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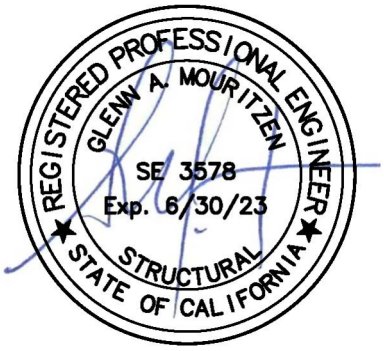
6593 Riverdale St.
San Diego, CA 92120
619-727-4800

Structural Calculations

for

CBKD-80 Series

KDKITPRD3715



Prepared for:

PROVENT / RRS

3847 Wabash Drive
Mira Loma, CA 91725

Date: October 1, 2021

Project Number: PV2101

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

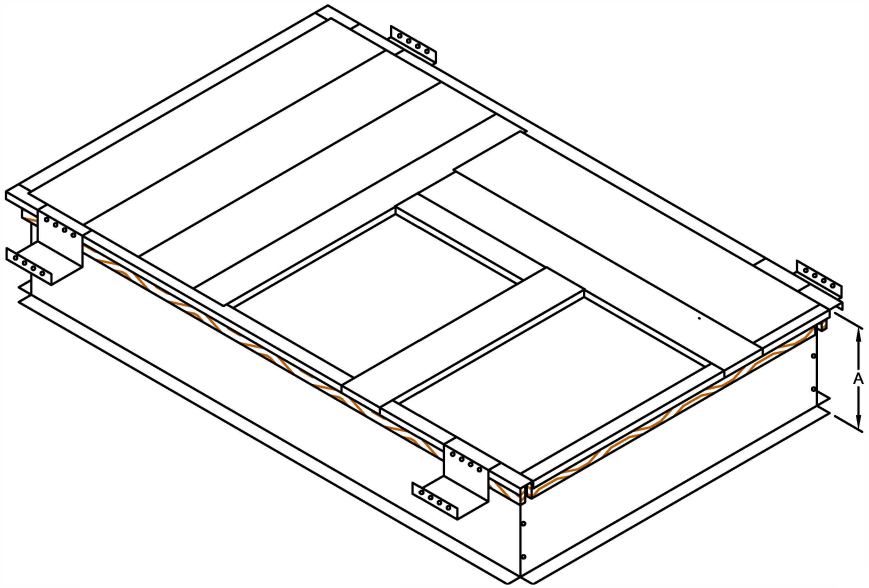
Will conform to seismic code requirements for knock-down or pre-assembled application. (Contact factory for assembled version.)

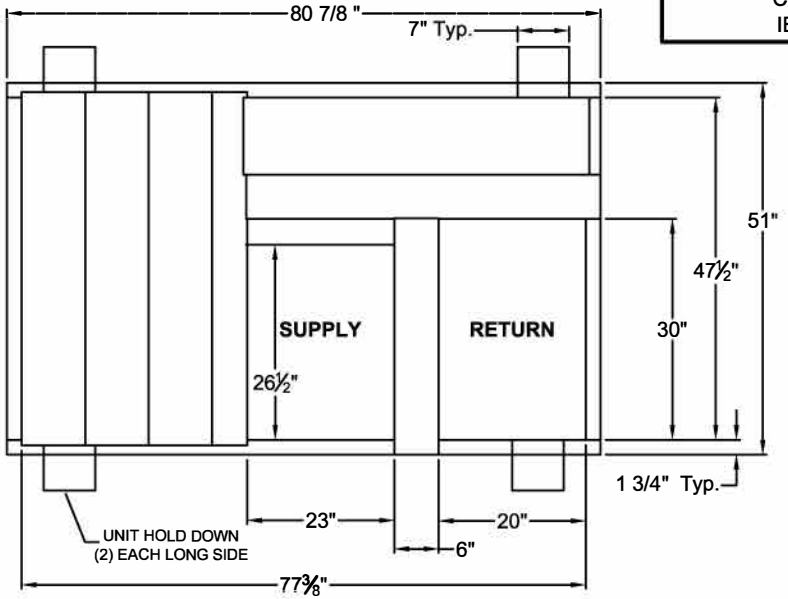
STRUCTURALLY CALCULATED HOLD DOWN CLIPS FOR KNOCK-DOWN ROOF CURBS FOR YORK UNITS

