EnCon Services, Inc.

Sign Design Calculations

Job Description
Kinetic Ring Sculpture
Kennedy Blvd.
Tampa, FL
12'-6" ring @ 24'-6" OAH
Design per 2010 Florida Building Code, ASCE 7-10

PREPARED BY: EnCon Services, Inc.
2272 Jaudon Road
Dover, FL 33527
813-655-3373
F 813-655-9814

Aaron Biedenbach, P.E.
FL PE #52949, FL EB 9394
OH PE 60756, OC #01893
KY PE #20281, P #2463
IN PE #PE 19600322
FL CBC #060535, QB #22527

Load Condition D+.6W

Importance Factor	1	
Kzt	1	
Exposure	C	
Kd	0.85	
Kz	0.94	
V	150	mph
Cf	1.72	
G	0.85	
Number of Poles	1	

Wind Pressure
67 PSF

Sign	Area (sf)	Distance to Center (ft)	P = Force (lb)	Moment (ft-lb)
Top	78.50	16.25	3169	51498
Middle			0	0
Bottom			0	0
Poles	12.00	6.00	484	2907
		Totals	**3,654**	**54,405**

Required Sx 21.50 inches cubed per pole
Provided Sx 42.9 HSS 10x10x3/8" Grade A500 B **OK**

Base Plate Design

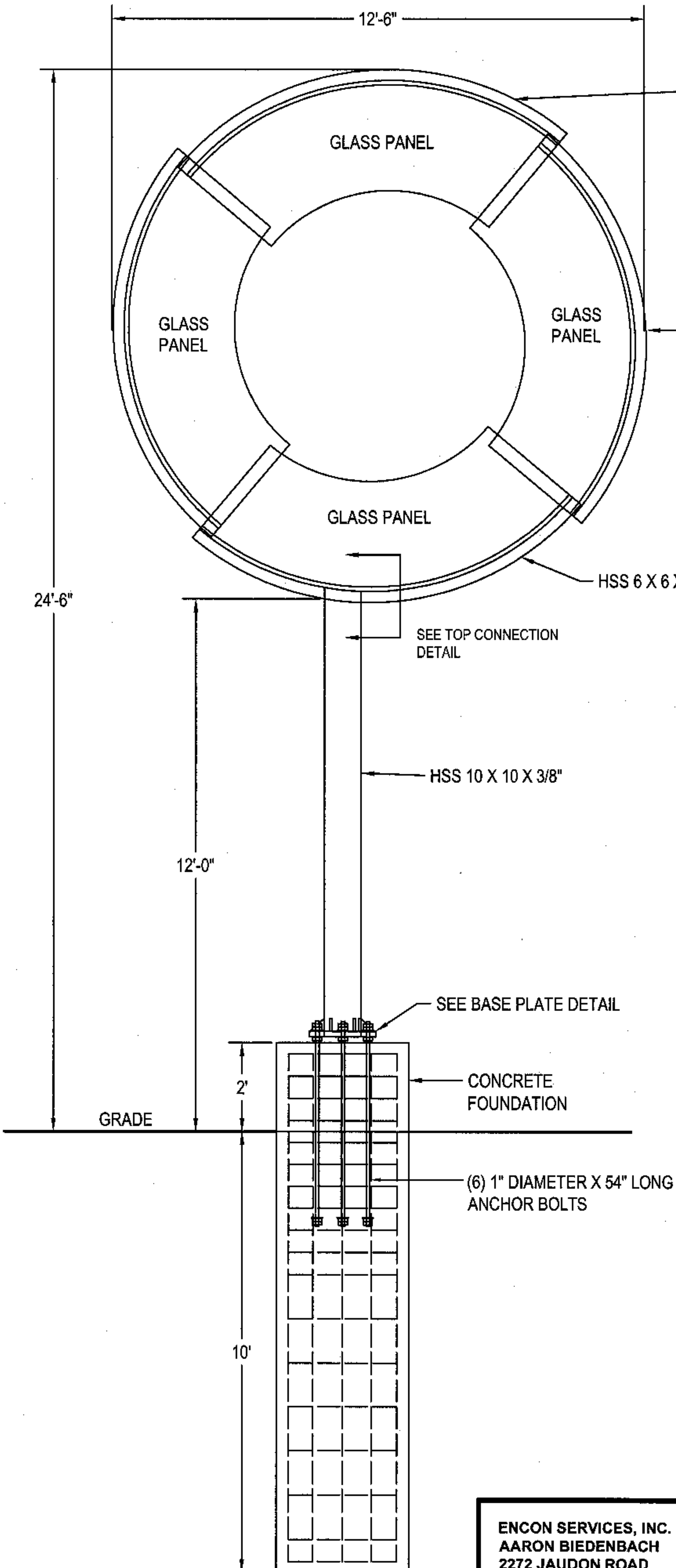
Distance Between Bolts	14	15544	**Tension on Bolts (LB)**
Number of Bolts per Base Plate	6		**Use 1" Dia. X 54" Long F1554 Gr55 Bolts**
Plate Width B (IN)	18	1.07	**Plate thickness (IN)**
Bolt Spacing d (IN)	14		**Use 1 1/2" A36 Plate**
Diameter of Pole (IN)	10		

Base Design

Number of Bases	1
Diagonal B (FT)	3.00
Lateral soil pressure (LB/SF/FT)	150
Depth (Estimated) (FT)	10
S1	1000
Design Depth (FT)	8.37 Ft

Base Size Required
10.0 FT Deep
3.0 FT Diameter

AARON P. BIEDENBACH
LICENSE
No 52949
STATE OF
FLORIDA
PROFESSIONAL ENGINEER



150 MPH WIND LOAD
RISK CATEGORY II
EXPOSURE C
2010 FLORIDA BUILDING CODE
ASCE 7-10

MATERIALS:
ALL JOINTS TO BE WELDED ALL AROUND
GRADE A36 STEEL SHAPES
GRADE A500 B STEEL TUBE
GRADE F1554 GR55 ANCHOR BOLTS
GRADE 70XX WELDING ROD
GRADE 60 KSI REBAR

FOUNDATION:
3000 PSI CONCRETE @ 28 DAYS
2000 PSF SOIL BEARING
150 PSL/LF SOIL LATERAL BEARING
UNDISTURBED SOIL

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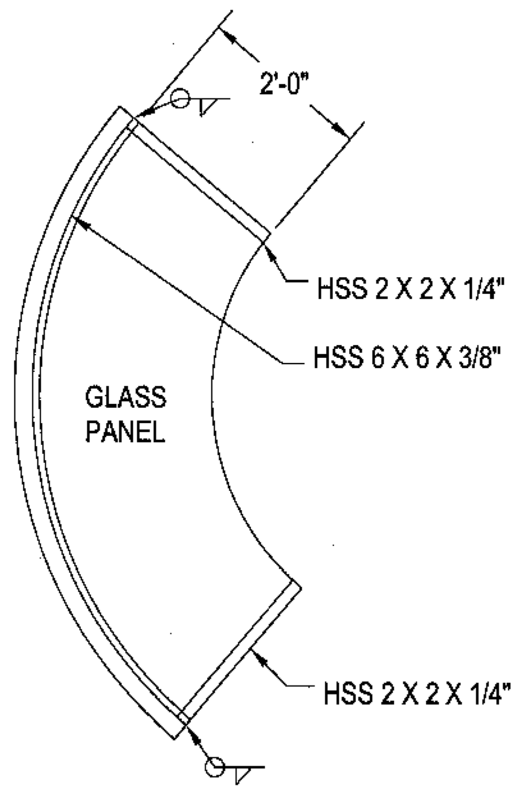
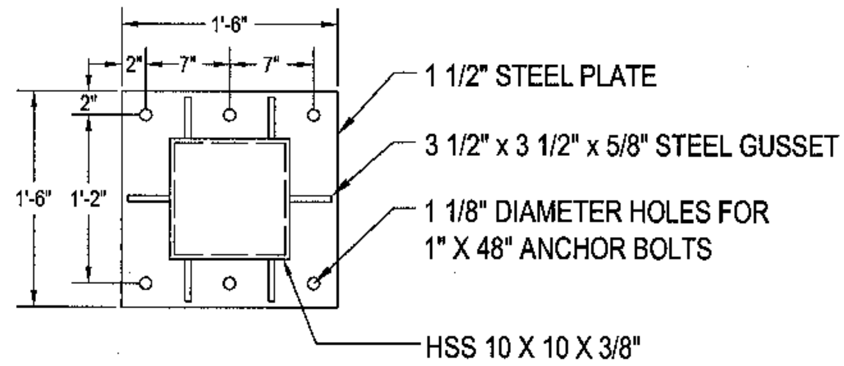
LOCATION:
KINETIC RING
KENNEDY BLVD.
TAMPA, FL

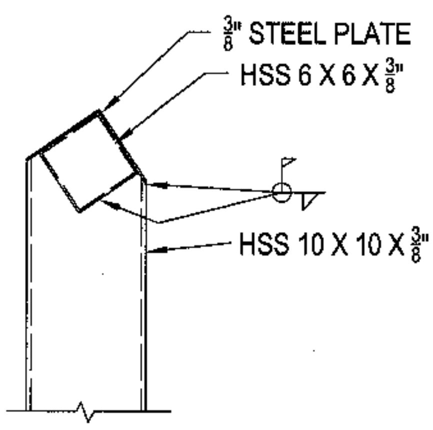
AARON P. BIEDENBACH ★ LICENSE No 52949 ★ STATE OF FLORIDA ★ PROFESSIONAL ENGINEER



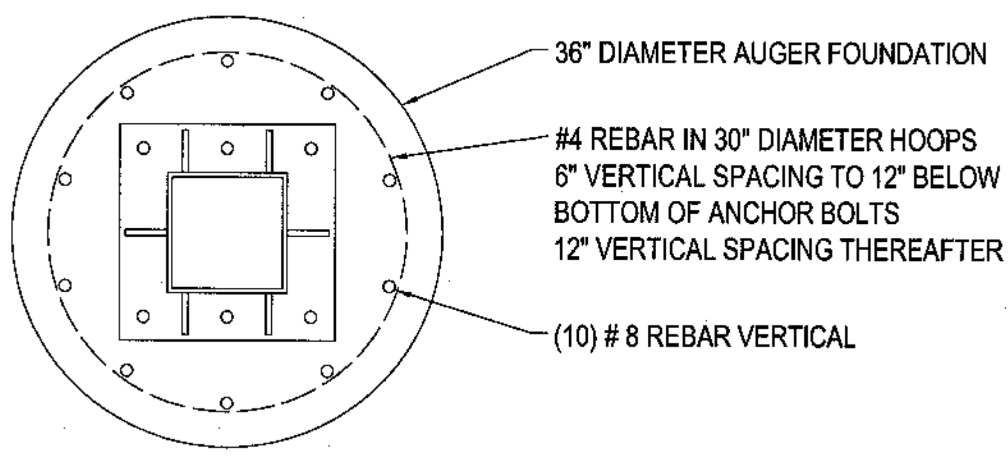
GLASS PANEL MOUNTING DETAIL



BASE PLATE DETAIL



TOP CONNECTION DETAIL



TOP VIEW OF FOUNDATION

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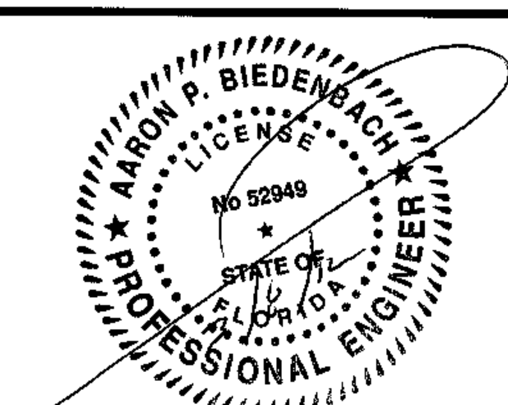
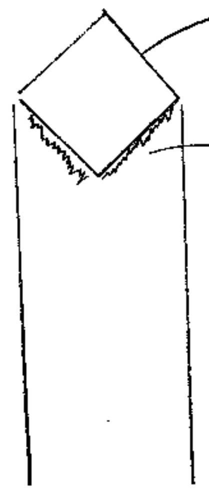


KINETIC RING

TOP POLE CONNECTION



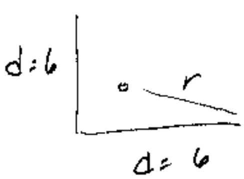
LOAD CASE D + .6W

TORSION FROM WIND = $(70)(67)(.6)(12.5/2) = 17587'^{\#}$

TORSIONAL SHEAR OF 6x6x3/8 = $f = \dfrac{T}{2b'd't} = \dfrac{17587}{2(5.625)^2 .375} = 8839$ PSI

ALLOWABLE TORSIONAL SHEAR = $.4F_y = .4(46) = 18400$ PSI

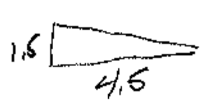
WELD DESIGN



Centroid x-y $= \dfrac{d^2}{2(b+d)} = \dfrac{6^2}{2(6+6)} = 1.5''$

$$J = \left[\frac{(b+d)^4 - 6b^2d^2}{12(b+d)}\right] \text{WELD LEG} = \left[\frac{(6+6)^4 - 6(6)^2(6)^2}{12(6+6)}\right].375$$

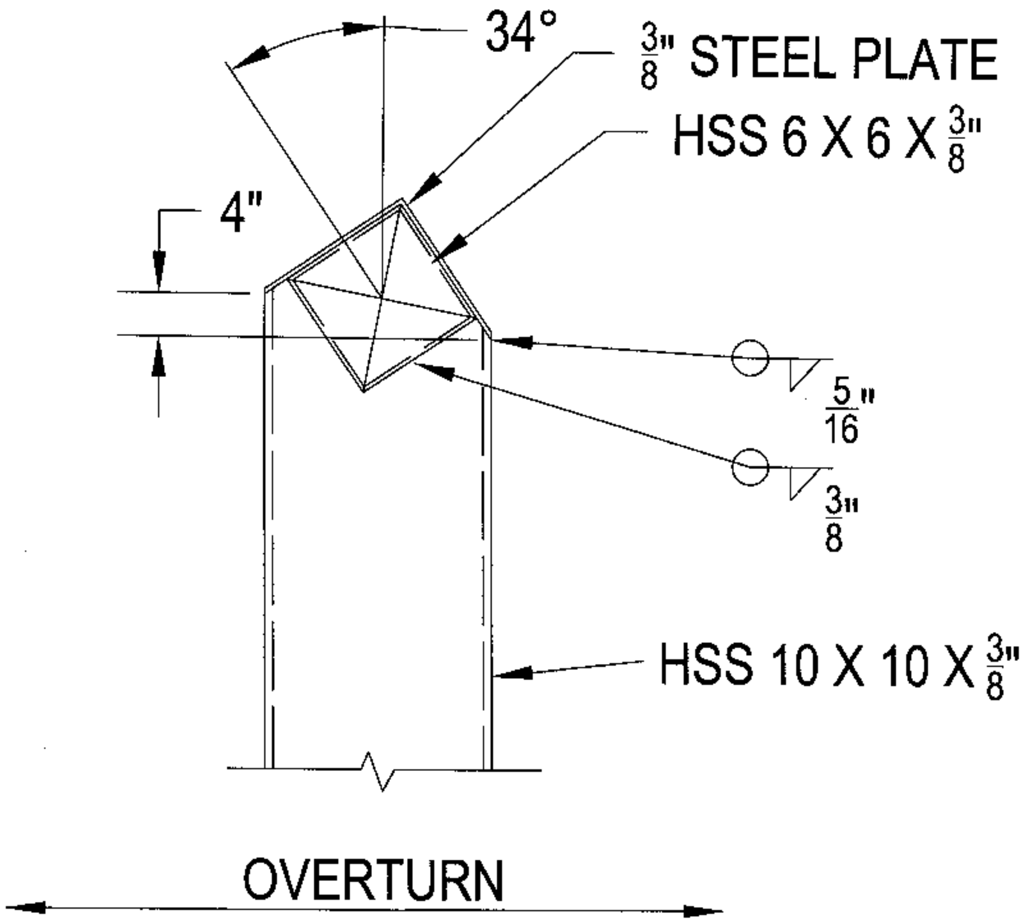
$= 33.75$



$r = \sqrt{1.5^2 + 4.5^2} = 4.74$

$f = \dfrac{Tr}{J} = \dfrac{\left(\dfrac{17587}{2\text{ SIDES}}\right)(12)(4.74)}{33.75} = 14819$ PSI < 21000 PSI

ALLOWED FOR 70XX ROD



TOP CONNECTION DETAIL

SCALE: 3/4" = 1'-0"

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Importance Factor	1	
Kzt	1	
Exposure	C	
Kd	0.85	
Kz	0.94	
V	150	mph
Cf	1.72	
G	0.85	
Number of Poles	1	

Sign	Area (sf)	Distance to Center (ft)	Wind Pressure 67 PSF P = Force (lb)	Moment (ft-lb)
Top	70.00	14.25	2826	40270
Middle			0	0
Bottom			0	0
Poles	7.06	4.25	285	1210
		Totals	**3,111**	**41,480**

Required Sx (moment / fb)	16.40	inches cubed per pole
Provided Sx	42.9	HSS 10x10x3/8" Grade A500 B **OK**
Shear Stress (shear /area)	221	PSI

Base Plate Design

Distance Between Bolts	14	11852	**Tension on Bolts (LB)**
Number of Bolts per Base Plate	6		**Use 1" Dia. X 54" Long F1554 Gr55 Bolts**
Plate Width B (IN)	18	0.94	**Plate thickness (IN)**
Bolt Spacing d (IN)	14		**Use 1 1/2" A36 Plate**
Diameter of Pole (IN)	10		

