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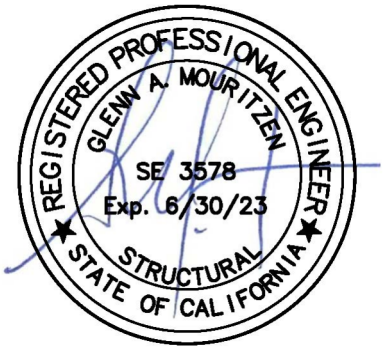
6593 Riverdale St.
San Diego, CA 92120
619-727-4800

Structural Calculations

for

CBWC-115 Series

CBWCSLM1830



Prepared for:

PROVENT / RRS

3847 Wabash Drive
Mira Loma, CA 91725

Date: October 11, 2021

Project Number: PV2101

For wood, concrete and steel attachments see Roof Anchorage Detail, Form No. CB-60.

STRUCTURALLY CALCULATED WELDED ROOF CURBS FOR YORK UNITS

ZJ, ZR 180-300; XP 180-240
ZF 210-300; ZT 180-276

ProVent P/N	A	WEIGHT
CBWCSLM183008	8"	159 Lbs
CBWCSLM183011	11"	185 Lbs
CBWCSLM183014	14"	211 Lbs
CBWCSLM183024	24"	370 Lbs

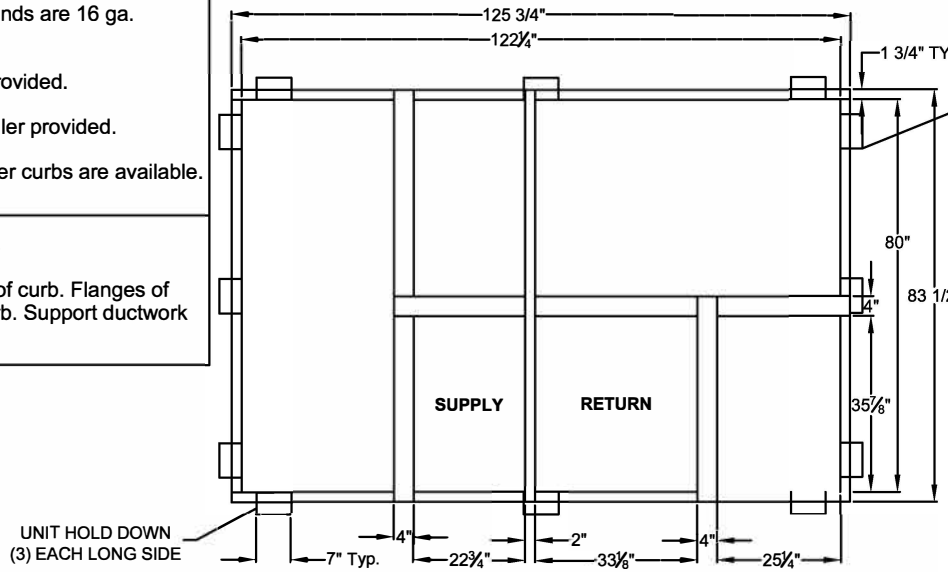
Meets seismic requirements for the following codes:
CBC 2019
IBC 2018

