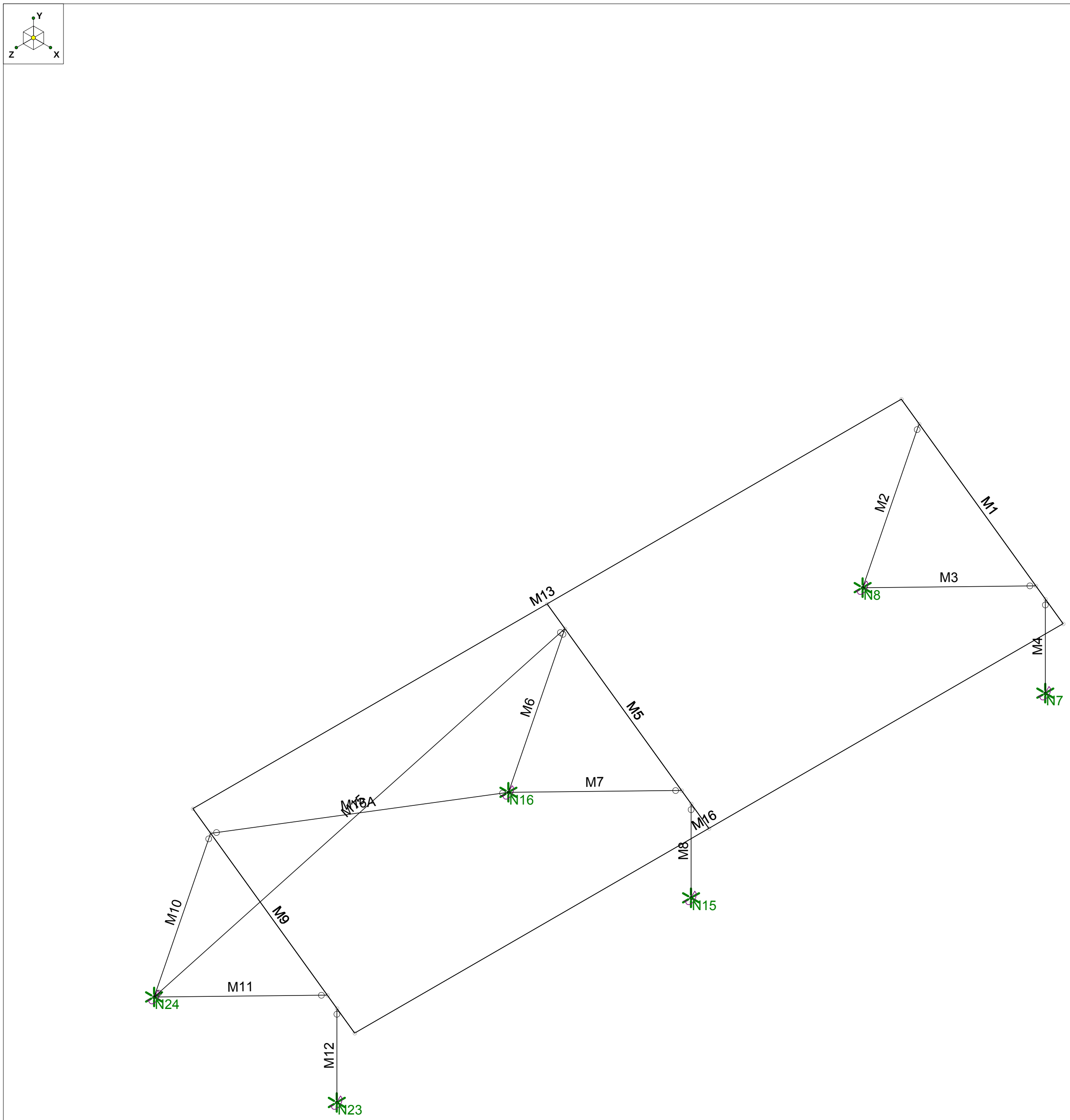


Schletter, Inc.		35° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

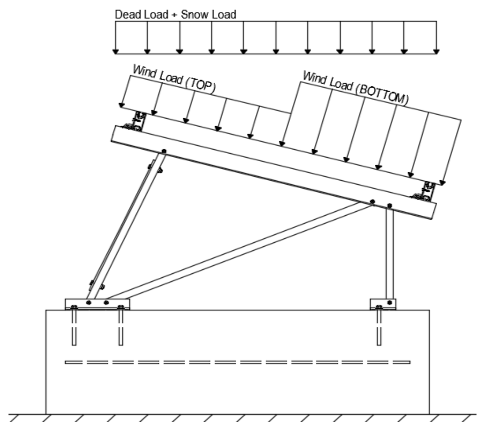
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

1.2 Construction
Photovoltaic modules are attached to aluminum purlins using clamp fasteners. Purlins are clamped to inclined aluminum girders, which are then connected to aluminum struts. Each support structure is equally spaced.

PV modules are required to meet the following specifications:

	Maximum			Minimum	
Height =	1700	mm	Height =	1550	mm
Width =	1050	mm	Width =	970	mm
Dead Load =	3.00	psf	Dead Load =	1.75	psf

Modules Per Row =	1
Module Tilt =	35°
Maximum Height Above Grade =	3 ft



Typical loading conditions of the module dead loads, snow loads, and wind loads are shown on the left.

1.3 Technical Codes
- ASCE 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf

g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	14.43	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.64		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	100	mph	Exposure Category = C
Height ≤	15	ft	Importance Category = II

Peak Velocity Pressure, q_z = 15.70 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.2	*(Pressure)*
$Cf+_{BOTTOM}$	=	2	
$Cf-_{TOP}$	=	-2.4	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.2	

Provided pressure coefficients are the result of wind tunnel testing done by Ruscheweyh Consult. Coefficients are located in test report # 1127/0611-1e. Negative forces are applied away from the surface.

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.04	C_d =	1.25

ASCE 7, Section 12.8.1.3: A maximum S_s of 1.5 may be used to calculate the base shear, C_s, of structures under five stories and with a period, T, of 0.5 or less. Therefore, a S_{ds} of 1.0 was used to calculate C_s.

2.5 Combination of Loads

ASCE 7 requires that all structures be checked by specified combinations of loads. Applicable load combinations are provided below.

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)

Allowable Stress Design, ASD

Member deflection checks and foundation designs are done according to the following ASD load combinations:

1.0D + 1.0S
1.0D + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)

[M] *Uses the minimum allowable module dead load.*
[R] *Include redundancy factor of 1.3.*
[O] *Includes overstrength factor of 1.25. Used to check seismic drift.*

3. STRUCTURAL ANALYSIS

3.1 RISA Results

Appendix B.1 contains outputs from the structural analysis software package, RISA. These outputs are used to accurately determine resultant member and reaction forces from the loads seen throughout Section 2.

3.2 RISA Components

A member and node list has been provided below to correlate the RISA components with the design calculations in Section 4. Items of significance have been listed.

Purlins	Location	Diagonal Struts	Location	Front Reactions	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer

Girders	Location	Rear Struts	Location	Rear Reactions	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

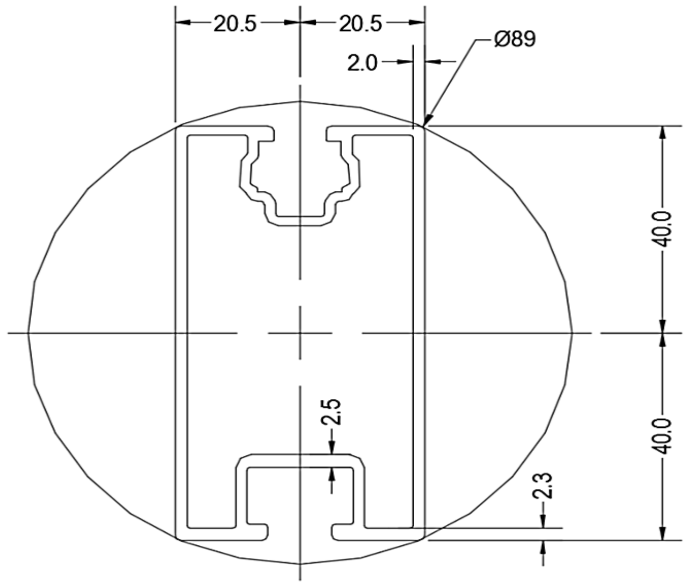
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

Aluminum purlins are used to transfer loads to the support structure. Purlins are designed as continous beams with cantilevers. These are considered beams with internal hinges that can be joined with splices at 25% of the support respective span. See Appendix A.1 for detailed member calculations. Section units are in (mm).

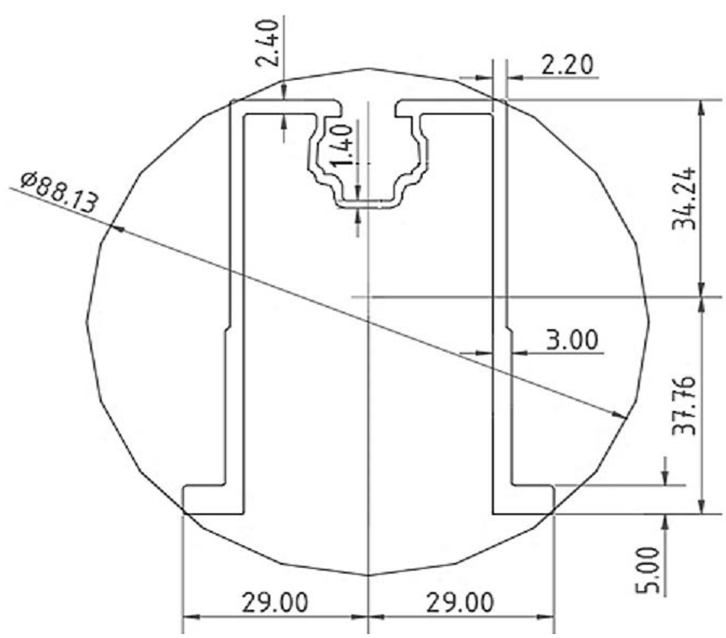
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	66	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.56	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	0.466	k-ft
M_z =	0.128	k-ft
$M_{y\ allowable}$ =	1.837	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	41%	



4.2 Girder Design

Loads from purlins are transferred using an inclined girder, which is connected to a set of aluminum struts. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

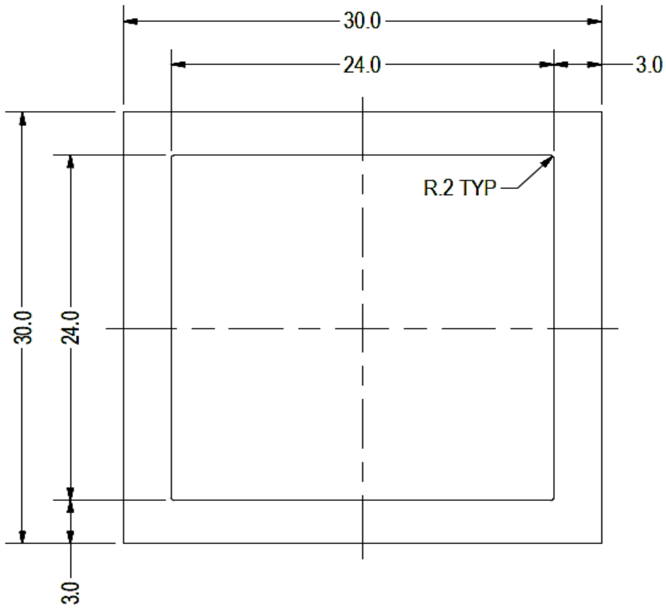
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.38	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.574	k-ft
M_z =	0.000	k-ft
P_n =	0.280	k
$M_{y\ allowable}$ =	1.442	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	42%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

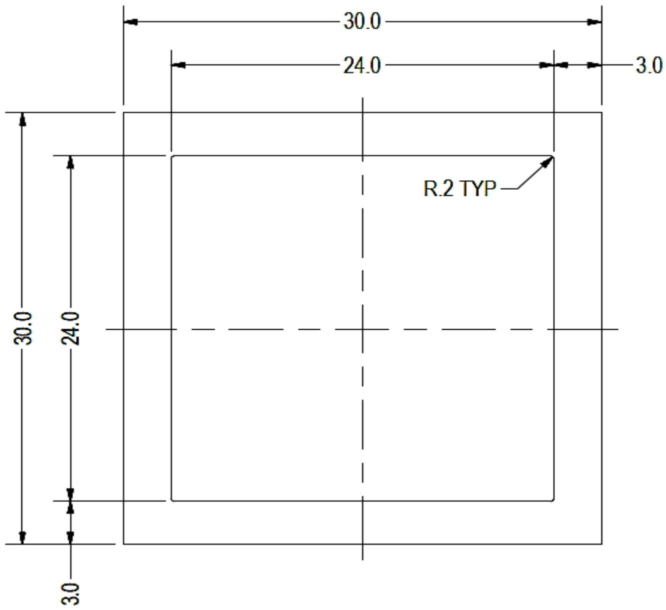
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.036	k-ft
P_n =	0.184	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	10%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

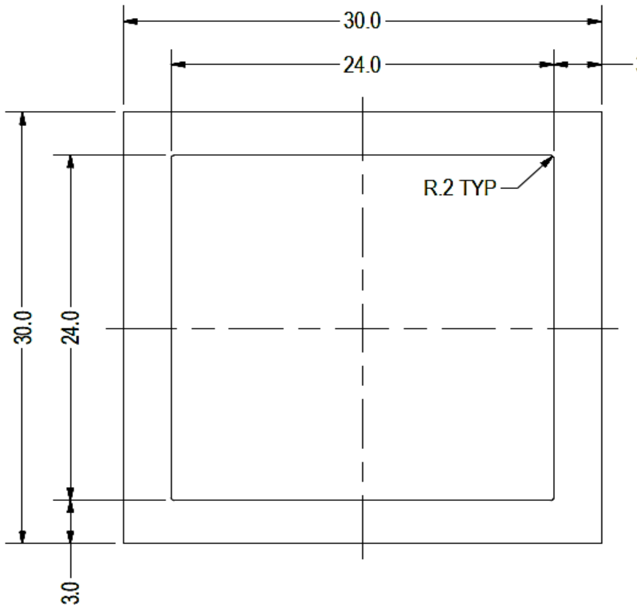
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.764	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	20%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

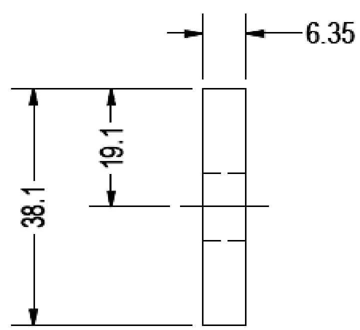
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.695	k
$M_{y\ allowable}$ =	0.406	k-ft
$M_{z\ allowable}$ =	0.406	k-ft
$P_{n\ allowable}$ =	4.450	k
Utilization =	16%	



4.6 Cross Brace Design

In order to resist weak side loading, aluminum cross bracing kits are provided. The cross bracing is attached at one end of a rear aluminum strut diagonally down to the bottom end of an adjacent strut. Single M10 bolts are provided at each of the cross bracing. Section units are in (mm).

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.004	k-ft
P_n =	0.213	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	11%	



A cross brace kit is required every 18 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

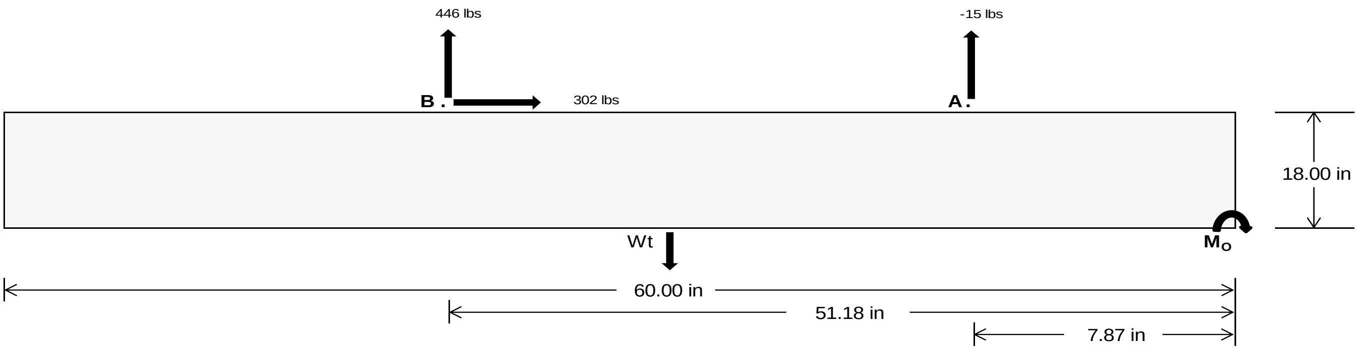
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	9.86	1859.55	k
Compressive Load =	1061.28	1289.94	k
Lateral Load =	29.33	1257.60	k
Moment (Weak Axis) =	0.05	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC tables 1804.2 (2003, 2006) & 1806.2 (2009).



Concrete Properties

Weight of Concrete = 145 pcf
Compressive Strength = 2500 psi
Yield Strength = 60000 psi

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O = 28174.5 in-lbs
Resisting Force Required = 939.15 lbs
S.F. = 1.67
Weight Required = 1565.25 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 302.20 lbs
Friction = 0.4
Weight Required = 755.49 lbs
Resisting Weight = 1993.75 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 302.20 lbs
Cohesion = 130 psf
Area = 9.17 ft^2
Resisting = 996.88 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

Additional Force = 0 lbs
Lateral Bearing Pressure = 200 psf/ft
Required Depth = 0.00 ft
f'_c = 2500 psi
Length = 8 in

Shear key is not required.

