

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 **2023 (8th EDITION)** OF THE FLORIDA BUILDING CODE. THIS ACCORDION SHUTTER SYSTEM MAY BE INSTALLED AT HIGH VELOCITY HURRICANE ZONES.
- DESIGN WIND LOADS SHALL BE DETERMINED AS PER SECTION **1620** 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 11 THRU 15, 19 & 20.
- 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 11 THRU 15, 19 & 20.
- IN ORDER TO VERIFY THAT ANCHORS ON THIS P.E.D., AS TESTED, WERE NOT OVERSTRESSED, A 33 % INCREASE IN ALLOWABLE LOADS FOR WIND LOADS WAS **NOT** USED IN THEIR ANALYSIS. BERTHA H.V. ACCORDION SHUTTER SYSTEM'S ADEQUACY FOR WIND AND LARGE MISSILE IMPACT LOAD HAS BEEN VERIFIED IN ACCORDANCE WITH SECTION **1626** 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 #0210.01-11AS PER TAS 201, TAS 202 AND TAS 203 PROTOCOLS & #1220.01-10 AS PER TAS 201, TAS 202 & TAS 203 PROTOCOLS LARGE MISSILE.
- HV WINDOW BLADE ①A #0505.01-08 AS TAS 201, 202 & 203 PROTOCOLS AND 0725.01-08 AS PER TAS 202 PROTOCOL.
2. HV BLADE ① AND HV WINDOW BLADE ①A 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 31.7 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 TO 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 SECTION 2411.3.3.4.
6. BOLTS TO 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 : 12,13,14,14A,15 AND 20
- HV BLADE ① & ①A 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 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.
10. 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 HV AND HD CENTERMATES AND ENGAGE OR LOCK ALL HV AND HD LOCKS.
11. SHUTTER MANUFACTURER'S LABEL SHALL BE LOCATED ON A READILY VISIBLE LOCATION ATACCORDION SHUTTER IN ACCORDANCE WITH SECTION 1709.9.2 OF FLORIDA BUILDING CODE. ONE LABEL SHALL BE PLACED FOR EVERY OPENING.
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 PERMIT IS APPLIED TO.
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) 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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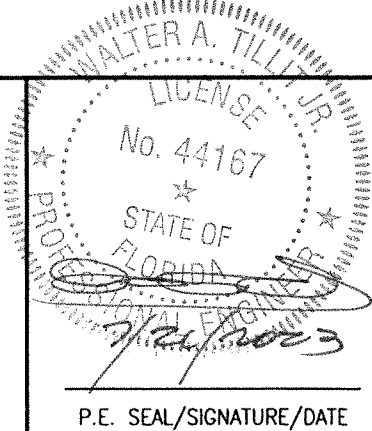
TYPICAL SHUTTER ELEVATION	SHEET 19
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THIS DRAWING SHALL ONLY BE USED TO OBTAIN PERMITS IN THE STATE OF FLORIDA

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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TILTECO INC.

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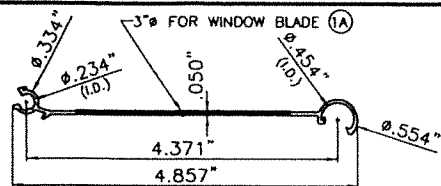
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BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130

SHEET
1 OF 20

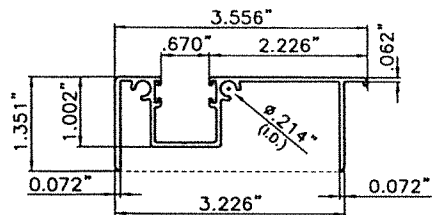


1 HV SOLID BLADE

COVERED UNDER US PATENT # 5458179

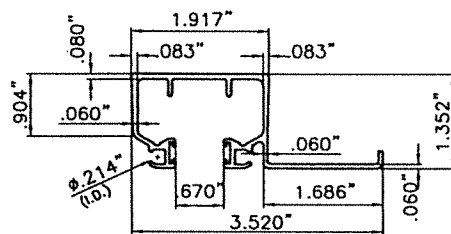
1A HV WINDOW BLADE*

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



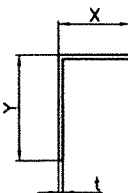
6 HV ADJ. FLOOR TRACK

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



11 HV CEILING HEADER

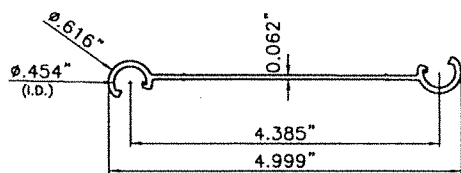
QUALIFIED FOR USE W/ HV BLADE 1 ONLY,
SEE SECTIONS FOR VALIDITY.
6063-T6 ALLOY AND TEMPER



16 SIDE ANGLES

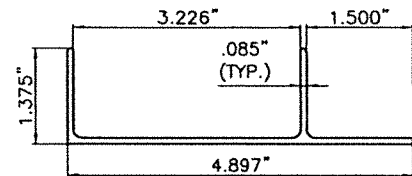
QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER

MN.	X	MN.	Y	MN.	t
1"		1"		0.062"	



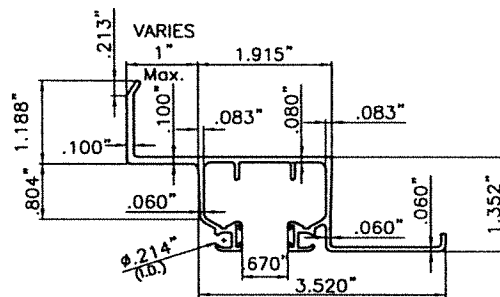
3 HV UNIVERSAL FLOATER

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



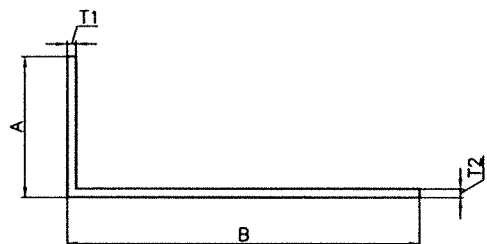
7 HV ADJ. ADAPTER W/LIP

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



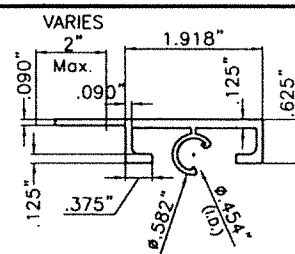
12 HV HEADER/SILL

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



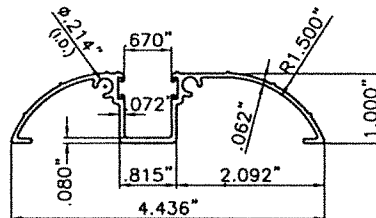
ALUMINUM ANGLES

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



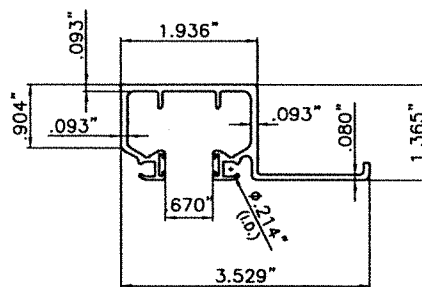
4 HV DIRECT MOUNT

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



8 HV WALK-OVER TRACK

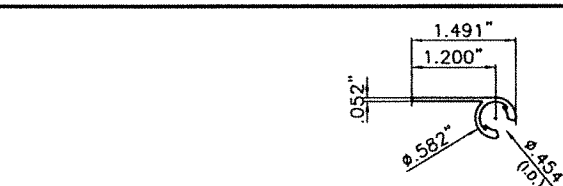
QUALIFIED FOR USE W/ HV
BLADE 1
6063-T6 ALLOY AND TEMPER



13 HD CEILING HEADER/SILL

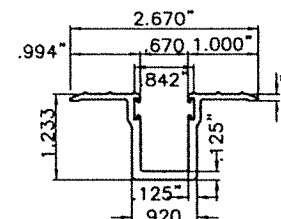
QUALIFIED FOR USE W/ HV BLADE 1
SEE SECTIONS FOR VALIDITY.
6063-T6 ALLOY AND TEMPER

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"



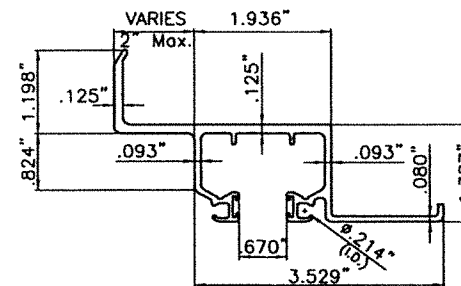
5 HV 90°/180° STARTER

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



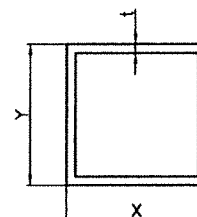
9 HV TRENCH TRACK

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"

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

PROFESSIONAL ENGINEER
WALTER A. TILLIT JR.
No. 44167
STATE OF FLORIDA
7/20/2023
P.E. SEAL/SIGNATURE/DATE

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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: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130
SHEET
2 OF 20

SHUTTER ASSEMBLY SCHEDULE FOR HV ①, HV ①A

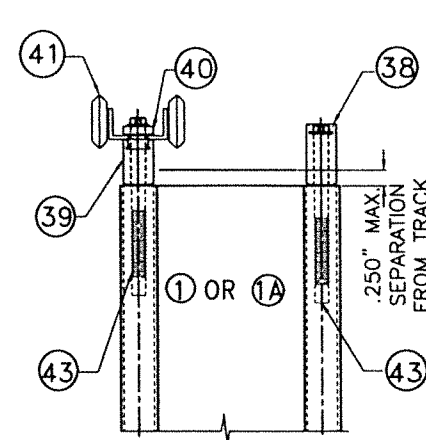
①	HV BLADE 1
①A	HV BLADE 1A
③8	HV LONG RECESSED NYLON BUSHING
③9	HV SHORT RECESSED NYLON BUSHING
④0	HV NYLON HAT WASHER
④1	HV WHEEL CARRIAGE AISI 302-303 SERIES Ø.870"x3/16" THICK NYLON WHEEL. 0.188"Ø AISI 302 SERIES S.S. RIVETS
④2	HV 1 3/4" ACCORDION PIN W/ #8 HEAD *
④3	HV 2 3/4" ACCORDION PIN W/ #8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

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

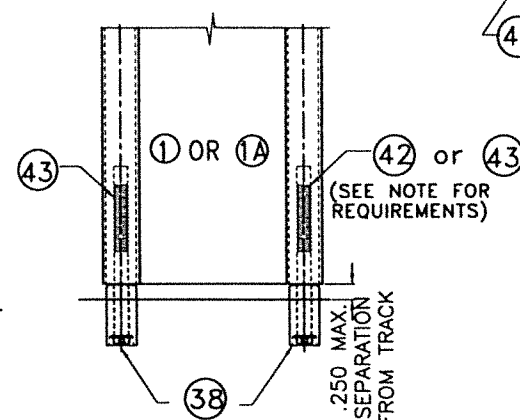
(1) HV PIN ④3 SHALL ALWAYS BE USED AT ALL EXTERIOR BOTTOM KNUCKLES OF HV ACCORDION SYSTEM W/ HV ① OR HV ①A BLADE.

(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 "I1", SHEET 7.

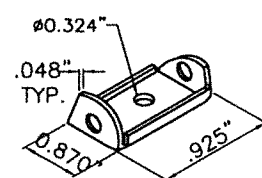
(3) HV PIN ④2 OR ④3 W/ 1/2" O.D. 1/16" THICK S.S. WASHER SHALL BE USED FOR DIRECT MOUNT INSTALLATION PER DETAIL X, SHEET ⑩



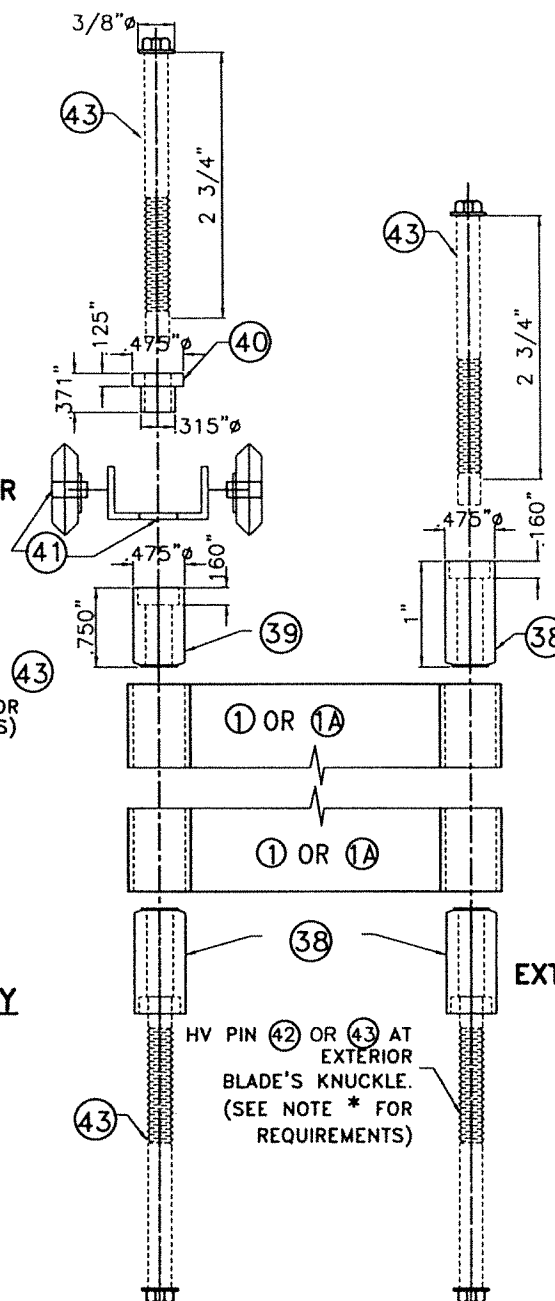
EXTERIOR



TYPICAL SHUTTER ASSEMBLY
N.T.S.

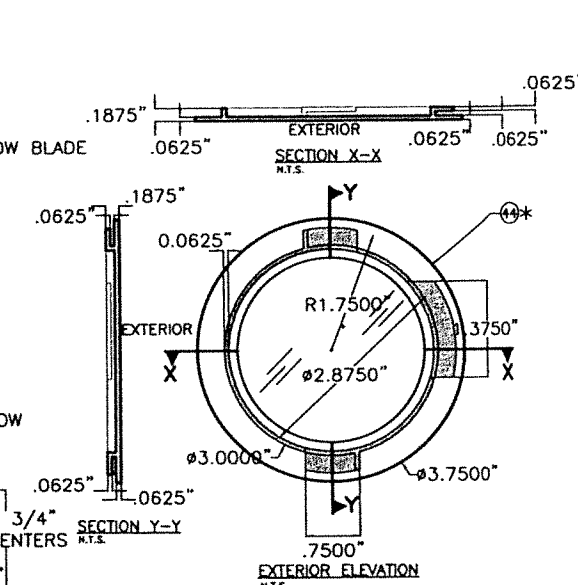
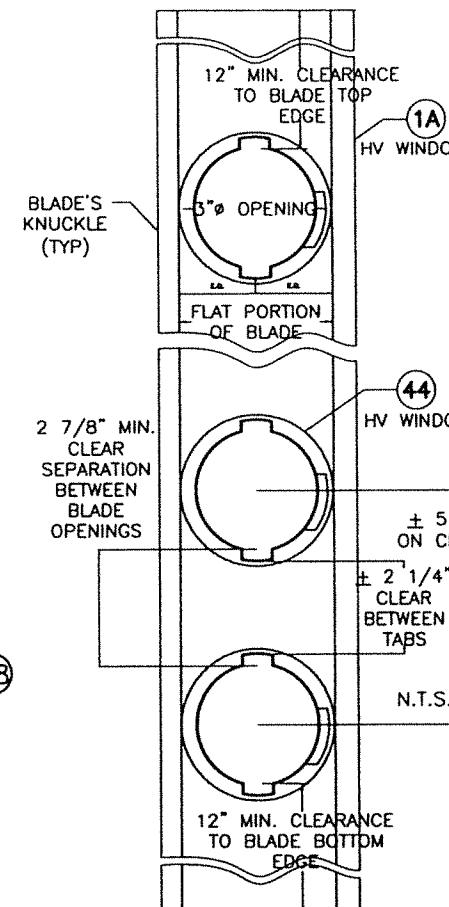


WHEEL CARRIAGE DETAIL
N.T.S.