Base Design

Number of Bases	1	
Diagonal B (FT)	3.00	
Lateral soil pressure (LB/SF/FT)	150	
Depth (Estimated) (FT)	10	
S1	1000	
Design Depth (FT)	7.27	Ft

Base Size Required
10.0 FT Deep
3.0 FT Diameter

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ASD - DESIGN MOMENTS (ABOUT X-X) AND SHEARS (Y-Y)

M_{xx} = **41.5** kip_ft

V_{yy} = **3.2** kips

ASD - AXIAL LOAD

Axial load

P = **2.0** kips

SQUARE AND RECTANGULAR HOLLOW SECTIONS

Try section - HSS 10x10x0.375

Minimum yield stress of section F_y = **46** ksi

TUBE CLASSIFICATION - FLANGE IN FLEXURE (ABOUT X-X AXIS)

Limiting width - thickness ratios

Flange: compact limit $R_{fl\_cmp} = 190 / \sqrt{(F_y)}$ = **28.01**

non-compact limit $R_{fl\_non} = 238 / \sqrt{(F_y)}$ = **35.09**

Including limits of ASD F3.1

Ratio of end moments (M1/M2) R_{em} = **0.0**

$L_c = \max((1200 \times (1\ ksi) \times b/F_y),((1950 \times (1\ ksi) + 1200 \times (1\ ksi) \times (R_{em})) \times b/F_y))$ = **31.627** ft

Flange is COMPACT

TUBE CLASSIFICATION - WEB IN COMBINED FLEXURAL (ABOUT X-X) AND AXIAL COMPRESSION

Limiting width - thickness ratios

f_a = abs(P)/A = **0.15** ksi

compact limit R_{wb_cmp} = **93.2**

non-compact limit $R_{wb\_non} = 760 / \sqrt{(0.6 \times F_y)}$ = **144.66**

Including limits of ASD F3.1

Ratio of end moments (M1/M2) R_{em} = **0.0**

$L_c = \max((1200 \times (1\ ksi) \times b/F_y),((1950 \times (1\ ksi) + 1200 \times (1\ ksi) \times (R_{em})) \times b/F_y))$ = **31.627** ft

Web is COMPACT

ALLOWABLE STRESS – FLEXURE ABOUT X-X OR COMBINED FLEXURE ABOUT X-X WITH AXIAL COMPRESSION

F_{bx} = **30.36** ksi

ALLOWABLE STRESS - AXIAL COMPRESSION

Slenderness ratio about x-x axis

Effective length factor K_x = **2.00**

Unbraced length x-x L_{bx} = **20.00** ft

$sr_x = (K_x \times L_{bx}/r_x)$ = **122.45**

Slenderness ratio within limits for compression

Allowable stress – compression F_{ax}

$C_c = \sqrt{(2 \times \pi^2 \times E_{SASD}) / F_y}$ = **111.6**

Allowable stress

F_{ax} = **10.0** ksi

Slenderness ratio about y-y axis

Effective length factor K_y = **2.00**

Unbraced length y-y L_{by} = **20.00** ft

$sr_y = (K_y \times L_{by} / r_y)$ = **122.45**

Slenderness ratio within limits for compression

Allowable stress – compression F_{ay}

$C_c = \sqrt{(2 \times \pi^2 \times E_{SASD}) / F_y}$ = **111.6**

Allowable stress

F_{ay} = **10.0** ksi

F_a = **10.0** ksi

Note - For singly symmetric and unsymmetric columns, such as angles, channel or tee shaped columns, and doubly symmetric columns such as cruciform or built up columns with very thin walls, additional checks may be required for consideration of flexural-torsional and torsional buckling according to ASD cl E3.

COMBINED COMPRESSION AND BENDING ABOUT X-X AXIS - STRESS CHECK

Computed axial stress f_a = **0.15** ksi

Computed flexural stress (x-axis) f_{bx} = **12.33** ksi

Stress reduction factors C_{mx} =**1.00**

Effective length factor K_x = **2.0**

$F'_{ex} = (12 \times \pi^2 \times E_{SASD})/(23 \times (K_x \times L_{bx}/r_x)^2)$ = **9.96** ksi

$C_{cb1} = (f_a / F_a) + (C_{mx} \times f_{bx}) / ((1 - f_a / F'_{ex}) \times F_{bx})$ = **0.43**

$C_{cb2} = (f_a / (0.6 \times F_y)) + (f_{bx} / F_{bx})$ = **0.41**

$C_{cb3} = (f_a / F_a) + (f_{bx} / F_{bx})$ = **0.42**

C_{cb} = If((f_a / F_a) <= 0.15, C_{cb3}, max(C_{cb2}, C_{cb1})) = **0.42**

Combined compression and bending check - Pass

SHEAR STRESS CHECK - SHEAR IN Y-Y AXIS DIRECTION

Allowable shear stress $F_v = 0.40 \times F_y$ = **18.40** ksi

Shear area $A_{sy} = 2 \times t \times b$ = **6.2** in^2

Applied shear (web) $F_{vy} = V_{yy} / A_{sy}$ = **0.512** ksi

Shear stress - PASS

ASD SECTION DESIGN RESULTS SUMMARY

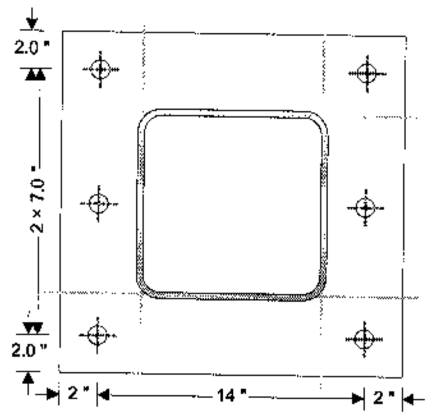
Item	Capacity	Actual	Condition

Comb Compresion-Flexure	1.00	**0.42**	**Pass**
Shear (y)	**18.40** ksi	**0.51** ksi	**Pass**

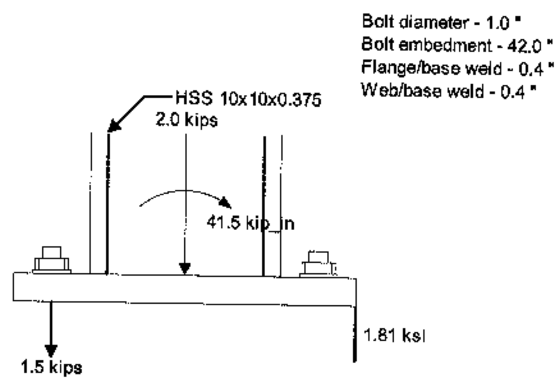
COLUMN BASE PLATE DESIGN (AISC360-05)

In accordance with the ASD method

TEDDS calculation version 2.0.04



Plan on baseplate



Elevation on baseplate

Design forces and moments

Axial force	P_u = **2.0** kips (Compression)
Bending moment	M_u = **41.5** kip_in
Shear force	F_v = **0.0** kips
Eccentricity	e = ABS(M_u / P_u) = **20.750** in
Anchor bolt to center of plate	f = N/2 - e_1 = **7.000** in

Column details

Column section	HSS 10x10x0.375
Depth	d = **10.000** in
Breadth	b_f = **10.000** in
Thickness	t = **0.349** in

Baseplate details

Depth	N = **18.000** in
Breadth	B = **18.000** in
Thickness	t_p = **1.500** in
Design strength	F_y = **36.0** ksi

Foundation geometry

Member thickness	h_a = **120.000** in
Dist center of baseplate to left edge foundation	x_{ce1} = **16.000** in
Dist center of baseplate to right edge foundation	x_{ce2} = **16.000** in
Dist center of baseplate to bot edge foundation	y_{ce1} = **16.000** in
Dist center of baseplate to top edge foundation	y_{ce2} = **16.000** in

Holding down bolt and anchor plate details

Total number of bolts	N_{bolt} = **6**
Bolt diameter	d_o = **1.000** in
Bolt spacing	s_{bolt} = **7.000** in

Edge distance	e_1 = **2.000** in
Minimum tensile strength of steel	F_y = **36** ksi
Compressive strength of concrete	f'_c = **3** ksi

Safety factors

Compression	Ω = **2.50**
Flexure	Ω = **1.67**
Weld shear	Ω = **2.00**

Plate cantilever dimensions

Area of base plate	$A_1 = B \times N$ = **324.000** in^2
Maximum area of supporting surface	$A_2 = (N + 2 \times l_{min}) \times (B + 2 \times l_{min})$ = **1024.000** in^2
Nominal strength of concrete under base plate	$P_p = 0.85 \times f'_c \times A_1 \times \min(\sqrt{(A_2 / A_1)}, 2)$ = **1468.8** kips
Bending line cantilever distance m	$m = (N - 0.95 \times d) / 2$ = **4.250** in
Bending line cantilever distance n	$n = (B - 0.95 \times b_f) / 2$ = **4.250** in
Maximum bending line cantilever	$l = \max(m, n)$ = **4.250** in

Check eccentricity

Maximum bearing stress	$f_{p,max} = 0.85 \times f'_c / \Omega \times \min(\sqrt{(A_2 / A_1)}, 2)$ = **1.81** ksi
Maximum bearing pressure	$q_{max} = f_{p,max} \times B$ = **32.64** kips/in
Critical eccentricity	$e_{crit} = N / 2 - P_u / (2 \times q_{max})$ = **8.969** in

$e > e_{crit}$ so loads cannot be resisted by bearing alone. Therefore consider as a large moment

Plate dimensions adequate as $(f + N/2)^2 >= (2 \times P_u \times (e + f))/q_{max}$ and a real solution for bearing length exists

Bearing length - quadratic solution 1	$Y_1 = (f + N/2) + \sqrt{((f + N/2)^2 - (2 \times P_u \times (e + f))/q_{max})}$ = **31.893** in
Bearing length - quadratic solution 2	$Y_2 = (f + N/2) - \sqrt{((f + N/2)^2 - (2 \times P_u \times (e + f))/q_{max})}$ = **0.107** in
Bearing length	$Y = \min(Y_1, Y_2)$ = **0.107** in
Tension force in bolts	$T_u = q_{max} \times Y - P_u$ = **1.5** kips
Max tension in single bolt	$T_{rod} = T_u / (N_{bolt}/2)$ = **0.5** kips

Base plate yielding limit at bearing interface

Required plate thickness	$t_{p,req} = \sqrt{((4 \times f_{p,max} \times Y \times (l - Y/2))/(F_y / \Omega))}$ = **0.388** in

PASS - Thickness of plate exceeds required thickness

Base plate yielding limit at tension interface

Distance from bolt CL to plate bending lines	$x = \text{abs}(l - e_1)$ = **2.250** in
Plate thickness required	$t_{p,req} = 2.58 \times \sqrt{((T_u \times x)/(B \times F_y))}$ = **0.185** in

PASS - Thickness of plate exceeds required thickness

Flange weld

Flange weld leg length	t_{fw} = **0.3125** in
Tension capacity of flange	$P_{tf} = b_f \times t \times F_y$ = **125.6** kips
Force in tension flange	$F_{tf} = M_u / (d - t) - P_u \times (b_f \times t) / A_{col}$ = **3.8** kips
Critical force in flange	$F_f = \min(P_{tf}, \max(F_{tf}, 0\text{kips}))$ = **3.8** kips
Flange weld force per in	$R_{wf} = F_f / b_f$ = **0.4** kips/in
Electrode classification number	F_{EXX} = **70.0** ksi
Nominal weld stress	$F_w = 0.60 \times F_{EXX} \times (1.0 + 0.5 \times (\sin(90\text{deg}))^{1.5}) / \Omega$ = **31.500**ksi
Design strength of weld per in	$R_{nf} = F_w \times t_{wf} / \sqrt{(2)}$ = **8.4** kips/in

PASS - Available strength of flange weld exceeds force in flange weld

ANCHOR BOLT DESIGN (ACI318-08)

TEDDS calculation version 2.0.03

Anchor bolt geometry

Type of anchor bolt	Cast-in headed end bolt anchor
Diameter of anchor bolt	d_a = **1** in
Number of bolts in x direction	N_{boltx} = **2**
Number of bolts in y direction	N_{bolty} = **3**
Total number of bolts	$n_{total} = (N_{boltx} \times 2) + (N_{bolty} - 2) \times 2 =$ **6**
Total number of bolts in tension	$n_{tens} = (N_{boltN} \times 2) + (N_{bolty} - 2) =$ **3**
Spacing of bolts in x direction	s_{boltx} = **14** in
Spacing of bolts in y direction	s_{bolty} = **7** in
Number of threads per inch	n_t = **8**
Effective cross-sectional area of anchor	$A_{se} = \pi / 4 \times (d_a - 0.9743 \text{ in} / n_t)^2 =$ **0.606** in^2
Embedded depth of each anchor bolt	h_{ef} = **25** in

Foundation geometry

Member thickness	h_a = **120** in
Dist center of baseplate to left edge foundation	x_{ce1} = **16** in
Dist center of baseplate to right edge foundation	x_{ce2} = **16** in
Dist center of baseplate to bot. edge foundation	y_{ce1} = **16** in
Dist center of baseplate to top edge foundation	y_{ce2} = **16** in

Material details

Minimum yield strength of steel	f_{ya} = **55** ksi
Minimum tensile strength of steel	f_{uta} = **55** ksi
Compressive strength of concrete	f'_c = **6** ksi
Concrete modification factor	λ = **1.00**

Strength reduction factors

Tension of steel element	$\phi_{t,s}$ = **0.75**
Shear of steel element	$\phi_{v,s}$ = **0.65**
Concrete tension	$\phi_{t,c}$ = **0.75**
Concrete shear	$\phi_{v,c}$ = **0.75**
Concrete tension for pullout	$\phi_{t,cB}$ = **0.70**
Concrete shear for pryout	$\phi_{v,cB}$ = **0.70**

Anchor forces

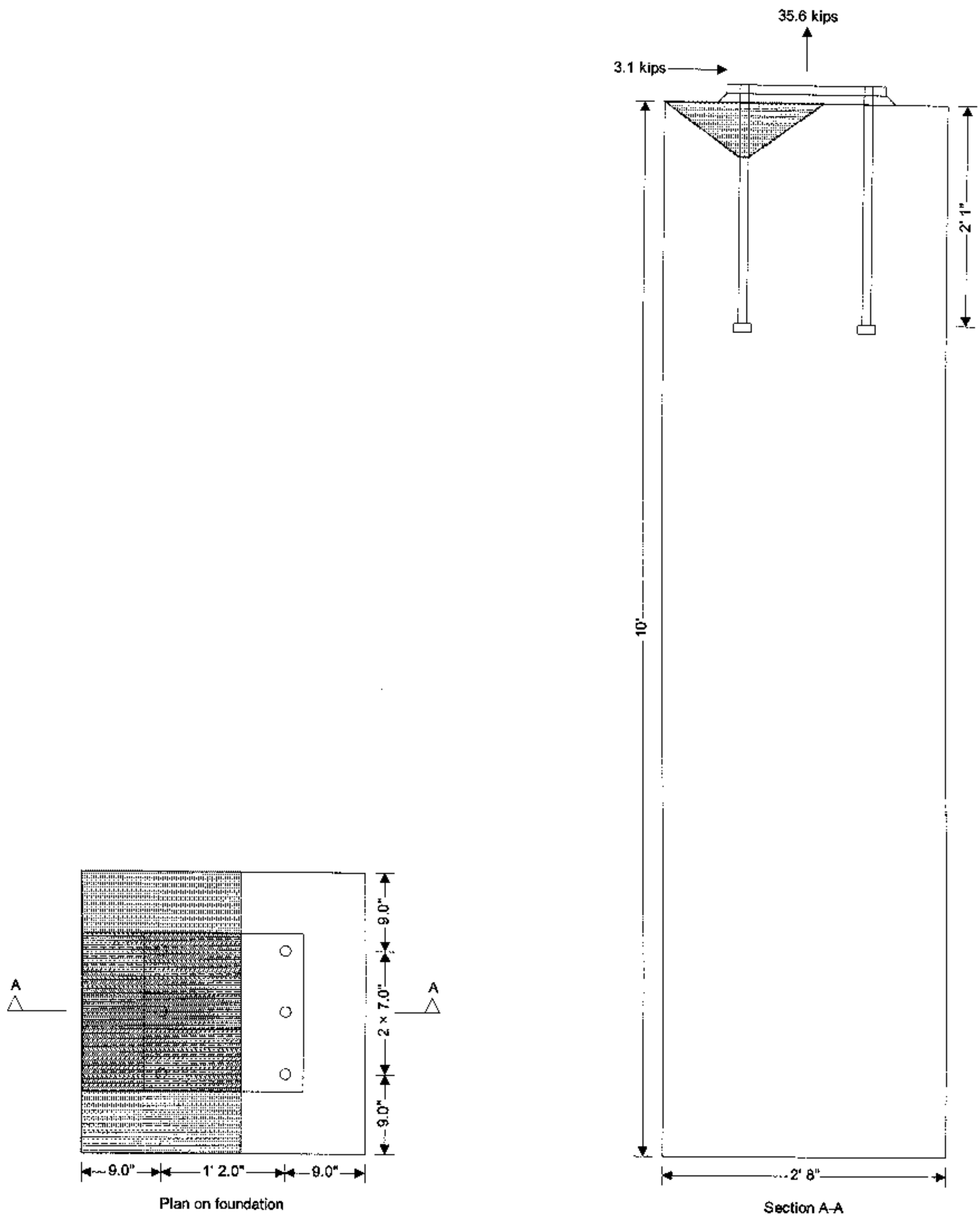
Number of bolt rows in tension	N_{boltN} = **1**
Axial force in bolts for row 1	N_1 = **35.60** kips
Total axial force on bolt group	N_R = **35.60** kips
Maximum axial force to single bolt	$N_{max,s}$ = **11.87** kips
Eccentricity of axial load (from bolt group centroid)	e'_N = **0.00** in
Shear force applied to bolt group	V = **3.10** kips

