

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 2010 EDITION OF THE FLORIDA BUILDING CODE. THIS ACCORDION SHUTTER SYSTEM SHALL NOT BE INSTALLED AT HIGH VELOCITY HURRICANE ZONES.

DESIGN WIND LOADS SHALL BE DETERMINED AS PER SECTION 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 7-10 FOR INSTALLATIONS UNDER 2010 FBC AND SHALL NOT EXCEED THE MAXIMUM (A.S.D.) DESIGN PRESSURE RATINGS INDICATED ON SHEETS 11, 12, 13, 14, 15, 19 & 20.

IN ORDER TO VERIFY THE ABOVE CONDITION, ULTIMATE DESIGN WIND LOADS DETERMINED PER ASCE 7-10 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, 12, 13, 14, 15, 19 & 20.

IN ORDER TO VERIFY THAT COMPONENTS AND ANCHORS ON THIS P.E.D., AS TESTED, WERE NOT OVER STRESSED, A 33 % INCREASE IN ALLOWABLE STRESS FOR WIND LOADS WAS **NOT** USED IN THEIR ANALYSIS. HOWEVER, A WIND DURATION FACTOR $CD=1.60$ WAS USED FOR VERIFICATION OF FASTENERS IN WOOD. BERTHA H.V. ACCORDION SHUTTER SYSTEM'S ADEQUACY FOR WIND AND LARGE MISSILE IMPACT LOAD HAS BEEN VERIFIED IN ACCORDANCE WITH SECTION 1609.1.2 OF THE ABOVE MENTIONED CODE AS PER ATL REPORTS:

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

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

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

3. BERTHA H.V. ACCORDION PINS (HV SCREWS), USED AT BLADES KNUCKLE AND FOR DIRECT MOUNT CONNECTION TO TRACKS SHALL BE #14x2.75" AND #14x1.75" RESPECTIVELY, 410-HT MINIMUM SERIES STAINLESS STEEL SCREWS WITH 135.0 ksi YIELD STRENGTH AND 180 ksi TENSILE STRENGTH. PINS SHALL BE COATED WITH BERTHA HV DACROSHIELD COATING SYSTEM AS MANUFACTURED BY APPROVED COATING APPLICATORS, REGISTERED WITH AMERICAN SHUTTER SYSTEMS ASSOCIATION. PINS MUST BEAR THE HV MARKING ON THEIR HEAD.

4. ALL ALUMINUM EXTRUSIONS SHALL BE ALUMINUM ASSOCIATION ALLOY AND TEMPER AS INDICATED ON SHEETS 2 AND 3. MINIMUM YIELD STRENGTH FOR 6063-T6 ALLOY IS 30.0 ksi AND 35.7 ksi FOR 6005-T5 ALLOY.

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 : 12,13,14,15 AND 20

HV BLADE ① & ② 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 AT ACCORDION SHUTTER IN ACCORDANCE WITH SECTION 1715.8.3 OF FLORIDA BUILDING CODE. ONE LABEL SHALL BE PLACED FOR EVERY OPENING. LABELING TO COMPLY WITH SECTION 1715.8.2 OF THE FLORIDA BUILDING CODE.

12. BERTHA H.V. ACCORDION SHUTTER SYSTEM'S INSTALLATION SHALL COMPLY WITH SPECS INDICATED IN THIS DRAWING PLUS ANY BUILDING AND ZONING REGULATIONS PROVIDED BY THE JURISDICTION WHERE 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) THIS P.E.D. SHALL BEAR THE DATE AND ORIGINAL SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER OF RECORD THAT PREPARED IT.

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| | |
|---------------------------|----------|
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| | |
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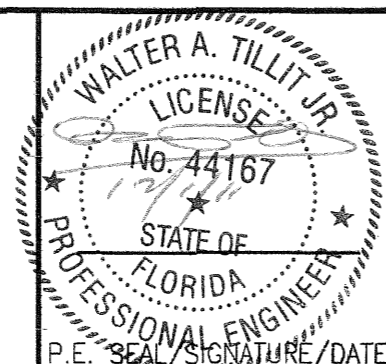
FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

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

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
|---------|-------------|----------|----------------|
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
| 2 | | | |
| 3 | | | |
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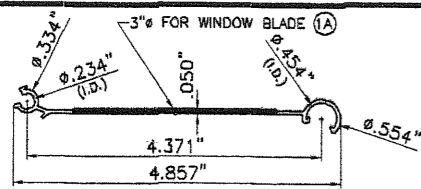
DRAWING No
11-192
 SHEET
1 OF 20



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

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

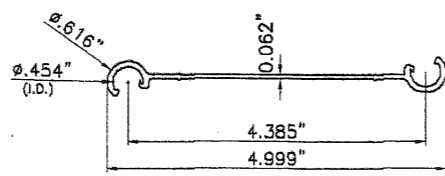


1 HV SOLID BLADE

COVERED UNDER US PATENT # 5458179

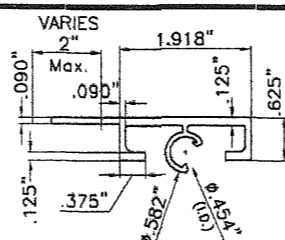
1A HV WINDOW BLADE*

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



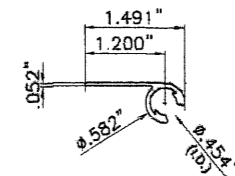
3 HV UNIVERSAL FLOATER

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



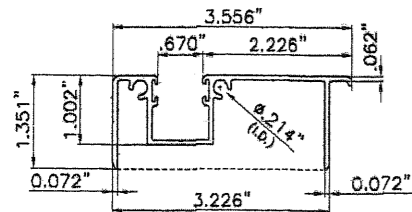
4 HV DIRECT MOUNT

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6063-T6 ALLOY AND TEMPER



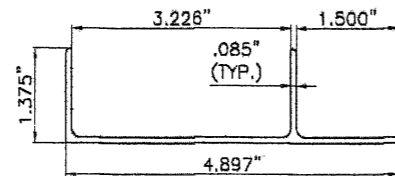
5 HV 90°/180° STARTER

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6063-T6 ALLOY AND TEMPER



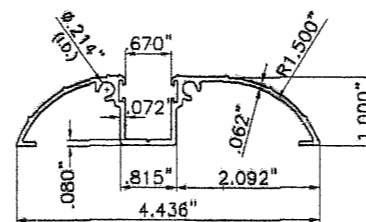
6 HV ADJ. FLOOR TRACK

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



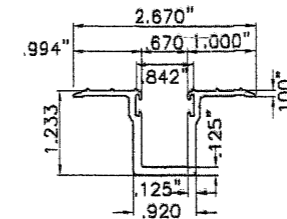
7 HV ADJ. ADAPTER W/LIP

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



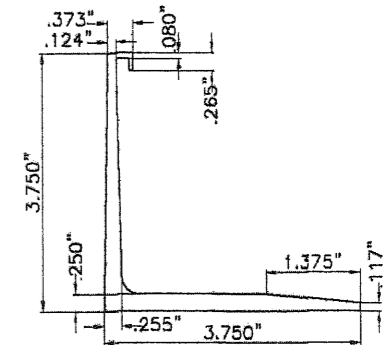
8 HV WALK-OVER TRACK

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6063-T6 ALLOY AND TEMPER



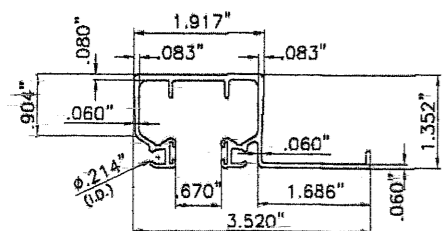
9 HV TRENCH TRACK

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6063-T6 ALLOY AND TEMPER



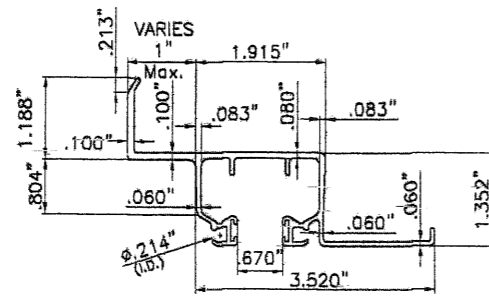
10 HV RAINGUARD

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



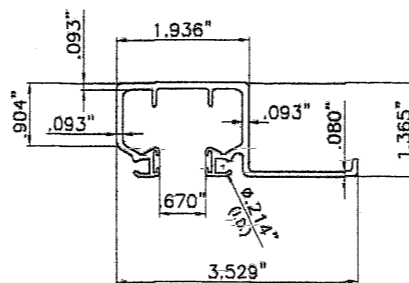
11 HV CEILING HEADER

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



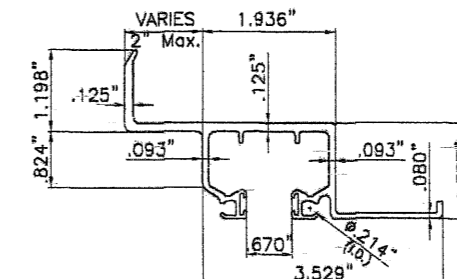
12 HV HEADER/SILL

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6063-T6 ALLOY AND TEMPER



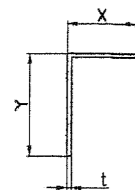
13 HD CEILING HEADER/SILL

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



14 HD WALL HEADER/SILL

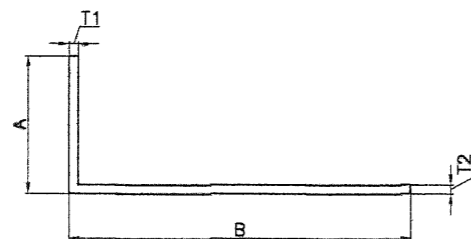
QUALIFIED FOR USE W/ HV BLADE 1 ONLY.
6063-T6 ALLOY AND TEMPER



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

16 SIDE ANGLES

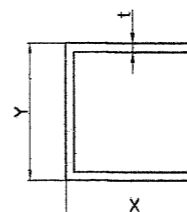
QUALIFIED FOR USE W/ HV BLADE 1
6063-T6 ALLOY AND TEMPER



ALUMINUM ANGLES

QUALIFIED FOR USE W/ HV BLADE 1 ONLY.
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" |



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

20 CORNER POSTS

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

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

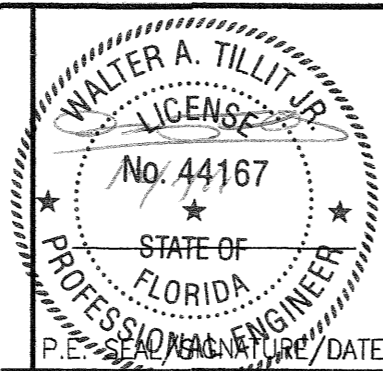
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H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

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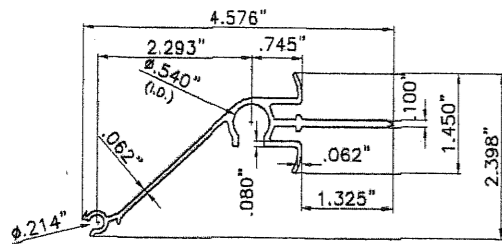
DRAWING No
11-192

SHEET
2 OF 20



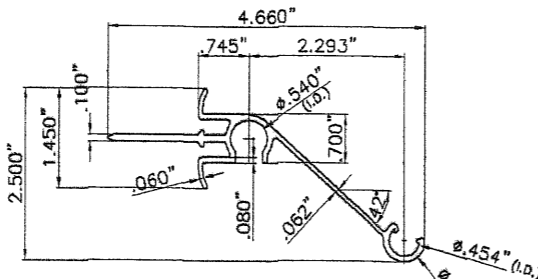
TILLIT TESTING & ENGINEERING COMPANY
6355 N.W. 36th. St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33168
Phone : (305)871-1530 . Fax : (305)871-1531
e-mail: tilteco@aol.com
EB-0006719
WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167

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



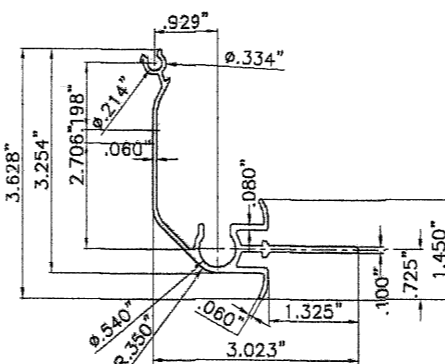
21 HV CENTERMATE

QUALIFIED FOR USE W/ HV BLADE (1) & (1A) ONLY
6063-T6 ALLOY AND TEMPER



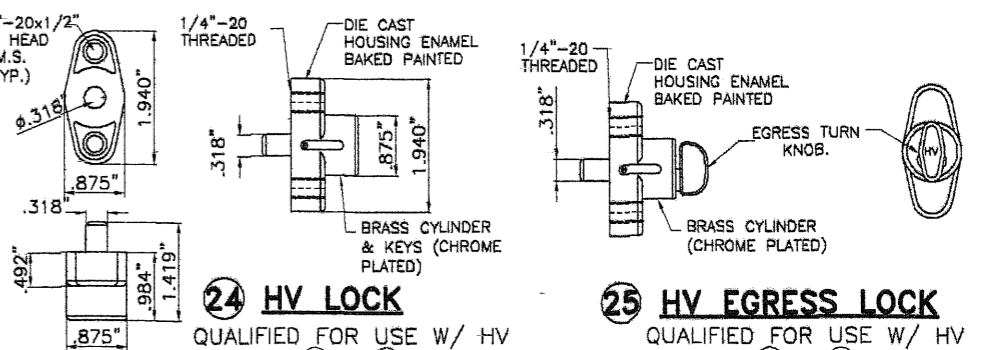
22 HV FLOATING CENTERMATE

QUALIFIED FOR USE W/ HV BLADE (1) & (1A) ONLY
6063-T6 ALLOY AND TEMPER



23 HV CORNER CENTERMATE

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

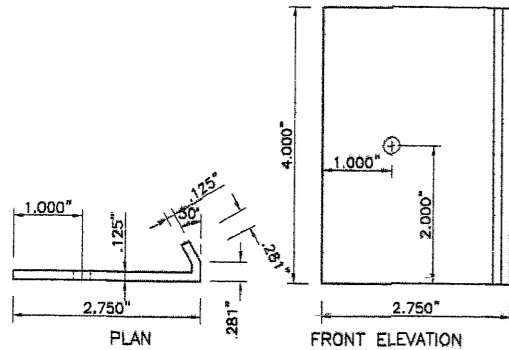


24 HV LOCK

QUALIFIED FOR USE W/ HV
BLADE (1) & (1A) ONLY.

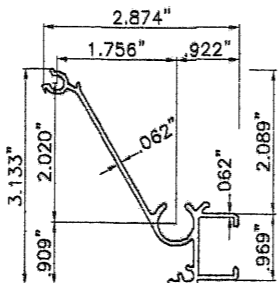
25 HV EGRESS LOCK

QUALIFIED FOR USE W/ HV
BLADE (1) & (1A) ONLY.



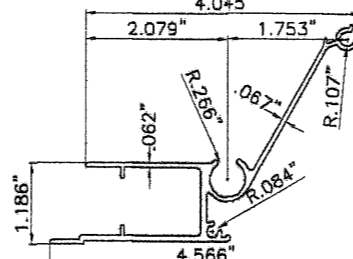
27 LOCKER FOR "T" LOCK CENTERMATE

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



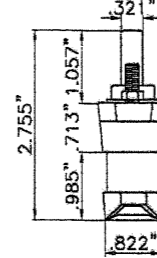
28 HV MALE "T" LOCK CENTERMATE

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



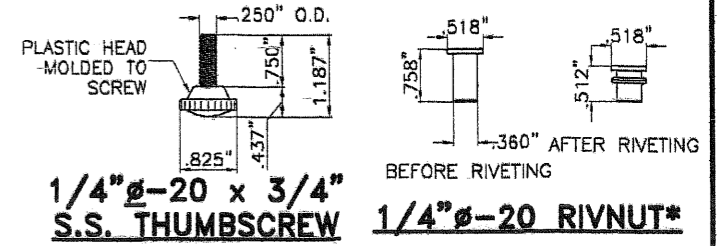
29 HV FEMALE "T" LOCK CENTERMATE

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



30 HV "T" LOCK

QUALIFIED FOR USE
W/HV-BLADE (1) ONLY.

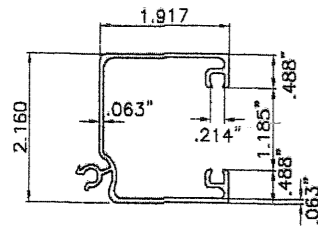


26 HV ALTERNATIVE LOCK

QUALIFIED FOR USE W/ HV
BLADE (1) ONLY.

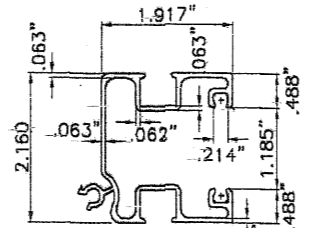
1/4" - 20 x 3/4" S.S. THUMBSCREW **1/4" - 20 RIVNUT***

*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.