EXTERIOR

ASSEMBLY LAYOUT
N.T.S.



TYPICAL HV WINDOW BLADE ①A AND
POLYCARBONATE HV WINDOW DETAIL

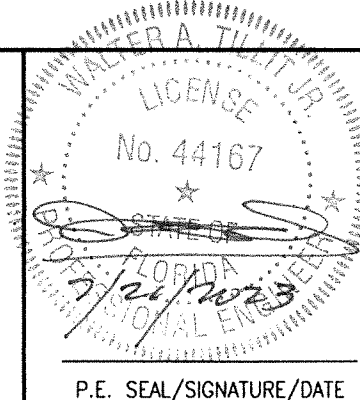
* POLYCARBONATE IMPACT RESISTANT HV WINDOW
BAYER MAKROLON 3103 POLYCARBONATE
RESINS, UV-STABILIZED GRADE OR SABIC
INNOVATIVE PLASTIC LEXAN 103 RESIN
(SEE NOTE "F" ON SHEET 19).

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:			
TENSILE STRENGTH AFTER WEATHERING	ASTM G155	9302 p.s.i.	8840 p.s.i.
TENSILE STRESS BEFORE WEATHERING	ASTM G38	8461 p.s.i.	8880 p.s.i.

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

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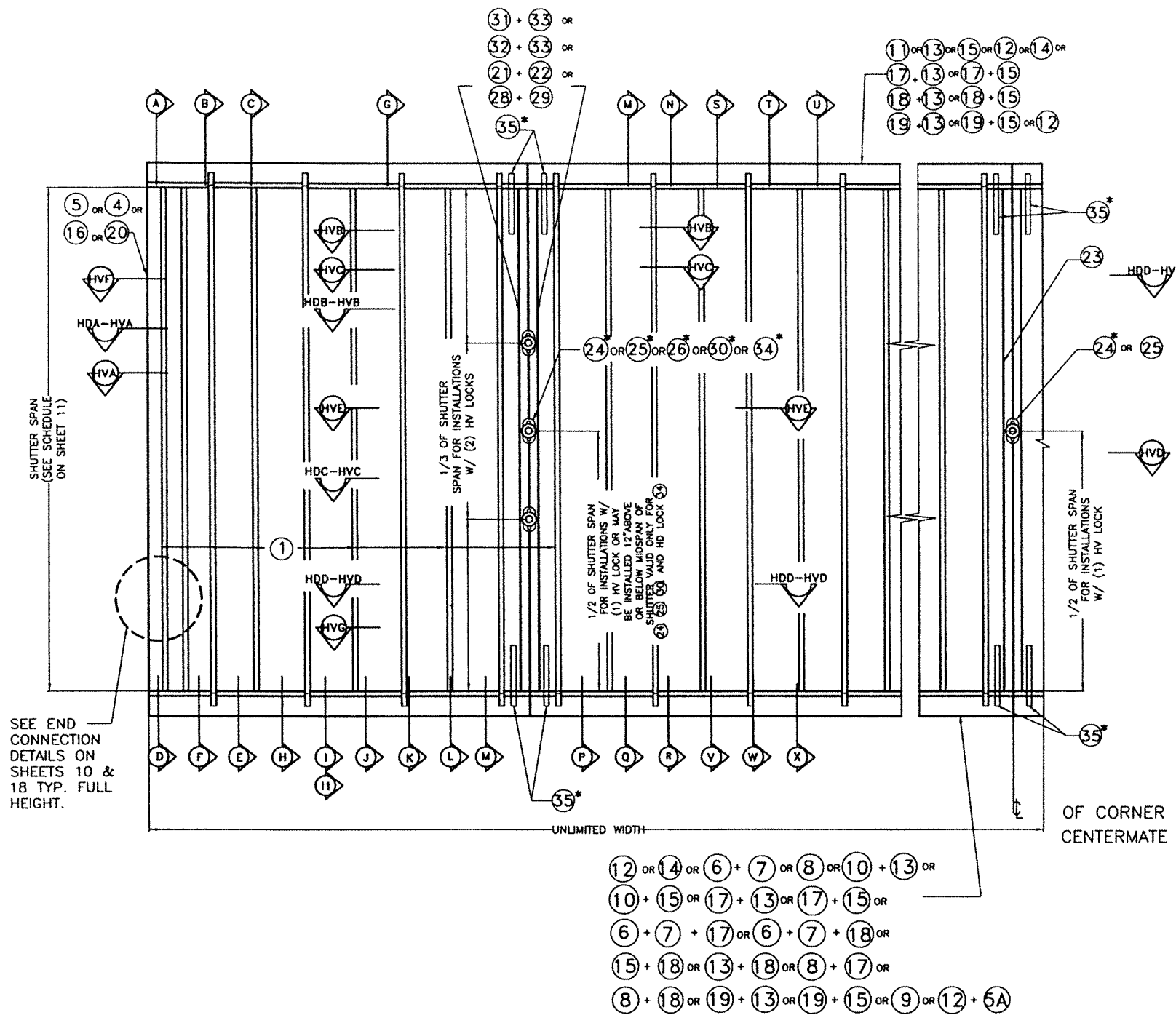
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BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130

SHEET
4 OF 20



TYPICAL (1) HV BLADE SHUTTER ELEVATION
N.T.S.

* NOTES ON HV LOCKS AND CENTERMATES:

- 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"-20 x 1/2" LONG FLAT HEAD S.S. M.S. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION.
- LIMITED MANDATORY CONDITION #2 ALTERNATE TO MANDATORY CONDITION #1 (VALID ONLY FOR FLOOR/CEILING INSTALLATIONS):** TWO HV LOCKS (24) OR (25) OR ONE HV LOCK (24) OR (25) W/ TWO LOCKING RODS (35) AT TOP & BOTTOM SHALL BE USED FOR ANY SPAN AND INSTALLATION AT ANY ELEVATION. HV LOCK (24) OR (25) SHALL BE ATTACHED TO (21) OR (22) CENTERMATES W/ SAME SPECIFICATIONS AS PER MANDATORY CONDITION #1. LOCATION OF LOCK/LOCKS AS APPLICABLE SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION. MAXIMUM SHUTTER SPAN SHALL BE DETERMINED AS PER SCHEDULE #3 ON SHEET 12.
- 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.
- 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).
- 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"-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.
- 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"-20x3/4" S.S. THUMBSCREW TO (21) OR (22) CENTERMATES SHALL BE MADE W/ 1/4"-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.
- 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.

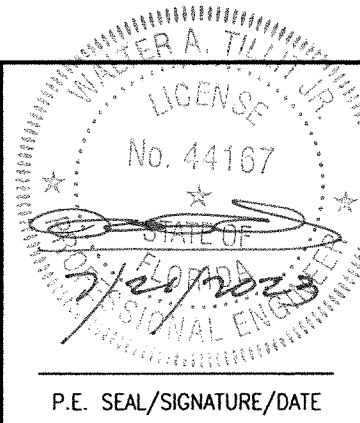
*NOTES ON HV "T" LOCKS AND CENTERMATES:

- 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"-20 x 1 1/2" LONG S.S. THREADED BOLT W/ 7/8" x 3/32" WINGNUT OR W/ 1/4"-20x1" S.S.M.S. INTO A 1/4"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 BOTTOM IS MANDATORY.

*NOTES ON HD LOCKS & CENTERMATES:

- HD LOCK (34) W/ HD CENTERMATES (31) OR (32) W/ (33):** ONE ALTERNATE HD LOCK (34) MAY BE 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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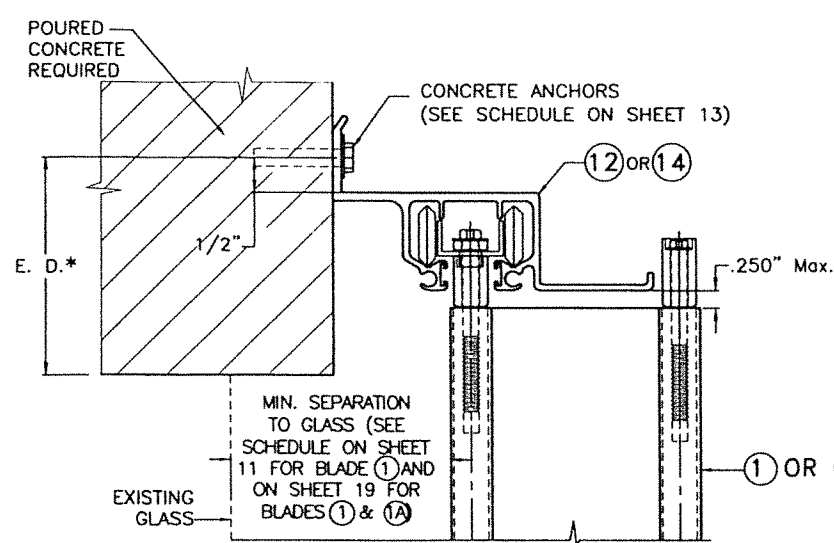
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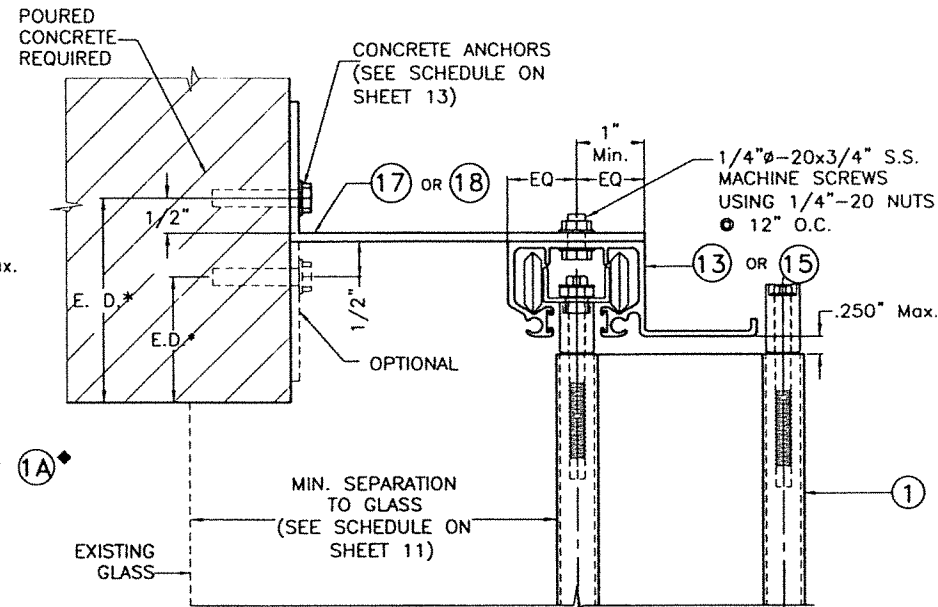
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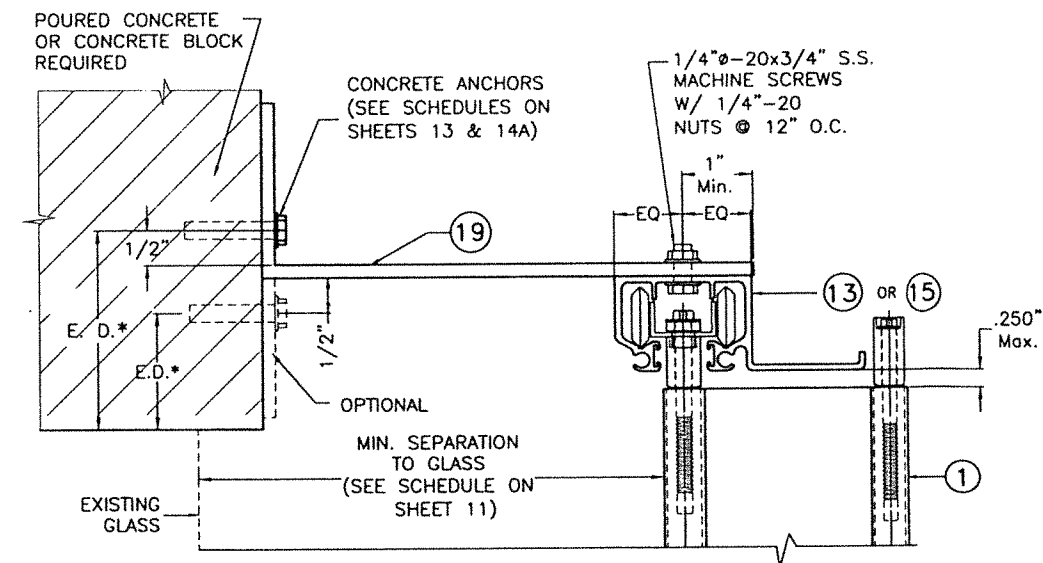
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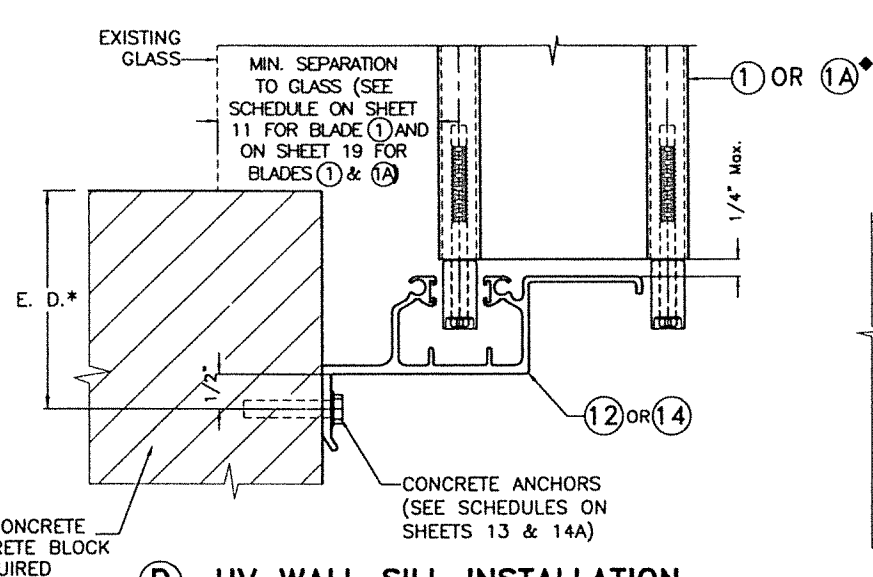
A HV WALL HEADER INSTALLATION



