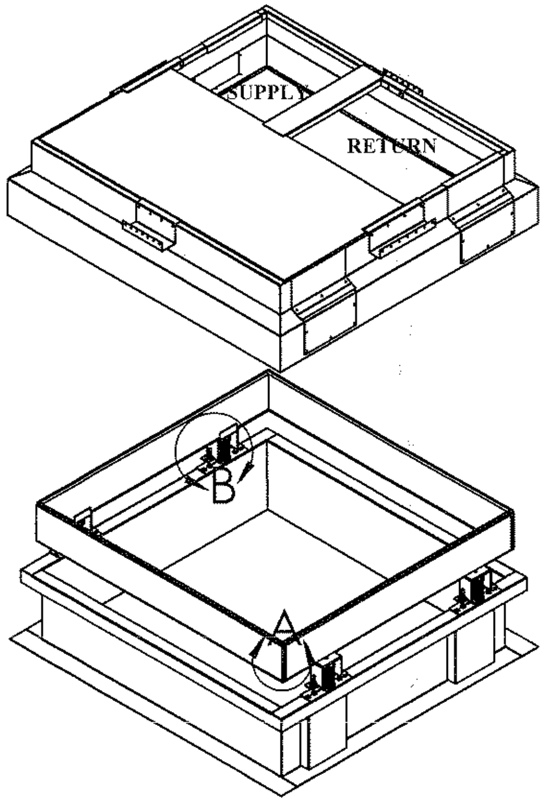
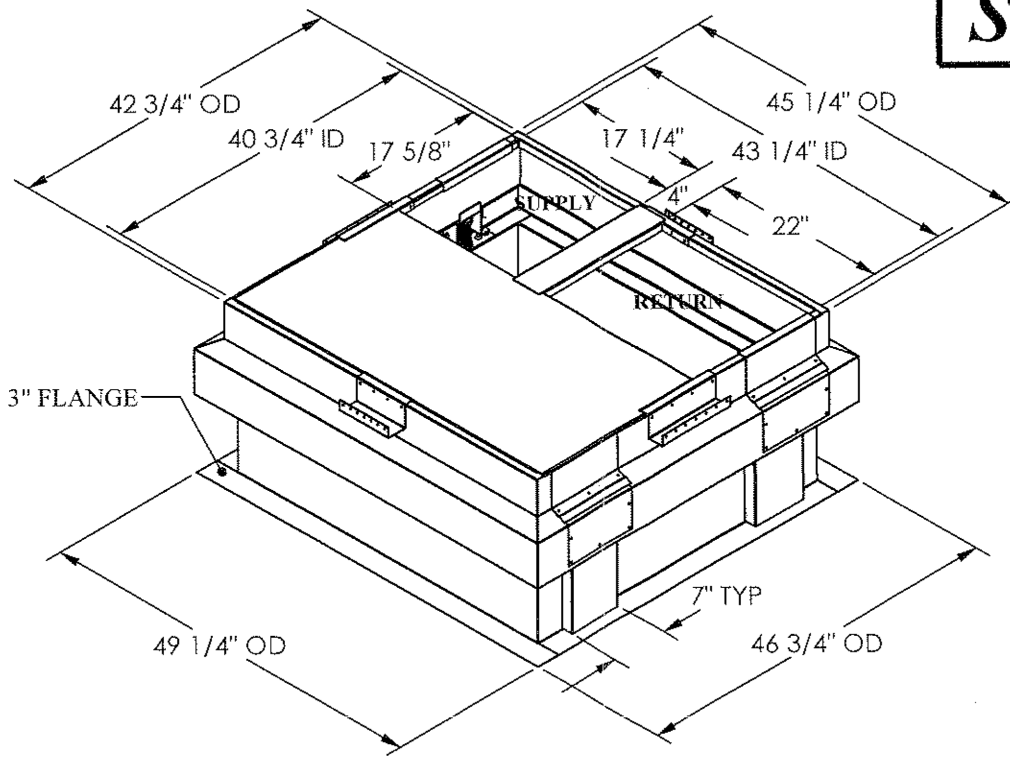
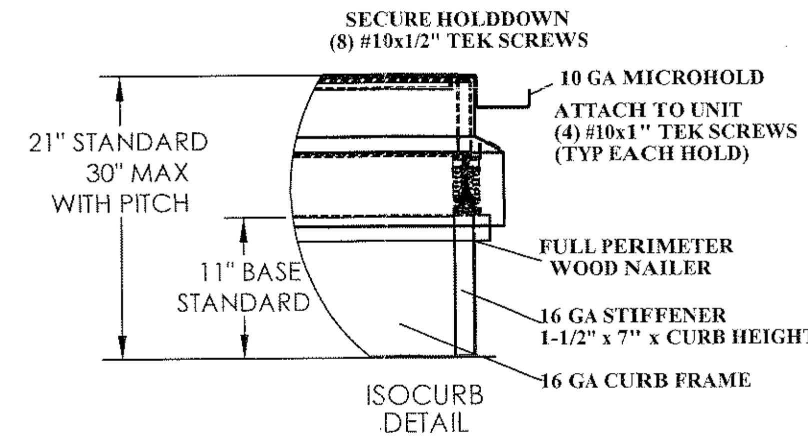
SUBMITTAL | 0403-572A SERIES



