MOUR GROUP
ENGINEERING + DESIGN

6593 Riverdale St.
San Diego, CA 92120

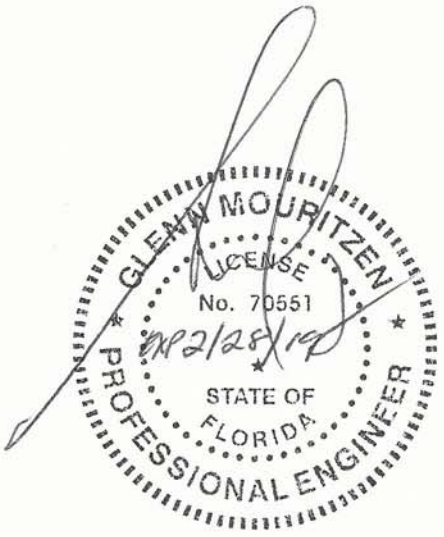
619-727-4800

Structural Calculations

for

CBKD-163 Roof Curb

Kit #80-266-46**
2017 Florida Building Code requirements

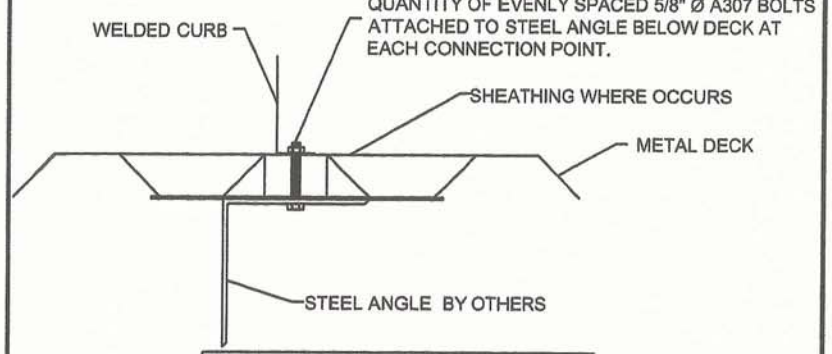


Prepared for:

PROVENT
3847 Wabash Drive
Mira Loma, CA 91725

Date: June 15, 2018
Project Number: PV1807

STEEL ATTACHMENT



CURB KIT	NO. OF ANCHORAGE BOLTS REQUIRED LONG SIDE *	SHORT SIDE *	UNIT
80-266-49	2 @ 34.5" o.c.	2 @ 19" o.c.	LXS
80-266-50	2 @ 34.5" o.c.	2 @ 29" o.c.	LXL
80-266-13	2 @ 61" o.c.	2 @ 25.3" o.c.	SUNLINE 3-6 TON
80-266-45	2 @ 58.4" o.c.	2 @ 28.2" o.c.	PRESTIGE SMALL
80-266-46	2 @ 72" o.c.	2 @ 41" o.c.	PRESTIGE LARGE
80-266-29	3 @ 34.7" o.c.	2 @ 39.5" o.c.	PREDATOR
80-266-19	3 @ 51.6" o.c.	2 @ 72" o.c.	ULTRA
80-266-18	4 @ 38.1" o.c.	3 @ 36" o.c.	SUNLINE 15-25 TON

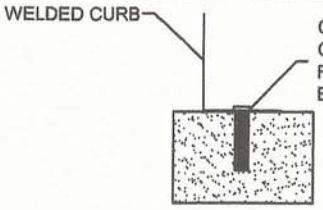
WIND AND SEISMIC LOAD ROOF ANCHORAGE DETAIL

Meets wind, seismic requirements for the following codes:
FBC 2017
based on ASCE 7-10.