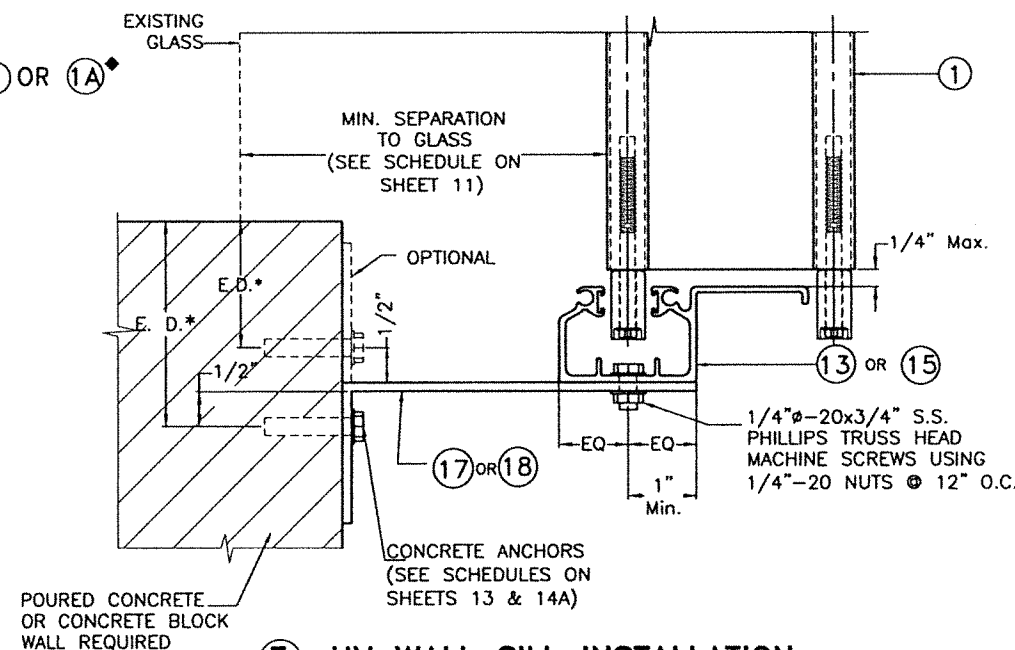
B HV WALL HEADER INSTALLATION



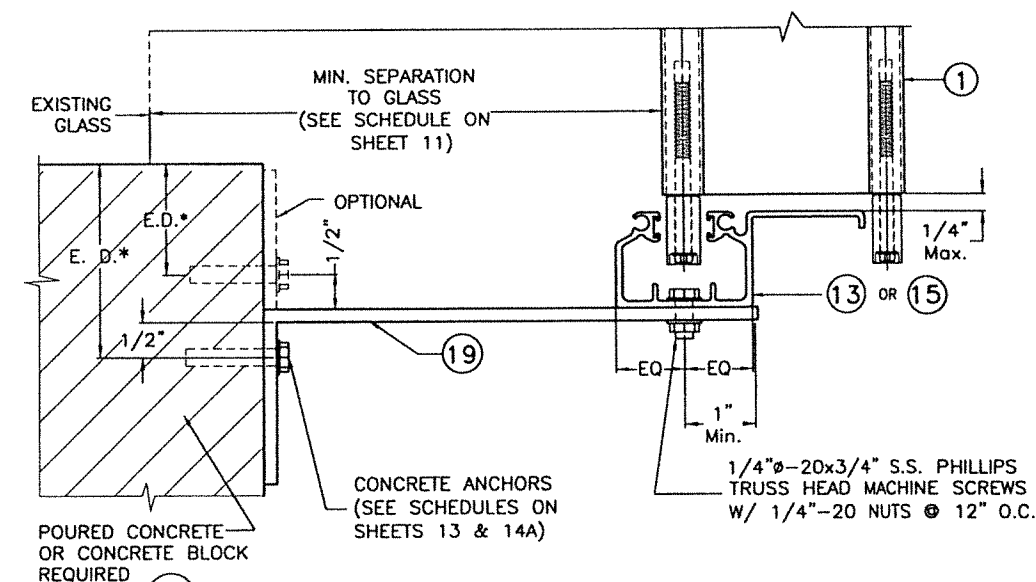
C HV WALL HEADER INSTALLATION



D HV WALL SILL INSTALLATION



E HV WALL SILL INSTALLATION



F HV WALL SILL INSTALLATION

NOTE FOR COMBINATION OF SECTIONS:

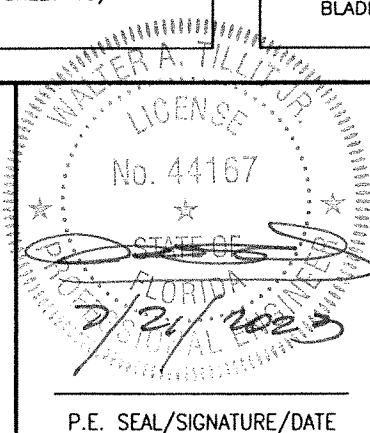
- 1- SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY
- 2- MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

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

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

**INSTALLATION DETAILS W/
1 HV BLADE**

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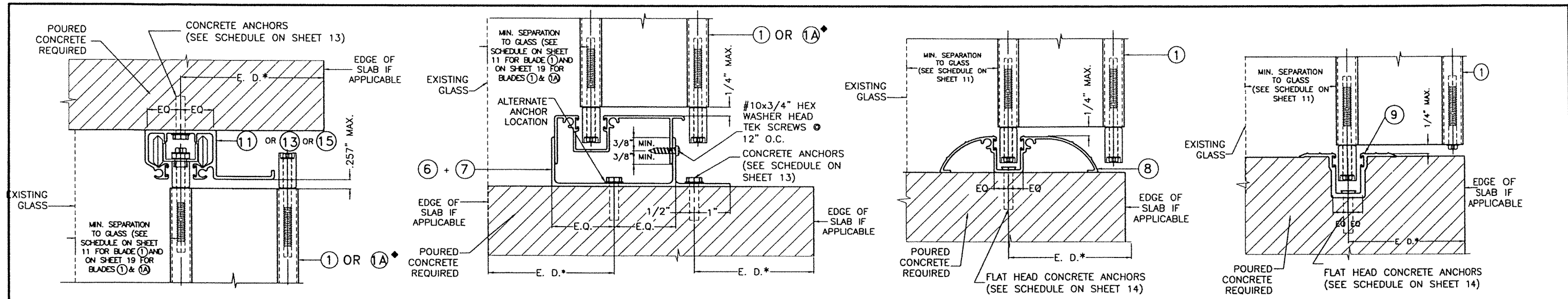
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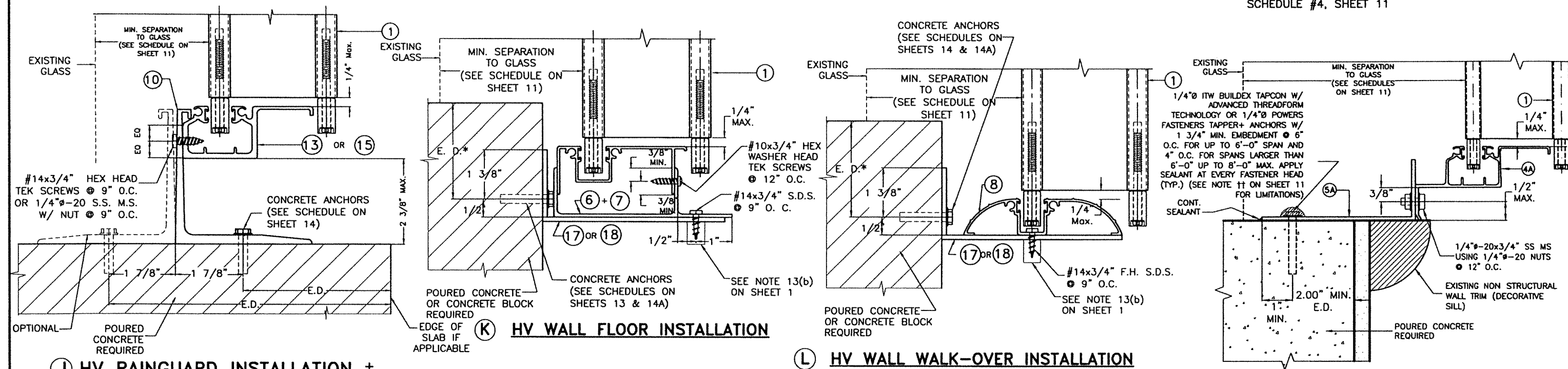
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⑧ HV FLOOR INSTALLATION †

① HV WALK-OVER INSTALLATION

⑪ TRENCH INSTALLATION
VALID ONLY FOR UP TO +70, -75 PSF A.S.D. DESIGN PRESSURE RATING & FOR SPANS PER SCHEDULE #4, SHEET 11



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)

NOTE:

† 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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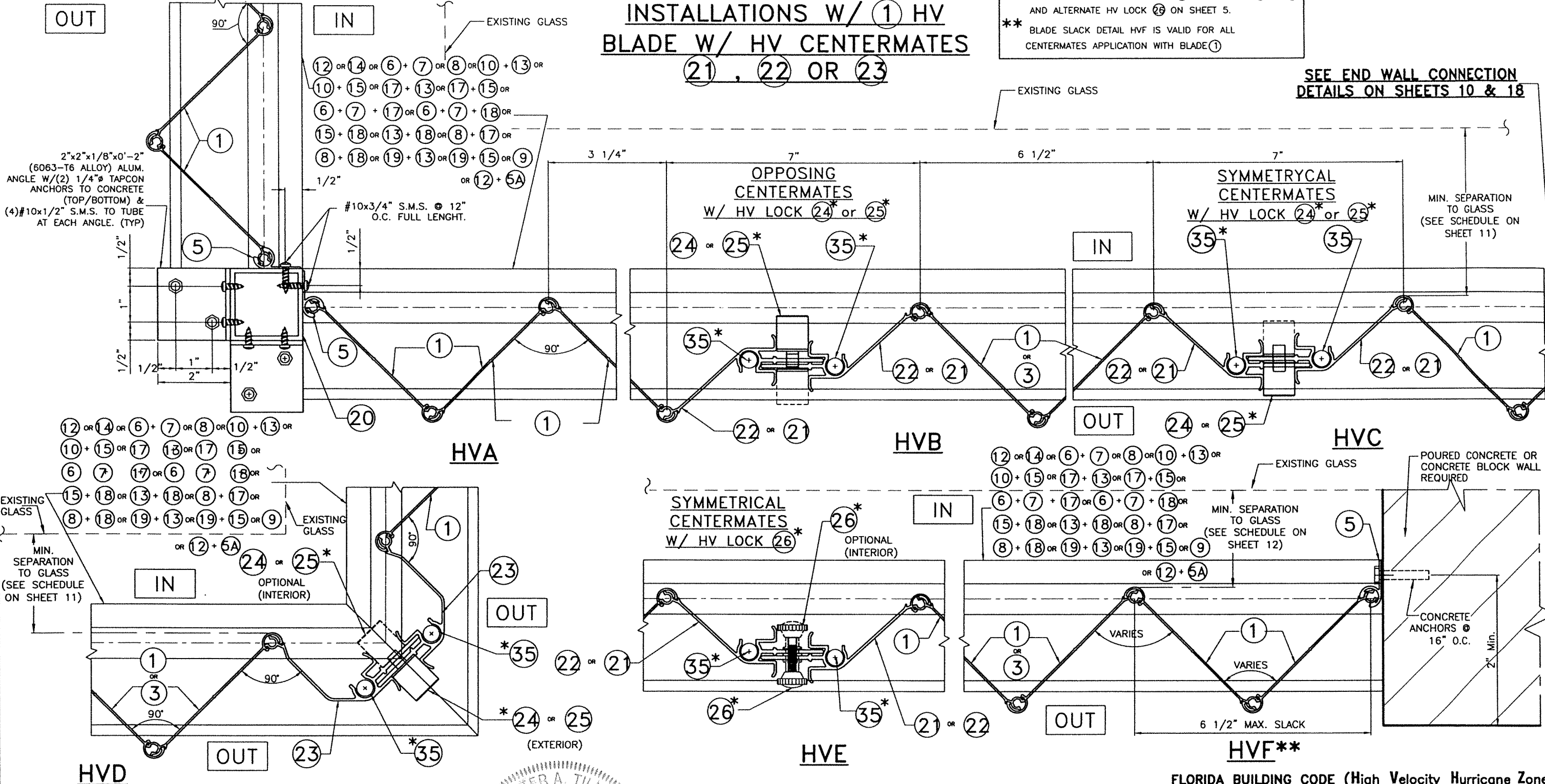
SHEET
7 OF 20

SEE END WALL CONNECTION DETAILS ON SHEETS 10 & 18

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

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

SEE END WALL CONNECTION
DETAILS ON SHEETS 10 & 18



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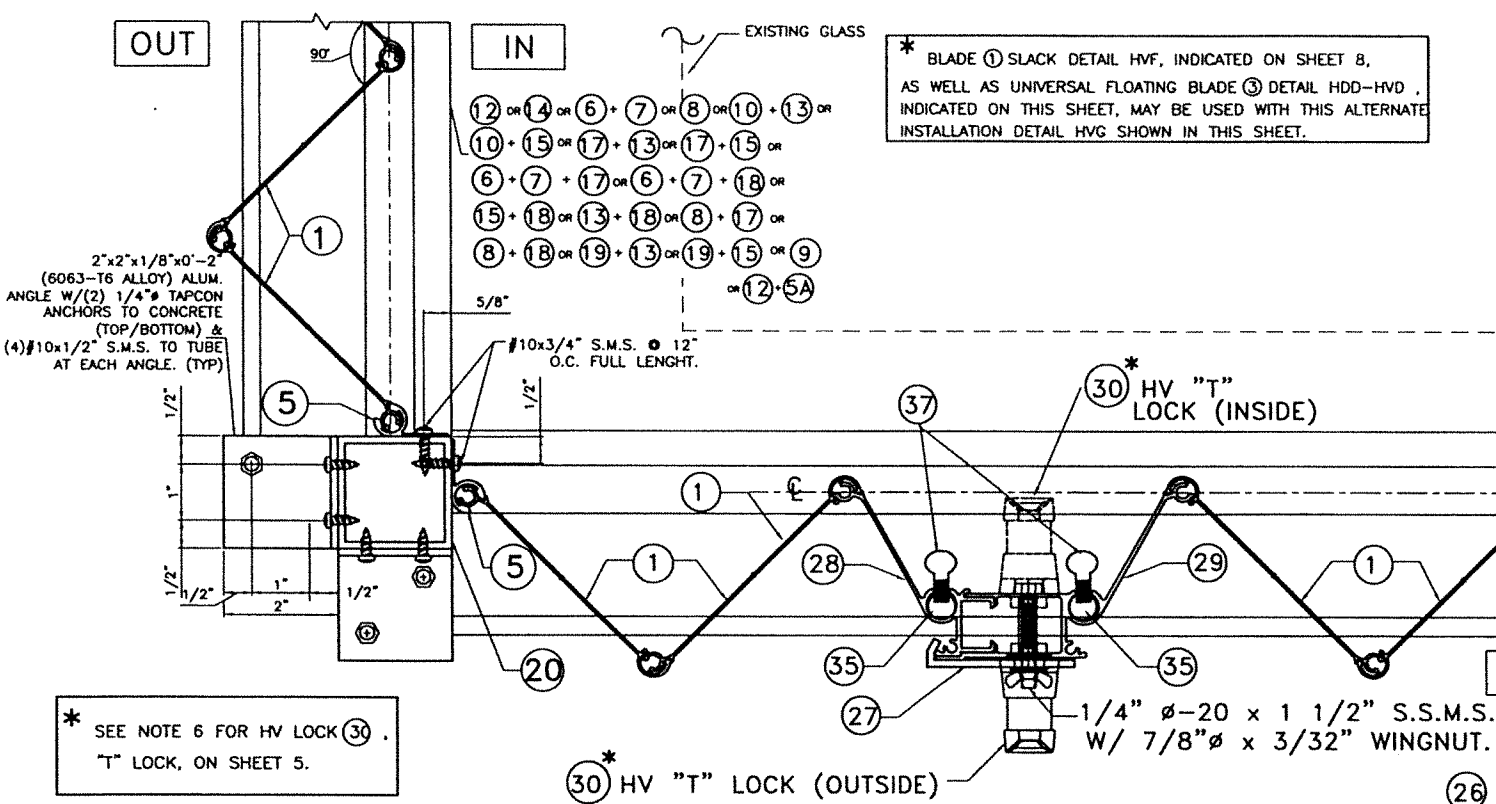
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ALTERNATE INSTALLATION W/HV "T" LOCK 30, HV
MALE/FEMALE "T" LOCKS CENTERMATES 28, 29 &
LOCKERS 27 W/ 1 HV BLADE *

SEE END CONNECTION DETAILS ON SHEETS 10 & 18



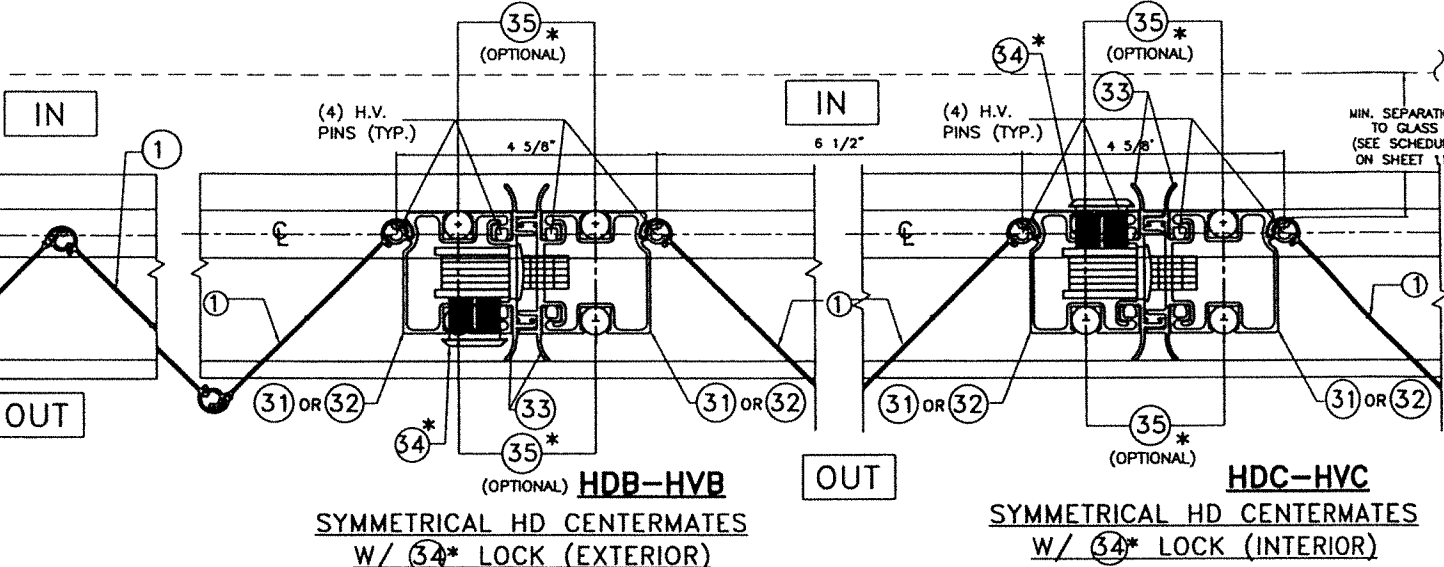
* SEE NOTE 6 FOR HV LOCK 30, "T" LOCK, ON SHEET 5.

