC



HVF**

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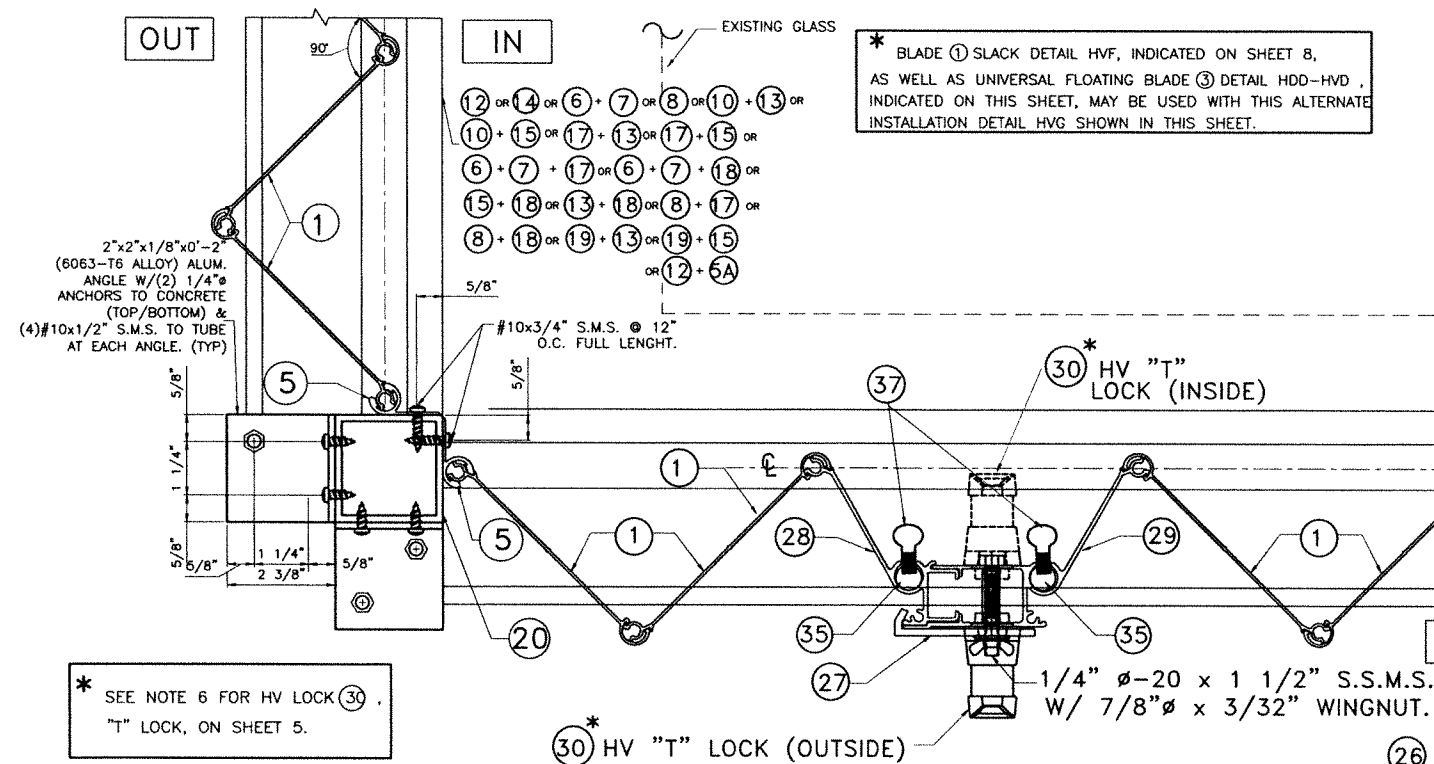
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H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE			
REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			
3			
4			
5			
6			
			DRAWING No
			26-103
			SHEET
			8 OF 20

ALTERNATE INSTALLATION W/HV "T" LOCK (30), HV
MALE/FEMALE "T" LOCKS CENTERMATES (28), (29) &
LOCKERS (27) W/ (1) HV BLADE *

SEE END CONNECTION DETAILS ON SHEETS 10 & 18



* SEE NOTE 6 FOR HV LOCK (30),
"T" LOCK, ON SHEET 5.

† SERIES 9444 ALUMINUM
(2024-T3 ALLOY) LARGE FLANGE THIN
SHEET NUTSERT, PART # 0820,
AS MANUFACTURED BY AVDEL CHERRY
TEXTORN, PARSIPPENY, NEW JERSEY
Q7054 OR EQUAL.

* BLADE ① SLACK DETAIL HVF, INDICATED ON SHEET 8,
AS WELL AS UNIVERSAL FLOATING BLADE ③ DETAIL HDD-HVD ,
INDICATED ON THIS SHEET, MAY BE USED WITH THIS ALTERNATE
INSTALLATION DETAIL HVG SHOWN IN THIS SHEET.

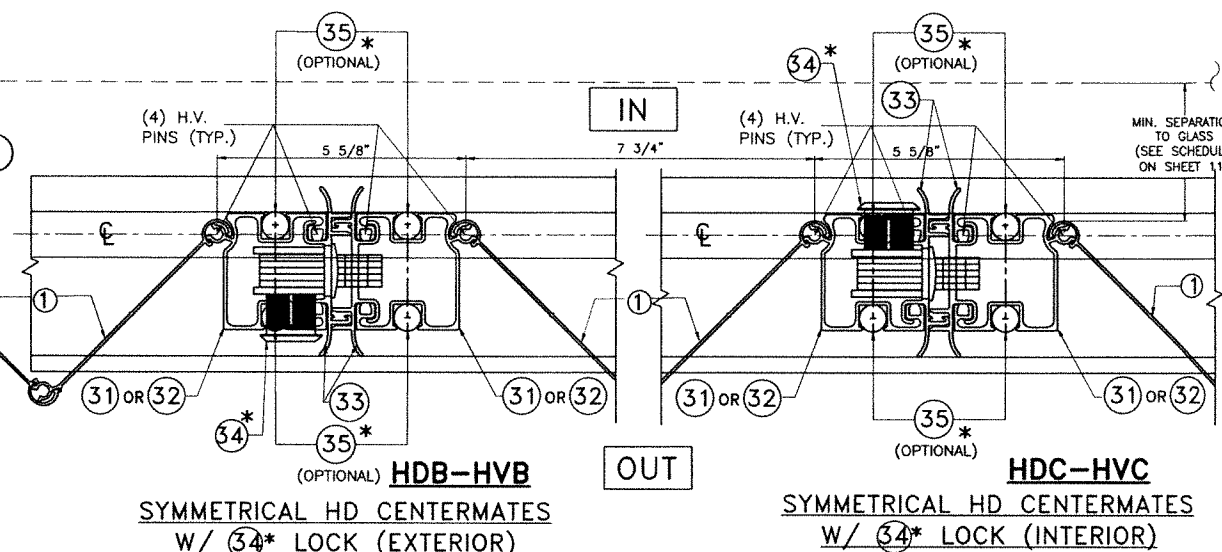
-1/4" Ø-20 x 1 1/2" S.S.M.S.
W/ 7/8" Ø x 3/32" WINGNUT.

(30)* HV "T" LOCK (OUTSIDE)

HVG*

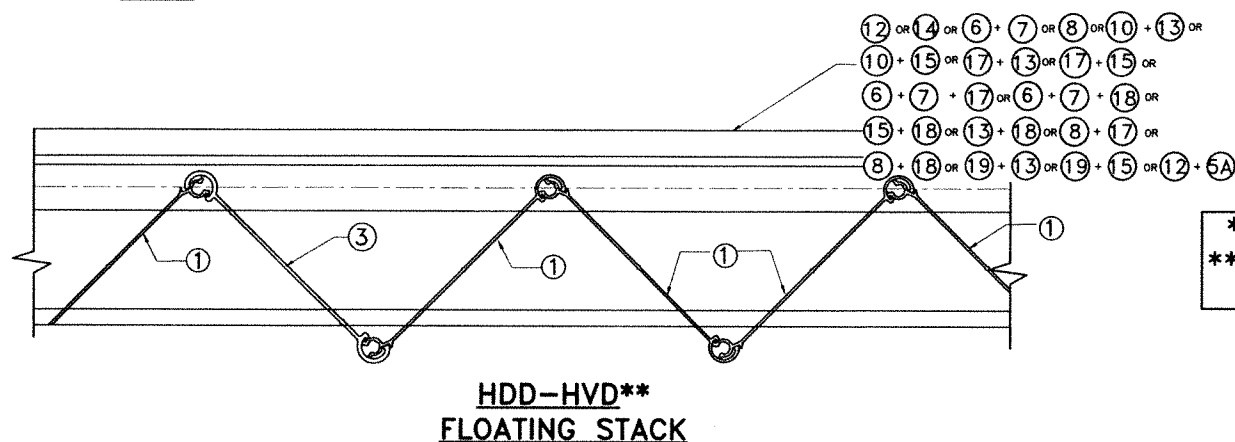
INSTALLATION ① HV BLADE
W/ HD CENTERMATES ③①, ③②, ③③

SEE END WALL CONNECTION-
DETAILS ON SHEETS 10 & 18



* SEE NOTES ON LOCKING RODS (33) & HD (34) LOCKS ON SHEET 5

** UNIVERSAL FLOATING BLADE (3) DETAIL HDD-HVD IS
VALID FOR ALL CENTERMATES APPLICATIONS WITH BLADE (1)



FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

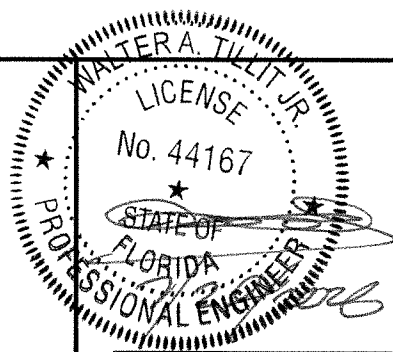
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2			DRAWING No 26-103
3			
4			
5			SHEET
6			9 OF 20



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WALTER A. TILLIT Jr. P.E.
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West Palm Beach, FL 33407

SCHEDULE #1

MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.). FOR INSTALLATIONS W/ SYMMETRICAL CENTERMATES, ② & ② or ③① or ③② W/ ONE H.V. LOCK ②④ or ②⑤ or ②⑥ or HD LOCK ③④ W/ NO LOCKING RODS ③⑤ or CENTERMATES ②⑧ & ②⑨ W/ ONE HV "T" LOCK ③① W/TWO LOCKING RODS ③⑤ TOP & BOTTOM (SEE NOTES †, ††)

MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS ①			
	WALL MOUNTING		FLOOR/CEILING MOUNTING	
	L + (ft)	L - (ft)	L + (ft)	L - (ft)
30 OR LESS	16'-0"	16'-0"	16'-0"	16'-0"
35	14'-10"	14'-10"	15'-2"	16'-0"
40	13'-10"	13'-10"	14'-2"	15'-2"
45	13'-1"	13'-1"	13'-4"	14'-3"
50	12'-5"	12'-5"	12'-8"	13'-7"
55	11'-10"	11'-10"	12'-1"	12'-11"
60	11'-4"	11'-4"	11'-7"	12'-4"
65	10'-10"	10'-10"	11'-1"	11'-11"
70	10'-6"	10'-6"	10'-9"	11'-5"
75	10'-1"	10'-1"	10'-4"	11'-1"
80	9'-10"	9'-10"	10'-0"	10'-9"
85	9'-6"	9'-6"	9'-9"	10'-5"
90	9'-3"	9'-3"	9'-5"	10'-1"
95	9'-0"	8'-9"	9'-2"	9'-10"
100	8'-9"	8'-4"	9'-0"	9'-7"
105	8'-7"	7'-11"	8'-9"	9'-4"
110	8'-4"	7'-7"	8'-7"	9'-2"
115	8'-2"	7'-3"	8'-4"	8'-11"
120	8'-0"	6'-11"	8'-2"	8'-9"
125	7'-10"	6'-8"	8'-0"	8'-5"
130	7'-8"	6'-5"	7'-10"	8'-1"
135	7'-7"	6'-2"	7'-9"	7'-9"
140	7'-5"	5'-11"	7'-7"	7'-6"
145	7'-3"	5'-9"	7'-5"	7'-3"
150	7'-2"	5'-7"	7'-4"	7'-0"
155	7'-0"	5'-5"	7'-2"	6'-9"
160	6'-11"	5'-2"	7'-1"	6'-7"
165	6'-10"	5'-1"	7'-0"	6'-4"
170	6'-9"	4'-11"	6'-11"	6'-2"
175	6'-7"	4'-9"	6'-9"	6'-0"
180	6'-6"	4'-8"	6'-8"	5'-10"
185	6'-5"	4'-6"	6'-7"	5'-8"
190	6'-4"	4'-5"	6'-6"	5'-6"
195	6'-3"	4'-3"	6'-5"	5'-5"
200	6'-2"	4'-2"	6'-4"	5'-3"
205	6'-1"	4'-1"	6'-3"	5'-1"

SCHEDULE #2

MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.) FOR INSTALLATIONS W/ OPPOSING CENTERMATES, ②① & ②② ONE HV LOCK ②④ or ②⑤ or ②⑥ W/ NO LOCKING RODS ③⑤ (SEE NOTES †, ††)

MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS ①	
	WALL MOUNTING & FLOOR/CEILING MOUNTING	
	L + (ft)	L - (ft)
30	16'-0"	16'-0"
35	14'-10"	14'-10"
40	13'-10"	13'-10"
45	13'-1"	13'-1"
50	12'-5"	12'-5"
55	11'-10"	11'-10"
60	11'-4"	11'-4"
65	10'-10"	10'-10"
70	10'-6"	10'-6"
75	10'-1"	10'-1"
80	9'-10"	9'-10"
85	9'-6"	9'-6"
90	9'-3"	9'-3"
95	9'-0"	8'-9"
100	8'-9"	8'-4"
105	8'-7"	7'-11"
110	8'-4"	7'-7"
115	8'-2"	7'-3"
120	8'-0"	6'-11"
125	7'-10"	6'-8"
130	7'-8"	6'-5"
135	7'-7"	6'-2"
140	7'-5"	5'-11"
145	7'-3"	5'-9"
150	7'-2"	5'-7"
155	7'-0"	5'-5"
160	6'-11"	5'-2"
165	6'-10"	5'-1"
170	6'-9"	4'-11"
175	6'-7"	4'-9"
180	6'-6"	4'-8"
185	6'-5"	4'-6"
190	6'-4"	4'-5"
195	6'-3"	4'-3"
200	6'-2"	4'-2"
205	6'-1"	4'-1"

SCHEDULE #3

MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.) INSTALLATIONS W/ SYMMETRICAL CENTERMATES ②① & ②② W/ ONE HV LOCKS ②④ OR ②⑤ W/ NO LOCKING RODS ③⑤ (VALID FOR MOUNTING ①① SHEET 7)

MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE INSTALLATIONS	
	FLOOR/CEILING MOUNTING OR FLOOR/WALL MOUNTING	
	L + (ft)	L - (ft)
30	16'-0"	16'-0"
35	15'-2"	16'-10"
40	14'-2"	15'-2"
45	13'-4"	14'-3"
50	12'-3"	13'-1"
55	11'-1"	11'-11"
60	10'-2"	10'-11"
65	9'-5"	10'-1"
70	8'-9"	9'-4"
75	-	8'-9"

INSTALLATION LEGEND		
	CONCRETE & MANSORY	WOOD
WALL MOUNTING	A, B, C, D, E, F, K & L	M, N, O, P, Q, R, S, & V.
FLOOR/CEILING MOUNTING	G, H, I, I1, J & M	T, U, W & X

① MAXIMUM SHUTTER SPAN "L+" OR "L-" FOR INSTALLATIONS INTO WOOD SHALL BE LIMITED TO 105 psf. A.S.D. DESIGN PRESSURE RATING.

† HV CORNER CENTERMATE #3 MAY BE USED AT ALL MOUNTING INSTALLATIONS. LOCKING SPECIFICATIONS SHALL BE AS INDICATED ON MANDATORY CONDITION #2 NOTE #5, SHEET 5.

†† 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 8'-0" SPAN, SEE MOUNTING ① ON SHEET 7.

SEPARATION TO GLASS SCHEDULE

WIND ZONE ASTM E-1996	MINIMUM SEPARATION TO GLASS
1 THRU 3	1"

① HV BLADE

* NOTES:

(1) L+: MAXIMUM ALLOWABLE SPAN FOR A GIVEN POSITIVE A.S.D. DESIGN PRESSURE RATING.
L-: MAX. 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 SCHEDULE.
GIVEN A NEGATIVE A.S.D. DESIGN PRESSURE RATING, DETERMINE MAXIMUM SPAN "L-" FROM SCHEDULE.

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 WITH FINAL MAXIMUM ALLOWABLE SPAN AND NEGATIVE A.S.D. DESIGN PRESSURE RATING TO DETERMINE MAXIMUM ANCHOR SPACING.

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF FLORIDA
PROFESSIONAL ENGINEER
P.E. SEAL/SIGNATURE/DATE

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TILTECO INC.
TILLIT TESTING & ENGINEERING COMPANY
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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

© 2026 EASTERN METAL SUPPLY, INC.			
BERTHA HV™ Accordion Shutter System H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE			
REV. No	DESCRIPTION	DATE	DRAWN BY: MCHV./L.G.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			DRAWING No 26-103
3			
4			
5			SHEET 11 OF 20
6			

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

MAXIMUM SPAN (ft)	POURED CONCRETE (SEE MOUNTINGS A, B, C, D AND F ON SHEET 6)																POURED CONCRETE/CONCRETE BLOCK																															
	(A) WALL HEADER MOUNTING W/ (12)								(A) WALL HEADER MOUNTING W/ (14)								(B) WALL HEADER MOUNTING								(D) WALL SILL MOUNTING W/ (12)								(D) WALL SILL MOUNTING W/ (14)								(C) & (F) WALL HEADER/SILL MOUNTING							
	A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)							
	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205
3'-0" OR LESS	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	5.5	8	8	8	8	8	8	7	5.5
	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	8
	14	12	10	9	8	8	6	5	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	6.5
	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
4'-0"	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	7	5.5	8	8	8	8	8	8	7	5.5
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8
5'-0"	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
6'-0"	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
7'-0"	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
8'-0"	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
9'-0"	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
10'-0"	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	7	5.5	14	12	10	9	8	8	6	6	8	8	8	8	8	8	8	7
11'-0"	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	10	9	8	8	6	3	14	12	1																					

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 E, G, & H ON SHEETS 6 & 7)

MAXIMUM SPAN (ft)	POURED CONCRETE/CONCRETE BLOCK									POURED CONCRETE																							
	Ⓔ WALL SILL MOUNTING									Ⓖ CEILING MOUNTING									Ⓕ FLOOR MOUNTING														
	A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)									A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)									A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)														
	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205									
3'-0" OR LESS	14	12	10	9	8	8	6	5.5	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6									
	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6									
	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	5									
	14	12	10	9	8	8	6	7	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6									
4'-0"	14	12	10	9	8	7	5.5	3.5	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	5									
	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	5.5									
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	4.5	14	12	10	9	8	6	4	3.5									
	14	12	10	9	8	8	6	4.5	14	12	10	9	8	8	6	5.5	14	12	10	9	8	8	6	4.5									
5'-0"	14	12	10	9	7.5	5.5	3.5	-	14	12	10	9	8	8	6	5	14	12	10	9	8	7	5.5	4									
	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	5.5	14	12	10	9	8	8	6	4.5									
	14	12	10	9	8	7	4	-	14	12	10	9	8	6.5	5	3.5	14	12	10	8	6.5	5	3.5	3									
	14	12	10	9	8	7.5	4.5	-	14	12	10	9	8	8	6	4.5	14	12	10	9	8	6	4.5	3.75									
6'-0"	14	12	9.5	7.5	6.5	4.5	-	-	14	12	10	9	8	7.5	5.5	4	14	12	10	9	8	6	4.5	3.5									
	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	5	14	12	10	9	8	6.5	5	3.5									
	14	12	10	9	7.5	5.5	3	-	14	12	10	8.5	7	5.5	4	3	14	12	8	6.5	5.5	4	3	-									
	14	12	10	9	8	6	-	-	14	12	10	9	8	6.5	5	3.75	14	12	10	8.5	8	5	4	-									
7'-0"	14	12	8	6.5	5.5	3	-	-	14	12	10	9	8	6.5	4.5	3.5	14	12	10	8	7	5	3.5	3									
	14	12	10	9	8	8	-	-	14	12	10	9	8	7	5	4	14	12	10	9	7.5	5.5	4	3									
	14	12	10	8	6.5	4	-	-	14	12	9	7.5	6	4.5	3.5	-	14	10.5	7	5.5	4.5	3.5	-	-									
	14	12	10	8.5	7	4	-	-	14	12	10	9	7.5	5.5	4	-	14	12	9	7	7.5	4.5	-	-									
8'-0"	14	11	7	5.5	4.5	-	-	-	14	12	10	9	7.5	5.5	4	-	14	12	9	7	6	4.5	3	-									
	14	12	10	9	8	6.5	-	-	14	12	10	9	8	6	4	-	14	12	10	8	6.5	5	3.5	-									
	14	12	8.5	7	5.5	3	-	-	14	12	8	6.5	5.5	4	3	-	12.5	9.5	6	5	4	3	-	-									
	14	12	9.5	7.5	6	-	-	-	14	12	9.5	8	6.5	5	-	-	14	12	8	6	6.5	4	-	-									
9'-0"	13	9.5	6.5	5	3.5	-	-	-	14	12	10	8	6.5	5	-	-	14	12	8	6.5	5	4	-	-									
	14	12	10	9	8	-	-	-	14	12	10	9	7.5	4.5	-	-	14	12	8.5	7	5.5	4	-	-									
	14	11.5	7.5	6	4	-	-	-	14	11	7	5.5	5	3.5	-	-	11	8	5.5	4.5	3.5	-	-	-									
	14	12	8	6.5	4.5	-	-	-	14	12	8.5	7	5.5	4	-	-	14	10.5	7	5.5	6	4.5	-	-									
10'-0"	11.5	8.5	5.5	4	-	-	-	-	14	12	9	7	6	4.5	-	-	14	11	7	5.5	4.5	3.5	-	-									
	14	12	10	9	7.5	-	-	-	14	12	10	8	6.5	5	-	-	14	12	8	6	5	4	-	-									
	14	10.5	7	5	3.5	-	-	-	13	9.5	6.5	5	4	3	-	-	10	7.5	5	4	3	-	-	-									
	14	11	7.5	5.5	-	-	-	-	14	11.5	9	6	5	4	-	-	12.5	9.5	6	5	4	4	-	-									
11'-0"	10.5	8	5	-	-	-	-	-	14	12	8	6.5	5.5	4	-	-	13	10	6.5	5	4	3	-	-									
	14	12	10	-	-	-	-	-	14	12	9	7	6	4.5	-	-	14	10.5	7	5.5	4.5	3.5	-	-									
	12.5	9.5	5	-	-	-	-	-	12	9	6	4.5	4	3	-	-	9	7	4.5	3.5	3	-	-	-									
	14	10	7	-	-	-	-	-	14	10.5	7	5.5	4.5	-	-	-	11.5	8.5	5.5	4.5	3.75	-	-	-									
12'-0"	9.5	7	4.5	-	-	-	-	-	14	11.5	7.5	6	5	-	-	-	12	9	6	4.5	4	-	-	-									
	14	12	10	-	-	-	-	-	14	12	8	6.5	5.5	-	-	-	13	10	6.5	5	4	-	-	-									
	11.5	8.5	4.5	-	-	-	-	-	11	8	5.5	4	3.5	-	-	-	8	6	4	3	-	-	-	-									
	13.5	9.5	6	-	-	-	-	-	13	9.5	6.5	5	4	-	-	-	10.5	8	5	4	-	-	-	-									
13'-0"	9	6.5	-	-	-	-	-	-	14	10.5	7	5.5	4.5	-	-	-	11	8.5	5.5	4.5	3.5	-	-	-									
	14	12	-	-	-	-	-	-	14	11.5	7.5	6	5	-	-	-	12	9	6	4.5	4	-	-	-									
	10.5	8	-	-	-	-	-	-	10	7.5	5	4	3	-	-	-	7.5	5.5	4	3	-	-	-	-									
	12.5	8.5	-	-	-	-	-	-	12	9	6	4.5	4	-	-	-	9.5	7	5	4	-	-	-	-									
14'-0"	8	6	-	-	-	-	-	-	13	9.5	6.5	5	-	-	-	-	10.5	7.5	5	4	-	-	-	-									
	14	12	-	-	-	-	-	-	14	10.5	7	5.5	-	-	-	-	11	8.5	5.5	4.5	-	-	-	-									
	10	7.5	-	-	-	-	-	-	9	7	4.5	3.5	-	-	-	-	7	5	3.5	3	-	-	-	-									
	11.5	8	-	-	-	-	-	-	11	8	5.5	4.5	-	-	-	-	9	6.5	4.5	-	-	-	-	-									
15'-0"	7.5	-	-	-	-	-	-	-	12	9	6	-	-	-	-	-	9.5	7	4.5	-	-	-	-	-									
	14	-	-	-	-	-	-	-	13.5	10	6.5	-	-	-	-	-	10.5	8	5	-	-	-	-	-									
	9	-	-	-	-	-	-	-	8.5	6.5	4	-	-	-	-	-	6.5	5	3	-	-	-	-	-									
	10	-	-	-	-	-	-	-	10.5	8	5	-	-	-	-	-	8.5	6	4	-	-	-	-	-									
16'-0"	7	-	-	-	-	-	-	-	11.5	8.5	5.5	-	-	-	-	-	9	6.5	4.5	-	-	-	-	-									
	14	-	-	-	-	-	-	-	12.5	9.5	6	-	-	-	-	-	10	7.5	5	-	-	-	-	-									
	8	-	-	-	-	-	-	-	8	6	4	-	-	-	-	-	6	4.5	3	-	-	-	-	-									
	9.5	-	-	-	-	-	-	-	9.5	7	5	-	-	-	-	-	8	6	4	-	-	-	-	-									