Steel strength of anchor in tension (D.5.1)

Nominal strength of anchor in tension	$N_{sa} = A_{se} \times f_{uta} =$ **33.32** kips
Steel strength of anchor in tension	$\phi N_{sa} = \phi_{t,s} \times N_{sa} =$ **24.99** kips

PASS - Steel strength of anchor exceeds max tension in single bolt

Check concrete breakout strength of anchor bolt in tension (D.5.2)



Concrete breakout - tension

The anchors are located at less than 1.5h_{ef} from 4 edges. Therefore the effective embedded depth has to be limited to 6.00 " in accordance with D.5.2.3

Limiting embedded depth $h_{ef,lim}$ = **6.00** in

Stength reduction factor	$\phi_t = \mathbf{0.65}$
Coeff for basic breakout strength in tension	$k_c = \mathbf{24}$
Breakout strength for single anchor in tension	$N_b = k_c \times \lambda \times \sqrt{(f'_c \times 1\text{ psi})} \times h_{ef,lim}^{1.5} \times 1\text{ in}^{0.5} = \mathbf{27.32}$ kips
Projected area for groups of anchors	$A_{Nc} = \mathbf{576}$ in^2
Projected area of a single anchor	$A_{Nco} = 9 \times h_{ef,lim}^2 = \mathbf{324}$ in^2
Min dist center of anchor to edge of concrete	$c_{a,min} = \mathbf{9}$ in
Mod factor for groups loaded eccentrically	$\psi_{ec,N} = \min(1 / (1 + ((2 \times e'_N) / (3 \times h_{ef,lim}))), 1) = \mathbf{1.000}$
Modification factor for edge effects	$\psi_{ed,N} = 1.0 = \mathbf{1.000}$
Modification factor for no cracking at service loads	$\psi_{c,N} = \mathbf{1.000}$
Modification factor for cracked concrete	$\psi_{cp,N} = \mathbf{1.000}$
Nominal concrete breakout strength	$N_{cbg} = A_{Nc} / A_{Nco} \times \psi_{ed,N} \times \psi_{c,N} \times \psi_{cp,N} \times N_b = \mathbf{48.57}$ kips
Concrete breakout strength	$\phi N_{cbg} = \phi_{t,c} \times N_{cbg} = \mathbf{36.43}$ kips

PASS - Breakout strength exceeds tension in bolts

Pullout strength (D.5.3)

Net bearing area of the head of anchor	$A_{brg} = \mathbf{2}$ in^2
Mod factor for no cracking at service loads	$\psi_{c,P} = \mathbf{1.000}$
Pullout strength for single anchor	$N_p = 8 \times A_{brg} \times f'_c = \mathbf{96.00}$ kips
Nominal pullout strength of single anchor	$N_{pn} = \psi_{c,P} \times N_p = \mathbf{96.00}$ kips
Pullout strength of single anchor	$\phi N_{pn} = \phi_{t,cB} \times N_{pn} = \mathbf{67.20}$ kips

PASS - Pullout strength of single anchor exceeds maximum axial force in single bolt

Side face blowout strength (D.5.4)

The sideface blowout will be checked in the x and y directions as the egde distances for the bolts in both directions are less than h_{ef} / 2.5

Check x direction

Axial force in anchors	$N_{sfb} = N_1 = \mathbf{35.60}$ kips
Edge distance	$c_{a1} = \mathbf{9.00}$ in
Side face blowout strength for single anchor	$N_{sb} = (160 \times c_{a1} \times \sqrt{(A_{brg})} \times \lambda \times \sqrt{(f'_c \times 1\text{psi})}) = \mathbf{157.74}$ kips
Distance between outer anchors along the edge	$s = (N_{bolty}-1) \times s_{bolty} = \mathbf{14}$ in
Nom side face blowout strength multiple anchors	$N_{sbg} = (1 + s / (6 \times c_{a1})) \times N_{sb} = \mathbf{198.64}$ kips
Side face blowout strength for multiple anchors	$\phi N_{sbg} = \phi_{t,c} \times N_{sbg} = \mathbf{148.98}$ kips

PASS - Sideface blowout strength exceeds tension in bolts

Check y direction

Axial force in anchors	$N_{sfb} = N_1 / N_{bolty} = \mathbf{11.87}$ kips
Edge distance	$c_{a1} = \mathbf{9.00}$ in
Side face blowout strength for single anchor	$N_{sb} = (160 \times c_{a1} \times \sqrt{(A_{brg})} \times \lambda \times \sqrt{(f'_c \times 1\text{psi})}) = \mathbf{157.74}$ kips
Distance between outer anchors along the edge	$s = (N_{boltN}-1) \times s_{boltx} = \mathbf{0}$ in
Nom side face blowout strength multiple anchors	$N_{sbg} = (1 + s / (6 \times c_{a1})) \times N_{sb} = \mathbf{157.74}$ kips
Side face blowout strength for multiple anchors	$\phi N_{sbg} = \phi_{t,c} \times N_{sbg} = \mathbf{118.31}$ kips

PASS - Sideface blowout strength exceeds tension in bolts

Steel strength of anchor in shear (D.6.1)

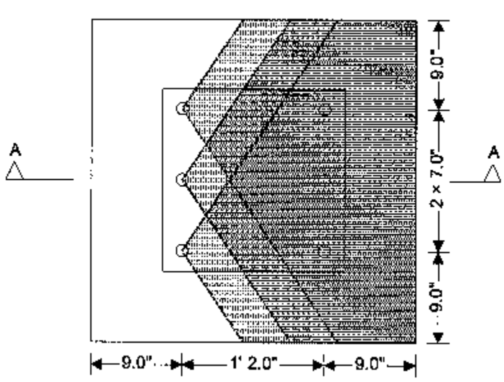
Built-up grout pads are used so nominal strength will be multiplied by 0.8 (D.6.1.3)

Effective number of anchors in shear	$N_{boltV} = \mathbf{6}$
Nom strength of anchor in shear	$V_{sa} = 0.8 \times N_{boltV} \times 0.6 \times A_{se} \times f_{uta} = \mathbf{95.95}$ kips

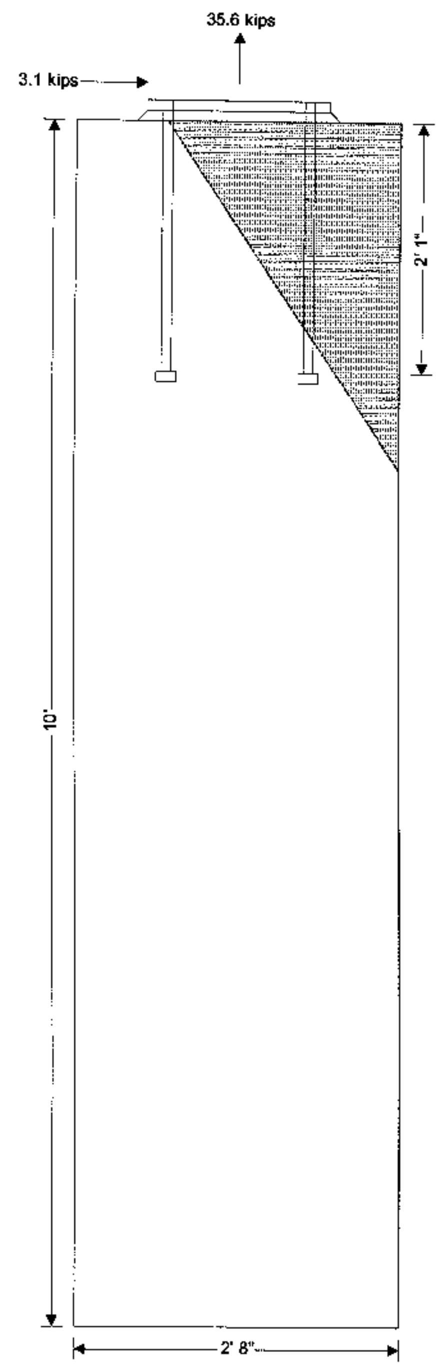
Steel strength of anchor in shear $\phi V_{sa} = \phi_{v,s} \times V_{sa}$ = **62.37** kips

PASS - Steel strength of anchor exceeds shear in bolts

Concrete break out strengh in shear - Case 2. All shear resisted by rear bolts (D.6.2)



Plan on foundation



Section A-A

Concrete breakout - shear

Applied shear $V_{app} = V$ = **3.10** kips

Edge distance x for shear near corner c_{a1} = **23** in

Edge distance y for shear near corner $c_{a2} = \min(y_{ce1}, y_{ce2}) - (((N_{bolty} - 1)/2) \times s_{bolty}) = \mathbf{9}$ in
Load bearing length of anchor $l_e = \min(h_{ef}, 8 \times d_a) = \mathbf{8}$ in
Basic concrete breakout strength $V_b = 7 \times (l_e / d_a)^{0.2} \times \sqrt{(d_a)} \times \lambda \times \sqrt{(f'_c \times 1psi)} \times (c_{a1})^{1.5} = \mathbf{90.65}$ kips
Projected area of a single anchor $A_{Vco} = 4.5 \times c_{a1}^2 = \mathbf{2380.5}$ in^2
Projected area of a group of anchors $A_{Vc} = \mathbf{1104}$ in^2
Mod factor for edge effect $\psi_{ed,V} = 0.7 + 0.3 \times c_{a2} / (1.5 \times c_{a1}) = \mathbf{0.778}$
Eccentricity of loading $e'_V = \mathbf{0}$ in
Modification factor of eccentric loading $\psi_{ec,V} = \min(1, 1 / (1 + ((2 \times e'_V) / (3 \times c_{a1})))) = \mathbf{1.000}$
Modification factor for cracking $\psi_{c,V} = \mathbf{1.000}$
Modification factor for edge distance $\psi_{h,V} = 1.0 = \mathbf{1.000}$
Nominal concrete break out strength in shear $V_{cbg} = A_{Vc} / A_{Vco} \times \psi_{ec,V} \times \psi_{ed,V} \times \psi_{c,V} \times \psi_{h,V} \times V_b = \mathbf{32.72}$ kips
Concrete break out strength in shear $\phi V_{cbg} = \phi_{v,c} \times V_{cbg} = \mathbf{24.54}$ kips

PASS - Shear breakout strength exceeds shear in bolts

Pryout strength of anchor in shear (D.6.3)

Coefficient of pryout strength $k_{cp} = \mathbf{2.0}$
Nominal pryout strength of anchor in shear $V_{cpg} = k_{cp} \times N_{cbg} = \mathbf{97.15}$ kips
Pryout strength of anchor in shear $\phi V_{cpg} = \phi_{v,cB} \times V_{cpg} = \mathbf{68.00}$ kips

PASS - Pryout strength of anchor exceeds shear in bolts

Interaction of tensile and shear forces

Critical design strength in tension $\phi N_n = \phi N_{cbg} = \mathbf{36.43}$ kips
Critical applied tensile force $N_{ua} = N_R = \mathbf{35.60}$ kips

As $N_{ua} > 0.2 \times \phi N_n$ partial strength shear permitted

Critical design strength in shear $\phi V_n = \phi V_{cbg,r} = \mathbf{24.54}$ kips
Critical applied shear force $V_{ua} = V = \mathbf{3.10}$ kips

As $V_{ua} \le 0.2 \times \phi V_n$ full strength in tension permitted

Interaction $I_b = N_{ua} / \phi N_n + V_{ua} / \phi V_n = \mathbf{1.104}$

PASS - interaction of forces is less than or equal to 1.2

KINETIC RING
FOUNDATION DESIGN
PAGE 1 OF 2

FOUNDATION
DEPTH DESIGN

MOMENT AT GRADE = 47.7 K FT

SHEAR = P = 3.2 K

$S_1 = (150\ PSF/LF)(2)\left(\frac{10}{3}\right) = 1000$

$h = \frac{M}{P} = \frac{47.7}{3.2} = 14.9\ FT$

$b = 3'$ DIAMETER

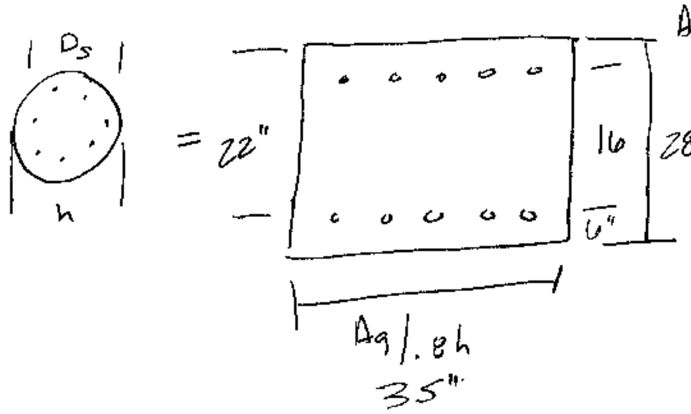
$\text{depth} = \frac{1.17P}{b\,S_1}\left[1 + \sqrt{1 + \frac{1.86\,S_1\,b\,h}{P}}\right]$

$= \frac{(1.17)(3200)}{(3)(1000)}\left[1 + \sqrt{1 + \frac{(1.86)(1000)(3)(14.9)}{3200}}\right]$

$= 7.73 < 10'$ USE $10'$ DEPTH

REINFORCEMENT

CONVERT ROUND FOUNDATION TO EQUIVALENT STRIP



$A_g = \frac{\pi 3^2}{4} = 7.06$

$D_s = 24'' \Rightarrow .67(24) = 16$

$.8h = (.8)(36) = 28$

A_{STEEL} MIN $= \frac{(.0018)(36)^2 \pi}{4} = 1.83$ SI

AREA #8 BAR = .78 (10 BARS)(.78) = 7.8 SI

$A_s f_y = .85 f'_c ab$

ASSUMING $a = 1''$

$M_u = 1.3 M = (1.3)(47.7) = 62.1$

$A_s = \frac{(62.1)(12)}{(.9)(60)(22 - \frac{1}{2})} = .64$

$a = \frac{(.64)(60)}{(.85)(6\ KSI)(35)} = .21 < 1''$ Assumed.

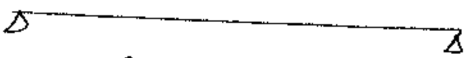
MINIMUM AREA OF STEEL = .64 SQ IN FOR FLEXURE

PROVIDED AREA OF STEEL = 7.8 SI FOR FLEXURE

KINETIC RING

GLASS SUPPORT DESIGN

GLASS DESIGN



80" ARC LENGTH

6'-8"

WIND PRESSURE = 67 PSF

WT. OF GLASS = 7.16 PSF

LOAD CASE $D + .6W = 7.16 + (.6)(67) = 47.3$ PSF ∴ USE 48 PSF

USING 1' WIDE STRIP OF GLASS

FULLY TEMPERED LAMINATED GLASS MODULUS OF RUPTURE = 24,000 PSI

FACTOR OF SAFETY = 4 ⇒ MOR = $\frac{24000}{4000} = 6000$ PSI

MAX MOMENT = $\frac{wl^2}{8} = \frac{(48)(6.66)^2}{8} = 267$ '#

Sx REQ'D = $\frac{(267)(12)}{6000} = .53 \text{ in}^3$

Sx OF 14 mm GLASS = $\frac{bd^2}{6} = \frac{(12)(.55)^2}{6} = .60 \text{ in}^3$ OK