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

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

SEE END WALL CONNECTION
DETAILS ON SHEETS 10 & 18



SYMMETRICAL HD CENTERMATES
W/ 34* LOCK (EXTERIOR)

SYMMETRICAL HD CENTERMATES
W/ 34* LOCK (INTERIOR)

HVG*

HDD-HVD**
FLOATING STACK

* SEE NOTES ON LOCKING RODS 3 & HD 3 LOCKS ON SHEET 5
** UNIVERSAL FLOATING BLADE 3 DETAIL HDD-HVD IS
VALID FOR ALL CENTERMATES APPLICATIONS WITH BLADE 1

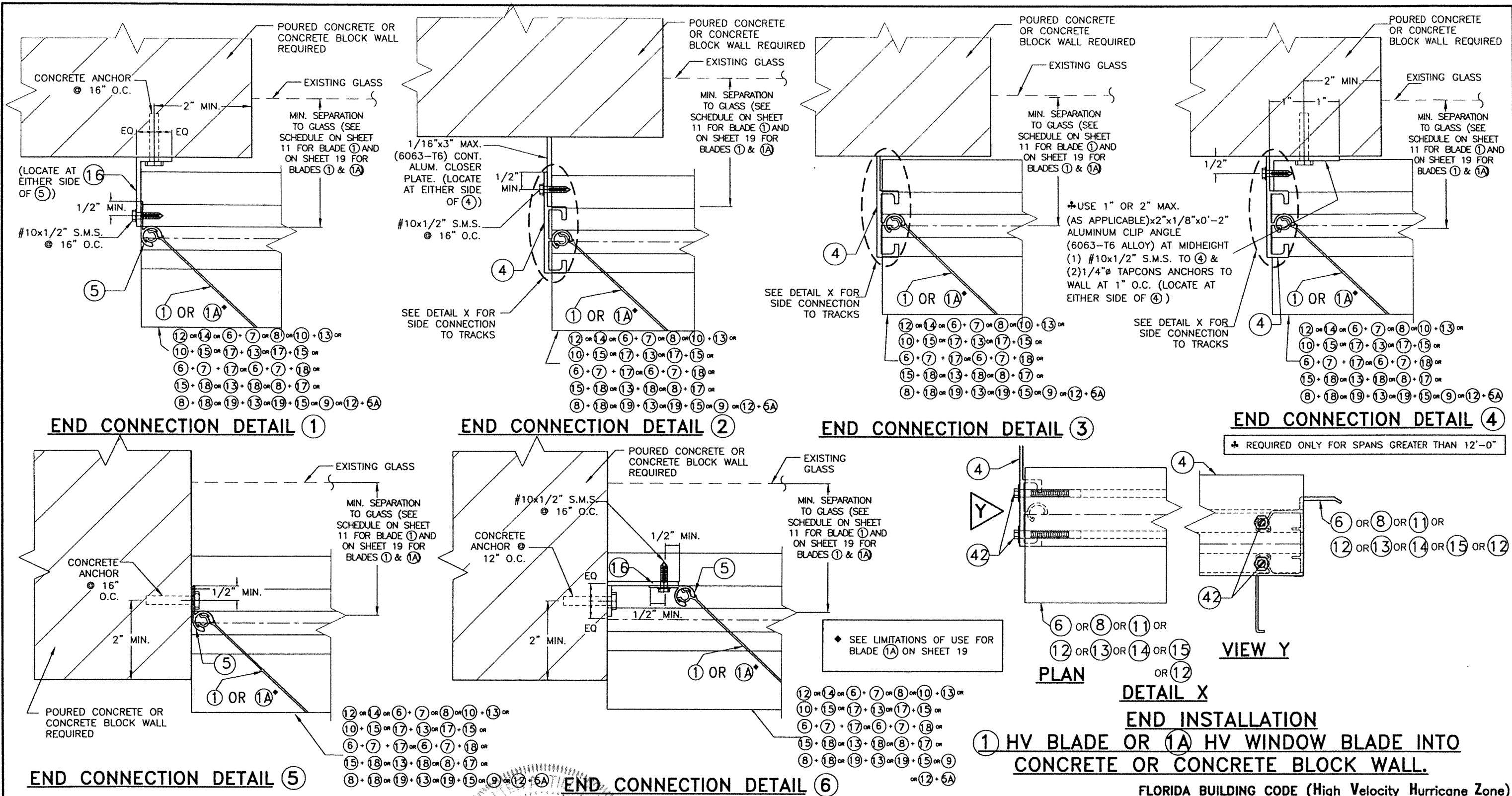
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3			
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			DRAWING No 23-130
			SHEET 9 OF 20



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DRAWING No
23-130

SHEET
10 OF 20

SCHEDULE #1				
MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.) FOR INSTALLATIONS W/ SYMMETRICAL CENTERMATES, 21 & 22 or 31 or 32 W/ ONE HV LOCK 24 or 25 or 26 or HD LOCK 34 W/ NO LOCKING RODS 35 OR CENTERMATES 28 & 29 W/ ONE HV LOCK 30 W/ TWO LOCKING RODS 35 TOP & BOTTOM ♦(SEE NOTES †, ††)				
MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS 0			
	WALL MOUNTING		FLOOR/CEILING MOUNTING	
	L + (ft)	L - (ft)	L + (ft)	L - (ft)
30	13'-2"	16'-0"	13'-2"	16'-0"
35	12'-8"	14'-10"	12'-8"	14'-10"
40	12'-3"	13'-10"	12'-3"	13'-10"
45	11'-11"	13'-1"	11'-11"	13'-1"
50	11'-7"	12'-5"	11'-7"	12'-5"
55	11'-4"	11'-10"	11'-4"	11'-10"
60	11'-1"	11'-4"	11'-0"	11'-4"
65	10'-10"	10'-10"	10'-7"	10'-10"
70	10'-6"	10'-6"	10'-2"	10'-6"
75	10'-1"	10'-1"	9'-10"	10'-1"
80	9'-10"	9'-9"	9'-7"	9'-10"
85	9'-6"	9'-6"	9'-3"	9'-6"
90	9'-3"	9'-3"	9'-0"	9'-3"
95	9'-0"	8'-9"	8'-9"	9'-0"
100	8'-9"	8'-4"	8'-6"	8'-9"
105	8'-7"	7'-11"	8'-4"	8'-4"
110	8'-4"	7'-7"	8'-2"	7'-11"
115	8'-2"	7'-3"	8'-0"	7'-7"
120	8'-0"	6'-11"	7'-10"	7'-4"
125	7'-10"	6'-8"	7'-8"	7'-0"
130	7'-8"	6'-5"	7'-6"	6'-9"
135	7'-7"	6'-2"	7'-4"	6'-6"
140	7'-5"	5'-11"	7'-3"	6'-3"
145	7'-3"	5'-9"	7'-1"	6'-0"
150	7'-2"	5'-7"	7'-0"	5'-10"
155	7'-0"	5'-5"	6'-10"	5'-8"
160	6'-11"	5'-2"	6'-9"	5'-6"
165	6'-10"	5'-1"	6'-8"	5'-4"
170	6'-9"	4'-11"	6'-7"	5'-2"
175	6'-7"	4'-9"	6'-5"	5'-0"
180	6'-6"	4'-8"	6'-4"	4'-10"
185	6'-5"	4'-6"	6'-3"	4'-9"
190	6'-4"	4'-5"	6'-2"	4'-7"
195	6'-3"	4'-3"	6'-1"	4'-6"
200	6'-2"	4'-2"	6'-0"	4'-5"
205	6'-0"	4'-1"	6'-0"	4'-3"

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 0			
	WALL MOUNTINGS & FLOOR/CEILING MOUNTINGS			
	L + (ft)	L - (ft)		
30	12'-3"	14'-9"		
35	11'-9"	13'-8"		
40	11'-4"	12'-9"		
45	11'-1"	12'-0"		
50	10'-9"	11'-5"		
55	10'-6"	10'-11"		
60	10'-3"	10'-5"		
65	10'-0"	10'-0"		
70	9'-8"	9'-8"		
75	9'-4"	9'-4"		
80	9'-0"	9'-0"		
85	8'-9"	8'-9"		
90	8'-6"	8'-6"		
95	8'-3"	8'-3"		
100	8'-1"	8'-1"		
105	7'-11"	7'-11"		
110	7'-8"	7'-7"		
115	7'-6"	7'-3"		
120	7'-4"	6'-11"		
125	7'-3"	6'-8"		
130	7'-1"	6'-5"		
135	6'-11"	6'-2"		
140	6'-10"	5'-11"		
145	6'-8"	5'-9"		
150	6'-7"	5'-7"		
155	6'-6"	5'-5"		
160	6'-5"	5'-2"		
165	6'-3"	5'-1"		
170	6'-2"	4'-11"		
175	6'-1"	4'-9"		
180	6'-0"	4'-8"		
185	5'-11"	4'-6"		
190	5'-10"	4'-5"		
195	5'-9"	4'-3"		
200	5'-9"	4'-2"		
205	5'-8"	4'-1"		

SCHEDULE #3				
MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.) INSTALLATIONS W/ SYMMETRICAL CENTERMATES 21 & 22 W/ TWO HV 24 OR 25 OR 26 LOCKS OR TWO LOCKING RODS 35 TOP/BOTTOM W/ ONE HV LOCK 24 OR 25 OR 26 ♦(SEE NOTES †, ††)				
MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS 0			
	FLOOR/CEILING MOUNTING			
	L + (ft)	L - (ft)		
30	13'-1"	16'-0"		
35	12'-7"	15'-7"		
40	12'-2"	15'-2"		
45	11'-9"	14'-3"		
50	11'-6"	13'-7"		
55	11'-3"	12'-11"		
60	11'-0"	12'-4"		
65	10'-9"	11'-11"		
70	10'-7"	11'-5"		
75	10'-4"	11'-1"		
80	10'-0"	10'-9"		
85	9'-9"	10'-5"		
90	9'-5"	10'-1"		
95	9'-2"	9'-10"		
100	9'-0"	9'-7"		
105	8'-9"	9'-4"		
110	8'-7"	9'-2"		
115	8'-4"	8'-11"		
120	8'-2"	8'-9"		
125	8'-0"	8'-5"		
130	7'-10"	8'-1"		
135	7'-9"	7'-9"		
140	7'-7"	7'-6"		
145	7'-5"	7'-3"		
150	7'-4"	7'-0"		
155	7'-2"	6'-9"		
160	7'-1"	6'-7"		
165	7'-0"	6'-4"		
170	6'-11"	6'-2"		
175	6'-9"	6'-0"		
180	6'-8"	5'-10"		
185	6'-7"	5'-8"		
190	6'-6"	5'-6"		
195	6'-5"	5'-5"		
200	6'-4"	5'-3"		
205	6'-3"	5'-1"		

SCHEDULE #4				
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	13'-2"	16'-0"		
35	12'-8"	14'-10"		
40	12'-3"	13'-10"		
45	11'-11"	13'-1"		
50	11'-7"	12'-5"		
55	11'-2"	11'-10"		
60	10'-2"	10'-11"		
65	9'-5"	10'-1"		
70	8'-9"	9'-4"		
75	-	8'-9"		

*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 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 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.

0 MAXIMUM SHUTTER SPAN "L+" OR "L-" FOR INSTALLATIONS INTO WOOD SHALL BE LIMITED TO 105 psf. DESIGN LOAD.

† H.V. 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 (M) ON SHEET 7.

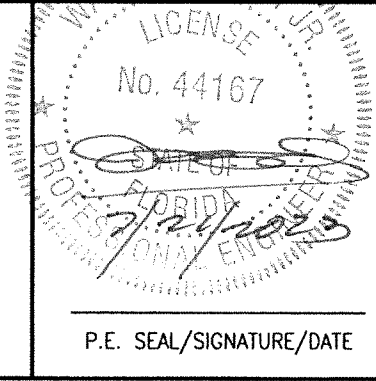
♦ SEPARATION TO GLASS REQUIREMENTS		
(1) SEE BELOW FOR MINIMUM SEPARATION TO GLASS SCHEDULE FOR SHUTTERS INSTALLED WITHIN THE FIRST 30'-0" ELEVATION OF BUILDING MEASURED AT BOTTOM OF SHUTTER.		
(2) MINIMUM SEPARATION TO GLASS FOR SHUTTERS INSTALLED ABOVE 30'-0" ELEVATION OF BUILDING, MEASURED AT BOTTOM OF SHUTTER IS 3".		
MINIMUM SEPARATION TO GLASS SCHEDULE: SHUTTER W/ ONE LOCK WITHOUT LOCKING RODS		
SHUTTER SPAN	INSTALLATION W/ SYMMETRICAL CENTERMATES	INSTALLATION W/ OPPOSING CENTERMATES
105" OR LESS	3 3/8"s	4"
>105" TO MAX. ALLOWED	3 7/8"s	4"
s USE 2 1/2" FOR HD LOCK 31+33 OR 32+33. USE INDICATED VALUES FOR HV CENTERMATES.		
MINIMUM SEPARATION TO GLASS SCHEDULE: SHUTTER W/ ONE LOCK & TWO LOCKING RODS OR WITH ONLY TWO LOCKS		
SHUTTER SPAN	INSTALLATION W/ SYMMETRICAL CENTERMATES	INSTALLATION W/ OPPOSING CENTERMATES
105" OR LESS	2 3/4" **	3 3/16"
>105" TO MAX. ALLOWED	3 1/4" ***	3 1/4"
** USE 2 15/16" FOR HV "T" LOCK 30 W/ 35		
*** USE 4 1/8" FOR HV "T" LOCK 30 W/ 35 USE INDICATED VALUES FOR HV CENTERMATES.		

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, J + J.	T, U, W & X.