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 I, J, K & L ON SHEET 7)

MAXIMUM SPAN (ft)	POURED CONCRETE																POURED CONCRETE/CONCRETE BLOCK																
	(I) WALK OVER & (11) TRENCH MOUNTINGS ⬇								(J) RAINGUARD MOUNTING								(K) WALL/FLOOR MOUNTING								(L) WALL/WALK OVER MOUNTING								
	A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)								
	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	30	40	60	75	90	120	160	205	
3'-0" OR LESS	14	12	10	9	8	8	6	6	12	12	12	12	12	11.5	8.5	6.5	7	7	7	7	7	7	7	5.5	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	6	12	12	12	12	12	12	9.5	7	7	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	6	12	12	12	12	12	10.5	8	6	4.5	7	7	7	7	7	7	7	6.5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	6	12	12	12	12	12	10	7.5	6	7	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	
4'-0"	14	12	10	9	8	8	6	6	12	12	12	12	12	11.5	8.5	6.5	5	7	7	7	7	7	7	5.5	4	5	5	5	5	5	5	4	
	14	12	10	9	8	8	6	6	12	12	12	12	12	9.5	7	5.5	7	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	6	12	12	12	9.5	8	6	4.5	3.5	7	7	7	7	7	7	6.5	5	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	6	12	12	12	12	10	7.5	5.5	4	7	7	7	7	7	7	7	5.5	5	5	5	5	5	5	5	5	
5'-0"	14	12	10	9	8	8	6	6	12	12	12	11	9	7	5	4	7	7	7	7	7	7	5.5	4	3	5	5	5	5	5	5	4	3
	14	12	10	9	8	8	6	6	12	12	12	12	10	7.5	5.5	4	7	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	6	12	12	9.5	7.5	6	4.5	3.5	—	7	7	7	7	7	7	5	3.5	5	5	5	5	5	5	5	4	
	14	12	10	9	8	8	6	6	12	12	12	9.5	8	6	4.5	—	7	7	7	7	7	7	5.5	4	5	5	5	5	5	5	5	4	
6'-0"	14	12	10	9	8	8	6	6	12	12	11.5	9	7.5	5.5	4	3	7	7	7	7	7	4.5	3.5	—	5	5	5	5	5	4.5	3.5	—	
	14	12	10	9	8	8	6	6	12	12	12	10	8	6	4.5	3.5	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5		
	14	12	10	9	8	8	6	6	12	12	8	6	5	4	3	—	7	7	7	7	7	5.5	4	—	5	5	5	5	5	5	4	3	
	14	12	10	9	8	8	6	6	12	12	10	8	6.5	5	3.75	—	7	7	7	7	7	6	4.5	—	5	5	5	5	5	5	4.5	—	
7'-0"	14	12	10	9	8	8	6	6	12	12	10	8	6.5	5	3.5	—	7	7	7	6.5	5.5	4	—	—	5	5	5	5	5	4	3	—	
	14	12	10	9	8	8	6	6	12	12	12	8.5	7	5	4	3	7	7	7	7	7	7	6	5	5	5	5	5	5	5	5		
	14	12	10	9	8	8	6	6	12	10	6.5	5	4.5	3	—	—	7	7	7	7	6.5	5	3	—	5	5	5	5	5	5	3.5	3	
	14	12	10	9	8	8	6	6	12	12	8.5	7	5.5	4	—	—	7	7	7	7	7	5	—	—	5	5	5	5	5	5	4	—	
8'-0"	14	12	10	9	8	8	6	—	12	12	8.5	7	5.5	4	3	—	7	7	7	5.5	4.5	3	—	—	5	5	5	5	4.5	3.5	—	—	
	14	12	10	9	8	8	6	—	12	12	10.5	7.5	6	4.5	3.5	—	7	7	7	7	7	7	7	4	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	6	—	12	9	6	4.5	4	3	—	—	7	7	7	7	5.5	4	—	—	5	5	5	5	5	4	3	—	
	14	12	10	9	8	8	6	—	12	11	7.5	6	5	3.75	—	—	7	7	7	7.5	6	4.5	—	—	5	5	5	5	5	4.5	—	—	
9'-0"	14	12	10	9	8	8	—	—	12	11.5	7.5	6	5	3.5	—	—	7	7	6.5	5	4	—	—	—	5	5	5	5	5	4	3	—	
	14	12	10	9	8	8	—	—	12	12	9.5	6.5	5.5	4	3	—	7	7	7	7	7	7	6	3	5	5	5	5	5	5	5	5	
	14	12	10	9	8	8	—	—	10.5	8	5	4	3.5	—	—	—	7	7	7	6	5	3.5	—	—	5	5	5	5	5	4	3	—	
	14	12	10	9	8	8	—	—	12	10	6.5	5	4.5	—	—	—	7	7	7	6.5	5.5	—	—	—	5	5	5	5	5	4	—	—	
10'-0"	14	12	10	9	8	8	—	—	12	10.5	7	5.5	4.5	3.5	—	—	7	7	5.5	4.5	3.5	—	—	—	5	5	5	4.5	3.5	—	—	—	
	14	12	10	9	8	8	—	—	12	11	8.5	6	5	3.5	—	—	7	7	7	7	7	7	4.5	—	5	5	5	5	5	5	5	4.5	
	14	12	10	9	8	8	—	—	9.5	7	4.5	3.5	3	—	—	—	7	7	7	5.5	4.5	—	—	—	5	5	5	5	4.5	3.5	—	—	
	14	12	10	9	8	8	—	—	12	9	6	5	4	—	—	—	7	7	7	6	5	—	—	—	5	5	5	4.5	5	—	—	—	
11'-0"	14	12	10	9	8	8	—	—	12	9.5	6	5	4	3	—	—	7	7	5	4	3	—	—	—	5	5	5	4	3.5	—	—	—	
	14	12	10	9	8	8	—	—	12	10	7	5.5	4.5	3.5	—	—	7	7	7	7	7	7	3.5	—	5	5	5	5	5	5	5	4	
	14	12	10	9	8	8	—	—	8.5	6.5	4	3.5	3	—	—	—	7	7	6	5	4	—	—	—	5	5	5	5	4	3	—	—	
	14	12	10	9	8	8	—	—	11	8	5.5	4	—	—	—	—	7	7	7	5.5	4.5	—	—	—	5	5	5	5	4.5	—	—	—	
12'-0"	14	12	10	9	8	—	—	—	11.5	8.5	5.5	4.5	3.5	—	—	—	7	7	4.5	3.5	—	—	—	—	5	5	4.5	3.5	3	—	—	—	
	14	12	10	9	8	—	—	—	12	9.5	6.5	5	4	3	—	—	7	7	7	7	7	6	3	—	5	5	5	5	5	5	4.5	3.5	
	14	12	10	9	8	—	—	—	8	6	4	3	—	—	—	—	7	7	5.5	4.5	3.5	—	—	—	5	5	5	4.5	4	3	—	—	
	14	12	10	9	8	—	—	—	10	7.5	5	4	—	—	—	—	7	7	6	5	—	—	—	—	5	5	5	5	4	—	—	—	
13'-0"	14	12	10	9	8	—	—	—	10.5	8	5	4	3.5	—	—	—	7	6.5	4.5	3.5	—	—	—	—	5	5	4.5	3.5	3	—	—	—	
	14	12	10	9	8	—	—	—	11.5	8.5	6	4.5	3.5	3	—	—	7	7	7	7	7	4.5	—	—	5	5	5	5	5	5	4.5	3.5	
	14	12	10	9	8	—	—	—	7	5.5	3.5	3	—	—	—	—	7	7	5	4	3	—	—	—	5	5	5	4	3	—	—	—	
	14	12	10	9	8	—	—	—	9	7	4.5	3.75	—	—	—	—	7	7	5.5	4.5	—	—	—	—	5	5	5	4.5	4	—	—	—	
14'-0"	14	12	10	9	—	—	—	—	10	7.5	5	4	3	—	—	—	7	6	4	3	—	—	—	—	5	5	4	3	—	—	—	—	
	14	12	10	9	—	—	—	—	10.5	8	5.5	4	3.5	—	—	—	7	7	7	7	7	4	—	—	5	5	5	5	5	5	4	3	
	14	12	10	9	—	—	—	—	6.5	5	3	—	—	—	—	—	7	7	5	3.5	—	—	—	—	5	5	5	4	—	—	—	—	
	14	12	10	9	—	—	—	—	8.5	6.5	4	—	—	—	—	—	7	7	5	4	—	—	—	—	5	5	5	4	—	—	—	—	
15'-0"	14	12	10	—	—	—	—	—	9	7	4.5	3.5	3	—	—	—	7	5.5	3.5	—	—	—	—	—	5	5	3.5	3	—	—	—	—	
	14	12	10	—	—	—	—	—	10	7.5	5	4	3	—	—	—	7	7	7	7	7	3.5	—	—	5	5	5	5	5	5	4	3	
	14	12	10	—	—	—	—	—	6	4.5	3	—	—	—	—	—	7	7	4.5	3	—	—	—	—	5	5	4.5	3.5	—	—	—	—	
	14	12	10	—	—	—	—	—	8	6	4	—	—	—	—	—	7	7	5	—	—	—	—	—	5	5	5	4	—	—	—	—	
16'-0"	14	12	10	—	—	—	—	—	8.5	6.5	4	3.5	—	—	—	—	7	5.5	3.5	—	—	—	—	—	5	5	3.5	—	—				

(SEE MOUNTINGS ON SHEETS 16 & 17).