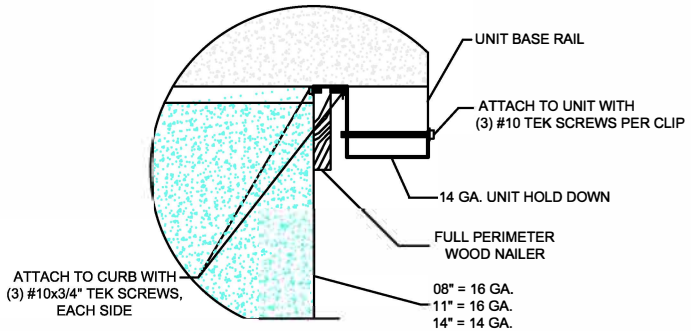
ZT, ZH, ZJ, ZR 037-150
ZF, XP, ZB 078-150

ProVent P/N	A	WEIGHT	SEISMIC KIT P/N	WEIGHT
CBKDPRD371508	8"	115 Lbs	KDKITPRD371508	8 Lbs
CBKDPRD371511	11"	129 Lbs	KDKITPRD371511	10 Lbs
CBKDPRD371514	14"	144 Lbs	KDKITPRD371514	11 Lbs

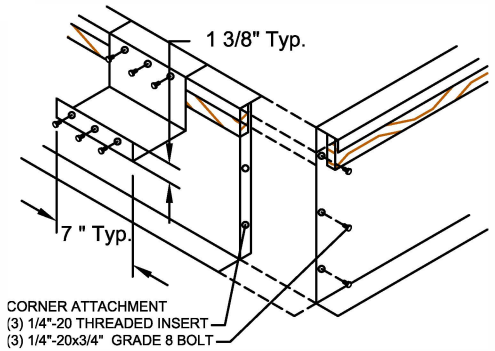
Meets seismic requirements for the following codes:
CBC 2019
IBC 2018







HOLD DOWN DETAIL



CORNER &
HOLD DOWN DETAIL

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

ProVent

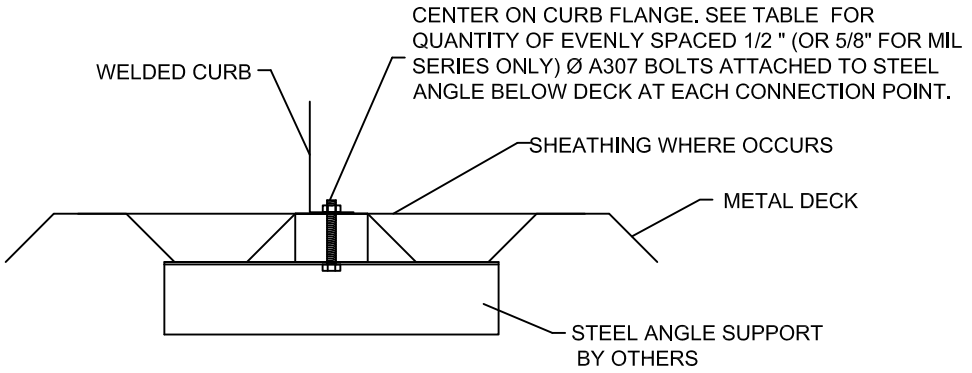
3847 WABASH DRIVE
MIRA LOMA, CA 91725

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

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

FORM NO:		PART NUMBER:
CBKD-80		KDKITPRD3715 Series
DATE: 9/9/2021	REV: 6	DRAWN BY: ALL

STEEL ATTACHMENT



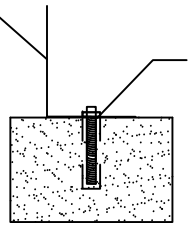
	NO. OF ANCHORAGE BOLTS REQUIRED	
CURB	LONG SIDE	SHORT SIDE
LXS	2 @ 34.5" O.C.	2 @ 19" O.C.
LXL	2 @ 34.5" O.C.	2 @ 29" O.C.
SUN3672	2 @ 60.5" O.C.	2 @ 39" O.C.
PRD3715	2 @ 68.88" O.C.	2 @ 39" O.C.
PRS	2 @ 58.88" O.C.	2 @ 28.69" O.C.
PRL	2 @ 72" O.C.	2 @ 41.5" O.C.
SLU180	3 @ 51.38" O.C.	2 @ 71.5" O.C.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

