

GENERAL NOTES:

1. NAUTILUS END RETENTION ROLL-UP SHUTTER SHOWN ON THIS PRODUCT EVALUATION DOCUMENT (P.E.D.) HAS BEEN VERIFIED FOR COMPLIANCE IN ACCORDANCE WITH THE 2018 EDITIONS OF THE INTERNATIONAL BUILDING CODE, (I.B.C.) AND INTERNATIONAL RESIDENTIAL CODE, (I.R.C.).
2. DESIGN WIND LOADS SHALL BE DETERMINED AS PER SECTION 1609 OF THE INTERNATIONAL BUILDING CODE, FOR A BASIC WIND SPEED AS REQUIRED BY THE JURISDICTION WHERE SHUTTER WILL BE INSTALLED, AND FOR A DIRECTIONALITY FACTOR $K_d = 0.85$, IN ACCORDANCE WITH ASCE 7-16 STANDARD.

IN ORDER TO VERIFY THE ABOVE CONDITION, ULTIMATE DESIGN WIND LOADS DETERMINED PER ASCE 7-16 STANDARD SHALL BE FIRST REDUCED TO A.S.D. DESIGN WIND LOADS BY MULTIPLYING THEM BY 0.60 IN ORDER TO COMPARE THESE W/MAX. (A.S.D.) DESIGN PRESSURE RATINGS INDICATED ON SHEETS 15 THRU 26.

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. FASTENERS SPACING TO WOOD HAVE BEEN DETERMINED IN ACCORDANCE WITH N.D.S. 2018.

NAUTILUS END RETENTION ROLL-UP SHUTTER ADEQUACY FOR IMPACT AND CYCLIC RESISTANCE HAS BEEN VERIFIED IN ACCORDANCE WITH SECTIONS 1609.2 OF THE INTERNATIONAL BUILDING CODE, AS PER AMERICAN TEST LAB OF SOUTH FLORIDA. REPORT # 1030.01-08 AS PER FLORIDA BUILDING CODE HIGH VELOCITY HURRICANE ZONE TAS-201, TAS-202 AND TAS-203 PROTOCOLS.

3. ALL ALUMINUM EXTRUSIONS SHALL BE 6063-T6 ALLOY (UNLESS OTHERWISE NOTED), SEE SHEET 2.
4. ALL SCREWS AND BOLTS (EXCEPT END RETENTION SCREW (C)) INSTALLED TO BE STAINLESS STEEL 304 OR 316 AISI SERIES AND MEET ASTM A167, OR HOT DIPPED GALVANIZED (AFTER FABRICATION) CARBON STEEL AS PER ASTM A123 OR ASTM A153, OR HOT DIPPED GALVANIZED OR GALVANNEALED (PRIOR TO FABRICATION) AND MEET ASTM A653 WITH 50 ksi YIELD STRENGTH AND 90 ksi TENSILE STRENGTH.

5. THIS PRODUCT BEARS U.S. PATENTS #6,095,225 AND #7,409,980.

6. ANCHORS TO WALL FOR (D) SIDE RAIL SHALL BE AS FOLLOWS:

(A) TO EXISTING POURED CONCRETE: MIN. 3000 p.s.i. COMPRESSIVE STRENGTH.

-5/16" TAPCON XL ANCHORS AS MANUFACTURED BY ITW BUILDEX, INC.
 -3/8" KWIK BOLT 3 ANCHORS AS MANUFACTURED BY HILTI, INC.

A.1) MINIMUM EMBEDMENT INTO POURED CONCRETE SHALL BE:
 2 1/4" FOR 5/16" TAPCON XL ANCHORS & 2 1/2" FOR 3/8" KWIK BOLT 3 ANCHORS.
 NO EMBEDMENT INTO STUCCO SHALL BE CONSIDERED AS PART OF THE REQUIRED EMBEDMENT.

A.2) MINIMUM EDGE DISTANCE (E.D.) INTO POURED CONCRETE SHALL BE:
 4" FOR 5/16" TAPCON XL ANCHORS & 5" FOR 3/8" KWIK BOLT 3 ANCHORS. EDGE DISTANCE IS BEYOND ANY FINISH MATERIAL.

A.3) IN CASE THAT PRECAST STONE, PRECAST CONCRETE OR BRICK PANELS, VENEER OR PAVERS BE FOUND ON THE EXISTING WALL OR FLOOR, ANCHORS SHALL BE LONG ENOUGH TO REACH THE MAIN STRUCTURE BEHIND SUCH PANELS.

(B) TO EXISTING GROUT FILLED CELL CONCRETE BLOCK WALL: ASTM C-90

-5/16" TAPCON XL ANCHORS, AS MANUFACTURED BY ITW BUILDEX, INC.

B.1) MINIMUM EMBEDMENT OF 5/16" TAPCON XL ANCHORS INTO THE GROUT FILLED CELL CONCRETE BLOCK UNIT SHALL BE 2 1/4".
 NO EMBEDMENT INTO STUCCO SHALL BE CONSIDERED AS PART OF THE REQUIRED EMBEDMENT.

B.2) MINIMUM EDGE DISTANCE (E.D.) OF 5/16" TAPCON XL ANCHORS INTO GROUT FILLED CELL CONCRETE BLOCK SHALL BE 4". EDGE DISTANCE IS BEYOND ANY FINISH MATERIAL.

B.3) IN CASE THAT PRECAST STONE, PRECAST CONCRETE OR BRICK PANELS, VENEER OR PAVERS BE FOUND ON THE EXISTING WALL OR FLOOR, ANCHORS SHALL BE LONG ENOUGH TO REACH THE MAIN STRUCTURE BEHIND SUCH PANELS.

(C) TO EXISTING WOOD FRAME BUILDING: SPRUCE PINE-FIR-SOUTH (G=0.36), DOUGLAS-FIR-SOUTH (G=0.46) OR SOUTHERN PINE #2 W/ G = 0.55 MIN.

-5/16" TAPCON XL ANCHORS, AS MANUFACTURED BY ITW BUILDEX, INC.

C.1) MINIMUM EMBEDMENT OF TAPCON XL ANCHORS, INTO THE WOOD FRAME UNIT SHALL BE 2 1/2" PHYSICAL THREADED PENETRATION.
 NO EMBEDMENT INTO FINISH MATERIAL SHALL BE CONSIDERED AS PART OF THE REQUIRED EMBEDMENT.

C.2) MINIMUM EDGE DISTANCE (E.D.) OF TAPCON XL ANCHORS, INTO WOOD SHALL BE 2". EDGE DISTANCE IS BEYOND ANY FINISH MATERIAL.

C.3) IN CASE THAT PRECAST STONE, PRECAST CONCRETE OR BRICK PANELS, VENEER OR PAVERS BE FOUND ON THE EXISTING WALL OR FLOOR, ANCHORS SHALL BE LONG ENOUGH TO REACH THE MAIN STRUCTURE BEHIND SUCH PANELS.

7. ANCHORS SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS OF THE ANCHOR MANUFACTURER.

8. ANCHORS REQUIRED FOR STORM BARS CONNECTIONS SHALL BE AS SPECIFIED ON APPLICABLE SECTIONS SHOWN ON SHEET 9.

- 3/8"x1 1/4" CALK-INS MANUFACTURED BY DEWALT, INC.
- 1/4"x3/4" SOLID-SET MANUFACTURED BY ALL POINT, INC.
- 3/8" KWIK BOLT TZ MANUFACTURED BY HILTI, INC.
- 5/16" TAPCON MANUFACTURED BY ITW BUILDEX, INC.

MINIMUM EDGE DISTANCE AND SPACING FOR ABOVE MENTIONED ANCHORS SHALL BE AS INDICATED BELOW OR AT ABOVE MENTIONED SHEET. EDGE DISTANCE AND EMBEDMENTS ARE BEYOND ANY FINISH MATERIAL.

ANCHOR	SPACING @ 100%	EDGE DISTANCE @ 100%	CONCRETE	EMBEDMENT @ 100%	GROUT FILLED OR CONCRETE BLOCK
3/8"x1 1/4" CALK-IN	3 3/4"	4 1/2"	1 1/4" (3000 psi)		NOT ALLOWED
1/4"x3/4" SOLID-SET	3"	3"	7/8" (3000 psi)		NOT ALLOWED
3/8" KWIK BOLT TZ	9"	4"	2 1/2" (3000 psi)		NOT ALLOWED
5/16" TAPCON XL	3 3/4"	3 1/8"	2 1/4" (2899 psi)		NOT ALLOWED

9. ANCHORS REQUIRED FOR MULLION CONNECTIONS SHALL BE AS SPECIFIED ON APPLICABLE SECTIONS SHOWN ON SHEETS 10, 10A, 11, 11A, 12, 12A, 13 & 13A.

- KWIK BOLT TZ EXPANSION ANCHOR MANUFACTURED BY HILTI, INC.
- HUS-H SCREW ANCHOR MANUFACTURED BY HILTI, INC.
- WEDGE-BOLT ANCHOR MANUFACTURED BY DEWALT, INC.

MINIMUM EDGE DISTANCE AND SPACING FOR ABOVE MENTIONED ANCHORS SHALL BE AS INDICATED BELOW OR AT ABOVE MENTIONED SHEET. EDGE DISTANCE AND EMBEDMENTS ARE BEYOND ANY FINISH MATERIAL.

ANCHOR	SPACING @ 100%	EDGE DISTANCE @ 100%	CONCRETE	EMBEDMENT @ 100%	GROUT FILLED OR CONCRETE BLOCK
3/4" KWIK BOLT TZ	27"	9"	4 3/4" (3000 psi)		NOT ALLOWED
1/2" KWIK BOLT TZ	22 1/2"	7 1/2"	3 1/4" (3000 PSI)		NOT ALLOWED
3/8" KWIK BOLT TZ	6"	4 3/8"	2" (3000 PSI)		NOT ALLOWED
3/8" HUS-H SCREW	4"	5"	2" (3000 PSI)		NOT ALLOWED
3/8" WEDGE-BOLT	4 1/2"	4 1/2"	2 1/2" (3000 PSI)		NOT ALLOWED
1/2" HUS-H SCREW OR WEDGE BOLT	6"	6"	3" (3000 PSI)		NOT ALLOWED
5/8" HUS-H SCREW OR WEDGE BOLT	7 1/2"	7 1/2"	2 1/2" (3000 PSI)		NOT ALLOWED

10. THE INSTALLATION CONTRACTOR IS TO SEAL/CAULK ALL PRODUCT COMPONENT EDGES WHICH REMAIN IN CONTINUOUS CONTACT WITH THE BUILDING TO PREVENT WIND/RAIN INTRUSION. CAULK AND SEAL PRODUCT TRACKS ALL AROUND FULL LENGTH.

11. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE SOUNDNESS OF THE STRUCTURE WHERE PRODUCT IS TO BE ATTACHED TO INSURE PROPER ANCHORAGE. THIS PRODUCT SHALL ONLY BE ATTACHED TO CONCRETE, CONCRETE BLOCK OR WOOD FRAME BUILDINGS.

12. THIS PRODUCT'S INSTALLATION SHALL COMPLY WITH ALL SPECS INDICATED IN THIS DRAWING PLUS ANY BUILDING AND ZONING REGULATIONS PROVIDED BY THE JURISDICTION WHERE PERMIT IS APPLIED TO.

13. LIFTING MECHANISM NOT PART OF THIS APPROVAL.

14. (a) THIS PRODUCT EVALUATION DOCUMENT (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 PRODUCT EVALUATION DOCUMENT, PROVIDED HE/SHE DOES NOT DEVIATE FROM THE CONDITIONS DETAILED ON THIS DOCUMENT. CONSTRUCTION SAFETY AT SITE IS THE CONTRACTOR'S RESPONSIBILITY.

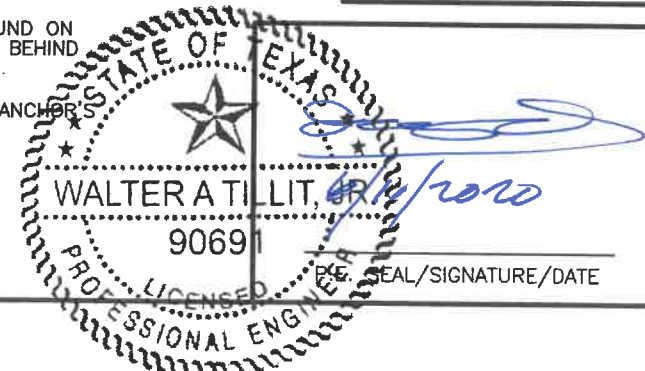
(c) THIS PRODUCT EVALUATION DOCUMENT WILL BE CONSIDERED INVALID IF ALTERED BY ANY MEANS.

(d) SITE SPECIFIC PROJECTS SHALL BE PREPARED BY A PROFESSIONAL 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.


15. PRODUCT MANUFACTURER'S LABEL SHALL BE LOCATED ON A READILY VISIBLE LOCATION AT PRODUCT IN ACCORDANCE WITH TEXAS DEPARTMENT OF INSURANCE REQUIREMENTS. ONE LABEL SHALL BE PLACED FOR EVERY OPENING.

SIGNED AND SEALED COPIES OF THIS DRAWING SHALL BE USED ONLY TO OBTAIN PERMITS IN THE STATE OF TEXAS



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 TEXAS LIC. # 90691
 FIRM REGISTRATION # F-13790

TEXAS DEPARTMENT OF INSURANCE - 2018

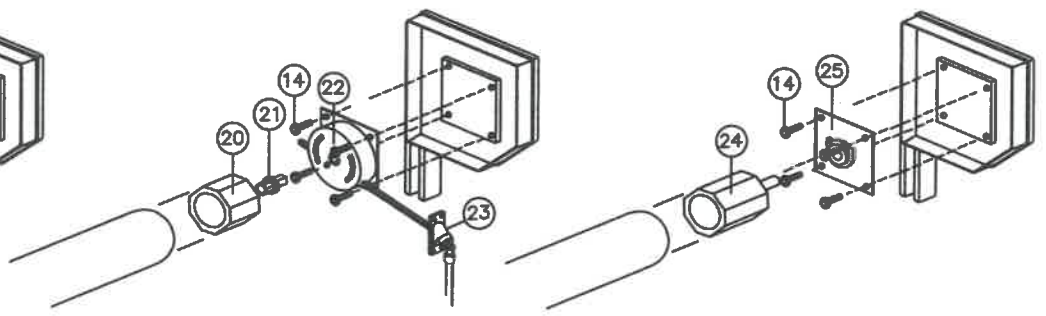
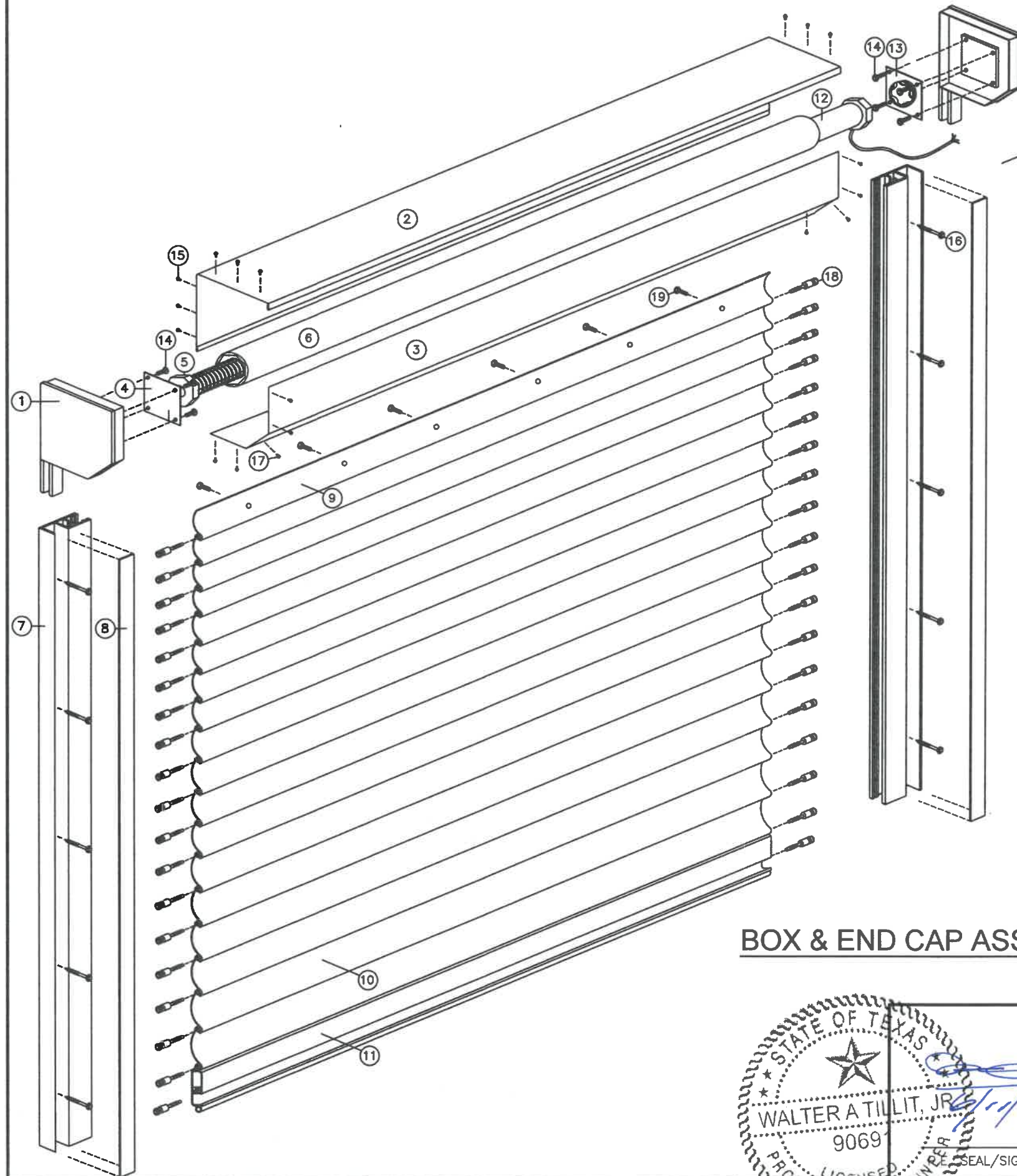


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1	OLD 14-051	06/9/2020	4		
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 SHEET 1 OF 26



- 1 SIDE/END CAP (CAST ALUM. OR EXTRUDED)
- 2 HOUSING (BACK & TOP) .040" THICK
- 3 HOUSING (FRONT & BOTTOM) .040" THICK
- 4 SPRING BRACKET
- 5 SPRING ASSEMBLY
- 6 60 MM OCTAGONAL AXLE
- 7 SIDE RAIL (MAIN SECTION)
- 8 SIDE RAIL (COVER SECTION)
- 9 ALUMINUM STARTER SLAT
- 10 ALUMINUM SLATS 1-10
- 11 ALUMINUM BASE SLAT
- 12 TUBULAR MOTOR
- 13 MOTOR BRACKET
- 14 SPRING, GEAR & MOTOR BRACKET BOLTS
- 15 HOUSING (BACK & TOP) FASTENERS
- 16 SIDE RAIL (MAIN SECTION) FASTENERS
- 17 HOUSING (FRONT & BOTTOM) FASTENERS
- 18 END RETENTION ASSEMBLY AT EVERY SLAT
- 19 OCTAGONAL AXLE FASTENERS
- 20 60MM OCTAGONAL DRIVE CROWN
- 21 CONNECTOR SLEEVE
- 22 GEAR - PLASTIC OR ZAMAC CASING
- 23 UNIVERSAL WITH DRIVE SHAFT
- 24 60MM OCTAGONAL IDLER END
- 25 IDLER BRACKET WITH BEARING

BOX & END CAP ASSEMBLY COMPONENTS

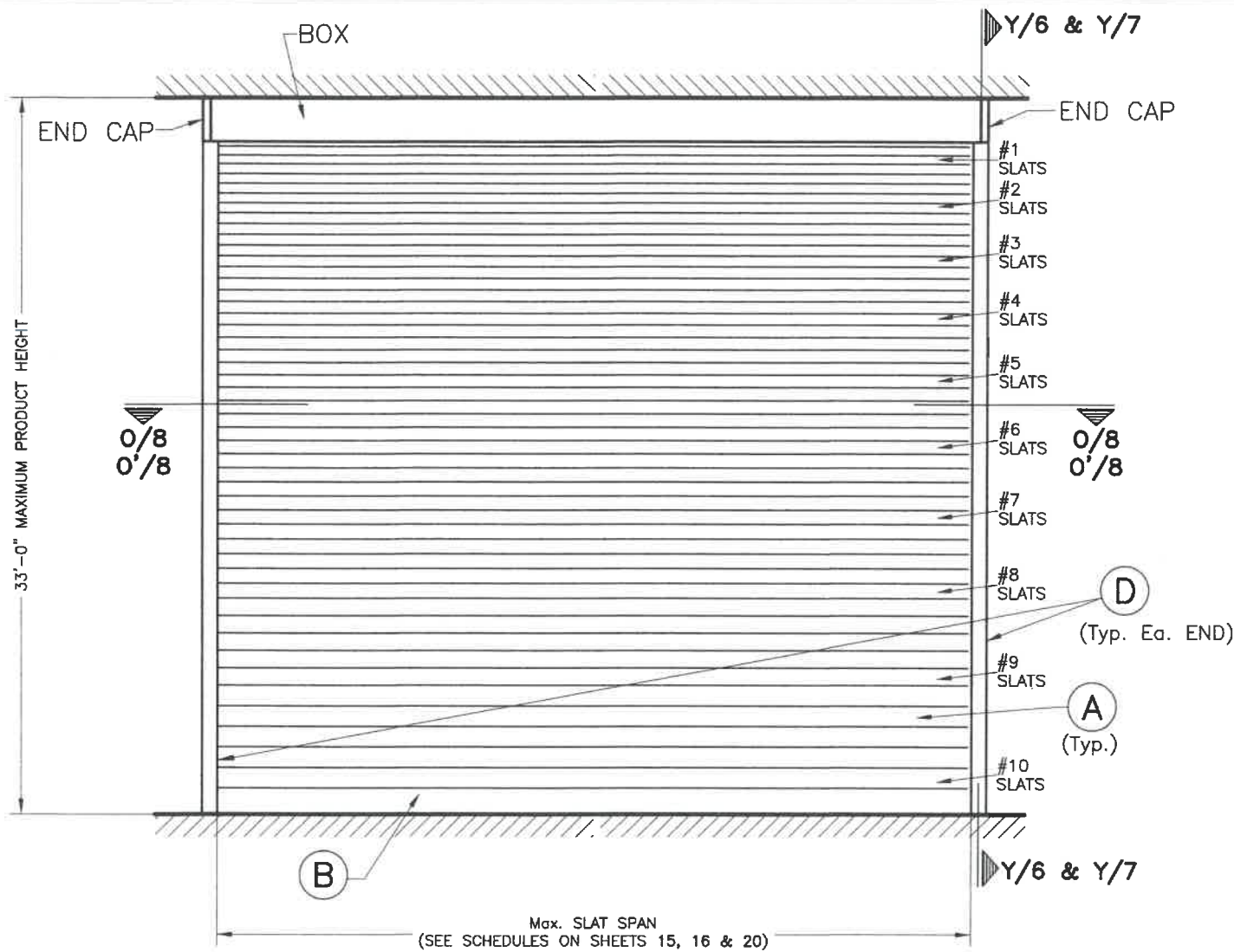
STATE OF TEXAS
 WALTER A. TILLIT, JR.
 9069
 LICENSED PROFESSIONAL ENGINEER
 SEAL/SIGNATURE/DATE

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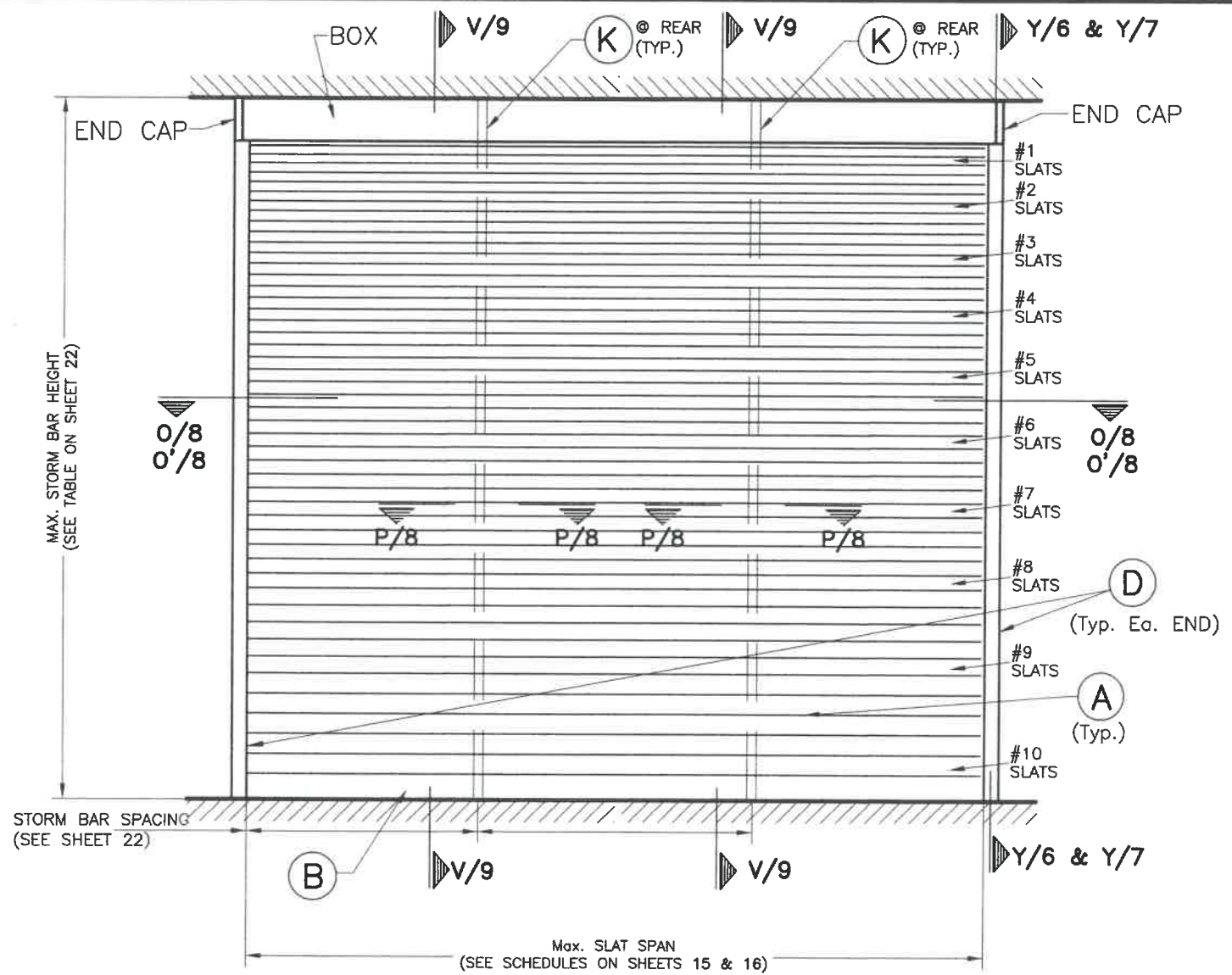
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 SHEET 3 OF 26



TYPICAL SINGLE UNIT ELEVATION W/O STORM BARS * , **
 NOTE: SEE SHEETS 2 & 3 FOR COMPONENTS NOMENCLATURE.
 N.T.S.



TYPICAL SINGLE UNIT ELEVATION W/ STORM BARS *
 NOTE: SEE SHEETS 2 & 3 FOR COMPONENTS NOMENCLATURE.
 N.T.S.

PROCEDURE FOR SLAT INSTALLATION GIVEN A PRODUCT HEIGHT:

- * **CASE 1:** PRODUCT HEIGHT EQUAL OR LESS THAN 11'-0" APPLICABLE TO INSTALLATIONS W/O STORM BARS, W/ STORM BARS OR W/ STORM BARS & MULLIONS W/ HEIGHTS UP TO 11'-0".
 - (a) CURTAIN SHALL START W/ #1 SLATS AT TOP, FOLLOWED BY #2, #3, THEREAFTER, ALL THE WAY DOWN. EACH SLAT # SHALL CONSIST OF MIN. FIVE (5) SLATS OF THAT SLAT NUMBER. PROCEDURE FOR ADDING SLATS DOWNWARD BELOW #1 SLAT SHALL BE CONTINUED UNTIL TOTAL PRODUCT HEIGHT IS COMPLETED. QUANTITY OF FINAL SLAT NUMBER INSTALLED BEFORE BOTTOM SLAT (B) MAY VARY WITH PRODUCT'S HEIGHT.
 - (b) BOTTOM SLAT (B) MUST BE ALWAYS INSTALLED.
- ** **CASE 2:** PRODUCT HEIGHT LARGER THAN 11'-0" APPLICABLE TO INSTALLATIONS W/O STORM BARS AND W/ OR W/O MULLIONS W/ HEIGHTS LARGER THAN 11'-0".
 - (a) CURTAIN SHALL START W/ #1 SLATS AT TOP, FOLLOWED BY #2, #3, THEREAFTER, ALL THE WAY DOWN. EACH SLAT # SHALL CONSIST OF MIN. FIVE (5) SLATS OF THAT SLAT NUMBER. PROCEDURE FOR ADDING SLATS DOWNWARD BELOW #1 SLAT SHALL BE CONTINUED UNTIL #10 SLAT IS INSTALLED. AFTER #10 SLAT IS INSTALLED, ADDITIONAL #10 SLATS MUST BE USED TO COMPLETE THE TOTAL PRODUCT HEIGHT.
 - (b) BOTTOM SLAT (B) MUST BE ALWAYS INSTALLED.