REACTION AT SUPPORT ARM = $\frac{(6.67)(2)(48)}{2} = 320$ #

SHEAR ON GLASS = $\frac{320}{2(.55)} = 291$ PSI

2x2 x 1/4 SUPPORT

KINETIC RINGS
GLASS SUPPORT

MOMENT = $(320)(2/2) = 320$ '#

Sx REQD = $\frac{(320)(12)}{30360} = .12 \text{ in}^3$

2x2x 1/4 Sx= .77 OK

WELD to 6X6

$\frac{(320)(12)}{2' \text{ SEPARATION}} = 1920$ # TENSION

1/4" Fillet weld yields 3.7 k/in E70 ROD

2" PROVIDED yields 7.4 kip > 1.92 KIP REQD

BOLTS FOR GLASS

USING 1/2" BOLTS, 3 AT EACH CONNECTION YIELDS
Allowable CAPACITY IN TENSION OF (6480)(3)= 19,440 Lbs

KINETIC RING SCULPTURE

150 MPH WIND LOAD
RISK CATEGORY II
EXPOSURE C
2010 FLORIDA BUILDING CODE
ASCE 7-10

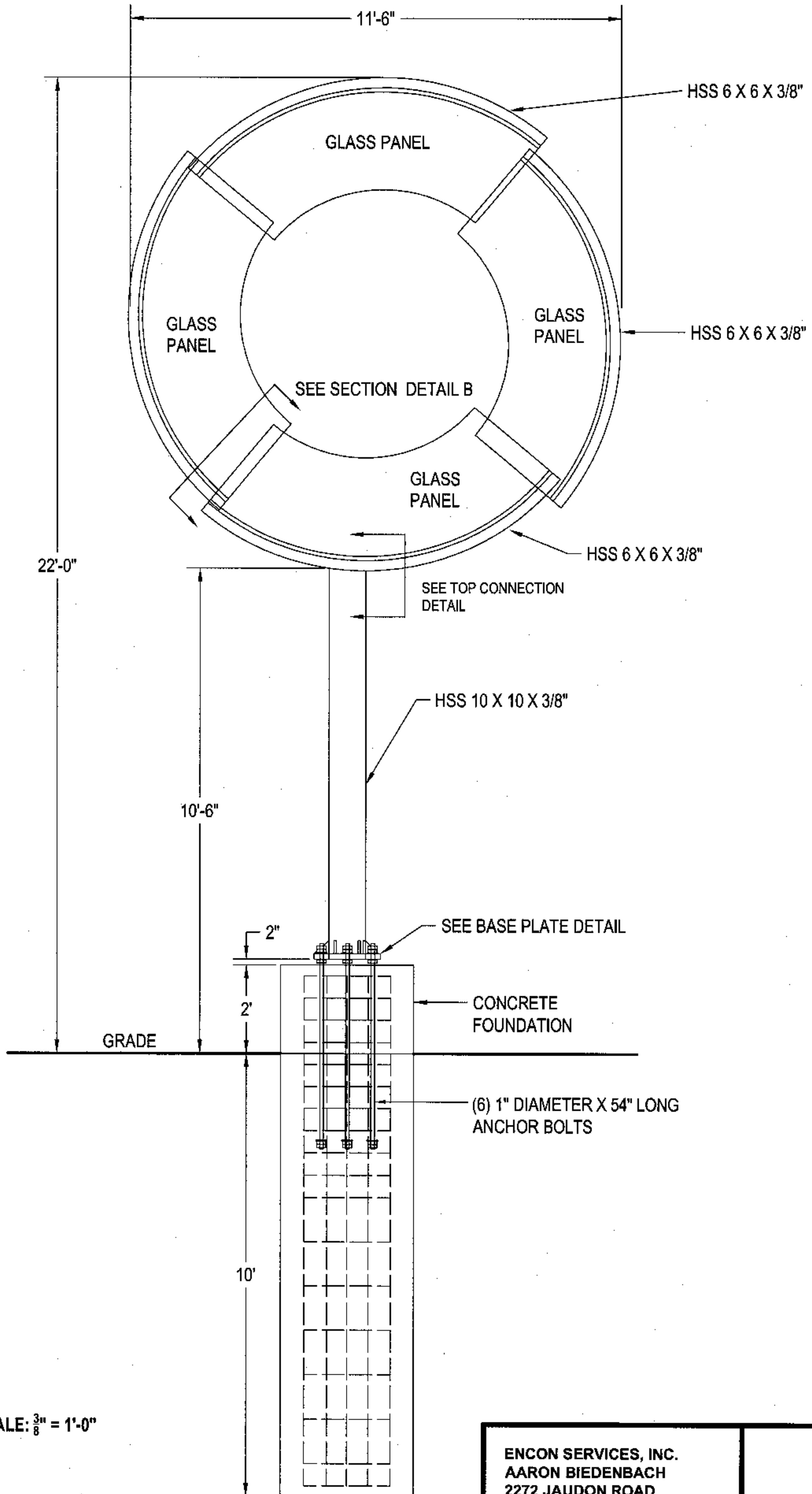
MATERIALS:
ALL JOINTS TO BE WELDED ALL AROUND
GRADE ASTM A36 STEEL SHAPES
GRADE ASTM A500 B STEEL TUBE
GRADE ASTM F1554 GR55 ANCHOR BOLTS, NUTS AND WASHERS
ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED PER FDOT STANDARD
SPECIFICATION 962-7
GRADE ASTM GRADE 60 KSI REBAR
ALL WELDING PER AWS D 1.1
GRADE 70XX WELDING ROD

FOUNDATION:
6000 PSI CONCRETE @ 28 DAYS
2000 PSF SOIL BEARING
150 PSL/LF SOIL LATERAL BEARING
UNDISTURBED SOIL

ENCON SERVICES, INC.
AARON BIEDENBACH
2272 JAUDON ROAD
DOVER, FL 33527
813-655-3373
FLPE #52949, FLEB #9394

LOCATION:
KINETIC RING
KENNEDY BLVD.
TAMPA, FL

AARON P. BIEDENBACH
LICENSE
No 52949
STATE OF
FLORIDA
PROFESSIONAL ENGINEER



SCALE: $\frac{3}{8}$" = 1'-0"

ELEVATION VIEW

ENCON SERVICES, INC.
AARON BIEDENBACH
2272 JAUDON ROAD
DOVER, FL 33527
813-655-3373
FLPE #52949, FLEB #9394

LOCATION:
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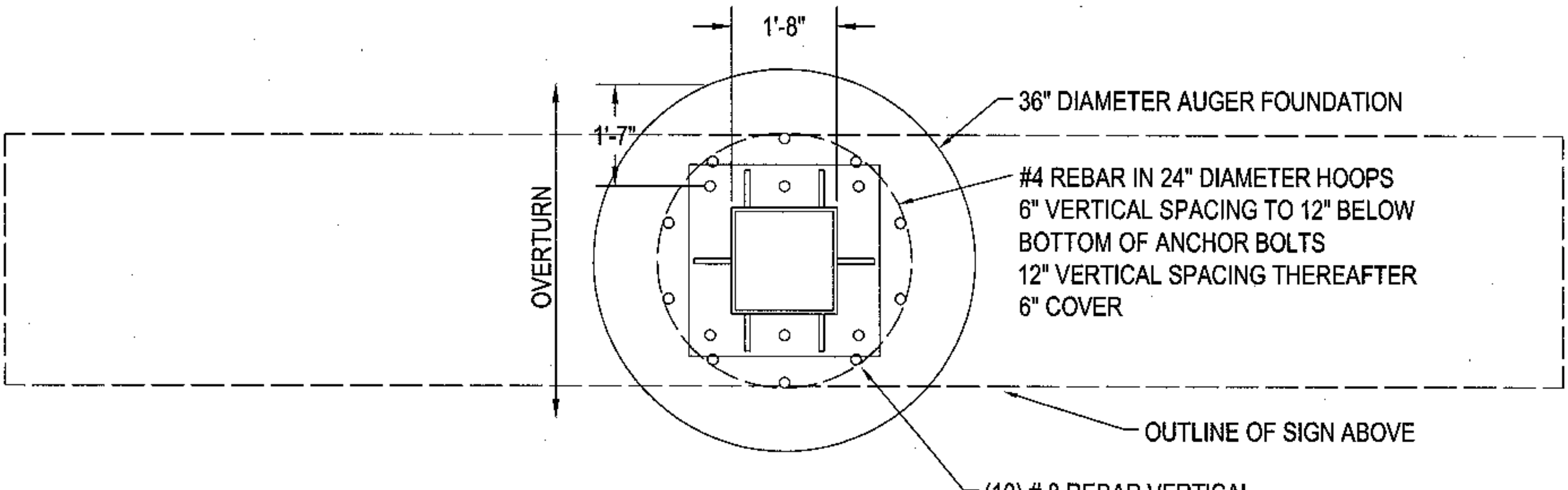
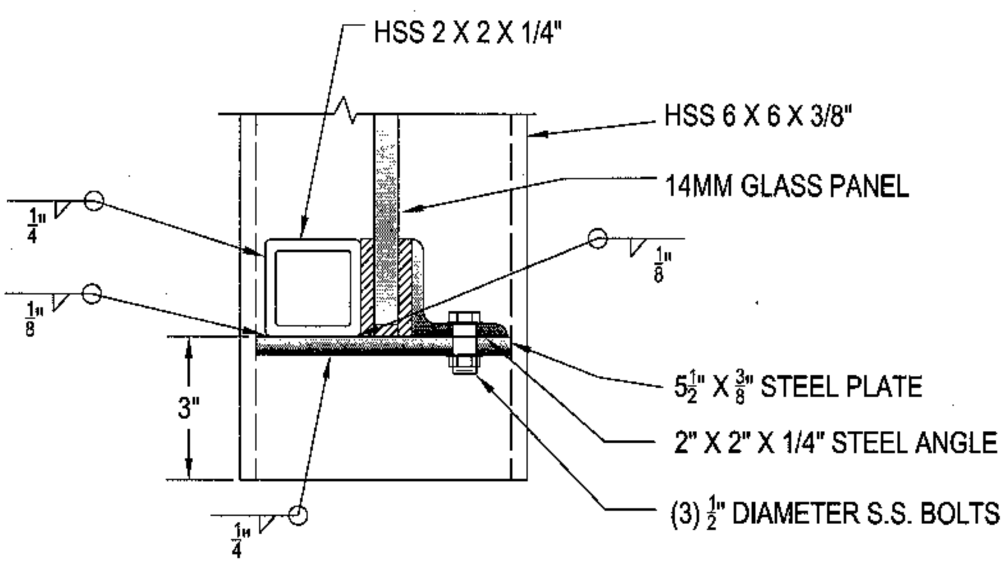


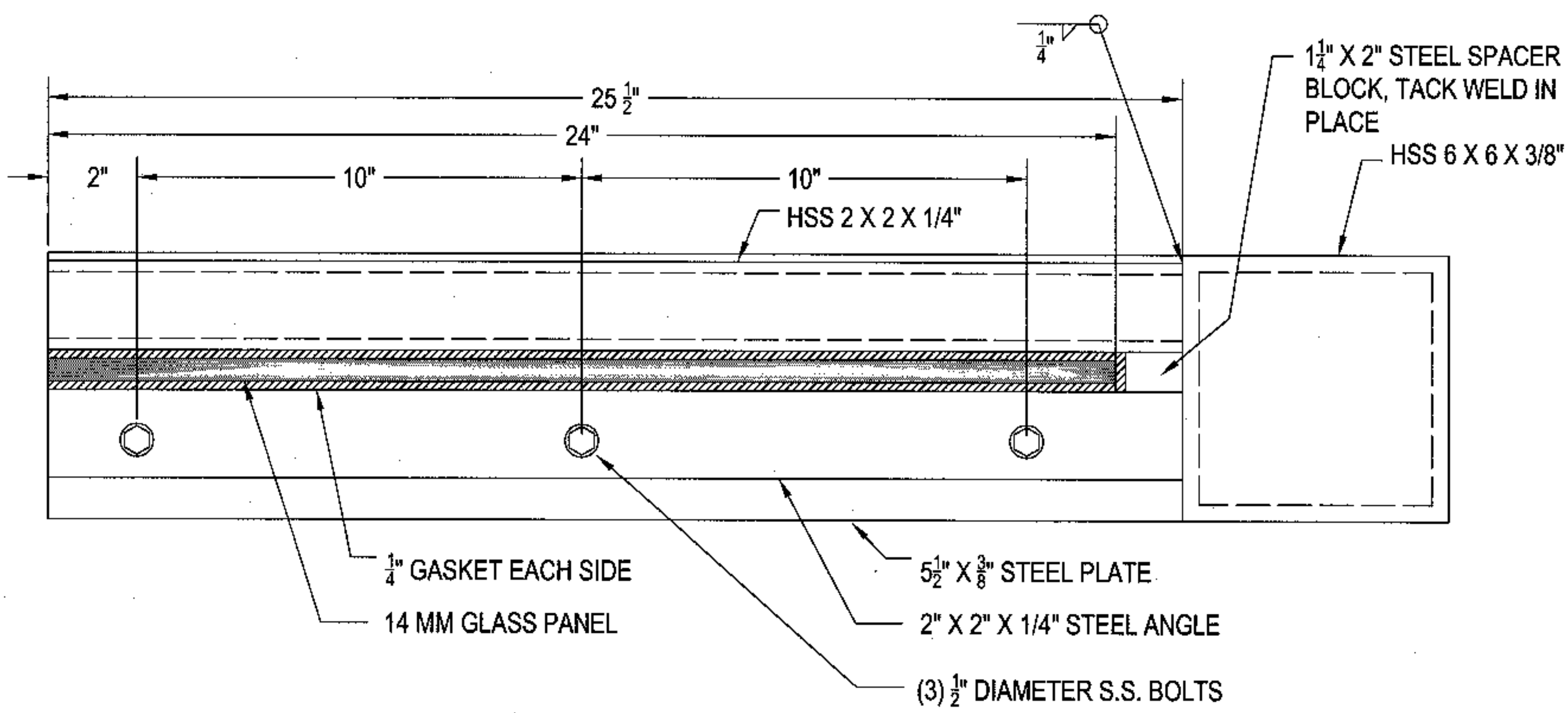
PLAN VIEW

SCALE: $\frac{3}{4}$" = 1'-0"



CONNECTION DETAIL A

SCALE: $\frac{1}{4}$" = 1"



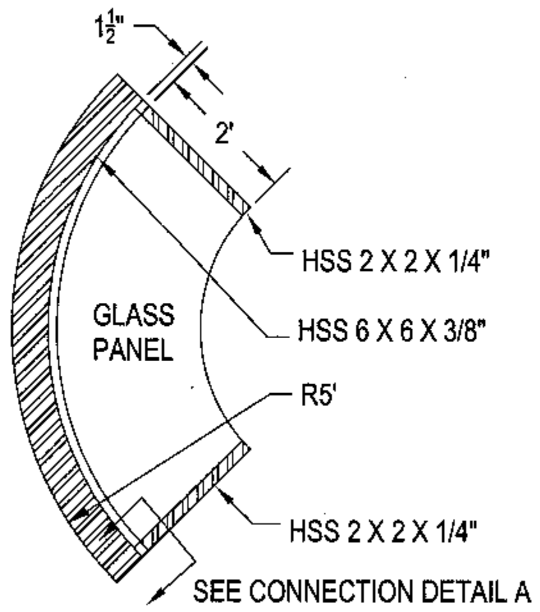
SCALE: $\frac{1}{4}$" = 1"

SECTION DETAIL B

ENCON SERVICES, INC.
AARON BIEDENBACH
2272 JAUDON ROAD
DOVER, FL 33527
813-655-3373
FLPE #52949, FLEB #9394

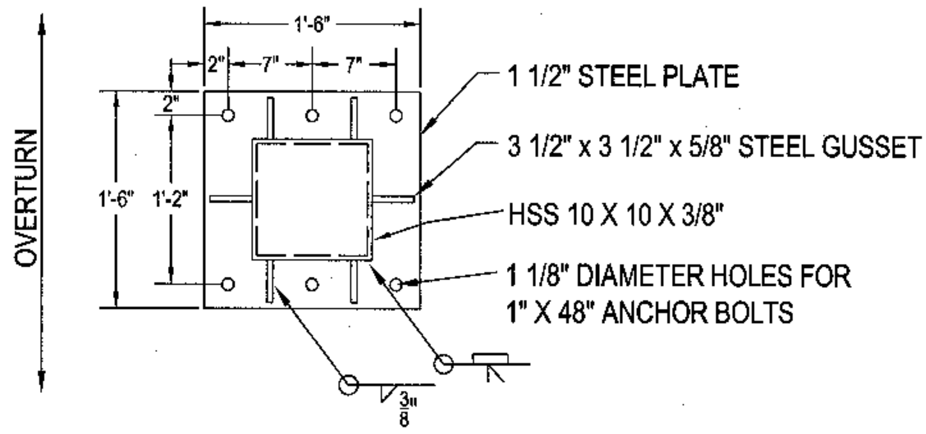
LOCATION:
KINETIC RING
KENNEDY BLVD.
TAMPA, FL

AARON P. BIEDENBACH ★ LICENSE No 52949 ★ STATE OF FLORIDA ★ PROFESSIONAL ENGINEER



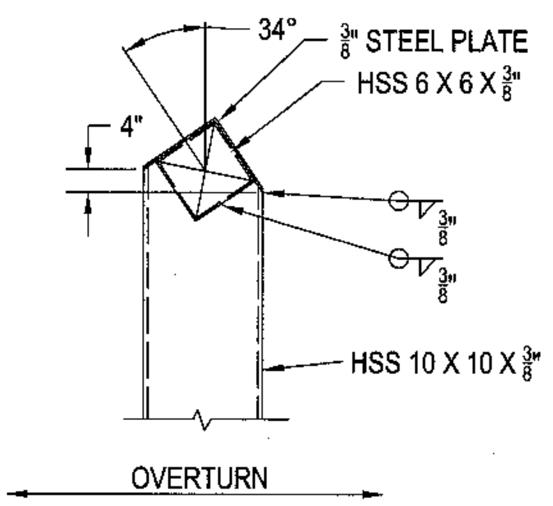
GLASS PANEL MOUNTING DETAIL

SCALE: 3/8" = 1'-0"



BASE PLATE DETAIL

SCALE: 3/4" = 1'-0"

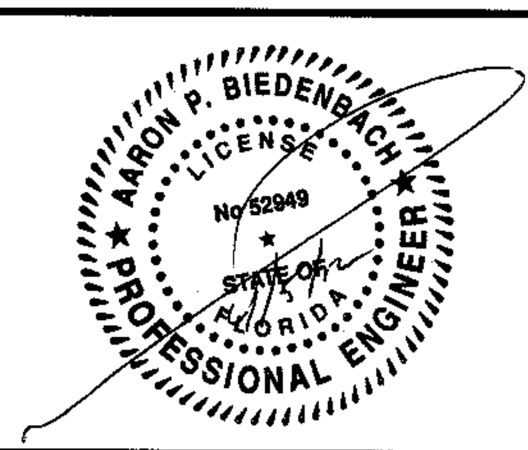


TOP CONNECTION DETAIL

SCALE: 3/4" = 1'-0"

ENCON SERVICES, INC.
AARON BIEDENBACH
2272 JAUDON ROAD
DOVER, FL 33527
813-655-3373
FLPE #52949, FLEB #9394

LOCATION:
KINETIC RING
KENNEDY BLVD.
TAMPA, FL



KINETIC RING SCULPTURE

150 MPH WIND LOAD
RISK CATEGORY II
EXPOSURE C
2010 FLORIDA BUILDING CODE
ASCE 7-10

MATERIALS:
ALL JOINTS TO BE WELDED ALL AROUND
GRADE ASTM A36 STEEL SHAPES
GRADE ASTM A500 B STEEL TUBE
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6000 PSI CONCRETE @ 28 DAYS
2000 PSF SOIL BEARING
150 PSL/LF SOIL LATERAL BEARING
UNDISTURBED SOIL

