MOUR GROUP
ENGINEERING + DESIGN

6593 Riverdale St.
San Diego, CA 92120

619-727-4800

Structural Calculations

for

CBKD Series Roof Curbs

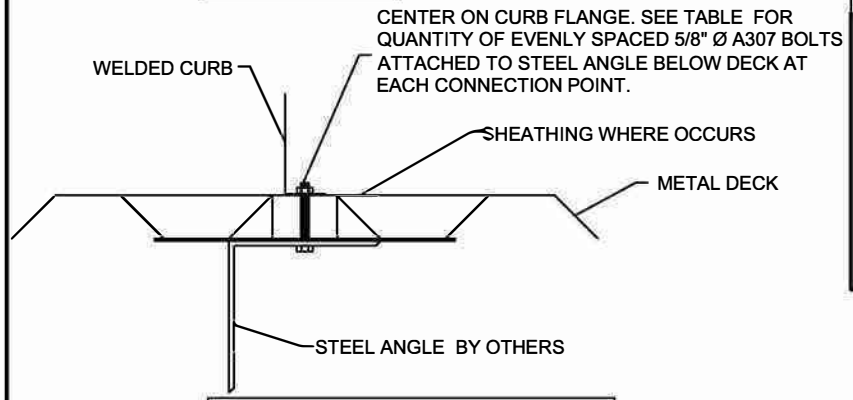
CBKD-162A (80-265-45)
2020 Florida Building Code requirements

Prepared for:

PROVENT
3847 Wabash Drive
Mira Loma, CA 91725

Date: May 19, 2021
Project Number: PV2101

STEEL ATTACHMENT



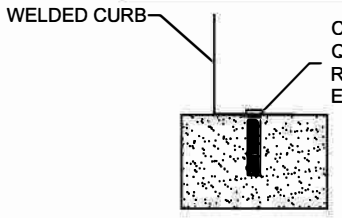
	NO. OF ANCHORAGE BOLTS REQUIRED		
CURB KIT	LONG SIDE *	SHORT SIDE *	UNIT
80-265-49	2 @ 34.5" o.c.	2 @ 19" o.c.	LXS
80-265-50	2 @ 34.5" o.c.	2 @ 29" o.c.	LXL
80-265-13	2 @ 61" o.c.	2 @ 25.25" o.c.	SUNLINE 3-6 TON
80-265-45	2 @ 58.38" o.c.	2 @ 28.19" o.c.	PRESTIGE SMALL
80-265-46	2 @ 72" o.c.	2 @ 41" o.c.	PRESTIGE LARGE
80-265-29	3 @ 34.69" o.c.	2 @ 39.5" o.c.	PREDATOR
80-265-19	3 @ 51.63" o.c.	2 @ 72" o.c.	SUNLINE ULTRA
80-265-18	3 @ 57.13" o.c.	2 @ 72" o.c.	SUNLINE MAGNA

WIND LOAD ROOF ANCHORAGE DETAIL

Meets wind requirements for the following codes:
FBC 2020
based on ASCE 7-16.

Wind:
190 mph exposure D category III or IV
building, max BLDG height: 60 ft
Kzt=1.00 max

CONCRETE ATTACHMENT

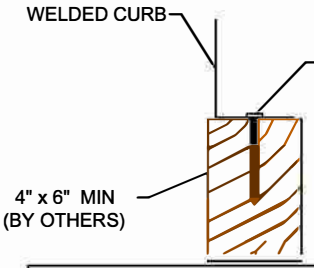


- NORMAL WEIGHT CONC SLAB
- f'c=4000 PSI MIN
- 6" MIN THICK CONC.
- SPECIAL INSPECTION REQUIRED (ESR-3187)