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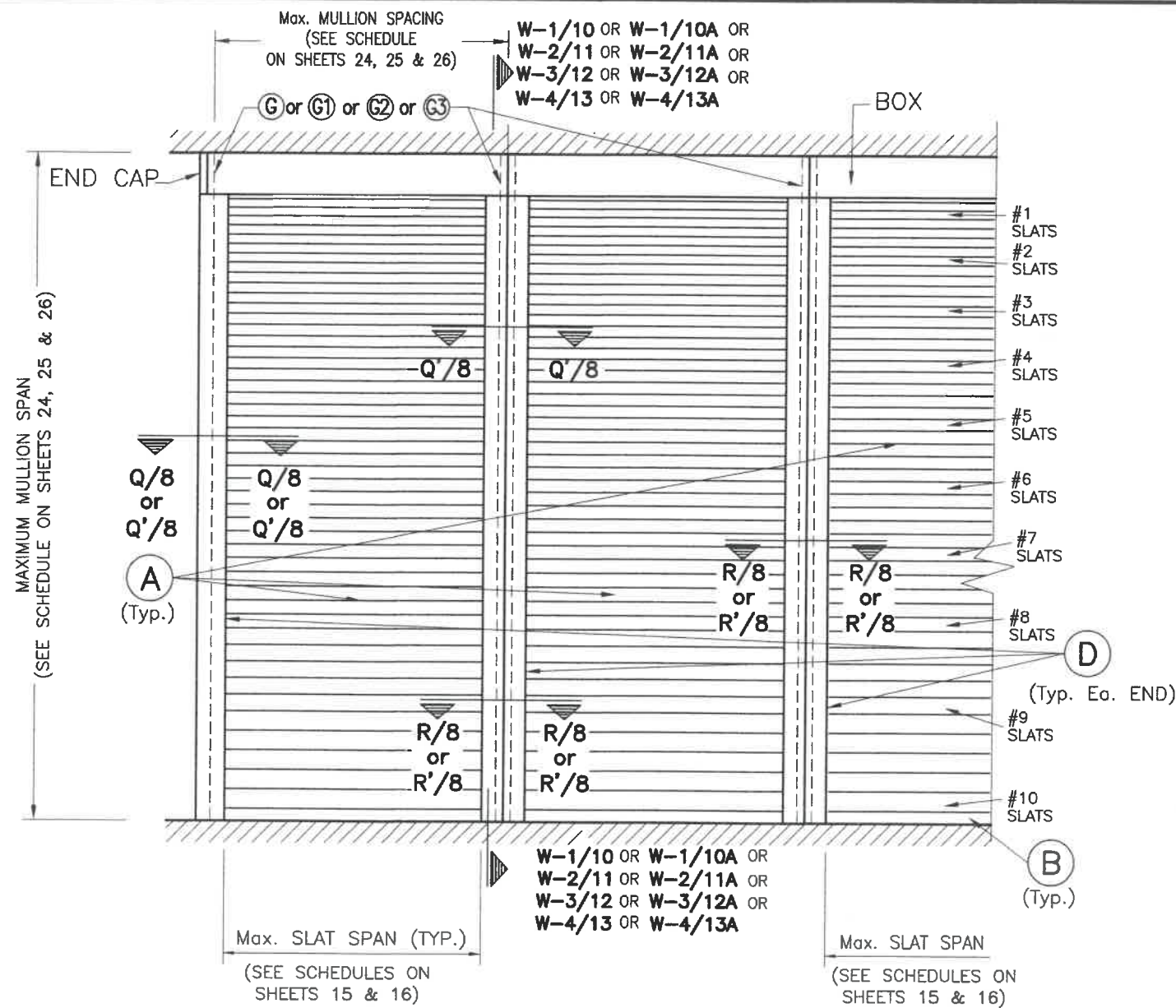
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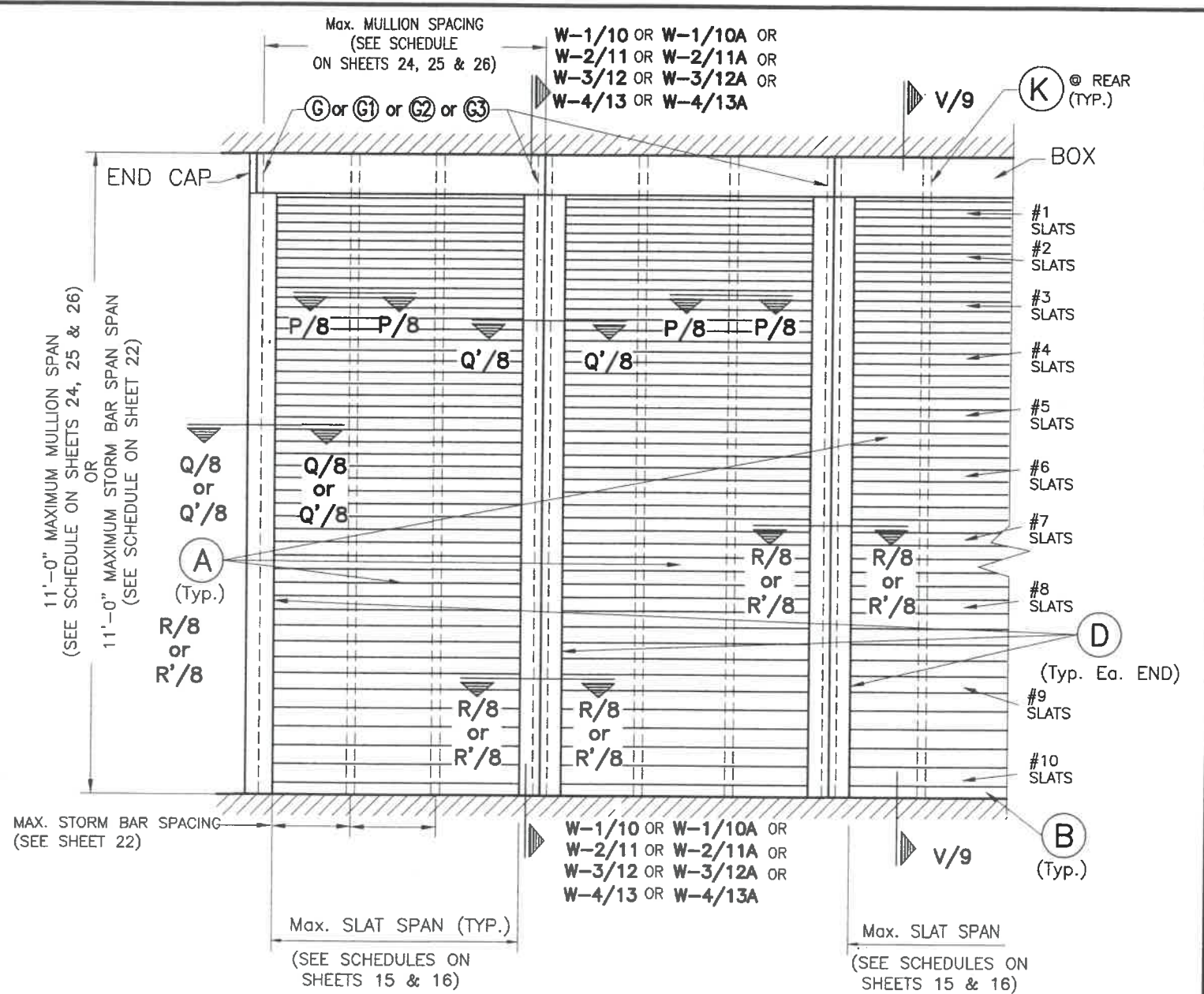
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TYPICAL CONSECUTIVE SINGLE UNIT ELEVATION *, **
W/ MULLION & W/O STORM BARS

NOTE: SEE SHEETS 2 & 3 FOR COMPONENTS NOMENCLATURE.
 N.T.S.



TYPICAL CONSECUTIVE SINGLE UNIT ELEVATION *
W/ MULLION & W/ STORM BARS

NOTE: SEE SHEETS 2 & 3 FOR COMPONENTS NOMENCLATURE.
 N.T.S.

PROCEDURE FOR SLAT INSTALLATION GIVEN A PRODUCT HEIGHT:

- * **CASE 1:** PRODUCT HEIGHT EQUAL OR LESS THAN 11'-0". APPLICABLE TO INSTALLATIONS W/O STORM BARS, W/ STORM BARS OR W/ STORM BARS & MULLIONS W/ HEIGHTS UP TO 11'-0".
 - (a) CURTAIN SHALL START W/ #1 SLATS AT TOP, FOLLOWED BY #2, #3, THEREAFTER ALL THE WAY DOWN. EACH SLAT # SHALL CONSIST OF FIVE (5) SLATS OF THAT SLAT NUMBER. PROCEDURE FOR ADDING SLATS DOWNWARD BELOW #1 SLAT SHALL BE CONTINUE UNTIL TOTAL PRODUCT HEIGHT IS COMPLETED. QUANTITY OF FINAL SLAT NUMBER INSTALLED BEFORE BOTTOM SLAT (B) MAY VARY WITH PRODUCT HEIGHT.
 - (b) BOTTOM SLAT (B) MUST BE ALWAYS INSTALLED.
- ** **CASE 2:** PRODUCT HEIGHT LARGER THAN 11'-0" APPLICABLE TO INSTALLATION W/O STORM BAR AND W/ MULLIONS W/ HEIGHTS LARGER THAN 11'-0".
 - (a) CURTAIN SHALL START W/ #1 SLATS AT TOP, FOLLOWED BY #2, #3, THEREAFTER ALL THE WAY DOWN. EACH SLAT # SHALL CONSIST OF FIVE (5) SLATS OF THAT SLAT NUMBER. PROCEDURE FOR ADDING SLATS DOWNWARD BELOW #1 SLAT SHALL BE CONTINUE UNTIL #10 SLAT IS INSTALLED. AFTER #10 SLAT IS INSTALLED, ADDITIONAL #10 SLATS MUST BE USED TO COMPLETE THE TOTAL PRODUCT HEIGHT.
 - (b) BOTTOM SLAT (B) MUST BE ALWAYS INSTALLED.

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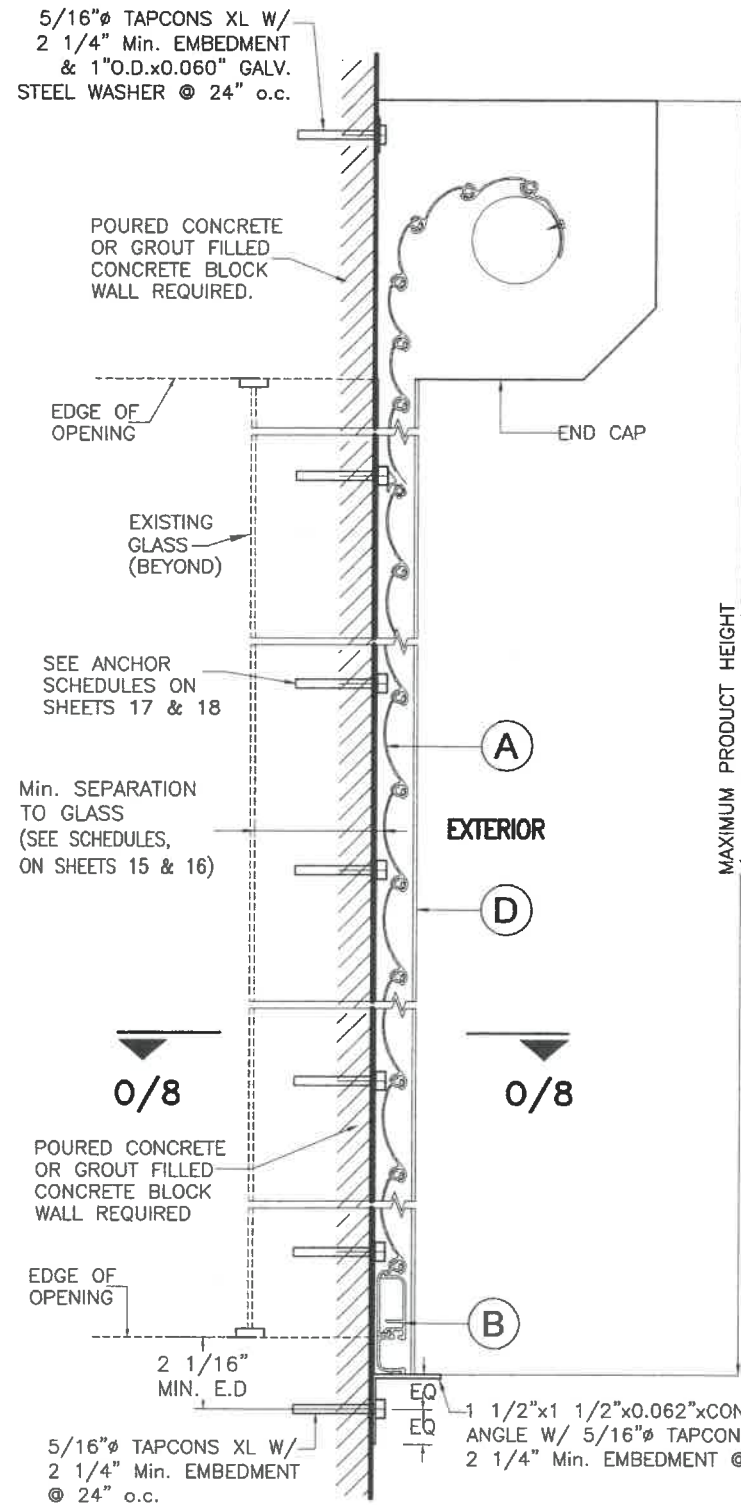
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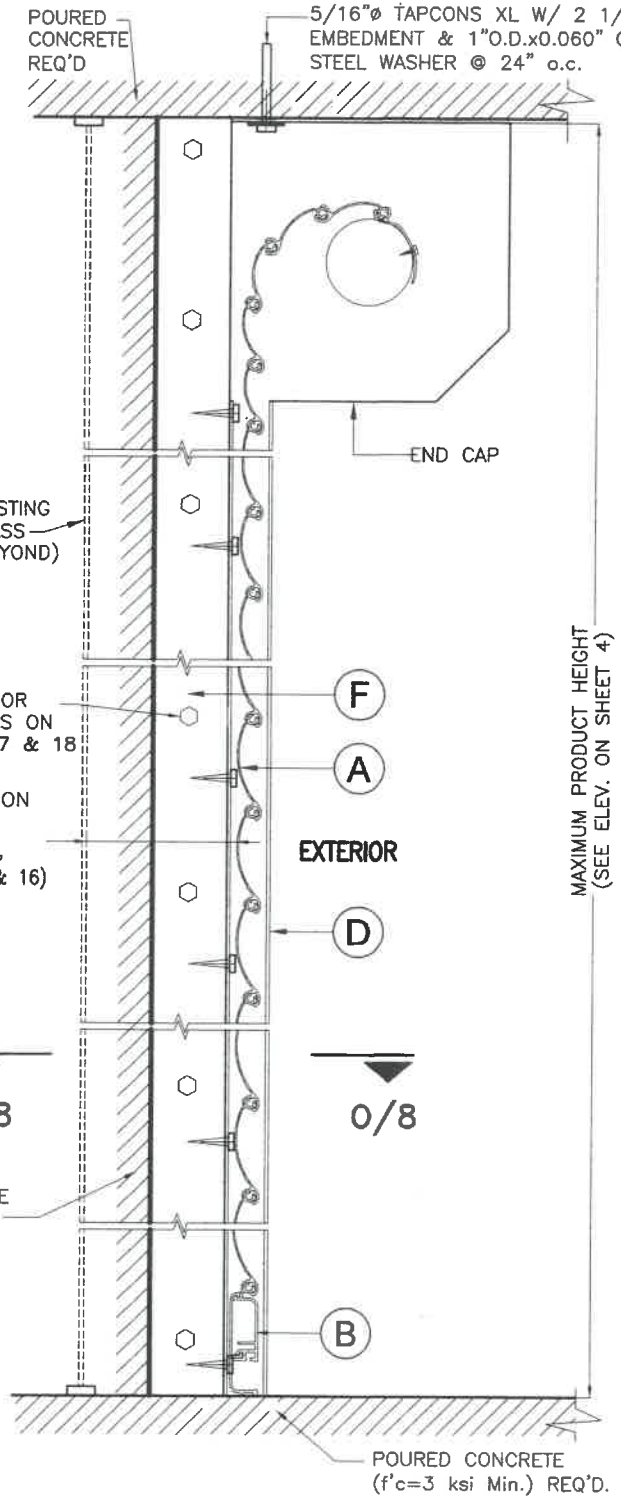
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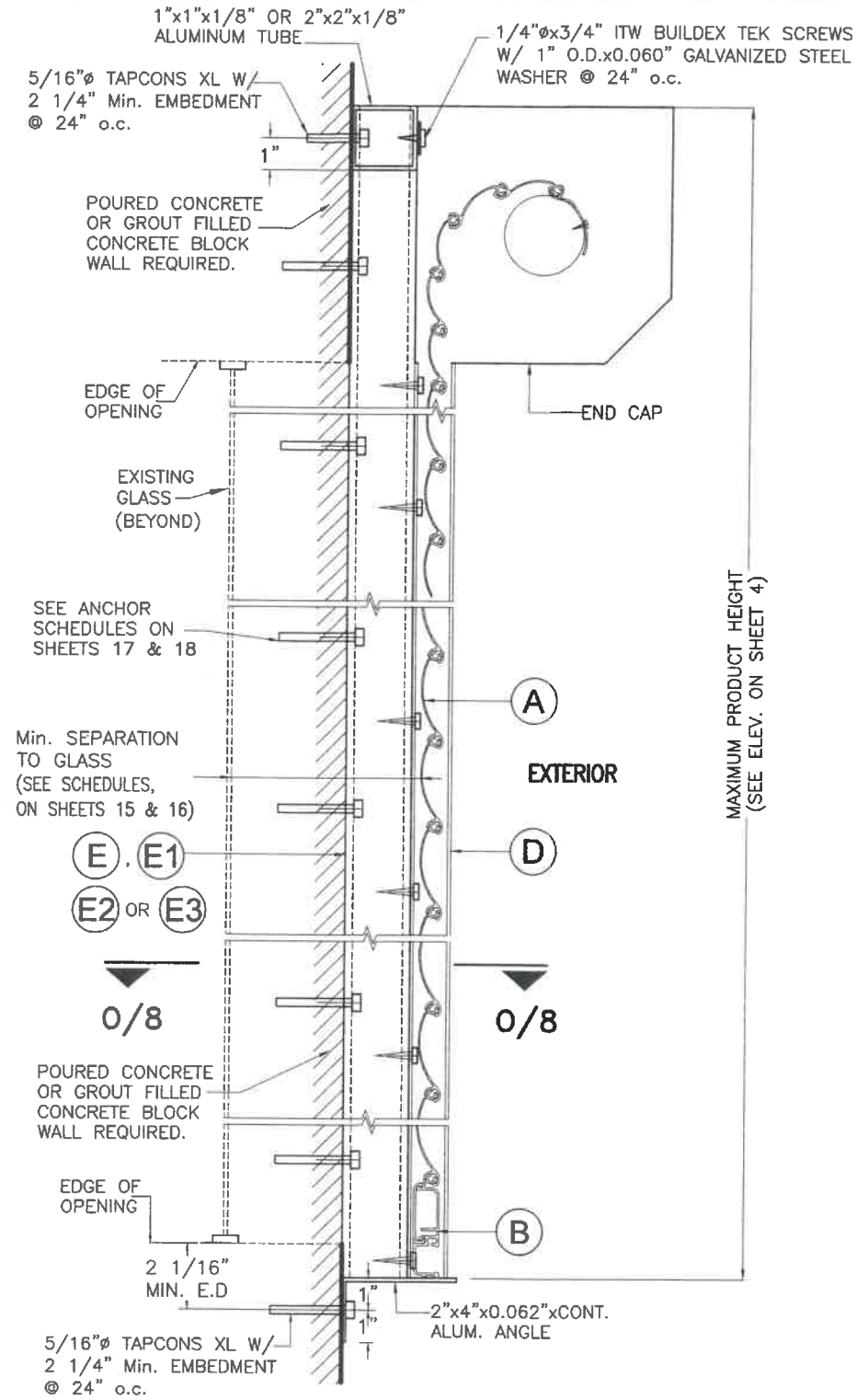
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WALL MOUNTING *



FLOOR/CEILING / TRAPPED MOUNTING *



BUILD-OUT MOUNTING *

SECTIONS Y-Y

* NOTE: SECTIONS Y-Y: BOX MAY BE ALTERNATIVELY ATTACHED TO A WOOD CEILING FOLLOWING SPECS ON SHEET 7.

INSTALLATION DETAILS ON EXISTING POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK BUILDINGS

SCALE: 3/16" = 1"

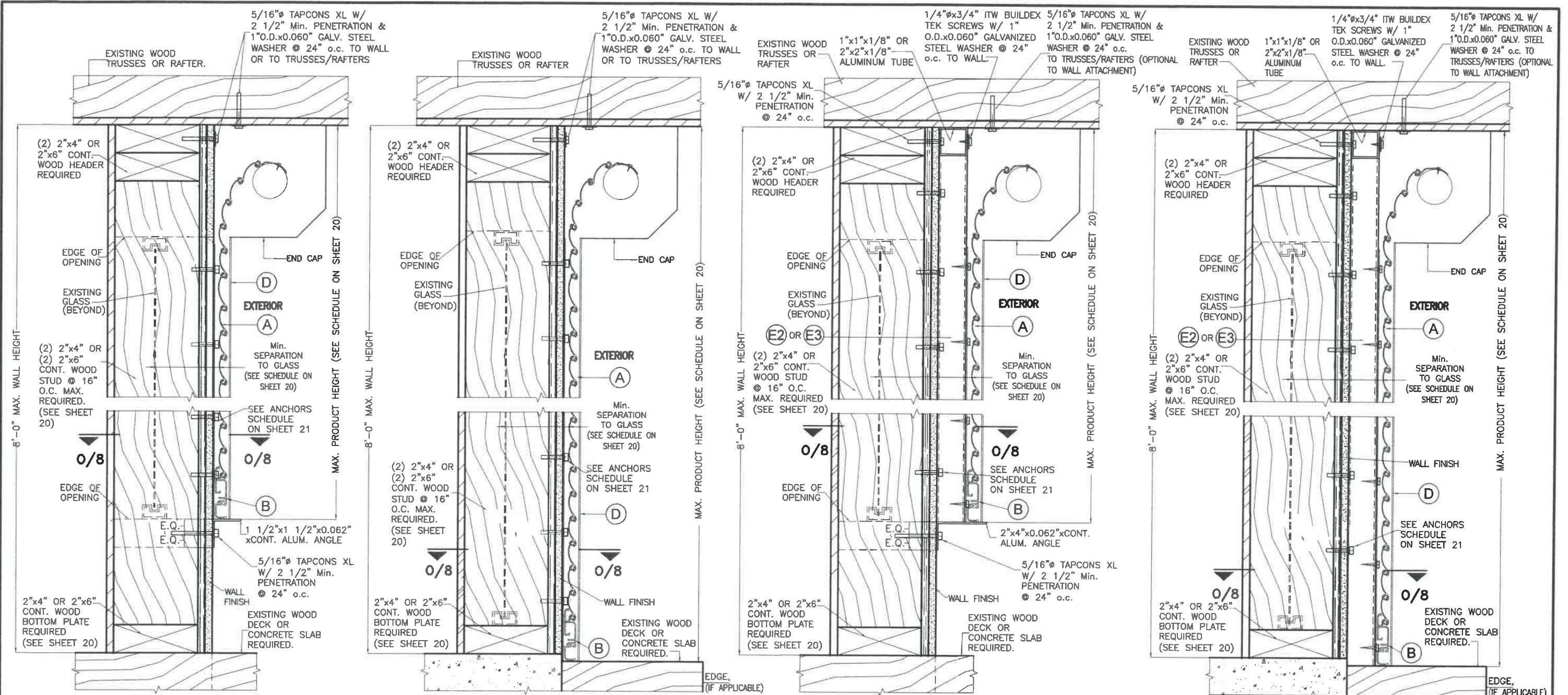
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WALL MOUNTING

WALL MOUNTING

BUILD-OUT MOUNTING

BUILD-OUT MOUNTING

SECTIONS Y-Y

INSTALLATION DETAILS ON EXISTING WOOD BUILDINGS

N.T.S.

-SEE SHEET 7 (SECTIONS 0'-0') FOR SIDE RAIL FASTENINGS DETAILS
 -SEE SHEETS 20 & 21 FOR MAXIMUM SHUTTER SPAN Vs. A.S.D DESIGN LOAD & FASTENING SCHEDULE.



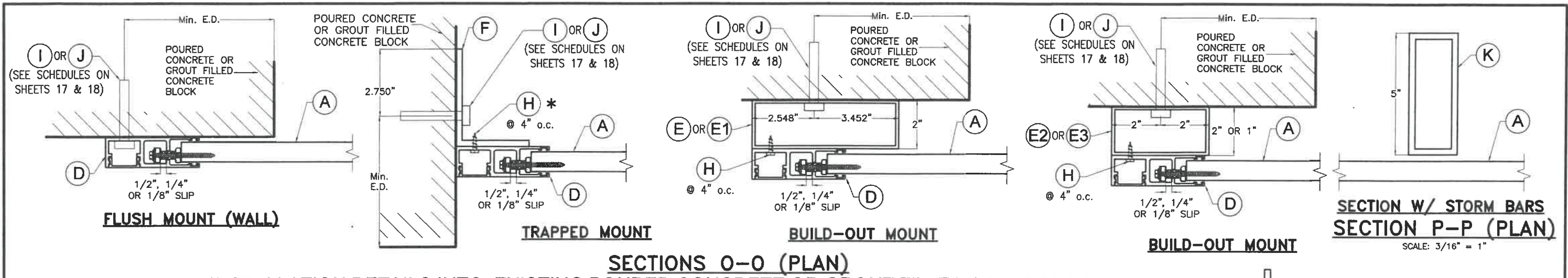
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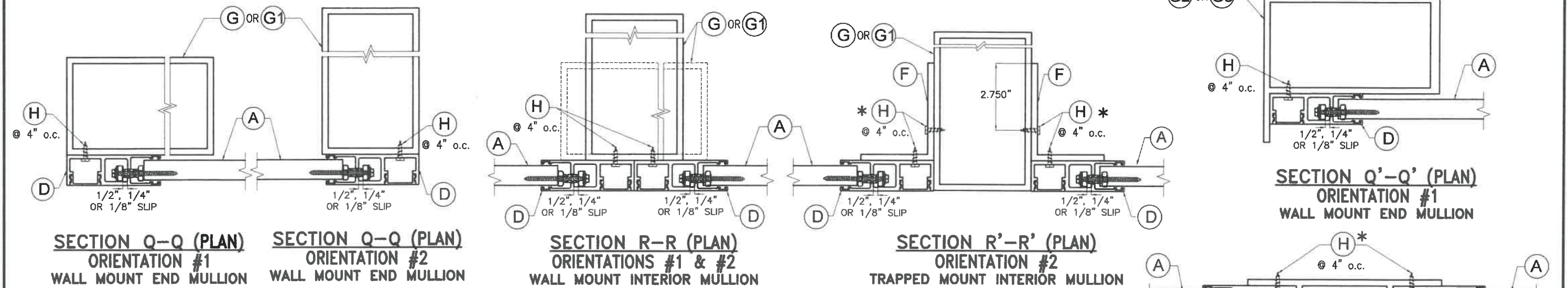
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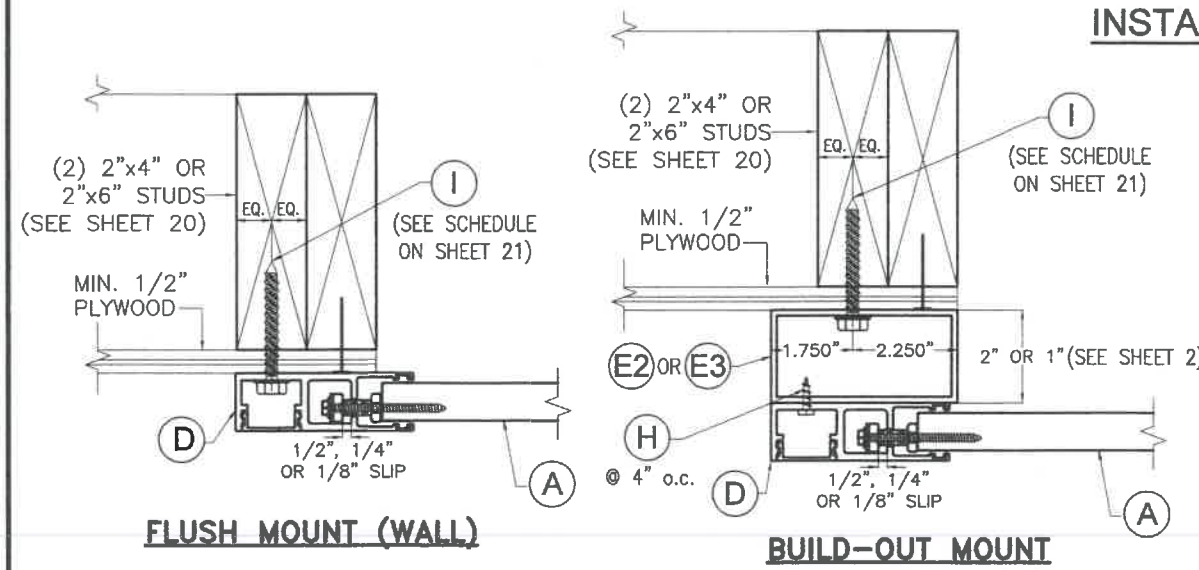


