

STORM BARS SELECTION TABLES

ALLOWABLE DESIGN RATING - Pd (Psf)

TABLE 8
1/8-1x 6063-T6 STORM BAR

SBH	SS	1X2	1X3	1X4
60	24	39	113	191
	30	31	90	153
	36	26	75	127
	42	22	64	109
	48	--	56	96
	54	--	50	85
	60	--	45	76
	66	--	41	70
72	24	23	65	130
	30	--	52	104
	36	--	43	87
	42	--	37	75
	48	--	33	65
	54	--	29	58
	60	--	26	52
	66	--	24	47
84	24	--	41	88
	30	--	33	70
	36	--	27	59
	42	--	23	50
	48	--	21	44
	54	--	--	39
	60	--	--	35
	66	--	--	32
96	24	--	27	59
	30	--	22	47
	36	--	--	39
	42	--	--	34
	48	--	--	30
	54	--	--	26
	60	--	--	24
	66	--	--	21
108	24	--	--	41
	30	--	--	33
	36	--	--	28
	42	--	--	24
	48	--	--	21
	54	--	--	--
	60	--	--	--
	66	--	--	--
120	24	--	--	30
	30	--	--	24
	36	--	--	20
	42	--	--	--
	48	--	--	--
	54	--	--	--
	60	--	--	--
	66	--	--	--

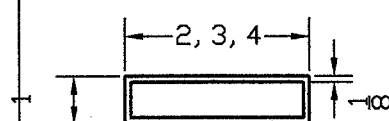


TABLE 8.1
1/8-2x 6063-T6 STORM BAR

SBH	SS	2X2	2X3	2X4	2X5	2X6
60	24	65	174	200	200	200
	30	52	139	200	200	200
	36	43	116	199	200	200
	42	37	100	170	200	200
	48	33	87	149	200	200
	54	29	77	132	185	200
	60	26	70	119	166	200
	66	24	63	108	151	200
72	24	38	101	200	200	200
	30	30	81	164	200	200
	36	25	67	136	192	200
	42	22	58	117	164	200
	48	--	50	102	144	190
	54	--	45	91	128	169
	60	--	40	82	115	152
	66	--	37	74	105	138
84	24	24	63	129	200	200
	30	--	51	103	168	200
	36	--	42	86	140	184
	42	--	36	74	120	158
	48	--	32	64	105	138
	54	--	28	57	93	123
	60	--	25	51	84	111
	66	--	23	47	76	101
96	24	--	21	43	70	92
	30	--	43	86	150	200
	36	--	34	69	120	168
	42	--	28	57	100	140
	48	--	24	49	86	120
	54	--	21	43	75	105
	60	--	--	38	67	93
	66	--	--	34	60	84
108	24	--	--	31	55	76
	30	--	--	29	50	70
	36	--	--	24	42	66
	42	--	--	22	38	60
	48	--	--	20	35	55
	54	--	--	18	32	50
	60	--	--	16	29	46
	66	--	--	14	26	41
120	24	--	--	12	22	38
	30	--	--	10	18	32
	36	--	--	8	14	26
	42	--	--	6	10	20
	48	--	--	4	6	14
	54	--	--	3	4	10
	60	--	--	2	3	8
	66	--	--	1	2	6

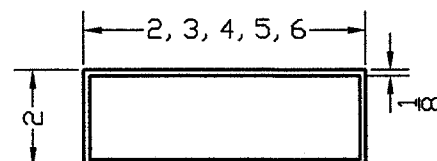
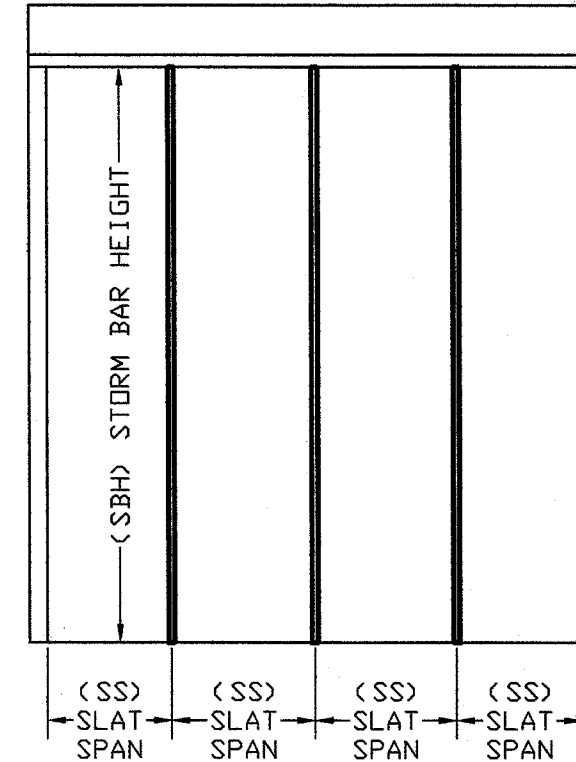
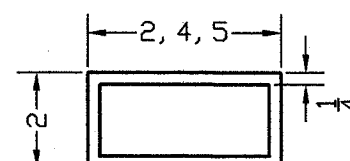


TABLE 8.2
1/4-2x 6063-T6 STORM BAR

SBH	SS	2X2	2X4	2X5
60	24	108	200	200
	30	86	200	200
	36	72	200	200
	42	62	200	200
	48	54	200	200
	54	48	200	200
	60	43	200	200
	66	39	193	200
72	24	62	200	200
	30	50	200	200
	36	42	200	200
	42	36	200	200
	48	31	182	200
	54	28	162	200
	60	25	146	200
	66	23	132	190
84	24	39	200	200
	30	31	183	200
	36	26	153	200
	42	22	131	200
	48	--	115	190
	54	--	102	169
	60	--	92	152
	66	--	83	138
96	24	26	154	200
	30	21	123	200
	36	--	102	182
	42	--	88	156
	48	--	77	137
	54	--	68	121
	60	--	61	109
	66	--	56	99
108	24	--	51	91
	30	--	43	77
	36	--	39	70
	42	--	36	64
	48	--	33	59
	54	--	30	54
	60	--	27	49
	66	--	24	44
120	24	--	21	38
	30	--	18	32
	36	--	15	26
	42	--	12	20
	48	--	9	14
	54	--	7	10
	60	--	5	8
	66	--	4	6



STORM BAR USER GUIDE:

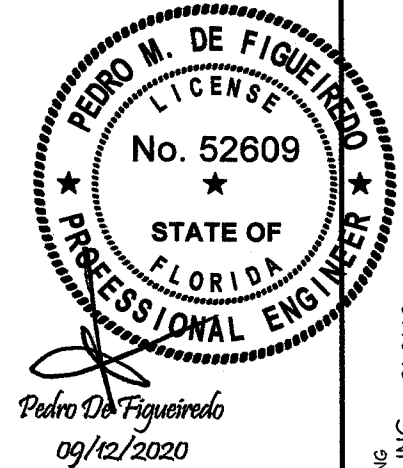
- 1- OBTAIN PROJECT DESIGNED PRESSURE AS PER GENERAL NOTES 4, DRAWING 20-151.
- 2- VERIFY THE MAXIMUM ALLOWABLE SPAN AND TRACK ANCHORAGE FUNCTION OF DESIGNED PRESSURE ON DWG 20-151.
- 3- FIND THE MAXIMUM RATING IN PSF ON TABLE 8, 8.1 OR 8.2 FUNCTION OF STORM BAR TYPE, SHUTTER SLAT SPAN (SS) IN INCHES AND STORM BAR HEIGHT (SBH) IN INCHES.
- 4- VERIFY IF CONNECTION REACTION AS PER TABLE 9 DOES NOT EXCEED MAXIMUM CONNECTION TYPE CAPACITY.
- 5- DUE TO MANY VARIATIONS SPECIFIC CONDITIONS OUT OF THE SCOPE OF THESE TABLES CAN BE ADDRESSED WITH A SITE SPECIFIC DESIGN BY A PROFESSIONAL ENGINEER.

ASSOCIATION:

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ENGCO@AOL.COM
ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

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NATIONAL APPROVED SHUTTER ASSOCIATION L.L.C.
MIRAMAR, FL 33027

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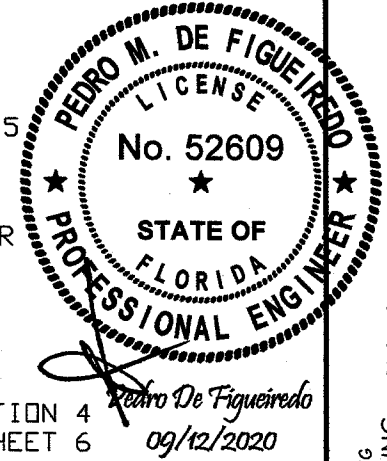
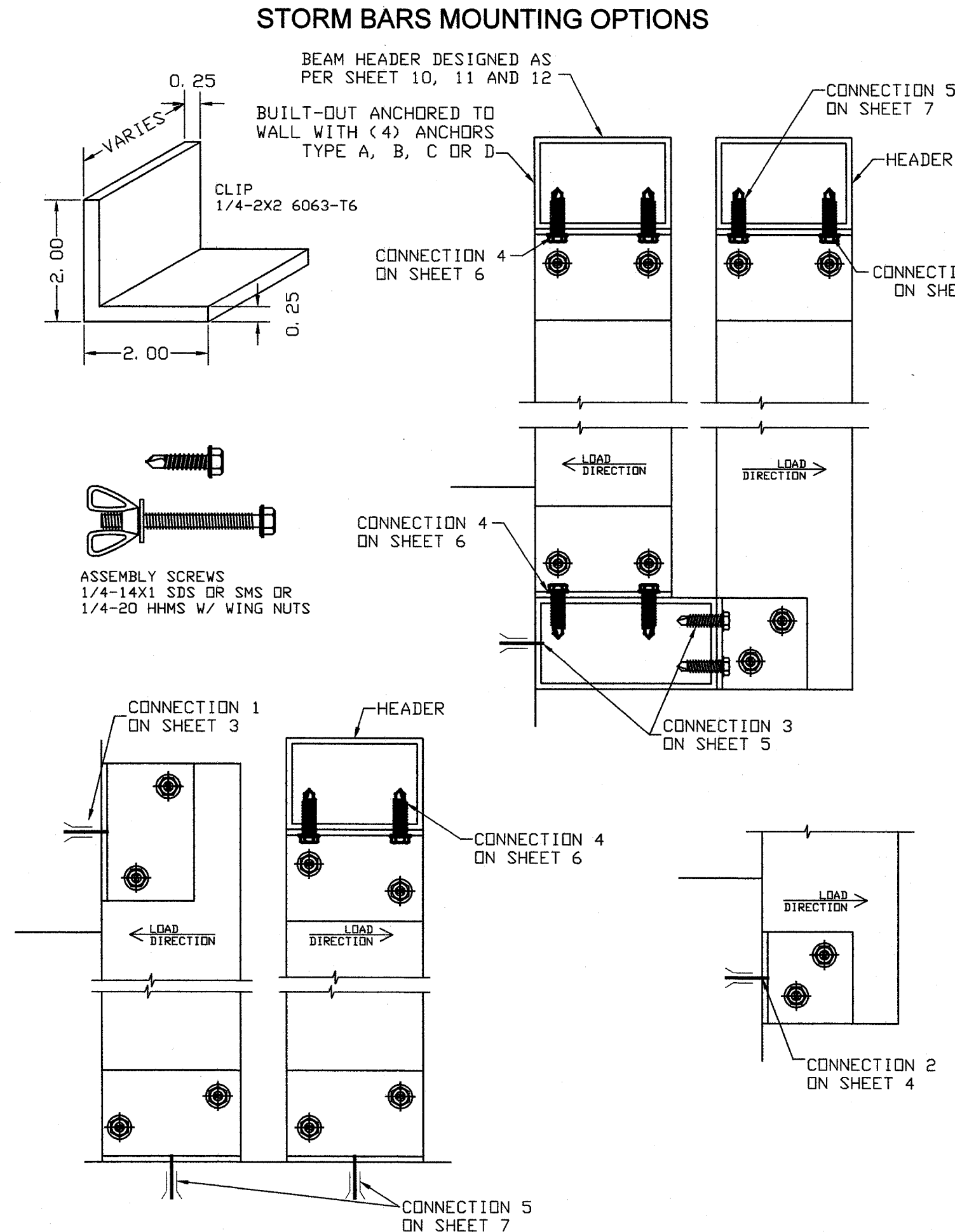
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1 OF 22

TABLE 9
MAXIMUM STORM BAR END REACTION R_s (Lb)

SBH	SS	Pd - DESIGN LOADS IN PSF									
		40	60	80	100	120	140	160	180	200	
60	24	200	300	400	500	600	700	800	900	1000	
	30	250	375	500	625	750	875	1000	1125	1250	
	36	300	450	600	750	900	1050	1200	1350	1500	
	42	350	525	700	875	1050	1225	1400	1575	1750	
	48	400	600	800	1000	1200	1400	1600	1800	2000	
	54	450	675	900	1125	1350	1575	1800	2025	2250	
	60	500	750	1000	1250	1500	1750	2000	2250	2500	
	66	550	825	1100	1375	1650	1925	2200	2475	2750	
	72	600	900	1200	1500	1800	2100	2400	2700	3000	
	72	240	360	480	600	720	840	960	1080	1200	
72	30	300	450	600	750	900	1050	1200	1350	1500	
	36	360	540	720	900	1080	1260	1440	1620	1800	
	42	420	630	840	1050	1260	1470	1680	1890	2100	
	48	480	720	960	1200	1440	1680	1920	2160	2400	
	54	540	810	1080	1350	1620	1890	2160	2430	2700	
	60	600	900	1200	1500	1800	2100	2400	2700	3000	
	66	660	990	1320	1650	1980	2310	2640	2970	3300	
	72	720	1080	1440	1800	2160	2520	2880	3240	3600	
	72	240	420	560	700	840	980	1120	1260	1400	
	30	350	525	700	875	1050	1225	1400	1575	1750	
84	36	420	630	840	1050	1260	1470	1680	1890	2100	
	42	490	735	980	1225	1470	1715	1960	2205	2450	
	48	560	840	1120	1400	1680	1960	2240	2520	2800	
	54	630	945	1260	1575	1890	2205	2520	2835	3150	
	60	700	1050	1400	1750	2100	2450	2800	3150	3500	
	66	770	1155	1540	1925	2310	2695	3080	3465	3850	
	72	840	1260	1680	2100	2520	2940	3360	3780	4200	
	72	320	480	640	800	960	1120	1280	1440	1600	
	30	400	600	800	1000	1200	1400	1600	1800	2000	
	36	480	720	960	1200	1440	1680	1920	2160	2400	
96	42	560	840	1120	1400	1680	1960	2240	2520	2800	
	48	640	960	1280	1600	1920	2240	2560	2880	3200	
	54	720	1080	1440	1800	2160	2520	2880	3240	3600	
	60	800	1200	1600	2000	2400	2800	3200	3600	4000	
	66	880	1320	1760	2200	2640	3080	3520	3960	4400	
	72	960	1440	1920	2400	2880	3360	3840	4320	4800	
	72	360	540	720	900	1080	1260	1440	1620	1800	
	30	450	675	900	1125	1350	1575	1800	2025	2250	
	36	540	810	1080	1350	1620	1890	2160	2430	2700	
	42	630	945	1260	1575	1890	2205	2520	2835	3150	
108	48	720	1080	1440	1800	2160	2520	2880	3240	3600	
	54	810	1215	1620	2025	2430	2835	3240	3645	4050	
	60	900	1350	1800	2250	2700	3150	3600	4050	4500	
	66	990	1485	1980	2475	2970	3465	3960	4455	4950	
	72	1080	1620	2160	2700	3240	3780	4320	4860	5400	
	72	400	600	800	1000	1200	1400	1600	1800	2000	
	30	500	750	1000	1250	1500	1750	2000	2250	2500	
	36	600	900	1200	1500	1800	2100	2400	2700	3000	
	42	700	1050	1400	1750	2100	2450	2800	3150	3500	
	48	800	1200	1600	2000	2400	2800	3200	3600	4000	
120	54	900	1350	1800	2250	2700	3150	3600	4050	4500	
	60	1000	1500	2000	2500	3000	3500	4000	4500	5000	
	66	1100	1650	2200	2750	3300	3850	4400	4950	5500	
	72	1200	1800	2400	3000	3600	4200	4800	5400	6000	



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PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
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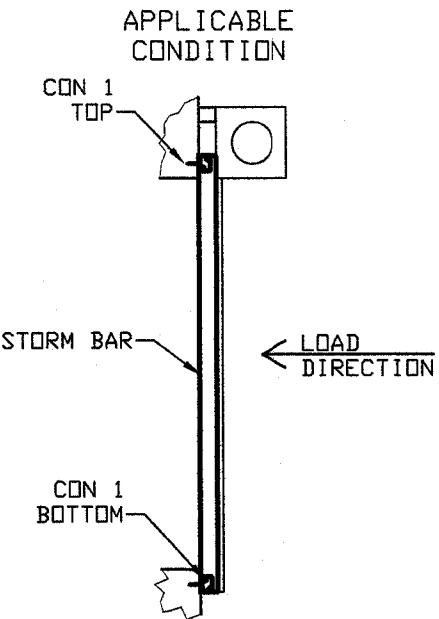
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CONNECTION 1 - STORM BARS ANCHORAGE
WALL MOUNTED WITH INWARD LOAD DIRECTION



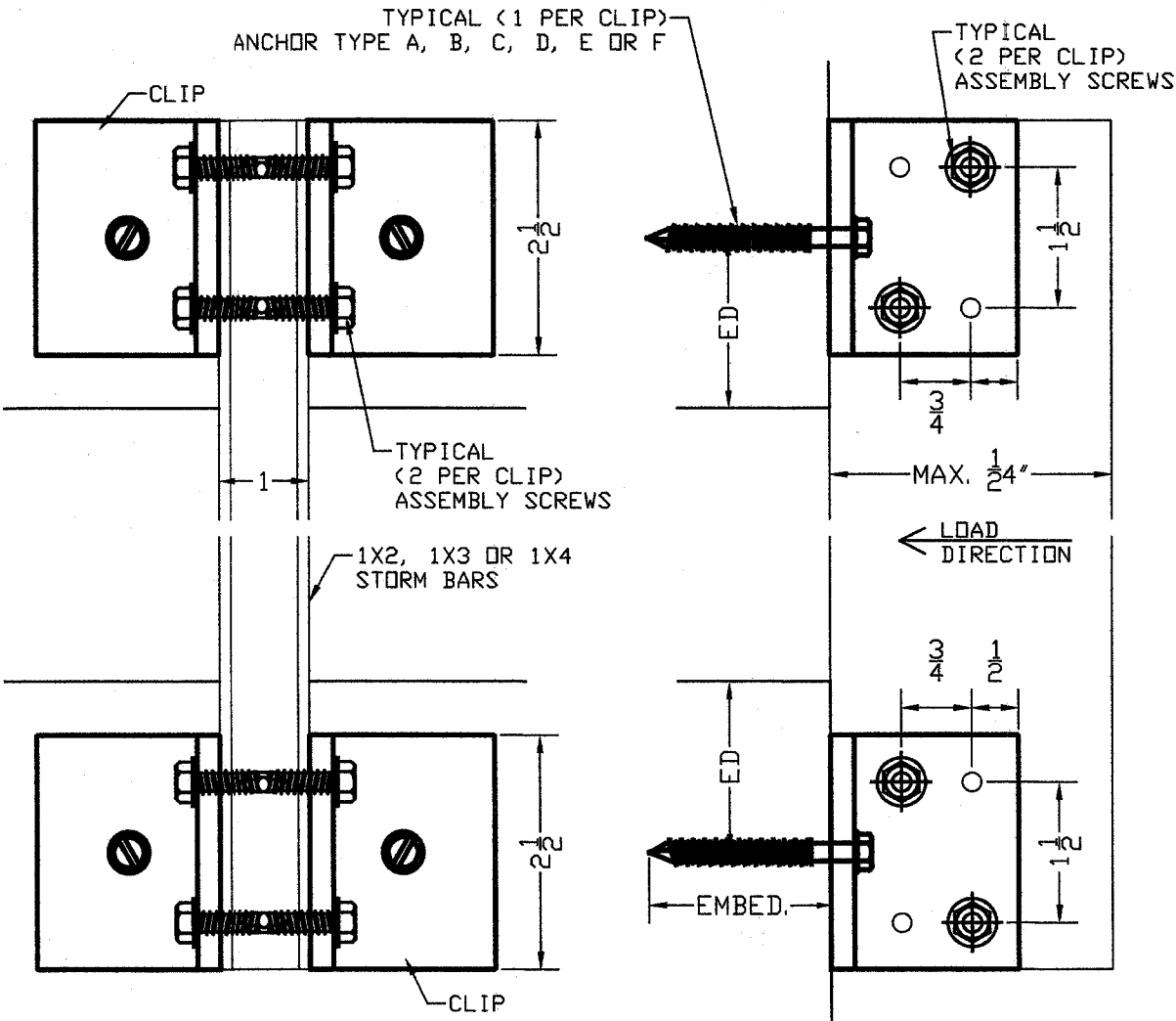
ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL
A	1/4" ss TAPCON	ITW	1 3/4"	3"	3000 psi CONCRETE
B	1/4" ss TAPCON	ITW	1 1/4"	4"	HOLLOW BLOCK
C	1/4"-14 ss HHSMS	GENERIC	1 1/2"	1"	WOOD (SG=, 46)
D	1/4"-14 ss HHSMS	GENERIC	1/8"	3/4"	1/8" METAL STRUCTURE
E	1/4"-20 ss SOLID-SET	ALL POINTS	7/8"	3"	3000 psi CONCRETE
F	1/4"-20 ss SOLID-SET	ALL POINTS	7/8"	3"	HOLLOW BLOCK

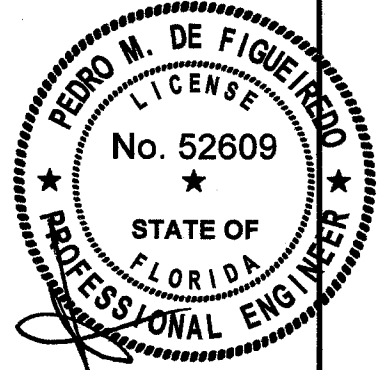
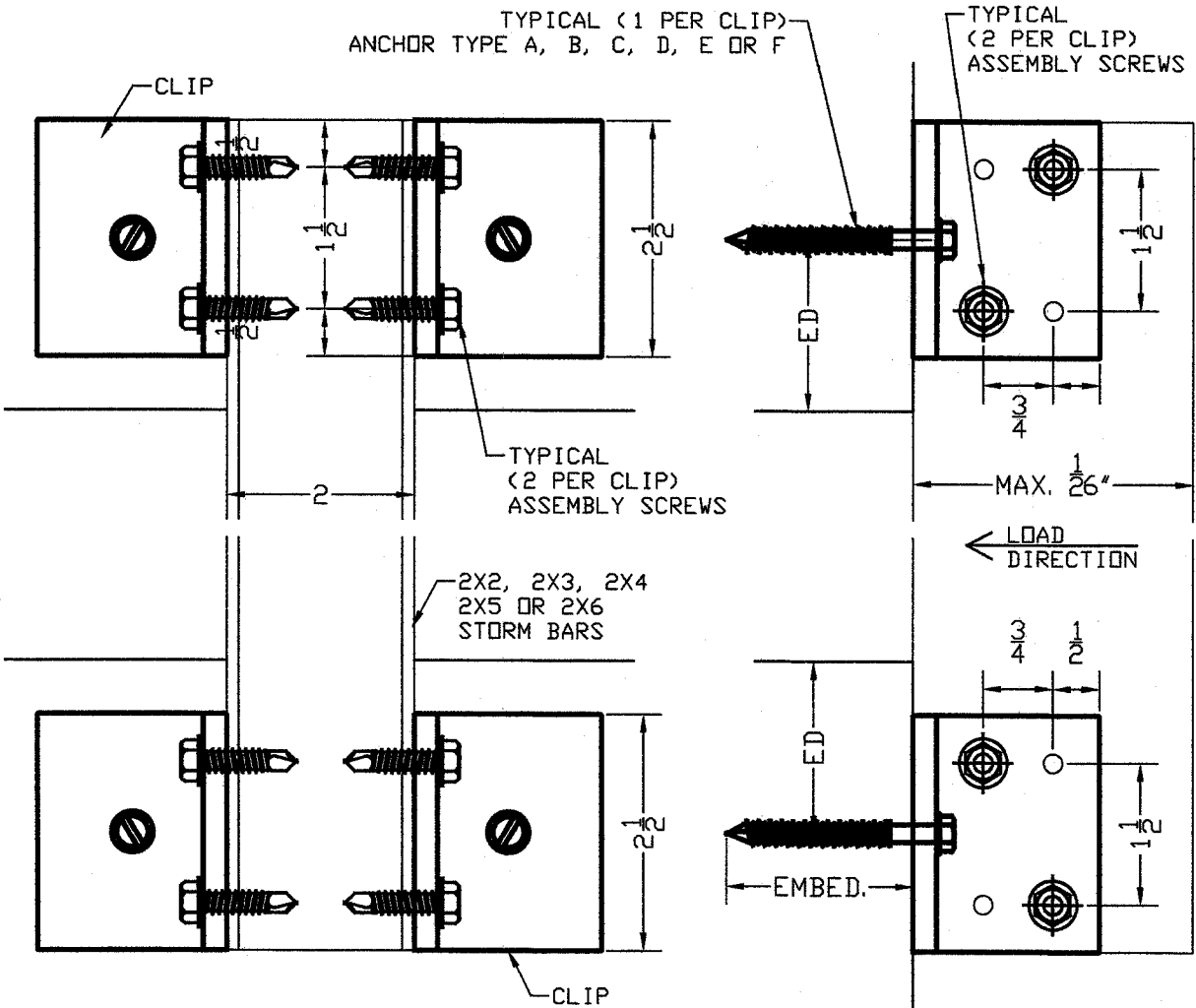
ANCHOR NOTES:

- 1- 1/4" TAPCONS CAN BE USED AS TYPE C INTO WOOD
- 2- 1/4" CARBON STEEL TAPCONS CAN BE USED AS AN ALTERNATE TO THE STAINLESS STEEL
- 3- METAL STRUCTURES ARE MADE OF MINIMUM 6063-T6 ALUMINUM OR ASTM A36 STEEL

CONNECTION CON1 TOP AND BOTTOM FOR 1X STORM BARS
MAXIMUM END REACTION CAPACITY: $R_a=3150$ LB
LESS OR EQUAL R_s FROM TABLE 9



CONNECTION CON1 TOP AND BOTTOM FOR 2X STORM BARS
MAXIMUM END REACTION CAPACITY: $R_a=3750$ LB
LESS OR EQUAL R_s FROM TABLE 9



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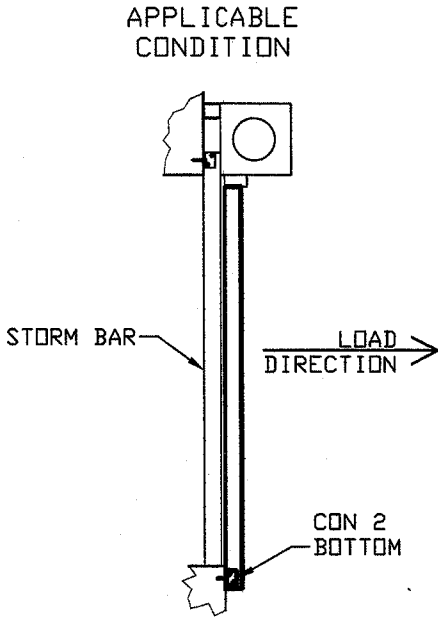
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TO BE USED IN CONJUNCTION
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CONNECTION 2 - STORM BARS ANCHORAGE
WALL MOUNTED WITH OUTWARD LOAD DIRECTION



CONNECTION CAPACITY (R_a):

ANCHOR TYPE	CONNECTION TYPE		
	2.1	2.2	2.3
A	913	1826	2739
B	250	500	750
C	700	1400	2100
D	834	1668	2502
E	1088	2176	3264
F	632	1264	1896
G	1560	3120	4680

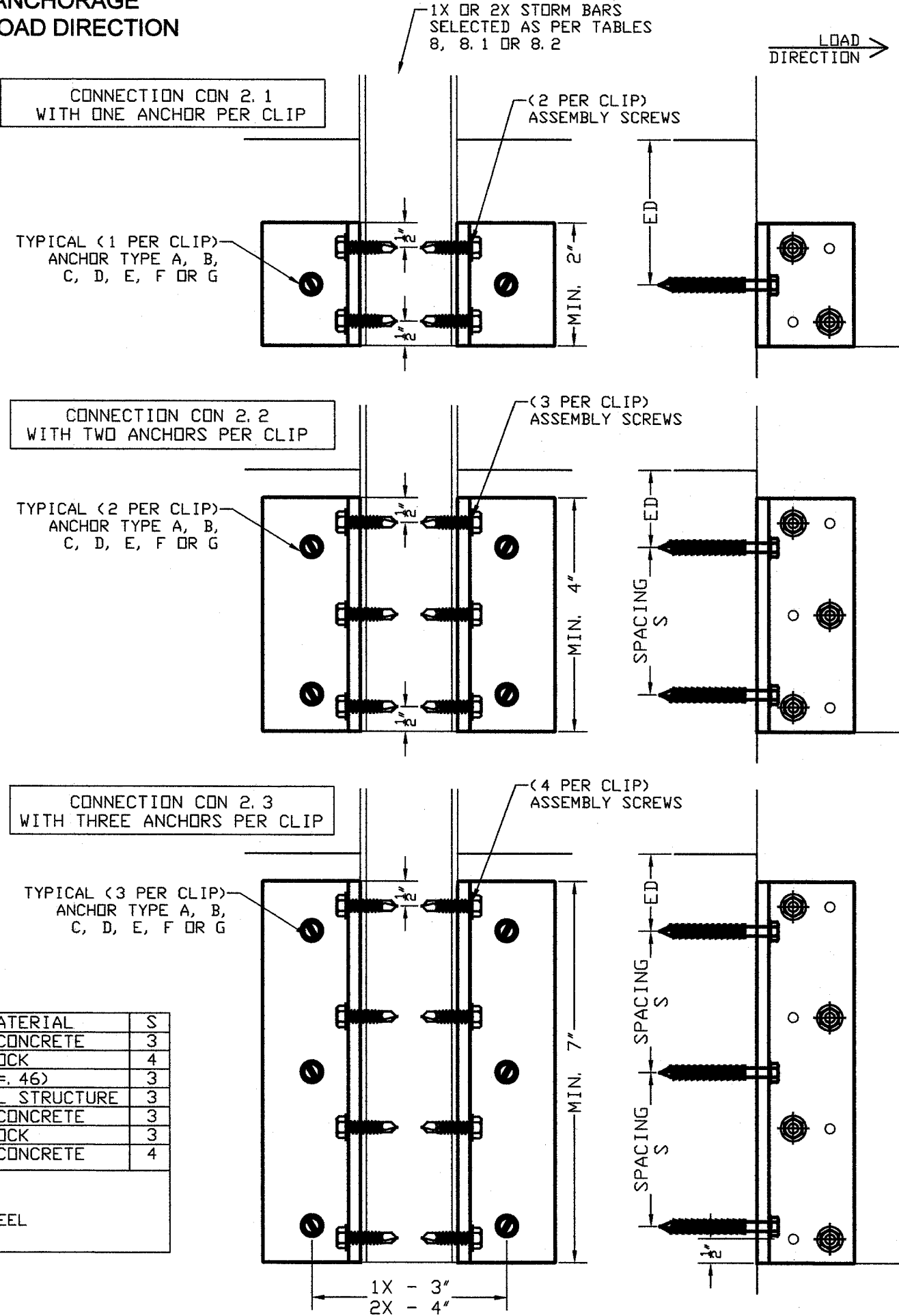
CONNECTION CAPACITY (R_a) MUST BE GREATER OR EQUAL THAN THE STORM BAR REACTION (R_s) FROM TABLE 9:
 $R_s \leq R_a$

ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL	S
A	1/4" ss TAPCON	ITW	1 3/4"	2 1/2"	3000 psi CONCRETE	3
B	1/4" ss TAPCON	ITW	1 1/4"	2 1/2"	HOLLOW BLOCK	4
C	1/4"-14 ss HHSMS	GENERIC	1 1/2"	1"	WOOD (SG) = .46	3
D	1/4"-14 ss HHSMS	GENERIC	1/8"	3/4"	1/8" METAL STRUCTURE	3
E	1/4"-20 ss SOLID-SET	ALL POINTS	7/8"	3"	3000 psi CONCRETE	3
F	1/4"-20 ss SOLID-SET	ALL POINTS	7/8"	3"	HOLLOW BLOCK	3
G	5/16" TAPCON	ITW	2 1/4"	3"	3000 psi CONCRETE	4

ANCHOR NOTES:

- 1- 1/4" TAPCONS CAN BE USED AS TYPE C INTO WOOD
- 2- 1/4" CARBON STEEL TAPCONS CAN BE USED AS AN ALTERNATE TO THE STAINLESS STEEL
- 3- METAL STRUCTURES ARE MADE OF MINIMUM 6063-T6 ALUMINUM OR ASTM A36 STEEL



PEDRO M. DE FIGUEIREDO
LICENSE
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STATE OF
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PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

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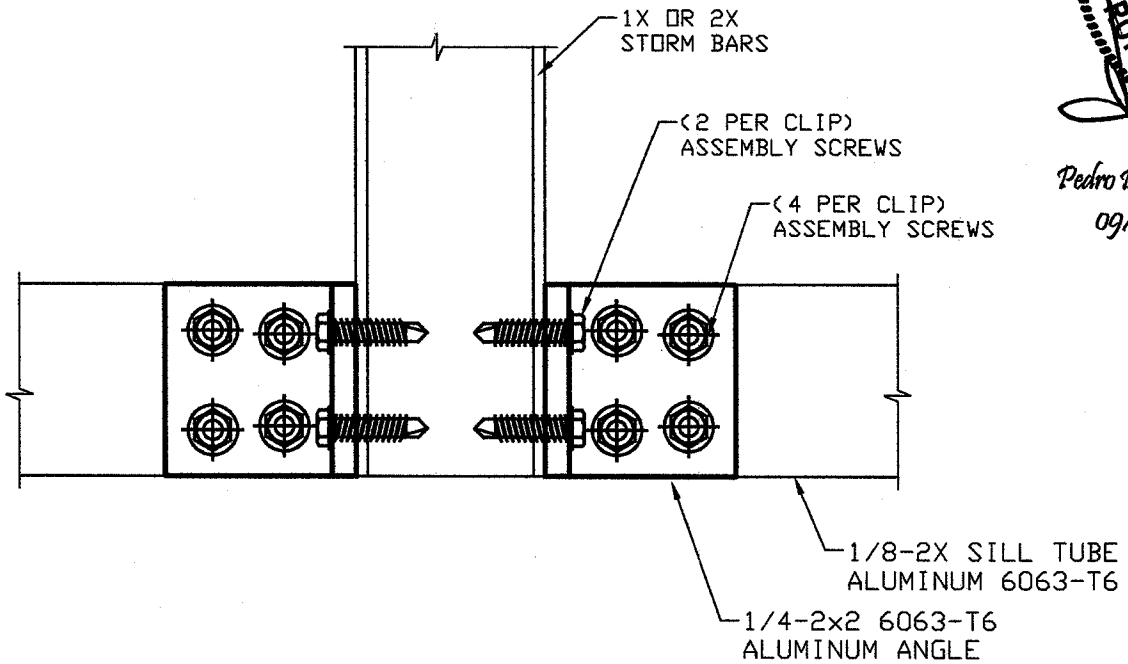
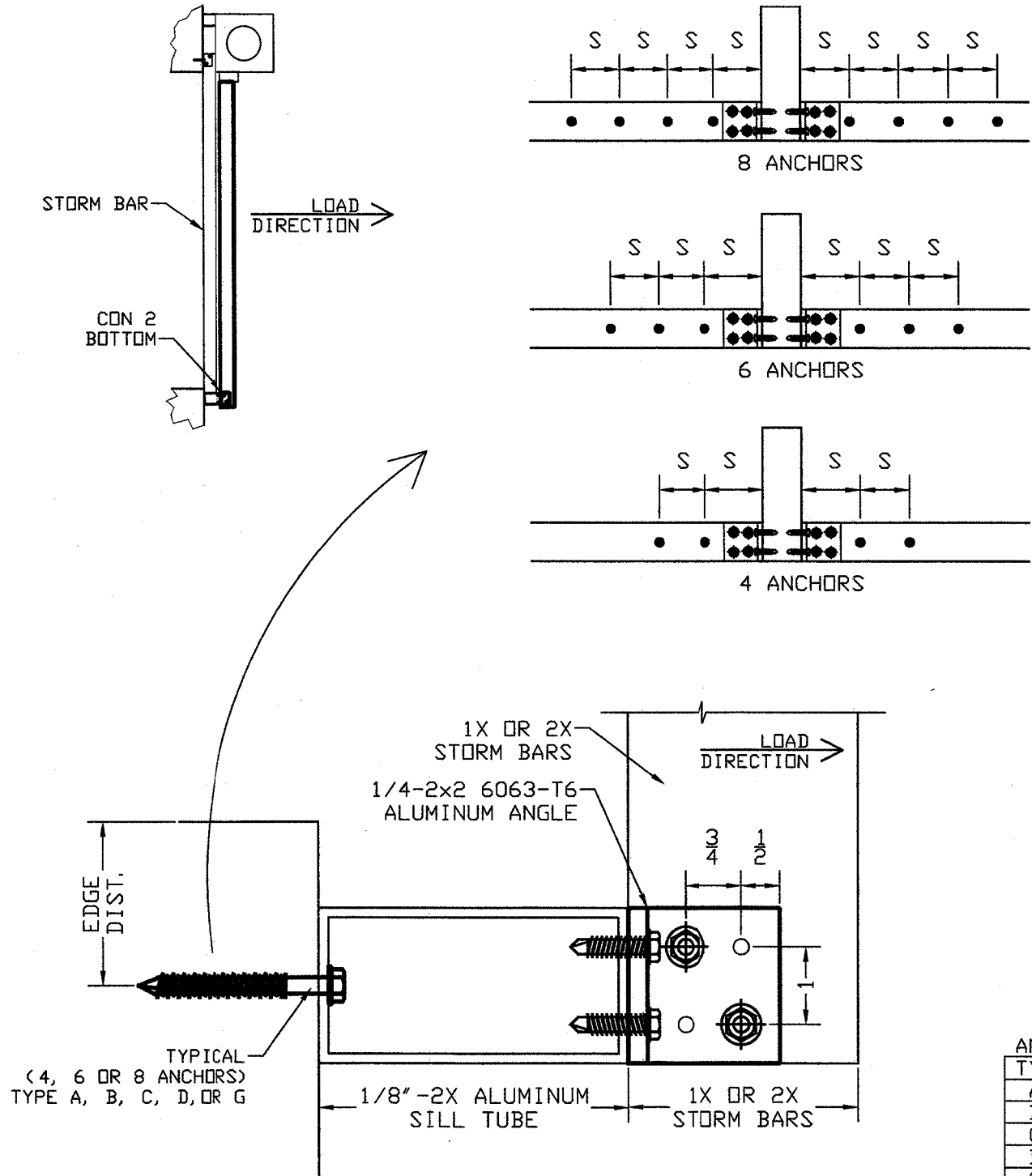
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CONNECTION 3 - STORM BARS MOUNTED
TO SILL TUBE WITH OUTWARD LOAD DIRECTION



CONNECTION CAPACITY (R_a):

ANCHOR TYPE	# OF ANCHORS		
	4	6	8
A	1826	2739	3652
B	500	750	1000
C	1400	2100	2800
D	1668	2502	3336
G	3120	4680	6240

CONNECTION CAPACITY (R_a) MUST BE GREATER OR EQUAL THAN THE STORM BAR REACTION (R_s) FROM TABLE 9:
 $R_s \leq R_a$

ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL	S
A	1/4" ss TAPCON	ITW	1 3/4"	3"	3000 psi CONCRETE	3
B	1/4" ss TAPCON	ITW	1 1/4"	4"	HOLLOW BLOCK	4
C	1/4"-14 ss HHSMS	GENERIC	1 1/2"	1"	WOOD ($SG \geq .46$)	3
D	1/4"-14 ss HHSMS	GENERIC	1/8"	3/4"	1/8" METAL STRUCTURE	3
G	5/16" TAPCON	ITW	2 1/4"	2 1/2"	3000 psi CONCRETE	4

ANCHOR NOTES:
1- 1/4" TAPCONS CAN BE USED AS TYPE C INTO WOOD
2- 1/4" CARBON STEEL TAPCONS CAN BE USED AS AN ALTERNATE TO THE STAINLESS STEEL
3- METAL STRUCTURES ARE MADE OF MINIMUM 6063-T6 ALUMINUM OR ASTM A36 STEEL



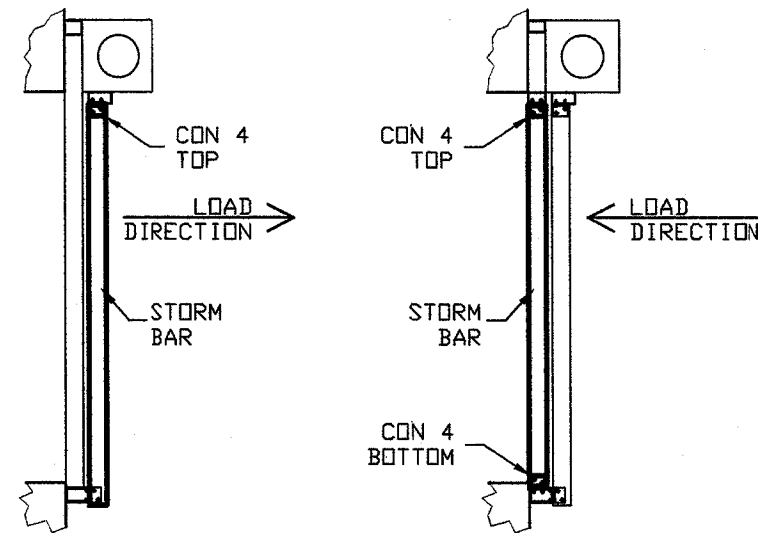
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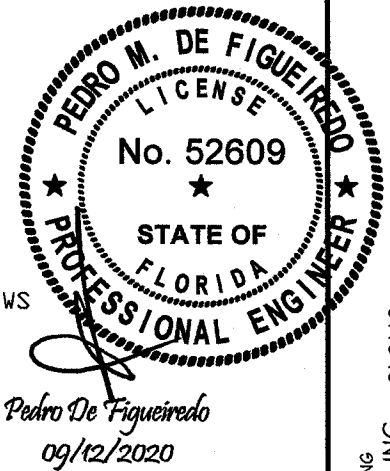
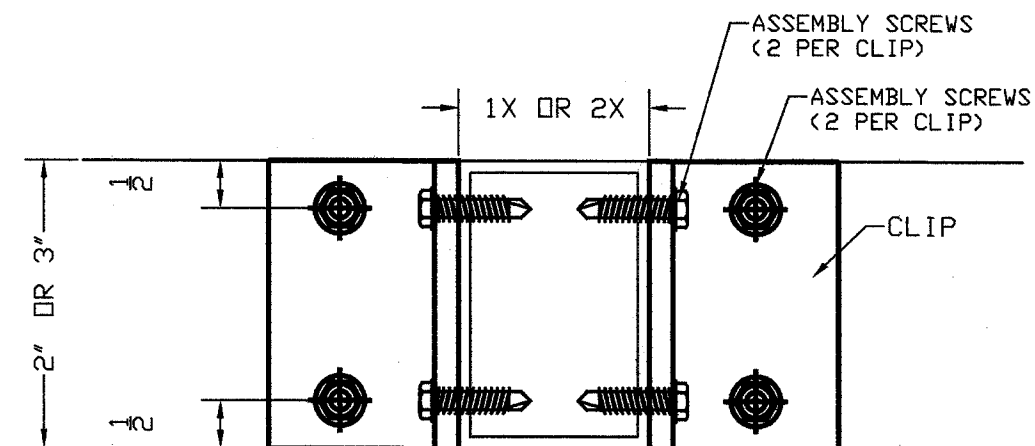
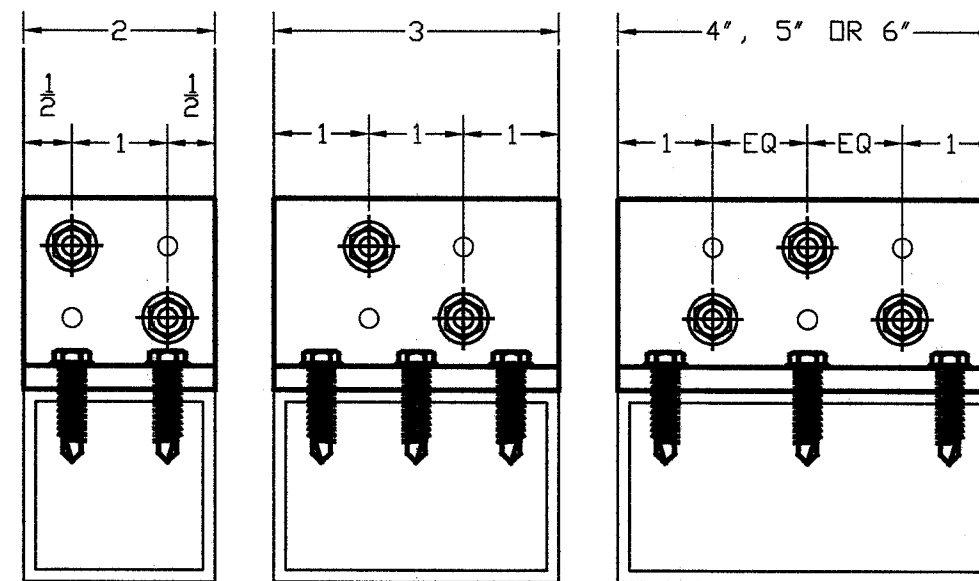
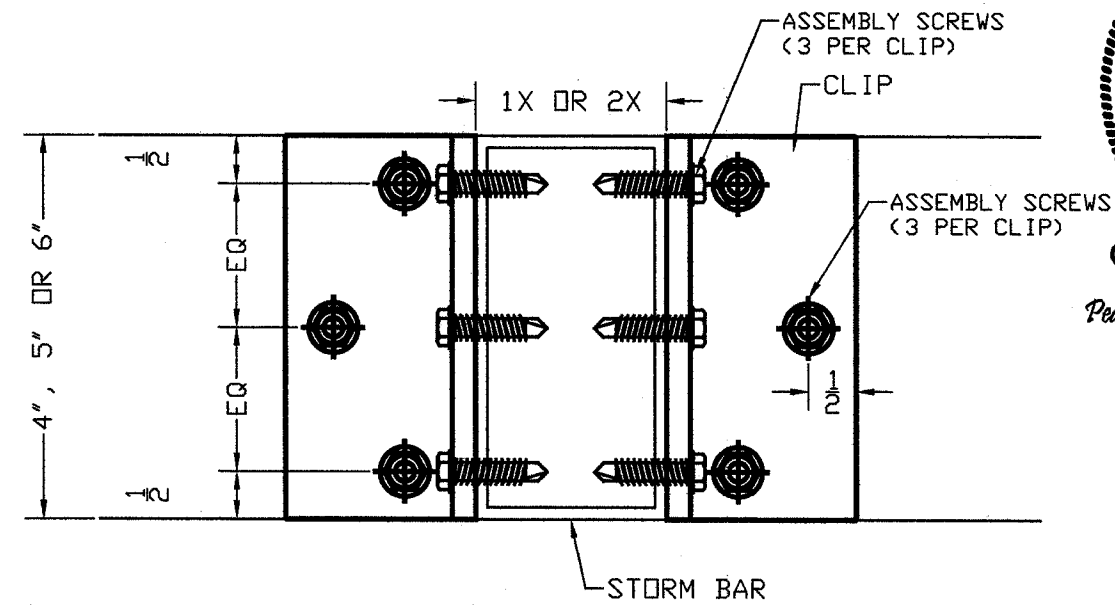
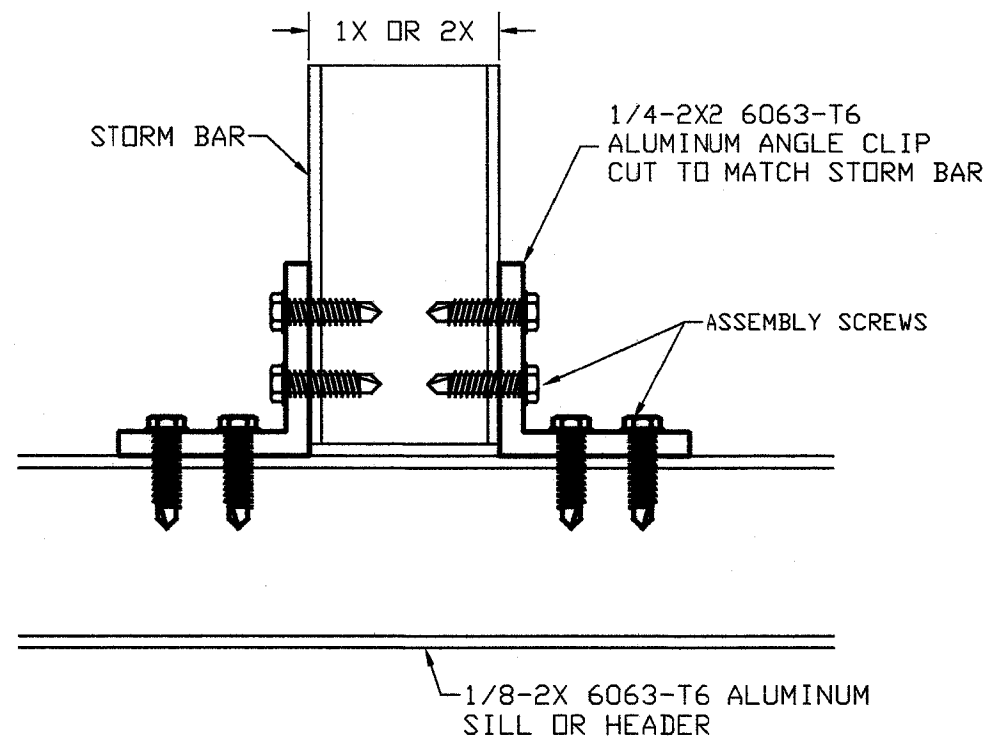
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CONNECTION 4 - STORM BARS MOUNTED TO SILL / HEADER
TUBE WITH INWARD / OUTWARD LOAD DIRECTION



