CBWC Series
AFF1860
Form No: CBWC - 111

Prepared For:

PROVENT
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Prepared By:

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Job No.: PRO1103
Effective Date: 2014.09.30

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For wood, concrete and steel attachments see Roof Anchorage Detail, Form No. CB-24A.

STRUCTURALLY CALCULATED WELDED ROOF CURBS FOR YORK UNITS

DNQ/DNY/DNZ/DEQ/DEZ/BHQ/BHX/BHZ 024-060
DNX/DEX 024-060, DEY 060

ProVent P/N	A	WEIGHT
CBWCAFF186008	8"	74 Lbs
CBWCAFF186011	11"	85 Lbs
CBWCAFF186014	14"	97 Lbs
CBWCAFF186024	24"	171 Lbs

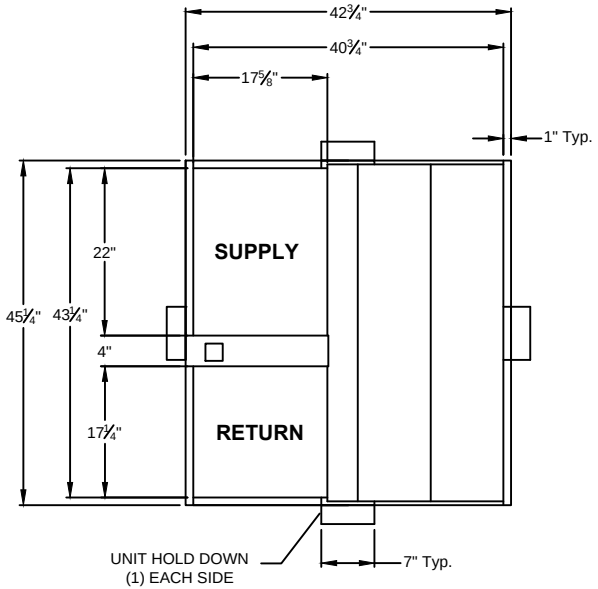
Meets seismic requirements for the following codes:
CBC 2013
IBC 2012

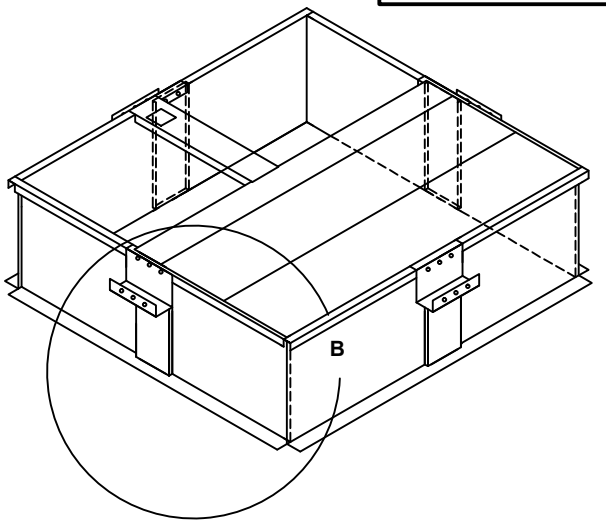
FEATURES

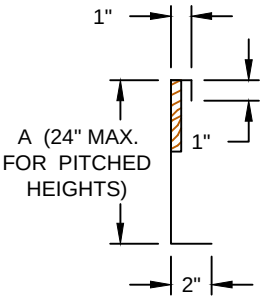
- Roof curb sides and ends are 16 ga. galvanized steel.
- Gasketing package provided.
- Heat treated wood nailer provided.
- Insulated deck pans provided.
- Pitched curbs and taller curbs are available.