SECTIONS 0-0 (PLAN)
INSTALLATION DETAILS INTO EXISTING POURED CONCRETE OR GROUT FILLED CONCRETE BLOCK BUILDINGS
 SCALE: 1/4" = 1"

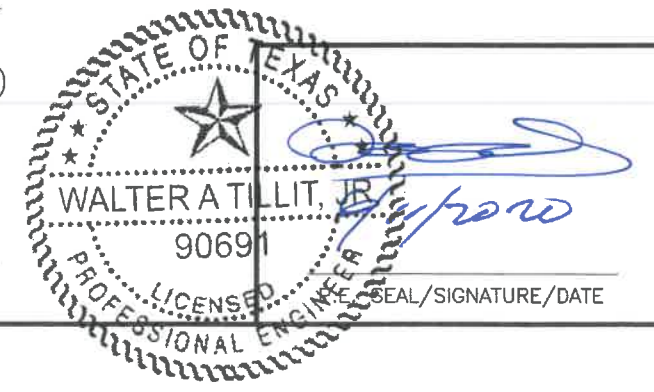


INSTALLATION DETAILS INTO MULLIONS G, G1, G2 & G3
 SCALE: 1/4" = 1"

* ALTERNATIVELY TO (H), A 1/4"Ø-20x3/4" S.S. M.S. W/ NUT MAY BE USED FOR THIS CONNECTION



SECTIONS 0'-0' (PLAN)
INSTALLATION DETAILS INTO EXISTING WOOD BUILDINGS
 SCALE: 1/4" = 1"



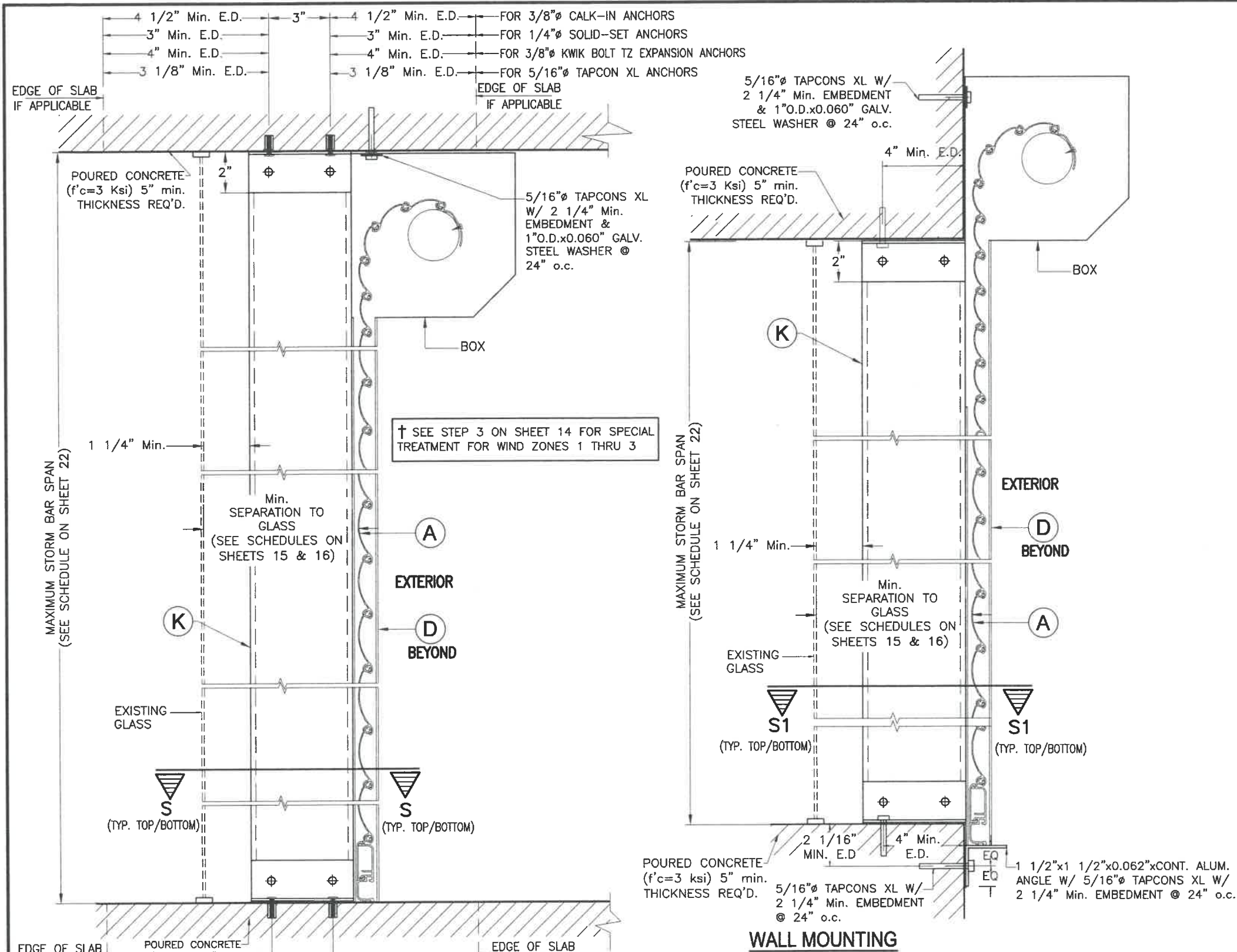
WALTER A. TILLIT Jr. P.E.
 PROFESSIONAL ENGINEER
 6355 N.W. 36 STREET, STE. 305
 VIRGINIA GARDENS, FL 33166
 PHONE (305) 871-1530 FAX (305) 871-1531
 TEXAS LIC. # 90691
 FIRM REGISTRATION # F-13790

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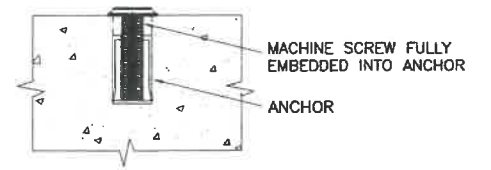
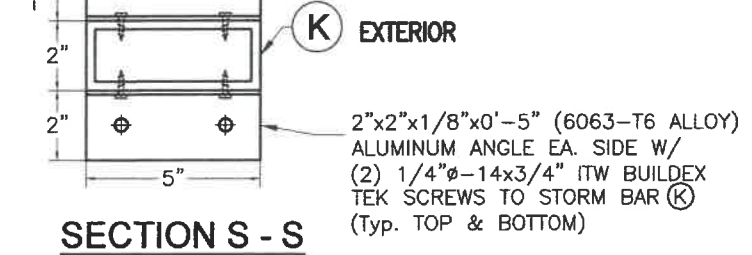
Nautilus
 End Retention Roll-Up Shutter
 EXPERT SHUTTER SERVICES INC.
 668 S.W. WHITMORE DRIVE
 PORT ST. LUCIE, FL. 34984
 PHONE: (800) 749-9056, FAX: (772) 871-0990

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

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 DATE: 06/9/2020
 DRAWING No: 20-068
 SHEET 8 OF 26

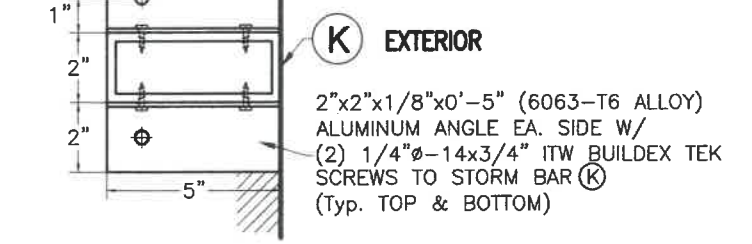


(4) 3/8"Ø CALK-IN ANCHORS OR
 (4) 1/4"Ø SOLID-SET ANCHORS OR
 (4) 3/8"Ø KWIK BOLT TZ EXPANSION ANCHORS OR
 (4) 5/16"Ø TAPCON XL ANCHORS
 (4) ANCHORS* PER STORM BAR CONNECTION, SEE TABLE 2 ON SHEET 23 (Typ. TOP & BOTTOM)

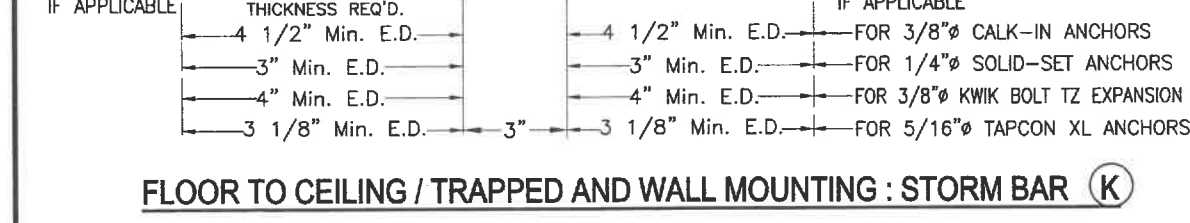


* 1/4" Ø-20 OR 3/8" Ø-16 MACHINE SCREWS USED JOINTLY W/ 1/4"Ø x 3/4" SOLID-SET OR 3/8"Ø x 1 1/4" CALK-IN ANCHORS RESPECTIVELY SHALL BE LEFT TOGETHER W/ ANCHORS AT THE TIME STORM BARS ARE REMOVED. (SEE DET. A).

(2) 3/8"Ø CALK-IN ANCHORS OR
 (2) 1/4"Ø SOLID-SET ANCHORS OR
 (2) 3/8"Ø KWIK BOLT TZ EXPANSION ANCHORS OR
 (2) 5/16"Ø TAPCON XL ANCHORS
 (2) ANCHORS* PER STORM BAR CONNECTION, SEE TABLE 3 ON SHEET 23 (Typ. TOP & BOTTOM)



SECTION S1 - S1



SECTIONS V
 SCALE: 3/16" = 1"

WALL MOUNTING

STATE OF TEXAS
 WALTER A. TILLIT, P.E.
 90691
 PROFESSIONAL ENGINEER
 P.E. SEAL/SIGNATURE/DATE

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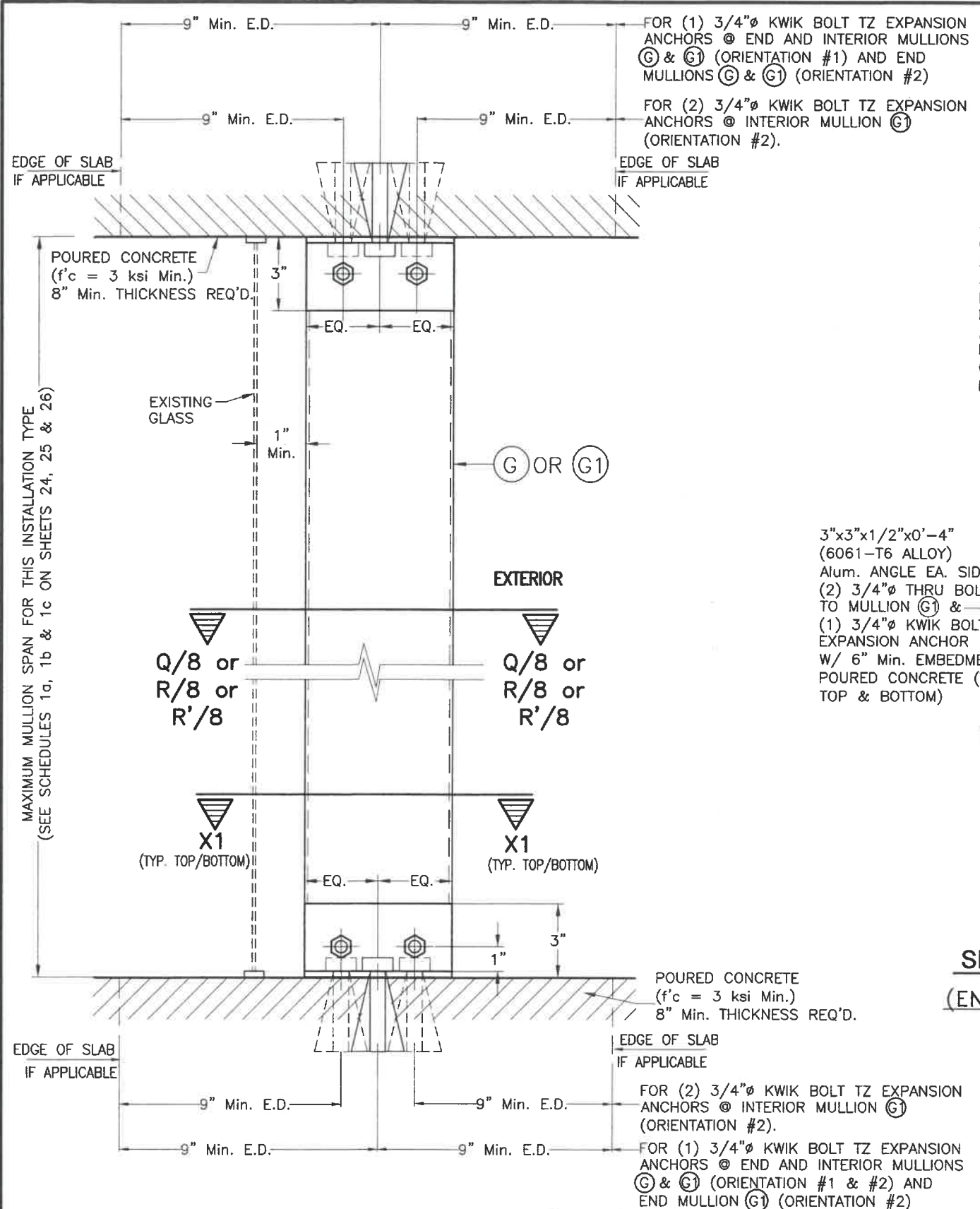
TEXAS DEPARTMENT OF INSURANCE - 2018

Nautilus
 End Retention Roll-Up Shutter

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REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

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 20-068 DRAWING No
 SHEET 9 OF 26



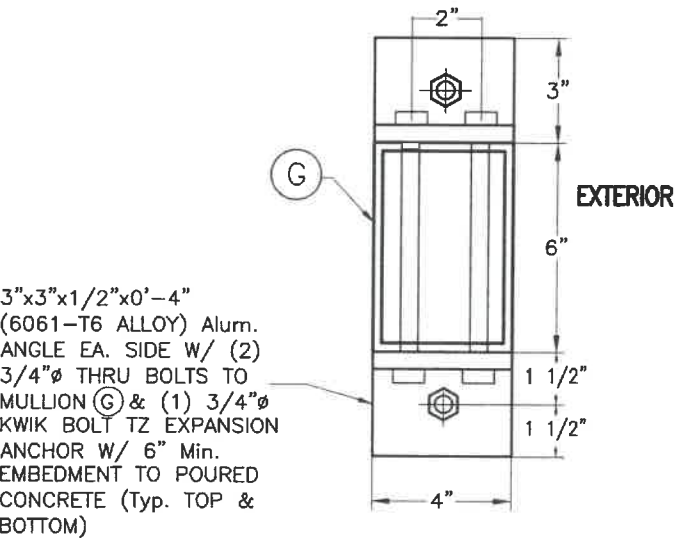
FLOOR TO CEILING / TRAPPED MOUNTING : MULLIONS (G) OR (G1)

SECTIONS W-1

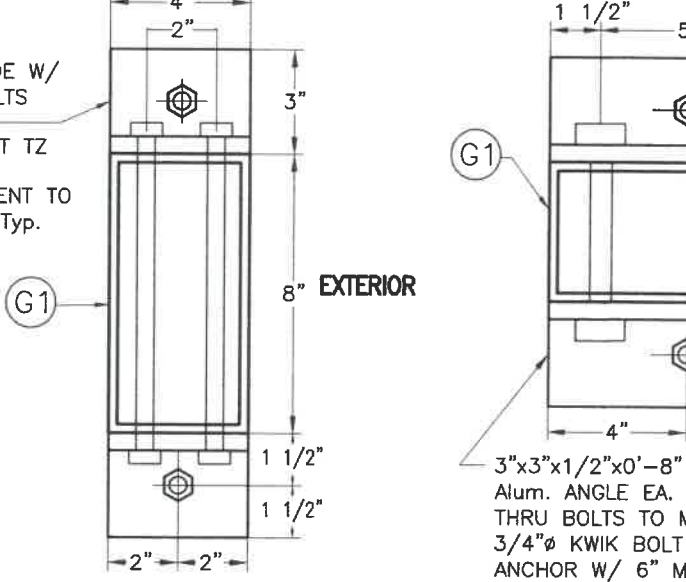
END & INTERIOR TRAPPED MOUNTED MULLION INSTALLATION *

APPLICABLE TO ALL INSTALLATIONS EXCEPT THOSE W/ LIMITATIONS COVERED ON SHEET 10A

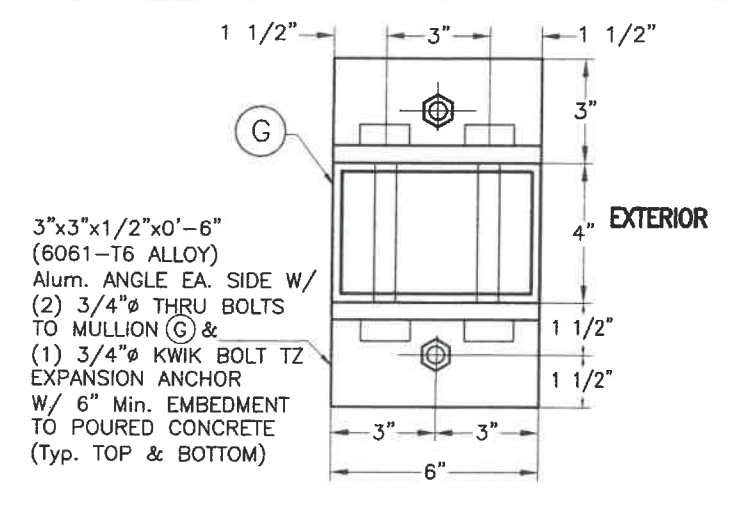
SCALE: 1/8" = 1"



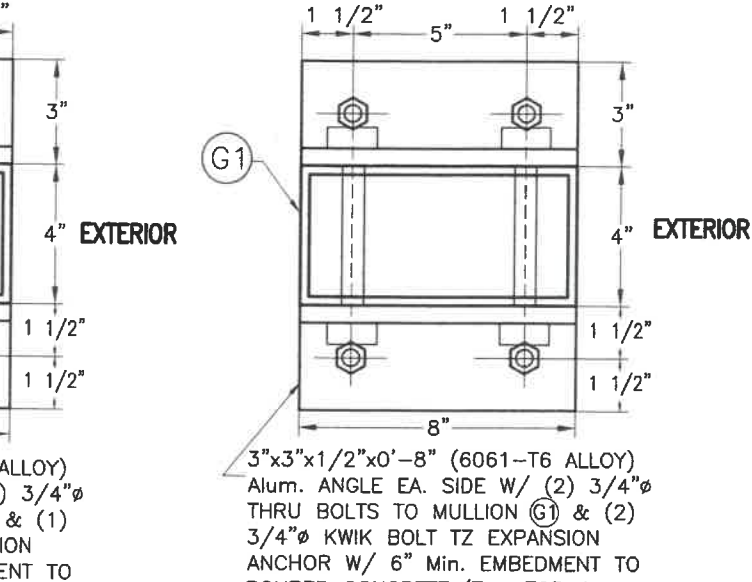
SECTION X1-X1 W/ (G) *
(END & INTERIOR MULLION)
(W/ ORIENTATION # 1)
(6"x4")



SECTION X1-X1 W/ (G1) *
(END & INTERIOR MULLION)
(W/ ORIENTATION # 1)
(8"x4")



ALTERNATIVE SECTION X1-X1 W/ (G) *
(END & INTERIOR MULLION)
(W/ ORIENTATION # 2)
(4"x6")



ALTERNATIVES SECTION X1-X1 W/ (G1) *
(END MULLION ONLY)
(W/ ORIENTATION # 2)
(4"x8")

* SIDE RAIL (D) AND BOX NOT SHOWN FOR CLARITY

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TEXAS LIC. # 90691
FIRM REGISTRATION # F-13790
P.E. SEAL/SIGNATURE/DATE

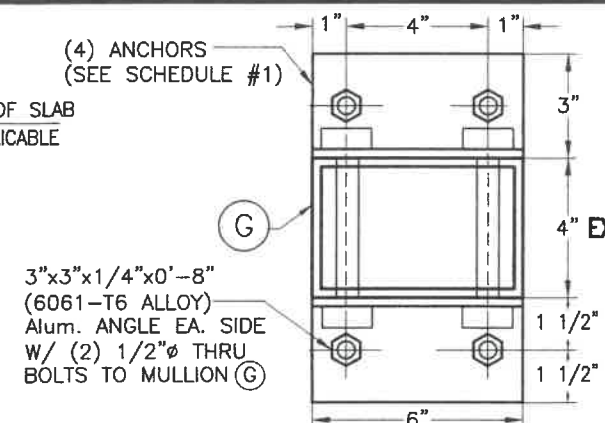
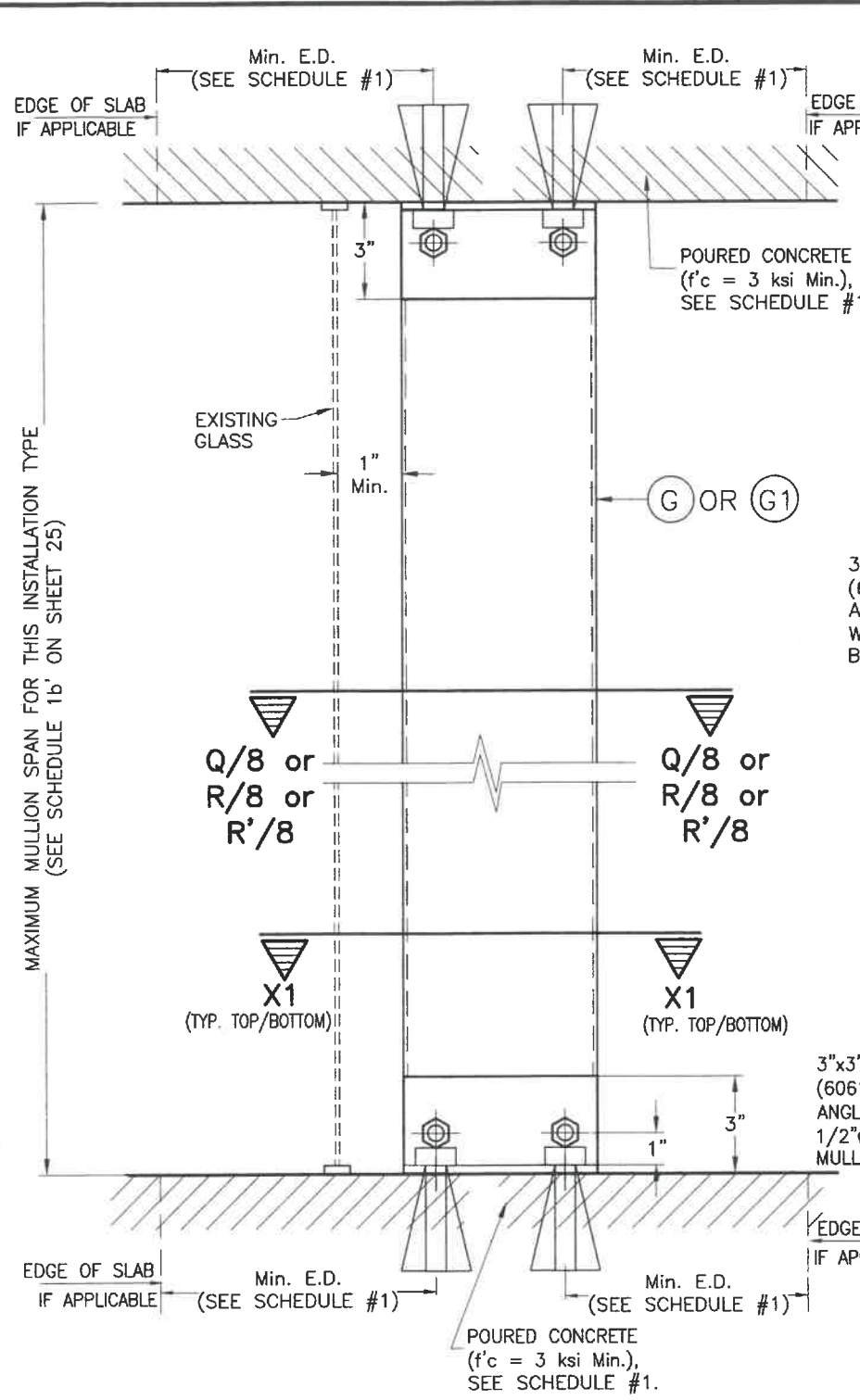
TEXAS DEPARTMENT OF INSURANCE - 2018

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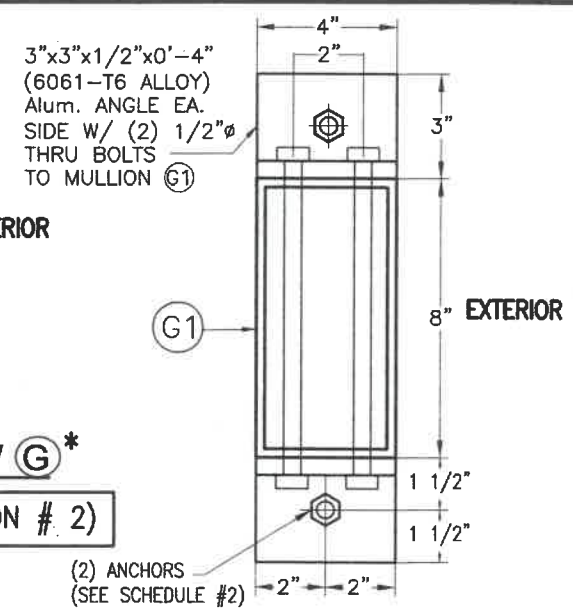
EXPERT SHUTTER SERVICES INC.
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REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

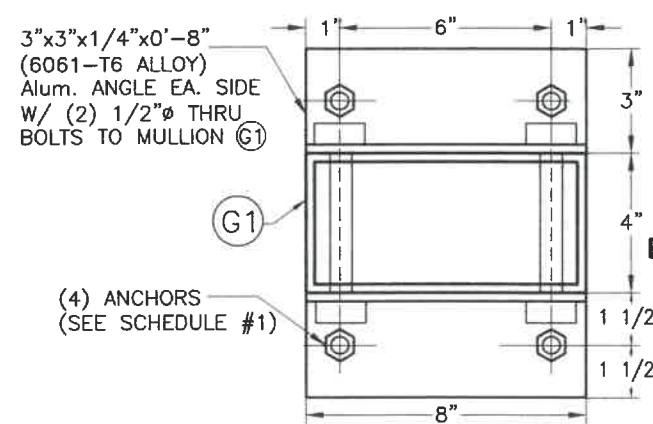
DRAWN BY: M.P.
DATE: 06/9/2020
DRAWING No: 20-068
SHEET 10 OF 26



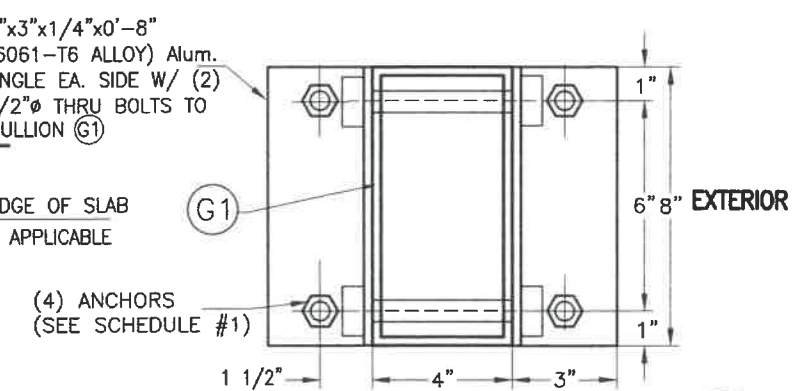
ALTERNATIVE SECTION X1-X1 W/ (G)*
(4"x6" INTERIOR MULLION ONLY W/ ORIENTATION # 2)



ALTERNATIVE SECTION X1-X1 W/ (G1)*
(4"x8" INTERIOR MULLION W/ ORIENTATION # 1)



ALTERNATIVE SECTION X1-X1 W/ (G1)*
(4"x8" INTERIOR MULLION ONLY W/ ORIENTATION # 2)



ALTERNATIVE SECTION X1-X1 W/ (G1)*
(4"x8" INTERIOR MULLION ONLY W/ ORIENTATION # 1)

SEE MAXIMUM (G) (INTERIOR) & (G1) (END & INTERIOR) TRAPPED MOUNTED MULLIONS SPAN COVERED BY SCHEDULE 1b' FOR INSTALLATION CASES I, Ia & II ON SHEET 25.
(LIMITED LOAD, MULLION SPACING AND SPAN INSTALLATION):

INSTALLATION CASE I - RESIDENTIAL AND COMMERCIAL APPLICATIONS WITH ±60.8 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 12'-0" MAXIMUM MULLION SPACING. SEE SCHEDULES #1 & #2 FOR ADDITIONAL SPECS.

INSTALLATION CASE Ia - RESIDENTIAL AND COMMERCIAL APPLICATION W/ ±60.8 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 8'-0" MAXIMUM MULLION SPACING. SEE SCHEDULES #1 & #2 FOR ADDITIONAL SPECS.

INSTALLATION CASE II - COMMERCIAL APPLICATION FOR ±100.0 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 8'-0" MAXIMUM MULLION SPACING. SEE SCHEDULES #1 & #2 FOR ADDITIONAL SPECS.