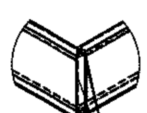


* WELDED CONSTRUCTION
* PERIMETER WOOD NAILER
* GASKET PACKAGE
* FACTORY INSTALLED HOLDDOWNS
* OSHPD PRE-APPROVED 2" DEF SEISMIC RESTRAINTS (OPA#0070)

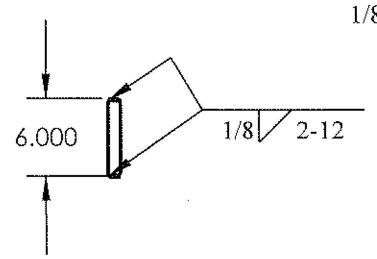


ISOCURB DETAIL

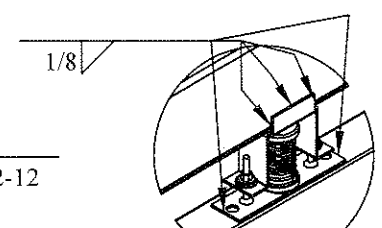
DETAIL A
SCALE 1 : 12



SEAM WELD TOP AND SIDES (TYP. 4 CORNERS)



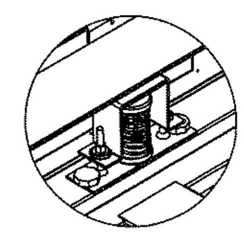
10 GA SUPPORT ASSY DETAILS



DETAIL B
SCALE 1 : 8

ISOLATOR WELDING STANDARD OFFERING

FOR BOLTED ON ISOLATORS



DETAIL C
SCALE 1 : 8

FOR BOLTED ON ISOLATORS ADD "BOLT" TO PART#
EX: 0403-572A-01CBC-BOLT

IF BOLTED RESTRAINTS ARE PREFERRED, IT MUST BE NOTED AT TIME OF ORDER.

BOLTS WILL BE 1/2" X 2", 2 PER ISOLATOR
1/2" FLAT WASHER, 2 PER BOLT,
1/2" NUT
1/4" THICK NEOPRENE PAD IS PLACED BETWEEN RESTRAINT AND CURB
NEOPRENE CUP WILL BE UNDER SPRING.

REGISTERED PROFESSIONAL ENGINEER
CLIFFORD H. JOHNSON
No. 2602
Exp. 6.30.09
STRUCTURAL
STATE OF CALIFORNIA
9/1/07

MicroMetl Corporation

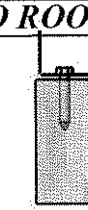
PRODUCT NUMBER:			
0403-572A	*0403-572A-8B-01CBC*	*18" TALL*	STRUCTURALLY CALCULATED VIBRATION ISOLATION
ISOLATION CURBS	*0403-572A-01CBC*	*21" TALL*	CURB FOR YORK DNA, DNP, DNX, DNY, DNZ, DEM 024-060
	0403-572A-14B-01CBC	*14" TALL*	BHA, BHP, BHX, BHY, BHZ 024-060

Sparks, NV. (800) 884-4662
Indianapolis, IN. (800) 662-4822
Longview, TX. (903) 248-4800

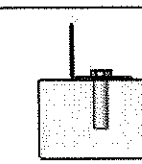
ANCHORAGE DETAILS TO ROOF:

STEEL ATTACHMENT:
SEE STEEL ATTACHMENT DETAIL SHEETS.