MAXIMUM SPAN (ft)	SUBSTRATE																																																											
	SOUTHERN PINE No. 2 W/ MIN. G=0.55, DOUGLAS FIR W/ MIN. G=0.50												SPRUCE PINE FIR NORTH W/ MIN. G=0.43												SPRUCE PINE FIR SOUTH W/ MIN. G=0.36												1/2" MIN. CDX PLYWOOD						SOUTHERN PINE No. 2 W/ MIN. G=0.55, DOUGLAS FIR W/ MIN. G=0.50						SPRUCE PINE FIR NORTH W/ MIN. G=0.43						SPRUCE PINE FIR SOUTH W/ MIN. G=0.36					
	WALL MOUNTINGS M, N, O & R						CEILING MOUNT T FLOOR MOUNTINGS W & X						WALL MOUNTINGS M, N, O & R						CEILING MOUNT T FLOOR MOUNTINGS W & X						WALL MOUNTINGS M, N, O & R						CEILING MOUNT T FLOOR MOUNTINGS W & X						WALL MOUNTINGS P & Q						B.O. WALL MOUNTINGS S & V						B.O. WALL MOUNTINGS S & V						B.O. WALL MOUNTINGS S & V					
	A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)						A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf)											
	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105						
3'-0" OR LESS	12	10	10	9	8	8	6	6	6	6	6	6	12	10	10	9	8	8	6	6	6	6	6	6	12	10	10	9	8	8	6	6	6	6	6	6	6	5	4	4	4	3	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
4'-0"	12	10	10	9	8	8	6	6	6	6	6	6	12	10	10	9	8	8	6	6	6	6	6	6	12	10	10	9	8	8	6	6	6	6	6	6	6	5	4	4	4	3	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
5'-0"	12	10	10	9	8	8	6	6	6	6	6	5.5	12	10	10	9	8	8	6	6	6	6	6	5	12	10	10	9	8	7	6	6	6	6	6	5	6	5	4	4	4	3	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	10.5
6'-0"	12	10	10	9	8	6.5	6	6	6	6	5.5	4.5	12	10	10	9	8	5	6	6	6	5.5	5	4.5	12	10	10	9	6	3.5	6	6	6	6	5	4.5	6	5	4	4	3.5	-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	10	8.5
7'-0"	12	10	10	9	6.5	4	6	6	6	5.5	4.5	4	12	10	10	9	5	3	6	6	6	5	4	3.5	12	10	10	7	3.5	-	6	6	6	5	4	3.5	6	5	4	4	-	-	12	12	12	12	12	12	12	12	12	12	12	10.5	12	12	12	10.5	8.5	7.5
8'-0"	12	10	10	7.5	4.5	3	6	6	6	5	4	3.5	12	10	10	6	3.5	-	6	6	5	4.5	3.5	3	12	10	10	4	-	-	6	6	5	4.5	3.5	3	6	5	4	-	-	-	12	12	12	12	12	12	12	12	12	12	11	9.5	12	12	11.5	9	7.5	6.5
9'-0"	12	10	10	5	3.5	-	6	6	5.5	4.5	3.5	3	12	10	9	4	-	-	6	6	4.5	4	3	3	12	10	4	3	-	-	6	6	4.5	4	3	3	6	5	3.5	-	-	-	12	12	12	12	12	10.5	12	12	12	11.5	9.5	8.5	12	12	10	8		

◆ SEE LIMITATIONS OF USE FOR
BLADE (1A) ON SHEET 19

1. ANCHORS TO WALL, FLOOR OR SOLID WOOD SOFFIT SHALL BE AS FOLLOWS:

- 1/4"Ø 410 SS TAPCON ANCHORS, OR 1/4"Ø ULTRAICON+ OR ULTRAICON SS4 ANCHORS, AS MANUFACTURED BY I.T.W. BUILDOR OR DEWALT RESPECTIVELY W/ MINIMUM EMBEDMENT AS INDICATED AT EACH SECTION ON SHEETS 16 & 17.

EXCEPTION: SEE NOTE 2 BELOW.

2. ANCHORS TO HOLLOW CEILING SHALL BE AS PER MOUNTING TYPE U, SHEET 17 AND SHALL CONSIST OF LAG SCREWS AS PER ANSI/AWC NDS-24 SPECIFICATIONS. OR 1/4"Ø ULTRAICON SS4 OR 5/16"Ø SS LAG SCREWS.

3. SUBSTRATE SHALL CONSIST OF THE FOLLOWING:

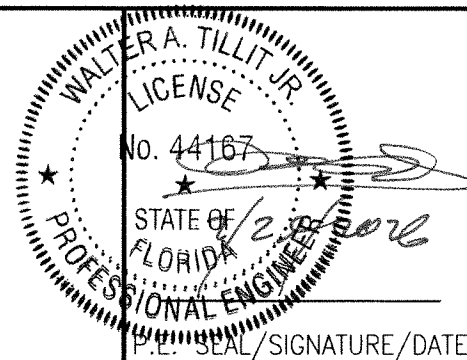
- SOUTHERN PINE No. 2 W/ G=0.55 (N.D.S.)
- DOUGLAS FIR W/ G=0.50 (N.D.S.)
- SPRUCE PINE FIR NORTH W/ G=0.43 (N.D.S.)
- SPRUCE PINE FIR SOUTH W/ G=0.36 (N.D.S.)
- MIN. 1/2" CDX PLYWOOD (1986 APA)

4. ANCHORS SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS OF THE ANCHOR'S MANUFACTURER. ONLY SS ANCHORS ARE ALLOWED AT INSTALLATIONS WITHIN 300 ft FROM COASTAL SHORELINE.

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BERTHA HV™
Accordion Shutter System
 V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			DRAWING No 26-103
3			
4			
5			SHEET 15 OF 20
6			



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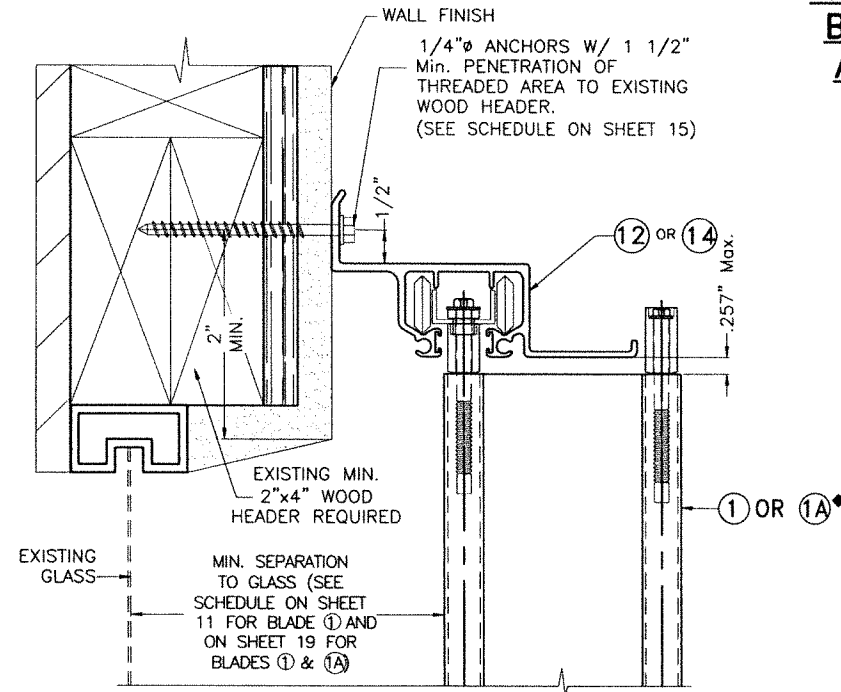


TILLIT TESTING & ENGINEERING COMPANY
6355 N.W. 36th. St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33166
Phone : (305)871-1530 . Fax : (305)871-1531
e-mail: tiltec@aol.com
CA-0006719
WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167

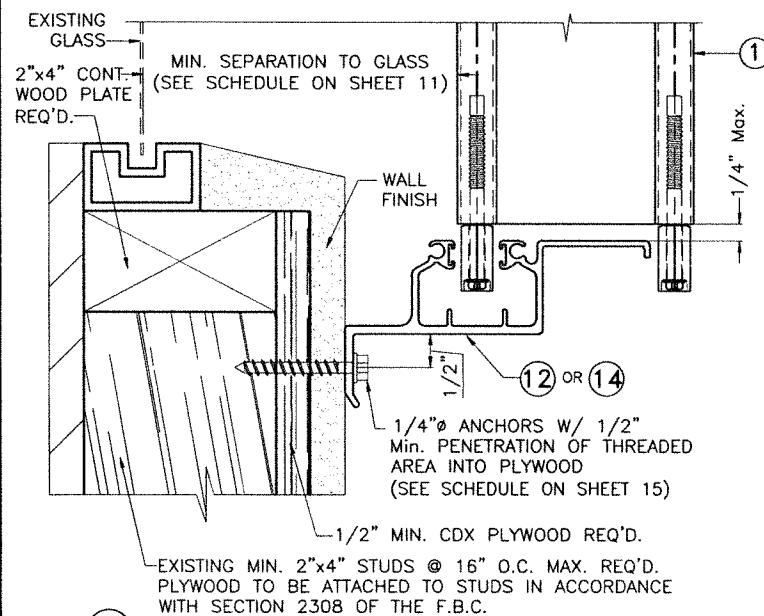
A.S.S.A.
American Shutter Systems
Association, Inc.
4268 Westroads Drive
West Palm Beach, FL 33407

INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS FOR ① HV & ①A HV ♦ BLADES (AS APPLICABLE)