SCHEDULE #1				
INSTALLATION CASES	MIN. SLAB THICKNESS REQ'D.	ANCHOR TYPE & SIZE (TYP. TOP & BOTTOM)	MIN. ANCHOR EMBEDMENT	MIN. EDGE DISTANCE FOR ANCHOR
I	4"	3/8" HILTI INC HUS-H SCREW & 3/8" POWER FASTENER WEDGE-BOLT ANCHOR FOR (G) & (G1) (INTERIOR) MULLIONS W/ ORIENTATION #2.	2 1/2"	5 1/2"
		1/2" HILTI INC HUS-H SCREW & 1/2" POWER FASTENER WEDGE-BOLT ANCHOR FOR (G1) (END & INTERIOR) MULLION W/ ORIENTATION #1.	3"	6"
Ia	4"	1/2" HILTI INC KWIK BOLT TZ ONLY FOR (G) & (G1) INTERIOR MULLIONS W/ ORIENTATION #2) & (G1) (END MULLION W/ ORIENTATION #1).	2 1/2"	5 1/2"
		1/2" HILTI INC HUS-H SCREW & 1/2" POWER FASTENER WEDGE-BOLT ANCHOR FOR (G) & (G1) (END OR INTERIOR MULLION) W/ ORIENTATIONS #1 OR #2.	3"	6"
II	6"	1/2" HILTI INC KWIK BOLT TZ ONLY FOR (G) & (G1) INTERIOR MULLIONS W/ ORIENTATION #2) & (G1) (END MULLION W/ ORIENTATION #1).	3 1/4"	7 1/2"
		1/2" HILTI INC HUS-H SCREW OR 1/2" POWER FASTENER WEDGE-BOLT ANCHOR SEE * NOTE ON SCHEDULE 1b' ON SHEET 25. VALID FOR END & INTERIOR MULLIONS (G) & (G1) W/ ORIENTATIONS #1 OR #2.	3"	6"
SCHEDULE #2				
INSTALLATION CASES	MIN. SLAB THICKNESS REQ'D.	ANCHOR TYPE & SIZE (TYP. TOP & BOTTOM)	MIN. ANCHOR EMBEDMENT	MIN. EDGE DISTANCE FOR ANCHOR
I, Ia & II	4"	5/8" HILTI INC HUS-H SCREW & 5/8" POWER FASTENER WEDGE-BOLT ANCHOR.	2 1/2"	7 1/2"

◇ END & INTERIOR TRAPPED MOUNTED MULLION INSTALLATION *
APPLICABLE TO A LIMITED LOAD, MULLION SPAN AND MULLION SPACING INSTALLATIONS

SCALE: 1/8" = 1"

* SIDE RAIL (D) AND BOX NOT SHOWN FOR CLARITY

STATE OF TEXAS
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P.E. SEAL/SIGNATURE

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FIRM REGISTRATION # F-13790

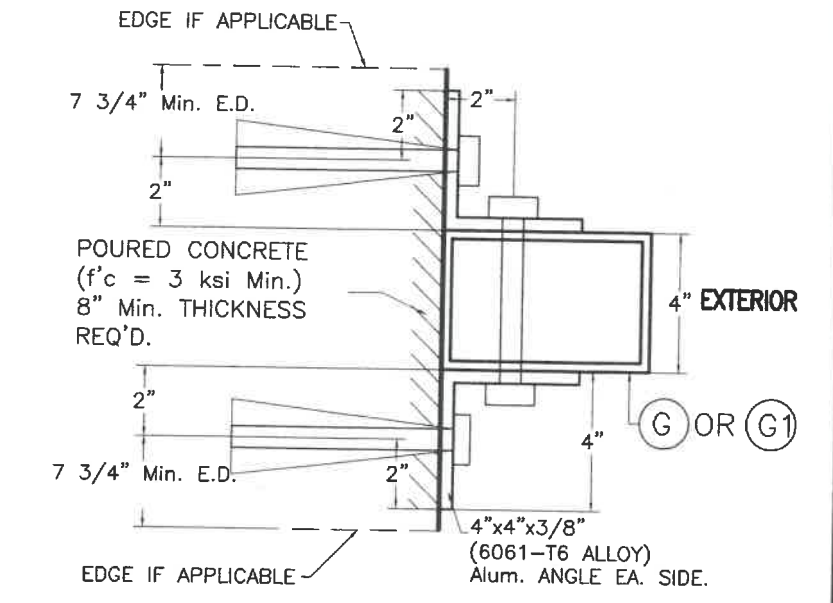
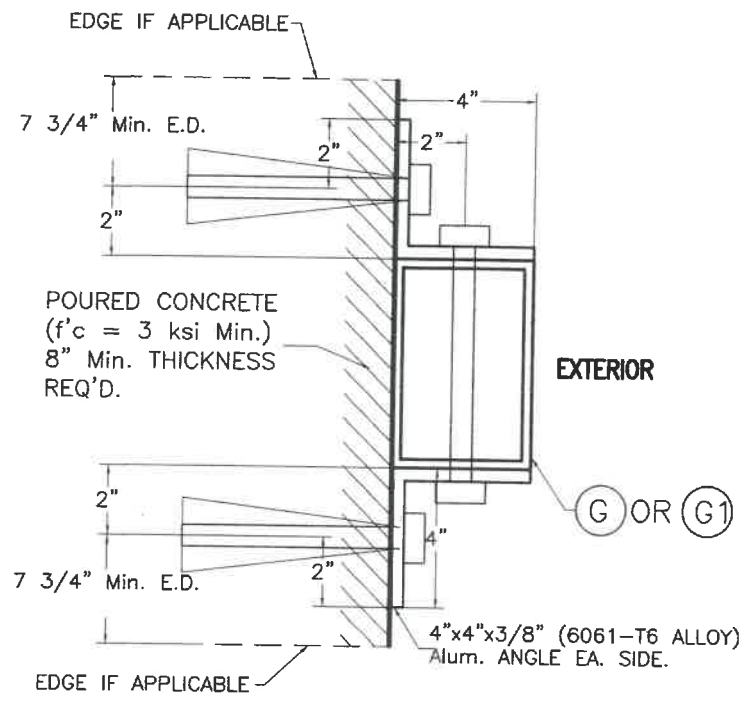
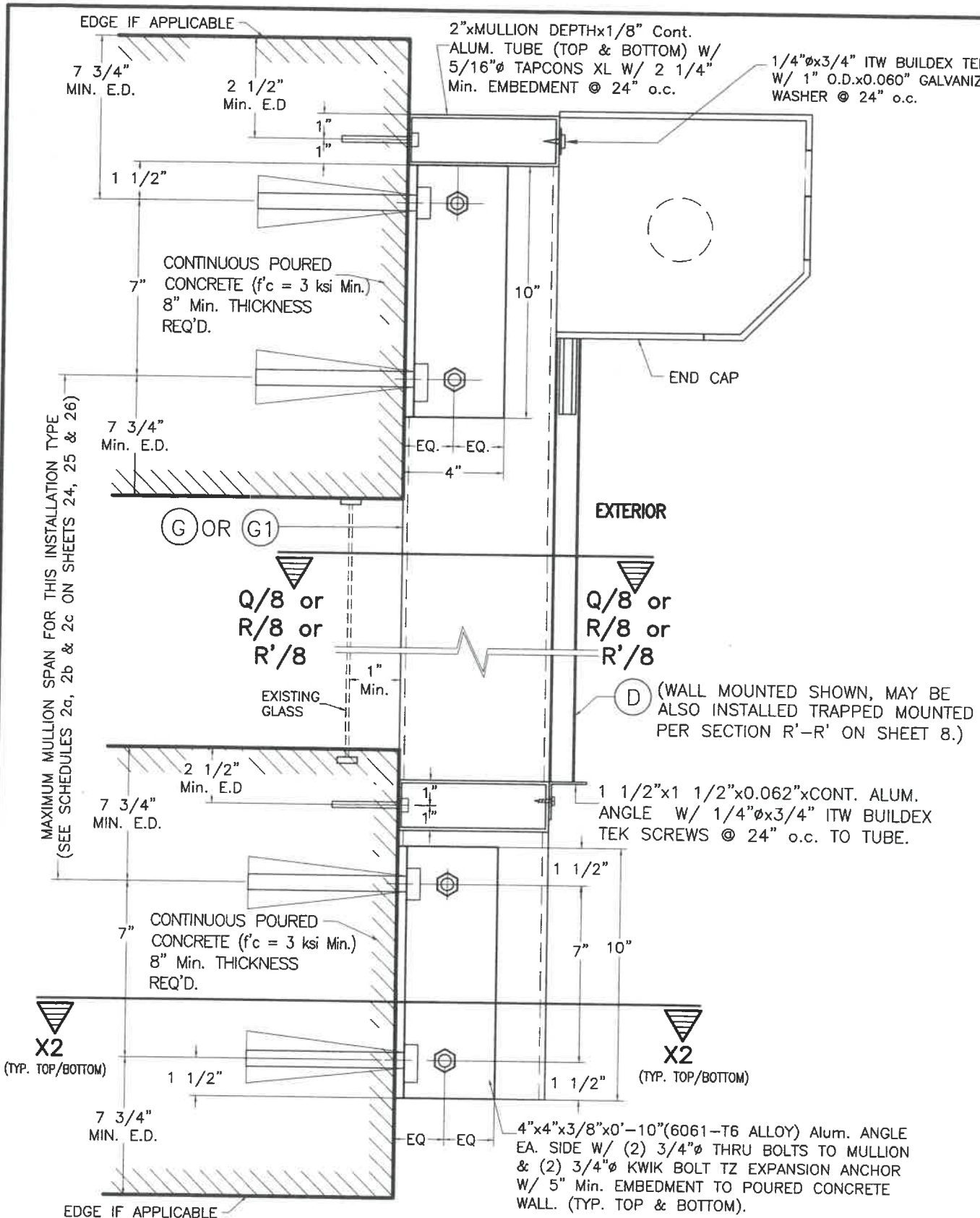
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SHEET 10A OF 26

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		



SECTION X2-X2 W/ G OR G1*
 (END & INTERIOR MULLION)
 (W/ ORIENTATION # 1)
 (6" x 4" or 8" x 4")

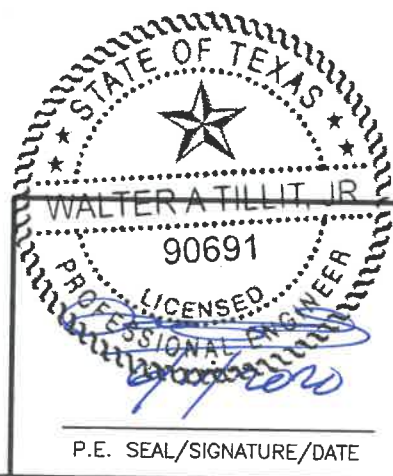
ALTERNATIVE SECTION X2-X2 W/ G OR G1*
 (END & INTERIOR MULLION)
 (W/ ORIENTATION # 2)
 (4" x 6" or 4" x 8")

* SIDE RAIL D NOT SHOWN FOR CLARITY

WALL MOUNTING : MULLIONS G OR G1
POURED CONCRETE WALL
SECTION W-2

END & INTERIOR WALL MOUNTED MULLION INSTALLATION *
APPLICABLE TO ALL INSTALLATIONS EXCEPT THOSE W/ LIMITATIONS COVERED ON SHEET 11A

SCALE: 1/8" = 1"



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 TEXAS LIC. # 90691
 FIRM REGISTRATION # F-13790

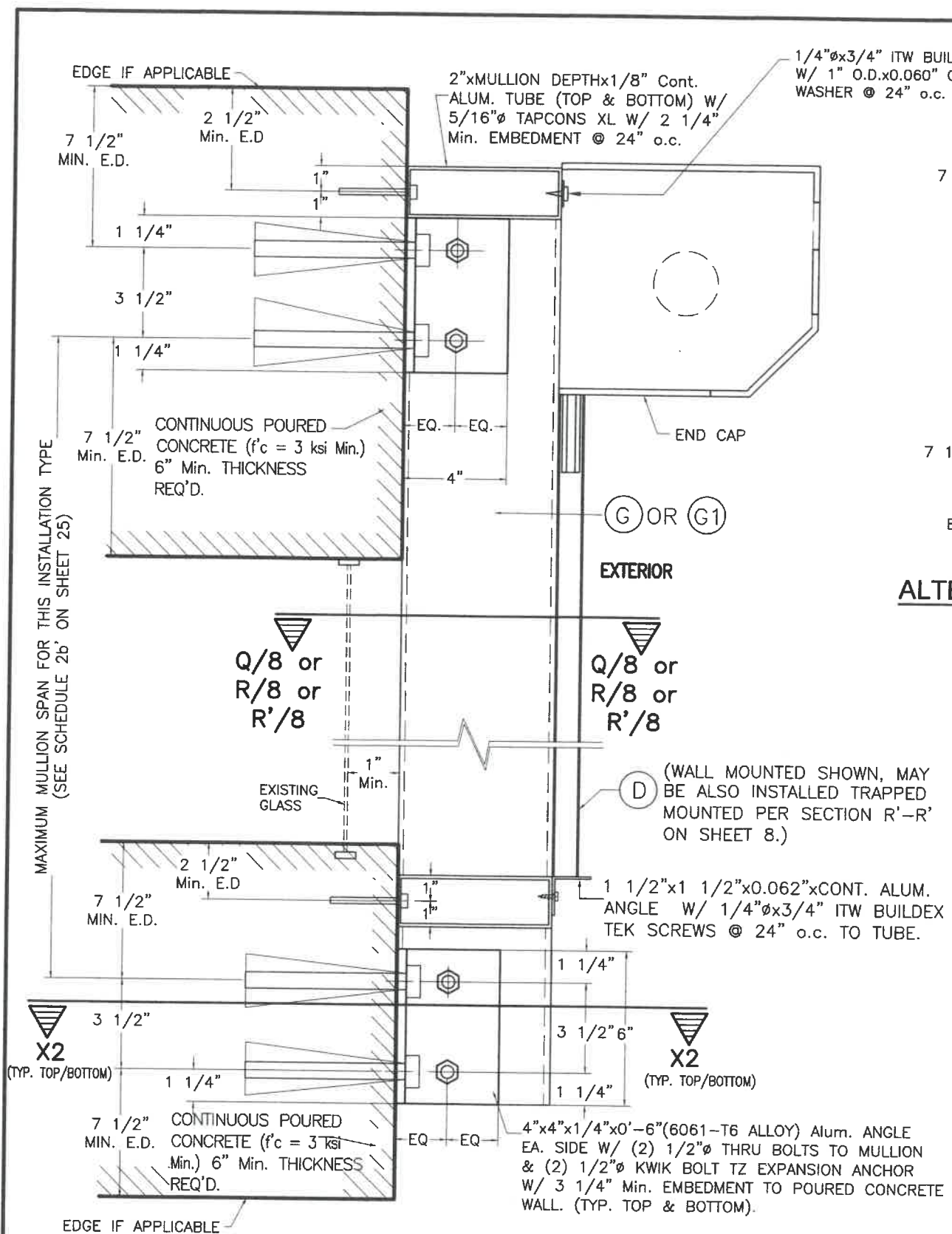
TEXAS DEPARTMENT OF INSURANCE - 2018

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 End Retention Roll-Up Shutter

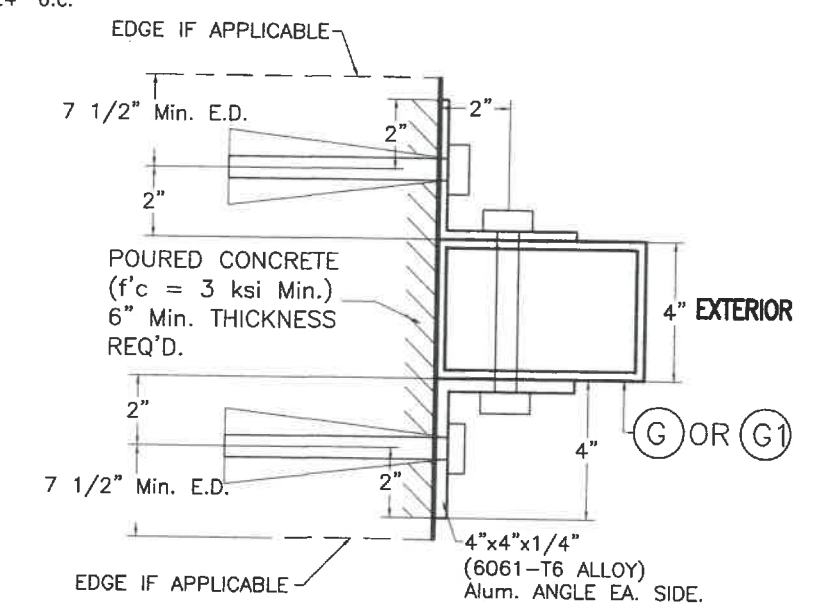
EXPERT SHUTTER SERVICES INC.
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1	OLD 14-051	06/9/2020	4		
2			5		

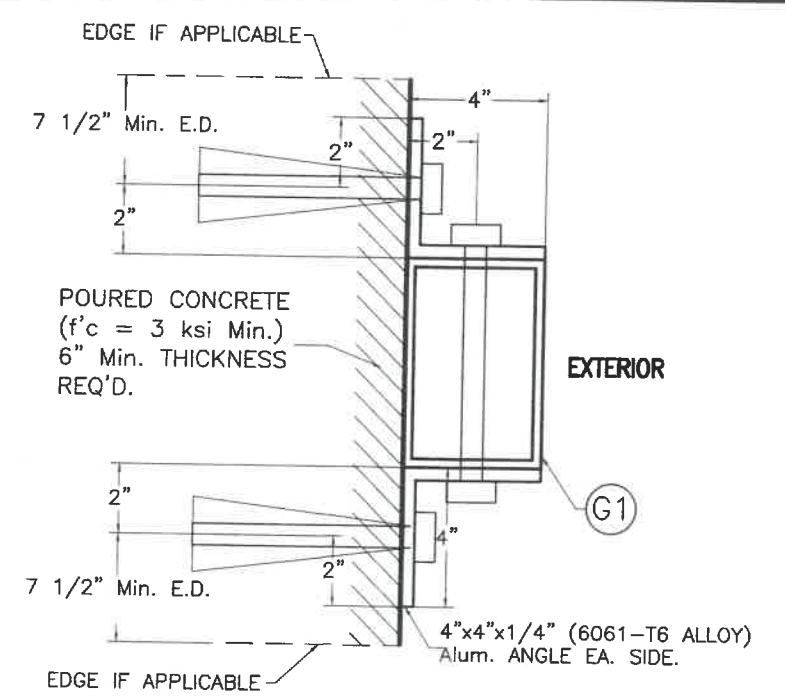
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 DATE
 20-068
 DRAWING No
 SHEET 11 OF 26



◇ END & INTERIOR WALL MOUNTED MULLION INSTALLATION *
APPLICABLE TO A LIMITED LOAD, MULLION SPAN AND MULLION SPACING INSTALLATIONS
SCALE: 1/8" = 1"



ALTERNATIVE SECTION X2-X2 W/ (G) OR (G1) *
(INTERIOR MULLION)
(W/ ORIENTATION # 2)
(4"x6" or 4"x8")



ALTERNATIVE SECTION X2-X2 W/ (G1) *
(END & INTERIOR MULLIONS)
(W/ ORIENTATION # 1)
(8"x4")

◇ SEE MAXIMUM (G) (INTERIOR) & (G1) (END & INTERIOR) WALL MOUNTED MULLIONS SPAN COVERED BY SCHEDULE 2b' FOR INSTALLATION CASES I' & II' ON SHEET 25 (LIMITED LOAD, MULLION SPACING AND SPAN INSTALLATION):

INSTALLATION CASE I' - RESIDENTIAL AND COMMERCIAL APPLICATIONS WITH ±60.8 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 12'-0" MAXIMUM MULLION SPACING. VALID FOR CONNECTION TO CONCRETE W/ HILTI INC HUS-H OR POWER FASTENERS WEDGE-BOLT ANCHORS.

INSTALLATION CASE II' - COMMERCIAL APPLICATION FOR ±100.0 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 8'-0" MAXIMUM MULLION SPACING. VALID FOR CONNECTION TO CONCRETE W/ HILTI INC KWIK BOLT TZ ANCHORS.

SIDE RAIL (D) NOT SHOWN FOR CLARITY

STATE OF TEXAS
WALTER A TILLIT, JR.
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P.E. SEAL/SIGNATURE/DATE

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TEXAS LIC. # 90691
FIRM REGISTRATION # F-13790

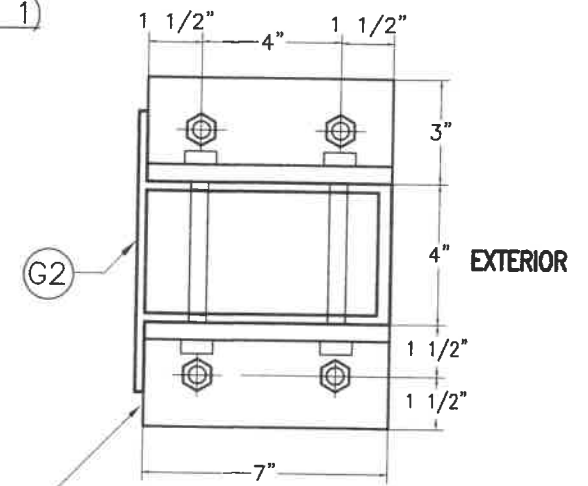
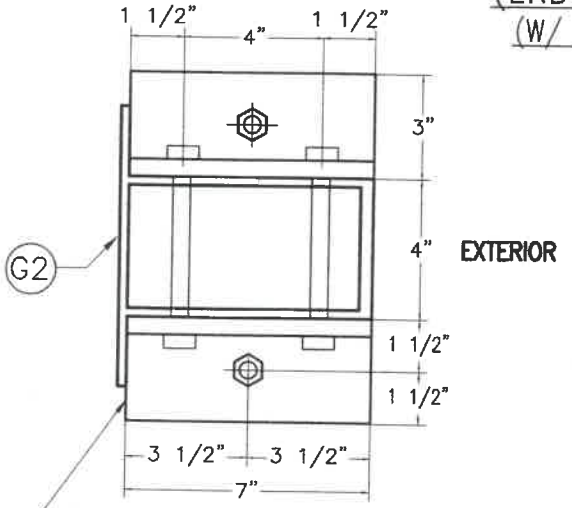
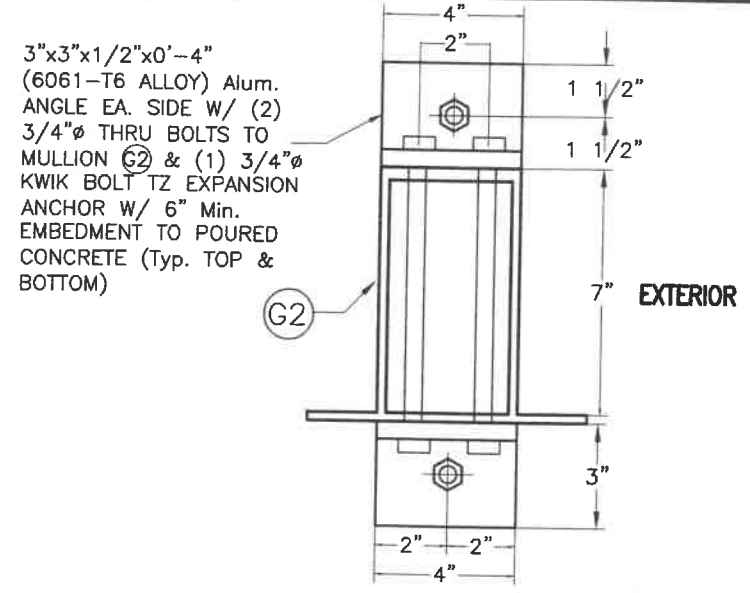
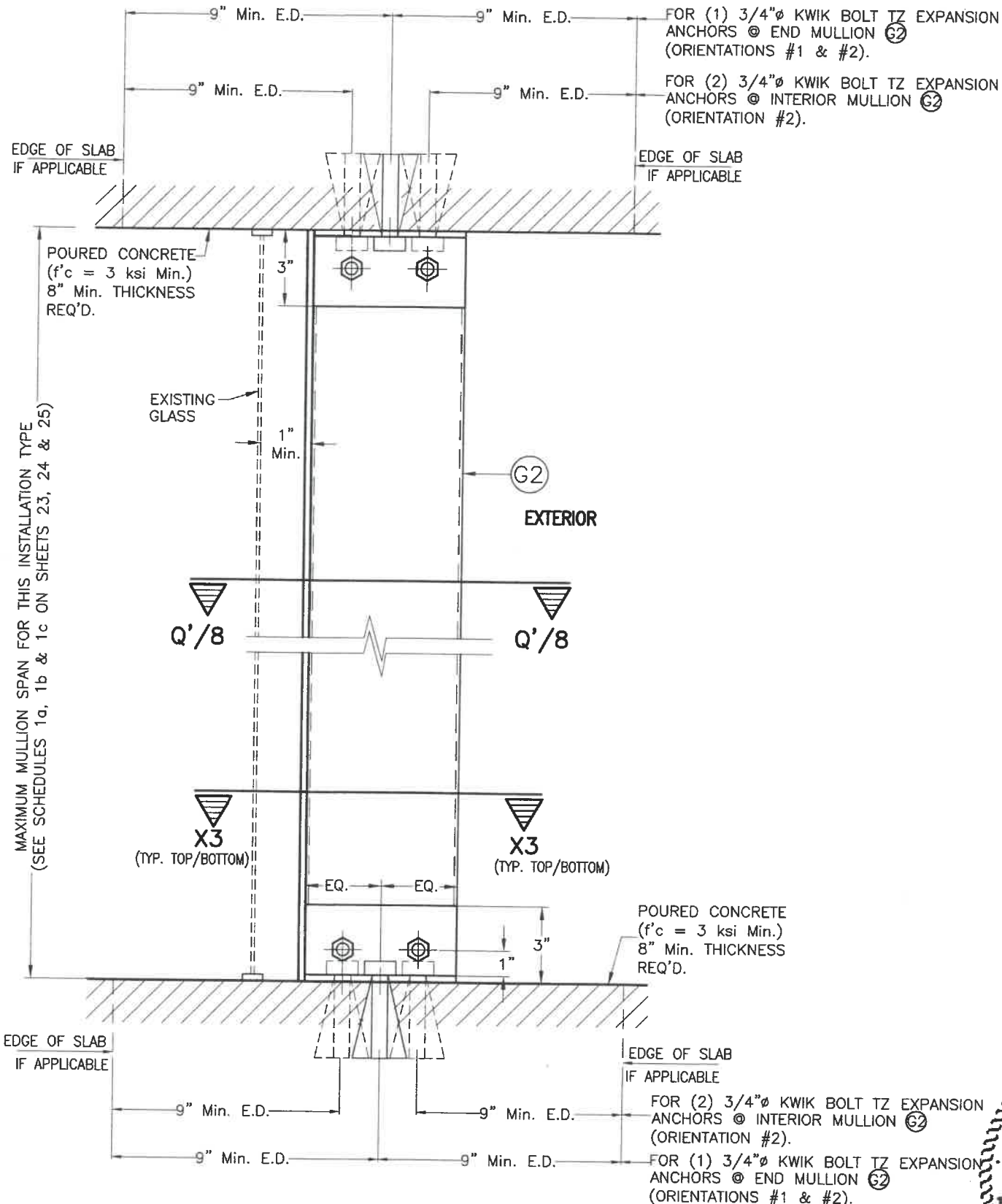
TEXAS DEPARTMENT OF INSURANCE - 2018

Nautilus
End Retention Roll-Up Shutter

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1	OLD 14-051	06/9/2020	4		
2			5		

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SHEET 11A OF 26



ALTERNATIVE SECTIONS X3-X3 W/ G2*
(W/ ORIENTATION # 2)
(4"x7")

* SIDE RAIL (D) AND BOX NOT SHOWN FOR CLARITY.