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

Seismic:
Sds=0.30 max
Sd1=0.187 max
Site Class D
Importance Factor: Ip=1.5

CONCRETE ATTACHMENT

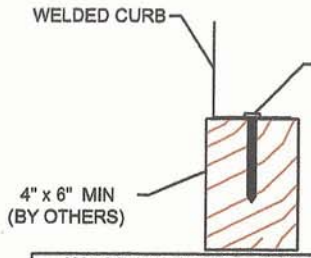


- NORMAL WEIGHT CONC SLAB
- f'c=4000 PSI MIN
- 6" MIN THICK CONC.
- SPECIAL INSPECTION REQUIRED (ESR-3187)

CURB KIT	NO. OF ANCHORAGE BOLTS REQUIRED LONG SIDE *	SHORT SIDE **	UNIT
80-266-49	5 @ 8.6" o.c.	4 @ 6.3" o.c.	LXS
80-266-50	5 @ 8.6" o.c.	5 @ 7.25" o.c.	LXL
80-266-13	9 @ 7.63" o.c.	6 @ 5.1" o.c.	SUNLINE 3-6 TON
80-266-45	6 @ 11.7" o.c.	4 @ 9.4" o.c.	PRESTIGE SMALL
80-266-46	6 @ 14.4" o.c.	5 @ 10.25" o.c.	PRESTIGE LARGE
80-266-29	16 @ 4.63" o.c.	10 @ 4.4" o.c.	PREDATOR
80-266-19	15 @ 7.4" o.c.	12 @ 6.5" o.c.	ULTRA
80-266-18	22 @ 5.4" o.c.	17 @ 4.5" o.c.	SUNLINE 15-25 TON

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

WOOD ATTACHMENT

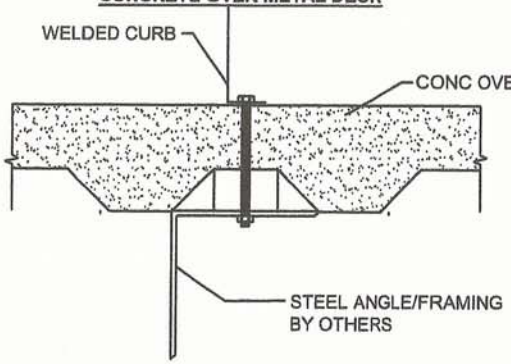


(SPECIFIC GRAVITY OF WOOD= 0.43 MIN)

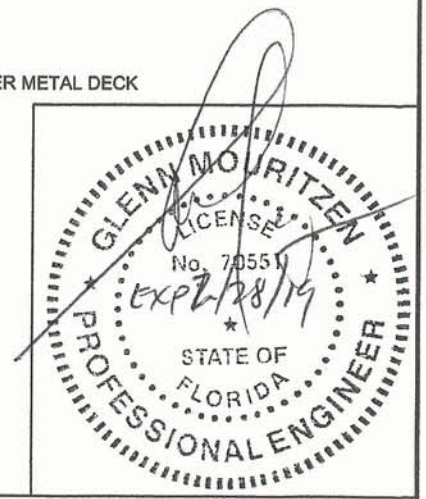
CURB KIT	NO. OF ANCHORAGE SCREWS REQUIRED LONG SIDE	SHORT SIDE	UNIT
80-266-49	5 @ 9.6" o.c.	3 @ 11.5" o.c.	LXS
80-266-50	5 @ 9.6" o.c.	5 @ 8.3" o.c.	LXL
80-266-13	8 @ 9.3" o.c.	4 @ 9.8" o.c.	SUNLINE 3-6 TON
80-266-45	6 @ 12.5" o.c.	3 @ 16.1" o.c.	PRESTIGE SMALL
80-266-46	6 @ 15.2" o.c.	4 @ 15" o.c.	PRESTIGE LARGE
80-266-29	14 @ 5.6" o.c.	7 @ 7.3" o.c.	PREDATOR
80-266-19	15 @ 7.7" o.c.	12 @ 6.9" o.c.	ULTRA
80-266-18	23 @ 5.4" o.c.	14 @ 5.8" o.c.	SUNLINE 15-25 TON

FOUR INCHES FROM EACH CORNER EVENLY SPACED.

CONCRETE OVER METAL DECK



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



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

FORM NO: CB-25

DATE:	REV:	DRAWN BY:
06/06/18	7	ALL

For wood, concrete and steel attachments see Roof Anchorage Detail, Form No. CB-26.