Bearing Pressure

	Ballast Width			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.83 ft) =	1994 lbs	2084 lbs	2175 lbs	2266 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	398 lbs	398 lbs	398 lbs	398 lbs	347 lbs	347 lbs	347 lbs	347 lbs	518 lbs	518 lbs	518 lbs	518 lbs	29 lbs	29 lbs	29 lbs	29 lbs
F_B	259 lbs	259 lbs	259 lbs	259 lbs	570 lbs	570 lbs	570 lbs	570 lbs	594 lbs	594 lbs	594 lbs	594 lbs	-893 lbs	-893 lbs	-893 lbs	-893 lbs
F_V	43 lbs	43 lbs	43 lbs	43 lbs	548 lbs	548 lbs	548 lbs	548 lbs	440 lbs	440 lbs	440 lbs	440 lbs	-604 lbs	-604 lbs	-604 lbs	-604 lbs
P_{total}	2651 lbs	2742 lbs	2832 lbs	2923 lbs	2910 lbs	3001 lbs	3091 lbs	3182 lbs	3106 lbs	3197 lbs	3287 lbs	3378 lbs	333 lbs	387 lbs	441 lbs	496 lbs
M	341 lbs-ft	341 lbs-ft	341 lbs-ft	341 lbs-ft	457 lbs-ft	457 lbs-ft	457 lbs-ft	457 lbs-ft	565 lbs-ft	565 lbs-ft	565 lbs-ft	565 lbs-ft	724 lbs-ft	724 lbs-ft	724 lbs-ft	724 lbs-ft
e	0.13 ft	0.12 ft	0.12 ft	0.12 ft	0.16 ft	0.15 ft	0.15 ft	0.14 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	2.18 ft	1.87 ft	1.64 ft	1.46 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	244.6 psf	243.4 psf	242.3 psf	241.4 psf	257.7 psf	256.0 psf	254.4 psf	252.9 psf	264.8 psf	262.8 psf	260.9 psf	259.1 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	333.8 psf	328.7 psf	324.1 psf	319.8 psf	377.2 psf	370.3 psf	363.9 psf	358.1 psf	412.9 psf	404.4 psf	396.6 psf	389.4 psf	372.5 psf	213.6 psf	171.0 psf	152.5 psf

Maximum Bearing Pressure = 413 psf
Allowable Bearing Pressure = 1500 psf

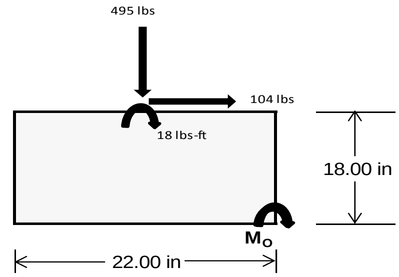
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 279.5 ft-lbs
Resisting Force Required = 304.86 lbs
S.F. = 1.67
Weight Required = 508.11 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	137 lbs	94 lbs	72 lbs	253 lbs	495 lbs	204 lbs	88 lbs	-25 lbs	26 lbs
F_V	16 lbs	138 lbs	17 lbs	11 lbs	104 lbs	13 lbs	17 lbs	138 lbs	16 lbs
P_{total}	2605 lbs	2562 lbs	2540 lbs	2603 lbs	2845 lbs	2553 lbs	810 lbs	696 lbs	747 lbs
M	46 lbs-ft	231 lbs-ft	49 lbs-ft	32 lbs-ft	174 lbs-ft	38 lbs-ft	47 lbs-ft	231 lbs-ft	48 lbs-ft
e	0.02 ft	0.09 ft	0.02 ft	0.01 ft	0.06 ft	0.01 ft	0.06 ft	0.33 ft	0.06 ft
L/6	0.31 ft	1.65 ft	1.79 ft	1.81 ft	1.71 ft	1.80 ft	1.72 ft	1.17 ft	1.71 ft
f_{min}	267.6 sqft	196.9 sqft	259.7 sqft	272.6 sqft	248.1 sqft	264.9 sqft	71.6 sqft	-6.5 sqft	64.5 sqft
f_{max}	300.8 psf	362.0 psf	294.5 psf	295.3 psf	372.6 psf	292.1 psf	105.1 psf	158.4 psf	98.5 psf

Maximum Bearing Pressure = 373 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 22in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

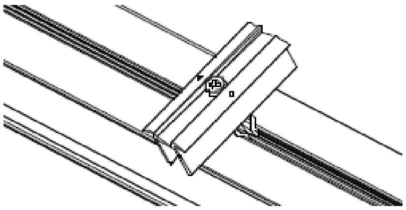
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

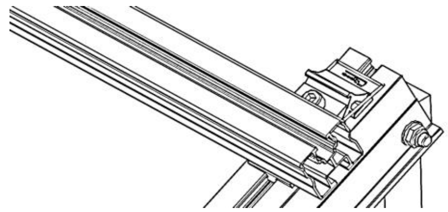
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of a Schletter, Inc. Klicktop connector. The reliability of calculations is uncertain due to limited standards, therefore the strength of the fasteners has been evaluated by load testing.

Fastening of Modules to Purlins	
Maximum Uplifting Force =	0.564 k
Allowable Uplift =	1.214 k
Utilization =	46%



Fastening of Purlins to Girders	
Maximum Uplifting Force =	1.106 k
Allowable Uplift =	1.116 k
Utilization =	99%



6.2 Bolted Connections

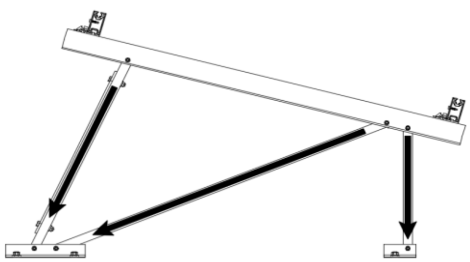
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut	
Maximum Axial Load =	0.816 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	14%

Rear Strut	
Maximum Axial Load =	1.149 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	20%

Diagonal Strut	
Maximum Axial Load =	0.764 k
M8 Bolt Shear Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	13%

Bracing	
Maximum Axial Load =	0.213 k
M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k
Utilization =	3%



Bolt and bearing capacities are accounting for double shear (ASCE 8-02, Eq. 5.3.4-1). Struts under compression are shown to demonstrate the load transfer from the girder. Single M8 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

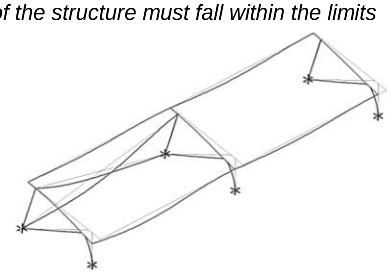
7.1 Seismic Drift

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, h_{sx} =	33.11 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.662 in
Max Drift, Δ_{MAX} =	0.074 in

$0.074 \leq 0.662$, OK.

The racking structure's reaction to seismic loads is shown to the right. The deflections have been magnified to provide a clear portrayal of potential story drift.



APPENDIX A

A.1 Design of Aluminum Purlins - Aluminum Design Manual, 2005 Edition

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

$L_b =$ 66.00 in

J = 0.427

137.652

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

$\varphi F_L =$ φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

$\varphi F_L =$ 29.6 ksi

3.4.16

b/t = 6.6

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

$\varphi F_L =$ φyFcy

$\varphi F_L =$ 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L =$ 1.17φyFcy

$\varphi F_L =$ 38.9 ksi

Weak Axis:

3.4.14

$L_b =$ 66.00 in

J = 0.427

149.579

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

$\varphi F_L =$ φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

$\varphi F_L =$ 29.4

3.4.16

b/t = 37.95

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

$\varphi F_L =$ φb[Bp-1.6Dp*b/t]

$\varphi F_L =$ 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 38.1
m = 0.63
C_0 = 40.784
Cc = 39.216

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 29.6 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.837 k-ft

3.4.18

h/t = 6.6

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9
m = 0.65
C_0 = 20.5
Cc = 20.5

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 22.7 ksi
Iy = 148662 mm^4
0.357 in^4
x = 20.5 mm
Sy = 0.443 in^3
$M_{max}Wk$ = 0.838 k-ft

<u>Compression</u>

3.4.9

b/t = 6.6
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 37.95
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.4 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b} Fcy}{Dt}\right)^2$$

S1 = 6.87
S2 = 131.3
φF_L= φyFcy
φF_L= 33.25 ksi

φF_L= 21.42 ksi
A = 620.02 mm^2
0.96 in^2
P_{max} = 20.59 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.09

23.5807

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.4 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.09

24.5845

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.4 ksi

3.4.15

b/t = 24.46

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{5.1Dp}$$

S1 = 3.8

$$S2 = \frac{k_1 Bp}{5.1Dp}$$

S2 = 14.7

F_{UT}= (φbk2*√(BpE))/(5.1b/t)

F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.4 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.442 k-ft

3.4.18

h/t = 4.29

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

b/t = 24.46
S1 = 3.83
S2 = 10.30
φF_L= (φck2*√(BpE))/(5.1b/t)
φF_L= 10.4 ksi

3.4.9

b/t = 4.29
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 24.46
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT}= 10.43
F_{ST}= 28.24
φF_L= Fut + (Fst - Fut)ρst < Fst
φF_L= 14.3 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b}Fcy}{Dt}\right)^2$$

S1 = 6.87
S2 = 131.3
φF_L= φyFcy
φF_L= 33.25 ksi

φF_L= 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

A.3 Design of Aluminum Struts (Front) - Aluminum Design Manual, 2005 Edition

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 31.2

3.4.16

b/t = 7.75

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.83792

φF_L = φcc(Bc-Dc*λ)

φF_L = 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φyFcy

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b}Fcy}{Dt}\right)^2$$

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

A.4 Design of Aluminum Struts (Diagonal) - Aluminum Design Manual, 2005 Edition

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 29.8

3.4.16

b/t = 7.75

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.98863

r = 0.437 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.85841

φF_L = (φccFcy)/(λ²)

φF_L = 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φyFcy

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b}Fcy}{Dt}\right)^2$$

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 7.60 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 3.81 kips

A.5 Design of Aluminum Struts (Rear) - Aluminum Design Manual, 2005 Edition

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 30.0 ksi

3.4.16

b/t = 7.75

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

$$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$$

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.0 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.406 k-ft

Weak Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

$$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$$

S1 = 0.51461

$$S2 = \left(\frac{C_c}{1.6}\right)^2$$

S2 = 1701.56

φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

φF_L= 30.0

3.4.16

b/t = 7.75

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

S1 = 12.2

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

$$S2 = \frac{k_1 Bbr}{mDbr}$$

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.81475

r = 0.437 in

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$S1^*$ = 0.33515

$$S2^* = \frac{Cc}{\pi}\sqrt{Fcy/E}$$

$S2^*$ = 1.23671

φcc = 0.83406

φF_L= (φccFcy)/(λ²)

φF_L= 8.86409 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

$$S1 = \left(\frac{Bt - \frac{\theta_y}{\theta_b} Fcy}{Dt}\right)^2$$

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 8.86 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 4.45 kips

APPENDIX B

B.1

The following pages will contain the results from RISA. Please refer back to Section 2 for load information and Section 4-5 for member and foundation design.

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.8			4		

Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M16	Y	-8.366	-8.366	0	0

Member Distributed Loads (BLC 2 : Dead Load, Min)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-4.45	-4.45	0	0
2	M16	Y	-4.45	-4.45	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-40.249	-40.249	0	0
2	M16	Y	-40.249	-40.249	0	0

Member Distributed Loads (BLC 4 : Wind Load - Pressure)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-52.543	-52.543	0	0
2	M16	y	-87.571	-87.571	0	0