FLOOR TO CEILING / TRAPPED MOUNTING : MULLION G2
SECTION W-3

END & INTERIOR TRAPPED MOUNTED MULLION INSTALLATION *
APPLICABLE TO ALL INSTALLATIONS EXCEPT THOSE W/ LIMITATIONS COVERED ON SHEET 12A

SCALE: 1/8" = 1"

STATE OF TEXAS
WALTER A. TILLIT, JR.
90691
LICENSED PROFESSIONAL ENGINEER
P.E. SEAL/SIGNATURE/DATE

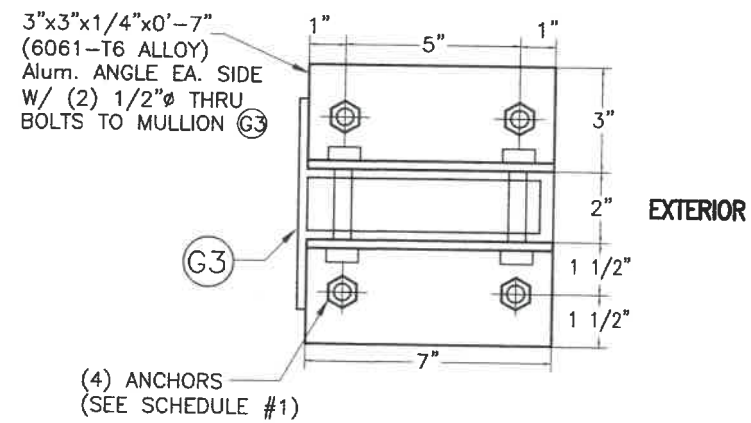
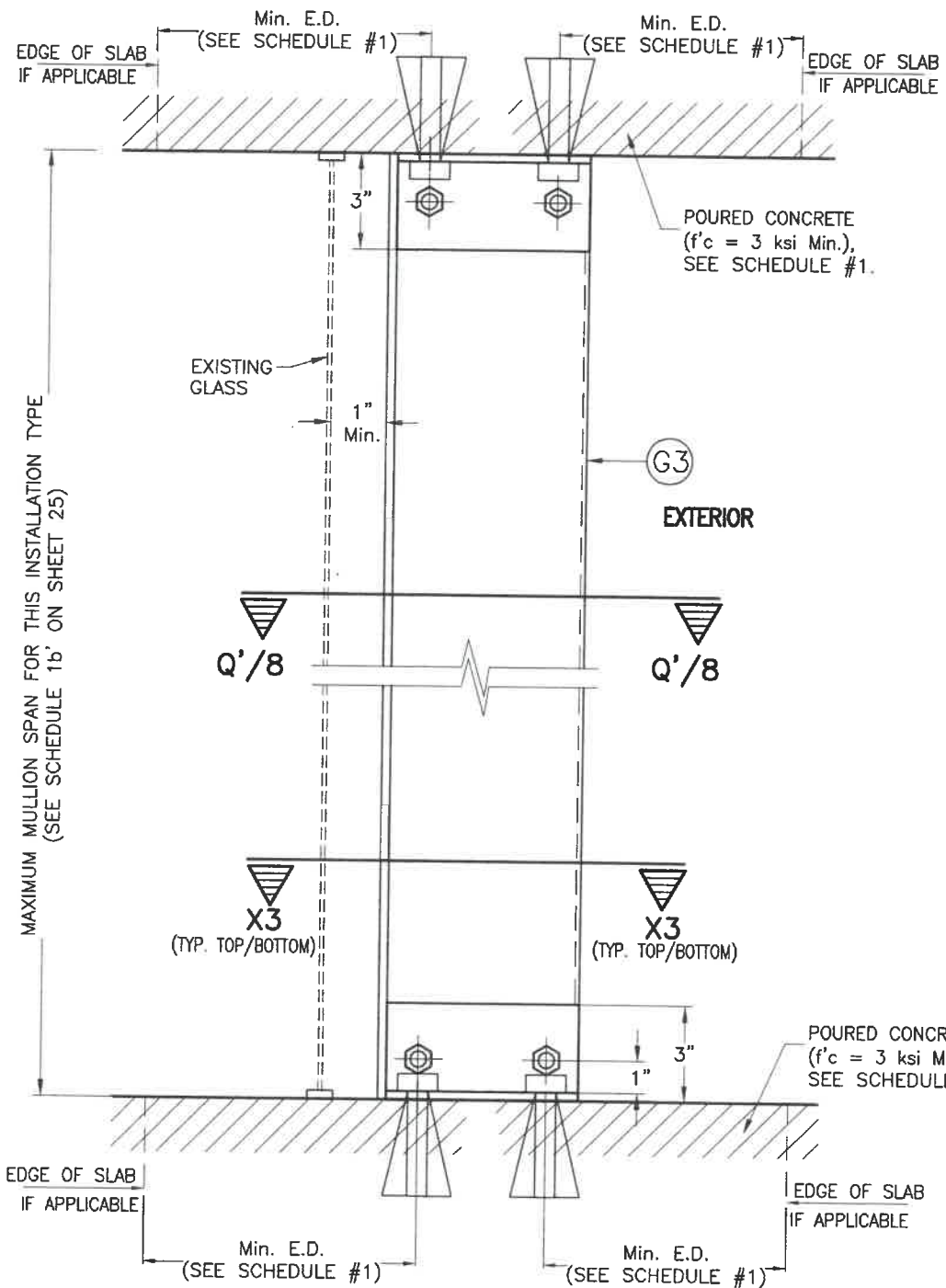
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1	OLD 14-051	08/9/2020	4		
2			5		

TEXAS DEPARTMENT OF INSURANCE - 2018

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06/9/2020
DATE
20-068
DRAWING No
SHEET 12 OF 26



ALTERNATIVE SECTION X3-X3 W/ G3*
 (W/ ORIENTATION # 2)
 (2"x7" INTERIOR MULLION ONLY)

* SIDE RAIL (D) AND BOX NOT SHOWN FOR CLARITY.

◇ SEE MAXIMUM G3 (INTERIOR) TRAPPED MOUNTED MULLIONS SPAN COVERED BY SCHEDULE 1b' FOR INSTALLATION CASES I, Ia & II ON SHEET 25.
 (LIMITED LOAD, MULLION SPACING AND SPAN INSTALLATION):

INSTALLATION CASE I - RESIDENTIAL AND COMMERCIAL APPLICATIONS WITH ±60.8 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 12'-0" MAXIMUM MULLION SPACING.
 SEE SCHEDULE #1 FOR ADDITIONAL SPECS.

INSTALLATION CASE Ia - RESIDENTIAL AND COMMERCIAL APPLICATION W/ ±60.8 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 8'-0" MAXIMUM MULLION SPACING.
 SEE SCHEDULE #1 FOR ADDITIONAL SPECS.

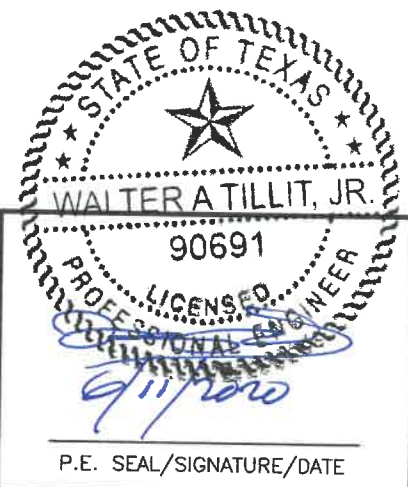
INSTALLATION CASE II - COMMERCIAL APPLICATION FOR ±100.0 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 8'-0" MAXIMUM MULLION SPACING. SEE SCHEDULE #1 FOR ADDITIONAL SPECS.

SCHEDULE #1				
INSTALLATION CASES	MIN. SLAB THICKNESS REQ'D.	ANCHOR TYPE & SIZE (TYP. TOP & BOTTOM)	MIN. ANCHOR EMBEDMENT	MIN. EDGE DISTANCE FOR ANCHOR
I	4"	3/8"φ HILTI INC HUS-H SCREW, 3/8"φ POWER FASTENER WEDGE- BOLT ANCHOR	2 1/2"	5 1/2"
Ia	4"	1/2"φ HILTI INC KWIK BOLT TZ	2 1/2"	5 1/2"
II	6"	1/2"φ HILTI INC KWIK BOLT TZ	3 1/4"	7 1/2"

FLOOR TO CEILING / TRAPPED MOUNTING : MULLIONS G3
SECTION W-3

◇ **INTERIOR TRAPPED MOUNTED MULLION INSTALLATION***
 APPLICABLE TO A LIMITED LOAD, MULLION SPAN AND MULLION SPACING INSTALLATIONS

SCALE: 1/8" = 1"



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 FIRM REGISTRATION # F-13790

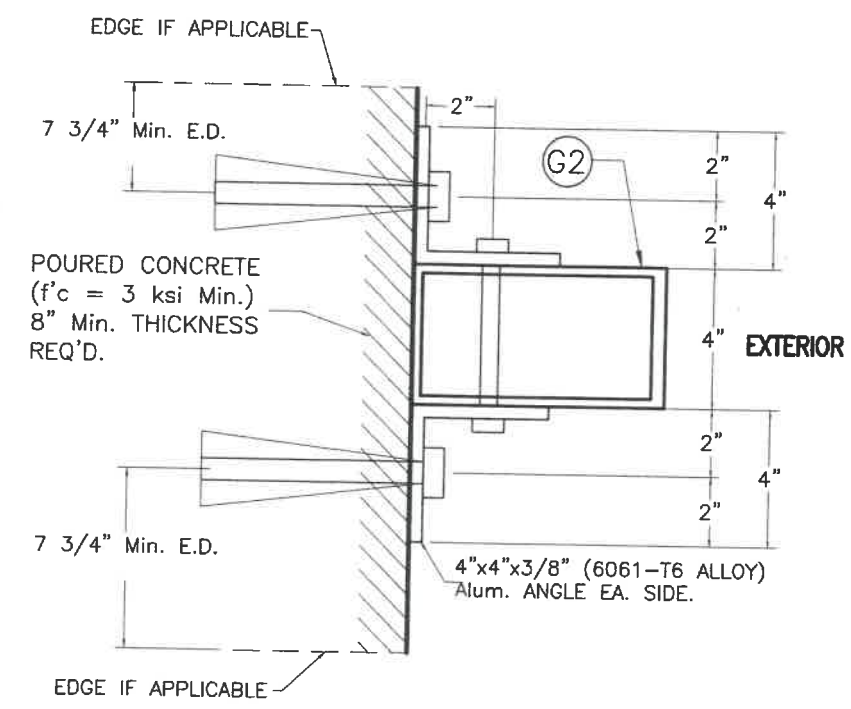
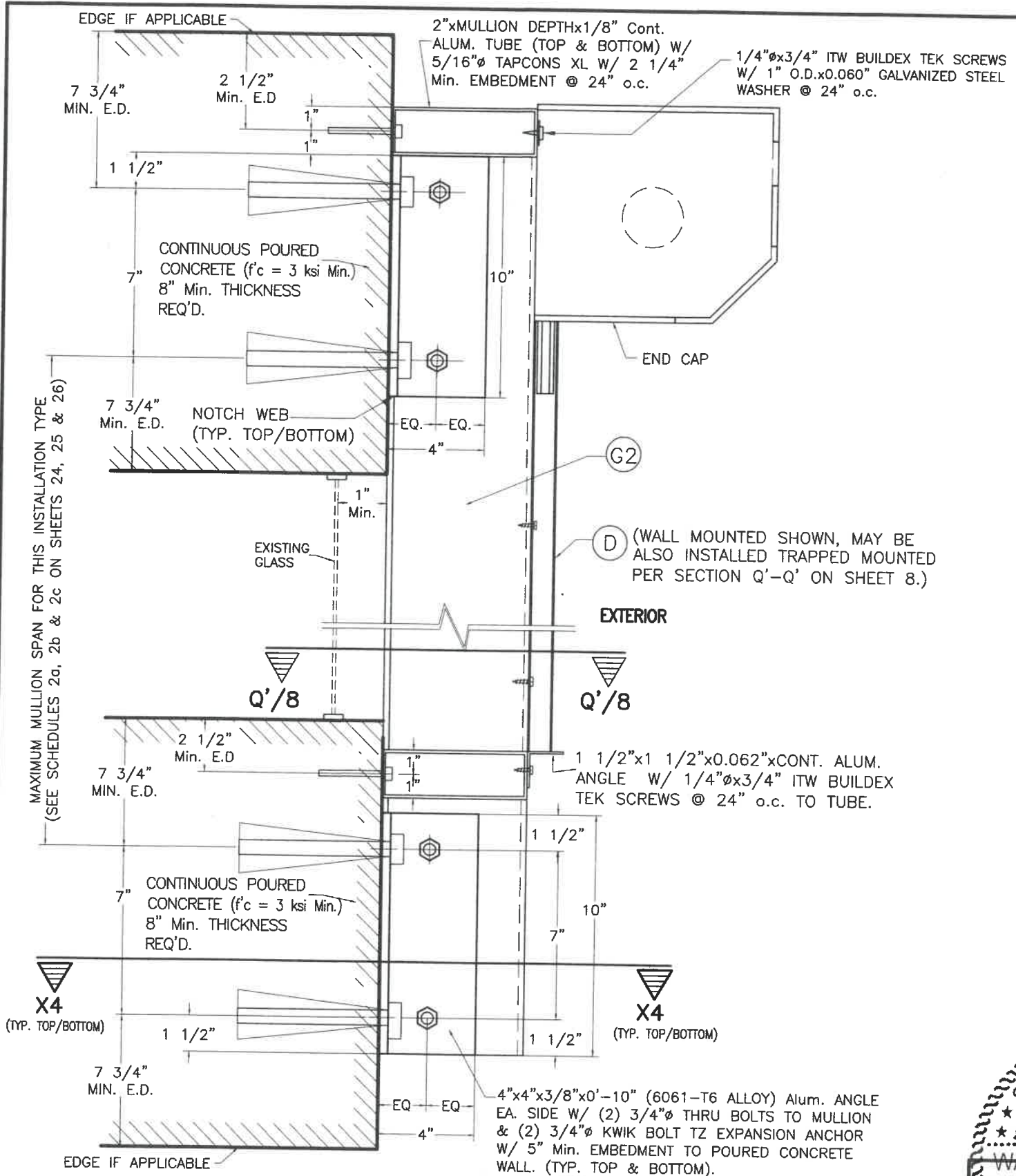
TEXAS DEPARTMENT OF INSURANCE - 2018

Nautilus
 End Retention Roll-Up Shutter

EXPERT SHUTTER SERVICES INC.
 668 S.W. WHITMORE DRIVE
 PORT ST. LUCIE, FL. 34984
 PHONE: (800) 749-9056 , FAX: (772) 871-0990

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

DRAWN BY: M.P.
 06/9/2020 DATE
 20-068 DRAWING No
 SHEET 12A OF 26



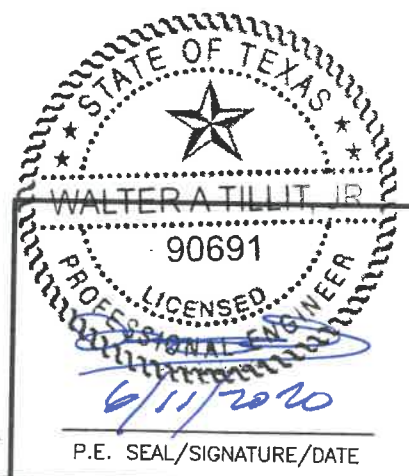
SECTION X4-X4 W/ G2 *
 (END & INTERIOR MULLION)
 (W/ ORIENTATION # 2)
 (4"x7")

* SIDE RAIL D NOT SHOWN FOR CLARITY

WALL MOUNTING : MULLION G2
POURED CONCRETE WALL
SECTION W-4

END & INTERIOR WALL MOUNTED MULLION INSTALLATION *
APPLICABLE TO ALL INSTALLATIONS EXCEPT THOSE W/ LIMITATIONS COVERED ON SHEET 13A

SCALE: 1/8" = 1"



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TEXAS LIC. # 90691
 FIRM REGISTRATION # F-13790

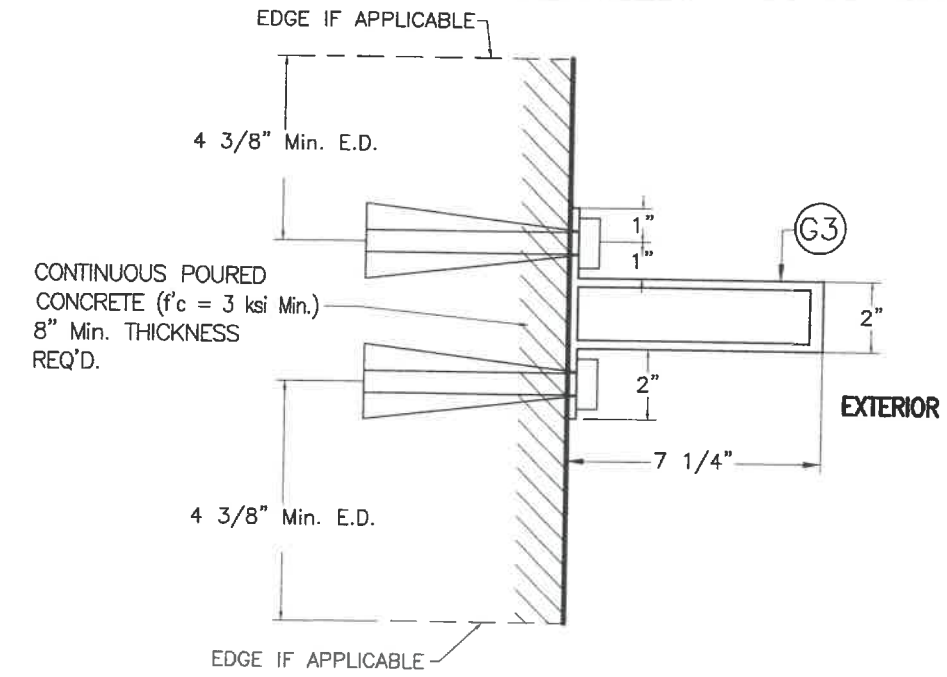
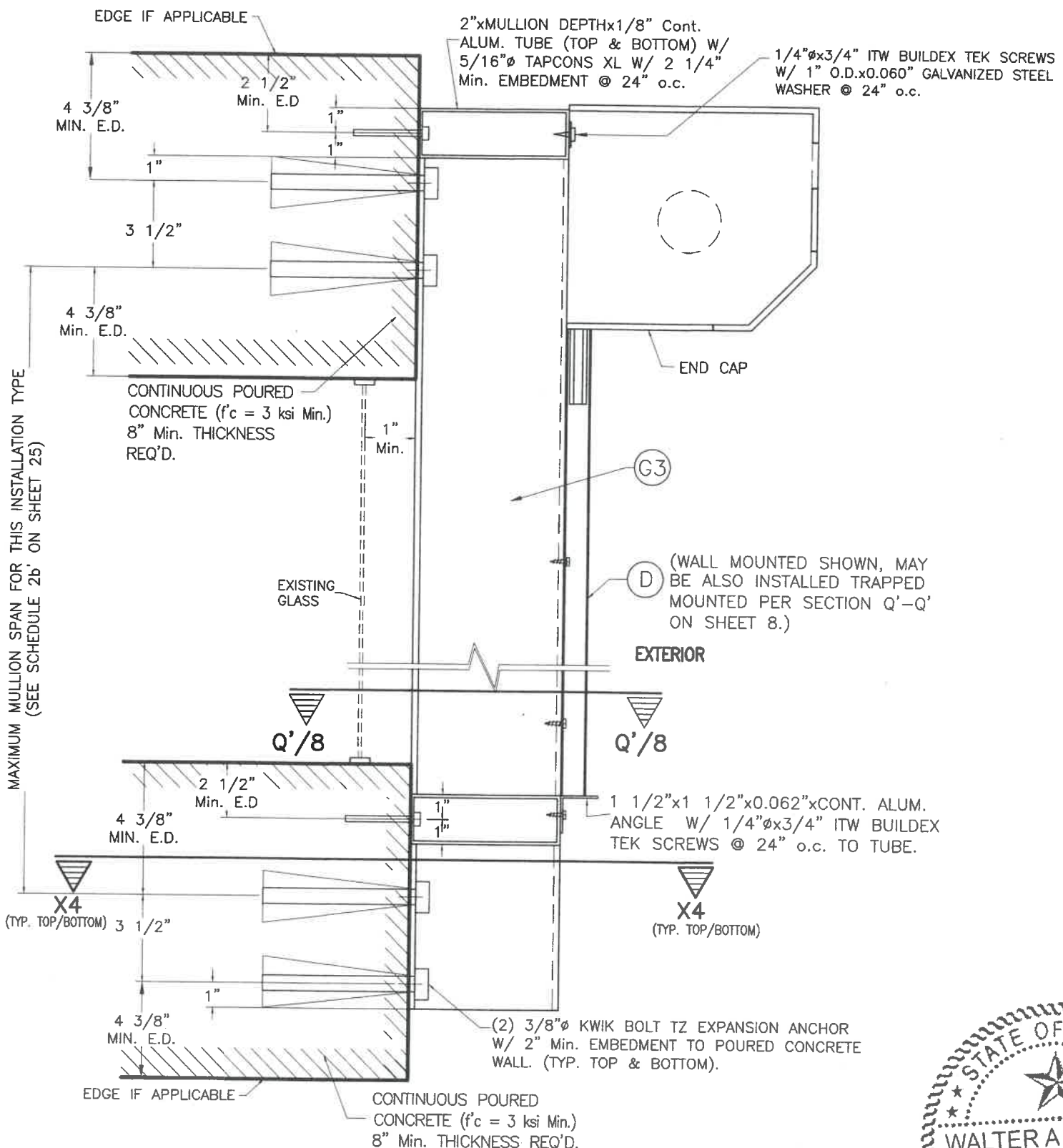
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 20-068
 DRAWING No
 SHEET 13 OF 26



SECTION X4-X4 W/ G3 *
(INTERIOR MULLION)
(W/ ORIENTATION # 2)
(2"x7")

◇ SEE MAXIMUM G3 (INTERIOR) WALL MOUNTED MULLION SPAN COVERED BY SCHEDULE 2b' FOR INSTALLATION CASES I' & II' ON SHEET 25 (LIMITED LOAD, MULLION SPACING AND SPAN INSTALLATION):

INSTALLATION CASE I' - RESIDENTIAL AND COMMERCIAL APPLICATIONS WITH ±60.8 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 12'-0" MAXIMUM MULLION SPACING. VALID FOR CONNECTION TO CONCRETE W/ HILTI INC HUS-H OR POWER FASTENERS WEDGE-BOLT ANCHORS.

INSTALLATION CASE II' - COMMERCIAL APPLICATION FOR ±100.0 p.s.f. MAXIMUM DESIGN PRESSURE RATING, 8'-0" MAXIMUM MULLION SPACING. VALID FOR CONNECTION TO CONCRETE W/ HILTI INC KWIK BOLT TZ ANCHORS.

SIDE RAIL D NOT SHOWN FOR CLARITY

◇ **INTERIOR WALL MOUNTED MULLION INSTALLATION ***
APPLICABLE TO A LIMITED LOAD, MULLION SPAN AND MULLION SPACING INSTALLATIONS
 SCALE: 1/8" = 1"

STATE OF TEXAS
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 90691
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 P.E. SEAL/SIGNATURE/DATE

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 SHEET 13A OF 26

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
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2			5		

TYPICAL MANDATORY PROCEDURE FOR VERIFYING PRODUCT CODE COMPLIANCE RELATED TO ITS INSTALLATION INTO EXISTING POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK STRUCTURES (*)

STEP 1: OBTAIN JOB SITE'S A.S.D DESIGN PRESSURE RATING (p.s.f.) FOR THE OPENING AND DESIRED SLAT SPAN "L" (ft) TO PROTECT IT (SEE GENERAL NOTE #2, SHEET 1).

STEP 2: ENTER TO CHARTS I (Ia OR Ib) THRU IV ON SHEETS 15 & 16 TO DETERMINE, BASED ON AN ASSUMED SLAT SLIP (in), ANCHOR TYPE AT SIDE RAILS, A.S.D DESIGN PRESSURE RATING (p.s.f.); AND SLAT SPAN "L" (ft); THE REQUIRED FINAL SLAT SLIP THAT SLATS MUST BE INSTALLED WITH TO MEET THE REQUIRED LOAD AND DESIRED SLAT SPAN.

THE FOLLOWING INFORMATION IS PROVIDED AT CHARTS I THRU IV TO PROCEED WITH PRODUCT INSTALLATION VERIFICATION:

- ENTER A.S.D DESIGN PRESSURE RATING: SEE STEP (1) ABOVE.
- FOR A SPECIFIC PRODUCT MOUNTING INSTALLATION TYPE, INCLUDING ANCHOR TYPE, THE FOLLOWING DEFINITION FOR SLAT SPAN SHALL BE CONSIDERED:

L_{max}: THIS IS THE MAXIMUM ALLOWABLE SLAT SPAN FOR WHICH A GIVEN SLAT SLIP (1/2", 1/4", 1/8") MAY BE USED, FOR A GIVEN A.S.D DESIGN PRESSURE RATING.
- MINIMUM REQUIRED SEPARATION TO GLASS IS PROVIDED ON CHARTS I_c, II_c, III & IV: PROVIDES SEPARATION TO GLASS FOR PRODUCTS W/O OR W/ STORM BARS (SEE STEP 4).

STEP 3: OBTAIN INFORMATION ON PRODUCT'S SIDE RAIL ANCHOR SPACING REQUIREMENTS FOR CONNECTION TO EXISTING STRUCTURE FROM ANCHOR SCHEDULES Va & Vb ON SHEETS 17 & 18. ENTER SCHEDULES WITH FINALLY DETERMINED ANCHOR TYPE, SUBSTRATE, MOUNTING TYPE, A.S.D DESIGN PRESSURE RATING & SLAT SPAN AND OBTAIN MAXIMUM ANCHOR SPACING (INCHES ON CENTERS). SEE GENERAL NOTE 7 ON SHEET 1 FOR ANCHOR SPECS.

STEP 4: IF PRODUCT INSTALLATION INCLUDES STORM BARS, MULLIONS OR STORM BARS & MULLIONS, THE FOLLOWING MANDATORY ADDITIONAL PROCEDURES ARE APPLICABLE.

PROCEDURE 4a: IF STORM BARS ARE USED

1. MINIMUM SEPARATION TO GLASS FOR SLATS IF STORM BARS ARE USED SHALL BE BASED ON CHART I_c, ON SHEET 15, IT SHALL BE MEASURED FROM BACK OF SLATS TO GLASS.
2. ENTER TABLE 1 ON SHEET 22 W/ DESIGN LOAD; STORM BAR SPACING AND DETERMINE MAXIMUM ALLOWABLE STORM BAR SPAN (HEIGHT).
3. ENTER TABLES 2 OR 3 ON SHEET 23, WITH A.S.D DESIGN PRESSURE RATING AND STORM BAR SPACING AND DETERMINE APPLICABLE OPTIONS FOR STORM BAR CONNECTION TO CONCRETE TOP & BOTTOM. OPTIONS PROVIDE ANCHOR SPECS AT ANCHORS TYPE LEGEND FOR VARIOUS ANCHOR TYPES COVERING PERMANENT (ANCHORS A & D) OR REMOVABLE (ANCHORS B & C) INSTALLATIONS & A CHOICE OF 2 OR 4 ANCHORS PER CONNECTION DEPENDING ON LOAD AND STORM BAR SPACING.

PROCEDURE 4b: IF MULLIONS ARE USED BUT W/O STORM BARS

1. MINIMUM SEPARATION TO GLASS FOR SLATS IF MULLIONS ARE USED BUT W/O STORM BARS SHALL BE BASED ON CHARTS I_c, II_c, III & IV ON SHEETS 15 & 16. IT SHALL BE MEASURED FROM BACK OF SLATS TO GLASS.
2. ENTER SCHEDULES 1a THRU 2c ON SHEETS 24, 25 & 26 W/ A.S.D DESIGN LOAD; MAXIMUM MULLION SPACING (MAX., 12', 8' OR 7'), AND DETERMINE MAXIMUM MULLION SPAN (HEIGHT) W/ ALLOWABLE INTERPOLATION IN BETWEEN SPACINGS FOR A GIVEN (G, G1, G2 & G3), MULLION TYPE & MULLION ORIENTATION.
3. SEE SHEETS 10, 10A, 11, 11A, 12, 12A, 13 & 13A FOR REQUIRED MULLION CONNECTION DETAILS AT TOP & BOTTOM FOR FLOOR TO CEILING (TRAPPED) OR WALL MOUNTINGS OF MULLIONS INTO CONCRETE FOR A GIVEN MULLION TYPE (G, G1, G2 & G3).

PROCEDURE 4c: IF BOTH STORM BARS & MULLIONS ARE USED

1. MINIMUM SEPARATION TO GLASS FOR SLATS IF BOTH STORM BARS AND MULLIONS ARE USED SHALL BE BASED ON CHART I_c, ON SHEET 15, IT SHALL BE MEASURED FROM BACK OF SLATS TO GLASS.
2. ENTER TABLE 1 ON SHEET 22 W/ DESIGN LOAD AND STORM BAR SPACING AND DETERMINE MAXIMUM STORM BAR SPAN (HEIGHT).
3. ENTER TABLES 2 OR 3 ON SHEET 23, WITH A.S.D DESIGN PRESSURE RATING AND STORM BAR SPACING AND DETERMINE APPLICABLE OPTIONS FOR STORM BAR CONNECTION TO CONCRETE TOP & BOTTOM. OPTIONS PROVIDE ANCHOR SPECS AT ANCHORS TYPE LEGEND FOR VARIOUS ANCHOR TYPES COVERING PERMANENT (ANCHORS A & D) OR REMOVABLE (ANCHORS B & C) INSTALLATIONS & A CHOICE OF 2 OR 4 ANCHORS PER CONNECTION DEPENDING ON LOAD AND STORM BAR SPACING.
4. ENTER SCHEDULES 1a THRU 2c ON SHEETS 24, 25 & 26 W/ A.S.D DESIGN PRESSURE RATING; MAXIMUM MULLION SPACING (MAX., 12', 8' OR 7'), AND DETERMINE MAXIMUM MULLION SPAN (HEIGHT) W/ ALLOWABLE INTERPOLATION IN BETWEEN SPACINGS FOR A GIVEN (G, G1, G2 & G3), MULLION TYPE & MULLION ORIENTATION.
5. SEE SHEETS 10, 10A, 11, 11A, 12, 12A, 13 & 13A FOR MULLION CONNECTION DETAILS AT TOP & BOTTOM FOR FLOOR TO CEILING (TRAPPED) OR WALL MOUNTINGS OF MULLIONS INTO CONCRETE FOR A GIVEN MULLION TYPE (G, G1, G2 & G3).

* PROCEDURE PER STEPS 1 THRU 3 IS SIMILAR FOR INSTALLATIONS INTO WOOD FRAME STRUCTURES. SEE SHEETS 20 & 21 FOR LIMITATIONS APPLICABLE TO INSTALLATIONS INTO WOOD FRAME STRUCTURES.