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

CALCULATED WIND AND SEISMIC ROOF CURBS FOR YORK UNITS

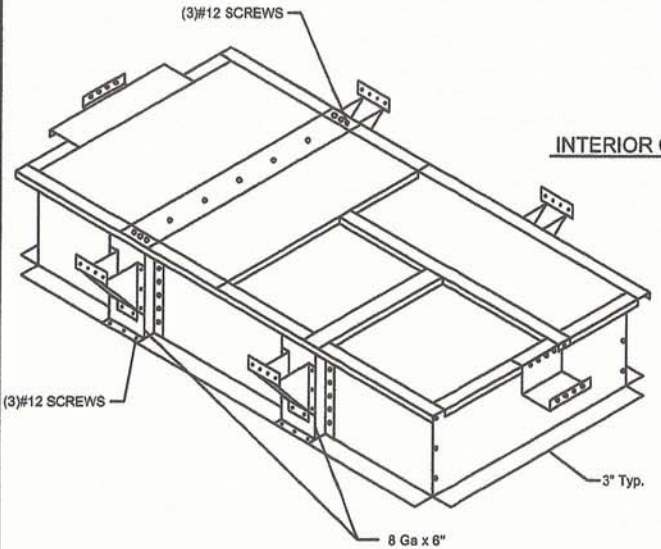
ZX, ZY 08-12; ZX 14; ZY 07

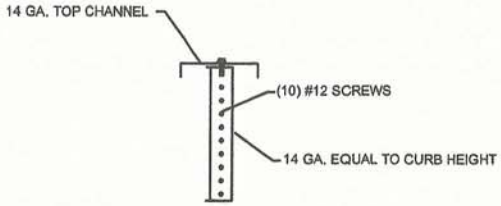
ProVent P/N	A	WEIGHT	CALCULATED KIT P/N	WEIGHT
80-268-4614	14"	99 Lbs	80-266-4614	37 Lbs
80-268-4618	18"	116 Lbs	80-266-4618	44 Lbs

Meets wind, seismic requirements for the following codes:
FBC 2017
based on ASCE 7-10.

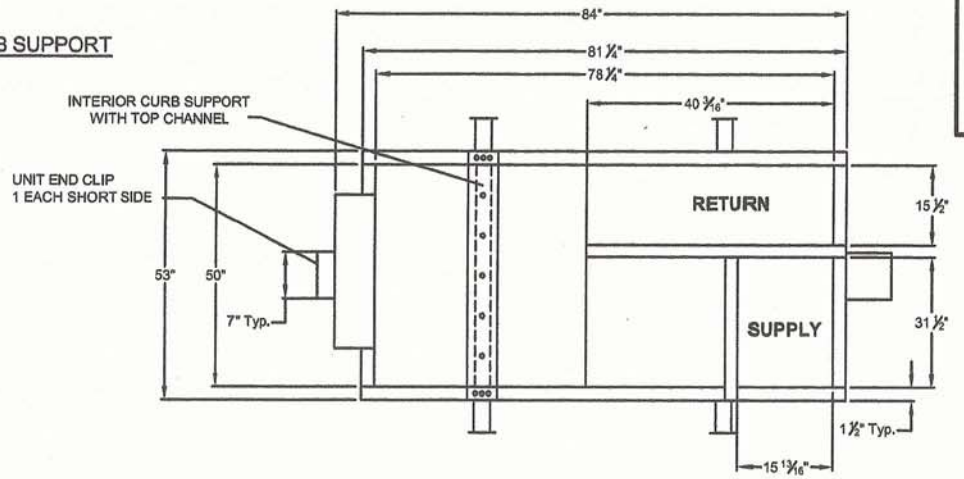
Wind:
190 mph exposure D category III or IV building, max BLDG height: 60 ft
Kzt=1.00 max