	NO. OF ANCHORAGE BOLTS REQUIRED		
CURB KIT	LONG SIDE *	SHORT SIDE **	UNIT
80-265-49	5 @ 8.63" o.c.	3 @ 9.5" o.c.	LXS
80-265-50	5 @ 8.63" o.c.	4 @ 9.67" o.c.	LXL
80-265-13	5 @ 15.25" o.c.	3 @ 12.63" o.c.	SUNLINE 3-6 TON
80-265-45	5 @ 14.59" o.c.	3 @ 14.09" o.c.	PRESTIGE SMALL
80-265-46	5 @ 18" o.c.	4 @ 13.67" o.c.	PRESTIGE LARGE
80-265-29	9 @ 8.67" o.c.	5 @ 9.88" o.c.	PREDATOR
80-265-19	8 @ 14.75" o.c.	6 @ 14.4" o.c.	SUNLINE ULTRA
80-265-18	12 @ 10.39" o.c.	8 @ 10.29" o.c.	SUNLINE MAGNA

STEEL AND CONCRETE ANCHORS ARE 6" FROM EACH CORNER EVENLY SPACED

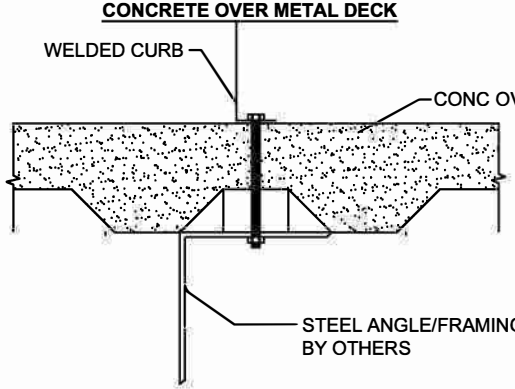
WOOD ATTACHMENT



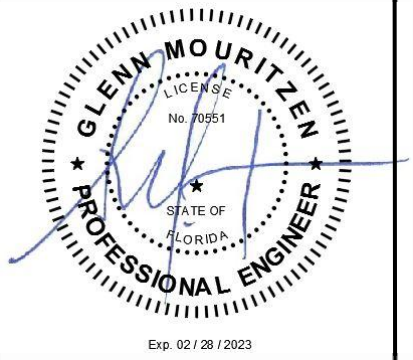
(SPECIFIC GRAVITY OF WOOD= 0.43 MIN)

	NO. OF ANCHORAGE SCREWS REQUIRED		
CURB KIT	LONG SIDE	SHORT SIDE	UNIT
80-265-49	6 @ 7.7" o.c.	3 @ 11.5" o.c.	LXS
80-265-50	5 @ 9.63" o.c.	5 @ 8.25" o.c.	LXL
80-265-13	6 @ 13" o.c.	3 @ 14.63" o.c.	SUNLINE 3-6 TON
80-265-45	6 @ 12.48" o.c.	3 @ 16.09" o.c.	PRESTIGE SMALL
80-265-46	6 @ 15.2" o.c.	4 @ 15" o.c.	PRESTIGE LARGE
80-265-29	10 @ 8.15" o.c.	6 @ 8.7" o.c.	PREDATOR
80-265-19	8 @ 15.32" o.c.	6 @ 15.2" o.c.	SUNLINE ULTRA
80-265-18	14 @ 9.1" o.c.	8 @ 10.86" o.c.	SUNLINE MAGNA
	FOUR INCHES FROM EACH CORNER EVENLY SPACED.		

CONCRETE OVER METAL DECK



NOTE: FOR CONC OVER METAL DECK OVER STEEL FRAMING USE STEEL ATTACHMENT



Exp. 02 / 28 / 2023

RRS ROOFTOP SYSTEMS

1625 DIPLOMAT DRIVE
CARROLTON, TX 75006

PHONE (972) 247-7447
FAX (972) 243-0940

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

FORM NO:		
CB-25A		
DATE:	REV:	DRAWN BY:
3/29/2021	2	ALL

For wood, concrete and steel attachments see Roof Anchorage Detail, Form No. CB-25A.