1 HV BLADE

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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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: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130

SHEET
11 OF 20

ANCHORS SPACING LEGEND

BLUE TAP

TAPPER+

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

① HV BLADE OR ① HV BLADE
W/ ①A HV WINDOW BLADE
WORKING IN UNISON ♦

MAXIMUM SPAN (ft)	POURED CONCRETE																																																								
	(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 LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (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	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	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	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	
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	6	6	14	12	10	9	8	8	7	-	14	12	10	9	8	8	7	5.5	-	8	8	8	8	8	7	5.5	
	14	12	10	9	8	8	4.5	-	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	-	-	14	12	10	9	8	8	6	-	8	8	8	8	8	6.5			
	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	6	6	14	12	10	9	8	8	-	-	14	12	10	9	8	8	6	-	8	8	8	8	8	7	5		
5'-0"	14	12	10	9	8	8	4.5	-	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	7.5	-	-	14	12	10	9	8	7.5	5.5	-	-	8	8	8	8	7.5	5.5	4
	14	12	10	9	8	8	5.5	-	14	12	10	9	8	8	4.5	-	14	12	10	9	8	8	6	5	14	12	10	9	8	8	6	5	14	12	10	9	8	8	3	-	-	14	12	10	9	8	7	-	-	8	8	8	8	8	7	5	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	3.5	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	-	-	14	12	10	9	8	7.5	-	-	8	8	8	8	8	7.5	5.5		
6'-0"	14	12	10	9	8	8	5.5	3	-	14	12	10	9	8	8	4.5	-	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	6	14	12	10	9	8	8	-	-	14	12	10	9	8	7.5	-	-	8	8	8	8	8	7.5	5.5	
	14	12	10	9	8	8	3	-	14	12	10	9	8	8	-	-	14	12	10	9	8	8	5.5	3.5	14	12	10	9	8	8	5.5	3.5	14	12	10	9	8	4.5	-	-	14	12	9.5	7.5	6.5	3.5	-	-	8	8	8	7.5	6.5	4.5	3.5		
	14	12	10	9	8	8	5	-	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	5.5	14	12	10	9	8	8	6	5.5	14	12	10	9	8	5	-	-	14	12	10	9	8	4.5	-	-	8	8	8	8	8	6	4.5		
7'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6.5	3	-	14	12	10	9	8	8	6	-	14	12	8	4.5	-	-	-	14	12	8	6.5	5.5	-	-	-	14	12	8	6.5	5.5	4	3	-	-	8	8	8	8	8	6.5	5	3.5
	14	12	10	9	8	8	4.5	-	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	5	-	-	14	12	10	9	8	4.5	-	-	8	8	8	8	8	6	4.5		
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6.5	3	-	14	12	10	9	8	8	6	-	14	12	8	4.5	-	-	-	14	12	8	6.5	5.5	-	-	-	14	12	8	6.5	5.5	4	3	-	-	8	8	8	8	8	6.5	5	3.5
8'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
9'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
10'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
11'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
12'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
13'-0"	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	
	14	12	10	9	8	8	4	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	-																									

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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: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-130
3			
4			
5			
6			SHEET 12 OF 20

WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
7/24/2023

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TILTECO INC.

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**American Shutter Systems
Association, Inc.**

4268 West Roads Drive
West Palm Beach, FL 33407
Phone: (800)432-2204 . Fax: (561)209-8380

MAXIMUM ANCHOR* SPACING (in.) SCHEDULE FOR A GIVEN MAX. SHUTTER SPAN, A.S.D.
DESIGN NEGATIVE LOAD AND A CORRESPONDING MOUNTING TYPE FOR CONCRETE INSTALLATIONS
(SEE MOUNTINGS E, G, & H ON SHEETS 6 & 7)

MAXIMUM SPAN (ft)	POURED CONCRETE																							
	E WALL SILL MOUNTING								G CEILING MOUNTING								H FLOOR MOUNTING							
	A.S.D. DESIGN NEGATIVE LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (psf)								A.S.D. DESIGN NEGATIVE LOAD (psf)							
	30	40	60	75	90	120	180	205	30	40	60	75	90	120	180	205	30	40	60	75	90	120	180	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	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	5	14	12	10	9	8	8	6	5
	14	12	10	9	8	8	6	4	14	12	10	9	8	8	6	4.5	14	12	10	9	8	8	6	4.5
	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	8	7	5.5
	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	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	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	8.5	7	5.5	3	-	-	14	12	8	6.5	5.5	4	3	-	14	12	10	8	6.5	5	3.5	-
	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	11.5	7.5	6	4	-	-	-	14	11	7	5.5	5	3.5	-	-	14	12	8.5	7	5.5	4	-	-
	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	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	-	-
	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	-	-	-
	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	-	-	-
	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	-	-	-	-
	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	-	-	-	-	-
	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	-	-	-	-	-
	8	-	-	-	-	-	-	-	8	6	4	-	-	-	-	-	10	7.5	5	-	-	-	-	-
	9.5	-	-	-	-	-	-	-	9.5	7	5	-	-	-	-	-	8	6	4	-	-	-	-	-

ANCHORS SPACING LEGEND

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

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

① HV BLADE OR
① HV BLADE W/
①A HV WINDOW
BLADE WORKING
IN UNISON ♦

* SPECIFICATIONS ON ANCHOR REQUIREMENTS: POURED CONCRETE OR CONCRETE BLOCK SUBSTRATES

1. ANCHORS TO SUBSTRATE SHALL BE AS FOLLOWS:

- (A) TO EXISTING POURED CONCRETE: (Min. f'c = 3 ksi)
- 1/4"Ø TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDDEX. (Min. f'c = 3 ksi)
 - 1/4"Ø x 3/4" ALL POINTS SOLID-SET ANCHORS, AS DISTRIBUTED BY ALL POINTS SCREW, BOLT & SPECIALTY COMPANY. (Min. f'c = 3 ksi)
 - 1/4"Ø BLUE TAP CONCRETE ANCHORS W/ CAP AS MANUFACTURED BY FLORIDA FASTENERS DIRECT, INC. (Min. f'c = 2 ksi)
 - 1/4"Ø TAPPER+ ANCHORS AS MANUFACTURED BY DEWALT, INC., AND DISTRIBUTED BY ALL POINTS SCREW, BOLT & SPECIALTY COMPANY OR ANY OTHER APPROVED LICENSED OR AUTHORIZED VENDOR REGISTERED WITH THE AMERICAN SHUTTER SYSTEMS ASSOCIATION, INC. (Min. f'c = 3 ksi)

NOTES:

- A.1) MINIMUM EMBEDMENT INTO POURED CONCRETE OF TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS AND TAPPER+ ANCHORS IS 1 3/4", AND FOR BLUE TAP W/ CAP ANCHORS IS 1 1/2".
- A.2) MINIMUM EMBEDMENT OF 1/4"Ø x 3/4" ALL POINTS SOLID-SET ANCHORS SHALL BE 7/8" INTO THE POURED CONCRETE. NO EMBEDMENT INTO STUCCO SHALL BE PERMITTED. 1/4"Ø-20 S.S. MACHINE SCREW USED SHALL BE 1 1/2" LONG MINIMUM SHOULD STUCCO EXIST, AND 1" MINIMUM FOR WALLS WITH NO STUCCO.
- A.3) IN CASE THAT PRECAST STONE, PRECAST CONCRETE PANELS, PAVERS OR ANY VENEER BE FOUND ON THE EXISTING WALL OR FLOOR, ANCHORS SHALL BE LONG ENOUGH TO REACH THE MAIN STRUCTURE BEHIND SAID WALL FINISHES. ANCHORAGE SHALL BE AS INDICATED ON NOTES A.1) & A.2) ABOVE. FOR INSTALLATIONS ON VINYL SIDING OR EIFS WITH OR WITHOUT METAL STUDS CONSULT THIS ENGINEER. FOR INSTALLATION INTO EIFS WITH METAL STUDS SEE SHEET 28A.

(B) TO EXISTING CONCRETE BLOCK: (ASTM C-90)

- 1/4"Ø TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDDEX.
- 1/4"Ø x 3/4" ALL POINTS SOLID-SET ANCHORS, AS DISTRIBUTED BY ALL POINTS SCREW, BOLT & SPECIALTY COMPANY.
- 1/4"Ø BLUE TAP CONCRETE ANCHORS W/ CAP AS MANUFACTURED BY FLORIDA FASTENERS DIRECT, INC.
- 1/4"Ø TAPPER+ ANCHORS AS MANUFACTURED BY DEWALT, INC., AND DISTRIBUTED BY ALL POINTS SCREW, BOLT & SPECIALTY COMPANY OR ANY OTHER APPROVED LICENSED OR AUTHORIZED VENDOR REGISTERED WITH THE AMERICAN SHUTTER SYSTEMS ASSOCIATION, INC.

NOTES:

- B.1) MINIMUM EMBEDMENT INTO CONCRETE BLOCK OF BLUE TAP W/ CAP ANCHORS AND TAPPER+ ANCHORS IS 1 1/4" AND TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS IS 1".
- B.2) MINIMUM EMBEDMENT OF 1/4"Ø x 3/4" ALL POINTS SOLID-SET ANCHORS SHALL BE ENTIRELY EMBEDDED INTO THE CONCRETE BLOCK. NO EMBEDMENT INTO STUCCO SHALL BE PERMITTED. 1/4" Ø-20 S.S. MACHINE SCREW USED SHALL BE 1 1/2" LONG MINIMUM SHOULD STUCCO EXIST, AND 1" MINIMUM FOR WALLS WITH NO STUCCO.
- B.3) IN CASE THAT PRECAST STONE, PRECAST CONCRETE PANELS, PAVERS OR ANY VENEER BE FOUND ON THE EXISTING WALL OR FLOOR, ANCHORS SHALL BE LONG ENOUGH TO REACH THE MAIN STRUCTURE BEHIND SAID WALL FINISHES. ANCHORAGE SHALL BE AS INDICATED ON NOTES B.1) & B.2) ABOVE. FOR INSTALLATIONS ON VINYL SIDING OR EIFS WITH OR WITHOUT METAL STUDS CONSULT THIS ENGINEER. FOR INSTALLATION INTO EIFS WITH METAL STUDS SEE SHEET 20.

(C) ANCHORS SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS OF THE ANCHOR'S MANUFACTURER.

(D) SEE SCHEDULE BELOW FOR EDGE DISTANCE (E.D.) VERSUS SPACING RELATIONSHIP FOR ANCHORS.

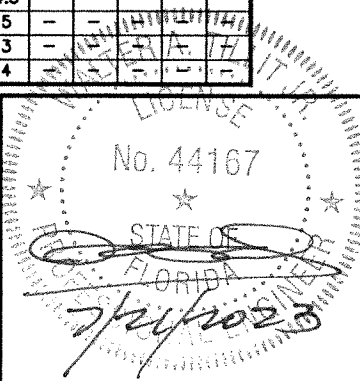
EDGE DISTANCE VERSUS SPACING SCHEDULE FOR ANCHORS:						
MAXIMUM ANCHOR SPACINGS ARE VALID FOR EDGE DISTANCES INDICATED BELOW. FOR E. D. LESS THAN THE INDICATED, REDUCE ANCHOR SPACING BY MULTIPLYING SPACING SHOWN ON SCHEDULE BY THE FOLLOWING FACTORS. REDUCED SPACING OBTAINED USING FACTOR SHALL NOT BE LESS THAN MINIMUM SPACING INDICATED FOR EACH ANCHOR TYPE.						
ACTUAL EDGE DISTANCE E.D.	FACTOR					
	TAPCON W/ ADVANCED THREADFORM TECH. MIN. SPACING		ALL POINT SOLID SET	BLUE TAP W/ CAP	TAPPER + MIN. SPACING	
	3"	4"	MIN. SPACING = 3 1/2"	MIN. SPACING = 3"	3 3/4"	4"
	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"	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 (A & B MOUNTINGS ONLY)	-	-	-	0.43	-
1 1/2"	-	-	-	-	0.35	-

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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P.E. SEAL/SIGNATURE/DATE

A.S.S.A.

American Shutter Systems
Association, Inc.

4268 West Roads Drive
West Palm Beach, FL 33407
Phone: (800)432-2204 . Fax: (561)209-8380

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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: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130
SHEET
13 OF 20

4268 West Roads Drive
West Palm Beach, FL 33407
Phone: (800)432-2204 . Fax: (561)209-8380

MAXIMUM ANCHOR* SPACING (in.) SCHEDULE FOR A GIVEN MAX. SHUTTER SPAN, A.S.D.
DESIGN NEGATIVE LOAD AND A CORRESPONDING MOUNTING TYPE FOR CONCRETE INSTALLATIONS
(SEE MOUNTINGS I, J, K & L ON SHEET 7)

MAXIMUM SPAN (ft)	POURED CONCRETE																															
	(I) WALK OVER & (II) TRENCH MOUNTINGS ◇								(J) RAINGUARD MOUNTING								(K) WALL/FLOOR MOUNTING								(L) WALL/WALK OVER MOUNTING							
	A.S.D.DESIGN NEGATIVE LOAD (psf)								A.S.D.DESIGN NEGATIVE LOAD (psf)								A.S.D.DESIGN NEGATIVE LOAD (psf)								A.S.D.DESIGN NEGATIVE LOAD (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	5	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	6.5	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	5	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	5	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	5.5	4	3	5	5	5	5	5	5	4	3
	14	12	10	9	8	8	6	6	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	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	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	4	5	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	4	3	—	—
	14	12	10	9	8	8	—	—	12	12	9.5	6.5	5.5	4	3	—	7	7	7	7	7	6	3	5	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	4.5	—	—	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	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	—												

(SEE MOUNTINGS ON SHEETS 16 & 17).

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

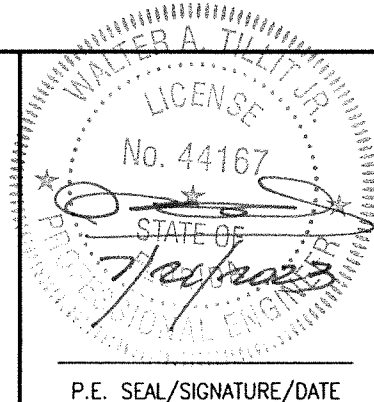
+ NOTES ON ANCHORS REQUIREMENTS: WOOD SUBSTRATES.

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)

- FLORIDA BUILDING CODE (High Velocity Hurricane Zone)**

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

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			DRAWING No 23-130
3			
4			
5			
6			SHEET 15 OF 20



TILECO INC.