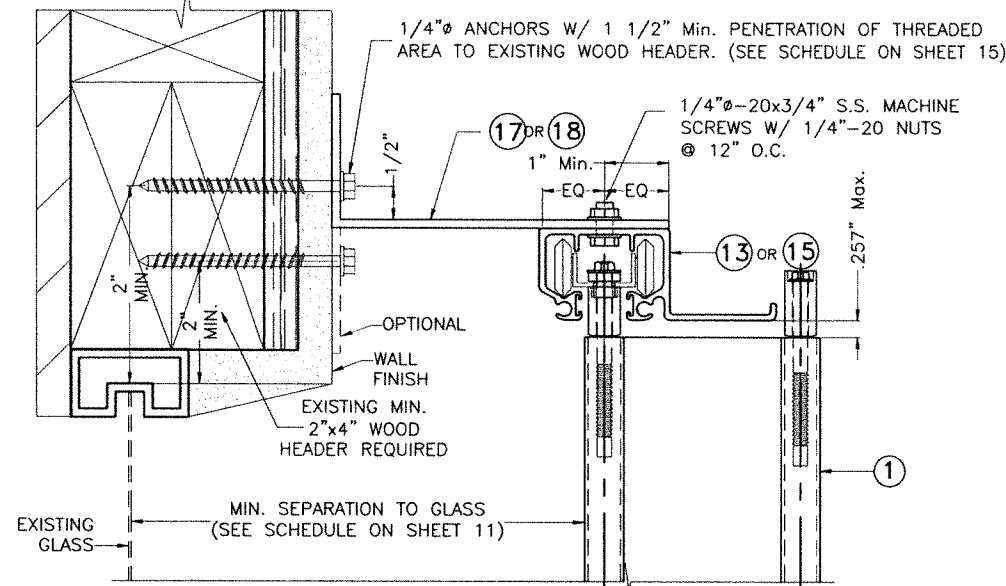
MAX. SHUTTER SPAN L+ OR L- FOR INSTALLATIONS INTO WOOD WITH HV BLADE ① ONLY SHALL BE LIMITED TO 105.0 psf. A.S.D. DESIGN PRESSURE RATING, SEE SHEET 19 FOR MAX SPAN & A.S.D. DESIGN PRESSURE RATING FOR INSTALLATION WITH BLADE ① & ①A WORKING IN UNISON



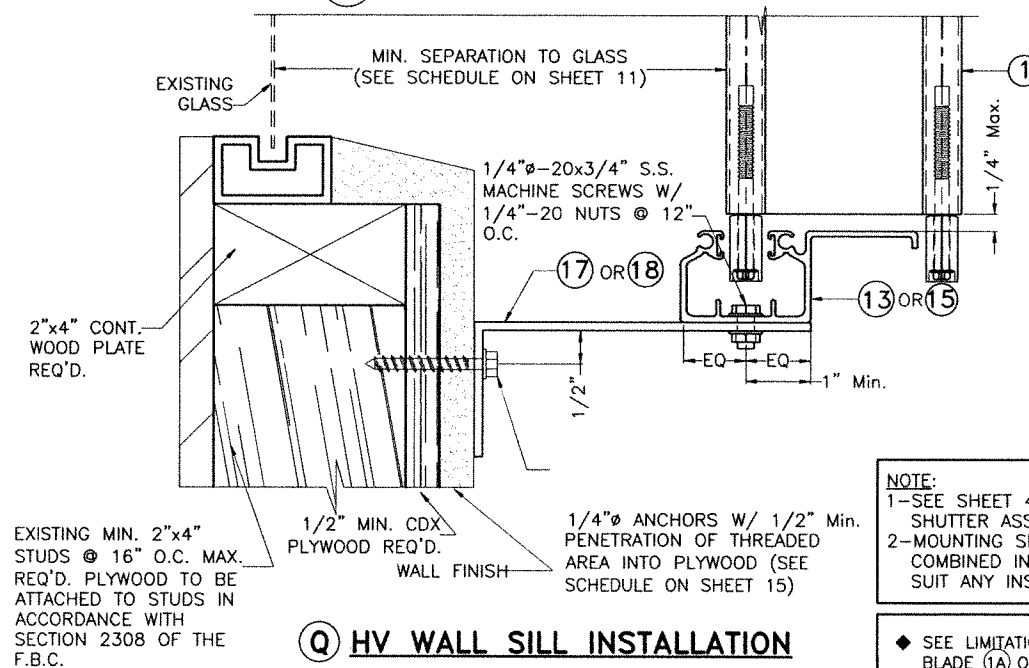
M HV WALL HEADER INSTALLATION



P HV WALL SILL INSTALLATION



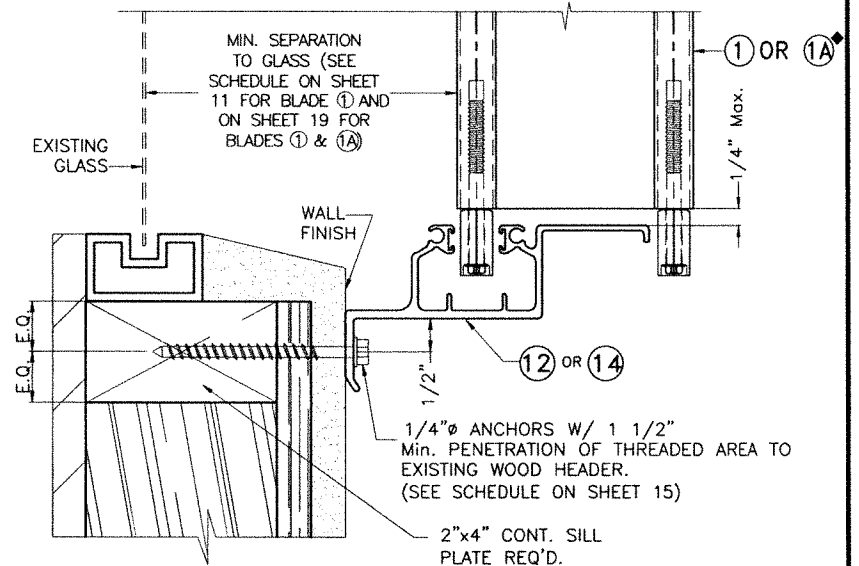
N HV WALL HEADER INSTALLATION



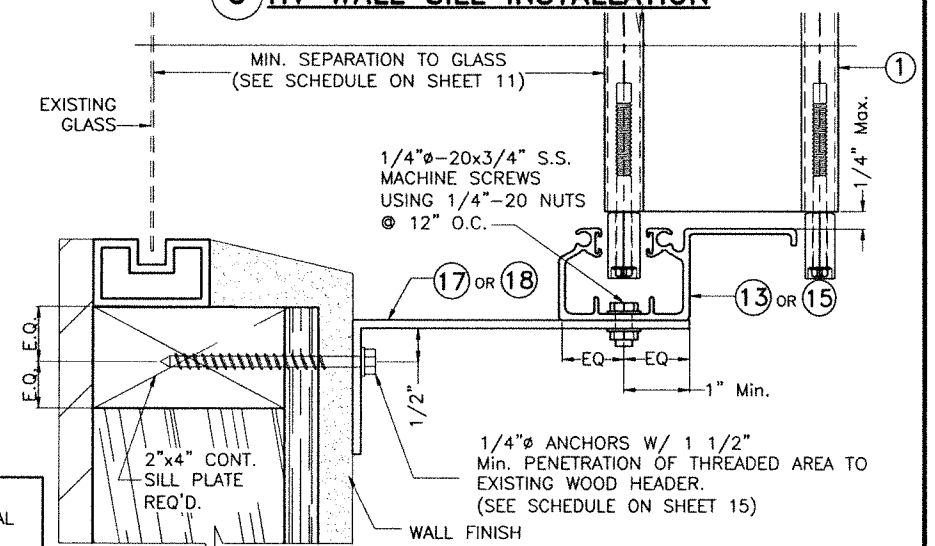
Q HV WALL SILL INSTALLATION

NOTE:
1-SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY.
2-MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

♦ SEE LIMITATIONS OF USE OF BLADE ①A ON SHEET ①9

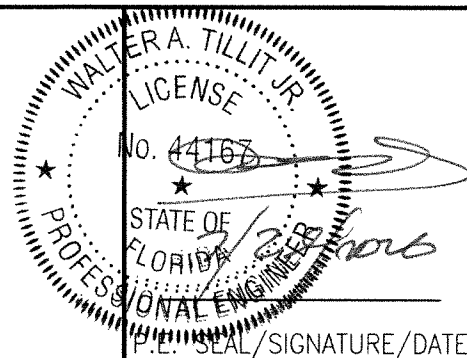


O HV WALL SILL INSTALLATION



R HV WALL SILL INSTALLATION

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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4268 Westroads Drive
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BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

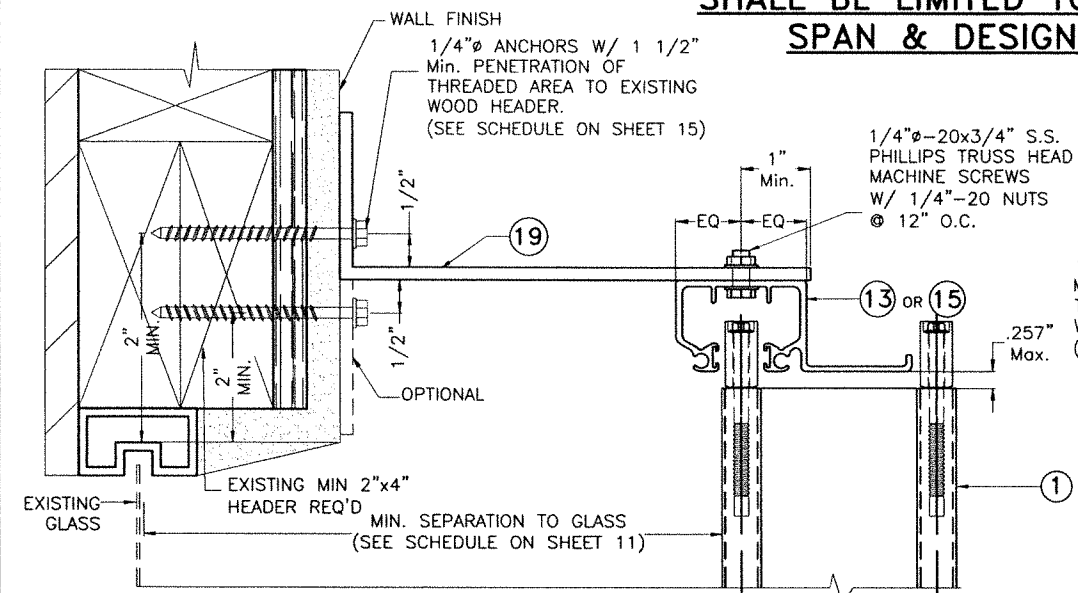
REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
1	OLD 23-127	6/30/26	DATE: 6/30/2026
2			
3			
4			
5			
6			