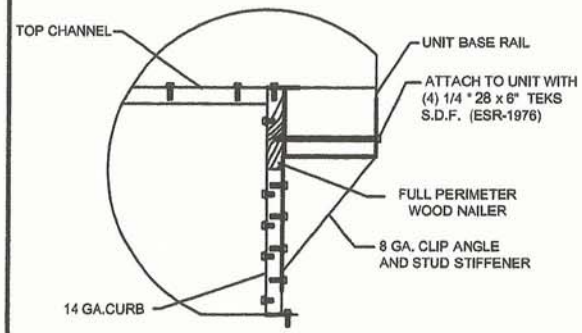
Seismic:
Sds=0.30 max
Sd1=0.187 max
Site Class D
Importance Factor: Ip=1.5



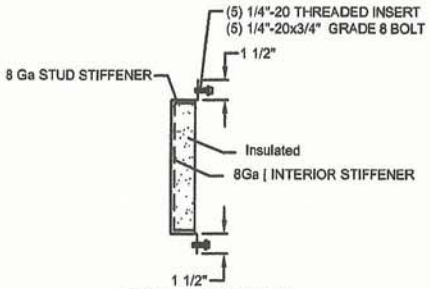


INTERIOR CURB SUPPORT

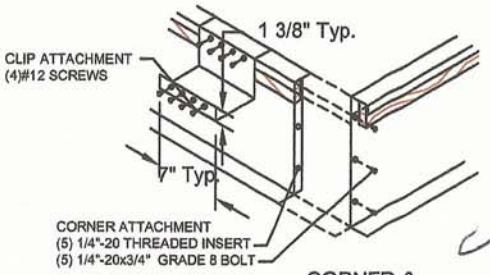




HOLD DOWN DETAIL



STUD STIFFENER



CORNER & END CLIP DETAIL

GLENN MOURITZEN
LICENSE
No. 70551
EXP 2/28/19
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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

FORM NO:		PART NUMBER:
CBKD-162		80-268-46
DATE: 6/12/18	REV: 2	DRAWN BY: JG

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ENGINEERING + DESIGN

6593 Riverdale St.
San Diego, CA 92120
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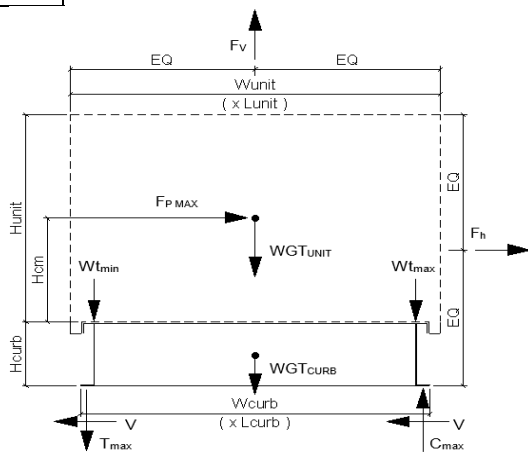
Client: ProVent PV1807
Description: CBKD-163 (80-266-46**)
Unit: ZX,ZY 08-12 / ZX 14 / ZY 07 (York Prestige)

Curb Information

Hcurb =	18	in	(Height of curb)
Lcurb =	84	in	(Length of curb)
wcurb =	53	in	(Width of curb)
WGTcurb =	160	lbs	(Weight of curb)



Unit Information

WGTunit =	734	lbs	(Weight of Unit)
Wtmax =	213	lbs	(Maximum corner weight)
Wtmin =	154	lbs	(Minimum corner weight)
Hunit =	40.56	in	(Height of unit above curb)
Hcm =	20.28	in	(Height to center of mass)
Lunit =	87.1875	in	(Length of unit)
Wunit =	61.69	in	(Width of unit)

Seismic Loading - 2017 FBC/2015 IBC

Ss =	0.15		(Worst Case for state of Florida)
Fa =	2.5		(Worst case Site class E from Table 11.4-1 ASCE 7-10)
Sms =	0.375		(Fa*Ss)
Sds =	0.250		(2/3*Sms)
Ip =	1.5		(Importance Factor Category III or IV Building)
Fpmax =	0.6000	Wp	(1.6*Sds*Ip)*Wp
FpmaxASD =	308	lbs	(0.7*Fpmax) FpmaxASD = 375 lbs
	(unit only)		(unit and curb)