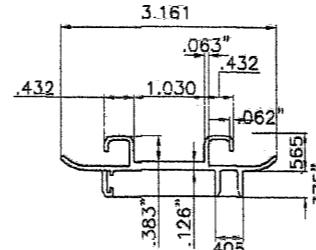
31 HD CENTERMATE W/ NO LOCKING ROD

QUALIFIED FOR USE W/ HV BLADE (1) & (1A)
6063-T6 ALLOY AND TEMPER



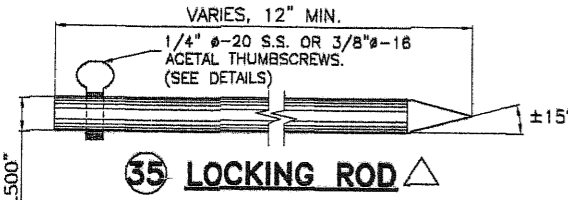
32 HD CENTERMATE W/ LOCKING ROD

QUALIFIED FOR USE W/ HV BLADE (1) & (1A)
6063-T6 ALLOY AND TEMPER



33 HD CENTERMATE'S INSERT

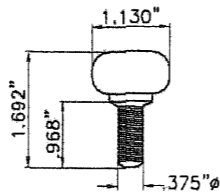
QUALIFIED FOR USE W/ HV BLADE (1) & (1A)
6063-T6 ALLOY AND TEMPER



35 LOCKING ROD

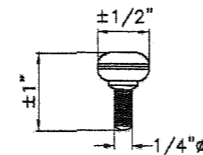
QUALIFIED FOR USE W/ HV BLADE (1)
6063-T6 ALLOY AND TEMPER

△ (35) INSTALLATION WILL REQUIRE A 7/16" HOLE
DRILLED AT TRACKS FOR PROPER EMBEDMENT



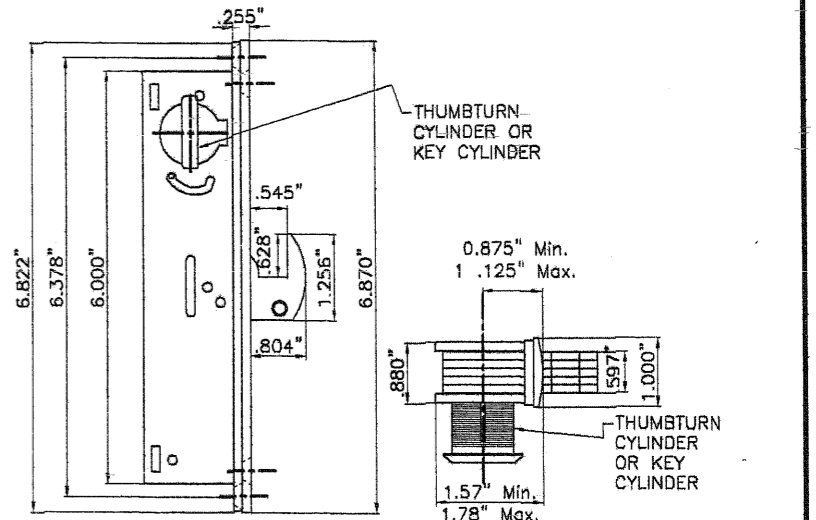
36 HV 3/8" - 16 ACETAL THUMBSCREWS

QUALIFIED FOR USE W/ HV BLADE (1)



37 HV 1/4" - 20 AISI 304 SERIES S.S. THUMBSCREWS

QUALIFIED FOR USE W/ HV BLADE (1)



34 HD LOCK

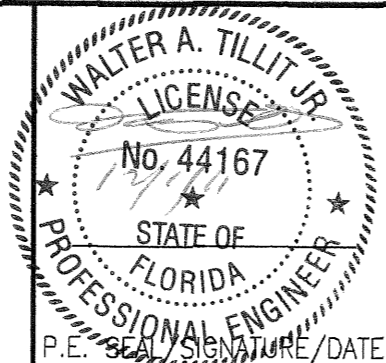
BY REGENT HARDWARE MORTISE LOCKS SERIES 2333 HOOK BOLT LOCK.
QUALIFIED FOR USE W/ HV BLADE (1) & (1A)

FLORIDA BUILDING CODE (Non 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

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
|---------|-------------|----------|----------------|
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
| 2 | | | DRAWING No |
| 3 | | | 11-192 |
| 4 | | | SHEET |
| 5 | | | 3 OF 20 |
| 6 | | | |



TILLIT TESTING & ENGINEERING COMPANY
6355 N.W. 38th. St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33168
Phone: (305)871-1530 Fax: (305)871-1531
e-mail: tilteco@aol.com
EB-0006719
WALTER A. TILLIT Jr. P.E.
FLORIDA Lic. # 44167



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

SHUTTER ASSEMBLY SCHEDULE FOR HV ①, HV ①A

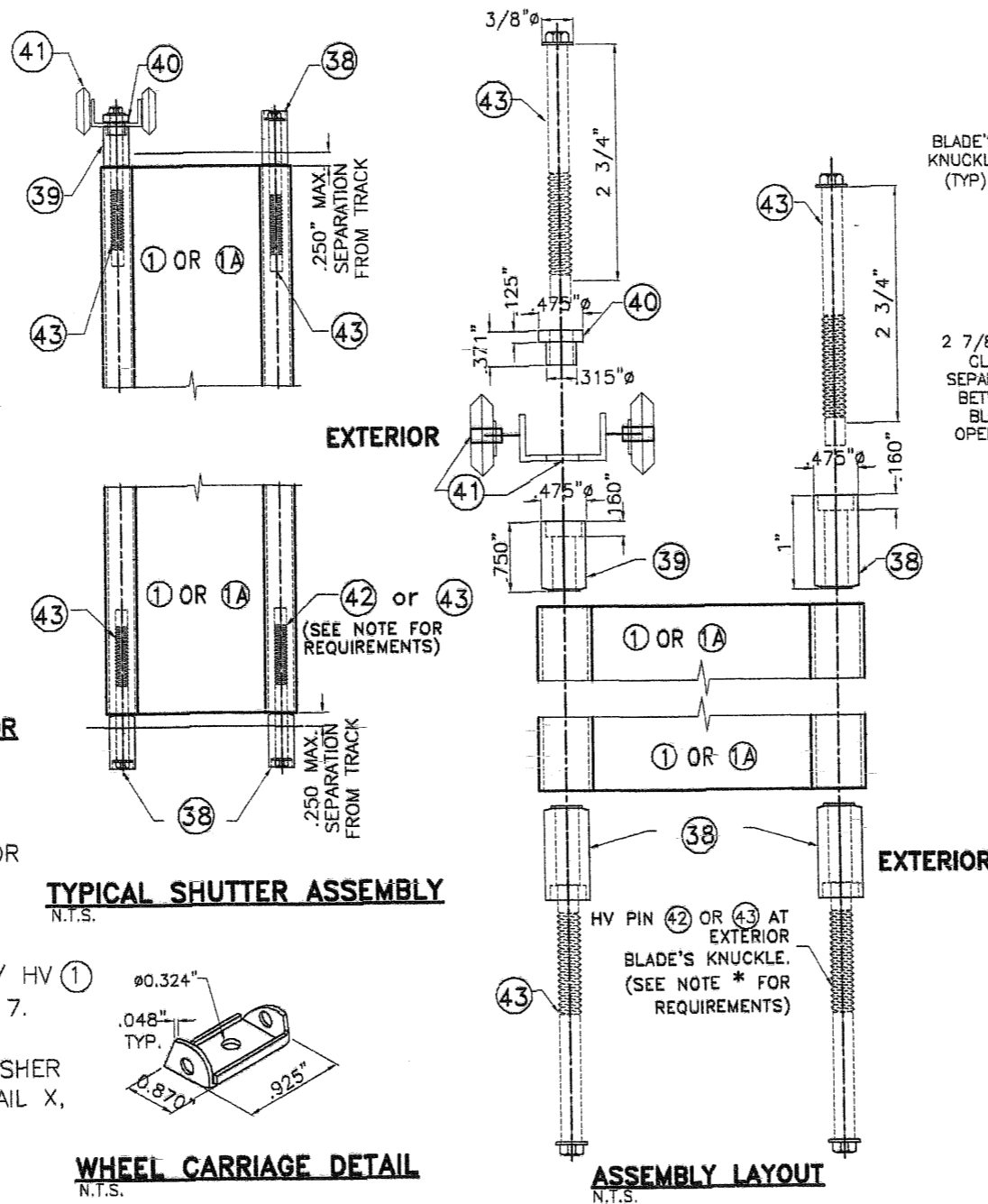
| | |
|----|---|
| ① | HV BLADE 1 |
| ①A | HV BLADE 1A |
| ③⑧ | HV LONG RECESSED NYLON BUSHING |
| ③⑨ | HV SHORT RECESSED NYLON BUSHING |
| ④① | HV NYLON HAT WASHER |
| ④② | HV WHEEL CARRIAGE AISI 302-303 SERIES ϕ.870"x3/16" THICK NYLON WHEEL. 0.188"ϕ AISI 302 SERIES S.S. RIVETS |
| ④③ | HV 1 3/4" ACCORDION PIN W/ #8 HEAD * |
| ④④ | HV 2 3/4" ACCORDION PIN W/ #8 HEAD * |
| ④⑤ | 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 "1", SHEET 7.

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

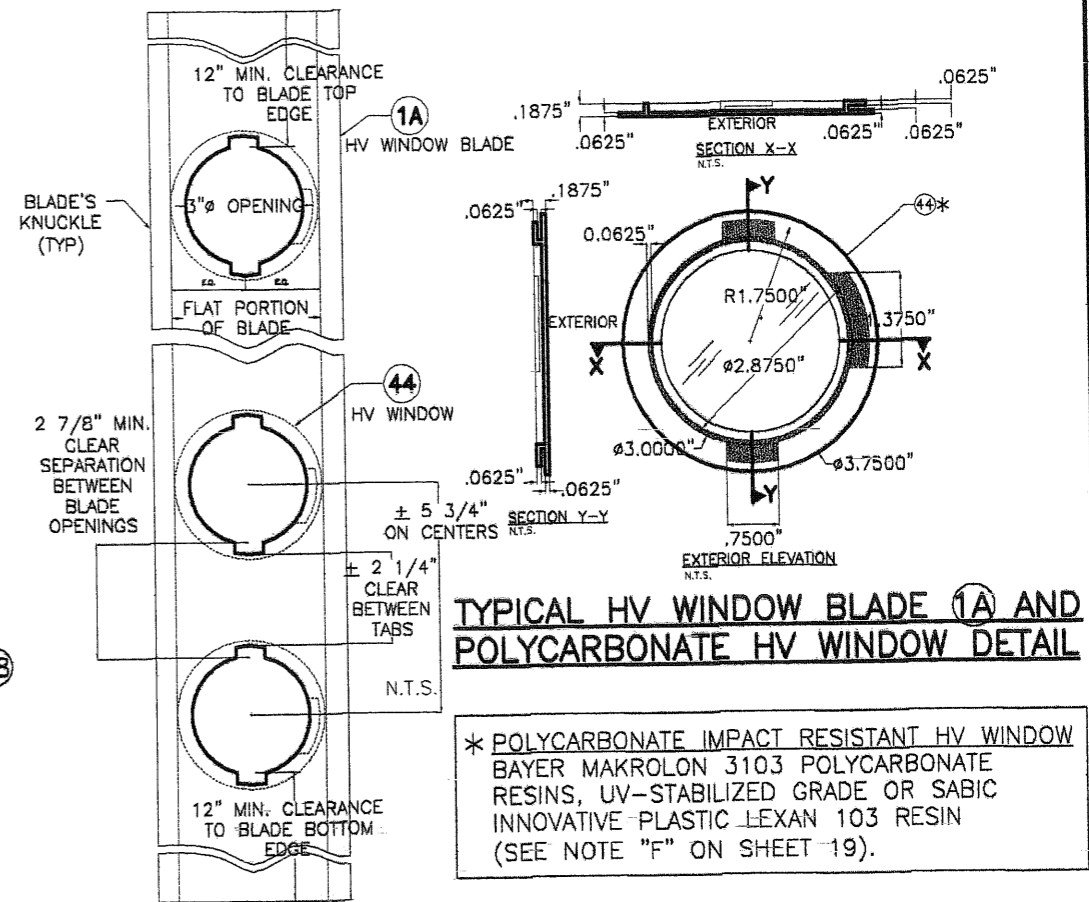


TYPICAL SHUTTER ASSEMBLY
N.T.S.

WHEEL CARRIAGE DETAIL
N.T.S.

ASSEMBLY LAYOUT
N.T.S.

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



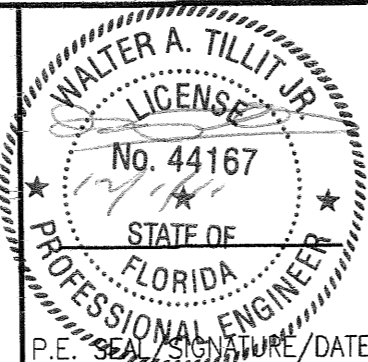
TYPICAL HV WINDOW BLADE ①A AND POLYCARBONATE HV WINDOW DETAIL

* 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 ④⑤ | | | |
|--------------------------------------|-------------------------------|--|--|
| 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 | | |
| TENSILE STRESS BEFORE WEATHERING | ASTM G38 | 9302 p.s.i. | 8840 p.s.i. |
| | ASTM G38 | 8461 p.s.i. | 8880 p.s.i. |

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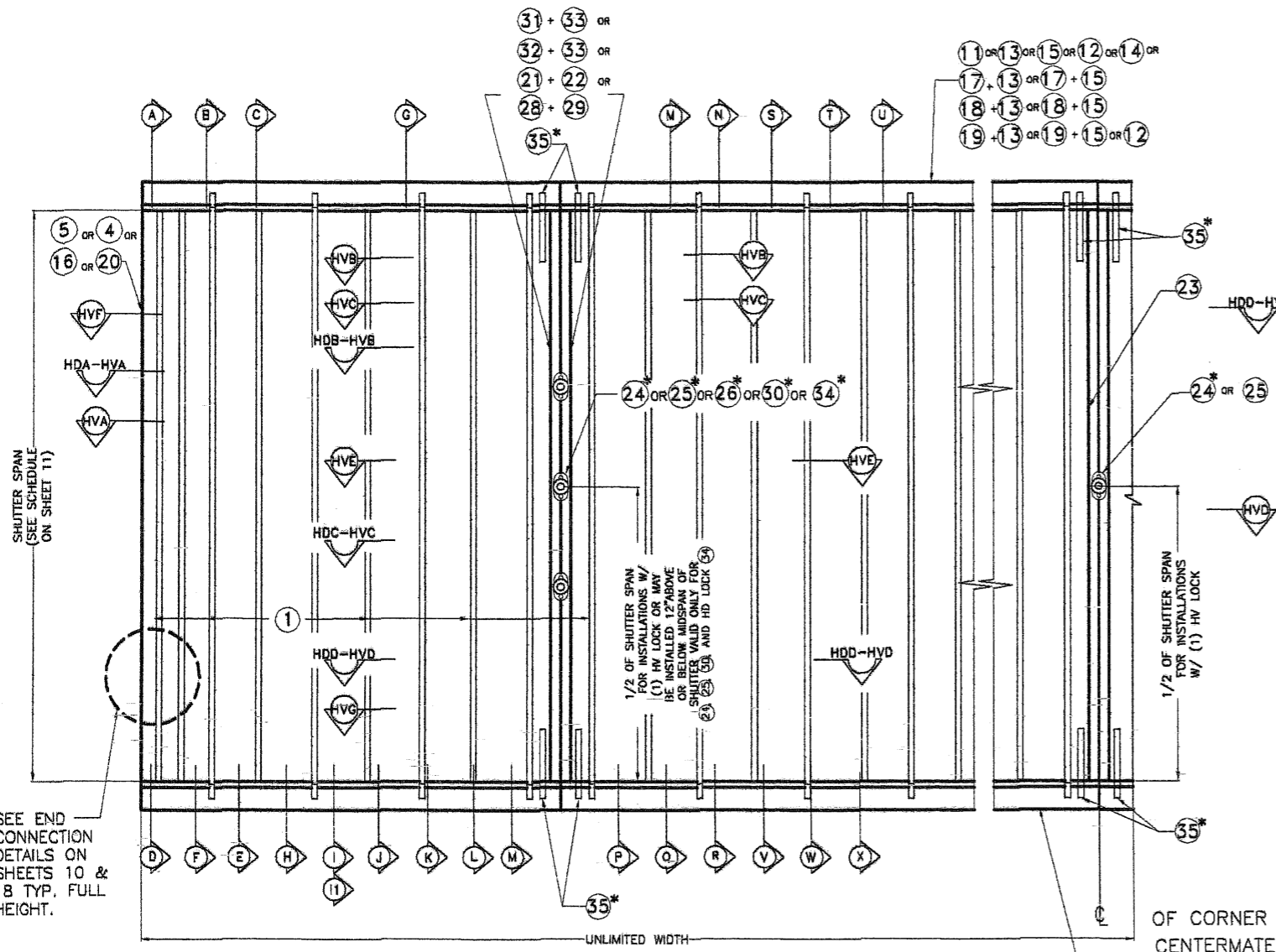


TILLIT TESTING & ENGINEERING COMPANY
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A.S.S.A.
American Shutter Systems
Association, Inc.
4268 Westroads Drive
West Palm Beach, FL 33407

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

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
|---------|-------------|----------|----------------|
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
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| 5 | | | 4 OF 20 |
| 6 | | | |



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"φ-20 x 1/2" LONG FLAT HEAD S.S. M.S. LOCATION OF LOCK SHALL BE AS INDICATED ON TYPICAL SHUTTER ELEVATION.
 - 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"φ-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"φ-20x3/4" S.S. THUMBSCREW TO ②① OR ②② CENTERMATES SHALL BE MADE W/ 1/4"φ-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 ③⑩ AND CENTERMATES ②⑧ AND ②⑨:** ONE ALTERNATE HV "T" LOCK ③⑩ MAY BE INSTALLED IN LIEU OF HV LOCKS ②④ OR ②⑤ FOR ANY SPAN AND INSTALLATION AT ANY ELEVATION. ALTERNATE LOCK ③⑩ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF LOCK ③⑩ INCLUDES USING REINFORCING LOCKER ②⑦, AS SHOWN ON SECTION HVG, SHEET 9, WHICH MUST BE CONNECTED TO CENTERMATES ②⑧ AND ②⑨ W/ 1/4"φ-20 x 1 1/2" LONG S.S. THREADED BOLT W/ 7/8"φ x 3/32" WINGNUT OR W/ 1/4"φ-20x1" S.S.M.S. INTO A 1/4"φx 5/8" RIVNUT. LOCK MAY BE INSTALLED AT MIDSPAN OR 12" MAXIMUM ABOVE AND BELOW MIDSPAN. USE OF TWO LOCKING RODS ③⑤ TOP AND BOTOM IS MANDATORY.