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: tilteco@aol.com
CA-0006719
WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167

A.S.S.A.
American Shutter Systems
Association, Inc.
 4268 West Roads Drive
 West Palm Beach, FL 33407
 Phone: (800)432-2204 . Fax: (561)209-8380

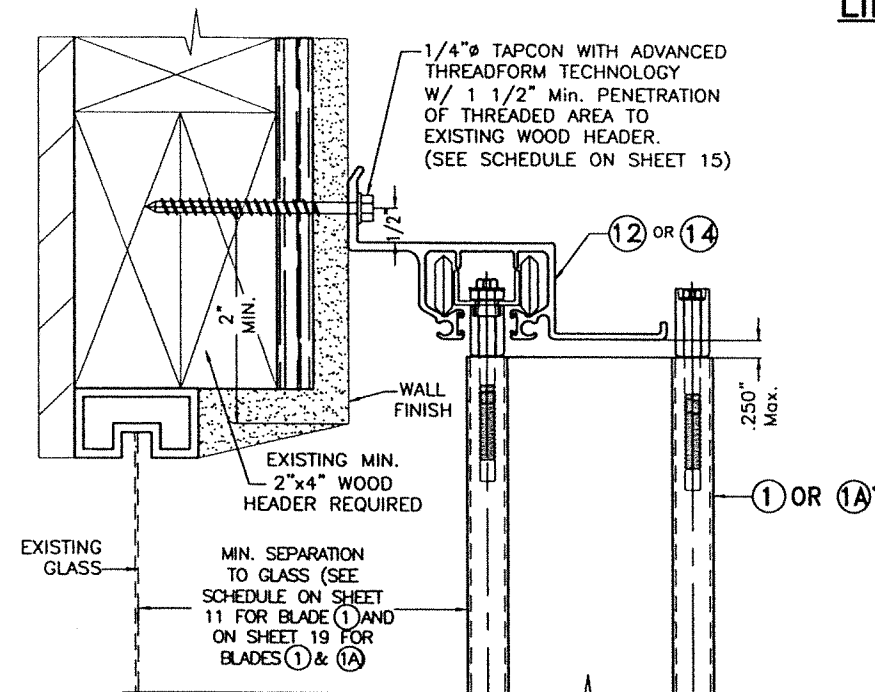
BERTHA HV™

Accordion Shutter System

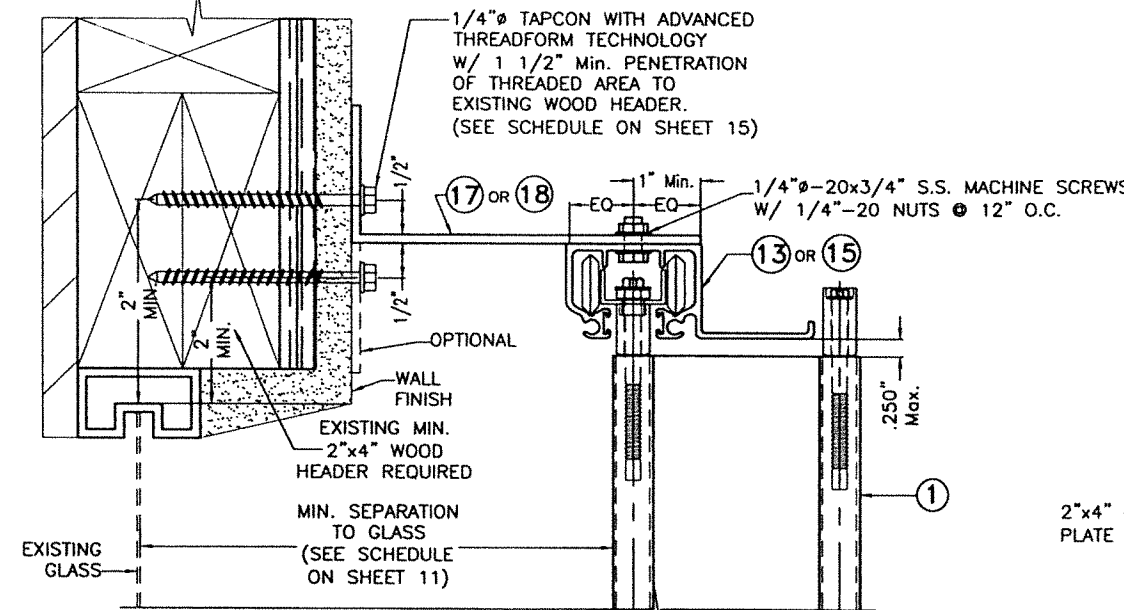
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

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

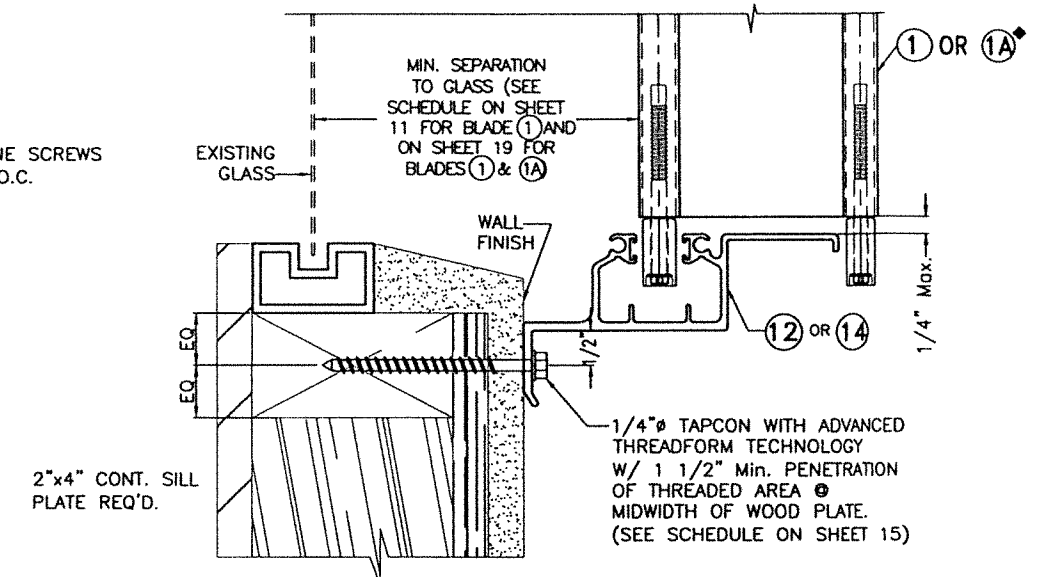
MAX. SHUTTER SPAN L+ OR L- FOR INSTALLATIONS INTO WOOD WITH HV BLADE ① ONLY SHALL BE LIMITED TO 105.0 psf. A.S.D. DESIGN PRESSURE RATING. SEE SHEET 19 FOR MAX SPAN & A.S.D. DESIGN PRESSURE RATING FOR INSTALLATION WITH BLADE ① & ①A WORKING IN UNISON



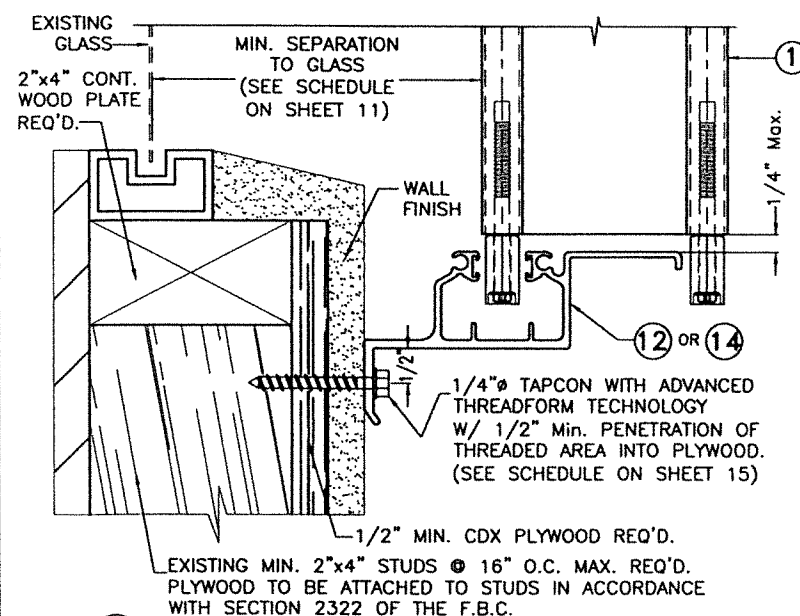
M HV WALL HEADER INSTALLATION



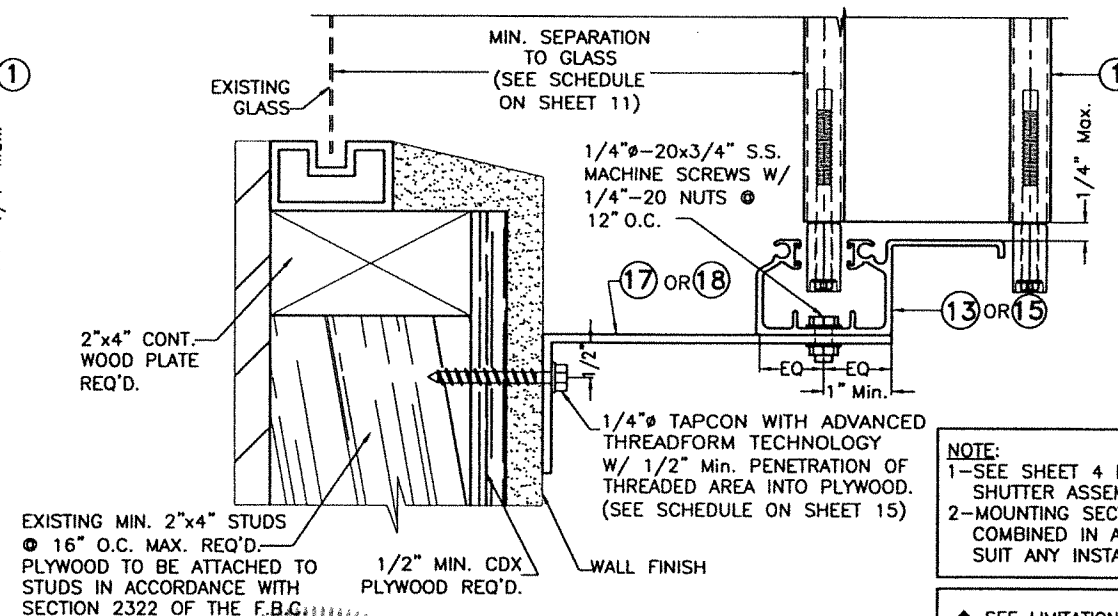
N HV WALL HEADER INSTALLATION



O HV WALL SILL INSTALLATION



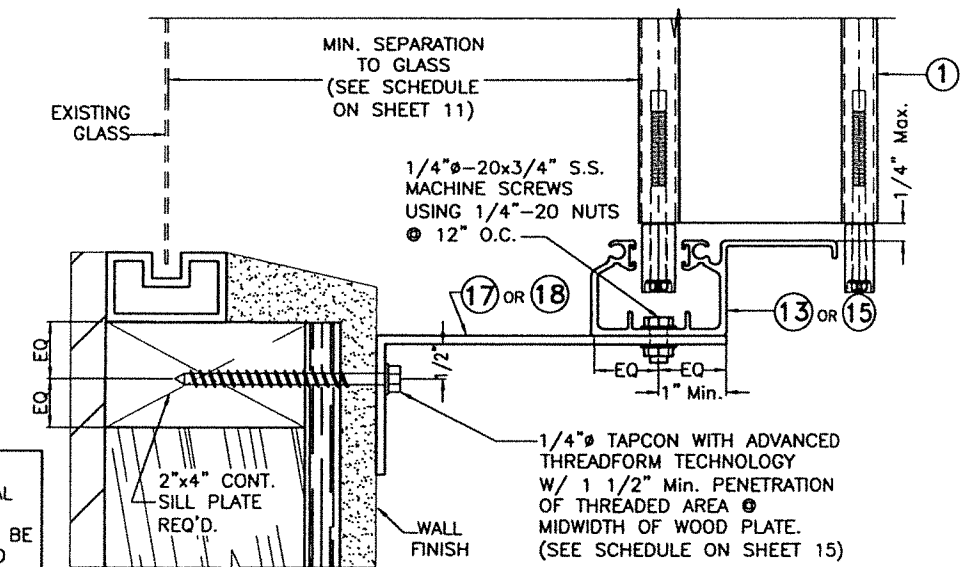
P HV WALL SILL INSTALLATION



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



R HV WALL SILL INSTALLATION

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

WALTER A. TILLIT
LICENSE
No. 44167
STATE OF FLORIDA
7/24/2023
P.E. SEAL/SIGNATURE/DATE

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

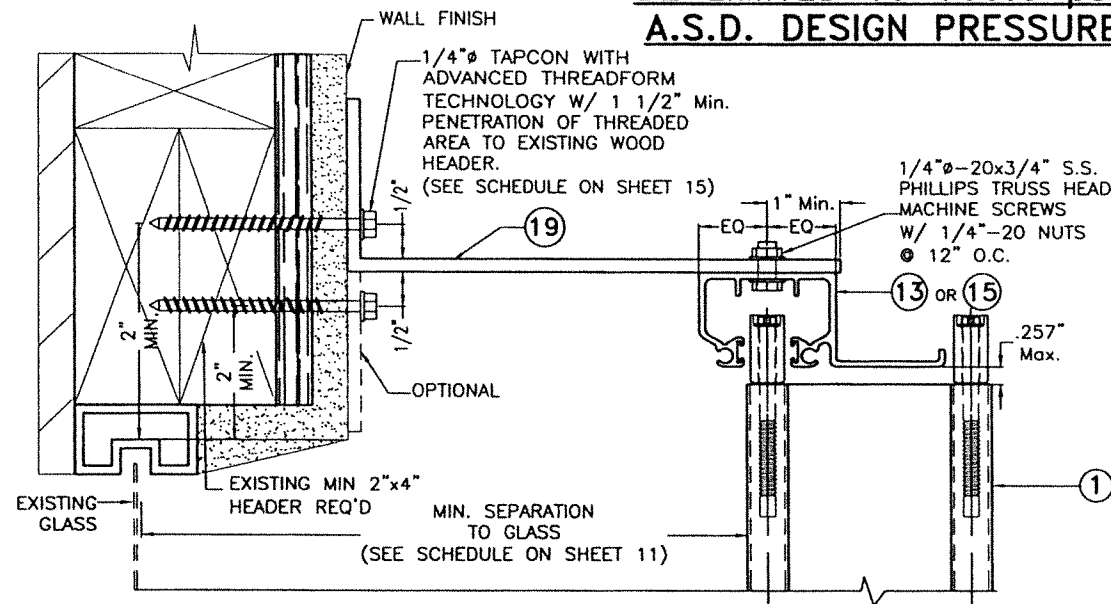
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130

SHEET
16 OF 20

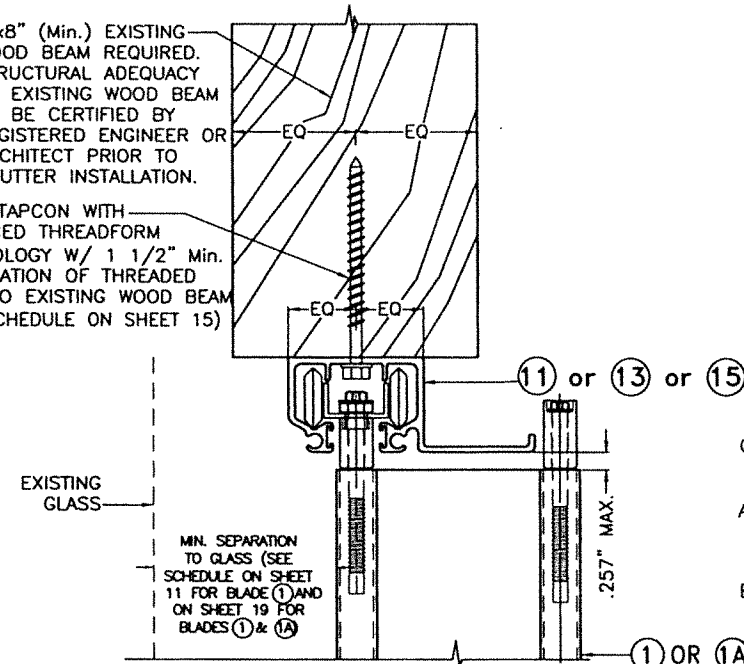
INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS FOR ① HV & ①A HV ♦ BLADES (AS APPLICABLE)

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 & A.S.D. DESIGN PRESSURE RATING FOR INSTALLATION WITH BLADE ① & ①A WORKING IN UNISON