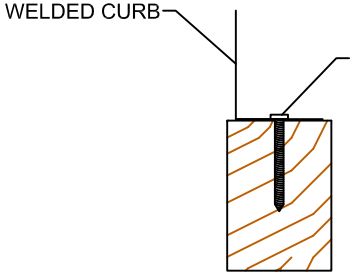
CONCRETE ATTACHMENT



	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.

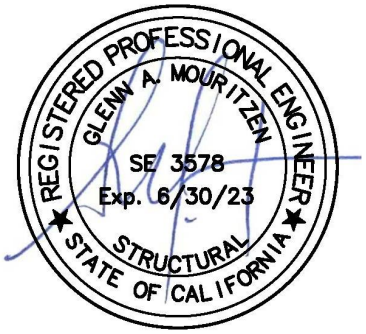
*** SIX INCHES FROM EACH CORNER EVENLY SPACED.**
**** CENTERED.**

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



ProVent
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MIRA LOMA, CA 91725
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SUBMITTED TO: _____
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NOTES: _____

FORM NO: CB-60

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

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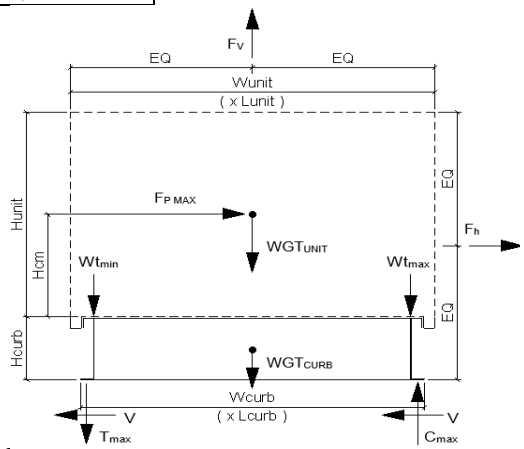
Client:	ProVent	PV2101	Previous: PV1806
Description:	CBKD-80	14"	KDKITPRD3715
Unit:	ZT,ZR,ZJ,ZH 037-150; ZF,ZH,ZJ,ZR,XP,DH,DM,DF,DR,BP 078-150		

Curb Information

Hcurb =	14	in	(Height of curb)
Lcurb =	80.875	in	(Length of curb)
wcurb =	51	in	(Width of curb)
WGTcurb =	155	lbs	(Weight of curb)
# Clips long side =	2	# Clips short side =	0

Unit Information

WGTunit =	1700	lbs	(Weight of Unit)
Wtmax =	329	lbs	(Maximum corner weight)
Wtmin =	191	lbs	(Minimum corner weight)
Hunit =	50.75	in	(Height of unit above curb)
Hcm =	25.375	in	(Height to center of mass)
Lunit =	89	in	(Length of unit)
Wunit =	59	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		
Ip =	1.50		(Importance Factor Category III Building)		
Sms =	3.420		(Fa*Ss)	ap =	2.5
Sds =	2.280		(2/3*Sms)	Rp =	6
Fpmax =	1.710	Wp	(0.4*ap*Sds*Ip)*Wp*3/Rp <=1.6*Sds*Ip*Wp		
FpmaxASD =	2035	lbs	(0.7*Fpmax)	FpmaxASD =	2220 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)
$F_{h\ ASD\ trans}$ =	1484	lbs	= 0.6*qz*GCr*Lunit*(Hunit+Hcurb) (Eq. 29.4-2)
$F_{h\ ASD\ long}$ =	983	lbs	= 0.6*qz*GCr*Wunit*(Hunit+Hcurb)
$F_{vert\ ASD}$ =	1067	lbs	= 0.6*qz*GCr*Lunit*Wunit (Eq. 29.4-3)