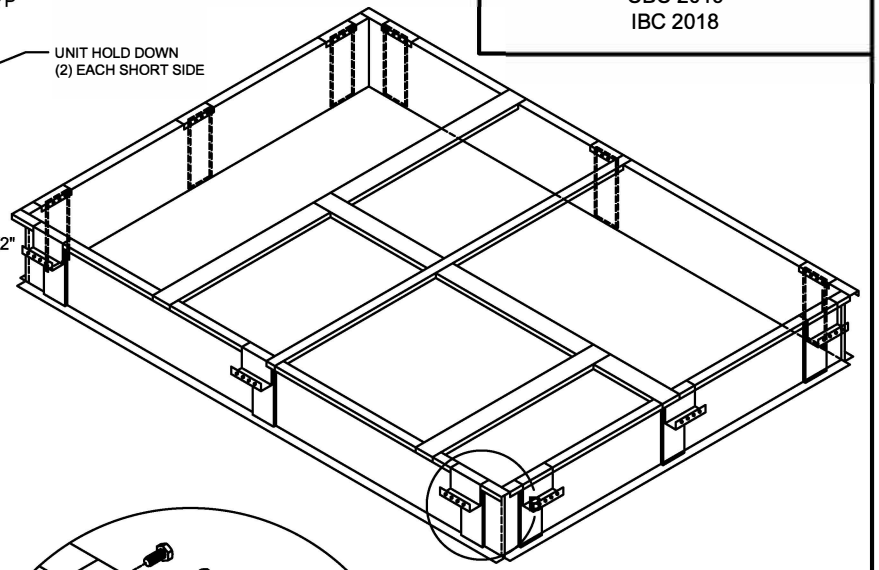
FEATURES

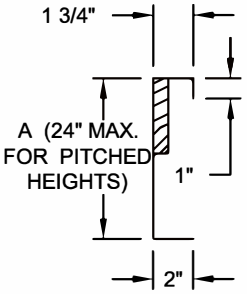
- Roof curb sides and ends are 16 ga. galvanized steel.
- Gasketing package provided.
- Heat treated wood nailer provided.
- Pitched curbs and taller curbs are available.

NOTES

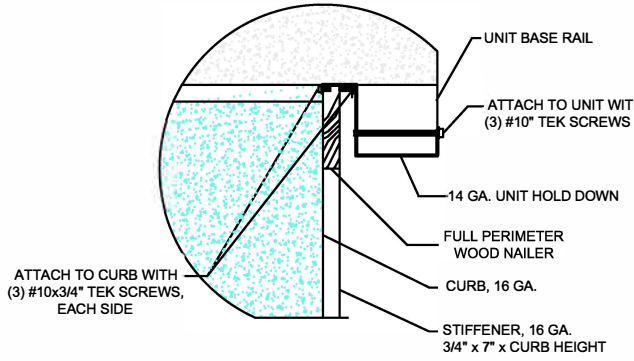
- Attach ductwork to roof curb. Flanges of duct rest on top of curb. Support ductwork below the curb.



