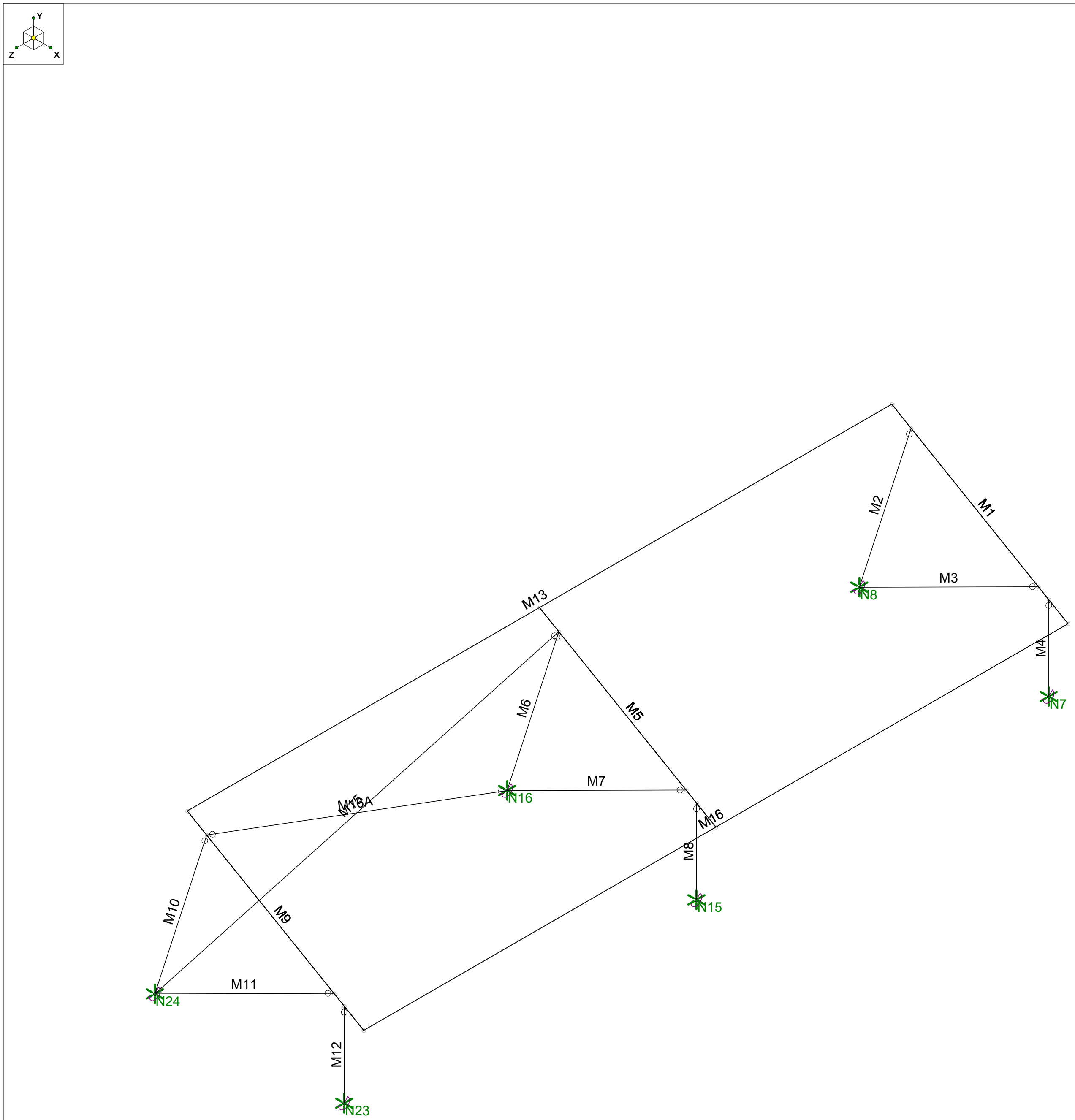


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

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.

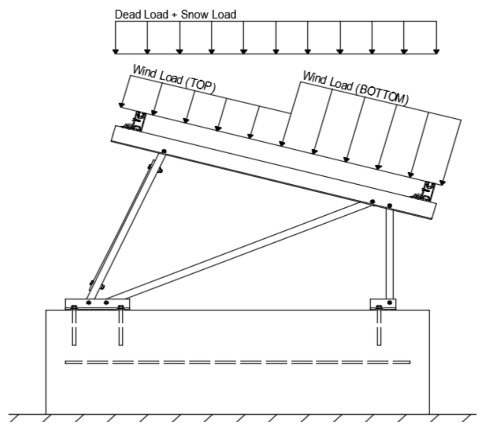
1.2 Construction

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 = 30°
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 = 16.49 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 85 mph — Exposure Category = C
Height ≤ 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 11.34 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.15	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.85	
$Cf-_{TOP}$	=	-2.3	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.1	

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 - N/A

S_S =	0.00	R =	1.25
S_{DS} =	0.00	C_S =	0
S_1 =	0.00	ρ =	1.3
S_{D1} =	0.00	Ω =	1.25
T_a =	0.00	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

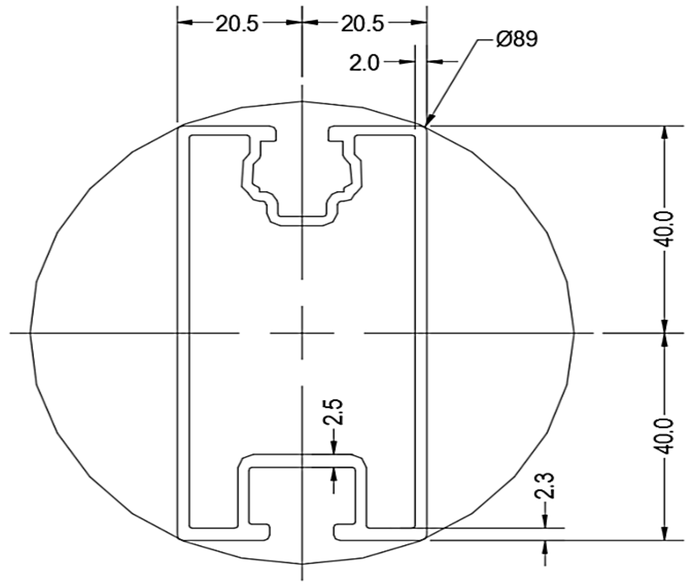
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

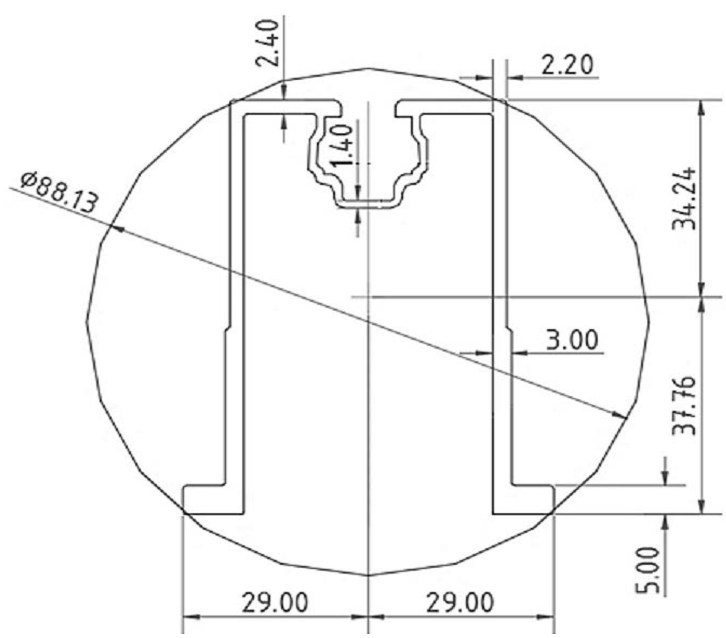
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	0.942	k-ft
M_z =	0.251	k-ft
$M_{y\ allowable}$ =	1.787	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	83%	



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).

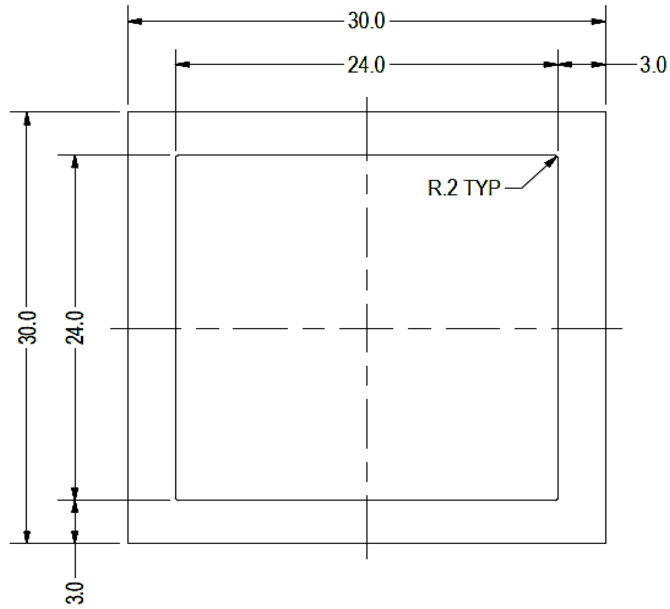
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.87	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.596	k-ft
M_z =	0.000	k-ft
P_n =	0.316	k
$M_{y\ allowable}$ =	1.466	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



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).

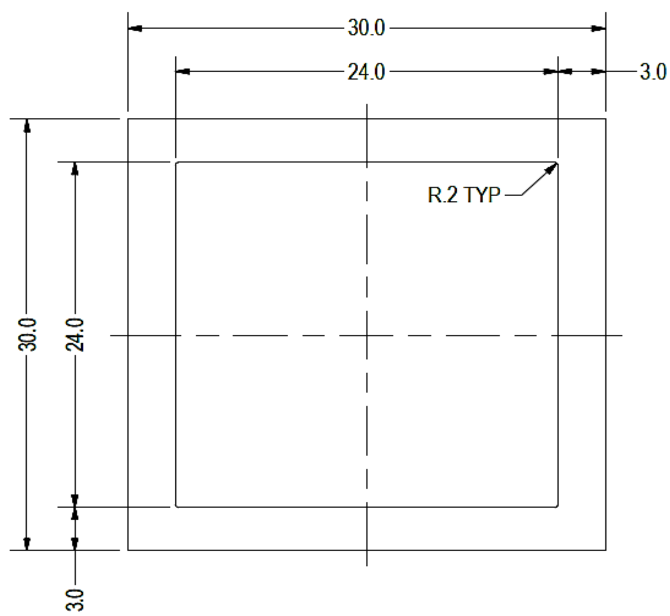
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.229	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).

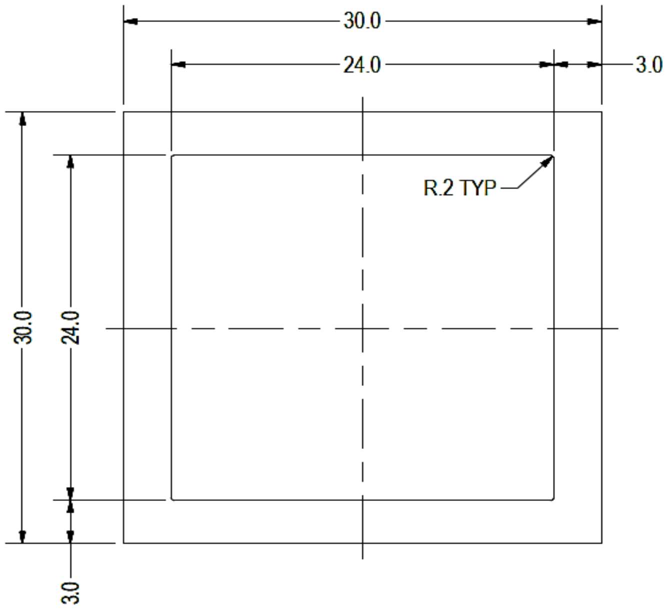
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.624	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	16%	



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).

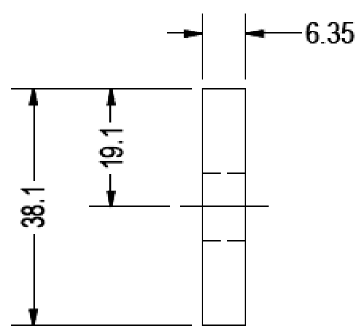
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.031	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	20%	



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 =	0.006	k-ft
P_n =	0.047	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	14%	



A cross brace kit is required every 14 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

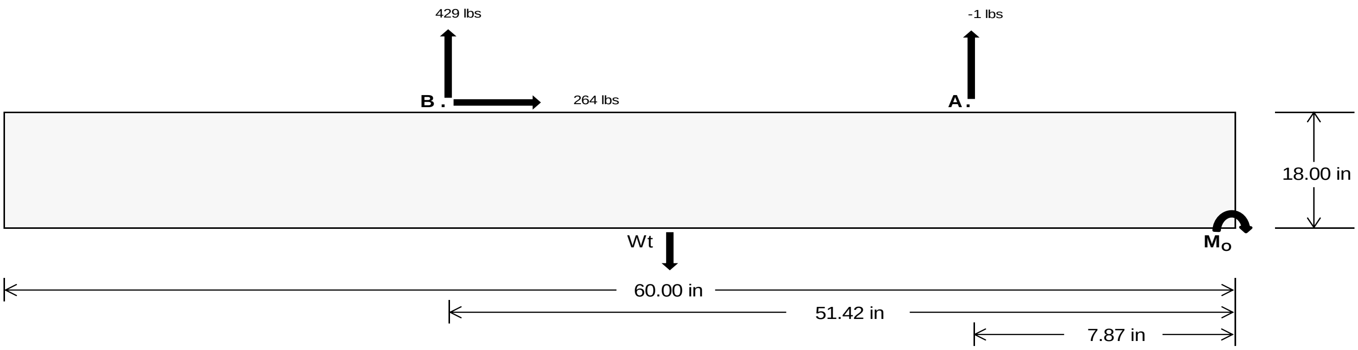
5.1 Helical Pile Foundations

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 =	2.11	1787.02	k
Compressive Load =	1597.09	1387.51	k
Lateral Load =	5.72	1100.66	k
Moment (Weak Axis) =	0.01	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 =	26796.0 in-lbs
Resisting Force Required =	893.20 lbs
S.F. =	1.67
Weight Required =	1488.67 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 =	264.44 lbs
Friction =	0.4
Weight Required =	661.10 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 =	264.44 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	631 lbs	631 lbs	631 lbs	631 lbs	444 lbs	444 lbs	444 lbs	444 lbs	750 lbs	750 lbs	750 lbs	750 lbs	2 lbs	2 lbs	2 lbs	2 lbs
F_B	443 lbs	443 lbs	443 lbs	443 lbs	570 lbs	570 lbs	570 lbs	570 lbs	719 lbs	719 lbs	719 lbs	719 lbs	-857 lbs	-857 lbs	-857 lbs	-857 lbs
F_V	76 lbs	76 lbs	76 lbs	76 lbs	484 lbs	484 lbs	484 lbs	484 lbs	414 lbs	414 lbs	414 lbs	414 lbs	-529 lbs	-529 lbs	-529 lbs	-529 lbs
P_{total}	3068 lbs	3159 lbs	3249 lbs	3340 lbs	3008 lbs	3098 lbs	3189 lbs	3280 lbs	3462 lbs	3553 lbs	3644 lbs	3734 lbs	341 lbs	395 lbs	449 lbs	504 lbs
M	488 lbs-ft	488 lbs-ft	488 lbs-ft	488 lbs-ft	527 lbs-ft	527 lbs-ft	527 lbs-ft	527 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft	740 lbs-ft	740 lbs-ft	740 lbs-ft	740 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.18 ft	0.17 ft	0.17 ft	0.16 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.17 ft	1.87 ft	1.65 ft	1.47 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}	270.9 psf	268.5 psf	266.4 psf	264.5 psf	259.2 psf	257.4 psf	255.7 psf	254.2 psf	283.5 psf	280.6 psf	278.0 psf	275.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	398.5 psf	390.7 psf	383.4 psf	376.8 psf	397.1 psf	389.3 psf	382.1 psf	375.5 psf	472.0 psf	460.9 psf	450.8 psf	441.4 psf	379.1 psf	219.5 psf	175.7 psf	156.4 psf

Maximum Bearing Pressure =	472 psf
Allowable Bearing Pressure =	1500 psf

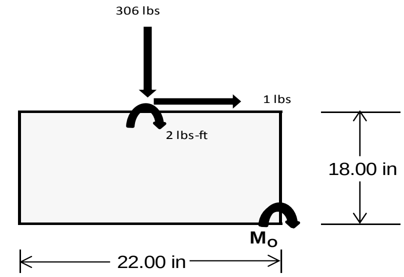
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 276.2 ft-lbs
Resisting Force Required = 301.35 lbs
S.F. = 1.67
Weight Required = 502.26 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	93 lbs	242 lbs	88 lbs	311 lbs	889 lbs	306 lbs	27 lbs	71 lbs	26 lbs
F_V	6 lbs	6 lbs	0 lbs	25 lbs	24 lbs	1 lbs	2 lbs	2 lbs	0 lbs
P_{total}	2561 lbs	2710 lbs	2556 lbs	2660 lbs	3239 lbs	2655 lbs	749 lbs	792 lbs	747 lbs
M	10 lbs-ft	9 lbs-ft	0 lbs-ft	42 lbs-ft	35 lbs-ft	4 lbs-ft	3 lbs-ft	3 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.02 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.31 ft	1.83 ft	1.83 ft	1.80 ft	1.81 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	275.7 sqft	292.5 sqft	278.6 sqft	275.1 sqft	340.7 sqft	288.3 sqft	80.7 sqft	85.5 sqft	81.5 sqft
f_{max}	283.0 psf	298.8 psf	279.0 psf	305.3 psf	366.0 psf	291.1 psf	82.7 psf	87.4 psf	81.6 psf

Maximum Bearing Pressure = 366 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

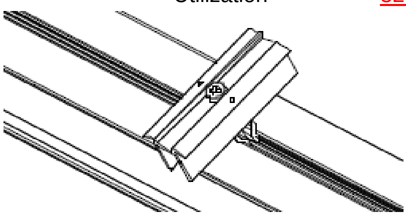
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

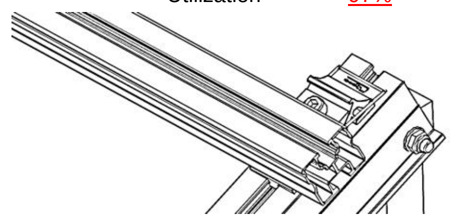
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.386	k
Allowable Uplift =	1.214	k
Utilization =	32%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.088	k
Allowable Uplift =	1.116	k
Utilization =	97%	



6.2 Bolted Connections

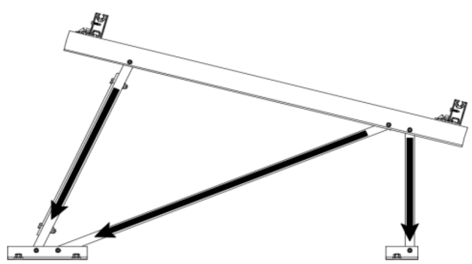
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	1.229	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	22%	

Rear Strut		
Maximum Axial Load =	1.173	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut		
Maximum Axial Load =	0.624	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	11%	

Bracing		
Maximum Axial Load =	0.047	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



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.