CONNECTION CON4 TOP AND BOTTOM FOR 1X OR 2X STORM BARS
ACCEPTABLE FOR ALL LOAD CONDITIONS AS PER TABLES 8, 8.1 AND 8.2



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& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
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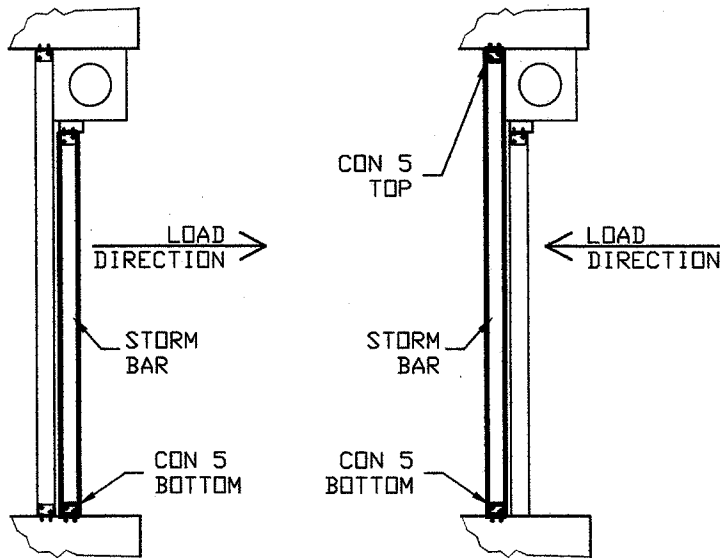
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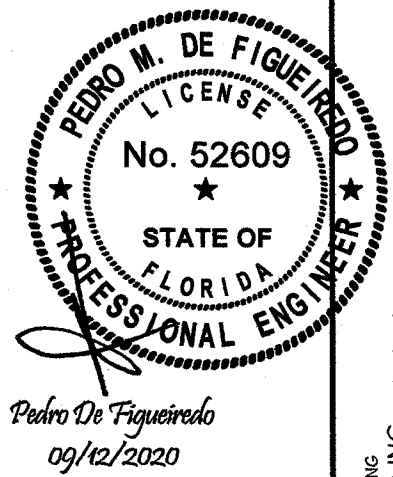
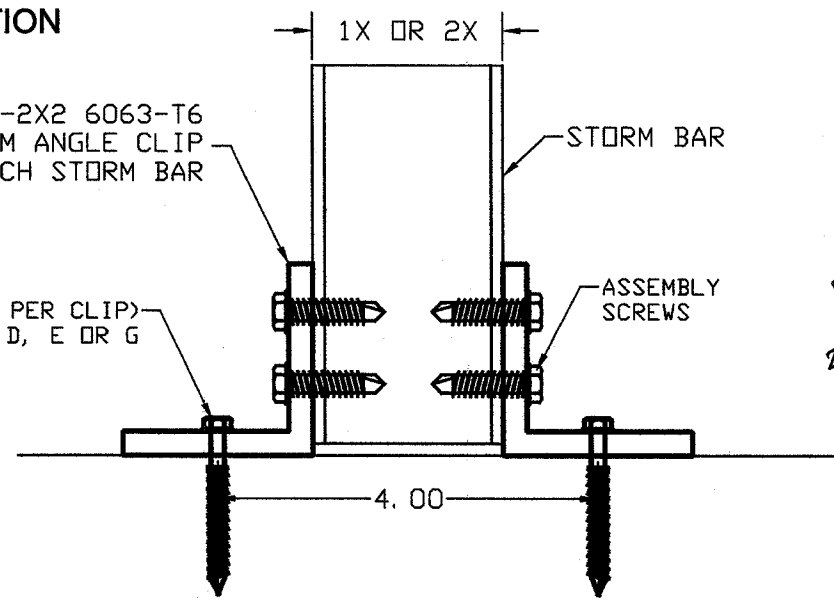
SHEET
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CONNECTION 5 - STORM BARS MOUNTED INSET TO
SUBSTRATE WITH INWARD / OUTWARD LOAD DIRECTION



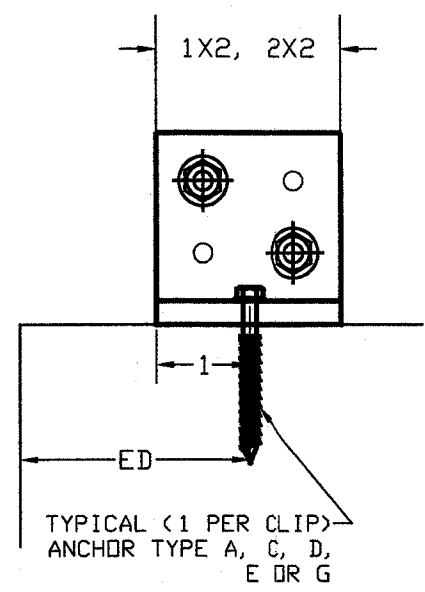
1/4-2X2 6063-T6
ALUMINUM ANGLE CLIP
CUT TO MATCH STORM BAR

TYPICAL (1, 2 OR 3 PER CLIP)
ANCHOR TYPE A, C, D, E OR G

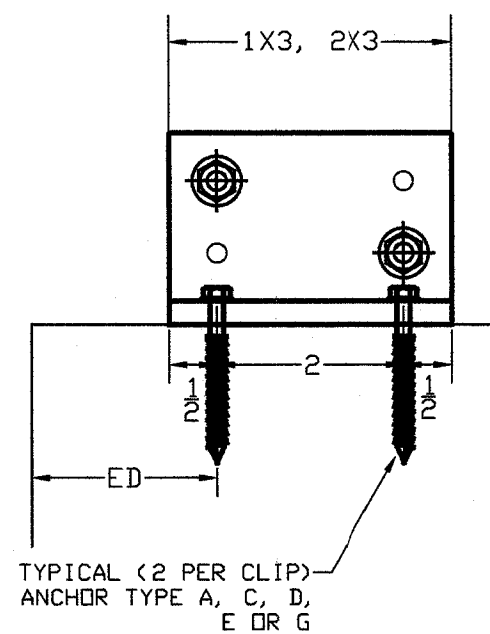


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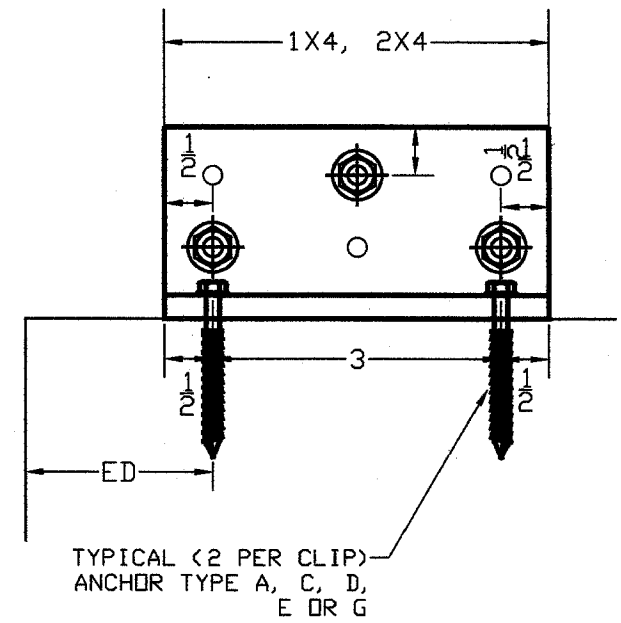
CONNECTION CON 5.1
WITH ONE ANCHOR PER CLIP



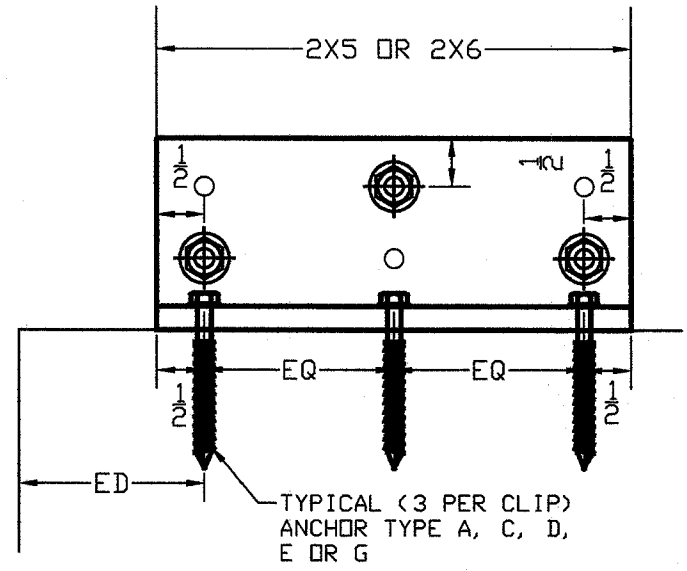
CONNECTION CON 5.2
WITH 2 ANCHORS PER CLIP



CONNECTION CON 5.3
WITH 2 ANCHORS PER CLIP



CONNECTION CON 5.4
WITH 3 ANCHORS PER CLIP



ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL
A	1/4" ss TAPCON	ITW	1 3/4"	2 1/2"	3000 psi CONCRETE
C	1/4"-14 ss HHSMS	GENERIC	1 1/2"	1"	WOOD (SG>= .46)
D	1/4"-14 ss HHSMS	GENERIC	1/8"	3/4"	1/8" METAL STRUCTURE
E	1/4"-20 ss SOLID-SET	ALL POINTS	7/8"	3"	3000 psi CONCRETE
G	5/16" TAPCON	ITW	2 1/4"	3"	3000 psi CONCRETE

ANCHOR NOTES:
1- 1/4" TAPCONS CAN BE USED AS TYPE C INTO WOOD
2- 1/4" CARBON STEEL TAPCONS CAN BE USED AS AN ALTERNATE TO THE STAINLESS STEEL
3- METAL STRUCTURES ARE MADE OF MINIMUM 6063-T6 ALUMINUM OR ASTM A36 STEEL

CONNECTION CAPACITY (Ra):

ANCHOR TYPE	CONNECTION TYPE			
	5.1	5.2	5.3	5.4
A	888	1,243	1,776	1,865
C	560	1,120	1,120	1,680
D	1,294	2,588	2,588	3,882
E	1,130	1,582	2,260	2,373
G	1,694	1,796	2,710	2,709

CONNECTION CAPACITY (Ra) MUST BE GREATER OR EQUAL THAN THE STORM BAR REACTION (Rs) FROM TABLE 9: ***** Rs <= Ra

PRODUCT:
STORM BARS, HEADERS
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WITH DRAWING 20-151

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SPRING LOADED STORM BARS SELECTION TABLES
ALLOWABLE DESIGN LOAD - Pd (Psf)
ANCHORAGE OF SPRING-LOADED STORM BARS AS PER SHEET 9

TABLE 10.1
1/8-2x 6063-T6 SPRING LOADED STORM BAR

SBH	SS	2X3	2X4
60	24	90	90
	30	72	72
	36	60	60
	42	51	51
	48	45	45
	54	40	40
	60	36	36
	66	33	33
72	72	30	30
	24	75	75
	30	60	60
	36	50	50
	42	43	43
	48	38	38
	54	33	33
	60	30	30
84	66	27	27
	72	25	25
	24	63	64
	30	51	51
	36	42	43
	42	36	37
	48	32	32
	54	28	29
96	60	25	26
	66	23	23
	72	21	21
	24	43	56
	30	34	45
	36	28	38
	42	24	32
	48	21	28
108	54	--	25
	60	--	23
	66	--	20
	72	--	--
	24	30	50
	30	24	40
	36	--	33
	42	--	29
120	48	--	25
	54	--	22
	60	--	--
	66	--	--
	72	--	--
	24	22	44
	30	--	35
	36	--	29
	42	--	25
	48	--	22
	54	--	--
	60	--	--
	66	--	--
	72	--	--

MAXIMUM END REACTION:
Ra= 450 LB

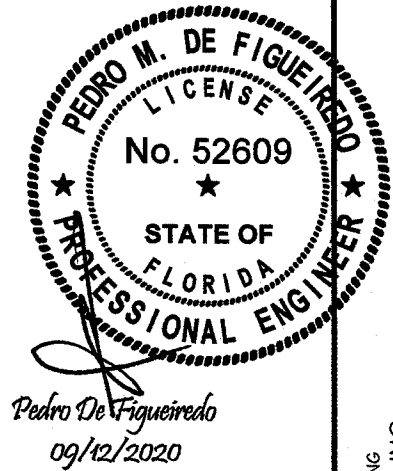
MAXIMUM END REACTION:
Ra= 500 LB

TABLE 10.2
1/4-2x 6063-T6 SPRING LOADED STORM BAR

SBH	SS	2X2	2X4
60	24	100	100
	30	80	80
	36	67	67
	42	57	57
	48	50	50
	54	44	44
	60	40	40
	66	36	36
72	72	33	33
	24	62	83
	30	50	67
	36	42	56
	42	36	48
	48	31	42
	54	28	37
	60	25	33
84	66	23	30
	72	21	28
	24	39	71
	30	31	57
	36	26	48
	42	22	41
	48	--	36
	54	--	32
96	60	--	29
	66	--	26
	72	--	24
	24	26	63
	30	21	50
	36	--	42
	42	--	36
	48	--	31
108	54	--	28
	60	--	25
	66	--	23
	72	--	21
	24	--	56
	30	--	44
	36	--	37
	42	--	32
120	48	--	28
	54	--	25
	60	--	22
	66	--	20
	72	--	--
	24	--	50
	30	--	40
	36	--	33
	42	--	29
	48	--	25
	54	--	22
	60	--	--
	66	--	--
	72	--	--

MAXIMUM END REACTION:
Ra= 500 LB

MAXIMUM END REACTION:
Ra= 500 LB

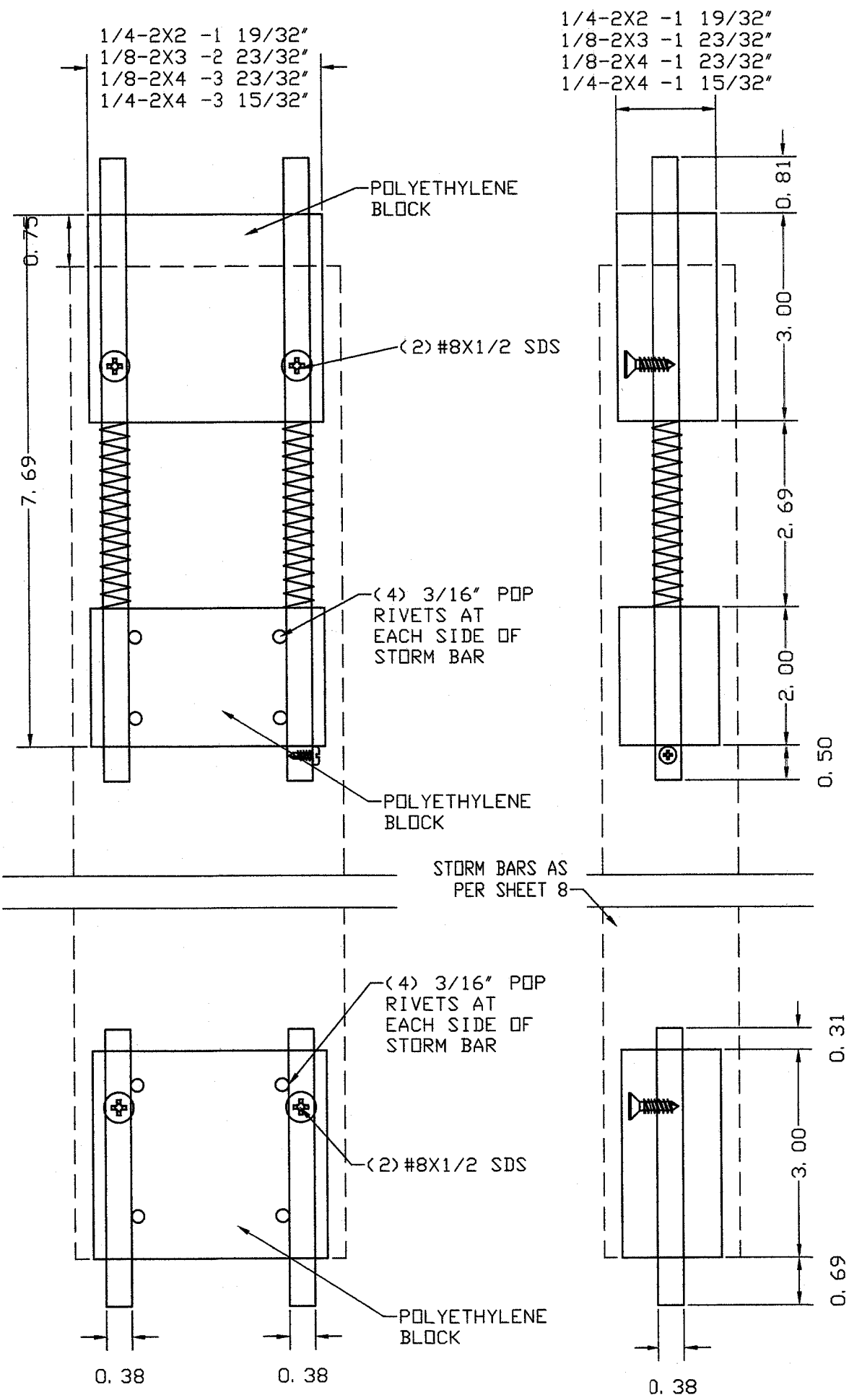


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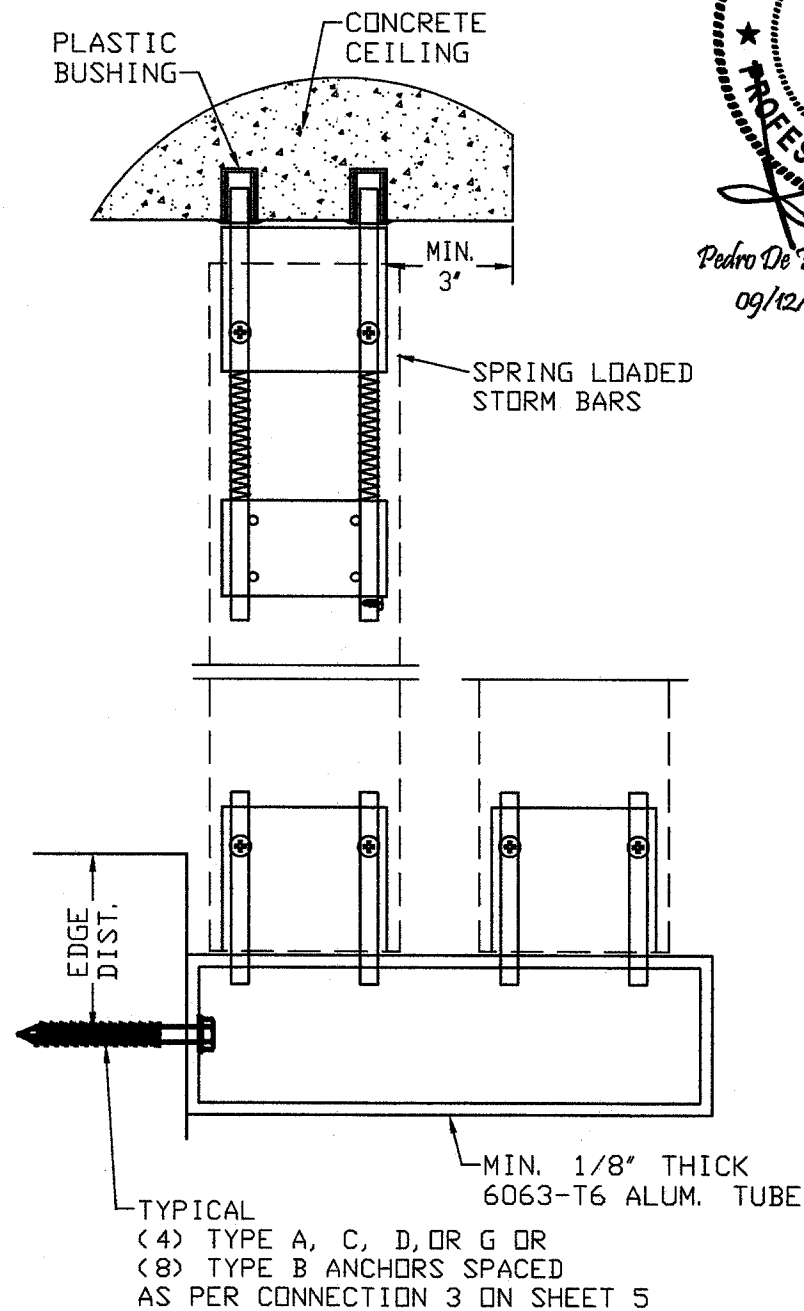
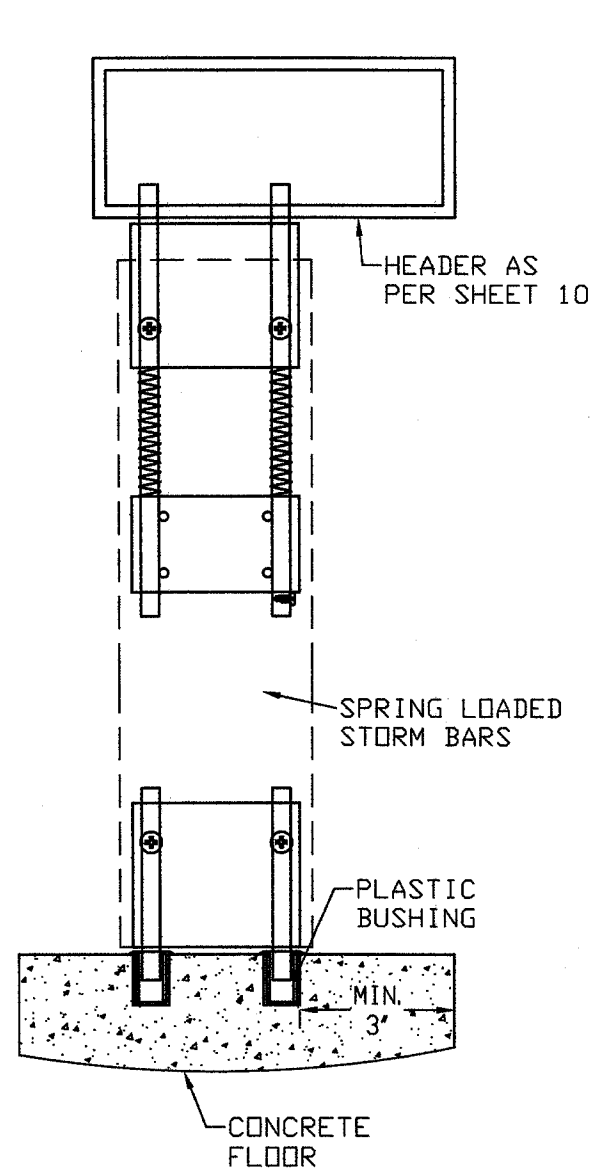
PRODUCT:
**STORM BARS, HEADERS
& MULLIONS**
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
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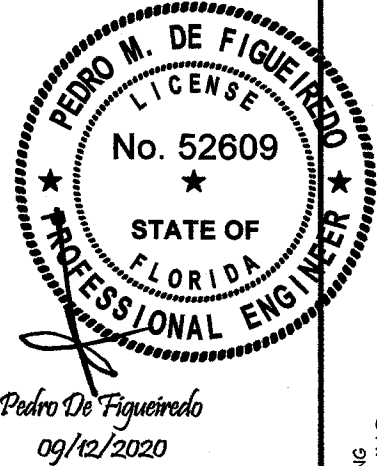


SPRING LOADED STORM BARS MOUNTING OPTIONS SPRING-LOADED STORM BARS ACCEPTABLE FOR LOADS ON SHEET 8



PLASTIC BUSHING TO BE USED IN CONCRETE INSTALLATION NOTES:

1- 5/8X1" ENGAGEMENT HOLE IN CONCRETE SHALL BE PROTECTED BY THE PLASTIC BUSHING.
2- PLASTIC BUSHING MUST BE KEPT FREE OF DUST FOR PROPER INSTALLATION OF THE STORM BARS.
3- HOLES MUST KEEP 3" MINIMUM EDGE DISTANCE.