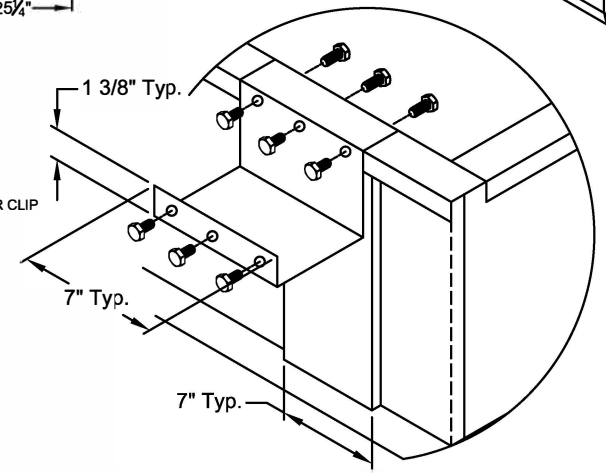




CURB DETAIL



HOLD DOWN DETAIL



DETAIL B

REGISTERED PROFESSIONAL ENGINEER
GLENN A. MOURITZEN
SE 3578
Exp. 6/30/23
STRUCTURAL
STATE OF CALIFORNIA

ProVent

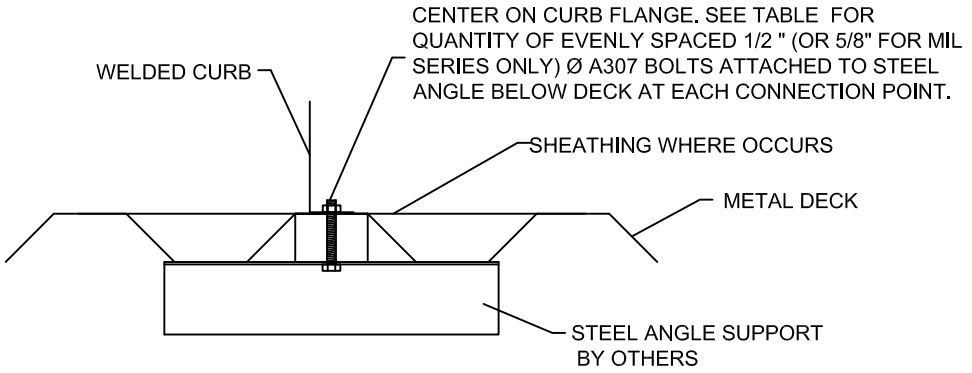
3847 WABASH DRIVE
MIRA LOMA, CA 91725

PHONE (951) 685-1101
FAX (619) 872-9799

SUBMITTED TO:_____
COMPANY:_____
JOB NAME:_____
EQUIPMENT:_____
NOTES:_____

FORM NO:		PART NUMBER:
CBWC-115		CBWCSLM1830 SERIES
DATE: 9/9/2021	REV: 8	DRAWN BY: ALL

STEEL ATTACHMENT



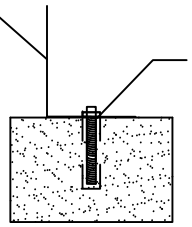
	NO. OF ANCHORAGE BOLTS REQUIRED	
CURB	LONG SIDE	SHORT SIDE
LXS	2 @ 34.5" O.C.	2 @ 19" O.C.
LXL	2 @ 34.5" O.C.	2 @ 29" O.C.
SUN3672	2 @ 60.5" O.C.	2 @ 39" O.C.
PRD3715	2 @ 68.88" O.C.	2 @ 39" O.C.
PRS	2 @ 58.88" O.C.	2 @ 28.69" O.C.
PRL	2 @ 72" O.C.	2 @ 41.5" O.C.
SLU180	3 @ 51.38" O.C.	2 @ 71.5" O.C.
SLM1830	3 @ 56.88" O.C	3 @ 35.75" O.C.

Meets seismic requirements for the following codes:
CBC 2019
IBC 2018

ROOF ANCHORAGE DETAIL	
CBKD Series	CBWC Series
LXS	LXS
LXL	LXL
SUN3672	SUN3672
PRD3715	PRD3715
PRS	PRS
PRL	PRL
SLU180	SLU180
SLM1830	SLM1830

ASSUMES:
CONC SLAB
f'c= 4000PSI MINIMUM
6" MIN THICKNESS
NORMAL WEIGHT CONCRETE
OR SAND LIGHT WEIGHT

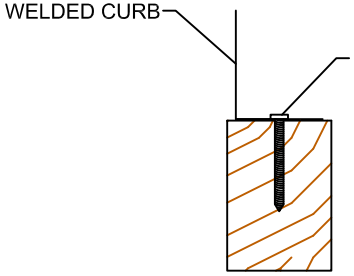
CONCRETE ATTACHMENT



	NO. OF ANCHORAGE BOLTS REQUIRED	
CURB	LONG SIDE	SHORT SIDE
LXS	4 @ 11.5" O.C.	3 @ 9.5" O.C.
LXL	4 @ 11.5" O.C.	3 @ 14.5" O.C.
SUN3672	4 @ 20.17" O.C.	3 @ 12.38" O.C.
PRD3715	9 @ 8.61" O.C.	7 @ 6.5" O.C.
PRS	5 @ 14.72" O.C.	4 @ 9.56" O.C.
PRL	6 @ 14.4" O.C.	5 @ 10.38" O.C.
SLU180	8 @ 14.68" O.C.	7 @ 11.92" O.C.
SLM1830	12 @ 10.34" O.C.	10 @ 7.94" O.C.

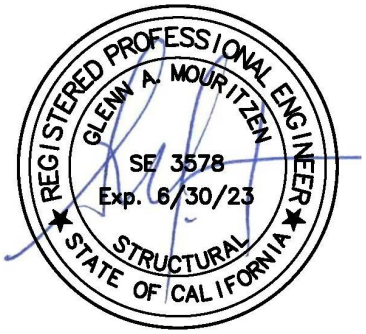
*** SIX INCHES FROM EACH CORNER EVENLY SPACED.**
**** CENTERED.**

WOOD ATTACHMENT



	NO. OF ANCHORAGE SCREWS REQUIRED	
CURB	LONG SIDE	SHORT SIDE
LXS	4 @ 12.83" O.C.	3 @ 11.5" O.C.
LXL	4 @ 12.83" O.C.	3 @ 16.5" O.C.
SUN3672	4 @ 21.5" O.C.	3 @ 14.38" O.C.
PRD3715	9 @ 9.11" O.C.	8 @ 6.14" O.C.
PRS	4 @ 20.96" O.C.	3 @ 16.34" O.C.
PRL	5 @ 19" O.C.	4 @ 15.17" O.C.
SLU180	9 @ 13.34" O.C.	7 @ 12.58" O.C.
SLM1830	13 @ 9.81" O.C.	12 @ 6.86" O.C.