Member Distributed Loads (BLC 5 : Wind Load - Suction)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	105.085	105.085	0	0
2	M16	y	52.543	52.543	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	6.693	6.693	0	0
2	M16	Z	6.693	6.693	0	0
3	M13	Z	0	0	0	0
4	M16	Z	0	0	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	262.028	2	303.349	2	-.007	10	0	15	0	1	0	1
2		min	-311.868	3	-447.814	3	-2.372	4	0	3	0	1	0	1
3	N7	max	.028	3	317.158	1	-.116	10	0	10	0	1	0	1
4		min	-.166	2	23.987	15	-22.188	4	-.035	4	0	1	0	1
5	N15	max	.171	3	816.368	1	.476	1	0	1	0	1	0	1
6		min	-1.398	2	26.975	15	-22.559	5	-.036	4	0	1	0	1
7	N16	max	892.026	2	992.261	2	0	10	0	1	0	1	0	1
8		min	-967.385	3	-1430.422	3	-183.281	4	0	3	0	1	0	1
9	N23	max	.028	3	316.987	1	1.937	1	.003	1	0	1	0	1
10		min	-.166	2	4.567	15	-20.906	5	-.033	5	0	1	0	1
11	N24	max	262.119	2	306.411	2	74.335	3	0	4	0	1	0	1
12		min	-312.22	3	-446.219	3	-3.674	5	0	3	0	1	0	1
13	Totals:	max	1414.443	2	2755.753	2	0	3						
14		min	-1591.246	3	-2130.337	3	-253.922	5						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	219.357	1	.676	6	1.262	4	0	10	0	10	0	1
2			min	-370.122	3	.158	15	-.039	3	0	4	0	1	0	1
3		2	max	219.492	1	.619	6	1.139	4	0	10	0	5	0	15
4			min	-370.02	3	.145	15	-.039	3	0	4	0	1	0	6
5		3	max	219.627	1	.561	6	1.016	4	0	10	0	5	0	15
6			min	-369.919	3	.131	15	-.039	3	0	4	0	1	0	6
7		4	max	219.761	1	.504	6	.892	4	0	10	0	5	0	15
8			min	-369.818	3	.118	15	-.039	3	0	4	0	3	0	6
9		5	max	219.896	1	.446	6	.769	4	0	10	0	4	0	15
10			min	-369.717	3	.104	15	-.039	3	0	4	0	3	0	6
11		6	max	220.031	1	.389	6	.646	4	0	10	0	4	0	15
12			min	-369.616	3	.091	15	-.039	3	0	4	0	3	0	6
13		7	max	220.166	1	.331	6	.523	4	0	10	0	4	0	15
14			min	-369.515	3	.077	15	-.039	3	0	4	0	3	0	6
15		8	max	220.301	1	.274	6	.4	4	0	10	0	4	0	15
16			min	-369.413	3	.064	15	-.039	3	0	4	0	3	0	6
17		9	max	220.436	1	.216	6	.277	4	0	10	.001	4	0	15
18			min	-369.312	3	.05	15	-.039	3	0	4	0	3	0	6
19		10	max	220.571	1	.159	6	.255	1	0	10	.001	4	0	15
20			min	-369.211	3	.037	15	-.039	3	0	4	0	3	0	6
21		11	max	220.705	1	.11	2	.255	1	0	10	.001	4	0	15
22			min	-369.11	3	.015	12	-.039	3	0	4	0	3	0	6
23		12	max	220.84	1	.065	2	.255	1	0	10	.001	4	0	15
24			min	-369.009	3	-.014	3	-.159	5	0	4	0	3	0	6
25		13	max	220.975	1	.02	2	.255	1	0	10	.001	4	0	15
26			min	-368.908	3	-.047	3	-.282	5	0	4	0	3	0	6
27		14	max	221.11	1	-.017	15	.255	1	0	10	.001	4	0	15
28			min	-368.807	3	-.081	3	-.405	5	0	4	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	221.245	1	-.031	15	.255	1	0	10	0	4	0	15
30			min	-368.705	3	-.129	4	-.528	5	0	4	0	3	0	6
31		16	max	221.38	1	-.044	15	.255	1	0	10	0	4	0	15
32			min	-368.604	3	-.186	4	-.651	5	0	4	0	3	0	6
33		17	max	221.515	1	-.058	15	.255	1	0	10	0	4	0	15
34			min	-368.503	3	-.243	4	-.775	5	0	4	0	3	0	6
35		18	max	221.65	1	-.071	15	.255	1	0	10	0	1	0	15
36			min	-368.402	3	-.301	4	-.898	5	0	4	0	3	0	6
37		19	max	221.784	1	-.085	15	.255	1	0	10	0	1	0	15
38			min	-368.301	3	-.358	4	-1.021	5	0	4	0	3	0	6
39	M3	1	max	219.726	2	1.734	6	-.025	10	0	5	0	1	0	6
40			min	-218.816	3	.407	15	-1.367	4	0	1	0	10	0	15
41		2	max	219.656	2	1.557	6	-.025	10	0	5	0	1	0	2
42			min	-218.868	3	.365	15	-1.233	4	0	1	0	10	0	3
43		3	max	219.586	2	1.381	6	-.025	10	0	5	0	1	0	2
44			min	-218.921	3	.324	15	-1.099	4	0	1	0	5	0	3
45		4	max	219.516	2	1.205	6	-.025	10	0	5	0	1	0	15
46			min	-218.973	3	.283	15	-.966	4	0	1	0	5	0	4
47		5	max	219.446	2	1.028	6	-.025	10	0	5	0	1	0	15
48			min	-219.026	3	.241	15	-.832	4	0	1	0	5	0	4
49		6	max	219.376	2	.852	6	-.025	10	0	5	0	1	0	15
50			min	-219.078	3	.2	15	-.698	4	0	1	0	5	0	4
51		7	max	219.306	2	.676	6	-.025	10	0	5	0	1	0	15
52			min	-219.131	3	.158	15	-.565	4	0	1	0	5	0	4
53		8	max	219.236	2	.499	6	-.025	10	0	5	0	1	0	15
54			min	-219.183	3	.117	15	-.431	4	0	1	0	5	-.001	4
55		9	max	219.166	2	.323	6	-.025	10	0	5	0	1	0	15
56			min	-219.236	3	.075	15	-.297	4	0	1	0	5	-.001	4
57		10	max	219.096	2	.146	6	-.025	10	0	5	0	1	0	15
58			min	-219.288	3	.034	15	-.287	1	0	1	0	5	-.001	4
59		11	max	219.026	2	.005	2	.038	5	0	5	0	1	0	15
60			min	-219.341	3	-.054	3	-.287	1	0	1	0	5	-.001	4
61		12	max	218.956	2	-.049	15	.172	5	0	5	0	1	0	15
62			min	-219.393	3	-.206	4	-.287	1	0	1	0	5	-.001	4
63		13	max	218.886	2	-.091	15	.305	5	0	5	0	1	0	15
64			min	-219.446	3	-.383	4	-.287	1	0	1	0	5	-.001	4
65		14	max	218.816	2	-.132	15	.439	5	0	5	0	1	0	15
66			min	-219.498	3	-.559	4	-.287	1	0	1	0	5	-.001	4
67		15	max	218.746	2	-.173	15	.573	5	0	5	0	1	0	15
68			min	-219.551	3	-.735	4	-.287	1	0	1	0	5	0	4
69		16	max	218.676	2	-.215	15	.706	5	0	5	0	1	0	15
70			min	-219.603	3	-.912	4	-.287	1	0	1	0	5	0	4
71		17	max	218.606	2	-.256	15	.84	5	0	5	0	12	0	15
72			min	-219.656	3	-1.088	4	-.287	1	0	1	0	5	0	4
73		18	max	218.536	2	-.298	15	.974	5	0	5	0	10	0	15
74			min	-219.708	3	-1.265	4	-.287	1	0	1	0	4	0	4
75		19	max	218.466	2	-.339	15	1.107	5	0	5	0	5	0	1
76			min	-219.761	3	-1.441	4	-.287	1	0	1	0	1	0	1
77	M4	1	max	315.993	1	0	1	-.118	10	0	1	0	5	0	1
78			min	23.636	15	0	1	-21.527	4	0	1	0	2	0	1
79		2	max	316.058	1	0	1	-.118	10	0	1	0	12	0	1
80			min	23.656	15	0	1	-21.583	4	0	1	-.002	4	0	1
81		3	max	316.122	1	0	1	-.118	10	0	1	0	10	0	1
82			min	23.675	15	0	1	-21.639	4	0	1	-.004	4	0	1
83		4	max	316.187	1	0	1	-.118	10	0	1	0	10	0	1
84			min	23.695	15	0	1	-21.695	4	0	1	-.006	4	0	1
85		5	max	316.252	1	0	1	-.118	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	23.714	15	0	1	-21.751	4	0	1	-.008	4	0	1
87		6	max	316.316	1	0	1	-.118	10	0	1	0	10	0	1
88			min	23.734	15	0	1	-21.807	4	0	1	-.01	4	0	1
89		7	max	316.381	1	0	1	-.118	10	0	1	0	10	0	1
90			min	23.753	15	0	1	-21.864	4	0	1	-.012	4	0	1
91		8	max	316.446	1	0	1	-.118	10	0	1	0	10	0	1
92			min	23.773	15	0	1	-21.92	4	0	1	-.014	4	0	1
93		9	max	316.511	1	0	1	-.118	10	0	1	0	10	0	1
94			min	23.792	15	0	1	-21.976	4	0	1	-.016	4	0	1
95		10	max	316.575	1	0	1	-.118	10	0	1	0	10	0	1
96			min	23.812	15	0	1	-22.032	4	0	1	-.018	4	0	1
97		11	max	316.64	1	0	1	-.118	10	0	1	0	10	0	1
98			min	23.831	15	0	1	-22.088	4	0	1	-.019	4	0	1
99		12	max	316.705	1	0	1	-.118	10	0	1	0	10	0	1
100			min	23.851	15	0	1	-22.144	4	0	1	-.021	4	0	1
101		13	max	316.769	1	0	1	-.118	10	0	1	0	10	0	1
102			min	23.87	15	0	1	-22.2	4	0	1	-.023	4	0	1
103		14	max	316.834	1	0	1	-.118	10	0	1	0	10	0	1
104			min	23.89	15	0	1	-22.256	4	0	1	-.025	4	0	1
105		15	max	316.899	1	0	1	-.118	10	0	1	0	10	0	1
106			min	23.909	15	0	1	-22.312	4	0	1	-.027	4	0	1
107		16	max	316.964	1	0	1	-.118	10	0	1	0	10	0	1
108			min	23.929	15	0	1	-22.368	4	0	1	-.029	4	0	1
109		17	max	317.028	1	0	1	-.118	10	0	1	0	10	0	1
110			min	23.948	15	0	1	-22.424	4	0	1	-.031	4	0	1
111		18	max	317.093	1	0	1	-.118	10	0	1	0	10	0	1
112			min	23.968	15	0	1	-22.48	4	0	1	-.033	4	0	1
113		19	max	317.158	1	0	1	-.118	10	0	1	0	10	0	1
114			min	23.987	15	0	1	-22.536	4	0	1	-.035	4	0	1
115	M6	1	max	692.789	1	.662	6	1.168	4	0	3	0	3	0	1
116			min	-1148.578	3	.147	15	-.194	3	0	5	0	9	0	1
117		2	max	692.924	1	.604	6	1.045	4	0	3	0	4	0	15
118			min	-1148.477	3	.133	15	-.194	3	0	5	0	9	0	6
119		3	max	693.059	1	.547	6	.921	4	0	3	0	4	0	15
120			min	-1148.376	3	.12	15	-.194	3	0	5	0	10	0	6
121		4	max	693.194	1	.489	6	.798	4	0	3	0	4	0	15
122			min	-1148.275	3	.106	15	-.194	3	0	5	0	10	0	6
123		5	max	693.329	1	.444	2	.675	4	0	3	0	4	0	15
124			min	-1148.174	3	.093	15	-.194	3	0	5	0	10	0	6
125		6	max	693.464	1	.399	2	.552	4	0	3	0	4	0	15
126			min	-1148.073	3	.075	12	-.194	3	0	5	0	10	0	6
127		7	max	693.599	1	.354	2	.429	4	0	3	.001	4	0	15
128			min	-1147.971	3	.053	12	-.194	3	0	5	0	10	0	6
129		8	max	693.733	1	.31	2	.306	4	0	3	.001	4	0	15
130			min	-1147.87	3	.03	12	-.194	3	0	5	0	3	0	2
131		9	max	693.868	1	.265	2	.182	4	0	3	.001	4	0	15
132			min	-1147.769	3	.004	3	-.194	3	0	5	0	3	0	2
133		10	max	694.003	1	.22	2	.063	14	0	3	.001	4	0	15
134			min	-1147.668	3	-.029	3	-.194	3	0	5	0	3	0	2
135		11	max	694.138	1	.175	2	.061	1	0	3	.001	4	0	12
136			min	-1147.567	3	-.063	3	-.194	3	0	5	0	3	0	2
137		12	max	694.273	1	.13	2	.061	1	0	3	.001	4	0	12
138			min	-1147.466	3	-.096	3	-.209	5	0	5	0	3	0	2
139		13	max	694.408	1	.086	2	.061	1	0	3	.001	4	0	12
140			min	-1147.365	3	-.13	3	-.332	5	0	5	0	3	0	2
141		14	max	694.543	1	.041	2	.061	1	0	3	.001	4	0	12
142			min	-1147.263	3	-.164	3	-.455	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	694.678	1	-.004	2	.061	1	0	3	0	4	0	12
144			min	-1147.162	3	-.197	3	-.578	5	0	5	0	3	0	2
145		16	max	694.812	1	-.049	2	.061	1	0	3	0	4	0	12
146			min	-1147.061	3	-.231	3	-.701	5	0	5	0	3	0	2
147		17	max	694.947	1	-.07	15	.061	1	0	3	0	4	0	3
148			min	-1146.96	3	-.264	3	-.824	5	0	5	0	3	0	2
149		18	max	695.082	1	-.083	15	.061	1	0	3	0	4	0	3
150			min	-1146.859	3	-.316	4	-.948	5	0	5	0	3	0	2
151		19	max	695.217	1	-.097	15	.061	1	0	3	0	4	0	3
152			min	-1146.758	3	-.374	4	-1.071	5	0	5	0	3	0	2
153	M7	1	max	763.581	2	1.757	4	.042	3	0	1	0	4	0	2
154			min	-661.362	3	.421	15	-1.311	4	0	3	0	3	0	3
155		2	max	763.511	2	1.58	4	.042	3	0	1	0	4	0	2
156			min	-661.414	3	.379	15	-1.178	4	0	3	0	3	0	3
157		3	max	763.441	2	1.404	4	.042	3	0	1	0	2	0	2
158			min	-661.467	3	.338	15	-1.044	4	0	3	0	3	0	3
159		4	max	763.371	2	1.228	4	.042	3	0	1	0	1	0	2
160			min	-661.519	3	.296	15	-.91	4	0	3	0	3	0	3
161		5	max	763.301	2	1.051	4	.042	3	0	1	0	1	0	15
162			min	-661.572	3	.255	15	-.777	4	0	3	0	5	0	3
163		6	max	763.231	2	.875	4	.042	3	0	1	0	1	0	15
164			min	-661.624	3	.213	15	-.643	4	0	3	0	5	0	3
165		7	max	763.161	2	.699	4	.042	3	0	1	0	1	0	15
166			min	-661.677	3	.172	15	-.509	4	0	3	0	5	0	6
167		8	max	763.091	2	.522	4	.042	3	0	1	0	1	0	15
168			min	-661.729	3	.122	12	-.376	4	0	3	0	5	-.001	6
169		9	max	763.021	2	.346	4	.042	3	0	1	0	1	0	15
170			min	-661.782	3	.054	12	-.242	4	0	3	0	5	-.001	6
171		10	max	762.951	2	.208	2	.042	3	0	1	0	1	0	15
172			min	-661.834	3	-.03	3	-.108	4	0	3	0	5	-.001	6
173		11	max	762.881	2	.071	2	.042	3	0	1	0	1	0	15
174			min	-661.887	3	-.133	3	-.017	2	0	3	0	5	-.001	6
175		12	max	762.811	2	-.036	15	.159	5	0	1	0	1	0	15
176			min	-661.939	3	-.236	3	-.017	2	0	3	0	5	-.001	6
177		13	max	762.741	2	-.077	15	.293	5	0	1	0	1	0	15
178			min	-661.992	3	-.36	6	-.017	2	0	3	0	5	-.001	6
179		14	max	762.671	2	-.118	15	.427	5	0	1	0	1	0	15
180			min	-662.044	3	-.537	6	-.017	2	0	3	0	5	-.001	6
181		15	max	762.601	2	-.16	15	.56	5	0	1	0	1	0	15
182			min	-662.097	3	-.713	6	-.017	2	0	3	0	5	0	6
183		16	max	762.531	2	-.201	15	.694	5	0	1	0	1	0	15
184			min	-662.149	3	-.89	6	-.017	2	0	3	0	5	0	6
185		17	max	762.461	2	-.243	15	.828	5	0	1	0	1	0	15
186			min	-662.202	3	-1.066	6	-.017	2	0	3	0	5	0	6
187		18	max	762.391	2	-.284	15	.961	5	0	1	0	1	0	15
188			min	-662.254	3	-1.242	6	-.017	2	0	3	0	5	0	6
189		19	max	762.321	2	-.326	15	1.095	5	0	1	0	1	0	1
190			min	-662.307	3	-1.419	6	-.017	2	0	3	0	3	0	1
191	M8	1	max	815.203	1	0	1	.549	1	0	1	0	4	0	1
192			min	26.624	15	0	1	-21.724	4	0	1	0	1	0	1
193		2	max	815.268	1	0	1	.549	1	0	1	0	1	0	1
194			min	26.644	15	0	1	-21.78	4	0	1	-.002	4	0	1
195		3	max	815.332	1	0	1	.549	1	0	1	0	1	0	1
196			min	26.663	15	0	1	-21.836	4	0	1	-.004	4	0	1
197		4	max	815.397	1	0	1	.549	1	0	1	0	1	0	1
198			min	26.683	15	0	1	-21.892	4	0	1	-.006	4	0	1
199		5	max	815.462	1	0	1	.549	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	26.702	15	0	1	-21.948	4	0	1	-.008	4	0	1
201		6	max	815.526	1	0	1	.549	1	0	1	0	1	0	1
202			min	26.722	15	0	1	-22.004	4	0	1	-.01	4	0	1
203		7	max	815.591	1	0	1	.549	1	0	1	0	1	0	1
204			min	26.741	15	0	1	-22.06	4	0	1	-.012	4	0	1
205		8	max	815.656	1	0	1	.549	1	0	1	0	1	0	1
206			min	26.761	15	0	1	-22.116	4	0	1	-.014	4	0	1
207		9	max	815.721	1	0	1	.549	1	0	1	0	1	0	1
208			min	26.78	15	0	1	-22.172	4	0	1	-.016	4	0	1
209		10	max	815.785	1	0	1	.549	1	0	1	0	1	0	1
210			min	26.8	15	0	1	-22.229	4	0	1	-.018	4	0	1
211		11	max	815.85	1	0	1	.549	1	0	1	0	1	0	1
212			min	26.819	15	0	1	-22.285	4	0	1	-.02	4	0	1
213		12	max	815.915	1	0	1	.549	1	0	1	0	1	0	1
214			min	26.839	15	0	1	-22.341	4	0	1	-.022	4	0	1
215		13	max	815.979	1	0	1	.549	1	0	1	0	1	0	1
216			min	26.858	15	0	1	-22.397	4	0	1	-.024	4	0	1
217		14	max	816.044	1	0	1	.549	1	0	1	0	1	0	1
218			min	26.878	15	0	1	-22.453	4	0	1	-.026	4	0	1
219		15	max	816.109	1	0	1	.549	1	0	1	0	1	0	1
220			min	26.897	15	0	1	-22.509	4	0	1	-.028	4	0	1
221		16	max	816.174	1	0	1	.549	1	0	1	0	1	0	1
222			min	26.917	15	0	1	-22.565	4	0	1	-.03	4	0	1
223		17	max	816.238	1	0	1	.549	1	0	1	0	1	0	1
224			min	26.936	15	0	1	-22.621	4	0	1	-.032	4	0	1
225		18	max	816.303	1	0	1	.549	1	0	1	0	1	0	1
226			min	26.956	15	0	1	-22.677	4	0	1	-.034	4	0	1
227		19	max	816.368	1	0	1	.549	1	0	1	0	1	0	1
228			min	26.975	15	0	1	-22.733	4	0	1	-.036	4	0	1
229	M10	1	max	221.881	1	.709	4	1.306	5	0	1	0	1	0	1
230			min	-321.661	3	.18	15	-.143	1	-.001	5	0	3	0	1
231		2	max	222.016	1	.651	4	1.183	5	0	1	0	1	0	15
232			min	-321.56	3	.167	15	-.143	1	-.001	5	0	3	0	4
233		3	max	222.151	1	.594	4	1.06	5	0	1	0	4	0	15
234			min	-321.459	3	.153	15	-.143	1	-.001	5	0	3	0	4
235		4	max	222.286	1	.537	4	.937	5	0	1	0	4	0	15
236			min	-321.358	3	.14	15	-.143	1	-.001	5	0	3	0	4
237		5	max	222.421	1	.479	4	.813	5	0	1	0	4	0	15
238			min	-321.257	3	.126	15	-.143	1	-.001	5	0	3	0	4
239		6	max	222.555	1	.422	4	.69	5	0	1	0	4	0	15
240			min	-321.156	3	.113	15	-.143	1	-.001	5	0	3	0	4
241		7	max	222.69	1	.364	4	.567	5	0	1	0	4	0	15
242			min	-321.055	3	.099	15	-.143	1	-.001	5	0	3	0	4
243		8	max	222.825	1	.307	4	.444	5	0	1	.001	4	0	15
244			min	-320.953	3	.086	15	-.143	1	-.001	5	0	3	0	4
245		9	max	222.96	1	.249	4	.321	5	0	1	.001	4	0	15
246			min	-320.852	3	.072	12	-.143	1	-.001	5	0	3	0	4
247		10	max	223.095	1	.192	4	.198	5	0	1	.001	4	0	15
248			min	-320.751	3	.049	12	-.143	1	-.001	5	0	3	0	4
249		11	max	223.23	1	.134	4	.074	5	0	1	.001	4	0	15
250			min	-320.65	3	.027	12	-.143	1	-.001	5	0	3	0	4
251		12	max	223.365	1	.077	4	.006	3	0	1	.001	4	0	15
252			min	-320.549	3	.005	12	-.143	1	-.001	5	0	3	0	4
253		13	max	223.499	1	.027	5	.006	3	0	1	.001	5	0	15
254			min	-320.448	3	-.028	3	-.196	4	-.001	5	0	3	0	4
255		14	max	223.634	1	.006	5	.006	3	0	1	.001	5	0	15
256			min	-320.346	3	-.061	3	-.32	4	-.001	5	0	3	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	223.769	1	-.009	15	.006	3	0	1	.001	5	0	15
258			min	-320.245	3	-.097	6	-.443	4	-.001	5	0	3	0	4
259		16	max	223.904	1	-.022	15	.006	3	0	1	0	5	0	15
260			min	-320.144	3	-.154	6	-.566	4	-.001	5	0	3	0	4
261		17	max	224.039	1	-.036	15	.006	3	0	1	0	5	0	12
262			min	-320.043	3	-.212	6	-.689	4	-.001	5	0	1	0	4
263		18	max	224.174	1	-.049	15	.006	3	0	1	0	5	0	12
264			min	-319.942	3	-.269	6	-.812	4	-.001	5	0	1	0	4
265		19	max	224.309	1	-.063	15	.006	3	0	1	0	5	0	12
266			min	-319.841	3	-.327	6	-.935	4	-.001	5	0	1	0	4
267	M11	1	max	219.268	2	1.721	6	.308	1	.001	4	0	5	0	2
268			min	-219.516	3	.398	15	-1.258	5	0	10	0	1	0	15
269		2	max	219.198	2	1.545	6	.308	1	.001	4	0	5	0	2
270			min	-219.568	3	.357	15	-1.125	5	0	10	0	1	0	3
271		3	max	219.128	2	1.368	6	.308	1	.001	4	0	3	0	2
272			min	-219.621	3	.315	15	-.991	5	0	10	0	1	0	3
273		4	max	219.058	2	1.192	6	.308	1	.001	4	0	3	0	15
274			min	-219.673	3	.274	15	-.857	5	0	10	0	1	0	4
275		5	max	218.988	2	1.016	6	.308	1	.001	4	0	3	0	15
276			min	-219.726	3	.232	15	-.724	5	0	10	0	1	0	4
277		6	max	218.918	2	.839	6	.308	1	.001	4	0	3	0	15
278			min	-219.778	3	.191	15	-.59	5	0	10	0	1	0	4
279		7	max	218.848	2	.663	6	.308	1	.001	4	0	3	0	15
280			min	-219.831	3	.149	15	-.456	5	0	10	0	1	-.001	4
281		8	max	218.778	2	.486	6	.308	1	.001	4	0	3	0	15
282			min	-219.883	3	.108	15	-.323	5	0	10	0	4	-.001	4
283		9	max	218.708	2	.31	6	.308	1	.001	4	0	3	0	15
284			min	-219.936	3	.066	15	-.189	5	0	10	0	4	-.001	4
285		10	max	218.638	2	.142	2	.308	1	.001	4	0	3	0	15
286			min	-219.988	3	.025	15	-.055	5	0	10	0	4	-.001	4
287		11	max	218.568	2	.005	2	.308	1	.001	4	0	3	0	15
288			min	-220.041	3	-.066	3	-.041	3	0	10	0	4	-.001	4
289		12	max	218.498	2	-.058	15	.308	1	.001	4	0	3	0	15
290			min	-220.093	3	-.22	4	-.041	3	0	10	0	4	-.001	4
291		13	max	218.428	2	-.1	15	.419	4	.001	4	0	3	0	15
292			min	-220.146	3	-.396	4	-.041	3	0	10	0	4	-.001	4
293		14	max	218.358	2	-.141	15	.552	4	.001	4	0	3	0	15
294			min	-220.198	3	-.572	4	-.041	3	0	10	0	4	-.001	4
295		15	max	218.288	2	-.182	15	.686	4	.001	4	0	3	0	15
296			min	-220.251	3	-.749	4	-.041	3	0	10	0	4	0	4
297		16	max	218.218	2	-.224	15	.82	4	.001	4	0	3	0	15
298			min	-220.303	3	-.925	4	-.041	3	0	10	0	5	0	4
299		17	max	218.148	2	-.265	15	.953	4	.001	4	0	3	0	15
300			min	-220.356	3	-1.101	4	-.041	3	0	10	0	10	0	4
301		18	max	218.078	2	-.307	15	1.087	4	.001	4	0	4	0	15
302			min	-220.408	3	-1.278	4	-.041	3	0	10	0	10	0	4
303		19	max	218.008	2	-.348	15	1.221	4	.001	4	0	4	0	1
304			min	-220.461	3	-1.454	4	-.041	3	0	10	0	10	0	1
305	M12	1	max	315.822	1	0	1	2.043	1	0	1	0	4	0	1
306			min	4.216	15	0	1	-19.921	5	0	1	0	3	0	1
307		2	max	315.887	1	0	1	2.043	1	0	1	0	1	0	1
308			min	4.235	15	0	1	-19.977	5	0	1	-.002	5	0	1
309		3	max	315.952	1	0	1	2.043	1	0	1	0	1	0	1
310			min	4.255	15	0	1	-20.033	5	0	1	-.004	5	0	1
311		4	max	316.016	1	0	1	2.043	1	0	1	0	1	0	1
312			min	4.275	15	0	1	-20.089	5	0	1	-.005	5	0	1
313		5	max	316.081	1	0	1	2.043	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	4.294	15	0	1	-20.146	5	0	1	-.007	5	0	1
315		6	max	316.146	1	0	1	2.043	1	0	1	0	1	0	1
316			min	4.314	15	0	1	-20.202	5	0	1	-.009	5	0	1
317		7	max	316.21	1	0	1	2.043	1	0	1	.001	1	0	1
318			min	4.333	15	0	1	-20.258	5	0	1	-.011	5	0	1
319		8	max	316.275	1	0	1	2.043	1	0	1	.001	1	0	1
320			min	4.353	15	0	1	-20.314	5	0	1	-.013	5	0	1
321		9	max	316.34	1	0	1	2.043	1	0	1	.001	1	0	1
322			min	4.372	15	0	1	-20.37	5	0	1	-.014	5	0	1
323		10	max	316.404	1	0	1	2.043	1	0	1	.002	1	0	1
324			min	4.392	15	0	1	-20.426	5	0	1	-.016	5	0	1
325		11	max	316.469	1	0	1	2.043	1	0	1	.002	1	0	1
326			min	4.411	15	0	1	-20.482	5	0	1	-.018	5	0	1
327		12	max	316.534	1	0	1	2.043	1	0	1	.002	1	0	1
328			min	4.431	15	0	1	-20.538	5	0	1	-.02	5	0	1
329		13	max	316.599	1	0	1	2.043	1	0	1	.002	1	0	1
330			min	4.45	15	0	1	-20.594	5	0	1	-.022	5	0	1
331		14	max	316.663	1	0	1	2.043	1	0	1	.002	1	0	1
332			min	4.47	15	0	1	-20.65	5	0	1	-.024	5	0	1
333		15	max	316.728	1	0	1	2.043	1	0	1	.003	1	0	1
334			min	4.489	15	0	1	-20.706	5	0	1	-.025	5	0	1
335		16	max	316.793	1	0	1	2.043	1	0	1	.003	1	0	1
336			min	4.509	15	0	1	-20.762	5	0	1	-.027	5	0	1
337		17	max	316.857	1	0	1	2.043	1	0	1	.003	1	0	1
338			min	4.528	15	0	1	-20.818	5	0	1	-.029	5	0	1
339		18	max	316.922	1	0	1	2.043	1	0	1	.003	1	0	1
340			min	4.548	15	0	1	-20.875	5	0	1	-.031	5	0	1
341		19	max	316.987	1	0	1	2.043	1	0	1	.003	1	0	1
342			min	4.567	15	0	1	-20.931	5	0	1	-.033	5	0	1
343	M1	1	max	110.844	1	345.146	3	-3.351	10	0	2	.079	1	.013	2
344			min	7.302	12	-232.706	2	-40.253	1	0	3	.007	10	-.015	3
345		2	max	111.004	1	344.975	3	-3.351	10	0	2	.07	1	.064	2
346			min	7.382	12	-232.934	2	-40.253	1	0	3	.006	10	-.09	3
347		3	max	117.574	3	5.48	14	-3.335	10	0	12	.061	1	.114	2
348			min	-19.038	10	-30.964	2	-40.162	1	0	1	.005	10	-.163	3
349		4	max	117.694	3	5.256	14	-3.335	10	0	12	.052	1	.12	2
350			min	-18.904	10	-31.192	2	-40.162	1	0	1	.004	10	-.161	3
351		5	max	117.814	3	5.031	14	-3.335	10	0	12	.044	1	.127	2
352			min	-18.771	10	-31.421	2	-40.162	1	0	1	.004	10	-.159	3
353		6	max	117.934	3	4.806	14	-3.335	10	0	12	.035	1	.134	2
354			min	-18.637	10	-31.65	2	-40.162	1	0	1	.003	10	-.157	3
355		7	max	118.054	3	4.581	14	-3.335	10	0	12	.026	1	.141	2
356			min	-18.504	10	-31.878	2	-40.162	1	0	1	.002	10	-.154	3
357		8	max	118.174	3	4.378	9	-3.335	10	0	12	.018	1	.148	2
358			min	-18.37	10	-32.107	2	-40.162	1	0	1	.001	10	-.152	3
359		9	max	118.294	3	4.187	9	-3.335	10	0	12	.009	1	.155	2
360			min	-18.237	10	-32.336	2	-40.162	1	0	1	0	10	-.15	3
361		10	max	118.414	3	3.996	9	-3.335	10	0	12	.002	3	.162	2
362			min	-18.103	10	-32.565	2	-40.162	1	0	1	0	10	-.148	3
363		11	max	118.535	3	3.806	9	-3.335	10	0	12	0	3	.169	2
364			min	-17.97	10	-32.793	2	-40.162	1	0	1	-.009	1	-.145	3
365		12	max	118.655	3	3.615	9	-3.335	10	0	12	0	12	.176	2
366			min	-17.836	10	-33.022	2	-40.162	1	0	1	-.017	1	-.143	3
367		13	max	118.775	3	3.425	9	-3.335	10	0	12	-.001	12	.183	2
368			min	-17.703	10	-33.251	2	-40.162	1	0	1	-.026	1	-.14	3
369		14	max	118.895	3	3.234	9	-3.335	10	0	12	-.002	12	.19	2
370			min	-17.569	10	-33.48	2	-40.162	1	0	1	-.035	1	-.138	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	119.015	3	3.043	9	-3.335	10	0	12	-.003	12	.198	2
372			min	-17.436	10	-33.708	2	-40.162	1	0	1	-.043	1	-.135	3
373		16	max	90.328	2	158.822	2	-3.357	10	0	1	-.004	12	.203	2
374			min	2.737	15	-206.515	3	-40.403	1	0	5	-.052	1	-.131	3
375		17	max	90.488	2	158.593	2	-3.357	10	0	1	-.004	12	.169	2
376			min	2.785	15	-206.687	3	-40.403	1	0	5	-.061	1	-.086	3
377		18	max	-5.76	12	350.356	2	-3.476	10	0	5	-.005	12	.094	2
378			min	-110.993	1	-170.138	3	-41.405	1	0	2	-.07	1	-.049	3
379		19	max	-5.68	12	350.128	2	-3.476	10	0	5	-.006	12	.018	2
380			min	-110.833	1	-170.31	3	-41.405	1	0	2	-.079	1	-.012	3
381	M5	1	max	257.092	1	1114.022	3	0	10	0	1	.038	4	.03	3
382			min	6.967	12	-745.122	2	-66.732	3	0	5	0	10	-.027	2
383		2	max	257.253	1	1113.85	3	0	10	0	1	.033	4	.135	2
384			min	7.047	12	-745.35	2	-66.732	3	0	5	-.005	3	-.211	3
385		3	max	352.801	3	5.255	9	7.318	3	0	3	.027	4	.294	2
386			min	-80.847	2	-99.877	2	-20.892	4	0	4	-.019	3	-.448	3
387		4	max	352.922	3	5.065	9	7.318	3	0	3	.023	4	.316	2
388			min	-80.687	2	-100.105	2	-20.65	4	0	4	-.017	3	-.441	3
389		5	max	353.042	3	4.874	9	7.318	3	0	3	.018	4	.338	2
390			min	-80.527	2	-100.334	2	-20.408	4	0	4	-.016	3	-.433	3
391		6	max	353.162	3	4.684	9	7.318	3	0	3	.014	4	.359	2
392			min	-80.367	2	-100.563	2	-20.166	4	0	4	-.014	3	-.426	3
393		7	max	353.282	3	4.493	9	7.318	3	0	3	.01	4	.381	2
394			min	-80.207	2	-100.792	2	-19.924	4	0	4	-.013	3	-.419	3
395		8	max	353.402	3	4.302	9	7.318	3	0	3	.005	4	.403	2
396			min	-80.047	2	-101.02	2	-19.682	4	0	4	-.011	3	-.411	3
397		9	max	353.522	3	4.112	9	7.318	3	0	3	.001	4	.425	2
398			min	-79.886	2	-101.249	2	-19.44	4	0	4	-.01	3	-.403	3
399		10	max	353.642	3	3.921	9	7.318	3	0	3	0	2	.447	2
400			min	-79.726	2	-101.478	2	-19.198	4	0	4	-.008	3	-.396	3
401		11	max	353.762	3	3.731	9	7.318	3	0	3	0	10	.469	2
402			min	-79.566	2	-101.707	2	-18.956	4	0	4	-.007	4	-.388	3
403		12	max	353.883	3	3.54	9	7.318	3	0	3	0	10	.491	2
404			min	-79.406	2	-101.935	2	-18.714	4	0	4	-.011	4	-.381	3
405		13	max	354.003	3	3.349	9	7.318	3	0	3	0	10	.513	2
406			min	-79.246	2	-102.164	2	-18.472	4	0	4	-.015	4	-.373	3
407		14	max	354.123	3	3.159	9	7.318	3	0	3	0	10	.535	2
408			min	-79.086	2	-102.393	2	-18.23	4	0	4	-.019	4	-.365	3
409		15	max	354.243	3	2.968	9	7.318	3	0	3	0	10	.558	2
410			min	-78.925	2	-102.622	2	-17.988	4	0	4	-.023	4	-.358	3
411		16	max	279.697	2	573.12	2	7.303	3	0	3	.001	3	.574	2
412			min	1.668	15	-621.672	3	-16.66	4	0	4	-.027	4	-.345	3
413		17	max	279.858	2	572.892	2	7.303	3	0	3	.003	3	.45	2
414			min	1.717	15	-621.844	3	-16.418	4	0	4	-.031	4	-.21	3
415		18	max	-9.427	12	1123.548	2	6.7	3	0	4	.004	3	.208	2
416			min	-257.267	1	-538.321	3	-37.319	5	0	1	-.039	4	-.093	3
417		19	max	-9.347	12	1123.319	2	6.7	3	0	4	.006	3	.024	3
418			min	-257.107	1	-538.493	3	-37.077	5	0	1	-.047	4	-.035	2
419	M9	1	max	110.457	1	345.091	3	159.441	4	0	3	-.002	15	.013	2
420			min	3.19	15	-232.705	2	3.351	10	0	2	-.078	1	-.015	3
421		2	max	110.617	1	344.919	3	159.683	4	0	3	.029	5	.064	2
422			min	3.238	15	-232.934	2	3.351	10	0	2	-.069	1	-.09	3
423		3	max	117.456	3	5.308	9	39.218	1	0	1	.06	5	.113	2
424			min	-18.563	10	-30.972	2	-25.808	5	0	5	-.06	1	-.163	3
425		4	max	117.577	3	5.118	9	39.218	1	0	1	.054	5	.12	2
426			min	-18.429	10	-31.201	2	-25.566	5	0	5	-.051	1	-.161	3
427		5	max	117.697	3	4.927	9	39.218	1	0	1	.049	5	.127	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-18.296	10	-31.43	2	-25.324	5	0	5	-.043	1	-.159	3
429		6	max	117.817	3	4.736	9	39.218	1	0	1	.043	5	.134	2
430			min	-18.162	10	-31.659	2	-25.082	5	0	5	-.034	1	-.157	3
431		7	max	117.937	3	4.546	9	39.218	1	0	1	.038	5	.141	2
432			min	-18.029	10	-31.887	2	-24.84	5	0	5	-.026	1	-.154	3
433		8	max	118.057	3	4.355	9	39.218	1	0	1	.032	5	.148	2
434			min	-17.895	10	-32.116	2	-24.598	5	0	5	-.017	1	-.152	3
435		9	max	118.177	3	4.165	9	39.218	1	0	1	.027	5	.155	2
436			min	-17.762	10	-32.345	2	-24.356	5	0	5	-.009	1	-.15	3
437		10	max	118.297	3	3.974	9	39.218	1	0	1	.022	4	.162	2
438			min	-17.628	10	-32.574	2	-24.114	5	0	5	0	1	-.148	3
439		11	max	118.417	3	3.783	9	39.218	1	0	1	.019	4	.169	2
440			min	-17.495	10	-32.802	2	-23.872	5	0	5	0	10	-.145	3
441		12	max	118.538	3	3.593	9	39.218	1	0	1	.017	1	.176	2
442			min	-17.361	10	-33.031	2	-23.63	5	0	5	.001	10	-.143	3
443		13	max	118.658	3	3.402	9	39.218	1	0	1	.025	1	.183	2
444			min	-17.228	10	-33.26	2	-23.388	5	0	5	.002	10	-.14	3
445		14	max	118.778	3	3.211	9	39.218	1	0	1	.034	1	.19	2
446			min	-17.095	10	-33.489	2	-23.146	5	0	5	0	15	-.138	3
447		15	max	118.898	3	3.021	9	39.218	1	0	1	.043	1	.198	2
448			min	-16.961	10	-33.717	2	-22.904	5	0	5	-.004	5	-.135	3
449		16	max	90.646	2	158.41	2	39.475	1	0	10	.051	1	.203	2
450			min	4.662	15	-207.062	3	-21.516	5	0	4	-.007	5	-.131	3
451		17	max	90.806	2	158.181	2	39.475	1	0	10	.06	1	.169	2
452			min	4.71	15	-207.234	3	-21.274	5	0	4	-.012	5	-.086	3
453		18	max	3.171	5	350.357	2	41.552	1	0	4	.069	1	.094	2
454			min	-110.614	1	-170.131	3	-40.92	5	0	3	-.021	5	-.049	3
455		19	max	3.246	5	350.128	2	41.552	1	0	4	.078	1	.018	2
456			min	-110.453	1	-170.302	3	-40.678	5	0	3	-.03	5	-.012	3
457	M13	1	max	159.444	4	232.544	2	-3.19	15	.013	2	.078	1	0	2
458			min	3.352	10	-345.102	3	-110.449	1	-.015	3	.002	15	0	3
459		2	max	153.393	4	165.375	2	-1.982	15	.013	2	.019	1	.18	3
460			min	3.352	10	-244.877	3	-83.871	1	-.015	3	0	10	-.122	2
461		3	max	147.342	4	98.207	2	-.774	15	.013	2	.008	3	.299	3
462			min	3.352	10	-144.652	3	-57.294	1	-.015	3	-.024	1	-.202	2
463		4	max	141.291	4	31.038	2	.564	5	.013	2	.004	3	.357	3
464			min	3.352	10	-44.428	3	-30.716	1	-.015	3	-.051	1	-.242	2
465		5	max	135.24	4	55.797	3	2.432	5	.013	2	.001	3	.354	3
466			min	3.352	10	-36.131	2	-4.139	1	-.015	3	-.062	1	-.24	2
467		6	max	129.189	4	156.022	3	22.438	1	.013	2	.002	5	.289	3
468			min	3.352	10	-103.299	2	-1.794	3	-.015	3	-.056	1	-.197	2
469		7	max	123.138	4	256.247	3	49.016	1	.013	2	.005	5	.163	3
470			min	3.352	10	-170.468	2	-.025	3	-.015	3	-.035	1	-.114	2
471		8	max	117.087	4	356.471	3	75.593	1	.013	2	.01	4	.013	1
472			min	3.352	10	-237.637	2	1.296	12	-.015	3	0	3	-.024	3
473		9	max	111.036	4	456.696	3	102.171	1	.013	2	.058	1	.177	2
474			min	3.352	10	-304.805	2	2.474	12	-.015	3	0	12	-.273	3
475		10	max	104.985	4	556.921	3	128.748	1	.013	2	.128	1	.383	2
476			min	3.352	10	-371.974	2	3.653	12	-.015	3	-.005	3	-.583	3
477		11	max	74.875	4	304.805	2	1.792	5	.015	3	.057	1	.177	2
478			min	3.352	10	-456.696	3	-101.783	1	-.013	2	-.015	5	-.273	3
479		12	max	68.824	4	237.637	2	3.66	5	.015	3	.004	2	.013	1
480			min	3.352	10	-356.471	3	-75.206	1	-.013	2	-.013	5	-.024	3
481		13	max	62.773	4	170.468	2	5.529	5	.015	3	-.003	10	.163	3
482			min	3.352	10	-256.247	3	-48.629	1	-.013	2	-.035	1	-.114	2
483		14	max	56.722	4	103.299	2	7.398	5	.015	3	-.004	15	.289	3
484			min	3.352	10	-156.022	3	-22.051	1	-.013	2	-.057	1	-.197	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	50.671	4	36.131	2	10.659	4	.015	3	0	15	.354	3
486			min	3.352	10	-55.797	3	-.754	10	-.013	2	-.062	1	-.24	2
487		16	max	44.62	4	44.428	3	31.104	1	.015	3	.005	5	.357	3
488			min	3.352	10	-31.038	2	2.584	10	-.013	2	-.051	1	-.242	2
489		17	max	40.359	1	144.652	3	57.681	1	.015	3	.012	5	.299	3
490			min	3.352	10	-98.207	2	4.945	12	-.013	2	-.024	1	-.202	2
491		18	max	40.359	1	244.877	3	84.258	1	.015	3	.026	4	.18	3
492			min	3.352	10	-165.375	2	6.124	12	-.013	2	0	10	-.122	2
493		19	max	40.359	1	345.102	3	110.836	1	.015	3	.079	1	0	2
494			min	3.352	10	-232.544	2	7.303	12	-.013	2	.007	10	0	3
495	M16	1	max	40.672	5	350.334	2	3.246	5	.012	3	.078	1	0	4
496			min	-41.442	1	-170.338	3	-110.462	1	-.018	2	-.03	5	0	3
497		2	max	34.621	5	248.916	2	5.115	5	.012	3	.019	1	.089	3
498			min	-41.442	1	-121.487	3	-83.884	1	-.018	2	-.027	5	-.183	2
499		3	max	28.57	5	147.498	2	6.983	5	.012	3	0	12	.148	3
500			min	-41.442	1	-72.637	3	-57.307	1	-.018	2	-.029	4	-.304	2
501		4	max	22.519	5	46.079	2	8.852	5	.012	3	-.003	12	.178	3
502			min	-41.442	1	-23.787	3	-30.73	1	-.018	2	-.051	1	-.363	2
503		5	max	16.468	5	25.064	3	10.721	5	.012	3	-.004	12	.178	3
504			min	-41.442	1	-55.339	2	-4.152	1	-.018	2	-.062	1	-.361	2
505		6	max	10.417	5	73.914	3	22.425	1	.012	3	-.004	15	.147	3
506			min	-41.442	1	-156.757	2	-.571	3	-.018	2	-.056	1	-.296	2
507		7	max	4.366	5	122.764	3	49.003	1	.012	3	.003	5	.087	3
508			min	-41.442	1	-258.176	2	.882	12	-.018	2	-.035	1	-.169	2
509		8	max	.788	3	171.615	3	75.58	1	.012	3	.013	4	.02	2
510			min	-41.442	1	-359.594	2	2.06	12	-.018	2	-.006	3	-.003	3
511		9	max	.788	3	220.465	3	102.157	1	.012	3	.058	1	.271	2
512			min	-41.442	1	-461.012	2	3.239	12	-.018	2	-.003	3	-.123	3
513		10	max	23.308	5	-9.563	15	128.735	1	.003	14	.128	1	.583	2
514			min	-41.442	1	-562.43	2	-7.325	3	-.018	2	.004	12	-.272	3
515		11	max	17.257	5	461.012	2	1.227	5	.018	2	.057	1	.271	2
516			min	-41.301	1	-220.465	3	-101.778	1	-.012	3	-.012	5	-.123	3
517		12	max	11.206	5	359.594	2	3.096	5	.018	2	.004	2	.02	2
518			min	-41.301	1	-171.615	3	-75.201	1	-.012	3	-.01	5	-.003	3
519		13	max	5.155	5	258.175	2	4.965	5	.018	2	-.002	12	.087	3
520			min	-41.301	1	-122.764	3	-48.624	1	-.012	3	-.035	1	-.169	2
521		14	max	-.528	15	156.757	2	6.834	5	.018	2	-.002	12	.147	3
522			min	-41.301	1	-73.914	3	-22.046	1	-.012	3	-.056	1	-.296	2
523		15	max	-3.475	10	55.339	2	10.07	4	.018	2	0	5	.178	3
524			min	-41.301	1	-25.064	3	-.735	10	-.012	3	-.062	1	-.361	2
525		16	max	-3.475	10	23.787	3	31.109	1	.018	2	.006	5	.178	3
526			min	-41.301	1	-46.079	2	2.143	12	-.012	3	-.051	1	-.363	2
527		17	max	-3.475	10	72.637	3	57.686	1	.018	2	.013	5	.148	3
528			min	-41.301	1	-147.498	2	3.322	12	-.012	3	-.024	1	-.304	2
529		18	max	-3.475	10	121.487	3	84.264	1	.018	2	.027	4	.089	3
530			min	-41.301	1	-248.916	2	4.5	12	-.012	3	0	10	-.183	2
531		19	max	-3.475	10	170.338	3	110.841	1	.018	2	.079	1	0	2
532			min	-41.301	1	-350.334	2	5.679	12	-.012	3	.006	12	0	5
533	M15	1	max	0	1	1.263	9	.073	3	0	9	0	9	0	1
534			min	-87.721	3	0	1	-.017	9	0	3	0	3	0	1
535		2	max	0	1	1.122	9	.073	3	0	9	0	9	0	1
536			min	-87.797	3	0	1	-.017	9	0	3	0	3	0	9
537		3	max	0	1	.982	9	.073	3	0	9	0	9	0	1
538			min	-87.873	3	0	1	-.017	9	0	3	0	3	0	9
539		4	max	0	1	.842	9	.073	3	0	9	0	9	0	1
540			min	-87.948	3	0	1	-.017	9	0	3	0	3	-.001	9
541		5	max	0	1	.701	9	.073	3	0	9	0	9	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-88.024	3	0	1	-.017	9	0	3	0	3	-.001	9
543		6	max	0	1	.561	9	.073	3	0	9	0	9	0	1
544			min	-88.099	3	0	1	-.017	9	0	3	0	3	-.002	9
545		7	max	0	1	.421	9	.073	3	0	9	0	3	0	1
546			min	-88.175	3	0	1	-.017	9	0	3	0	9	-.002	9
547		8	max	0	1	.281	9	.073	3	0	9	0	3	0	1
548			min	-88.25	3	0	1	-.017	9	0	3	0	9	-.002	9
549		9	max	0	1	.14	9	.073	3	0	9	0	3	0	1
550			min	-88.326	3	0	1	-.017	9	0	3	0	9	-.002	9
551		10	max	0	1	0	1	.073	3	0	9	0	3	0	1
552			min	-88.401	3	0	1	-.017	9	0	3	0	9	-.002	9
553		11	max	0	1	0	1	.073	3	0	9	0	3	0	1
554			min	-88.477	3	-.14	9	-.017	9	0	3	0	9	-.002	9
555		12	max	0	1	0	1	.073	3	0	9	0	3	0	1
556			min	-88.552	3	-.281	9	-.017	9	0	3	0	9	-.002	9
557		13	max	0	1	0	1	.073	3	0	9	0	3	0	1
558			min	-88.628	3	-.421	9	-.017	9	0	3	0	9	-.002	9
559		14	max	0	1	0	1	.073	3	0	9	0	3	0	1
560			min	-88.703	3	-.561	9	-.017	9	0	3	0	9	-.002	9
561		15	max	0	1	0	1	.073	3	0	9	0	3	0	1
562			min	-88.779	3	-.701	9	-.017	9	0	3	0	9	-.001	9
563		16	max	0	1	0	1	.073	3	0	9	0	3	0	1
564			min	-88.854	3	-.842	9	-.017	9	0	3	0	9	-.001	9
565		17	max	0	1	0	1	.073	3	0	9	0	3	0	1
566			min	-88.93	3	-.982	9	-.017	9	0	3	0	9	0	9
567		18	max	0	1	0	1	.073	3	0	9	0	3	0	1
568			min	-89.006	3	-1.122	9	-.017	9	0	3	0	9	0	9
569		19	max	0	1	0	1	.073	3	0	9	0	3	0	1
570			min	-89.081	3	-1.263	9	-.017	9	0	3	0	9	0	1
571	M16A	1	max	0	10	2.714	4	.332	4	0	3	0	3	0	1
572			min	-213.168	4	0	10	-.034	3	0	2	0	4	0	1
573		2	max	0	10	2.413	4	.298	4	0	3	0	3	0	10
574			min	-213.182	4	0	10	-.034	3	0	2	0	4	0	4
575		3	max	0	10	2.111	4	.265	4	0	3	0	3	0	10
576			min	-213.196	4	0	10	-.034	3	0	2	0	4	-.002	4
577		4	max	0	10	1.81	4	.231	4	0	3	0	3	0	10
578			min	-213.21	4	0	10	-.034	3	0	2	0	4	-.002	4
579		5	max	0	10	1.508	4	.197	4	0	3	0	3	0	10
580			min	-213.223	4	0	10	-.034	3	0	2	0	1	-.003	4
581		6	max	0	10	1.206	4	.163	4	0	3	0	3	0	10
582			min	-213.237	4	0	10	-.034	3	0	2	0	1	-.004	4
583		7	max	0	10	.905	4	.129	4	0	3	0	5	0	10
584			min	-213.251	4	0	10	-.034	3	0	2	0	1	-.004	4
585		8	max	0	10	.603	4	.096	4	0	3	0	5	0	10
586			min	-213.265	4	0	10	-.034	3	0	2	0	1	-.004	4
587		9	max	0	10	.302	4	.062	4	0	3	0	5	0	10
588			min	-213.279	4	0	10	-.034	3	0	2	0	1	-.004	4
589		10	max	0	10	0	1	.029	2	0	3	0	5	0	10
590			min	-213.292	4	0	1	-.034	3	0	2	0	1	-.004	4
591		11	max	0	10	0	10	.029	2	0	3	0	5	0	10
592			min	-213.306	4	-.302	4	-.034	3	0	2	0	1	-.004	4
593		12	max	.076	2	0	10	.029	2	0	3	0	5	0	10
594			min	-213.32	4	-.603	4	-.043	5	0	2	0	1	-.004	4