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

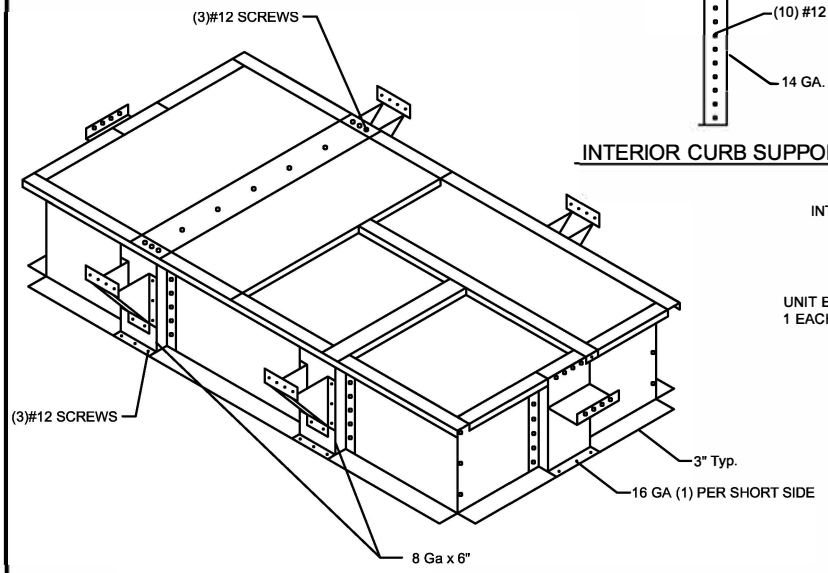
CALCULATED WIND ROOF CURBS FOR YORK UNITS

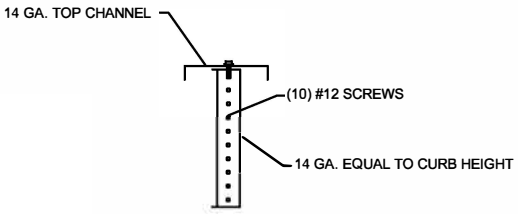
ZX 04-07; XX A7, ZX A7, ZY, ZQ, XY, XQ 04-06

ProVent P/N	A	WEIGHT
80-265-4514	14"	117 Lbs
80-265-4518	18"	141 Lbs

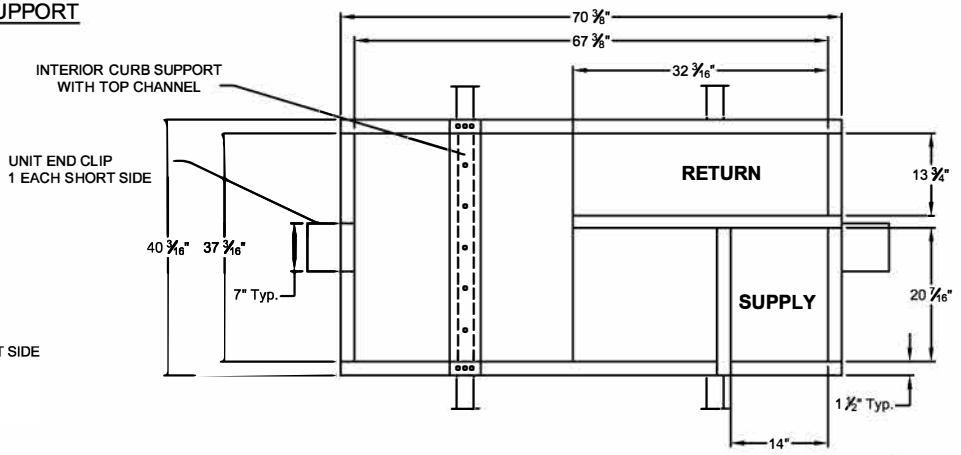
Meets wind requirements for the following codes:
FBC 2020
based on ASCE 7-16.