WOOD ATTACHMENT:
(DOUGLAS FIR)
(32) 1/4 x 3" SIMPSON SDS W/WASHER CENTER ON CURB FLANGE, EVENLY SPACED, (8) EACH LONG SIDE, (8) EACH SHORT SIDE



CONCRETE ATTACHMENT:
(3000 PSI MINIMUM, 4" MIN THICKNESS)
(6" MIN EDGE DISTANCE)
(16) 1/2"SIMPSON TITEN HD EVENLY SPACED,CENTER ON CURB FLANGE
8" MIN SPACING
(4) EACH LONG SIDE, (4) EACH SHORT SIDE



DATE:	07/2007
DRAWN BY:	MAC
WEIGHT:	220/240/260

MEETS SEISMIC REQUIREMENTS FOR FOLLOWING CODES:
2001 CBC
2006 IBC

ENG007

BJG | ARCHITECTURE + ENGINEERING

Structural Calculations
BJG# 20070133

Project:

0403-572A

Prepared for:

MicroMetl Corporation
905 Southern Way
Sparks, NV 89431

Date:

August 2007

REGISTERED PROFESSIONAL ENGINEER
CLIFFORD H. JOHNSON
No. 2602
Exp 6-30-08
STRUCTURAL
STATE OF CALIFORNIA

9/11/07

6995 Sierra Center Parkway Suite 200 Reno Nevada 89511 Phone 775.827.1010 Fax 775.827.1663 www.bjginc.com

Frame and Support Curb Information — Product Number 0403-572A-01CBC

h_{FRAME} =	30	in - Overall height from support substrate to top of curb
$h_{SUPPORT}$ =	6	in - Height of support curb from top of isolators to bottom of unit
L_{CURB} =	43.125	in - Longitudinal distance from center-to-center of transverse curb members
W_{CURB} =	40.75	in - Transverse distance from center-to-center of longitudinal curb members
h_i =	4.5	in - Height of isolator
d_i =	7.5	in - Dist. off long member end to isolator
d_{HD} =	7.5	in - Dist. off short member end to holddown

Unit Information — DNY

W_P =	740	lbs - Max. unit weight
h_{UNIT} =	41.5	in - Overall unit height above curb
h_{CM} =	27.7	in - Height above curb to center of mass
L_{UNIT} =	47.25	in - Overall unit length (longitudinal direction)
W_{UNIT} =	49.125	in - Overall unit length (transverse direction)

Seismic Loading - 2006 International Building Code (2006 IBC)

$Fp_{MAX} = 1.6 * S_{DS} * Ip * Wp$

Ss =	2	(2 is worst case in NV, OR, WA, AZ)
Fa =	1	(1.0 at worst case Site D, Ss ≥ 1.25)
Sms =	2	= FaSs
S_{DS} =	1.33	= 2/3 Sms
Ip =	1.5	(1.5 at worst case Occupancy)
Fp_{MAX} =	3.20	Wp
Fp_{MAX} =	2.29	Wp (ASD)
Fp_{MAX} =	1691	lb (ASD) - ASD values will be used throughout unless noted otherwise

Seismic Loading - 2001 California Building Code (2001 CBC)

$Fp_{MAX} = 4 * Ca * Ip * Wp$

Ca =	0.44	(.44 at worst case at Zone 4, Soil Type Sd)
Na =	1.5	(1.5 at worst case Seismic Source Type A <= 2km)
Ip =	1.5	(1.5 at worst case Occupancy)
Fp_{MAX} =	3.96	Wp
Fp_{MAX} =	2.83	Wp (ASD)
Fp_{MAX} =	2093	lb (ASD) - ASD values will be used throughout unless noted otherwise