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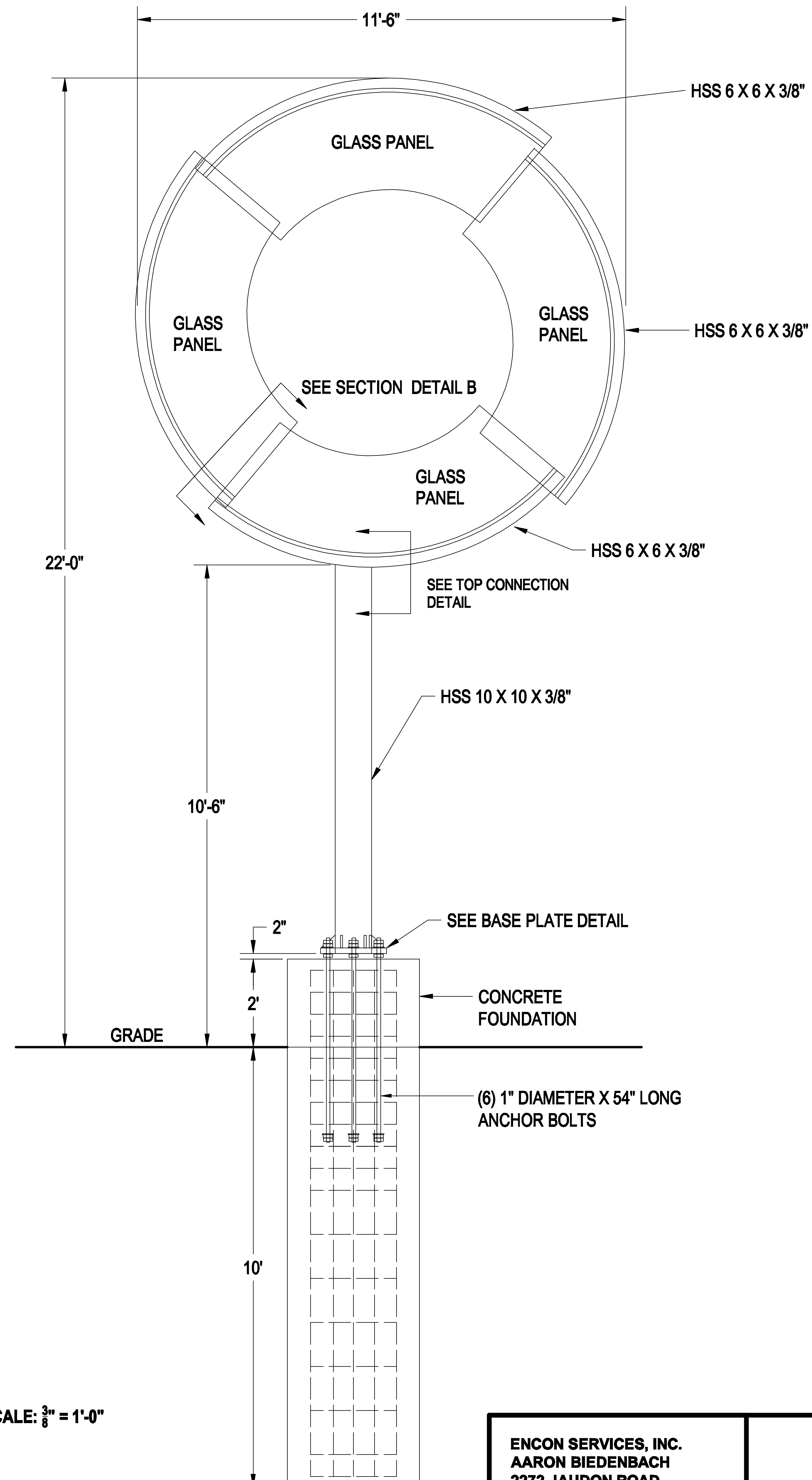

SCALE: $\frac{3}{8}$" = 1'-0"

ELEVATION VIEW

ENCON SERVICES, INC.
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DOVER, FL 33527
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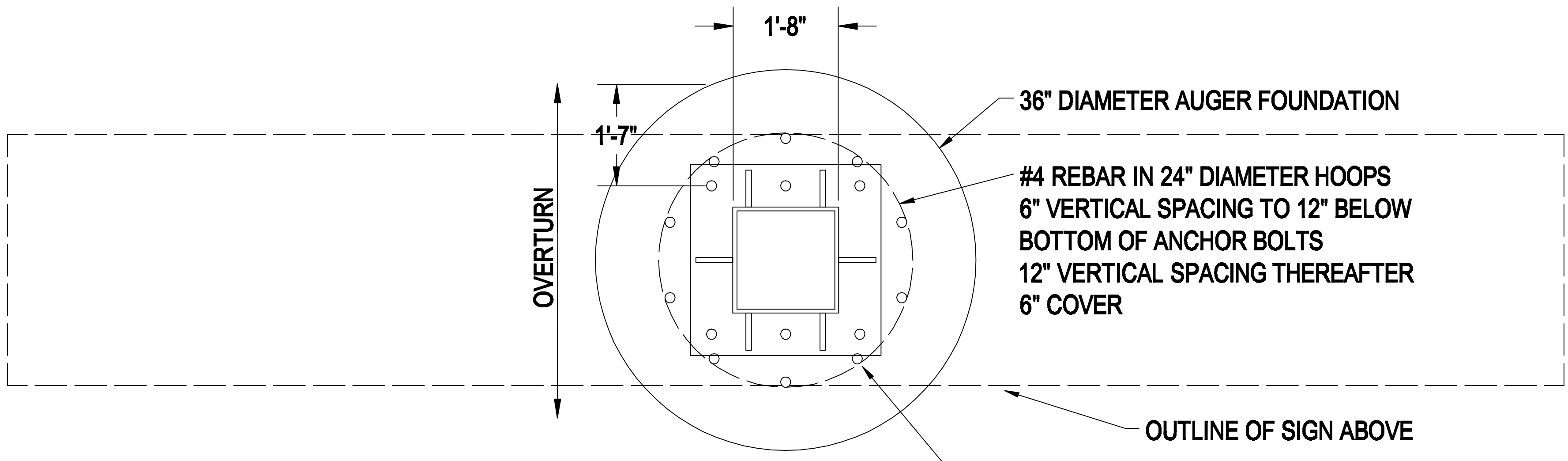
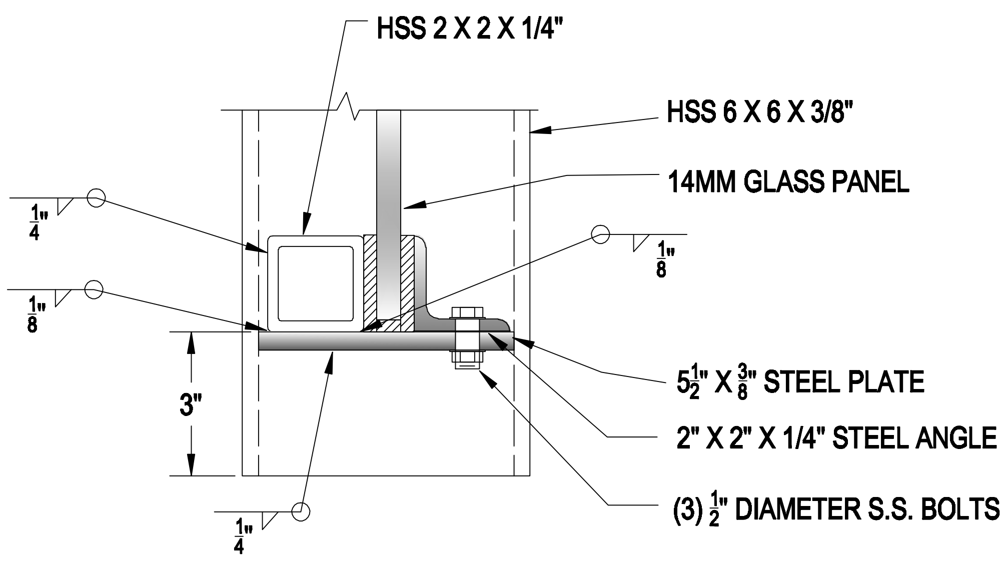
TAMPA, FL.



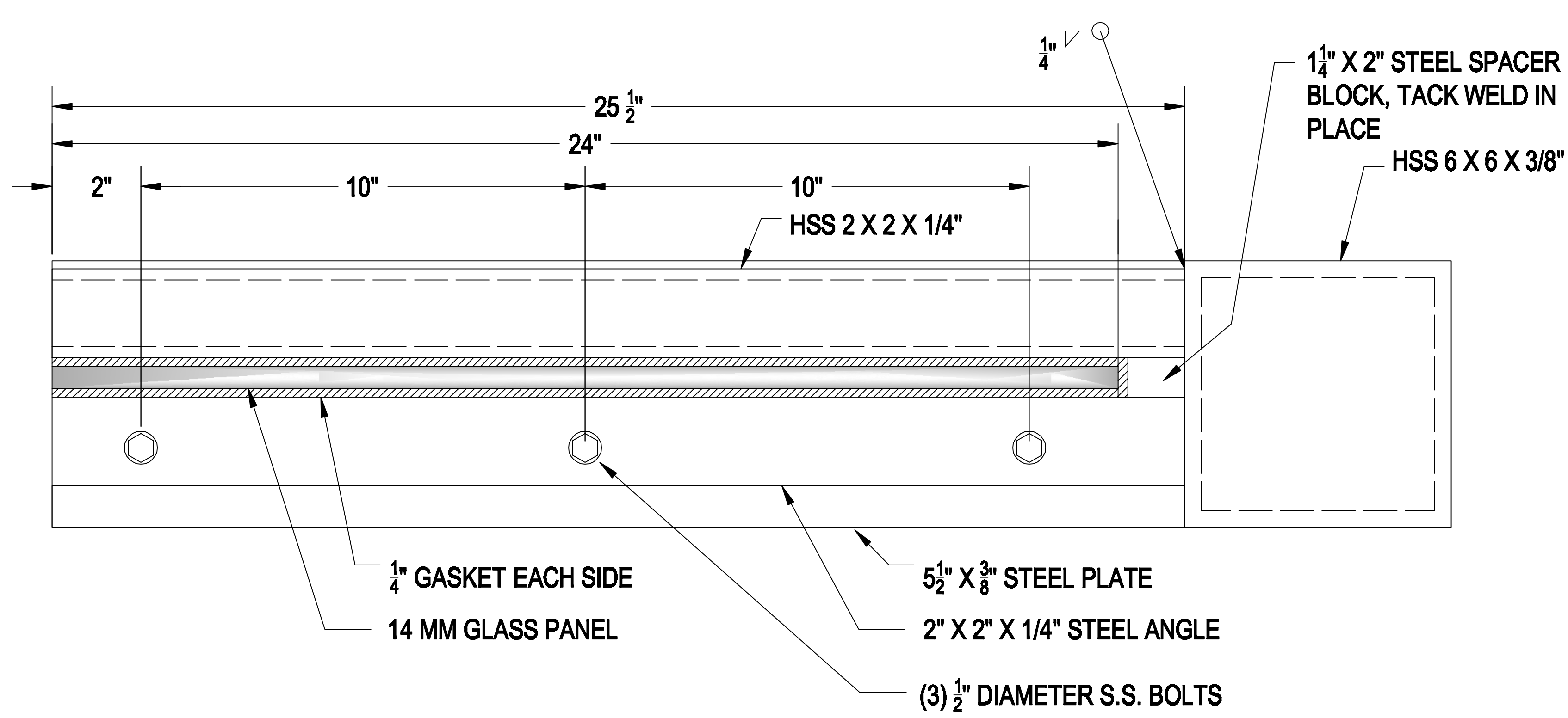
PLAN VIEW

SCALE: $\frac{3}{4}$" = 1'-0"



SCALE: $\frac{1}{4}$" = 1"

CONNECTION DETAIL A

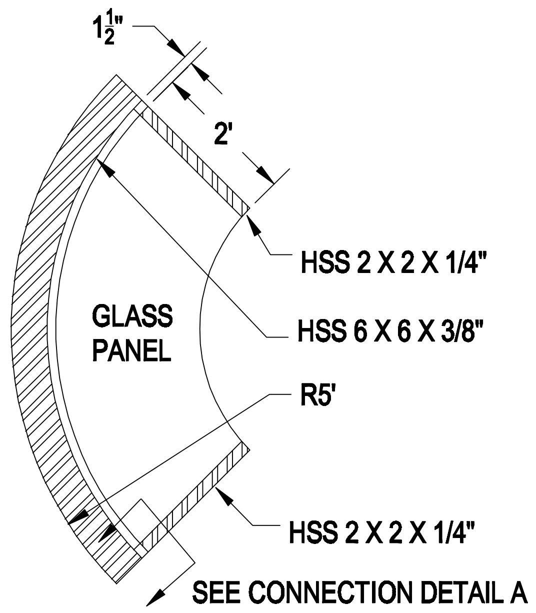


SCALE: $\frac{1}{4}$" = 1"

SECTION DETAIL B

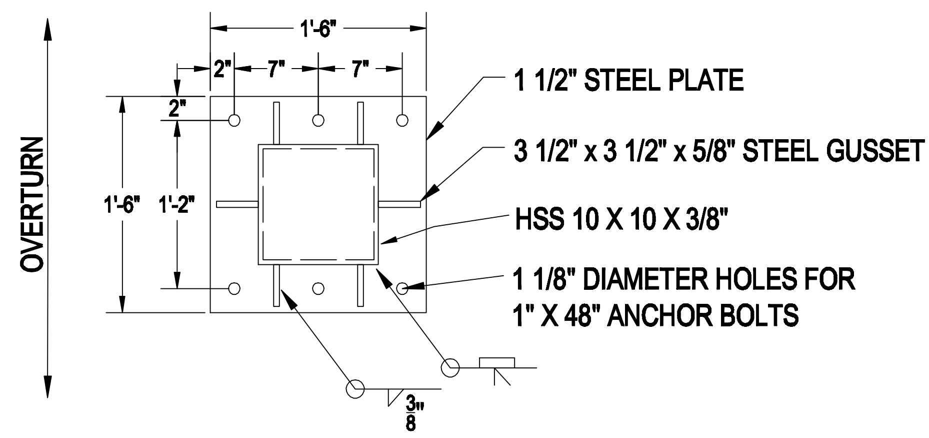
ENCON SERVICES, INC.
AARON BIEDENBACH
2272 JAUDON ROAD
DOVER, FL 33527
813-655-3373
FLPE #52949, FLEB #9394

LOCATION:
KINETIC RING
KENNEDY BLVD.
TAMPA, FL.



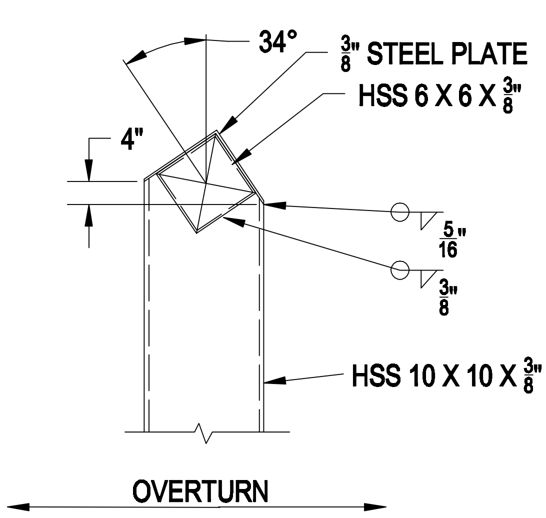
GLASS PANEL MOUNTING DETAIL

SCALE: $\frac{3}{8}$" = 1'-0"



BASE PLATE DETAIL

SCALE: $\frac{3}{4}$" = 1'-0"



TOP CONNECTION DETAIL

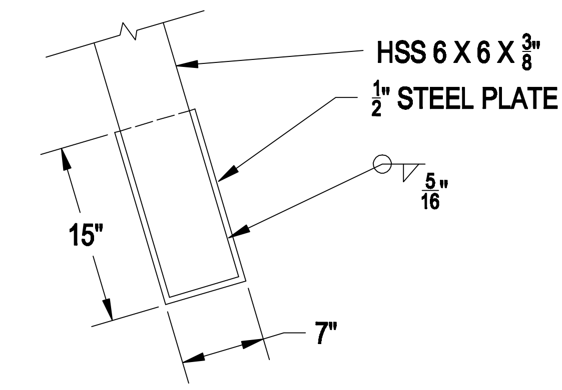
SCALE: $\frac{1}{2}$" = 1'-0"

[redacted]

[redacted]