Curb Loading

Transverse:

$Compression_{SEISMIC}$ =	1880	lbs	=[FpmaxASD*Hcm+2*(1+0.14S_{DS})*Wtmax*wcurb]/wcurb
$Tension_{SEISMIC}$ =	905	lbs	=[FpmaxASD*Hcm-2*(0.6-0.14S_{DS})*Wtmin*wcurb]/wcurb
$Compression_{WIND}$ =	599	lbs	=[$F_{h\ ASD\ trans}$*Hcm+2*0.6*Wtmax*wcurb-$F_{vert\ ASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ =	1043	lbs	=[$F_{h\ ASD\ trans}$*Hcm-2*0.6*Wtmin*wcurb+$F_{vertASD}$*wcurb/2]/wcurb

---> Negative values indicate opposite load.

Longitudinal:

$Compression_{SEISMIC}$ =	1506	lbs	=[FpmaxASD*Hcm+2*(1+0.14*S_{DS})*Wtmax*Lcurb]/Lcurb
$Tension_{SEISMIC}$ =	531	lbs	=[FpmaxASD*Hcm-2*(0.6-0.14S_{DS})*Wtmin*Lcurb]/Lcurb
$Compression_{WIND}$ =	170	lbs	=[$F_{h\ ASD\ long}$*Hcm+2*0.6*Wtmax*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ =	613	lbs	=[$F_{h\ ASD\ long}$*Hcm-2*0.6*Wtmin*Lcurb+$F_{vertASD}$*Lcurb/2]/Lcurb

---> Negative values indicate opposite load.

Governing Reactions:

Transverse:	$Comp_{MAX}$ =	1880	lbs	---> Along long edge of curb.
(on long edge)	$Tens_{MAX}$ =	1043	lbs	---> Along long edge of curb.
Longitudinal:	$Comp_{MAX}$ =	1506	lbs	---> Along short edge of curb.
(on short edge)	$Tens_{MAX}$ =	613	lbs	---> Along short edge of curb.

---> Negative values indicate opposite load.

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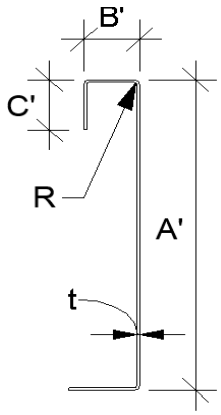
Curb Design

Fy = 50 ksi Fu = 65 ksi
E = 29500 ksi t = 0.0713 [14 Gauge]



Calculate Section Properties of Curb

A' =	[14.000] in	a =	13.644 in	= A'-(2r+t)
B' =	[1.750] in	a' =	13.929 in	= A'-t
C' =	[0.000] in (0 if no lips)	b =	1.572 in	= B'-[r+t/2+α(r+t/2)]
α =	[0.000] (0 - no Lip; 1 w/ lip)	b' =	1.714 in	= B'-(t/2+αt/2)
R =	0.1069 (Inside bend radius)	c =	0.000 in	= α[C'-(r+t/2)]
t =	0.0713 in	c' =	0.000 in	= α(C'-t/2)
r' =	0.143 in = R+t/2	u =	0.224 in	= πr/2
x =	0.171 in (Distance between centroid and web centerline)			
Ix =	27.499 in^4	rx =	4.73 in	
Iy =	0.204 in^4	ry =	0.407 in	
A =	1.23 in^2	rmin =	0.407 in	

Axial Compression

Pu = 1.017 k (Max Axial Comp) Ωc = 1.80
Pn/Ωc = 17.057 k
Fe = 30.16 ksi
λc = 1.29
Fn = 24.98 ksi
Ly = 50 in Lateral unbraced length
k_yL_y/r_y = 98 (assume k=0.8)

$$\frac{P_n}{\Omega_c} = \frac{F_nA}{\Omega_c} \qquad If\ \lambda_c \le 1.5;\ F_n = \left(0.658^{\lambda_c{}^2}\right)F_y \qquad If\ \lambda_c > 1.5;\ F_n = \frac{0.877}{\lambda_c{}^2}F_y$$

$$\lambda_c = \sqrt{\frac{F_y}{F_e}} \qquad F_e = \frac{\pi^2E}{\left(kl/r\right)^2}$$