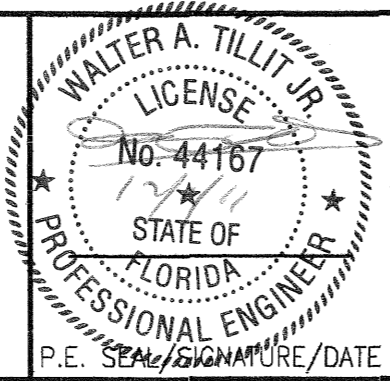
- *NOTES ON HD LOCKS & CENTERMATES:**
- HD LOCK ③④ W/ HD CENTERMATES ③① OR ③② W/ ③③:** ONE ALTERNATE HD LOCK ③④ MAY BE USED IN LIEU OF HV LOCKS ②④ OR ②⑤ FOR ANY SPAN AND INSTALLATIONS AT ANY ELEVATION. ALTERNATE HD LOCK ③④ MAY BE USED AS AN INSIDE OR OUTSIDE LOCK. ATTACHMENT OF HD LOCK ③④ TO ③③ IS W/ 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 ABOVE OR BELOW MIDSPAN. USE OF LOCKING RODS ③⑤ IS COMPLETELY OPTIONAL.

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|---------|-------------|----------|-----------------------------|
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| 2 | | | DRAWING No 11-192 |
| 3 | | | |
| 4 | | | |
| 5 | | | SHEET |
| 6 | | | 5 OF 20 |

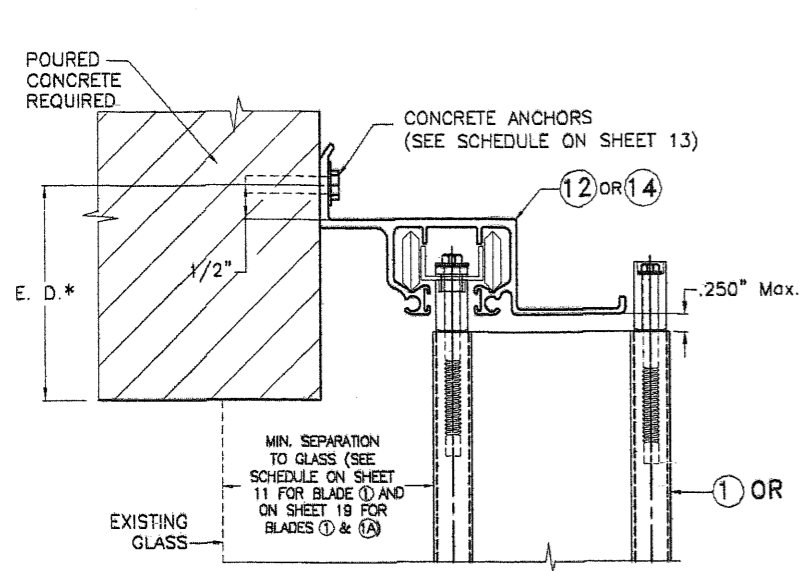


TILLIT TESTING & ENGINEERING COMPANY
6355 N.W. 36th St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33166
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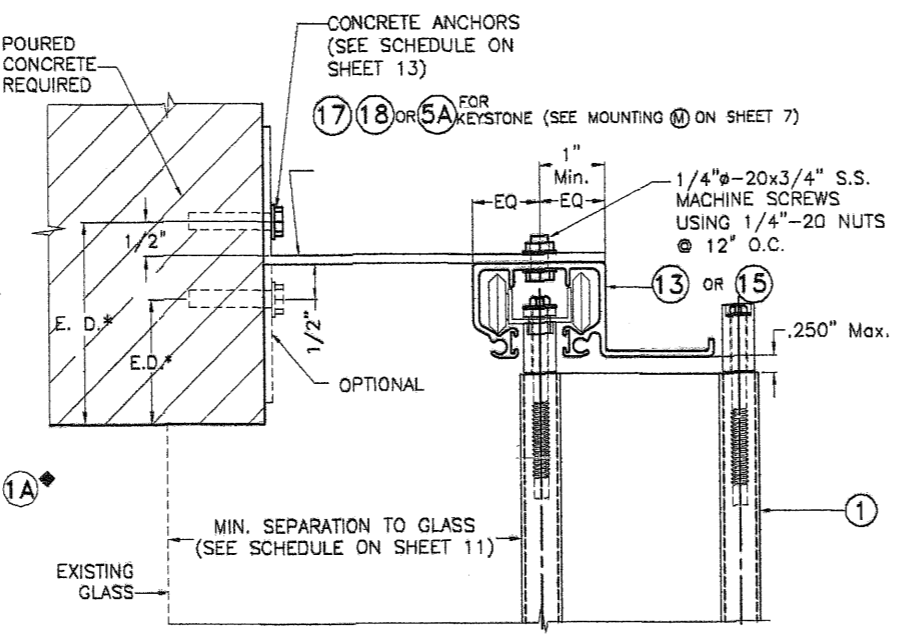
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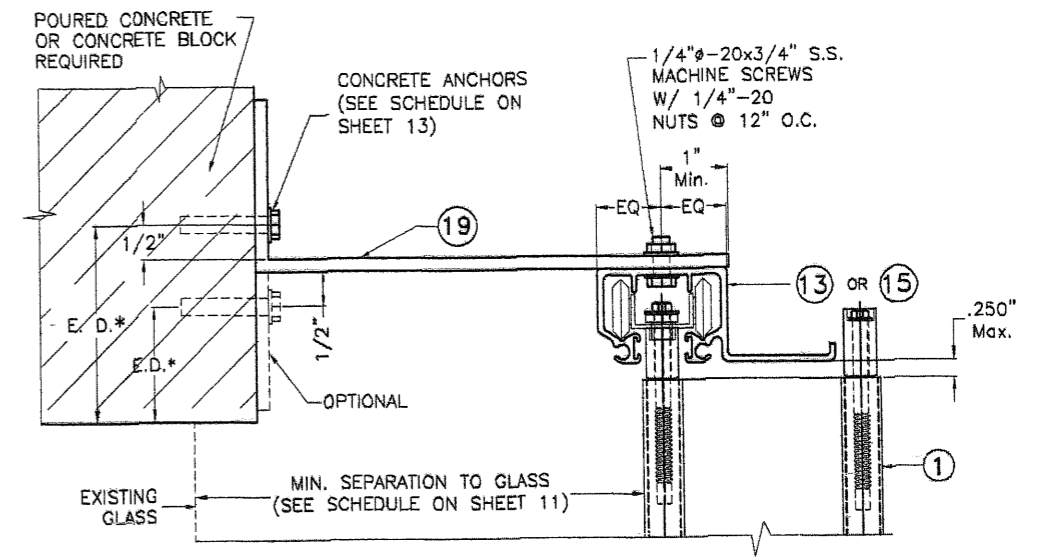
P.E. SEAL/SIGNATURE/DATE



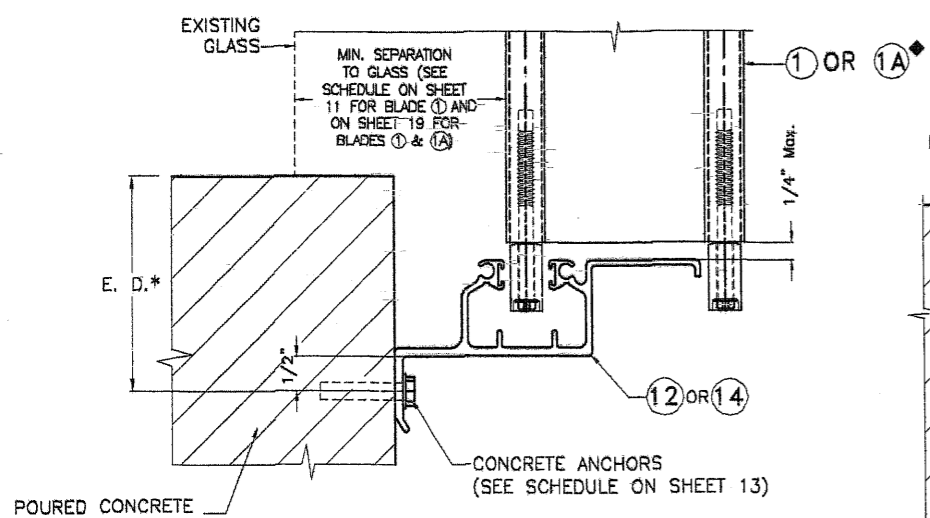
A HV WALL HEADER INSTALLATION



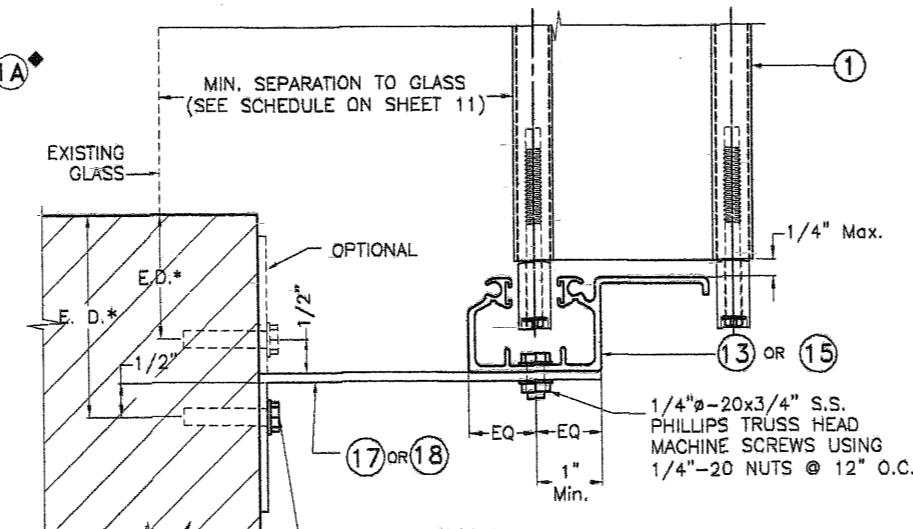
B HV WALL HEADER INSTALLATION + KEYSTONE



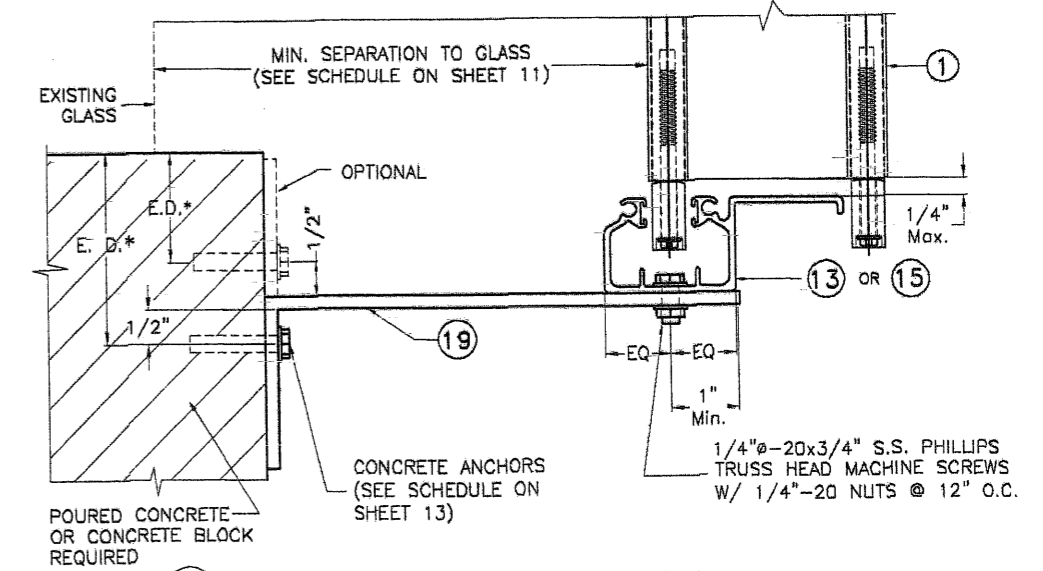
C HV WALL HEADER INSTALLATION



D HV WALL SILL INSTALLATION



E HV WALL SILL INSTALLATION



F HV WALL SILL INSTALLATION

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

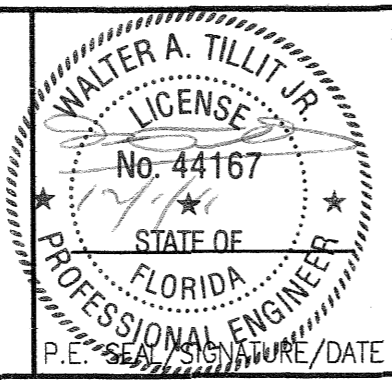
**INSTALLATION DETAILS W/
 1 HV BLADE**

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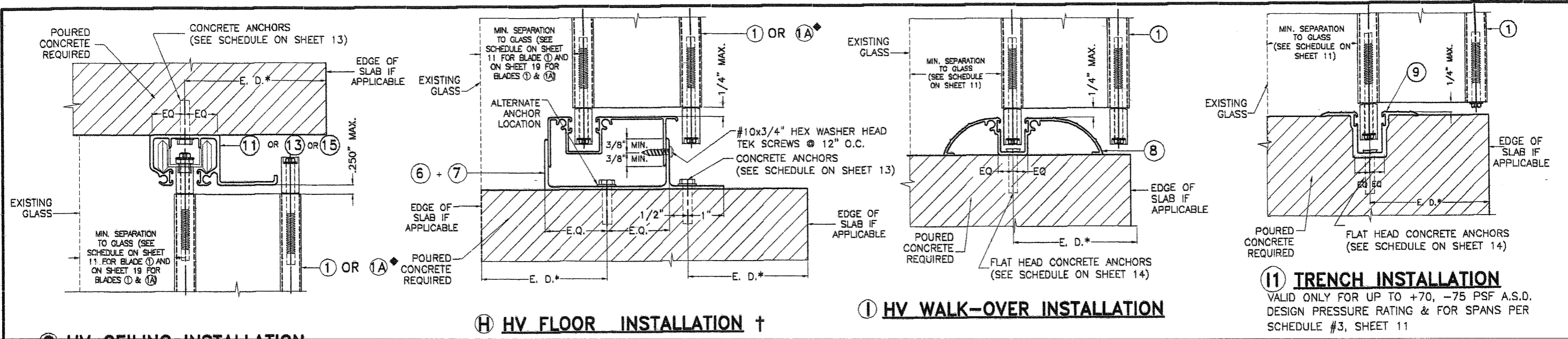
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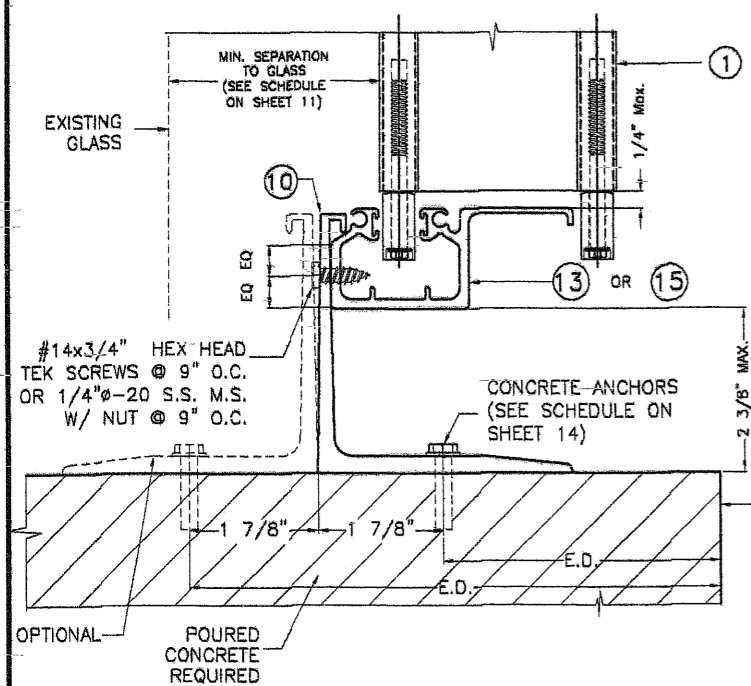
G HV CEILING INSTALLATION

