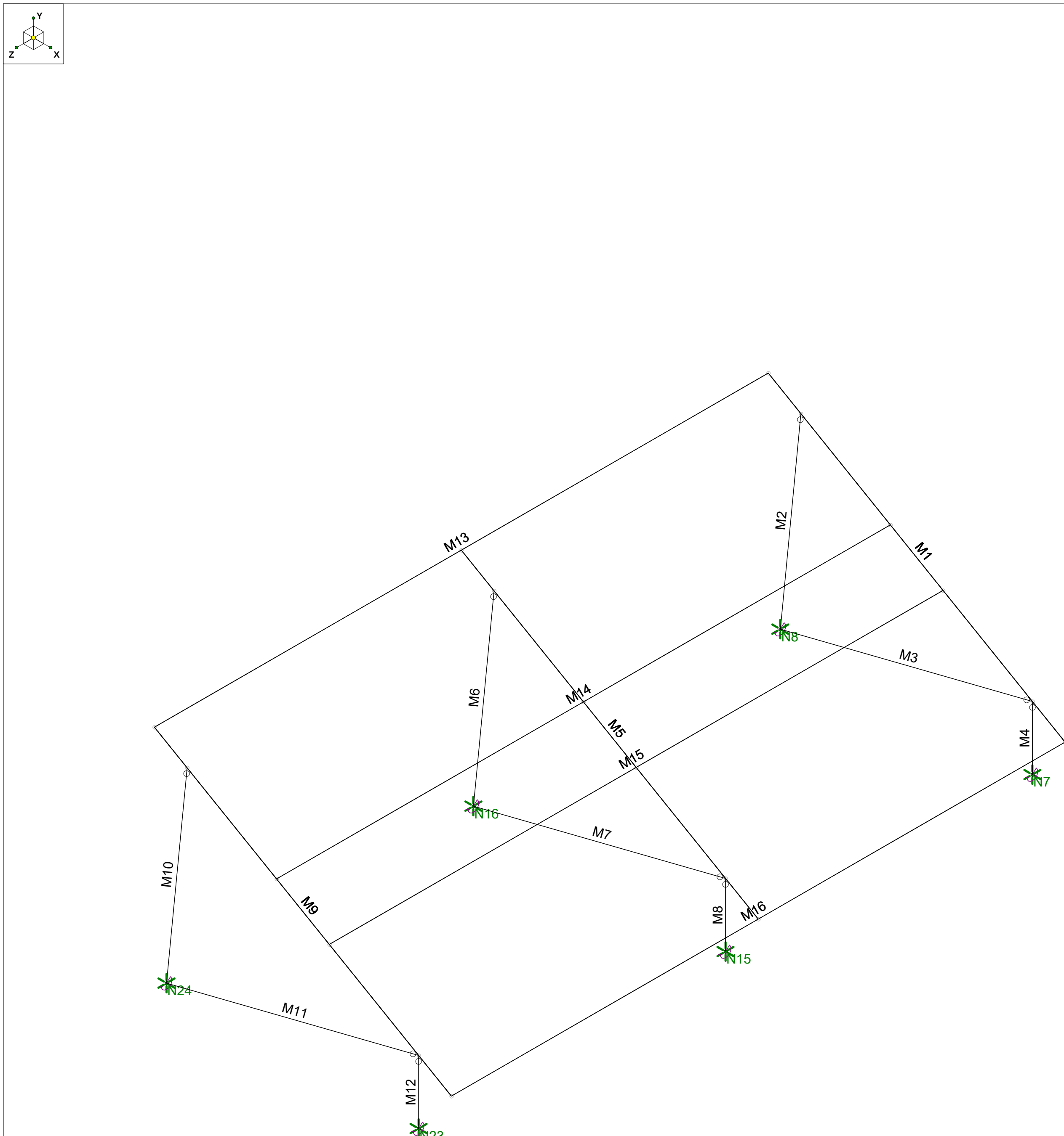


Schletter, Inc.		30° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

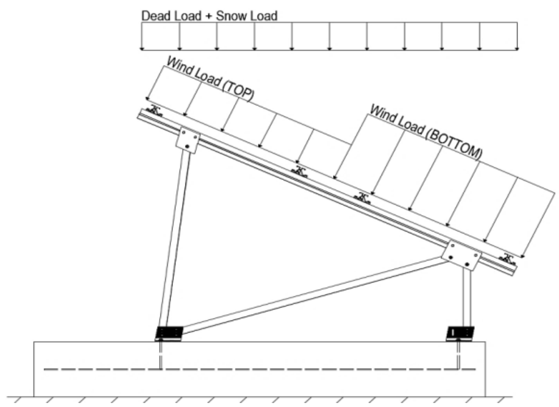
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 =	2000 mm	Height =	1900 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

Modules Per Row = 2
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 = 100 mph Exposure Category = C
Height < 15 ft Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.150	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.850	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.600	
$Cf-_{TOP, INNER PURLIN}$	=	-2.000	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.100	

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

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.07	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} *(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)*
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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} *(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)*
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

^{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.

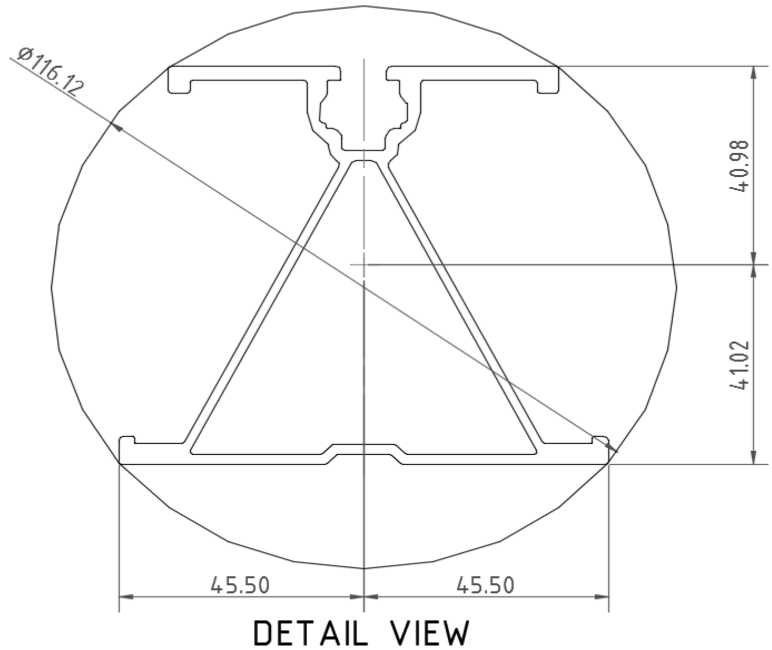
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer
Front Struts	Location				
M4	Outer				
M8	Inner				
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).