NOTES

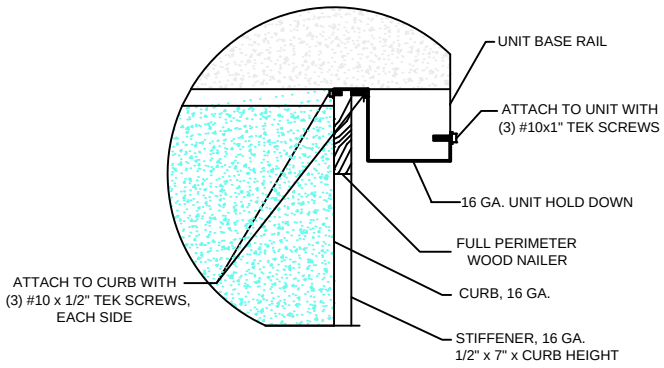
- Attach ductwork to roof curb. Flanges of duct rest on top of curb. Support ductwork below the curb.
- Thru the curbs utilities are available. Contact your York distributor or Provent directly.



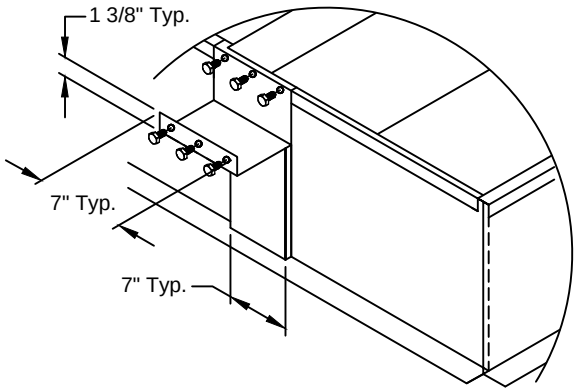




CURB DETAIL



HOLD DOWN DETAIL



DETAIL B

ProVent

3847 WABASH DR.
MIRA LOMA, CA 91725

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

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

FORM NO:		PART NUMBER:
CBWC-111		CBWCAFF1860 SERIES
DATE: 7/23/14	REV: 2	DRAWN BY: JG

STEEL CURB DESIGN

PROVENT PART NUMBER: CBWC-111

Curb Information HVAC UNIT: Affinity Welded Roof Curb 8-14"

Curb Number:

Hcurb	24	(Height from support structure to top of curb)
Lcurb	43.25	(Length of Curb - In to In)
Wcurb	40.75	(Width of Curb - In to In)
Lclip	22.625	(min Length in Long dir from end to clip)
# clips Long Side	1	(Shear + Uplift Clips)
# clips short side	1	(Shear Clips)

Unit Information:	845 lbs	(Max Weight)
Weight:	845 lbs	(Min Weight)
W c-max	401 lbs	(Maximum corner weight)
W c-min	110 lbs	(Minimum corner weight)
W mid	161 lbs	
H unit	41.50	(Height of unit above curb)
H cm	20.75	(Height from top of curb to center of mass of unit)
L unit	49.13	(Length of unit)
w unit	47.25	(Width of unit)

Seismic Loading	CBC2012	(DESIGN ALSO OK FOR IBC 2009/CBC2010)
Ss	2.00	
Fa	1.00	(worst case for site; Ss>1.25, Site Class D)
Sms	2.00	(=Fa*Ss)
Sds	1.33	(=2/3*Sms)
Ip	1.5	(=Worst case)
ap	2.5	
Rp	6	
Fp max	1.0 Wp	(=0.4*ap*Sds*Wp*(1+2*z/h)/(Rp/Ip))
Fp ASD	616 lbs	(=0.7*Fpmax)

Wind Loading (Ultimate)

Code:	CBC2012	(DESIGN ALSO OK FOR IBC 2009/CBC2010 - 90MPH)
Wind Exposure:	C	
V	120 mph	(Ultimate Wind Speed)
Kzt	1	
Kd	0.9	
Kh	1.13	for 60 foot roof height
GCf	1.9	
Wind Loading: Lateral		

qh	37 psf			(ASD=0.6W)	
F	71 psf	(ultimate)	F	43 psf	(service)
A net/transv.	14 sf				
Fwind transv	1008 lbs	(ultimate)	Fwind trnsv	605 lbs	(service)
A net/long	14 sf				
Fwind long	970 lbs	(ultimate)	Fwind long	582 psf	(service)