595		13	max	.177	2	0	10	.029	2	0	3	0	5	0	10
596			min	-213.334	4	-.905	4	-.076	5	0	2	0	3	-.004	4
597		14	max	.277	2	0	10	.029	2	0	3	0	5	0	10
598			min	-213.347	4	-1.206	4	-.11	5	0	2	0	3	-.004	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.378	2	0	10	.029	2	0	3	0	4	0	10
600			min	-213.361	4	-1.508	4	-.144	5	0	2	0	3	-.003	4
601		16	max	.479	2	0	10	.029	2	0	3	0	2	0	10
602			min	-213.375	4	-1.81	4	-.178	5	0	2	0	3	-.002	4
603		17	max	.579	2	0	10	.029	2	0	3	0	2	0	10
604			min	-213.389	4	-2.111	4	-.212	5	0	2	0	3	-.002	4
605		18	max	.68	2	0	10	.029	2	0	3	0	2	0	10
606			min	-213.402	4	-2.413	4	-.245	5	0	2	0	5	0	4
607		19	max	.781	2	0	10	.029	2	0	3	0	2	0	1
608			min	-213.416	4	-2.714	4	-.279	5	0	2	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.002	1	.012	2	.008	1	1.228e-3	5	NC	3	NC	2
2			min	-.004	3	-.012	3	-.013	5	-6.582e-4	1	3653.922	2	5345.344	1
3		2	max	.002	1	.011	2	.007	1	1.252e-3	5	NC	3	NC	2
4			min	-.004	3	-.011	3	-.013	5	-6.293e-4	1	3986.715	2	5741.029	1
5		3	max	.002	1	.01	2	.007	1	1.275e-3	5	NC	3	NC	2
6			min	-.003	3	-.011	3	-.013	5	-6.004e-4	1	4382.124	2	6209.563	1
7		4	max	.002	1	.009	2	.006	1	1.298e-3	5	NC	3	NC	2
8			min	-.003	3	-.01	3	-.012	5	-5.715e-4	1	4854.966	2	6768.102	1
9		5	max	.002	1	.008	2	.006	1	1.322e-3	5	NC	1	NC	2
10			min	-.003	3	-.01	3	-.012	5	-5.426e-4	1	5424.891	2	7439.558	1
11		6	max	.002	1	.007	2	.005	1	1.345e-3	5	NC	1	NC	2
12			min	-.003	3	-.009	3	-.012	5	-5.136e-4	1	6118.362	2	8255.06	1
13		7	max	.002	1	.006	2	.005	1	1.368e-3	5	NC	1	NC	2
14			min	-.003	3	-.009	3	-.011	5	-4.847e-4	1	6971.671	2	9257.763	1
15		8	max	.001	1	.005	2	.004	1	1.392e-3	5	NC	1	NC	1
16			min	-.002	3	-.008	3	-.011	5	-4.558e-4	1	8035.654	2	NC	1
17		9	max	.001	1	.005	2	.004	1	1.415e-3	5	NC	1	NC	1
18			min	-.002	3	-.008	3	-.01	5	-4.269e-4	1	9383.322	2	NC	1
19		10	max	.001	1	.004	2	.003	1	1.438e-3	5	NC	1	NC	1
20			min	-.002	3	-.007	3	-.009	5	-3.98e-4	1	NC	1	NC	1
21		11	max	.001	1	.003	2	.003	1	1.462e-3	5	NC	1	NC	1
22			min	-.002	3	-.006	3	-.009	5	-3.691e-4	1	NC	1	NC	1
23		12	max	0	1	.003	2	.002	1	1.485e-3	5	NC	1	NC	1
24			min	-.002	3	-.006	3	-.008	5	-3.402e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.002	1	1.508e-3	5	NC	1	NC	1
26			min	-.001	3	-.005	3	-.007	5	-3.113e-4	1	NC	1	NC	1
27		14	max	0	1	.002	2	.001	1	1.532e-3	5	NC	1	NC	1
28			min	-.001	3	-.004	3	-.006	5	-2.824e-4	1	NC	1	NC	1
29		15	max	0	1	.001	2	0	1	1.555e-3	5	NC	1	NC	1
30			min	0	3	-.003	3	-.005	5	-2.535e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.578e-3	5	NC	1	NC	1
32			min	0	3	-.003	3	-.004	5	-2.246e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.602e-3	5	NC	1	NC	1
34			min	0	3	-.002	3	-.003	5	-1.957e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.625e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-1.668e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.649e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.379e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	6.603e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-7.883e-4	5	NC	1	NC	1
41		2	max	0	3	0	2	.004	5	8.014e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-7.964e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.008	5	9.426e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	-8.045e-4	5	NC	1	NC	1
45		4	max	0	3	0	2	.012	5	1.084e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	0	1	-8.126e-4	5	NC	1	NC	1
47		5	max	0	3	0	2	.016	5	1.225e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	0	1	-8.206e-4	5	NC	1	NC	1
49		6	max	0	3	0	2	.02	5	1.366e-4	1	NC	1	NC	1
50			min	0	2	-.005	3	0	1	-8.287e-4	5	NC	1	NC	1
51		7	max	0	3	.001	2	.024	4	1.507e-4	1	NC	1	NC	1
52			min	0	2	-.006	3	0	1	-8.368e-4	5	NC	1	NC	1
53		8	max	0	3	.001	2	.028	4	1.648e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	-8.449e-4	5	NC	1	NC	1
55		9	max	.001	3	.002	2	.031	4	1.79e-4	1	NC	1	NC	1
56			min	-.001	2	-.007	3	0	9	-8.53e-4	5	NC	1	NC	1
57		10	max	.001	3	.002	2	.035	4	1.931e-4	1	NC	1	NC	1
58			min	-.001	2	-.008	3	0	10	-8.611e-4	5	NC	1	NC	1
59		11	max	.001	3	.003	2	.039	4	2.072e-4	1	NC	1	NC	1
60			min	-.001	2	-.008	3	0	10	-8.691e-4	5	NC	1	NC	1
61		12	max	.002	3	.004	2	.042	4	2.213e-4	1	NC	1	NC	1
62			min	-.002	2	-.009	3	0	10	-8.772e-4	5	NC	1	NC	1
63		13	max	.002	3	.004	2	.046	4	2.354e-4	1	NC	1	NC	1
64			min	-.002	2	-.009	3	0	10	-8.853e-4	5	NC	1	NC	1
65		14	max	.002	3	.005	2	.049	4	2.495e-4	1	NC	1	NC	1
66			min	-.002	2	-.009	3	0	10	-8.934e-4	5	8827.768	2	NC	1
67		15	max	.002	3	.006	2	.053	4	2.637e-4	1	NC	1	NC	1
68			min	-.002	2	-.009	3	0	10	-9.015e-4	5	7473.745	2	NC	1
69		16	max	.002	3	.007	2	.056	4	2.778e-4	1	NC	1	NC	1
70			min	-.002	2	-.01	3	0	10	-9.095e-4	5	6415.955	2	NC	1
71		17	max	.002	3	.008	2	.059	4	2.919e-4	1	NC	1	NC	1
72			min	-.002	2	-.01	3	0	10	-9.176e-4	5	5581.309	2	NC	1
73		18	max	.002	3	.009	2	.062	4	3.06e-4	1	NC	3	NC	1
74			min	-.002	2	-.01	3	0	10	-9.257e-4	5	4917.086	2	NC	1
75		19	max	.002	3	.011	2	.066	4	3.201e-4	1	NC	3	NC	1
76			min	-.002	2	-.01	3	0	10	-9.338e-4	5	4384.952	2	NC	1
77	M4	1	max	.002	1	.014	2	0	10	5.217e-3	5	NC	1	NC	2
78			min	0	15	-.012	3	-.069	4	-5.231e-4	1	NC	1	279.676	4
79		2	max	.001	1	.013	2	0	10	5.217e-3	5	NC	1	NC	2
80			min	0	15	-.011	3	-.063	4	-5.231e-4	1	NC	1	304.868	4
81		3	max	.001	1	.012	2	0	10	5.217e-3	5	NC	1	NC	2
82			min	0	15	-.011	3	-.058	4	-5.231e-4	1	NC	1	334.85	4
83		4	max	.001	1	.011	2	0	10	5.217e-3	5	NC	1	NC	2
84			min	0	15	-.01	3	-.052	4	-5.231e-4	1	NC	1	370.884	4
85		5	max	.001	1	.011	2	0	10	5.217e-3	5	NC	1	NC	2
86			min	0	15	-.009	3	-.047	4	-5.231e-4	1	NC	1	414.689	4
87		6	max	.001	1	.01	2	0	10	5.217e-3	5	NC	1	NC	1
88			min	0	15	-.009	3	-.041	4	-5.231e-4	1	NC	1	468.655	4
89		7	max	.001	1	.009	2	0	10	5.217e-3	5	NC	1	NC	1
90			min	0	15	-.008	3	-.036	4	-5.231e-4	1	NC	1	536.187	4
91		8	max	0	1	.008	2	0	10	5.217e-3	5	NC	1	NC	1
92			min	0	15	-.007	3	-.031	4	-5.231e-4	1	NC	1	622.267	4
93		9	max	0	1	.008	2	0	10	5.217e-3	5	NC	1	NC	1
94			min	0	15	-.007	3	-.026	4	-5.231e-4	1	NC	1	734.436	4
95		10	max	0	1	.007	2	0	10	5.217e-3	5	NC	1	NC	1
96			min	0	15	-.006	3	-.022	4	-5.231e-4	1	NC	1	884.543	4
97		11	max	0	1	.006	2	0	10	5.217e-3	5	NC	1	NC	1
98			min	0	15	-.005	3	-.018	4	-5.231e-4	1	NC	1	1092.104	4
99		12	max	0	1	.005	2	0	10	5.217e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	15	-.005	3	-.014	4	-5.231e-4	1	NC	1	1391.161	4
101		13	max	0	1	.005	2	0	10	5.217e-3	5	NC	1	NC	1
102			min	0	15	-.004	3	-.01	4	-5.231e-4	1	NC	1	1845.567	4
103		14	max	0	1	.004	2	0	10	5.217e-3	5	NC	1	NC	1
104			min	0	15	-.003	3	-.007	4	-5.231e-4	1	NC	1	2587.027	4
105		15	max	0	1	.003	2	0	10	5.217e-3	5	NC	1	NC	1
106			min	0	15	-.003	3	-.005	4	-5.231e-4	1	NC	1	3924.952	4
107		16	max	0	1	.002	2	0	10	5.217e-3	5	NC	1	NC	1
108			min	0	15	-.002	3	-.003	4	-5.231e-4	1	NC	1	6738.91	4
109		17	max	0	1	.002	2	0	10	5.217e-3	5	NC	1	NC	1
110			min	0	15	-.001	3	-.001	4	-5.231e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	5.217e-3	5	NC	1	NC	1
112			min	0	15	0	3	0	4	-5.231e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	5.217e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-5.231e-4	1	NC	1	NC	1
115	M6	1	max	.007	1	.034	2	.003	1	1.333e-3	4	NC	3	NC	1
116			min	-.012	3	-.033	3	-.013	5	-6.38e-7	1	1234.752	2	7657.329	3
117		2	max	.007	1	.032	2	.003	1	1.355e-3	4	NC	3	NC	1
118			min	-.011	3	-.031	3	-.013	5	-4.097e-6	1	1323.041	2	8104.268	3
119		3	max	.006	1	.03	2	.003	1	1.378e-3	4	NC	3	NC	1
120			min	-.011	3	-.03	3	-.013	5	-7.555e-6	1	1424.446	2	8637.841	3
121		4	max	.006	1	.028	2	.002	1	1.4e-3	4	NC	3	NC	1
122			min	-.01	3	-.028	3	-.013	5	-1.101e-5	1	1541.589	2	9275.999	3
123		5	max	.006	1	.025	2	.002	1	1.422e-3	4	NC	3	NC	1
124			min	-.009	3	-.026	3	-.012	5	-1.447e-5	1	1677.853	2	NC	1
125		6	max	.005	1	.023	2	.002	1	1.444e-3	4	NC	3	NC	1
126			min	-.009	3	-.024	3	-.012	5	-1.793e-5	1	1837.664	2	NC	1
127		7	max	.005	1	.021	2	.002	1	1.467e-3	4	NC	3	NC	1
128			min	-.008	3	-.023	3	-.012	5	-2.139e-5	1	2026.926	2	NC	1
129		8	max	.004	1	.019	2	.002	1	1.489e-3	4	NC	3	NC	1
130			min	-.007	3	-.021	3	-.011	5	-2.485e-5	1	2253.692	2	NC	1
131		9	max	.004	1	.017	2	.001	1	1.511e-3	4	NC	3	NC	1
132			min	-.007	3	-.019	3	-.011	5	-2.831e-5	1	2529.231	2	NC	1
133		10	max	.004	1	.015	2	.001	1	1.533e-3	4	NC	3	NC	1
134			min	-.006	3	-.017	3	-.01	5	-3.177e-5	1	2869.81	2	NC	1
135		11	max	.003	1	.013	2	0	1	1.556e-3	4	NC	3	NC	1
136			min	-.005	3	-.015	3	-.009	5	-3.523e-5	1	3299.819	2	NC	1
137		12	max	.003	1	.011	2	0	1	1.578e-3	4	NC	3	NC	1
138			min	-.005	3	-.013	3	-.008	5	-3.868e-5	1	3857.554	2	NC	1
139		13	max	.002	1	.009	2	0	1	1.6e-3	4	NC	3	NC	1
140			min	-.004	3	-.012	3	-.007	5	-4.214e-5	1	4606.803	2	NC	1
141		14	max	.002	1	.007	2	0	1	1.622e-3	4	NC	1	NC	1
142			min	-.003	3	-.01	3	-.006	5	-4.56e-5	1	5662.321	2	NC	1
143		15	max	.002	1	.006	2	0	1	1.644e-3	5	NC	1	NC	1
144			min	-.003	3	-.008	3	-.005	5	-4.906e-5	1	7253.518	2	NC	1
145		16	max	.001	1	.004	2	0	1	1.668e-3	5	NC	1	NC	1
146			min	-.002	3	-.006	3	-.004	5	-5.252e-5	1	9915.516	2	NC	1
147		17	max	0	1	.003	2	0	1	1.691e-3	5	NC	1	NC	1
148			min	-.001	3	-.004	3	-.003	5	-5.598e-5	1	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.714e-3	5	NC	1	NC	1
150			min	0	3	-.002	3	-.001	5	-5.944e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.737e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-6.29e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.989e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-8.304e-4	5	NC	1	NC	1
155		2	max	0	3	.001	2	.004	5	2.567e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-8.251e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.008	5	2.144e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-8.203e-4	4	NC	1	NC	1
159		4	max	.001	3	.004	2	.013	5	1.722e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-8.16e-4	4	NC	1	NC	1
161		5	max	.002	3	.005	2	.017	5	1.3e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	-8.117e-4	4	8545.612	2	NC	1
163		6	max	.002	3	.007	2	.021	5	2.391e-5	3	NC	1	NC	1
164			min	-.002	2	-.01	3	0	1	-8.074e-4	4	6842.696	2	NC	1
165		7	max	.003	3	.008	2	.025	5	4.582e-5	3	NC	1	NC	1
166			min	-.003	2	-.012	3	0	1	-8.031e-4	4	5679.074	2	NC	1
167		8	max	.003	3	.01	2	.029	5	6.773e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-7.988e-4	4	4826.842	2	NC	1
169		9	max	.003	3	.011	2	.033	5	8.964e-5	3	NC	3	NC	1
170			min	-.004	2	-.015	3	-.001	1	-7.945e-4	4	4172.403	2	NC	1
171		10	max	.004	3	.013	2	.036	5	1.115e-4	3	NC	3	NC	1
172			min	-.004	2	-.017	3	-.001	1	-7.903e-4	4	3652.757	2	NC	1
173		11	max	.004	3	.014	2	.04	5	1.335e-4	3	NC	3	NC	1
174			min	-.005	2	-.018	3	-.001	1	-7.86e-4	4	3230.053	2	NC	1
175		12	max	.005	3	.016	2	.044	5	1.554e-4	3	NC	3	NC	1
176			min	-.005	2	-.019	3	-.001	1	-7.817e-4	4	2880.056	2	NC	1
177		13	max	.005	3	.018	2	.047	5	1.773e-4	3	NC	3	NC	1
178			min	-.006	2	-.02	3	-.001	1	-7.774e-4	4	2586.412	2	NC	1
179		14	max	.005	3	.02	2	.051	5	1.992e-4	3	NC	3	NC	1
180			min	-.006	2	-.022	3	-.001	1	-7.731e-4	4	2337.593	2	NC	1
181		15	max	.006	3	.022	2	.054	5	2.211e-4	3	NC	3	NC	1
182			min	-.007	2	-.023	3	-.002	1	-7.688e-4	4	2125.17	2	NC	1
183		16	max	.006	3	.024	2	.057	4	2.43e-4	3	NC	3	NC	1
184			min	-.007	2	-.024	3	-.002	1	-7.645e-4	4	1942.791	2	NC	1
185		17	max	.007	3	.026	2	.06	4	2.649e-4	3	NC	3	NC	1
186			min	-.008	2	-.025	3	-.002	1	-7.602e-4	4	1785.551	2	NC	1
187		18	max	.007	3	.028	2	.063	4	2.868e-4	3	NC	3	NC	1
188			min	-.008	2	-.026	3	-.002	1	-7.559e-4	4	1649.587	2	NC	1
189		19	max	.008	3	.03	2	.067	4	3.087e-4	3	NC	3	NC	1
190			min	-.009	2	-.026	3	-.002	1	-7.516e-4	4	1531.818	2	NC	1
191	M8	1	max	.004	1	.04	2	.002	1	5.028e-3	4	NC	1	NC	1
192			min	0	15	-.033	3	-.07	4	-2.358e-4	3	NC	1	277.2	4
193		2	max	.004	1	.038	2	.002	1	5.028e-3	4	NC	1	NC	1
194			min	0	15	-.031	3	-.064	4	-2.358e-4	3	NC	1	302.168	4
195		3	max	.003	1	.035	2	.001	1	5.028e-3	4	NC	1	NC	1
196			min	0	15	-.029	3	-.058	4	-2.358e-4	3	NC	1	331.885	4
197		4	max	.003	1	.033	2	.001	1	5.028e-3	4	NC	1	NC	1
198			min	0	15	-.027	3	-.053	4	-2.358e-4	3	NC	1	367.6	4
199		5	max	.003	1	.031	2	.001	1	5.028e-3	4	NC	1	NC	1
200			min	0	15	-.025	3	-.047	4	-2.358e-4	3	NC	1	411.018	4
201		6	max	.003	1	.029	2	.001	1	5.028e-3	4	NC	1	NC	1
202			min	0	15	-.023	3	-.042	4	-2.358e-4	3	NC	1	464.507	4
203		7	max	.003	1	.027	2	0	1	5.028e-3	4	NC	1	NC	1
204			min	0	15	-.022	3	-.036	4	-2.358e-4	3	NC	1	531.442	4
205		8	max	.002	1	.024	2	0	1	5.028e-3	4	NC	1	NC	1
206			min	0	15	-.02	3	-.031	4	-2.358e-4	3	NC	1	616.762	4
207		9	max	.002	1	.022	2	0	1	5.028e-3	4	NC	1	NC	1
208			min	0	15	-.018	3	-.027	4	-2.358e-4	3	NC	1	727.939	4
209		10	max	.002	1	.02	2	0	1	5.028e-3	4	NC	1	NC	1
210			min	0	15	-.016	3	-.022	4	-2.358e-4	3	NC	1	876.72	4
211		11	max	.002	1	.018	2	0	1	5.028e-3	4	NC	1	NC	1
212			min	0	15	-.014	3	-.018	4	-2.358e-4	3	NC	1	1082.447	4
213		12	max	.002	1	.015	2	0	1	5.028e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	15	-.013	3	-.014	4	-2.358e-4	3	NC	1	1378.864	4
215		13	max	.001	1	.013	2	0	1	5.028e-3	4	NC	1	NC	1
216			min	0	15	-.011	3	-.011	4	-2.358e-4	3	NC	1	1829.258	4
217		14	max	.001	1	.011	2	0	1	5.028e-3	4	NC	1	NC	1
218			min	0	15	-.009	3	-.008	4	-2.358e-4	3	NC	1	2564.171	4
219		15	max	0	1	.009	2	0	1	5.028e-3	4	NC	1	NC	1
220			min	0	15	-.007	3	-.005	4	-2.358e-4	3	NC	1	3890.286	4
221		16	max	0	1	.007	2	0	1	5.028e-3	4	NC	1	NC	1
222			min	0	15	-.005	3	-.003	4	-2.358e-4	3	NC	1	6679.408	4
223		17	max	0	1	.004	2	0	1	5.028e-3	4	NC	1	NC	1
224			min	0	15	-.004	3	-.001	4	-2.358e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	5.028e-3	4	NC	1	NC	1
226			min	0	15	-.002	3	0	4	-2.358e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	5.028e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.358e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.012	2	0	3	6.484e-4	1	NC	3	NC	1
230			min	-.003	3	-.012	3	-.006	4	-4.865e-4	3	3657.447	2	NC	1
231		2	max	.002	1	.011	2	0	3	6.147e-4	1	NC	3	NC	1
232			min	-.003	3	-.011	3	-.007	4	-4.691e-4	3	3990.681	2	NC	1
233		3	max	.002	1	.01	2	0	3	5.81e-4	1	NC	3	NC	1
234			min	-.003	3	-.011	3	-.007	4	-4.518e-4	3	4386.636	2	NC	1
235		4	max	.002	1	.009	2	0	3	5.473e-4	1	NC	3	NC	1
236			min	-.003	3	-.01	3	-.007	4	-4.344e-4	3	4860.16	2	NC	1
237		5	max	.002	1	.008	2	0	3	5.296e-4	4	NC	1	NC	1
238			min	-.003	3	-.01	3	-.007	4	-4.171e-4	3	5430.947	2	NC	1
239		6	max	.002	1	.007	2	0	3	5.915e-4	4	NC	1	NC	1
240			min	-.002	3	-.009	3	-.007	4	-3.997e-4	3	6125.52	2	NC	1
241		7	max	.002	1	.006	2	0	3	6.533e-4	4	NC	1	NC	1
242			min	-.002	3	-.009	3	-.007	4	-3.823e-4	3	6980.256	2	NC	1
243		8	max	.001	1	.005	2	0	3	7.151e-4	4	NC	1	NC	1
244			min	-.002	3	-.008	3	-.007	4	-3.65e-4	3	8046.116	2	NC	1
245		9	max	.001	1	.005	2	0	3	7.769e-4	4	NC	1	NC	1
246			min	-.002	3	-.008	3	-.007	4	-3.476e-4	3	9396.301	2	NC	1
247		10	max	.001	1	.004	2	0	3	8.387e-4	4	NC	1	NC	1
248			min	-.002	3	-.007	3	-.007	4	-3.303e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	9.006e-4	4	NC	1	NC	1
250			min	-.001	3	-.006	3	-.006	4	-3.129e-4	3	NC	1	NC	1
251		12	max	0	1	.003	2	0	3	9.624e-4	4	NC	1	NC	1
252			min	-.001	3	-.006	3	-.006	4	-2.956e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	1.024e-3	4	NC	1	NC	1
254			min	-.001	3	-.005	3	-.005	4	-2.782e-4	3	NC	1	NC	1
255		14	max	0	1	.002	2	0	3	1.086e-3	4	NC	1	NC	1
256			min	0	3	-.004	3	-.005	4	-2.609e-4	3	NC	1	NC	1
257		15	max	0	1	.001	2	0	3	1.148e-3	4	NC	1	NC	1
258			min	0	3	-.003	3	-.004	4	-2.435e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.21e-3	4	NC	1	NC	1
260			min	0	3	-.003	3	-.003	4	-2.262e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.271e-3	4	NC	1	NC	1
262			min	0	3	-.002	3	-.002	4	-2.088e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.333e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-1.914e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.395e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.741e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	8.332e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-6.677e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.003	4	6.124e-5	3	NC	1	NC	1
270			min	0	2	-.001	3	0	3	-7.31e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.007	4	3.915e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-7.943e-4	4	NC	1	NC	1
273		4	max	0	3	0	2	.01	4	1.706e-5	3	NC	1	NC	1
274			min	0	2	-.003	3	-.001	3	-8.576e-4	4	NC	1	NC	1
275		5	max	0	3	0	2	.014	4	-3.568e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-9.209e-4	4	NC	1	NC	1
277		6	max	0	3	0	2	.017	5	-1.143e-5	10	NC	1	NC	1
278			min	0	2	-.005	3	-.002	3	-9.842e-4	4	NC	1	NC	1
279		7	max	0	3	.001	2	.02	5	-1.299e-5	10	NC	1	NC	1
280			min	0	2	-.006	3	-.002	3	-1.047e-3	4	NC	1	NC	1
281		8	max	0	3	.001	2	.024	5	-1.456e-5	10	NC	1	NC	1
282			min	0	2	-.006	3	-.002	3	-1.111e-3	4	NC	1	NC	1
283		9	max	.001	3	.002	2	.027	5	-1.613e-5	10	NC	1	NC	1
284			min	-.001	2	-.007	3	-.002	3	-1.174e-3	4	NC	1	NC	1
285		10	max	.001	3	.002	2	.03	5	-1.769e-5	10	NC	1	NC	1
286			min	-.001	2	-.008	3	-.002	3	-1.237e-3	4	NC	1	NC	1
287		11	max	.001	3	.003	2	.034	5	-1.926e-5	10	NC	1	NC	1
288			min	-.001	2	-.008	3	-.003	1	-1.301e-3	4	NC	1	NC	1
289		12	max	.002	3	.004	2	.037	5	-2.082e-5	10	NC	1	NC	1
290			min	-.002	2	-.009	3	-.003	1	-1.364e-3	4	NC	1	NC	1
291		13	max	.002	3	.004	2	.04	5	-2.239e-5	10	NC	1	NC	1
292			min	-.002	2	-.009	3	-.004	1	-1.427e-3	4	NC	1	NC	1
293		14	max	.002	3	.005	2	.043	5	-2.396e-5	10	NC	1	NC	1
294			min	-.002	2	-.009	3	-.005	1	-1.491e-3	4	8843.027	2	NC	1
295		15	max	.002	3	.006	2	.046	5	-2.552e-5	10	NC	1	NC	2
296			min	-.002	2	-.009	3	-.005	1	-1.554e-3	4	7485.529	2	8851.214	1
297		16	max	.002	3	.007	2	.049	5	-2.709e-5	10	NC	1	NC	2
298			min	-.002	2	-.01	3	-.006	1	-1.617e-3	4	6425.264	2	7900.567	1
299		17	max	.002	3	.008	2	.052	5	-2.865e-5	10	NC	1	NC	2
300			min	-.002	2	-.01	3	-.006	1	-1.68e-3	4	5588.826	2	7136.111	1
301		18	max	.002	3	.009	2	.055	5	-3.022e-5	10	NC	3	NC	2
302			min	-.002	2	-.01	3	-.007	1	-1.744e-3	4	4923.287	2	6514.167	1
303		19	max	.002	3	.01	2	.058	5	-3.179e-5	10	NC	3	NC	2
304			min	-.002	2	-.01	3	-.008	1	-1.807e-3	4	4390.176	2	6003.62	1
305	M12	1	max	.002	1	.014	2	.006	1	6.024e-3	4	NC	1	NC	2
306			min	0	15	-.012	3	-.064	5	3.89e-5	10	NC	1	301.887	5
307		2	max	.001	1	.013	2	.006	1	6.024e-3	4	NC	1	NC	2
308			min	0	15	-.011	3	-.059	5	3.89e-5	10	NC	1	329.072	5
309		3	max	.001	1	.012	2	.005	1	6.024e-3	4	NC	1	NC	2
310			min	0	15	-.011	3	-.053	5	3.89e-5	10	NC	1	361.426	5
311		4	max	.001	1	.011	2	.005	1	6.024e-3	4	NC	1	NC	2
312			min	0	15	-.01	3	-.048	5	3.89e-5	10	NC	1	400.31	5
313		5	max	.001	1	.011	2	.004	1	6.024e-3	4	NC	1	NC	2
314			min	0	15	-.009	3	-.043	5	3.89e-5	10	NC	1	447.579	5
315		6	max	.001	1	.01	2	.004	1	6.024e-3	4	NC	1	NC	2
316			min	0	15	-.009	3	-.038	5	3.89e-5	10	NC	1	505.812	5
317		7	max	.001	1	.009	2	.003	1	6.024e-3	4	NC	1	NC	2
318			min	0	15	-.008	3	-.033	5	3.89e-5	10	NC	1	578.681	5
319		8	max	0	1	.008	2	.003	1	6.024e-3	4	NC	1	NC	2
320			min	0	15	-.007	3	-.029	5	3.89e-5	10	NC	1	671.564	5
321		9	max	0	1	.008	2	.002	1	6.024e-3	4	NC	1	NC	2
322			min	0	15	-.007	3	-.024	5	3.89e-5	10	NC	1	792.595	5
323		10	max	0	1	.007	2	.002	1	6.024e-3	4	NC	1	NC	2
324			min	0	15	-.006	3	-.02	5	3.89e-5	10	NC	1	954.559	5
325		11	max	0	1	.006	2	.002	1	6.024e-3	4	NC	1	NC	1
326			min	0	15	-.005	3	-.016	5	3.89e-5	10	NC	1	1178.512	5
327		12	max	0	1	.005	2	.001	1	6.024e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	15	-.005	3	-.013	5	3.89e-5	10	NC	1	1501.181	5
329		13	max	0	1	.005	2	0	1	6.024e-3	4	NC	1	NC	1
330			min	0	15	-.004	3	-.01	5	3.89e-5	10	NC	1	1991.457	5
331		14	max	0	1	.004	2	0	1	6.024e-3	4	NC	1	NC	1
332			min	0	15	-.003	3	-.007	5	3.89e-5	10	NC	1	2791.432	5
333		15	max	0	1	.003	2	0	1	6.024e-3	4	NC	1	NC	1
334			min	0	15	-.003	3	-.005	5	3.89e-5	10	NC	1	4234.919	5
335		16	max	0	1	.002	2	0	1	6.024e-3	4	NC	1	NC	1
336			min	0	15	-.002	3	-.003	5	3.89e-5	10	NC	1	7270.842	5
337		17	max	0	1	.002	2	0	1	6.024e-3	4	NC	1	NC	1
338			min	0	15	-.001	3	-.001	5	3.89e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	6.024e-3	4	NC	1	NC	1
340			min	0	15	0	3	0	5	3.89e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	6.024e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	3.89e-5	10	NC	1	NC	1
343	M1	1	max	.01	3	.029	3	.008	5	5.577e-3	2	NC	1	NC	1
344			min	-.01	2	-.025	2	-.003	1	-7.978e-3	3	NC	1	NC	1
345		2	max	.01	3	.018	3	.01	5	2.704e-3	2	NC	4	NC	1
346			min	-.01	2	-.015	2	-.006	1	-3.945e-3	3	4532.425	2	NC	1
347		3	max	.01	3	.007	3	.013	5	4.497e-4	5	NC	4	NC	2
348			min	-.01	2	-.005	2	-.008	1	-4.067e-4	1	2332.835	2	8969.366	5
349		4	max	.01	3	.003	2	.016	5	4.628e-4	5	NC	4	NC	2
350			min	-.01	2	-.002	3	-.009	1	-3.522e-4	1	1632.434	2	5580.637	5
351		5	max	.01	3	.011	2	.02	5	4.758e-4	5	NC	4	NC	2
352			min	-.01	2	-.01	3	-.009	1	-2.977e-4	1	1293.81	2	3947.352	5
353		6	max	.01	3	.017	2	.023	5	4.888e-4	5	NC	4	NC	2
354			min	-.01	2	-.016	3	-.009	1	-2.432e-4	1	1100.977	2	3004.129	5
355		7	max	.01	3	.022	2	.027	5	5.019e-4	5	NC	4	NC	2
356			min	-.01	2	-.021	3	-.008	1	-1.887e-4	1	982.906	2	2399.397	5
357		8	max	.01	3	.026	2	.032	5	5.149e-4	5	NC	5	NC	1
358			min	-.01	2	-.024	3	-.006	1	-1.342e-4	1	910.015	2	1984.101	5
359		9	max	.01	3	.029	2	.036	5	5.28e-4	5	NC	5	NC	1
360			min	-.01	2	-.026	3	-.004	1	-7.967e-5	1	868.51	2	1684.687	5
361		10	max	.01	3	.03	2	.04	5	5.41e-4	5	NC	5	NC	1
362			min	-.01	2	-.027	3	-.003	1	-2.516e-5	1	852.105	2	1440.928	4
363		11	max	.01	3	.029	2	.044	4	5.636e-4	4	NC	5	NC	1
364			min	-.01	2	-.026	3	0	1	9.02e-6	10	859.104	2	1256.874	4
365		12	max	.01	3	.027	2	.049	4	5.901e-4	4	NC	4	NC	1
366			min	-.01	2	-.024	3	0	10	1.322e-5	10	891.802	2	1116.053	4
367		13	max	.01	3	.024	2	.054	4	6.165e-4	4	NC	4	NC	2
368			min	-.01	2	-.02	3	0	10	1.742e-5	10	957.734	2	1006.494	4
369		14	max	.01	3	.018	2	.058	4	6.429e-4	4	NC	4	NC	2
370			min	-.01	2	-.015	3	0	10	2.162e-5	10	1074.101	2	920.285	4
371		15	max	.01	3	.011	2	.062	4	6.693e-4	4	NC	4	NC	2
372			min	-.01	2	-.009	3	0	10	2.582e-5	10	1281.153	2	852.046	4
373		16	max	.01	3	.002	2	.066	4	9.457e-4	4	NC	4	NC	2
374			min	-.01	2	-.002	3	0	10	2.884e-5	10	1691.286	2	798.037	4
375		17	max	.01	3	.006	3	.069	4	7.17e-3	4	NC	4	NC	2
376			min	-.01	2	-.008	2	0	10	-1.063e-4	1	2453.569	3	755.682	4
377		18	max	.01	3	.016	3	.072	4	4.131e-3	4	NC	2	NC	1
378			min	-.01	2	-.021	2	0	10	-2.09e-3	3	4794.256	3	723.039	4
379		19	max	.01	3	.026	3	.074	4	8.28e-3	2	NC	1	NC	1
380			min	-.01	2	-.034	2	-.002	1	-4.275e-3	3	5256.823	2	699.648	4
381	M5	1	max	.028	3	.081	3	.008	5	1.377e-5	4	NC	1	NC	1
382			min	-.031	2	-.07	2	-.003	1	0	2	3539.221	3	NC	1
383		2	max	.028	3	.05	3	.01	5	2.254e-4	5	NC	4	NC	1
384			min	-.031	2	-.043	2	-.003	1	-5.089e-5	1	1690.11	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.028	3	.02	3	.013	5	4.338e-4	5	NC	5	NC	1
386			min	-.031	2	-.016	2	-.003	1	-1.009e-4	1	864.59	2	NC	1
387		4	max	.028	3	.007	2	.017	5	4.56e-4	5	NC	5	NC	1
388			min	-.031	2	-.004	3	-.003	1	-9.634e-5	1	603.166	2	NC	1
389		5	max	.028	3	.028	2	.021	5	4.782e-4	5	NC	5	NC	1
390			min	-.031	2	-.025	3	-.003	1	-9.175e-5	1	476.805	2	NC	1
391		6	max	.028	3	.045	2	.025	5	5.004e-4	5	NC	5	NC	1
392			min	-.031	2	-.042	3	-.003	1	-8.715e-5	1	404.794	2	9542.642	3
393		7	max	.028	3	.06	2	.029	5	5.226e-4	5	NC	5	NC	1
394			min	-.031	2	-.054	3	-.003	1	-8.255e-5	1	360.618	2	9059.483	3
395		8	max	.028	3	.07	2	.033	5	5.448e-4	5	NC	5	NC	1
396			min	-.031	2	-.063	3	-.003	1	-7.796e-5	1	333.234	2	8945.378	3
397		9	max	.028	3	.077	2	.038	5	5.67e-4	5	NC	5	NC	1
398			min	-.031	2	-.069	3	-.003	1	-7.336e-5	1	317.487	2	9129.169	3
399		10	max	.028	3	.08	2	.042	5	5.892e-4	5	NC	5	NC	1
400			min	-.031	2	-.07	3	-.002	1	-6.876e-5	1	311.02	2	9601.345	3
401		11	max	.027	3	.079	2	.047	5	6.114e-4	5	NC	5	NC	1
402			min	-.031	2	-.068	3	-.002	1	-6.417e-5	1	313.178	2	NC	1
403		12	max	.027	3	.074	2	.051	5	6.336e-4	5	NC	5	NC	1
404			min	-.031	2	-.062	3	-.002	1	-5.957e-5	1	324.788	2	NC	1
405		13	max	.027	3	.064	2	.056	5	6.558e-4	5	NC	5	NC	1
406			min	-.031	2	-.053	3	-.002	1	-5.497e-5	1	348.614	2	NC	1
407		14	max	.027	3	.049	2	.06	5	6.78e-4	5	NC	5	NC	1
408			min	-.031	2	-.04	3	-.002	1	-5.038e-5	1	391.019	2	NC	1
409		15	max	.027	3	.03	2	.063	5	7.002e-4	5	NC	5	NC	1
410			min	-.031	2	-.024	3	-.002	1	-4.578e-5	1	466.996	2	NC	1
411		16	max	.027	3	.005	2	.067	4	9.7e-4	5	NC	5	NC	1
412			min	-.031	2	-.005	3	-.002	1	-4.531e-5	1	618.923	2	NC	1
413		17	max	.027	3	.018	3	.07	4	7.15e-3	4	NC	5	NC	1
414			min	-.031	2	-.025	2	-.002	1	-1.431e-4	1	934.635	3	NC	1
415		18	max	.027	3	.042	3	.072	4	3.668e-3	4	NC	4	NC	1
416			min	-.031	2	-.059	2	-.002	1	-7.314e-5	1	1838.096	3	NC	1
417		19	max	.027	3	.068	3	.074	4	3.612e-6	5	NC	3	NC	1
418			min	-.031	2	-.096	2	-.002	1	-8.123e-7	3	1829.376	2	NC	1
419	M9	1	max	.01	3	.029	3	.007	5	7.988e-3	3	NC	1	NC	1
420			min	-.01	2	-.025	2	-.004	1	-5.577e-3	2	NC	1	NC	1
421		2	max	.01	3	.017	3	.006	5	3.915e-3	3	NC	4	NC	1
422			min	-.01	2	-.015	2	0	9	-2.718e-3	2	4534.784	2	NC	1
423		3	max	.01	3	.006	3	.006	4	1.886e-4	1	NC	4	NC	1
424			min	-.01	2	-.005	2	0	3	-8.219e-5	3	2334.089	2	NC	1
425		4	max	.01	3	.003	2	.008	4	1.427e-4	1	NC	4	NC	1
426			min	-.01	2	-.003	3	-.001	3	-8.449e-5	3	1633.326	2	NC	1
427		5	max	.01	3	.011	2	.009	4	9.683e-5	1	NC	4	NC	1
428			min	-.01	2	-.01	3	-.002	3	-8.679e-5	3	1294.509	2	NC	1
429		6	max	.01	3	.017	2	.012	4	5.094e-5	1	NC	4	NC	1
430			min	-.01	2	-.016	3	-.003	3	-8.909e-5	3	1101.557	2	7911.595	4
431		7	max	.01	3	.022	2	.015	4	5.017e-5	4	NC	4	NC	1
432			min	-.01	2	-.021	3	-.004	3	-9.139e-5	3	983.406	2	5285.176	4
433		8	max	.01	3	.026	2	.018	4	7.39e-5	5	NC	4	NC	1
434			min	-.01	2	-.024	3	-.004	3	-9.369e-5	3	910.459	2	3809.174	4
435		9	max	.01	3	.029	2	.022	5	9.964e-5	5	NC	5	NC	1
436			min	-.01	2	-.026	3	-.004	3	-9.599e-5	3	868.913	2	2896.602	4
437		10	max	.01	3	.03	2	.027	5	1.254e-4	5	NC	5	NC	1
438			min	-.01	2	-.027	3	-.005	3	-1.326e-4	1	852.477	2	2292.325	4
439		11	max	.01	3	.029	2	.032	5	1.511e-4	5	NC	5	NC	1
440			min	-.01	2	-.026	3	-.005	3	-1.785e-4	1	859.451	2	1871.027	4
441		12	max	.01	3	.027	2	.037	5	1.768e-4	5	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.01	2	-.024	3	-.006	1	-2.244e-4	1	892.127	2	1560.249	5
443		13	max	.01	3	.024	2	.042	5	2.026e-4	5	NC	4	NC	2
444			min	-.01	2	-.02	3	-.007	1	-2.702e-4	1	958.036	2	1323.176	5
445		14	max	.01	3	.018	2	.048	5	2.283e-4	5	NC	4	NC	2
446			min	-.01	2	-.015	3	-.008	1	-3.161e-4	1	1074.366	2	1145.855	5
447		15	max	.01	3	.011	2	.053	5	2.541e-4	5	NC	4	NC	2
448			min	-.01	2	-.009	3	-.008	1	-3.62e-4	1	1281.339	2	1009.975	5
449		16	max	.01	3	.002	2	.059	5	5.499e-4	5	NC	4	NC	2
450			min	-.01	2	-.002	3	-.008	1	-3.973e-4	1	1687.483	3	903.868	5
451		17	max	.01	3	.006	3	.064	5	7.282e-3	4	NC	4	NC	2
452			min	-.01	2	-.008	2	-.007	1	-1.795e-4	1	2443.348	3	819.706	5
453		18	max	.01	3	.016	3	.069	5	3.627e-3	5	NC	2	NC	1
454			min	-.01	2	-.021	2	-.004	1	-4.114e-3	2	4774.816	3	747.161	4
455		19	max	.01	3	.026	3	.074	4	4.273e-3	3	NC	1	NC	1
456			min	-.01	2	-.034	2	-.001	1	-8.28e-3	2	5270.056	2	685.992	4
457	M13	1	max	.004	1	.029	3	.01	3	4.412e-3	3	NC	1	NC	1
458			min	-.007	5	-.025	2	-.01	2	-3.954e-3	2	NC	1	NC	1
459		2	max	.004	1	.085	3	.01	9	5.232e-3	3	NC	4	NC	2
460			min	-.007	5	-.065	2	-.005	10	-4.679e-3	2	2332.428	3	8471.879	1
461		3	max	.004	1	.133	3	.029	1	6.053e-3	3	NC	4	NC	2
462			min	-.007	5	-.098	2	-.004	10	-5.404e-3	2	1270.935	3	3799.317	1
463		4	max	.004	1	.164	3	.044	1	6.874e-3	3	NC	5	NC	3
464			min	-.007	5	-.121	2	-.004	5	-6.128e-3	2	974.428	3	2652.387	1
465		5	max	.003	1	.177	3	.051	1	7.694e-3	3	NC	5	NC	3
466			min	-.007	5	-.131	2	-.005	5	-6.853e-3	2	889.921	3	2363.976	1
467		6	max	.003	1	.172	3	.046	1	8.515e-3	3	NC	5	NC	2
468			min	-.007	5	-.128	2	-.007	10	-7.578e-3	2	925.428	3	2585.604	1
469		7	max	.003	1	.151	3	.031	1	9.335e-3	3	NC	5	NC	2
470			min	-.007	5	-.116	2	-.01	10	-8.303e-3	2	1083.416	3	3625.524	1
471		8	max	.003	1	.122	3	.022	3	1.016e-2	3	NC	4	NC	2
472			min	-.007	5	-.097	2	-.017	2	-9.028e-3	2	1424.938	3	8346.171	1
473		9	max	.003	1	.094	3	.025	3	1.098e-2	3	NC	4	NC	1
474			min	-.008	5	-.079	2	-.027	2	-9.753e-3	2	2030.72	3	8199.451	2
475		10	max	.003	1	.081	3	.028	3	1.18e-2	3	NC	4	NC	1
476			min	-.008	5	-.07	2	-.031	2	-1.048e-2	2	2530.455	3	6473.521	2
477		11	max	.003	1	.094	3	.031	3	1.098e-2	3	NC	4	NC	1
478			min	-.008	5	-.079	2	-.027	2	-9.753e-3	2	2030.718	3	6385.685	3
479		12	max	.003	1	.122	3	.032	3	1.016e-2	3	NC	4	NC	2
480			min	-.008	5	-.097	2	-.017	2	-9.029e-3	2	1424.937	3	5978.394	3
481		13	max	.003	1	.151	3	.032	3	9.34e-3	3	NC	5	NC	2
482			min	-.008	5	-.116	2	-.01	10	-8.304e-3	2	1083.415	3	3609.027	1
483		14	max	.003	1	.172	3	.046	1	8.522e-3	3	NC	5	NC	2
484			min	-.008	5	-.128	2	-.007	10	-7.579e-3	2	925.427	3	2583.39	1
485		15	max	.003	1	.177	3	.05	1	7.703e-3	3	NC	5	NC	5
486			min	-.008	5	-.131	2	-.004	10	-6.854e-3	2	889.92	3	2368.108	1
487		16	max	.003	1	.165	3	.044	1	6.884e-3	3	NC	5	NC	3
488			min	-.008	5	-.121	2	-.004	10	-6.13e-3	2	974.427	3	2663.883	1
489		17	max	.003	1	.133	3	.029	1	6.065e-3	3	NC	4	NC	2
490			min	-.008	5	-.098	2	-.004	10	-5.405e-3	2	1270.934	3	3828.614	1
491		18	max	.003	1	.086	3	.014	3	5.246e-3	3	NC	4	NC	2
492			min	-.008	5	-.065	2	-.005	10	-4.68e-3	2	2332.426	3	8586.727	1
493		19	max	.003	1	.029	3	.01	3	4.428e-3	3	NC	1	NC	1
494			min	-.008	5	-.025	2	-.01	2	-3.956e-3	2	NC	1	NC	1
495	M16	1	max	.001	1	.026	3	.01	3	5.09e-3	2	NC	1	NC	1
496			min	-.074	4	-.034	2	-.01	2	-3.762e-3	3	NC	1	NC	1
497		2	max	.001	1	.056	3	.014	4	6.055e-3	2	NC	4	NC	2
498			min	-.074	4	-.093	2	-.005	10	-4.418e-3	3	2247.088	2	8474.18	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.001	1	.082	3	.029	1	7.02e-3	2	NC	4	NC	2
500			min	-.074	4	-.142	2	-.004	10	-5.073e-3	3	1222.091	2	3800.018	1
501		4	max	.001	1	.1	3	.044	1	7.985e-3	2	NC	5	NC	3
502			min	-.074	4	-.176	2	-.003	10	-5.728e-3	3	933.804	2	2652.813	1
503		5	max	.001	1	.108	3	.05	1	8.95e-3	2	NC	5	NC	10
504			min	-.074	4	-.19	2	-.004	10	-6.383e-3	3	848.163	2	2364.417	1
505		6	max	.002	1	.108	3	.046	1	9.915e-3	2	NC	5	NC	2
506			min	-.074	4	-.185	2	-.007	10	-7.039e-3	3	874.279	2	2586.371	1
507		7	max	.002	1	.099	3	.031	1	1.088e-2	2	NC	5	NC	2
508			min	-.074	4	-.165	2	-.01	10	-7.694e-3	3	1008.699	2	3627.874	1
509		8	max	.002	1	.087	3	.029	3	1.184e-2	2	NC	4	NC	2
510			min	-.074	4	-.136	2	-.017	2	-8.349e-3	3	1293.851	2	6726.222	3
511		9	max	.002	1	.074	3	.028	3	1.281e-2	2	NC	4	NC	1
512			min	-.074	4	-.109	2	-.026	2	-9.004e-3	3	1771.559	2	7090.714	3
513		10	max	.002	1	.068	3	.027	3	1.377e-2	2	NC	4	NC	1
514			min	-.074	4	-.096	2	-.031	2	-9.66e-3	3	2140.035	2	6534.006	2
515		11	max	.002	1	.074	3	.026	3	1.281e-2	2	NC	4	NC	1
516			min	-.074	4	-.109	2	-.026	2	-9.003e-3	3	1771.559	2	8298.638	2
517		12	max	.002	1	.086	3	.025	3	1.185e-2	2	NC	4	NC	2
518			min	-.074	4	-.136	2	-.017	2	-8.346e-3	3	1293.851	2	8297.402	1
519		13	max	.002	1	.099	3	.031	1	1.088e-2	2	NC	5	NC	2
520			min	-.074	4	-.165	2	-.01	10	-7.689e-3	3	1008.699	2	3623.595	1
521		14	max	.002	1	.108	3	.045	1	9.916e-3	2	NC	5	NC	2
522			min	-.074	4	-.185	2	-.007	10	-7.032e-3	3	874.279	2	2590.963	1
523		15	max	.002	1	.108	3	.05	1	8.951e-3	2	NC	5	NC	3
524			min	-.074	4	-.19	2	-.004	10	-6.375e-3	3	848.163	2	2374.142	1
525		16	max	.002	1	.1	3	.044	1	7.986e-3	2	NC	5	NC	3
526			min	-.074	4	-.176	2	-.004	5	-5.718e-3	3	933.804	2	2670.536	1
527		17	max	.002	1	.082	3	.029	1	7.022e-3	2	NC	4	NC	2
528			min	-.074	4	-.142	2	-.005	5	-5.061e-3	3	1222.091	2	3839.096	1
529		18	max	.002	1	.056	3	.012	3	6.057e-3	2	NC	4	NC	2
530			min	-.074	4	-.093	2	-.005	10	-4.404e-3	3	2247.088	2	8616.529	1
531		19	max	.002	1	.026	3	.01	3	5.092e-3	2	NC	1	NC	1
532			min	-.074	4	-.034	2	-.01	2	-3.747e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	4.247e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.672e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.007	4	8.706e-4	3	NC	1	NC	1
536			min	0	5	-.006	1	0	3	-6.83e-4	5	NC	1	NC	1
537		3	max	0	3	.001	5	.017	4	1.317e-3	3	NC	5	NC	1
538			min	-.001	5	-.012	1	-.003	3	-9.619e-4	2	6733.316	2	4716.491	4
539		4	max	0	3	.002	5	.027	4	1.763e-3	3	NC	5	NC	9
540			min	-.002	5	-.017	1	-.007	3	-1.403e-3	2	4619.448	2	2948.106	4
541		5	max	0	3	.002	5	.036	4	2.209e-3	3	NC	5	NC	9
542			min	-.003	5	-.022	1	-.012	3	-1.845e-3	2	3604.602	2	2161.472	4
543		6	max	0	3	.003	5	.045	4	2.655e-3	3	NC	5	NC	9
544			min	-.003	5	-.026	1	-.017	3	-2.287e-3	2	3033.654	2	1748.849	4
545		7	max	0	3	.003	5	.052	4	3.1e-3	3	NC	5	8545.943	9
546			min	-.004	5	-.029	1	-.023	3	-2.728e-3	2	2690.304	2	1518.893	4
547		8	max	0	3	.004	5	.056	4	3.546e-3	3	NC	5	7148.43	9
548			min	-.004	5	-.031	1	-.028	3	-3.17e-3	2	2484.242	2	1396.027	4
549		9	max	0	3	.004	5	.058	4	3.992e-3	3	NC	5	6224.088	9
550			min	-.005	5	-.033	1	-.033	3	-3.611e-3	2	2373.327	2	1347.963	4
551		10	max	0	3	.005	5	.058	4	4.438e-3	3	NC	5	5611.957	9
552			min	-.006	5	-.033	1	-.037	3	-4.053e-3	2	2338.239	2	1363.362	4
553		11	max	.001	3	.005	5	.055	4	4.884e-3	3	NC	5	5226.954	9
554			min	-.006	5	-.033	1	-.039	3	-4.494e-3	2	2373.327	2	1333.49	3
555		12	max	.001	3	.005	5	.049	4	5.33e-3	3	NC	5	5027.856	9