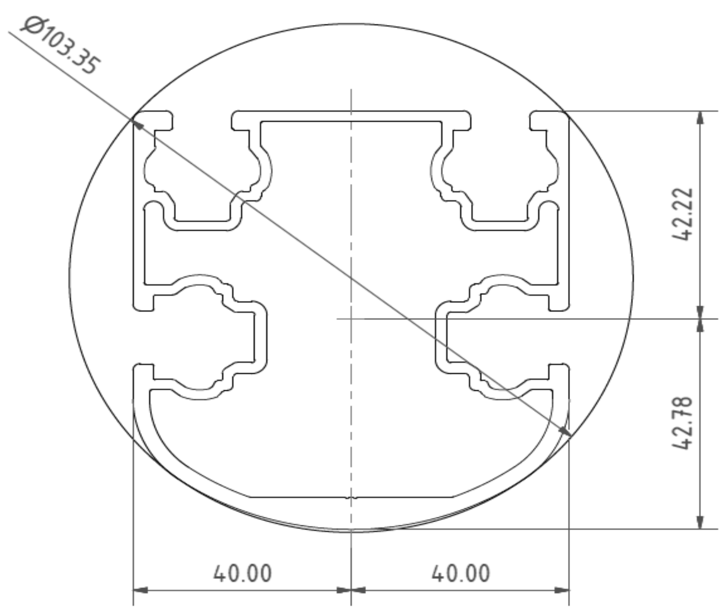
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	105	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.527	k-ft
M_z =	0.311	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	82%	



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).

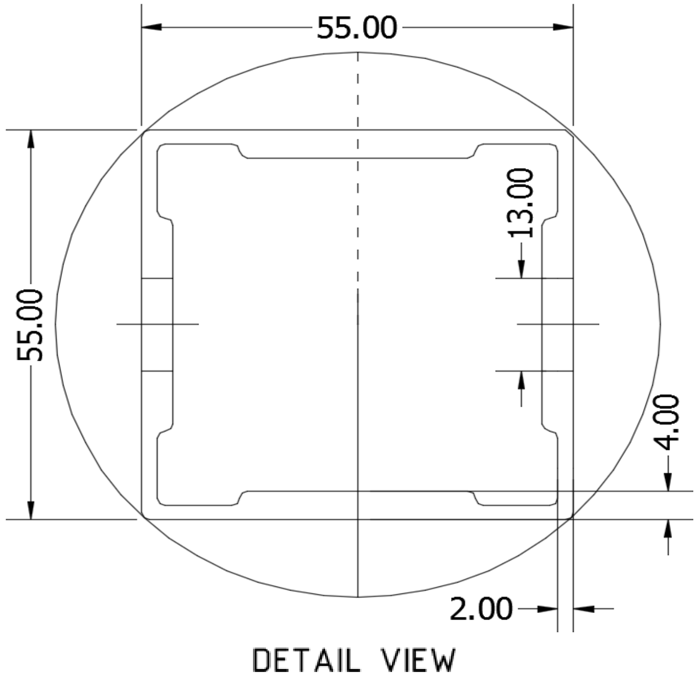
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.272	k-ft
M_z =	0.000	k-ft
P_n =	-0.933	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	97%	



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 M12 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

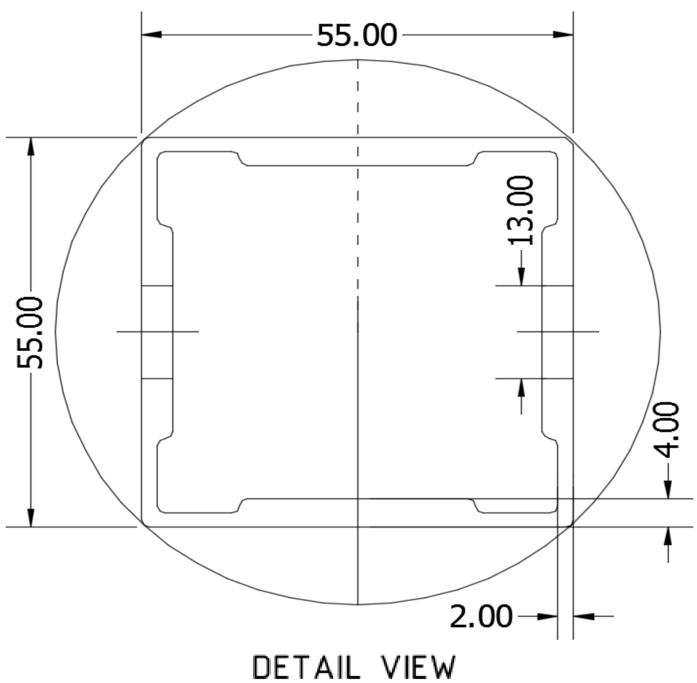
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.588	k-ft
P_n =	0.126	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	42%	



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 M12 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

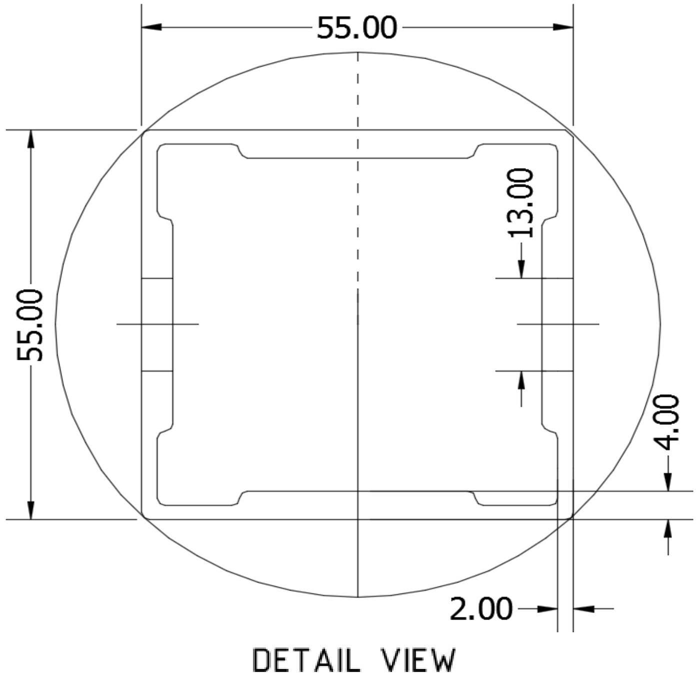
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.496	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	42%	



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 M12 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.35	in
$\Phi F_{ty\ AXIAL}$ =	8.88	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.159	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.726	k
Utilization =	37%	



5. FOUNDATION DESIGN CALCULATIONS

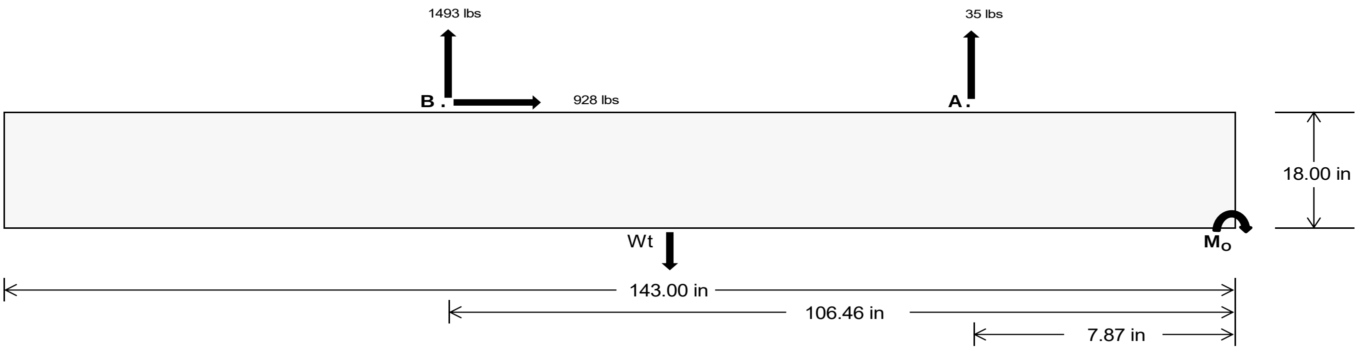
5.1 Helical Pile Foundations

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 =	160.55	6220.23	k
Compressive Load =	3462.94	4885.58	k
Lateral Load =	388.67	3861.51	k
Moment (Weak Axis) =	0.76	0.28	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 (2) #5 rebar.

