

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.
- 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 12 THRU 17, 25, 26, 28 & 28A.
- 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 12 THRU 17, 25, 26, 28 & 28A.
- 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 #0210.01-11 AS PER TAS 201, TAS 202 AND TAS 203 PROTOCOLS.
- HV WINDOW BLADE ①A #0505.01-08 AS TAS 201, 202 & 203 PROTOCOLS AND 0725.01-08 AS PER TAS 202 PROTOCOL.
- HV BLADE ② #0422.01-05 AS PER TAS 201, TAS 202 AND TAS 203 PROTOCOLS.
2. HV BLADE ① AND HV BLADE ② ARE ENGINEERED TO WORK IN UNISON WITH EACH OTHER IN AREAS WHERE THE DESIGN PRESSURES TRANSITION FROM END ZONE 5 TO INTERIOR ZONE 4. EACH WIND ZONE MUST BE CLEARLY IDENTIFIED IN ACCORDANCE WITH CHAPTER 30, OF ASCE 7-22 STANDARD. ALL MOUNTING CONDITIONS AND FASTENER TYPES SCHEDULES MUST BE APPLIED TO THE CORRESPONDING WIND ZONE. THIS SHALL INCLUDE REQUIREMENTS FOR MIN. SEPARATION TO GLASS. DELIMITATION OF WIND ZONES 4 AND 5 AS WELL AS VALIDITY OF COMPONENTS FOR HV BLADE 1 & 2 ACCORDION SHUTTERS SYSTEMS FOR EITHER WIND ZONE SHALL BE PREPARED AND CERTIFIED BY A FLORIDA REGISTERED ENGINEER OR ARCHITECT BASED ON BUILDING CONFIGURATION AND ASCE 7-10 STANDARD, AND SHALL BE SUBMITTED TO THE BUILDING OFFICIAL AT THE TIME PERMIT IS APPLIED FOR.
- 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 28.
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 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 & 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: 13,14,15,15A,16,17 & 28A
HV BLADE ② : 26.
HV BLADE ③ & ①A WORKING IN UNISON: 13, 14 & 16
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 AT ACCORDION 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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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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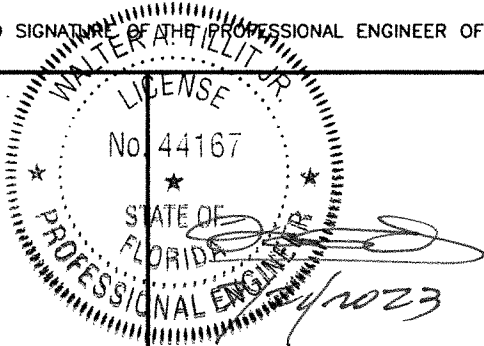
BERTHA HV™
Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

SHEET
1 OF 28



P.E. SEAL/SIGNATURE/DATE

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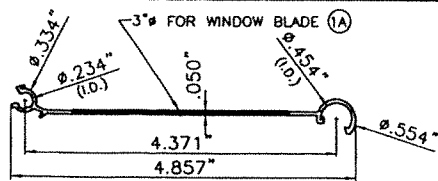


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CA-0006719
WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167

A.S.S.A.

American Shutter Systems
Association, Inc.

4268 West Roads Drive
West Palm Beach, FL 33407
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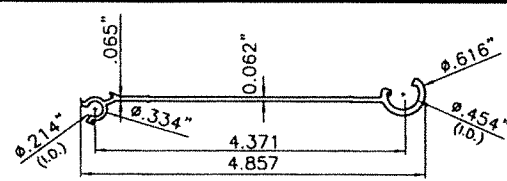


1 HV SOLID BLADE

COVERED UNDER US PATENT # 5458179

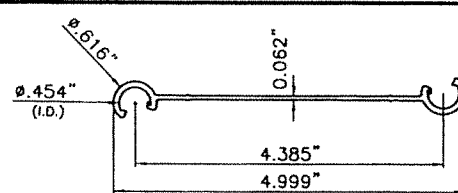
1A HV WINDOW BLADE*

*SEE LIMITATIONS OF USE OF BLADE 1A ON SHEET 28
6063-T6 ALLOY AND TEMPER



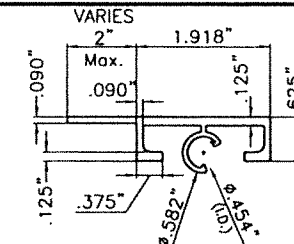
2 HV BLADE

COVERED UNDER US PATENT # 5458179
6005-T5 ALLOY AND TEMPER



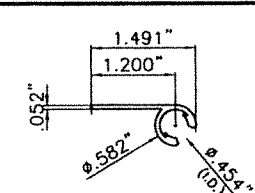
3 HV UNIVERSAL FLOATER

QUALIFIED FOR USE W/ HV BLADE 1 & 2
6005-T5 ALLOY AND TEMPER



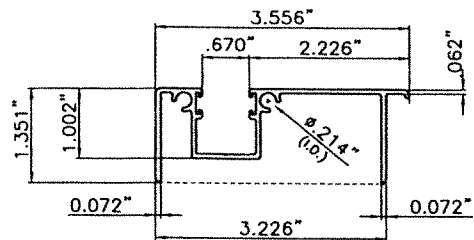
4 HV DIRECT MOUNT

QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



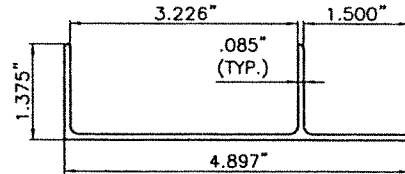
5 HV 90°/180° STARTER

QUALIFIED FOR USE W/
HV BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



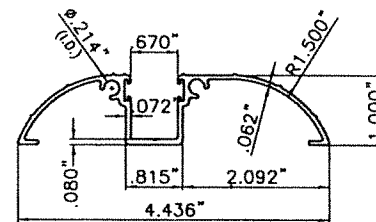
6 HV ADJ. FLOOR TRACK

QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



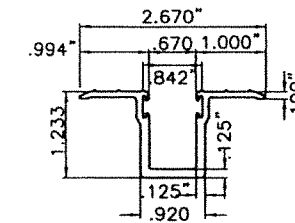
7 HV ADJ. ADAPTER W/LIP

QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



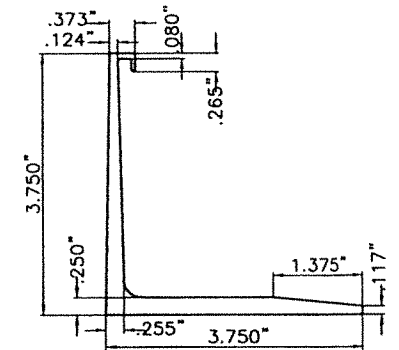
8 HV WALK-OVER TRACK

QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



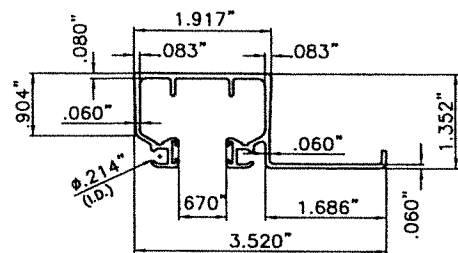
9 HV TRENCH TRACK

QUALIFIED FOR USE W/ HV
BLADE 1 & 2 ONLY.
6063-T6 ALLOY AND TEMPER



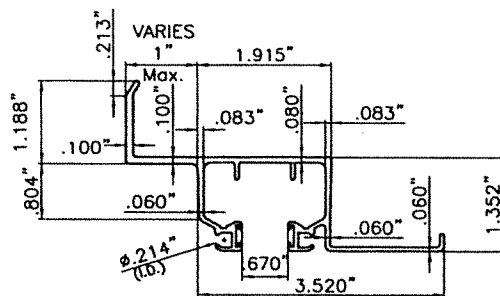
10 HV RAINGUARD

QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



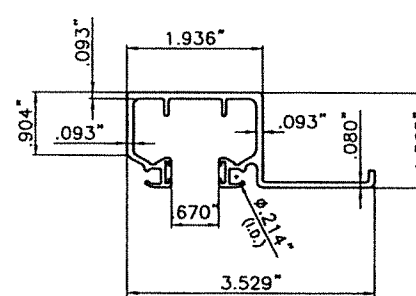
11 HV CEILING HEADER

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



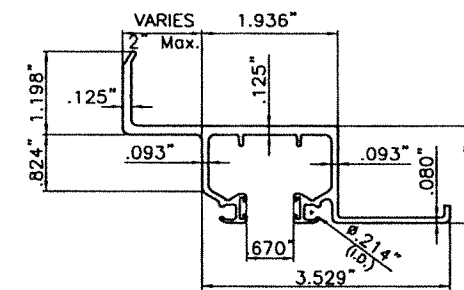
12 HV HEADER/SILL

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



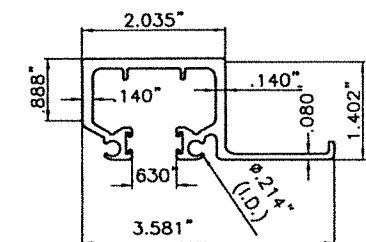
13 HD CEILING HEADER/SILL

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



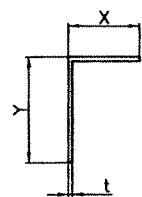
14 HD WALL HEADER/SILL

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



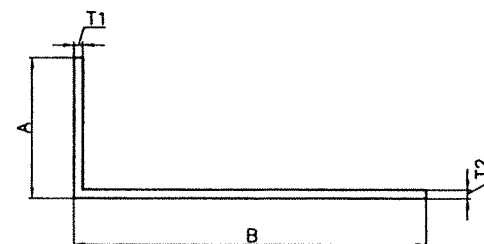
15 SHD CEILING HEADER/SILL

QUALIFIED FOR USE W/ HV BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



16 SIDE ANGLES

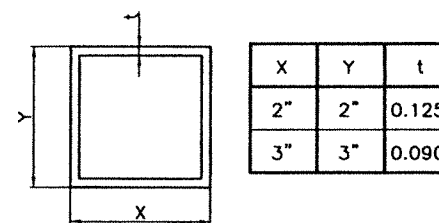
QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER



ALUMINUM ANGLES

QUALIFIED FOR USE W/ HV
BLADE (SEE SCHEDULE)
6063-T6 ALLOY AND TEMPER

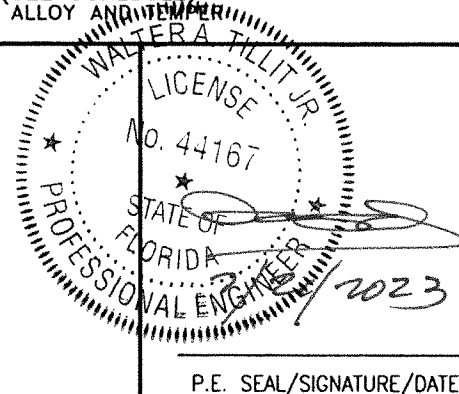
COMPONENT	A	B	T1	T2	BLADE QUALIFIED
17	2"	5" MAX.	1/8"	1/8"	HV 1
18	2"	5" MAX.	0.192"	0.192"	HV 2
19	2.5"	7" MAX.	0.190"	0.190"	HV 1



20 CORNER POSTS

QUALIFIED FOR USE W/ HV
BLADE 1 & 2
6063-T6 ALLOY AND TEMPER

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

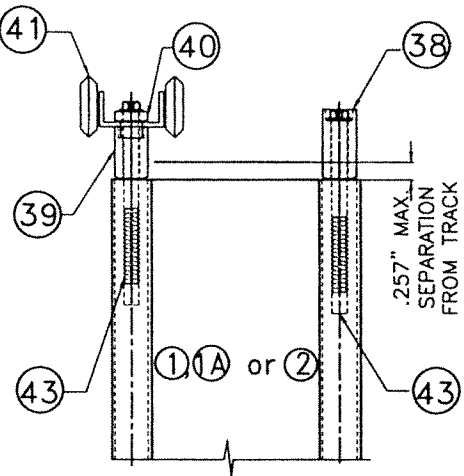
DRAWING No
23-128
SHEET
2 OF 28

SHUTTER ASSEMBLY SCHEDULE FOR
HV ①, HV ①A AND HV ② BLADES.

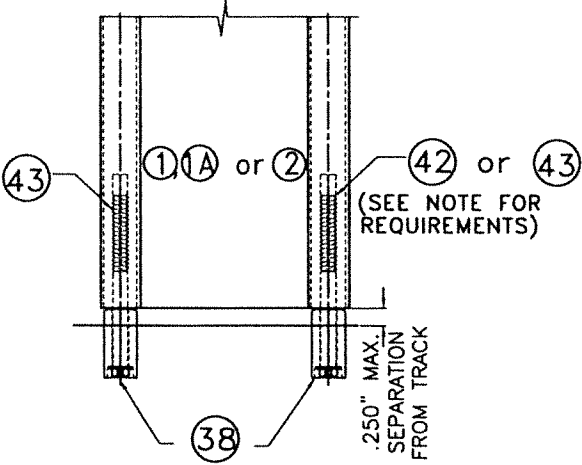
①	HV BLADE 1
①A	HV BLADE 1A
②	HV BLADE 2
③8	HV LONG RECESSED NYLON BUSHING
③9	HV SHORT RECESSED NYLON BUSHING
④0	HV NYLON HAT WASHER
④1	HV WHEEL CARRIAGE AISI 302-303 SERIES ø.870"x3/16" THICK NYLON WHEEL. 0.188"ø AISI 302 SERIES S.S. RIVETS
④2	HV 1 3/4" ACCORDION PIN W/ #8 HEAD *
④3	HV 2 3/4" ACCORDION PIN W/ #8 HEAD *
④4	POLYCARBONATE IMPACT RESISTANT HV WINDOW (SEE SHEET 27)

* HV PIN REQUIREMENTS AT EXTERIOR BLADE KNUCKLE FOR
HV ①, HV ①A & HV ② BLADES.

- (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 ②
BLADE WHEN CORRESPONDING TO INSTALLATIONS "CC" AND "DD",
SHEET 22.
- (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,
SHEETS 11 & 24.

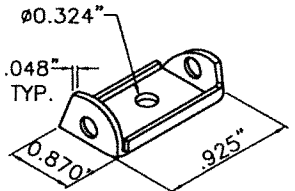


EXTERIOR



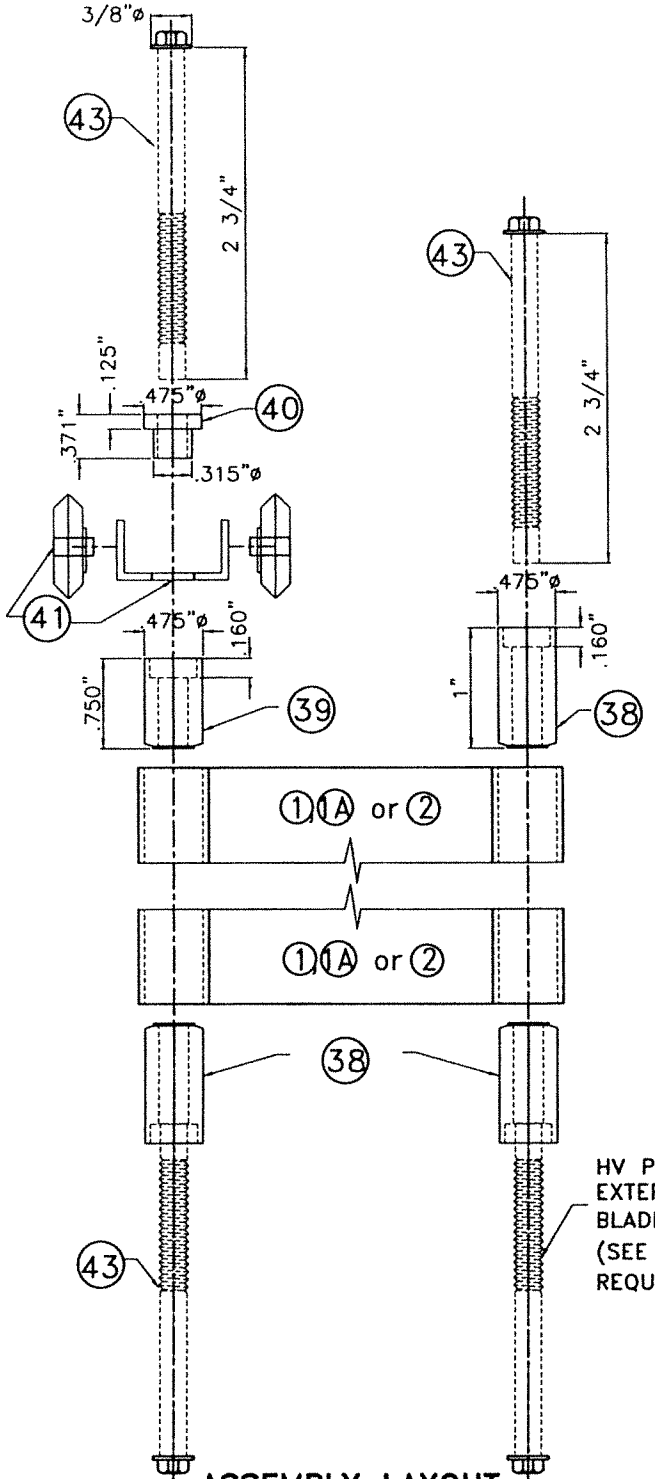
TYPICAL SHUTTER ASSEMBLY

SCALE: 3/8" = 1"



WHEEL CARRIAGE DETAIL

N.T.S.



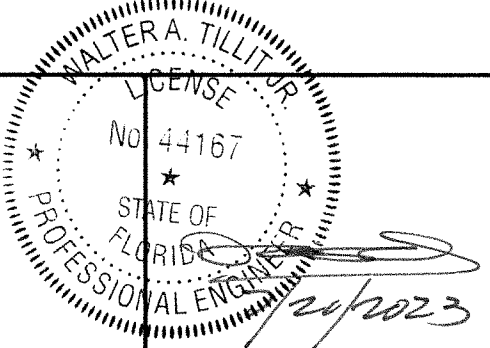
EXTERIOR

HV PIN ④2 OR ④3 AT
EXTERIOR
BLADE'S KNUCKLE.
(SEE NOTE * FOR
REQUIREMENTS)

ASSEMBLY LAYOUT

N.T.S.

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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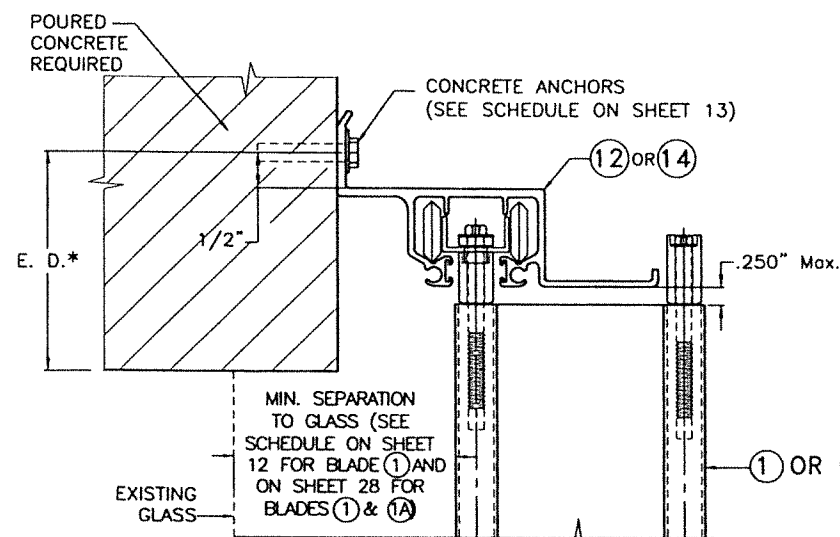
BERTHA HV™
Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

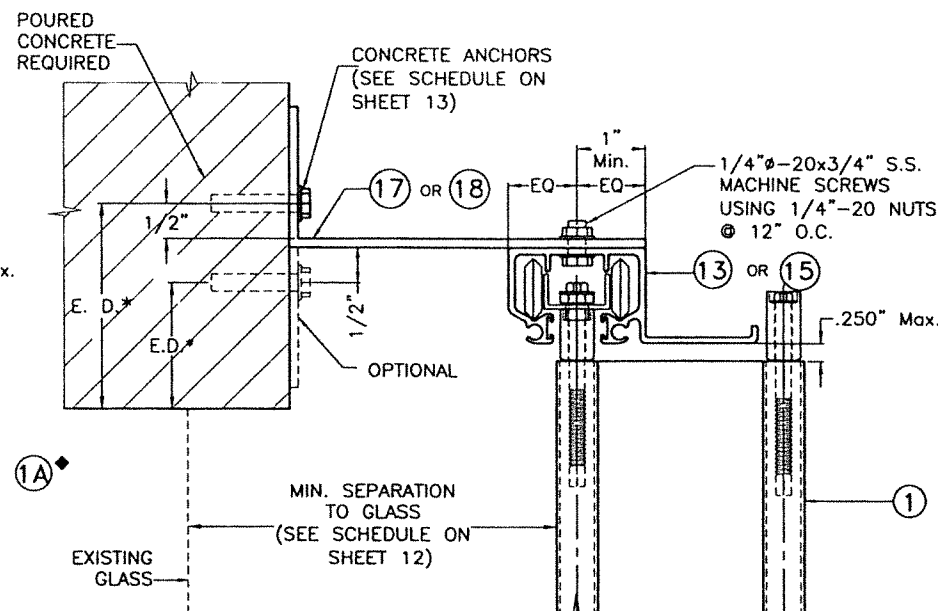
REV.No	DESCRIPTION	DATE	DRAWN BY:	Y.M.
1	OLD 20-159	07/21/23	DATE:	07/21/2023
2				
3				
4				
5				
6				