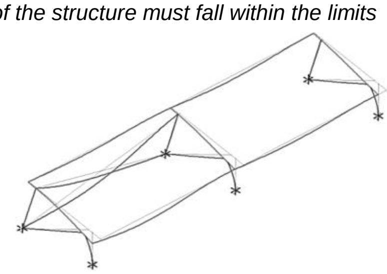
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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} =	32.32	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.646	in
Max Drift, Δ_{MAX} =	0.072	in
N/A		

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 = 96.00 in

J = 0.427

200.222

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

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 = 28.8 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

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

Weak Axis:

3.4.14

L_b = 96.00 in

J = 0.427

217.57

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

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 = 28.6

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

φF_L = φb[Bp-1.6Dp*b/t]

φF_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

$\varphi F_L St$= 28.8 ksi

Ix = 498305 mm^4

1.197 in^4

y = 40.784 mm

Sx = 0.746 in^3

$M_{max}St$ = 1.787 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

A.2 Design of Aluminum Girders - Aluminum Design Manual, 2005 Edition

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.40
20.7639

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.9 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 = 1.40
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= 29.9 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= 29.9 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.466 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

$\lambda =$ 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

$\varphi cc =$ 0.83792

$\varphi F_L = \varphi cc(Bc - Dc^* \lambda)$

$\varphi F_L =$ 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)

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.3 ksi

$b/t =$ 7.75

$S1 =$ 12.21

$S2 =$ 32.70

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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

$\lambda =$ 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

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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 = 39.29 in

J = 0.16

103.073

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

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= 30.1 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= 30.1 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.408 k-ft

Weak Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

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= 30.1

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

$\lambda =$ 1.68476

r = 0.437 in

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

$S1^{*} =$ 0.33515

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

$S2^{*} =$ 1.23671

$\varphi cc =$ 0.81587

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 10.0603 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 10.06 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 5.05 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								

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	-45.999	-45.999	0	0
2	M16	Y	-45.999	-45.999	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	-36.38	-36.38	0	0
2	M16	y	-58.525	-58.525	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	72.761	72.761	0	0
2	M16	y	34.799	34.799	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																
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	207.464	2	307.48	2	-.004	15	0	15	0	1	0	1
2		min	-265.01	3	-419.758	3	-.226	1	0	1	0	1	0	1
3	N7	max	.005	3	472.786	1	-.093	15	0	15	0	1	0	1
4		min	-.194	2	7.949	12	-2.01	1	-.004	1	0	1	0	1
5	N15	max	.001	12	1228.532	1	.733	1	.001	1	0	1	0	1
6		min	-1.842	1	-1.62	3	-.356	3	0	3	0	1	0	1
7	N16	max	801.424	2	1067.319	1	-.303	10	0	1	0	1	0	1
8		min	-846.665	3	-1374.63	3	-43.014	3	0	3	0	1	0	1
9	N23	max	.006	3	472.413	1	4.399	1	.008	1	0	1	0	1
10		min	-.194	2	8.319	12	.193	15	0	15	0	1	0	1
11	N24	max	208.073	2	312.284	2	43.266	3	.002	1	0	1	0	1
12		min	-265.1	3	-416.951	3	.037	10	0	3	0	1	0	1
13	Totals:	max	1214.784	2	3816.143	1	0	10						
14		min	-1376.768	3	-2190.692	3	0	1						

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	314.869	1	.653	4	.649	1	0	15	0	12	0	1
2			min	-360.782	3	.154	15	-.02	3	-.001	1	0	1	0	1
3		2	max	314.995	1	.602	4	.649	1	0	15	0	15	0	15
4			min	-360.688	3	.142	15	-.02	3	-.001	1	0	1	0	4
5		3	max	315.12	1	.551	4	.649	1	0	15	0	15	0	15
6			min	-360.594	3	.13	15	-.02	3	-.001	1	0	1	0	4
7		4	max	315.246	1	.5	4	.649	1	0	15	0	1	0	15
8			min	-360.499	3	.118	15	-.02	3	-.001	1	0	3	0	4
9		5	max	315.372	1	.449	4	.649	1	0	15	0	1	0	15
10			min	-360.405	3	.106	15	-.02	3	-.001	1	0	3	0	4
11		6	max	315.498	1	.398	4	.649	1	0	15	0	1	0	15
12			min	-360.31	3	.094	15	-.02	3	-.001	1	0	3	0	4
13		7	max	315.624	1	.346	4	.649	1	0	15	0	1	0	15
14			min	-360.216	3	.082	15	-.02	3	-.001	1	0	3	0	4
15		8	max	315.75	1	.295	4	.649	1	0	15	0	1	0	15
16			min	-360.122	3	.07	15	-.02	3	-.001	1	0	3	0	4
17		9	max	315.876	1	.244	4	.649	1	0	15	0	1	0	15
18			min	-360.027	3	.058	15	-.02	3	-.001	1	0	3	0	4
19		10	max	316.002	1	.193	4	.649	1	0	15	0	1	0	15
20			min	-359.933	3	.046	15	-.02	3	-.001	1	0	3	0	4
21		11	max	316.127	1	.142	4	.649	1	0	15	0	1	0	15
22			min	-359.838	3	.033	12	-.02	3	-.001	1	0	3	0	4
23		12	max	316.253	1	.099	2	.649	1	0	15	0	1	0	15
24			min	-359.744	3	.013	12	-.02	3	-.001	1	0	3	0	4
25		13	max	316.379	1	.059	2	.649	1	0	15	.001	1	0	15
26			min	-359.65	3	-.013	3	-.02	3	-.001	1	0	3	0	4
27		14	max	316.505	1	.019	2	.649	1	0	15	.001	1	0	15
28			min	-359.555	3	-.043	3	-.02	3	-.001	1	0	3	0	4
29		15	max	316.631	1	-.014	15	.649	1	0	15	.001	1	0	15
30			min	-359.461	3	-.073	3	-.02	3	-.001	1	0	3	0	4
31		16	max	316.757	1	-.026	15	.649	1	0	15	.001	1	0	15
32			min	-359.366	3	-.114	4	-.02	3	-.001	1	0	3	0	4
33		17	max	316.883	1	-.038	15	.649	1	0	15	.002	1	0	15
34			min	-359.272	3	-.165	4	-.02	3	-.001	1	0	3	0	4
35		18	max	317.008	1	-.05	15	.649	1	0	15	.002	1	0	15
36			min	-359.178	3	-.216	4	-.02	3	-.001	1	0	3	0	4
37		19	max	317.134	1	-.062	15	.649	1	0	15	.002	1	0	15