FOUR INCHES FROM EACH CORNER EVENLY SPACED



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SUBMITTED TO: _____
COMPANY: _____
JOB NAME: _____
EQUIPMENT: _____
NOTES: _____

FORM NO: CB-60

DATE:	REV:	DRAWN BY:
10/07/2021	7	FMM

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San Diego, CA 92120
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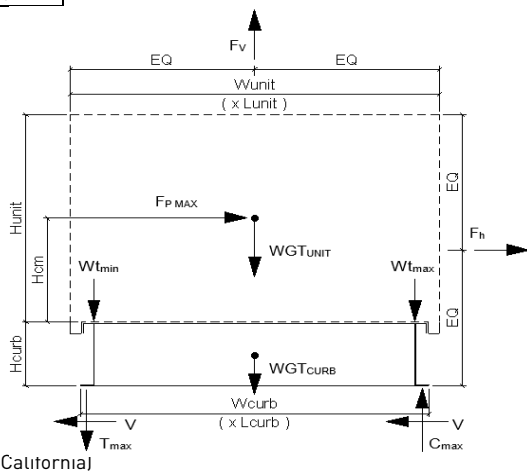
Client:	ProVent PV2101 Previous: PV1806
Description:	CBWC-115 CBWCSLM1830
Unit:	ZJ,ZR 180-300; ZF 210-300; XP 180-240; ZT 180-276

Curb Information

Hcurb =	24	in	(Height of curb)
Lcurb =	125.75	in	(Length of curb)
wcurb =	83.5	in	(Width of curb)
WGTcurb =	370	lbs	(Weight of curb)
# Clips long side =	3		# Clips short side = 3

Unit Information

WGTunit =	3061.3	lbs	(Weight of Unit)
Wtmax =	908	lbs	(Maximum corner weight)
Wtmin =	306	lbs	(Minimum corner weight)
Hunit =	52.625	in	(Height of unit above curb)
Hcm =	26.3125	in	(Height to center of mass)
Lunit =	136.25	in	(Length of unit)
Wunit =	92	in	(Width of unit)



Seismic Loading - 2018 IBC/2019 CBC

Ss =	2.85		(Worst case for majority of California)
Fa =	1.2		Default Site Class D
Sms =	3.420		(Fa*Ss)
Sds =	2.280		(2/3*Sms)
Ip =	1.50		(Importance Factor Category III Building)
Fpmax =	1.710	Wp	(0.4*Sds*Ip)*Wp*3/Rp
FpmaxASD =	3664	lbs	(0.7*Fpmax) FpmaxASD = 4107 lbs
	(unit only)		(unit and curb)

Wind Loading - 2018 IBC/2019 CBC

*** Exposure Category C ***

Kz =	1.13		(For 60 ft roof height, Exposure C - Table 26.10-1 ACSE 7-16)
Kzt =	1.0		(No topographic effects assumed for rooftop mounted units)
Kd =	0.85		(Directionality factor Table 26.6-1 ASCE 7-16)
V =	115		(Max wind velocity, mph for Cat III & IV bldgs Exp. Cat C)
$GCr_{(horiz)}$ =	1.9		(Refer Sect 29.4.1 ASCE 7-16)
$GCr_{(vert)}$ =	1.5		(Refer Sect 29.4.1 ASCE 7-16)
qz	32.5	psf	= 0.00256*Kz*Kzt*Kd*V^2 (Eq. 26.10-1 ASCE 7-16)
$F_{h\ ASD\ trans}$ =	2688	lbs	= 0.6*qz*GCr*Lunit*(Hunit+Hcurb) (Eq. 29.4-2)
$F_{h\ ASD\ long}$ =	1815	lbs	= 0.6*qz*GCr*Wunit*(Hunit+Hcurb)
$F_{vert\ ASD}$ =	2548	lbs	= 0.6*qz*GCr*Lunit*Wunit (Eq. 29.4-3)