DRAWING No
26-103

SHEET
16 OF 20

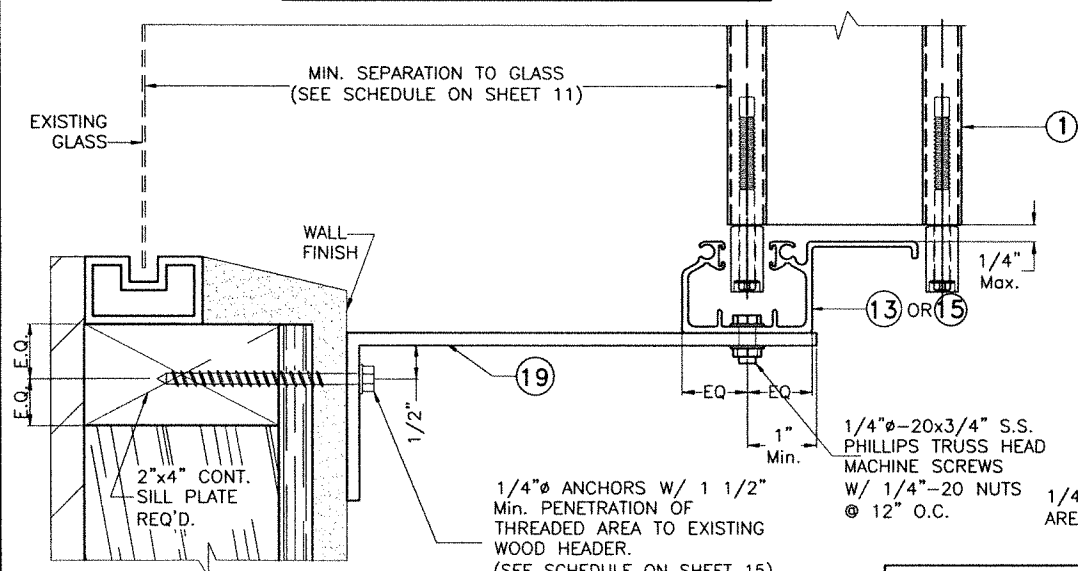
INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS FOR ① HV & ①A HV♦ BLADES (AS APPLICABLE)

MAX. SHUTTER SPAN L+ OR L- FOR INSTALLATIONS INTO WOOD WITH HV BLADE ① ONLY
SHALL BE LIMITED TO 105.0 psf. A.S.D. DESIGN PRESSURE RATING, SEE SHEET 19 FOR MAX
SPAN & DESIGN LOAD FOR INSTALLATION WITH BLADE ① & ①A WORKING IN UNISON



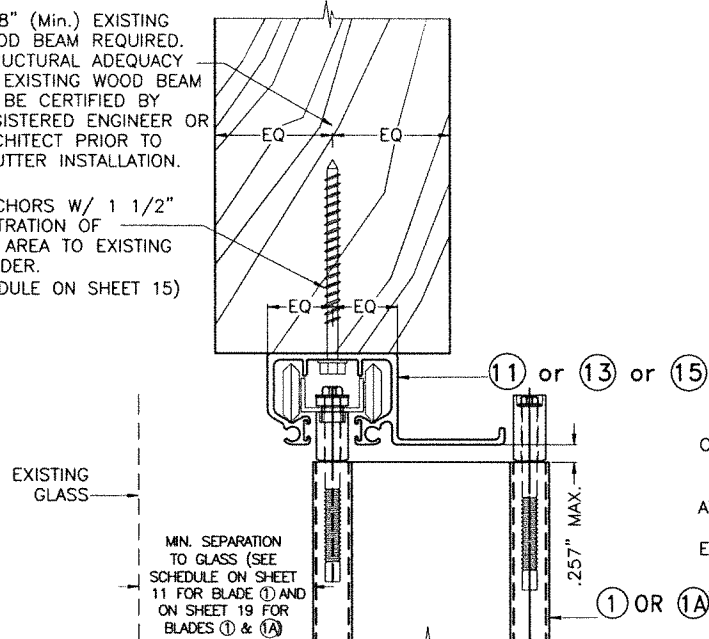
⑤ HV WALL HEADER INSTALLATION

NOTES:
1-SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY
2-MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

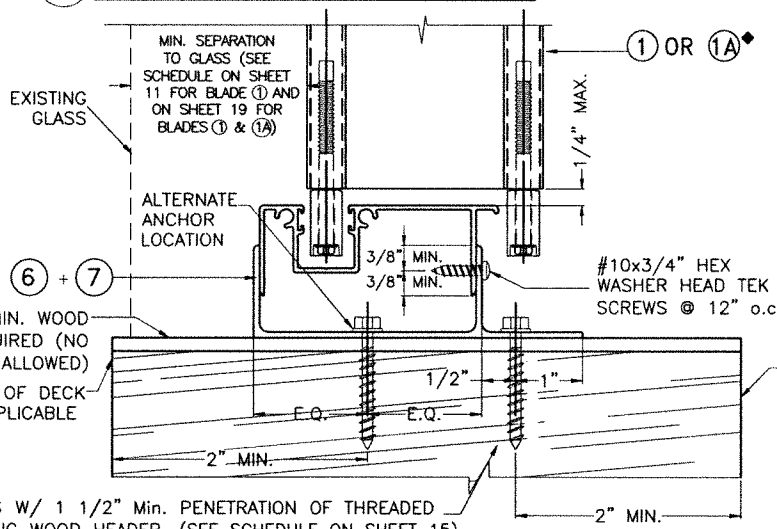


⑥ HV WALL SILL INSTALLATION

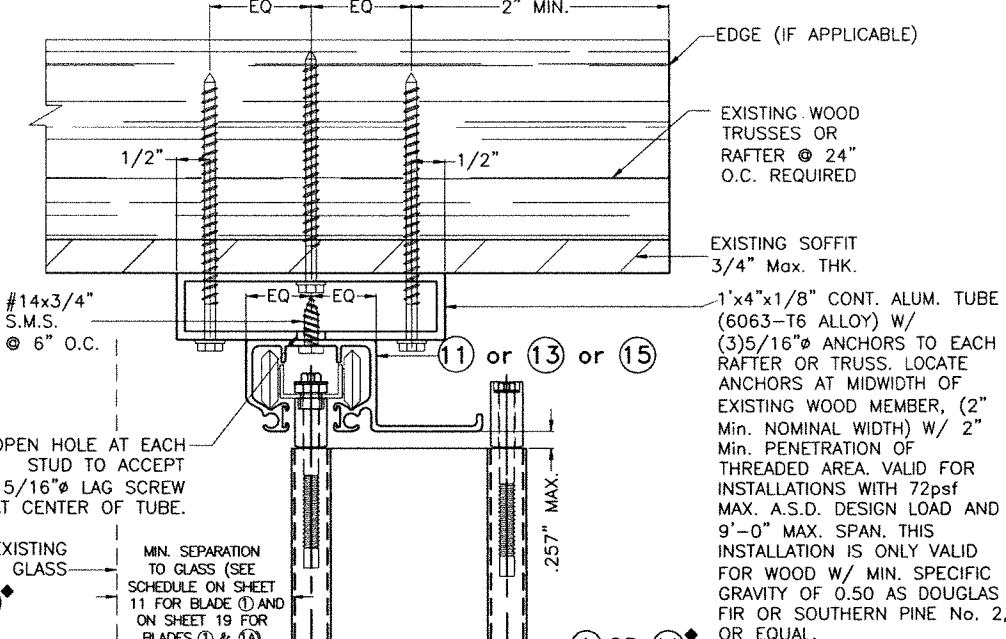
♦ SEE LIMITATIONS OF USE FOR BLADE ①A ON SHEET 19



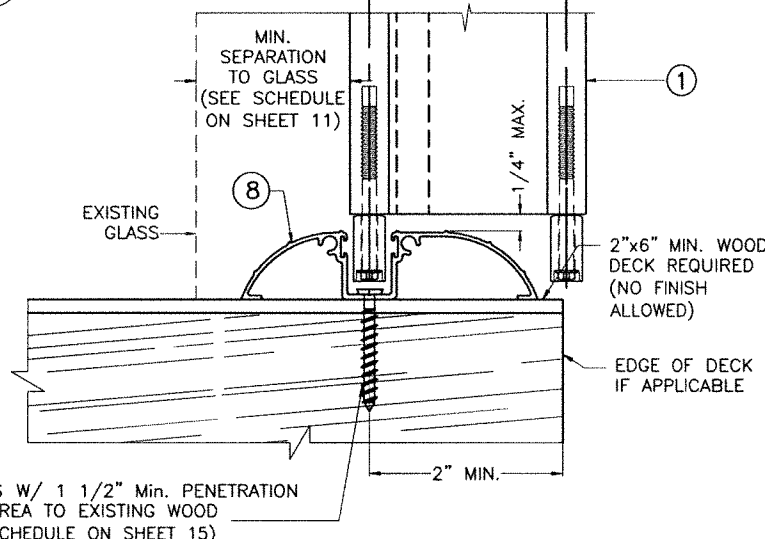
⑦ HV CEILING INSTALLATION



⑧ HV FLOOR INSTALLATION



⑨ HV CEILING INSTALLATION



⑩ HV WALK-OVER INSTALLATION

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF FLORIDA
PROFESSIONAL ENGINEER
P.E. SEAL/SIGNATURE/DATE

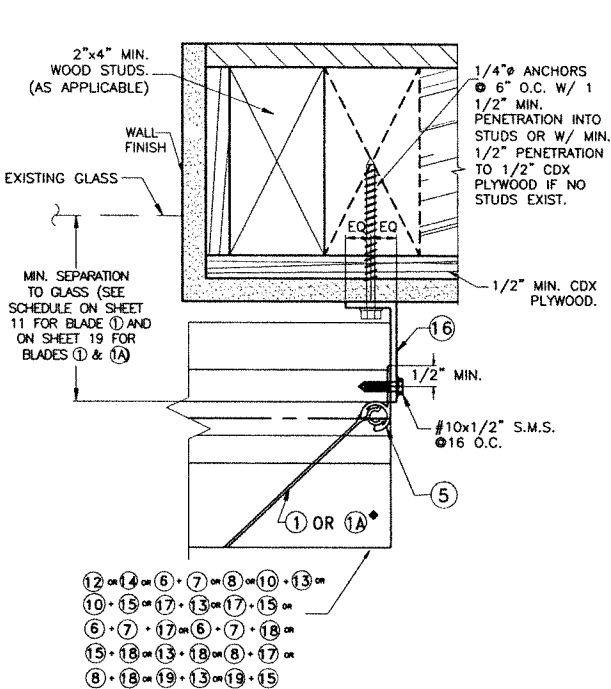
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TILTECO INC.
TILLIT TESTING & ENGINEERING COMPANY
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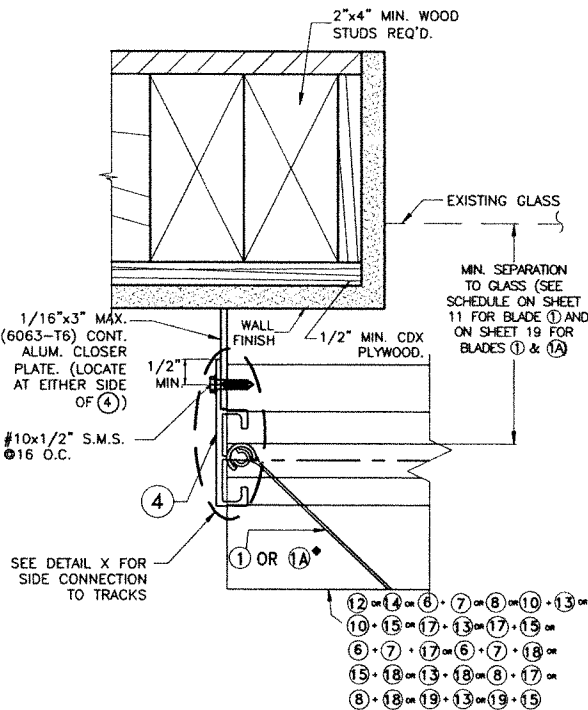
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BERTHA HV™ Accordion Shutter System H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE			
REV. No	DESCRIPTION	DATE	DRAWN BY: W.H.
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2			DRAWING No 26-103
3			
4			SHEET 17 OF 20
5			
6			