Controlling Lateral Load (Seismic vs. Wind)

Transverse	616 lbs	(ASD)
Long	616 lbs	(ASD)

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Wind Loading: Uplift

qh	37.5 psf				
GCr	1.5				
Fv (psf)	56.2 psf	(ultimate)			
Av	16 sf				
Fv	906 lbs	(ultimate)	Fv	544 lbs	(ASD: 0.6W)

Curb Loading:

Transverse direction:

OTM:	1065 lb-ft		0.6W: F max - transv * Hcm
M res.	495 lb-ft		0.6D: 2 * Wcrnmin *0.6* (width curb +4.25")
Net OTM:	570 lb-ft		0.6D+0.6W: OTM-RM
Max Comp	866 lbs	/side	1.0D+0.6W: (2 x Wcrnmax + (Mot-Mres)/ (width curb +4.25"))
Max Tension	424 lbs	/side	0.6D+0.6W: (Mot-Mres)/(width curb +4.25")) + Fv/(2 sides)
Max Tension	424 lbs	/clip	0.6D+0.6W: Max tension/side /#clips
Max Corner:	485 lbs		W c-max+ (Mot-Mres)/((w/curb+4.25")/Lcurb*(N-corner)/2/12
Max Interior:	330 lbs		W mid+ (Mot-Mres)/(width curb +4.25")/Lcurb*(N-mid)

Longitudinal direction:

OTM:	1065 lb-ft		0.6W: F max long * Hcm
RM	525 lb-ft		0.6D: 2 X Wcrnmin x (Lcurb+4.25in)/12 x 0.6
Net OTM:	540 lb-ft		0.6D+0.6W: OTM-RM
Max Comp =	903 lbs	/side	1.0D+0.6W: (2*Wcmax + (NetOTM)/Lclip)+ Fv/(U.C)
Max Tens =	558 lbs	/side	0.6D+0.6W: (Mot-Mres)/Lclip) + Fv/(2 sides)
Max Tension =	558 lbs	/clip	0.6D+0.6W: (Mot-Mres)/Lclip) + Fv/(2 sides)/#clips/side
Max Corner:	489 lbs		W c-max+ (Mot-Mres)/Lcurb/Wcurb*(N-corner)/2

Connection of Unit to Curb

	Screws - metal ga			
Screws in Uplift clips	#10-16ga	Vall=	582	lbs/screw
Screws in Short Side Clips	#10-16ga	Vall=	582	lbs/screw

UPLIFT CLIPS:			UPLIFT CLIPS:		
Shear:	308 lbs/clip			2	#10-16ga
Uplift:	558 lbs/clip		Fdiag/screw	208	lbs/screw
F diag	416	lbs/clip to curb	F/screw outs.	140	lbs/screw
				SCREWS OK	
SHORTSIDE CLIPS			SHORTSIDE CLIPS		
Shear:	308 lbs/clip			2	#10-16ga
			F screw	154	lbs/screw
				SCREWS OK	

Curb info

H curb	24	in, curb height max
Fy	50	ksi
E	29000	ksi
Fu	65	ksi
gage:	16	
R	0.0849	
t	0.0593	
R/t	1.43	
h	23.77	in

Interior Curb

N	48	bearing length: 2*h
C	20	
C_R	0.1	
C_N	0.08	
C_h	0.03	
ϕ_w	0.85	
Ω_w	1.75	
Pn	4.05 k	
Pall	2.31 k	
ϕPn	3.44 k	
Pmax	0.33 k	Pall>Pmax,curb OK,

Exterior Curb:

N total	48	2*curb height
N -BUS	7	bearing length with stiffener (built up section)
N - SWC	41	bearing length without stiffener (single web channel)

Exterior Curb SWC	
N	41
C	7.5
C_R	0.08
C_N	0.12
C_h	0.05
ϕ_w	0.85
Ω_w	1.75
Pn	-0.01 k
Pall	0.00 k
ϕPn	0.00 k