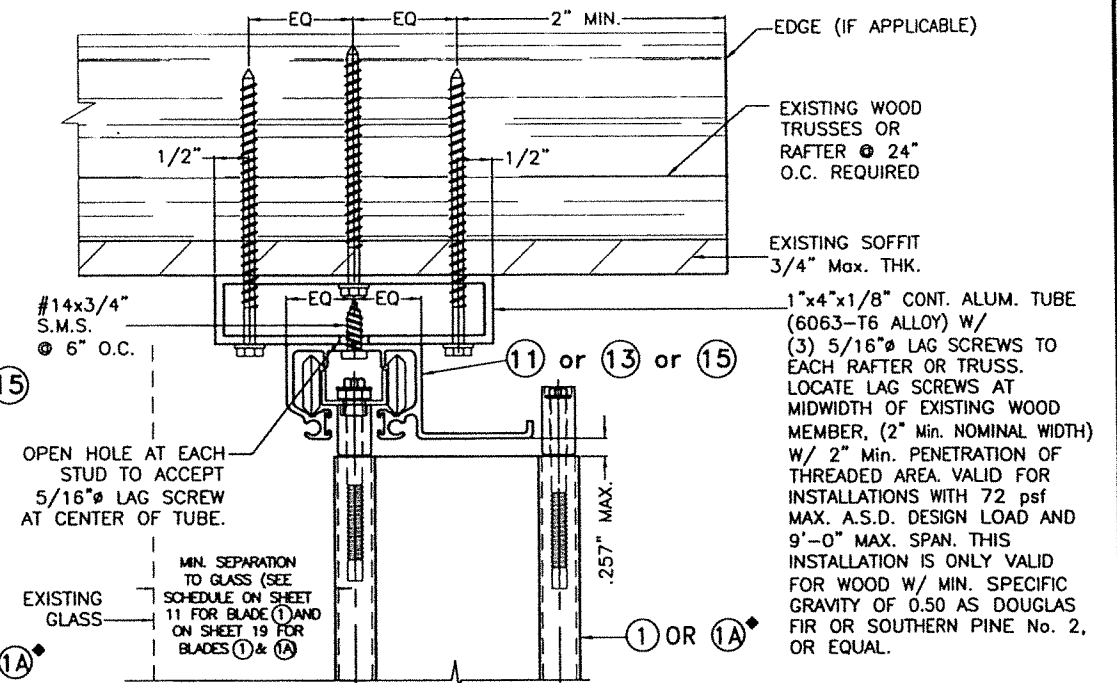


⑤ HV WALL HEADER INSTALLATION

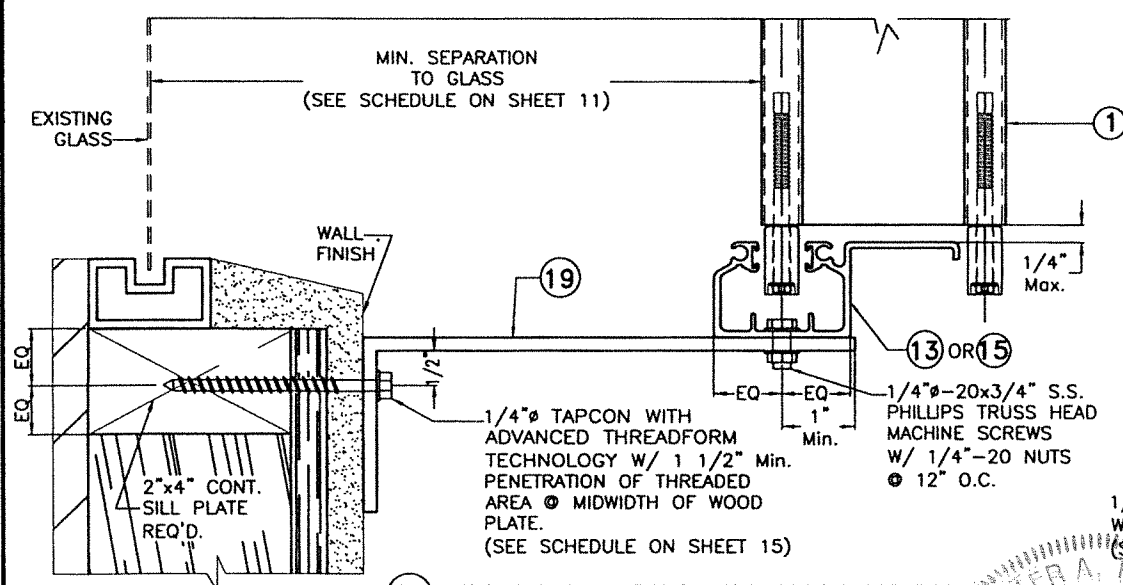
NOTES:
1-SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY.
2-MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.



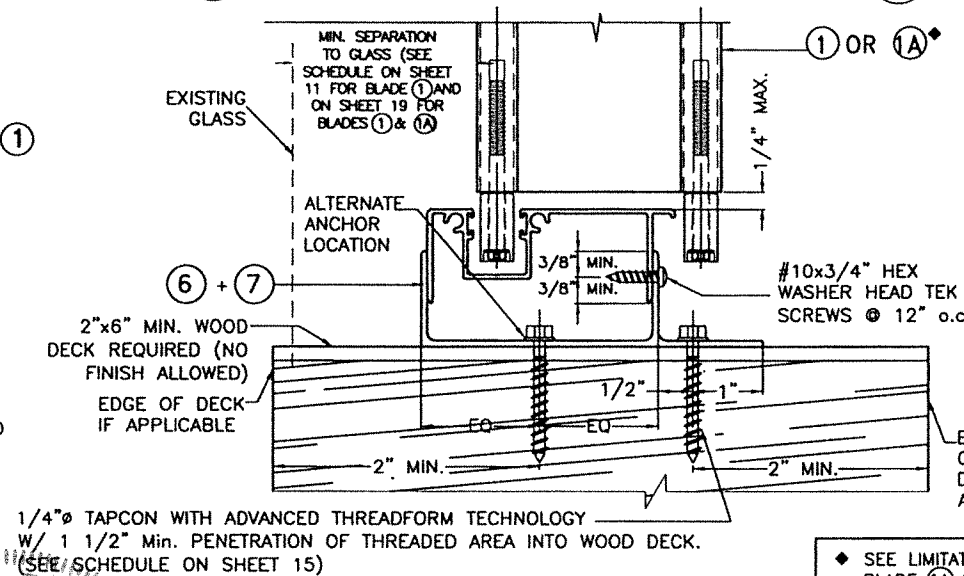
① HV CEILING INSTALLATION



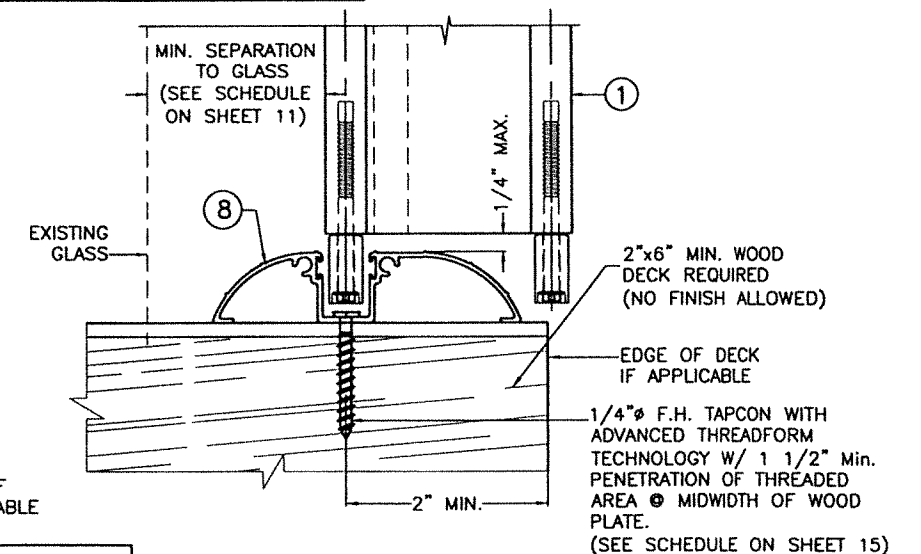
① HV CEILING INSTALLATION



⑥ HV WALL SILL INSTALLATION



⑦ HV FLOOR INSTALLATION



⑧ HV WALK-OVER INSTALLATION

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

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

WALTER A. TILLIT JR.
P.E. SEAL/SIGNATURE/DATE

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TILTECO INC.

TILLIT TESTING & ENGINEERING COMPANY
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American Shutter Systems
Association, Inc.

4268 West Roads Drive
West Palm Beach, FL 33407
Phone: (800)432-2204 . Fax: (561)209-8380

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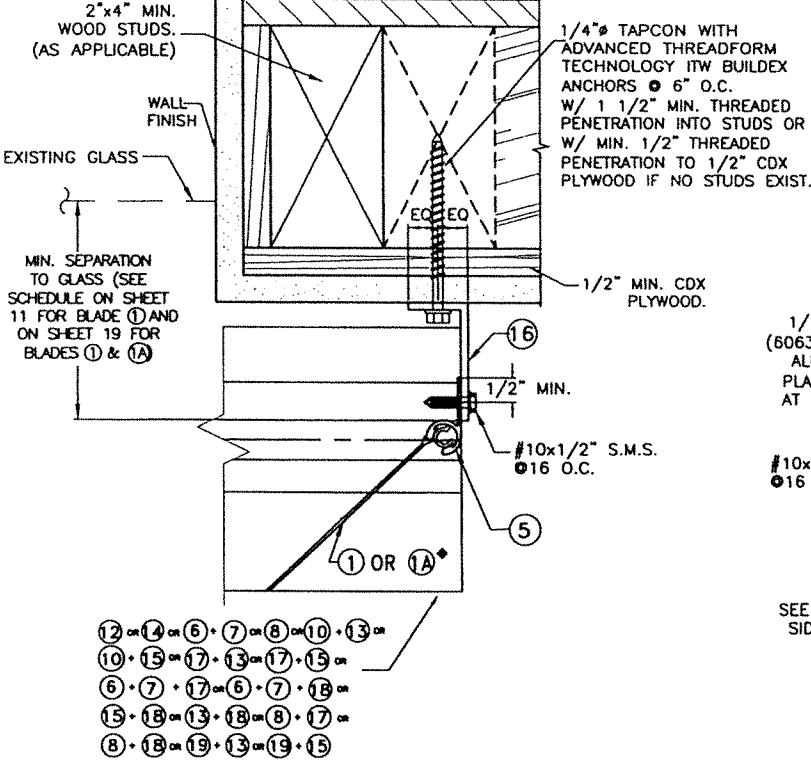
BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
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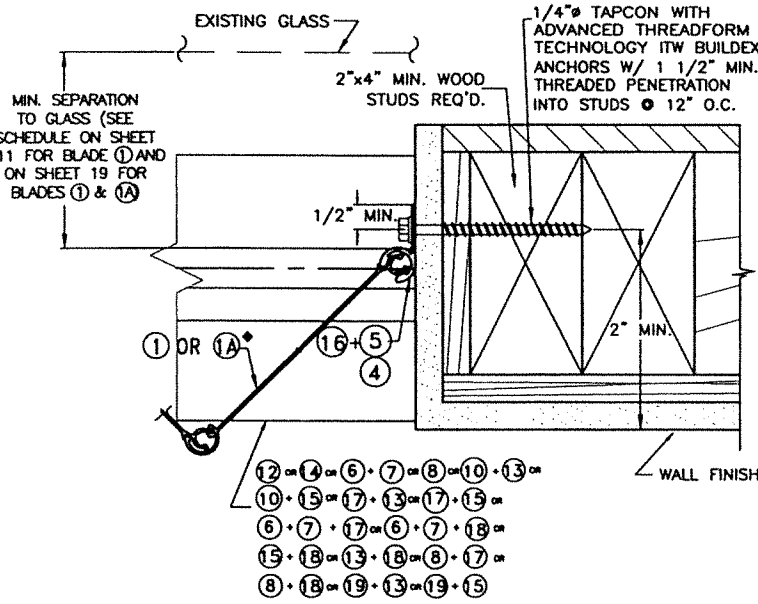
DRAWING No
23-130

SHEET
17 OF 20

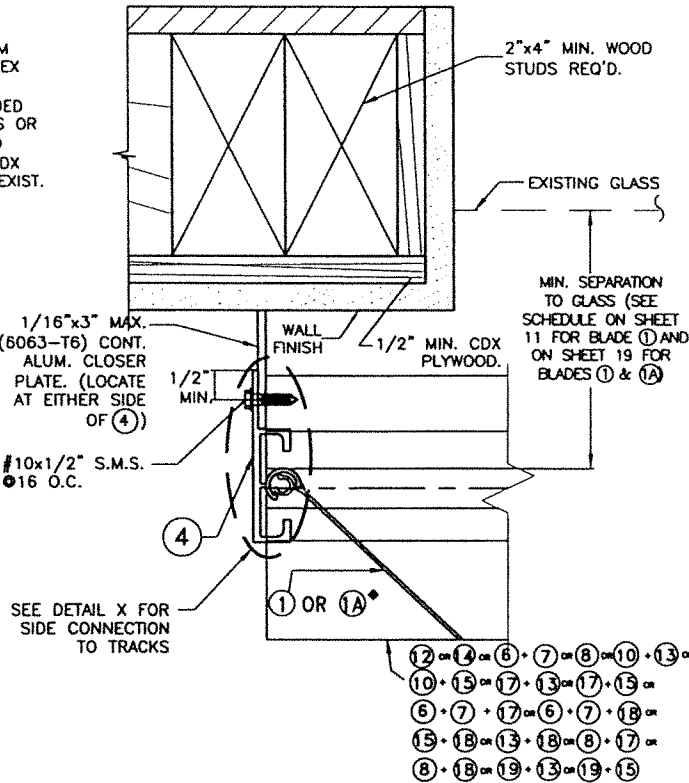
END INSTALLATIONS ① HV & ①A HV ♦ BLADES INTO 2"x4" MIN. WOOD STUDS.



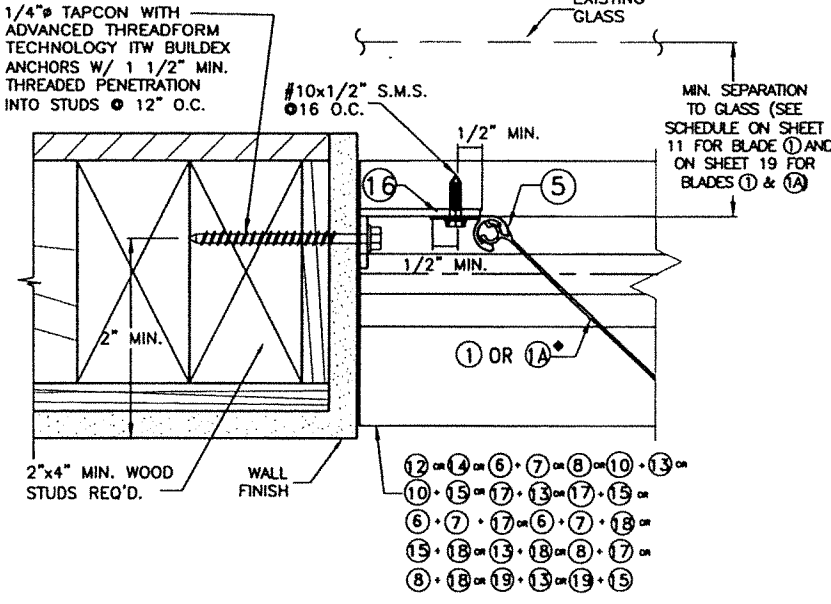
END CONNECTION DETAIL ⑦



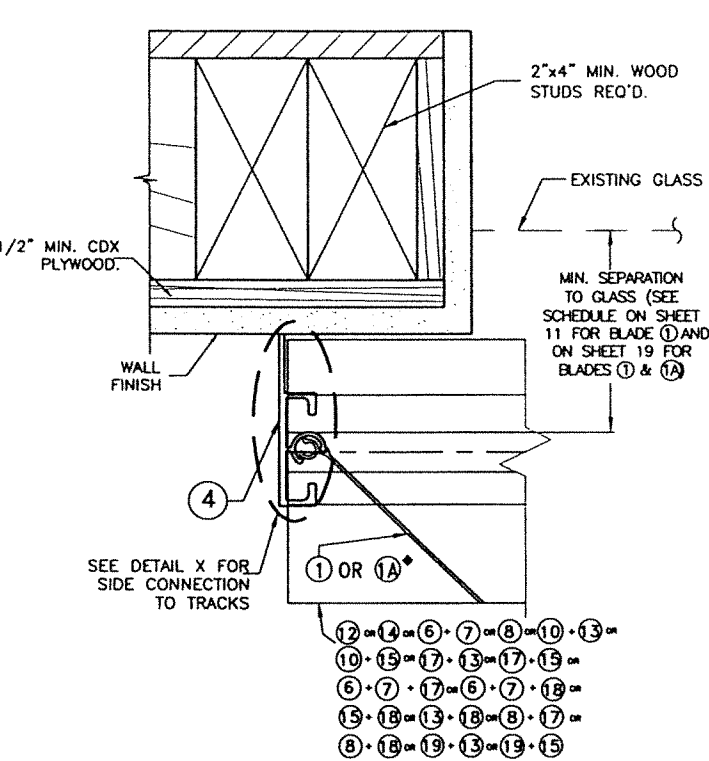
END CONNECTION DETAIL ⑪



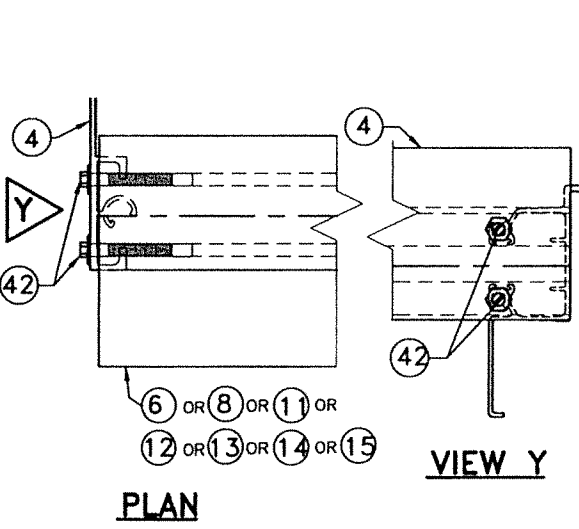
END CONNECTION DETAIL ⑧



END CONNECTION DETAIL ⑫



END CONNECTION DETAIL ⑨



END CONNECTION DETAIL ⑩

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

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

DETAIL X

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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