Compression Check = **O.K.**

Check Web Crippling

h = 14 in -- Check limits: C = 4.00
t = 0.0713 in h/t = 196.35 ≤ 200 C_R = 0.14
N = 7.00 N/t = 98.18 ≤ 210 C_N = 0.35
Ω_w = 1.75 N/h = 0.5 ≤ 2.0 C_h = 0.02
P_n = 2.422 k R/t = 1.50 ≤ 9.0
P_n/Ω_w = 1.384 k
Long side: Pu_{Trans} = 0.940 k **O.K.** # clips = 2
Short side: Pu_{Long} = 0.753 k **O.K.** # clips = 2

(See table C3.4.1-2, fastened to support, one flange, end loading)

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

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 = 2.422 k Ae = 0.380 in^2
Pn = 15.002 k Pn/Ω = 8.825 k

Not Req'd

Corner Connections

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

Tcrnmax = 555 lbs Max($F_{pmaxASD}$/4 -OR- $Fh_{ASDtrans}$/4 corner connections)
Vcrnmax = 940 lbs Max(Tens/2 -OR- Comp/2 corner connections per side)

Bolt:	Tall =	[2480] lbs	Vall =	[1208] lbs
Threaded Insert:	Tall =	[2860] lbs	Vall =	[1536] lbs

# of Bolts required for Tension = 0.2
# of Bolts required for Shear = 0.8
# of Bolts Used = [2.0]
Check Combined Stress in Bolts & Inserts: 0.501 **O.K.**

Check 1/8" welded connection

<--- USE WELD Ω = 2.35
Assume L/t > 25: 25*t = 1.783 in
Lreq'd = 0.636 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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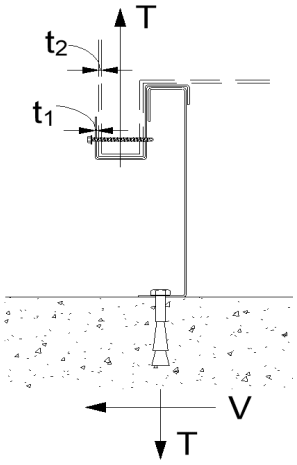
Connection Unit to Curb Clip | #10 SMS screw | Ω = 3.0

t1 = 0.0713 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 = 1.4



For t2/t1 ≤ 1.0: | Pns = 2377 #

Shear: $P_{ns} = 4.2F_{u2}\sqrt{t_2^3 d}$ = 3.86 k

$P_{ns} = 2.7t_1 dF_{u1}$ = 2.38 k

$P_{ns} = 2.7t_2 dF_{u2}$ = 3.39 k

For t2/t1 ≥ 2.5: | Pns = 2377 #

$P_{ns} = 2.7t_1 dF_{u1}$ = 2.38 k

$P_{ns} = 2.7t_2 dF_{u2}$ = 3.39 k

Pns/Ω = 792 #

Pss/Ω = 540 # <- Controls

Tension: Pnot = 1.068 k (screw pull-out strength)

Pnov = 2.607 k (screw pull-over strength)

$P_{not} = 0.85t_c dF_{u2})$

$t_c = \min(t_1, t_2)$

$P_{nov} = 1.5t_1 d_w F_{u1}$

Pts/Ω = 356 # <- Controls

Pts/Ω = 820 # (full tensile screw capacity)

	Shear (k)	# clips	V_{clip} (k)	V_{allow}(lb)	# screws	spacing
Long side:	2.035	2	1.02	540 #	2	6.00 in
Short side:	2.035	2	1.02	540 #	2	6.00 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 = 0.0713 AISI BSR applies

Fy = 50 ksi | Ω = 2.22 bolt/screw connection

Agv = 0.463 in^2 | Anv = 0.443 in^2 | Ant = 0.042 in^2

Rn/Ω = 7.500 k

$R_n = 0.6F_y A_{gv} + F_u A_{nt} \leq 0.6F_u A_{nv} + F_u A_{nt}$

BSR O.K. (AISI Sect. E5.3)