Wind Loading - 2017 FBC/2015 IBC

*** Exposure Category D ***

Kz =	1.31		(For 60 ft roof height, Exposure D - Table 29.3-1 ACSE 7-10)
Kzt =	1.0		(No topographic effects assumed for rooftop mounted units)
Kd =	0.85		(Directionality factor Table 26.6-1 ASCE 7-10)
V =	190		(Wind velocity, mph for Occupancy Cat III-IV bldgs Exp. Cat D)
$GCr_{(horiz)}$ =	1.9		(Refer Sect 29.5.1 ASCE 7-10)
$GCr_{(vert)}$ =	1.5		(Refer Sect 29.5.1 ASCE 7-10)
qz	102.9	psf	= 0.00256*Kz*Kzt*Kd*V^2 (Eq. 29.3-1 ASCE 7-10)
$F_{h\ ASD\ trans}$ =	4159	lbs	= 0.6*qz*GCr*Lunit*(Hunit+Hcurb) (Eq. 29.5-2)
$F_{h\ ASD\ long}$ =	2943	lbs	= 0.6*qz*GCr*Wunit*(Hunit+Hcurb)
$F_{vert\ ASD}$ =	3459	lbs	= 0.6*qz*GCr*Lunit*Wunit (Eq. 29.5-3)

Curb Loading

Transverse:

$Compression_{SEISMIC}$ =	559	lbs	=[FpmaxASD*Hcm+2*(1+0.14S_{DS})*Wtmax*wcurb]/wcurb
$Tension_{SEISMIC}$ =	144	lbs	= $Comp_{SEISMIC}$-(0.6-0.14S_{DS})*WGTunit
$Compression_{WIND}$ =	118	lbs	=[$F_{h\ transASD}$*Hcm+2*0.6*Wtmax*wcurb-$F_{vertASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ =	3136	lbs	= $Comp_{WIND}$+Fvert-0.6*WGTunit

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

Longitudinal:

$Compression_{SEISMIC}$ =	515	lbs	=[FpmaxASD*Hcm+2*(1+0.14*S_{DS})*Wtmax*Lcurb]/Lcurb
$Tension_{SEISMIC}$ =	101	lbs	= $Comp_{SEISMIC}$-(0.6-0.14S_{DS})*WGTunit
$Compression_{WIND}$ =	-764	lbs	=[$F_{h\ transASD}$*Hcm+2*0.6*Wtmax*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ =	2255	lbs	= $Comp_{WIND}$+Fvert-0.6*WGTunit

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

Governing Reactions:

Transverse:	$Comp_{MAX}$ =	559	lbs	---> Along long edge of curb.
(on long edge)	$Tens_{MAX}$ =	3136	lbs	---> Along long edge of curb.
Longitudinal:	$Comp_{MAX}$ =	515	lbs	---> Along short edge of curb.
(on short edge)	$Tens_{MAX}$ =	2255	lbs	---> Along short edge of curb.

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

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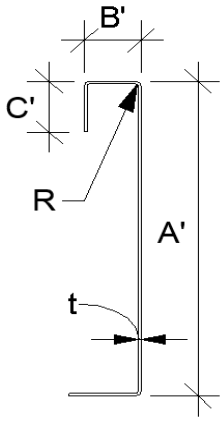
Curb Design

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



Calculate Section Properties of Curb

A'=	[18.000] in		a =	17.644 in	= A'-(2r+t)
B'=	[3.000] in		a'=	17.929 in	= A'-t
C'=	[1.000] in	(0 if no lips)	b =	2.644 in	= B'-[r+t/2+α(r+t/2)]
α =	[1.000]	(0 - no Lip; 1 w/ lip)	b'=	2.929 in	= B'-(t/2+αt/2)
R =	0.1069 in	(Inside bend radius)	c =	0.822 in	= α[C'-(r+t/2)]
t =	0.0713 in		c'=	0.964 in	= α(C'-t/2)
r'=	0.143 in	= R+t/2	u =	0.224 in	= πr/2
x =	0.544 in	(Distance between centroid and web centerline)			
Ix =	76.324 in	(Moment of Inertia about X-Axis)			
Iy =	1.759 in	(Moment of Inertia about Y-Axis)			
A =	1.82 in^2				
rx =	6.48 in				
ry =	0.984 in				
rmin =	0.984 in				