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.007	5	-.031	1	-.04	3	-4.936e-3	2	2484.242	2	1275.254	3
557		13	max	.001	3	.006	5	.041	4	5.776e-3	3	NC	5	5005.773	9
558			min	-.008	5	-.029	1	-.038	3	-5.378e-3	2	2690.304	2	1263.335	3
559		14	max	.001	3	.006	5	.032	4	6.222e-3	3	NC	5	5186.753	9
560			min	-.008	5	-.025	1	-.035	3	-5.819e-3	2	3033.654	2	1303.362	3
561		15	max	.001	3	.006	5	.023	4	6.668e-3	3	NC	5	6630.621	15
562			min	-.009	5	-.021	1	-.028	3	-6.261e-3	2	3604.602	2	1415.687	3
563		16	max	.002	3	.006	5	.016	1	7.114e-3	3	NC	5	NC	15
564			min	-.009	5	-.016	1	-.018	3	-6.702e-3	2	4619.448	2	1655.443	3
565		17	max	.002	3	.006	5	.006	4	7.56e-3	3	NC	5	NC	4
566			min	-.01	5	-.012	9	-.004	3	-7.144e-3	2	6733.316	2	2195.494	3
567		18	max	.002	3	.006	5	.014	3	8.006e-3	3	NC	1	NC	4
568			min	-.011	5	-.007	9	-.015	2	-7.585e-3	2	NC	1	3910.186	3
569		19	max	.002	3	.007	2	.036	3	8.452e-3	3	NC	1	NC	1
570			min	-.011	5	-.002	9	-.034	2	-8.027e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	.002	2	.012	3	2.923e-3	3	NC	1	NC	1
572			min	-.004	4	-.004	4	-.012	2	-2.828e-3	2	NC	1	NC	1
573		2	max	0	10	-.004	10	.003	3	2.804e-3	3	NC	1	NC	1
574			min	-.004	4	-.015	4	-.004	2	-2.698e-3	2	7386.321	4	9582.077	3
575		3	max	0	10	-.007	12	.007	1	2.685e-3	3	NC	12	NC	4
576			min	-.004	4	-.025	4	-.01	5	-2.568e-3	2	3758.647	4	5424.713	3
577		4	max	0	10	-.009	12	.011	1	2.566e-3	3	9238.896	12	NC	9
578			min	-.004	4	-.034	4	-.019	5	-2.438e-3	2	2578.651	4	4128.657	3
579		5	max	0	10	-.012	12	.014	1	2.447e-3	3	7209.204	12	NC	14
580			min	-.003	4	-.042	4	-.028	5	-2.307e-3	2	2012.148	4	2942.746	5
581		6	max	0	10	-.014	12	.016	1	2.328e-3	3	6067.307	12	8698.162	9
582			min	-.003	4	-.049	4	-.038	5	-2.177e-3	2	1693.435	4	2138.887	5
583		7	max	0	10	-.015	12	.017	1	2.209e-3	3	5380.607	12	8416.453	9
584			min	-.003	4	-.055	4	-.047	5	-2.047e-3	2	1501.771	4	1708.541	5
585		8	max	0	10	-.016	12	.017	1	2.09e-3	3	4968.484	12	8478.858	9
586			min	-.003	4	-.059	4	-.055	5	-1.917e-3	2	1386.744	4	1462.99	5
587		9	max	0	10	-.017	12	.016	1	1.972e-3	3	4746.654	12	8845.298	9
588			min	-.002	4	-.062	4	-.06	5	-1.786e-3	2	1324.83	4	1324.624	5
589		10	max	0	10	-.017	12	.015	1	1.853e-3	3	4676.478	12	9535.796	9
590			min	-.002	4	-.062	4	-.063	5	-1.656e-3	2	1305.243	4	1258.748	5
591		11	max	0	10	-.017	12	.013	1	1.734e-3	3	4746.654	12	NC	9
592			min	-.002	4	-.061	4	-.064	5	-1.526e-3	2	1324.83	4	1251.148	5
593		12	max	0	10	-.016	12	.011	1	1.615e-3	3	4968.484	12	NC	9
594			min	-.002	4	-.058	4	-.061	5	-1.395e-3	2	1386.744	4	1300.599	5
595		13	max	0	10	-.015	12	.008	1	1.496e-3	3	5380.607	12	NC	9
596			min	-.001	4	-.054	4	-.056	5	-1.265e-3	2	1501.771	4	1418.441	5
597		14	max	0	10	-.013	12	.006	1	1.377e-3	3	6067.307	12	NC	2
598			min	-.001	4	-.048	4	-.049	5	-1.135e-3	2	1693.435	4	1634.998	5
599		15	max	0	10	-.011	12	.004	1	1.258e-3	3	7209.204	12	NC	1
600			min	0	4	-.04	4	-.039	5	-1.005e-3	2	2012.148	4	2020.238	5
601		16	max	0	10	-.009	12	.002	1	1.139e-3	3	9238.896	12	NC	1
602			min	0	4	-.031	4	-.029	5	-8.743e-4	2	2578.651	4	2750.154	5
603		17	max	0	10	-.006	12	.001	9	1.02e-3	3	NC	12	NC	1
604			min	0	4	-.021	4	-.018	5	-7.44e-4	2	3758.647	4	4380.897	5
605		18	max	0	10	-.003	12	0	3	1.012e-3	4	NC	1	NC	1
606			min	0	4	-.011	4	-.008	5	-6.138e-4	2	7386.321	4	9807.535	5
607		19	max	0	1	0	1	0	1	1.084e-3	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.835e-4	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-05
Units: Imperial units