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
38			min	-359.083	3	-.267	4	-.02	3	-.001	1	0	3	0	4
39	M3	1	max	148.345	2	1.757	4	-.03	15	0	15	.002	1	0	4
40			min	-174.51	3	.413	15	-.726	1	0	1	0	15	0	15
41		2	max	148.276	2	1.58	4	-.03	15	0	15	.002	1	0	2
42			min	-174.562	3	.372	15	-.726	1	0	1	0	15	0	12
43		3	max	148.206	2	1.403	4	-.03	15	0	15	.002	1	0	2
44			min	-174.614	3	.33	15	-.726	1	0	1	0	15	0	3
45		4	max	148.137	2	1.226	4	-.03	15	0	15	.002	1	0	15
46			min	-174.666	3	.289	15	-.726	1	0	1	0	15	0	4
47		5	max	148.068	2	1.049	4	-.03	15	0	15	.002	1	0	15
48			min	-174.718	3	.247	15	-.726	1	0	1	0	15	0	4
49		6	max	147.998	2	.873	4	-.03	15	0	15	.002	1	0	15
50			min	-174.77	3	.205	15	-.726	1	0	1	0	15	0	4
51		7	max	147.929	2	.696	4	-.03	15	0	15	.001	1	0	15
52			min	-174.822	3	.164	15	-.726	1	0	1	0	15	0	4
53		8	max	147.86	2	.519	4	-.03	15	0	15	.001	1	0	15
54			min	-174.874	3	.122	15	-.726	1	0	1	0	15	-.001	4
55		9	max	147.79	2	.342	4	-.03	15	0	15	.001	1	0	15
56			min	-174.926	3	.081	15	-.726	1	0	1	0	15	-.001	4
57		10	max	147.721	2	.165	4	-.03	15	0	15	0	1	0	15
58			min	-174.978	3	.039	15	-.726	1	0	1	0	15	-.001	4
59		11	max	147.652	2	.015	2	-.03	15	0	15	0	1	0	15
60			min	-175.03	3	-.038	3	-.726	1	0	1	0	15	-.001	4
61		12	max	147.582	2	-.044	15	-.03	15	0	15	0	1	0	15
62			min	-175.082	3	-.188	4	-.726	1	0	1	0	15	-.001	4
63		13	max	147.513	2	-.086	15	-.03	15	0	15	0	1	0	15
64			min	-175.134	3	-.365	4	-.726	1	0	1	0	15	-.001	4
65		14	max	147.444	2	-.127	15	-.03	15	0	15	0	1	0	15
66			min	-175.186	3	-.542	4	-.726	1	0	1	0	15	-.001	4
67		15	max	147.374	2	-.169	15	-.03	15	0	15	0	1	0	15
68			min	-175.238	3	-.719	4	-.726	1	0	1	0	12	0	4
69		16	max	147.305	2	-.21	15	-.03	15	0	15	0	1	0	15
70			min	-175.29	3	-.896	4	-.726	1	0	1	0	3	0	4
71		17	max	147.236	2	-.252	15	-.03	15	0	15	0	15	0	15
72			min	-175.342	3	-1.073	4	-.726	1	0	1	0	1	0	4
73		18	max	147.167	2	-.293	15	-.03	15	0	15	0	15	0	15
74			min	-175.394	3	-1.249	4	-.726	1	0	1	0	1	0	4
75		19	max	147.097	2	-.335	15	-.03	15	0	15	0	15	0	1
76			min	-175.446	3	-1.426	4	-.726	1	0	1	0	1	0	1
77	M4	1	max	471.621	1	0	1	-.094	15	0	1	0	3	0	1
78			min	7.366	12	0	1	-2.181	1	0	1	0	1	0	1
79		2	max	471.686	1	0	1	-.094	15	0	1	0	15	0	1
80			min	7.399	12	0	1	-2.181	1	0	1	0	1	0	1
81		3	max	471.75	1	0	1	-.094	15	0	1	0	15	0	1
82			min	7.431	12	0	1	-2.181	1	0	1	0	1	0	1
83		4	max	471.815	1	0	1	-.094	15	0	1	0	15	0	1
84			min	7.463	12	0	1	-2.181	1	0	1	0	1	0	1
85		5	max	471.88	1	0	1	-.094	15	0	1	0	15	0	1
86			min	7.496	12	0	1	-2.181	1	0	1	0	1	0	1
87		6	max	471.944	1	0	1	-.094	15	0	1	0	15	0	1
88			min	7.528	12	0	1	-2.181	1	0	1	-.001	1	0	1
89		7	max	472.009	1	0	1	-.094	15	0	1	0	15	0	1
90			min	7.56	12	0	1	-2.181	1	0	1	-.001	1	0	1
91		8	max	472.074	1	0	1	-.094	15	0	1	0	15	0	1
92			min	7.593	12	0	1	-2.181	1	0	1	-.001	1	0	1
93		9	max	472.139	1	0	1	-.094	15	0	1	0	15	0	1
94			min	7.625	12	0	1	-2.181	1	0	1	-.002	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
95		10	max	472.203	1	0	1	-.094	15	0	1	0	15	0	1
96			min	7.657	12	0	1	-2.181	1	0	1	-.002	1	0	1
97		11	max	472.268	1	0	1	-.094	15	0	1	0	15	0	1
98			min	7.69	12	0	1	-2.181	1	0	1	-.002	1	0	1
99		12	max	472.333	1	0	1	-.094	15	0	1	0	15	0	1
100			min	7.722	12	0	1	-2.181	1	0	1	-.002	1	0	1
101		13	max	472.397	1	0	1	-.094	15	0	1	0	15	0	1
102			min	7.754	12	0	1	-2.181	1	0	1	-.002	1	0	1
103		14	max	472.462	1	0	1	-.094	15	0	1	0	15	0	1
104			min	7.787	12	0	1	-2.181	1	0	1	-.003	1	0	1
105		15	max	472.527	1	0	1	-.094	15	0	1	0	15	0	1
106			min	7.819	12	0	1	-2.181	1	0	1	-.003	1	0	1
107		16	max	472.592	1	0	1	-.094	15	0	1	0	15	0	1
108			min	7.852	12	0	1	-2.181	1	0	1	-.003	1	0	1
109		17	max	472.656	1	0	1	-.094	15	0	1	0	15	0	1
110			min	7.884	12	0	1	-2.181	1	0	1	-.003	1	0	1
111		18	max	472.721	1	0	1	-.094	15	0	1	0	15	0	1
112			min	7.916	12	0	1	-2.181	1	0	1	-.003	1	0	1
113		19	max	472.786	1	0	1	-.094	15	0	1	0	15	0	1
114			min	7.949	12	0	1	-2.181	1	0	1	-.004	1	0	1
115	M6	1	max	1028.311	1	.657	4	.173	1	0	1	0	3	0	1
116			min	-1172.728	3	.154	15	-.122	3	0	15	0	11	0	1
117		2	max	1028.437	1	.606	4	.173	1	0	1	0	3	0	15
118			min	-1172.633	3	.142	15	-.122	3	0	15	0	15	0	4
119		3	max	1028.562	1	.554	4	.173	1	0	1	0	3	0	15
120			min	-1172.539	3	.13	15	-.122	3	0	15	0	15	0	4
121		4	max	1028.688	1	.503	4	.173	1	0	1	0	1	0	15
122			min	-1172.445	3	.118	15	-.122	3	0	15	0	15	0	4
123		5	max	1028.814	1	.452	4	.173	1	0	1	0	1	0	15
124			min	-1172.35	3	.103	12	-.122	3	0	15	0	15	0	4
125		6	max	1028.94	1	.409	2	.173	1	0	1	0	1	0	15
126			min	-1172.256	3	.083	12	-.122	3	0	15	0	12	0	4
127		7	max	1029.066	1	.369	2	.173	1	0	1	0	1	0	15
128			min	-1172.161	3	.063	12	-.122	3	0	15	0	3	0	4
129		8	max	1029.192	1	.329	2	.173	1	0	1	0	1	0	15
130			min	-1172.067	3	.043	12	-.122	3	0	15	0	3	0	4
131		9	max	1029.318	1	.29	2	.173	1	0	1	0	1	0	12
132			min	-1171.973	3	.023	12	-.122	3	0	15	0	3	0	4
133		10	max	1029.443	1	.25	2	.173	1	0	1	0	1	0	12
134			min	-1171.878	3	-.002	3	-.122	3	0	15	0	3	0	2
135		11	max	1029.569	1	.21	2	.173	1	0	1	0	1	0	12
136			min	-1171.784	3	-.032	3	-.122	3	0	15	0	3	0	2
137		12	max	1029.695	1	.17	2	.173	1	0	1	0	1	0	12
138			min	-1171.689	3	-.062	3	-.122	3	0	15	0	3	0	2
139		13	max	1029.821	1	.13	2	.173	1	0	1	0	1	0	12
140			min	-1171.595	3	-.092	3	-.122	3	0	15	0	3	0	2
141		14	max	1029.947	1	.09	2	.173	1	0	1	0	1	0	12
142			min	-1171.501	3	-.122	3	-.122	3	0	15	0	3	0	2
143		15	max	1030.073	1	.051	2	.173	1	0	1	0	1	0	12
144			min	-1171.406	3	-.151	3	-.122	3	0	15	0	3	0	2
145		16	max	1030.199	1	.011	2	.173	1	0	1	0	1	0	12
146			min	-1171.312	3	-.181	3	-.122	3	0	15	0	3	0	2
147		17	max	1030.325	1	-.029	2	.173	1	0	1	0	1	0	12
148			min	-1171.217	3	-.211	3	-.122	3	0	15	0	3	0	2
149		18	max	1030.45	1	-.05	15	.173	1	0	1	0	1	0	3
150			min	-1171.123	3	-.241	3	-.122	3	0	15	0	3	0	2
151		19	max	1030.576	1	-.062	15	.173	1	0	1	0	1	0	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
152			min	-1171.029	3	-.271	3	-.122	3	0	15	0	3	0	2
153	M7	1	max	623.952	2	1.762	4	.016	1	0	2	0	2	0	2
154			min	-544.359	3	.414	15	-.004	10	0	3	0	3	0	3
155		2	max	623.883	2	1.585	4	.016	1	0	2	0	2	0	2
156			min	-544.411	3	.372	15	-.004	10	0	3	0	3	0	3
157		3	max	623.814	2	1.408	4	.016	1	0	2	0	2	0	2
158			min	-544.463	3	.331	15	-.004	10	0	3	0	3	0	3
159		4	max	623.744	2	1.231	4	.016	1	0	2	0	2	0	2
160			min	-544.515	3	.289	15	-.004	10	0	3	0	3	0	3
161		5	max	623.675	2	1.054	4	.016	1	0	2	0	2	0	15
162			min	-544.567	3	.248	15	-.004	10	0	3	0	3	0	3
163		6	max	623.606	2	.878	4	.016	1	0	2	0	2	0	15
164			min	-544.619	3	.206	15	-.004	10	0	3	0	3	0	4
165		7	max	623.536	2	.701	4	.016	1	0	2	0	2	0	15
166			min	-544.671	3	.165	15	-.004	10	0	3	0	3	0	4
167		8	max	623.467	2	.524	4	.016	1	0	2	0	2	0	15
168			min	-544.723	3	.123	15	-.004	10	0	3	0	3	-.001	4
169		9	max	623.398	2	.36	2	.016	1	0	2	0	2	0	15
170			min	-544.775	3	.066	12	-.004	10	0	3	0	3	-.001	4
171		10	max	623.328	2	.223	2	.016	1	0	2	0	2	0	15
172			min	-544.827	3	-.01	3	-.004	10	0	3	0	3	-.001	4
173		11	max	623.259	2	.085	2	.016	1	0	2	0	2	0	15
174			min	-544.879	3	-.114	3	-.004	10	0	3	0	3	-.001	4
175		12	max	623.19	2	-.043	15	.016	1	0	2	0	2	0	15
176			min	-544.931	3	-.217	3	-.004	10	0	3	0	3	-.001	4
177		13	max	623.121	2	-.085	15	.016	1	0	2	0	2	0	15
178			min	-544.983	3	-.36	4	-.004	10	0	3	0	3	-.001	4
179		14	max	623.051	2	-.126	15	.016	1	0	2	0	2	0	15
180			min	-545.035	3	-.537	4	-.004	10	0	3	0	3	-.001	4
181		15	max	622.982	2	-.168	15	.016	1	0	2	0	2	0	15
182			min	-545.087	3	-.714	4	-.004	10	0	3	0	3	0	4
183		16	max	622.913	2	-.209	15	.016	1	0	2	0	2	0	15
184			min	-545.139	3	-.891	4	-.004	10	0	3	0	3	0	4
185		17	max	622.843	2	-.251	15	.016	1	0	2	0	2	0	15
186			min	-545.191	3	-1.068	4	-.004	10	0	3	0	3	0	4
187		18	max	622.774	2	-.293	15	.016	1	0	2	0	2	0	15
188			min	-545.243	3	-1.244	4	-.004	10	0	3	0	3	0	4
189		19	max	622.705	2	-.334	15	.016	1	0	2	0	2	0	1
190			min	-545.295	3	-1.421	4	-.004	10	0	3	0	3	0	1
191	M8	1	max	1227.368	1	0	1	.917	1	0	1	0	15	0	1
192			min	-2.494	3	0	1	-.356	3	0	1	0	1	0	1
193		2	max	1227.432	1	0	1	.917	1	0	1	0	1	0	1
194			min	-2.445	3	0	1	-.356	3	0	1	0	3	0	1
195		3	max	1227.497	1	0	1	.917	1	0	1	0	1	0	1
196			min	-2.397	3	0	1	-.356	3	0	1	0	3	0	1
197		4	max	1227.562	1	0	1	.917	1	0	1	0	1	0	1
198			min	-2.348	3	0	1	-.356	3	0	1	0	3	0	1
199		5	max	1227.626	1	0	1	.917	1	0	1	0	1	0	1
200			min	-2.3	3	0	1	-.356	3	0	1	0	3	0	1
201		6	max	1227.691	1	0	1	.917	1	0	1	0	1	0	1
202			min	-2.251	3	0	1	-.356	3	0	1	0	3	0	1
203		7	max	1227.756	1	0	1	.917	1	0	1	0	1	0	1
204			min	-2.203	3	0	1	-.356	3	0	1	0	3	0	1
205		8	max	1227.821	1	0	1	.917	1	0	1	0	1	0	1
206			min	-2.154	3	0	1	-.356	3	0	1	0	3	0	1
207		9	max	1227.885	1	0	1	.917	1	0	1	0	1	0	1
208			min	-2.106	3	0	1	-.356	3	0	1	0	3	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
209		10	max	1227.95	1	0	1	.917	1	0	1	0	1	0	1
210			min	-2.057	3	0	1	-.356	3	0	1	0	3	0	1
211		11	max	1228.015	1	0	1	.917	1	0	1	0	1	0	1
212			min	-2.009	3	0	1	-.356	3	0	1	0	3	0	1
213		12	max	1228.079	1	0	1	.917	1	0	1	0	1	0	1
214			min	-1.96	3	0	1	-.356	3	0	1	0	3	0	1
215		13	max	1228.144	1	0	1	.917	1	0	1	0	1	0	1
216			min	-1.911	3	0	1	-.356	3	0	1	0	3	0	1
217		14	max	1228.209	1	0	1	.917	1	0	1	.001	1	0	1
218			min	-1.863	3	0	1	-.356	3	0	1	0	3	0	1
219		15	max	1228.273	1	0	1	.917	1	0	1	.001	1	0	1
220			min	-1.814	3	0	1	-.356	3	0	1	0	3	0	1
221		16	max	1228.338	1	0	1	.917	1	0	1	.001	1	0	1
222			min	-1.766	3	0	1	-.356	3	0	1	0	3	0	1
223		17	max	1228.403	1	0	1	.917	1	0	1	.001	1	0	1
224			min	-1.717	3	0	1	-.356	3	0	1	0	3	0	1
225		18	max	1228.468	1	0	1	.917	1	0	1	.001	1	0	1
226			min	-1.669	3	0	1	-.356	3	0	1	0	3	0	1
227		19	max	1228.532	1	0	1	.917	1	0	1	.001	1	0	1
228			min	-1.62	3	0	1	-.356	3	0	1	0	3	0	1
229	M10	1	max	331.785	1	.647	4	-.008	12	.001	1	0	1	0	1
230			min	-341.578	3	.153	15	-.235	1	0	3	0	3	0	1
231		2	max	331.911	1	.596	4	-.008	12	.001	1	0	1	0	15
232			min	-341.484	3	.141	15	-.235	1	0	3	0	3	0	4
233		3	max	332.037	1	.545	4	-.008	12	.001	1	0	1	0	15
234			min	-341.39	3	.129	15	-.235	1	0	3	0	3	0	4
235		4	max	332.163	1	.494	4	-.008	12	.001	1	0	1	0	15
236			min	-341.295	3	.117	15	-.235	1	0	3	0	3	0	4
237		5	max	332.289	1	.443	4	-.008	12	.001	1	0	1	0	15
238			min	-341.201	3	.105	15	-.235	1	0	3	0	3	0	4
239		6	max	332.415	1	.392	4	-.008	12	.001	1	0	1	0	15
240			min	-341.106	3	.093	15	-.235	1	0	3	0	3	0	4
241		7	max	332.54	1	.341	4	-.008	12	.001	1	0	1	0	15
242			min	-341.012	3	.081	15	-.235	1	0	3	0	3	0	4
243		8	max	332.666	1	.289	4	-.008	12	.001	1	0	1	0	15
244			min	-340.918	3	.069	15	-.235	1	0	3	0	3	0	4
245		9	max	332.792	1	.238	4	-.008	12	.001	1	0	2	0	15
246			min	-340.823	3	.057	15	-.235	1	0	3	0	3	0	4
247		10	max	332.918	1	.187	4	-.008	12	.001	1	0	2	0	15
248			min	-340.729	3	.045	15	-.235	1	0	3	0	3	0	4
249		11	max	333.044	1	.139	2	-.008	12	.001	1	0	15	0	15
250			min	-340.634	3	.033	15	-.235	1	0	3	0	3	0	4
251		12	max	333.17	1	.099	2	-.008	12	.001	1	0	15	0	15
252			min	-340.54	3	.021	15	-.235	1	0	3	0	3	0	4
253		13	max	333.296	1	.059	2	-.008	12	.001	1	0	15	0	15
254			min	-340.446	3	.007	1	-.235	1	0	3	0	1	0	4
255		14	max	333.421	1	.019	2	-.008	12	.001	1	0	15	0	15
256			min	-340.351	3	-.033	1	-.235	1	0	3	0	1	0	4
257		15	max	333.547	1	-.015	15	-.008	12	.001	1	0	15	0	15
258			min	-340.257	3	-.073	1	-.235	1	0	3	0	1	0	4
259		16	max	333.673	1	-.027	15	-.008	12	.001	1	0	15	0	15
260			min	-340.162	3	-.12	4	-.235	1	0	3	0	1	0	4
261		17	max	333.799	1	-.039	15	-.008	12	.001	1	0	15	0	15
262			min	-340.068	3	-.171	4	-.235	1	0	3	0	1	0	4
263		18	max	333.925	1	-.051	15	-.008	12	.001	1	0	15	0	15
264			min	-339.974	3	-.222	4	-.235	1	0	3	0	1	0	4
265		19	max	334.051	1	-.063	15	-.008	12	.001	1	0	15	0	15