H HV FLOOR INSTALLATION †

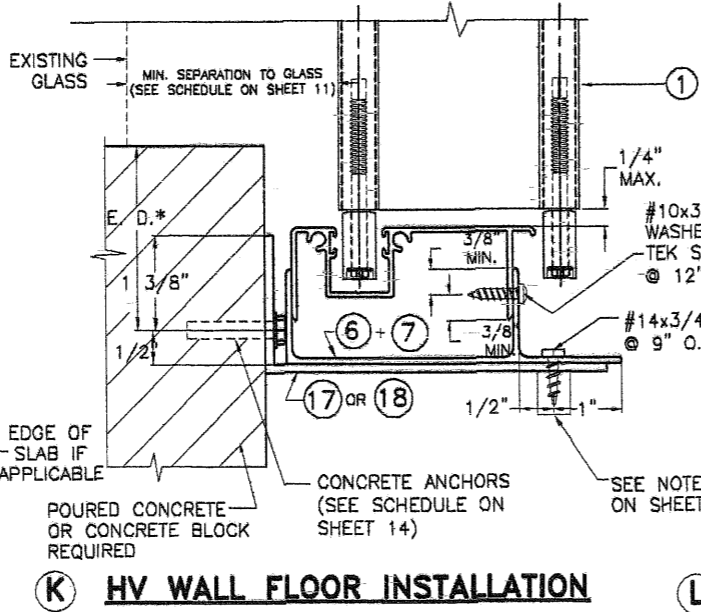
I HV WALK-OVER INSTALLATION

11 TRENCH INSTALLATION

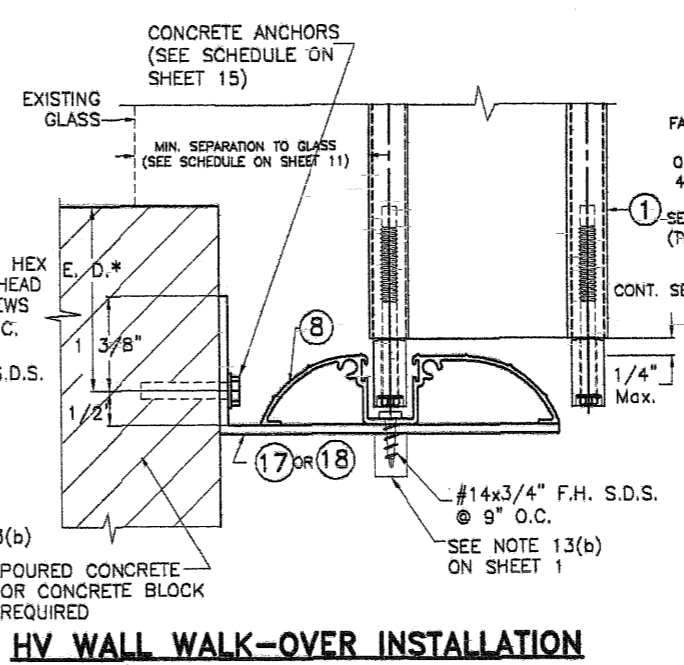
VALID ONLY FOR UP TO +70, -75 PSF A.S.D. DESIGN PRESSURE RATING & FOR SPANS PER SCHEDULE #3, SHEET 11



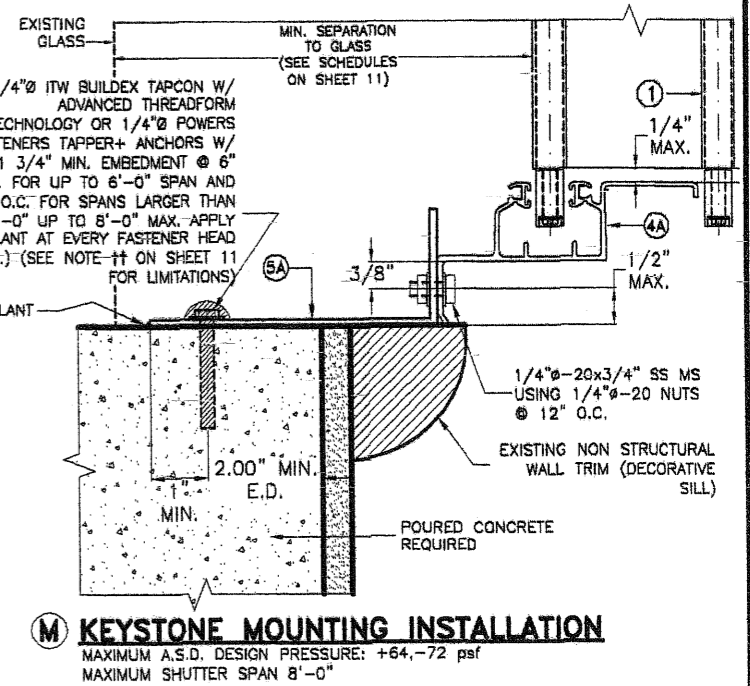
J HV RAINGUARD INSTALLATION †



K HV WALL FLOOR INSTALLATION



L HV WALL WALK-OVER INSTALLATION



M KEYSTONE MOUNTING INSTALLATION

MAXIMUM A.S.D. DESIGN PRESSURE: +64, -72 psf
MAXIMUM SHUTTER SPAN 8'-0"

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 (A) ON SHEET 19

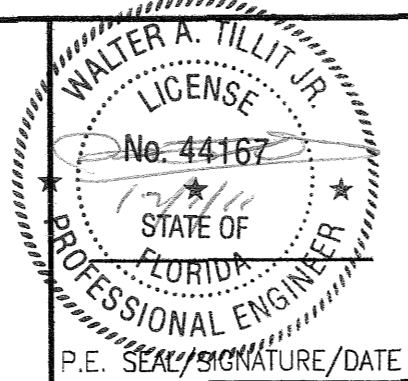
INSTALLATION DETAILS W/ 1 HV BLADE

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Phone : (305)871-1530 . Fax : (305)871-1531
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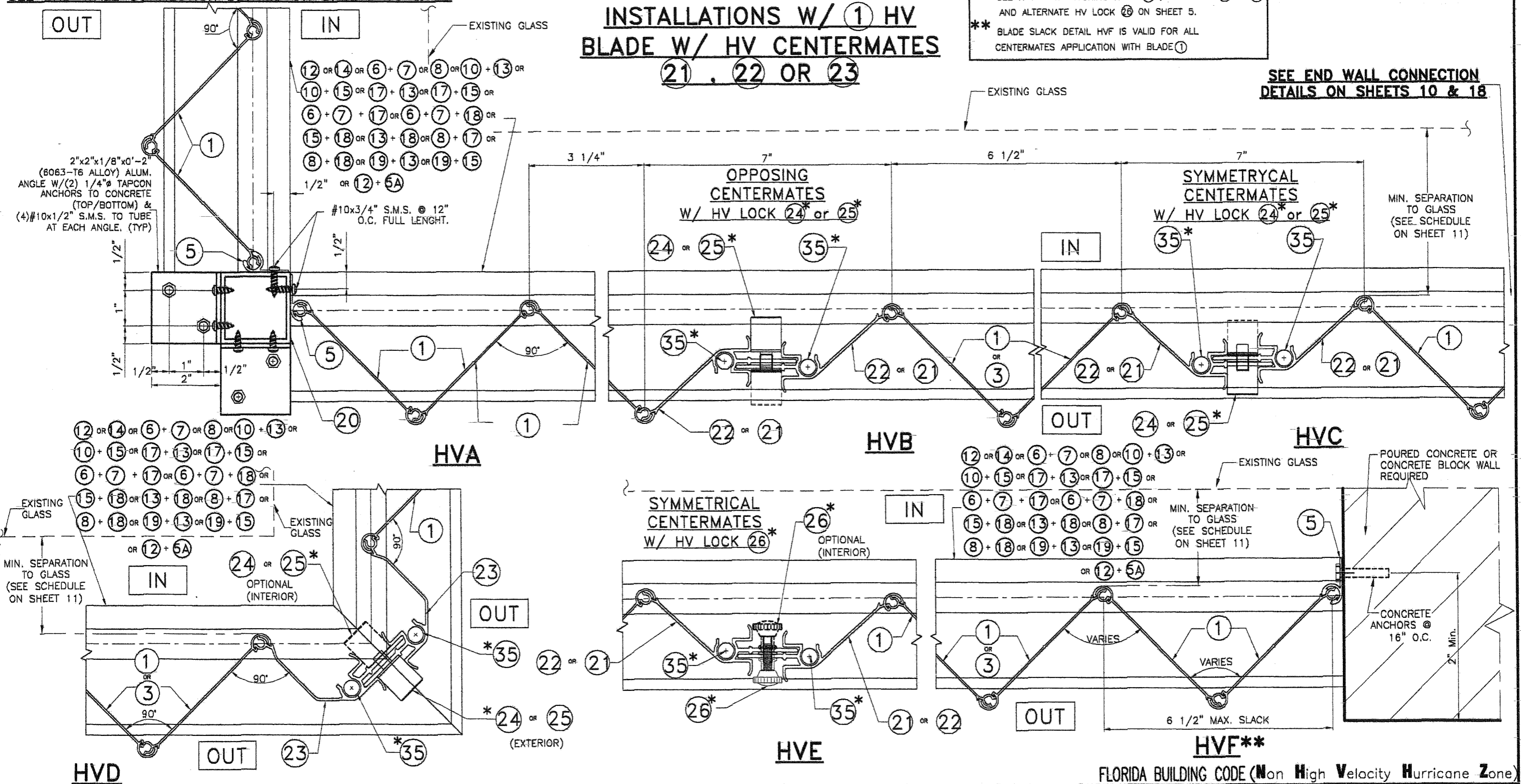
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SEE END WALL CONNECTION DETAILS ON SHEETS 10 & 18

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

* SEE NOTES ON LOCKING RODS ③⑤, 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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WALTER A. TILLIT JR.
 LICENSE
 No. 44167
 STATE OF FLORIDA
 PROFESSIONAL ENGINEER
 P.E. SIGNATURE/DATE

TILTECO INC.
 TILLIT TESTING & ENGINEERING COMPANY
 6355 N.W. 36th St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33186
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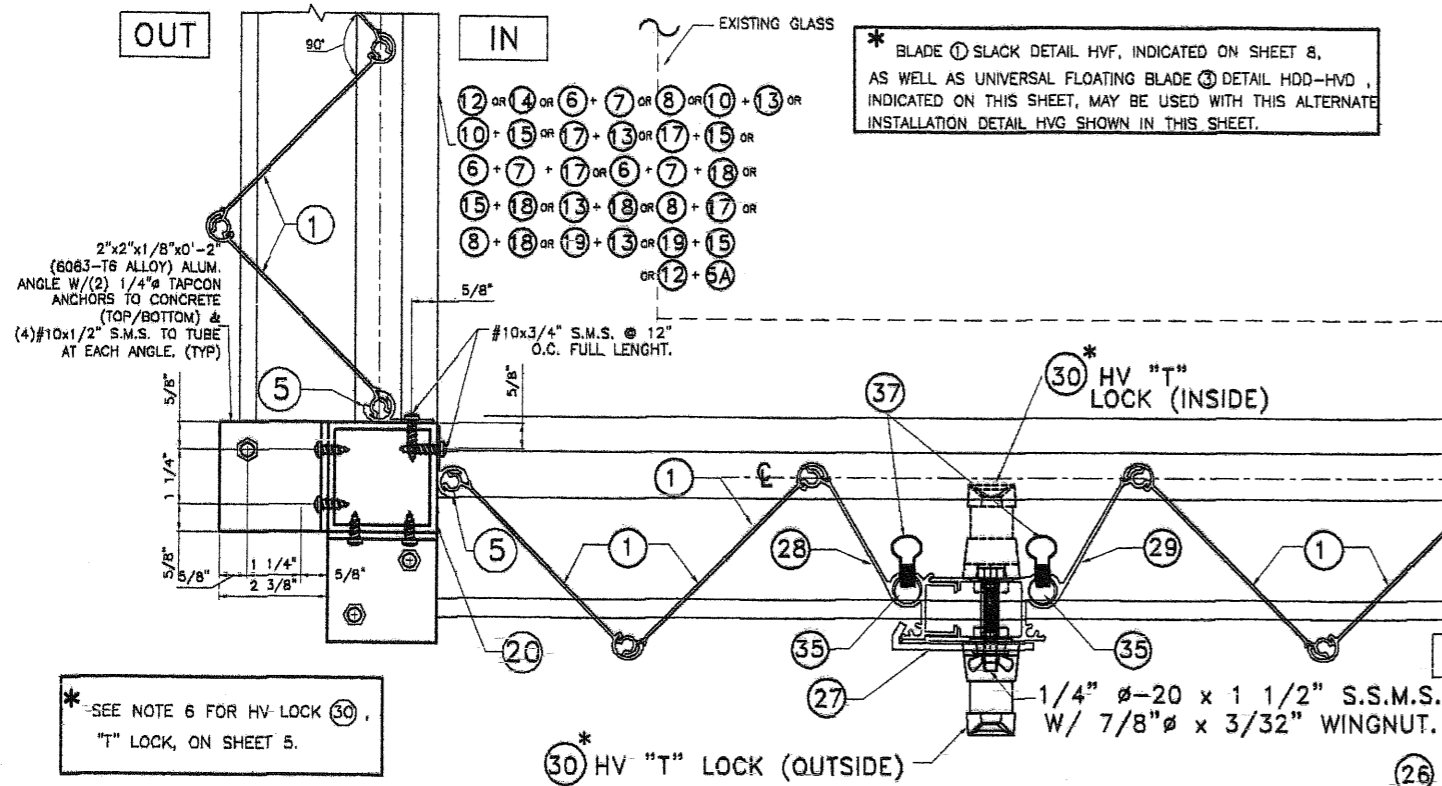
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| 5 | | | 8 OF 20 |
| 6 | | | |

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

SEE END CONNECTION DETAILS ON SHEETS 10 & 18



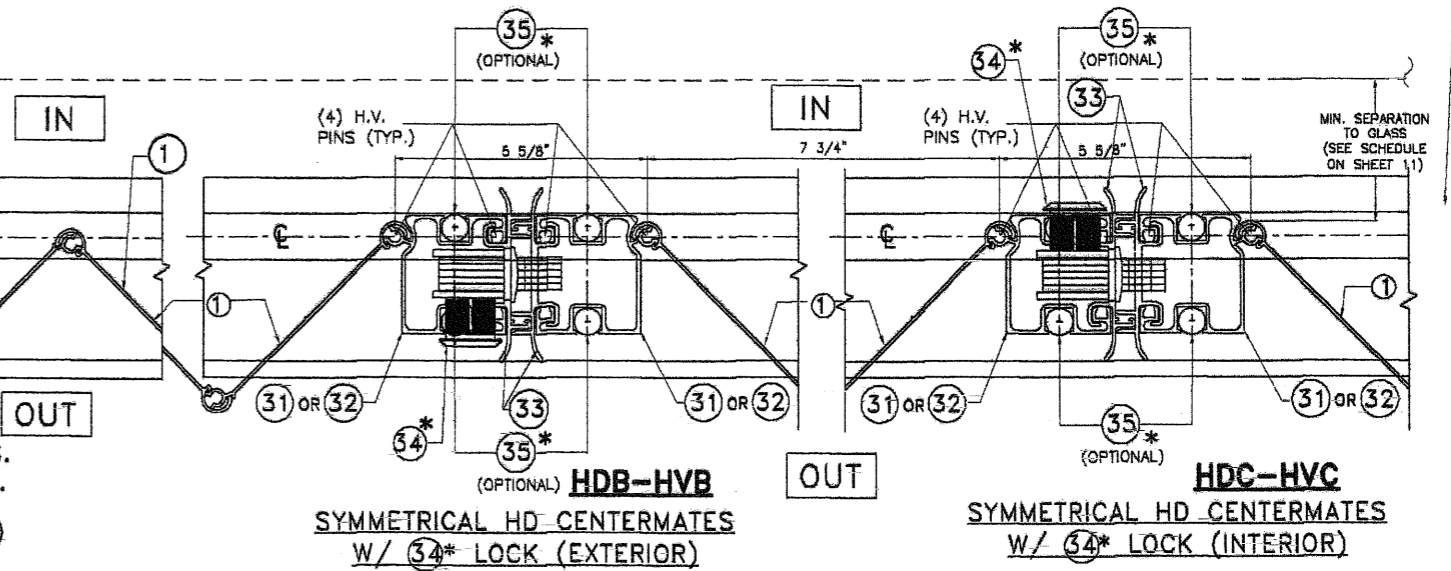
* -SEE NOTE 6 FOR HV-LOCK 30, "T" LOCK, ON SHEET 5.