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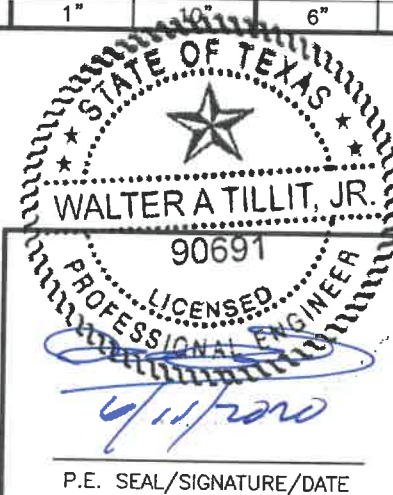
SLAT PERFORMANCE CHARTS Ia, Ib & Ic: (ONLY VALID FOR 1/2" SLIP)

FOR A GIVEN DESIGN LOAD (p.s.f), SHUTTER MOUNT CONDITION INCLUDING ANCHOR TYPE AND FOR INSTALLATIONS W/ OR W/O STORM BARS

CHART Ia				CHART Ib				CHART Ic				
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD												
3/8"Ø KWIK BOLT 3 ANCHOR POURED CONCRETE				5/16"Ø TAPCON XL ANCHOR TO POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK				USE MAXIMUM POSITIVE LOAD VALUE				
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (FT)				MAX. SLAT SPAN "LMAX." (FT)				REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)			
	WALL MOUNT	TRAPPED MOUNT	BUILD-OUT MOUNT W/ E1 & E2	BUILD-OUT MOUNT W/ E3	WALL MOUNT	TRAPPED MOUNT	BUILD-OUT MOUNT W/ E1 & E2	BUILD-OUT MOUNT W/ E3	W/O STORM BARS		W/ STORM BARS	
	SEE NOTES *	SEE NOTES *	SEE NOTES *	SEE NOTES *	SEE NOTES *	SEE NOTES *	SEE NOTES *	SEE NOTES *	WIND ZONES 1-3 SEE NOTES *	WIND ZONE 4 SEE NOTES *	WIND ZONES 1-3 SEE NOTES *	WIND ZONE 4 SEE NOTES *
30.0	20'-0"	20'-0"	20'-0"	20'-0"	20'-0"	20'-0"	20'-0"	18'-0"	1"	14 1/2"	6"	7"
35.0	20'-0"	19'-10"	20'-0"	18'-0"	20'-0"	19'-6"	19'-0"	16'-3"	1"	14 1/2"	6"	7"
40.0	20'-0"	19'-8"	19'-7"	16'-6"	20'-0"	19'-0"	17'-4"	14'-10"	1"	14 1/2"	6"	7"
45.0	20'-0"	19'-6"	18'-0"	15'-3"	20'-0"	18'-5"	16'-0"	13'-9"	1"	14 1/2"	6"	7"
50.0	20'-0"	19'-4"	16'-9"	14'-2"	19'-1"	17'-2"	14'-10"	12'-10"	1"	14 1/2"	6"	7"
55.0	20'-0"	19'-2"	15'-8"	13'-4"	17'-9"	16'-1"	13'-11"	12'-1"	1"	14 1/2"	6"	7"
60.0	19'-5"	17'-11"	14'-9"	12'-7"	16'-9"	15'-2"	13'-2"	11'-5"	1"	14 1/2"	6"	7"
65.0	18'-4"	16'-10"	13'-11"	11'-11"	15'-9"	14'-4"	12'-5"	10'-11"	1"	14"	6"	7"
70.0	17'-4"	15'-11"	13'-3"	11'-4"	15'-0"	13'-8"	11'-10"	10'-4"	1"	13 1/2"	6"	7"
75.0	16'-6"	15'-1"	12'-7"	10'-10"	14'-3"	13'-1"	11'-4"	9'-11"	1"	13 1/2"	6"	7"
80.0	15'-9"	14'-4"	12'-0"	10'-5"	13'-7"	12'-6"	10'-10"	9'-7"	1"	13"	6"	7"
85.0	15'-0"	13'-9"	11'-7"	10'-0"	13'-0"	12'-1"	10'-5"	9'-3"	1"	13"	6"	7"
90.0	14'-2"	13'-2"	11'-2"	9'-8"	12'-6"	11'-7"	10'-1"	8'-11"	1"	12 1/2"	6"	7"
95.0	13'-5"	12'-8"	10'-9"	9'-4"	12'-0"	11'-3"	9'-9"	8'-7"	1"	12 1/2"	6"	7"
100.0	12'-9"	12'-2"	10'-5"	9'-1"	11'-8"	10'-10"	9'-5"	8'-4"	1"	12"	6"	7"
105.0	12'-2"	11'-9"	10'-1"	8'-9"	11'-3"	10'-6"	9'-2"	8'-2"	1"	11 1/2"	6"	7"
110.0	11'-7"	11'-4"	9'-9"	8'-6"	10'-11"	10'-3"	8'-10"	7'-11"	1"	11 1/2"	6"	7"
115.0	11'-1"	11'-0"	9'-6"	8'-4"	10'-7"	10'-0"	8'-8"	7'-8"	1"	11 1/2"	6"	7"
120.0	10'-8"	10'-8"	9'-3"	8'-2"	10'-3"	9'-8"	8'-5"	7'-6"	1"	11"	6"	7"
125.0	10'-2"	10'-2"	9'-0"	7'-11"	10'-0"	9'-5"	8'-2"	7'-4"	1"	11"	6"	7"
130.0	9'-10"	9'-10"	8'-9"	7'-9"	9'-9"	9'-2"	8'-0"	7'-2"	1"	10 1/2"	6"	7"
135.0	9'-5"	9'-5"	8'-6"	7'-7"	9'-6"	8'-11"	7'-10"	7'-1"	1"	10 1/2"	6"	7"
140.0	9'-1"	9'-1"	8'-4"	7'-5"	9'-1"	8'-9"	7'-8"	6'-11"	1"	10 1/2"	6"	7"
145.0	8'-10"	8'-10"	8'-2"	7'-3"	8'-10"	8'-6"	7'-6"	-	1"	10"	6"	7"
150.0	8'-6"	8'-6"	8'-0"	7'-2"	8'-6"	8'-4"	7'-4"	-	1"	10"	6"	7"
155.0	8'-3"	8'-3"	7'-10"	7'-0"	8'-3"	8'-1"	7'-2"	-	1"	10"	6"	7"
160.0	8'-0"	8'-0"	7'-8"	6'-10"	8'-0"	7'-11"	7'-1"	-	1"	10"	6"	7"

*** NOTES:**

- ABOVE INDICATED MAX. SLAT SPANS MAY BE USED AS LONG AS ANCHOR SPACING SCHEDULES ON SHEETS 17 & 18 INDICATE THAT AN ANCHOR SPACING IS AVAILABLE FOR THE CORRESPONDING SLAT SPAN AND DESIGN LOAD.
- REQUIRES SIDE RAILS FASTENED TO EXISTING STRUCTURE WITH 3/8"Ø KWIK BOLT 3 ANCHOR OR 5/16"Ø TAPCON XL ANCHOR, INTO POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK, OR WITH 1/4"Ø TEK SCREWS AT MULLIONS CONNECTION. VALID FOR WALL MOUNTED, TRAPPED MOUNTED, AND BUILD-OUT MOUNTED.
- MAXIMUM SLAT SPANS FOR INTERMEDIATE LOADS MAY BE DETERMINED BY LINEAR INTERPOLATION BETWEEN END VALUES.
- WIND ZONES FOR SEPARATION TO GLASS AS DEFINED BY ASTM E-1996 STANDARD.



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SHEET 15 OF 26

SLAT PERFORMANCE CHARTS IIa, IIb & IIc: (ONLY VALID FOR 1/4" SLIP)

FOR A GIVEN DESIGN LOAD (p.s.f), SHUTTER MOUNT CONDITION INCLUDING ANCHOR TYPE AND FOR INSTALLATIONS W/O STORM BARS

CHART IIa					CHART IIb					CHART IIc	
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD										USE MAXIMUM POSITIVE LOAD VALUE	
3/8"Ø KWIK BOLT 3 ANCHOR POURED CONCRETE					5/16"Ø TAPCON XL ANCHOR TO POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK					(3/8" KWIK BOLT 3 ANCHOR & 5/16" TAPCON XL ANCHOR)	
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (FT)				MAX. SLAT SPAN "LMAX." (FT)				REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)		
	WALL MOUNT SEE NOTES *	TRAPPED MOUNT SEE NOTES *	BUILD-OUT MOUNT W/ E & E2 SEE NOTES *	BUILD-OUT MOUNT W/ E3 SEE NOTES *	WALL MOUNT SEE NOTES *	TRAPPED MOUNT SEE NOTES *	BUILD-OUT MOUNT W/ E & E2 SEE NOTES *	BUILD-OUT MOUNT W/ E3 SEE NOTES *	W/O STORM BARS		
									WIND ZONES 1-3 *	WIND ZONE 4 *	
30.0	8'-3"	8'-3"	8'-3"	8'-3"	8'-3"	8'-3"	8'-3"	8'-3"	1"	8 1/8"	
35.0	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"			
40.0	7'-7"	7'-7"	7'-7"	7'-7"	7'-7"	7'-7"	7'-7"	7'-7"			
45.0	7'-4"	7'-4"	7'-4"	7'-4"	7'-4"	7'-4"	7'-4"	7'-4"			
50.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
55.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
60.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
65.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
70.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
75.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
80.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
85.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
90.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
95.0	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"	7'-3"			
100.0	7'-2"	7'-2"	7'-2"	7'-2"	7'-2"	7'-2"	7'-2"	7'-2"			
105.0	7'-0"	7'-0"	7'-0"	7'-0"	7'-0"	7'-0"	7'-0"	7'-0"			
110.0	6'-10"	6'-10"	6'-10"	6'-10"	6'-10"	6'-10"	6'-10"	6'-10"			
115.0	6'-8"	6'-8"	6'-8"	6'-8"	6'-8"	6'-8"	6'-8"	6'-8"			
120.0	6'-6"	6'-6"	6'-6"	6'-6"	6'-6"	6'-6"	6'-6"	6'-6"			
125.0	6'-4"	6'-4"	6'-4"	6'-4"	6'-4"	6'-4"	6'-4"	6'-4"			
130.0	6'-3"	6'-3"	6'-3"	6'-3"	6'-3"	6'-3"	6'-3"	6'-3"			
135.0	6'-1"	6'-1"	6'-1"	6'-1"	6'-1"	6'-1"	6'-1"	6'-1"			
140.0	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"			
145.0	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	5'-11"			
150.0	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	5'-10"			
155.0	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	6'-0"	5'-8"			
160.0	6'-0"	6'-0"	6'-0"	5'-11"	6'-0"	6'-0"	6'-0"	5'-7"			

*** NOTES:**

- ABOVE INDICATED MAX. SLAT SPANS MAY BE USED AS LONG AS ANCHOR SPACING SCHEDULES ON SHEETS 17 & 18 INDICATE THAT AN ANCHOR SPACING IS AVAILABLE FOR THE CORRESPONDING SLAT SPAN AND DESIGN LOAD.
- REQUIRES SIDE RAILS FASTENED TO EXISTING STRUCTURE WITH 3/8"Ø KWIK BOLT 3 ANCHOR OR 5/16"Ø TAPCON XL ANCHOR, INTO POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK, OR WITH 1/4"Ø TEK SCREWS AT MULLIONS CONNECTION. VALID FOR WALL MOUNTED, TRAPPED MOUNTED, AND BUILD-OUT MOUNTED.
- MAXIMUM SLAT SPANS FOR INTERMEDIATE LOADS MAY BE DETERMINED BY LINEAR INTERPOLATION BETWEEN END VALUES.
- WIND ZONES FOR SEPARATION TO GLASS AS DEFINED BY ASTM E-1996 STANDARD.

**SLAT PERFORMANCE CHART III:
(ONLY VALID FOR 1/8" SLIP)**

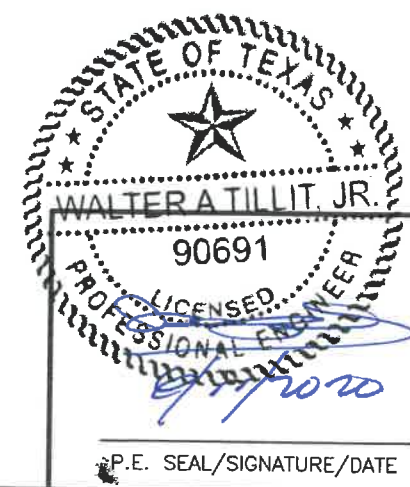
FOR A GIVEN DESIGN LOAD (p.s.f), SHUTTER MOUNT CONDITION INCLUDING ANCHOR TYPE AND FOR INSTALLATIONS W/O STORM BARS

3/8"Ø KWIK BOLT 3 ANCHOR & 5/16"Ø TAPCON XL ANCHOR POURED CONCRETE TO POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK			
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD		USE MAXIMUM POSITIVE LOAD VALUE	
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (FT)	REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)	
		W/O STORM BARS	
	WALL, TRAPPED & BUILD-OUT MOUNT W/ E, E2 & E3 SEE NOTES *	WIND ZONES 1-3 *	WIND ZONE 4 *
30.0	7'-6"	1"	8 1/8"
35.0	7'-2"		
40.0	6'-9"		
45.0	6'-8"		
50.0	6'-5"		
55.0	6'-3"		
60.0	6'-1"		
65.0	6'-0"		
70.0	5'-10"		
75.0	5'-9"		
80.0	5'-9"	1"	5"
85.0	5'-9"		
90.0	5'-9"		
95.0	5'-9"		
100.0	5'-9"		
105.0	5'-9"		
110.0	5'-9"		
115.0	5'-9"		
120.0	5'-8"		
125.0	5'-6"		
130.0	5'-5"		
135.0	5'-4"		
140.0	5'-3"		
145.0	5'-2"		
150.0	5'-1"		
155.0	5'-0"		
160.0	4'-11"		

**SLAT PERFORMANCE CHART IV:
(LESS THAN 1/8" SLIP)**

FOR A GIVEN DESIGN LOAD (p.s.f), SHUTTER MOUNT CONDITION INCLUDING ANCHOR TYPE AND FOR INSTALLATIONS W/O STORM BARS

3/8"Ø KWIK BOLT 3 ANCHOR & 5/16"Ø TAPCON XL ANCHOR POURED CONCRETE TO POURED CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK			
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD		USE MAXIMUM POSITIVE LOAD VALUE	
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (FT)	REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)	
		W/O STORM BARS	
	WALL, TRAPPED & BUILD-OUT MOUNT W/ E, E2 & E3 SEE NOTES *	WIND ZONES 1-3 *	WIND ZONE 4 *
30.0	6'-6"	1"	5"
35.0	6'-3"		
40.0	6'-0"		
45.0	5'-10"		
50.0	5'-9"		
55.0	5'-7"		
60.0	5'-5"		
65.0	5'-4"		
70.0	5'-3"		
75.0	5'-1"		
80.0	4'-11"		
85.0	4'-10"		
90.0	4'-8"		
95.0	4'-6"		
100.0	4'-5"		
105.0	4'-4"		
110.0	4'-3"		
115.0	4'-1"		
120.0	4'-0"		
125.0	3'-11"		
130.0	3'-11"		
135.0	3'-10"		
140.0	3'-9"		
145.0	3'-8"		
150.0	3'-7"		
155.0	3'-7"		
160.0	3'-6"		



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TEXAS DEPARTMENT OF INSURANCE - 2018

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End Retention Roll-Up Shutter

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REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-081	06/9/2020	4		
2			5		

DRAWN BY: M.P.
06/9/2020 DATE
20-068 DRAWING No
SHEET 16 OF 26

P.E. SEAL/SIGNATURE/DATE

MAX. ANCHOR'S SPACING SCHEDULE Va

FOR A GIVEN SHUTTER MOUNTING TYPE, W/ 3/8"Ø KWIK BOLT 3 ANCHORS TO POURED CONCRETE WALL, DESIGN LOAD & SLAT SPAN RANGE †

WALL MOUNT

MAXIMUM A.S.D. DESIGN PRESSURE RATING (psf)	SLAT SPAN RANGE							
	0'-4' †	> 4'-5' †	> 5'-6' †	> 6'-7' †	> 7'-9' †	> 9'-12' †	> 12'-16' †	> 16'-20' †
≤ 30.0	9"	9"	9"	9"	9"	9"	9"	9"
>31-40	9"	9"	9"	9"	9"	9"	9"	8"
>41-60	9"	9"	9"	9"	9"	9"	7"	5 5/8"
>61-80	9"	9"	9"	9"	9"	8"	5 5/8"	5 5/8"
>81-105	9"	9"	9"	9"	9"	6 1/2"	5 5/8"	-
>106-120	9"	9"	9"	9"	8"	6"	-	-
>121-140	9"	9"	9"	8"	7"	6"	-	-
>141-160	9"	9"	9"	7"	7"	-	-	-



SLAT SPAN DEFINITION

† NOTE:
MAX. SLAT SPAN FOR A GIVEN DESIGN LOAD SHALL NEVER EXCEED MAX. SLAT SPAN INDICATED ON SLAT PERFORMANCE CHART ON SHEETS 15 & 16.

TRAPPED MOUNT

MAXIMUM A.S.D. DESIGN PRESSURE RATING (psf)	SLAT SPAN RANGE							
	0'-4' †	> 4'-5' †	> 5'-6' †	> 6'-7' †	> 7'-9' †	> 9'-12' †	> 12'-16' †	> 16'-20' †
≤ 30.0	9"	9"	9"	9"	9"	9"	9"	9"
>31-40	9"	9"	9"	9"	9"	9"	9"	7"
>41-60	9"	9"	9"	9"	9"	9"	6 1/2"	5 5/8"
>61-80	9"	9"	9"	9"	9"	7"	5 5/8"	5 5/8"
>81-105	9"	9"	9"	9"	8"	6"	5 5/8"	-
>106-120	9"	9"	9"	8 1/2"	7"	5 5/8"	-	-
>121-140	9"	9"	9"	7"	6"	5 5/8"	-	-
>141-160	9"	9"	8"	6"	6"	-	-	-

BUILD-OUT MOUNT

MAXIMUM A.S.D. DESIGN PRESSURE RATING (psf)	SLAT SPAN RANGE																							
	0'-4' †			> 4'-5' †			> 5'-6' †			> 6'-7' †			> 7'-9' †			> 9'-12' †			> 12'-16' †			> 16'-20' †		
	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3
≤ 30.0	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>31-40	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>41-60	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>61-80	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>81-105	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>106-120	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>121-140	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"	9"
>141-160	9"	9"	9"	8"	8"	6"	7"	7"	5 5/8"	6 3/4"	6 3/4"	5 5/8"	5 5/8"	5 5/8"	-	-	-	-	-	-	-	-	-	-



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DRAWN BY:
M.P.
06/9/2020
DATE
20-068
DRAWING No
SHEET 17 OF 26

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-081	06/9/2020	4		
2			5		

MAX. ANCHOR'S SPACING SCHEDULE Vb

FOR A GIVEN SHUTTER MOUNTING TYPE, W/ 5/16"Ø TAPCON XL ANCHORS TO POURED CONCRETE WALL
OR GROUT FILLED CELL CONCRETE BLOCK WALL, DESIGN LOAD & SLAT SPAN RANGE †

WALL MOUNT

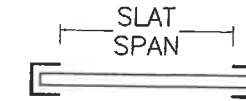
MAXIMUM A.S.D DESIGN PRESSURE RATING RANGE(psf)	SLAT SPAN RANGE							
	0'-4' †	> 4'-5' †	> 5'-6' †	> 6'-7' †	> 7'-9' †	> 9'-12' †	> 12'-16' †	> 16'-20' †
≤ 30.0	8"	8"	8"	8"	8"	8"	7 1/2"	5 1/2"
>31-40	8"	8"	8"	8"	8"	8"	6"	4"
>41-60	8"	8"	8"	8"	8"	6"	4"	3 3/4"
>61-80	8"	8"	8"	8"	7"	4 1/2"	3 3/4"	-
>81-105	8"	8"	8"	6 1/2"	5"	3 3/4"	3 3/4"	-
>106-120	8"	8"	8"	5 1/2"	4 1/2"	3 3/4"	-	-
>121-140	8"	7 1/2"	6"	4 1/2"	4"	3 3/4"	-	-
>141-160	8"	6"	5"	4"	4"	-	-	-

TRAPPED MOUNT

MAXIMUM A.S.D DESIGN PRESSURE RATING RANGE(psf)	SLAT SPAN RANGE							
	0'-4' †	> 4'-5' †	> 5'-6' †	> 6'-7' †	> 7'-9' †	> 9'-12' †	> 12'-16' †	> 16'-20' †
≤ 30.0	6"	6"	6"	6"	6"	6"	6"	5 1/2"
>31-40	6"	6"	6"	6"	6"	6"	5 1/2"	4 1/2"
>41-60	6"	6"	6"	6"	6"	5 1/2"	4"	4"
>61-80	6"	6"	6"	6"	6"	4"	4"	-
>81-105	6"	6"	6"	6"	4 3/4"	3 3/4"	3 3/4"	-
>106-120	6"	6"	6"	5"	4"	3 3/4"	-	-
>121-140	6"	6"	5 3/4"	4"	3 3/4"	3 3/4"	-	-
>141-160	6"	6"	5"	3 3/4"	3 3/4"	-	-	-

BUILD-OUT MOUNT

MAXIMUM A.S.D DESIGN PRESSURE RATING RANGE(psf)	SLAT SPAN RANGE																							
	0'-4' †			> 4'-5' †			> 5'-6' †			> 6'-7' †			> 7'-9' †			> 9'-12' †			> 12'-16' †			> 16'-20' †		
	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3	E1	E2	E3
≤ 30.0	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	5 1/2"	5 1/2"	4 1/2"	4"	4"	3 3/4"
>31-40	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	5"	4"	4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"
>41-60	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	4"	4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"
>61-80	6"	6"	6"	6"	6"	6"	6"	6"	5 1/2"	6"	6"	5"	5"	5"	4"	3 3/4"	3 3/4"	-	3 3/4"	3 3/4"	-	-	-	-
>81-105	6"	6"	6"	6"	6"	6"	6"	6"	5 3/4"	4 1/2"	4 1/2"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	-	3 3/4"	3 3/4"	-	-	-	-
>106-120	6"	6"	6"	6"	6"	5 1/2"	5 3/4"	5 3/4"	4 1/2"	4 1/2"	4 1/2"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	-	-	-	-	-	-	-	-
>121-140	6"	6"	6"	5"	5"	4"	4 3/4"	4 3/4"	3 3/4"	4 1/2"	4 1/2"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	-	-	-	-	-	-	-	-	-
>141-160	6"	6"	5"	4 1/2"	4 1/2"	3 3/4"	4"	4"	-	4"	4"	-	3 3/4"	3 3/4"	-	-	-	-	-	-	-	-	-	-



SLAT SPAN DEFINITION

† NOTE:
MAX. SLAT SPAN FOR A GIVEN DESIGN LOAD SHALL NEVER EXCEED MAX. SLAT SPAN INDICATED ON SLAT PERFORMANCE CHART ON SHEETS 15 & 16.

WALTER A. TILLIT, JR.
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 LICENSED PROFESSIONAL ENGINEER
 SEAL/SIGNATURE/DATE

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 FIRM REGISTRATION # F-13790

TEXAS DEPARTMENT OF INSURANCE - 2018

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DRAWN BY:
M.P.

06/9/2020
DATE

20-068
DRAWING No

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-061	06/9/2020	4		
2			5		

SHEET 18 OF 26

SCHEDULE Vc:
Vx FORCES (Lb/FT) & Vy FORCES (Lb/FT) ACTING AT JAMBS FOR AN A.S.D DESIGN PRESSURE RATING RANGE, SLAT SPAN RANGE FOR Poured CONCRETE OR GROUT FILLED CELL CONCRETE BLOCK WALL BUILDINGS *

(USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD)

MAX. A.S.D DESIGN PRESSURE RATING RANGE(p.s.f.)	SLAT SPAN RANGE															
	0'-4'		> 4'-5'		> 5'-6'		> 6'-7'		> 7'-9'		> 9'-12'		> 12'-16'		> 16'-20'	
	Vx	Vy	Vx	Vy	Vx	Vy	Vx	Vy	Vx	Vy	Vx	Vy	Vx	Vy	Vx	Vy
≤ 30.0	10	60	10	75	165	90	238	105	421	135	594	180	999	240	1390	300
>31-40	10	80	10	100	386	120	440	140	398	180	823	240	1328	320	1823	400
>41-60	10	120	290	150	794	180	509	210	708	270	1266	360	1962	480	2553	582
>61-80	10	160	616	200	767	240	796	280	1007	360	1695	480	2422	600	2547	596
>81-105	123	210	550	263	711	315	1142	368	1372	473	2009	591	2492	638	-	-
>106-120	313	240	728	300	881	360	1345	420	1587	540	2112	640	-	-	-	-
>121-140	552	280	960	350	1003	420	1612	490	1869	630	2039	635	-	-	-	-
>141-160	781	320	1186	400	1322	480	1873	560	1740	640	-	-	-	-	-	-



SLAT SPAN DEFINITION

*NOTE:
 IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR PERMIT HOLDER TO VERIFY THAT EXISTING STRUCTURE IS DESIGNED TO SUPPORT Vx AND Vy FORCES IN POUNDS PER UNIT FOOT OF PRODUCT HEIGHT AT BOTH JAMBS. SEE THIS SHEET FOR Vx & Vy VALUES.



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REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

DRAWN BY:
 M.P.
 06/9/2020
 DATE
 20-068
 DRAWING No
 SHEET 19 OF 26

SLAT PERFORMANCE CHART Ib1 & Ic1: (ONLY VALID FOR 1/2" SLIP)

FOR A GIVEN MAXIMUM A.S.D DESIGN PRESSURE RATING (p.s.f) AND SHUTTER MOUNT CONDITION FOR INSTALLATIONS W/O STORM BARS PER DETAIL 2 BELOW

CHART Ib1				CHART Ic1	
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD				USE MAXIMUM POSITIVE LOAD VALUE	
5/16"Ø TAPCON XL ANCHOR					
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (ft)			REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)	
	WALL MOUNT (SEE NOTES Δ)	BUILD-OUT MOUNT W/ (E2)	BUILD-OUT MOUNT W/ (E3)	W/O STORM BARS	
				WIND ZONES 1-3 (SEE NOTES Δ)	WIND ZONE 4 (SEE NOTES Δ)
30.0 *	10'-0"	10'-0"	10'-0"	1"	8 1/2"
35.0 **	10'-0"	10'-0"	10'-0"	1"	8 1/2"
40.0 **	10'-0"	10'-0"	10'-0"	1"	8 1/2"
45.0 ***	10'-0"	10'-0"	10'-0"	1"	8 1/2"
50.0 ***	10'-0"	10'-0"	10'-0"	1"	8 1/2"
55.0 ***	10'-0"	10'-0"	10'-0"	1"	8 1/2"
60.0 ***	10'-0"	10'-0"	10'-0"	1"	8 1/2"

SLAT PERFORMANCE CHART IIb1 & IIc1: (ONLY VALID FOR 1/4" SLIP)

FOR A GIVEN MAXIMUM A.S.D DESIGN PRESSURE RATING (p.s.f) AND SHUTTER MOUNT CONDITION FOR INSTALLATIONS W/O STORM BARS PER DETAIL 2 BELOW

CHART IIb1				CHART IIc1	
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD				USE MAXIMUM POSITIVE LOAD VALUE	
5/16"Ø TAPCON XL ANCHOR					
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	REQUIRED MAX. SLAT SPAN "LMAX." (ft)			REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)	
	WALL MOUNT (SEE NOTES Δ)	BUILD-OUT MOUNT W/ (E2)	BUILD-OUT MOUNT W/ (E3)	W/O STORM BARS	
				WIND ZONES 1-3 (SEE NOTES Δ)	WIND ZONE 4 (SEE NOTES Δ)
30.0 *	8'-3"	8'-3"	8'-3"	1"	8 1/8"
35.0 **	7'-9"	7'-9"	7'-9"	1"	8 1/8"
40.0 **	7'-7"	7'-7"	7'-7"	1"	8 1/8"
45.0 ***	7'-4"	7'-4"	7'-4"	1"	8 1/8"
50.0 ***	7'-3"	7'-3"	7'-3"	1"	8 1/8"
55.0 ***	7'-3"	7'-3"	7'-3"	1"	8 1/8"
60.0 ***	7'-3"	7'-3"	7'-3"	1"	8 1/8"

MAXIMUM SLAT SPAN AND MINIMUM SEPARATION TO GLASS FOR A GIVEN WOOD GRADE, A.S.D DESIGN LOAD (p.s.f), SLAT SLIP 1/8" AND SHUTTER MOUNTING TYPE FOR WOOD FRAME WALLS W/ 2"x4" STUDS, AS PER LIMITATIONS ON DETAIL 1

WOOD GRADE	MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (ft)		REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)	
		WALL MOUNT (SEE NOTES Δ)	BUILD-OUT MOUNT W/ (E2) (SEE NOTES Δ)	W/O STORM BARS	
				WIND ZONES 1-3 (SEE NOTES Δ)	WIND ZONE 4 (SEE NOTES Δ)
SOUTHERN PINE #2 (G=0.55)	60.	4'-5"	4'-5"		
DOUGLAS-FIR-SOUTH (G=0.46)	60	4'-5"	4'-5"	1"	5 1/2"
SPRUCE PINE-FIR-SITH (G=0.36)	60	4'-5"	4'-5"		

SLAT PERFORMANCE CHART IIIb1: (ONLY VALID FOR 1/8" SLIP)