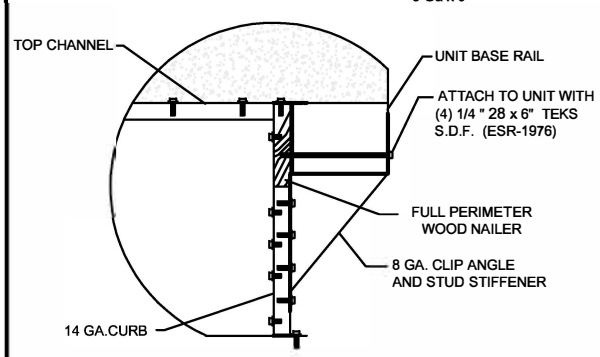
Wind:
190 mph exposure D category III or IV building, max BLDG height: 60 ft
Kzt=1.00 max



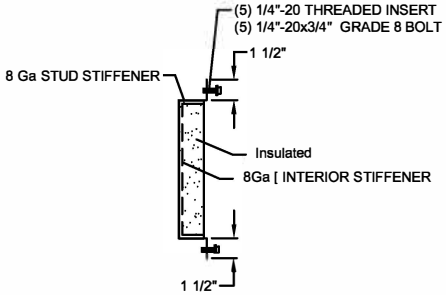


INTERIOR CURB SUPPORT

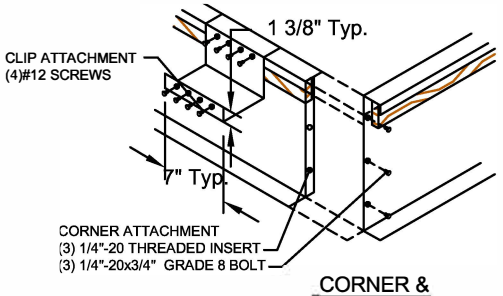




HOLD DOWN DETAIL



STUD STIFFENER



CORNER & END CLIP DETAIL

GLENN MOURITZEN
LICENSE
No. 70551
STATE OF FLORIDA
PROFESSIONAL ENGINEER

Exp. 02 / 28 / 2023

RRS ROOFTOP SYSTEMS

1625 DIPLOMAT DRIVE
CARROLTON, TX 75006

PHONE (972) 247-7447
FAX (972) 243-0940

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

FORM NO:		PART NUMBER:
CBKD-162A		80-265-45
DATE: 3/29/2021	**REV:** 3	**DRAWN BY:** ALL

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ENGINEERING + DESIGN

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

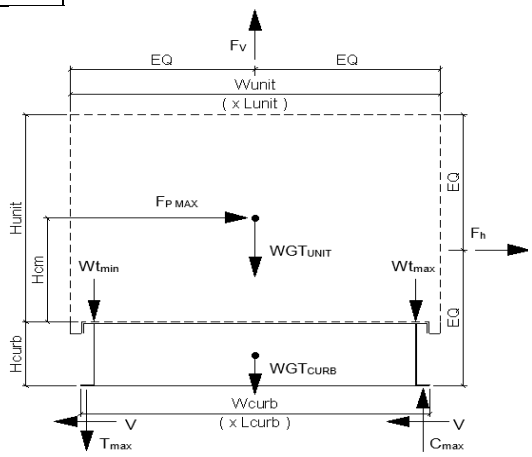
Client:	ProVent PV2101	Previous: PV1807
Description:	CBKD-162	80-265-45**
Unit:	ZX 04-07; XX A7; ZY, ZQ, XY, XQ 04-06	

Curb Information

Hcurb =	18	in	(Height of curb)
Lcurb =	70.375	in	(Length of curb)
wcurb =	40.1875	in	(Width of curb)
WGTcurb =	141	lbs	(Weight of curb)
# Clips long side =	2	# Clips short side =	1