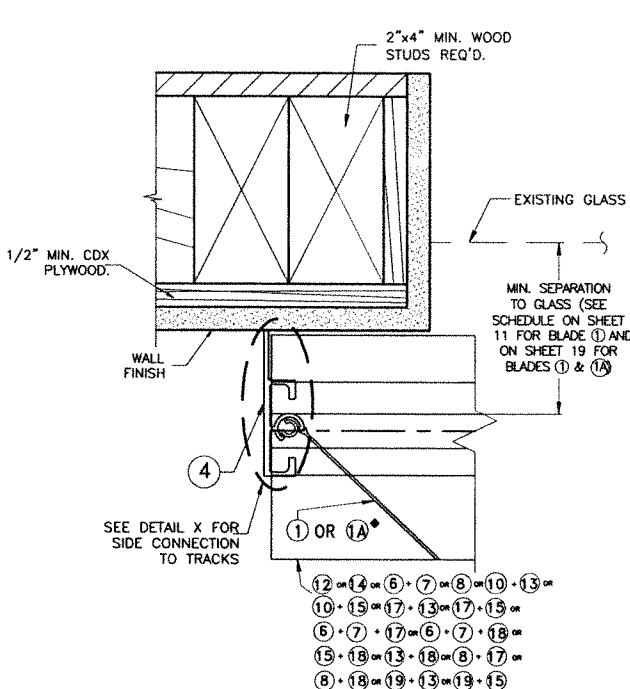
END INSTALLATIONS ① HV BLADE OR ①A WINDOW BLADE INTO 2"x4" MIN. WOOD STUDS



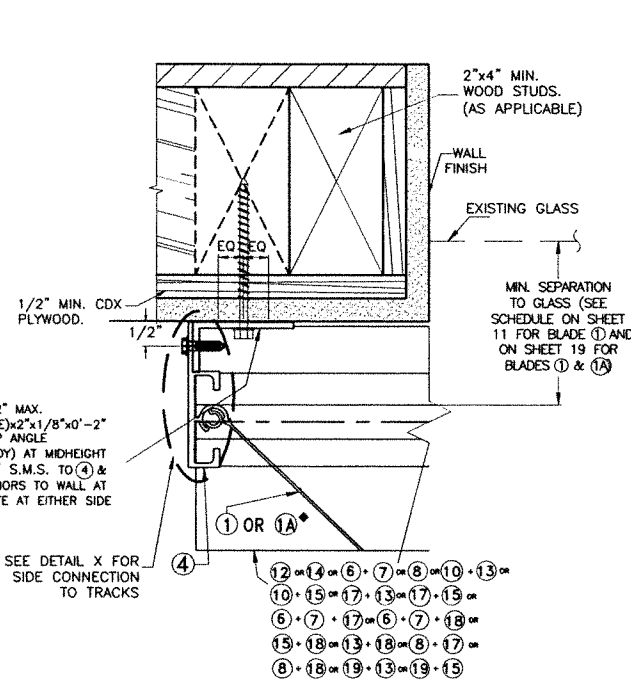
END CONNECTION DETAIL ⑦



END CONNECTION DETAIL ⑧

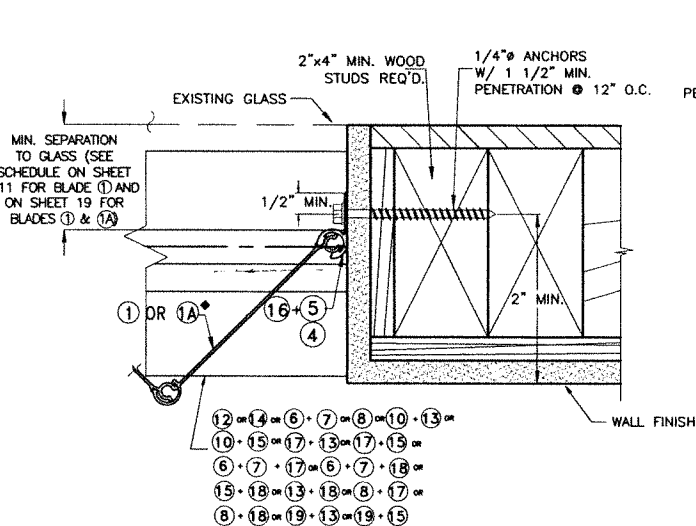


END CONNECTION DETAIL ⑨

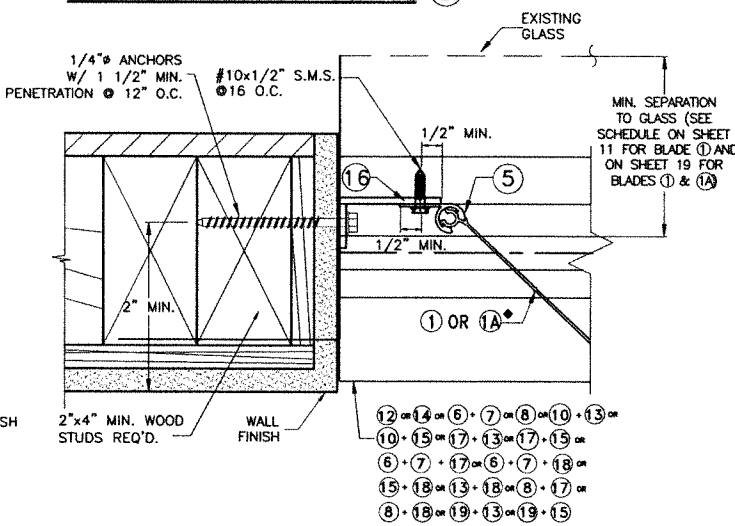


END CONNECTION DETAIL ⑩

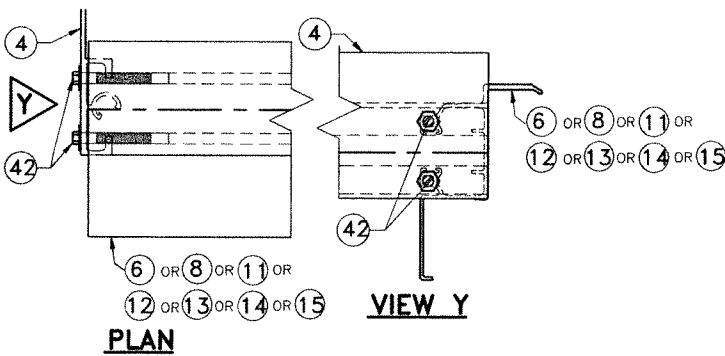
■ REQUIRED ONLY FOR SPANS GREATER THAN 12'-0"



END CONNECTION DETAIL ⑪



END CONNECTION DETAIL ⑫



DETAIL X

◆ SEE LIMITATIONS OF USE FOR BLADE ①A ON SHEET 19

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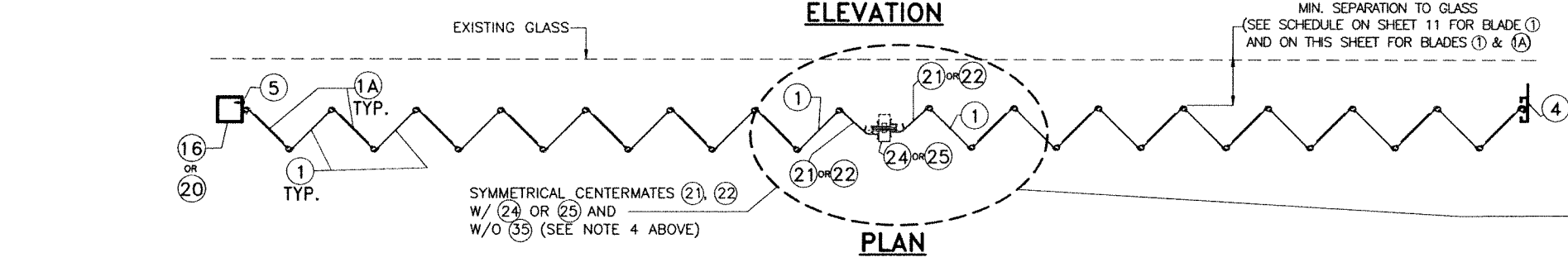
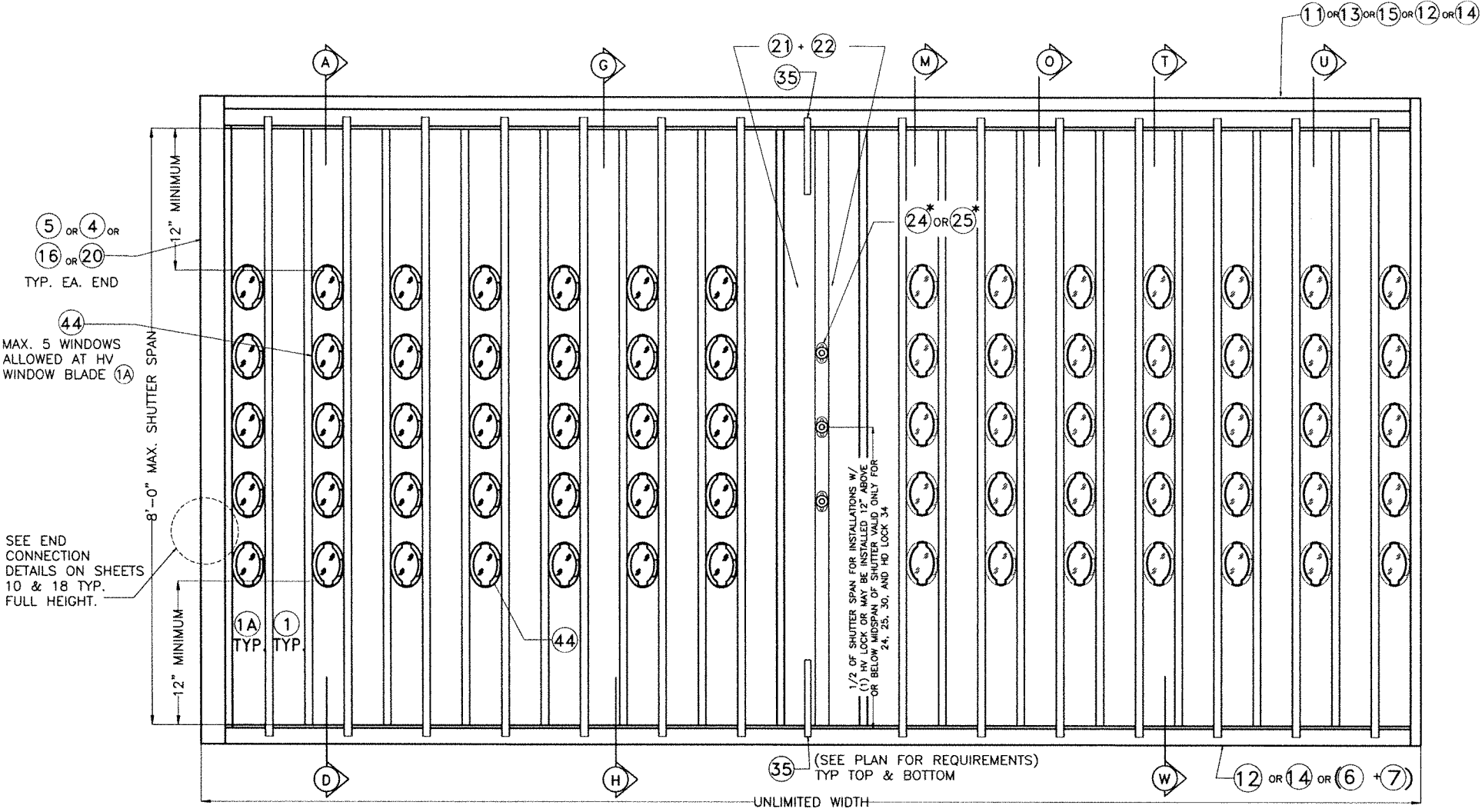
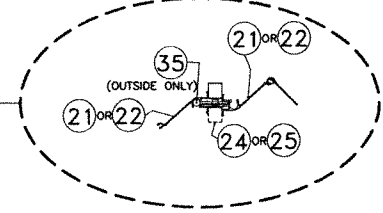
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BERTHA HV™ Accordion Shutter System H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE			
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3			
4			SHEET 18 OF 20
5			
6			