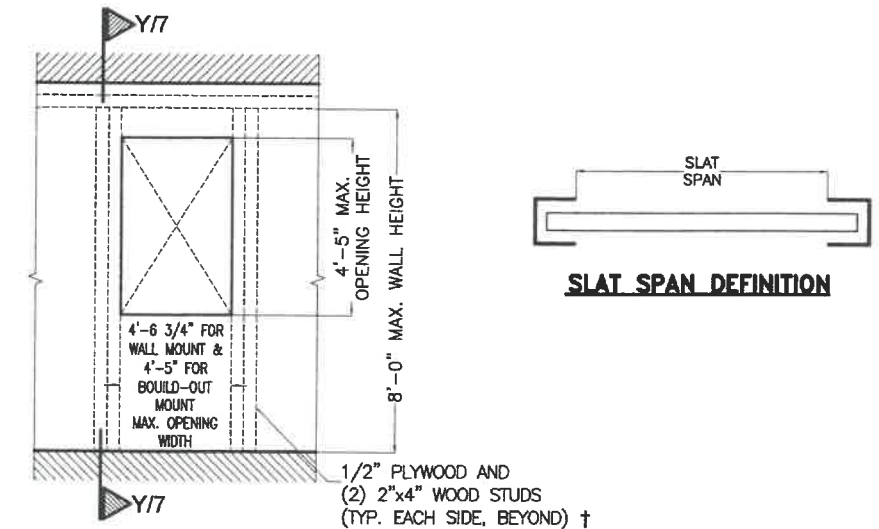
FOR A GIVEN MAXIMUM A.S.D DESIGN PRESSURE RATING (p.s.f) AND SHUTTER MOUNT CONDITION FOR INSTALLATIONS W/O STORM BARS PER DETAIL 2 BELOW

CHART IIIb1				CHART IIIc1	
USE MAXIMUM VALUE BETWEEN POSITIVE AND NEGATIVE LOAD				USE MAXIMUM POSITIVE LOAD VALUE	
5/16"Ø TAPCON XL ANCHOR					
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (FT)			REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)	
	WALL MOUNT (SEE NOTES Δ)	BUILD-OUT MOUNT W/ (E2)	BUILD-OUT MOUNT W/ (E3)	W/O STORM BARS	
				WIND ZONES 1-3 (SEE NOTES Δ)	WIND ZONE 4 (SEE NOTES Δ)
30.0 *	7'-6"	7'-6"	7'-6"	1"	8 1/8"
35.0 **	7'-2"	7'-2"	7'-2"	1"	8 1/8"
40.0 **	6'-9"	6'-9"	6'-9"	1"	8 1/8"
45.0 ***	6'-8"	6'-8"	6'-8"	1"	8 1/8"
50.0 ***	6'-5"	6'-5"	6'-5"	1"	8 1/8"
55.0 ***	6'-3"	6'-3"	6'-3"	1"	8 1/8"
60.0 ***	6'-1"	6'-1"	6'-1"	1"	8 1/8"

SLAT PERFORMANCE CHART IV: (LESS THAN 1/8" SLIP)

FOR A GIVEN MAX. A.S.D DESIGN LOAD (p.s.f), SHUTTER MOUNT CONDITION INCLUDING ANCHOR TYPE AND FOR INSTALLATIONS W/O STORM BARS PER DETAIL 2 BELOW

5/16"Ø TAPCON XL ANCHOR		
USE MAXIMUM POSITIVE AND NEGATIVE LOAD	USE MAXIMUM POSITIVE LOAD VALUE	USE MAXIMUM POSITIVE LOAD VALUE
MAXIMUM A.S.D DESIGN PRESSURE RATING (psf)	MAX. SLAT SPAN "LMAX." (FT) WALL, TRAPPED & BUILD-OUT MOUNT W/ (E2 & E3) SEE NOTES Δ	REQUIRED MIN. SEPARATION TO GLASS MEASURED TO BACK OF SLAT (in)
30.0 *	6'-6"	
35.0 **	6'-3"	
40.0 **	6'-0"	
45.0 ***	5'-10"	1"
50.0 ***	5'-9"	5"
55.0 ***	5'-7"	
60.0 ***	5'-5"	



DETAIL 1 (ELEVATION)

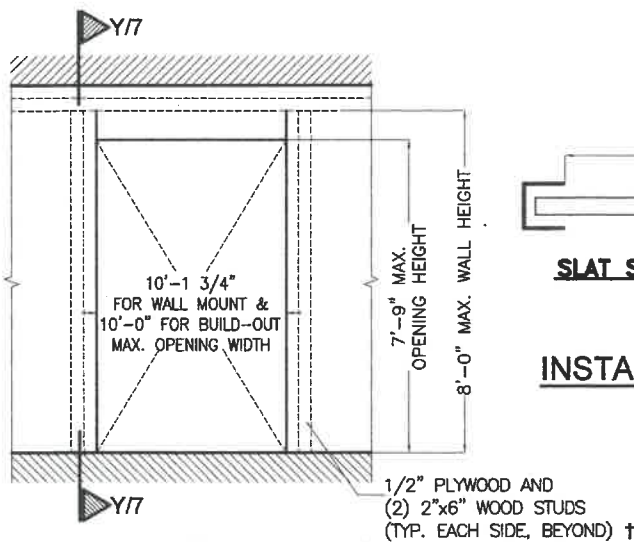
Δ NOTES 1 & 2:

1. ABOVE INDICATED MAX. SLAT SPANS MAY BE USED AS LONG AS ANCHOR SPACING SCHEDULES ON SHEET 21 INDICATE THAT A SPACING IS AVAILABLE FOR THE CORRESPONDING SLAT SPAN AND DESIGN LOAD.
2. WIND ZONES FOR SEPARATION TO GLASS AS DEFINED BY ASTM E-1996 STANDARD.

†: WOOD FRAME WALL TO BE BUILT STRICTLY IN ACCORDANCE WITH SPECS GIVEN ON DETAIL AND PROVISIONS FROM CHAPTER 23 OF THE INTERNATIONAL BUILDING CODE. MINIMUM LENGTH OF WALL AT EITHER SIDE OF OPENING SHALL BE 33".

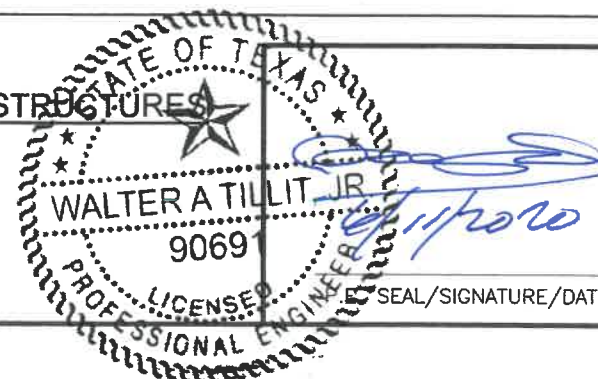
MAXIMUM A.S.D. DESIGN LOAD VS WOOD GRADE SCHEDULE:

- * VALID FOR DOUGLAS-FIR-SOUTH (G=0.46)
SOUTHERN PINE #2 (G=0.55)
SPRUCE PINE-FIR-SITH (G=0.36)
- ** VALID FOR DOUGLAS-FIR-SOUTH (G=0.46)
SOUTHERN PINE #2 (G=0.55)
- *** VALID FOR SOUTHERN PINE #2 (G=0.55)



DETAIL 2 (ELEVATION)

INSTALLATION INTO WOOD FRAME STRUCTURES



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TEXAS LIC. # 90691
FIRM REGISTRATION # F-13790

TEXAS DEPARTMENT OF INSURANCE - 2018



Nautilus
End Retention Roll-Up Shutter

EXPERT SHUTTER SERVICES INC.

668 S.W. WHITMORE DRIVE
PORT ST. LUCIE, FL. 34984
PHONE: (800) 749-9056, FAX: (772) 871-0990

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

DRAWN BY:
M.P.

06/9/2020
DATE

20-068
DRAWING No

SHEET 20 OF 26

MAX. ANCHOR'S SPACING SCHEDULE VI FOR A GIVEN PRODUCT MOUNTING TYPE, WOOD GRADE, A.S.D DESIGN PRESSURE RATING (psf) AND SLAT SPAN RANGE *

WALL MOUNT & BUILD-OUT MOUNT TO 2"x4" WOOD STUD
(SEE DETAIL 1 ON SHEET 20)

WOOD GRADE	MAX. A.S.D DESIGN PRESSURE RATING RANGE (p.s.f)	SLAT SPAN RANGE 0'-0" to 4'-5" *
SOUTHERN PINE #2 (G=0.55)	≤ 30.0	6"
	40	6"
	50	6"
	60	6"
DOUGLAS-FIR-SOUTH (G=0.46)	≤ 30.0	6"
	40	6"
SPRUCE PINE-FIR-SOUTH (G=0.36)	≤ 30.0	6"

WALL MOUNT TO 2"x6" WOOD STUD WITH MINIMUM 1/2" PLYWOOD
(SEE DETAIL 2 ON SHEET 20)

WOOD GRADE	MAX. A.S.D DESIGN PRESSURE RATING RANGE (p.s.f)	SLAT SPAN RANGE					
		0' to 4' *	> 4' to 5' *	> 5' to 6' *	> 6' to 7' *	> 7' to 9' *	> 9' to 10' *
SOUTHERN PINE #2 (G=0.55)	≤ 30.0	6"	6"	6"	6"	6"	6"
	40	6"	6"	6"	6"	6"	4 3/4"
	50	6"	6"	6"	6"	4 3/4"	3 1/2"
	60	6"	6"	5 3/4"	5 1/4"	3 3/4"	3"
DOUGLAS-FIR-SOUTH (G=0.46)	≤ 30.0	6"	6"	6"	6"	6"	6"
	40	6"	6"	6"	5 1/4"	5 1/4"	4 1/4"
SPRUCE PINE-FIR-SOUTH (G=0.36)	≤ 30.0	6"	6"	6"	6"	6"	5 1/4"

BUILD-OUT MOUNT TO 2"x6" WOOD STUD WITH MINIMUM 1/2" PLYWOOD
(SEE DETAIL 2 ON SHEET 20)

WOOD GRADE	MAX. A.S.D DESIGN PRESSURE RATING RANGE (p.s.f)	SLAT SPAN RANGE											
		0'-4' *		> 4'-5' *		> 5'-6' *		> 6'-7' *		> 7'-9' *		> 9'-10' *	
		BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E	BUILD-OUT MOUNT W/E
SOUTHERN PINE #2 (G=0.55)	≤ 30.0	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
	40	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	5 1/4"	5 1/4"
	50	6"	6"	6"	6"	6"	6"	6"	6"	5 1/4"	5 1/4"	4"	4"
	60	6"	6"	6"	6"	6"	6"	5 3/4"	5 3/4"	4"	4"	3"	3"
DOUGLAS-FIR-SOUTH (G=0.46)	≤ 30.0	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
	40	6"	6"	6"	6"	6"	6"	5 1/2"	5 1/2"	5 1/2"	5 1/2"	4 1/2"	4 1/2"
SPRUCE PINE-FIR-SOUTH (G=0.36)	≤ 30.0	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	5 1/4"	5"

*** NOTE:**
MAX. SPAN FOR SLAT FOR A GIVEN A.S.D DESIGN PRESSURE RATING SHALL **NEVER** EXCEED MAX. SLAT SPAN INDICATED ON SLAT PERFORMANCE CHARTS ON SHEET 20.



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DRAWN BY:
M.P.

06/9/2020
DATE

20-068
DRAWING No

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-081	06/9/2020	4		
2			5		

SHEET 21 OF 26

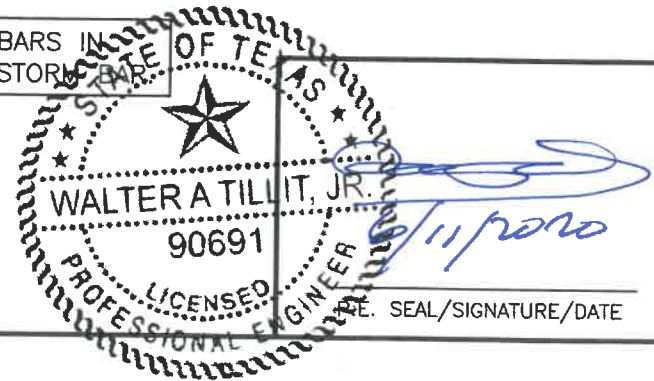
TABLE 1
MAX. ALLOWABLE STORM BAR SPAN (ft) FOR A GIVEN A.S.D DESIGN
PRESSURE RATING (p.s.f.), & A GIVEN STORM BAR SPACING (ft) **

MAX. A.S.D DESIGN PRESSURE RATING RANGE(p.s.f)	STORM BAR SPACING (FT)									
	2'	2.667'	3'	3.5'	4'	4.5'	5'	5.5'	6'	6.667'
30.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"
35.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"
40.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"
45.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"
50.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"
55.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0" *
60.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0" *
65.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0" *	-
70.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0" *	11'-0" *	-
75.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0" *	-	-
80.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	10'-10" *	-	-
85.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0" *	-	-	-
90.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	-	-	-	-
95.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	-	-	-	-
100.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	-	-	-	-	-
105.0	11'-0"	11'-0"	11'-0"	11'-0"	11'-0"	-	-	-	-	-
110.0	11'-0"	11'-0"	11'-0"	11'-0"	10'-10"	-	-	-	-	-
115.0	11'-0"	11'-0"	11'-0"	11'-0"	-	-	-	-	-	-
120.0	11'-0"	11'-0"	11'-0"	11'-0"	-	-	-	-	-	-
125.0	11'-0"	11'-0"	11'-0"	10'-10"	-	-	-	-	-	-
130.0	11'-0"	11'-0"	11'-0"	-	-	-	-	-	-	-
135.0	11'-0"	11'-0"	11'-0"	-	-	-	-	-	-	-
140.0	11'-0"	11'-0"	11'-0"	-	-	-	-	-	-	-
145.0	11'-0"	11'-0"	10'-11"	-	-	-	-	-	-	-
150.0	11'-0"	11'-0"	-	-	-	-	-	-	-	-
155.0	11'-0"	11'-0"	-	-	-	-	-	-	-	-
160.0	11'-0"	11'-0"	-	-	-	-	-	-	-	-

THIS REGION IS ONLY VALID FOR INSTALLATIONS W/ 1 OR MORE STORM BARS PER PRODUCT.

*THIS REGION IS ONLY VALID FOR INSTALLATIONS W/ 2 OR MORE STORM BARS PER PRODUCT.

** MEASURED IN BETWEEN CENTER LINES OF STORM BARS IN FEET OR FROM TIP OF SIDE RAIL TO CENTER OF STORM BAR.



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REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

DRAWN BY: M.P.
 DATE: 06/9/2020
 DRAWING No: 20-068
 SHEET 22 OF 26

TABLE 2
REQUIREMENTS FOR STORM BAR CONNECTION TO CONCRETE TOP AND BOTTOM PER
SECTION S-S (SHEET 9) FOR A GIVEN A.S.D DESIGN PRESSURE RATING (p.s.f.),
& STORM BAR SPACING (ft)

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	STORM BAR SPACING "a" (FT)									
	2'	2.667'	3'	3.5'	4'	4.5'	5'	5.5'	6'	6.667'
30.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D
35.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D
40.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D
45.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C
50.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C
55.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C
60.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C
65.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A,B
70.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A,B	A
75.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B	A	A
80.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A	A	A
85.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B	A	A	A
90.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A	A	A	A
95.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B	A	A	A	A
100.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A
105.0	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B	A	A	A	A	A
110.0	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A
115.0	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A
120.0	A,B,C,D	A,B,C	A,B,C	A,B	A	A	A	A	A	A
125.0	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A	A
130.0	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A	A
135.0	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A	-
140.0	A,B,C,D	A,B,C	A,B	A	A	A	A	A	A	-
145.0	A,B,C,D	A,B,C	A,B	A	A	A	A	A	A	-
150.0	A,B,C,D	A,B,C	A	A	A	A	A	A	-	-
155.0	A,B,C	A,B	A	A	A	A	A	A	-	-
160.0	A,B,C	A,B	A	A	A	A	A	-	-	-

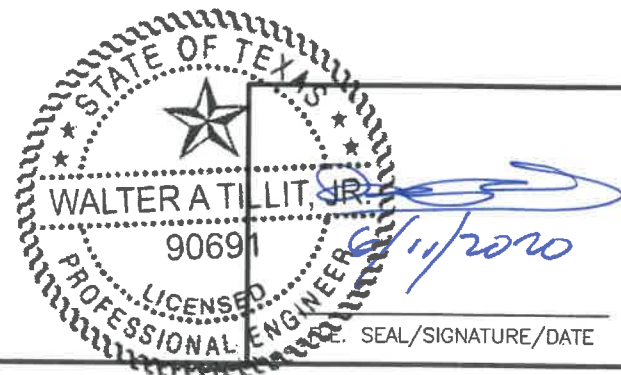
TABLE 3
REQUIREMENTS FOR STORM BAR CONNECTION TO CONCRETE TOP AND BOTTOM PER
SECTION S1-S1 (SHEET 9) FOR A GIVEN A.S.D DESIGN PRESSURE RATING (p.s.f.),
& STORM BAR SPACING (ft)

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	STORM BAR SPACING "a" (FT)									
	2'	2.667'	3'	3.5'	4'	4.5'	5'	5.5'	6'	6.667'
30.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C
35.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A,B,C
40.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A,B	A
45.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A,B,C	A	A	A	A
50.0	A,B,C,D	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A
55.0	A,B,C,D	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A
60.0	A,B,C,D	A,B,C	A,B,C	A,B	A	A	A	A	A	A
65.0	A,B,C,D	A,B,C	A,B,C	A	A	A	A	A	A	A
70.0	A,B,C,D	A,B,C	A,B	A	A	A	A	A	A	A
75.0	A,B,C,D	A,B,C	A	A	A	A	A	A	A	-
80.0	A,B,C	A,B	A	A	A	A	A	A	-	-
85.0	A,B,C	A	A	A	A	A	A	-	-	-
90.0	A,B,C	A	A	A	A	A	-	-	-	-
95.0	A,B,C	A	A	A	A	-	-	-	-	-
100.0	A,B,C	A	A	A	A	-	-	-	-	-
105.0	A,B	A	A	A	A	-	-	-	-	-
110.0	A	A	A	A	-	-	-	-	-	-
115.0	A	A	A	A	-	-	-	-	-	-
120.0	A	A	A	A	-	-	-	-	-	-
125.0	A	A	A	-	-	-	-	-	-	-
130.0	A	A	A	-	-	-	-	-	-	-
135.0	A	A	A	-	-	-	-	-	-	-
140.0	A	A	A	-	-	-	-	-	-	-
145.0	A	A	A	-	-	-	-	-	-	-
150.0	A	A	-	-	-	-	-	-	-	-
155.0	A	A	-	-	-	-	-	-	-	-
160.0	A	A	-	-	-	-	-	-	-	-

ANCHORS TYPE LEGEND

- A** 3/8"Ø CARBON STEEL KWIK BOLT TZ EXPANSION ANCHOR W/ 2 1/2" Min. EMBEDMENT* & 5" Min. THICK POURED CONCRETE (f'c = 3000 psi)
- B** 3/8"Øx1 1/4" POWERS CALK-IN ANCHORS W/ 1 1/4" Min. EMBEDMENT* TO POURED CONCRETE (f'c = 3000 psi) & 3/8"Ø-16 MACHINE SCREWS
- C** 1/4"Øx3/4" ALL POINTS SOLID-SET ANCHORS W/ 7/8" Min. EMBEDMENT* TO POURED CONCRETE (f'c = 3000 psi) & 1/4"Ø-20, 18-8 STAINLESS STEEL MACHINE SCREWS
- D** 5/16"Ø ITW/BUILDEX TAPCON ANCHORS W/ 2 1/4" Min. EMBEDMENT* TO POURED CONCRETE (f'c = 2899 psi)

* EMBEDMENT IS BEYOND ANY FLOOR / CEILING FINISH



SEAL/SIGNATURE/DATE

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 FIRM REGISTRATION # F-13790

TEXAS DEPARTMENT OF INSURANCE - 2018



Nautilus
 End Retention Roll-Up Shutter

EXPERT SHUTTER SERVICES INC.
 668 S.W. WHITMORE DRIVE
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DRAWN BY:
M.P.

06/9/2020
DATE

20-068
DRAWING No

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

SHEET 23 OF 26

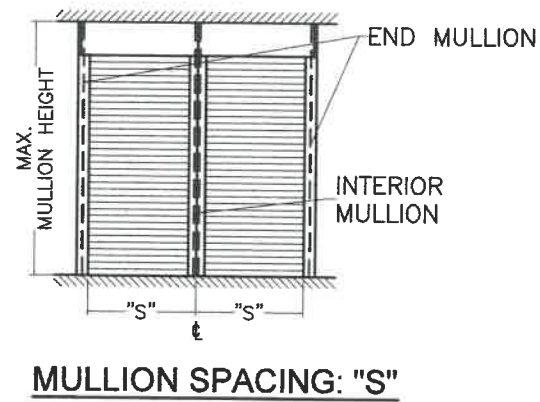
SCHEDULE 1a
FLOOR TO CEILING (TRAPPED) MOUNTING
MAX. SPAN (ft) FOR END AND INTERIOR MULLIONS FOR A GIVEN A.S.D
DESIGN PRESSURE RATING (p.s.f.), & A MAX. MULLION SPACING (ft) *

SCHEDULE 2a
WALL MOUNTING
MAX. SPAN (FT) FOR END AND INTERIOR MULLIONS FOR A GIVEN A.S.D
DESIGN PRESSURE RATING (P.S.F.), & A MAX. MULLION SPACING (FT) *

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)											
		Ⓞ 4"x6"x1/4" MULLION				Ⓞ1 4"x8"x1/4" MULLION				Ⓞ2 4"x7"x1/4" THICK (3/8" FLANGE) MULLION			
		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †	
		END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR
30.0	20'-0"	7'-10"	9'-8"	7'-3"	12'-0"	9'-4"	10'-7"	8'-0"	12'-6"	9'-8"	7'-6"	12'-6"	
35.0	20'-0"	7'-4"	9'-3"	6'-9"	11'-5"	8'-8"	10'-0"	7'-7"	12'-6"	8'-11"	6'-11"	12'-6"	
40.0	20'-0"	6'-10"	8'-10"	6'-4"	10'-11"	8'-1"	9'-7"	7'-3"	12'-6"	8'-5"	6'-6"	12'-6"	
45.0	20'-0"	6'-6"	8'-6"	6'-6"	10'-6"	7'-8"	9'-3"	6'-11"	12'-6"	7'-11"	6'-2"	12'-6"	
50.0	20'-0"	6'-2"	8'-2"	6'-0"	9'-11"	7'-4"	8'-11"	6'-7"	12'-6"	7'-4"	5'-11"	12'-6"	
55.0	20'-0"	5'-11"	7'-11"	5'-9"	9'-0"	6'-8"	8'-7"	6'-3"	12'-6"	6'-8"	5'-7"	12'-6"	
60.0	19'-5"	5'-9"	7'-9"	5'-6"	8'-6"	6'-4"	8'-6"	6'-2"	12'-0"	6'-4"	5'-6"	12'-6"	
65.0	18'-4"	5'-9"	7'-9"	5'-4"	8'-4"	6'-4"	8'-4"	6'-2"	11'-10"	6'-4"	5'-6"	12'-6"	
70.0	17'-4"	5'-9"	7'-8"	5'-4"	8'-2"	6'-3"	8'-2"	6'-2"	11'-9"	6'-3"	5'-6"	12'-6"	
75.0	16'-6"	5'-9"	7'-7"	5'-4"	8'-0"	6'-3"	8'-0"	6'-2"	11'-7"	6'-3"	5'-6"	12'-5"	
80.0	15'-9"	5'-9"	7'-7"	5'-4"	7'-10"	6'-3"	7'-10"	6'-2"	11'-6"	6'-3"	5'-6"	12'-4"	
85.0	15'-0"	5'-9"	7'-7"	5'-4"	7'-9"	6'-3"	7'-9"	6'-2"	11'-5"	6'-3"	5'-6"	12'-3"	
90.0	14'-2"	5'-10"	7'-7"	5'-5"	7'-9"	6'-4"	7'-9"	6'-3"	11'-5"	6'-4"	5'-7"	12'-3"	
95.0	13'-5"	5'-10"	7'-7"	5'-6"	7'-9"	6'-5"	7'-9"	6'-4"	11'-5"	6'-5"	5'-8"	12'-3"	
100.0	12'-9"	5'-11"	7'-7"	5'-7"	7'-9"	6'-6"	7'-9"	6'-4"	11'-5"	6'-6"	5'-9"	12'-3"	
105.0	12'-2"	6'-0"	7'-7"	5'-7"	7'-9"	6'-7"	7'-9"	6'-5"	11'-5"	6'-7"	5'-9"	12'-3"	
110.0	11'-7"	6'-0"	7'-7"	5'-8"	7'-9"	6'-8"	7'-9"	6'-5"	11'-5"	6'-8"	5'-10"	12'-3"	
115.0	11'-1"	6'-1"	7'-7"	5'-9"	7'-9"	6'-9"	7'-9"	6'-7"	11'-5"	6'-9"	5'-11"	12'-3"	
120.0	10'-8"	6'-1"	7'-6"	5'-9"	7'-9"	6'-10"	7'-9"	6'-7"	11'-5"	6'-10"	6'-0"	12'-3"	
125.0	10'-2"	6'-2"	7'-7"	5'-10"	7'-10"	7'-0"	7'-10"	6'-9"	11'-5"	7'-0"	6'-1"	12'-3"	
130.0	9'-10"	6'-3"	7'-7"	5'-10"	7'-9"	7'-0"	7'-9"	6'-9"	11'-5"	7'-0"	6'-1"	12'-3"	
135.0	9'-5"	6'-4"	7'-7"	5'-11"	7'-10"	7'-2"	7'-10"	6'-10"	11'-5"	7'-2"	6'-2"	12'-3"	
140.0	9'-1"	6'-4"	7'-7"	6'-0"	7'-10"	7'-3"	7'-10"	6'-11"	11'-5"	7'-3"	6'-3"	12'-3"	
145.0	8'-10"	6'-5"	7'-6"	6'-0"	7'-9"	7'-4"	7'-9"	6'-11"	11'-5"	7'-4"	6'-3"	12'-3"	
150.0	8'-6"	6'-6"	7'-7"	6'-1"	7'-9"	7'-5"	7'-9"	7'-0"	11'-5"	7'-5"	6'-4"	12'-3"	
155.0	8'-3"	6'-6"	7'-7"	6'-2"	7'-9"	7'-6"	7'-9"	7'-1"	11'-5"	7'-6"	6'-5"	12'-3"	
160.0	8'-0"	6'-7"	7'-6"	6'-2"	7'-9"	7'-7"	7'-9"	7'-2"	11'-5"	7'-7"	6'-6"	12'-3"	

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)											
		Ⓞ 4"x6"x1/4" MULLION				Ⓞ1 4"x8"x1/4" MULLION				Ⓞ2 4"x7"x1/4" THICK (3/8" FLANGE) MULLION			
		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †	
		END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR
30.0	20'-0"	7'-10"	9'-8"	7'-3"	12'-0"	9'-4"	10'-7"	8'-0"	12'-6"	9'-8"	7'-6"	12'-6"	
35.0	20'-0"	7'-4"	9'-3"	6'-9"	11'-5"	8'-8"	10'-0"	7'-7"	12'-6"	8'-11"	6'-11"	12'-6"	
40.0	20'-0"	6'-10"	8'-10"	6'-4"	10'-11"	8'-1"	9'-7"	7'-3"	12'-6"	8'-5"	6'-6"	12'-6"	
45.0	20'-0"	6'-6"	8'-6"	6'-6"	10'-6"	7'-8"	9'-3"	6'-11"	12'-6"	7'-11"	6'-2"	12'-6"	
50.0	20'-0"	6'-2"	8'-2"	6'-0"	9'-11"	7'-4"	8'-11"	6'-7"	12'-6"	7'-4"	5'-11"	12'-6"	
55.0	20'-0"	5'-11"	7'-11"	5'-9"	9'-0"	6'-8"	8'-7"	6'-3"	12'-6"	6'-8"	5'-7"	12'-6"	
60.0	19'-5"	5'-9"	7'-9"	5'-6"	8'-6"	6'-4"	8'-6"	6'-2"	12'-0"	6'-4"	5'-6"	12'-6"	
65.0	18'-4"	5'-9"	7'-9"	5'-4"	8'-4"	6'-4"	8'-4"	6'-2"	11'-10"	6'-4"	5'-6"	12'-6"	
70.0	17'-4"	5'-9"	7'-8"	5'-4"	8'-2"	6'-3"	8'-2"	6'-2"	11'-9"	6'-3"	5'-6"	12'-6"	
75.0	16'-6"	5'-9"	7'-7"	5'-4"	8'-0"	6'-3"	8'-0"	6'-2"	11'-7"	6'-3"	5'-6"	12'-5"	
80.0	15'-9"	5'-9"	7'-7"	5'-4"	7'-10"	6'-3"	7'-10"	6'-2"	11'-6"	6'-3"	5'-6"	12'-4"	
85.0	15'-0"	5'-9"	7'-7"	5'-4"	7'-9"	6'-3"	7'-9"	6'-2"	11'-5"	6'-3"	5'-6"	12'-3"	
90.0	14'-2"	5'-10"	7'-7"	5'-5"	7'-9"	6'-4"	7'-9"	6'-3"	11'-5"	6'-4"	5'-7"	12'-3"	
95.0	13'-5"	5'-10"	7'-7"	5'-6"	7'-9"	6'-5"	7'-9"	6'-4"	11'-5"	6'-5"	5'-8"	12'-3"	
100.0	12'-9"	5'-11"	7'-7"	5'-7"	7'-9"	6'-6"	7'-9"	6'-4"	11'-5"	6'-6"	5'-9"	12'-3"	
105.0	12'-2"	6'-0"	7'-7"	5'-7"	7'-9"	6'-7"	7'-9"	6'-5"	11'-5"	6'-7"	5'-9"	12'-3"	
110.0	11'-7"	6'-0"	7'-7"	5'-8"	7'-9"	6'-8"	7'-9"	6'-5"	11'-5"	6'-8"	5'-10"	12'-3"	
115.0	11'-1"	6'-1"	7'-7"	5'-9"	7'-9"	6'-9"	7'-9"	6'-7"	11'-5"	6'-9"	5'-11"	12'-3"	
120.0	10'-8"	6'-1"	7'-6"	5'-9"	7'-9"	6'-10"	7'-9"	6'-7"	11'-5"	6'-10"	6'-0"	12'-3"	
125.0	10'-2"	6'-2"	7'-7"	5'-10"	7'-10"	7'-0"	7'-10"	6'-9"	11'-5"	7'-0"	6'-1"	12'-3"	
130.0	9'-10"	6'-3"	7'-7"	5'-10"	7'-9"	7'-0"	7'-9"	6'-9"	11'-5"	7'-0"	6'-1"	12'-3"	
135.0	9'-5"	6'-4"	7'-7"	5'-11"	7'-10"	7'-2"	7'-10"	6'-10"	11'-5"	7'-2"	6'-2"	12'-3"	
140.0	9'-1"	6'-4"	7'-7"	6'-0"	7'-10"	7'-3"	7'-10"	6'-11"	11'-5"	7'-3"	6'-3"	12'-3"	
145.0	8'-10"	6'-5"	7'-6"	6'-0"	7'-9"	7'-4"	7'-9"	6'-11"	11'-5"	7'-4"	6'-3"	12'-3"	
150.0	8'-6"	6'-6"	7'-7"	6'-1"	7'-9"	7'-5"	7'-9"	7'-0"	11'-5"	7'-5"	6'-4"	12'-3"	
155.0	8'-3"	6'-6"	7'-7"	6'-2"	7'-9"	7'-6"	7'-9"	7'-1"	11'-5"	7'-6"	6'-5"	12'-3"	
160.0	8'-0"	6'-7"	7'-6"	6'-2"	7'-9"	7'-7"	7'-9"	7'-2"	11'-5"	7'-7"	6'-6"	12'-3"	

* MAXIMUM MULLION SPACING SHALL BE SUCH THAT MAX. ALLOWABLE SLAT SPAN FOR THAT DESIGN PRESSURE RATING SHALL NOT BE EXCEEDED.
 † MULLION ORIENTATION IS AS SEEN FROM THE OUTSIDE (EXTERIOR) OF PRODUCT.