Curb Loading

Transverse:

$Compression_{SEISMIC}$ =	3550	lbs	=[FpmaxASD*Hcm+2*(1+0.14S_{DS})*Wtmax*wcurb]/wcurb
$Tension_{SEISMIC}$ =	2691	lbs	= $Comp_{SEISMIC}$-(0.6-0.14S_{DS})*WGTunit
$Compression_{WIND}$ =	663	lbs	=[$F_{h\ transASD}$*Hcm+2*0.6*Wtmax*wcurb-$F_{vertASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ =	1374	lbs	= $Comp_{WIND}$+Fvert-0.6*WGTunit

---> Negative values indicate Compression load rather than Tension.

Longitudinal:

$Compression_{SEISMIC}$ =	3162	lbs	=[FpmaxASD*Hcm+2*(1+0.14*S_{DS})*Wtmax*Lcurb]/Lcurb
$Tension_{SEISMIC}$ =	2303	lbs	= $Comp_{SEISMIC}$-(0.6-0.14S_{DS})*WGTunit
$Compression_{WIND}$ =	196	lbs	=[$F_{h\ transASD}$*Hcm+2*0.6*Wtmax*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ =	906	lbs	= $Comp_{WIND}$+Fvert-0.6*WGTunit

---> Negative values indicate Compression load rather than Tension.

Governing Reactions:

Transverse:	$Comp_{MAX}$ =	3550	lbs	---> Along long edge of curb.
(on long edge)	$Tens_{MAX}$ =	2691	lbs	---> Along long edge of curb.
Longitudinal:	$Comp_{MAX}$ =	3162	lbs	---> Along short edge of curb.
(on short edge)	$Tens_{MAX}$ =	2303	lbs	---> Along short edge of curb.

---> Negative values indicate Compression load rather than Tension.

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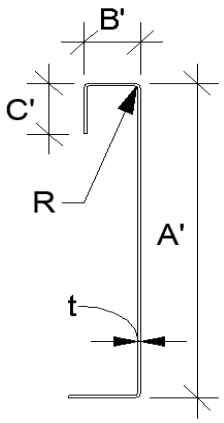
Curb Design

Fy = 50 ksi Fu = 65 ksi t = 0.0566 [16 Gauge]
E = 29500 ksi



Calculate Section Properties of Curb

A'=	[24.000] in		a =	23.717 in	= A'-(2r+t)
B'=	[1.750] in		a'=	23.943 in	= A'-t
C'=	[0.000] in	(0 if no lips)	b =	1.609 in	= B'-[r+t/2+α(r+t/2)]
α =	[0.000]	(0 - no Lip; 1 w/ lip)	b'=	1.722 in	= B'-(t/2+αt/2)
R =	0.0849 in	(Inside bend radius)	c =	0.000 in	= α[C'-(r+t/2)]
t =	0.0566 in		c'=	0.000 in	= α(C'-t/2)
r'=	0.113 in	= R+t/2	u =	0.178 in	= πr/2
x =	0.109 in	(Distance between centroid and web centerline)			
Ix =	91.935 in	(Moment of Inertia about X-Axis)			
Iy =	0.174 in	(Moment of Inertia about Y-Axis)			
A =	1.54 in^2				
rx =	7.71 in				
ry =	0.336 in				
rmin =	0.336 in				

Axial Compression

Pu = 1.832 k (Max Axial Comp) Ωc = 1.80
Pn/Ωc = 6.038 k
Fe = 8.02 ksi
λc = 2.50
Fn = 7.04 ksi
Ly = 80 in Lateral unbraced length
k_yL_y/r_y = 191 (assume k=0.8)

$$\frac{P_n}{\Omega_c} = \frac{F_nA}{\Omega_c} \qquad If\ \lambda_c \le 1.5;\ F_n = \left(0.658^{\lambda_c^2}\right)F_y \qquad If\ \lambda_c > 1.5;\ F_n = \frac{0.877}{\lambda_c^2}F_y \qquad \lambda_c = \sqrt{\frac{F_y}{F_e}} \qquad F_e = \frac{\pi^2E}{\left(kl/r\right)^2}$$