PRODUCT:
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TABLE 11.1 - HEADER BARS
CONNECTION TYPE 6
ALLOWABLE DESIGN LOAD - Pd (Psf)

TT	SBH	HEADER BAR				
		2X2	2X3	2X4	2X5	2X6
84	36	32	85	172	179	179
	48	24	63	129	134	134
	60	--	51	103	107	107
	72	--	42	86	89	89
	84	--	36	74	77	77
	96	--	32	64	67	67
	108	--	28	57	60	60
	120	--	25	51	54	54
96	36	21	57	115	157	157
	48	--	43	86	117	117
	60	--	34	69	94	94
	72	--	28	57	78	78
	84	--	24	49	67	67
	96	--	21	43	59	59
	108	--	--	38	52	52
	120	--	--	34	47	47
108	36	--	40	81	139	139
	48	--	30	61	104	104
	60	--	24	48	83	83
	72	--	20	40	70	70
	84	--	--	35	60	60
	96	--	--	30	52	52
	108	--	--	27	46	46
	120	--	--	24	42	42
120	36	--	29	59	103	125
	48	--	22	44	77	94
	60	--	--	35	62	75
	72	--	--	29	51	63
	84	--	--	25	44	54
	96	--	--	22	39	47
	108	--	--	20	34	42
	120	--	--	--	31	38
144	36	--	--	34	59	94
	48	--	--	26	45	71
	60	--	--	20	36	57
	72	--	--	--	30	47
	84	--	--	--	25	40
	96	--	--	--	22	35
	108	--	--	--	20	31
	120	--	--	--	--	28
156	36	--	--	27	47	74
	48	--	--	20	35	56
	60	--	--	--	28	45
	72	--	--	--	23	37
	84	--	--	--	20	32
	96	--	--	--	--	28
	108	--	--	--	--	25
	120	--	--	--	--	22
168	36	--	--	21	37	59
	48	--	--	--	28	45
	60	--	--	--	22	36
	72	--	--	--	--	30
	84	--	--	--	--	25
	96	--	--	--	--	22
	108	--	--	--	--	20
	120	--	--	--	--	--

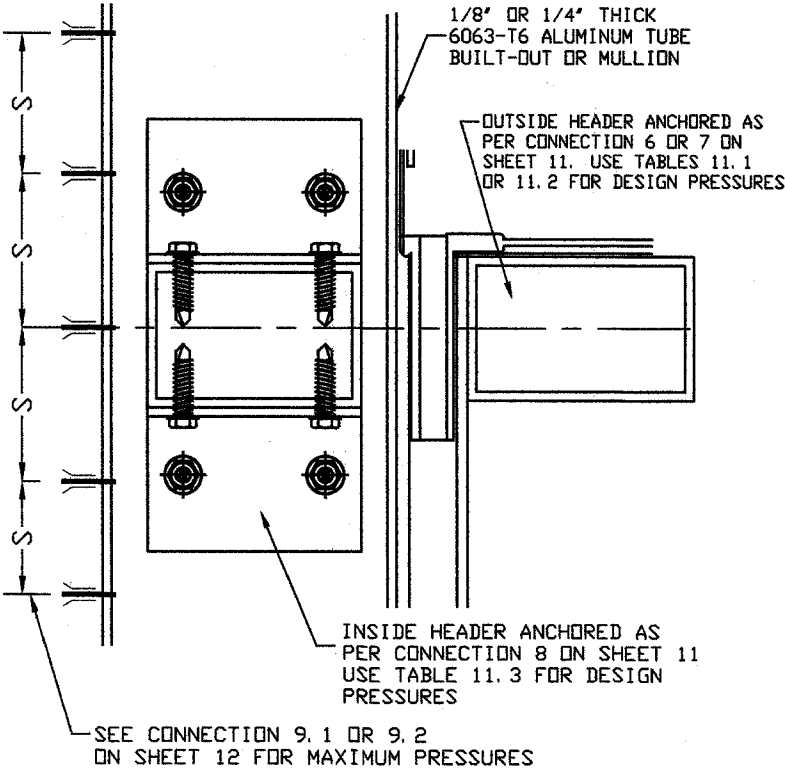
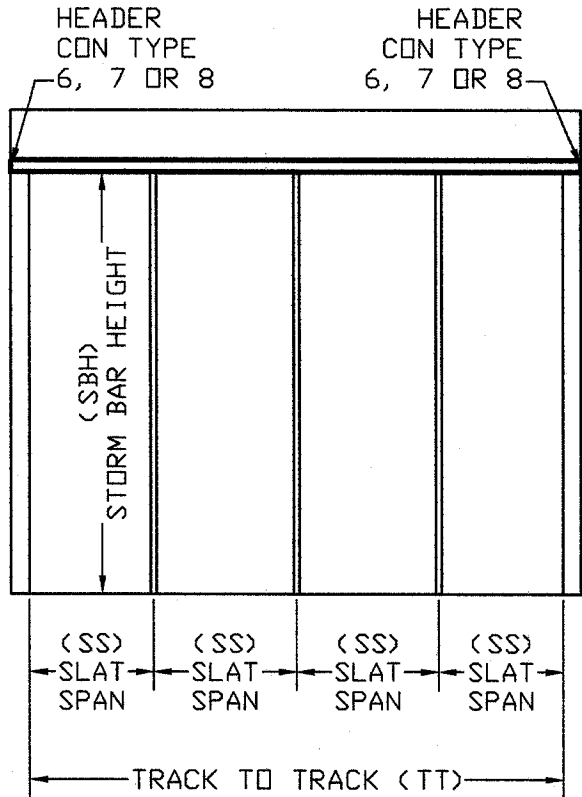
TABLE 11.2 - HEADER BARS
CONNECTION TYPE 7
ALLOWABLE DESIGN LOAD - Pd (Psf)

TT	SBH	HEADER BAR TYPE				
		2X2	2X3	2X4	2X5	2X6
84	36	32	85	172	200	200
	48	24	63	129	200	200
	60	--	51	103	170	184
	72	--	42	86	141	153
	84	--	36	74	121	131
	96	--	32	64	106	115
	108	--	28	57	94	102
	120	--	25	51	85	92
96	36	21	57	115	200	200
	48	--	43	86	150	200
	60	--	34	69	120	161
	72	--	28	57	100	134
	84	--	24	49	86	115
	96	--	21	43	75	100
	108	--	--	38	67	89
	120	--	--	34	60	80
108	36	--	40	81	141	200
	48	--	30	61	106	168
	60	--	24	48	85	134
	72	--	20	40	70	112
	84	--	--	35	60	96
	96	--	--	30	53	84
	108	--	--	27	47	75
	120	--	--	24	42	67
120	36	--	29	59	103	163
	48	--	22	44	77	122
	60	--	--	35	62	98
	72	--	--	29	51	82
	84	--	--	25	44	70
	96	--	--	22	39	61
	108	--	--	20	34	54
	120	--	--	--	31	49
144	36	--	--	34	59	94
	48	--	--	26	45	71
	60	--	--	20	36	57
	72	--	--	--	30	47
	84	--	--	--	25	40
	96	--	--	--	22	35
	108	--	--	--	20	31
	120	--	--	--	--	28
156	36	--	--	27	47	74
	48	--	--	20	35	56
	60	--	--	--	28	45
	72	--	--	--	23	37
	84	--	--	--	20	32
	96	--	--	--	--	28
	108	--	--	--	--	25
	120	--	--	--	--	22
168	36	--	--	21	37	59
	48	--	--	--	28	45
	60	--	--	--	22	36
	72	--	--	--	--	30
	84	--	--	--	--	25
	96	--	--	--	--	22
	108	--	--	--	--	20
	120	--	--	--	--	--

TABLE 11.3 - HEADER BARS
CONNECTION TYPE 8
ALLOWABLE DESIGN LOAD - Pd (Psf)

TT	SBH	HEADER BAR TYPE				
		2X2	2X3	2X4	2X5	2X6
84	36	32	85	172	200	200
	48	24	63	129	200	200
	60	--	51	103	170	200
	72	--	42	86	141	188
	84	--	36	74	121	161
	96	--	32	64	106	141
	108	--	28	57	94	125
	120	--	25	51	85	113
96	36	21	57	115	200	200
	48	--	43	86	150	200
	60	--	34	69	120	173
	72	--	28	57	100	144
	84	--	24	49	86	123
	96	--	21	43	75	108
	108	--	--	38	67	96
	120	--	--	34	60	86
108	36	--	40	81	141	200
	48	--	30	61	106	168
	60	--	24	48	85	134
	72	--	20	40	70	112
	84	--	--	35	60	96
	96	--	--	30	53	84
	108	--	--	27	47	75
	120	--	--	24	42	67
120	36	--	29	59	103	163
	48	--	22	44	77	122
	60	--	--	35	62	98
	72	--	--	29	51	82
	84	--	--	25	44	70
	96	--	--	22	39	61
	108	--	--	20	34	54
	120	--	--	--	31	49
144	36	--	--	34	59	94
	48	--	--	26	45	71
	60	--	--	20	36	57
	72	--	--	--	30	47
	84	--	--	--	25	40
	96	--	--	--	22	35
	108	--	--	--	20	31
	120	--	--	--	--	28
156	36	--	--	27	47	74
	48	--	--	20	35	56
	60	--	--	--	28	45
	72	--	--	--	23	37
	84	--	--	--	20	32
	96	--	--	--	--	28
	108	--	--	--	--	25
	120	--	--	--	--	22
168	36	--	--	21	37	59
	48	--	--	--	28	45
	60	--	--	--	22	36
	72	--	--	--	--	30
	84	--	--	--	--	25
	96	--	--	--	--	22
	108	--	--	--	--	20
	120	--	--	--	--	--

HEADER BARS SELECTION TABLES
ALLOWABLE DESIGN RATING - Pd (Psf)



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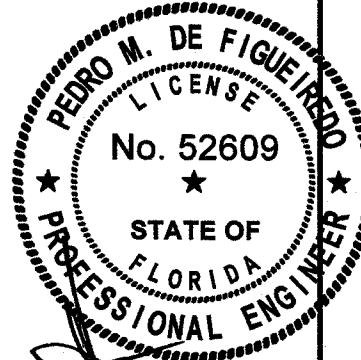
PRODUCT:
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HEADER NOTES:
1- TT: TRACK TO TRACK, SBH: STORM BAR HEIGHT
2- CONSERVATIVE DESIGN WAS USED IN ORDER TO PRODUCE THE ABOVE TABLE. SPECIFIC CONDITIONS CAN BE DESIGNED AND ADDRESSED WITH A SITE SPECIFIC PROVIDED BY A PROFESSIONAL ENGINEER.

HEADER BARS ANCHORAGE DETAILS



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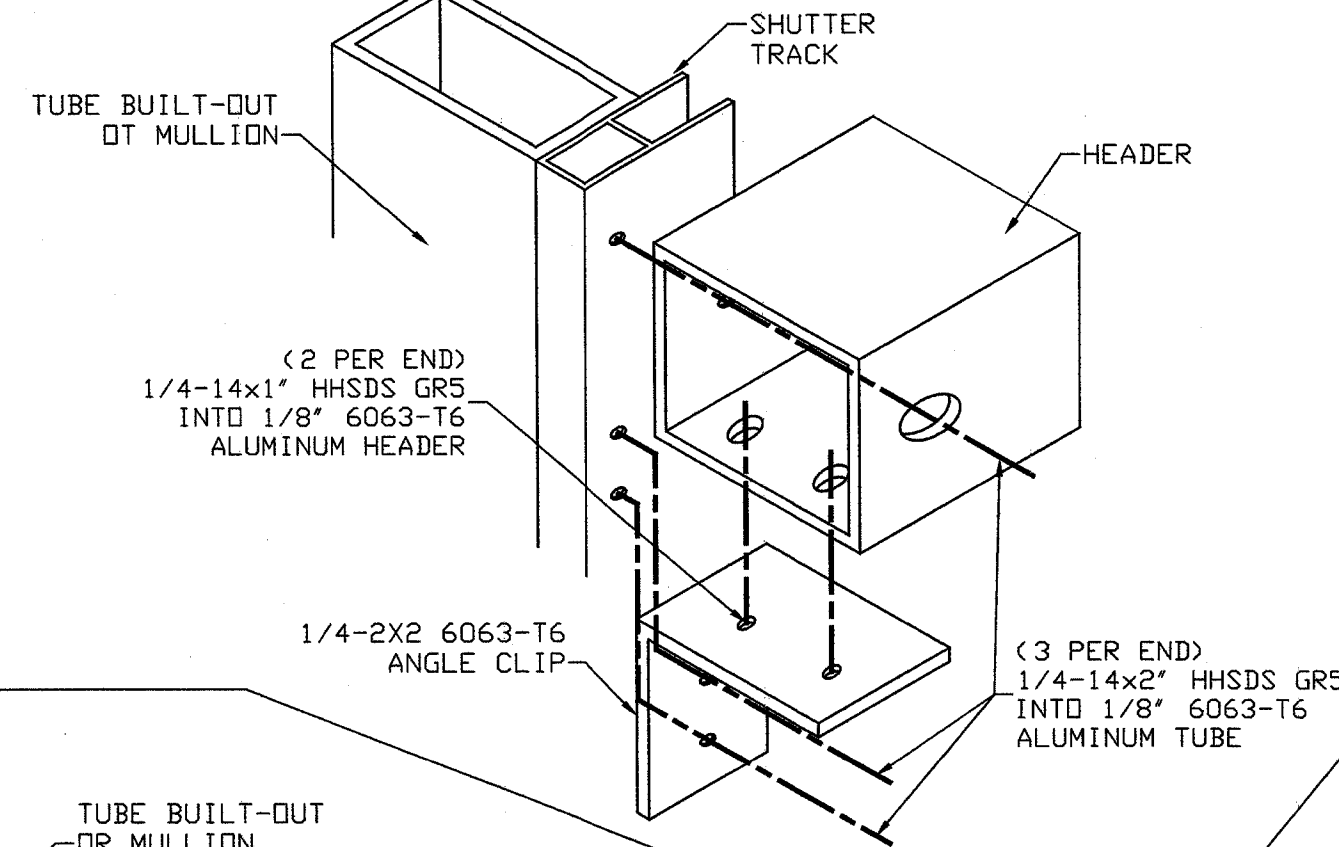
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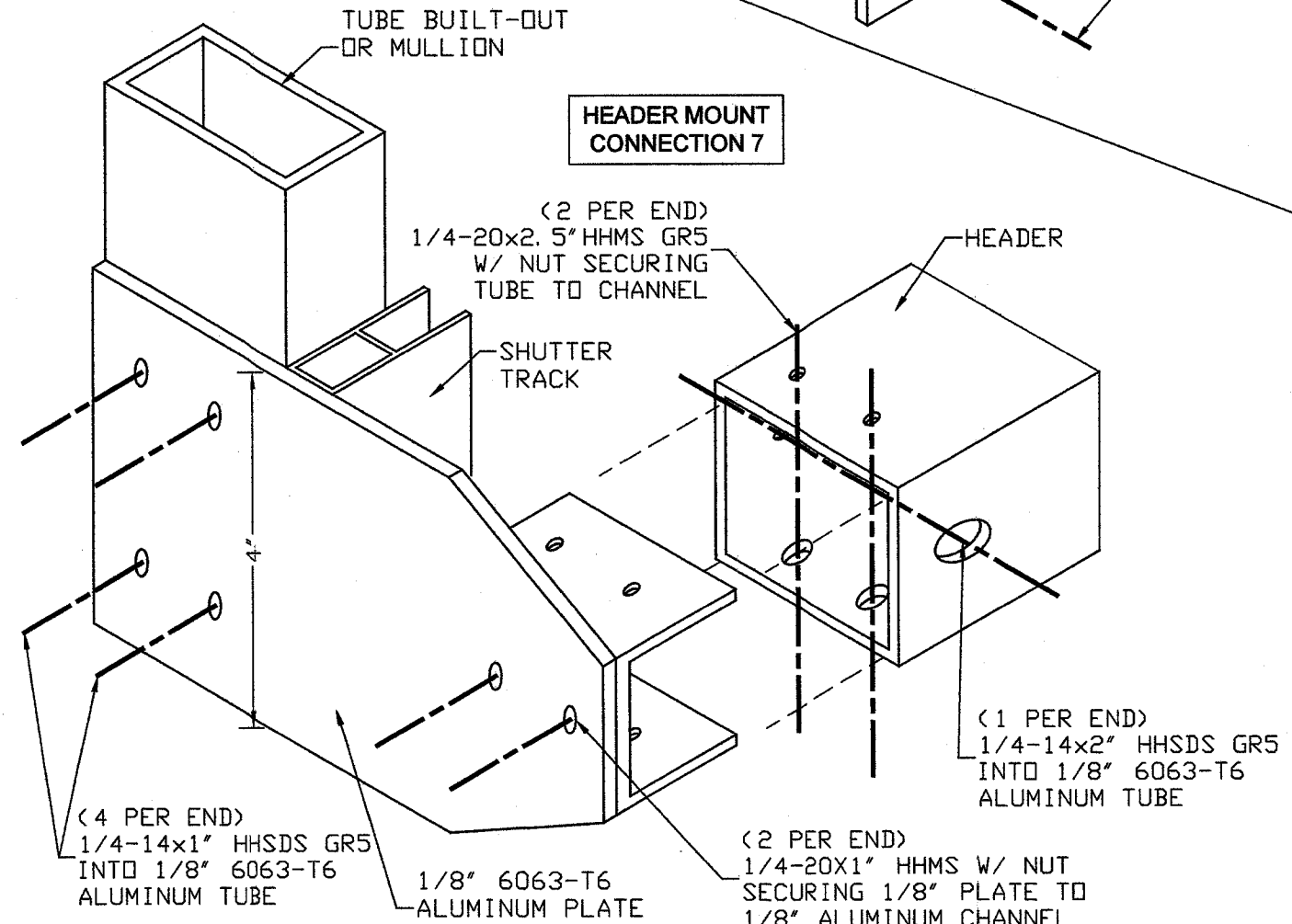
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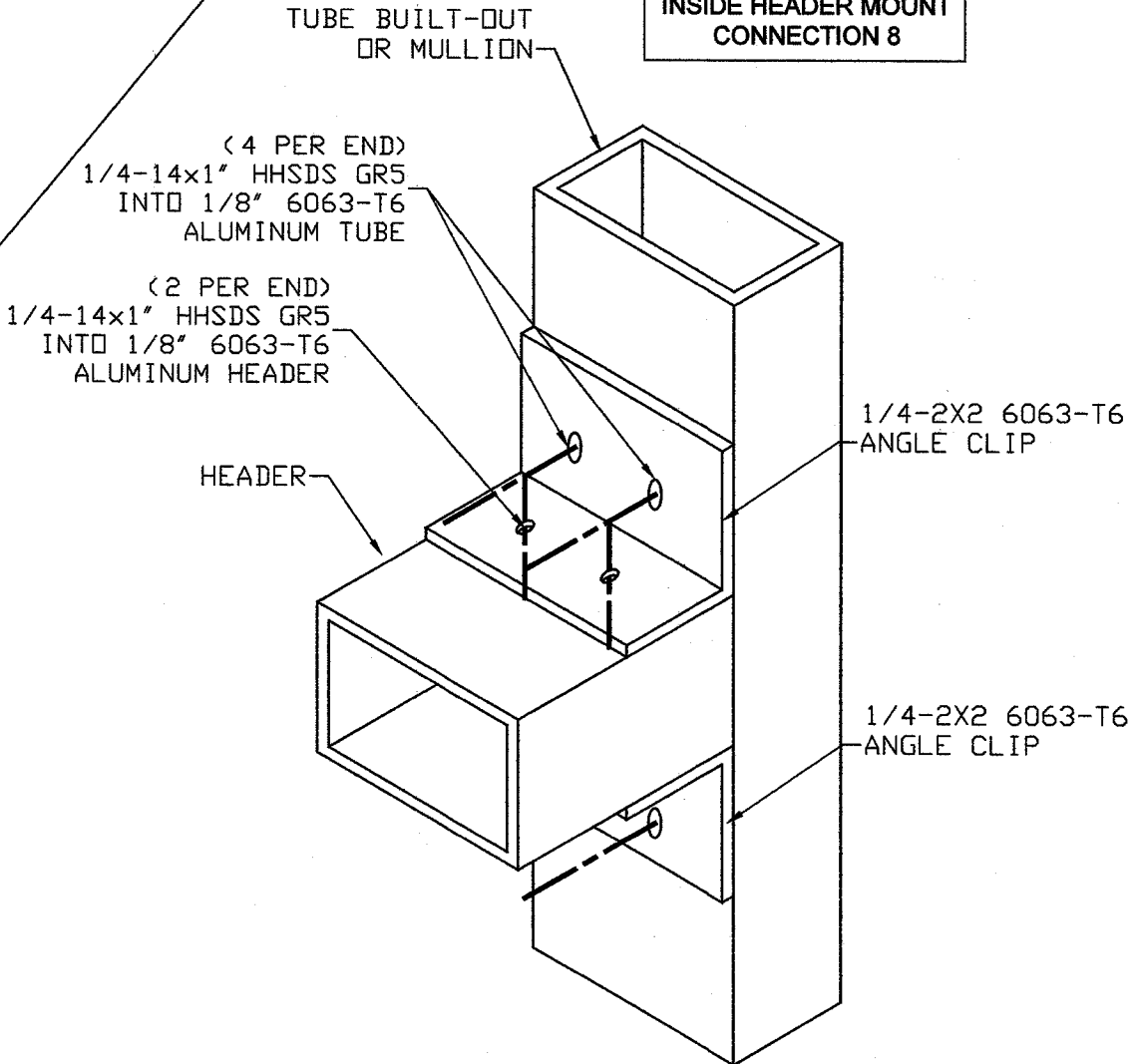
HEADER MOUNT
CONNECTION 6



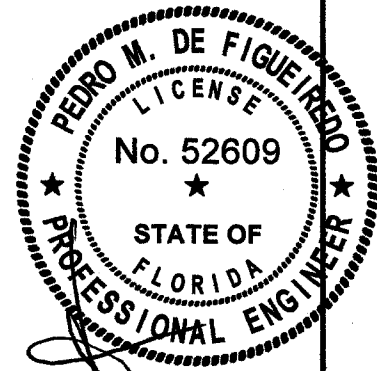
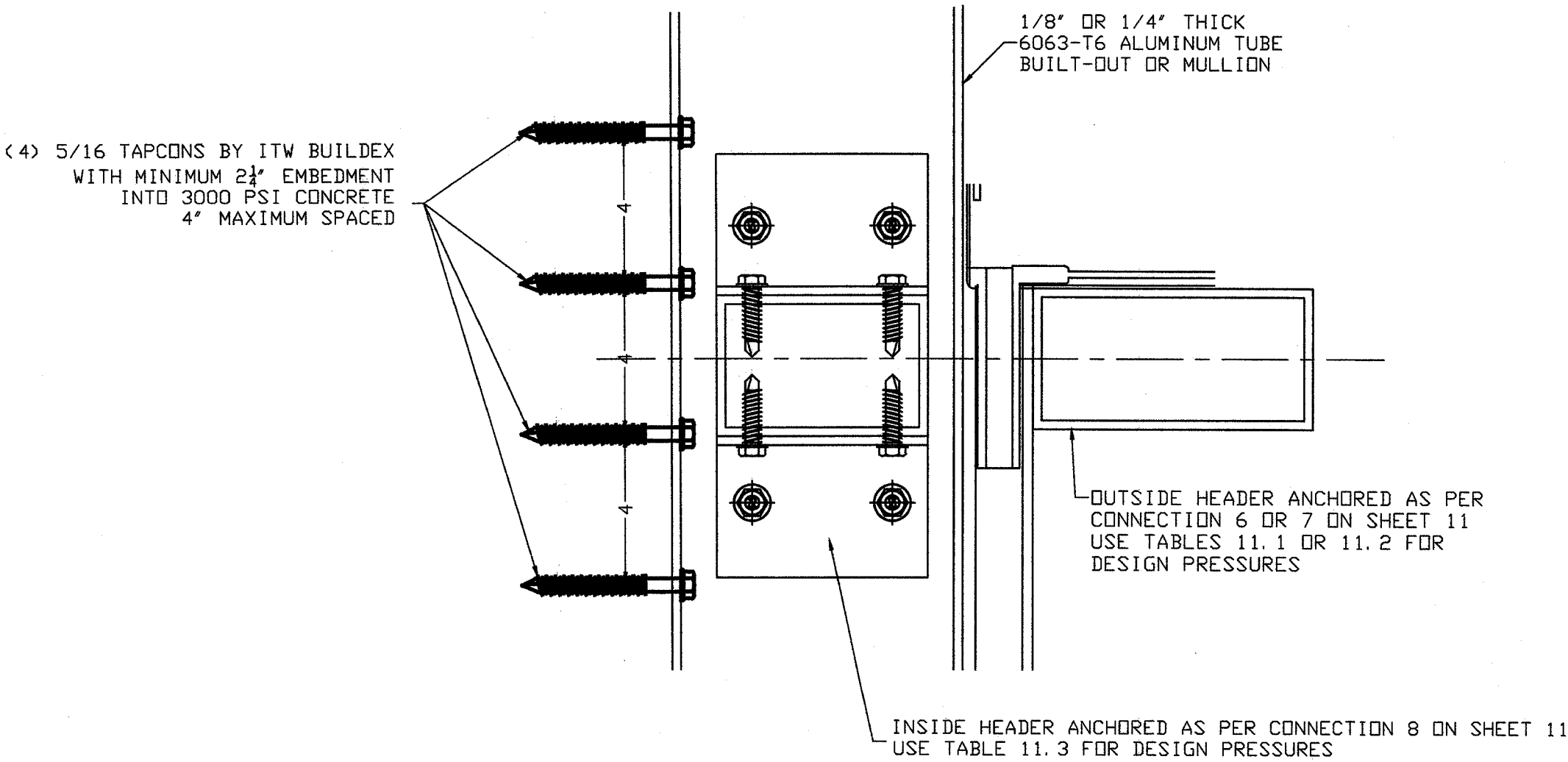
HEADER MOUNT
CONNECTION 7