DRAWING No
23-128

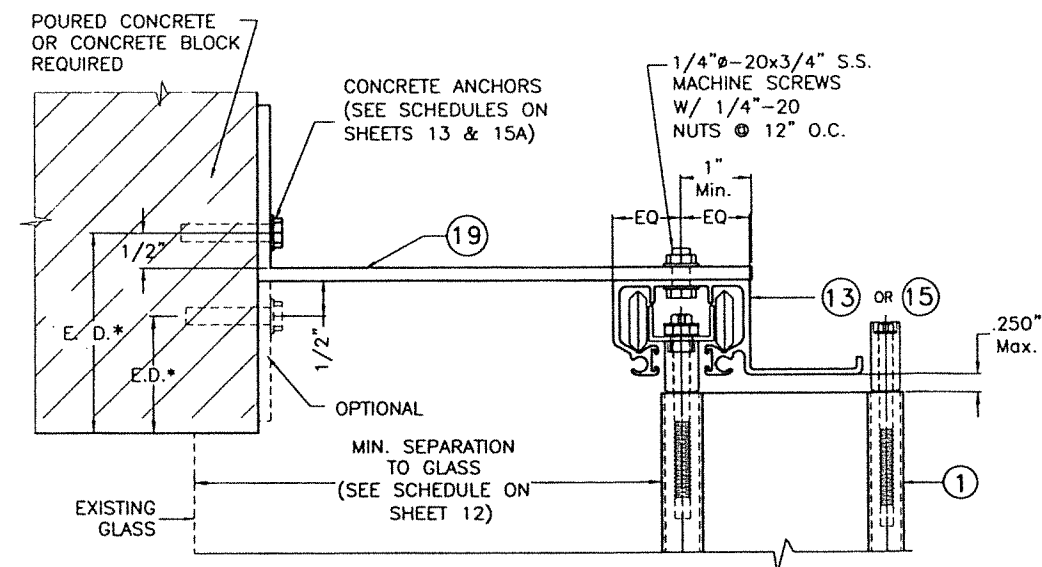
SHEET
4 OF 28



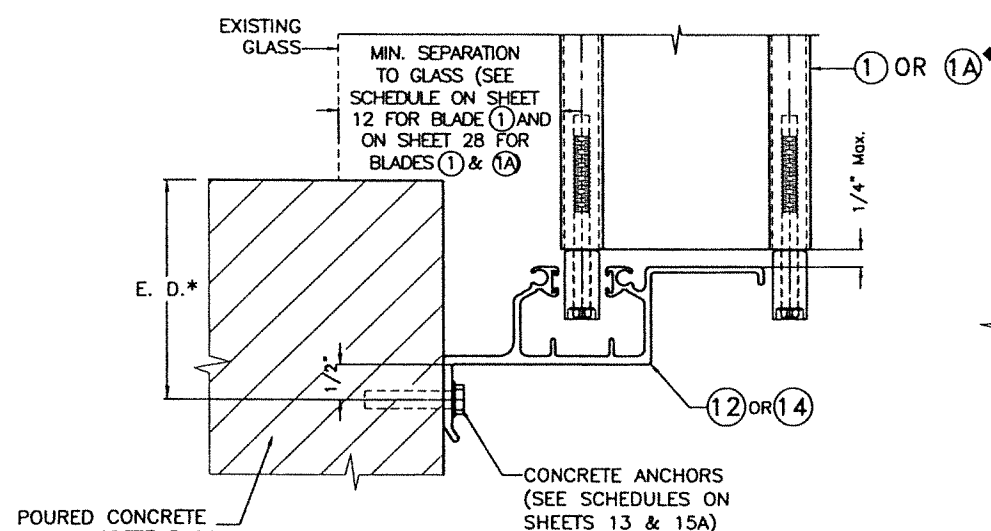
A HV WALL HEADER INSTALLATION



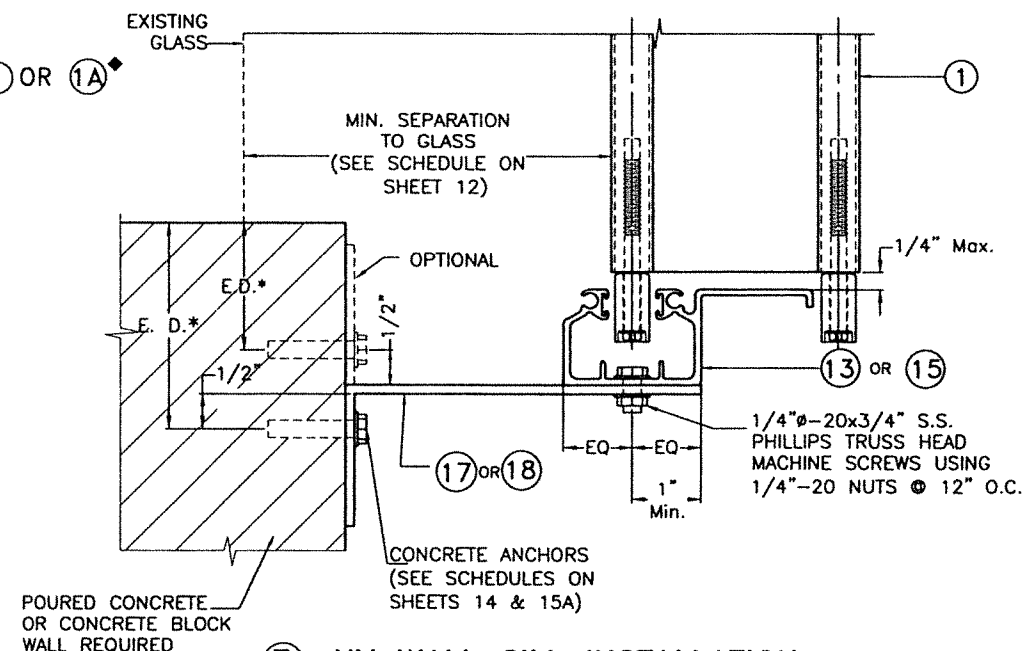
B HV WALL HEADER INSTALLATION



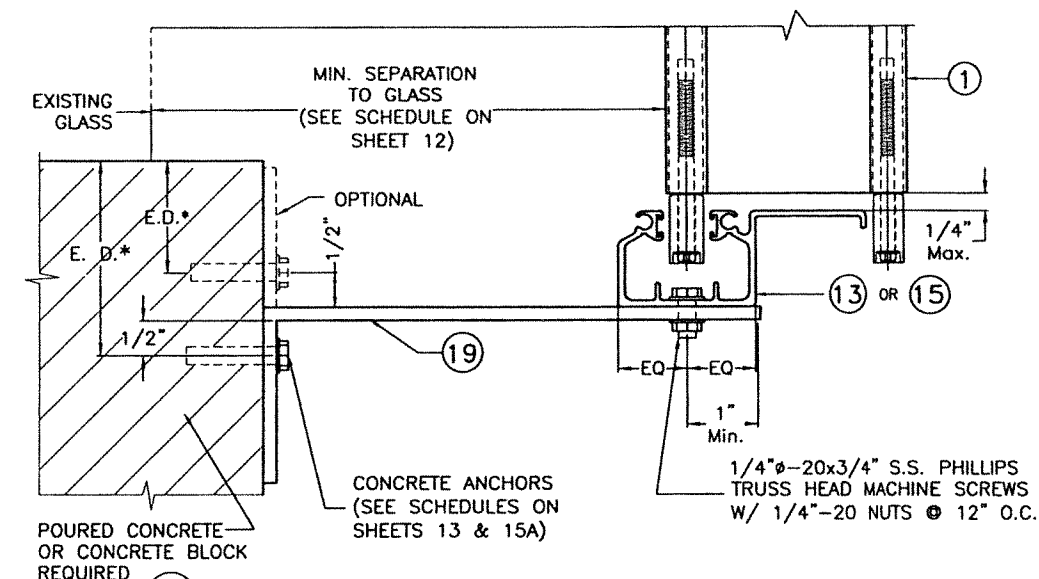
C HV WALL HEADER INSTALLATION



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.

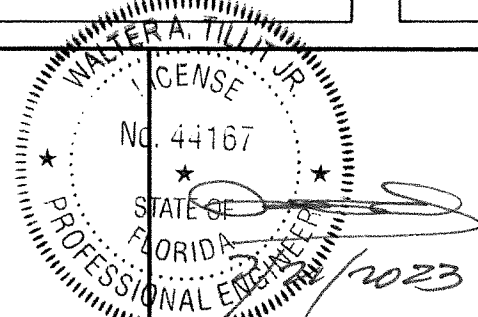
* E. D. = EDGE DISTANCE
(SEE SPECIFICATIONS ON SHEET 14)

♦ SEE LIMITATIONS OF USE FOR
BLADE 1A ON SHEET 28

INSTALLATION DETAILS W/

1 HV BLADE

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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FLORIDA Lic. # 44167

A.S.S.A.

American Shutter Systems Association, Inc.

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

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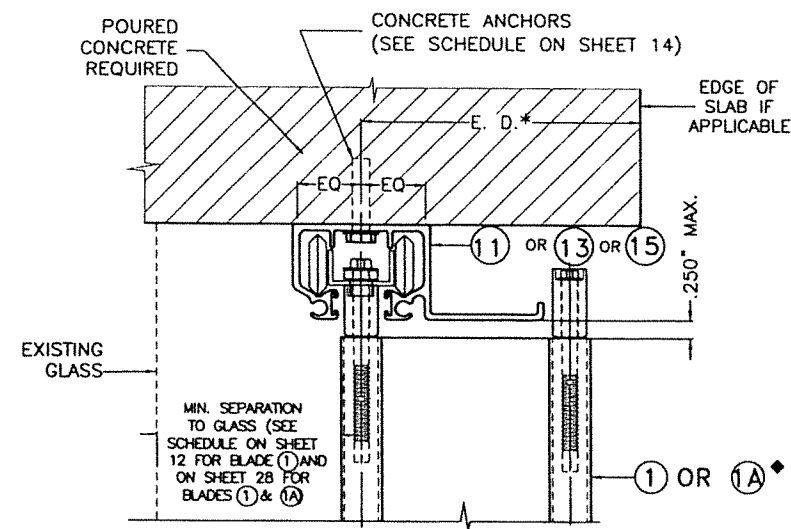
BERTHA HV™
Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

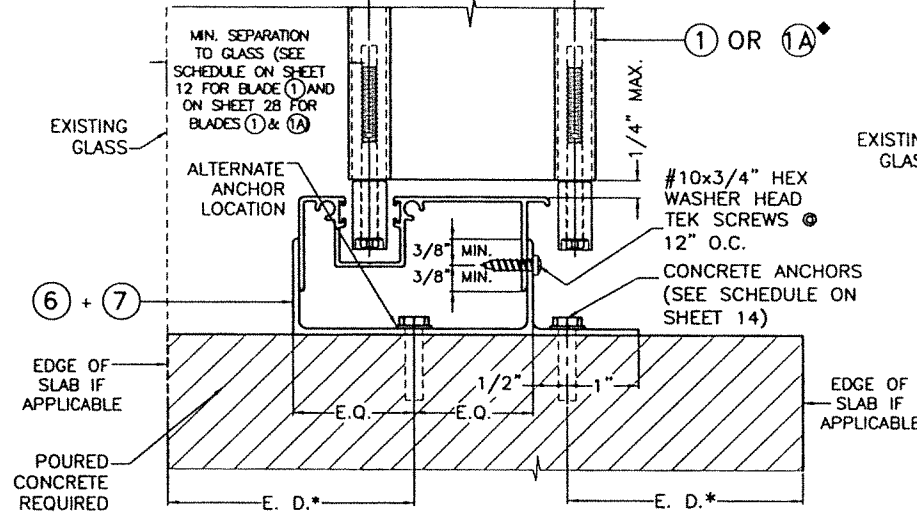
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

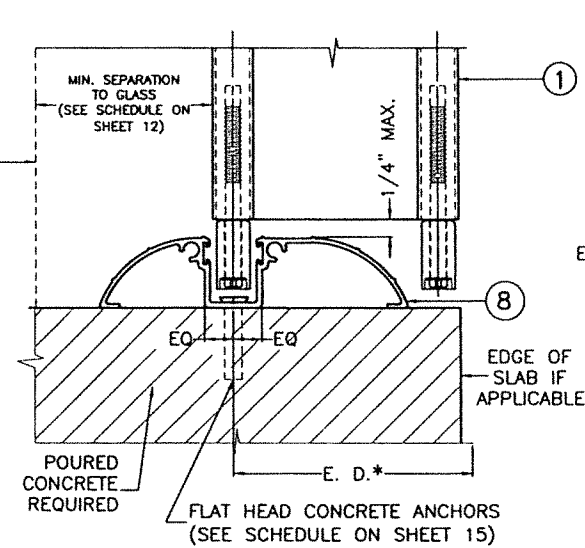
SHEET
6 OF 28



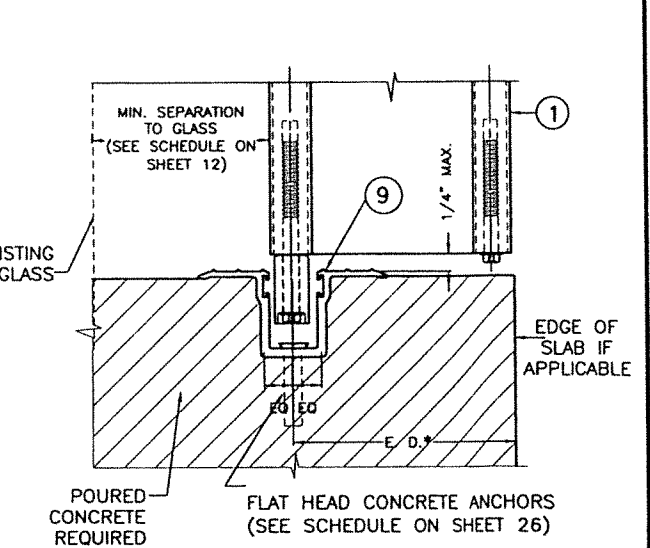
© HV CEILING INSTALLATION



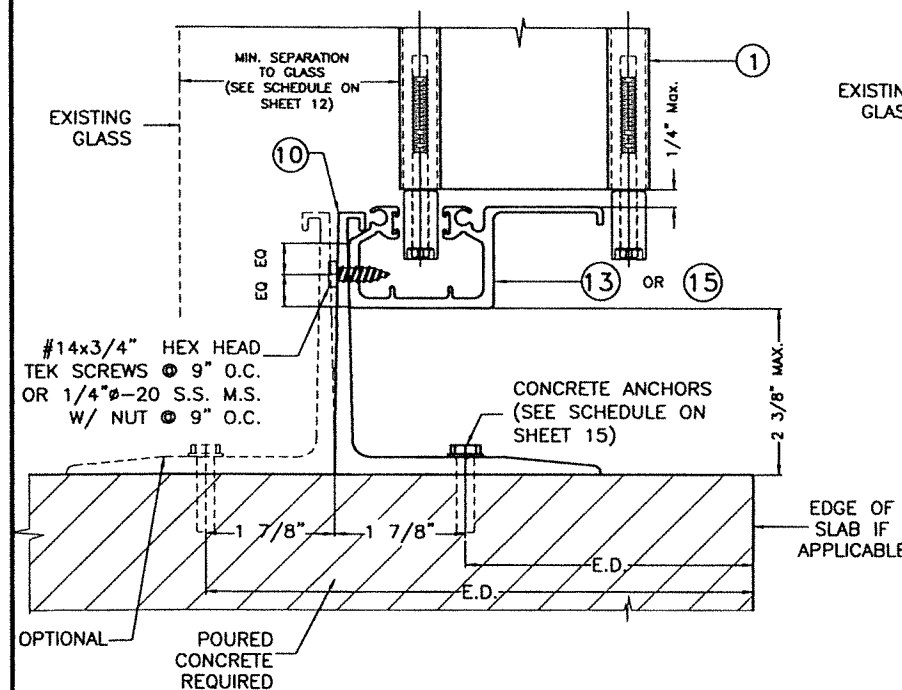
© HV FLOOR INSTALLATION †



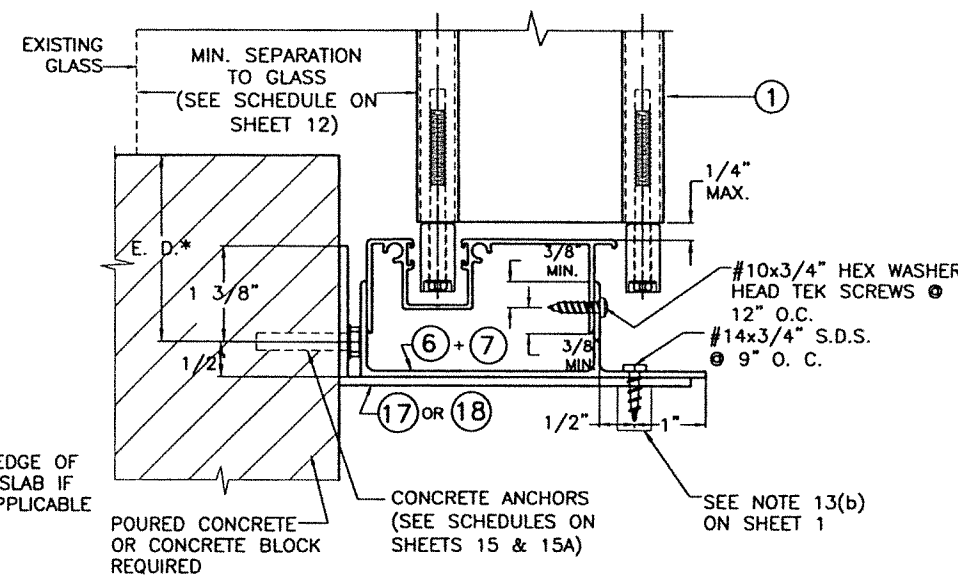
© HV WALK-OVER INSTALLATION



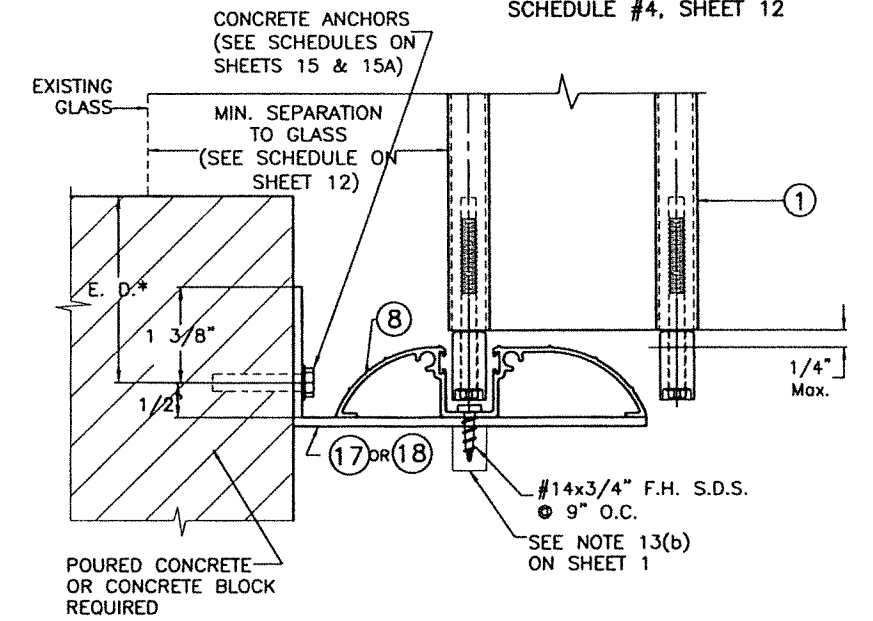
© TRENCH INSTALLATION
VALID ONLY FOR UP TO +70, -75 PSF
PRESSURE RATING & FOR SPANS PER
SCHEDULE #4, SHEET 12



© HV RAINGUARD INSTALLATION †



© HV WALL FLOOR INSTALLATION



© HV WALL WALK-OVER 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 14)

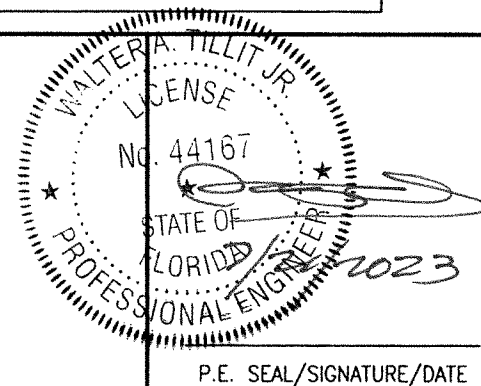
NOTE:

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

♦ SEE LIMITATIONS OF USE FOR
BLADE 1A ON SHEET 28

INSTALLATION DETAILS W/ © HV BLADE

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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BERTHA HV™
Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

SHEET
7 OF 28

OUT

IN

— EXISTING GLASS

* SEE NOTES ON LOCKING RODS (33), HV LOCKS (24) or (23)
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 11 & 20

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

#10x3/4" S.M.S. @ 12"
O.C. FULL LENGTH.

OPPOSING
CENTERMATES
W/ HV LOCK (24)* or (25)*

SYMMETRICAL
CENTERMATES
W/ HV LOCK (24)* or (25)*

MIN. SEPARATION
TO GLASS
(SEE SCHEDULE ON
SHEET 12)

HVAHVBHVC

SYMMETRICAL
CENTERMATES
W/ HV LOCK (26)*

MIN. SEPARATION
TO GLASS
(SEE SCHEDULE ON
9) SHEET 12)

-POURED CONCRETE OR
CONCRETE BLOCK WALL
REQUIRED

CONCRETE
ANCHORS @
16" O.C. Min.

6 1/2" MAX. SLACK

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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BERTHA HV™

Accordion Shutter System

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			SHEET 8 OF 28
6			

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e-mail: tilliteco@aol.com
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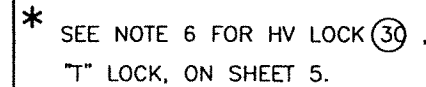
A.S.S.A.

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

A circular professional engineer seal for the State of Florida. The outer ring contains the text "WALTER A. TILLIT JR." at the top and "PROFESSIONAL ENGINEER" at the bottom, separated by two stars. The inner circle contains the word "LICENSE" at the top, the license number "No. 44167" in the center, and "STATE OF FLORIDA" at the bottom, also separated by two stars. A signature is written across the seal, and the date "12/2023" is handwritten in the bottom right corner.