Axial Compression

Pu = 2.080 k (Max Axial Comp) Ωc = 1.80
Pn/Ωc = 36.083 k
Fe = 62.46 ksi
λc = 0.89
Fn = 35.76 ksi
Ly = 84 in Lateral unbraced length
k_yL_y/r_y = 68 (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} = 0.279 k **O.K.** # clips = 2
Short side: Pu_{Long} = 0.515 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

Not Req'd

Corner Connections

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

Tcrnmax = 1040 lbs Max($F_{pmaxASD}$/4 -OR- $Fh_{ASDtrans}$/4 corner connections)
Vcrnmax = 1568 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 = 1.4 ***If combined fails:
# of Bolts Used = [2.0] USE --> 3.0

Check Combined Stress in Bolts & Inserts: 0.925 O.K. StressComb = 0.617 **O.K.**

Check 1/8" welded connection

<--- USE WELD Ω = 2.35
Assume L/t > 25: 25*t = 1.783 in
Lreq'd = 1.060 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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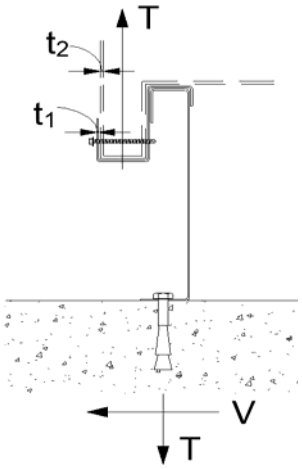
Connection Unit to Curb Clip | #12 SMS screw | Ω = 3.0

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 | $P_{ns} = 2.7t_1 d F_{u1}$ = 2.70 k | $P_{ns} = 2.7t_2 d F_{u2}$ = 3.86 k

$P_{ns} = 2.7t_1 d F_{u1}$ = 2.70 k
$P_{ns} = 2.7t_2 d F_{u2}$ = 3.86 k

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

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

	Shear (k)	# clips	V_{clip} (k)	V_{allow}(lb)	# screws	spacing
Long side:	4.159	2	2.08	840 #	3	3.00 in
Short side:	2.943	1	2.94	840 #	4	2.00 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 = 0.410 in² | Ant = 0.081 in²
Rn/Ω = 8.647 k $R_n = 0.6F_y A_{gv} + F_u A_{nt} \le 0.6F_u A_{nv} + F_u A_{nt}$
BSR O.K. (AISI Sect. E5.3)

Connection of Curb to Supporting Structure

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

Transverse: $Uplift_{MAX}$ = 4466 lbs | $Shear_{MAX}$ = 2080 lbs

$Compression_{SEISMIC}$ = 734 lbs =[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*wcurb]/wcurb
$Tension_{SEISMIC}$ = 229 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)
$Compression_{WIND}$ = 1543 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)+0.6*($WGT_{unit+curb}$/2)*wcurb-$F_{vertASD}$*wcurb/2]/wcurb
$Tension_{WIND}$ = 4466 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)-0.6*($WGT_{unit+curb}$/2)*wcurb+$F_{vertASD}$*wcurb/2]/wcurb

Longitudinal: $Uplift_{MAX}$ = 2803 lbs | $Shear_{MAX}$ = 1472 lbs

$Compression_{SEISMIC}$ = 634 lbs =[FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*Lcurb]/Lcurb
$Tension_{SEISMIC}$ = 129 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)
$Compression_{WIND}$ = -120 lbs =[$F_{h\ transASD}$*(Hcm+Hcurb)+0.6*($WGT_{unit+curb}$/2)*Lcurb-$F_{vertASD}$*Lcurb/2]/Lcurb
$Tension_{WIND}$ = 2803 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 = 4.72 | COMBINED LOADING: 0.961 O.K.
# of Screws Req'd for Shear = 2.03 | Screw Spacing = 15.2 in o.c.
Total # of screws Required = 6