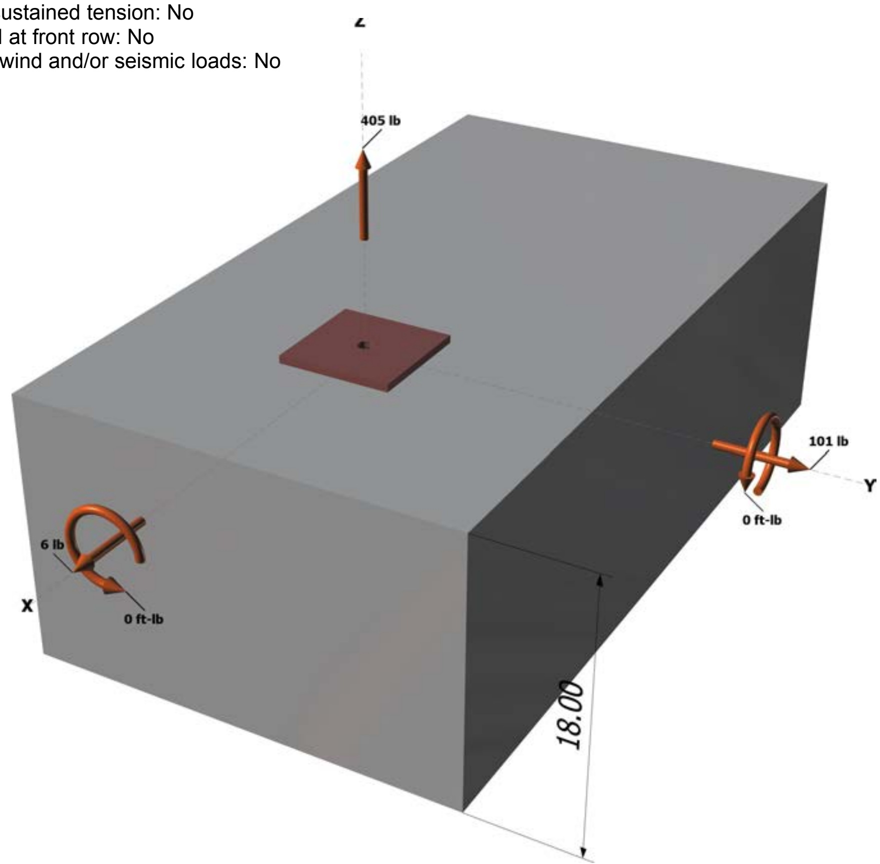
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