P.E. SEAL/SIGNATURE/DATE

SEE END CONNECTION DETAILS ON SHEETS 11 & 20



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

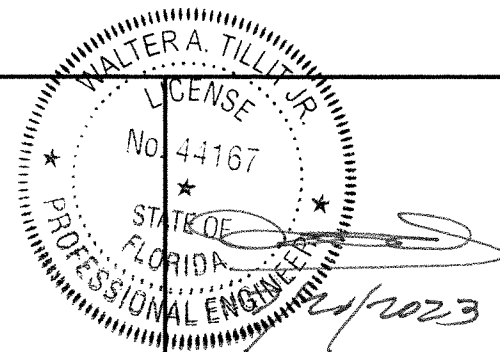
FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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BERTHA HV™

Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2			
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			SHEET 9 OF 28
6			



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BERTHA HV™

Accordion Shutter System

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			SHEET 9 OF 28
6			

SEE END WALL CONNECTION DETAILS ON SHEETS 11 & 20

OUT

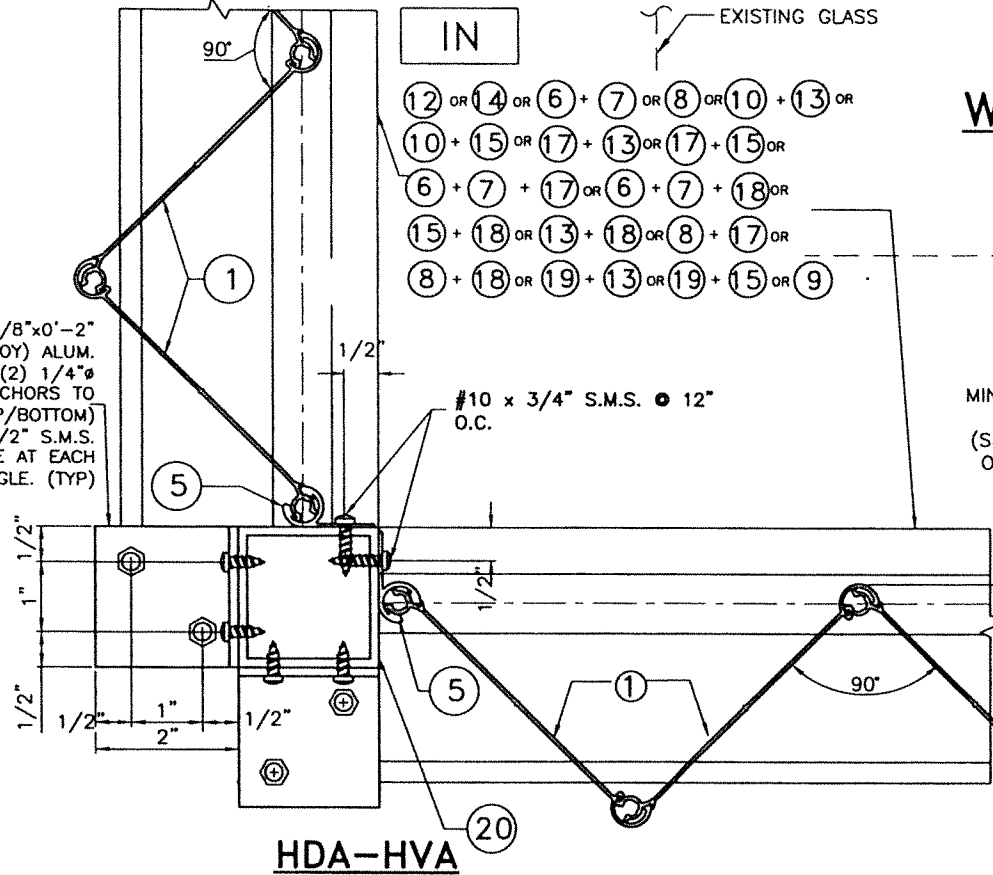
IN

EXISTING GLASS

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

SEE END WALL CONNECTION
DETAILS ON SHEETS 11 & 20

2"x2"x1/8"x0'-2"
(6063-T6 ALLOY) ALUM.
ANGLE W/ (2) 1/4"Ø
TAPCON ANCHORS TO
CONCRETE (TOP/BOTTOM)
& (4) #14x1/2" S.M.S.
TO TUBE AT EACH
ANGLE. (TYP)



HDA-HVA

MIN. SEPARATION
TO GLASS
(SEE SCHEDULE
ON SHEET 12)

(4) H.V.
PINS (TYP.)

③⑤*
(OPTIONAL)

HDB-HVB
SYMMETRICAL HD CENTERMATES
W/ ③④* LOCK (EXTERIOR)

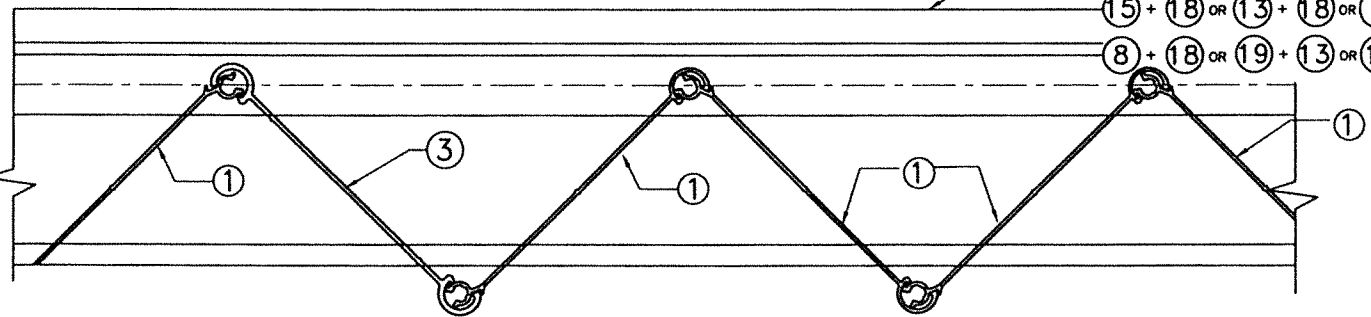
OUT

(4) H.V.
PINS (TYP.)

③⑤*
(OPTIONAL)

HDC-HVC
SYMMETRICAL HD CENTERMATES
W/ ③④* LOCK (INTERIOR)

①② OR ①④ OR ⑥ + ⑦ OR ⑧ OR ⑩ + ⑬ OR
⑩ + ⑮ OR ⑰ + ⑬ OR ⑰ + ⑮ OR
⑥ + ⑦ + ⑰ OR ⑥ + ⑦ + ⑱ OR
⑮ + ⑱ OR ⑬ + ⑱ OR ⑧ + ⑱ OR
⑧ + ⑱ OR ⑱ + ⑬ OR ⑱ + ⑮ OR ⑨



HDD-HVD**

* SEE NOTES ON LOCKING RODS ③⑤ & HD ③④ LOCKS ON SHEET 5
** UNIVERSAL FLOATING BLADE ③ DETAIL HDD-HVD IS
VALID FOR ALL CENTERMATES APPLICATIONS WITH BLADE ①

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

P.E. SEAL/SIGNATURE/DATE

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FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

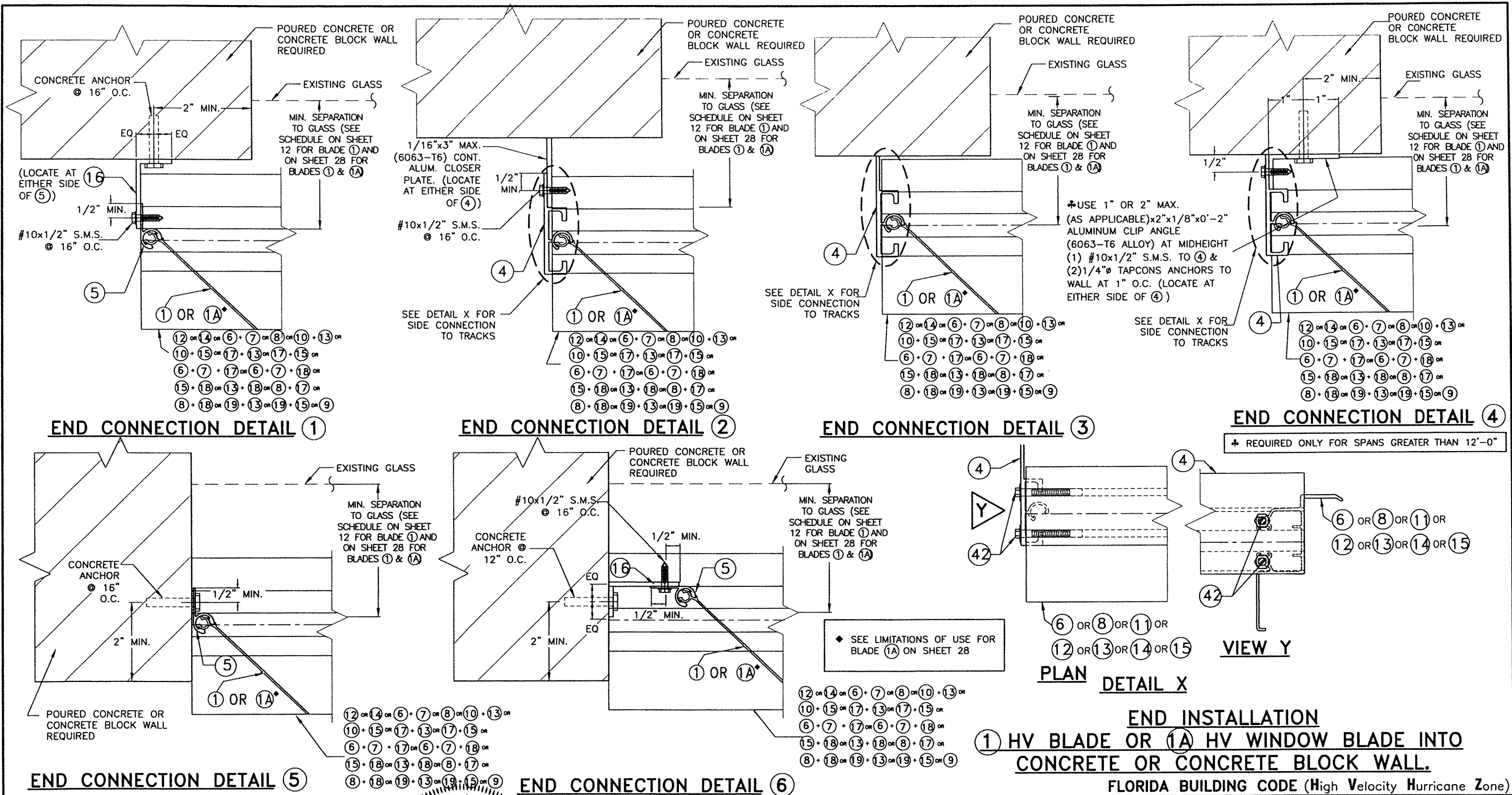
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Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128
SHEET
10 OF 28



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REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

SHEET
11 OF 28

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 NOTE †)

MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS Ø			
	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 NOTE †)

MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS Ø	
	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 NOTE †)

MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	CONCRETE & WOOD INSTALLATIONS Ø	
	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

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.

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

† 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.

♦ 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

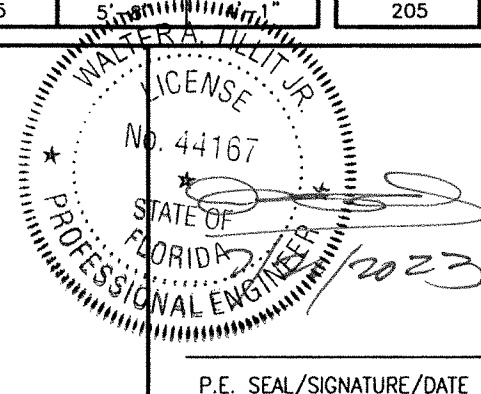
*** USE 4 1/8" FOR HV "T" LOCK 30 W/ 35
USE INDICATED VALUES FOR HV CENTERMATES.

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 & K.	T, U, W & X.

1 HV BLADE

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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Association, Inc.

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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 & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

SHEET
12 OF 28

ANCHORS SPACING LEGEND

TAPPER+

◆ SEE LIMITATIONS OF USE FOR
BLADE (1A) ON SHEET 28

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	7	7	—	14	12	10	9	8	8	7	5.5	—	8	8	8	8	8	7	5.5	4			
	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	6	—	14	12	10	9	8	8	6	—	8	8	8	8	8	8	6.5	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	6	6	14	12	10	9	8	8	6	—	14	12	10	9	8	8	6	—	8	8	8	8	8	8	7	5.5				
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	7.5	—	—	—	14	12	10	9	7.5	5.5	—	—	8	8	8	8	7.5	5.5	4	3				
	14	12	10	9	8	5.5	—	—	14	12	10	9	8	8	4.5	—	14	12	10	9	8	8	6	5	14	12	10	9	8	3	—	—	14	12	10	9	8	3	—	—	14	12	10	9	8	7	—	—	8	8	8	8	8	7	5	4				
	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	—	—	—	14	12	10	9	8	7.5	—	—	14	12	10	9	8	7.5	—	—	8	8	8	8	8	7.5	5.5	4				
6'-0"	14	12	10	9	8	5.5	3	—	14	12	10	9	8	8	4.5	—	14	12	10	9	8	8	6	6	14	12	9.5	7.5	4	—	—	—	14	12	9.5	7.5	6.5	3.5	—	—	8	8	8	7.5	6.5	4.5	3.5	—	—	8	8	8	8	7.5	5.5	4	3			
	14	12	10	9	8	3	—	—	14	12	10	9	8	8	—	—	14	12	10	9	8	8	5.5	3.5	14	12	10	9	8	4.5	—	—	—	14	12	10	9	7.5	4	—	—	8	8	8	8	7.5	5.5	4	3	—	—	8	8	8	8	8	6	4.5	—	
	14	12	10	9	8	5	—	—	14	12	10	9	8	8	4	—	14	12	10	9	8	8	6	5.5	14	12	10	9	5	—	—	—	14	12	10	9	8	4.5	—	—	8	8	8	8	8	8	8	6	4.5	—	—	8	8	8	8	8	6	4.5	—	
7'-0"	14	12	10	9	8	4	—	—	14	12	10	9	8	6.5	3	—	14	12	10	9	8	8	6	—	14	12	8	4.5	—	—	—	14	12	8	6.5	5.5	—	—	—	8	8	8	6.5	5.5	4	3	—	—	8	8	8	8	8	6	4.5	—				
	14	12	10	9	4.5	—	—	—	14	12	10	9	8	4	—	—	14	12	10	9	8	7	4	—	14	12	10	5.5	—	—	—	14	12	10	8	6.5	—	—	—	8	8	8	8	6.5	5	3.5	—	—	8	8	8	8	7	5	4	—				
	14	12	10	9	7.5	3.75	—	—	14	12	10	9	8	6	—	—	14	12	10	9	8	6	—	14	12	10	6	—	—	—	14	12	10	8	6.5	—	—	—	8	8	8	8	8	7	5	4	—	—	8	8	8	8	7	5	4	—				
8'-0"	14	12	10	9	5.5	3	—	—	14	12	10	9	8	4.5	—	—	14	12	10	9	8	8	—	14	11	7	—	—	—	—	14	11	7	5.5	3.5	—	—	—	8	8	7	5.5	4.5	3.5	—	—	8	8	8	8	7	5	4	—						
	14	12	10	9	5	—	—	—	14	12	10	9	8	—	—	—	14	12	10	9	8	5.5	—	14	12	8.5	3	—	—	—	14	12	8.5	7	4	—	—	—	8	8	8	7	5.5	4	3	—	—	8	8	8	8	7	5	4	—					
	14	12	10	9	5	—	—	—	14	12	10	9	8	4	—	—	14	12	10	9	8	8	—	14	12	9.5	—	—	—	—	14	12	9.5	7.5	4.5	—	—	—	8	8	8	7.5	6	4.5	—	—	8	8	8	8	7.5	6	4.5	—						
9'-0"	14	12	10	6.5	4.5	—	—	—	14	12	10	9	7.5	—	—	—	14	12	10	9	8	—	—	13	9.5	4	—	—	—	—	13	9.5	6.5	5	—	—	—	—	8	8	6.5	5	4	3	—	—	8	8	6.5	5	4	3	—	—						
	14	12	8.5	4	—	—	—	—	14	12	10	9	4.5	—	—	—	14	12	10	9	7.5	—	—	14	11.5	4.5	—	—	—	—	14	11.5	7.5	6	—	—	—	—	8	8	7.5	6	5	4	—	—	8	8	7.5	6	5	4	—	—						
	14	12	10	6	4	—	—	—	14	12	10	9	7	—	—	—	14	12	10	9	8	—	—	14	12	5	—	—	—	—	14	12	8	6.5	—	—	—	—	8	8	8	6.5	5.5	4	—	—	8	8	8	6.5	5.5	4	—	—						
10'-0"	14	12	9.5	5	3.5	—	—	—	14	12	10	9	5.5	—	—	—	14	12	10	9	8	—	—	11.5	8.5	—	—	—	—	11.5	8.5	5.5	—	—	—	—	—	8	8	5.5	4.5	3.5	—	—	8	8	5.5	4.5	3.5	—	—	8	8	5.5	4.5	3.5	—			
	14	12	5.5	3	—	—	—	—	14	12	10	6	3	—	—	—	14	12	10	9	6	—	—	14	10.5	3	—	—	—	14	10.5	7	3.5	—	—	—	—	8	8	7	5.5	4.5	3.5	—	—	8	8	7	5.5	4.5	3.5	—	—							
	14	12	9	4.5	3	—	—	—	14	12	10	9	5	—	—	—	14	12	10	9	8	—	—	14	11	—	—	—	—	14	11	7.5	—	—	—	—	—	8	8	7.5	6	5	—	—	8	8	7.5	6	5	—	—									
11'-0"	14	12	7	—	—	—	—	—	14	12	10	—	—	—	—	—	14	12	10	—	—	—	—	10.5	8	—	—	—	—	10.5	8	5	—	—	—	—	—	8	8	5	4	3.5	—	—	8	8	5	4	3.5	—	—									
	14	12	4	—	—	—	—	—	14	12	10	—	—	—	—	—	14	12	10	—	—	—	—	12.5	9.5	—	—	—	—	12.5	9.5	6	—	—	—	—	—	8	8	6	5	4	3	—	—	8	8	6	5	4	3	—	—							
	14	12	6.5	—	—	—	—	—	14	12	10	—	—	—	—	—	14	12	10	—	—	—	—	13.5	10	—	—	—	—	14	10	7	—	—	—	—	—	8	8	7	5.5	4.5	—	—	8	8	7	5.5	4.5	—	—									
12'-0"	14	12	5.5	—	—	—	—	—	14	12	10	—	—	—	—	—	14	12	10	—	—	—	—	9.5	7	—	—	—	—	9.5	7	3.5	—	—	—	—	—	8	7	4.5	3.5	3	—	—	8	7	4.5	3.5	3	—	—									
	14	12	3	—	—	—	—	—	14	12	8	—	—	—	—	—	14	12	10	—	—	—	—	11.5	8.5	—	—	—	—	11.5	8.5	4	—	—	—	—	—	8	8	5.5	4.5	4	—	—	8	8	5.5	4.5	4	—	—									
	14	12	5	—	—	—	—	—	14	12	10	—	—	—	—	—	14	12	10	—	—	—	—	12.5	9.5	—	—	—	—	13.5	9.5	4.5	—	—	—	—	—	8	8	6	5	4	—	—	8	8	6	5	4	—	—									
13'-0"	14	12	—	—	—	—	—	—	14	12	—	—	—	—	—	—	14	12	—	—	—	—	—	9	4.5	—	—	—	—	9	6.5	—	—	—	—	—	—	8	6.5	4.5	3.5	3	—	—	8	6.5	4	3.5	3	—	—									
	14	10	—	—	—	—	—	—	14	12	—	—	—	—	—	—	14	12	—	—	—	—	—	10.5	5.5	—	—	—	—	10.5	8	—	—	—	—	—	—	8	8	5	4	3.5	—	—	8	8	5	4	3.5	—	—									
	14	12	—	—	—	—	—	—	14	12	—	—	—	—	—	—	14	12	—	—	—	—	—	11.5	6	—	—	—	—	11.5	8.5	—	—	—																										

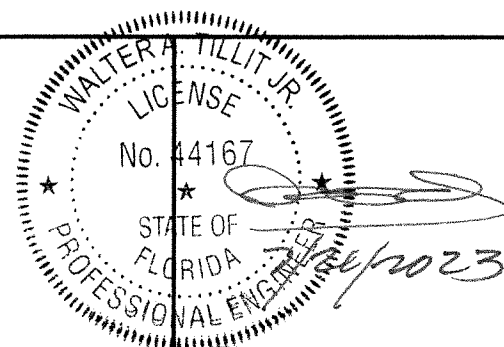
FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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BERTHA HV™

Accordion Shutter System

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			
6			SHEET 13 OF 28



P.E. SEAL/SIGNATURE/DATE

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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	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	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	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	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	-	-	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	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 28

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" TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDDEX. (Min. f'c = 3 ksi)
 - 1/4" x 3/4" ALL POINTS SOLID-SET ANCHORS, AS DISTRIBUTED BY ALL POINTS SCREW, BOLT & SPECIALTY COMPANY. (Min. f'c = 3 ksi)
 - 1/4" BLUE TAP CONCRETE ANCHORS W/ CAP AS MANUFACTURED BY FLORIDA FASTENERS DIRECT, INC. (Min. f'c = 2 ksi)
 - 1/4" TAPPER+ ANCHORS AS MANUFACTURED BY POWERS FASTENERS, 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" 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"-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" TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDDEX.
 - 1/4" x 3/4" ALL POINTS SOLID-SET ANCHORS, AS DISTRIBUTED BY ALL POINTS SCREW, BOLT & SPECIALTY COMPANY.
 - 1/4" BLUE TAP CONCRETE ANCHORS W/ CAP AS MANUFACTURED BY FLORIDA FASTENERS DIRECT, INC.
 - 1/4" TAPPER+ ANCHORS AS MANUFACTURED BY POWERS FASTENERS, 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" 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" -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 28A.
- (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)

WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
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 & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY:	Y.M.
1	OLD 20-159	07/21/23	DATE:	07/21/2023
2				
3				
4				
5				
6				

DRAWING No
23-128
SHEET
14 OF 28

MAXIMUM ANCHOR* SPACING (in.) SCHEDULE FOR A GIVEN MAX. SHUTTER SPAN.
DESIGN NEGATIVE LOAD AND A CORRESPONDING MOUNTING TYPE FOR CONCRETE BLOCK INSTALLATIONS
(SEE MOUNTINGS A, B, C, D AND F ON SHEET 6)

ANCHORS SPACING LEGEND

TAPCON WITH ADVANCED THREADFORM TECHNOLOGY
BLUE TAP
TAPPER+

* SEE ANCHOR
SPECIFICATIONS
ON SHEET 14

◆ SEE LIMITATIONS OF USE FOR
BLADE (1A) ON SHEET 28

MAXIMUM SPAN (ft)	CONCRETE BLOCK																							
	(D) WALL SILL MOUNTING W/ (12)								(D) WALL SILL MOUNTING W/ (14)								(E) WALL SILL 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	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	7.5	-	-	14	12	10	9	8	7.5	4	4	14	12	10	9	8	7.5	5.5	4.5
	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	3.5
	14	12	10	9	8	8	6	-	14	12	10	9	8	8	6	6	14	12	10	9	8	8	6	7
4'-0"	14	12	10	9	7.5	5.5	-	-	14	12	10	9	7.5	5.5	4	-	14	12	10	9	7.5	5.5	4	-
	14	12	10	9	8	7.5	-	-	14	12	10	9	8	7.5	5	-	14	12	10	9	8	7.5	5.5	4.5
	14	12	10	9	8	8	-	-	14	12	10	9	8	8	6	4.5	8	8	8	8	8	8	7	5.5
5'-0"	14	12	9	7.5	6	-	-	-	14	12	9	7.5	6	4.5	-	-	14	12	9	7.5	6	4.5	-	-
	14	12	10	9	8	-	-	-	14	12	10	9	8	6	-	-	14	12	10	9	8	6	-	-
	14	12	10	9	8	-	-	-	14	12	10	9	8	7.5	-	-	14	12	10	9	8	7.5	-	-
6'-0"	14	11.5	7.5	6	-	-	-	-	14	11.5	7.5	6	5	-	-	-	14	11.5	7.5	6	5	-	-	-
	14	12	10	8	4	-	-	-	14	12	10	8	7	4	-	-	14	12	10	8	7	4	-	-
	14	12	10	9	5	-	-	-	14	12	10	9	8	4.5	-	-	14	12	10	9	8	4.5	-	-
7'-0"	13.5	10	6.5	-	-	-	-	-	13.5	10	6.5	5	4.5	-	-	-	13.5	10	6.5	5	4.5	-	-	-
	14	12	9	5	-	-	-	-	14	12	9	7	6	3.5	-	-	14	12	9	7	6	4.5	-	-
	14	12	10	6	-	-	-	-	14	12	10	8.5	7	4	-	-	14	12	10	8.5	7	4	-	-
8'-0"	11.5	8.5	5	-	-	-	-	-	11.5	8.5	5.5	4.5	-	-	-	-	11.5	8.5	5.5	4.5	-	-	-	-
	14	11.5	7.5	-	-	-	-	-	14	11.5	7.5	6	4	-	-	-	14	11.5	7.5	6	5	3.5	-	-
	14	12	9.5	-	-	-	-	-	14	12	9.5	7.5	4.5	-	-	-	14	12	9.5	7.5	6	4.5	-	-
9'-0"	10.5	7.5	-	-	-	-	-	-	10.5	7.5	5	4	-	-	-	-	10.5	7.5	5	4	-	-	-	-
	14	10.5	4	-	-	-	-	-	14	10.5	7	5.5	-	-	-	-	14	10.5	7	5.5	4.5	3.5	-	-
	14	12	5	-	-	-	-	-	14	12	8	6.5	4.5	-	-	-	14	12	8	6.5	5.5	4	-	-
10'-0"	9	7	-	-	-	-	-	-	9	7	4.5	-	-	-	-	-	9	7	4.5	-	-	-	-	-
	12.5	9	-	-	-	-	-	-	12.5	9	6	-	-	-	-	-	12.5	9	6	4.5	-	-	-	-
	14	11	-	-	-	-	-	-	14	11	7.5	-	-	-	-	-	14	11	7.5	5.5	-	-	-	-
11'-0"	8.5	6	-	-	-	-	-	-	8.5	6	4	-	-	-	-	-	8.5	6	4	-	-	-	-	-
	11	8.5	-	-	-	-	-	-	11.5	8.5	5.5	-	-	-	-	-	11	8.5	5.5	3.5	-	-	-	-
	13.5	10	-	-	-	-	-	-	14	10	7	-	-	-	-	-	14	10	7	-	-	-	-	-
12'-0"	7.5	5.5	-	-	-	-	-	-	7.5	5.5	-	-	-	-	-	-	7.5	5.5	-	-	-	-	-	-
	10.5	7.5	-	-	-	-	-	-	10.5	7.5	4	-	-	-	-	-	10.5	7.5	5	4	3.5	-	-	-
	12.5	9.5	-	-	-	-	-	-	13.5	9.5	4.5	-	-	-	-	-	12.5	9.5	-	-	-	-	-	-
13'-0"	7	-	-	-	-	-	-	-	7	5	-	-	-	-	-	-	7	5	-	-	-	-	-	-
	9.5	5	-	-	-	-	-	-	9.5	7	-	-	-	-	-	-	10.5	8	-	-	-	-	-	-
	11.5	6	-	-	-	-	-	-	11.5	8.5	-	-	-	-	-	-	12.5	8.5	-	-	-	-	-	-
14'-0"	8.5	-	-	-	-	-	-	-	8.5	5	-	-	-	-	-	-	7	5.5	-	-	-	-	-	-
	9	3.5	-	-	-	-	-	-	9	6.5	-	-	-	-	-	-	9.5	7	-	-	-	-	-	-
	10.5	4	-	-	-	-	-	-	10.5	8	-	-	-	-	-	-	11.5	8	-	-	-	-	-	-
15'-0"	6	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-
16'-0"	5.5	-	-	-	-	-	-	-	5.5	4	-	-	-	-	-	-	5.5	-	-	-	-	-	-	-
	7.5	-	-	-	-	-	-	-	7.5	-	-	-	-	-	-	-	7.5	-	-	-	-	-	-	-
	9.5	-	-	-	-	-	-	-	9.5	-	-	-	-	-	-	-	8	7	4.5	-	-	-	-	-

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

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF FLORIDA
PROFESSIONAL ENGINEER
4/2023
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 & H.V. BLADE #2			
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128
SHEET
15A OF 28

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			
	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
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
	14	12	10	9	8	8	6	6	12	12	12	12	12	12	9.5	7	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	12	10.5	8	6	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	12	12	10	7.5	6	7	7	7
4'-0"	14	12	10	9	8	8	6	6	12	12	12	12	11.5	8.5	6.5	5	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	12	9.5	7	5.5	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	12	10	7.5	5.5	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	12	11	9	7	5	7	7	7
5'-0"	14	12	10	9	8	8	6	6	12	12	12	12	10	7.5	5.5	4	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	10	7.5	5.5	4	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	10	7.5	5.5	4	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	12	10	7.5	5.5	4	7	7	7	7
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
	14	12	10	9	8	8	6	6	12	12	12	10	8	6	4.5	3.5	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	8	6	5	4	3	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	8	6.5	5	3.75	—	7	7	7	7
7'-0"	14	12	10	9	8	8	6	6	12	12	10	8	6.5	5	3.5	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	12	8.5	7	5	4	3	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	10	8	6.5	5	3.5	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	10	8	6.5	5	3.5	—	7	7	7	7
8'-0"	14	12	10	9	8	8	6	6	12	12	8.5	7	5.5	4	3	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	10.5	7.5	6	4.5	3.5	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	9	6	4.5	4	3	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	11	7.5	6	5	3.75	—	—	7	7	7	7
9'-0"	14	12	10	9	8	8	6	6	12	11.5	7.5	6	5	3.5	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	12	9.5	6.5	5.5	4	3	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	10	6.5	5	4.5	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	10	6.5	5	4.5	—	—	—	7	7	7	7
10'-0"	14	12	10	9	8	8	6	6	12	10.5	7	5.5	4.5	3.5	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	11	8.5	6	5	3.5	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	9.5	7	4.5	3.5	3	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	9	6	5	4	—	—	—	7	7	7	7
11'-0"	14	12	10	9	8	8	6	6	12	9.5	6	5	4	3	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	10	7	5.5	4.5	3.5	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	8.5	6.5	4	3.5	3	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	11	8	5.5	4	—	—	—	—	7	7	7	7
12'-0"	14	12	10	9	8	8	6	6	11.5	8.5	5.5	4.5	3.5	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	12	9.5	6.5	5	4	3	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	8	6	4	3	—	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	10	7.5	5	4	—	—	—	—	7	7	7	7
13'-0"	14	12	10	9	8	8	6	6	10.5	8	5	4	3.5	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	11.5	8.5	6	4.5	3.5	3	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	7	5.5	3.5	3	—	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	9	7	4.5	3.75	—	—	—	—	7	7	7	7
14'-0"	14	12	10	9	8	8	6	6	10	7.5	5	4	3	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	10.5	8	5.5	4	3.5	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	6.5	5	3	—	—	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	8.5	6.5	4	—	—	—	—	—	7	7	7	7
15'-0"	14	12	10	9	8	8	6	6	9	7	4.5	3.5	3	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	10	7.5	5	4	3	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	8	4.5	3	—	—	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	8	6	4	—	—	—	—	—	7	7	7	7
16'-0"	14	12	10	9	8	8	6	6	8.5	6.5	4	3.5	—	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	9.5	7	4.5	3.5	3	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	6	4.5	3	—	—	—	—	—	7	7	7	7
	14	12	10	9	8	8	6	6	7.5	5.5	3.75	—	—	—	—	—	7	7	7	7

ANCHORS SPACING LEGEND

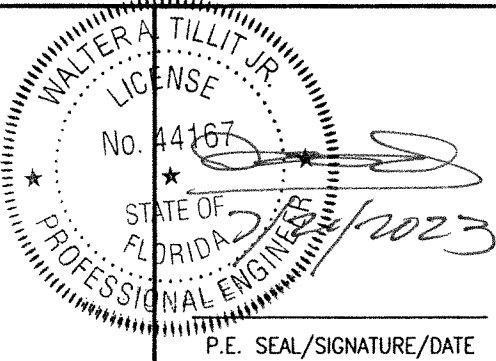
TAPCON WITH ADVANCED THREADFORM TECHNOLOGY
ALL POINTS SOLID-SET
BLUE TAP
TAPPER+

* SEE ANCHOR
SPECIFICATIONS
ON SHEET 14

◇ VALID ONLY FOR UP TO +70, -75
PSF A.S.D. DESIGN PRESSURE
RATING & FOR SPANS PER
SCHEDULE #4, SHEET 12

① HV BLADE ONLY

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BERTHA HV™
Accordion Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY:	Y.M.
1	OLD 20-159	07/21/23	DATE:	07/21/2023
2				
3				
4				
5				
6				

DRAWING No
23-128
SHEET
15 OF 28

MAXIMUM ANCHOR⁺ SPACING (in.) SCHEDULE FOR A GIVEN MAX. SHUTTER SPAN,
NEGATIVE A.S.D. DESIGN PRESSURE RATING AND A CORRESPONDING MOUNTING TYPE
(SEE MOUNTINGS ON SHEETS 18 & 19)

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							
	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							
	A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (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		
3'-0" OR LESS	12	10	10	9	8	8	6	6	6	6	6	5	12	10	10	9	8	8	6	6	6	6	5	4	12	10	10	9	8	8	6	6	6	4.5	4	3	6	5	4	4	4	3		
4'-0"	12	10	10	9	8	8	6	6	6	5	4.5	4	12	10	10	9	8	8	6	6	5.5	4.5	3.5	3	12	10	10	9	8	8	6	6	4.5	3.5	3	2.5	6	5	4	4	4	3		
5'-0"	12	10	10	9	8	8	6	6	5	4	3.5	3	12	10	10	9	8	8	6	6	4.5	3.5	3	2.5	12	10	10	9	8	7	6	5.5	3.5	3	2	2	6	5	4	4	4	3		
6'-0"	12	10	10	9	8	6.5	6	6	4.5	3.5	3	2.5	12	10	10	9	8	4.5	6	5.5	3.5	3	2.5	2	12	10	10	9	6	3	6	4.5	3	2	2	-	6	5	4	4	3.5	-		
7'-0"	12	10	10	9	6.5	4	6	5.5	4	3	2.5	2	12	10	10	9	4.5	3	6	5	3	2.5	2	-	12	10	10	7	3	-	5	4	2.5	2	-	-	6	5	4	4	-	-		
8'-0"	12	10	10	7.5	4.5	3	6	5	3	2.5	2	2	12	10	10	5.5	3	-	5.5	4	2.5	2	2	-	12	10	10	4	-	-	4.5	3	2	-	-	-	6	5	4	-	-	-		
9'-0"	12	10	10	5	3.5	-	6	4.5	3	2	2	-	12	10	8.5	4	-	-	5	3.5	2.5	2	-	-	12	10	4	2.5	-	-	4	3	2	-	-	-	6	5	3.5	-	-	-		
10'-0"	12	10	7.5	4	-	-	5	4	2.5	2	-	-	12	10	5.5	3	-	-	4.5	3	2	-	-	-	12	10	3	-	-	-	3.5	2.5	-	-	-	-	6	5	-	-	-	-		
11'-0"	12	10	5.5	-	-	-	5	3.5	2	-	-	-	12	10	4	-	-	-	4	3	2	-	-	-	12	10	-	-	-	-	3	2.5	-	-	-	-	6	5	-	-	-	-		
12'-0"	12	10	4.5	-	-	-	4.5	3	2	-	-	-	12	10	3	-	-	-	3.5	2.5	-	-	-	-	12	10	-	-	-	-	3	2	-	-	-	-	6	5	-	-	-	-		
13'-0"	12	10	-	-	-	-	4	3	-	-	-	-	12	10	-	-	-	-	3.5	2.5	-	-	-	-	12	7	-	-	-	-	2.5	2	-	-	-	-	6	4	-	-	-	-		
14'-0"	12	10	-	-	-	-	4	3	-	-	-	-	12	7	-	-	-	-	3	2	-	-	-	-	12	5	-	-	-	-	2.5	2	-	-	-	-	6	3	-	-	-	-		
15'-0"	12	-	-	-	-	-	3.5	-	-	-	-	-	12	-	-	-	-	-	3	-	-	-	-	-	11.5	-	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-		
16'-0"	12	-	-	-	-	-	3	-	-	-	-	-	12	-	-	-	-	-	2.5	-	-	-	-	-	11	-	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-		

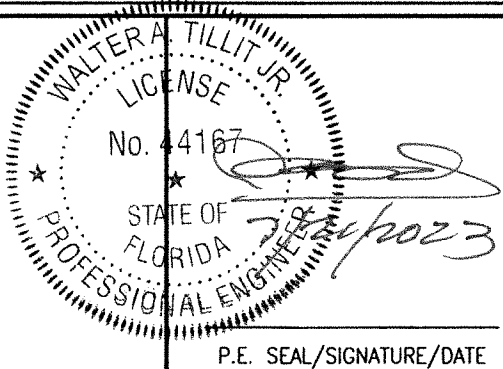
+ NOTES ON ANCHORS REQUIREMENTS: WOOD SUBSTRATES.

1. ANCHORS TO WALL, FLOOR OR SOLID WOOD SOFFIT SHALL BE AS FOLLOWS:
- 1/4" TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDDEX W/ MINIMUM THREADED PENETRATION AS INDICATED AT EACH SECTION ON SHEETS 18 & 19. EXCEPTION: SEE NOTE 2 BELOW.
2. ANCHORS TO HOLLOW CEILING SHALL BE AS PER MOUNTING TYPE U, SHEET 19 AND SHALL CONSIST OF LAG SCREWS AS PER N.D.S. 2018 SPECIFICATIONS.
3. SUBSTRATE SHALL CONSIST OF THE FOLLOWING:
- SOUTHERN PINE No. 2 W/ G=0.55 (N.D.S.)
 - DOUGLAS FIR W/ G=0.50 (N.D.S.)
 - SPRUCE PINE FIR NORTH W/ G=0.43 (N.D.S.)
 - SPRUCE PINE FIR SOUTH W/ G=0.36 (N.D.S.)
 - MIN. 1/2" CDX PLYWOOD (1986 APA)
4. ANCHORS SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS OF THE ANCHOR'S MANUFACTURER.

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

♦ SEE LIMITATIONS OF USE OF
BLADE ①A ON SHEET 28

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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American Shutter Systems
Association, Inc.

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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 & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

SHEET
16 OF 28

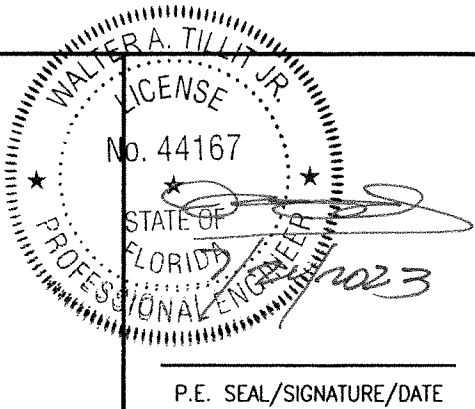
MAXIMUM ANCHOR+ SPACING (in.) SCHEDULE FOR A GIVEN MAX. SHUTTER SPAN, NEGATIVE A.S.D. DESIGN PRESSURE RATING AND A CORRESPONDING MOUNTING TYPE
(SEE MOUNTINGS ON SHEET 19)

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					
	B.O. WALL MOUNTINGS S & V						B.O. WALL MOUNTINGS S & V						B.O. WALL MOUNTINGS S & V					
	A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)						A.S.D. NEGATIVE DESIGN LOAD (psf)					
	30	40	60	75	90	105	30	40	60	75	90	105	30	40	60	75	90	105
3'-0" OR LESS	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
4'-0"	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
5'-0"	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11.5	10
6'-0"	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11.5	9.5	8
7'-0"	12	12	12	12	12	12	12	12	12	12	12	10	12	12	12	10	8	8
8'-0"	12	12	12	12	12	12	12	12	12	12	10.5	9	12	12	11	8.5	7	7
9'-0"	12	12	12	12	12	10.5	12	12	12	11	9	8	12	12	9.5	7.5	6.5	6
10'-0"	12	12	12	12	11.5	9.5	12	12	12	10	8	7	12	12	8.5	7	6	5.5
11'-0"	12	12	12	12	10	8.5	12	12	11.5	9	7.5	6.5	12	12	8	6	5	5
12'-0"	12	12	12	11.5	9.5	8	12	12	10.5	8	7	6	12	11	7	6	5	4.5
13'-0"	12	12	12	10.5	8.5	7.5	12	12	9.5	7.5	6	5.5	12	10	6.5	5	4.5	4
14'-0"	12	12	12	9.5	8	6	12	12	9	7	6	4.5	12	9.5	6	5	4	3.5
15'-0"	12	12	11	9	7.5	5	12	12	8	6.5	5.5	3.5	11.5	8.5	6	4.5	4	3
16'-0"	12	12	10.5	8.5	6.5	4	11.5	12	8	6	4.5	3	11	8	5.5	4	3	-

- + NOTES ON ANCHORS REQUIREMENTS: WOOD SUBSTRATES.
- ANCHORS TO WALL, FLOOR OR SOLID WOOD SOFFIT SHALL BE AS FOLLOWS:
 - 1/4"Ø TAPCON WITH ADVANCED THREADFORM TECHNOLOGY ANCHORS, AS MANUFACTURED BY I.T.W. BUILDDEX W/ MINIMUM THREADED PENETRATION AS INDICATED AT EACH SECTION ON SHEETS 18 & 19. EXCEPTION: SEE NOTE 2 BELOW.
 - ANCHORS TO HOLLOW CEILING SHALL BE AS PER MOUNTING TYPE U, SHEET 19 AND SHALL CONSIST OF LAG SCREWS AS PER NDS 2018 SPECIFICATIONS.
 - 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)
 - ANCHORS SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS OF THE ANCHOR'S MANUFACTURER.