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



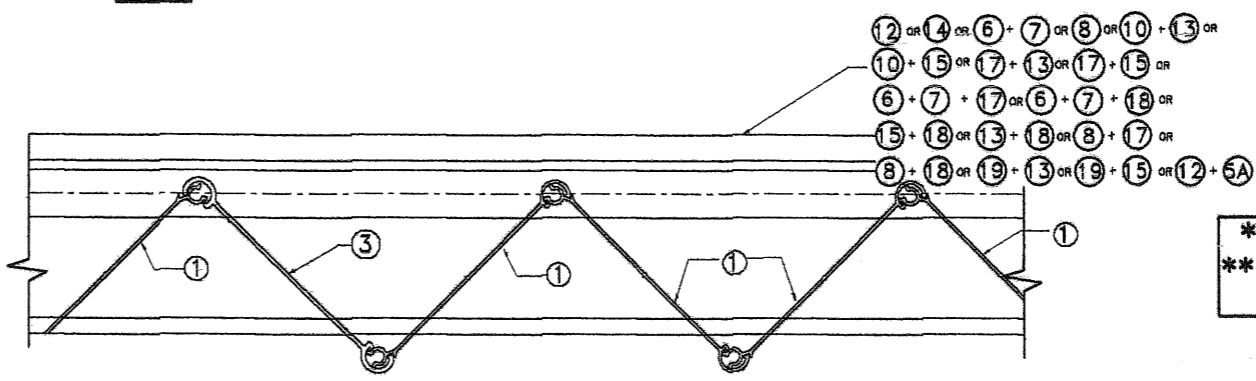
SYMMETRICAL HD CENTERMATES W/ 34* LOCK (EXTERIOR)

SYMMETRICAL HD CENTERMATES W/ 34* LOCK (INTERIOR)

30* HV "T" LOCK (OUTSIDE)

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

HVG*

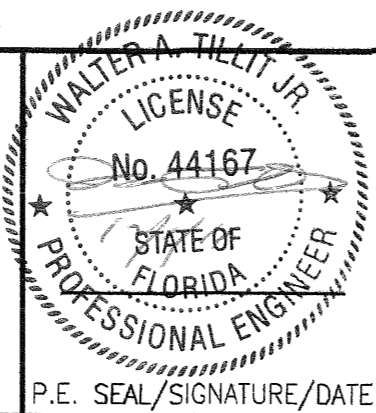


HDD-HVD** FLOATING STACK

* SEE NOTES ON LOCKING RODS 28 & HD 34 LOCKS ON SHEET 5
 ** UNIVERSAL FLOATING BLADE 3 DETAIL HDD-HVD IS VALID FOR ALL CENTERMATES APPLICATIONS WITH BLADE 1

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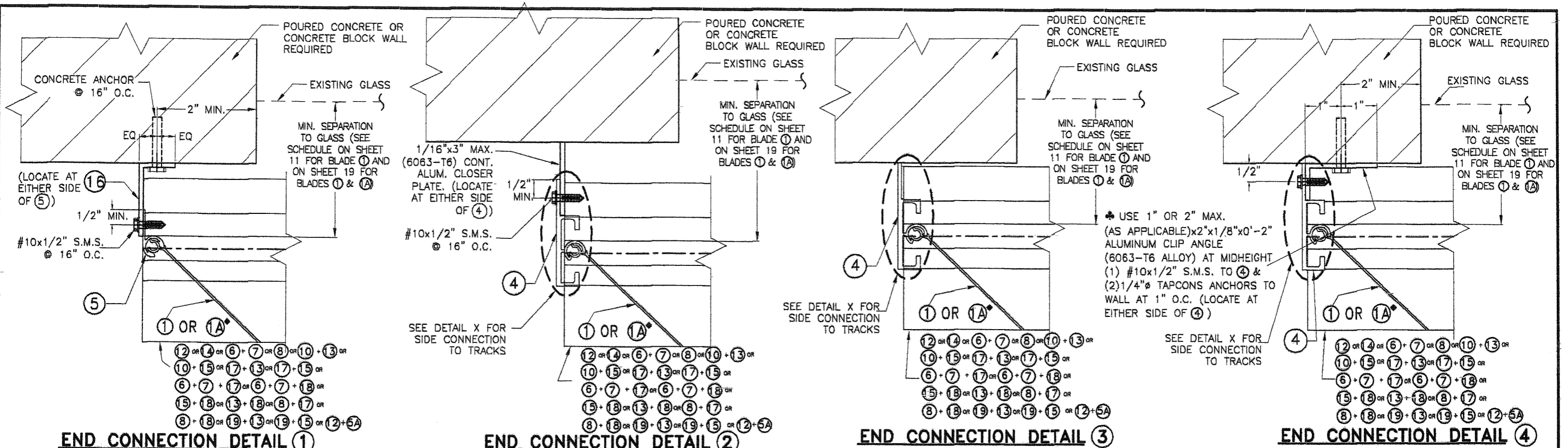


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 e-mail: tilteco@aol.com
 EB-0006719
 WALTER A. TILLIT Jr. P.E.
 FLORIDA Lic. # 44167

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

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

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
|---------|-------------|----------|----------------|
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
| 2 | | | DRAWING No |
| 3 | | | 11-192 |
| 4 | | | SHEET |
| 5 | | | 9 OF 20 |
| 6 | | | |

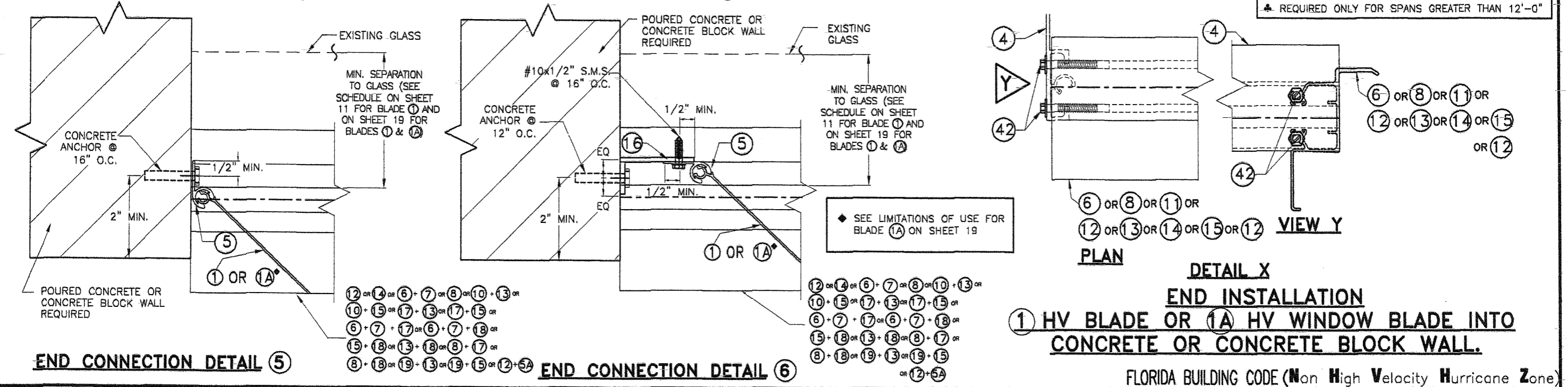


END CONNECTION DETAIL 1

END CONNECTION DETAIL 2

END CONNECTION DETAIL 3

END CONNECTION DETAIL 4

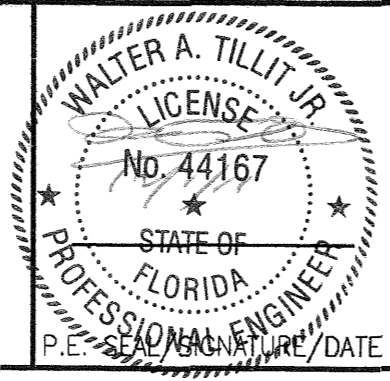


END CONNECTION DETAIL 5

END CONNECTION DETAIL 6

END INSTALLATION
1 HV BLADE OR 1A HV WINDOW BLADE INTO CONCRETE OR CONCRETE BLOCK WALL.

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)



TILLIT TESTING & ENGINEERING COMPANY
 6355 N.W. 36th. St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33168
 Phone : (305)871-1530 . Fax : (305)871-1531
 e-mail: tiltcco@aol.com
 EB-006719
 WALTER A. TILLIT Jr. P.E.
 FLORIDA Lic. # 44167



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

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
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| 2 | | | DRAWING No |
| 3 | | | 11-192 |
| 4 | | | SHEET |
| 5 | | | 10 OF 20 |
| 6 | | | |

SCHEDULE #1

MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.). FOR INSTALLATIONS W/ SYMMETRICAL CENTERMATES ① & ② or ③ or ④ W/ ONE H.V. LOCK ④ or ⑤ or ⑥ or HD LOCK ④ W/ NO LOCKING RODS ⑤ or CENTERMATES ② & ③ W/ ONE HV "T" LOCK ③ W/TWO LOCKING RODS ⑤ TOP & BOTTOM (SEE NOTES †, ††)

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

SCHEDULE #2

MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.) FOR INSTALLATIONS W/ OPPOSING CENTERMATES ① & ② ONE HV LOCK ④ or ⑤ or ⑥ W/ NO LOCKING RODS ⑤ (SEE NOTES †, ††)

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

SCHEDULE #3

MAXIMUM SHUTTER SPAN* "L+" OR "L-" (ft.) INSTALLATIONS W/ SYMMETRICAL CENTERMATES ① & ② W/ ONE HV LOCKS ④ OR ⑤ W/ NO LOCKING RODS ⑤ (VALID FOR MOUNTING ① SHEET 7)

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

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

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

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

†† EXCEPT THAT MAXIMUM SHUTTER SPAN "L+" OR "L-" AND MAXIMUM A.S.D. DESIGN PRESSURE RATING FOR INSTALLATIONS INTO CONCRETE OR CONCRETE BLOCK SHALL BE LIMITED AS FOLLOWS:
1- CONNECTIONS TO KEYSTONE MOUNTING LIMITED TO +64,-72 p.s.f. AND 8'-0" SPAN, SEE MOUNTING ① ON SHEET 7.

SEPARATION TO GLASS SCHEDULE

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

① HV BLADE

*** NOTES:**

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

(2) PROCEDURE TO DETERMINE MAXIMUM SPAN FOR WALL MOUNTINGS (TOP/BOTTOM) OR FLOOR/CEILING:
GIVEN A POSITIVE A.S.D. DESIGN PRESSURE RATING, DETERMINE MAXIMUM SPAN "L+" FROM SCHEDULE. GIVEN A NEGATIVE A.S.D. DESIGN PRESSURE RATING, DETERMINE MAXIMUM SPAN "L-" FROM SCHEDULE.
FINAL MAXIMUM ALLOWABLE SPAN IS EQUAL TO THE MINIMUM DETERMINED SPAN BETWEEN "L+" AND "L-".

(3) PROCEDURE TO DETERMINE MAXIMUM SPAN FOR COMBINATIONS IN BETWEEN WALL MOUNTINGS W/ FLOOR/CEILING MOUNTINGS:
FOR A GIVEN POSITIVE A.S.D. DESIGN PRESSURE RATING:
DETERMINE:
L1+= MAX. SPAN FOR WALL MOUNTING INSTALLATIONS.
L2+= MAX. SPAN FOR FLOOR/CEILING MOUNTING INSTALLATIONS.
FOR A GIVEN NEGATIVE A.S.D. DESIGN PRESSURE RATING:
DETERMINE:
L1-= MAX. SPAN FOR WALL MOUNTING INSTALLATIONS.
L2-= MAX. SPAN FOR FLOOR/CEILING MOUNTING INSTALLATIONS.
FINAL MAXIMUM ALLOWABLE SPAN IS EQUAL TO THE MINIMUM BETWEEN "L1+", "L2+", "L1-" AND "L2-".

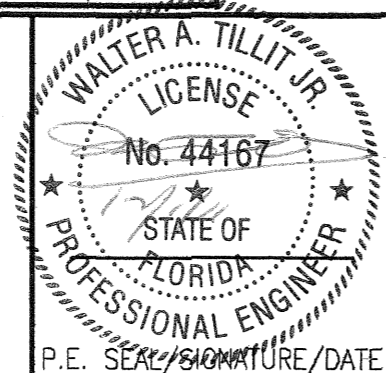
(4) GO TO ANCHOR SCHEDULE WITH FINAL MAXIMUM ALLOWABLE SPAN AND NEGATIVE A.S.D. DESIGN PRESSURE RATING TO DETERMINE MAXIMUM ANCHOR SPACING.

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

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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: MACGY./L.G. |
|---------|-------------|----------|-----------------------------|
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
| 2 | | | DRAWING No 11-192 |
| 3 | | | |
| 4 | | | SHEET 11 OF 20 |
| 5 | | | |
| 6 | | | |



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

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

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

| MAXIMUM SPAN (ft) | POURED CONCRETE | | | | | | | | | | | | | | | | POURED CONCRETE/CONCRETE BLOCK | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|--|----|----|----|----|-----|-----|-----|--|----|------|----|------|------|------|-----|--|----|----|----|----|-----|-----|-----|--|-----|-----|----|----|-----|-----|-----|---|---|---|---|---|---|---|-----|-----|-----|---|
| | ① WALK OVER & ② TRENCH MOUNTINGS | | | | | | | | ③ RAINGUARD MOUNTING | | | | | | | | ④ WALL/FLOOR MOUNTING | | | | | | | | ⑤ WALL/WALK OVER MOUNTING | | | | | | | | | | | | | | | | | | |
| | A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf) | | | | | | | | A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf) | | | | | | | | A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf) | | | | | | | | A.S.D. DESIGN NEGATIVE PRESSURE RATING (psf) | | | | | | | | | | | | | | | | | | |
| | 30 | 40 | 60 | 75 | 90 | 120 | 160 | 205 | 30 | 40 | 60 | 75 | 90 | 120 | 160 | 205 | 30 | 40 | 60 | 75 | 90 | 120 | 160 | 205 | 30 | 40 | 60 | 75 | 90 | 120 | 160 | 205 | | | | | | | | | | | |
| 3'-0" OR LESS | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 12 | 11.5 | 8.5 | 6.5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 3.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | | | | |
| | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 12 | 12 | 9.5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 7 | 7 | 8.5 | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 4.5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| 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 | 7 | 7 | 7 | 7 | 5.5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | | | |
| | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 12 | 9.5 | 7 | 5.5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 5 | 5 | 5 | 5 | 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 | 7 | 7 | 7 | 5.5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 11 | 9 | 7 | 5 | 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5.5 | 4 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 |
| 5'-0" | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 12 | 10 | 7.5 | 5.5 | 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | | |
| | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 12 | 9.5 | 7.5 | 6 | 4.5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 3.5 | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 5.5 | 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5.5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| | 14 | 12 | 10 | 9 | 8 | 8 | 6 | 6 | 12 | 12 | 12 | 12 | 11 | 9 | 7 | 5 | 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5.5 | 4 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 7 | 7 | 7 | 4.5 | 3.5 | - | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 7 | 7 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 7 | 7 | 6 | 4.5 | 4 | - | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 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 | 7 | 7 | 6 | 4.5 | 4 | - | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4.5 | - |

ANCHORS SPACING LEGEND

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

* SEE ANCHOR SPECIFICATIONS ON SHEET 13

◇ VALID ONLY FOR UP TO +70, -75 PSF A.S.D. DESIGN PRESSURE RATING & FOR SPANS PER SCHEDULE #3, SHEET 11

① HV BLADE ONLY

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

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BERTHA HVTM
Accordian Shutter System
H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
|---------|-------------|----------|-----------------|
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
| 2 | | | DRAWING No |
| 3 | | | 11-192 |
| 4 | | | SHEET |
| 5 | | | 14 OF 20 |

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

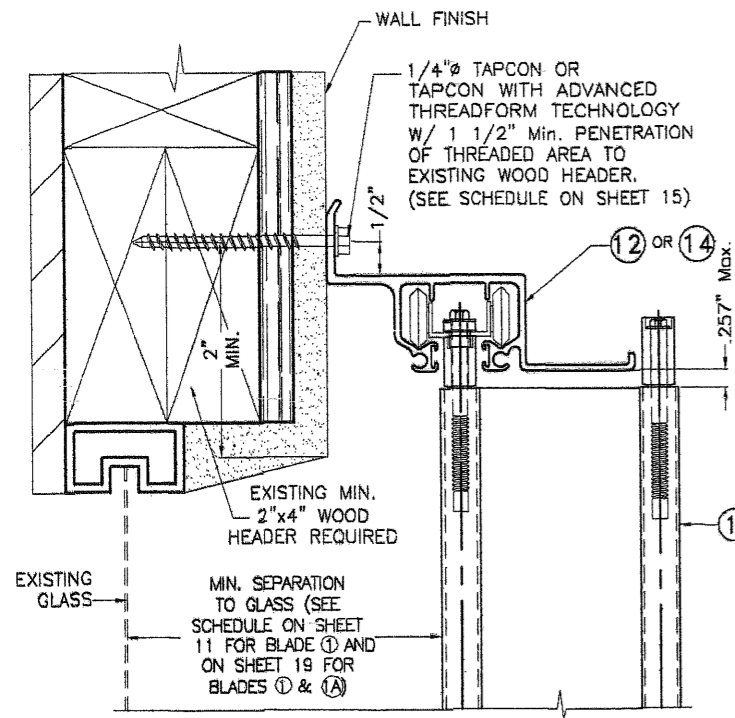


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6355 N.W. 36th St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33166
Phone: (305)871-1530 Fax: (305)871-1531
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EB-0006719
WALTER A. TILLIT JR. P.E.
FLORIDA Lic. # 44167