Controlling Seismic Loads

Fp_{MAX} =	2.83	Wp (ASD)
Fp_{MAX} =	2093	lb (ASD) - ASD values will be used throughout unless noted otherwise

Wind Loading Check

Max. Projected Area (A_{MAX}) = h_{UNIT} * MAX (L_{UNIT} or W_{UNIT})

A_{MAX} =	2039	in^2
=	14.2	ft^2

Equivalent wind pressure required to equal seisimic loading (P_{EQ}) = Fp_{MAX} / A_{MAX}

P_{EQ} = 148 psf (ASD) **OKAY BY INSPECTION: P > 60 PSF**

Connectors from Unit to Support:

Use Self-drilling, Self Tapping Steel Screws, allowable load per Table IV-7A of the cold formed steel manual

#10 screw allowable load in 16 gage minimum material is **463** lbs each

Transverse or Longitudinal Loading

$V_{each\ side} = 2/3 * Fp_{MAX}$ (ASD)

$V_{HD} =$ **1395** lb per side (where applicable)

Transverse Loading

Holddowns:

$N_{HD} =$ **1** Number of holddowns per long side

$R_{HD1} = (Fp_{MAX} * h_{CM}) / (N_{HD} * W_{CURB}) - 1/3 * W_P$

$R_{HD1} =$ **1174** lb per HD uplift

$V_{HD} =$ **0** lb per HD

Max Resultant Force = **1174** lb per HD
Min Screws Required = **3** per HD

Isolators:

$R_{MAX} = (Fp_{MAX} * (h_{cm} + h_s)) / W_{CURB} + 2/3 * W_P$

$R_{MAX} =$ **2223** lb per side - Downward

$RISO_{MIN} = (Fp_{MAX} * (h_{cm} + h_s)) / W_{CURB} - 1/3 * W_P$

$R_{ISO\ MIN} =$ **1483** lb per side uplift

$V_{ISO} = F_{pMAX}/(\#\ Iso)$

$V_{ISO} =$ **0** lb per side

Longitudinal Loading

Holddowns:

$R_{HD1} = (F_{pmax} * h_{cm}) / (2*(L_{UNIT} - d_{HD}) - 1/6*W_P$

$R_{HD1} =$ **605** lb per HD Assume all uplift into end holddowns

$V_{HD} =$ **1395** lb per HD

Max Resultant Force = **1521** lb per HD
Min Screws Required = **4** per HD

Isolators:

$R_{MAX} = (Fp_{MAX} * (h_{cm} + h_s)) / (L_{CURB} - 2d_i) + 2/3 * W_P$

$R_{MAX} =$ **2999** lb per side - Downward

$R_{ISO\ MIN} = (Fp_{MAX} * (h_{cm} + h_s)) / (L_{CURB} - 2d_i) - 1/3 * W_P$

$R_{ISO\ MIN} =$ **2259** lb per side uplift

$V_{ISO} = V_{each\ side}$

$V_{ISO} =$ **1395** lb per side

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Isolator Load Summary

USE 2 TYPE **OPA0070** Isolator restraints each long side for shear and vertical

USE 0 TYPE **OPA0070** Isolator restraints each short side for shear

Max. $V_{ISO} \leftrightarrow$ = V_{ISO} max. due to transverse or longitudinal loading

Max. $V_{ISO} \leftrightarrow$ = 1395 lb per side — Max. $V_{ISO} \leftrightarrow$ = 698 lb each isolator

Max. $R_{ISO} \downarrow$ = max. downward force due to transverse or longitudinal loading

Max. $R_{ISO} \downarrow$ = 2999 lb per side — Max. $R_{ISO} \downarrow$ = 1499 lb each isolator

Max. $R_{ISO} \uparrow$ = max. uplift force due to transverse or longitudinal loading

Max. $R_{ISO} \uparrow$ = 2259 lb per side — Max. $R_{ISO} \uparrow$ = 1129 lb each isolator