① HV BLADE ONLY

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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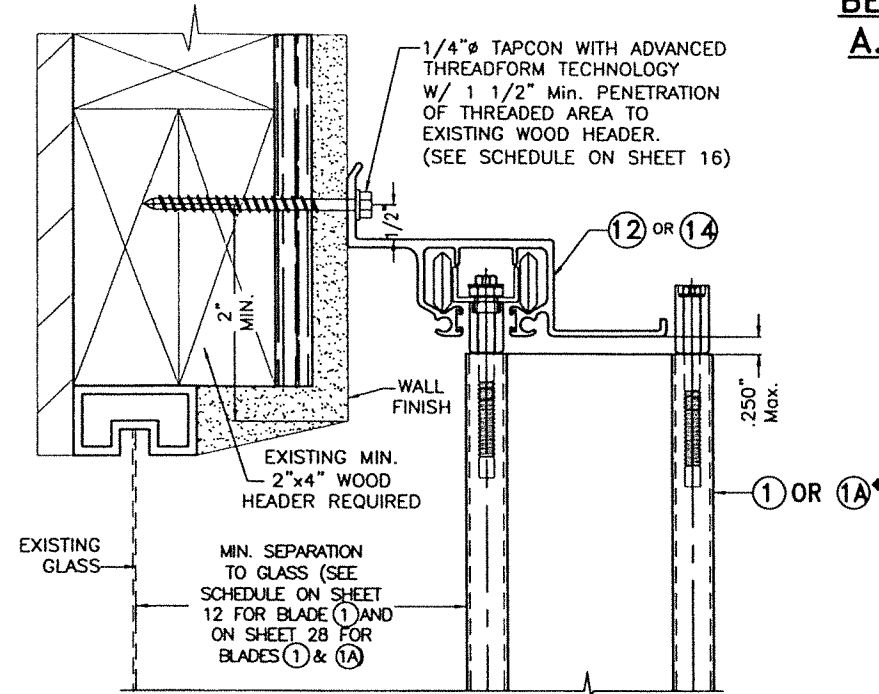
Accordian Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

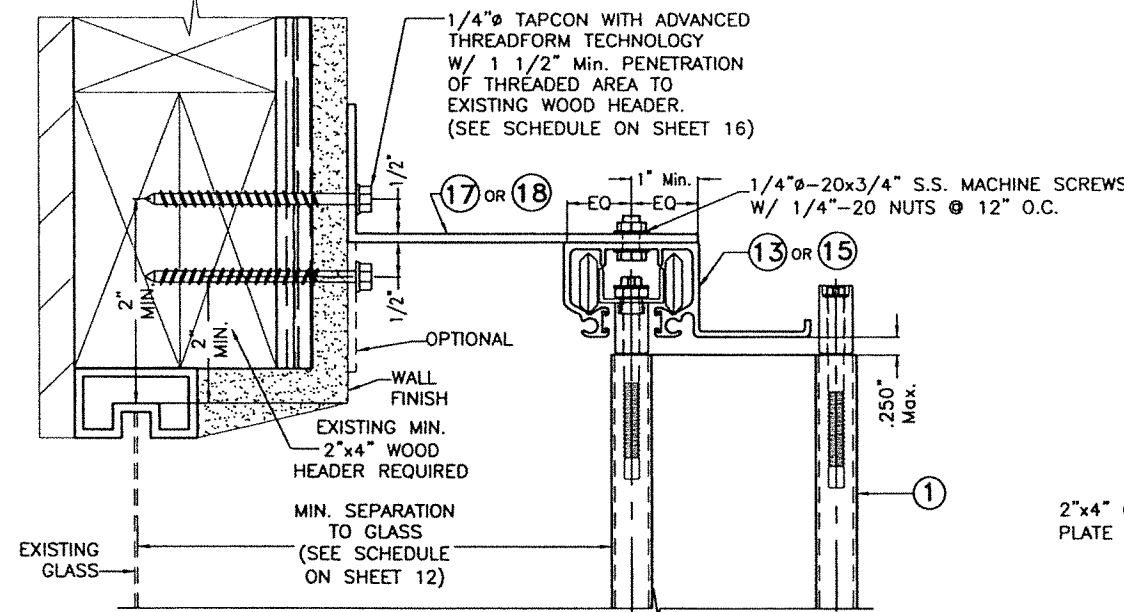
DRAWING No
23-128
SHEET
17 OF 28

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

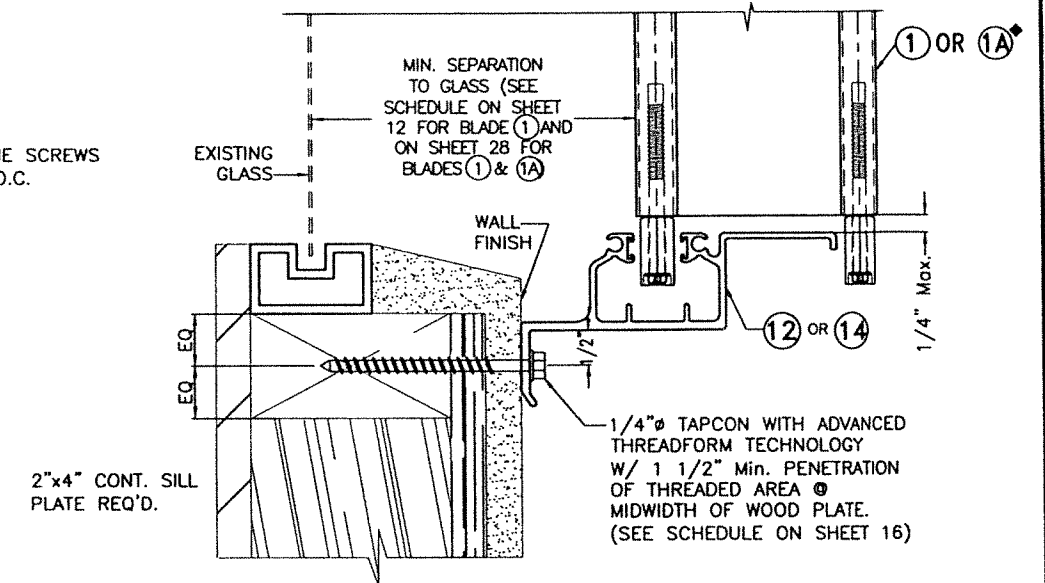
MAX. SHUTTER SPAN L+ OR L- FOR INSTALLATIONS INTO WOOD WITH HV BLADE ① ONLY SHALL BE LIMITED TO 105.0 psf. A.S.D. DESIGN PRESSURE RATING. SEE SHEET 28 FOR MAX SPAN & A.S.D. DESIGN PRESSURE RATING FOR INSTALLATION WITH BLADE ① & ①A WORKING IN UNISON



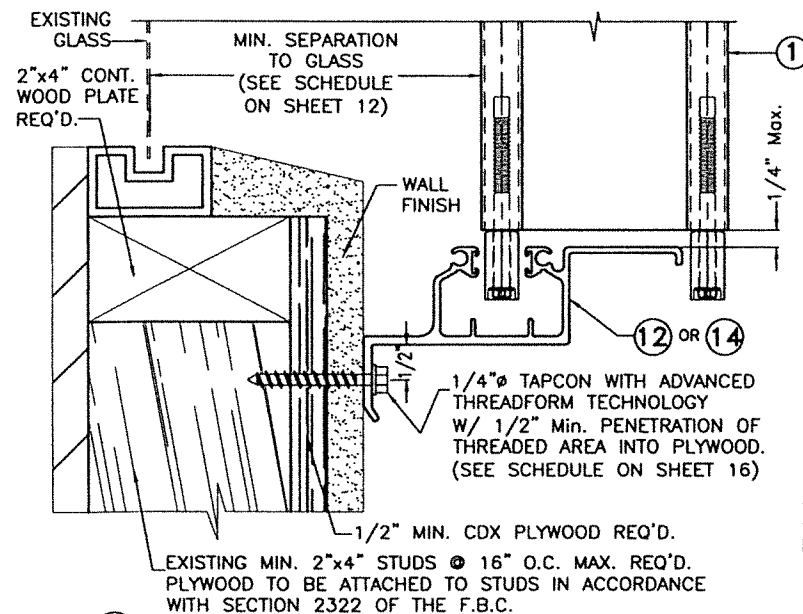
M HV WALL HEADER INSTALLATION



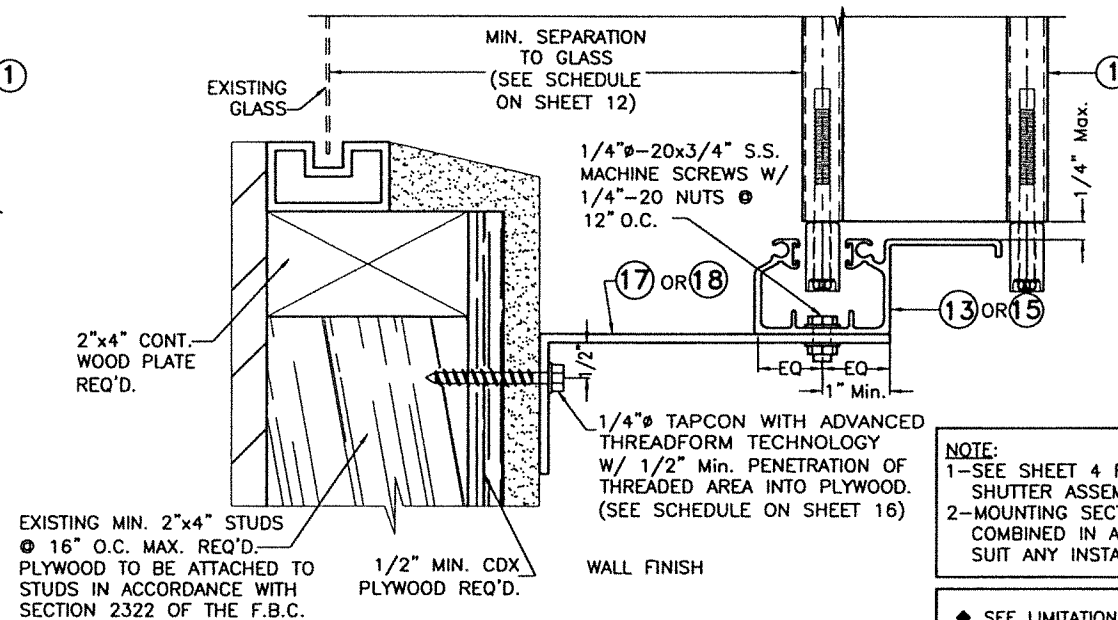
N HV WALL HEADER INSTALLATION



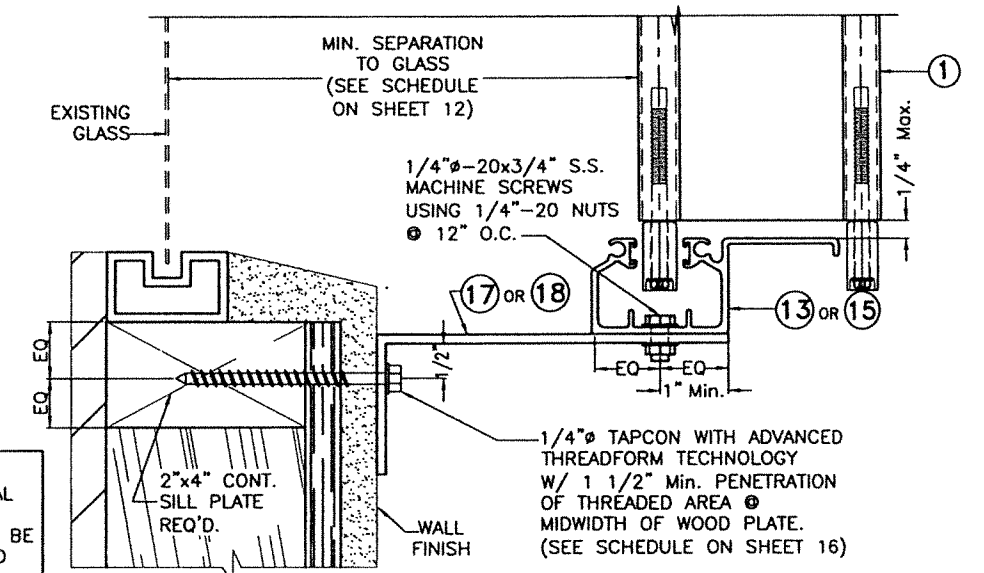
O HV WALL SILL INSTALLATION



P HV WALL SILL INSTALLATION



Q HV WALL SILL INSTALLATION

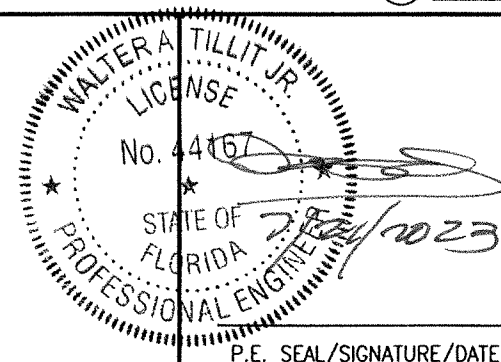


R HV WALL SILL INSTALLATION

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 28

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P.E. SEAL/SIGNATURE/DATE

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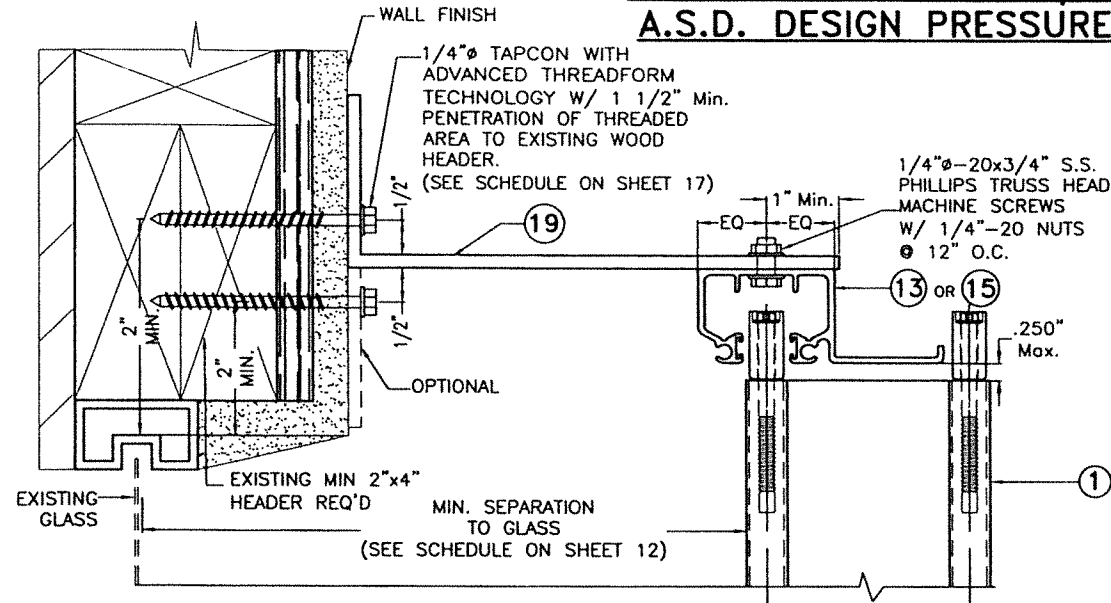
BERTHA HV™ Accordion Shutter System			
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2			
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			

DRAWING No
23-128

SHEET
18 OF 28

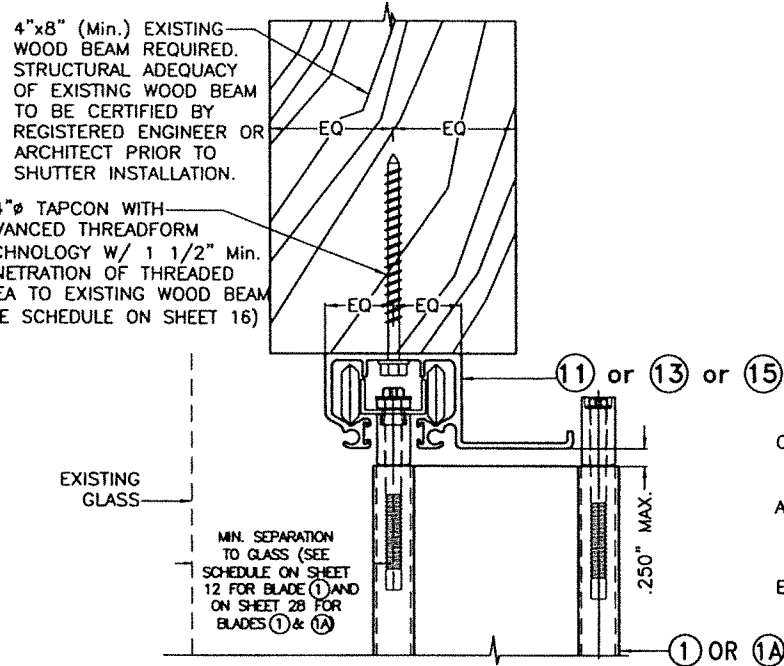
INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS FOR ① HV & ①A HV ♦ BLADES (AS APPLICABLE)

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

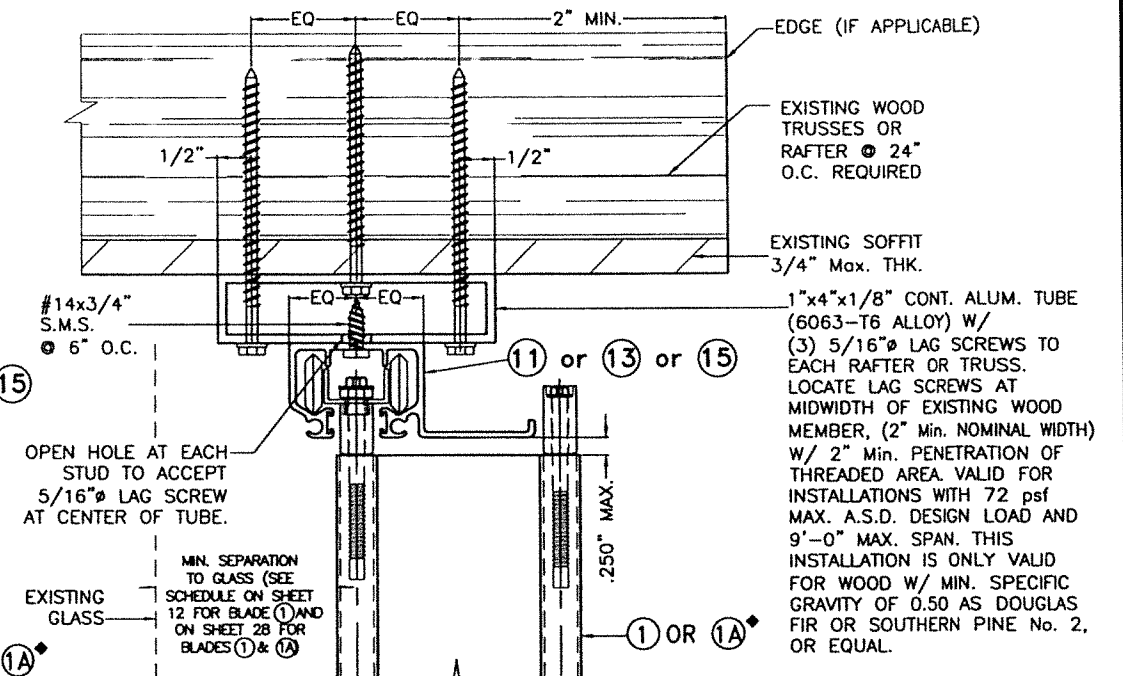


⑤ HV WALL HEADER INSTALLATION

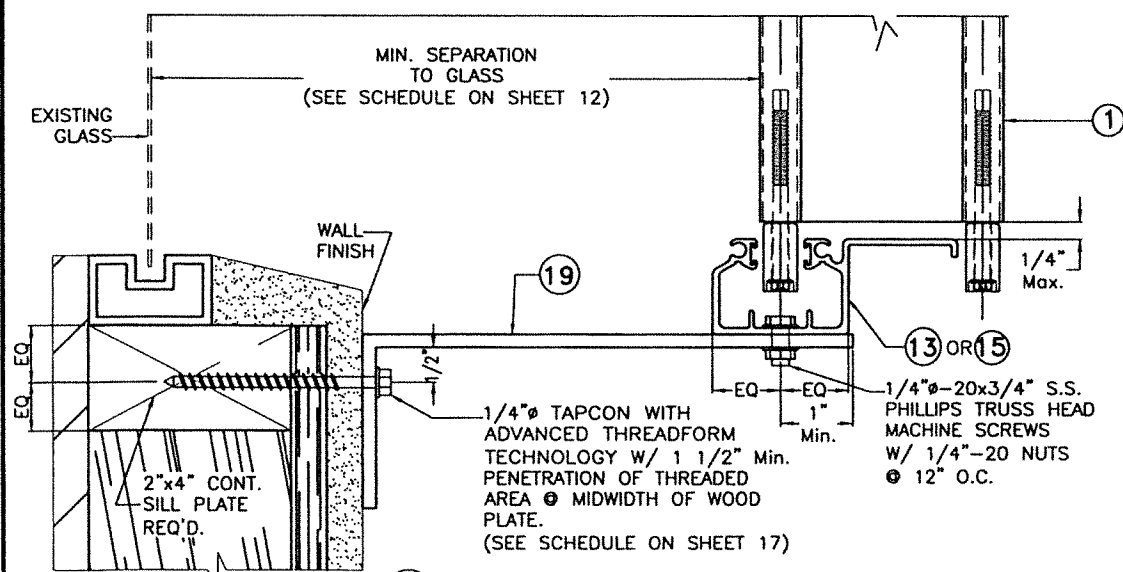
NOTES:
1-SEE SHEET 4 FOR TYPICAL SHUTTER ASSEMBLY,
2-MOUNTING SECTIONS CAN BE COMBINED
IN ANY WAY TO SUIT ANY INSTALLATION.