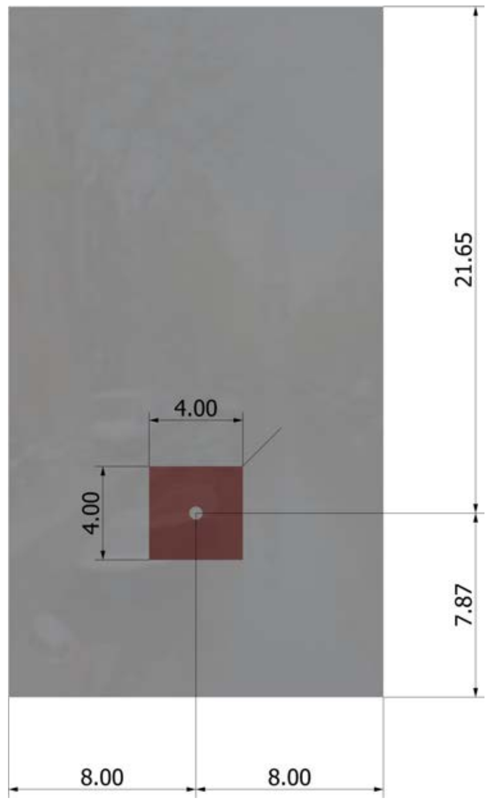
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Periodic
Temperature range, Short/Long: 110/75°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 4.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>