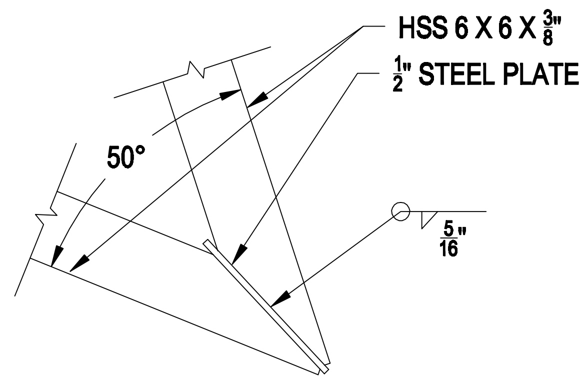
FRAME CONNECTION DETAIL A

FRAME CONNECTION DETAIL B



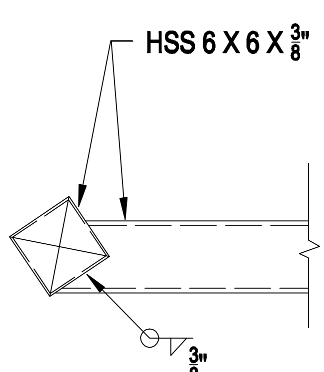
FRAME CONNECTION DETAIL B

SIDE VIEW



FRAME CONNECTION DETAIL B

SCALE: 1/2" = 1'-0"



FRAME CONNECTION DETAIL A

SCALE: 1/2" = 1'-0"

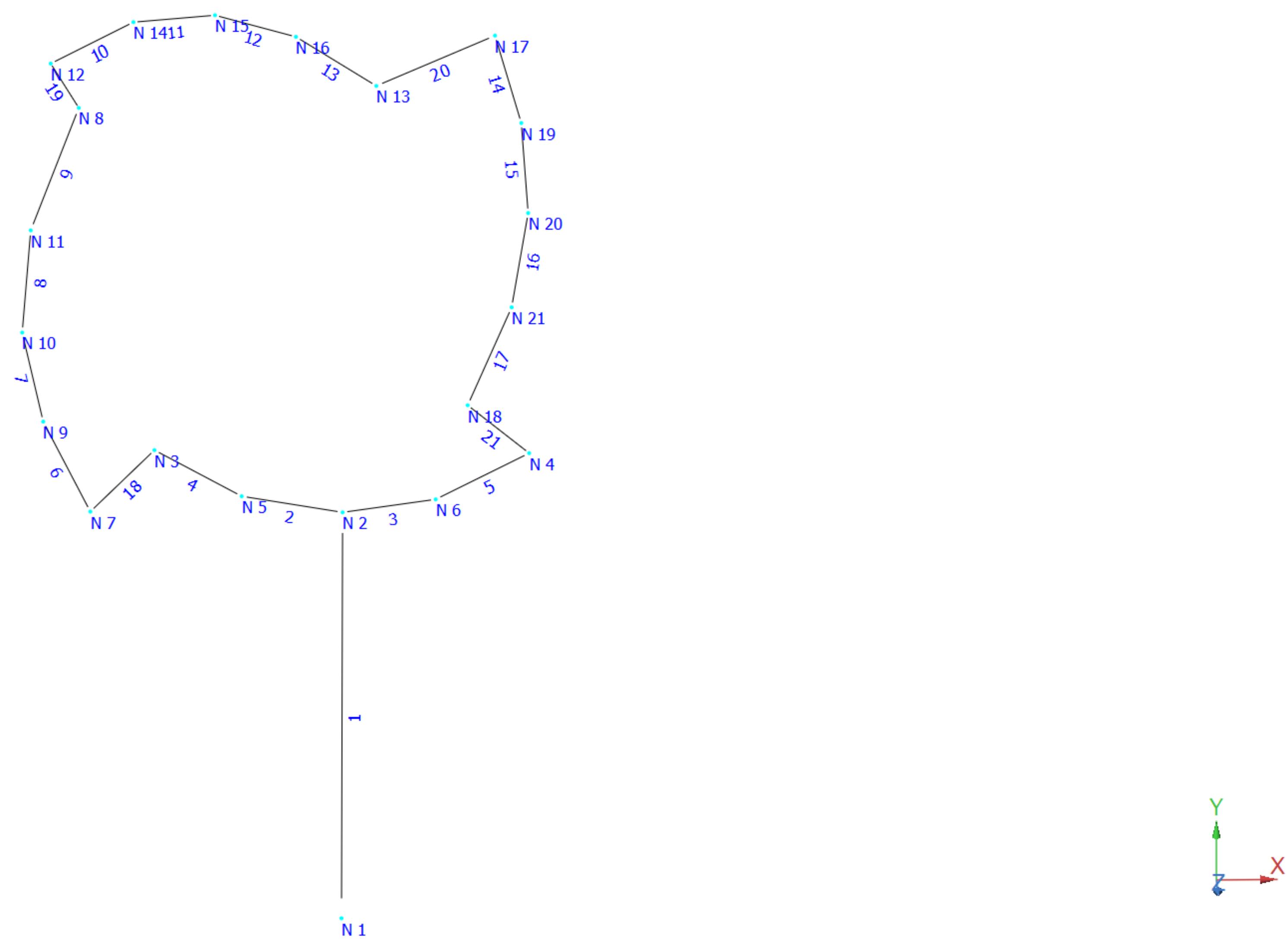
[illegible] SERVICES, INC.
AARON [illegible]
[illegible] ROAD
DOVER, FL [illegible]
[illegible]
FLPE [illegible], FLEB [illegible]

LOCATION:
[illegible]
KENNEDY BLVD.
TAMPA, FL

Steven Schaefer Associates, Inc.
Consulting Structural Engineers

ESG
Entertainment Structures Group
A Division of Steven Schaefer Associates, Inc.
Engineering for the Entertainment Industry

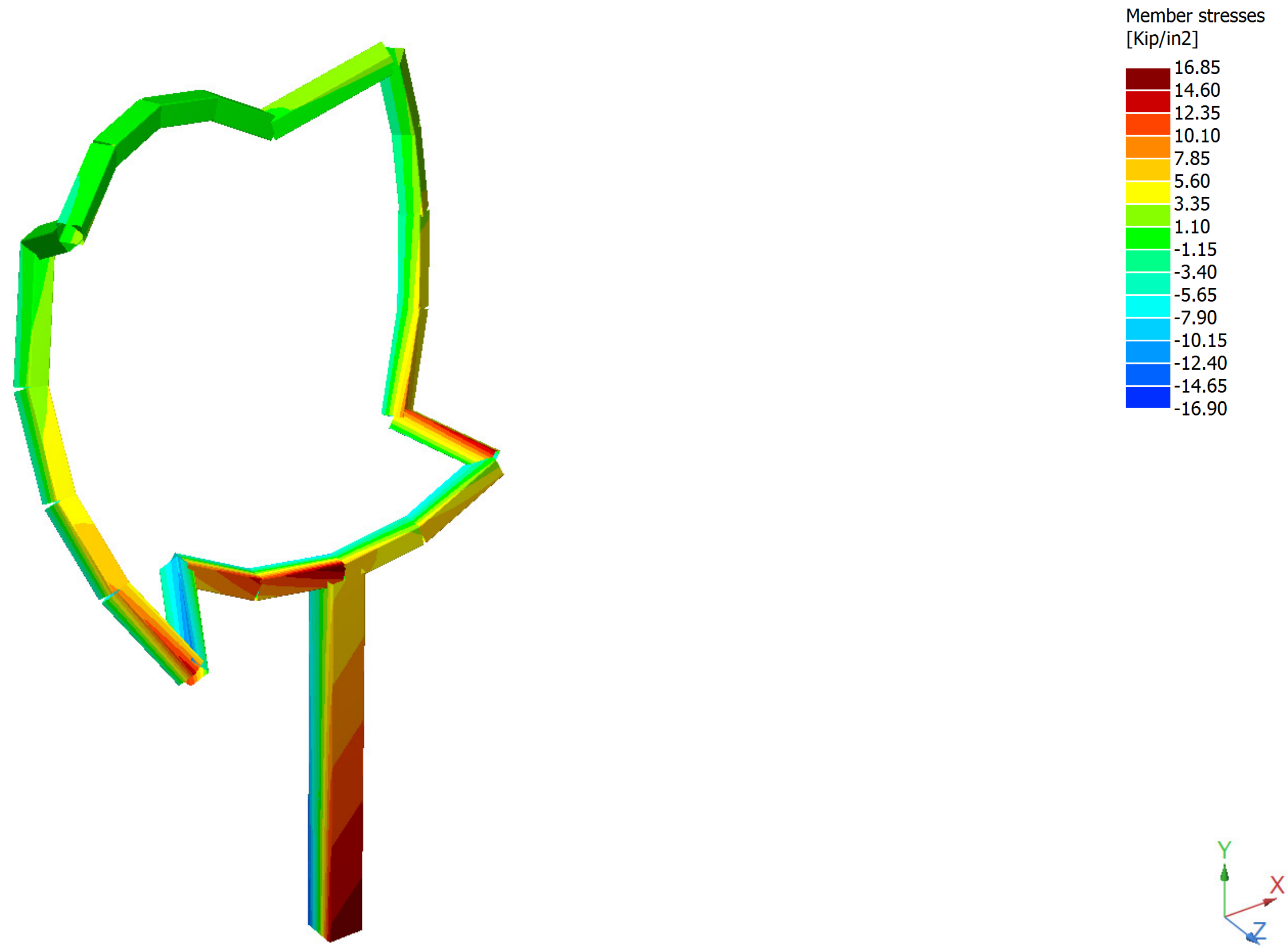
Current Date: 5/1/2012 10:02 AM
Units system: English
Project: Kinetic Sculpture
Client: Encon Services, Inc.
Structural Engineer: Gene F. Sirca, Jr., P.E., S.E.
Job Number: 1218.12
File name: G:\PROJECT\12\18\12\design\Ram Elements\1218.12 Kinetic Sculpture with all tube members 02.etz\
Company Address: 815 Grandview Ave., Suite 250, Columbus, Ohio 43215

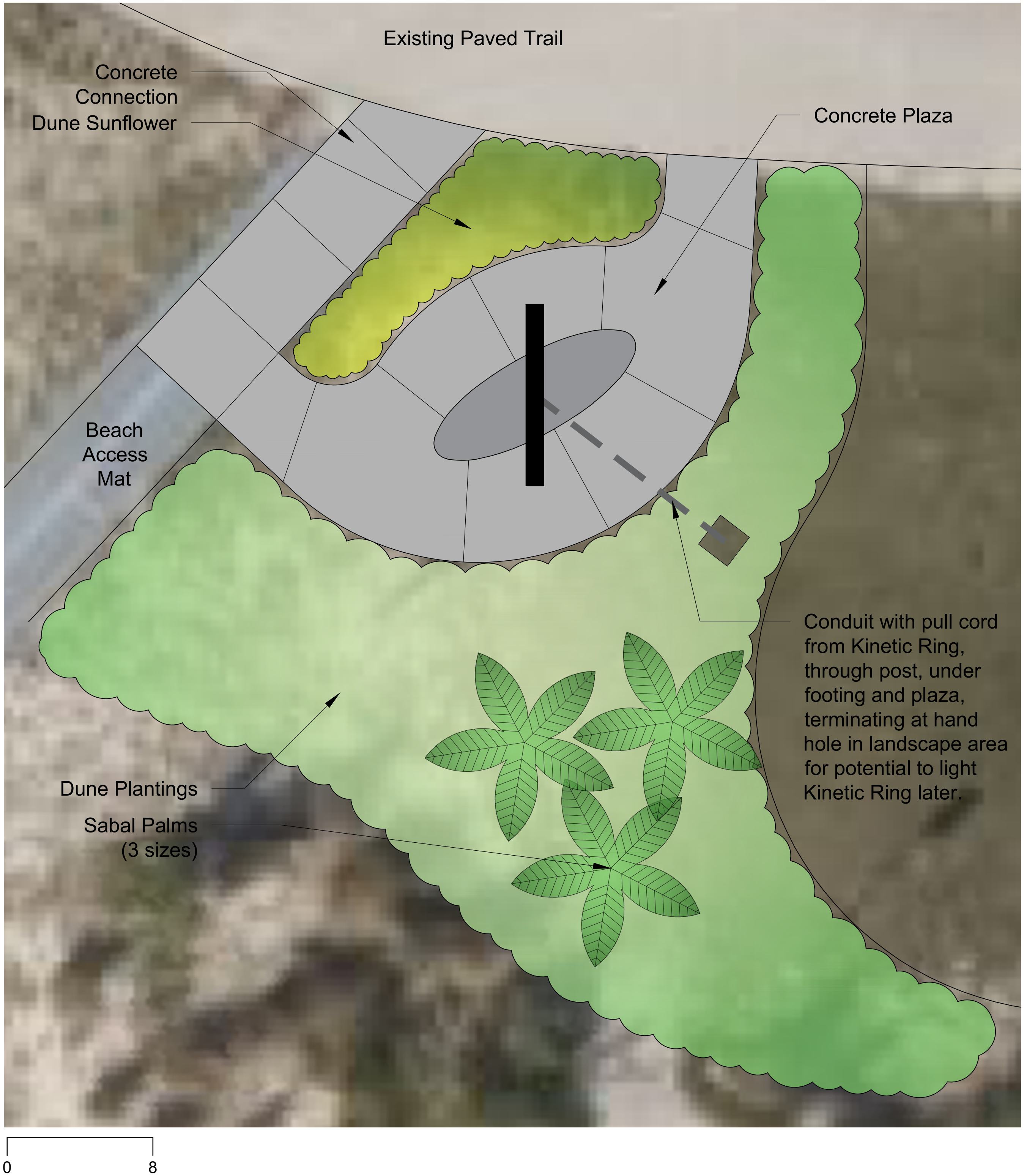


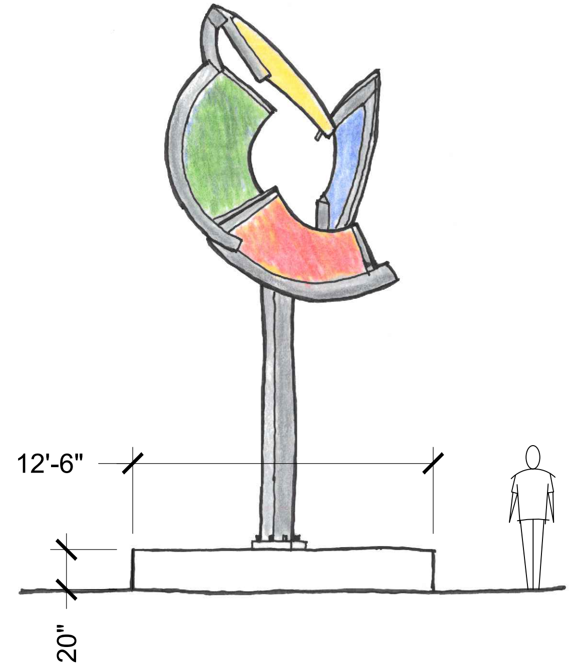
Steven Schaefer Associates, Inc.
Consulting Structural Engineers

ESG Entertainment Structures Group
A Division of Steven Schaefer Associates, Inc.
Engineering for the Entertainment Industry

Current Date: 5/1/2012 9:15 AM
Units system: English
Project: Kinetic Sculpture
Client: Encon Services, Inc.
Structural Engineer: Gene F. Sirca, Jr., P.E., S.E.
Job Number: 1218.12
File name: G:\PROJECT\12\18\12\design\Ram Elements\1218.12 Kinetic Sculpture with all tube members 02.etz\
Company Address: 815 Grandview Ave., Suite 250, Columbus, Ohio 43215
Load condition: case1=DL+0.6WL1







Kinetic Ring Relocation

Cypress Point Park
5620 W Cypress Street, Tampa

*Note: Footer shown oriented parallel to jetty to help reduce potential wave action during storm surge. Kinetic Ring oriented to align with direction of sunset.

Concrete plaza area to be at grade. Footer will anchor sculpture and provide seating area for beach visitors.