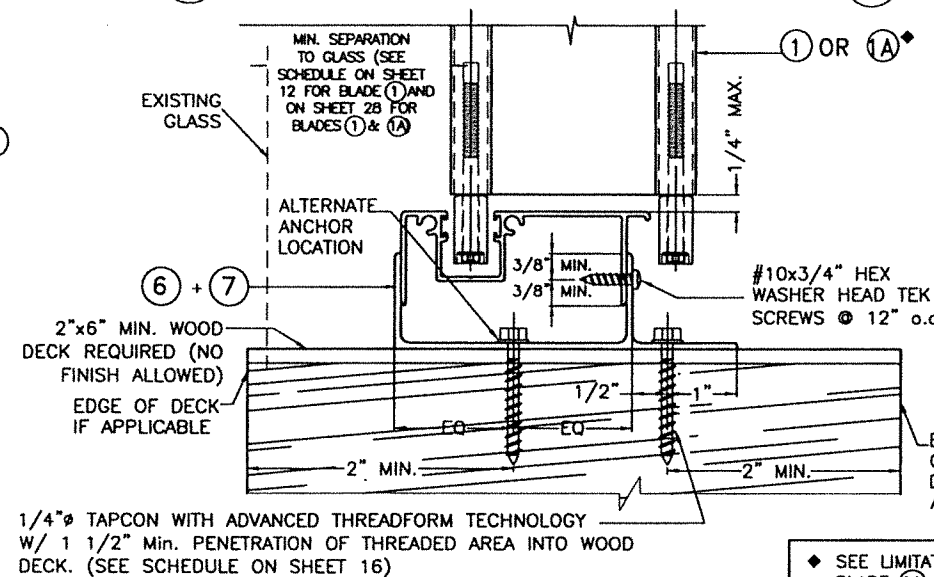
⑦ HV CEILING INSTALLATION



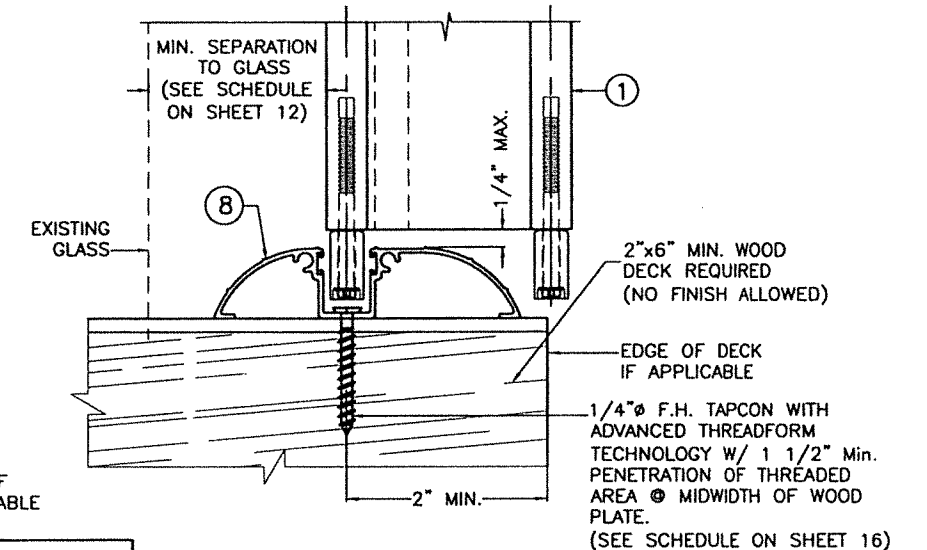
⑧ HV CEILING INSTALLATION



⑥ HV WALL SILL INSTALLATION



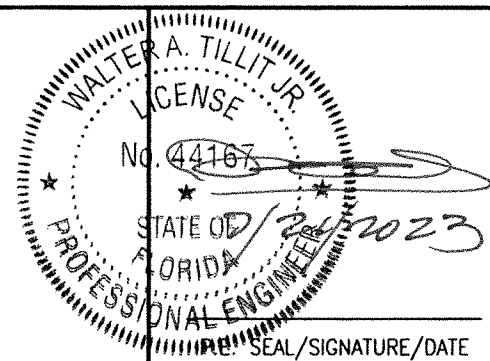
⑨ HV FLOOR INSTALLATION



⑩ HV WALK-OVER INSTALLATION

♦ SEE LIMITATIONS OF USE OF
BLADE ①A ON SHEET 28

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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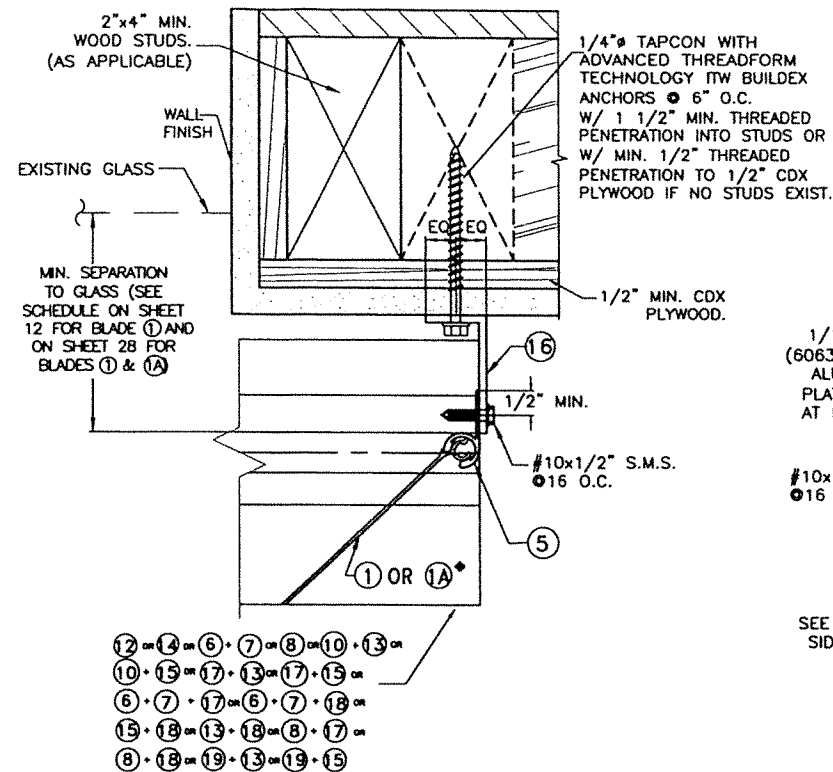
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
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6			

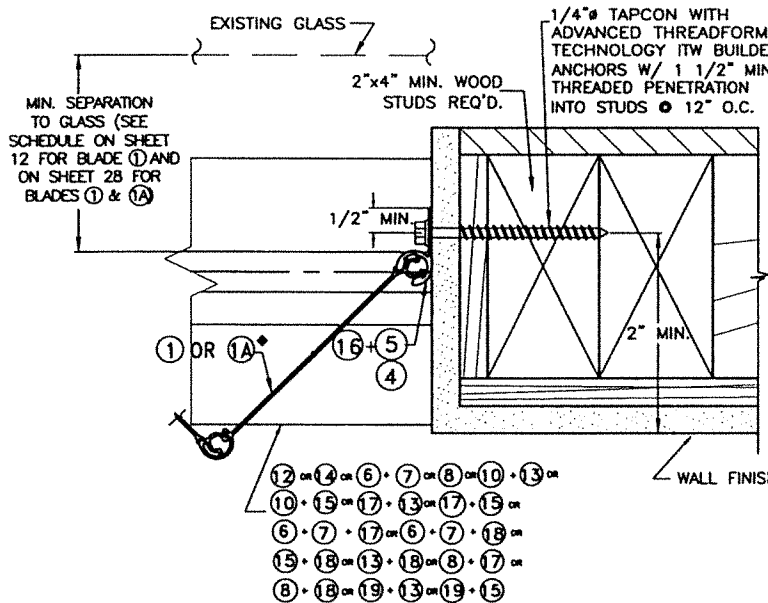
DRAWING No
23-128

SHEET
19 OF 28

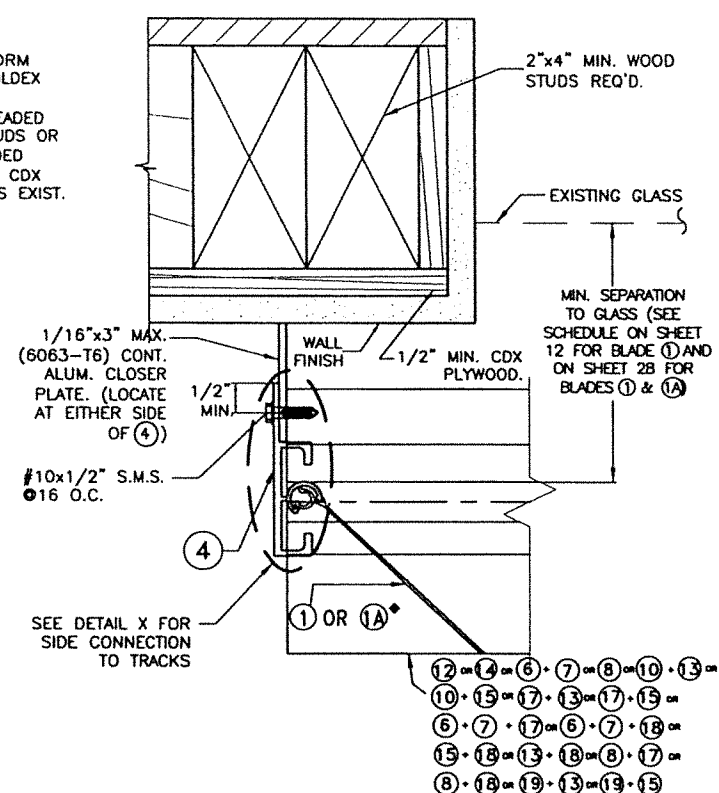
END INSTALLATIONS ① HV & ①A HV ♦ BLADES INTO 2"x4" MIN. WOOD STUDS.



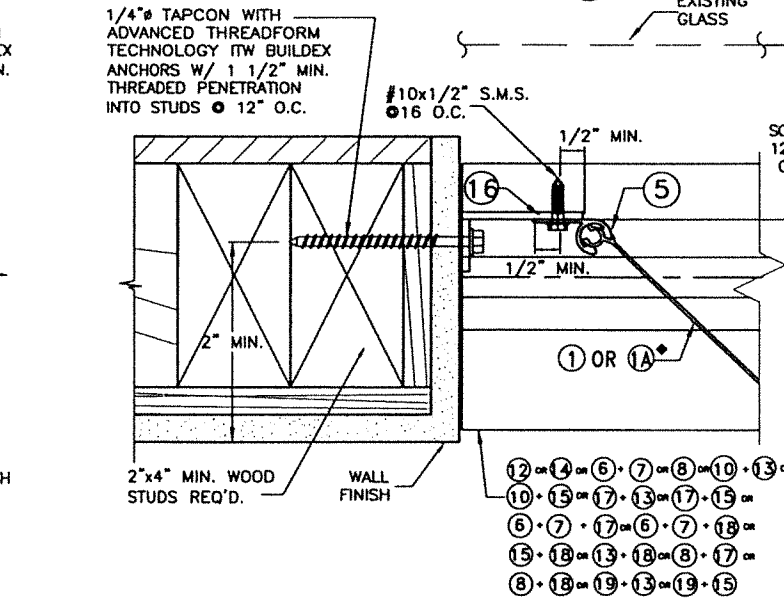
END CONNECTION DETAIL ⑦



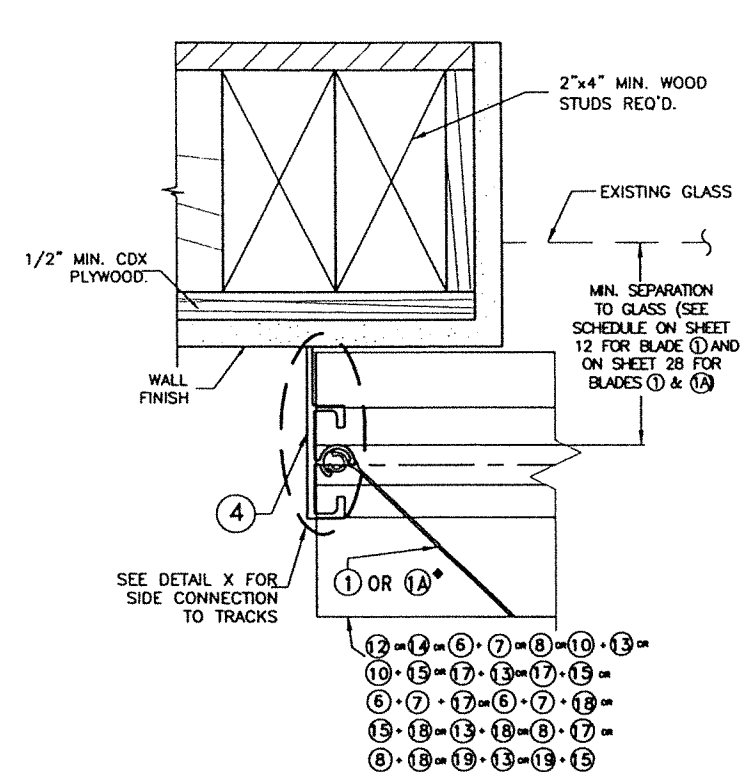
END CONNECTION DETAIL ⑪



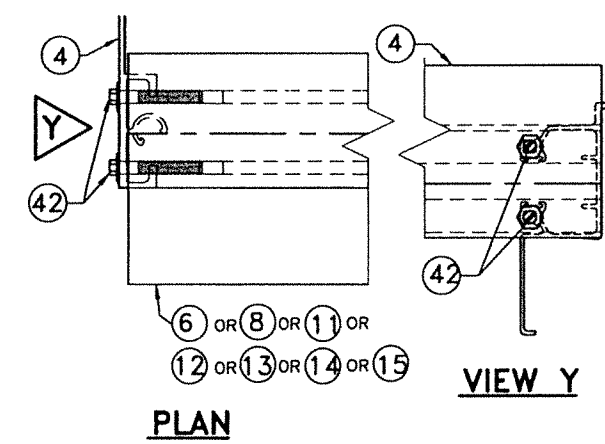
END CONNECTION DETAIL ⑧



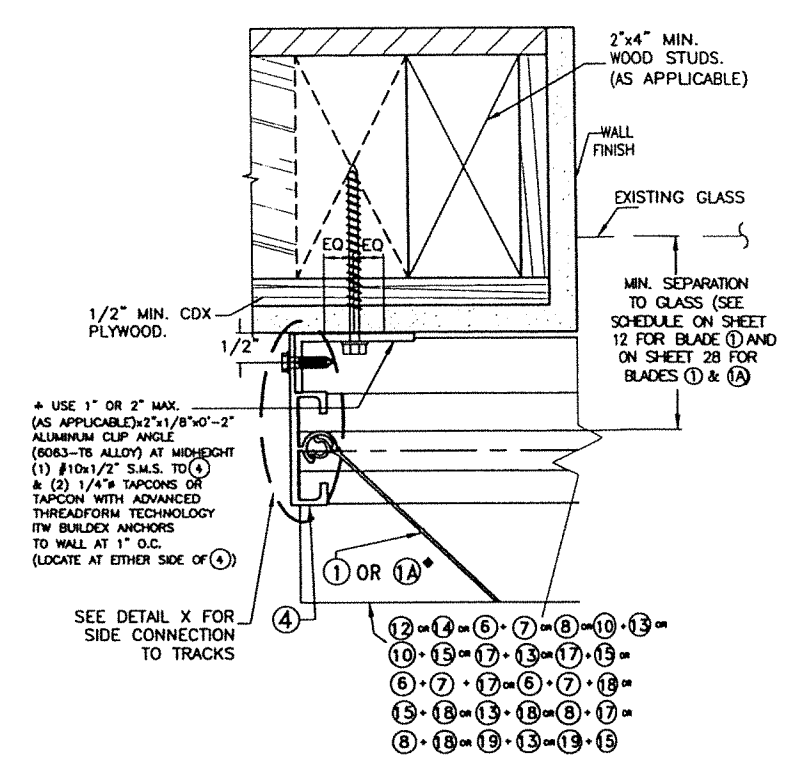
END CONNECTION DETAIL ⑫



END CONNECTION DETAIL ⑨



DETAIL X



END CONNECTION DETAIL ⑩

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

♦ SEE LIMITATIONS OF USE OF BLADE ①A ON SHEET 28

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)

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No. 44167
STATE OF FLORIDA
PROFESSIONAL ENGINEER
P.E. SEAL/SIGNATURE/DATE

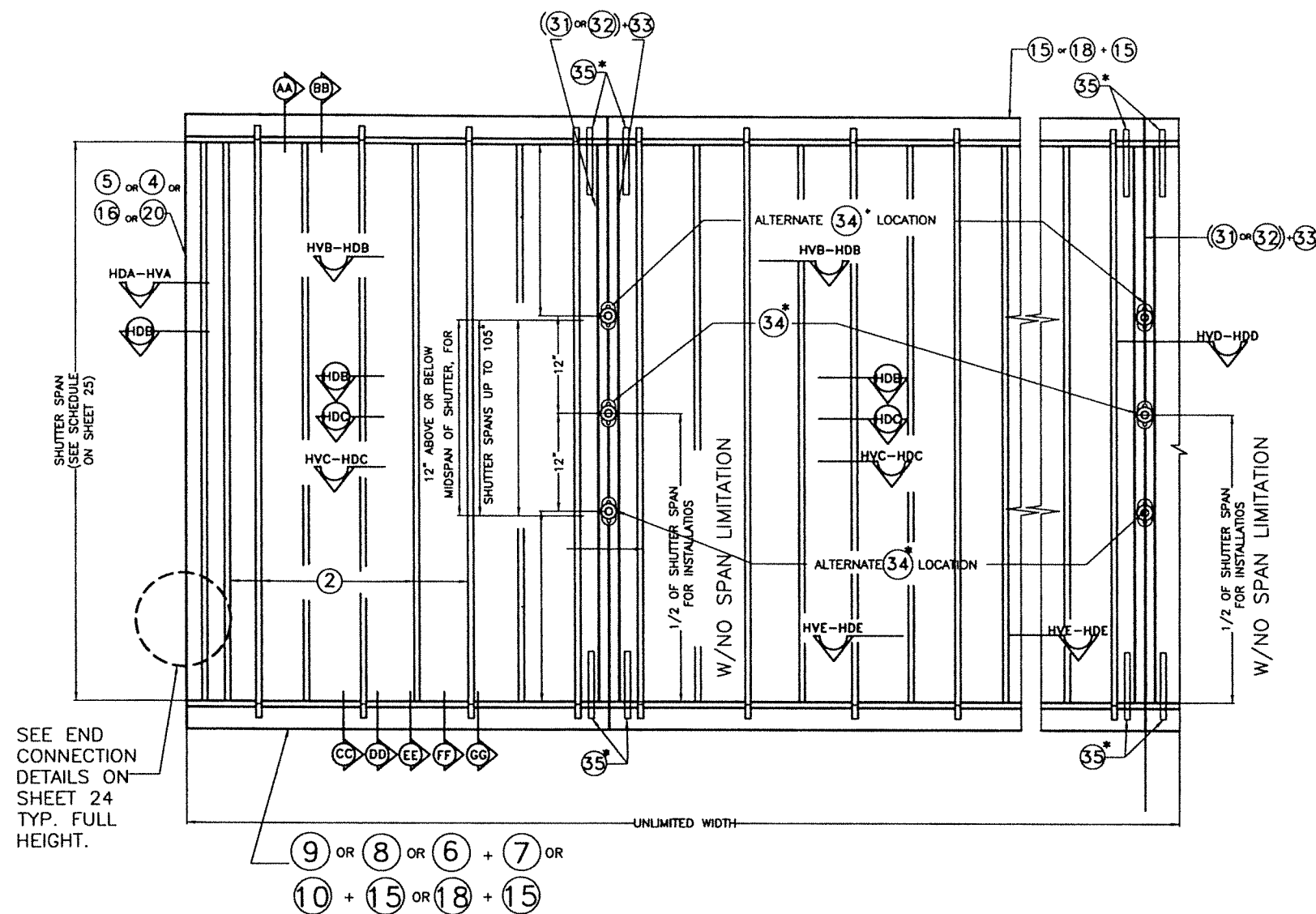
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BERTHA HV™ Accordion Shutter System			
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2			
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
3			
4			
5			
6			
			DRAWING No 23-128
			SHEET 20 OF 28



* NOTES ON HD LOCKS AND CENTERMATES:

1. MANDATORY CONDITION # 1: ONE (34) H.D. LOCK SHALL BE USED FOR ANY SPAN AND INSTALLATION AT HEAVY DUTY SYMMETRICAL CENTERMATES, (31) OR (32)+(33) AND AT ANY ELEVATION. (34) H.D. LOCK MAY BE USED AS AN INSIDE OR OUTSIDE LOCK, ATTACHED TO (33) HEAVY DUTY SYMMETRICAL CENTERMATES WITH (3) #8 x 3/8" LONG FLAT HEAD S.S. M.S. LOCKING RODS (35) ARE NOT MANDATORY, i.e. THEY ARE COMPLETELY OPTIONAL.
2. MANDATORY CONDITION # 2: LOCATION OF (34) H.D. LOCK SHALL BE AS INDICATED ON SHUTTER ELEVATION, i.e., FOR SHUTTER SPANS UP TO 105". (34) H.D. LOCK MAY BE INSTALLED AT MID HEIGHT OF SHUTTER OR AT 12" ABOVE OR BELOW MID HEIGHT OF SHUTTER. FOR SHUTTER SPANS GREATER THAN 105", (34) H.D. LOCK SHALL BE INSTALLED AT MID HEIGHT OF SHUTTER.