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
266			min	-339.879	3	-.273	4	-.235	1	0	3	0	1	0	4
267	M11	1	max	148.115	2	1.761	4	.809	1	.001	1	0	3	0	4
268			min	-175.154	3	.414	15	.011	12	0	15	-.002	1	0	12
269		2	max	148.046	2	1.584	4	.809	1	.001	1	0	3	0	1
270			min	-175.206	3	.372	15	.011	12	0	15	-.002	1	0	3
271		3	max	147.976	2	1.408	4	.809	1	.001	1	0	3	0	1
272			min	-175.258	3	.331	15	.011	12	0	15	-.002	1	0	3
273		4	max	147.907	2	1.231	4	.809	1	.001	1	0	3	0	15
274			min	-175.31	3	.289	15	.011	12	0	15	-.002	1	0	3
275		5	max	147.838	2	1.054	4	.809	1	.001	1	0	3	0	15
276			min	-175.362	3	.248	15	.011	12	0	15	-.002	1	0	4
277		6	max	147.768	2	.877	4	.809	1	.001	1	0	3	0	15
278			min	-175.414	3	.206	15	.011	12	0	15	-.001	1	0	4
279		7	max	147.699	2	.7	4	.809	1	.001	1	0	3	0	15
280			min	-175.466	3	.165	15	.011	12	0	15	-.001	1	0	4
281		8	max	147.63	2	.523	4	.809	1	.001	1	0	3	0	15
282			min	-175.518	3	.123	15	.011	12	0	15	-.001	1	-.001	4
283		9	max	147.561	2	.347	4	.809	1	.001	1	0	3	0	15
284			min	-175.57	3	.081	15	.011	12	0	15	0	1	-.001	4
285		10	max	147.491	2	.17	4	.809	1	.001	1	0	3	0	15
286			min	-175.622	3	.034	12	.011	12	0	15	0	1	-.001	4
287		11	max	147.422	2	.016	1	.809	1	.001	1	0	3	0	15
288			min	-175.674	3	-.055	3	.011	12	0	15	0	1	-.001	4
289		12	max	147.353	2	-.043	15	.809	1	.001	1	0	3	0	15
290			min	-175.726	3	-.184	4	.011	12	0	15	0	1	-.001	4
291		13	max	147.283	2	-.085	15	.809	1	.001	1	0	3	0	15
292			min	-175.778	3	-.361	4	.011	12	0	15	0	1	-.001	4
293		14	max	147.214	2	-.126	15	.809	1	.001	1	0	3	0	15
294			min	-175.83	3	-.538	4	.011	12	0	15	0	1	-.001	4
295		15	max	147.145	2	-.168	15	.809	1	.001	1	0	3	0	15
296			min	-175.882	3	-.714	4	.011	12	0	15	0	10	0	4
297		16	max	147.075	2	-.21	15	.809	1	.001	1	0	1	0	15
298			min	-175.934	3	-.891	4	.011	12	0	15	0	15	0	4
299		17	max	147.006	2	-.251	15	.809	1	.001	1	0	1	0	15
300			min	-175.986	3	-1.068	4	.011	12	0	15	0	15	0	4
301		18	max	146.937	2	-.293	15	.809	1	.001	1	0	1	0	15
302			min	-176.038	3	-1.245	4	.011	12	0	15	0	15	0	4
303		19	max	146.867	2	-.334	15	.809	1	.001	1	0	1	0	1
304			min	-176.09	3	-1.422	4	.011	12	0	15	0	15	0	1
305	M12	1	max	471.248	1	0	1	4.768	1	0	1	0	1	0	1
306			min	7.737	12	0	1	.193	15	0	1	0	3	0	1
307		2	max	471.313	1	0	1	4.768	1	0	1	0	1	0	1
308			min	7.769	12	0	1	.193	15	0	1	0	15	0	1
309		3	max	471.378	1	0	1	4.768	1	0	1	0	1	0	1
310			min	7.801	12	0	1	.193	15	0	1	0	15	0	1
311		4	max	471.442	1	0	1	4.768	1	0	1	.001	1	0	1
312			min	7.834	12	0	1	.193	15	0	1	0	15	0	1
313		5	max	471.507	1	0	1	4.768	1	0	1	.002	1	0	1
314			min	7.866	12	0	1	.193	15	0	1	0	15	0	1
315		6	max	471.572	1	0	1	4.768	1	0	1	.002	1	0	1
316			min	7.898	12	0	1	.193	15	0	1	0	15	0	1
317		7	max	471.637	1	0	1	4.768	1	0	1	.003	1	0	1
318			min	7.931	12	0	1	.193	15	0	1	0	15	0	1
319		8	max	471.701	1	0	1	4.768	1	0	1	.003	1	0	1
320			min	7.963	12	0	1	.193	15	0	1	0	15	0	1
321		9	max	471.766	1	0	1	4.768	1	0	1	.003	1	0	1
322			min	7.995	12	0	1	.193	15	0	1	0	15	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
323		10	max	471.831	1	0	1	4.768	1	0	1	.004	1	0	1
324			min	8.028	12	0	1	.193	15	0	1	0	15	0	1
325		11	max	471.895	1	0	1	4.768	1	0	1	.004	1	0	1
326			min	8.06	12	0	1	.193	15	0	1	0	15	0	1
327		12	max	471.96	1	0	1	4.768	1	0	1	.005	1	0	1
328			min	8.092	12	0	1	.193	15	0	1	0	15	0	1
329		13	max	472.025	1	0	1	4.768	1	0	1	.005	1	0	1
330			min	8.125	12	0	1	.193	15	0	1	0	15	0	1
331		14	max	472.089	1	0	1	4.768	1	0	1	.006	1	0	1
332			min	8.157	12	0	1	.193	15	0	1	0	15	0	1
333		15	max	472.154	1	0	1	4.768	1	0	1	.006	1	0	1
334			min	8.189	12	0	1	.193	15	0	1	0	15	0	1
335		16	max	472.219	1	0	1	4.768	1	0	1	.006	1	0	1
336			min	8.222	12	0	1	.193	15	0	1	0	15	0	1
337		17	max	472.284	1	0	1	4.768	1	0	1	.007	1	0	1
338			min	8.254	12	0	1	.193	15	0	1	0	15	0	1
339		18	max	472.348	1	0	1	4.768	1	0	1	.007	1	0	1
340			min	8.287	12	0	1	.193	15	0	1	0	15	0	1
341		19	max	472.413	1	0	1	4.768	1	0	1	.008	1	0	1
342			min	8.319	12	0	1	.193	15	0	1	0	15	0	1
343	M1	1	max	162.228	1	338.41	3	-3.828	15	0	1	.184	1	.012	1
344			min	6.595	15	-311.124	1	-93.198	1	0	3	.008	15	-.011	3
345		2	max	162.367	1	338.229	3	-3.828	15	0	1	.164	1	.079	1
346			min	6.637	15	-311.366	1	-93.198	1	0	3	.007	15	-.084	3
347		3	max	95.178	1	7.576	9	-3.803	15	0	12	.142	1	.145	1
348			min	-8.058	10	-23.512	2	-93.133	1	0	1	.006	15	-.156	3
349		4	max	95.317	1	7.374	9	-3.803	15	0	12	.122	1	.146	1
350			min	-7.942	10	-23.754	2	-93.133	1	0	1	.005	15	-.153	3
351		5	max	95.457	1	7.173	9	-3.803	15	0	12	.102	1	.147	1
352			min	-7.825	10	-23.996	2	-93.133	1	0	1	.004	15	-.15	3
353		6	max	95.596	1	6.971	9	-3.803	15	0	12	.082	1	.148	1
354			min	-7.709	10	-24.238	2	-93.133	1	0	1	.003	15	-.147	3
355		7	max	95.736	1	6.77	9	-3.803	15	0	12	.062	1	.149	1
356			min	-7.593	10	-24.479	2	-93.133	1	0	1	.003	15	-.143	3
357		8	max	95.876	1	6.568	9	-3.803	15	0	12	.041	1	.152	2
358			min	-7.476	10	-24.721	2	-93.133	1	0	1	.002	15	-.14	3
359		9	max	96.015	1	6.367	9	-3.803	15	0	12	.021	1	.157	2
360			min	-7.36	10	-24.963	2	-93.133	1	0	1	0	15	-.137	3
361		10	max	96.155	1	6.165	9	-3.803	15	0	12	0	1	.163	2
362			min	-7.244	10	-25.205	2	-93.133	1	0	1	0	10	-.133	3
363		11	max	96.295	1	5.964	9	-3.803	15	0	12	0	12	.168	2
364			min	-7.127	10	-25.447	2	-93.133	1	0	1	-.019	1	-.13	3
365		12	max	96.434	1	5.762	9	-3.803	15	0	12	-.001	12	.174	2
366			min	-7.011	10	-25.689	2	-93.133	1	0	1	-.039	1	-.127	3
367		13	max	96.574	1	5.561	9	-3.803	15	0	12	-.002	12	.179	2
368			min	-6.894	10	-25.93	2	-93.133	1	0	1	-.06	1	-.123	3
369		14	max	96.713	1	5.359	9	-3.803	15	0	12	-.003	15	.185	2
370			min	-6.778	10	-26.172	2	-93.133	1	0	1	-.08	1	-.12	3
371		15	max	96.853	1	5.157	9	-3.803	15	0	12	-.004	15	.191	2
372			min	-6.662	10	-26.414	2	-93.133	1	0	1	-.1	1	-.116	3
373		16	max	95.522	2	96.111	2	-3.833	15	0	1	-.005	15	.195	2
374			min	-5.286	3	-163.712	3	-93.729	1	0	12	-.121	1	-.111	3
375		17	max	95.662	2	95.869	2	-3.833	15	0	1	-.006	15	.174	2
376			min	-5.181	3	-163.893	3	-93.729	1	0	12	-.141	1	-.076	3
377		18	max	-6.605	15	373.14	2	-3.927	15	0	3	-.007	15	.095	2
378			min	-161.689	1	-155.413	3	-96.153	1	0	2	-.162	1	-.042	3
379		19	max	-6.562	15	372.898	2	-3.927	15	0	3	-.007	15	.014	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
380			min	-161.55	1	-155.594	3	-96.153	1	0	2	-.183	1	-.008	3
381	M5	1	max	356.5	1	1116.298	3	-.113	10	0	1	.006	1	.021	3
382			min	12.703	12	-1027.292	1	-38.658	3	0	3	0	10	-.023	1
383		2	max	356.64	1	1116.116	3	-.113	10	0	1	0	2	.2	1
384			min	12.773	12	-1027.534	1	-38.658	3	0	3	-.004	3	-.221	3
385		3	max	275.741	3	7.087	9	4.395	3	0	3	0	2	.418	1
386			min	-44.044	10	-85.264	2	-.543	2	0	1	-.012	3	-.458	3
387		4	max	275.845	3	6.885	9	4.395	3	0	3	0	2	.426	1
388			min	-43.928	10	-85.506	2	-.543	2	0	1	-.011	3	-.447	3
389		5	max	275.95	3	6.684	9	4.395	3	0	3	0	2	.433	1
390			min	-43.812	10	-85.748	2	-.543	2	0	1	-.01	3	-.437	3
391		6	max	276.055	3	6.482	9	4.395	3	0	3	0	2	.441	1
392			min	-43.695	10	-85.99	2	-.543	2	0	1	-.009	3	-.426	3
393		7	max	276.159	3	6.281	9	4.395	3	0	3	0	2	.449	1
394			min	-43.579	10	-86.232	2	-.543	2	0	1	-.008	3	-.416	3
395		8	max	276.264	3	6.079	9	4.395	3	0	3	0	2	.456	1
396			min	-43.463	10	-86.473	2	-.543	2	0	1	-.007	3	-.405	3
397		9	max	276.369	3	5.878	9	4.395	3	0	3	0	2	.468	2
398			min	-43.346	10	-86.715	2	-.543	2	0	1	-.006	3	-.394	3
399		10	max	276.474	3	5.676	9	4.395	3	0	3	0	10	.487	2
400			min	-43.23	10	-86.957	2	-.543	2	0	1	-.005	3	-.383	3
401		11	max	276.578	3	5.475	9	4.395	3	0	3	0	10	.505	2
402			min	-43.114	10	-87.199	2	-.543	2	0	1	-.004	3	-.373	3
403		12	max	276.683	3	5.273	9	4.395	3	0	3	0	10	.524	2
404			min	-42.997	10	-87.441	2	-.543	2	0	1	-.003	3	-.362	3
405		13	max	276.788	3	5.072	9	4.395	3	0	3	0	10	.543	2
406			min	-42.881	10	-87.683	2	-.543	2	0	1	-.003	1	-.351	3
407		14	max	276.892	3	4.87	9	4.395	3	0	3	0	10	.562	2
408			min	-42.765	10	-87.924	2	-.543	2	0	1	-.002	1	-.34	3
409		15	max	276.997	3	4.669	9	4.395	3	0	3	0	15	.581	2
410			min	-42.648	10	-88.166	2	-.543	2	0	1	-.002	1	-.329	3
411		16	max	316.453	2	435.635	2	4.373	3	0	1	0	3	.596	2
412			min	-21.694	3	-506.825	3	-.576	2	0	15	-.002	1	-.314	3
413		17	max	316.593	2	435.393	2	4.373	3	0	1	.001	3	.502	2
414			min	-21.589	3	-507.007	3	-.576	2	0	15	-.001	1	-.204	3
415		18	max	-13.536	12	1226.902	2	4.018	3	0	12	.002	3	.239	2
416			min	-357.556	1	-509.343	3	-.136	2	0	1	0	2	-.094	3
417		19	max	-13.466	12	1226.661	2	4.018	3	0	12	.003	3	.017	3
418			min	-357.416	1	-509.524	3	-.136	2	0	1	0	2	-.027	2
419	M9	1	max	161.456	1	338.388	3	123.996	1	0	3	-.008	15	.012	1
420			min	6.561	15	-311.105	1	5.32	15	0	1	-.184	1	-.011	3
421		2	max	161.595	1	338.207	3	123.996	1	0	3	-.005	12	.079	1
422			min	6.603	15	-311.347	1	5.32	15	0	1	-.157	1	-.084	3
423		3	max	95.096	1	7.547	9	87.862	1	0	1	.002	3	.145	1
424			min	-7.512	10	-23.526	2	1.901	12	0	15	-.129	1	-.156	3
425		4	max	95.235	1	7.345	9	87.862	1	0	1	.003	3	.146	1
426			min	-7.396	10	-23.767	2	1.901	12	0	15	-.11	1	-.153	3
427		5	max	95.375	1	7.144	9	87.862	1	0	1	.004	3	.147	1
428			min	-7.279	10	-24.009	2	1.901	12	0	15	-.09	1	-.15	3
429		6	max	95.515	1	6.942	9	87.862	1	0	1	.004	3	.148	1
430			min	-7.163	10	-24.251	2	1.901	12	0	15	-.071	1	-.147	3
431		7	max	95.654	1	6.741	9	87.862	1	0	1	.005	3	.149	1
432			min	-7.047	10	-24.493	2	1.901	12	0	15	-.052	1	-.143	3
433		8	max	95.794	1	6.539	9	87.862	1	0	1	.005	3	.152	2
434			min	-6.93	10	-24.735	2	1.901	12	0	15	-.033	1	-.14	3
435		9	max	95.934	1	6.338	9	87.862	1	0	1	.006	3	.157	2
436			min	-6.814	10	-24.977	2	1.901	12	0	15	-.014	1	-.137	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
437		10	max	96.073	1	6.136	9	87.862	1	0	1	.006	3	.163	2
438			min	-6.698	10	-25.218	2	1.901	12	0	15	0	2	-.133	3
439		11	max	96.213	1	5.935	9	87.862	1	0	1	.024	1	.168	2
440			min	-6.581	10	-25.46	2	1.901	12	0	15	.001	15	-.13	3
441		12	max	96.352	1	5.733	9	87.862	1	0	1	.043	1	.174	2
442			min	-6.465	10	-25.702	2	1.901	12	0	15	.002	15	-.127	3
443		13	max	96.492	1	5.532	9	87.862	1	0	1	.062	1	.179	2
444			min	-6.348	10	-25.944	2	1.901	12	0	15	.003	15	-.123	3
445		14	max	96.632	1	5.33	9	87.862	1	0	1	.081	1	.185	2
446			min	-6.232	10	-26.186	2	1.901	12	0	15	.003	15	-.12	3
447		15	max	96.771	1	5.129	9	87.862	1	0	1	.1	1	.191	2
448			min	-6.116	10	-26.428	2	1.901	12	0	15	.004	15	-.116	3
449		16	max	95.871	2	95.906	2	88.543	1	0	15	.121	1	.195	2
450			min	-5.31	3	-164.197	3	1.914	12	0	1	.005	15	-.111	3
451		17	max	96.01	2	95.664	2	88.543	1	0	15	.14	1	.174	2
452			min	-5.205	3	-164.378	3	1.914	12	0	1	.006	15	-.076	3
453		18	max	-6.592	15	373.141	2	93.428	1	0	2	.16	1	.095	2
454			min	-161.357	1	-155.41	3	2.242	12	0	3	.007	15	-.042	3
455		19	max	-6.55	15	372.899	2	93.428	1	0	2	.18	1	.014	2
456			min	-161.217	1	-155.591	3	2.242	12	0	3	.007	15	-.008	3
457	M13	1	max	124.324	1	310.508	1	-6.561	15	.012	1	.184	1	0	1
458			min	5.321	15	-338.37	3	-161.435	1	-.011	3	.008	15	0	3
459		2	max	124.324	1	219.187	1	-5.029	15	.012	1	.057	1	.256	3
460			min	5.321	15	-238.77	3	-123.647	1	-.011	3	.002	15	-.235	1
461		3	max	124.324	1	127.866	1	-3.498	15	.012	1	.002	3	.424	3
462			min	5.321	15	-139.171	3	-85.858	1	-.011	3	-.036	1	-.39	1
463		4	max	124.324	1	36.545	1	-1.966	15	.012	1	-.002	12	.504	3
464			min	5.321	15	-39.572	3	-48.07	1	-.011	3	-.096	1	-.463	1
465		5	max	124.324	1	60.028	3	-.434	15	.012	1	-.003	12	.495	3
466			min	5.321	15	-54.776	1	-10.282	1	-.011	3	-.122	1	-.455	1
467		6	max	124.324	1	159.627	3	27.506	1	.012	1	-.004	12	.397	3
468			min	5.321	15	-146.097	1	.448	12	-.011	3	-.114	1	-.365	1
469		7	max	124.324	1	259.226	3	65.294	1	.012	1	-.002	12	.211	3
470			min	5.321	15	-237.418	1	1.942	12	-.011	3	-.073	1	-.195	1
471		8	max	124.324	1	358.826	3	103.082	1	.012	1	.002	1	.057	1
472			min	5.321	15	-328.739	1	3.437	12	-.011	3	0	3	-.064	3
473		9	max	124.324	1	458.425	3	140.87	1	.012	1	.111	1	.39	1
474			min	5.321	15	-420.06	1	4.931	12	-.011	3	.004	12	-.427	3
475		10	max	124.324	1	558.025	3	178.658	1	.011	2	.253	1	.804	1
476			min	5.321	15	-511.381	1	6.426	12	-.012	1	.009	12	-.879	3
477		11	max	93.565	1	420.059	1	-4.779	12	.011	3	.106	1	.39	1
478			min	3.829	15	-458.425	3	-140.092	1	-.012	1	0	12	-.427	3
479		12	max	93.565	1	328.738	1	-3.284	12	.011	3	.001	2	.057	1
480			min	3.829	15	-358.826	3	-102.304	1	-.012	1	-.004	3	-.064	3
481		13	max	93.565	1	237.417	1	-1.79	12	.011	3	-.003	15	.211	3
482			min	3.829	15	-259.226	3	-64.516	1	-.012	1	-.076	1	-.195	1
483		14	max	93.565	1	146.096	1	-.295	12	.011	3	-.005	15	.397	3
484			min	3.829	15	-159.627	3	-26.728	1	-.012	1	-.117	1	-.365	1
485		15	max	93.565	1	54.775	1	11.06	1	.011	3	-.005	15	.495	3
486			min	3.829	15	-60.028	3	.468	15	-.012	1	-.124	1	-.455	1
487		16	max	93.565	1	39.572	3	48.848	1	.011	3	-.004	12	.504	3
488			min	3.829	15	-36.546	1	2	15	-.012	1	-.097	1	-.463	1
489		17	max	93.565	1	139.171	3	86.636	1	.011	3	0	12	.424	3
490			min	3.829	15	-127.867	1	3.531	15	-.012	1	-.037	1	-.39	1
491		18	max	93.565	1	238.771	3	124.424	1	.011	3	.057	1	.256	3
492			min	3.829	15	-219.188	1	5.063	15	-.012	1	.002	15	-.235	1
493		19	max	93.565	1	338.37	3	162.212	1	.011	3	.184	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
494			min	3.829	15	-310.509	1	6.595	15	-.012	1	.008	15	0	3
495	M16	1	max	-2.241	12	373.192	2	-6.55	15	.008	3	.18	1	0	2
496			min	-93.028	1	-155.624	3	-161.234	1	-.014	2	.007	15	0	3
497		2	max	-2.241	12	263.456	2	-5.018	15	.008	3	.054	1	.118	3
498			min	-93.028	1	-110.015	3	-123.446	1	-.014	2	.002	15	-.283	2
499		3	max	-2.241	12	153.721	2	-3.487	15	.008	3	-.001	12	.196	3
500			min	-93.028	1	-64.406	3	-85.658	1	-.014	2	-.039	1	-.468	2
501		4	max	-2.241	12	43.986	2	-1.955	15	.008	3	-.004	15	.233	3
502			min	-93.028	1	-18.797	3	-47.87	1	-.014	2	-.098	1	-.556	2
503		5	max	-2.241	12	26.812	3	-.423	15	.008	3	-.005	15	.229	3
504			min	-93.028	1	-65.75	2	-10.082	1	-.014	2	-.124	1	-.547	2
505		6	max	-2.241	12	72.421	3	27.706	1	.008	3	-.005	15	.185	3
506			min	-93.028	1	-175.485	2	.66	12	-.014	2	-.116	1	-.439	2
507		7	max	-2.241	12	118.03	3	65.494	1	.008	3	-.003	15	.1	3
508			min	-93.028	1	-285.22	2	2.155	12	-.014	2	-.075	1	-.235	2
509		8	max	-2.241	12	163.639	3	103.282	1	.008	3	.002	2	.068	2
510			min	-93.028	1	-394.955	2	3.649	12	-.014	2	-.003	3	-.025	3
511		9	max	-2.241	12	209.248	3	141.07	1	.008	3	.109	1	.468	2
512			min	-93.028	1	-504.691	2	5.144	12	-.014	2	.002	12	-.191	3
513		10	max	-3.926	15	-14.86	15	178.858	1	0	15	.251	1	.965	2
514			min	-95.802	1	-614.426	2	-10.221	3	-.014	2	.009	12	-.397	3
515		11	max	-3.926	15	504.691	2	-5.334	12	.014	2	.109	1	.468	2
516			min	-95.802	1	-209.248	3	-140.738	1	-.008	3	.004	12	-.191	3
517		12	max	-3.926	15	394.955	2	-3.839	12	.014	2	.001	2	.068	2
518			min	-95.802	1	-163.639	3	-102.95	1	-.008	3	0	3	-.025	3
519		13	max	-3.926	15	285.22	2	-2.345	12	.014	2	-.003	12	.1	3
520			min	-95.802	1	-118.03	3	-65.162	1	-.008	3	-.074	1	-.235	2
521		14	max	-3.926	15	175.485	2	-.85	12	.014	2	-.004	12	.185	3
522			min	-95.802	1	-72.421	3	-27.374	1	-.008	3	-.115	1	-.439	2
523		15	max	-3.926	15	65.749	2	10.414	1	.014	2	-.005	12	.229	3
524			min	-95.802	1	-26.812	3	.435	15	-.008	3	-.123	1	-.547	2
525		16	max	-3.926	15	18.797	3	48.202	1	.014	2	-.003	12	.233	3
526			min	-95.802	1	-43.986	2	1.967	15	-.008	3	-.097	1	-.556	2
527		17	max	-3.926	15	64.406	3	85.99	1	.014	2	0	12	.196	3
528			min	-95.802	1	-153.721	2	3.499	15	-.008	3	-.037	1	-.468	2
529		18	max	-3.926	15	110.015	3	123.778	1	.014	2	.056	1	.118	3
530			min	-95.802	1	-263.456	2	5.031	15	-.008	3	.002	15	-.283	2
531		19	max	-3.926	15	155.624	3	161.566	1	.014	2	.183	1	0	2
532			min	-95.802	1	-373.192	2	6.562	15	-.008	3	.007	15	0	3
533	M15	1	max	0	2	2.793	4	.03	3	0	1	0	1	0	1
534			min	-46.125	3	0	2	-.029	1	0	3	0	3	0	1
535		2	max	0	2	2.483	4	.03	3	0	1	0	1	0	2
536			min	-46.195	3	0	2	-.029	1	0	3	0	3	-.001	4
537		3	max	0	2	2.173	4	.03	3	0	1	0	1	0	2
538			min	-46.266	3	0	2	-.029	1	0	3	0	3	-.002	4
539		4	max	0	2	1.862	4	.03	3	0	1	0	1	0	2
540			min	-46.336	3	0	2	-.029	1	0	3	0	3	-.003	4
541		5	max	0	2	1.552	4	.03	3	0	1	0	1	0	2
542			min	-46.407	3	0	2	-.029	1	0	3	0	3	-.004	4
543		6	max	0	2	1.241	4	.03	3	0	1	0	1	0	2
544			min	-46.477	3	0	2	-.029	1	0	3	0	3	-.005	4
545		7	max	0	2	.931	4	.03	3	0	1	0	3	0	2
546			min	-46.548	3	0	2	-.029	1	0	3	0	1	-.005	4
547		8	max	0	2	.621	4	.03	3	0	1	0	3	0	2
548			min	-46.618	3	0	2	-.029	1	0	3	0	1	-.006	4
549		9	max	0	2	.31	4	.03	3	0	1	0	3	0	2
550			min	-46.689	3	0	2	-.029	1	0	3	0	1	-.006	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
551		10	max	0	2	0	1	.03	3	0	1	0	3	0	2
552			min	-46.759	3	0	1	-.029	1	0	3	0	1	-.006	4
553		11	max	0	2	0	2	.03	3	0	1	0	3	0	2
554			min	-46.83	3	-.31	4	-.029	1	0	3	0	1	-.006	4
555		12	max	0	2	0	2	.03	3	0	1	0	3	0	2
556			min	-46.9	3	-.621	4	-.029	1	0	3	0	1	-.006	4
557		13	max	0	2	0	2	.03	3	0	1	0	3	0	2
558			min	-46.971	3	-.931	4	-.029	1	0	3	0	1	-.005	4
559		14	max	0	2	0	2	.03	3	0	1	0	3	0	2
560			min	-47.041	3	-1.241	4	-.029	1	0	3	0	1	-.005	4
561		15	max	0	2	0	2	.03	3	0	1	0	3	0	2
562			min	-47.112	3	-1.552	4	-.029	1	0	3	0	1	-.004	4
563		16	max	0	2	0	2	.03	3	0	1	0	3	0	2
564			min	-47.182	3	-1.862	4	-.029	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.03	3	0	1	0	3	0	2
566			min	-47.253	3	-2.173	4	-.029	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.03	3	0	1	0	3	0	2
568			min	-47.323	3	-2.483	4	-.029	1	0	3	0	1	-.001	4
569		19	max	0	2	0	2	.03	3	0	1	0	3	0	1
570			min	-47.394	3	-2.793	4	-.029	1	0	3	0	1	0	1
571	M16A	1	max	-1.035	10	2.793	4	.021	1	0	3	0	3	0	1
572			min	-46.892	3	.657	15	-.013	3	0	2	0	1	0	1
573		2	max	-.957	10	2.483	4	.021	1	0	3	0	3	0	15
574			min	-46.822	3	.584	15	-.013	3	0	2	0	1	-.001	4
575		3	max	-.878	10	2.173	4	.021	1	0	3	0	3	0	15
576			min	-46.751	3	.511	15	-.013	3	0	2	0	1	-.002	4
577		4	max	-.8	10	1.862	4	.021	1	0	3	0	3	0	15
578			min	-46.681	3	.438	15	-.013	3	0	2	0	1	-.003	4
579		5	max	-.722	10	1.552	4	.021	1	0	3	0	3	0	15
580			min	-46.611	3	.365	15	-.013	3	0	2	0	1	-.004	4
581		6	max	-.643	10	1.241	4	.021	1	0	3	0	3	-.001	15
582			min	-46.54	3	.292	15	-.013	3	0	2	0	1	-.005	4
583		7	max	-.565	10	.931	4	.021	1	0	3	0	3	-.001	15
584			min	-46.47	3	.219	15	-.013	3	0	2	0	1	-.005	4
585		8	max	-.487	10	.621	4	.021	1	0	3	0	3	-.001	15
586			min	-46.399	3	.146	15	-.013	3	0	2	0	1	-.006	4
587		9	max	-.408	10	.31	4	.021	1	0	3	0	3	-.001	15
588			min	-46.329	3	.073	15	-.013	3	0	2	0	1	-.006	4
589		10	max	-.33	10	0	1	.021	1	0	3	0	3	-.001	15
590			min	-46.258	3	0	1	-.013	3	0	2	0	1	-.006	4
591		11	max	-.252	10	-.073	15	.021	1	0	3	0	3	-.001	15
592			min	-46.188	3	-.31	4	-.013	3	0	2	0	1	-.006	4
593		12	max	-.173	10	-.146	15	.021	1	0	3	0	3	-.001	15
594			min	-46.117	3	-.621	4	-.013	3	0	2	0	1	-.006	4
595		13	max	-.095	10	-.219	15	.021	1	0	3	0	2	-.001	15
596			min	-46.047	3	-.931	4	-.013	3	0	2	0	3	-.005	4
597		14	max	-.017	10	-.292	15	.021	1	0	3	0	1	-.001	15
598			min	-45.976	3	-1.241	4	-.013	3	0	2	0	3	-.005	4
599		15	max	.062	10	-.365	15	.021	1	0	3	0	1	0	15
600			min	-45.906	3	-1.552	4	-.013	3	0	2	0	3	-.004	4
601		16	max	.14	10	-.438	15	.021	1	0	3	0	1	0	15
602			min	-45.835	3	-1.862	4	-.013	3	0	2	0	3	-.003	4
603		17	max	.218	10	-.511	15	.021	1	0	3	0	1	0	15
604			min	-45.765	3	-2.173	4	-.013	3	0	2	0	3	-.002	4
605		18	max	.297	10	-.584	15	.021	1	0	3	0	1	0	15
606			min	-45.694	3	-2.483	4	-.013	3	0	2	0	3	-.001	4
607		19	max	.375	10	-.657	15	.021	1	0	3	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
608			min	-45.624	3	-2.793	4	-.013	3	0	2	0	3	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	.003	1	.01	2	.017	1	-6.216e-5	15	NC	3	NC	3
2			min	-.003	3	-.01	3	0	3	-1.52e-3	1	3952.211	2	2256.571	1
3		2	max	.003	1	.009	2	.016	1	-5.945e-5	15	NC	3	NC	3
4			min	-.003	3	-.009	3	0	3	-1.454e-3	1	4304.16	2	2429.417	1
5		3	max	.003	1	.008	2	.015	1	-5.674e-5	15	NC	3	NC	3
6			min	-.003	3	-.009	3	0	3	-1.388e-3	1	4720.966	2	2633.566	1
7		4	max	.003	1	.008	2	.014	1	-5.403e-5	15	NC	3	NC	3
8			min	-.003	3	-.009	3	0	3	-1.322e-3	1	5217.831	2	2876.462	1
9		5	max	.002	1	.007	2	.012	1	-5.132e-5	15	NC	1	NC	3
10			min	-.003	3	-.008	3	0	3	-1.256e-3	1	5814.88	2	3168.035	1
11		6	max	.002	1	.006	2	.011	1	-4.861e-5	15	NC	1	NC	3
12			min	-.003	3	-.008	3	0	3	-1.191e-3	1	6539.177	2	3521.769	1
13		7	max	.002	1	.005	2	.01	1	-4.589e-5	15	NC	1	NC	3
14			min	-.002	3	-.007	3	0	3	-1.125e-3	1	7427.796	2	3956.352	1
15		8	max	.002	1	.005	2	.009	1	-4.318e-5	15	NC	1	NC	2
16			min	-.002	3	-.007	3	0	3	-1.059e-3	1	8532.625	2	4498.296	1
17		9	max	.002	1	.004	2	.008	1	-4.047e-5	15	NC	1	NC	2
18			min	-.002	3	-.006	3	0	3	-9.93e-4	1	9928.147	2	5186.276	1
19		10	max	.002	1	.003	2	.006	1	-3.776e-5	15	NC	1	NC	2
20			min	-.002	3	-.006	3	0	3	-9.271e-4	1	NC	1	6078.578	1
21		11	max	.001	1	.003	2	.005	1	-3.505e-5	15	NC	1	NC	2
22			min	-.002	3	-.005	3	0	3	-8.613e-4	1	NC	1	7266.558	1
23		12	max	.001	1	.002	2	.004	1	-3.234e-5	15	NC	1	NC	2
24			min	-.001	3	-.005	3	0	3	-7.954e-4	1	NC	1	8900.456	1
25		13	max	.001	1	.002	2	.004	1	-2.962e-5	15	NC	1	NC	1
26			min	-.001	3	-.004	3	0	3	-7.295e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.003	1	-2.691e-5	15	NC	1	NC	1
28			min	0	3	-.003	3	0	3	-6.637e-4	1	NC	1	NC	1
29		15	max	0	1	.001	2	.002	1	-2.42e-5	15	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-5.978e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	-2.149e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	12	-5.32e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.878e-5	15	NC	1	NC	1
34			min	0	3	-.001	3	0	12	-4.661e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.607e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-4.003e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-1.165e-5	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.344e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.578e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	5.61e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.941e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	7.801e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	2.303e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	9.297e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	2.665e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	-.001	1	1.079e-5	15	NC	1	NC	1
47		5	max	0	3	0	2	0	12	3.027e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	-.001	1	1.229e-5	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	3.389e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.379e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	3.752e-4	1	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
52			min	0	2	-.005	3	-.001	1	1.528e-5	15	NC	1	NC	1
53		8	max	0	3	.001	2	0	3	4.114e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	1.678e-5	15	NC	1	NC	1
55		9	max	0	3	.002	2	0	3	4.476e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	2	1.827e-5	15	NC	1	NC	1
57		10	max	0	3	.002	2	0	1	4.838e-4	1	NC	1	NC	1
58			min	0	2	-.007	3	0	15	1.977e-5	15	NC	1	NC	1
59		11	max	.001	3	.003	2	.001	1	5.2e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	15	2.127e-5	15	NC	1	NC	1
61		12	max	.001	3	.003	2	.002	1	5.563e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	15	2.276e-5	15	NC	1	NC	1
63		13	max	.001	3	.004	2	.003	1	5.925e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	15	2.426e-5	15	NC	1	NC	1
65		14	max	.001	3	.005	2	.004	1	6.287e-4	1	NC	1	NC	1
66			min	-.001	2	-.008	3	0	15	2.575e-5	15	9415.819	2	NC	1
67		15	max	.002	3	.006	2	.005	1	6.649e-4	1	NC	1	NC	2
68			min	-.001	2	-.009	3	0	15	2.725e-5	15	7942.04	2	8880.786	1
69		16	max	.002	3	.007	2	.006	1	7.011e-4	1	NC	1	NC	2
70			min	-.001	2	-.009	3	0	15	2.875e-5	15	6796.151	2	7404.633	1
71		17	max	.002	3	.008	2	.007	1	7.374e-4	1	NC	3	NC	2
72			min	-.001	2	-.009	3	0	15	3.024e-5	15	5895.903	2	6345.265	1
73		18	max	.002	3	.009	2	.008	1	7.736e-4	1	NC	3	NC	2
74			min	-.002	2	-.009	3	0	15	3.174e-5	15	5182.303	2	5558.556	1
75		19	max	.002	3	.01	2	.009	1	8.098e-4	1	NC	3	NC	2
76			min	-.002	2	-.009	3	0	15	3.323e-5	15	4612.692	2	4959.723	1
77	M4	1	max	.002	1	.012	2	0	15	-4.646e-5	12	NC	1	NC	3
78			min	0	12	-.01	3	-.007	1	-1.176e-3	1	NC	1	2769.475	1
79		2	max	.002	1	.011	2	0	15	-4.646e-5	12	NC	1	NC	3
80			min	0	12	-.009	3	-.006	1	-1.176e-3	1	NC	1	3020.617	1
81		3	max	.002	1	.01	2	0	15	-4.646e-5	12	NC	1	NC	3
82			min	0	12	-.009	3	-.006	1	-1.176e-3	1	NC	1	3319.547	1
83		4	max	.002	1	.01	2	0	15	-4.646e-5	12	NC	1	NC	3
84			min	0	12	-.008	3	-.005	1	-1.176e-3	1	NC	1	3678.862	1
85		5	max	.002	1	.009	2	0	15	-4.646e-5	12	NC	1	NC	2
86			min	0	12	-.008	3	-.005	1	-1.176e-3	1	NC	1	4115.726	1
87		6	max	.002	1	.008	2	0	15	-4.646e-5	12	NC	1	NC	2
88			min	0	12	-.007	3	-.004	1	-1.176e-3	1	NC	1	4654.012	1
89		7	max	.001	1	.008	2	0	15	-4.646e-5	12	NC	1	NC	2
90			min	0	12	-.006	3	-.004	1	-1.176e-3	1	NC	1	5327.725	1
91		8	max	.001	1	.007	2	0	15	-4.646e-5	12	NC	1	NC	2
92			min	0	12	-.006	3	-.003	1	-1.176e-3	1	NC	1	6186.661	1
93		9	max	.001	1	.006	2	0	15	-4.646e-5	12	NC	1	NC	2
94			min	0	12	-.005	3	-.003	1	-1.176e-3	1	NC	1	7306.145	1
95		10	max	.001	1	.006	2	0	15	-4.646e-5	12	NC	1	NC	2
96			min	0	12	-.005	3	-.002	1	-1.176e-3	1	NC	1	8804.605	1
97		11	max	0	1	.005	2	0	15	-4.646e-5	12	NC	1	NC	1
98			min	0	12	-.004	3	-.002	1	-1.176e-3	1	NC	1	NC	1
99		12	max	0	1	.005	2	0	15	-4.646e-5	12	NC	1	NC	1
100			min	0	12	-.004	3	-.001	1	-1.176e-3	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-4.646e-5	12	NC	1	NC	1
102			min	0	12	-.003	3	-.001	1	-1.176e-3	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-4.646e-5	12	NC	1	NC	1
104			min	0	12	-.003	3	0	1	-1.176e-3	1	NC	1	NC	1
105		15	max	0	1	.003	2	0	15	-4.646e-5	12	NC	1	NC	1
106			min	0	12	-.002	3	0	1	-1.176e-3	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-4.646e-5	12	NC	1	NC	1
108			min	0	12	-.002	3	0	1	-1.176e-3	1	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
109		17	max	0	1	.001	2	0	15	-4.646e-5	12	NC	1	NC	1
110			min	0	12	-.001	3	0	1	-1.176e-3	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-4.646e-5	12	NC	1	NC	1
112			min	0	12	0	3	0	1	-1.176e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-4.646e-5	12	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.176e-3	1	NC	1	NC	1
115	M6	1	max	.01	1	.033	2	.005	1	2.791e-4	3	NC	3	NC	2
116			min	-.011	3	-.029	3	-.003	3	1.974e-6	10	1204.578	2	7644.399	1
117		2	max	.009	1	.031	2	.005	1	2.701e-4	3	NC	3	NC	2
118			min	-.011	3	-.027	3	-.003	3	1.054e-6	10	1288.503	2	8310.695	1
119		3	max	.009	1	.028	2	.004	1	2.61e-4	3	NC	3	NC	2
120			min	-.01	3	-.026	3	-.003	3	1.33e-7	10	1384.612	2	9099.158	1
121		4	max	.008	1	.026	2	.004	1	2.52e-4	3	NC	3	NC	1
122			min	-.009	3	-.024	3	-.003	3	-1.471e-6	2	1495.34	2	NC	1
123		5	max	.008	1	.024	2	.004	1	2.43e-4	3	NC	3	NC	1
124			min	-.009	3	-.023	3	-.002	3	-5.213e-6	2	1623.823	2	NC	1
125		6	max	.007	1	.022	2	.003	1	2.34e-4	3	NC	3	NC	1
126			min	-.008	3	-.021	3	-.002	3	-8.954e-6	2	1774.166	2	NC	1
127		7	max	.007	1	.02	2	.003	1	2.249e-4	3	NC	3	NC	1
128			min	-.008	3	-.02	3	-.002	3	-1.27e-5	2	1951.847	2	NC	1
129		8	max	.006	1	.018	2	.002	1	2.159e-4	3	NC	3	NC	1
130			min	-.007	3	-.018	3	-.002	3	-1.644e-5	2	2164.338	2	NC	1
131		9	max	.006	1	.016	2	.002	1	2.069e-4	3	NC	3	NC	1
132			min	-.006	3	-.016	3	-.002	3	-2.018e-5	2	2422.099	2	NC	1
133		10	max	.005	1	.014	2	.002	1	1.978e-4	3	NC	3	NC	1
134			min	-.006	3	-.015	3	-.001	3	-2.392e-5	2	2740.237	2	NC	1
135		11	max	.004	1	.013	2	.001	1	1.888e-4	3	NC	3	NC	1
136			min	-.005	3	-.013	3	-.001	3	-2.766e-5	2	3141.407	2	NC	1
137		12	max	.004	1	.011	2	.001	1	1.798e-4	3	NC	3	NC	1
138			min	-.004	3	-.012	3	0	3	-3.14e-5	2	3661.198	2	NC	1
139		13	max	.003	1	.009	2	0	1	1.708e-4	3	NC	3	NC	1
140			min	-.004	3	-.01	3	0	3	-3.515e-5	2	4358.911	2	NC	1
141		14	max	.003	1	.007	2	0	1	1.617e-4	3	NC	3	NC	1
142			min	-.003	3	-.008	3	0	3	-3.889e-5	2	5341.257	2	NC	1
143		15	max	.002	1	.006	2	0	1	1.527e-4	3	NC	3	NC	1
144			min	-.003	3	-.007	3	0	3	-4.263e-5	2	6821.61	2	NC	1
145		16	max	.002	1	.004	2	0	1	1.437e-4	3	NC	1	NC	1
146			min	-.002	3	-.005	3	0	3	-4.637e-5	2	9297.773	2	NC	1
147		17	max	.001	1	.003	2	0	1	1.346e-4	3	NC	1	NC	1
148			min	-.001	3	-.003	3	0	3	-5.011e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.256e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-5.385e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.166e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.759e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.692e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-5.473e-5	3	NC	1	NC	1
155		2	max	0	3	.002	2	0	3	2.248e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-4.021e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.119e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	2	-2.569e-5	3	NC	1	NC	1
159		4	max	.001	3	.004	2	0	3	2.161e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	2	-1.116e-5	3	NC	1	NC	1
161		5	max	.001	3	.006	2	0	3	2.203e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	2	7.415e-7	15	7970.879	2	NC	1
163		6	max	.002	3	.007	2	.001	3	2.246e-5	1	NC	3	NC	1
164			min	-.002	2	-.009	3	0	2	8.579e-7	15	6391.958	2	NC	1
165		7	max	.002	3	.009	2	.001	3	3.241e-5	3	NC	3	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
166			min	-.002	2	-.011	3	0	1	3.18e-7	2	5314.15	2	NC	1
167		8	max	.002	3	.01	2	.001	3	4.693e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-4.115e-6	2	4525.316	2	NC	1
169		9	max	.003	3	.012	2	.002	3	6.145e-5	3	NC	3	NC	1
170			min	-.003	2	-.014	3	-.001	1	-8.548e-6	2	3919.725	2	NC	1
171		10	max	.003	3	.013	2	.002	3	7.598e-5	3	NC	3	NC	1
172			min	-.004	2	-.016	3	-.001	1	-1.298e-5	2	3438.772	2	NC	1
173		11	max	.003	3	.015	2	.002	3	9.05e-5	3	NC	3	NC	1
174			min	-.004	2	-.017	3	-.001	1	-1.741e-5	2	3047.288	2	NC	1
175		12	max	.004	3	.017	2	.002	3	1.05e-4	3	NC	3	NC	1
176			min	-.004	2	-.018	3	-.002	1	-2.185e-5	2	2722.793	2	NC	1
177		13	max	.004	3	.019	2	.002	3	1.195e-4	3	NC	3	NC	1
178			min	-.005	2	-.02	3	-.002	1	-2.628e-5	2	2450.16	2	NC	1
179		14	max	.004	3	.021	2	.002	3	1.341e-4	3	NC	3	NC	1
180			min	-.005	2	-.021	3	-.002	1	-3.071e-5	2	2218.754	2	NC	1
181		15	max	.005	3	.023	2	.002	3	1.486e-4	3	NC	3	NC	1
182			min	-.006	2	-.022	3	-.002	1	-3.515e-5	2	2020.822	2	NC	1
183		16	max	.005	3	.025	2	.002	3	1.631e-4	3	NC	3	NC	1
184			min	-.006	2	-.023	3	-.002	1	-3.958e-5	2	1850.536	2	NC	1
185		17	max	.005	3	.027	2	.002	3	1.776e-4	3	NC	3	NC	1
186			min	-.006	2	-.023	3	-.002	1	-4.401e-5	2	1703.408	2	NC	1
187		18	max	.006	3	.029	2	.002	3	1.922e-4	3	NC	3	NC	1
188			min	-.007	2	-.024	3	-.003	1	-4.845e-5	2	1575.906	2	NC	1
189		19	max	.006	3	.031	2	.002	3	2.067e-4	3	NC	3	NC	1
190			min	-.007	2	-.025	3	-.003	1	-5.288e-5	2	1465.215	2	NC	1
191	M8	1	max	.006	1	.037	2	.003	1	-6.734e-6	10	NC	1	NC	2
192			min	0	3	-.028	3	-.001	3	-2.085e-4	1	NC	1	6679.983	1
193		2	max	.006	1	.035	2	.003	1	-6.734e-6	10	NC	1	NC	2
194			min	0	3	-.027	3	-.001	3	-2.085e-4	1	NC	1	7282.95	1
195		3	max	.005	1	.033	2	.002	1	-6.734e-6	10	NC	1	NC	2
196			min	0	3	-.025	3	0	3	-2.085e-4	1	NC	1	8000.784	1
197		4	max	.005	1	.031	2	.002	1	-6.734e-6	10	NC	1	NC	2
198			min	0	3	-.024	3	0	3	-2.085e-4	1	NC	1	8863.745	1
199		5	max	.005	1	.029	2	.002	1	-6.734e-6	10	NC	1	NC	2
200			min	0	3	-.022	3	0	3	-2.085e-4	1	NC	1	9913.052	1
201		6	max	.004	1	.027	2	.002	1	-6.734e-6	10	NC	1	NC	1
202			min	0	3	-.02	3	0	3	-2.085e-4	1	NC	1	NC	1
203		7	max	.004	1	.025	2	.002	1	-6.734e-6	10	NC	1	NC	1
204			min	0	3	-.019	3	0	3	-2.085e-4	1	NC	1	NC	1
205		8	max	.004	1	.023	2	.001	1	-6.734e-6	10	NC	1	NC	1
206			min	0	3	-.017	3	0	3	-2.085e-4	1	NC	1	NC	1
207		9	max	.003	1	.021	2	.001	1	-6.734e-6	10	NC	1	NC	1
208			min	0	3	-.016	3	0	3	-2.085e-4	1	NC	1	NC	1
209		10	max	.003	1	.019	2	0	1	-6.734e-6	10	NC	1	NC	1
210			min	0	3	-.014	3	0	3	-2.085e-4	1	NC	1	NC	1
211		11	max	.003	1	.017	2	0	1	-6.734e-6	10	NC	1	NC	1
212			min	0	3	-.013	3	0	3	-2.085e-4	1	NC	1	NC	1
213		12	max	.002	1	.015	2	0	1	-6.734e-6	10	NC	1	NC	1
214			min	0	3	-.011	3	0	3	-2.085e-4	1	NC	1	NC	1
215		13	max	.002	1	.012	2	0	1	-6.734e-6	10	NC	1	NC	1
216			min	0	3	-.009	3	0	3	-2.085e-4	1	NC	1	NC	1
217		14	max	.002	1	.01	2	0	1	-6.734e-6	10	NC	1	NC	1
218			min	0	3	-.008	3	0	3	-2.085e-4	1	NC	1	NC	1
219		15	max	.001	1	.008	2	0	1	-6.734e-6	10	NC	1	NC	1
220			min	0	3	-.006	3	0	3	-2.085e-4	1	NC	1	NC	1
221		16	max	0	1	.006	2	0	1	-6.734e-6	10	NC	1	NC	1
222			min	0	3	-.005	3	0	3	-2.085e-4	1	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
223		17	max	0	1	.004	2	0	1	-6.734e-6	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-2.085e-4	1	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-6.734e-6	10	NC	1	NC	1
226			min	0	3	-.002	3	0	3	-2.085e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-6.734e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.085e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.01	2	0	3	1.231e-3	1	NC	3	NC	1
230			min	-.003	3	-.01	3	-.002	1	-2.538e-4	3	3953.986	2	NC	1
231		2	max	.003	1	.009	2	0	3	1.167e-3	1	NC	3	NC	1
232			min	-.003	3	-.009	3	-.002	1	-2.459e-4	3	4306.163	2	NC	1
233		3	max	.003	1	.008	2	0	3	1.102e-3	1	NC	3	NC	1
234			min	-.003	3	-.009	3	-.002	1	-2.381e-4	3	4723.252	2	NC	1
235		4	max	.003	1	.008	2	0	3	1.037e-3	1	NC	3	NC	1
236			min	-.003	3	-.009	3	-.002	1	-2.302e-4	3	5220.473	2	NC	1
237		5	max	.003	1	.007	2	0	3	9.725e-4	1	NC	1	NC	1
238			min	-.003	3	-.008	3	-.002	1	-2.223e-4	3	5817.972	2	NC	1
239		6	max	.002	1	.006	2	0	3	9.077e-4	1	NC	1	NC	1
240			min	-.002	3	-.008	3	-.002	1	-2.144e-4	3	6542.846	2	NC	1
241		7	max	.002	1	.005	2	0	3	8.43e-4	1	NC	1	NC	1
242			min	-.002	3	-.007	3	-.002	1	-2.066e-4	3	7432.214	2	NC	1
243		8	max	.002	1	.005	2	0	3	7.783e-4	1	NC	1	NC	1
244			min	-.002	3	-.007	3	-.002	1	-1.987e-4	3	8538.032	2	NC	1
245		9	max	.002	1	.004	2	0	3	7.135e-4	1	NC	1	NC	1
246			min	-.002	3	-.006	3	-.001	1	-1.908e-4	3	9934.883	2	NC	1
247		10	max	.002	1	.003	2	0	3	6.488e-4	1	NC	1	NC	1
248			min	-.002	3	-.006	3	-.001	1	-1.83e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	5.841e-4	1	NC	1	NC	1
250			min	-.001	3	-.005	3	-.001	1	-1.751e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	5.193e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-1.672e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	4.546e-4	1	NC	1	NC	1
254			min	-.001	3	-.004	3	0	1	-1.594e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.898e-4	1	NC	1	NC	1
256			min	0	3	-.004	3	0	1	-1.515e-4	3	NC	1	NC	1
257		15	max	0	1	.001	2	0	3	3.251e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-1.436e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.604e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-1.358e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.956e-4	1	NC	1	NC	1
262			min	0	3	-.002	3	0	1	-1.279e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.309e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.2e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.616e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.122e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.286e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.264e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	2	3.588e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-1.011e-4	1	NC	1	NC	1
271		3	max	0	3	0	2	0	10	1.889e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.696e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	1.906e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-2.38e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-1.023e-5	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	1	-3.065e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	15	-1.529e-5	15	NC	1	NC	1
278			min	0	2	-.004	3	-.002	1	-3.75e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	15	-1.817e-5	15	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
280			min	0	2	-.005	3	-.003	1	-4.434e-4	1	NC	1	NC	1
281		8	max	0	3	.001	2	0	15	-2.105e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.004	1	-5.119e-4	1	NC	1	NC	1
283		9	max	0	3	.002	2	0	15	-2.393e-5	15	NC	1	NC	2
284			min	0	2	-.007	3	-.005	1	-5.803e-4	1	NC	1	9566.919	1
285		10	max	0	3	.002	2	0	15	-2.681e-5	15	NC	1	NC	2
286			min	0	2	-.007	3	-.006	1	-6.488e-4	1	NC	1	7640.227	1
287		11	max	.001	3	.003	2	0	15	-2.969e-5	15	NC	1	NC	2
288			min	0	2	-.008	3	-.007	1	-7.173e-4	1	NC	1	6292.05	1
289		12	max	.001	3	.003	2	0	15	-3.257e-5	15	NC	1	NC	2
290			min	-.001	2	-.008	3	-.009	1	-7.857e-4	1	NC	1	5311.243	1
291		13	max	.001	3	.004	2	0	15	-3.545e-5	15	NC	1	NC	2
292			min	-.001	2	-.008	3	-.01	1	-8.542e-4	1	NC	1	4575.551	1
293		14	max	.001	3	.005	2	0	15	-3.833e-5	15	NC	1	NC	2
294			min	-.001	2	-.008	3	-.011	1	-9.227e-4	1	9426.766	2	4010.117	1
295		15	max	.002	3	.006	2	0	15	-4.121e-5	15	NC	1	NC	3
296			min	-.001	2	-.009	3	-.013	1	-9.911e-4	1	7950.496	2	3566.992	1
297		16	max	.002	3	.007	2	0	15	-4.409e-5	15	NC	1	NC	3
298			min	-.001	2	-.009	3	-.014	1	-1.06e-3	1	6802.835	2	3214.306	1
299		17	max	.002	3	.008	2	0	15	-4.697e-5	15	NC	3	NC	3
300			min	-.001	2	-.009	3	-.016	1	-1.128e-3	1	5901.306	2	2930.219	1
301		18	max	.002	3	.009	2	0	15	-4.984e-5	15	NC	3	NC	3
302			min	-.002	2	-.009	3	-.017	1	-1.197e-3	1	5186.766	2	2699.388	1
303		19	max	.002	3	.01	2	0	15	-5.272e-5	15	NC	3	NC	3
304			min	-.002	2	-.009	3	-.018	1	-1.265e-3	1	4616.457	2	2510.814	1
305	M12	1	max	.002	1	.012	2	.015	1	1.181e-3	1	NC	1	NC	3
306			min	0	12	-.01	3	0	15	5.004e-5	15	NC	1	1275.919	1
307		2	max	.002	1	.011	2	.014	1	1.181e-3	1	NC	1	NC	3
308			min	0	12	-.009	3	0	15	5.004e-5	15	NC	1	1391.35	1
309		3	max	.002	1	.01	2	.013	1	1.181e-3	1	NC	1	NC	3
310			min	0	12	-.009	3	0	15	5.004e-5	15	NC	1	1528.759	1
311		4	max	.002	1	.01	2	.011	1	1.181e-3	1	NC	1	NC	3
312			min	0	12	-.008	3	0	15	5.004e-5	15	NC	1	1693.937	1
313		5	max	.002	1	.009	2	.01	1	1.181e-3	1	NC	1	NC	3
314			min	0	12	-.008	3	0	15	5.004e-5	15	NC	1	1894.773	1
315		6	max	.002	1	.008	2	.009	1	1.181e-3	1	NC	1	NC	3
316			min	0	12	-.007	3	0	15	5.004e-5	15	NC	1	2142.243	1
317		7	max	.001	1	.008	2	.008	1	1.181e-3	1	NC	1	NC	3
318			min	0	12	-.007	3	0	15	5.004e-5	15	NC	1	2451.978	1
319		8	max	.001	1	.007	2	.007	1	1.181e-3	1	NC	1	NC	3
320			min	0	12	-.006	3	0	15	5.004e-5	15	NC	1	2846.868	1
321		9	max	.001	1	.006	2	.006	1	1.181e-3	1	NC	1	NC	3
322			min	0	12	-.005	3	0	15	5.004e-5	15	NC	1	3361.54	1
323		10	max	.001	1	.006	2	.005	1	1.181e-3	1	NC	1	NC	2
324			min	0	12	-.005	3	0	15	5.004e-5	15	NC	1	4050.43	1
325		11	max	0	1	.005	2	.004	1	1.181e-3	1	NC	1	NC	2
326			min	0	12	-.004	3	0	15	5.004e-5	15	NC	1	5003.203	1
327		12	max	0	1	.005	2	.003	1	1.181e-3	1	NC	1	NC	2
328			min	0	12	-.004	3	0	15	5.004e-5	15	NC	1	6376.28	1
329		13	max	0	1	.004	2	.002	1	1.181e-3	1	NC	1	NC	2
330			min	0	12	-.003	3	0	15	5.004e-5	15	NC	1	8463.098	1
331		14	max	0	1	.003	2	.002	1	1.181e-3	1	NC	1	NC	1
332			min	0	12	-.003	3	0	15	5.004e-5	15	NC	1	NC	1
333		15	max	0	1	.003	2	.001	1	1.181e-3	1	NC	1	NC	1
334			min	0	12	-.002	3	0	15	5.004e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	1.181e-3	1	NC	1	NC	1
336			min	0	12	-.002	3	0	15	5.004e-5	15	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
337		17	max	0	1	.001	2	0	1	1.181e-3	1	NC	1	NC	1
338			min	0	12	-.001	3	0	15	5.004e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	1.181e-3	1	NC	1	NC	1
340			min	0	12	0	3	0	15	5.004e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	1.181e-3	1	NC	1	NC	1
342			min	0	1	0	1	0	1	5.004e-5	15	NC	1	NC	1
343	M1	1	max	.009	3	.026	3	.002	3	1.389e-2	1	NC	1	NC	1
344			min	-.009	2	-.025	1	-.006	1	-1.504e-2	3	NC	1	NC	1
345		2	max	.009	3	.015	3	.001	3	6.44e-3	1	NC	4	NC	2
346			min	-.009	2	-.015	2	-.013	1	-7.457e-3	3	4173.375	1	6495.872	1
347		3	max	.009	3	.005	3	0	3	-9.974e-6	12	NC	4	NC	2
348			min	-.009	2	-.004	2	-.018	1	-8.738e-4	1	2153.482	2	3938.948	1
349		4	max	.009	3	.005	1	0	3	-5.577e-6	12	NC	5	NC	3
350			min	-.009	2	-.003	3	-.02	1	-7.473e-4	1	1508.55	2	3259.339	1
351		5	max	.009	3	.012	1	0	3	4.934e-7	3	NC	5	NC	3
352			min	-.009	2	-.01	3	-.02	1	-6.209e-4	1	1196.507	2	3129.579	1
353		6	max	.009	3	.019	2	0	12	7.023e-6	3	NC	5	NC	3
354			min	-.009	2	-.016	3	-.019	1	-4.945e-4	1	1018.385	2	3348.376	1
355		7	max	.009	3	.024	2	0	3	1.355e-5	3	NC	5	NC	2
356			min	-.009	2	-.02	3	-.017	1	-3.681e-4	1	908.728	2	3986.109	1
357		8	max	.009	3	.028	2	0	3	2.008e-5	3	NC	5	NC	2
358			min	-.009	2	-.023	3	-.014	1	-2.417e-4	1	840.19	2	5469.4	1
359		9	max	.009	3	.03	2	0	3	2.661e-5	3	NC	5	NC	2
360			min	-.009	2	-.025	3	-.01	1	-1.152e-4	1	799.87	2	9882.257	1
361		10	max	.009	3	.031	2	0	3	3.314e-5	3	NC	5	NC	1
362			min	-.009	2	-.025	3	-.006	1	-4.657e-6	2	781.633	2	NC	1
363		11	max	.009	3	.031	2	0	3	1.376e-4	1	NC	5	NC	1
364			min	-.009	2	-.024	3	-.001	1	6.001e-6	15	783.301	2	NC	1
365		12	max	.009	3	.028	2	.003	1	2.64e-4	1	NC	5	NC	2
366			min	-.009	2	-.022	3	0	15	1.115e-5	15	805.832	2	6292.367	1
367		13	max	.009	3	.025	2	.006	1	3.904e-4	1	NC	5	NC	2
368			min	-.009	2	-.019	3	0	15	1.629e-5	15	853.825	2	4375.741	1
369		14	max	.008	3	.019	2	.008	1	5.169e-4	1	NC	5	NC	3
370			min	-.009	2	-.015	3	0	15	2.143e-5	15	937.831	2	3590.437	1
371		15	max	.008	3	.012	2	.01	1	6.433e-4	1	NC	5	NC	3
372			min	-.009	2	-.009	3	0	15	2.658e-5	15	1080.945	2	3308.73	1
373		16	max	.008	3	.004	1	.009	1	7.309e-4	1	NC	5	NC	3
374			min	-.009	2	-.003	3	0	15	3.017e-5	15	1339.477	2	3411.708	1
375		17	max	.008	3	.005	3	.007	1	2.822e-5	3	NC	4	NC	2
376			min	-.009	2	-.007	2	0	15	-1.059e-4	1	1892.241	2	4094.959	1
377		18	max	.008	3	.013	3	.003	1	8.252e-3	2	NC	4	NC	2
378			min	-.009	2	-.019	2	0	15	-3.526e-3	3	3655.521	2	6720.935	1
379		19	max	.008	3	.022	3	0	3	1.672e-2	2	NC	1	NC	1
380			min	-.009	2	-.032	2	-.004	1	-7.146e-3	3	NC	1	NC	1
381	M5	1	max	.025	3	.077	3	.002	3	1.122e-6	3	NC	1	NC	1
382			min	-.03	2	-.079	1	-.007	1	5.612e-8	10	NC	1	NC	1
383		2	max	.025	3	.046	3	.003	3	7.453e-5	3	NC	5	NC	1
384			min	-.03	2	-.046	1	-.006	1	-6.592e-5	1	1389.906	1	NC	1
385		3	max	.025	3	.017	3	.003	3	1.465e-4	3	NC	5	NC	1
386			min	-.03	2	-.014	1	-.005	1	-1.315e-4	1	714.589	1	NC	1
387		4	max	.025	3	.012	1	.004	3	1.419e-4	3	NC	5	NC	1
388			min	-.03	2	-.008	3	-.004	1	-1.245e-4	1	502.994	1	NC	1
389		5	max	.025	3	.036	1	.004	3	1.374e-4	3	NC	5	NC	1
390			min	-.03	2	-.028	3	-.004	1	-1.176e-4	1	401.076	1	NC	1
391		6	max	.025	3	.055	1	.005	3	1.329e-4	3	NC	15	NC	1
392			min	-.03	2	-.044	3	-.003	1	-1.107e-4	1	343.241	1	NC	1
393		7	max	.025	3	.07	2	.005	3	1.283e-4	3	NC	15	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
394			min	-.03	2	-.057	3	-.003	1	-1.038e-4	1	306.701	2	NC	1
395		8	max	.025	3	.081	2	.005	3	1.238e-4	3	NC	15	NC	1
396			min	-.03	2	-.065	3	-.003	1	-9.687e-5	1	283.053	2	NC	1
397		9	max	.025	3	.089	2	.004	3	1.192e-4	3	NC	15	NC	1
398			min	-.03	2	-.07	3	-.003	1	-8.996e-5	1	269.014	2	NC	1
399		10	max	.025	3	.092	2	.004	3	1.147e-4	3	NC	15	NC	1
400			min	-.03	2	-.071	3	-.002	1	-8.304e-5	1	262.472	2	NC	1
401		11	max	.025	3	.09	2	.004	3	1.101e-4	3	NC	15	NC	1
402			min	-.03	2	-.069	3	-.002	1	-7.612e-5	1	262.663	2	NC	1
403		12	max	.025	3	.084	2	.004	3	1.056e-4	3	NC	15	NC	1
404			min	-.03	2	-.063	3	-.002	1	-6.921e-5	1	269.885	2	NC	1
405		13	max	.025	3	.073	2	.003	3	1.011e-4	3	NC	15	NC	1
406			min	-.03	2	-.054	3	-.002	1	-6.229e-5	1	285.668	2	NC	1
407		14	max	.025	3	.058	2	.003	3	9.651e-5	3	NC	15	NC	1
408			min	-.03	2	-.042	3	-.002	1	-5.538e-5	1	313.547	2	NC	1
409		15	max	.025	3	.037	2	.002	3	9.197e-5	3	NC	5	NC	1
410			min	-.03	2	-.026	3	-.003	1	-4.915e-5	2	361.303	2	NC	1
411		16	max	.024	3	.011	1	.002	3	8.399e-5	3	NC	5	NC	1
412			min	-.03	2	-.008	3	-.003	1	-5.153e-5	1	448.013	2	NC	1
413		17	max	.024	3	.014	3	.001	3	-3.796e-6	12	NC	5	NC	1
414			min	-.03	2	-.022	2	-.003	1	-2.924e-4	1	635.21	2	NC	1
415		18	max	.024	3	.037	3	0	3	-2.514e-6	12	NC	5	NC	1
416			min	-.03	2	-.059	2	-.003	1	-1.499e-4	1	1233.563	2	NC	1
417		19	max	.024	3	.061	3	0	3	-3.228e-8	15	NC	1	NC	1
418			min	-.03	2	-.098	2	-.003	1	-2.297e-7	3	NC	1	NC	1
419	M9	1	max	.009	3	.026	3	.001	3	1.504e-2	3	NC	1	NC	1
420			min	-.009	2	-.026	1	-.008	1	-1.389e-2	1	NC	1	NC	1
421		2	max	.009	3	.015	3	0	3	7.44e-3	3	NC	4	NC	2
422			min	-.009	2	-.015	1	-.002	1	-6.733e-3	1	4174.218	1	7608.705	1
423		3	max	.009	3	.005	3	.003	1	2.907e-4	1	NC	4	NC	2
424			min	-.009	2	-.004	2	0	3	-2.353e-5	3	2154.327	2	4734.305	1
425		4	max	.009	3	.005	1	.005	1	1.834e-4	1	NC	5	NC	3
426			min	-.009	2	-.003	3	0	3	-3.153e-5	3	1509.154	2	4020.604	1
427		5	max	.009	3	.012	2	.005	1	7.607e-5	1	NC	5	NC	3
428			min	-.009	2	-.01	3	-.001	3	-3.953e-5	3	1196.984	2	3997.459	1
429		6	max	.009	3	.019	2	.004	1	7.227e-6	10	NC	5	NC	3
430			min	-.009	2	-.016	3	-.002	3	-4.753e-5	3	1018.784	2	4508.845	1
431		7	max	.009	3	.024	2	.002	1	-3.817e-6	10	NC	5	NC	2
432			min	-.009	2	-.02	3	-.002	3	-1.386e-4	1	909.078	2	5885.164	1
433		8	max	.009	3	.028	2	0	2	-1.007e-5	15	NC	5	NC	2
434			min	-.009	2	-.023	3	-.003	3	-2.459e-4	1	840.506	2	9917.987	1
435		9	max	.009	3	.03	2	0	10	-1.445e-5	15	NC	5	NC	1
436			min	-.009	2	-.025	3	-.005	1	-3.532e-4	1	800.163	2	NC	1
437		10	max	.009	3	.031	2	0	15	-1.883e-5	15	NC	5	NC	1
438			min	-.009	2	-.025	3	-.008	1	-4.605e-4	1	781.912	2	NC	1
439		11	max	.009	3	.03	2	0	15	-2.321e-5	15	NC	5	NC	2
440			min	-.009	2	-.024	3	-.012	1	-5.679e-4	1	783.573	2	6798.551	1
441		12	max	.009	3	.028	2	0	15	-2.759e-5	15	NC	5	NC	2
442			min	-.009	2	-.022	3	-.015	1	-6.752e-4	1	806.105	2	4496.915	1
443		13	max	.009	3	.025	2	0	15	-3.197e-5	15	NC	5	NC	2
444			min	-.009	2	-.019	3	-.018	1	-7.825e-4	1	854.106	2	3526.951	1
445		14	max	.009	3	.019	2	0	15	-3.635e-5	15	NC	5	NC	3
446			min	-.009	2	-.015	3	-.019	1	-8.898e-4	1	938.129	2	3083.671	1
447		15	max	.008	3	.012	2	0	15	-4.073e-5	15	NC	5	NC	3
448			min	-.009	2	-.009	3	-.019	1	-9.972e-4	1	1081.276	2	2955.279	1
449		16	max	.008	3	.004	1	0	15	-4.383e-5	15	NC	5	NC	3
450			min	-.009	2	-.003	3	-.018	1	-1.074e-3	1	1339.869	2	3128.828	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
451		17	max	.008	3	.005	3	0	15	2.395e-5	3	NC	4	NC	2
452			min	-.009	2	-.007	2	-.015	1	-4.318e-4	1	1892.756	2	3827.137	1
453		18	max	.008	3	.013	3	0	15	3.553e-3	3	NC	4	NC	2
454			min	-.009	2	-.019	2	-.01	1	-8.377e-3	2	3656.478	2	6370.138	1
455		19	max	.008	3	.022	3	0	3	7.145e-3	3	NC	1	NC	1
456			min	-.009	2	-.032	2	-.002	1	-1.672e-2	2	NC	1	NC	1
457	M13	1	max	.008	1	.026	3	.009	3	4.097e-3	3	NC	1	NC	1
458			min	-.001	3	-.026	1	-.009	2	-4.22e-3	1	NC	1	NC	1
459		2	max	.008	1	.181	3	.054	1	4.947e-3	3	NC	5	NC	3
460			min	-.001	3	-.169	1	0	10	-5.14e-3	1	1239.457	3	3273.687	1
461		3	max	.008	1	.308	3	.135	1	5.798e-3	3	NC	5	NC	3
462			min	-.001	3	-.286	1	.006	15	-6.059e-3	1	681.453	3	1372.085	1
463		4	max	.008	1	.388	3	.204	1	6.648e-3	3	NC	5	NC	3
464			min	-.001	3	-.36	1	.009	15	-6.979e-3	1	530.958	3	920.455	1
465		5	max	.007	1	.411	3	.237	1	7.499e-3	3	NC	5	NC	3
466			min	-.001	3	-.383	1	.01	15	-7.898e-3	1	498.008	3	793.099	1
467		6	max	.007	1	.381	3	.226	1	8.349e-3	3	NC	5	NC	3
468			min	-.002	3	-.355	1	.01	15	-8.818e-3	1	541.528	3	832.609	1
469		7	max	.007	1	.306	3	.172	1	9.199e-3	3	NC	5	NC	3
470			min	-.002	3	-.287	1	.007	10	-9.737e-3	1	686.558	3	1084.581	1
471		8	max	.007	1	.208	3	.092	1	1.005e-2	3	NC	5	NC	3
472			min	-.002	3	-.198	1	-.003	10	-1.066e-2	1	1055.998	3	1979.675	1
473		9	max	.007	1	.118	3	.024	3	1.09e-2	3	NC	4	NC	1
474			min	-.002	3	-.116	1	-.015	2	-1.158e-2	1	2087.325	3	NC	1
475		10	max	.007	1	.077	3	.025	3	1.175e-2	3	NC	4	NC	1
476			min	-.002	3	-.079	1	-.03	2	-1.25e-2	1	3607.5	1	9140.427	2
477		11	max	.007	1	.118	3	.03	3	1.09e-2	3	NC	4	NC	2
478			min	-.002	3	-.116	1	-.014	2	-1.158e-2	1	2087.323	3	8007.204	1
479		12	max	.007	1	.208	3	.1	1	1.005e-2	3	NC	5	NC	5
480			min	-.002	3	-.198	1	-.003	10	-1.066e-2	1	1055.998	3	1821.371	1
481		13	max	.006	1	.306	3	.182	1	9.201e-3	3	NC	5	NC	5
482			min	-.002	3	-.287	1	.007	10	-9.736e-3	1	686.557	3	1026.299	1
483		14	max	.006	1	.381	3	.236	1	8.351e-3	3	NC	5	NC	5
484			min	-.002	3	-.355	1	.01	15	-8.816e-3	1	541.528	3	797.016	1
485		15	max	.006	1	.412	3	.247	1	7.502e-3	3	NC	5	NC	5
486			min	-.002	3	-.383	1	.01	15	-7.896e-3	1	498.008	3	763.375	1
487		16	max	.006	1	.388	3	.211	1	6.652e-3	3	NC	5	NC	5
488			min	-.002	3	-.36	1	.009	15	-6.976e-3	1	530.958	3	887.692	1
489		17	max	.006	1	.308	3	.14	1	5.802e-3	3	NC	5	NC	3
490			min	-.002	3	-.286	1	.006	15	-6.057e-3	1	681.453	3	1321.307	1
491		18	max	.006	1	.181	3	.056	1	4.952e-3	3	NC	5	NC	3
492			min	-.002	3	-.169	1	0	10	-5.137e-3	1	1239.457	3	3128.38	1
493		19	max	.006	1	.026	3	.009	3	4.103e-3	3	NC	1	NC	1
494			min	-.002	3	-.025	1	-.009	2	-4.217e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.022	3	.008	3	5.037e-3	2	NC	1	NC	1
496			min	0	3	-.032	2	-.009	2	-3.313e-3	3	NC	1	NC	1
497		2	max	.002	1	.095	3	.057	1	6.124e-3	2	NC	5	NC	3
498			min	0	3	-.205	2	0	10	-3.969e-3	3	1114.758	2	3057.342	1
499		3	max	.003	1	.156	3	.142	1	7.21e-3	2	NC	5	NC	3
500			min	0	3	-.346	2	.006	15	-4.626e-3	3	612.416	2	1305.838	1
501		4	max	.003	1	.195	3	.212	1	8.297e-3	2	NC	5	NC	5
502			min	0	3	-.435	2	.009	15	-5.282e-3	3	476.49	2	882.732	1
503		5	max	.003	1	.208	3	.246	1	9.384e-3	2	NC	5	NC	5
504			min	0	3	-.463	2	.01	15	-5.938e-3	3	445.849	2	762.658	1
505		6	max	.003	1	.196	3	.235	1	1.047e-2	2	NC	5	NC	5
506			min	0	3	-.43	2	.01	15	-6.594e-3	3	482.803	2	799.955	1
507		7	max	.003	1	.164	3	.18	1	1.156e-2	2	NC	5	NC	5