Overturning Check

M_O =	175897.3 in-lbs
Resisting Force Required =	2460.10 lbs
S.F. =	1.67
Weight Required =	4100.17 lbs
Minimum Width =	35 in in
Weight Provided =	7559.64 lbs

A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	928.21 lbs
Friction =	0.4
Weight Required =	2320.53 lbs
Resisting Weight =	7559.64 lbs
Additional Weight Required =	0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	928.21 lbs
Cohesion =	130 psf
Area =	34.76 ft^2
Resisting =	3779.82 lbs
Additional Weight Required =	0 lbs

Use a 143in long x 35in 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			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1226 lbs	1226 lbs	1226 lbs	1226 lbs	1268 lbs	1268 lbs	1268 lbs	1268 lbs	1741 lbs	1741 lbs	1741 lbs	1741 lbs	-71 lbs	-71 lbs	-71 lbs	-71 lbs
F_B	1213 lbs	1213 lbs	1213 lbs	1213 lbs	2112 lbs	2112 lbs	2112 lbs	2112 lbs	2366 lbs	2366 lbs	2366 lbs	2366 lbs	-2985 lbs	-2985 lbs	-2985 lbs	-2985 lbs
F_V	171 lbs	171 lbs	171 lbs	171 lbs	1681 lbs	1681 lbs	1681 lbs	1681 lbs	1373 lbs	1373 lbs	1373 lbs	1373 lbs	-1856 lbs	-1856 lbs	-1856 lbs	-1856 lbs
P_{total}	9998 lbs	10214 lbs	10430 lbs	10646 lbs	10940 lbs	11156 lbs	11372 lbs	11588 lbs	11667 lbs	11883 lbs	12099 lbs	12315 lbs	1479 lbs	1609 lbs	1739 lbs	1868 lbs
M	3224 lbs-ft	3224 lbs-ft	3224 lbs-ft	3224 lbs-ft	3096 lbs-ft	3096 lbs-ft	3096 lbs-ft	3096 lbs-ft	4399 lbs-ft	4399 lbs-ft	4399 lbs-ft	4399 lbs-ft	5536 lbs-ft	5536 lbs-ft	5536 lbs-ft	5536 lbs-ft
e	0.32 ft	0.32 ft	0.31 ft	0.30 ft	0.28 ft	0.28 ft	0.27 ft	0.27 ft	0.38 ft	0.37 ft	0.36 ft	0.36 ft	3.74 ft	3.44 ft	3.18 ft	2.96 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	240.9 psf	240.3 psf	239.7 psf	239.1 psf	269.9 psf	268.4 psf	267.1 psf	265.8 psf	272.0 psf	270.4 psf	269.0 psf	267.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	334.4 psf	331.1 psf	328.0 psf	325.1 psf	359.6 psf	355.6 psf	351.9 psf	348.4 psf	399.4 psf	394.4 psf	389.6 psf	385.0 psf	152.6 psf	142.0 psf	135.5 psf	131.3 psf

Maximum Bearing Pressure = 399 psf
Allowable Bearing Pressure = 1500 psf

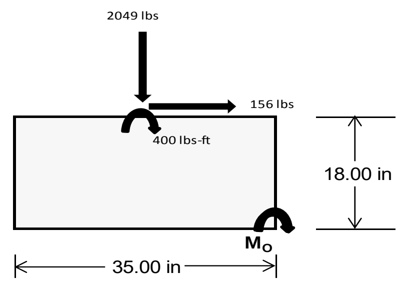
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 2353.6 ft-lbs
Resisting Force Required = 1613.90 lbs
S.F. = 1.67
Weight Required = 2689.83 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in 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	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	324 lbs	635 lbs	197 lbs	805 lbs	2049 lbs	707 lbs	139 lbs	186 lbs	13 lbs
F_V	218 lbs	212 lbs	223 lbs	159 lbs	156 lbs	175 lbs	219 lbs	213 lbs	221 lbs
P_{total}	9683 lbs	9993 lbs	9555 lbs	9714 lbs	10958 lbs	9616 lbs	2876 lbs	2922 lbs	2749 lbs
M	854 lbs-ft	839 lbs-ft	870 lbs-ft	634 lbs-ft	634 lbs-ft	684 lbs-ft	854 lbs-ft	836 lbs-ft	859 lbs-ft
e	0.09 ft	0.08 ft	0.09 ft	0.07 ft	0.06 ft	0.07 ft	0.30 ft	0.29 ft	0.31 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	228.0 psf	237.9 psf	223.5 psf	242.0 psf	277.7 psf	236.2 psf	32.2 psf	34.6 psf	28.2 psf
f_{max}	329.1 psf	337.2 psf	326.4 psf	317.0 psf	352.8 psf	317.1 psf	133.3 psf	133.5 psf	130.0 psf

Maximum Bearing Pressure = 353 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 143in long x 32in wide x 18in tall ballast foundation and fiber reinforcing with (2) #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.

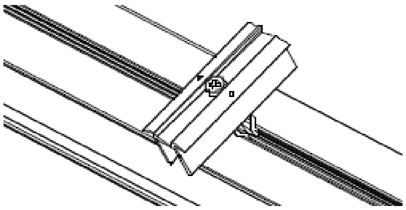
6. DESIGN OF JOINTS AND CONNECTIONS

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 80mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

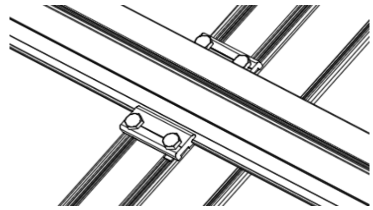
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.720	k
Allowable Uplift =	1.214	k
Utilization =	59%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.246	k
Allowable Uplift =	4.357	k
Utilization =	52%	



6.2 Strut Connections

The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 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 =	2.664	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	36%	

Rear Strut

Maximum Axial Load =	4.182	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	56%	

Diagonal Strut

Maximum Axial Load =	2.613	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	35%	

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 M12 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

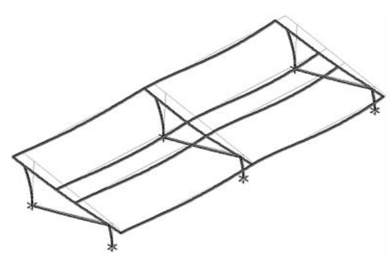
7.1 Seismic Drift

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

Mean Height, h_{sx} =	60.93	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.219	in
Max Drift, Δ_{MAX} =	0.826	in

$0.826 \leq 1.219$, OK.