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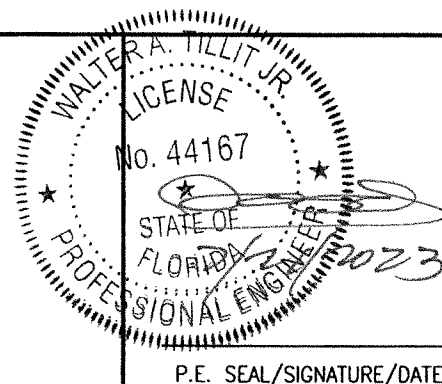
Accordion Shutter System

H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			SHEET 21 OF 28
6			

DRAWING No
23-128

SHEET
21 OF 28



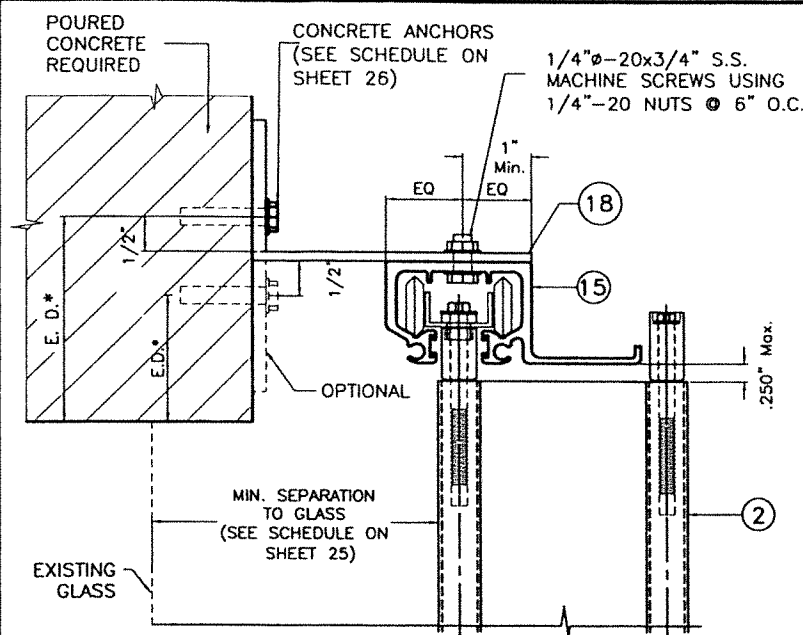
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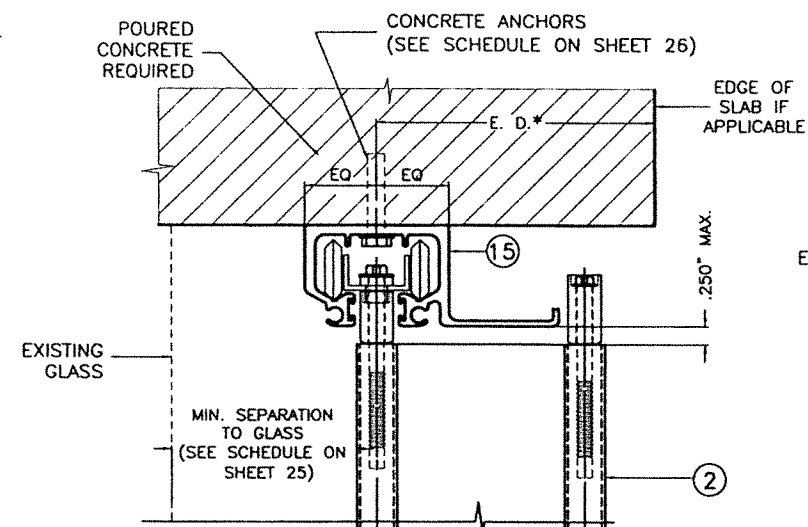
TILLIT TESTING & ENGINEERING COMPANY
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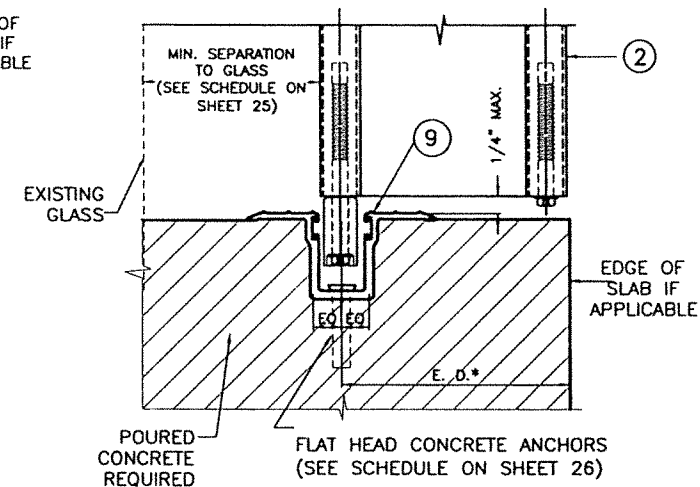
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West Palm Beach, FL 33407
Phone: (800)432-2204 . Fax: (561)209-8380



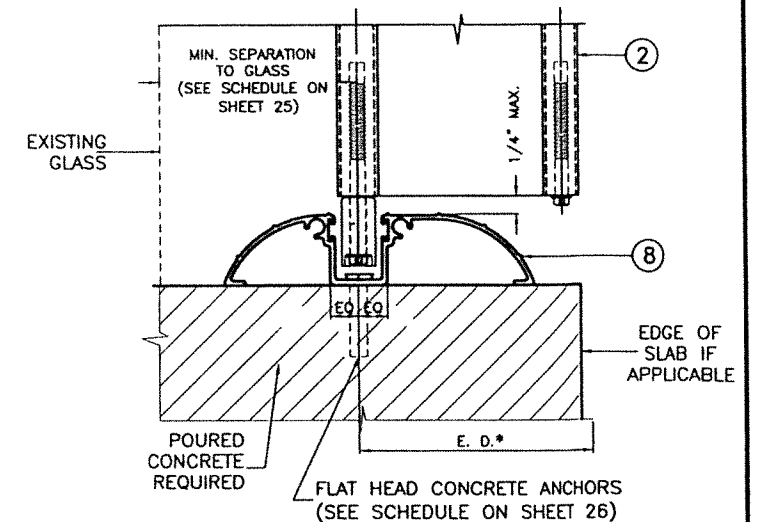
AA HD WALL HEADER INSTALLATION



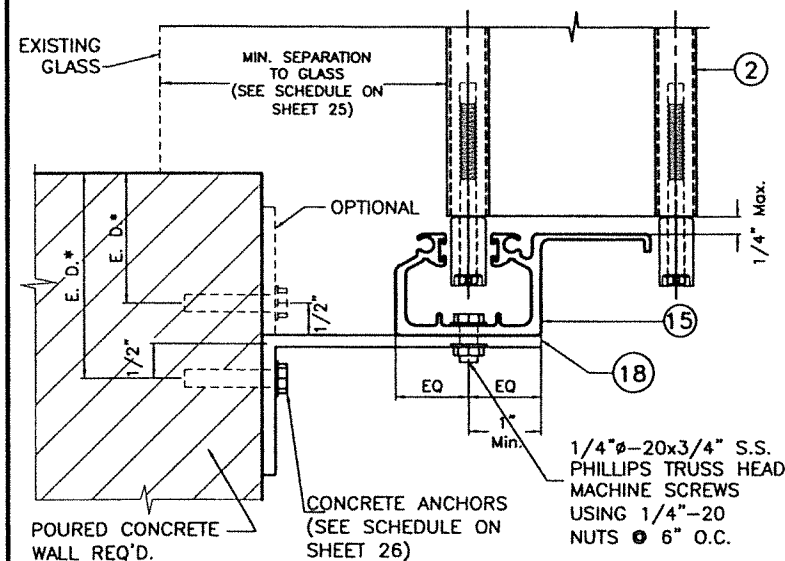
BB HD CEILING INSTALLATION



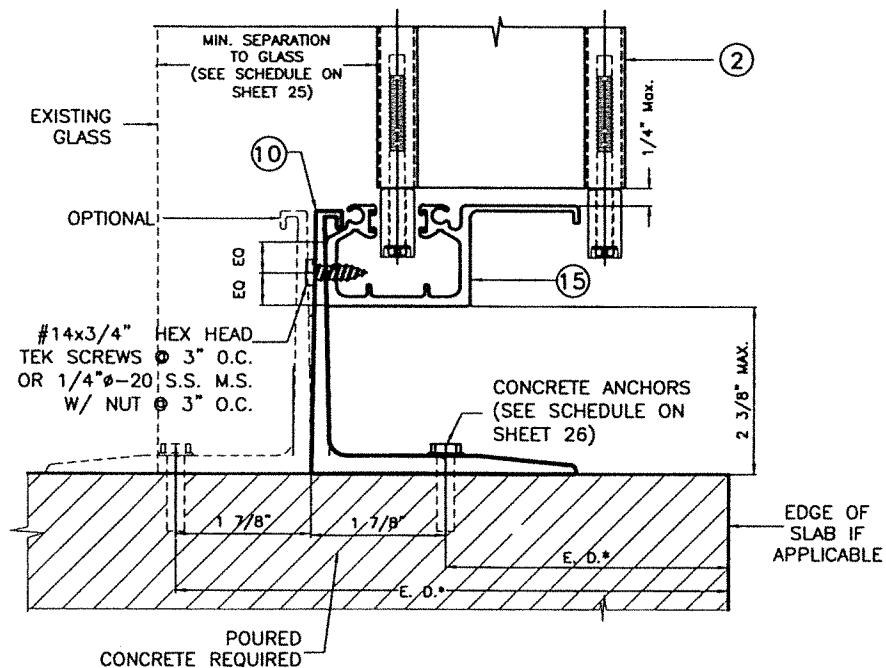
CC HD TRENCH INSTALLATION



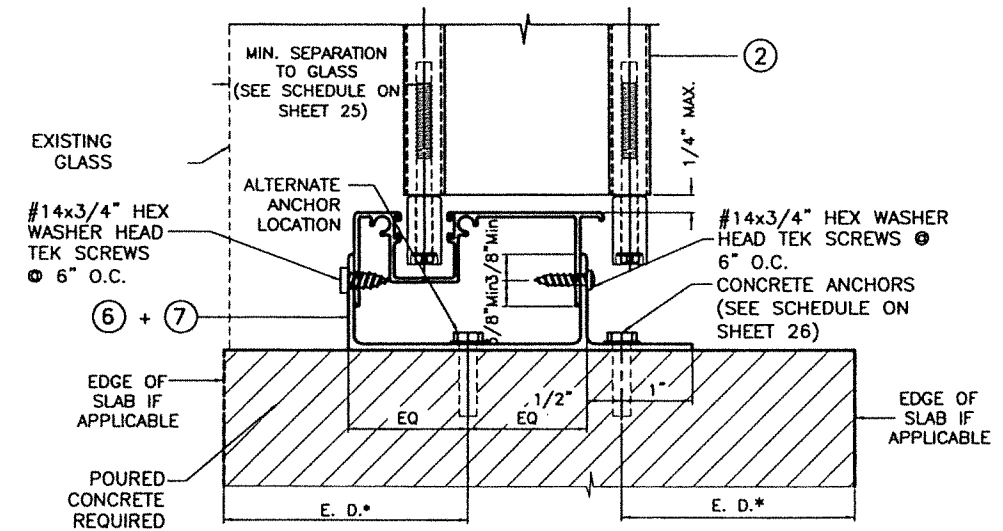
DD HD WALK-OVER INSTALLATION



EE HD WALL SILL INSTALLATION



FF HD RAINGUARD INSTALLATION



GG HD FLOOR INSTALLATION

NOTE FOR COMBINATION OF SECTIONS:

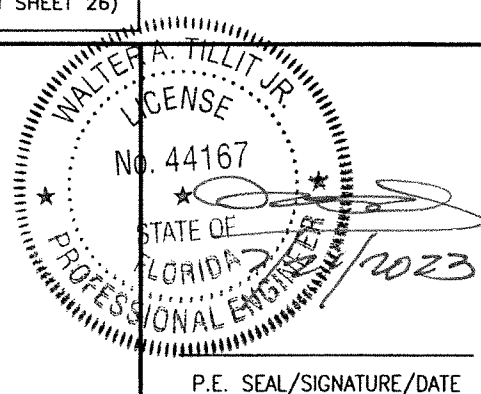
1- SEE SHEET 21 FOR TYPICAL SHUTTER ASSEMBLY
2- MOUNTING SECTIONS CAN BE COMBINED IN ANY WAY TO SUIT ANY INSTALLATION.

* E. D. = EDGE DISTANCE
(SEE SPECIFICATIONS ON SHEET 26)

INSTALLATION DETAILS W/ ② HV BLADE

SCALE: 3/8"=1"

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

REV.No	DESCRIPTION	DATE	DRAWN BY:	Y.M.
1	OLD 20-159	07/21/23	DATE:	07/21/2023
2				
3				
4				
5				
6				

DRAWING No

23-128

SHEET

22 OF 28

OUT

IN

— EXISTING GLASS

* SEE NOTES ON LOCKING RODS (35) & HD (34) LOCKS ON SHEET 21

② HV BLADE

SEE END WALL CONNECTION
DETAILS ON SHEET 24

HVA-HDA

MIN. SEPARATION
TO GLASS
(SEE SCHEDULE
ON SHEET 25)

(4) H.V.
PINS (TYP.)

35*
(OPTIONAL)

IN

(4) H.V. _____
PINS (TYP.)

35*
(OPTIONAL)

HVC-HDC

SYMMETRICAL HD CENTERMATES
W/ (34)* LOCK (INTERIOR)

(9) OR (8) OR (6) + (7) OR
 (10) + (15) OR (18) + (15)

— EXISTING GLASS

MIN. SEPARATION TO GLASS
(SEE SCHEDULE ON SHEET 25)

IN

CONCRETE
ANCHORS @
16" O.C. Min.

LPOURED CONCRETE OR
CONCRETE BLOCK WALL
REQUIRED

HVE-HDE

— (9) OR (8) OR (6) + (7) OR
 (10) + (15) OR (18) + (15)

OUT

HVD-HDD

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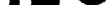
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2			
REV.No	DESCRIPTION	DATE	DRAWN BY: Y.M.
1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			SHEET 23 OF 28
6			

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LICENSE
No. 44167
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

2023

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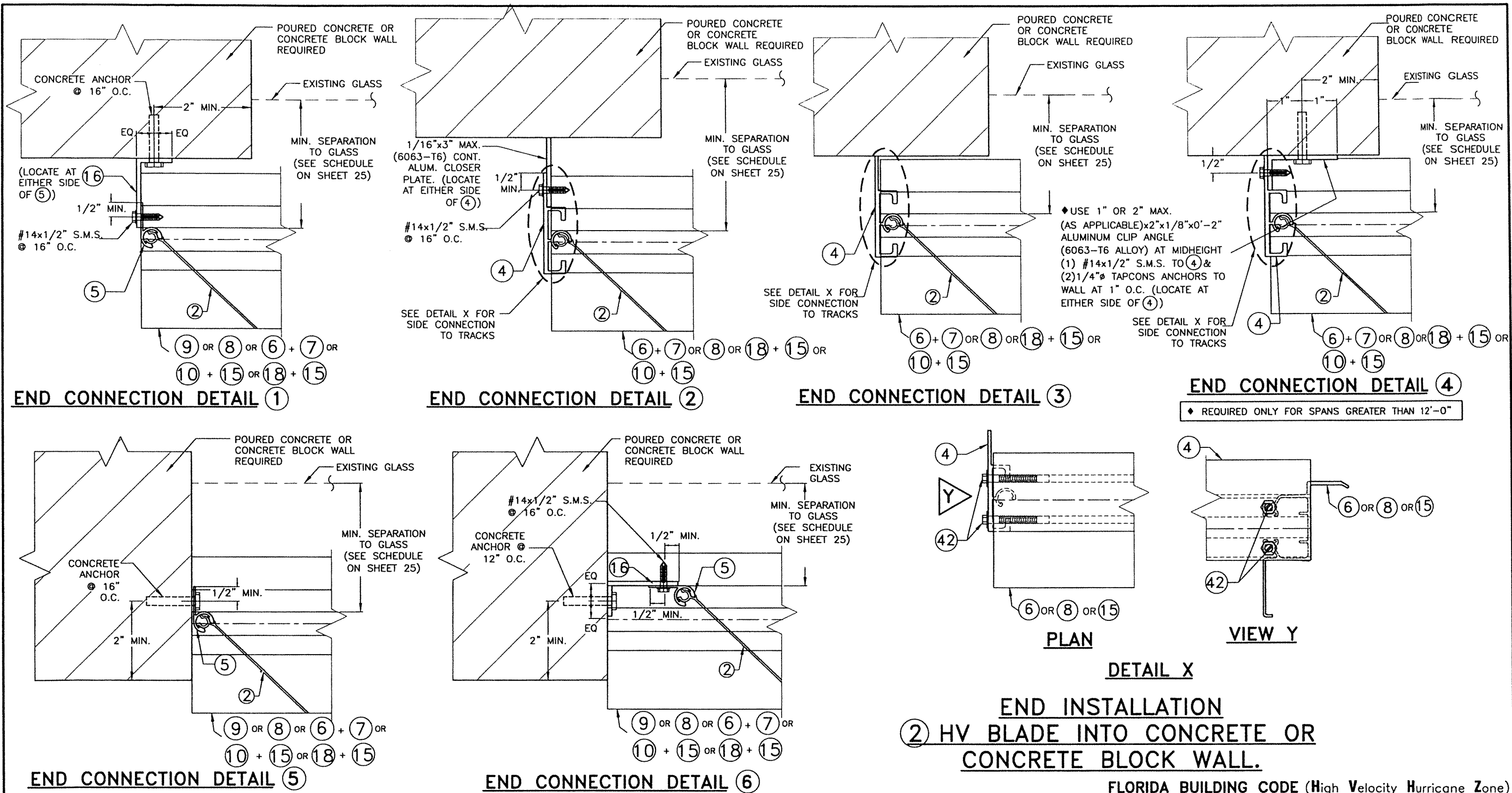
TILECO INC.

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2			
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6			

DRAWING No
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SHEET
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MAXIMUM SHUTTER SPAN "L+" OR "L-" (ft.) * INSTALLATIONS W/ SYMMETRICAL HD CENTERMATES (31) OR (32), W/ ONE HD (34) LOCK & NO LOCKING RODS (35) ♦		
MAXIMUM A.S.D. DESIGN PRESSURE RATING (p.s.f.) (+ OR -)	POURED CONCRETE INSTALLATIONS	
	ALL MOUNTING CONDITIONS	
	L + (ft)	L - (ft)
30 OR LESS	15'-5"	18'-0"
35	14'-10"	18'-0"
40	14'-4"	17'-10"
45	13'-11"	17'-6"
50	13'-6"	17'-0"
55	13'-3"	16'-10"
60	12'-11"	16'-2"
65	12'-8"	15'-6"
70	12'-6"	14'-11"
75	12'-3"	14'-5"
80	12'-0"	14'-0"
85	11'-10"	13'-7"
90	11'-6"	13'-2"
95	11'-3"	12'-10"
100	10'-6"	12'-6"
105	10'-0"	12'-2"
110	9'-6"	11'-11"
115	9'-1"	11'-8"
120	8'-9"	11'-5"
125	-	11'-2"
130	-	10'-11"
135	-	10'-9"
140	-	10'-6"
145	-	10'-4"
150	-	10'-2"
155	-	10'-0"
160	-	9'-10"
165	-	9'-9"
170	-	9'-7"
175	-	9'-5"
180	-	9'-4"
185	-	9'-2"
190	-	9'-0"
195	-	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 MAXIMUM A.S.D. DESIGN PRESSURE RATING TO DETERMINE MAXIMUM ANCHOR SPACING.

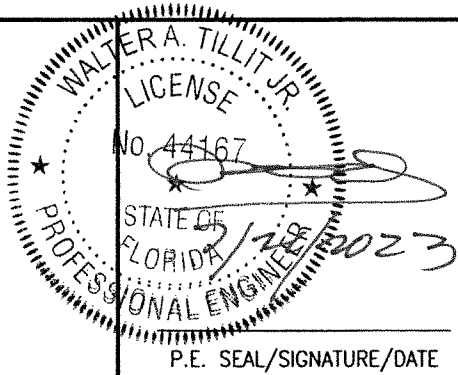
♦ SEPARATION TO GLASS REQUIREMENTS

MINIMUM SEPARATION TO GLASS FOR SHUTTERS INSTALLED AT ALL ELEVATIONS OF BUILDING IS 3".

INSTALLATION LEGEND	
SUBSTRATE MOUNTINGS	POURED CONCRETE (SHEET 22)
WALL MOUNTING	AA & EE
FLOOR/CEILING MOUNTING	BB, CC, DD, FF & GG

② HV BLADE

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



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3			
4			
5			
6			

DRAWING No
23-128
SHEET
25 OF 28

ANCHORS SPACING LEGEND

1/4"Ø TAPCON
5/16"Ø TAPCON XL

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

MAXIMUM SPAN (ft)	POURED CONCRETE				
	ALL MOUNTINGS AA THRU GG (SHEET 22)				
	USE MAXIMUM VALUES BETWEEN POSITIVE AND NEGATIVE A.S.D. DESIGN LOADS				
	50 OR LESS	>50 TO 90	>90 TO 120	>120 TO 160	>160 TO 195
8'-9" OR LESS	8"	4 1/2"	3 1/2"	—	—
	12"	8"	6"	4"	3 3/4"
>8'-9" UP TO 12'-1"	6"	3 1/2"	3" ‡	—	—
	10"	6"	4"	4"	—
>12'-1" UP TO 18'-0"	4"	3 1/2"	—	—	—
	7 1/2"	5 1/2"	4"	—	—

NOTE:

‡ VALID ONLY FOR UP TO 10'-0" SPAN

*SPECIFICATIONS ON ANCHOR REQUIREMENTS: POURED CONCRETE SUBSTRATE

(A) ANCHORS TO WALL SHALL BE AS FOLLOWS:

A.1) TO EXISTING POURED CONCRETE: (Min. f'c = 3192 psi)
— 1/4"Ø TAPCON ANCHORS, AS MANUFACTURED BY I.T.W. BUILDEX.
MINIMUM EMBEDMENT INTO POURED CONCRETE OF TAPCON IS 1 3/4".

A.2) TO EXISTING POURED CONCRETE: (Min. f'c = 2899 psi)
— 5/16"Ø TAPCON XL ANCHORS, AS MANUFACTURED BY I.T.W. BUILDEX.
MINIMUM EMBEDMENT INTO POURED CONCRETE OF 5/16" TAPCON XL ANCHORS IS 2 1/4".

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 NOTE A.1) ABOVE. FOR INSTALLATIONS ON VINYL SIDING OR EIFS CONSULT THIS ENGINEER.

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

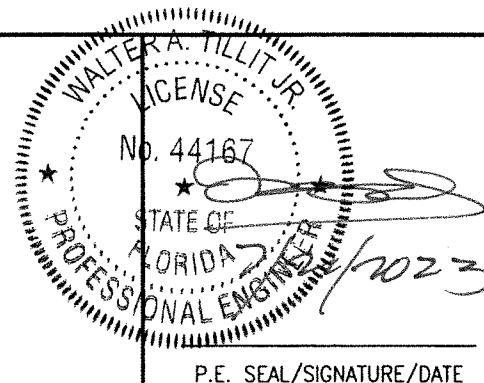
(C) SEE BELOW FOR MINIMUM REQUIRED EDGE DISTANCE FOR ANCHORS.

MINIMUM REQUIRED EDGE DISTANCE FOR ANCHORS

MAXIMUM ANCHOR SPACINGS ARE VALID FOR
3" EDGE DISTANCE FOR 1/4"Ø TAPCON AND
3 5/8" EDGE DISTANCE FOR 5/16"Ø TAPCON XL.