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
508			min	0	3	-.349	2	.007	10	-7.25e-3	3	607.321	2	1036.386	1
509		8	max	.003	1	.12	3	.098	1	1.264e-2	2	NC	5	NC	5
510			min	0	3	-.242	2	-.003	10	-7.906e-3	3	918.227	2	1860.942	1
511		9	max	.003	1	.08	3	.028	3	1.373e-2	2	NC	4	NC	2
512			min	0	3	-.143	2	-.015	2	-8.562e-3	3	1735.975	2	8664.082	1
513		10	max	.003	1	.061	3	.024	3	1.482e-2	2	NC	4	NC	1
514			min	0	3	-.098	2	-.03	2	-9.218e-3	3	2922.754	2	9176.41	2
515		11	max	.003	1	.08	3	.025	3	1.373e-2	2	NC	4	NC	2
516			min	0	3	-.143	2	-.014	2	-8.562e-3	3	1735.975	2	9331.17	1
517		12	max	.003	1	.12	3	.095	1	1.265e-2	2	NC	5	NC	3
518			min	0	3	-.242	2	-.003	10	-7.905e-3	3	918.227	2	1917.32	1
519		13	max	.004	1	.164	3	.176	1	1.156e-2	2	NC	5	NC	5
520			min	0	3	-.349	2	.007	10	-7.248e-3	3	607.321	2	1060.64	1
521		14	max	.004	1	.196	3	.23	1	1.047e-2	2	NC	5	NC	5
522			min	0	3	-.43	2	.01	15	-6.591e-3	3	482.803	2	817.254	1
523		15	max	.004	1	.208	3	.241	1	9.385e-3	2	NC	5	NC	5
524			min	0	3	-.463	2	.01	15	-5.934e-3	3	445.849	2	779.545	1
525		16	max	.004	1	.195	3	.207	1	8.299e-3	2	NC	5	NC	3
526			min	0	3	-.435	2	.009	15	-5.277e-3	3	476.49	2	904.542	1
527		17	max	.004	1	.156	3	.137	1	7.212e-3	2	NC	5	NC	3
528			min	0	3	-.346	2	.006	15	-4.621e-3	3	612.416	2	1345.556	1
529		18	max	.004	1	.095	3	.055	1	6.125e-3	2	NC	5	NC	3
530			min	0	3	-.205	2	0	10	-3.964e-3	3	1114.758	2	3190.945	1
531		19	max	.004	1	.022	3	.008	3	5.039e-3	2	NC	1	NC	1
532			min	0	3	-.032	2	-.009	2	-3.307e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.76e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-8.315e-5	2	NC	1	NC	1
535		2	max	0	3	-.006	15	.001	1	8.745e-4	3	NC	5	NC	1
536			min	0	10	-.025	4	0	3	-6.306e-4	2	4103.476	4	NC	1
537		3	max	0	3	-.012	15	.004	1	1.373e-3	3	8883.158	15	NC	1
538			min	0	10	-.05	4	-.003	3	-1.178e-3	1	2088.119	4	NC	1
539		4	max	0	3	-.017	15	.008	1	1.872e-3	3	6094.365	15	NC	4
540			min	0	10	-.073	4	-.007	3	-1.753e-3	1	1432.572	4	8212.859	2
541		5	max	0	3	-.022	15	.013	1	2.37e-3	3	4755.495	15	NC	4
542			min	0	10	-.093	4	-.012	3	-2.328e-3	1	1117.85	4	5479.863	2
543		6	max	0	3	-.026	15	.018	1	2.869e-3	3	4002.252	15	NC	4
544			min	0	10	-.111	4	-.017	3	-2.902e-3	1	940.789	4	4036.279	2
545		7	max	0	3	-.029	15	.024	1	3.367e-3	3	3549.275	15	NC	4
546			min	0	10	-.125	4	-.022	3	-3.477e-3	1	834.31	4	3182.252	2
547		8	max	0	3	-.032	15	.029	1	3.866e-3	3	3277.421	15	NC	4
548			min	0	10	-.135	4	-.027	3	-4.052e-3	1	770.407	4	2641.041	2
549		9	max	0	3	-.033	15	.034	1	4.365e-3	3	3131.093	15	NC	4
550			min	0	10	-.142	4	-.032	3	-4.626e-3	1	736.01	4	2279.568	3
551		10	max	0	3	-.034	15	.037	1	4.863e-3	3	3084.802	15	NC	4
552			min	0	10	-.144	4	-.036	3	-5.201e-3	1	725.129	4	2036.635	3
553		11	max	0	3	-.033	15	.04	1	5.362e-3	3	3131.093	15	NC	4
554			min	0	10	-.142	4	-.038	3	-5.776e-3	1	736.01	4	1882.499	3
555		12	max	0	3	-.032	15	.041	1	5.86e-3	3	3277.421	15	NC	5
556			min	0	10	-.136	4	-.039	3	-6.351e-3	1	770.407	4	1799.149	3
557		13	max	0	3	-.029	15	.04	1	6.359e-3	3	3549.275	15	NC	5
558			min	0	10	-.125	4	-.038	3	-6.925e-3	1	834.31	4	1781.374	3
559		14	max	0	3	-.026	15	.037	1	6.857e-3	3	4002.252	15	NC	4
560			min	0	10	-.111	4	-.034	3	-7.5e-3	1	940.789	4	1836.961	3
561		15	max	0	3	-.022	15	.031	1	7.356e-3	3	4755.495	15	NC	4
562			min	0	10	-.094	4	-.028	3	-8.075e-3	1	1117.85	4	1994.466	3
563		16	max	.001	3	-.017	15	.022	1	7.854e-3	3	6094.365	15	NC	4
564			min	0	10	-.074	4	-.019	3	-8.649e-3	1	1432.572	4	2331.413	3