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 105 in

J = 0.432

290.479

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

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= 27.8 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in³

$M_{max}St$ = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 105

J = 0.432

184.727

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

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= 28.9

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in³

$M_{max}Wk$ = 1.152 k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.9 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= 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 104.56 in
J = 1.08
179.85

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

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= 29.0 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 31.6 ksi

Weak Axis:

3.4.14

L_b = 104.56
J = 1.08
190.335

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

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= 28.9

3.4.16

b/t = 7.4

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

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 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

M_{max}St = 3.323 k-ft

φF_LWk= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

M_{max}Wk = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

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= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

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= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 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= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

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= 29.4 ksi

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

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= 29.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

$M_{max}St$ = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

$M_{max}Wk$ = 1.460 k-ft

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 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= 6.11 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 6.29 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 78.35 in
J = 0.942
122.273

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

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 = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

Weak Axis:

3.4.14

L_b = 78.35
J = 0.942
122.273

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

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 = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.8125

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83375

φF_L= (φccFcy)/(λ²)

φF_L= 8.88278 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 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

$\varphi F_L =$ 8.88 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.14 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				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.8			8		

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	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	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	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	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	-46.866	-46.866	0	0
2	M14	Y	-46.866	-46.866	0	0
3	M15	Y	-46.866	-46.866	0	0
4	M16	Y	-46.866	-46.866	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	-59.239	-59.239	0	0
2	M14	y	-59.239	-59.239	0	0
3	M15	y	-95.298	-95.298	0	0
4	M16	y	-95.298	-95.298	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	133.932	133.932	0	0
2	M14	y	103.025	103.025	0	0
3	M15	y	56.664	56.664	0	0
4	M16	y	56.664	56.664	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	7.874	7.874	0	0
2	M14	Z	7.874	7.874	0	0
3	M15	Z	7.874	7.874	0	0
4	M16	Z	7.874	7.874	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
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	791.19	2	1197.763	2	.698	1	.003	1	0	1	0	1
2		min	-966.731	3	-1503.902	3	-35.901	5	-.216	4	0	1	0	1
3	N7	max	.034	9	1035.813	1	-.921	12	-.002	12	0	1	0	1
4		min	-.225	2	-68.419	5	-298.98	4	-.588	4	0	1	0	1
5	N15	max	.013	9	2663.797	1	0	1	0	1	0	1	0	1
6		min	-2.302	2	-123.5	3	-281.173	4	-.562	4	0	1	0	1
7	N16	max	2747.408	2	3758.136	2	0	9	0	2	0	1	0	1
8		min	-2970.391	3	-4784.792	3	-35.914	5	-.218	4	0	1	0	1
9	N23	max	.047	14	1035.813	1	14.072	1	.027	1	0	1	0	1
10		min	-.225	2	-7.27	3	-288.452	5	-.571	4	0	1	0	1
11	N24	max	791.19	2	1197.763	2	-.058	12	0	12	0	1	0	1
12		min	-966.731	3	-1503.902	3	-36.712	5	-.218	4	0	1	0	1
13	Totals:	max	4327.036	2	10254.731	2	0	1						
14		min	-4903.99	3	-7930.636	3	-970.435	4						