Unit Information

WGTunit =	636	lbs	(Weight of Unit)
Wtmax =	176	lbs	(Maximum corner weight)
Wtmin =	151	lbs	(Minimum corner weight)
Hunit =	40.56	in	(Height of unit above curb)
Hcm =	20.28	in	(Height to center of mass)
Lunit =	74.05	in	(Length of unit)
Wunit =	48.875	in	(Width of unit)



Seismic Loading - 2020 FBC/2018 IBC

Ss =	0.15		(Worst Case for state of Florida)
Fa =	2.4		(Worst case Site class E from Table 11.4-1 ASCE 7-16)
Sms =	0.360		(Fa*Ss)
Sds =	0.240		(2/3*Sms)
Ip =	1.5		(Importance Factor Category III or IV Building)
Fpmax =	0.576	WGTunit	(1.6*Sds*Ip)*WGTunit (Eq 13.3-2 ASCE 7-16)
FpmaxASD =	256	lbs	(0.7*Fpmax) FpmaxASD = 313 lbs
	(unit only)		(unit and curb)

Wind Loading - 2020 FBC/2018 IBC *** Exposure Category D ***

Kz =	1.31		(For 60 ft roof height, Exposure D - Table 26.10-1 ACSE 7-16)
Kzt =	1.00		(Max. assumed topographic factor)
Kd =	0.85		(Directionality factor Table 26.6-1 ASCE 7-16)
Ke =	1.00		(Ground Elevation Factor Table 26.9-1 ASCE 7-16)
V =	190		(Wind velocity, mph for Occupancy Cat III-IV bldgs Exp. Cat C, Fig 26.5-1D - ASCE7-16)
$GCr_{(horiz)}$ =	1.9		(Refer Sect 29.4.1 ASCE 7-16)
$GCr_{(vert)}$ =	1.5		(Refer Sect 29.4.1 ASCE 7-16)
qz	102.9	psf	= 0.00256*Kz*Kzt*Kd*Ke*V^2 (Eq. 26.10-1 ASCE 7-10)
$F_{h\ ASD\ trans}$ =	3533	lbs	= 0.6*qz*GCr*Lunit*(Hunit+Hcurb) (Eq. 29.4-2)
$F_{h\ ASD\ long}$ =	2332	lbs	= 0.6*qz*GCr*Wunit*(Hunit+Hcurb)
$F_{vert\ ASD}$ =	2328	lbs	= 0.6*qz*GCr*Lunit*Wunit (Eq. 29.4-3)

Curb Loading

Transverse:

$Compression_{SEISMIC}$ =	493	lbs	=[FpmaxASD*Hcm+2*(1+0.14S_{DS})*Wtmax*wcurb]/wcurb
$Tension_{SEISMIC}$ =	133	lbs	= $Comp_{SEISMIC}$-(0.6-0.14S_{DS})*WGTunit
$Compression_{WIND}$ =	830	lbs	=[$F_{h\ transASD}$*Hcm+2*0.6*Wtmax*wcurb-$F_{vertASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ =	2776	lbs	= $Comp_{WIND}$+Fvert-0.6*WGTunit

---> Negative values indicate opposite load.

Longitudinal:

$Compression_{SEISMIC}$ =	438	lbs	=[FpmaxASD*Hcm+2*(1+0.14*S_{DS})*Wtmax*Lcurb]/Lcurb
$Tension_{SEISMIC}$ =	77	lbs	= $Comp_{SEISMIC}$-(0.6-0.14S_{DS})*WGTunit
$Compression_{WIND}$ =	-281	lbs	=[$F_{h\ transASD}$*Hcm+2*0.6*Wtmax*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ =	1665	lbs	= $Comp_{WIND}$+Fvert-0.6*WGTunit

---> Negative values indicate opposite load.