INSIDE HEADER MOUNT
CONNECTION 8



HEADER BARS ANCHORAGE DETAILS



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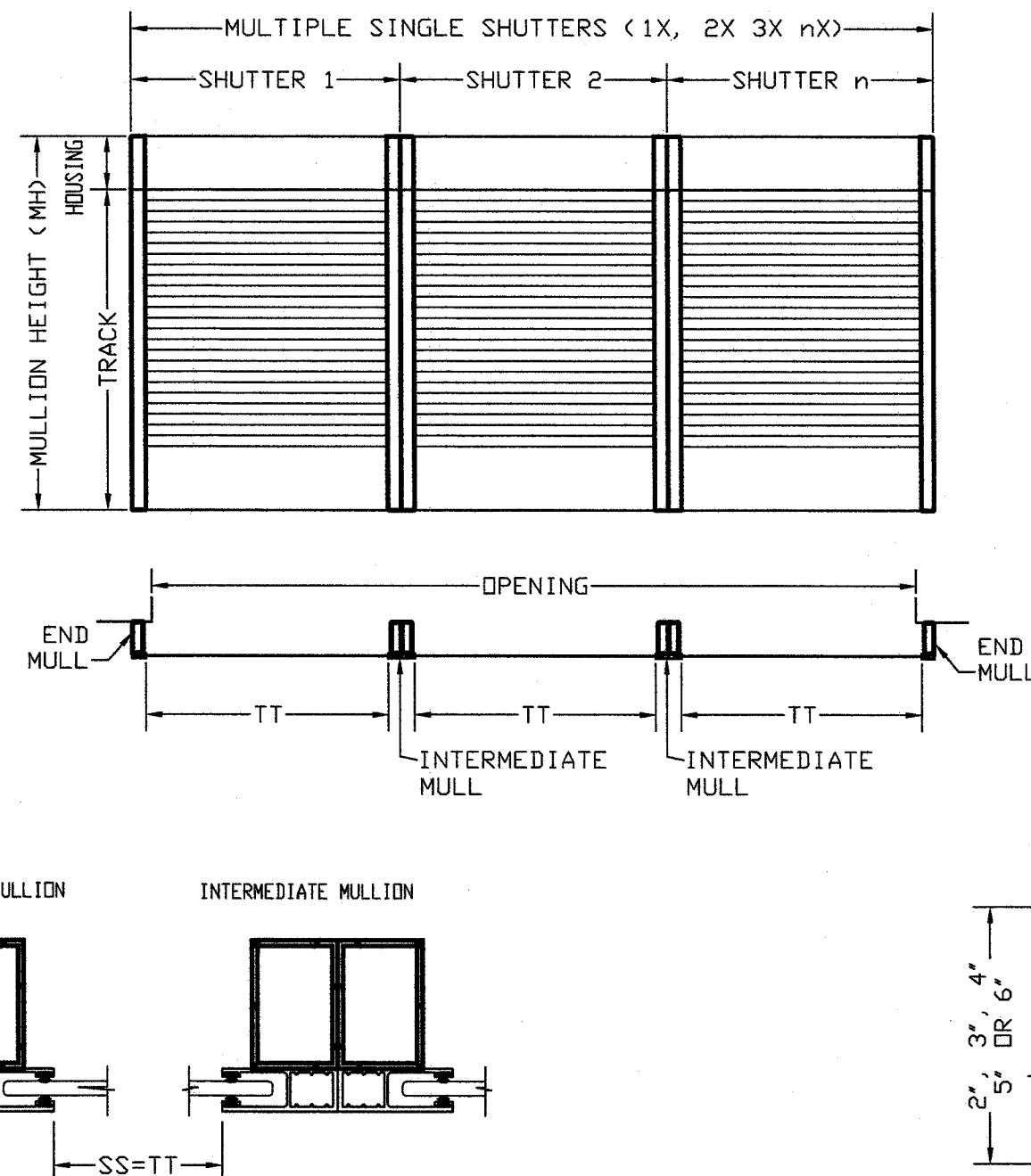
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TABLE 12- MULLION BARS
CASE 1- ALLOWABLE DESIGN LOAD - Pd (Psf)

SS	MH	2X2 Pd	2X3 Pd	2X4 Pd	2X5 Pd	2X6 Pd
54	48	113	200	200	200	200
	60	58	155	200	200	200
	72	34	90	182	200	200
	84	21	56	114	186	200
	96	--	38	77	134	186
	108	--	27	54	94	146
	120	--	--	39	68	109
	132	--	--	29	51	82
66	144	--	--	23	40	63
	48	93	200	200	200	200
	60	47	127	200	200	200
	72	27	73	149	200	200
	84	--	46	94	152	200
	96	--	31	63	109	153
	108	--	22	44	77	119
	120	--	--	32	56	89
78	132	--	--	24	42	67
	144	--	--	--	32	52
	48	78	188	200	200	200
	60	40	107	183	200	200
	72	23	62	126	177	200
	84	--	39	79	129	170
	96	--	26	53	93	129
	108	--	--	37	65	101
90	120	--	--	27	47	75
	132	--	--	20	36	57
	144	--	--	--	27	44
	48	68	163	200	200	200
	60	35	93	159	200	200
	72	20	54	109	154	200
	84	--	34	69	112	147
	96	--	23	46	80	112
102	108	--	--	32	56	88
	120	--	--	24	41	65
	132	--	--	--	31	49
	144	--	--	--	24	38
	48	60	144	200	200	200
	60	31	82	140	196	200
	72	--	47	96	135	179
	84	--	30	61	99	130
114	96	--	20	41	71	99
	108	--	--	28	50	77
	120	--	--	21	36	58
	132	--	--	--	27	43
	144	--	--	--	21	33
	48	54	129	196	200	200
	60	27	73	125	175	200
	72	--	42	86	121	160
132	84	--	27	54	88	116
	96	--	--	36	63	88
	108	--	--	25	44	69
	120	--	--	--	32	52
	132	--	--	--	24	39
	144	--	--	--	--	30
	48	46	111	169	200	200
	60	24	63	108	151	200
	72	--	37	74	105	138
	84	--	23	47	76	101
	96	--	--	31	55	76
	108	--	--	22	38	60
	120	--	--	--	28	45
	132	--	--	--	21	34
	144	--	--	--	--	26

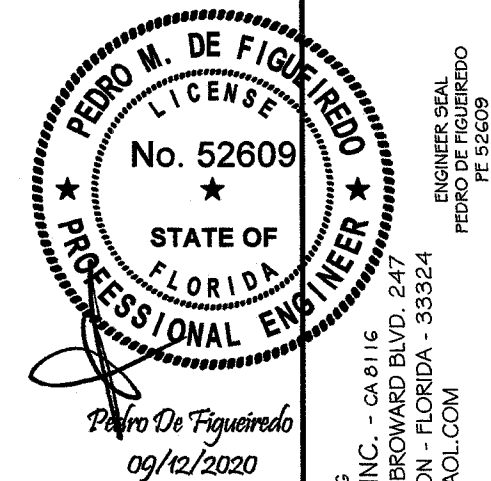
MULLION SELECTION TABLES
CASE 1 - SINGLE SPAN SHUTTERS



MULLION BAR NOTES:

- 1- SS: SLAT SPAN OR TRACK TO TRACK IN INCHES (SS=TT)
- 2- MH: MULLION BAR HEIGHT IN INCHES
- 3- Pd: ALLOWABLE DESIGNED PRESSURE IN PSF
- 4- R_{MAX}: MAXIMUM MULLION END REACTION.
- 5- TABLES MUST WORK IN CONJUNCTION WITH DRAWING 20-151 MAXIMUM ALLOWABLE SLAT SPAN TABLES.
- 6- MAXIMUM MULLION END REACTION MUST NOT EXCEED CONNECTION CAPACITY
- 7- DUE TO MANY VARIATIONS SPECIFIC CONDITIONS OUT OF THE SCOPE OF THESE TABLES CAN BE ADDRESSED WITH A SITE SPECIFIC DESIGN BY A PROFESSIONAL ENGINEER.

SHAPES:
1/8-2X2 6063-T6
1/8-2X3 6063-T6
1/8-2X4 6063-T6
1/8-2X5 6063-T6
1/8-2X6 6063-T6



PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

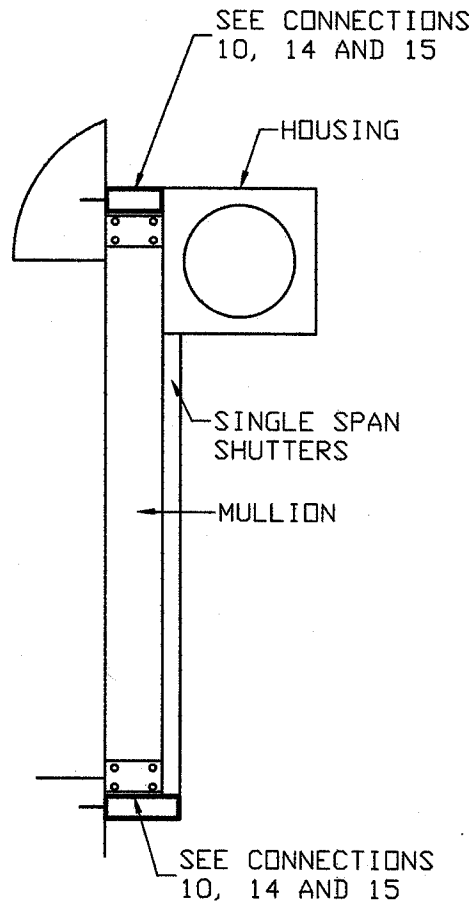
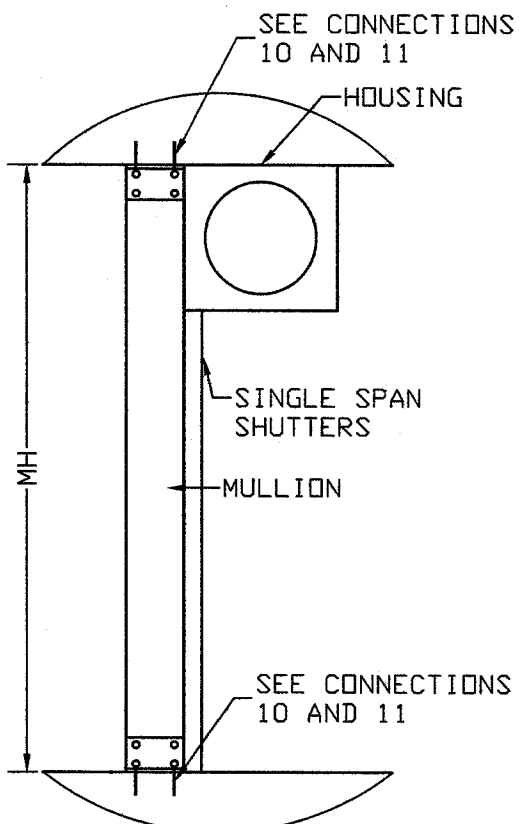
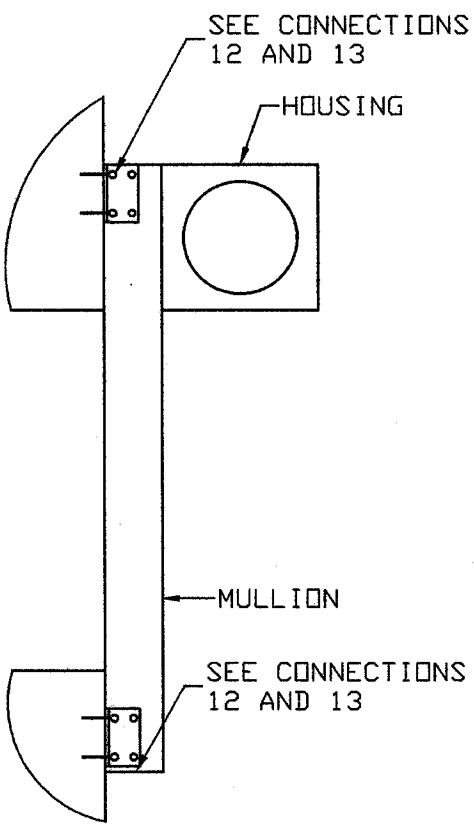
ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:
NA
DATE:
09/12/2020
DRAWING #
20-151MS
SHEET
13 OF 22

ENGINEERING
ENGCO INC. - CA 8116
9715 W. BROWARD BLVD. 247
PLANTATION - FLORIDA - 33324
ENGCO@AOL.COM
ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

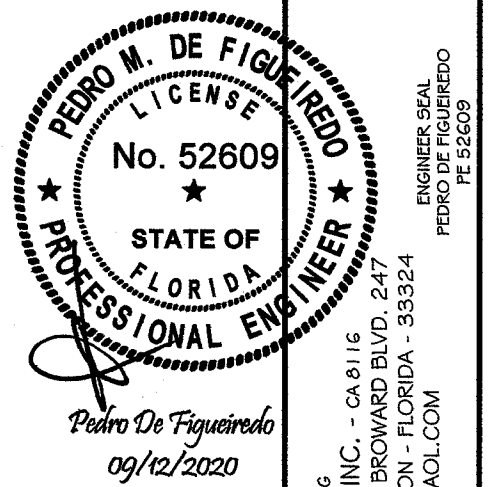
TABLE 12.1 - MULLION BARS
CASE 1- MULLION SERVICE END REACTIONS - Rs (lb)

TT	MH	SERVICE PRESSURE (PSF)							
		40	60	80	100	140	160	180	200
54	48	180	270	360	450	630	720	810	900
	60	225	338	450	563	788	900	1013	1125
	72	270	405	540	675	945	1080	1215	1350
	84	315	473	630	788	1103	1260	1418	1575
	96	360	540	720	900	1260	1440	1620	1800
	108	405	608	810	1013	1418	1620	1823	2025
	120	450	675	900	1125	1575	1800	2025	2250
	132	495	743	990	1238	1733	1980	2228	2475
	144	540	810	1080	1350	1890	2160	2430	2700
	156	585	885	1170	1463	2048	2340	2633	2925
66	48	220	330	440	550	770	880	990	1100
	60	275	413	550	688	963	1100	1238	1375
	72	330	495	660	825	1155	1320	1485	1650
	84	385	578	770	963	1348	1540	1733	1925
	96	440	660	880	1100	1540	1760	1980	2200
	108	495	743	990	1238	1733	1980	2228	2475
	120	550	825	1100	1375	1925	2200	2475	2750
	132	605	908	1210	1513	2118	2420	2723	3025
	144	660	990	1320	1650	2310	2640	2970	3300
	156	715	1073	1430	1788	2503	2860	3218	3575
78	48	260	390	520	650	910	1040	1170	1300
	60	325	488	650	813	1138	1300	1463	1625
	72	390	585	780	975	1365	1560	1755	1950
	84	455	683	910	1138	1593	1820	2048	2275
	96	520	780	1040	1300	1820	2080	2340	2600
	108	585	878	1170	1463	2048	2340	2633	2925
	120	650	975	1300	1625	2275	2600	2925	3250
	132	715	1073	1430	1788	2503	2860	3218	3575
	144	780	1170	1560	1950	2730	3120	3510	3900
	156	845	1273	1670	2063	2948	3380	3823	4275
90	48	300	450	600	750	1050	1200	1350	1500
	60	375	563	750	938	1313	1500	1688	1875
	72	450	675	900	1125	1575	1800	2025	2250
	84	525	788	1050	1313	1838	2100	2363	2625
	96	600	900	1200	1500	2100	2400	2700	3000
	108	675	1013	1350	1688	2363	2700	3038	3375
	120	750	1125	1500	1875	2625	3000	3375	3750
	132	825	1238	1650	2063	2888	3300	3713	4125
	144	900	1350	1800	2250	3150	3600	4050	4500
	156	965	1453	1920	2363	3368	3840	4323	4875
102	48	340	510	680	850	1190	1360	1530	1700
	60	425	638	850	1063	1488	1700	1913	2125
	72	510	765	1020	1275	1785	2040	2295	2550
	84	595	893	1190	1488	2083	2380	2678	2975
	96	680	1020	1360	1700	2380	2720	3060	3400
	108	765	1148	1530	1913	2678	3060	3443	3825
	120	850	1275	1700	2125	2975	3400	3825	4250
	132	935	1403	1870	2338	3273	3740	4208	4675
	144	1020	1530	2040	2550	3570	4080	4590	5100
	156	1085	1633	2160	2663	3788	4340	4923	5475
114	48	380	570	760	950	1330	1520	1710	1900
	60	475	713	950	1188	1663	1900	2138	2375
	72	570	855	1140	1425	1995	2280	2565	2850
	84	665	998	1330	1663	2328	2660	2993	3325
	96	760	1140	1520	1900	2660	3040	3420	3800
	108	855	1283	1710	2138	2993	3420	3848	4275
	120	950	1425	1900	2375	3325	3800	4275	4750
	132	1045	1568	2090	2613	3658	4180	4703	5225
	144	1140	1710	2280	2850	3990	4560	5130	5700
	156	1205	1813	2400	3063	4288	4920	5553	6175
132	48	440	660	880	1100	1540	1760	1980	2200
	60	550	825	1100	1375	1925	2200	2475	2750
	72	660	990	1320	1650	2310	2640	2970	3300
	84	770	1155	1540	1925	2695	3080	3465	3850
	96	880	1320	1760	2200	3080	3520	3960	4400
	108	990	1485	1980	2475	3465	3960	4455	4950
	120	1100	1650	2200	2750	3850	4400	4950	5500
	132	1210	1815	2420	3025	4235	4840	5445	6050
	144	1320	1980	2640	3300	4620	5280	5940	6600



MULLION ANCHORAGE BAR NOTES:

- 1- SS: SLAT SPAN OR TRACK TO TRACK IN INCHES (SS=TT)
- 2- MH: MULLION BAR HEIGHT IN INCHES
- 3- Pd: ALLOWABLE DESIGNED PRESSURE IN PSF
- 4- Rs: MULLION SERVICE END REACTION.
- 5- MULLION SERVICE END REACTION MUST NOT EXCEED CONNECTION CAPACITY
- 6- DUE TO MANY VARIATIONS SPECIFIC CONDITIONS OUT OF THE SCOPE OF THESE TABLES CAN BE ADDRESSED WITH A SITE SPECIFIC DESIGN BY A PROFESSIONAL ENGINEER.



PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

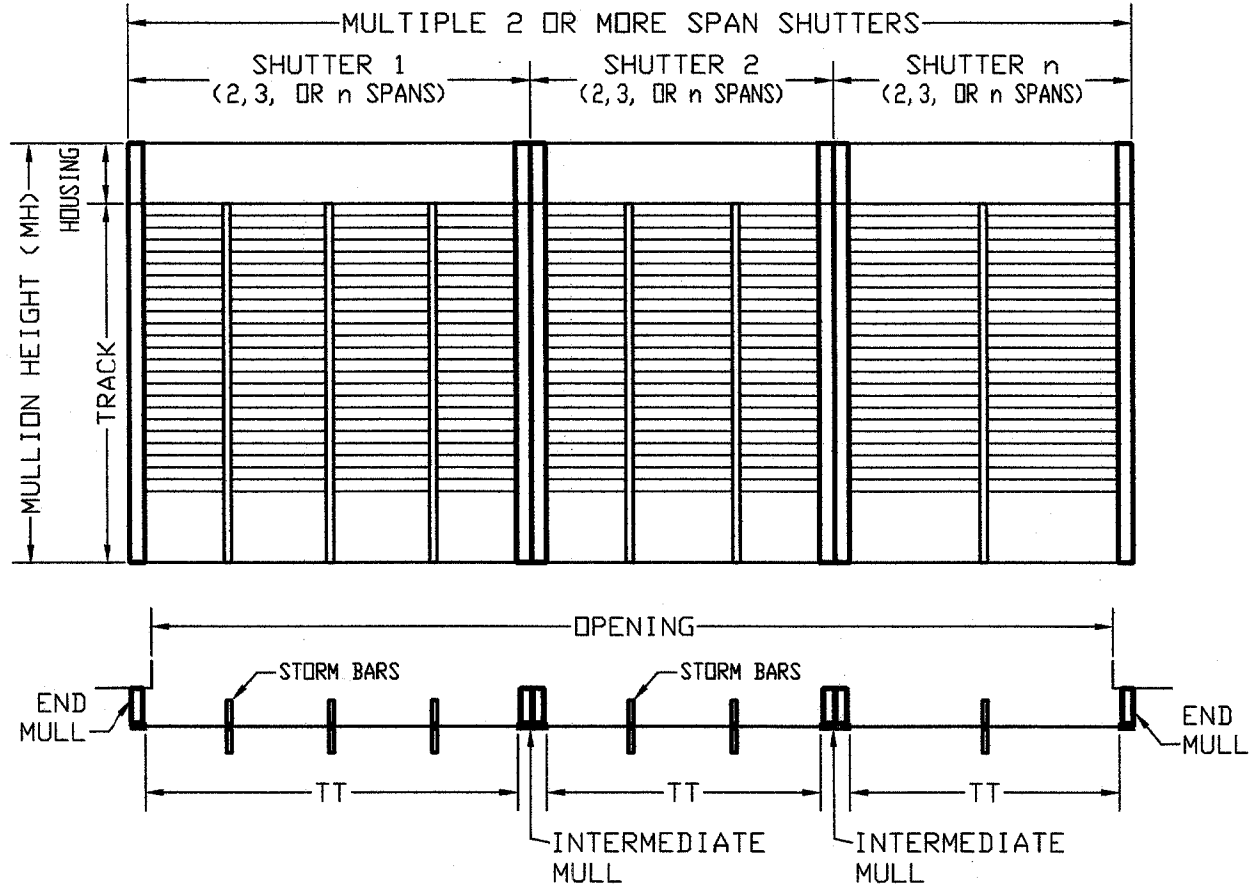
SCALE:
NA
DATE:
09/12/2020
DRAWING #
20-151MS
SHEET
14 OF 22

ENGINEERING
ENGCO INC. - CA 8116
9715 W. BROWARD BLVD. 247
PLANTATION - FLORIDA - 33324
ENGCO@AOL.COM
ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

TABLE 13 - MULLION BARS
CASE 2 - ALLOWABLE DESIGN LOAD - Pd (Psf)