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
565		17	max	.001	3	-.012	15	.009	1	8.353e-3	3	8883.158	15	NC	4
566			min	0	10	-.051	4	-.006	3	-9.224e-3	1	2088.119	4	3091.011	3
567		18	max	.001	3	-.006	15	.01	3	8.852e-3	3	NC	5	NC	4
568			min	0	10	-.027	4	-.013	2	-9.799e-3	1	4103.476	4	5503.56	3
569		19	max	.001	3	.003	2	.031	3	9.35e-3	3	NC	1	NC	1
570			min	0	10	-.003	9	-.034	2	-1.037e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.01	3	3.153e-3	3	NC	1	NC	1
572			min	-.001	3	-.002	1	-.01	2	-3.147e-3	2	NC	1	NC	1
573		2	max	0	10	-.006	15	.006	1	3.02e-3	3	NC	5	NC	2
574			min	-.001	3	-.026	4	-.002	10	-3.004e-3	2	4103.476	4	8629.704	1
575		3	max	0	10	-.012	15	.015	1	2.887e-3	3	8883.158	15	NC	4
576			min	-.001	3	-.05	4	-.003	3	-2.862e-3	2	2088.119	4	4876.88	1
577		4	max	0	10	-.017	15	.022	1	2.754e-3	3	6094.365	15	NC	4
578			min	-.001	3	-.073	4	-.008	3	-2.719e-3	2	1432.572	4	3704.218	1
579		5	max	0	10	-.022	15	.027	1	2.621e-3	3	4755.495	15	NC	4
580			min	0	3	-.094	4	-.011	3	-2.576e-3	2	1117.85	4	3194.165	1
581		6	max	0	10	-.026	15	.03	1	2.487e-3	3	4002.252	15	NC	4
582			min	0	3	-.111	4	-.013	3	-2.434e-3	2	940.789	4	2968.895	1
583		7	max	0	10	-.029	15	.031	1	2.354e-3	3	3549.275	15	NC	4
584			min	0	3	-.125	4	-.014	3	-2.291e-3	2	834.31	4	2909.694	1
585		8	max	0	10	-.032	15	.031	1	2.221e-3	3	3277.421	15	NC	4
586			min	0	3	-.135	4	-.014	3	-2.148e-3	2	770.407	4	2975.466	1
587		9	max	0	10	-.033	15	.029	1	2.088e-3	3	3131.093	15	NC	4
588			min	0	3	-.141	4	-.013	3	-2.006e-3	2	736.01	4	3159.692	1
589		10	max	0	10	-.034	15	.026	1	1.955e-3	3	3084.802	15	NC	4
590			min	0	3	-.144	4	-.012	3	-1.863e-3	2	725.129	4	3480.141	1
591		11	max	0	10	-.033	15	.023	1	1.821e-3	3	3131.093	15	NC	4
592			min	0	3	-.141	4	-.01	3	-1.72e-3	2	736.01	4	3982.353	1
593		12	max	0	10	-.032	15	.019	1	1.688e-3	3	3277.421	15	NC	4
594			min	0	3	-.135	4	-.008	3	-1.578e-3	2	770.407	4	4756.745	1
595		13	max	0	10	-.029	15	.015	1	1.555e-3	3	3549.275	15	NC	3
596			min	0	3	-.125	4	-.006	3	-1.435e-3	2	834.31	4	5982.428	1
597		14	max	0	10	-.026	15	.011	1	1.422e-3	3	4002.252	15	NC	2
598			min	0	3	-.111	4	-.004	3	-1.292e-3	2	940.789	4	8042.154	1
599		15	max	0	10	-.022	15	.007	1	1.289e-3	3	4755.495	15	NC	1
600			min	0	3	-.093	4	-.002	3	-1.15e-3	2	1117.85	4	NC	1
601		16	max	0	10	-.017	15	.004	1	1.155e-3	3	6094.365	15	NC	1
602			min	0	3	-.073	4	0	3	-1.007e-3	2	1432.572	4	NC	1
603		17	max	0	10	-.012	15	.002	1	1.022e-3	3	8883.158	15	NC	1
604			min	0	3	-.05	4	0	10	-8.644e-4	2	2088.119	4	NC	1
605		18	max	0	10	-.006	15	0	3	8.89e-4	3	NC	5	NC	1
606			min	0	3	-.025	4	0	2	-7.218e-4	2	4103.476	4	NC	1
607		19	max	0	1	0	1	0	1	7.558e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.791e-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