N

Parks&Recreation
CITY OF TAMPA

Revised 4/16/25

Steven Schaefer Associates, Inc.
Consulting Structural Engineers

ESG Entertainment Structures Group
A Division of Steven Schaefer Associates, Inc.
Engineering for the Entertainment Industry

Current Date: 5/1/2012 8:55 AM
Units system: English
Project: Kinetic Sculpture
Client: Encon Services, Inc.
Structural Engineer: Gene F. Sirca, Jr., P.E., S.E.
Job Number: 1218.12
File name: G:\PROJECT\12\18\12\design\Ram Elements\1218.12 Kinetic Sculpture with all tube members 02.etz\
Company Address: 815 Grandview Ave., Suite 250, Columbus, Ohio 43215

Analysis result

Envelope for principal stresses in members

Note.- **lc** is the controlling load condition
Principal stresses envelope for :

case1=DL+WL1
case2=DL+WL2
case3=DL-WL1
case4=DL-WL2
case5=0.6DL+WL1
case6=0.6DL-WL1

MEMBER **1**

								Bending							
Station		**Axial** [Kip/in2]	**lc**	**Shear V2** [Kip/in2]	**lc**	**Shear V3** [Kip/in2]	**lc**	**2-Pos** [Kip/in2]	**lc**	**2-Neg** [Kip/in2]	**lc**	**3-Pos** [Kip/in2]	**lc**	**3-Neg** [Kip/in2]	**lc**
0%	Max	-0.08	case5	5.89	case2	5.97	case2	-0.35	case5	0.58	case1	26.11	case6	26.94	case1
	Min	-0.14	case1	1.67	case1	2.98	case1	-0.58	case1	0.35	case5	-26.94	case1	-26.11	case6
25%	Max	-0.08	case5	5.89	case2	5.97	case2	-0.35	case5	0.58	case1	21.63	case6	22.47	case1
	Min	-0.13	case1	1.67	case1	2.95	case1	-0.58	case1	0.35	case5	-22.47	case1	-21.63	case6
50%	Max	-0.07	case5	5.89	case2	5.97	case2	-0.35	case5	0.58	case1	17.26	case6	18.10	case1
	Min	-0.12	case1	1.67	case1	2.92	case1	-0.58	case1	0.35	case5	-18.10	case1	-17.26	case6
75%	Max	-0.07	case5	5.89	case2	5.97	case2	-0.35	case5	0.58	case1	12.99	case6	13.83	case1
	Min	-0.11	case1	1.67	case1	2.90	case1	-0.58	case1	0.35	case5	-13.83	case1	-12.99	case6
100%	Max	-0.06	case5	5.89	case2	5.97	case2	-0.35	case5	0.58	case1	8.82	case6	9.66	case1
	Min	-0.11	case1	1.67	case1	2.87	case1	-0.58	case1	0.35	case5	-9.66	case1	-8.82	case6

MEMBER **2**

Station		Axial [Kip/in2]	Ic	Shear V2 [Kip/in2]	Ic	Shear V3 [Kip/in2]	Ic	Bending 2-Pos [Kip/in2]	Ic	Bending 2-Neg [Kip/in2]	Ic	Bending 3-Pos [Kip/in2]	Ic	Bending 3-Neg [Kip/in2]	Ic
0%	Max	0.02	case4	9.81	case1	11.27	case1	5.05	case4	-1.91	case5	24.84	case4	24.13	case2
	Min	-0.11	case2	2.16	case2	3.09	case2	1.91	case5	-5.05	case4	-24.13	case2	-24.84	case4
25%	Max	0.02	case4	9.80	case1	11.22	case1	4.72	case4	-1.75	case2	22.94	case4	22.25	case2
	Min	-0.10	case2	2.15	case2	3.09	case2	1.75	case2	-4.72	case4	-22.25	case2	-22.94	case4
50%	Max	0.02	case4	9.79	case1	11.18	case1	4.39	case4	-1.19	case2	21.03	case4	20.37	case2
	Min	-0.10	case2	2.14	case2	3.09	case2	1.19	case2	-4.39	case4	-20.37	case2	-21.03	case4
75%	Max	0.02	case4	9.78	case1	11.13	case1	4.08	case4	-0.64	case2	19.13	case4	18.49	case2
	Min	-0.10	case2	2.13	case2	3.09	case2	0.64	case2	-4.08	case4	-18.49	case2	-19.13	case4
100%	Max	0.02	case4	9.77	case1	11.08	case1	3.78	case4	-0.09	case2	17.22	case4	16.61	case2
	Min	-0.10	case2	2.12	case2	3.09	case2	0.09	case2	-3.78	case4	-16.61	case2	-17.22	case4

MEMBER **3**

Station		Axial [Kip/in2]	Ic	Shear V2 [Kip/in2]	Ic	Shear V3 [Kip/in2]	Ic	Bending 2-Pos [Kip/in2]	Ic	Bending 2-Neg [Kip/in2]	Ic	Bending 3-Pos [Kip/in2]	Ic	Bending 3-Neg [Kip/in2]	Ic
0%	Max	0.01	case4	12.80	case1	13.70	case1	2.61	case4	0.11	case2	17.17	case4	18.16	case2
	Min	-0.08	case2	4.06	case4	4.81	case4	-0.11	case2	-2.61	case4	-18.16	case2	-17.17	case4
25%	Max	0.01	case4	12.79	case1	13.66	case1	2.07	case4	0.32	case2	15.68	case4	16.69	case2
	Min	-0.08	case2	4.05	case4	4.81	case4	-0.32	case2	-2.07	case4	-16.69	case2	-15.68	case4
50%	Max	0.01	case4	12.79	case1	13.61	case1	1.55	case4	0.52	case2	14.19	case4	15.22	case2
	Min	-0.08	case2	4.05	case4	4.81	case4	-0.52	case2	-1.55	case4	-15.22	case2	-14.19	case4
75%	Max	0.02	case4	12.78	case1	13.57	case1	1.13	case3	0.87	case5	12.70	case4	13.76	case2
	Min	-0.08	case2	4.04	case4	4.81	case4	-0.87	case5	-1.13	case3	-13.76	case2	-12.70	case4
100%	Max	0.02	case4	12.77	case1	13.53	case1	1.09	case6	1.36	case1	11.21	case4	12.29	case2
	Min	-0.08	case2	4.03	case4	4.81	case4	-1.36	case1	-1.09	case6	-12.29	case2	-11.21	case4

MEMBER **4**

Station		Axial [Kip/in2]	Ic	Shear V2 [Kip/in2]	Ic	Shear V3 [Kip/in2]	Ic	Bending 2-Pos [Kip/in2]	Ic	Bending 2-Neg [Kip/in2]	Ic	Bending 3-Pos [Kip/in2]	Ic	Bending 3-Neg [Kip/in2]	Ic
0%	Max	0.00	case5	6.13	case1	7.46	case1	3.78	case4	-0.09	case2	19.50	case1	18.78	case6
	Min	-0.15	case2	1.52	case4	2.67	case4	0.09	case2	-3.78	case4	-18.78	case6	-19.50	case1
25%	Max	0.00	case5	6.12	case1	7.41	case1	3.49	case4	0.28	case2	17.57	case1	16.87	case6
	Min	-0.15	case2	1.51	case4	2.67	case4	-0.28	case2	-3.49	case4	-16.87	case6	-17.57	case1
50%	Max	0.00	case5	6.11	case1	7.36	case1	3.21	case4	0.65	case2	15.71	case1	15.03	case6
	Min	-0.15	case2	1.50	case4	2.67	case4	-0.65	case2	-3.21	case4	-15.03	case6	-15.71	case1
75%	Max	0.01	case5	6.11	case1	7.32	case1	2.94	case4	1.00	case2	13.91	case1	13.25	case6

	Min	-0.14	case2	1.49	case4	2.67	case4	-1.00	case2	-2.94	case4	-13.25	case6	-13.91	case1
100%	Max	0.01	case5	6.10	case1	7.27	case1	2.69	case4	1.34	case2	12.17	case1	11.53	case6
	Min	-0.14	case2	1.49	case4	2.67	case4	-1.34	case2	-2.69	case4	-11.53	case6	-12.17	case1

MEMBER **5**

								Bending							
Station		**Axial** [Kip/in2]	**Ic**	**Shear V2** [Kip/in2]	**Ic**	**Shear V3** [Kip/in2]	**Ic**	**2-Pos** [Kip/in2]	**Ic**	**2-Neg** [Kip/in2]	**Ic**	**3-Pos** [Kip/in2]	**Ic**	**3-Neg** [Kip/in2]	**Ic**
0%	Max	-0.02	case6	10.91	case1	11.71	case1	1.09	case6	1.36	case1	12.52	case4	14.60	case2
	Min	-0.10	case2	1.56	case4	2.35	case4	-1.36	case1	-1.09	case6	-14.60	case2	-12.52	case4
25%	Max	-0.02	case6	10.91	case1	11.67	case1	1.14	case6	1.92	case1	10.87	case4	12.97	case2
	Min	-0.09	case2	1.56	case4	2.35	case4	-1.92	case1	-1.14	case6	-12.97	case2	-10.87	case4
50%	Max	-0.02	case6	10.90	case1	11.62	case1	1.21	case6	2.46	case1	9.22	case4	11.35	case2
	Min	-0.09	case2	1.55	case4	2.35	case4	-2.46	case1	-1.21	case6	-11.35	case2	-9.22	case4
75%	Max	-0.02	case6	10.89	case1	11.57	case1	1.28	case6	2.98	case1	7.56	case4	9.72	case2
	Min	-0.09	case2	1.54	case4	2.35	case4	-2.98	case1	-1.28	case6	-9.72	case2	-7.56	case4
100%	Max	-0.02	case6	10.88	case1	11.52	case1	1.35	case6	3.50	case1	5.91	case4	8.09	case2
	Min	-0.09	case2	1.53	case4	2.35	case4	-3.50	case1	-1.35	case6	-8.09	case2	-5.91	case4

MEMBER **6**

								Bending							
Station		**Axial** [Kip/in2]	**Ic**	**Shear V2** [Kip/in2]	**Ic**	**Shear V3** [Kip/in2]	**Ic**	**2-Pos** [Kip/in2]	**Ic**	**2-Neg** [Kip/in2]	**Ic**	**3-Pos** [Kip/in2]	**Ic**	**3-Neg** [Kip/in2]	**Ic**
0%	Max	0.31	case5	4.01	case1	4.03	case1	4.91	case6	7.23	case1	14.70	case1	12.07	case6
	Min	-0.46	case2	1.84	case4	2.01	case4	-7.23	case1	-4.91	case6	-12.07	case6	-14.70	case1
25%	Max	0.30	case5	3.98	case1	4.00	case1	3.93	case6	6.15	case1	13.60	case1	11.34	case6
	Min	-0.43	case2	1.78	case4	1.95	case4	-6.15	case1	-3.93	case6	-11.34	case6	-13.60	case1
50%	Max	0.29	case5	3.95	case1	3.96	case1	2.99	case6	5.11	case1	12.54	case1	10.66	case6
	Min	-0.41	case3	1.72	case4	1.89	case4	-5.11	case1	-2.99	case6	-10.66	case6	-12.54	case1
75%	Max	0.28	case5	3.92	case1	3.93	case1	2.09	case6	4.12	case1	11.54	case1	10.00	case6
	Min	-0.39	case3	1.66	case4	1.82	case4	-4.12	case1	-2.09	case6	-10.00	case6	-11.54	case1
100%	Max	0.27	case5	3.89	case1	3.89	case1	1.23	case6	3.17	case1	10.58	case1	9.38	case6
	Min	-0.38	case3	1.61	case4	1.76	case4	-3.17	case1	-1.23	case6	-9.38	case6	-10.58	case1

MEMBER **7**

								Bending							
Station		**Axial**	**lc**	**Shear V2**	**lc**	**Shear V3**	**lc**	**2-Pos**	**lc**	**2-Neg**	**lc**	**3-Pos**	**lc**	**3-Neg**	**lc**
		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]	
0%	Max	0.29	case5	2.15	case2	2.54	case2	-0.29	case4	1.80	case2	11.92	case1	10.06	case6
	Min	-0.40	case3	1.20	case3	1.49	case3	-1.80	case2	0.29	case4	-10.06	case6	-11.92	case1
25%	Max	0.28	case5	2.13	case2	2.48	case2	-0.01	case4	1.95	case2	10.87	case1	9.29	case6
	Min	-0.39	case3	1.19	case3	1.46	case3	-1.95	case2	0.01	case4	-9.29	case6	-10.87	case1
50%	Max	0.27	case5	2.10	case2	2.42	case2	0.38	case5	2.07	case2	9.86	case1	8.56	case6
	Min	-0.37	case3	1.18	case3	1.43	case3	-2.07	case2	-0.38	case5	-8.56	case6	-9.86	case1
75%	Max	0.26	case5	2.07	case2	2.36	case2	0.76	case5	2.16	case2	8.91	case1	7.87	case6
	Min	-0.36	case3	1.16	case3	1.40	case3	-2.16	case2	-0.76	case5	-7.87	case6	-8.91	case1
100%	Max	0.25	case5	2.04	case2	2.31	case2	1.12	case5	2.41	case3	8.00	case1	7.22	case6
	Min	-0.34	case3	1.15	case3	1.38	case3	-2.41	case3	-1.12	case5	-7.22	case6	-8.00	case1

MEMBER **8**

								Bending							
Station		**Axial**	**lc**	**Shear V2**	**lc**	**Shear V3**	**lc**	**2-Pos**	**lc**	**2-Neg**	**lc**	**3-Pos**	**lc**	**3-Neg**	**lc**
		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]	
0%	Max	0.23	case5	1.41	case2	1.63	case2	1.07	case5	2.53	case2	8.41	case1	7.43	case6
	Min	-0.32	case3	0.06	case3	0.57	case3	-2.53	case2	-1.07	case5	-7.43	case6	-8.41	case1
25%	Max	0.22	case5	1.42	case2	1.56	case2	1.21	case5	2.39	case3	7.36	case1	6.60	case6
	Min	-0.31	case3	0.07	case3	0.54	case3	-2.39	case3	-1.21	case5	-6.60	case6	-7.36	case1
50%	Max	0.21	case5	1.43	case2	1.48	case2	1.33	case5	2.33	case3	6.38	case1	5.83	case6
	Min	-0.29	case3	0.07	case3	0.50	case3	-2.33	case3	-1.33	case5	-5.83	case6	-6.38	case1
75%	Max	0.20	case5	1.44	case2	1.40	case2	1.45	case5	2.27	case3	5.46	case1	5.11	case6
	Min	-0.28	case3	0.08	case3	0.47	case3	-2.27	case3	-1.45	case5	-5.11	case6	-5.46	case1
100%	Max	0.19	case5	1.45	case2	1.33	case2	1.55	case5	2.20	case3	5.03	case2	4.81	case4
	Min	-0.26	case3	0.08	case3	0.43	case3	-2.20	case3	-1.55	case5	-4.81	case4	-5.03	case2

MEMBER **9**

								Bending							
Station		**Axial**	**lc**	**Shear V2**	**lc**	**Shear V3**	**lc**	**2-Pos**	**lc**	**2-Neg**	**lc**	**3-Pos**	**lc**	**3-Neg**	**lc**
		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]		[Kip/in2]	
0%	Max	0.15	case5	0.65	case3	0.94	case3	1.54	case5	2.24	case3	5.35	case2	5.02	case4
	Min	-0.22	case3	0.13	case4	0.29	case4	-2.24	case3	-1.54	case5	-5.02	case4	-5.35	case2
25%	Max	0.15	case5	0.64	case3	0.89	case3	1.46	case5	1.88	case3	5.45	case2	5.33	case4
	Min	-0.20	case3	0.14	case4	0.17	case4	-1.88	case3	-1.46	case5	-5.33	case4	-5.45	case2
50%	Max	0.14	case5	0.64	case3	0.84	case3	1.37	case5	1.52	case3	5.36	case2	5.43	case4
	Min	-0.19	case3	0.14	case4	0.07	case4	-1.52	case3	-1.37	case5	-5.43	case4	-5.36	case2
75%	Max	0.13	case5	0.64	case3	0.79	case3	1.31	case1	1.20	case6	5.07	case2	5.31	case4

	Min	-0.17	case3	0.15	case4	0.18	case4	-1.20	case6	-1.31	case1	-5.31	case4	-5.07	case2
100%	Max	0.12	case5	0.63	case3	0.74	case3	1.27	case1	0.92	case6	4.58	case2	4.98	case4
	Min	-0.16	case3	0.16	case4	0.30	case4	-0.92	case6	-1.27	case1	-4.98	case4	-4.58	case2

MEMBER **10**

								Bending							
Station		**Axial** [Kip/in2]	**Ic**	**Shear V2** [Kip/in2]	**Ic**	**Shear V3** [Kip/in2]	**Ic**	**2-Pos** [Kip/in2]	**Ic**	**2-Neg** [Kip/in2]	**Ic**	**3-Pos** [Kip/in2]	**Ic**	**3-Neg** [Kip/in2]	**Ic**
0%	Max	0.12	case1	1.97	case2	1.81	case2	2.34	case2	2.34	case4	2.58	case4	2.54	case2
	Min	-0.11	case6	0.20	case1	0.52	case1	-2.34	case4	-2.34	case2	-2.54	case2	-2.58	case4
25%	Max	0.11	case1	1.96	case2	1.81	case2	1.95	case2	2.19	case4	2.35	case4	2.37	case2
	Min	-0.10	case6	0.22	case1	0.48	case1	-2.19	case4	-1.95	case2	-2.37	case2	-2.35	case4
50%	Max	0.11	case2	1.95	case2	1.81	case2	1.57	case2	2.03	case4	2.11	case4	2.20	case2
	Min	-0.09	case4	0.24	case1	0.45	case1	-2.03	case4	-1.57	case2	-2.20	case2	-2.11	case4
75%	Max	0.11	case2	1.94	case2	1.81	case2	1.21	case2	1.85	case4	1.88	case4	2.03	case2
	Min	-0.09	case4	0.25	case1	0.41	case1	-1.85	case4	-1.21	case2	-2.03	case2	-1.88	case4
100%	Max	0.12	case2	1.93	case2	1.81	case2	0.90	case6	1.66	case4	1.65	case4	1.86	case2
	Min	-0.09	case4	0.27	case1	0.37	case1	-1.66	case4	-0.90	case6	-1.86	case2	-1.65	case4

MEMBER **11**

								Bending							
Station		**Axial** [Kip/in2]	**Ic**	**Shear V2** [Kip/in2]	**Ic**	**Shear V3** [Kip/in2]	**Ic**	**2-Pos** [Kip/in2]	**Ic**	**2-Neg** [Kip/in2]	**Ic**	**3-Pos** [Kip/in2]	**Ic**	**3-Neg** [Kip/in2]	**Ic**
0%	Max	0.13	case2	2.16	case2	2.18	case2	0.76	case6	1.46	case1	0.94	case4	1.03	case2
	Min	-0.09	case4	0.53	case1	0.60	case1	-1.46	case1	-0.76	case6	-1.03	case2	-0.94	case4
25%	Max	0.13	case2	2.15	case2	2.18	case2	0.51	case6	1.28	case1	0.69	case4	0.81	case2
	Min	-0.09	case4	0.53	case1	0.56	case1	-1.28	case1	-0.51	case6	-0.81	case2	-0.69	case4
50%	Max	0.13	case2	2.14	case2	2.18	case2	0.27	case6	1.09	case1	0.70	case5	0.82	case3
	Min	-0.09	case4	0.54	case1	0.52	case1	-1.09	case1	-0.27	case6	-0.82	case3	-0.70	case5
75%	Max	0.13	case2	2.13	case2	2.18	case2	0.03	case6	0.89	case1	0.85	case5	1.01	case3
	Min	-0.09	case4	0.55	case1	0.49	case1	-0.89	case1	-0.03	case6	-1.01	case3	-0.85	case5
100%	Max	0.13	case2	2.12	case2	2.18	case2	-0.19	case6	0.76	case4	0.96	case5	1.15	case3
	Min	-0.09	case4	0.56	case1	0.45	case1	-0.76	case4	0.19	case6	-1.15	case3	-0.96	case5