Governing Reactions:

Transverse:	$Comp_{MAX}$ =	830	lbs	---> Along long edge of curb.
(on long edge)	$Tens_{MAX}$ =	2776	lbs	---> Along long edge of curb.
Longitudinal:	$Comp_{MAX}$ =	438	lbs	---> Along short edge of curb.
(on short edge)	$Tens_{MAX}$ =	1665	lbs	---> Along short edge of curb.

---> Negative values indicate opposite load.

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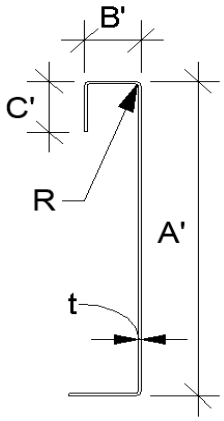
Curb Design

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



Calculate Section Properties of Curb

A'=	[18.000] in	a =	17.644 in	= A'-(2r+t)
B'=	[1.500] in	a'=	17.929 in	= A'-t
C'=	[0.000] in (0 if no lips)	b =	1.322 in	= B'-[r+t/2+α(r+t/2)]
α =	[0.000] (0 - no Lip; 1 w/ lip)	b'=	1.464 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 =	0.104 in (Distance between centroid and web centerline)			
Ix =	50.343 in (Moment of Inertia about X-Axis)			
Iy =	0.133 in (Moment of Inertia about Y-Axis)			
A =	1.48 in^2			
rx =	5.84 in			
ry =	0.300 in			
rmin =	0.300 in			

Axial Compression

Pu = 1.766 k (Max Axial Comp) Ωc = 1.80
Pn/Ωc = 8.214 k
Fe = 11.40 ksi
λc = 2.09
Fn = 10.00 ksi
Ly = 60 in Lateral unbraced length
k_yL_y/r_y = 160 (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 = 18 in -- Check limits: C = 4.00
t = 0.0713 in h/t = 252.45 ≤ 200 C_R = 0.14
N = 7.00 N/t = 98.18 ≤ 210 C_N = 0.35
Ω_w = 1.75 N/h = 0.388889 ≤ 2.0 C_h = 0.02
P_n = 2.296 k R/t = 1.50 ≤ 9.0
P_n/Ω_w = 1.312 k
Long side: Pu_{Trans} = 0.415 k **O.K.** # clips = 2
Short side: Pu_{Long} = 0.438 k **O.K.** # clips = 1

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

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

*****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 = 2.296 k Ae = 0.380 in^2
Pn = 14.913 k Pn/Ω = 8.773 k

O.K.

Corner Connections

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

Tcrnmax = 883 lbs Max($F_{pmaxASD}$/4 -OR- $Fh_{ASDtrans}$/4 corner connections)
Vcrnmax = 1388 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 = 1.3 ***If combined fails:
# of Bolts Used = [2.0] USE --> 3.0

Check Combined Stress in Bolts & Inserts: 0.811 O.K. StressComb = 0.541 **O.K.**

Check 1/8" welded connection

<--- USE WELD Ω = 2.35
Assume L/t > 25: 25*t = 1.783 in
Lreq'd = 0.938 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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San Diego, CA 92120
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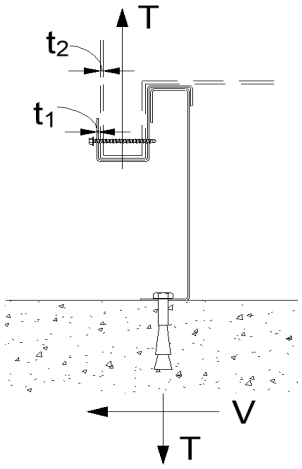
Connection Unit to Curb Clip | #12 SMS screw | Ω = 3.0

t1 = 0.0713 in | Fu1 = 65 ksi
t2 = 0.1017 in (unit base rail thickness) | Fu2 = 65 ksi
d = 0.216 in (screw diameter) | dw = 0.375 in (nom. washer diameter)
t2/t1 = 1.4