Connection of Curb to Supporting Structure

Roof Loading SEISMIC: (0.6-0.14S_{DS})D + 0.7E WIND: 0.6D + W

Transverse:	$Uplift_{MAX}$ = 2417 lbs	$Shear_{MAX}$ = 1110 lbs	
$Compression_{SEISMIC}$ =	2938 lbs	=[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*$WGT_{unit+curb}$*wcurb/2]/wcurb	
$Tension_{SEISMIC}$ =	2417 lbs	=[FpmaxASD*(Hcm+Hcurb)-(0.6-0.14S_{DS})*$WGT_{unit+curb}$*wcurb/2]/wcurb	
$Compression_{WIND}$ =	1168 lbs	=[$F_{h\ ASD\ trans}$*(Hcm+Hcurb)+0.6*$WGT_{unit+curb}$*wcurb/2-$F_{vert\ ASD}$*wcurb/2]/wcurb	
$Tension_{WIND}$ =	1123 lbs	=[$F_{h\ ASD\ trans}$*(Hcm+Hcurb)-0.6*$WGT_{unit+curb}$*wcurb/2+$F_{vertASD}$*wcurb/2]/wcurb	
Longitudinal:	$Uplift_{MAX}$ = 1784 lbs	$Shear_{MAX}$ = 1110 lbs	
$Compression_{SEISMIC}$ =	2305 lbs	=[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*$WGT_{unit+curb}$*Lcurb/2]/Lcurb	
$Tension_{SEISMIC}$ =	1784 lbs	=[FpmaxASD*(Hcm+Hcurb)-(0.6-0.14S_{DS})*$WGT_{unit+curb}$*Lcurb/2]/Lcurb	
$Compression_{WIND}$ =	502 lbs	=[$F_{h\ ASD\ long}$*(Hcm+Hcurb)+0.6*$WGT_{unit+curb}$*Lcurb/2-$F_{vert\ ASD}$*Lcurb/2]/Lcurb	
$Tension_{WIND}$ =	456 lbs	=[$F_{h\ ASD\ long}$*(Hcm+Hcurb)-0.6*$WGT_{unit+curb}$*Lcurb/2+$F_{vertASD}$*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 | $Vall_{wood}$ = 672 lbs

# of Screws Req'd for Uplift = 3.92 | COMBINED LOADING: 0.797 O.K.

# of Screws Req'd for Shear = 1.65 | Screw Spacing = 12.1 in o.c.

Total # of screws Required = 7

1/4"φ x 3.5" Simpson SDS screws @ 12.1 in o.c. along long side of curb w/ 2.25" threaded embed

Longitudinal:

# of Screws Req'd for Uplift = 2.9 | COMBINED LOADING: 0.758 O.K.

# of Screws Req'd for Shear = 1.7 | Screw Spacing = 8.6 in o.c.

Total # of screws Required = 6

1/4"φ x 3.5" Simpson SDS screws @ 8.6 in o.c. along short side of curb w/ 2.25" threaded embed

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

$Tall_{bolt}$ = 3927 lbs | $Vall_{bolt}$ = 2209 lbs

Transverse: $Tall_{metal}$ = 2086 lbs | $Vall_{metal}$ = 2192 lbs

# of Bolts Req'd for Uplift = 1.16 | COMBINED LOADING: 0.504 O.K.

# of Bolts Req'd for Shear = 0.51 | Bolt Spacing = 68.9 in o.c.

Total # of Bolts Required = 2

1/2" φ A307 Bolts to steel angle below deck @ 68.9 in o.c. along long side of curb

Longitudinal:

# of Bolts Req'd for Uplift = 0.86 | COMBINED LOADING: 0.344 O.K.

# of Bolts Req'd for Shear = 0.51 | Req'd Min Spacing = 39.0 in o.c.

Total # of Bolts Required = 2

1/2" φ A307 Bolts to steel angle below deck @ 39 in o.c. along short side of curb

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(619)727-4800

For Concrete anchorage: SEISMIC $(0.6-0.14S_{DS})D + 0.7\Omega_o E$ $\Omega o = 2.0$