Use 5/8" φ wood lag screws @ 15.2 in o.c. along long side of curb

Longitudinal:
# of Screws Req'd for Uplift = 3.0 | COMBINED LOADING: 0.945 O.K.
# of Screws Req'd for Shear = 1.4 | Screw Spacing = 15.0 in o.c.
Total # of screws Required = 4

Use 5/8" φ wood lag screws @ 15 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 = 0.65 | COMBINED LOADING: 0.274 O.K.
# of Bolts Req'd for Shear = 0.56 | Bolt Spacing = 72.0 in o.c.
Total # of Bolts Required = 2

Use 5/8" φ A307 Bolts attached to steel angle below deck @ 72 in o.c. along long side of curb

Longitudinal:
# of Bolts Req'd for Uplift = 0.41 | COMBINED LOADING: 0.138 O.K.
# of Bolts Req'd for Shear = 0.40 | Req'd Min Spacing = 41.0 in o.c.
Total # of Bolts Required = 2

Use 5/8" φ A307 Bolts attached to steel angle below deck @ 41 in o.c. along short side of curb

MOUR GROUP
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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: $Uplift_{MAX}$ = 4466 lbs $Shear_{MAX}$ = 2080 lbs

$Compression_{SEISMIC}$ = 1141 lbs =[2.5*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*wcurb]/wcurb

$Tension_{SEISMIC}$ = 636 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)

$Shear_{SEISMIC}$ = 469 lbs =2.5*FpmaxASD/2

Min Bolts Req'd Uplift = 4.85 spacing = 15.00 in o.c. Tapplied = 744.3 lbs

Min Bolts Req'd Shear = 2.00 spacing = 60 in o.c. Vapplied = 346.6 lbs

Try using 6 bolts
spaced at 14.40 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 1.13

Use 6 - 3/4" ϕ Hilti Hit-HY 200 adhesive anchors @ 14.4 in o.c. max. along long side of curb w/ 4" embed

Longitudinal: $Uplift_{MAX}$ = 2803 lbs $Shear_{MAX}$ = 2080 lbs

$Compression_{SEISMIC}$ = 890 lbs =[2.5*FpmaxASD*(Hcm+Hcurb)+(1+0.14S_{DS})*($WGT_{unit+curb}$/2)*Lcurb]/Lcurb

$Tension_{SEISMIC}$ = 385 lbs =$Comp_{SEISMIC}$-(0.6-0.14S_{DS})*(WGTunit+curb)

$Shear_{SEISMIC}$ = 469 lbs =2.5*FpmaxASD/2

Min Bolts Req'd Uplift = 3.04 spacing = 9.666667 in o.c. Tapplied = 560.5 lbs

Min Bolts Req'd Shear = 2.00 spacing = 29 in o.c. Vapplied = 415.9 lbs

Try using 5 bolts
spaced at 10.25 in o.c.

COMBINED LOADING = $\frac{T_{applied}}{T_{allow,ASD}} + \frac{V_{apllied}}{V_{allow,ASD}} \leq 1.2$ = 0.99

Use 5 - 3/4" ϕ Hilti Hit-HY 200 adhesive anchors @ 10.3 in o.c. max. along short side of curb w/ 4" embed

CURB DESIGN SUMMARY: CBKD-163

CURB RAIL THICKNESS: 0.0713 in 14 Gauge

UNIT CLIP THICKNESS: 0.0713 in 14 Gauge

 # OF CLIPS (LONG SIDE) - 2 clips with 3 - #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 4 - #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	3/4" ϕ thrd'd rod in Hilti HIT-HY 200 epoxy, min. 4" embed
LONG DIRECTION	6 @ 15.2 in o.c.	2 @ 72 in o.c.	6 @ 14.4 in o.c.
SHORT DIRECTION	4 @ 15 in o.c.	2 @ 41 in o.c.	5 @ 10.25 in o.c.