② HV BLADE ONLY

FLORIDA BUILDING CODE (High Velocity Hurricane Zone)



P.E. SEAL/SIGNATURE/DATE

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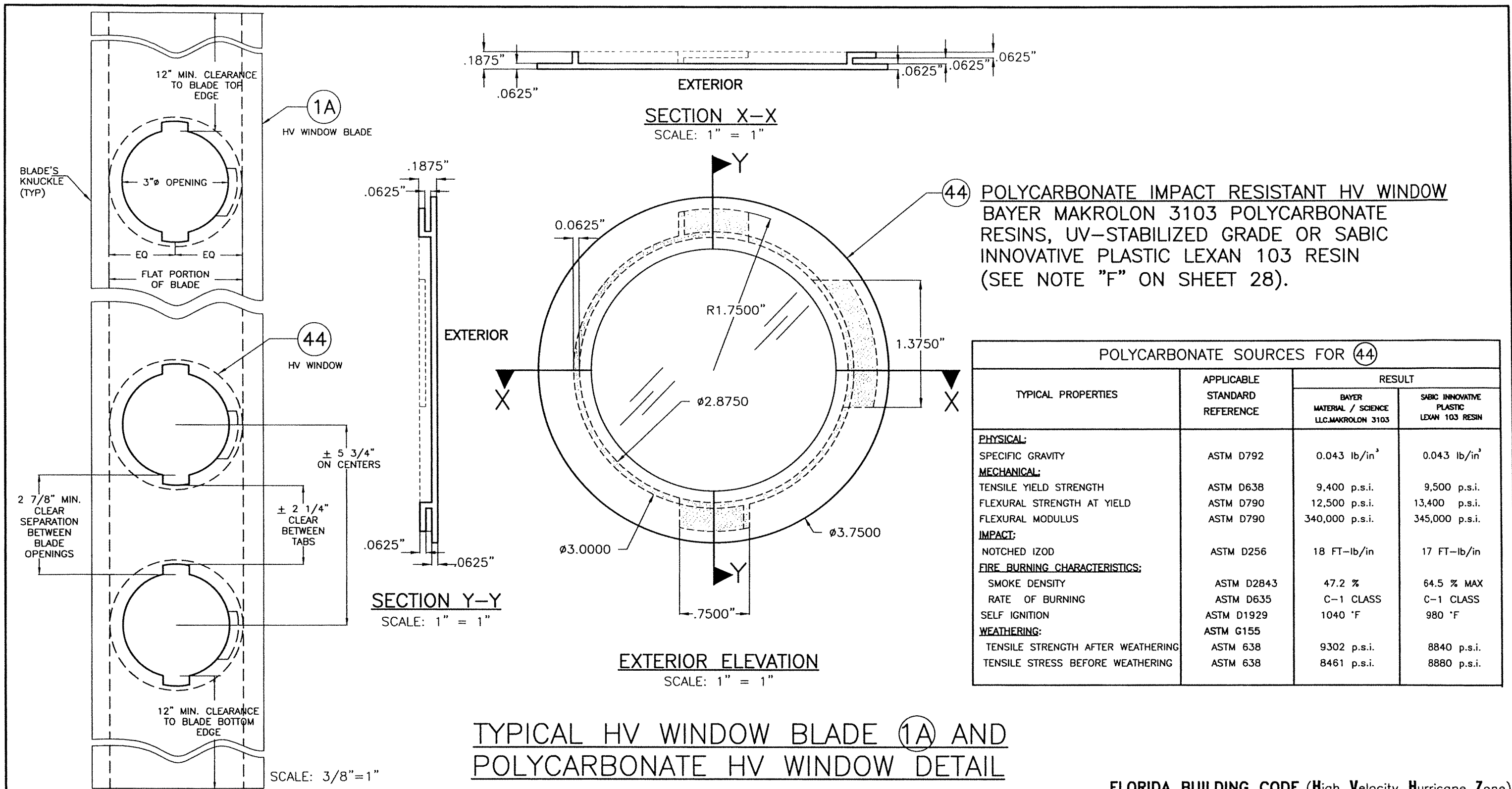
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BERTHA HV™
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H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2

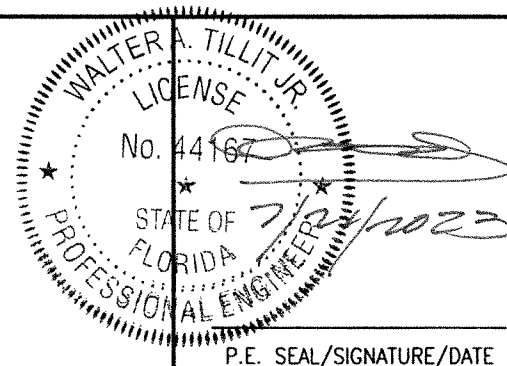
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1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			
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5			
6			

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23-128
SHEET
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TYPICAL HV WINDOW BLADE 1A AND
POLYCARBONATE HV WINDOW DETAIL

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1	OLD 20-159	07/21/23	DATE: 07/21/2023
2			DRAWING No 23-128
3			
4			
5			SHEET 27 OF 28
6			

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 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"

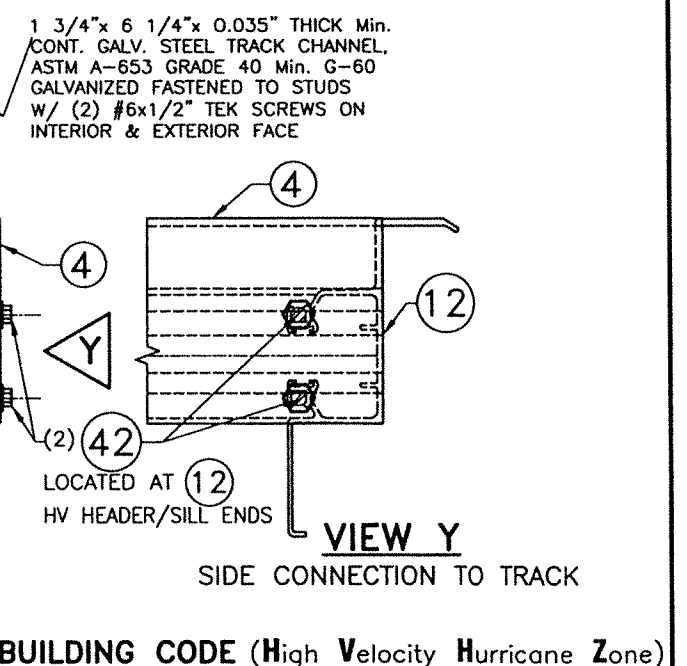
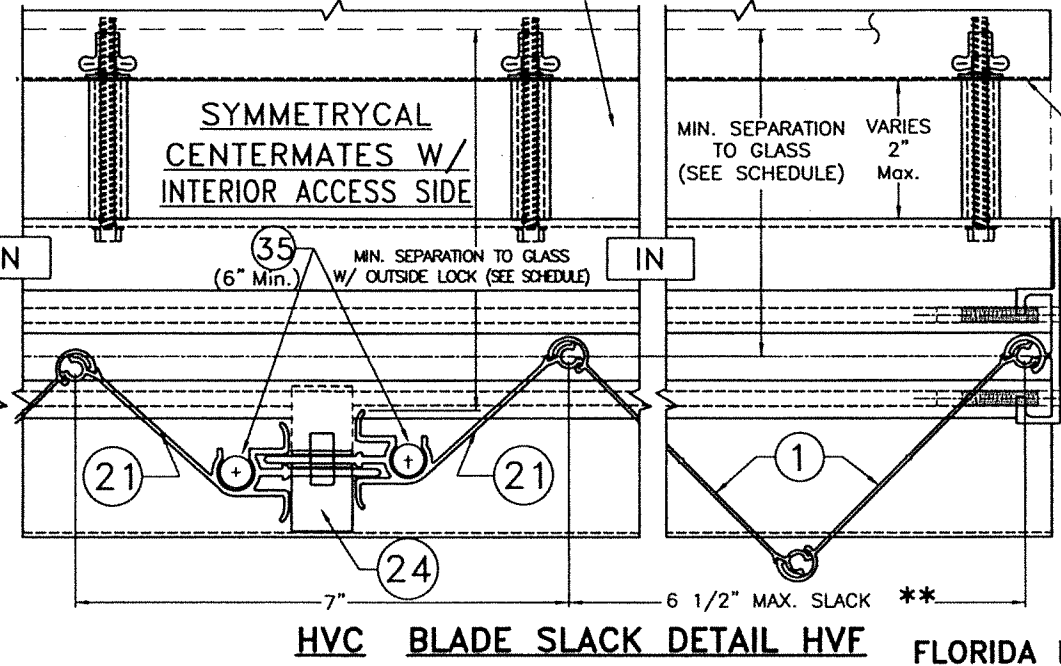
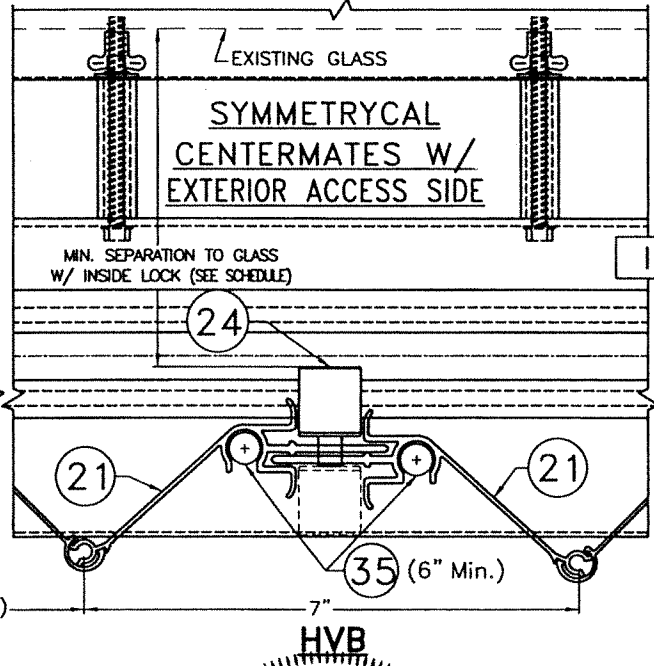
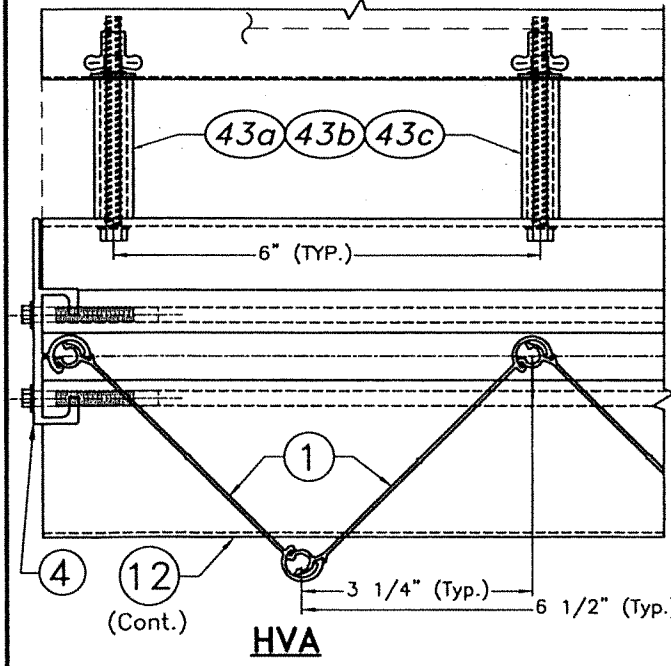
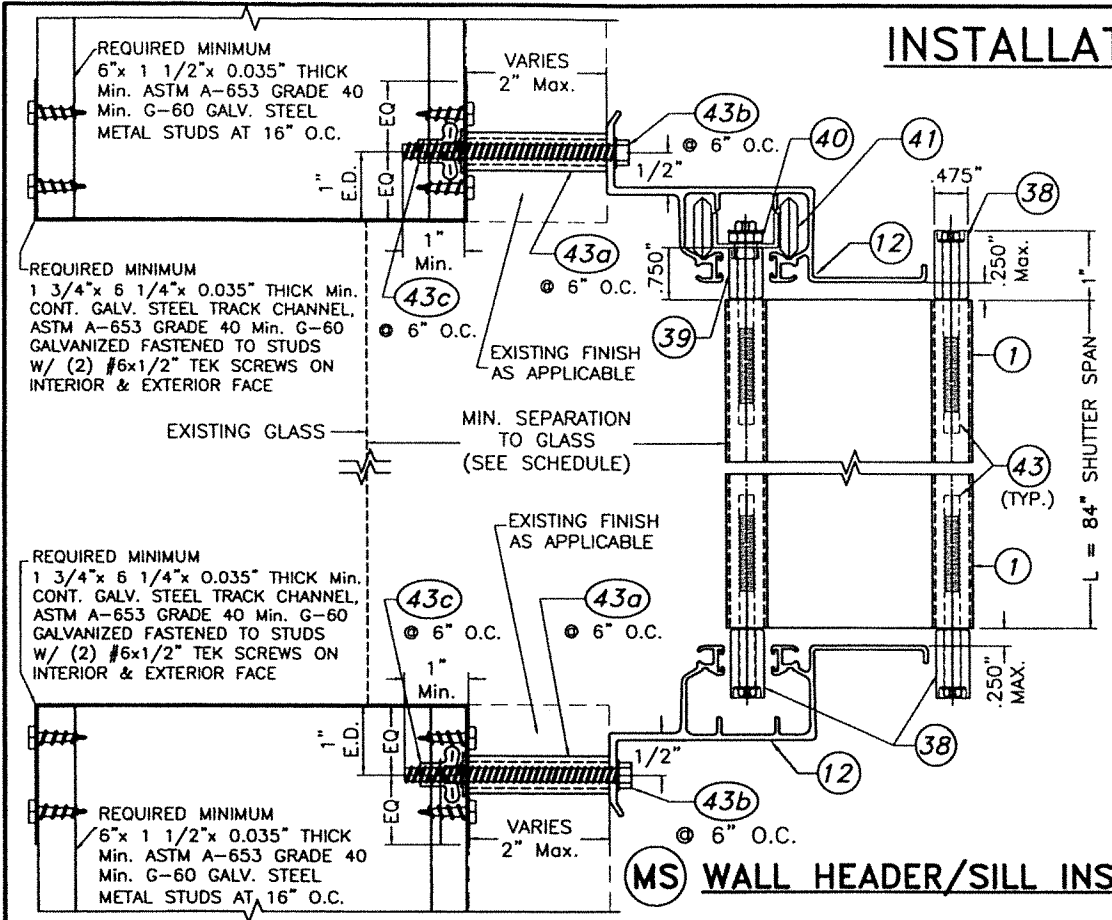
④③a 1/4"Ø NOMINAL
ALUMINUM SLEEVE
6063-T5 ALLOY

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

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

COMPONENTS

SCALE: 3/8" = 1"

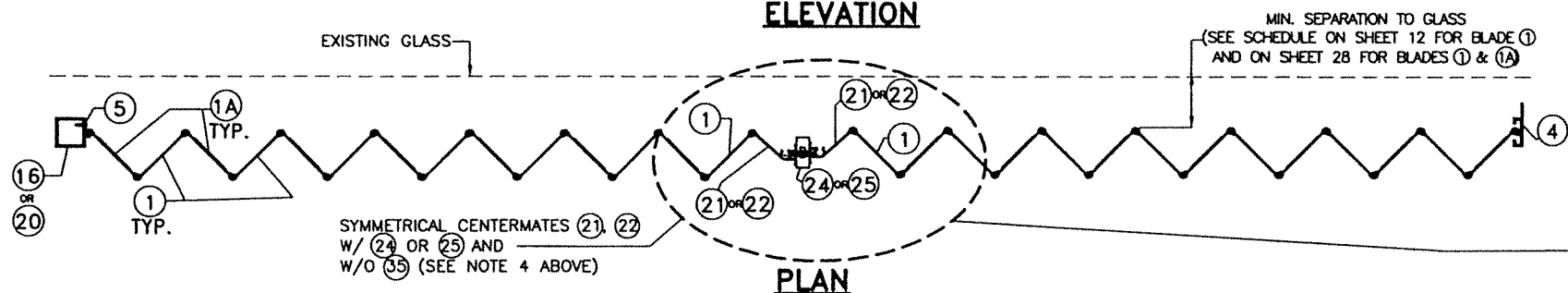
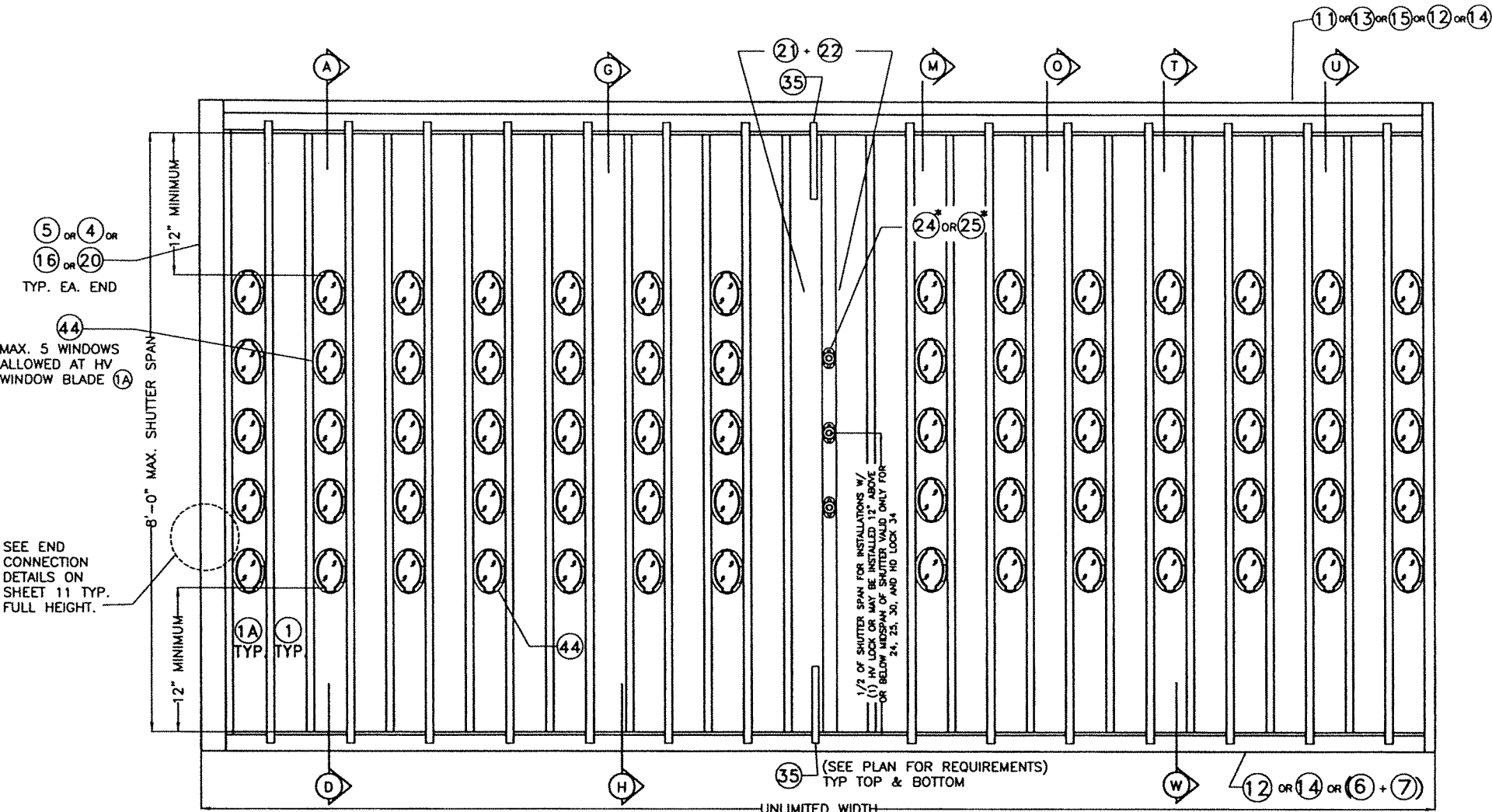


WALTER A. TILLIT JR.
LICENSE
No. 44167
STATE OF FLORIDA
PROFESSIONAL ENGINEER
P.E. SEAL/SIGNATURE/DATE

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H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE & H.V. BLADE #2			
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			DRAWING No 23-128
			SHEET 28A OF 28



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

N.T.S.

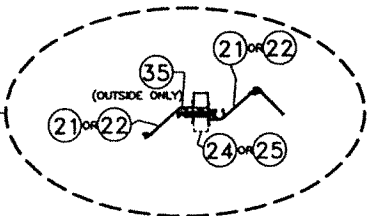
*** GENERAL LIMITATIONS AND CONDITIONS OF USE FOR BERTHA**

① HV BLADE ACCORDION SHUTTER SYSTEM WORKING IN UNISON WITH HV WINDOW BLADE ①A

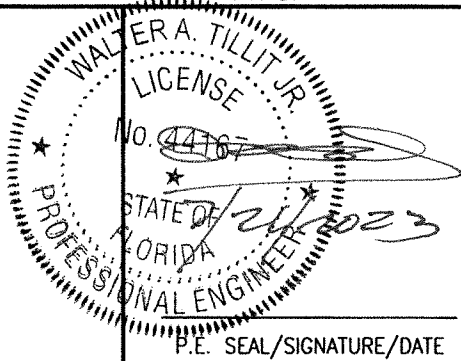
1. MAX. A.S.D. DESIGN PRESSURE RATING: +110, - 110 p.s.f.
2. MAX. SHUTTER SPAN: 96".
3. ALLOWED MOUNTINGS: A, D, G & H ON SHEETS 6, 7; AS WELL AS MOUNTINGS M, O, T, U & W ON SHEETS 18 & 19.
4. ONLY CENTERMATES ②①, ②② (BOTH W/ ②④ OR ②⑤) ARE ALLOWED WITH ②①, ②② ARRANGED IN A SYMMETRICAL OR OPPOSING LAYOUT. 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 27.
(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 16, AS LIMITED BY SPAN AND A.S.D. DESIGN LOAD (SEE NOTES 1 & 2 ABOVE).
7. SEE ANCHOR SPACING SCHEDULE FOR INSTALLATIONS INTO POURED CONCRETE OR CONCRETE BLOCK WALL ON SHEETS 13 & 14 AS LIMITED BY SPAN AND A.S.D. 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)



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