Exterior Curb BUS	
N	7
C	15.5
C_R	0.09
C_N	0.08
C_h	0.04
ϕ_w	0.75
Ω_w	2
Pn	1.81 k
Pall	0.91 k
ϕPn	1.36 k

Corner:	
Pall	0.90 k
ϕPn	1.35 k
Pmax	0.49 k

Pall>Pmax,curb OK,

Connection of Curb to Supporting Structure (ASD)

Transverse:	**0.6D+0.6W**				
**Uplift (wind)=	801	lbs			
*Uplift (seismic)	477	lbs			
Uplift max=	801	lbs/long side			
**Shear (wind)	913	lbs			
*Shear (seis)	616	lbs			
Shear max=	913	lbs/total curb			
Longitudinal:					
**Uplift (wind)=	1256	lbs			
*Uplift (seismic)	940	lbs	T max	1256	lbs/long
Uplift max=	1256	lbs/long side	V max	913	lbs/total
**Shear (wind)	872	lbs			
*Shear (seis)	616	lbs			
Shear max=	872	lbs/total curb			

Wood Attachment: (Use 1/4" ϕ x 3.5" SDS SCREWS)
(3.5" minimum embed into DF or SP wood)

W' 616 lbs
V' 256 lbs

total screws required=	6	
# screws: LONG SIDE	2	
# screws: SHORT SIDE	1	
W/screw (uplift)	314	lbs
V/Screw	152	lbs

WOOD SCREWS OK

Steel Deck Attach.: (Use 5/8" ϕ A307 Bolts attached to L5x5x1/4 below deck at each conn.point)

Tall= 6900 lbs
Vall= 3680 lbs

total bolts required=	6		
# bolts: LONG SIDE	2		
# bolts: SHORT SIDE	1		
T/bolt (uplift)	1256	lbs	
V/bolt	152	lbs	
fv	0.5	ksi	OK
ft	4.1	ksi	OK
Fnt'	56.7	ksi	
Fnv	24.0	ksi	

BOLTS OK

Connection of Curb to Concrete Supporting Structure - STRENGTH DESIGN

Transverse:	**0.9D +1.0(E or W)**				
**Uplift (wind)=	1357	lbs			
*Uplift (seismic)	4328	lbs	*Rp*1.3/1.5/0.7asd		
Uplift max=	4328	lbs/side	(Per long side curb)		
**Shear (wind)	1522	lbs	(Maximum Lateral Force) (seismic: Rp=1.5 max)		
*Shear (seis)	4576	lbs	*Rp*1.3/1.5/0.7asd		
Shear max=	4576	lbs	(Total Curb)		
Longitudinal:					
**Uplift (wind)=	2140	lbs			
*Uplift (seismic)	8633	lbs		Tu max	8633 lbs
Uplift max=	8633	lbs/side	(Per long side curb)	Vu max	4576 lbs
**Shear (wind)	1454	lbs			
*Shear (seis)	4576	lbs			
Shear max=	4576	lbs	(Total Curb)		

Concrete Attach.: (Use 5/8"ϕ Simpson Strong Bolt 2)			phi-Tn	2600 lbs
			phi-Vn	1100 lbs
	(LRFD design)			
Anchors Required for Uplift (long side only)=	3.3			
Anchors Required for Shear (Total Curb)=	4.2			
Anchors Required (long side only) =	4.0			Conc Anchors
		anchors (long side)	4.0	OK
Simpson Strong Bolt 2		anchors (short side)	1.0	
3 5/8" Embed		anchors (total)	10	OK
(f'c=4000psi, 6" min total thickness - normal weight concrete, 12" E.D.)		Tu	2158	OK
ESR Report - 3037		Vu	458	OK
Special Inspection Required				

*Uplift and Shear seismic anchorage forces have been designed for an Rp of 1.5 max per ASCE 13.4.2
Anchorage design per ASCE 14.2.2.17/ACI D3.3 with strength reduction factors
not required in combination with Rp=1.5
** For wind force, shear at base for anchorage design, accounts for add'l area from curb width and height