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 TEXAS LIC. # 90691
 FIRM REGISTRATION # F-13790

TEXAS DEPARTMENT OF INSURANCE - 2018

Nautilus
 End Retention Roll-Up Shutter

EXPERT SHUTTER SERVICES INC.
 668 S.W. WHITMORE DRIVE
 PORT ST. LUCIE, FL 34984
 PHONE: (800) 749-9056 , FAX: (772) 871-0990

REV. No. 1 DESCRIPTION OLD 14-051 DATE 06/9/2020 REV. No. 4 DESCRIPTION DATE

REV. No. 2 DESCRIPTION DATE REV. No. 5 DESCRIPTION DATE

DRAWN BY: M.P.
 DATE: 06/9/2020
 DRAWING No: 20-068
 SHEET 24 OF 26

SCHEDULE 1b
FLOOR TO CEILING (TRAPPED) MOUNTING MAX. SPAN (ft) FOR END AND INTERIOR MULLIONS FOR A GIVEN A.S.D DESIGN PRESSURE RATING (p.s.f.) & A 12'-0" MAX. MULLION SPACING (ft) *

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)											
		G 4"x6"x1/4" MULLION				G1 4"x8"x1/4" MULLION				G2 4"x7"x1/4" THICK (3/8" FLANGE) MULLION			
		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †	
		END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR		
30.0	12'-0"	11'-7"	11'-6"	9'-9"	12'-6"	12'-6"	12'-6"	10'-7"	12'-6"	12'-6"	11'-3"	12'-6"	
35.0	12'-0"	10'-7"	10'-11"	9'-2"	12'-6"	12'-6"	11'-11"	10'-0"	12'-6"	12'-6"	10'-4"	12'-6"	
40.0	12'-0"	9'-10"	10'-5"	8'-9"	12'-6"	11'-8"	11'-4"	9'-6"	12'-6"	11'-10"	9'-7"	12'-6"	
45.0	12'-0"	9'-3"	10'-1"	8'-4"	12'-5"	10'-11"	10'-11"	9'-1"	12'-6"	11'-2"	9'-0"	12'-6"	
50.0	12'-0"	8'-9"	9'-8"	8'-1"	12'-0"	10'-4"	10'-7"	8'-9"	12'-6"	10'-7"	8'-6"	12'-6"	
55.0	12'-0"	8'-4"	9'-5"	7'-10"	11'-8"	9'-10"	10'-3"	8'-6"	12'-6"	10'-1"	8'-1"	12'-6"	
60.0	12'-0"	8'-0"	9'-2"	7'-6"	11'-4"	9'-5"	9'-11"	8'-3"	12'-6"	9'-7"	7'-9"	12'-6"	
65.0	12'-0"	7'-8"	8'-11"	7'-2"	11'-0"	9'-1"	9'-8"	8'-0"	12'-6"	9'-3"	7'-5"	12'-6"	
70.0	12'-0"	7'-4"	8'-8"	6'-11"	10'-9"	8'-9"	9'-5"	7'-10"	12'-6"	8'-11"	7'-2"	12'-6"	
75.0	12'-0"	7'-1"	8'-6"	6'-8"	10'-6"	8'-5"	9'-3"	7'-8"	12'-6"	8'-7"	6'-11"	12'-6"	
80.0	12'-0"	6'-11"	8'-4"	6'-5"	10'-3"	8'-2"	9'-0"	7'-5"	12'-6"	8'-4"	6'-8"	12'-6"	
85.0	12'-0"	6'-8"	8'-2"	6'-3"	9'-9"	7'-11"	8'-10"	7'-2"	12'-6"	8'-1"	6'-6"	12'-6"	
90.0	12'-0"	6'-6"	8'-0"	6'-1"	9'-2"	7'-8"	8'-8"	7'-0"	12'-5"	7'-10"	6'-4"	12'-6"	
95.0	12'-0"	6'-4"	7'-10"	5'-11"	8'-8"	7'-5"	8'-6"	6'-10"	12'-1"	7'-5"	6'-2"	12'-6"	
100.0	12'-0"	6'-2"	7'-8"	5'-9"	8'-3"	7'-0"	8'-3"	6'-8"	11'-9"	7'-0"	6'-0"	12'-6"	
105.0	12'-0"	6'-0"	7'-7"	5'-8"	7'-10"	6'-8"	7'-10"	6'-6"	11'-6"	6'-8"	5'-10"	12'-4"	

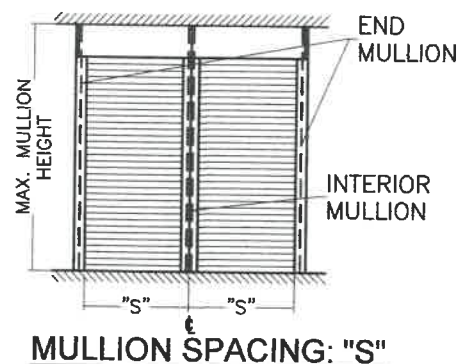
SCHEDULE 2b
WALL MOUNTING MAX. SPAN (FT) FOR END AND INTERIOR MULLIONS FOR A GIVEN A.S.D DESIGN PRESSURE RATING (P.S.F.) & A 12'-0" MAX. MULLION SPACING (FT) *

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)									
		G 4"x6"x1/4" MULLION				G1 4"x8"x1/4" MULLION				G2 4"x7"x1/4" THICK (3/8" FLANGE) MULLION	
		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #1 (⇌) †		ORIENTATION #2 (⊥) †		ORIENTATION #2 (⊥) †	
		END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR
30.0	12'-0"	9'-9"	11'-6"	9'-9"	12'-6"	12'-6"	12'-6"	11'-3"	12'-6"	11'-3"	12'-6"
35.0	12'-0"	9'-2"	10'-11"	9'-2"	12'-6"	12'-6"	11'-11"	10'-0"	12'-6"	11'-3"	12'-6"
40.0	12'-0"	8'-9"	10'-5"	8'-9"	12'-6"	11'-8"	11'-4"	9'-6"	12'-6"	10'-4"	12'-6"
45.0	12'-0"	8'-4"	10'-1"	8'-4"	12'-5"	10'-11"	10'-11"	9'-1"	12'-6"	9'-7"	12'-6"
50.0	12'-0"	8'-1"	9'-8"	8'-1"	12'-0"	10'-4"	10'-7"	8'-9"	12'-6"	9'-0"	12'-6"
55.0	12'-0"	7'-10"	9'-5"	7'-10"	11'-8"	9'-10"	10'-3"	8'-6"	12'-6"	8'-6"	12'-6"
60.0	12'-0"	7'-6"	9'-2"	7'-6"	11'-4"	9'-5"	9'-11"	8'-3"	12'-6"	8'-1"	12'-6"
65.0	12'-0"	7'-2"	8'-11"	7'-2"	11'-0"	9'-1"	9'-8"	8'-0"	12'-6"	7'-9"	12'-6"
70.0	12'-0"	6'-11"	8'-8"	6'-11"	10'-9"	8'-9"	9'-5"	7'-10"	12'-6"	7'-5"	12'-6"
75.0	12'-0"	6'-8"	8'-6"	6'-8"	10'-6"	8'-5"	9'-3"	7'-10"	12'-6"	7'-2"	12'-6"
80.0	12'-0"	6'-5"	8'-4"	6'-5"	10'-3"	8'-2"	9'-0"	7'-5"	12'-6"	6'-11"	12'-6"
85.0	12'-0"	6'-3"	8'-2"	6'-3"	9'-9"	7'-11"	8'-10"	7'-2"	12'-6"	6'-8"	12'-6"
90.0	12'-0"	6'-1"	8'-0"	6'-1"	9'-2"	7'-8"	8'-8"	7'-0"	12'-5"	6'-6"	12'-6"
95.0	12'-0"	5'-11"	7'-10"	5'-11"	8'-8"	7'-5"	8'-6"	6'-10"	12'-1"	6'-4"	12'-6"
100.0	12'-0"	5'-9"	7'-8"	5'-9"	8'-3"	7'-0"	8'-3"	6'-8"	11'-9"	6'-2"	12'-6"
105.0	12'-0"	5'-8"	7'-7"	5'-8"	7'-10"	6'-8"	7'-10"	6'-6"	11'-6"	5'-10"	12'-4"

SCHEDULE 1b' (LIMITED LOAD, MULLION SPACING & SPAN INSTALLATION)
FLOOR TO CEILING (TRAPPED) MOUNTED MAX. SPAN (ft) FOR END & INTERIOR MULLIONS FOR A GIVEN A.S.D DESIGN PRESSURE (p.s.f.) AND FOR 12'-0" (CASE I) & 8'-0" (CASES Ia & II) MAX. MULLION SPACING (ft) *

INSTALLATION CASES	MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)							
			G 4"x6"x1/4" THICK MULLION		G1 4"x8"x1/4" THICK MULLION		G3 2"x7"x1/4" THICK (3/8" FLANGE) MULLION			
			ORIENTATION #1 (⇌) †	ORIENTATION #2 (⊥) †	ORIENTATION #1 (⇌) †	ORIENTATION #1 (⇌) †	ORIENTATION #2 (⊥) †	ORIENTATION #2 (⊥) †	ORIENTATION #1 (⇌) †	ORIENTATION #2 (⊥) †
			END	INTERIOR	END	INTERIOR	INTERIOR	END	INTERIOR	
CASE I	30.0	12'-0"	-	12'-6"	12'-6"	12'-6"	12'-6"	-	11'-0"	
	35.0	12'-0"	-	12'-6"	12'-6"	11'-11"	12'-6"	-	11'-0"	
	40.0	12'-0"	-	12'-6"	12'-6"	11'-8"	11'-4"	12'-6"	-	
	45.0	12'-0"	-	12'-5"	10'-11"	10'-11"	12'-6"	-	11'-0"	
	50.0	12'-0"	-	12'-0"	10'-4"	10'-7"	12'-6"	-	11'-0"	
	55.0	12'-0"	-	11'-8"	9'-10"	10'-3"	12'-6"	-	11'-0"	
	60.0	12'-0"	-	11'-4"	9'-5"	9'-11"	12'-6"	-	11'-0"	
	60.8	12'-0"	-	11'-3"	9'-4"	9'-11"	12'-6"	-	11'-0"	
CASE Ia	30.0	8'-0"	-	12'-6"	12'-6"	12'-6"	12'-6"	-	11'-0"	
	35.0	8'-0"	-	12'-6"	12'-6"	12'-6"	12'-6"	-	11'-0"	
	40.0	8'-0"	-	12'-6"	12'-6"	12'-6"	12'-6"	-	11'-0"	
	45.0	8'-0"	-	12'-6"	12'-6"	12'-6"	12'-6"	-	11'-0"	
	50.0	8'-0"	-	12'-6"	12'-6"	12'-1"	12'-6"	-	11'-0"	
	55.0	8'-0"	-	12'-6"	12'-6"	11'-8"	12'-6"	-	11'-0"	
	60.0	8'-0"	-	12'-2"	12'-2"	11'-4"	12'-2"	-	11'-0"	
	60.8	8'-0"	-	12'-0"	12'-0"	11'-4"	12'-0"	-	11'-0"	
CASE II	30.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	35.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	40.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	45.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	50.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	55.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	60.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	65.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	70.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	75.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	80.0	8'-0"	-	9'-0"	9'-0"	8'-9"	9'-0"	-	9'-0"	
	85.0	8'-0"	-	9'-0"	8'-9"	8'-3"	9'-0"	-	9'-0"	
90.0	8'-0"	-	9'-0"	8'-2"	7'-9"	9'-0"	-	9'-0"		
95.0	8'-0"	-	9'-0"	7'-8"	7'-4"	9'-0"	-	9'-0"		
100.0	8'-0"	-	9'-0"	7'-3"	7'-0"	9'-0"	-	9'-0"		

* NOTE: USE 9'-0" IF ANCHOR CONSISTS OF HILTI, INC HUS-H SCREW OR POWER FASTENERS, WEDGE-BOLT ANCHOR. SEE SCHEDULES 1 & 2 ON SHEET 10A.



* MAXIMUM MULLION SPACING SHALL BE SUCH THAT MAX. ALLOWABLE SLAT SPAN FOR THAT A.S.D DESIGN LOAD SHALL NOT BE EXCEEDED.
 † MULLION ORIENTATION IS AS SEEN FROM THE OUTSIDE (EXTERIOR) OF PRODUCT.

STATE OF TEXAS
 WALTER A TILLIT, JR.
 90691
 PROFESSIONAL ENGINEER
 SEAL/SIGNATURE/DATE

SCHEDULE 2b' (LIMITED LOAD, MULLION SPACING & SPAN INSTALLATION)
WALL MOUNTED MAX. SPAN (ft) FOR END & INTERIOR MULLIONS FOR A GIVEN A.S.D DESIGN PRESSURE RATING (p.s.f.) AND FOR 12'-0" (CASE I) & 8'-0" (CASE II) MAX. MULLION SPACING (ft) *

INSTALLATION CASES	MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)							
			G 4"x6"x1/4" THICK MULLION		G1 4"x8"x1/4" THICK MULLION		G3 2"x7"x1/4" THICK (3/8" FLANGE) MULLION			
			ORIENTATION #1 (⇌) †	ORIENTATION #2 (⊥) †	ORIENTATION #1 (⇌) †	ORIENTATION #1 (⇌) †	ORIENTATION #2 (⊥) †	ORIENTATION #2 (⊥) †	ORIENTATION #1 (⇌) †	ORIENTATION #2 (⊥) †
			END	INTERIOR	END	INTERIOR	INTERIOR	END	INTERIOR	
CASE I'	30.0	12'-0"	-	12'-6"	12'-6"	12'-6"	12'-6"	-	11'-0"	
	35.0	12'-0"	-	12'-6"	12'-6"	11'-11"	12'-6"	-	11'-0"	
	40.0	12'-0"	-	12'-6"	12'-6"	11'-8"	11'-4"	12'-6"	-	
	45.0	12'-0"	-	12'-5"	10'-11"	10'-11"	12'-6"	-	11'-0"	
	50.0	12'-0"	-	12'-0"	10'-4"	10'-7"	12'-6"	-	11'-0"	
	55.0	12'-0"	-	11'-8"	9'-10"	10'-3"	12'-6"	-	11'-0"	
	60.0	12'-0"	-	11'-4"	9'-5"	9'-11"	12'-6"	-	11'-0"	
	60.8	12'-0"	-	11'-3"	9'-4"	9'-11"	12'-6"	-	11'-0"	
CASE II'	30.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	35.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	40.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	45.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	50.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	55.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	60.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	65.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	70.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	75.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	80.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
	85.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"	
90.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"		
95.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"		
100.0	8'-0"	-	9'-0"	9'-0"	9'-0"	9'-0"	-	9'-0"		

TEXAS DEPARTMENT OF INSURANCE - 2018

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TEXAS LIC. # 90691

FIRM REGISTRATION # F-13790



Nautilus

End Retention Roll-Up Shutter

EXPERT SHUTTER SERVICES INC.

668 S.W. WHITMORE DRIVE
 PORT ST. LUCIE, FL. 34984
 PHONE: (800) 749-9056, FAX: (772) 871-0990

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

DRAWN BY:
 M.P.

06/9/2020
 DATE

20-068
 DRAWING No

SHEET 25 OF 26

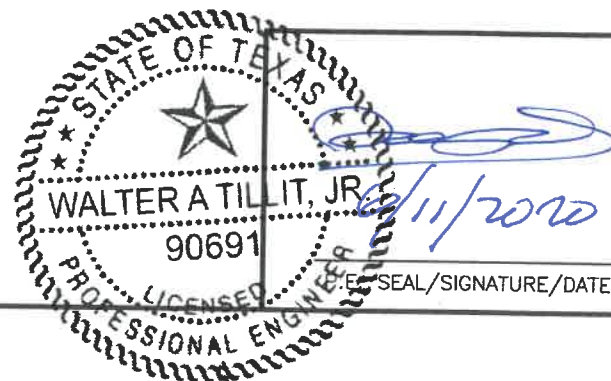
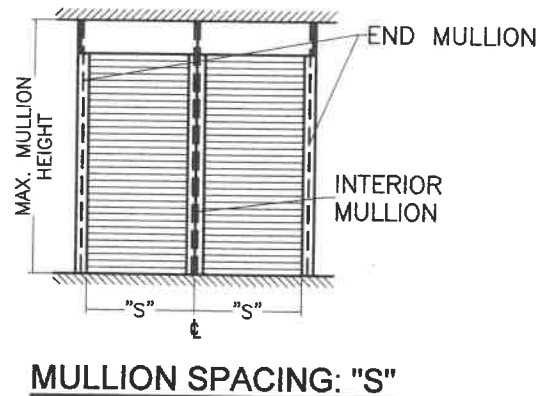
SCHEDULE 1c
FLOOR TO CEILING (TRAPPED) MOUNTING
MAX. SPAN (ft) FOR END AND INTERIOR MULLIONS FOR A GIVEN A.S.D
DESIGN PRESSURE RATING (p.s.f.), & A 7'-0" MAX. MULLION SPACING (ft) *

SCHEDULE 2c
WALL MOUNTING
MAX. SPAN (FT) FOR END AND INTERIOR MULLIONS FOR A GIVEN A.S.D
DESIGN PRESSURE RATING (P.S.F.), & AND 7'-0" MAX. MULLION SPACING (FT) *

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)											
		Ⓞ 4"x6"x1/4" MULLION				Ⓞ1 4"x8"x1/4" MULLION				Ⓞ2 4"x7"x1/4" THICK (3/8" FLANGE) MULLION			
		ORIENTATION #1 (⇐) †		ORIENTATION #2 (⇐) †		ORIENTATION #1 (⇐) †		ORIENTATION #2 (⇐) †		ORIENTATION #1 (⇐) †		ORIENTATION #2 (⇐) †	
		END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR
30.0	7'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
35.0	7'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
40.0	7'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
45.0	7'-0"	12'-6"	12'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
50.0	7'-0"	12'-6"	11'-7"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
55.0	7'-0"	12'-6"	11'-3"	12'-6"	12'-6"	12'-6"	12'-3"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
60.0	7'-0"	12'-6"	10'-11"	12'-6"	12'-6"	12'-6"	11'-7"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
65.0	7'-0"	12'-6"	10'-8"	12'-1"	12'-6"	12'-6"	11'-11"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
70.0	7'-0"	12'-6"	10'-5"	11'-6"	12'-6"	12'-6"	11'-3"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
75.0	7'-0"	12'-1"	10'-2"	10'-11"	12'-6"	12'-6"	11'-0"	11'-11"	12'-6"	12'-6"	12'-6"	12'-6"	
80.0	7'-0"	11'-6"	9'-11"	10'-6"	12'-4"	12'-6"	10'-10"	11'-5"	12'-6"	12'-6"	12'-6"	12'-6"	
85.0	7'-0"	11'-0"	9'-9"	10'-2"	12'-1"	12'-6"	10'-7"	11'-0"	12'-6"	12'-6"	12'-6"	12'-6"	
90.0	7'-0"	10'-7"	9'-7"	9'-10"	11'-10"	12'-5"	10'-5"	10'-8"	12'-6"	12'-2"	12'-6"	12'-6"	
95.0	7'-0"	10'-2"	9'-5"	9'-6"	11'-7"	11'-11"	10'-2"	10'-4"	12'-6"	11'-9"	10'-5"	12'-6"	
100.0	7'-0"	9'-10"	9'-3"	9'-3"	11'-5"	11'-6"	10'-0"	10'-1"	12'-6"	11'-5"	10'-1"	12'-6"	
105.0	7'-0"	9'-6"	9'-1"	9'-1"	11'-3"	11'-2"	9'-10"	9'-10"	12'-6"	11'-1"	9'-8"	12'-6"	
110.0	7'-0"	9'-3"	8'-11"	8'-10"	11'-1"	10'-10"	9'-9"	9'-7"	12'-6"	10'-9"	9'-5"	12'-6"	
115.0	7'-0"	9'-0"	8'-10"	8'-7"	10'-11"	10'-7"	9'-7"	9'-5"	12'-6"	10'-5"	9'-1"	12'-6"	
120.0	7'-0"	8'-9"	8'-8"	8'-5"	10'-9"	10'-3"	9'-5"	9'-3"	12'-6"	10'-2"	9'-10"	12'-6"	
125.0	7'-0"	8'-6"	8'-7"	8'-2"	10'-7"	10'-0"	9'-4"	9'-1"	12'-6"	9'-11"	8'-7"	12'-6"	
130.0	7'-0"	8'-4"	8'-5"	8'-0"	10'-6"	9'-9"	9'-2"	8'-11"	12'-6"	9'-9"	8'-5"	12'-6"	
135.0	7'-0"	8'-2"	8'-4"	7'-9"	10'-4"	9'-7"	9'-1"	8'-9"	12'-6"	9'-6"	8'-2"	12'-6"	
140.0	7'-0"	8'-0"	8'-3"	7'-7"	10'-1"	9'-4"	9'-0"	8'-7"	12'-6"	9'-4"	8'-0"	12'-6"	
145.0	7'-0"	7'-10"	8'-2"	7'-5"	9'-9"	9'-2"	8'-10"	8'-6"	12'-6"	9'-2"	7'-10"	12'-6"	
150.0	7'-0"	7'-8"	8'-1"	7'-4"	9'-5"	9'-0"	8'-9"	8'-4"	12'-6"	8'-11"	7'-8"	12'-6"	
155.0	7'-0"	7'-6"	8'-0"	7'-2"	9'-2"	8'-10"	8'-8"	8'-3"	12'-5"	8'-9"	7'-6"	12'-6"	
160.0	7'-0"	7'-4"	7'-11"	7'-0"	8'-10"	8'-8"	8'-7"	8'-1"	12'-2"	8'-8"	7'-5"	12'-6"	

MAX. A.S.D DESIGN PRESSURE RATING (p.s.f.)	MAXIMUM MULLION SPACING (ft) *	MAXIMUM MULLION SPAN (FT)											
		Ⓞ 4"x6"x1/4" MULLION				Ⓞ1 4"x8"x1/4" MULLION				Ⓞ2 4"x7"x1/4" THICK (3/8" FLANGE) MULLION			
		ORIENTATION #1 (⇐) †		ORIENTATION #2 (⇐) †		ORIENTATION #1 (⇐) †		ORIENTATION #2 (⇐) †		ORIENTATION #1 (⇐) †		ORIENTATION #2 (⇐) †	
		END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR	END	INTERIOR
30.0	7'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
35.0	7'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
40.0	7'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
45.0	7'-0"	12'-6"	12'-0"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
50.0	7'-0"	12'-6"	11'-7"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
55.0	7'-0"	12'-6"	11'-3"	12'-6"	12'-6"	12'-6"	12'-3"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
60.0	7'-0"	12'-6"	10'-11"	12'-6"	12'-6"	12'-6"	11'-7"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
65.0	7'-0"	12'-6"	10'-8"	12'-1"	12'-6"	12'-6"	11'-11"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
70.0	7'-0"	12'-6"	10'-5"	11'-6"	12'-6"	12'-6"	11'-3"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	
75.0	7'-0"	12'-1"	10'-2"	10'-11"	12'-6"	12'-6"	11'-0"	11'-11"	12'-6"	12'-6"	12'-6"	12'-6"	
80.0	7'-0"	11'-6"	9'-11"	10'-6"	12'-4"	12'-6"	10'-10"	11'-5"	12'-6"	12'-6"	12'-6"	12'-6"	
85.0	7'-0"	11'-0"	9'-9"	10'-2"	12'-1"	12'-6"	10'-7"	11'-0"	12'-6"	12'-6"	12'-6"	12'-6"	
90.0	7'-0"	10'-7"	9'-7"	9'-10"	11'-10"	12'-5"	10'-5"	10'-8"	12'-6"	12'-2"	12'-6"	12'-6"	
95.0	7'-0"	10'-2"	9'-5"	9'-6"	11'-7"	11'-11"	10'-2"	10'-4"	12'-6"	11'-9"	10'-5"	12'-6"	
100.0	7'-0"	9'-10"	9'-3"	9'-3"	11'-5"	11'-6"	10'-0"	10'-1"	12'-6"	11'-5"	10'-1"	12'-6"	
105.0	7'-0"	9'-6"	9'-1"	9'-1"	11'-3"	11'-2"	9'-10"	9'-10"	12'-6"	11'-1"	9'-8"	12'-6"	
110.0	7'-0"	9'-3"	8'-11"	8'-10"	11'-1"	10'-10"	9'-9"	9'-7"	12'-6"	10'-9"	9'-5"	12'-6"	
115.0	7'-0"	9'-0"	8'-10"	8'-7"	10'-11"	10'-7"	9'-7"	9'-5"	12'-6"	10'-5"	9'-1"	12'-6"	
120.0	7'-0"	8'-9"	8'-8"	8'-5"	10'-9"	10'-3"	9'-5"	9'-3"	12'-6"	10'-2"	9'-10"	12'-6"	
125.0	7'-0"	8'-6"	8'-7"	8'-2"	10'-7"	10'-0"	9'-4"	9'-1"	12'-6"	9'-11"	8'-7"	12'-6"	
130.0	7'-0"	8'-4"	8'-5"	8'-0"	10'-6"	9'-9"	9'-2"	8'-11"	12'-6"	9'-9"	8'-5"	12'-6"	
135.0	7'-0"	8'-2"	8'-4"	7'-9"	10'-4"	9'-7"	9'-1"	8'-9"	12'-6"	9'-6"	8'-2"	12'-6"	
140.0	7'-0"	8'-0"	8'-3"	7'-7"	10'-1"	9'-4"	9'-0"	8'-7"	12'-6"	9'-4"	8'-0"	12'-6"	
145.0	7'-0"	7'-10"	8'-2"	7'-5"	9'-9"	9'-2"	8'-10"	8'-6"	12'-6"	9'-2"	7'-10"	12'-6"	
150.0	7'-0"	7'-8"	8'-1"	7'-4"	9'-5"	9'-0"	8'-9"	8'-4"	12'-6"	8'-11"	7'-8"	12'-6"	
155.0	7'-0"	7'-6"	8'-0"	7'-2"	9'-2"	8'-10"	8'-8"	8'-3"	12'-5"	8'-9"	7'-6"	12'-6"	
160.0	7'-0"	7'-4"	7'-11"	7'-0"	8'-10"	8'-8"	8'-7"	8'-1"	12'-2"	8'-8"	7'-5"	12'-6"	

* MAXIMUM MULLION SPACING SHALL BE SUCH THAT MAX. ALLOWABLE SLAT SPAN FOR THAT A.S.D DESIGN PRESSURE RATING SHALL NOT BE EXCEEDED.
 † MULLION ORIENTATION IS AS SEEN FROM THE OUTSIDE (EXTERIOR) OF PRODUCT.



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 TEXAS LIC. # 90691
 FIRM REGISTRATION # F-13790



TEXAS DEPARTMENT OF INSURANCE - 2018

Nautilus
 End Retention Roll-Up Shutter

EXPERT SHUTTER SERVICES INC.
 668 S.W. WHITMORE DRIVE
 PORT ST. LUCIE, FL. 34984
 PHONE: (800) 749-9056 , FAX: (772) 871-0990

REV. No	DESCRIPTION	DATE	REV. No	DESCRIPTION	DATE
1	OLD 14-051	06/9/2020	4		
2			5		

DRAWN BY:
 M.P.
 06/9/2020
 DATE
 20-068
 DRAWING No
 SHEET 26 OF 26