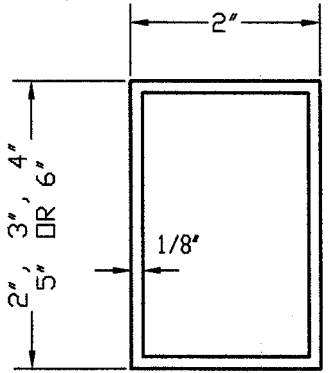
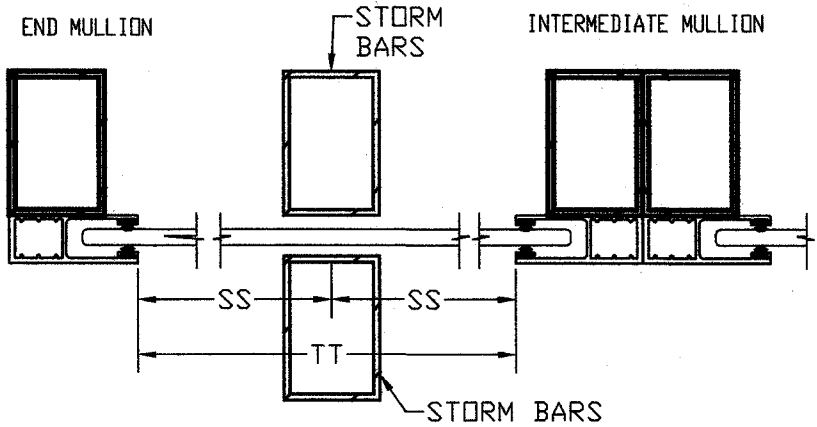
TT	MH	MULLION BAR TYPE				
		2X2	2X3	2X4	2X5	2X6
84	48	103	200	200	200	200
	60	55	146	200	200	200
	72	33	87	177	200	200
	84	21	56	114	200	200
	96	--	39	78	137	200
	108	--	28	56	98	156
	120	--	21	42	73	115
96	48	90	200	200	200	200
	60	48	128	200	200	200
	72	29	76	155	200	200
	84	--	49	100	175	200
	96	--	34	69	120	190
	108	--	24	49	86	136
	120	--	--	36	64	101
108	48	80	200	200	200	200
	60	42	114	200	200	200
	72	25	68	138	200	200
	84	--	44	89	155	200
	96	--	30	61	106	169
	108	--	22	44	76	121
	120	--	--	32	56	90
120	48	72	193	200	200	200
	60	38	102	200	200	200
	72	23	61	124	200	200
	84	--	40	80	140	200
	96	--	27	55	96	152
	108	--	--	39	69	109
	120	--	--	29	51	81
144	48	60	161	200	200	200
	60	32	85	173	200	200
	72	--	51	103	180	200
	84	--	33	67	116	183
	96	--	23	46	80	127
	108	--	--	33	57	91
	120	--	--	24	42	67
156	48	55	148	200	200	200
	60	29	79	159	200	200
	72	--	47	95	166	200
	84	--	30	62	107	169
	96	--	21	42	74	117
	108	--	--	30	53	84
	120	--	--	22	39	62
168	48	52	138	200	200	200
	60	27	73	148	200	200
	72	--	44	88	154	200
	84	--	28	57	100	157
	96	--	--	39	68	109
	108	--	--	28	49	78
	120	--	--	21	36	58
132	--	--	--	28	44	

MULLION SELECTION TABLES
CASE 2 - MULTIPLE SPAN SHUTTERS WITH
HEADER ANCHORED TO MULLION

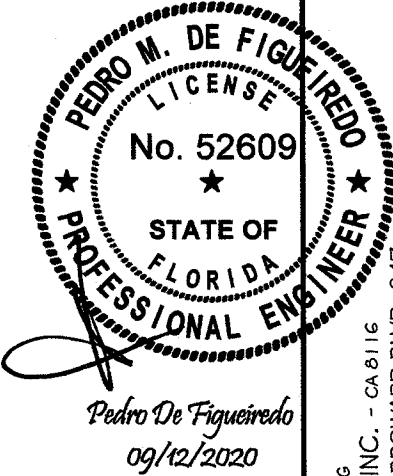


MULLION BAR NOTES:

- 1- TRACK TO TRACK IN INCHES (SS=TT)
- 2- MH: MULLION BAR HEIGHT IN INCHES
- 3- Pd: ALLOWABLE DESIGNED PRESSURE IN PSF
- 4- TABLES MUST WORK IN CONJUNCTION WITH MAXIMUM ALLOWABLE SLAT SPAN TABLES ON SHEETS 2 AND 3.
- 5- MAXIMUM MULLION END REACTION MUST NOT EXCEED CONNECTION CAPACITY
- 6- DUE TO MANY VARIATIONS SPECIFIC CONDITIONS OUT OF THE SCOPE OF THESE TABLES CAN BE ADDRESSED WITH A SITE SPECIFIC DESIGN BY A PROFESSIONAL ENGINEER.



- SHAPES:
- 1/8-2X2 6063-T6
 - 1/8-2X3 6063-T6
 - 1/8-2X4 6063-T6
 - 1/8-2X5 6063-T6
 - 1/8-2X6 6063-T6



Pedro De Figueiredo
09/12/2020

PRODUCT:
STORM BARS, HEADERS
MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

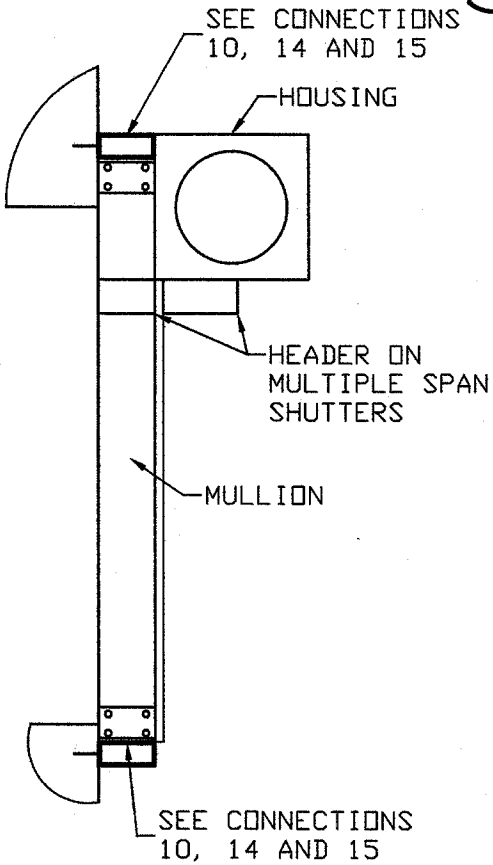
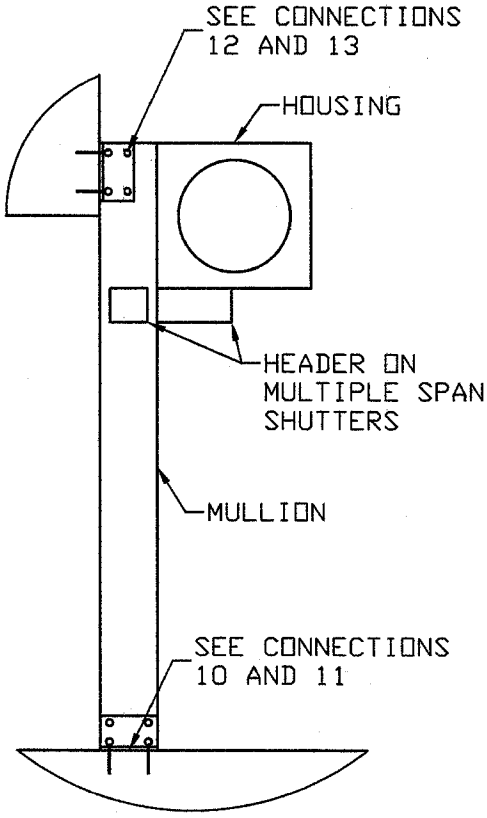
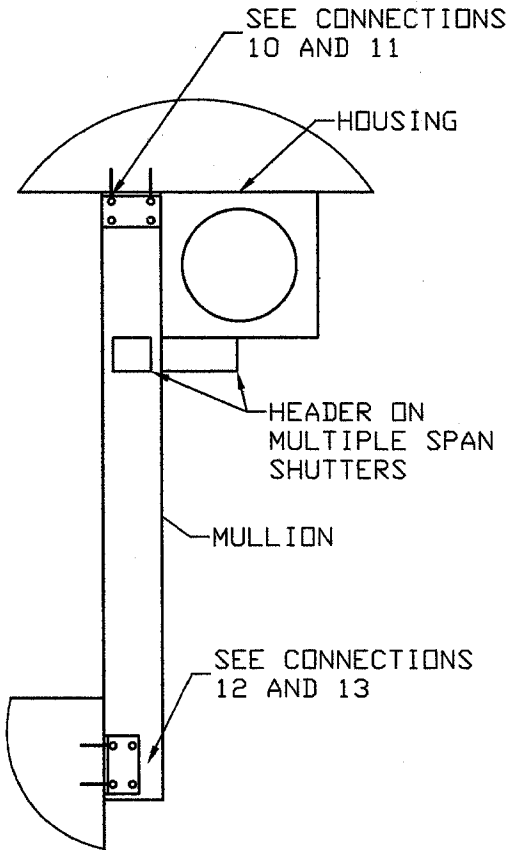
ASSOCIATION OF MANUFACTURERS:
N.A.S.A
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:
NA
DATE:
09/12/2020
DRAWING #
20-151MS
SHEET
15 OF 22

ENGINEERING
ENGCO INC. - CALIF
9715 W. BROWARD BLVD. 247
PLANTATION - FLORIDA - 33324
ENGCO@AOL.COM
ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

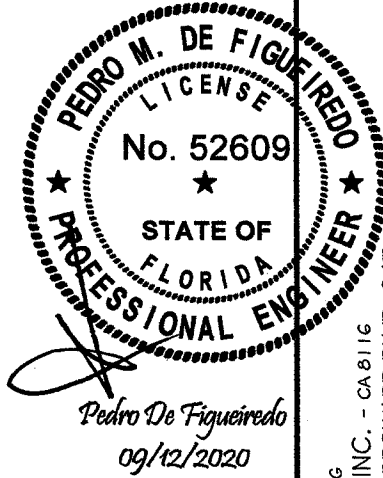
TABLE 13.1 - MULLION BARS
CASE 2- MULLION SERVICE END REACTIONS - Rs (lb)

TT	MH	SERVICE PRESSURE (PSF)							
		40	60	80	100	140	160	180	200
84	48	219	328	438	547	766	875	984	1094
	60	287	431	574	718	1005	1148	1292	1435
	72	356	534	712	890	1245	1423	1601	1779
	84	425	638	850	1063	1488	1700	1913	2125
	96	494	742	989	1236	1730	1978	2225	2472
	108	564	846	1128	1410	1974	2256	2538	2819
	120	634	950	1267	1584	2217	2534	2851	3168
96	132	703	1055	1406	1758	2461	2813	3164	3516
	48	250	375	500	625	875	1000	1125	1250
	60	328	492	656	820	1148	1312	1476	1640
	72	407	610	813	1017	1423	1627	1830	2033
	84	486	729	971	1214	1700	1943	2186	2429
	96	565	848	1130	1413	1978	2260	2543	2825
	108	644	967	1289	1611	2256	2578	2900	3222
108	120	724	1086	1448	1810	2534	2896	3258	3620
	132	804	1205	1607	2009	2813	3215	3616	4018
	48	281	422	563	703	984	1125	1266	1406
	60	369	554	738	923	1292	1476	1661	1845
	72	458	686	915	1144	1601	1830	2059	2288
	84	546	820	1093	1366	1913	2186	2459	2732
	96	636	953	1271	1589	2225	2543	2860	3178
120	108	725	1088	1450	1813	2538	2900	3263	3625
	120	815	1222	1629	2036	2851	3258	3665	4073
	132	904	1356	1808	2260	3164	3616	4068	4520
	48	313	469	625	781	1094	1250	1406	1563
	60	410	615	820	1025	1435	1640	1845	2050
	72	508	763	1017	1271	1779	2033	2288	2542
	84	607	911	1214	1518	2125	2429	2732	3036
144	96	706	1059	1413	1766	2472	2825	3178	3531
	108	806	1208	1611	2014	2819	3222	3625	4028
	120	905	1358	1810	2263	3168	3620	4073	4525
	132	1005	1507	2009	2511	3516	4018	4520	5023
	48	375	563	750	938	1313	1500	1688	1875
	60	492	738	984	1230	1722	1968	2214	2460
	72	610	915	1220	1525	2135	2440	2745	3050
156	84	729	1093	1457	1821	2550	2914	3279	3643
	96	848	1271	1695	2119	2966	3390	3814	4238
	108	967	1450	1933	2417	3383	3867	4350	4833
	120	1086	1629	2172	2715	3801	4344	4887	5430
	132	1205	1808	2411	3014	4219	4822	5425	6027
	48	406	609	813	1016	1422	1625	1828	2031
	60	533	800	1066	1333	1866	2132	2399	2665
168	72	661	991	1322	1652	2313	2643	2974	3304
	84	789	1184	1579	1973	2763	3157	3552	3946
	96	918	1377	1836	2295	3213	3673	4132	4591
	108	1047	1571	2094	2618	3665	4189	4713	5236
	120	1177	1765	2353	2941	4118	4706	5294	5883
	132	1306	1959	2612	3265	4571	5224	5877	6530
	48	438	656	875	1094	1531	1750	1969	2188
	60	574	861	1148	1435	2009	2296	2583	2870
	72	712	1068	1423	1779	2491	2847	3203	3558
	84	850	1275	1700	2125	2975	3400	3825	4250
	96	989	1483	1978	2472	3461	3955	4449	4944
	108	1128	1692	2256	2819	3947	4511	5075	5639
	120	1267	1901	2534	3168	4435	5068	5702	6335
	132	1406	2110	2813	3516	4922	5625	6329	7032



MULLION ANCHORAGE BAR NOTES:

- 1- TRACK TO TRACK IN INCHES (SS=TT)
- 2- MH: MULLION BAR HEIGHT IN INCHES
- 3- Pd: ALLOWABLE DESIGNED PRESSURE IN PSF
- 4- Rs: MULLION SERVICE END REACTION.
- 5- MULLION SERVICE END REACTION MUST NOT EXCEED CONNECTION CAPACITY
- 6- DUE TO MANY VARIATIONS SPECIFIC CONDITIONS OUT OF THE SCOPE OF THESE TABLES CAN BE ADDRESSED WITH A SITE SPECIFIC DESIGN BY A PROFESSIONAL ENGINEER.



Pedro De Figueiredo
09/12/2020

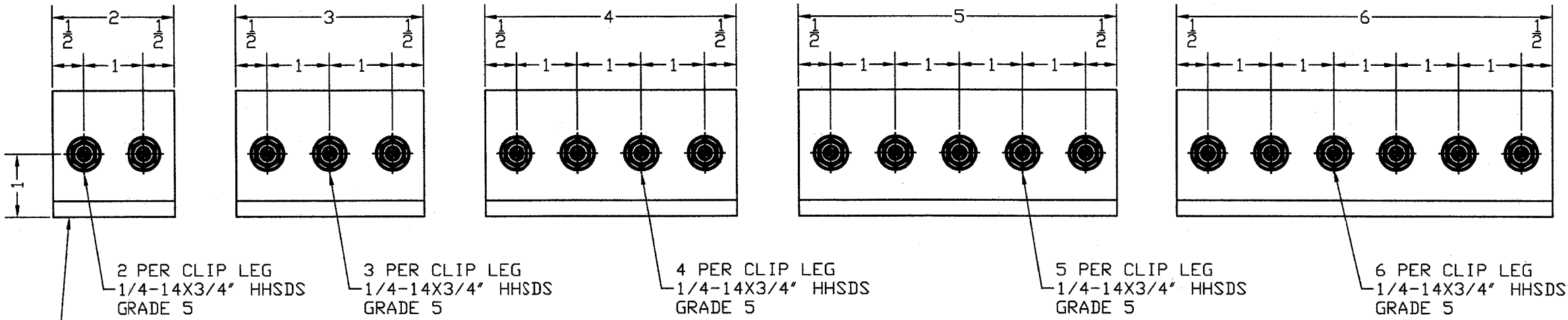
PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:
NA
DATE:
09/12/2020
DRAWING #
20-151MS
SHEET
16 OF 22

ENGINEERING
ENGCO INC. - CA 8116
9715 W. BROWARD BLVD. 247
PLANTATION - FLORIDA - 33324
ENGCO@AOL.COM
ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

CONNECTION 10 CLIP ANCHORED TO MULLION

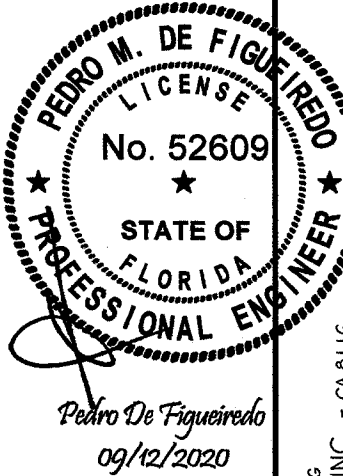
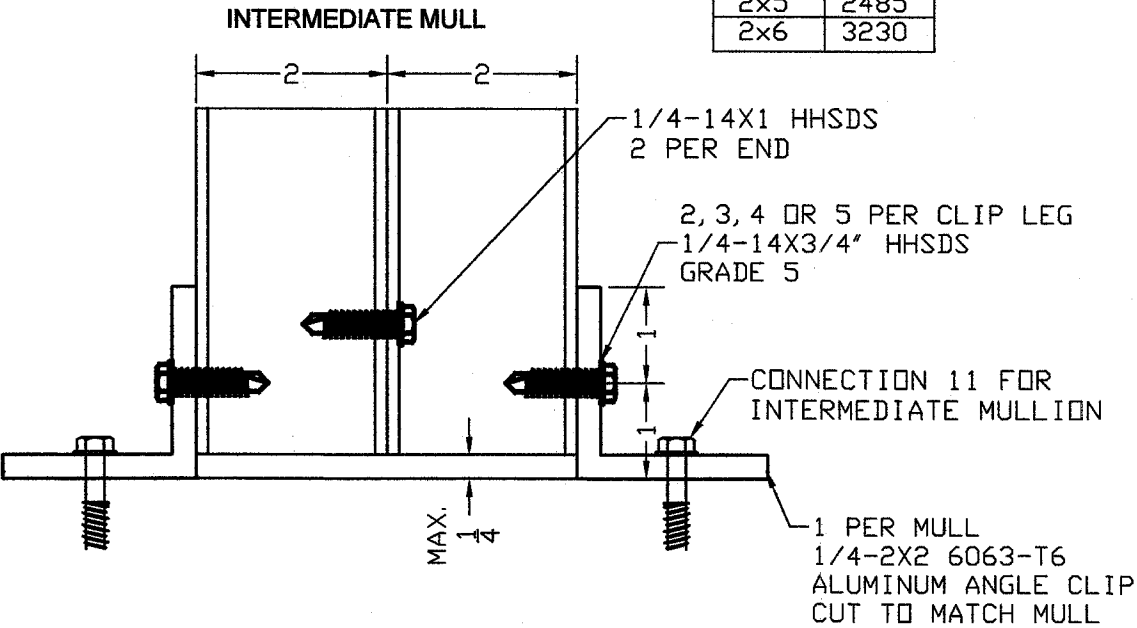
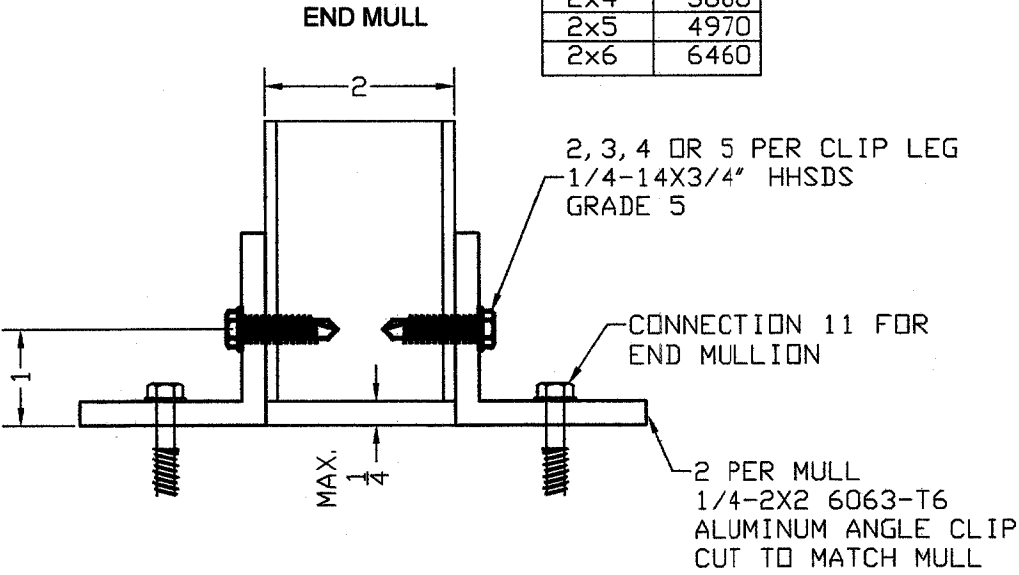


TYPICAL 1/4-2X2 6063-T6
ALUMINUM ANGLE CLIP
CUT TO MATCH MULL

R_a: ALLOWABLE END REACTION PER MULLION.
R_a MUST NOT EXCEED THE SERVICE REACTION
R_s VALUES FROM TABLES 12.1 AND 13.1

MULL TYPE	R _a (LB)
2x2	1157
2x3	2153
2x4	3660
2x5	4970
2x6	6460

MULL TYPE	R _a (LB)
2x2	579
2x3	1077
2x4	1830
2x5	2485
2x6	3230



ENGINEERING
ENGCO INC. - CA 8116
9715 W. BROWARD BLVD. 247
PLANTATION - FLORIDA - 33324
ENGCO@AOL.COM

ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

PRODUCT:
STORM BARS, HEADERS
MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:
NA

DATE:
09/12/2020

DRAWING #
20-151MS

SHEET
17 OF 22

CONNECTION 11 CLIP ANCHORED TO CONCRETE FLOOR/CEILING

INTERMEDIATE MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

MULL TYPE	1 ANCHOR PER CLIP		2 ANCHORS PER CLIP	
	A	G	A	G
2x2	418	813	--	--
2x3	418	813	--	--
2x4	380	650	760	1300
2x5	418	813	836	1620
2x6	418	813	836	1620

END MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

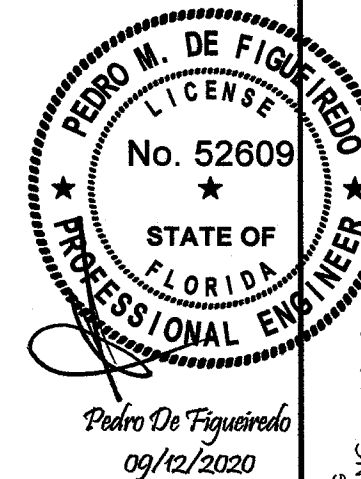
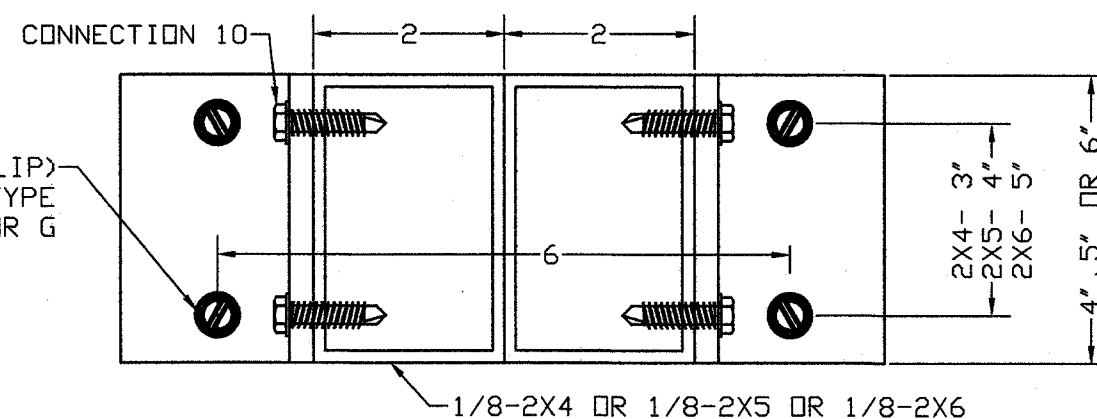
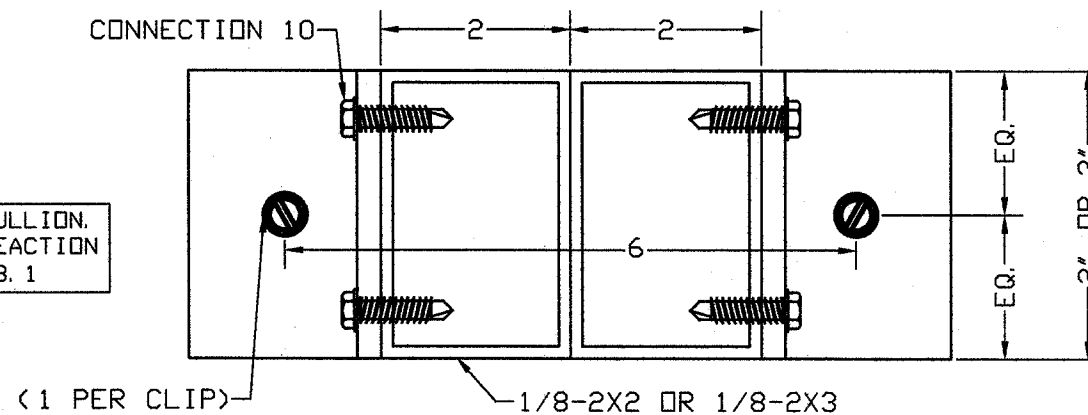
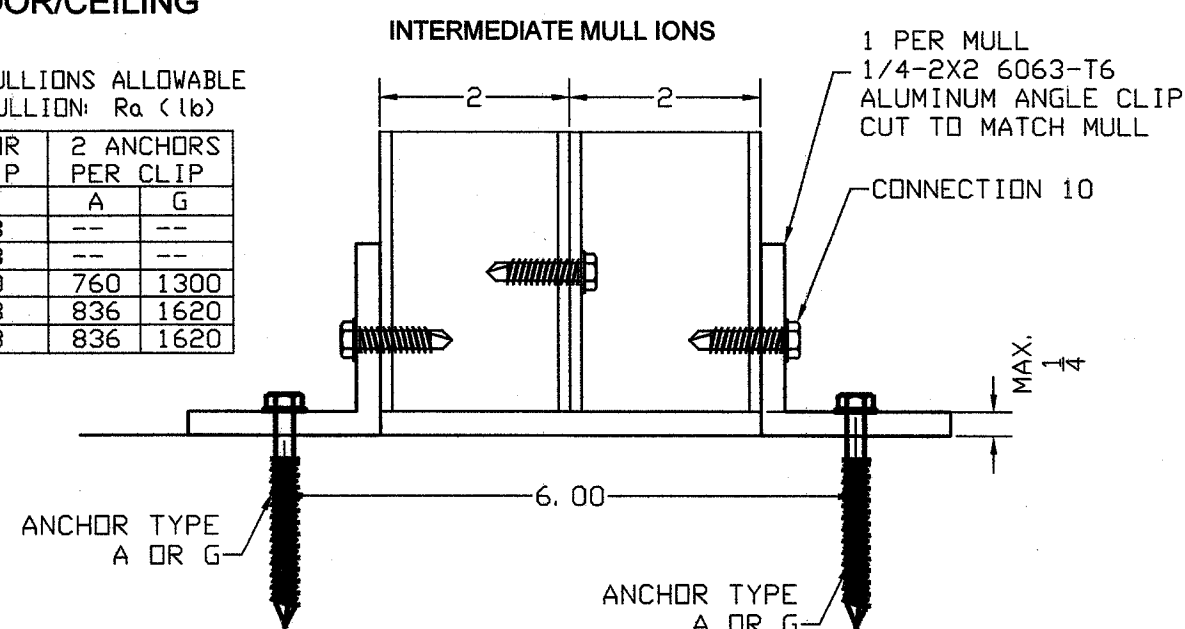
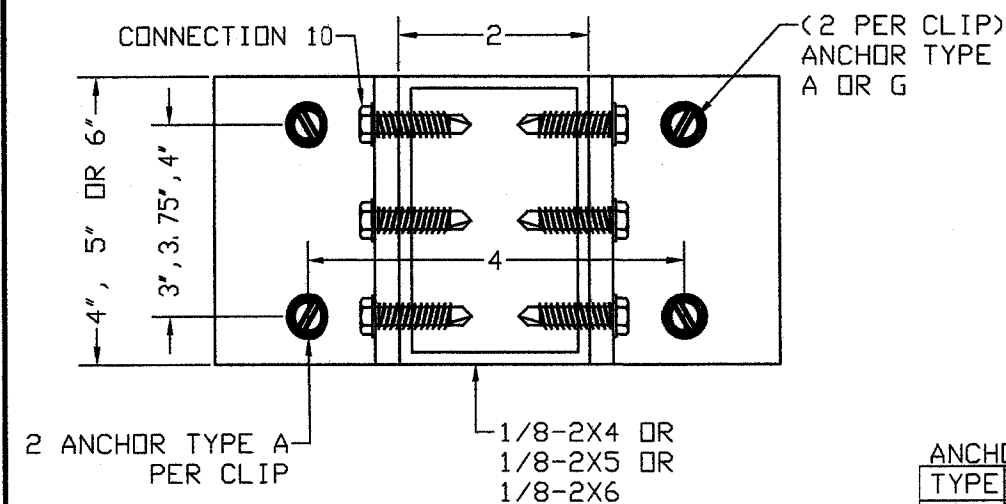
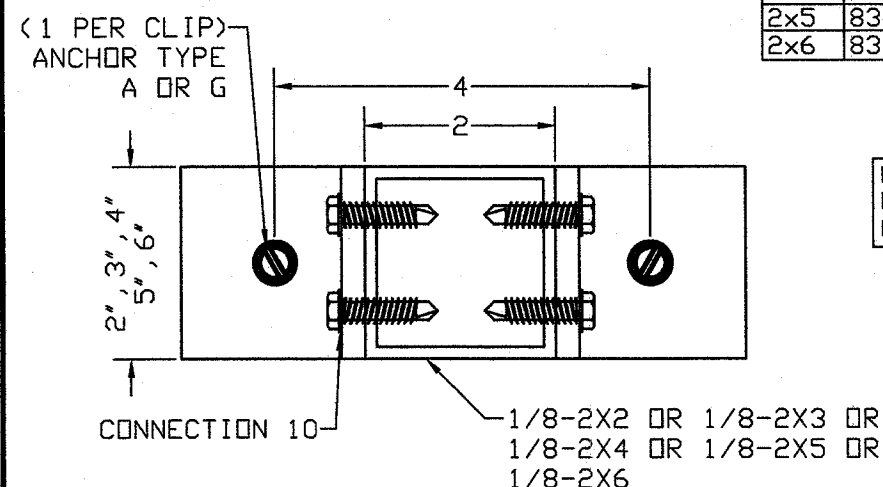
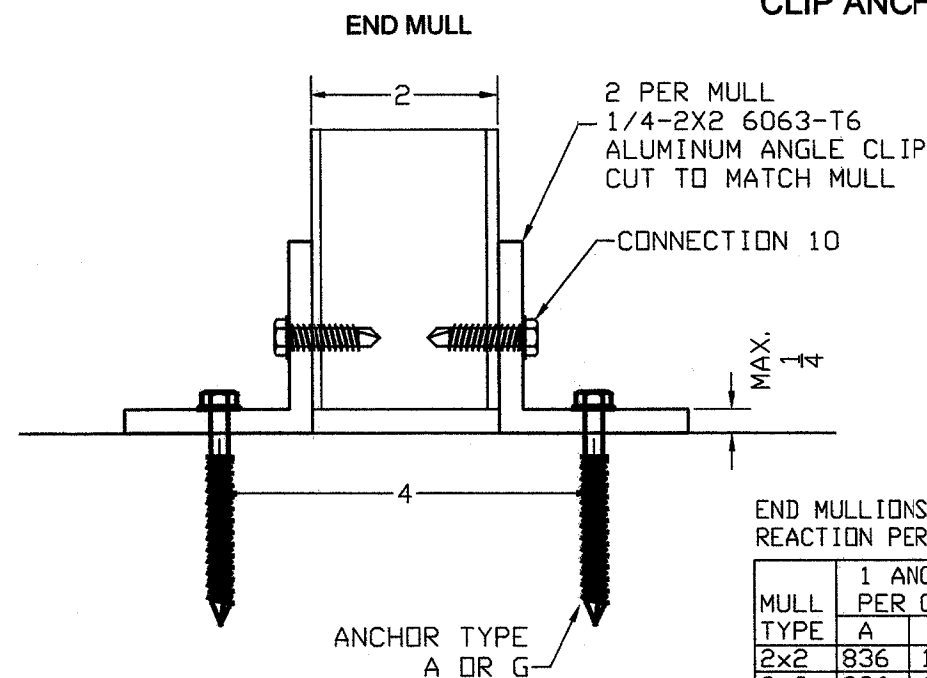
MULL TYPE	1 ANCHOR PER CLIP		2 ANCHORS PER CLIP	
	A	G	A	G
2x2	836	1626	--	--
2x3	836	1626	--	--
2x4	836	1626	1520	2600
2x5	836	1626	1672	3252
2x6	836	1626	1672	3252

R_a : ALLOWABLE END REACTION PER MULLION.
 R_a MUST NOT EXCEED THE SERVICE REACTION
 R_s VALUES FROM TABLES 12.1 AND 13.1

ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL
A	1/4" ss TAPCON	ITW	1 3/4"	3"	3000 psi CONCRETE
G	5/16" TAPCON	ITW	2 1/4"	2 1/2"	3000 psi CONCRETE

ANCHOR NOTES:
1- 1/4" CARBON STEEL TAPCONS CAN BE USED AS AN ALTERNATE TO THE STAINLESS STEEL



PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:
NA
DATE:
09/12/2020
DRAWING #
20-151MS
SHEET
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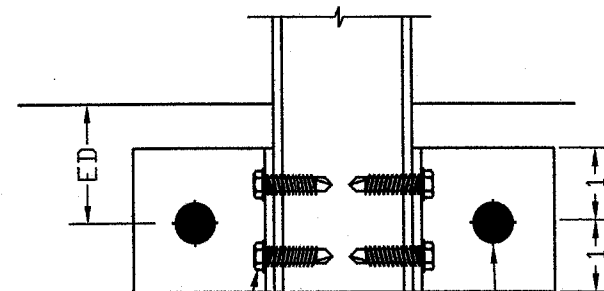
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ENGCO INC. - CA 8116
9715 W. BROWARD BLVD. 247
PLANTATION - FLORIDA - 33324
ENGCO@AOL.COM
ENGINEER SEAL
PEDRO DE FIGUEIREDO
PE 52609

CONNECTION 12 CLIP ANCHORED TO WALL

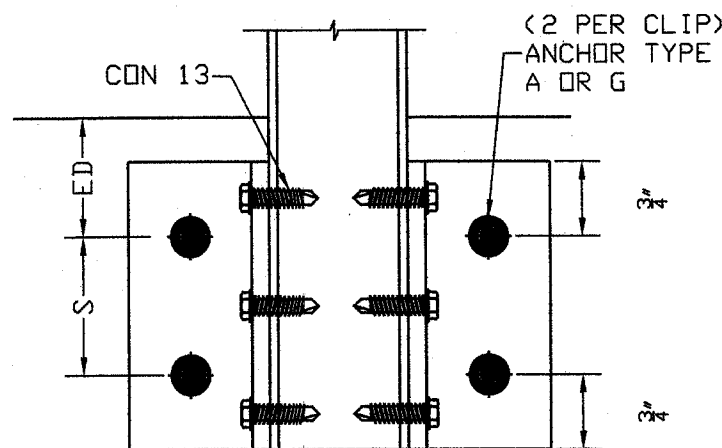
END MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

ANCHOR TYPE	# OF ANCHORS PER CLIP	1	2	4
A	1100	2200	4400	
G	1560	3120	6240	

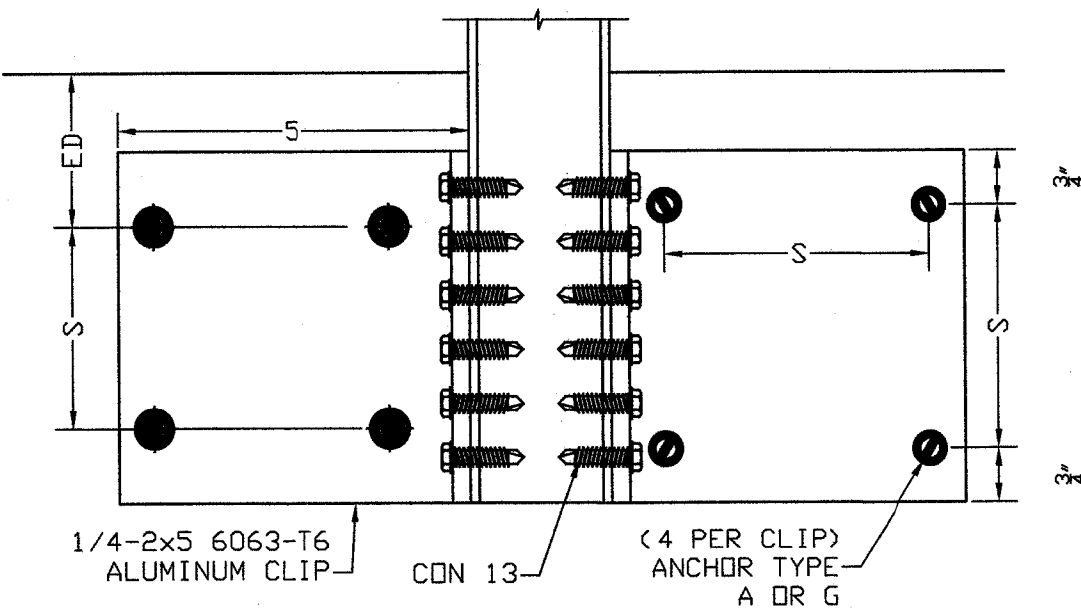
END MULL IONS



CON 13 (1 PER CLIP)
ANCHOR TYPE
A OR G

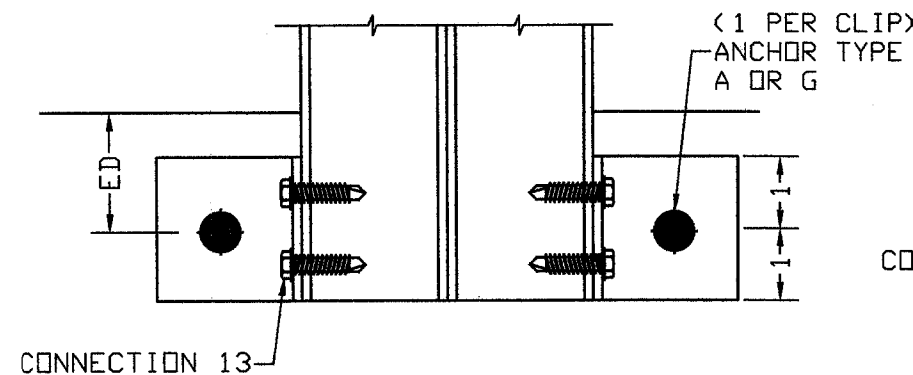


CON 13 (2 PER CLIP)
ANCHOR TYPE
A OR G



1/4-2x5 6063-T6
ALUMINUM CLIP CON 13 (4 PER CLIP)
ANCHOR TYPE
A OR G

INTERMEDIATE MULL IONS

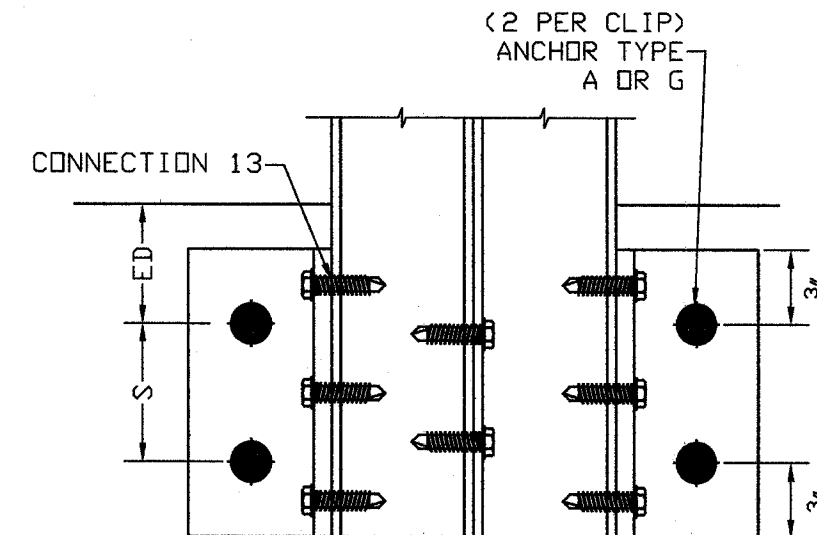


CONNECTION 13

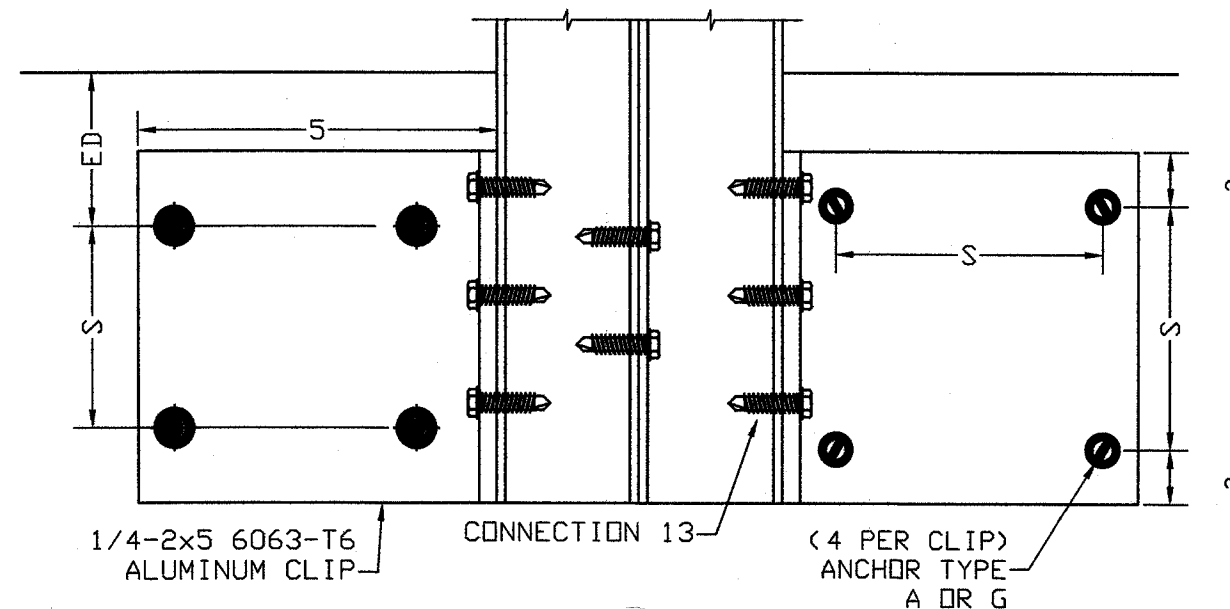
R_a : ALLOWABLE END REACTION PER MULLION.
 R_a MUST NOT EXCEED THE SERVICE REACTION
 R_s VALUES FROM TABLES 12.1 AND 13.1

INTERMEDIATE MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

ANCHOR TYPE	# OF ANCHORS PER CLIP	1	2	4
A	550	1100	2200	
G	780	1560	3120	



CONNECTION 13



1/4-2x5 6063-T6
ALUMINUM CLIP

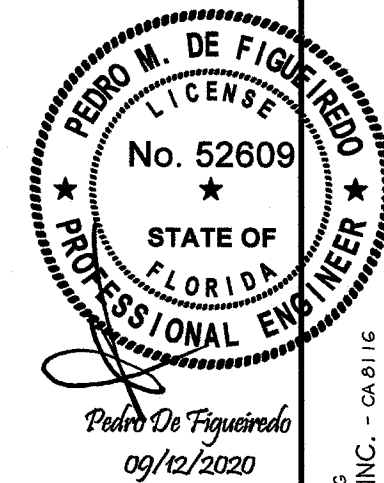
CONNECTION 13 (4 PER CLIP)
ANCHOR TYPE
A OR G

ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL	S
A	1/4" ss TAPCON	ITW	1 3/4"	4"	3000 psi CONCRETE	4
G	5/16" TAPCON	ITW	2 1/4"	2 1/2"	3000 psi CONCRETE	4

ANCHOR NOTES:

1- 1/4" CARBON STEEL TAPCONS CAN BE USED AS AN ALTERNATE TO THE STAINLESS STEEL



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PE 52609

PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:

NA

DATE:

09/12/2020

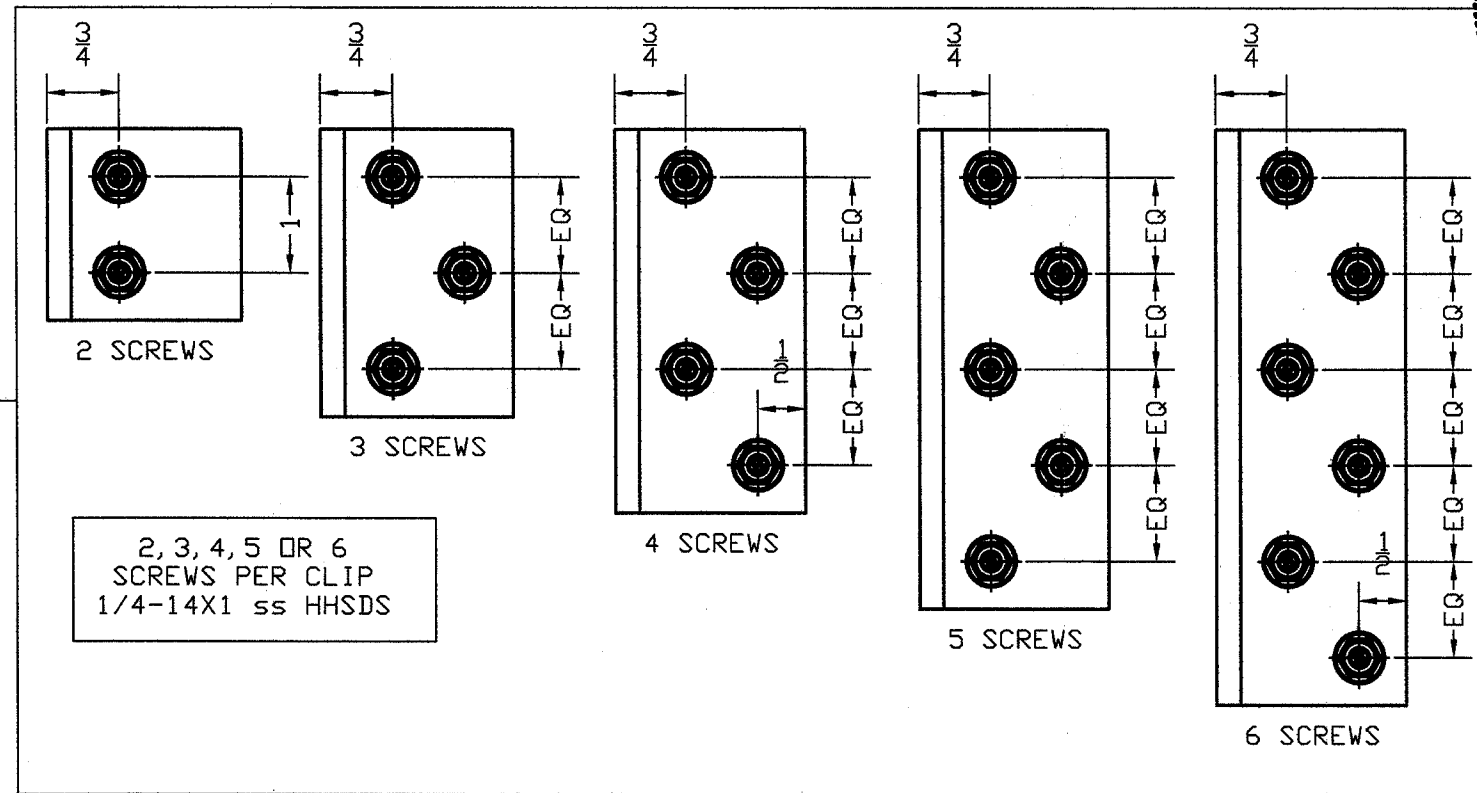
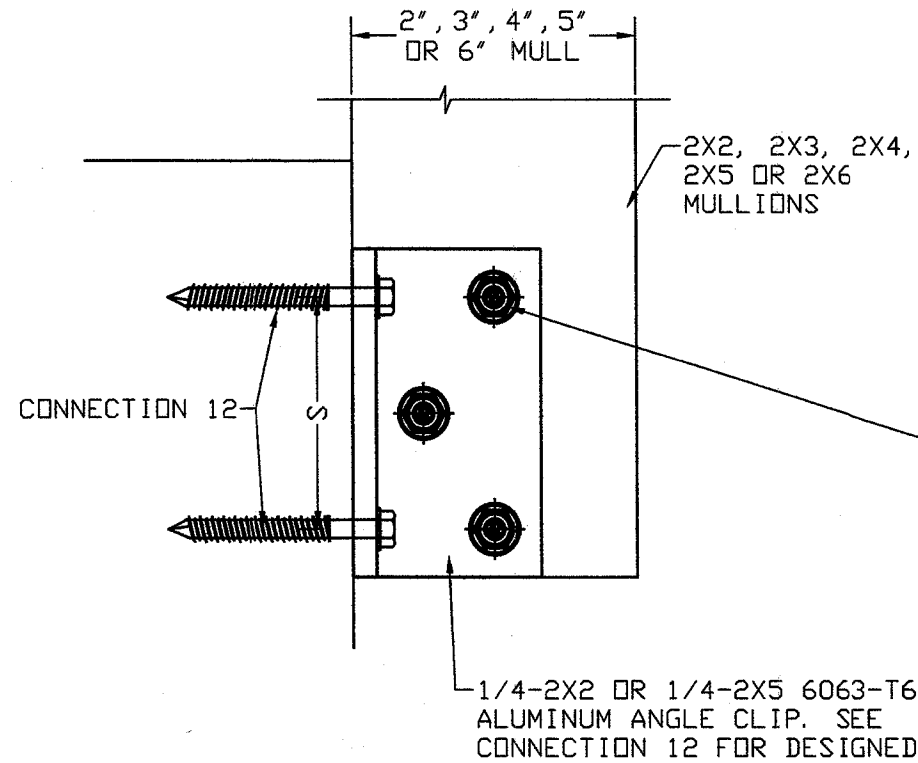
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CONNECTION 13 CLIP ANCHORED TO MULLION BAR