Compression Check = **O.K.**

Check Web Crippling

h =	24 in	-- Check limits:		C = 4.00	(See table C3.4.1-2, fastened to support, one flange, end loading)
t =	0.0566 in	h/t =	424.03 ≤ 200	C_R = 0.14	
N =	7.00	N/t =	123.67 ≤ 210	C_N = 0.35	
Ω_w =	1.75	N/h =	0.291667 ≤ 2.0	C_h = 0.02	
P_n =	1.366 k	R/t =	1.50 ≤ 9.0		
P_n/Ω_w =	0.780 k				
Long side: Pu_{Trans} =	1.183 k	**web stiffener REQ'D**	# clips = 3		
Short side: Pu_{Long} =	1.054 k	**web stiffener REQ'D**	# clips = 3		

$$P_n = Ct^2F_y\sin(90)\left(1 - C_R\sqrt{\frac{R}{t}}\right)\left(1 + C_N\sqrt{\frac{N}{t}}\right)\left(1 - C_h\sqrt{\frac{h}{t}}\right)$$

*****h/t > 200; use web stiffeners**

Check Web Stiffener

16Ga x 3/4" x 7" (C-channel)

width of stiffener = 7.000 in ts = 0.0566 [16 Gauge]
web of stiff. w = 6.717 in Rs = 0.0849 in
***Check w/ts ≤ 1.28√E/Fys Ωc = 1.70
w/ts = 118.675
1.28√(E/Fys) = 31.091 --> w/ts over limit Use C3.7.2

$$P_n = 0.7\left(P_{wc} + A_eF_y\right) \ge P_{wc}$$

Pwc = 1.366 k Ae = 0.380 in^2
Pn = 14.262 k Pn/Ω = 8.390 k

O.K.

Corner Connections

1/4" φ SAE Grade 8 bolts w/ 1/4-20-UNC Threaded inserts

Tcrnmax = 916 lbs Max($F_{pmaxASD}$/4 -OR- $Fh_{ASDtrans}$/4 corner connections)
Vcrnmax = 1345 lbs (Max Ten/2 corner connections per side)

Bolt:	Tall = [2480] lbs		Vall = [1096] lbs	
Threaded Insert:	Tall = [2860] lbs		Vall = [1714] lbs	
# of Bolts required for Tension =	0.4			
# of Bolts required for Shear =	1.2		***If combined fails:	
# of Bolts Used =	[2.0]		USE --> 3.0	

Check Combined Stress in Bolts & Inserts: 0.798 O.K. StressComb = 0.532 **O.K.**

Check 1/8" welded connection

<--- USE WELD Ω = 2.35
Assume L/t > 25: 25*t = 1.415 in
Lreq'd = 1.146 in

$$P_n/\Omega = \frac{1}{\Omega}0.75tLF_u \ge V_{req} \qquad L_{req'd} = \frac{V_{req}\Omega}{0.75tF_u}$$

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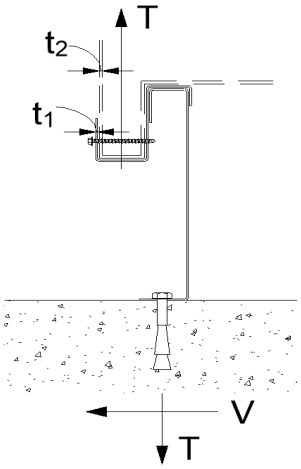
Connection Unit to Curb Clip | #10 SMS screw | Ω = 3.0

t1 = 0.0566 in | Fu1 = 65 ksi
t2 = 0.1017 in (unit base rail thickness) | Fu2 = 65 ksi
d = 0.190 in (screw diameter) | dw = 0.375 in (nom. washer diameter)
t2/t1 = 1.8



For t2/t1 ≤ 1.0: | Pns = 1887 # | For t2/t1 ≥ 2.5: | Pns = 1887 #

Shear: $P_{ns} = 4.2F_{u2}\sqrt{t_2^3 d}$ = 3.86 k | $P_{ns} = 2.7t_1 dF_{u1}$ = 1.89 k | $P_{ns} = 2.7t_2 dF_{u2}$ = 3.39 k