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	M13	1	max	80.526	1	406.928	2	-10	12	0	15	.226	1	0	4
2			min	5.73	12	-686.711	3	-183.801	1	-.015	2	.016	12	0	3
3		2	max	80.526	1	283.584	2	-7.97	12	0	15	.135	4	.569	3
4			min	5.73	12	-483.645	3	-140.731	1	-.015	2	.006	10	-.336	2
5		3	max	80.526	1	160.24	2	-5.941	12	0	15	.078	5	.94	3
6			min	5.73	12	-280.579	3	-97.66	1	-.015	2	-.048	1	-.551	2
7		4	max	80.526	1	37.119	1	-3.911	12	0	15	.043	5	1.114	3
8			min	5.73	12	-77.513	3	-54.59	1	-.015	2	-.122	1	-.647	2
9		5	max	80.526	1	125.553	3	-.6	10	0	15	.01	5	1.091	3
10			min	5.73	12	-86.448	2	-35.209	4	-.015	2	-.154	1	-.623	2
11		6	max	80.526	1	328.619	3	31.551	1	0	15	-.008	12	.87	3
12			min	1.787	15	-209.792	2	-28.686	5	-.015	2	-.144	1	-.479	2
13		7	max	80.526	1	531.685	3	74.622	1	0	15	-.007	12	.452	3
14			min	-8.59	5	-333.136	2	-25.597	5	-.015	2	-.093	1	-.217	1
15		8	max	80.526	1	734.751	3	117.692	1	0	15	.004	2	.169	2
16			min	-20.063	5	-456.481	2	-22.508	5	-.015	2	-.07	4	-.163	3
17		9	max	80.526	1	937.817	3	160.763	1	0	15	.136	1	.672	2
18			min	-31.536	5	-579.825	2	-19.419	5	-.015	2	-.089	5	-.977	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
19		10	max	80.526	1	1140.883	3	203.833	1	.015	2	.313	1	1.296	2
20			min	5.73	12	-703.169	2	-127.393	14	-.002	3	.009	12	-1.987	3
21		11	max	80.526	1	579.825	2	-6.236	12	.015	2	.141	4	.672	2
22			min	5.73	12	-937.817	3	-160.763	1	0	15	.002	12	-.977	3
23		12	max	80.526	1	456.481	2	-4.206	12	.015	2	.07	4	.169	2
24			min	5.73	12	-734.751	3	-117.692	1	0	15	-.006	3	-.163	3
25		13	max	80.526	1	333.136	2	-2.177	12	.015	2	.032	5	.452	3
26			min	5.73	12	-531.685	3	-74.622	1	0	15	-.093	1	-.217	1
27		14	max	80.526	1	209.792	2	-.094	3	.015	2	0	15	.87	3
28			min	5.677	15	-328.619	3	-40.803	4	0	15	-.144	1	-.479	2
29		15	max	80.526	1	86.448	2	11.519	1	.015	2	-.007	12	1.091	3
30			min	-2.883	5	-125.553	3	-30.01	5	0	15	-.154	1	-.623	2
31		16	max	80.526	1	77.513	3	54.59	1	.015	2	-.004	12	1.114	3
32			min	-14.355	5	-37.119	1	-26.921	5	0	15	-.122	1	-.647	2
33		17	max	80.526	1	280.579	3	97.66	1	.015	2	.001	3	.94	3
34			min	-25.828	5	-160.24	2	-23.832	5	0	15	-.097	4	-.551	2
35		18	max	80.526	1	483.645	3	140.731	1	.015	2	.068	1	.569	3
36			min	-37.301	5	-283.584	2	-20.743	5	0	15	-.106	5	-.336	2
37		19	max	80.526	1	686.711	3	183.801	1	.015	2	.226	1	0	1
38			min	-48.774	5	-406.928	2	-17.654	5	0	15	-.125	5	0	3
39	M14	1	max	50.952	4	461.07	2	-10.353	12	.012	3	.304	4	0	4
40			min	2.982	12	-556.649	3	-191.101	1	-.014	2	.018	12	0	3
41		2	max	47.443	1	337.726	2	-8.324	12	.012	3	.205	4	.466	3
42			min	2.982	12	-401.661	3	-148.031	1	-.014	2	.009	12	-.388	2
43		3	max	47.443	1	214.382	2	-6.294	12	.012	3	.12	5	.781	3
44			min	2.982	12	-246.672	3	-104.96	1	-.014	2	-.02	1	-.657	2
45		4	max	47.443	1	91.038	2	-4.265	12	.012	3	.067	5	.945	3
46			min	2.982	12	-91.684	3	-69.143	4	-.014	2	-.101	1	-.805	2
47		5	max	47.443	1	63.304	3	-1.499	10	.012	3	.016	5	.959	3
48			min	-5.888	5	-34.796	1	-56.092	4	-.014	2	-.14	1	-.834	2
49		6	max	47.443	1	218.293	3	24.251	1	.012	3	-.007	12	.822	3
50			min	-17.361	5	-155.651	2	-47.487	5	-.014	2	-.137	1	-.742	2
51		7	max	47.443	1	373.281	3	67.322	1	.012	3	-.006	12	.535	3
52			min	-28.834	5	-278.995	2	-44.398	5	-.014	2	-.099	4	-.531	2
53		8	max	47.443	1	528.27	3	110.392	1	.012	3	.001	10	.097	3
54			min	-40.307	5	-402.339	2	-41.309	5	-.014	2	-.122	4	-.2	2
55		9	max	47.443	1	683.258	3	153.463	1	.012	3	.122	1	.271	1
56			min	-51.779	5	-525.683	2	-38.22	5	-.014	2	-.157	5	-.492	3
57		10	max	80.664	4	838.247	3	196.533	1	.014	2	.305	4	.832	1
58			min	2.982	12	-649.027	2	-132.994	14	-.012	3	.008	12	-1.232	3
59		11	max	69.191	4	525.683	2	-5.883	12	.014	2	.204	4	.271	1
60			min	2.982	12	-683.258	3	-153.463	1	-.012	3	.001	12	-.492	3
61		12	max	57.719	4	402.339	2	-3.853	12	.014	2	.117	4	.097	3
62			min	2.982	12	-528.27	3	-110.392	1	-.012	3	-.007	1	-.2	2
63		13	max	47.443	1	278.995	2	-1.824	12	.014	2	.063	5	.535	3
64			min	2.982	12	-373.281	3	-70.298	4	-.012	3	-.093	1	-.531	2
65		14	max	47.443	1	155.651	2	.437	3	.014	2	.012	5	.822	3
66			min	2.982	12	-218.293	3	-57.247	4	-.012	3	-.137	1	-.742	2
67		15	max	47.443	1	34.796	1	18.819	1	.014	2	-.006	12	.959	3
68			min	2.982	12	-63.304	3	-47.762	5	-.012	3	-.14	1	-.834	2
69		16	max	47.443	1	91.684	3	61.89	1	.014	2	-.003	12	.945	3
70			min	.355	15	-91.038	2	-44.673	5	-.012	3	-.106	4	-.805	2
71		17	max	47.443	1	246.672	3	104.96	1	.014	2	.004	3	.781	3
72			min	-10.913	5	-214.382	2	-41.584	5	-.012	3	-.129	4	-.657	2
73		18	max	47.443	1	401.661	3	148.031	1	.014	2	.103	1	.466	3
74			min	-22.386	5	-337.726	2	-38.495	5	-.012	3	-.162	5	-.388	2
75		19	max	47.443	1	556.649	3	191.101	1	.014	2	.268	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
76			min	-33.859	5	-461.07	2	-35.406	5	-.012	3	-.198	5	0	3
77	M15	1	max	91.138	5	650.427	2	-10.236	12	.015	2	.373	4	0	2