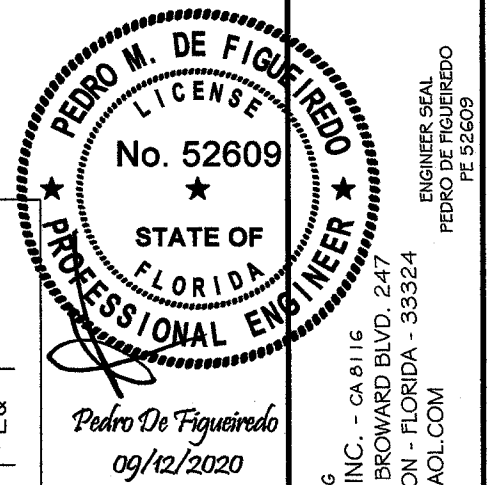
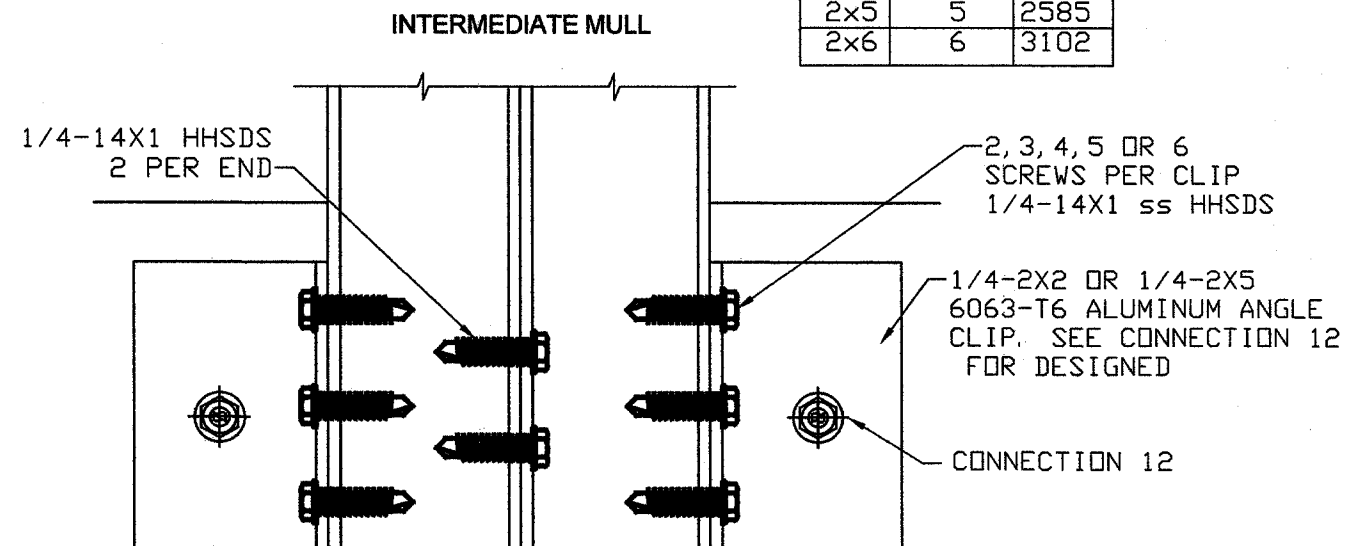
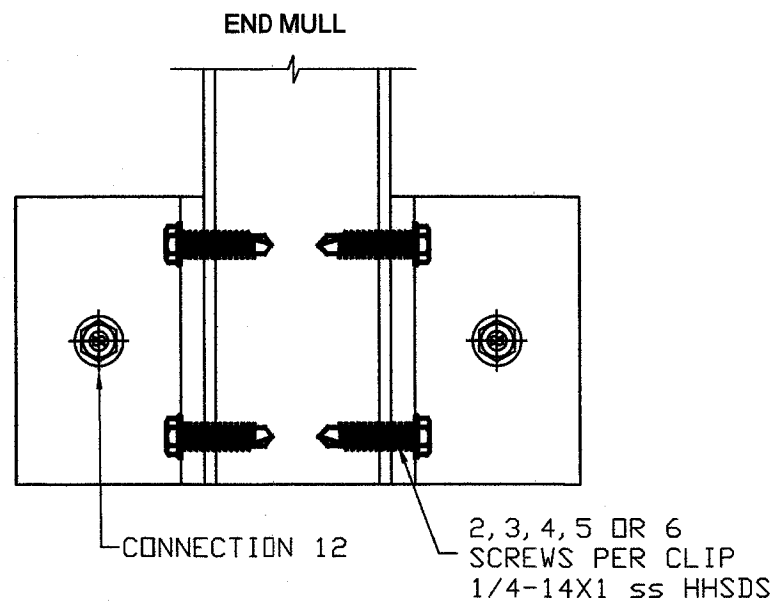
END MULLION ALLOWABLE
REACTION PER MULLION: R_a (lb)

MULL TYPE	# SCREWS	R_a (lb)
2x2	2	2068
2x3	3	3102
2x4	4	4136
2x5	5	5170
2x6	6	6204

R_a : ALLOWABLE END REACTION PER MULLION.
 R_a MUST NOT EXCEED THE SERVICE REACTION
 R_s VALUES FROM TABLES 12.1 AND 13.1

INTERMEDIATE MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

MULL TYPE	# SCREWS	R_a (lb)
2x2	2	1034
2x3	3	1551
2x4	4	2068
2x5	5	2585
2x6	6	3102

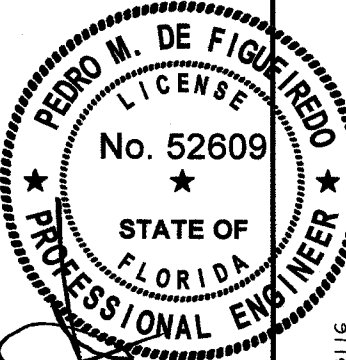


PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
NATIONAL APPROVED SHUTTER ASSOCIATION LLC.
MIRAMAR, FL 33027

SCALE:
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DATE:
09/12/2020
DRAWING #
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CONNECTION 14
CLIP ANCHORED TO BUILT-OUT TUBE



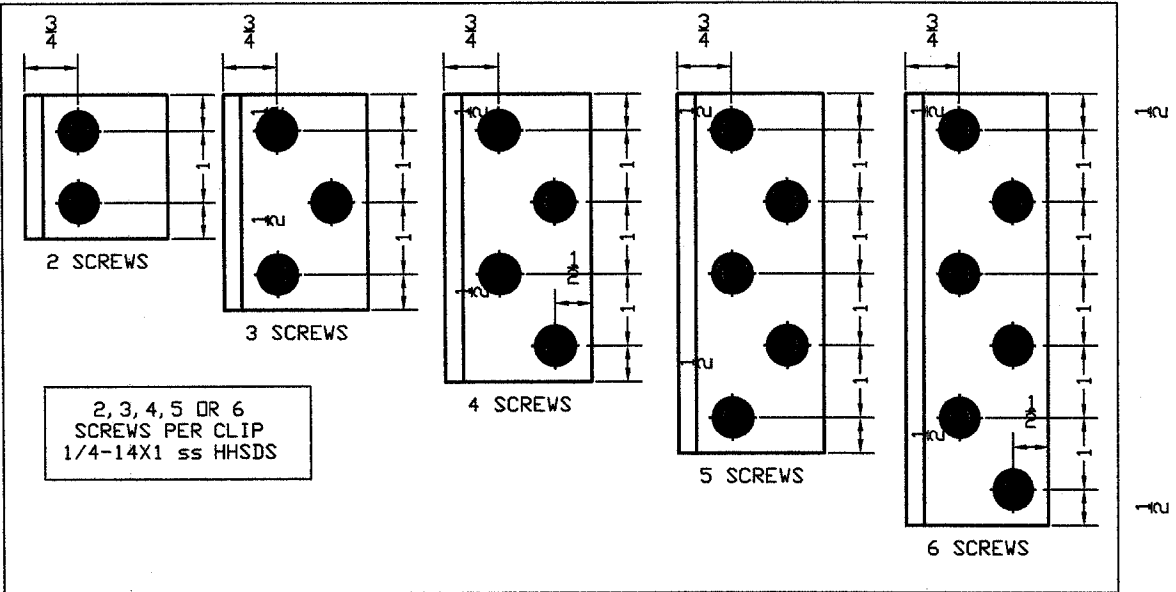
Pedro De Figueiredo
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PE 52609

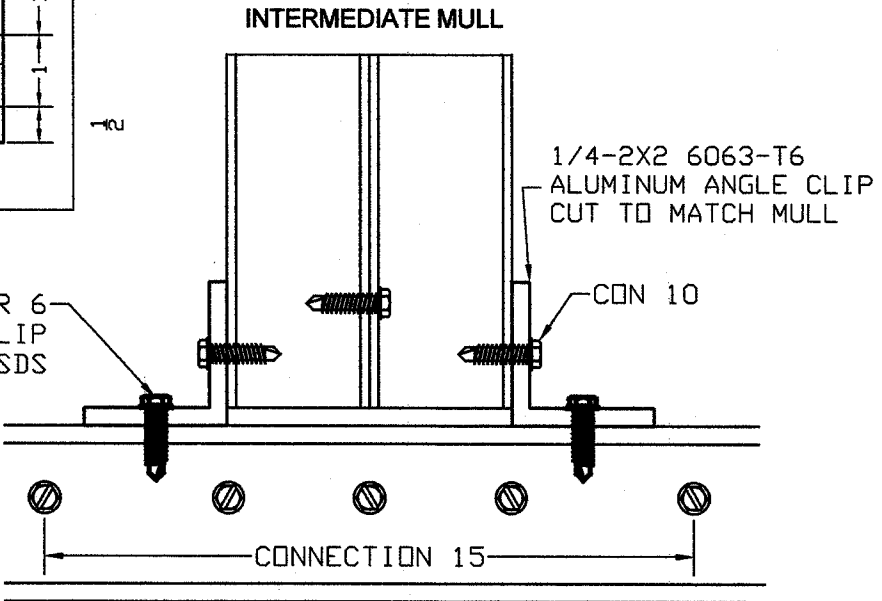
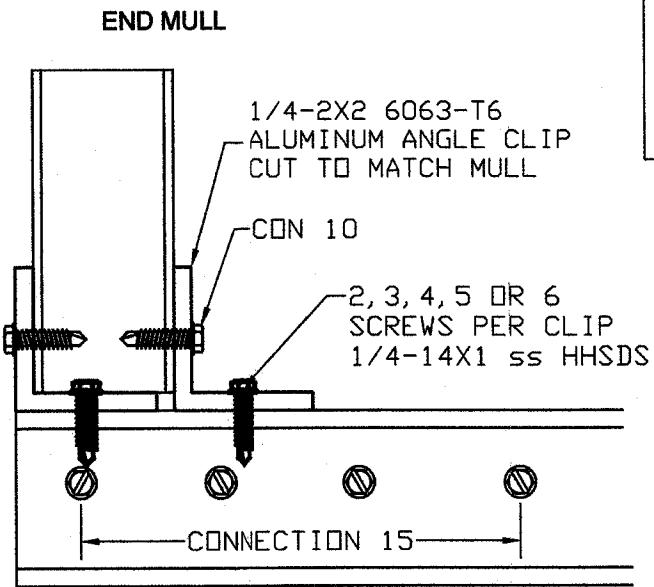
PRODUCT:
STORM BARS, HEADERS
& MULLIONS
TO BE USED IN CONJUNCTION
WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:
N.A.S.A.
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MIRAMAR, FL 33027

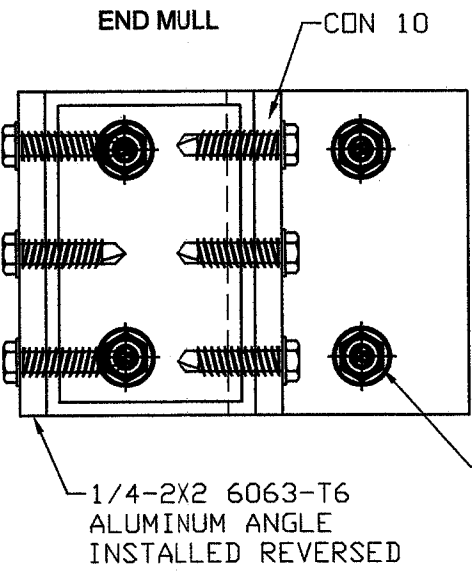
SCALE:
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2, 3, 4, 5 OR 6
SCREWS PER CLIP
1/4-14X1 ss HHSDS

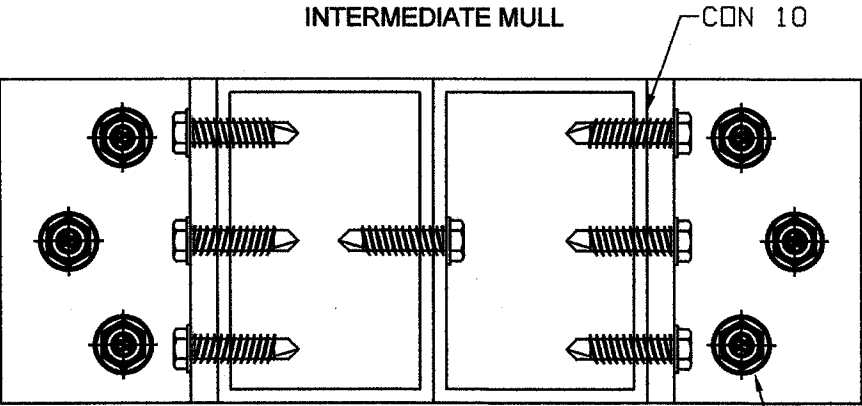


Ra: ALLOWABLE END REACTION PER MULLION.
Ra MUST NOT EXCEED THE SERVICE REACTION
Rs VALUES FROM TABLES 12.1 AND 13.1



END MULLION ALLOWABLE
REACTION PER MULLION: Ra (lb)

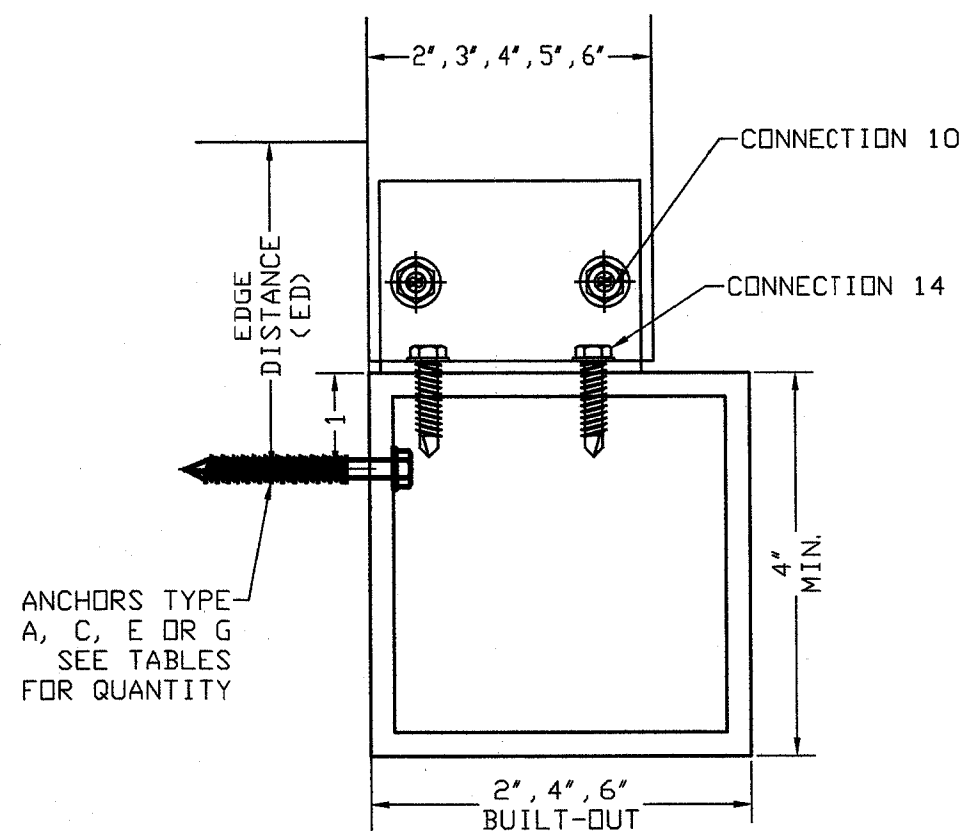
MULL TYPE	# SCREWS	Ra (Lb)
2x2	2	2068
2x3	3	3102
2x4	4	4136
2x5	5	5170
2x6	6	6204



INTERMEDIATE MULLIONS ALLOWABLE
REACTION PER MULLION: Ra (lb)

MULL TYPE	# SCREWS	Ra (Lb)
2x2	2	1034
2x3	3	1551
2x4	4	2068
2x5	5	2585
2x6	6	3102

CONNECTION 15 BUILT-OUT WALL ANCHORAGE SUPPORTING MULLIONS



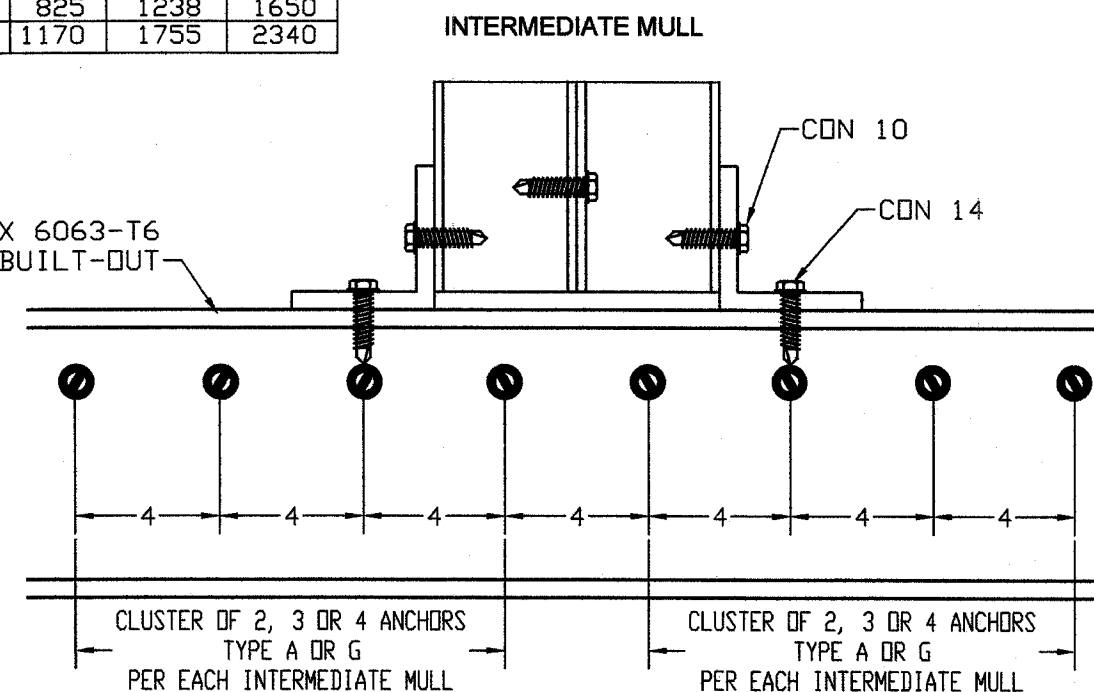
ANCHORS TYPE
A, C, E OR G
SEE TABLES
FOR QUANTITY

R_a: ALLOWABLE END REACTION PER MULLION.
R_a MUST NOT EXCEED THE SERVICE REACTION
R_s VALUES FROM TABLES 12.1 AND 13.1

INTERMEDIATE MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

ANCHOR TYPE	# OF ANCHORS PER MULL		
	2	3	4
A	825	1238	1650
G	1170	1755	2340

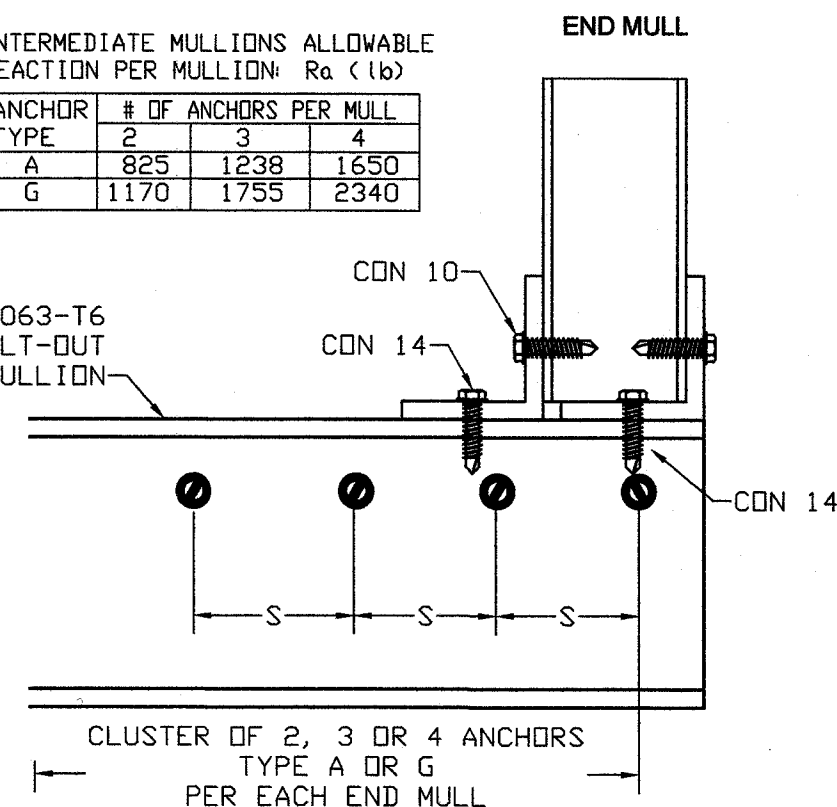
1/4-4X 6063-T6
ALUMINUM BUILT-OUT



INTERMEDIATE MULLIONS ALLOWABLE
REACTION PER MULLION: R_a (lb)

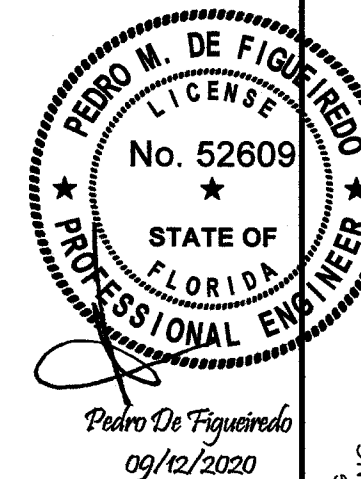
ANCHOR TYPE	# OF ANCHORS PER MULL		
	2	3	4
A	825	1238	1650
G	1170	1755	2340

1/4-2X 6063-T6
ALUMINUM BUILT-OUT
TO MATCH MULLION



ANCHOR SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	EMBEDMENT	ED	BASE MATERIAL	S
A	1/4" ss TAPCON	ITW	1 3/4"	3"	3000 psi CONCRETE	4
G	5/16" TAPCON	ITW	2 1/4"	2 1/2"	3000 psi CONCRETE	4



PRODUCT:
STORM BARS, HEADERS
& MULLIONS
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WITH DRAWING 20-151

ASSOCIATION OF MANUFACTURERS:

N.A.S.A.

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