Pns/Ω = 629 #
Pss/Ω = 540 # <- Controls

Tension: Pnot = 1.068 k (screw pull-out strength) $P_{not} = 0.85t_c dF_{u2}$ where $t_c = \min(t_1, t_2)$
Pnov = 2.069 k (screw pull-over strength) $P_{nov} = 1.5t_1 d_w F_{u1}$
Pts/Ω = 356 # <- Controls
Pts/Ω = 820 # (full tensile screw capacity)

	Shear (k)	# clips	V_{clip} (k)	V_{allow}(lb)	# screws	spacing
Long side:	3.664	3	1.22	540 #	3	3.00 in
Short side:	3.664	3	1.22	540 #	3	3.00 in

clip width (in) = 7.00 | clip height = 1.4 in
min spacing = 0.57 in | edge distance = 0.5 in (min. 1.5d)
Check Block shear rupture: O.K. | thinnest part = 0.0566 AISI BSR applies
Fy = 50 ksi | Ω = 2.22 bolt/screw connection
Agv = 0.368 in² | Anv = 0.341 in² | Ant = 0.034 in²
Rn/Ω = 5.954 k $R_n = 0.6F_y A_{gv} + F_u A_{nt} \le 0.6F_u A_{nv} + F_u A_{nt}$ (AISI Sect. E5.3)
BSR O.K.

Connection of Curb to Supporting Structure

Roof Loading SEISMIC: (0.6-0.14SDS)D + 0.7E WIND: 0.6D + W

Transverse: $Uplift_{MAX}$ = 3775 lbs | $Shear_{MAX}$ = 2054 lbs

$Compression_{SEISMIC}$ = 4738 lbs =[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*wcurb]/wcurb
$Tension_{SEISMIC}$ = 3775 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)
$Compression_{WIND}$ = 1375 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)+0.6*($WGT_{unit+curb}$/2)*wcurb-$F_{vertASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ = 1864 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)-0.6*($WGT_{unit+curb}$/2)*wcurb+$F_{vertASD}$*wcurb/2]/wcurb

Longitudinal: $Uplift_{MAX}$ = 2943 lbs | $Shear_{MAX}$ = 2054 lbs

$Compression_{SEISMIC}$ = 3907 lbs =[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*Lcurb]/Lcurb
$Tension_{SEISMIC}$ = 2943 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)
$Compression_{WIND}$ = 482 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)+0.6*($WGT_{unit+curb}$/2)*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ = 971 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)-0.6*($WGT_{unit+curb}$/2)*Lcurb+$F_{vertASD}$*Lcurb/2]/Lcurb

Wood Attachment: **1/4"φ x 3.5" Simpson SDS screws w/ 2.25" threaded emb** (SGmin = 0.43)

$Tall_{metal}$ = 997 lbs | $Vall_{metal}$ = 1097 lbs
Transverse: $Tall_{wood}$ = 616 lbs | $Vall_{wood}$ = 400 lbs

# of Screws Req'd for Uplift = 6.13 | COMBINED LOADING: 0.866 O.K.
# of Screws Req'd for Shear = 5.13 | Screw Spacing = 9.8 in o.c.
Total # of screws Required = 13

1/4"ϕ x 3.5" Simpson SDS screws @ 9.8 in o.c. along long side of curb

Longitudinal:
# of Screws Req'd for Uplift = 4.8 | COMBINED LOADING: 0.826 O.K.
# of Screws Req'd for Shear = 5.1 | Screw Spacing = 6.9 in o.c.
Total # of screws Required = 12

1/4"ϕ x 3.5" Simpson SDS screws @ 6.9 in o.c. along short side of curb

Steel Deck Attachment: **1/2" φ A307 Bolts to steel angle below deck**

$Tall_{bolt}$ = 3927 lbs | $Vall_{bolt}$ = 2209 lbs
Transverse: $Tall_{metal}$ = 1656 lbs | $Vall_{metal}$ = 1756 lbs

# of Bolts Req'd for Uplift = 2.28 | COMBINED LOADING: 0.841 O.K.
# of Bolts Req'd for Shear = 1.17 | Bolt Spacing = 56.9 in o.c.
Total # of Bolts Required = 3