For t2/t1 ≤ 1.0: | Pns = 2703 # | For t2/t1 ≥ 2.5: | Pns = 2703 #

Shear: $P_{ns} = 4.2F_{u2}\sqrt{t_2^3 d}$ = 4.12 k | $P_{ns} = 2.7t_1 dF_{u1}$ = 2.70 k | $P_{ns} = 2.7t_1 dF_{u1}$ = 2.70 k
$P_{ns} = 2.7t_2 dF_{u2}$ = 3.86 k | $P_{ns} = 2.7t_2 dF_{u2}$ = 3.86 k

Pns/Ω = 901 #
Pss/Ω = 840 # <- Controls

Tension: Pnot = 1.214 k (screw pull-out strength) | $P_{not} = 0.85t_c dF_{u2}$
$t_c = \min(t_1, t_2)$
Pnov = 2.607 k (screw pull-over strength) | $P_{nov} = 1.5t_1 d_w F_{u1}$
Pts/Ω = 405 # <- Controls
Pts/Ω = 845 # (full tensile screw capacity)

	Shear (k)	# clips	V_{clip} (k)	V_{allow}(lb)	# screws	spacing
Long side:	1.166	2	0.58	840 #	2	6.00 in
Short side:	1.766	1	1.77	840 #	3	3.00 in

clip width (in) = 7.00 | clip height = 2.5 in
min spacing = 0.65 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 in² | Anv = 0.425 in² | Ant = 0.081 in²
Rn/Ω = 8.647 k | $R_n = 0.6F_yA_{gv} + F_uA_{nt} \le 0.6F_uA_{nv} + F_uA_{nt}$
BSR O.K. (AISI Sect. E5.3)

Connection of Curb to Supporting Structure

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

Transverse: $Uplift_{MAX}$ = 4296 lbs | $Shear_{MAX}$ = 1766 lbs

$Compression_{SEISMIC}$ = 700 lbs =[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*wcurb]/wcurb
$Tension_{SEISMIC}$ = 260 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)
$Compression_{WIND}$ = 2434 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)+0.6*($WGT_{unit+curb}$/2)*wcurb-$F_{vertASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ = 4296 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)-0.6*($WGT_{unit+curb}$/2)*wcurb+$F_{vertASD}$*wcurb/2]/wcurb

Longitudinal: $Uplift_{MAX}$ = 2199 lbs | $Shear_{MAX}$ = 1166 lbs

$Compression_{SEISMIC}$ = 572 lbs =[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*Lcurb]/Lcurb
$Tension_{SEISMIC}$ = 132 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)
$Compression_{WIND}$ = 338 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)+0.6*($WGT_{unit+curb}$/2)*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ = 2199 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)-0.6*($WGT_{unit+curb}$/2)*Lcurb+$F_{vertASD}$*Lcurb/2]/Lcurb

Wood Attachment: **Use 5/8" φ wood lag screws** **w/ 3.5" Min. Embed**

$Tall_{metal}$ = 946.67 lbs | $Vall_{metal}$ = 1043.33 lbs
Transverse: $Tall_{wood}$ = 1195.95 lbs | $Vall_{wood}$ = 1024 lbs

# of Screws Req'd for Uplift = 4.54 | COMBINED LOADING: 0.948 O.K.
# of Screws Req'd for Shear = 1.72 | Screw Spacing = 12.5 in o.c.
Total # of screws Required = 6

Use 5/8" φ wood lag screws @ 12.5 in o.c. along long side of curb

Longitudinal:
# of Screws Req'd for Uplift = 2.3 | COMBINED LOADING: 0.901 O.K.
# of Screws Req'd for Shear = 1.1 | Screw Spacing = 16.1 in o.c.
Total # of screws Required = 3

Use 5/8" φ wood lag screws @ 16.1 in o.c. along short side of curb

Steel Deck Attachment: **Use 5/8" φ A307 Bolts attached to steel angle below deck**