78			min	-50.44	1	-313.833	3	-191.053	1	-.01	3	.018	12	0	3
79		2	max	79.666	5	470.991	2	-8.207	12	.015	2	.259	4	.265	3
80			min	-50.44	1	-230.962	3	-147.982	1	-.01	3	.009	12	-.545	2
81		3	max	68.193	5	291.555	2	-6.177	12	.015	2	.159	5	.449	3
82			min	-50.44	1	-148.091	3	-104.912	1	-.01	3	-.02	1	-.916	2
83		4	max	56.72	5	112.12	2	-4.148	12	.015	2	.091	5	.553	3
84			min	-50.44	1	-65.219	3	-84.573	4	-.01	3	-.101	1	-1.112	2
85		5	max	45.247	5	17.652	3	-1.549	10	.015	2	.025	5	.576	3
86			min	-50.44	1	-67.316	2	-71.522	4	-.01	3	-.14	1	-1.134	2
87		6	max	33.775	5	100.523	3	24.3	1	.015	2	-.007	12	.518	3
88			min	-50.44	1	-246.752	2	-62.856	5	-.01	3	-.138	1	-.981	2
89		7	max	22.302	5	183.394	3	67.37	1	.015	2	-.006	12	.38	3
90			min	-50.44	1	-426.188	2	-59.767	5	-.01	3	-.121	4	-.654	2
91		8	max	10.829	5	266.266	3	110.441	1	.015	2	.001	10	.162	3
92			min	-50.44	1	-605.624	2	-56.678	5	-.01	3	-.158	4	-.152	2
93		9	max	-.303	15	349.137	3	153.511	1	.015	2	.122	1	.524	2
94			min	-50.44	1	-785.06	2	-53.589	5	-.01	3	-.207	5	-.137	3
95		10	max	-3.666	12	432.008	3	196.582	1	.01	3	.371	4	1.374	2
96			min	-50.44	1	-964.496	2	-140.887	14	-.015	2	.008	12	-.517	3
97		11	max	-3.666	12	785.06	2	-5.999	12	.01	3	.256	4	.524	2
98			min	-50.44	1	-349.137	3	-153.511	1	-.015	2	.001	12	-.137	3
99		12	max	-3.666	12	605.624	2	-3.97	12	.01	3	.153	4	.162	3
100			min	-50.44	1	-266.266	3	-110.441	1	-.015	2	-.007	1	-.152	2
101		13	max	-3.666	12	426.188	2	-1.941	12	.01	3	.084	5	.38	3
102			min	-50.44	1	-183.394	3	-85.779	4	-.015	2	-.093	1	-.654	2
103		14	max	-3.666	12	246.752	2	.251	3	.01	3	.018	5	.518	3
104			min	-54.5	4	-100.523	3	-72.728	4	-.015	2	-.138	1	-.981	2
105		15	max	-3.666	12	67.316	2	18.771	1	.01	3	-.006	12	.576	3
106			min	-65.972	4	-17.652	3	-63.137	5	-.015	2	-.14	1	-1.134	2
107		16	max	-3.666	12	65.219	3	61.841	1	.01	3	-.003	12	.553	3
108			min	-77.445	4	-112.12	2	-60.048	5	-.015	2	-.13	4	-1.112	2
109		17	max	-3.666	12	148.091	3	104.912	1	.01	3	.003	3	.449	3
110			min	-88.918	4	-291.555	2	-56.959	5	-.015	2	-.169	4	-.916	2
111		18	max	-3.666	12	230.962	3	147.982	1	.01	3	.103	1	.265	3
112			min	-100.391	4	-470.991	2	-53.87	5	-.015	2	-.216	5	-.545	2
113		19	max	-3.666	12	313.833	3	191.053	1	.01	3	.268	1	0	2
114			min	-111.863	4	-650.427	2	-50.781	5	-.015	2	-.267	5	0	5
115	M16	1	max	85.644	5	598.752	2	-9.638	12	.01	1	.272	4	0	2
116			min	-90.903	1	-270.968	3	-184.337	1	-.013	3	.015	12	0	3
117		2	max	74.171	5	419.316	2	-7.608	12	.01	1	.181	4	.223	3
118			min	-90.903	1	-188.096	3	-141.267	1	-.013	3	.006	12	-.495	2
119		3	max	62.698	5	239.88	2	-5.579	12	.01	1	.111	5	.366	3
120			min	-90.903	1	-105.225	3	-98.196	1	-.013	3	-.046	1	-.815	2
121		4	max	51.226	5	60.444	2	-3.55	12	.01	1	.063	5	.428	3
122			min	-90.903	1	-22.354	3	-61.216	4	-.013	3	-.121	1	-.961	2
123		5	max	39.753	5	60.517	3	-.853	10	.01	1	.019	5	.409	3
124			min	-90.903	1	-118.992	2	-48.165	4	-.013	3	-.153	1	-.933	2
125		6	max	28.28	5	143.389	3	31.015	1	.01	1	-.007	12	.31	3
126			min	-90.903	1	-298.428	2	-41.421	5	-.013	3	-.144	1	-.73	2
127		7	max	16.807	5	226.26	3	74.086	1	.01	1	-.006	12	.13	3
128			min	-90.903	1	-477.864	2	-38.332	5	-.013	3	-.093	1	-.353	2
129		8	max	5.335	5	309.131	3	117.156	1	.01	1	.003	2	.199	2
130			min	-90.903	1	-657.3	2	-35.243	5	-.013	3	-.1	4	-.13	3
131		9	max	-4.031	15	392.003	3	160.227	1	.01	1	.135	1	.926	2
132			min	-90.903	1	-836.736	2	-32.154	5	-.013	3	-.13	5	-.471	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
133		10	max	-5.909	12	474.874	3	203.297	1	.013	3	.311	1	1.826	2
134			min	-90.903	1	-1016.172	2	-133.745	14	-.01	1	.01	12	-.892	3
135		11	max	-4.47	15	836.736	2	-6.598	12	.013	3	.182	4	.926	2
136			min	-90.903	1	-392.003	3	-160.227	1	-.01	1	.003	12	-.471	3
137		12	max	-5.909	12	657.3	2	-4.568	12	.013	3	.099	4	.199	2
138			min	-90.903	1	-309.131	3	-117.156	1	-.01	1	-.004	3	-.13	3
139		13	max	-5.909	12	477.864	2	-2.539	12	.013	3	.048	5	.13	3
140			min	-90.903	1	-226.26	3	-74.086	1	-.01	1	-.093	1	-.353	2
141		14	max	-5.909	12	298.428	2	-.509	12	.013	3	.002	5	.31	3
142			min	-90.903	1	-143.389	3	-53.554	4	-.01	1	-.144	1	-.73	2
143		15	max	-5.909	12	118.992	2	12.055	1	.013	3	-.007	12	.409	3
144			min	-90.903	1	-60.517	3	-42.712	5	-.01	1	-.153	1	-.933	2
145		16	max	-5.909	12	22.354	3	55.126	1	.013	3	-.005	12	.428	3
146			min	-90.903	1	-60.444	2	-39.623	5	-.01	1	-.121	1	-.961	2
147		17	max	-5.909	12	105.225	3	98.196	1	.013	3	0	3	.366	3
148			min	-97.958	4	-239.88	2	-36.534	5	-.01	1	-.13	4	-.815	2
149		18	max	-5.909	12	188.096	3	141.267	1	.013	3	.07	1	.223	3
150			min	-109.43	4	-419.316	2	-33.445	5	-.01	1	-.152	5	-.495	2
151		19	max	-5.909	12	270.968	3	184.337	1	.013	3	.228	1	0	2
152			min	-120.903	4	-598.752	2	-30.356	5	-.01	1	-.183	5	0	5
153	M2	1	max	1014.469	2	2.058	4	.449	1	0	3	0	3	0	1