MEMBER **12**

Station		Axial [Kip/in2]	lc	Shear V2 [Kip/in2]	lc	Shear V3 [Kip/in2]	lc	Bending 2-Pos [Kip/in2]	lc	2-Neg [Kip/in2]	lc	3-Pos [Kip/in2]	lc	3-Neg [Kip/in2]	lc
0%	Max	0.12	case2	1.92	case2	2.11	case2	-0.16	case4	0.99	case2	0.71	case2	0.90	case4
	Min	-0.08	case4	0.77	case1	0.67	case1	-0.99	case2	0.16	case4	-0.90	case4	-0.71	case2
25%	Max	0.12	case2	1.91	case2	2.11	case2	-0.10	case4	1.02	case2	0.99	case2	1.19	case4
	Min	-0.08	case4	0.77	case1	0.63	case1	-1.02	case2	0.10	case4	-1.19	case4	-0.99	case2
50%	Max	0.12	case2	1.90	case2	2.11	case2	0.08	case5	1.05	case2	1.26	case2	1.48	case4
	Min	-0.08	case4	0.78	case1	0.62	case1	-1.05	case2	-0.08	case5	-1.48	case4	-1.26	case2
75%	Max	0.12	case2	1.89	case2	2.11	case2	0.27	case5	1.08	case3	1.54	case2	1.77	case4
	Min	-0.09	case4	0.78	case1	0.66	case1	-1.08	case3	-0.27	case5	-1.77	case4	-1.54	case2
100%	Max	0.11	case2	1.89	case2	2.11	case2	0.47	case5	1.22	case3	1.82	case2	2.06	case4
	Min	-0.09	case4	0.78	case1	0.70	case1	-1.22	case3	-0.47	case5	-2.06	case4	-1.82	case2

MEMBER **13**

Station		Axial [Kip/in2]	lc	Shear V2 [Kip/in2]	lc	Shear V3 [Kip/in2]	lc	Bending 2-Pos [Kip/in2]	lc	2-Neg [Kip/in2]	lc	3-Pos [Kip/in2]	lc	3-Neg [Kip/in2]	lc
0%	Max	0.10	case2	1.51	case2	1.70	case2	0.56	case5	1.44	case2	2.48	case2	2.72	case4
	Min	-0.08	case4	0.82	case1	0.76	case1	-1.44	case2	-0.56	case5	-2.72	case4	-2.48	case2
25%	Max	0.10	case2	1.52	case2	1.70	case2	0.74	case5	1.38	case3	2.82	case2	3.07	case4
	Min	-0.08	case4	0.81	case3	0.80	case1	-1.38	case3	-0.74	case5	-3.07	case4	-2.82	case2
50%	Max	0.10	case2	1.52	case2	1.70	case2	0.92	case5	1.44	case3	3.16	case2	3.41	case4
	Min	-0.09	case4	0.80	case3	0.85	case1	-1.44	case3	-0.92	case5	-3.41	case4	-3.16	case2
75%	Max	0.10	case2	1.53	case2	1.70	case2	1.10	case5	1.48	case3	3.50	case2	3.75	case4
	Min	-0.09	case4	0.79	case3	0.89	case1	-1.48	case3	-1.10	case5	-3.75	case4	-3.50	case2
100%	Max	0.09	case2	1.54	case2	1.70	case2	1.28	case5	1.51	case3	3.85	case2	4.10	case4
	Min	-0.09	case4	0.77	case3	0.94	case1	-1.51	case3	-1.28	case5	-4.10	case4	-3.85	case2

MEMBER **14**

Station		Axial [Kip/in2]	lc	Shear V2 [Kip/in2]	lc	Shear V3 [Kip/in2]	lc	Bending 2-Pos [Kip/in2]	lc	2-Neg [Kip/in2]	lc	3-Pos [Kip/in2]	lc	3-Neg [Kip/in2]	lc
0%	Max	0.07	case6	2.05	case2	1.85	case2	1.65	case5	1.67	case3	5.05	case2	5.56	case4
	Min	-0.11	case1	0.81	case1	0.94	case1	-1.67	case3	-1.65	case5	-5.56	case4	-5.05	case2
25%	Max	0.07	case6	2.00	case2	1.79	case2	1.48	case1	1.38	case6	5.14	case2	5.74	case4
	Min	-0.12	case1	0.83	case1	0.97	case1	-1.38	case6	-1.48	case1	-5.74	case4	-5.14	case2
50%	Max	0.07	case6	1.94	case2	1.77	case2	1.29	case1	1.05	case6	5.15	case2	5.83	case4
	Min	-0.12	case1	0.86	case1	1.00	case1	-1.05	case6	-1.29	case1	-5.83	case4	-5.15	case2
75%	Max	0.07	case6	1.89	case2	1.84	case2	1.21	case2	0.73	case4	5.08	case2	5.84	case4

	Min	-0.13	case1	0.89	case1	1.04	case1	-0.73	case4	-1.21	case2	-5.84	case4	-5.08	case2
100%	Max	0.07	case6	1.83	case2	1.91	case2	1.36	case2	0.70	case4	4.91	case2	5.77	case4
	Min	-0.13	case1	0.91	case1	1.07	case1	-0.70	case4	-1.36	case2	-5.77	case4	-4.91	case2

MEMBER **15**

								Bending							
Station		**Axial** [Kip/in2]	**lc**	**Shear V2** [Kip/in2]	**lc**	**Shear V3** [Kip/in2]	**lc**	**2-Pos** [Kip/in2]	**lc**	**2-Neg** [Kip/in2]	**lc**	**3-Pos** [Kip/in2]	**lc**	**3-Neg** [Kip/in2]	**lc**
0%	Max	0.03	case6	2.61	case2	2.68	case2	0.63	case4	1.29	case2	4.82	case4	3.95	case2
	Min	-0.11	case1	1.72	case1	1.69	case3	-1.29	case2	-0.63	case4	-3.95	case2	-4.82	case4
25%	Max	0.03	case6	2.60	case4	2.74	case2	0.61	case4	1.38	case2	4.66	case4	3.74	case6
	Min	-0.11	case1	1.75	case1	1.72	case3	-1.38	case2	-0.61	case4	-3.74	case6	-4.66	case4
50%	Max	0.03	case6	2.65	case4	2.81	case2	0.52	case4	1.39	case2	5.03	case1	4.20	case6
	Min	-0.11	case1	1.77	case1	1.75	case3	-1.39	case2	-0.52	case4	-4.20	case6	-5.03	case1
75%	Max	0.02	case6	2.71	case4	2.87	case2	0.62	case5	1.41	case3	5.59	case1	4.69	case6
	Min	-0.11	case1	1.80	case1	1.79	case3	-1.41	case3	-0.62	case5	-4.69	case6	-5.59	case1
100%	Max	0.02	case6	2.77	case4	2.93	case2	1.14	case5	2.00	case3	6.20	case1	5.23	case6
	Min	-0.12	case4	1.83	case1	1.82	case3	-2.00	case3	-1.14	case5	-5.23	case6	-6.20	case1

MEMBER **16**

								Bending							
Station		**Axial** [Kip/in2]	**lc**	**Shear V2** [Kip/in2]	**lc**	**Shear V3** [Kip/in2]	**lc**	**2-Pos** [Kip/in2]	**lc**	**2-Neg** [Kip/in2]	**lc**	**3-Pos** [Kip/in2]	**lc**	**3-Neg** [Kip/in2]	**lc**
0%	Max	0.02	case2	3.21	case4	3.54	case4	0.19	case5	1.21	case3	5.15	case1	4.42	case6
	Min	-0.14	case4	2.73	case3	2.86	case3	-1.21	case3	-0.19	case5	-4.42	case6	-5.15	case1
25%	Max	0.02	case2	3.25	case4	3.61	case4	0.71	case5	1.72	case3	5.93	case1	5.13	case6
	Min	-0.15	case4	2.75	case3	2.89	case3	-1.72	case3	-0.71	case5	-5.13	case6	-5.93	case1
50%	Max	0.03	case2	3.29	case4	3.68	case4	1.25	case5	2.25	case3	6.76	case1	5.88	case6
	Min	-0.16	case4	2.76	case3	2.93	case3	-2.25	case3	-1.25	case5	-5.88	case6	-6.76	case1
75%	Max	0.03	case2	3.33	case4	3.76	case4	1.82	case5	2.81	case3	7.64	case1	6.69	case6
	Min	-0.18	case4	2.78	case3	2.96	case3	-2.81	case3	-1.82	case5	-6.69	case6	-7.64	case1
100%	Max	0.04	case2	3.37	case4	3.83	case4	2.42	case5	3.39	case3	8.58	case1	7.54	case6
	Min	-0.19	case4	2.80	case3	3.00	case3	-3.39	case3	-2.42	case5	-7.54	case6	-8.58	case1

MEMBER **17**

Station		Axial [Kip/in2]	lc	Shear V2 [Kip/in2]	lc	Shear V3 [Kip/in2]	lc	Bending 2-Pos [Kip/in2]	lc	2-Neg [Kip/in2]	lc	3-Pos [Kip/in2]	lc	3-Neg [Kip/in2]	lc
0%	Max	0.06	case2	4.53	case1	4.73	case1	2.48	case5	3.43	case3	6.99	case1	6.06	case6
	Min	-0.20	case4	2.67	case2	3.20	case2	-3.43	case3	-2.48	case5	-6.06	case6	-6.99	case1
25%	Max	0.07	case2	4.56	case1	4.78	case1	3.22	case5	4.02	case3	8.09	case1	7.08	case6
	Min	-0.22	case4	2.72	case2	3.29	case2	-4.02	case3	-3.22	case5	-7.08	case6	-8.09	case1
50%	Max	0.08	case2	4.58	case1	4.82	case1	4.00	case5	4.64	case3	9.25	case1	8.16	case6
	Min	-0.23	case4	2.77	case2	3.37	case2	-4.64	case3	-4.00	case5	-8.16	case6	-9.25	case1
75%	Max	0.09	case2	4.61	case1	4.86	case1	4.81	case5	5.27	case3	10.48	case1	9.31	case6
	Min	-0.25	case4	2.81	case2	3.46	case2	-5.27	case3	-4.81	case5	-9.31	case6	-10.48	case1
100%	Max	0.10	case2	4.63	case1	4.91	case1	5.66	case5	5.93	case3	11.77	case1	10.52	case6
	Min	-0.27	case4	2.86	case2	3.55	case2	-5.93	case3	-5.66	case5	-10.52	case6	-11.77	case1

MEMBER **18**

Station		Axial [Kip/in2]	lc	Shear V2 [Kip/in2]	lc	Shear V3 [Kip/in2]	lc	Bending 2-Pos [Kip/in2]	lc	2-Neg [Kip/in2]	lc	3-Pos [Kip/in2]	lc	3-Neg [Kip/in2]	lc
0%	Max	0.48	case2	6.48	case1	6.03	case1	8.36	case6	10.52	case1	7.03	case6	9.79	case1
	Min	-0.46	case4	2.98	case2	3.15	case2	-10.52	case1	-8.36	case6	-9.79	case1	-7.03	case6
25%	Max	0.48	case2	6.48	case1	6.03	case1	7.62	case6	9.29	case1	8.03	case6	10.16	case1
	Min	-0.46	case4	2.97	case2	3.16	case2	-9.29	case1	-7.62	case6	-10.16	case1	-8.03	case6
50%	Max	0.49	case2	6.48	case1	6.03	case1	6.87	case6	8.05	case1	9.04	case6	10.53	case1
	Min	-0.46	case4	2.97	case2	3.16	case2	-8.05	case1	-6.87	case6	-10.53	case1	-9.04	case6
75%	Max	0.49	case2	6.49	case1	6.02	case1	6.14	case6	6.81	case1	10.06	case6	10.89	case1
	Min	-0.46	case4	2.96	case2	3.17	case2	-6.81	case1	-6.14	case6	-10.89	case1	-10.06	case6
100%	Max	0.49	case2	6.49	case1	6.02	case1	5.40	case6	5.55	case1	11.08	case6	11.23	case1
	Min	-0.46	case4	2.96	case2	3.17	case2	-5.55	case1	-5.40	case6	-11.23	case1	-11.08	case6

MEMBER **19**

Station		Axial [Kip/in2]	lc	Shear V2 [Kip/in2]	lc	Shear V3 [Kip/in2]	lc	Bending 2-Pos [Kip/in2]	lc	2-Neg [Kip/in2]	lc	3-Pos [Kip/in2]	lc	3-Neg [Kip/in2]	lc
0%	Max	0.11	case4	1.34	case2	1.38	case2	3.27	case4	2.63	case2	3.27	case4	3.15	case2
	Min	-0.16	case2	1.27	case4	0.90	case3	-2.63	case2	-3.27	case4	-3.15	case2	-3.27	case4
25%	Max	0.11	case4	1.34	case2	1.38	case2	3.08	case4	2.71	case2	3.13	case4	3.01	case2
	Min	-0.16	case2	1.27	case4	0.90	case3	-2.71	case2	-3.08	case4	-3.01	case2	-3.13	case4
50%	Max	0.11	case4	1.34	case2	1.38	case2	2.89	case4	2.78	case2	2.99	case4	2.87	case2
	Min	-0.16	case2	1.27	case4	0.89	case3	-2.78	case2	-2.89	case4	-2.87	case2	-2.99	case4
75%	Max	0.11	case4	1.33	case2	1.38	case2	2.71	case4	2.85	case2	2.86	case4	2.73	case2

	Min	-0.16	case2	1.26	case4	0.89	case3	-2.85	case2	-2.71	case4	-2.73	case2	-2.86	case4
100%	Max	0.11	case4	1.33	case2	1.38	case2	2.54	case4	2.91	case2	2.73	case4	2.58	case2
	Min	-0.16	case2	1.26	case4	0.89	case3	-2.91	case2	-2.54	case4	-2.58	case2	-2.73	case4

MEMBER **20**

								Bending							
Station		**Axial** [Kip/in2]	**lc**	**Shear V2** [Kip/in2]	**lc**	**Shear V3** [Kip/in2]	**lc**	**2-Pos** [Kip/in2]	**lc**	**2-Neg** [Kip/in2]	**lc**	**3-Pos** [Kip/in2]	**lc**	**3-Neg** [Kip/in2]	**lc**
0%	Max	0.07	case1	2.57	case4	2.51	case4	0.75	case3	0.55	case5	2.85	case4	3.06	case2
	Min	-0.04	case6	0.37	case3	0.23	case3	-0.55	case5	-0.75	case3	-3.06	case2	-2.85	case4
25%	Max	0.08	case1	2.57	case4	2.52	case4	0.70	case4	0.57	case2	3.23	case4	3.30	case2
	Min	-0.03	case6	0.37	case3	0.22	case3	-0.57	case2	-0.70	case4	-3.30	case2	-3.23	case4
50%	Max	0.08	case1	2.57	case4	2.52	case4	1.18	case4	1.16	case2	3.61	case4	3.54	case2
	Min	-0.03	case6	0.37	case3	0.22	case3	-1.16	case2	-1.18	case4	-3.54	case2	-3.61	case4
75%	Max	0.08	case1	2.57	case4	2.53	case4	1.67	case4	1.76	case2	4.01	case4	3.77	case2
	Min	-0.03	case6	0.37	case3	0.21	case3	-1.76	case2	-1.67	case4	-3.77	case2	-4.01	case4
100%	Max	0.08	case1	2.57	case4	2.53	case4	2.15	case4	2.36	case2	4.41	case4	3.99	case2
	Min	-0.03	case6	0.37	case3	0.21	case3	-2.36	case2	-2.15	case4	-3.99	case2	-4.41	case4

MEMBER **21**

								Bending							
Station		**Axial** [Kip/in2]	**lc**	**Shear V2** [Kip/in2]	**lc**	**Shear V3** [Kip/in2]	**lc**	**2-Pos** [Kip/in2]	**lc**	**2-Neg** [Kip/in2]	**lc**	**3-Pos** [Kip/in2]	**lc**	**3-Neg** [Kip/in2]	**lc**
0%	Max	0.41	case2	4.34	case1	3.88	case3	10.94	case6	12.11	case1	12.44	case1	9.12	case6
	Min	-0.45	case4	3.34	case4	2.87	case2	-12.11	case1	-10.94	case6	-9.12	case6	-12.44	case1
25%	Max	0.41	case2	4.34	case1	3.88	case3	10.00	case6	10.99	case1	12.07	case1	9.26	case6
	Min	-0.45	case4	3.34	case4	2.87	case2	-10.99	case1	-10.00	case6	-9.26	case6	-12.07	case1
50%	Max	0.41	case2	4.34	case1	3.87	case3	9.06	case6	9.87	case1	11.70	case1	9.40	case6
	Min	-0.45	case4	3.34	case4	2.86	case2	-9.87	case1	-9.06	case6	-9.40	case6	-11.70	case1
75%	Max	0.41	case2	4.34	case1	3.87	case3	8.11	case6	8.75	case1	11.34	case1	9.53	case6
	Min	-0.45	case4	3.35	case4	2.86	case2	-8.75	case1	-8.11	case6	-9.53	case6	-11.34	case1
100%	Max	0.41	case2	4.33	case1	3.86	case3	7.16	case6	7.64	case1	10.99	case1	9.66	case6
	Min	-0.45	case4	3.35	case4	2.85	case2	-7.64	case1	-7.16	case6	-9.66	case6	-10.99	case1