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TILTECO INC.
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: tilteco@aol.com
CA-0006719
WALTER A. TILLIT JR. P.E.
FLORIDA Lic. # 44167

A.S.S.A.
American Shutter Systems
Association, Inc.
4268 West Roads Drive
West Palm Beach, FL 33407
Phone: (800)432-2204 . Fax: (561)209-8380

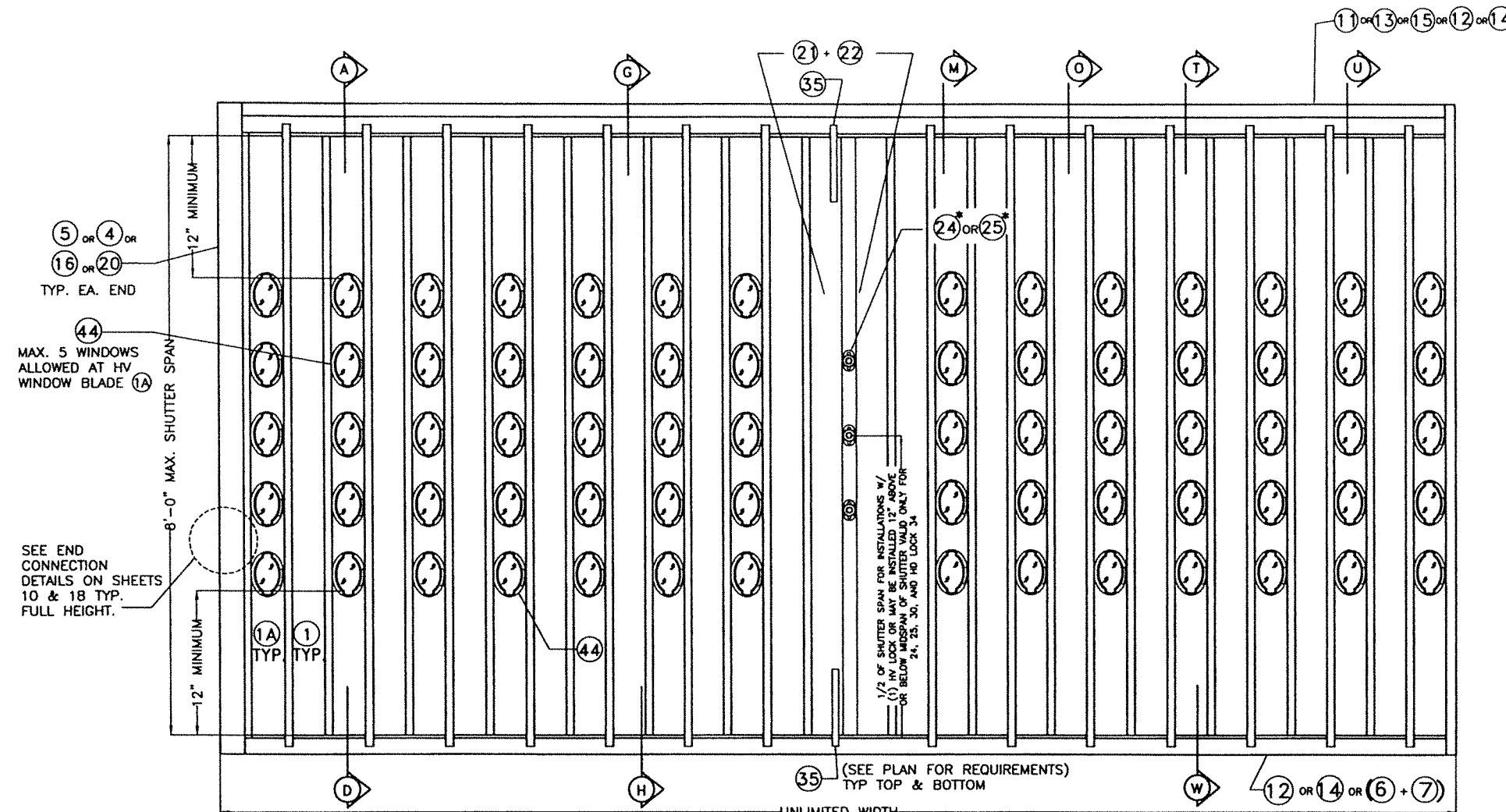
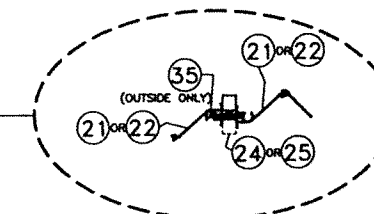
© 2020 EASTERN METAL SUPPLY, INC.			
BERTHA HV™ Accordion Shutter System H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE			
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			
			DRAWING No 23-130
			SHEET 18 OF 20

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

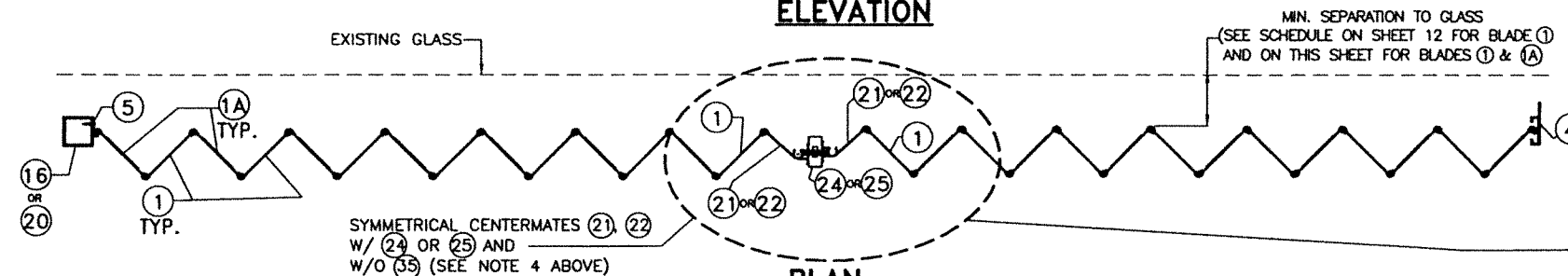
1. MAX. A.S.D. DESIGN PRESSURE RATING: +110, - 110 p.s.f.
2. MAX. SHUTTER SPAN: 96".
3. ALLOWED MOUNTINGS: A, D, G & H ON SHEETS 6, 7; AS WELL AS MOUNTINGS M, O, T, U & W ON SHEETS 16 & 17.
4. ONLY CENTERMATES ②①, ②② (BOTH W/ ②④ OR ②⑤) ARE ALLOWED WITH ②①, ②② ARRANGED IN A SYMMETRICAL OR OPPOSING LAYOUT. 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" 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" 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:

SHUTTER SPAN	MINIMUM SEPARATION TO GLASS
96" Max.	5"

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



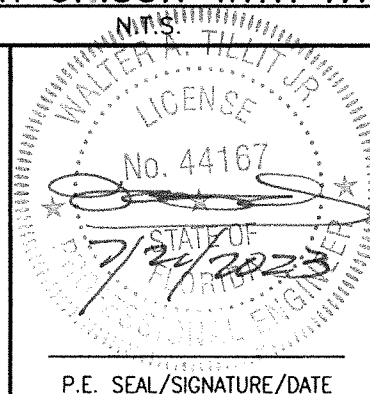
ELEVATION



PLAN

TYPICAL ① HV BLADE WORKING IN UNISON WITH HV WINDOW BLADE ①A SHUTTER*

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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A.S.S.A.

**American Shutter Systems
Association, Inc.**

4268 West Roads Drive
West Palm Beach, FL 33407
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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: Y.M.
1	OLD 20-169	7/21/23	DATE: 7/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-130

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

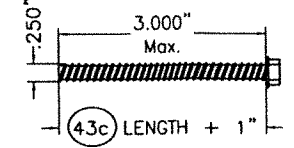
1. MAX. A.S.D. DESIGN PRESSURE RATING: +75, - 75 p.s.f.
2. MAX. SHUTTER SPAN: 84"
3. ALLOWED MOUNTING: (MS) ON THIS SHEET.
4. ONLY CENTERMATE ②① W/ ②④ HV LOCK ARE ALLOWED WITH ②① ARRANGED IN A SYMMETRICAL LAYOUT. USE OF (2) ③⑤ (6" LONG, MINIMUM) MUST ALWAYS BE INCLUDED AT EXTERIOR OR INTERIOR ACCESS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

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

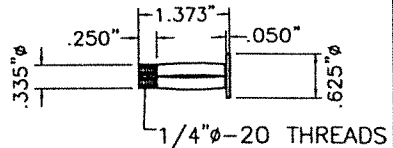
SEPARATION TO GLASS SCHEDULE

MINIMUM
SEPARATION
TO GLASS
3 1/4"

④③① 1/4"Ø NOMINAL
ALUMINUM SLEEVE
6063-T5 ALLOY



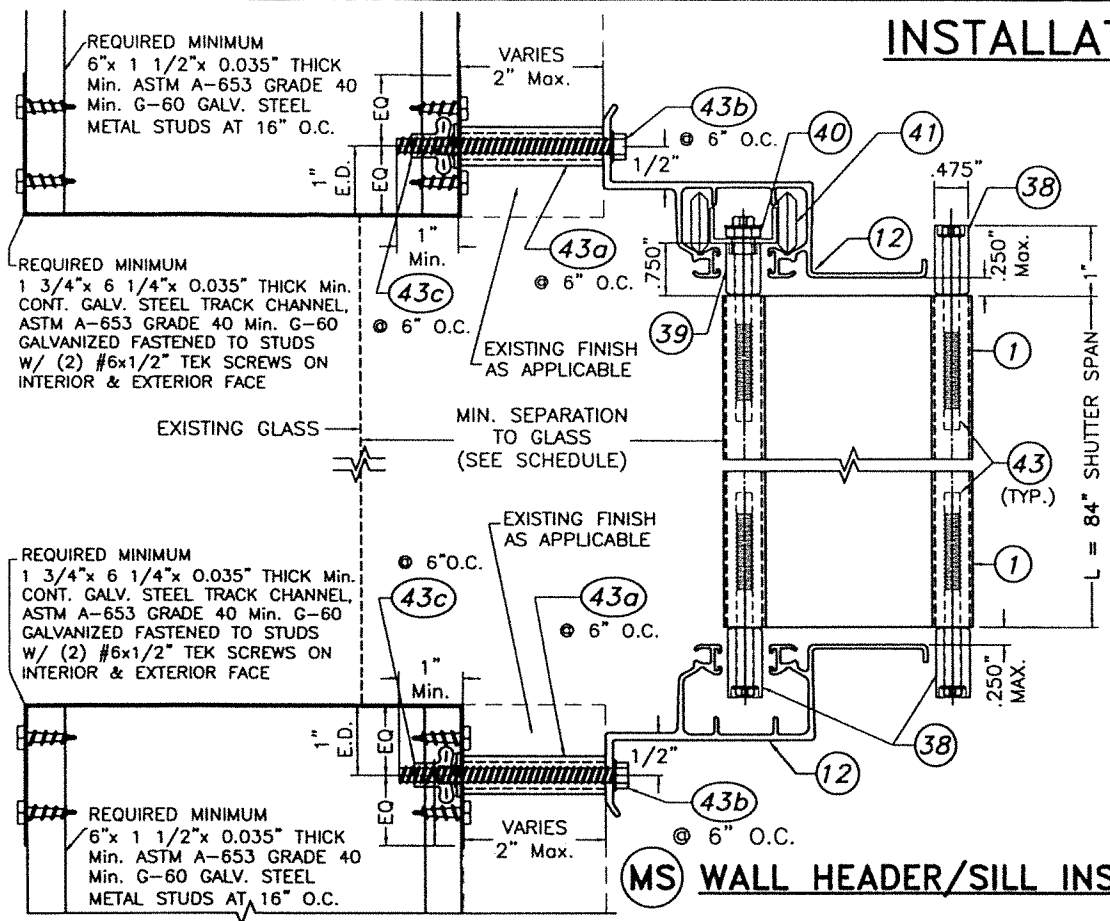
④③② 1/4"Ø-20X3" BOLT
MUST PENETRATE ④③① 1"



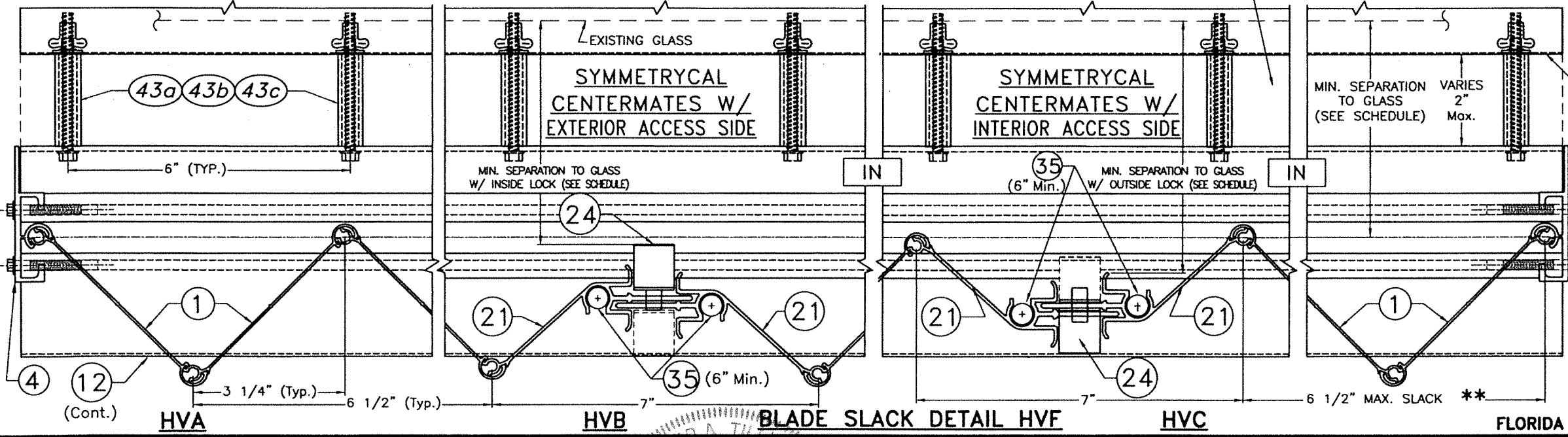
④③③ 1/4"Ø ELCO CONSTRUCTION
PRODUCTS FAB-LOK HD

COMPONENTS

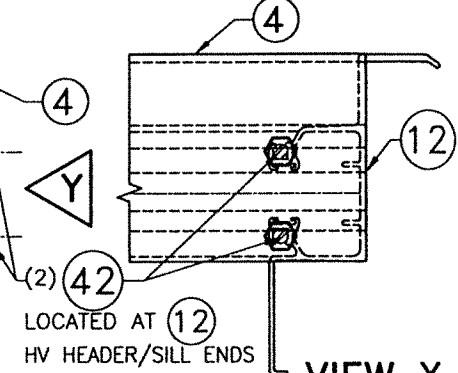
SCALE: 3/8" = 1"



(MS) WALL HEADER/SILL INSTALLATION



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

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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SHEET
20 OF 20