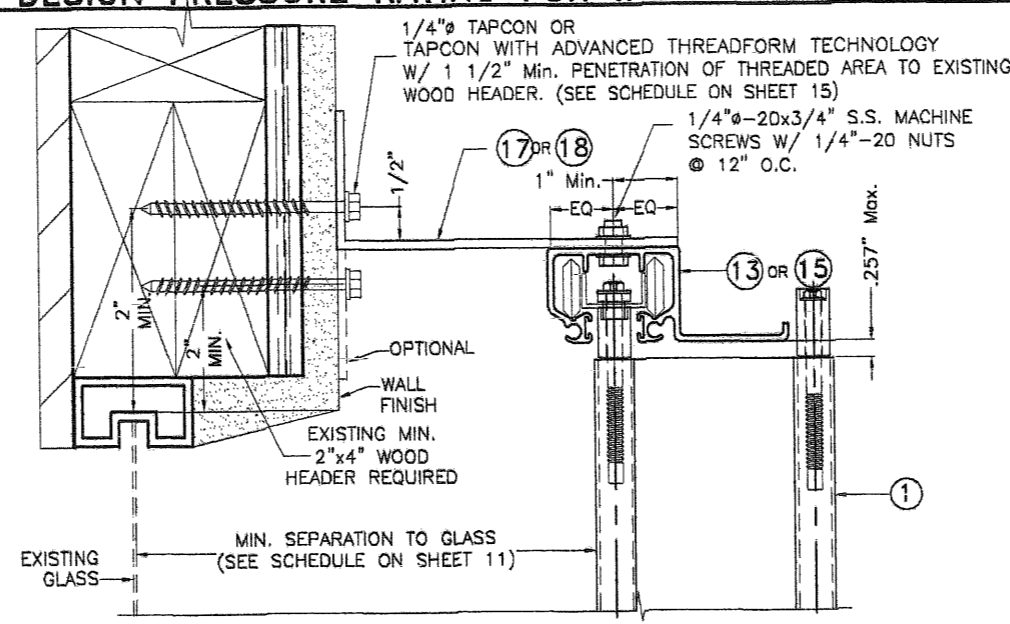
A.S.S.A.
American Shutter Systems
Association, Inc.
4268 Westroads Drive
West Palm Beach, FL 33407

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

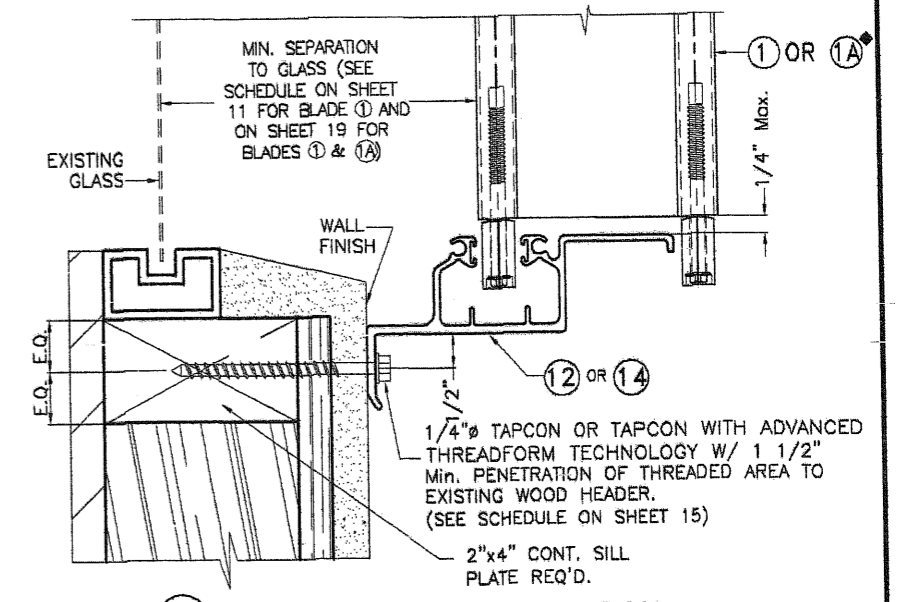
MAX. SHUTTER SPAN L+ OR L- FOR INSTALLATIONS INTO WOOD WITH HV BLADE ① ONLY SHALL BE LIMITED TO 105.0 psf. A.S.D. DESIGN PRESSURE RATING. SEE SHEET 19 FOR MAX SPAN & A.S.D. DESIGN PRESSURE RATING FOR INSTALLATION WITH BLADE ① & ①A WORKING IN UNISON



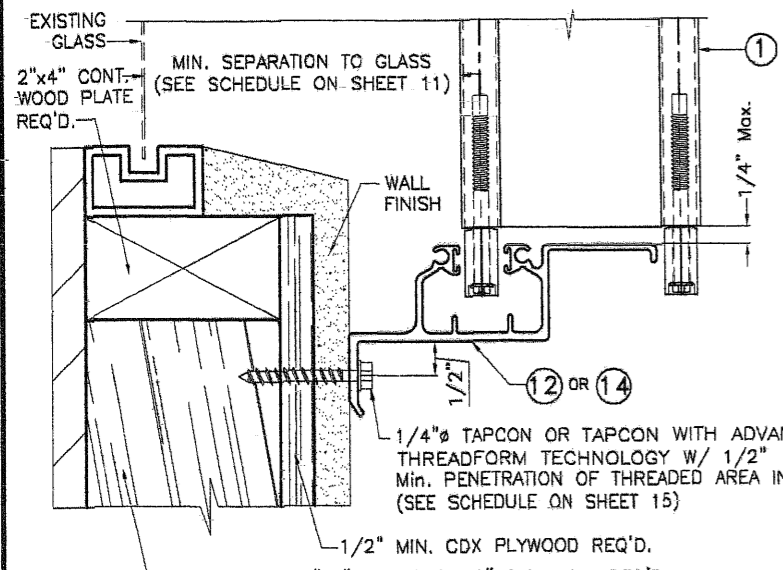
M HV WALL HEADER INSTALLATION



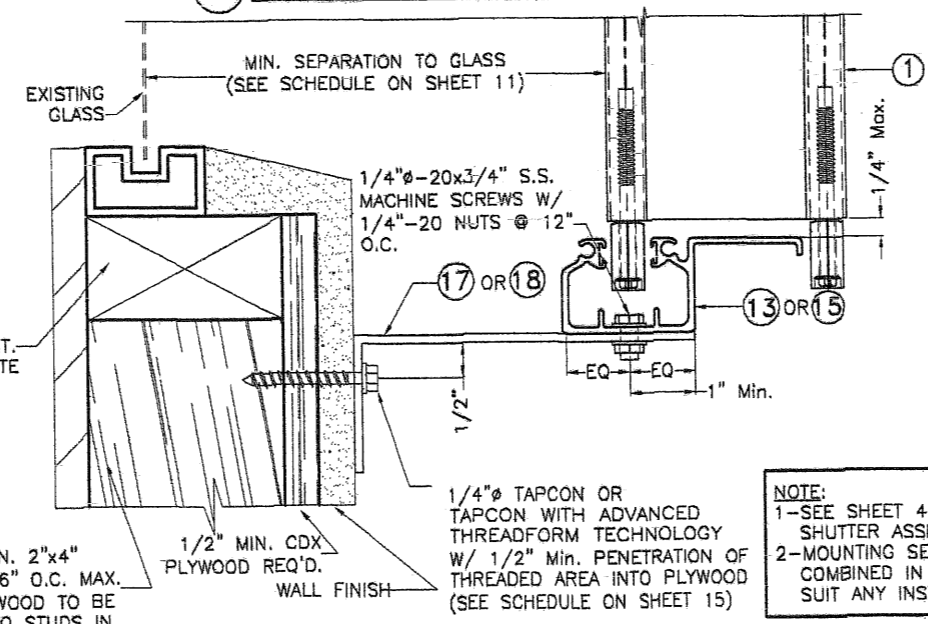
N HV WALL HEADER INSTALLATION



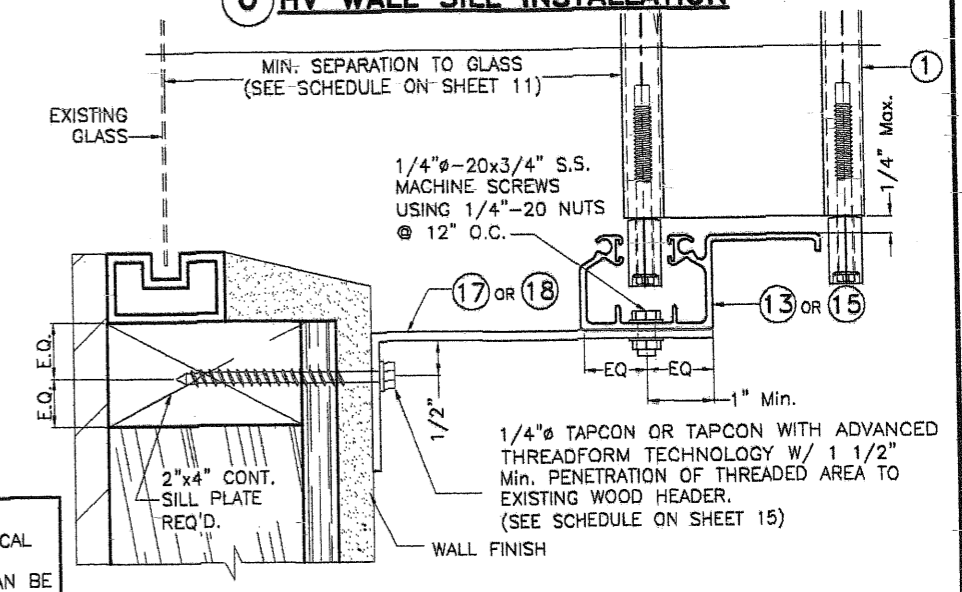
O HV WALL SILL INSTALLATION



P HV WALL SILL INSTALLATION



Q HV WALL SILL INSTALLATION



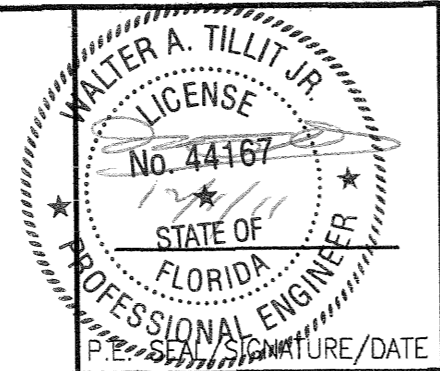
R HV WALL SILL INSTALLATION

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 ①9

FLORIDA BUILDING CODE (Non High Velocity Hurricane Zone)

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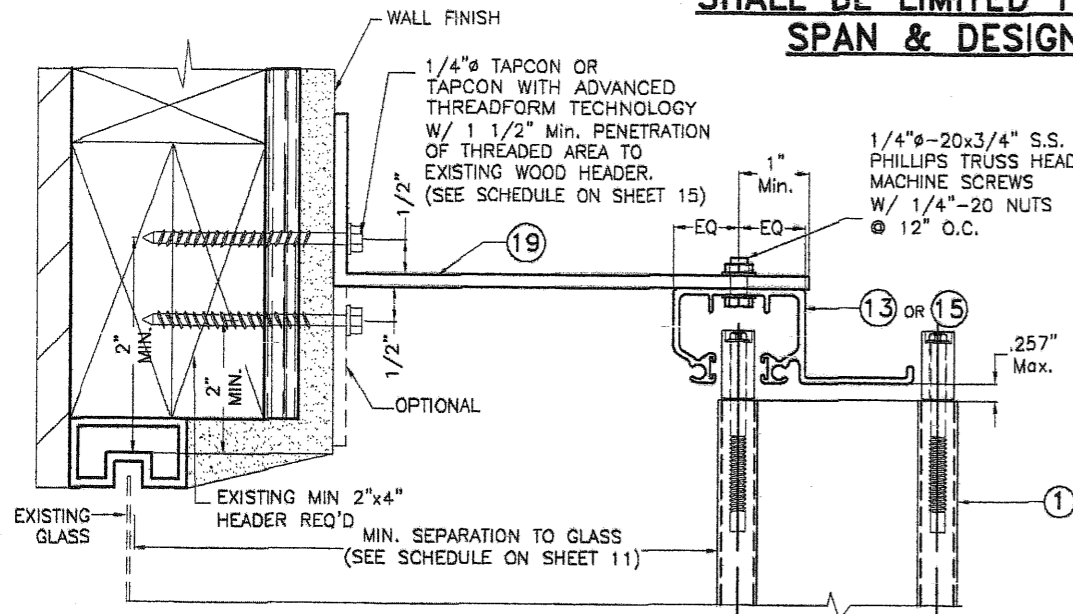
TILLIT TESTING & ENGINEERING COMPANY
 6355 N.W. 38th St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33166
 Phone : (305)871-1530 . Fax : (305)871-1531
 e-mail: tilteco@aol.com
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American Shutter Systems Association, Inc.
 4268 Westroads Drive
 West Palm Beach, FL 33407

| BERTHA HV™ Accordian Shutter System | | | |
|---|-------------|----------|-----------------|
| H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE | | | |
| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
| 1 | OLD 11-063 | 11/29/11 | DATE: 11/29/11 |
| 2 | | | DRAWING No |
| 3 | | | 11-192 |
| 4 | | | SHEET |
| 5 | | | 16 OF 20 |
| 6 | | | |

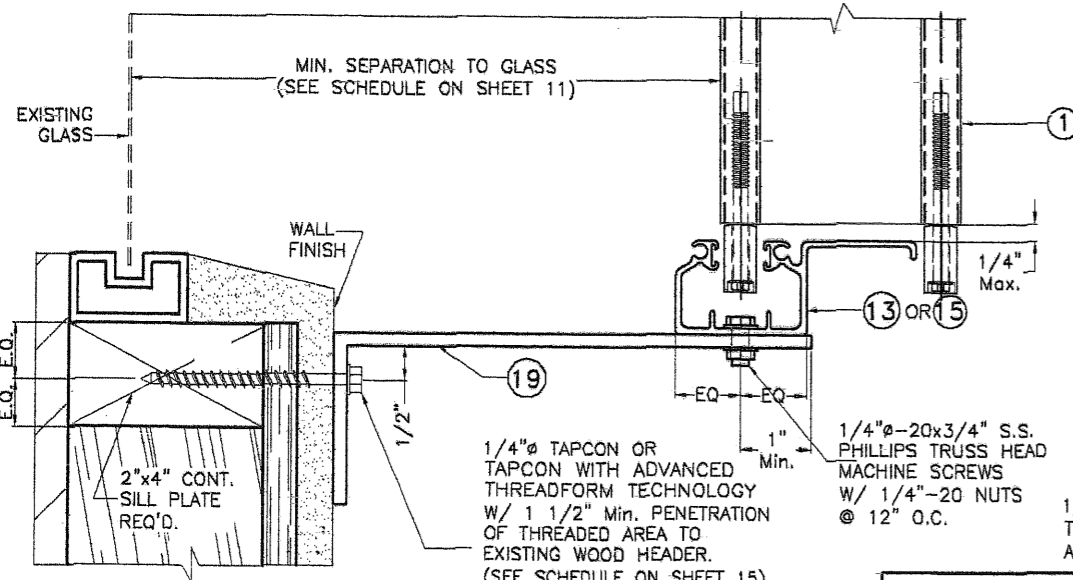
INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS FOR ① HV & ①A HV♦ BLADES (AS APPLICABLE)