$Tall_{bolt}$ = 6903 lbs | $Vall_{bolt}$ = 3682 lbs
Transverse: 6903 lbs | 3682 lbs

# of Bolts Req'd for Uplift = 0.62 | COMBINED LOADING: 0.235 O.K.
# of Bolts Req'd for Shear = 0.48 | Bolt Spacing = 58.4 in o.c.
Total # of Bolts Required = 2

Use 5/8" φ A307 Bolts attached to steel angle below deck @ 58.4 in o.c. along long side of curb

Longitudinal:
# of Bolts Req'd for Uplift = 0.32 | COMBINED LOADING: 0.093 O.K.
# of Bolts Req'd for Shear = 0.32 | Req'd Min Spacing = 28.2 in o.c.
Total # of Bolts Required = 2

Use 5/8" φ A307 Bolts attached to steel angle below deck @ 28.2 in o.c. along short side of curb

MOUR GROUP
ENGINEERING + DESIGN

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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: $Uplift_{MAX}$ = 4296 lbs $Shear_{MAX}$ = 1766 lbs

$Compression_{SEISMIC}$ = 1148 lbs =[2.5*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*wcurb]/wcurb

$Tension_{SEISMIC}$ = 708 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)

$Shear_{SEISMIC}$ = 392 lbs =2.5*FpmaxASD/2

Min Bolts Req'd Uplift = 4.66 spacing = 11.59 in o.c. Tapplied = 859.2 lbs

Min Bolts Req'd Shear = 2.00 spacing = 46.375 in o.c. Vapplied = 220.8 lbs

Try using 5 bolts
spaced at 14.59 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 1.14

Use 5 - 3/4" φ Hilti Hit-HY 200 adhesive anchors @ 14.6 in o.c. max. along long side of curb w/ 4" embed

Longitudinal: $Uplift_{MAX}$ = 2199 lbs $Shear_{MAX}$ = 1766 lbs

$Compression_{SEISMIC}$ = 828 lbs =[2.5*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*Lcurb]/Lcurb

$Tension_{SEISMIC}$ = 387 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)

$Shear_{SEISMIC}$ = 392 lbs =2.5*FpmaxASD/2

Min Bolts Req'd Uplift = 2.39 spacing = 8.09375 in o.c. Tapplied = 733.0 lbs

Min Bolts Req'd Shear = 2.00 spacing = 16.1875 in o.c. Vapplied = 220.8 lbs

Try using 3 bolts
spaced at 14.09 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 1.00

Use 3 - 3/4" φ Hilti Hit-HY 200 adhesive anchors @ 14.1 in o.c. max. along short side of curb w/ 4" embed

CURB DESIGN SUMMARY:	CBKD-162 80-265-45**		Unit: ZX 04-07; XX A7; ZY, ZQ, XY, XQ 04-06
CURB RAIL THICKNESS:	0.0713 in 14 Gauge		
UNIT CLIP THICKNESS:	0.0713 in 14 Gauge		
# OF CLIPS (LONG SIDE) -	2 clips with 2 - #12 SMS screws each clip		
WEB STIFFENER:	16Ga x 3/4" x 7" (C-channel) stiffener at each clip		
# OF CLIPS (SHORT SIDE) -	1 clips with 3 - #12 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	STEEL	CONCRETE
	5/8" φ lag screw w/ min. 3.5" embed (SGmin=0.43)	5/8" φ A307 bolts to steel angle below	3/4" φ thrd'd rod in Hilti HIT-HY 200 epoxy, min. 4" embed
LONG DIRECTION	6 @ 12.48 in o.c.	2 @ 58.38 in o.c.	5 @ 14.59 in o.c.
SHORT DIRECTION	3 @ 16.09 in o.c.	2 @ 28.19 in o.c.	3 @ 14.09 in o.c.