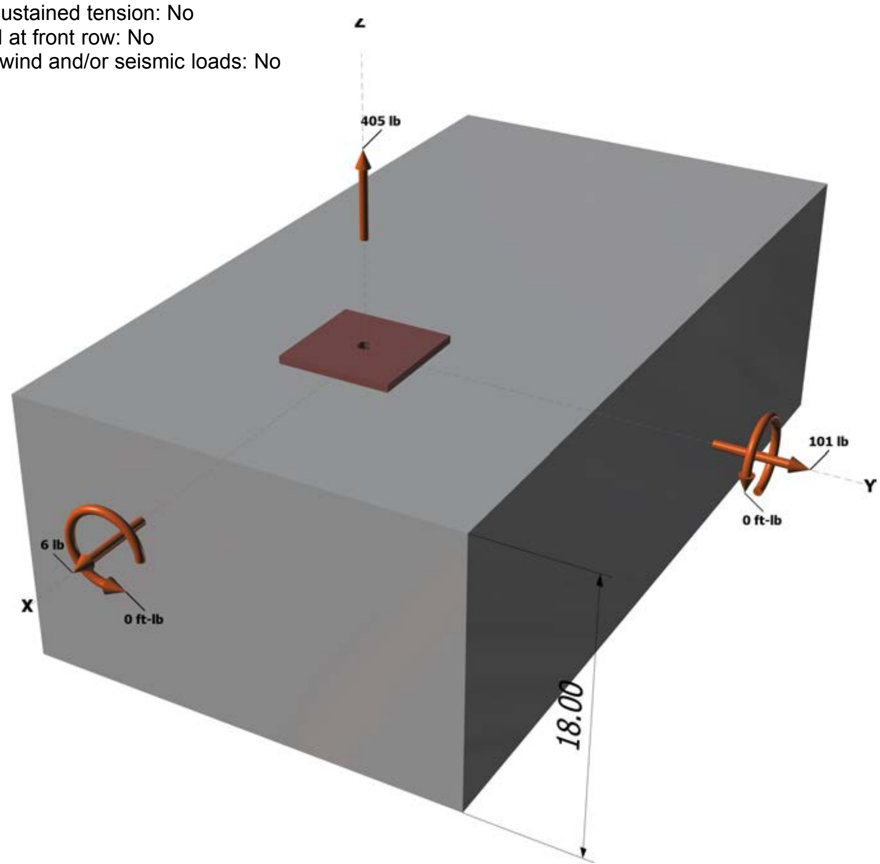
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