PRE-APPROVED MAXIMUM ALLOWABLE LOADS

Allowable Horizontal = 1000 lb each isolator **OKAY**

Allowable Vertical = 1600 lb each isolator **OKAY**

Tube Steel Support Assembly

Use 10GA cold-formed overlapping channels, 6" tall, 1.125" wide; Use properties for hollow rectangle

Conditions and formulas per AISI Cold-Formed Steel Specification (2001) Analyze as a beam

Bending: (Per C3.1)

t =	0.134	in
Fy =	33	ksi
b =	1.125	in
d =	6	in
C_b =	1.14	AISC 13th ed. Table 3-1
E =	29000	ksi
G =	11500	ksi
I_y =	0.41	in^4
J =	1.71	in^4
S_x =	2.057	in^3
Ax =	1.61	in^2
$b_1 = b - 2 * t$ =	0.857	in
$d_1 = d - 2 * t$ =	5.732	in
$L = L_{CURB} - 2 * d_i$ =	28.125	in
$L_u = L / 2$ =	14.06	in
$b_{eff} = b - 3 * t$ =	0.723	in
$h_{eff} = d - 3 * t$ =	5.598	in

Allowed Lateral Unbraced Length, L_A

$L_A = 0.36 * C_b \pi / (FyS_y) * (EGJIy)^{1/2}$

L_A = 291.2 in (Eq. C3.1.2.2-1)

Ω_b = 1.67

If laterally unbraced length is less than or equal to L_u, then the nominal moment M_n shall be used

Lu < La OKAY

$M_n = S_e F_y$

M_n / Ω_b = 40.6 k-in (Eq. C3.1.1-1)

Max moment due to center holddown, M_u

$M_u = (RMAX/L)L^2/8 = W L^2 / 8$

M_u = 10543.02 lb-in

M_u = 10.54 k-in

BENDING OKAY

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Shear: (Per C3.2.1)

Ω_v =	1.60	
h / t =	44.8	
k_v =	5.34	
$\sqrt{(Ek_v / F_y)}$ =	68.5	
Aw =	1.61	in^2
F_v =	19.80	ksi

F_v per Eqs. C3.2.1-2, 3, 4

Nominal Shear Strength

$V_n = A_w F_v$

V_n =	31.8	kips	(Eq. C3.2.1-1)
V_n / Ω_v =	19.9	kips	

Max Shear Force

$V_u = R_{MAX} / 2$

V_u =	1.50	kips	**OKAY**

Web Crippling: (Per C3.4.1)

C =	7.5	
C_h =	0.048	
C_N =	0.12	
C_R =	0.08	
Ω_w =	1.75	
N =	4	in.
R =	0.25	in.
θ =	90	°

Note: N = Bearing length per isolator

Nominal Web Crippling Strength

$P_n = Ct^2 F_y \sin\theta(1-C_R(R/t)^{1/2})(1+C_N(N/t)^{1/2})(1-C_h(h/t)^{1/2})$

P_n =	4.45	kips / web	(Eq. C3.4.1-1)
P_n =	8.90	kips	
P_n / Ω_w =	5.084	kips	

$P_u = R_{MAX}$ / # of isolators per side

P_u =	1.499	kips	(long side)
P_u =	0.00	kips	(short side)

OKAY

Frame Assembly Stiffeners

Use 16 gage stiffener material

Conditions and formulas per AISI Cold-Formed Steel Specification (2001)

t =	0.060	in
Fy =	33	ksi
Length =	7	in
Width =	1.5	in
Height =	20	in
Ω_C =	1.8	
A =	0.59	in^2
r_1 =	0.66	in
r_2 =	2.53	in
kl/r_{min} =	30.4	

$F_e = \pi^2 E/(KL/r)^2$

F_e =	309.96	ksi	(Eq. C4.1-1)

$\lambda_c = \sqrt{(F_y/F_e)}$

λ_c =	0.33		(Eq. C4-4)
F_n =	25.11	ksi	(Eq. C4-2,3)