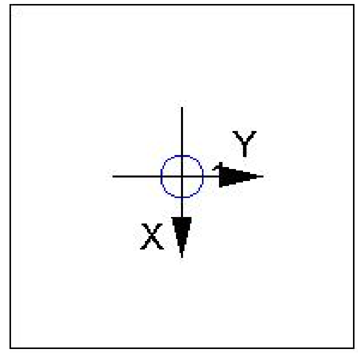
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-4)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

6. Adhesive Strength of Anchor in Tension (AC308 Sec. 3.3)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\tau_{k,cr}$ (psi)
1035	1.00	1.00	1035

$N_{a0} = \tau_{k,cr} \pi d_a h_{ef}$ (Eq. D-16f)

$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{a0} (lb)
1035	0.50	6.000	9755

$\phi N_a = \phi\,(A_{Na} / A_{Na0})\,\Psi_{ed,Na}\,\Psi_{p,Na} N_{a0}$ (Sec. D.4.1 & Eq. D-16a)

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

8. Steel Strength of Anchor in Shear (Sec. D.6.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4855	1.0	0.65	3156

9. Concrete Breakout Strength of Anchor in Shear (Sec. D.6.2)

Shear perpendicular to edge in y-direction:

$V_{by} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

Shear perpendicular to edge in x-direction:

$V_{bx} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	7.87	8282

$\phi V_{cbx} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

Shear parallel to edge in x-direction:

$V_{by} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

Shear parallel to edge in y-direction:

$V_{bx} = 7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	7.87	8282

$\phi V_{cby} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cp} = \phi\,\min|k_{cp}N_a\,;\,k_{cp}N_{cb}| = \phi\,\min|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{p,Na}N_{a0}\,;\,k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30a)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	109.66	109.66	1.000	1.000	9755	9755

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

11. Results

Interaction of Tensile and Shear Forces (Sec. D.7)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**101**	**3156**	**0.03**	**Pass (Governs)**
T Concrete breakout y+	101	4411	0.02	Pass
T Concrete breakout x+	6	3549	0.00	Pass
|| Concrete breakout y+	6	9838	0.00	Pass
|| Concrete breakout x+	101	7858	0.01	Pass
Concrete breakout, combined	-	-	0.02	Pass
Pryout	101	13657	0.01	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.08	0.00	7.5 %	1.0	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

SIMPSON Strong-Tie® Anchor Designer™ Software
Version 2.4.5673.0

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-05
Units: Imperial units

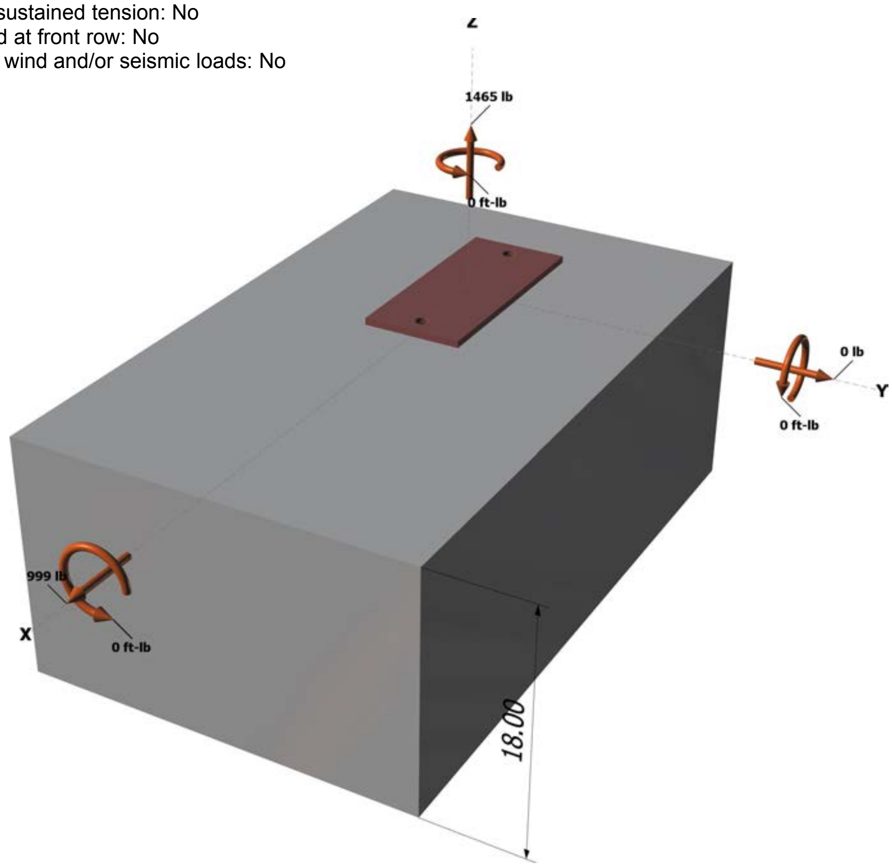
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

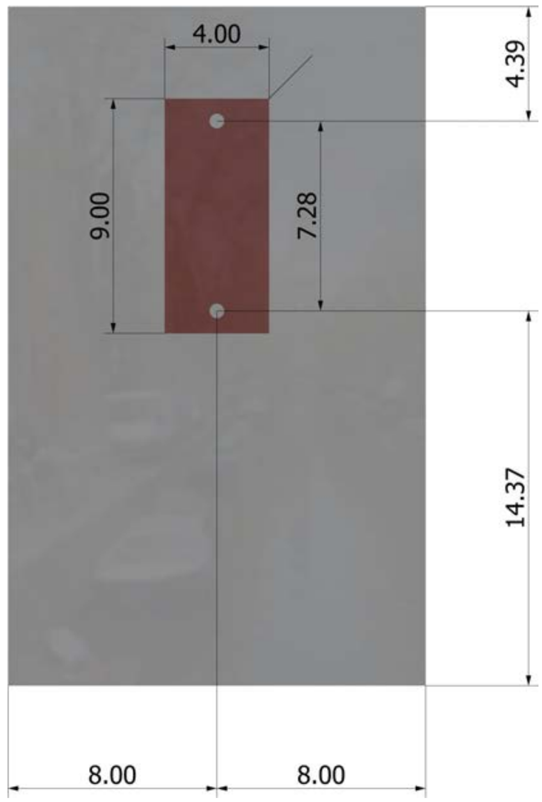
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Periodic
Temperature range, Short/Long: 110/75°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 9.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>



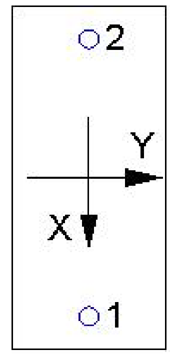
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

$\phi N_{cbg} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-5)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

6. Adhesive Strength of Anchor in Tension (AC308 Sec. 3.3)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\tau_{k,cr}$ (psi)
1035	1.00	1.00	1035

$N_{a0} = \tau_{k,cr} \pi d_a h_{ef}$ (Eq. D-16f)

$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{a0} (lb)
1035	0.50	6.000	9755

$\phi N_{ag} = \phi\,(A_{Na} / A_{Na0})\,\Psi_{ed,Na}\,\Psi_{g,Na}\,\Psi_{ec,Na}\,\Psi_{p,Na} N_{a0}$ (Sec. D.4.1 & Eq. D-16b)

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

8. Steel Strength of Anchor in Shear (Sec. D.6.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4855	1.0	0.65	3156

9. Concrete Breakout Strength of Anchor in Shear (Sec. D.6.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = 7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	12.00	15593

$\phi V_{cbx} = \phi\,(A_{Vc}/A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

Shear parallel to edge in x-direction:

$V_{by} = 7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda\sqrt{f'_c}c_{a1}^{1.5}$ (Eq. D-24)

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cbgx} = \phi\,(2)(A_{Vc}/A_{Vco})\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-22)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
284.04	288.00	1.000	1.000	1.000	1.000	8488	0.70	11720

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cpg} = \phi\min|k_{cp}N_{ag}\,;\,k_{cp}N_{cbg}| = \phi\min|k_{cp}(A_{Na}/A_{Na0})\Psi_{ed,Na}\Psi_{g,Na}\Psi_{ec,Na}\Psi_{p,Na}N_{a0}\,;\,k_{cp}(A_{Nc}/A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

11. Results

Interaction of Tensile and Shear Forces (Sec. D.7)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	500	3156	0.16	Pass
T Concrete breakout x+	**999**	**4043**	**0.25**	**Pass (Governs)**
|| Concrete breakout y-	**999**	**11720**	**0.09**	**Pass (Governs)**
Pryout	999	15580	0.06	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer’s product literature for hole cleaning and installation instructions.