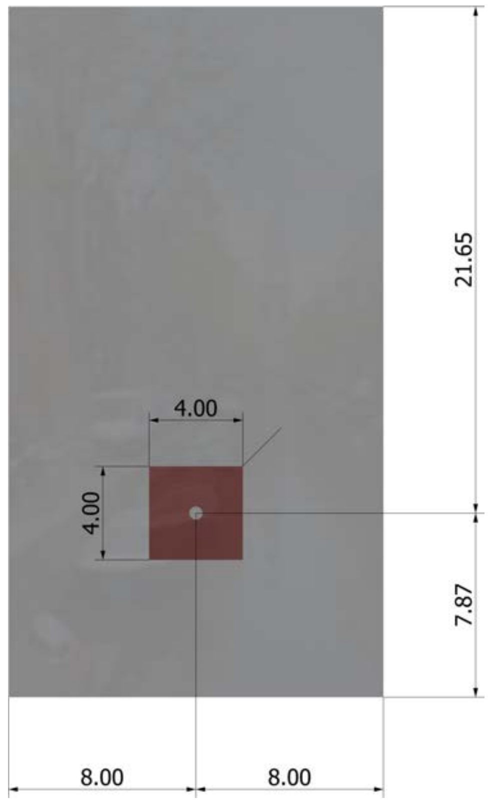
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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>



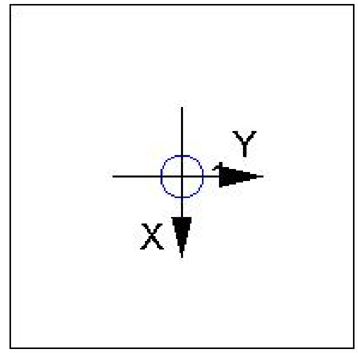
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.

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

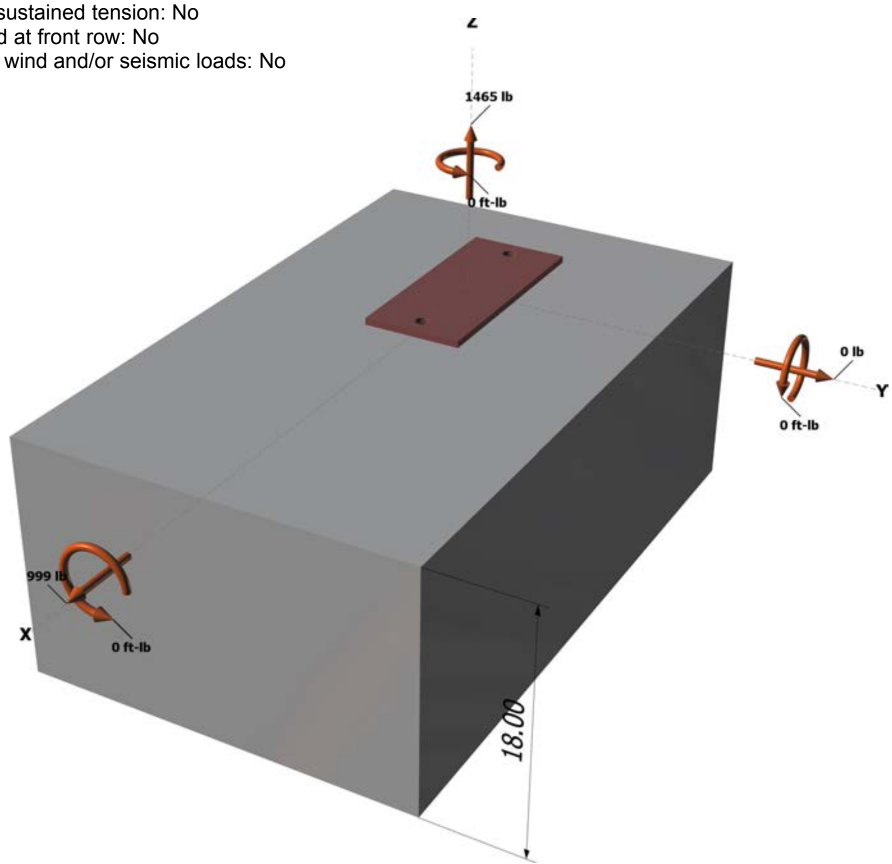
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

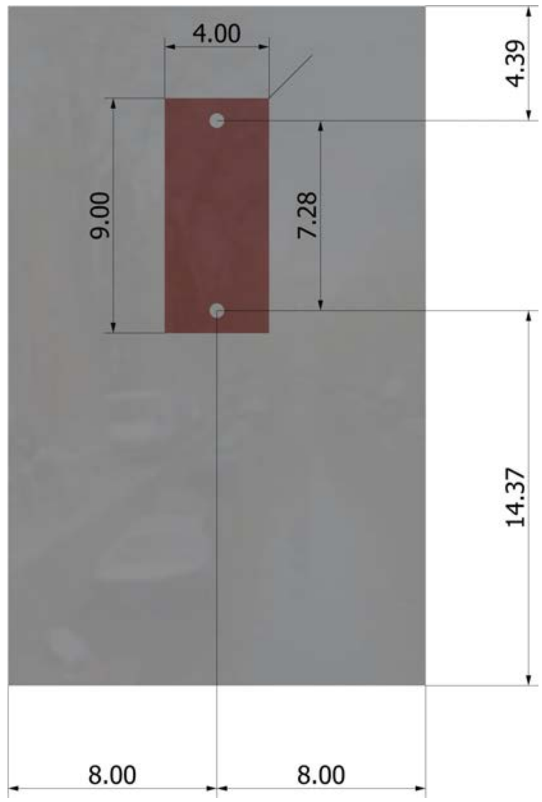
<Figure 1>

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 2>



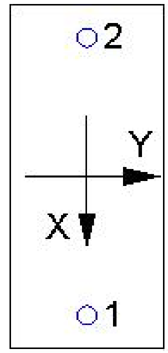
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, øN_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, øV_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.