154			min	-1314.307	3	.499	15	-30.429	4	0	4	0	2	0	1
155		2	max	1014.998	2	1.987	4	.449	1	0	3	0	1	0	15
156			min	-1313.91	3	.482	15	-30.891	4	0	4	-.011	4	0	4
157		3	max	1015.527	2	1.916	4	.449	1	0	3	0	1	0	15
158			min	-1313.513	3	.465	15	-31.352	4	0	4	-.022	4	-.001	4
159		4	max	1016.057	2	1.845	4	.449	1	0	3	0	1	0	15
160			min	-1313.116	3	.449	15	-31.813	4	0	4	-.033	4	-.002	4
161		5	max	1016.586	2	1.774	4	.449	1	0	3	0	1	0	15
162			min	-1312.719	3	.432	15	-32.274	4	0	4	-.045	4	-.003	4
163		6	max	1017.115	2	1.703	4	.449	1	0	3	0	1	0	15
164			min	-1312.322	3	.415	15	-32.735	4	0	4	-.057	4	-.003	4
165		7	max	1017.644	2	1.632	4	.449	1	0	3	0	1	0	15
166			min	-1311.925	3	.399	15	-33.197	4	0	4	-.068	4	-.004	4
167		8	max	1018.174	2	1.561	4	.449	1	0	3	.001	1	-.001	15
168			min	-1311.528	3	.382	15	-33.658	4	0	4	-.08	4	-.005	4
169		9	max	1018.703	2	1.49	4	.449	1	0	3	.001	1	-.001	15
170			min	-1311.131	3	.365	15	-34.119	4	0	4	-.093	4	-.005	4
171		10	max	1019.232	2	1.419	4	.449	1	0	3	.001	1	-.001	15
172			min	-1310.734	3	.348	15	-34.58	4	0	4	-.105	4	-.006	4
173		11	max	1019.762	2	1.347	4	.449	1	0	3	.002	1	-.001	15
174			min	-1310.337	3	.332	15	-35.042	4	0	4	-.117	4	-.006	4
175		12	max	1020.291	2	1.276	4	.449	1	0	3	.002	1	-.002	15
176			min	-1309.94	3	.315	15	-35.503	4	0	4	-.13	4	-.007	4
177		13	max	1020.82	2	1.205	4	.449	1	0	3	.002	1	-.002	15
178			min	-1309.543	3	.287	12	-35.964	4	0	4	-.143	4	-.007	4
179		14	max	1021.35	2	1.134	4	.449	1	0	3	.002	1	-.002	15
180			min	-1309.146	3	.26	12	-36.425	4	0	4	-.156	4	-.007	4
181		15	max	1021.879	2	1.063	4	.449	1	0	3	.002	1	-.002	15
182			min	-1308.749	3	.232	12	-36.886	4	0	4	-.169	4	-.008	4
183		16	max	1022.408	2	.992	4	.449	1	0	3	.002	1	-.002	15
184			min	-1308.352	3	.204	12	-37.348	4	0	4	-.182	4	-.008	4
185		17	max	1022.937	2	.921	4	.449	1	0	3	.003	1	-.002	15
186			min	-1307.955	3	.177	12	-37.809	4	0	4	-.196	4	-.009	4
187		18	max	1023.467	2	.85	4	.449	1	0	3	.003	1	-.002	15
188			min	-1307.558	3	.149	12	-38.27	4	0	4	-.209	4	-.009	4
189		19	max	1023.996	2	.779	4	.449	1	0	3	.003	1	-.002	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
190			min	-1307.161	3	.121	12	-38.731	4	0	4	-.223	4	-.009	4
191	M3	1	max	707.143	2	8.901	4	1.717	4	0	12	0	1	.009	4
192			min	-855.303	3	2.104	15	.023	12	0	4	-.024	4	.002	15
193		2	max	706.973	2	8.032	4	2.322	4	0	12	0	1	.005	4
194			min	-855.431	3	1.9	15	.023	12	0	4	-.023	4	0	12
195		3	max	706.802	2	7.164	4	2.927	4	0	12	0	1	.002	2
196			min	-855.559	3	1.695	15	.023	12	0	4	-.022	4	0	3
197		4	max	706.632	2	6.295	4	3.532	4	0	12	0	1	0	15
198			min	-855.687	3	1.491	15	.023	12	0	4	-.02	4	-.002	3
199		5	max	706.462	2	5.426	4	4.137	4	0	12	0	1	0	15
200			min	-855.814	3	1.287	15	.023	12	0	4	-.018	5	-.004	6
201		6	max	706.291	2	4.557	4	4.743	4	0	12	.001	1	-.001	15
202			min	-855.942	3	1.083	15	.023	12	0	4	-.016	5	-.007	6
203		7	max	706.121	2	3.688	4	5.348	4	0	12	.001	1	-.002	15
204			min	-856.07	3	.878	15	.023	12	0	4	-.014	5	-.009	6
205		8	max	705.951	2	2.819	4	5.953	4	0	12	.002	1	-.002	15
206			min	-856.198	3	.674	15	.023	12	0	4	-.012	5	-.01	6
207		9	max	705.78	2	1.95	4	6.558	4	0	12	.002	1	-.003	15
208			min	-856.325	3	.47	15	.023	12	0	4	-.009	5	-.011	6
209		10	max	705.61	2	1.081	4	7.163	4	0	12	.002	1	-.003	15
210			min	-856.453	3	.266	15	.023	12	0	4	-.006	5	-.012	6
211		11	max	705.44	2	.294	2	7.768	4	0	12	.002	1	-.003	15
212			min	-856.581	3	-.097	3	.023	12	0	4	-.002	5	-.012	6
213		12	max	705.269	2	-.143	15	8.373	4	0	12	.002	1	-.003	15
214			min	-856.709	3	-.658	6	.023	12	0	4	0	12	-.012	6
215		13	max	705.099	2	-.347	15	8.978	4	0	12	.006	4	-.003	15
216			min	-856.837	3	-1.526	6	.023	12	0	4	0	12	-.012	6
217		14	max	704.929	2	-.551	15	9.583	4	0	12	.011	4	-.002	15
218			min	-856.964	3	-2.395	6	.023	12	0	4	0	12	-.011	6
219		15	max	704.758	2	-.756	15	10.188	4	0	12	.015	4	-.002	15
220			min	-857.092	3	-3.264	6	.023	12	0	4	0	12	-.009	6
221		16	max	704.588	2	-.96	15	10.793	4	0	12	.02	4	-.002	15
222			min	-857.22	3	-4.133	6	.023	12	0	4	0	12	-.008	6
223		17	max	704.417	2	-1.164	15	11.398	4	0	12	.025	4	-.001	15
224			min	-857.348	3	-5.002	6	.023	12	0	4	0	12	-.006	6
225		18	max	704.247	2	-1.368	15	12.003	4	0	12	.031	4	0	15
226			min	-857.475	3	-5.871	6	.023	12	0	4	0	12	-.003	6
227		19	max	704.077	2	-1.573	15	12.608	4	0	12	.037	4	0	1
228			min	-857.603	3	-6.74	6	.023	12	0	4	0	12	0	1
229	M4	1	max	1032.747	1	0	1	-.921	12	0	1	.03	4	0	1
230			min	-69.85	5	0	1	-297.408	4	0	1	0	12	0	1
231		2	max	1032.917	1	0	1	-.921	12	0	1	.001	1	0	1
232			min	-69.771	5	0	1	-297.556	4	0	1	-.005	5	0	1
233		3	max	1033.088	1	0	1	-.921	12	0	1	0	12	0	1
234			min	-69.691	5	0	1	-297.704	4	0	1	-.039	4	0	1
235		4	max	1033.258	1	0	1	-.921	12	0	1	0	12	0	1
236			min	-69.612	5	0	1	-297.851	4	0	1	-.073	4	0	1
237		5	max	1033.428	1	0	1	-.921	12	0	1	0	12	0	1
238			min	-69.532	5	0	1	-297.999	4	0	1	-.107	4	0	1