Concrete Attachment: 3/4" φ thrd'd rods in Hilti Hit-HY 200 epoxy w/ 4" embed

$Tall_{LRFD}$ = 1722 lbs $Vall_{LRFD}$ = 2032 lbs $\propto = (1 + 0.2SDS)D + 2.5E = 1.708$

$Tall_{ASD} = Tall_{LRFD}/\alpha$ = 920.9 lbs $Vall_{ASD} = Vall_{LRFD}/\alpha$ = 1086.6 lbs $(D = 0.758, E = 0.242)$

Transverse: $Uplift_{MAX}$ = 3168 lbs $Shear_{MAX}$ = 2220 lbs

$Compression_{SEISMIC}$ = 4652 lbs =[Ωo*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*$WGT_{unit+curb}$*wcurb/2]/wcurb

$Tension_{SEISMIC}$ = 3168 lbs =[Ωo*FpmaxASD*(Hcm+Hcurb)-(0.6-0.14S_{DS})*$WGT_{unit+curb}$*wcurb/2]/wcurb

$Shear_{SEISMIC}$ = 2220 lbs =Ωo*FpmaxASD/2

Min Bolts Req'd Uplift = 3.44 spacing = 22.96 in o.c. Tapplied = 452.6 lbs

Min Bolts Req'd Shear = 2.04 spacing = 34.44 in o.c. Vapplied = 170.8 lbs

Try using 7 bolts
spaced at 11.48 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 0.65

Use 7 - 3/4" ϕ thrd'd rods in Hilti Hit-HY 200 epoxy @ 11.5 in o.c. max. along long side of curb w/ 4" embed

Longitudinal: $Uplift_{MAX}$ = 1902 lbs $Shear_{MAX}$ = 2220 lbs

$Compression_{SEISMIC}$ = 3386 lbs =[Ωo*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*$WGT_{unit+curb}$*Lcurb/2]/Lcurb

$Tension_{SEISMIC}$ = 1902 lbs =[Ωo*FpmaxASD*(Hcm+Hcurb)-(0.6-0.14S_{DS})*$WGT_{unit+curb}$*Lcurb/2]/Lcurb

$Shear_{SEISMIC}$ = 2220 lbs =Ωo*FpmaxASD/2

Min Bolts Req'd Uplift = 2.07 spacing = 19.50 in o.c. Tapplied = 316.9 lbs

Min Bolts Req'd Shear = 2.04 spacing = 19.50 in o.c. Vapplied = 170.8 lbs

Try using 6 bolts
spaced at 7.80 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 0.50

Use 6 - 3/4" ϕ thrd'd rods in Hilti Hit-HY 200 epoxy @ 7.8 in o.c. max. along short side of curb w/ 4" embed

CURB DESIGN SUMMARY:	CBKD-80	KDKITPRD3715	**Unit:**	ZT,ZR,ZJ,ZH 037-150;
CURB RAIL THICKNESS:	0.0713 in	14 Gauge		ZF,ZH,ZJ,ZR,XP,DH,DM,DF,DR,BP
UNIT CLIP THICKNESS:	0.0713 in	14 Gauge		078-150
# OF CLIPS (LONG SIDE) -	2 clips with 2 - #10 SMS screws each clip			
WEB STIFFENER:	NOT REQUIRED			
# OF CLIPS (SHORT SIDE) -	2 clips with 2 - #10 SMS screws each clip			
WEB STIFFENER:	NOT REQUIRED			
CORNER CONNECTION:	Use 2 - 1/4" ϕ SAE Grade 8 bolts w/ 1/4-20-UNC Threaded inserts			

CURB ANCHORAGE	WOOD	STEEL	CONCRETE
	1/4"φ x 3.5" Simpson SDS screws w/ 2.25" threaded embed	1/2" φ A307 Bolts to steel angle below deck	3/4" φ thrd'd rod in Hilti HIT-HY 200 epoxy, min. 4" embed
LONG DIRECTION	7 @ 12.15 in o.c.	2 @ 68.88 in o.c.	7 @ 11.48 in o.c.
SHORT DIRECTION	6 @ 8.6 in o.c.	2 @ 39 in o.c.	6 @ 7.8 in o.c.