$P_n = A_e F_n$

P_n =	14.89	kips	(Eq. C4-1)
P_n/Ω_c =	8.27	kips	

$P_U = R_{MAX} / 2$

P_U =	1499.45	lbs	
P_U =	1.50	kips	**STIFFENER OKAY**

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Anchorage to Supporting Structure

Shear to each long side = **1395** lbs
Shear to each short side = **1395** lbs

$R_{ISO\ MIN} = (Fp_{MAX} * (h_{cm} + h_{frame})) / W_{CURB} - 1/3 * W_P$
Uplift to each long side = **2715** lbs
$R_{ISO\ MIN} = (Fp_{MAX} * (h_{cm} + h_{frame})) / (L_{CURB} - 2 * d_i) - 1/3 * W_P$
Uplift to each short side = **4045** lbs

Anchorage to Concrete Pad

4 in. thick conrete pad - min. embedment of 3 in., min. spacing of 8 in. and min. edge distance of 6 in.

w/ 1/2" Simpson Titen HD, allow = **1605** lbs in **shear**
w/ 1/2" Simpson Titen HD, allow = **1155** lbs in **tension**

Try **3** Titen HD's per long side at a minimum
Try **4** Titen HD's per short side

(Actual Shear / Allowable Shear)^(5/3) + (Actual Tension / Allowable Tension)^(5/3) ≤1.0

Elliptical Interaction Equation = **0.793** at the long sides **OK, less than 1.0**
Elliptical Interaction Equation = **0.880** at the short sides **OK, less than 1.0**

Anchorage to Wood sub-Structure

With Simpson 1/4 x 3" SDS screws...

Allow Shear = **470** lb per simpson catalog
Allow Tension = **550** lb assuming 2" penetration per NDS Table 11.2B (#14 wood screw)

3 screws required for uplift long side
5 screws required for uplift short side

3 screws required for shear both sides

6 **total screws required long side** — **8.60** inches maximum spacing
8 **total screws required short side** — **5.8** inches maximum spacing

Anchorage to Steel sub-Structure

The steel sub-structure will have wood blocking in place between flutes of metal deck,
therefore the required number of SDS screws will be the same as for the wood sub-structure.

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Note: Connection evaluated without consideration of bolt hole deformation.

Anchorage to Steel

With A307 1/2" Bolts...

t =	**0.060**	in
F_y =	**33**	ksi
F_u =	**45**	ksi
e=	**1**	in.
d=	**1/2**	in.
width=	**3**	in.

$R_{ISO\ MIN} = (Fp_{MAX} * (h_{cm} + h_{frame})) / W_{CURB} - 1/3 * W_P$

Uplift to each long side = **2715** lbs

$R_{ISO\ MIN} = (Fp_{MAX} * (h_{cm} + h_{frame})) / (L_{CURB} - 2 * d_i) - 1/3 * W_P$

Uplift to each short side = **4045** lbs

Shear to each long side = **1395** lbs

Shear to each short side = **1395** lbs

Design strength based on spacing and edge distance:

P_n=	2.7	kips/bolt
F_u/F_y=	1.36	
Ω=	2.00	
Φ=	0.70	
P_n/Ω=	1.35	kips/bolt
ΦP_n=	1.89	kips/bolt
3d=	1 1/2	NOTE: Distance between bolt hole centers must be greater than 3d.
1.5d=	3/4	NOTE: Distance from edge of connection to bolt hole center must be greater than 1.5d

Design strength based on bearing: NOTE: bolt hole deformation is not considered

C=	3	in^2
m_f=	0.75	Table E3.3.1-2
Ω=	2.50	
Φ=	0.60	
P_n=	3.0375	kips/bolt
P_n/Ω=	1.215	kips/bolt
ΦP_n=	1.82	kips/bolt

Design strength based on bolt shear:

P_n=	5.3	kips/bolt (Table IV-6)
Ω=	2.40	
Φ=	0.65	
P_n/Ω=	2.21	kips/bolt
ΦP_n=	3.45	kips/bolt

Governing limit state:

			Governing Limit State
P_n/Ω=	1.22	kips/bolt	Bearing Strength
ΦP_n=	1.82	kips/bolt	Bearing Strength

3	# of bolts for the long side
4	# of bolts for the short side