1/2" ϕ A307 Bolts to steel angle below deck @ 56.9 in o.c. along long side of curb

Longitudinal:
# of Bolts Req'd for Uplift = 1.78 | COMBINED LOADING: 0.626 O.K.
# of Bolts Req'd for Shear = 1.17 | Req'd Min Spacing = 35.8 in o.c.
Total # of Bolts Required = 3

1/2" ϕ A307 Bolts to steel angle below deck @ 35.8 in o.c. along short side of curb

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(619)727-4800

For Concrete anchorage: SEISMIC (0.6-0.14SDS)D + 0.7Ω_oE (Ω_o = 2.5)

Concrete Attachment: 3/4" φ Hilti Hit-HY 200 adhesive anchors w/ 4" embed

$Tall_{LRFD}$ = 1722 lbs $Vall_{LRFD}$ = 2032 lbs $\propto = (1 + 0.2SDS)D + 2.5E$ =1.87

$Tall_{ASD} = Tall_{LRFD}/\alpha$ = 920.9 lbs $Vall_{ASD} = Vall_{LRFD}/\alpha$ = 1086.6 lbs $(D = 0.465, E = 0.535)$

Transverse: $Uplift_{MAX}$ = 7487 lbs $Shear_{MAX}$ = 5134 lbs

$Compression_{SEISMIC}$ = 8450 lbs =[2.5*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*wcurb]/wcurb

$Tension_{SEISMIC}$ = 7487 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)

$Shear_{SEISMIC}$ = 5134 lbs =2.5*FpmaxASD/2

Min Bolts Req'd Uplift = 8.13 spacing = 12.72 in o.c. Tapplied = 623.9 lbs

Min Bolts Req'd Shear = 4.72 spacing = 25.4375 in o.c. Vapplied = 427.8 lbs

Try using 12 bolts spaced at 10.34 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 1.07

Use 12 - 3/4" φ Hilti Hit-HY 200 adhesive anchors @ 10.3 in o.c. max. along long side of curb w/ 4" embed

Longitudinal: $Uplift_{MAX}$ = 5408 lbs $Shear_{MAX}$ = 5134 lbs

$Compression_{SEISMIC}$ = 6372 lbs =[2.5*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*Lcurb]/Lcurb

$Tension_{SEISMIC}$ = 5408 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)

$Shear_{SEISMIC}$ = 5134 lbs =2.5*FpmaxASD/2

Min Bolts Req'd Uplift = 5.87 spacing = 11.9 in o.c. Tapplied = 540.8 lbs

Min Bolts Req'd Shear = 4.72 spacing = 14.875 in o.c. Vapplied = 513.4 lbs

Try using 10 bolts spaced at 7.94 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 1.06

Use 10 - 3/4" φ Hilti Hit-HY 200 adhesive anchors @ 7.9 in o.c. max. along short side of curb w/ 4" embed

CURB DESIGN SUMMARY:	CBWC-115		
CURB RAIL THICKNESS:	0.0566 in 16 Gauge		
UNIT CLIP THICKNESS:	0.0566 in 16 Gauge		
# OF CLIPS (LONG SIDE) -	3 clips with 3 - #10 SMS screws each clip		
WEB STIFFENER:	16Ga x 3/4" x 7" (C-channel) stiffener at each clip		
# OF CLIPS (SHORT SIDE) -	3 clips with 3 - #10 SMS screws each clip		
WEB STIFFENER:	16Ga x 3/4" x 7" (C-channel) stiffener at each clip		
CORNER CONNECTION:	Use 3 - 1/4" φ SAE Grade 8 bolts w/ 1/4-20-UNC Threaded inserts		
CURB ANCHORAGE	WOOD 1/4" φ Simpson SDS screw w/ 2.25" threaded embed (SGmin=0.43)	STEEL 1/2" φ A307 bolts	CONCRETE 3/4" φ thrd'd rod in Hilti HIT-HY 200 epoxy, min. 4" embed
LONG DIRECTION	13 @ 9.81 in o.c.	3 @ 56.88 in o.c.	12 @ 10.34 in o.c.
SHORT DIRECTION	12 @ 6.86 in o.c.	3 @ 35.75 in o.c.	10 @ 7.94 in o.c.