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



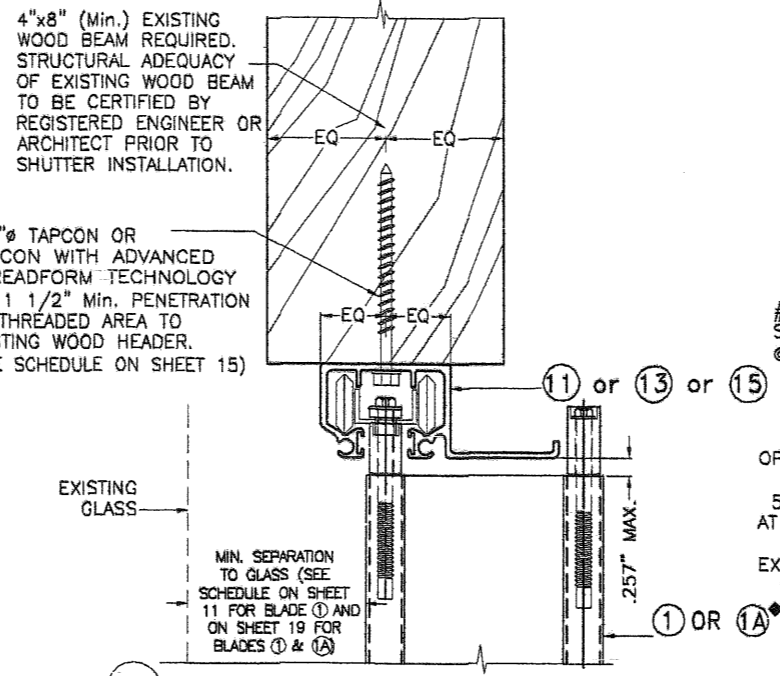
S HV WALL HEADER INSTALLATION

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

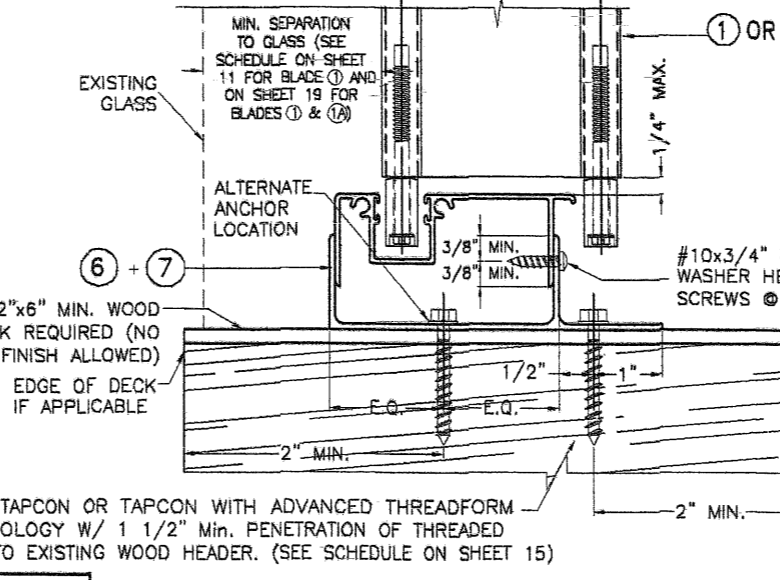


V HV WALL SILL INSTALLATION

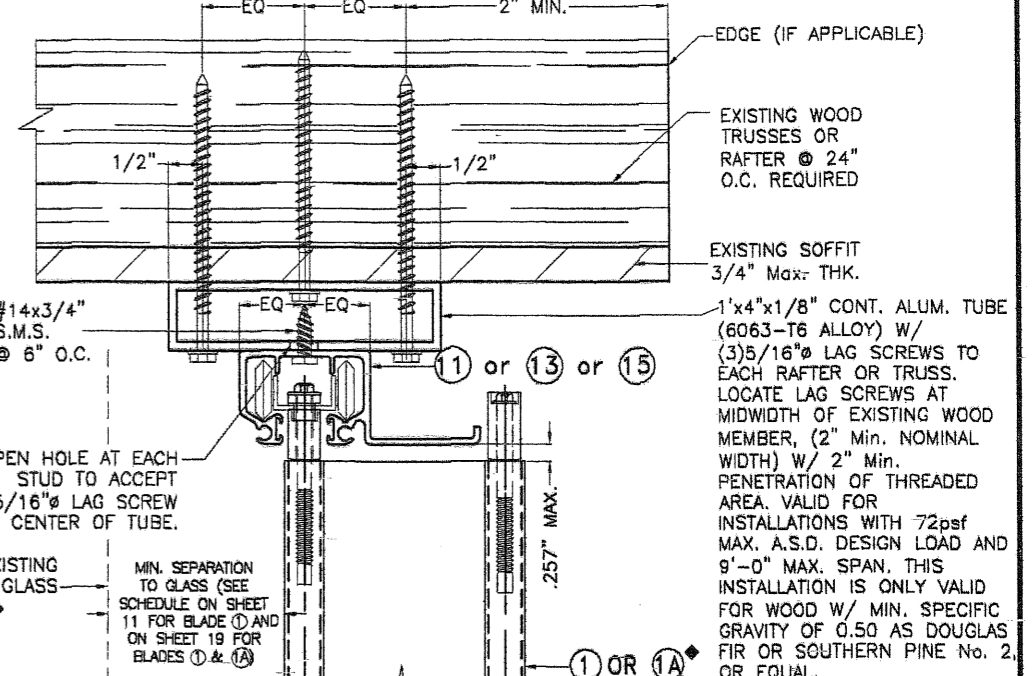
♦ SEE LIMITATIONS OF USE FOR BLADE ①A ON SHEET 19



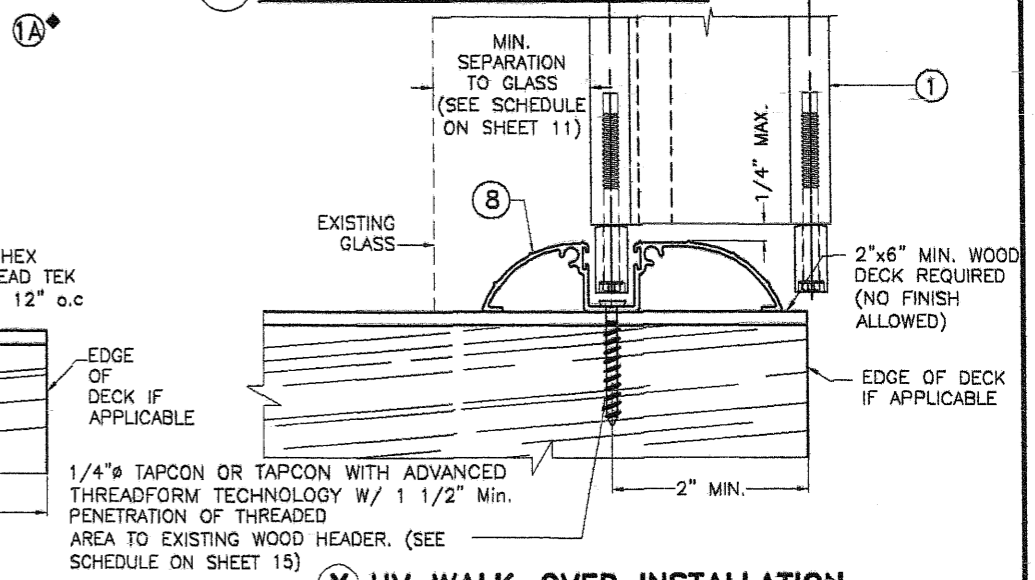
T HV CEILING INSTALLATION



W HV FLOOR INSTALLATION

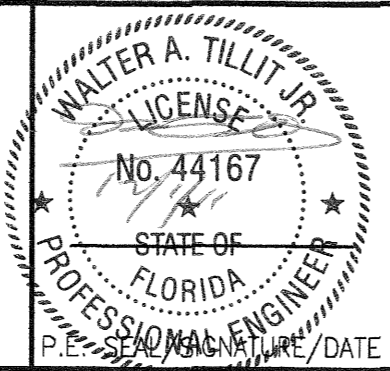


U HV CEILING INSTALLATION



X HV WALK-OVER INSTALLATION

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 e-mail: tiltco@aol.com
 EB-0006719
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 FLORIDA Lic. # 44167

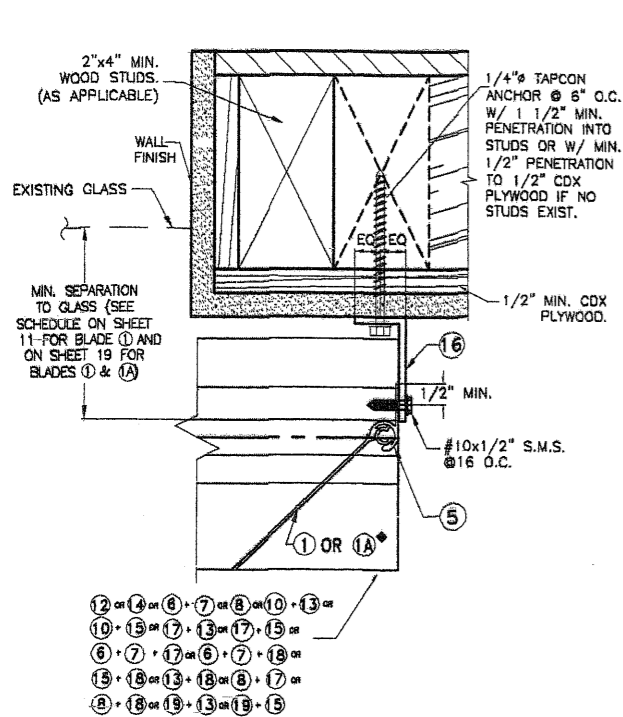
A.S.S.A.
 American Shutter Systems
 Association, Inc.
 4268 Westroads Drive
 West Palm Beach, FL 33407

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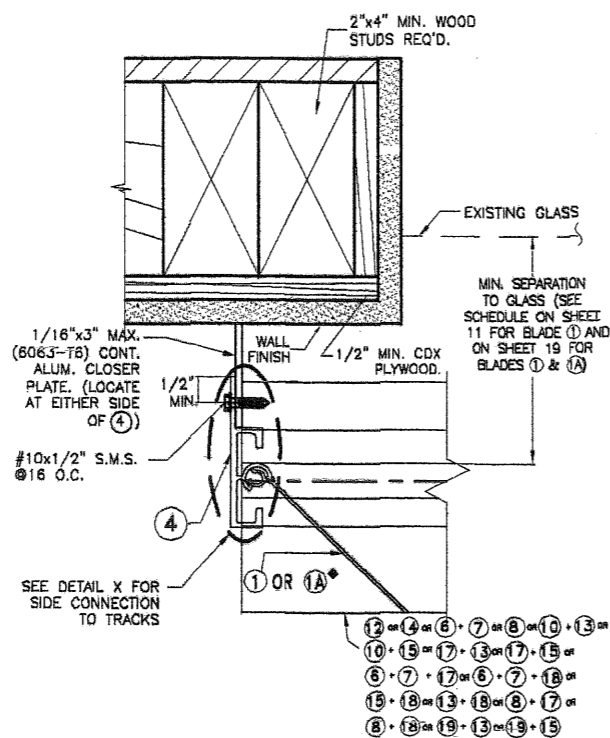
BERTHA HV™
Accordian Shutter System
 H.V. BLADE #1 W/ OR W/O H.V. WINDOW BLADE

| REV. No | DESCRIPTION | DATE | DRAWN BY: A.G. |
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| 3 | | | DRAWING No |
| 4 | | | 11-192 |
| 5 | | | SHEET |
| 6 | | | 17 OF 20 |

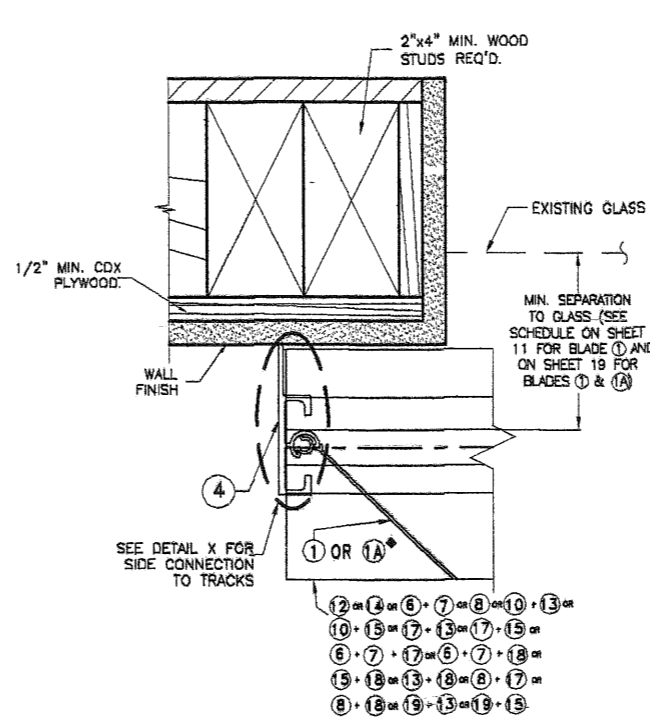
END INSTALLATIONS ① HV BLADE OR ①A WINDOW BLADE INTO 2"x4" MIN. WOOD STUDS



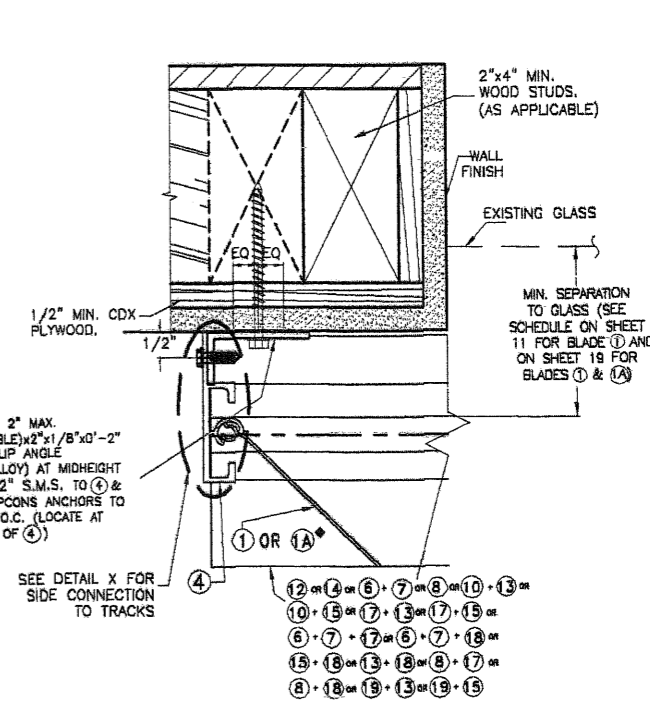
END CONNECTION DETAIL ⑦



END CONNECTION DETAIL ⑧



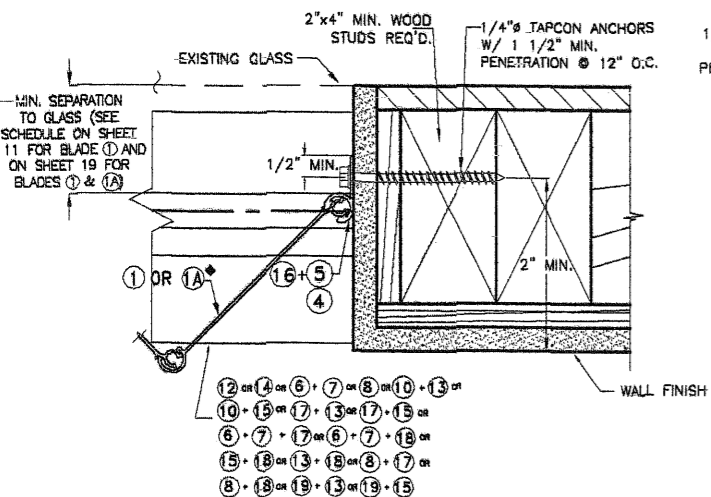
END CONNECTION DETAIL ⑨



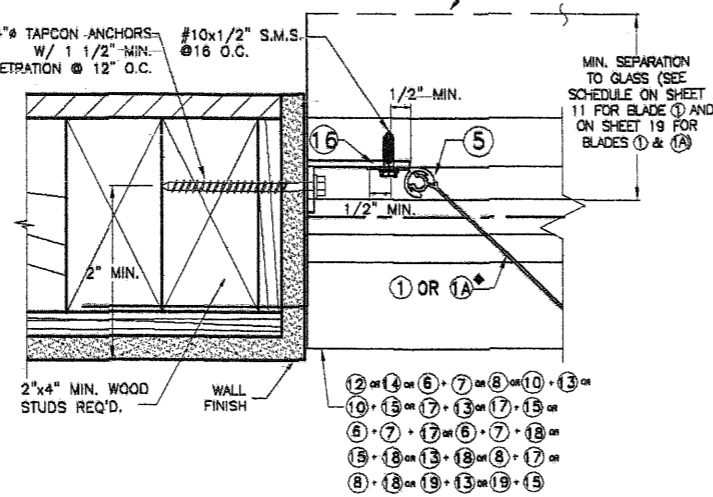
END CONNECTION DETAIL ⑩

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

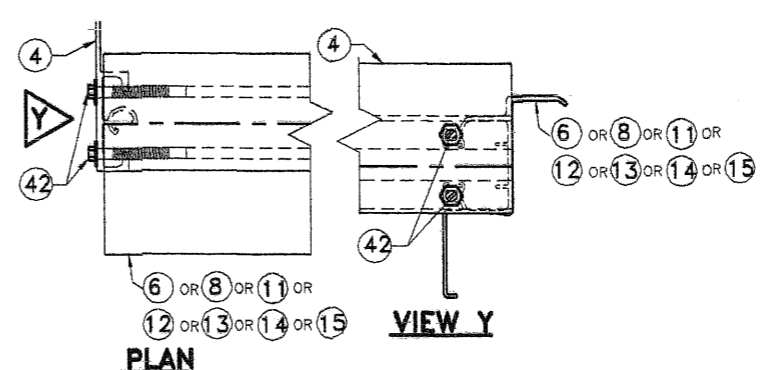
◆ SEE LIMITATIONS OF USE FOR BLADE ①A ON SHEET 19