*** GENERAL LIMITATIONS AND CONDITIONS OF USE FOR BERTHA**
1 HV BLADE ACCORDION SHUTTER SYSTEM WORKING IN UNISON WITH HV WINDOW BLADE 1A

1. MAX. A.S.D. DESIGN PRESSURE RATING: +110, - 110 p.s.f.
2. MAX. SHUTTER SPAN: 96"
3. ALLOWED MOUNTINGS: A, D, G & H ON SHEETS 6, 7; AS WELL AS MOUNTINGS M, O, T, U & W ON SHEETS 16 & 17.
4. ONLY CENTERMATES (21), (22) (BOTH W/ (24) OR (25)) ARE ALLOWED WITH (21), (22) ARRANGED IN A SYMMETRICAL OR OPPOSING LAYOUT. IN CASE OF OPPOSING LAYOUT, (35) MUST BE INCLUDED ONLY AT EXTERIOR ACCESS SIDE OF CENTERMATE.
5. (A) HV WINDOW BLADE (1A) SHALL ONLY ALLOW A MAXIMUM OF 5 OPENINGS (3"Ø HOLES) FOR (44) PER BLADE AT SPACINGS SHOWN ON SHEET 4.
(B) MIN. CLEARANCE FROM TOP OR BOTTOM EDGE OF HV WINDOW BLADE (1A) OF ANY 3"Ø HOLE FOR (44) SHALL BE 12".
(C) FIRST OR LAST BLADE COMING OUT FROM STARTERS AT ENDS MAY BE HV WINDOW BLADE (1A)
(D) HV WINDOW BLADE (1A) MUST BE USED ALTERNATE TO A SOLID HV BLADE (1) THROUGHOUT SHUTTER'S WIDTH.
(E) CENTERMATES SHALL ALWAYS BE INSTALLED ADJACENT TO A SOLID HV BLADE (1) AT EITHER SIDE OF THEM.
(F) POLYCARBONATE HV WINDOW (44) SHALL BE INSTALLED SO THAT TABS FACE THE INTERIOR OF THE OPENING BEING PROTECTED. HV WINDOW (44) MUST BE ONLY INSTALLED AND LOCKED USING A HV SETTING TOOL PROVIDED BY ASSA, INC.
6. SEE ANCHOR SPACING SCHEDULE FOR INSTALLATIONS INTO WOOD FRAME BUILDINGS ON SHEET 15, AS LIMITED BY SPAN AND DESIGN LOAD (SEE NOTES 1 & 2 ABOVE).
7. SEE ANCHOR SPACING SCHEDULE FOR INSTALLATIONS INTO POURED CONCRETE OR CONCRETE BLOCK WALL ON SHEETS 12 & 13 AS LIMITED BY SPAN AND DESIGN LOAD (SEE NOTES 1 & 2 ABOVE).
8. MINIMUM SEPARATION TO GLASS SCHEDULE, PER ASTM E-1996:

WIND ZONE	MINIMUM SEPARATION TO GLASS
1 THRU 3	1"
4	6.25"

ALTERNATE OPPOSING CENTERMATES (21,22) W/ (35) (EXTERIOR ONLY) AND W/ (24) OR (25) (SEE NOTE 4 ABOVE)



TYPICAL 1 HV BLADE WORKING IN UNISON WITH HV WINDOW BLADE 1A SHUTTER*
N.T.S.

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

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26-103
SHEET
19 OF 20

INSTALLATIONS W/ (1) HV BLADE & HV CENTERMATES (21)
INTO METAL STUD WALLS *

* GENERAL LIMITATIONS AND CONDITIONS OF USE
FOR BERTHA (1) HV BLADE ACCORDION SHUTTER
SYSTEM INSTALLATION TO METAL STUD WALLS

- 1. MAX. A.S.D. DESIGN PRESSURE RATING: +75, - 75 (psf)
- 2. MAX. SHUTTER SPAN: 84"
- 3. ALLOWED MOUNTING: (MS) ON THIS SHEET.
- 4. ONLY CENTERMATE (21) W/ (24) HV LOCK ARE ALLOWED WITH (21) ARRANGED IN A SYMMETRICAL LAYOUT. USE OF (2) (35) (6" LONG, MINIMUM) MUST ALWAYS BE INCLUDED AT EXTERIOR OR INTERIOR ACCESS SIDE OF CENTERMATE.

** BLADE SLACK DETAIL HVF IS ALSO VALID FOR CENTERMATE (21) APPLICATION WITH BLADE (1)

SEPARATION TO GLASS SCHEDULE

WIND ZONE ASTM E-1996	MINIMUM SEPARATION TO GLASS
1 THRU 3	1"
4	4"

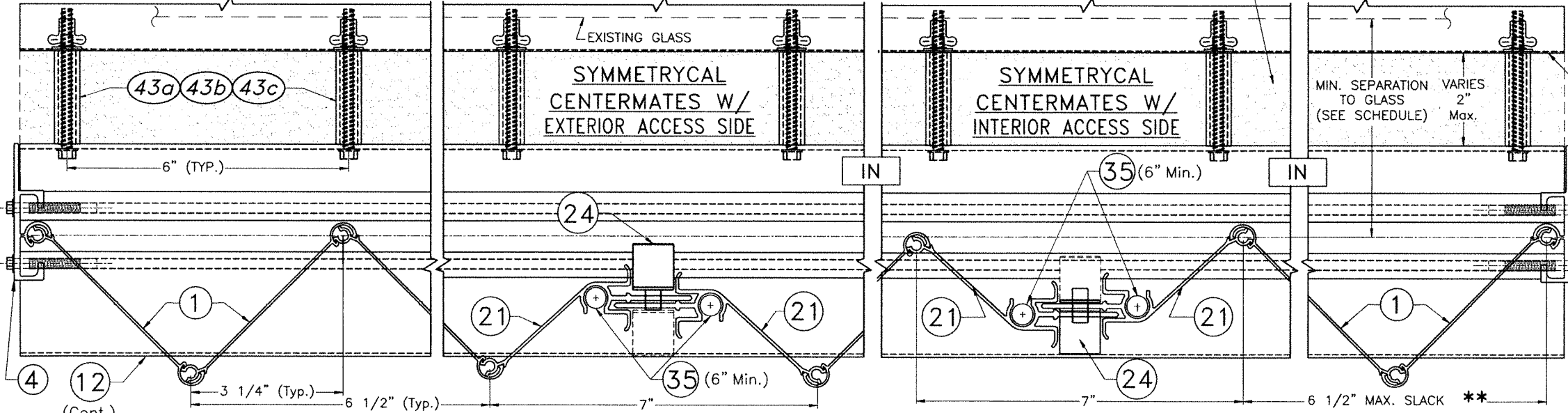
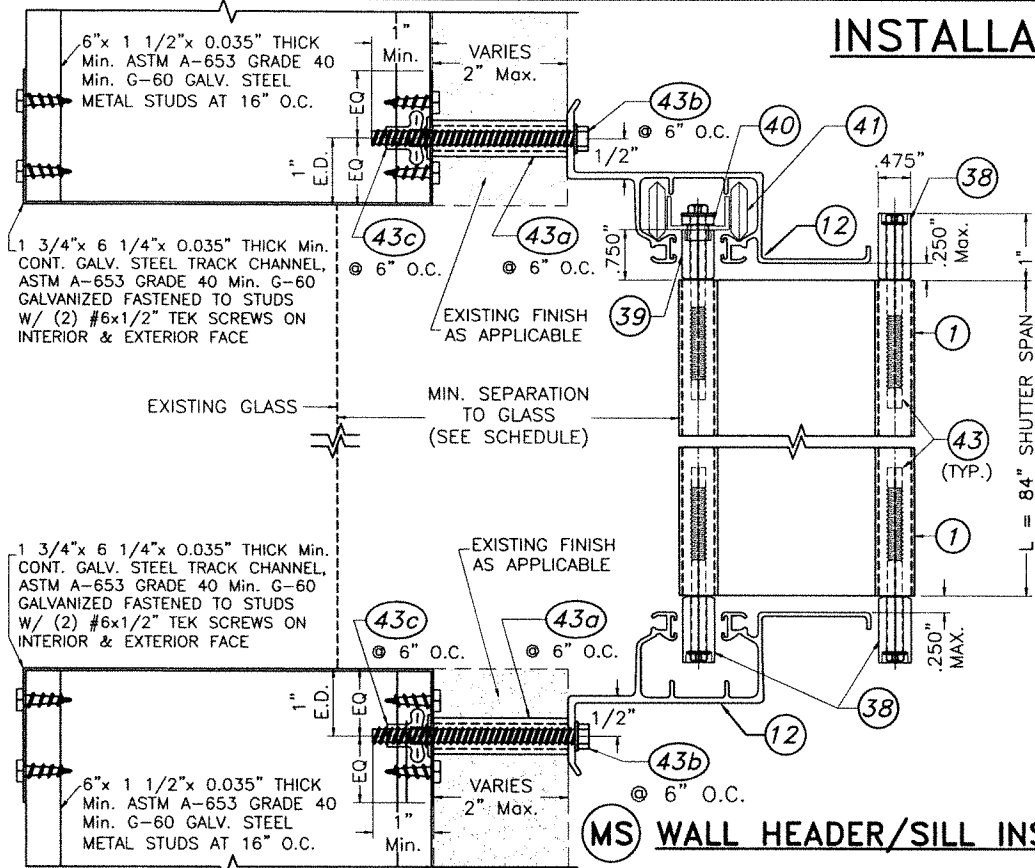
43a 1/4"Ø NOMINAL
ALUMINUM SLEEVE
6063-T5 ALLOY

43b 1/4"Ø-20X3"
304 SS BOLT
MUST PENETRATE 43c 1"

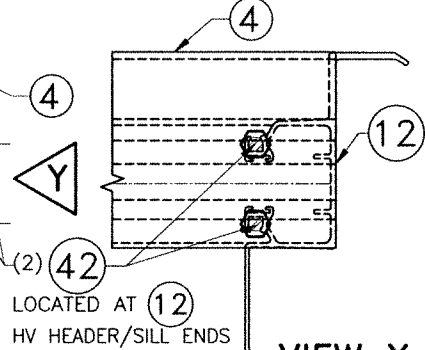
43c 1/4"Ø 304 SS ELCO
CONSTRUCTION PRODUCTS
FAB-LOK HD

COMPONENTS

SCALE: 3/8" = 1"



1 3/4" x 6 1/4" x 0.035" THICK Min.
CONT. GALV. STEEL TRACK CHANNEL,
ASTM A-653 GRADE 40 Min. G-60
GALVANIZED FASTENED TO STUDS
W/ (2) #6x1/2" TEK SCREWS ON
INTERIOR & EXTERIOR FACE



VIEW Y
SIDE CONNECTION TO TRACK

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			DRAWING No 26-103
			SHEET 20 OF 20