END CONNECTION DETAIL ⑪



END CONNECTION DETAIL ⑫



DETAIL X

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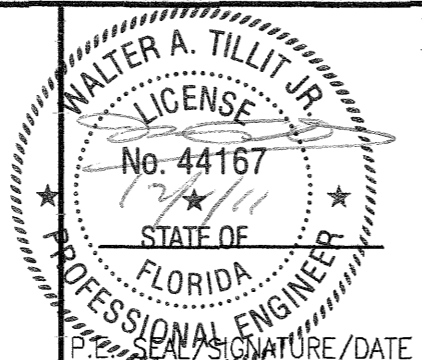
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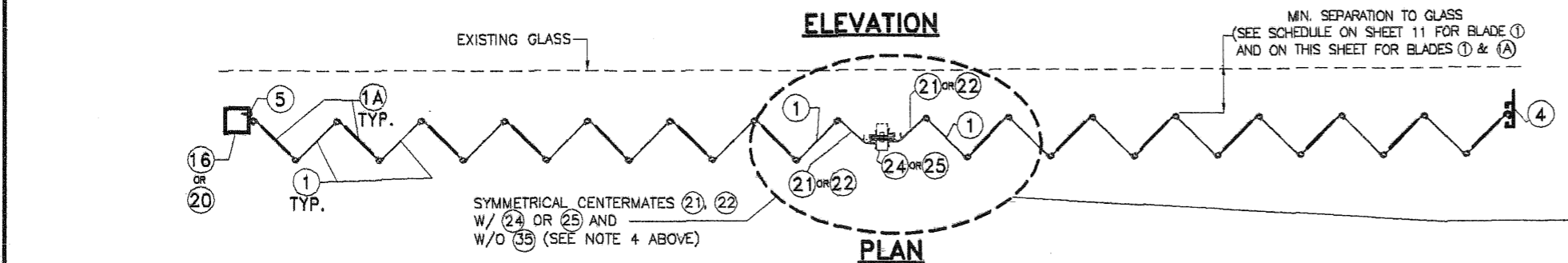
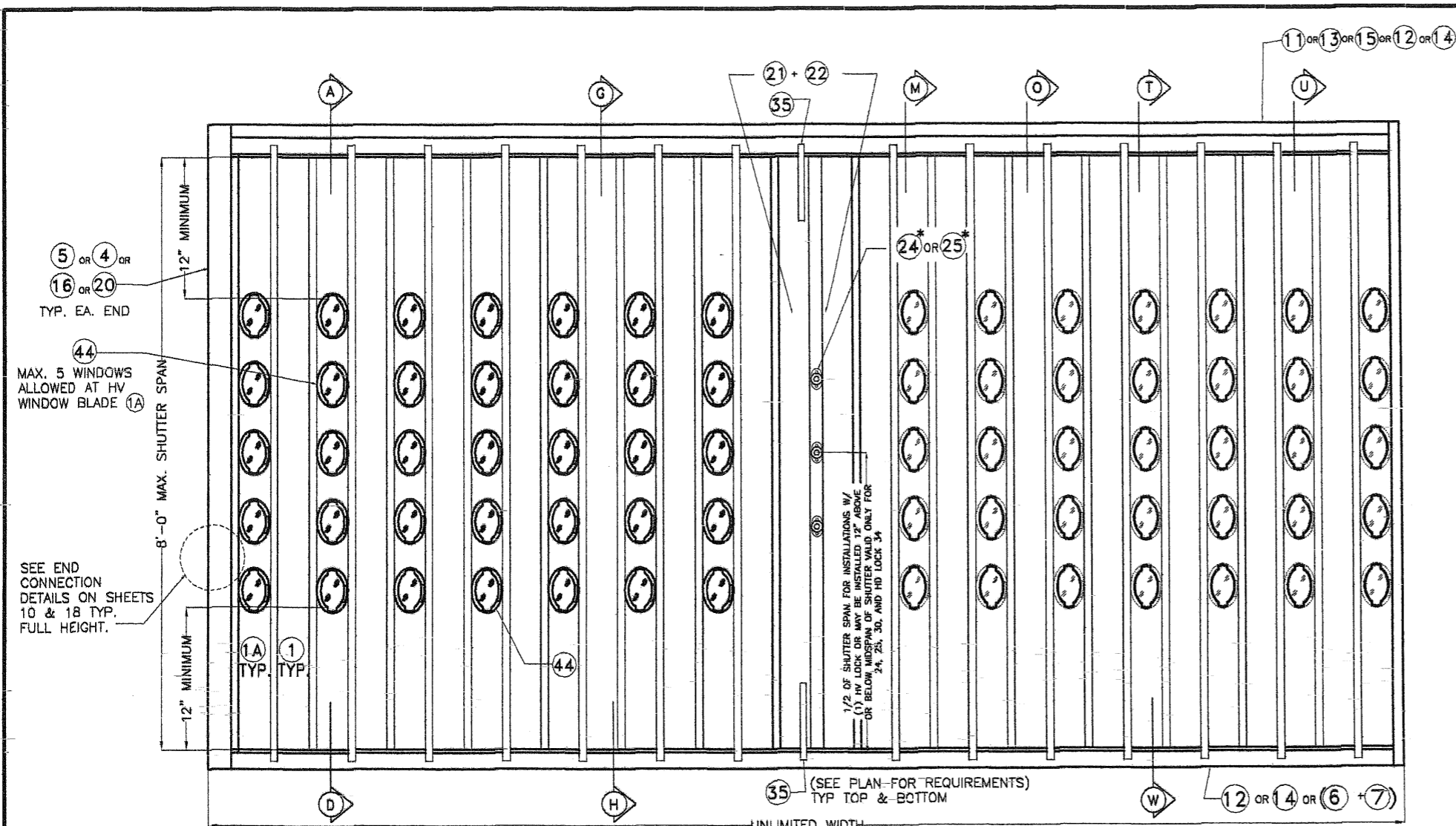
DRAWING No
11-192

SHEET
18 OF 20



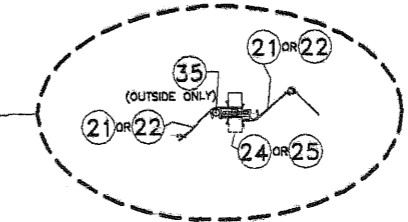
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 6355 N.W. 36th St., Ste. 305, VIRGINIA GARDENS, FLORIDA 33166
 Phone : (305)871-1530 . Fax : (305)871-1531
 e-mail: tilteco@aol.com
 EB-0006719
 WALTER A. TILLIT Jr. P.E.
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- * GENERAL LIMITATIONS AND CONDITIONS OF USE FOR BERTHA HV BLADE ACCORDION SHUTTER SYSTEM WORKING IN UNISON WITH HV WINDOW BLADE 1A**
- MAX. A.S.D. DESIGN PRESSURE RATING: +110, - 110 p.s.f.
 - MAX. SHUTTER SPAN: 96"
 - ALLOWED MOUNTINGS: A, D, G & H ON SHEETS 6, 7; AS WELL AS MOUNTINGS M, O, T, U & W ON SHEETS 16 & 17.
 - 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.
 - (A) HV WINDOW BLADE 1A SHALL ONLY ALLOW A MAXIMUM OF 5 OPENINGS (3"Ø HOLES) FOR 44 PER BLADE AT SPACINGS SHOWN ON SHEET 4.
(B) MIN. CLEARANCE FROM TOP OR BOTTOM EDGE OF HV WINDOW BLADE 1A OF ANY 3"Ø HOLE FOR 44 SHALL BE 12".
(C) FIRST OR LAST BLADE COMING OUT FROM STARTERS AT ENDS MAY BE HV WINDOW BLADE 1A
(D) HV WINDOW BLADE 1A MUST BE USED ALTERNATE TO A SOLID HV BLADE 1 THROUGHOUT SHUTTER'S WIDTH.
(E) CENTERMATES SHALL ALWAYS BE INSTALLED ADJACENT TO A SOLID HV BLADE 1 AT EITHER SIDE OF THEM.
(F) POLYCARBONATE HV WINDOW 44 SHALL BE INSTALLED SO THAT TABS FACE THE INTERIOR OF THE OPENING BEING PROTECTED. HV WINDOW 44 MUST BE ONLY INSTALLED AND LOCKED USING A HV SETTING TOOL PROVIDED BY ASSA, INC.
 - 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).
 - 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).
 - MINIMUM SEPARATION TO GLASS SCHEDULE, PER ASTM E-1996:
- | WIND ZONE | MINIMUM SEPARATION TO GLASS |
|-----------|-----------------------------|
| 1 THRU 3 | 1" |
| 4 | 6.25" |

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



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

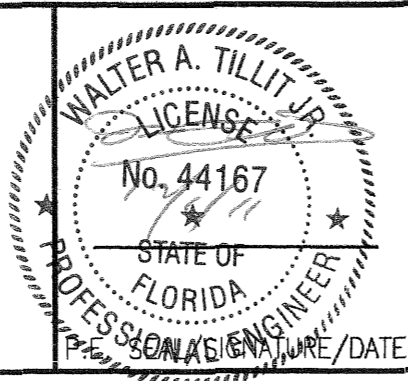
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 e-mail: tilteco@aol.com
 EB-0006719
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INSTALLATIONS W/ ① HV BLADE & HV CENTERMATES ②① INTO METAL STUD WALLS *

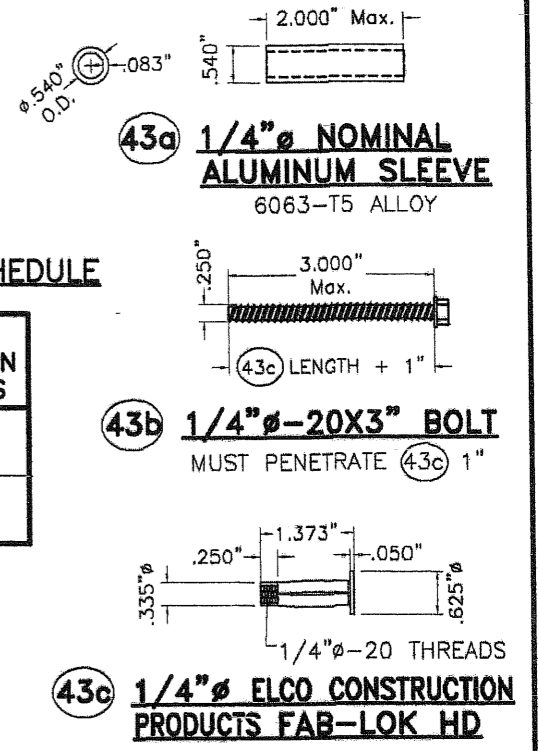
*** GENERAL LIMITATIONS AND CONDITIONS OF USE FOR BERTHA ① HV BLADE ACCORDION SHUTTER SYSTEM INSTALLATION TO METAL STUD WALLS**

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

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

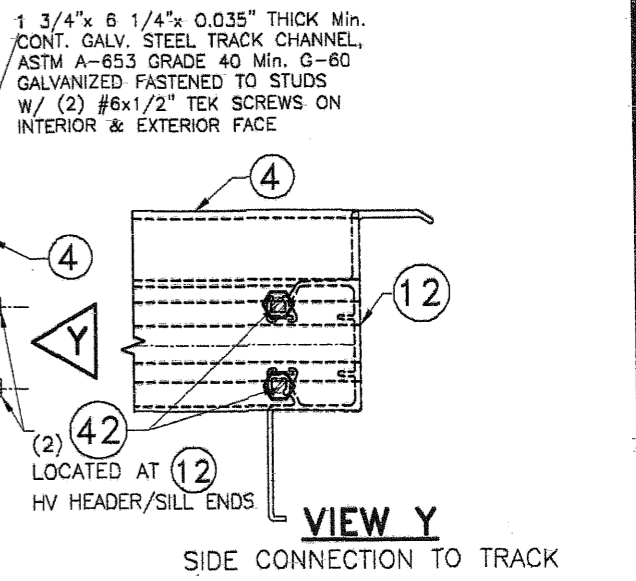
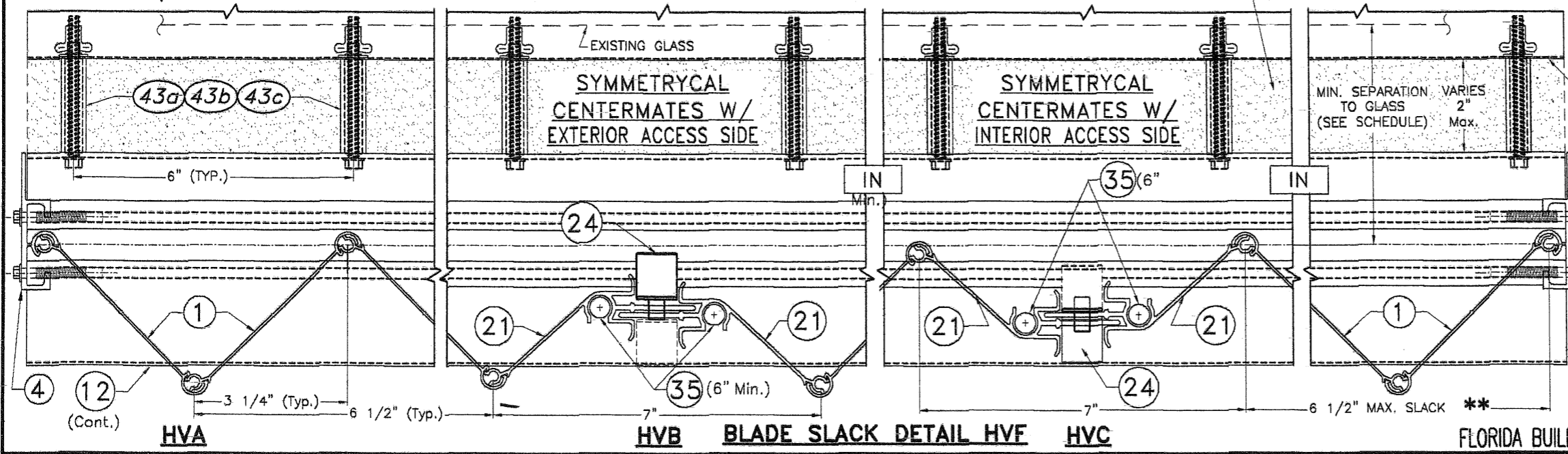
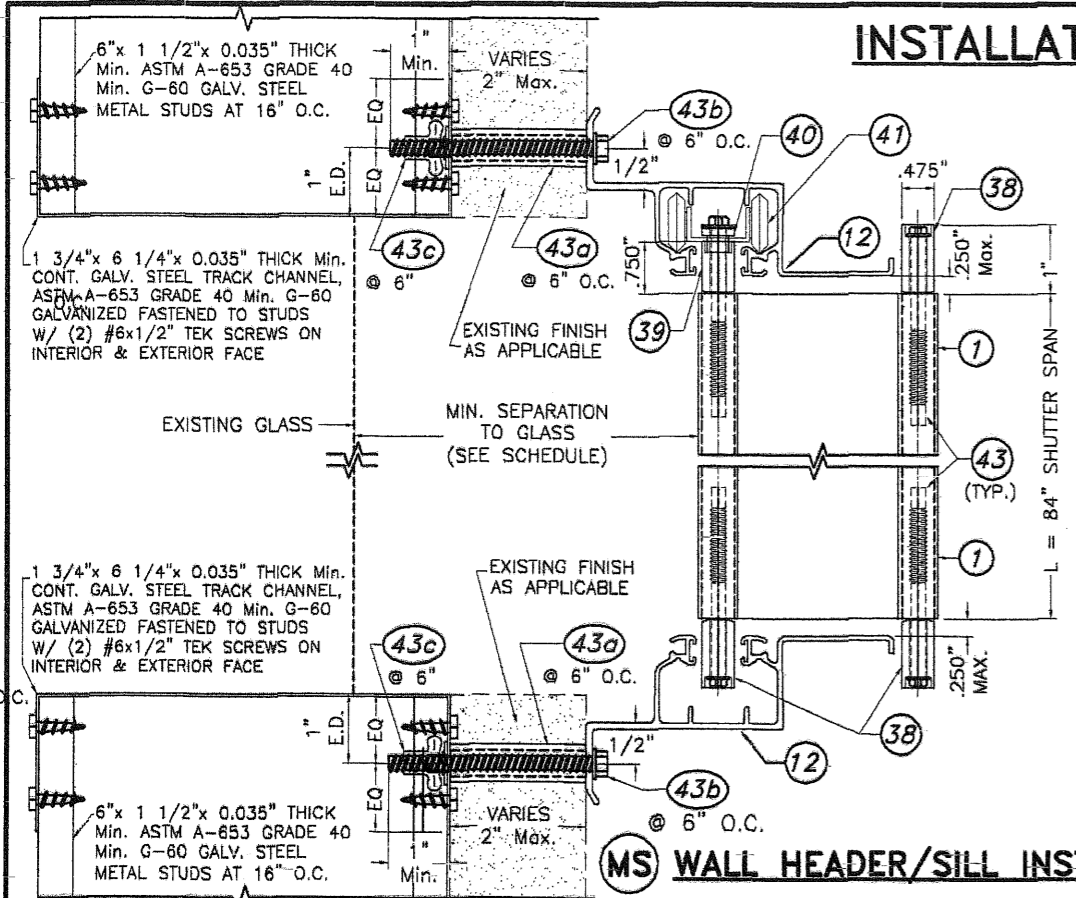
SEPARATION TO GLASS SCHEDULE

| WIND ZONE ASTM E-1998 | MINIMUM SEPARATION TO GLASS |
|--------------------------|-----------------------------|
| 1 THRU 3 | 1" |
| 4 | 4" |



COMPONENTS

SCALE: 3/8" = 1"



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

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