239		6	max	1033.599	1	0	1	-.921	12	0	1	0	12	0	1
240			min	-69.453	5	0	1	-298.147	4	0	1	-.141	4	0	1
241		7	max	1033.769	1	0	1	-.921	12	0	1	0	12	0	1
242			min	-69.373	5	0	1	-298.294	4	0	1	-.176	4	0	1
243		8	max	1033.939	1	0	1	-.921	12	0	1	0	12	0	1
244			min	-69.294	5	0	1	-298.442	4	0	1	-.21	4	0	1
245		9	max	1034.11	1	0	1	-.921	12	0	1	0	12	0	1
246			min	-69.214	5	0	1	-298.589	4	0	1	-.244	4	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
247		10	max	1034.28	1	0	1	-.921	12	0	1	0	12	0	1
248			min	-69.135	5	0	1	-298.737	4	0	1	-.279	4	0	1
249		11	max	1034.45	1	0	1	-.921	12	0	1	0	12	0	1
250			min	-69.055	5	0	1	-298.885	4	0	1	-.313	4	0	1
251		12	max	1034.621	1	0	1	-.921	12	0	1	0	12	0	1
252			min	-68.976	5	0	1	-299.032	4	0	1	-.347	4	0	1
253		13	max	1034.791	1	0	1	-.921	12	0	1	-.001	12	0	1
254			min	-68.896	5	0	1	-299.18	4	0	1	-.381	4	0	1
255		14	max	1034.961	1	0	1	-.921	12	0	1	-.001	12	0	1
256			min	-68.817	5	0	1	-299.328	4	0	1	-.416	4	0	1
257		15	max	1035.132	1	0	1	-.921	12	0	1	-.001	12	0	1
258			min	-68.737	5	0	1	-299.475	4	0	1	-.45	4	0	1
259		16	max	1035.302	1	0	1	-.921	12	0	1	-.001	12	0	1
260			min	-68.658	5	0	1	-299.623	4	0	1	-.485	4	0	1
261		17	max	1035.472	1	0	1	-.921	12	0	1	-.002	12	0	1
262			min	-68.578	5	0	1	-299.771	4	0	1	-.519	4	0	1
263		18	max	1035.643	1	0	1	-.921	12	0	1	-.002	12	0	1
264			min	-68.499	5	0	1	-299.918	4	0	1	-.553	4	0	1
265		19	max	1035.813	1	0	1	-.921	12	0	1	-.002	12	0	1
266			min	-68.419	5	0	1	-300.066	4	0	1	-.588	4	0	1
267	M6	1	max	3149.433	2	2.244	2	0	1	0	1	0	4	0	1
268			min	-4182.431	3	.264	12	-30.783	4	0	4	0	1	0	1
269		2	max	3149.962	2	2.188	2	0	1	0	1	0	1	0	12
270			min	-4182.034	3	.236	12	-31.244	4	0	4	-.011	4	0	2
271		3	max	3150.491	2	2.133	2	0	1	0	1	0	1	0	12
272			min	-4181.637	3	.209	12	-31.705	4	0	4	-.022	4	-.002	2
273		4	max	3151.02	2	2.078	2	0	1	0	1	0	1	0	12
274			min	-4181.24	3	.181	12	-32.166	4	0	4	-.034	4	-.002	2
275		5	max	3151.55	2	2.022	2	0	1	0	1	0	1	0	12
276			min	-4180.843	3	.153	12	-32.628	4	0	4	-.045	4	-.003	2
277		6	max	3152.079	2	1.967	2	0	1	0	1	0	1	0	12
278			min	-4180.446	3	.126	12	-33.089	4	0	4	-.057	4	-.004	2
279		7	max	3152.608	2	1.912	2	0	1	0	1	0	1	0	12
280			min	-4180.049	3	.095	3	-33.55	4	0	4	-.069	4	-.004	2
281		8	max	3153.138	2	1.856	2	0	1	0	1	0	1	0	12
282			min	-4179.652	3	.053	3	-34.011	4	0	4	-.081	4	-.005	2
283		9	max	3153.667	2	1.801	2	0	1	0	1	0	1	0	12
284			min	-4179.255	3	.012	3	-34.473	4	0	4	-.094	4	-.006	2
285		10	max	3154.196	2	1.746	2	0	1	0	1	0	1	0	12
286			min	-4178.858	3	-.03	3	-34.934	4	0	4	-.106	4	-.006	2
287		11	max	3154.725	2	1.69	2	0	1	0	1	0	1	0	12
288			min	-4178.461	3	-.071	3	-35.395	4	0	4	-.119	4	-.007	2
289		12	max	3155.255	2	1.635	2	0	1	0	1	0	1	0	12
290			min	-4178.064	3	-.113	3	-35.856	4	0	4	-.131	4	-.008	2
291		13	max	3155.784	2	1.58	2	0	1	0	1	0	1	0	3
292			min	-4177.667	3	-.154	3	-36.317	4	0	4	-.144	4	-.008	2
293		14	max	3156.313	2	1.524	2	0	1	0	1	0	1	0	3
294			min	-4177.27	3	-.196	3	-36.779	4	0	4	-.158	4	-.009	2
295		15	max	3156.843	2	1.469	2	0	1	0	1	0	1	0	3
296			min	-4176.873	3	-.237	3	-37.24	4	0	4	-.171	4	-.009	2
297		16	max	3157.372	2	1.413	2	0	1	0	1	0	1	0	3
298			min	-4176.476	3	-.279	3	-37.701	4	0	4	-.184	4	-.01	2
299		17	max	3157.901	2	1.358	2	0	1	0	1	0	1	0	3
300			min	-4176.079	3	-.321	3	-38.162	4	0	4	-.198	4	-.01	2
301		18	max	3158.43	2	1.303	2	0	1	0	1	0	1	0	3
302			min	-4175.682	3	-.362	3	-38.624	4	0	4	-.212	4	-.011	2
303		19	max	3158.96	2	1.247	2	0	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
304			min	-4175.285	3	-.404	3	-39.085	4	0	4	-.226	4	-.011	2
305	M7	1	max	2496.309	2	8.904	6	1.252	4	0	1	0	1	.011	2
306			min	-2610.855	3	2.091	15	0	1	0	4	-.024	4	0	3
307		2	max	2496.139	2	8.035	6	1.857	4	0	1	0	1	.008	2
308			min	-2610.982	3	1.886	15	0	1	0	4	-.023	4	-.002	3
309		3	max	2495.969	2	7.166	6	2.462	4	0	1	0	1	.005	2
310			min	-2611.11	3	1.682	15	0	1	0	4	-.022	4	-.004	3
311		4	max	2495.798	2	6.297	6	3.067	4	0	1	0	1	.002	2
312			min	-2611.238	3	1.478	15	0	1	0	4	-.021	4	-.006	3
313		5	max	2495.628	2	5.428	6	3.672	4	0	1	0	1	0	2
314			min	-2611.366	3	1.274	15	0	1	0	4	-.02	4	-.007	3
315		6	max	2495.458	2	4.559	6	4.278	4	0	1	0	1	-.002	15
316			min	-2611.494	3	1.07	15	0	1	0	4	-.018	4	-.008	3
317		7	max	2495.287	2	3.69	6	4.883	4	0	1	0	1	-.002	15
318			min	-2611.621	3	.865	15	0	1	0	4	-.016	4	-.009	3
319		8	max	2495.117	2	2.821	6	5.488	4	0	1	0	1	-.002	15
320			min	-2611.749	3	.661	15	0	1	0	4	-.013	4	-.01	4
321		9	max	2494.947	2	2.008	2	6.093	4	0	1	0	1	-.003	15
322			min	-2611.877	3	.35	12	0	1	0	4	-.01	4	-.011	4
323		10	max	2494.776	2	1.331	2	6.698	4	0	1	0	1	-.003	15
324			min	-2612.005	3	-.023	3	0	1	0	4	-.007	4	-.012	4
325		11	max	2494.606	2	.654	2	7.303	4	0	1	0	1	-.003	15
326			min	-2612.132	3	-.531	3	0	1	0	4	-.004	5	-.012	4
327		12	max	2494.436	2	-.024	2	7.908	4	0	1	0	1	-.003	15
328			min	-2612.26	3	-1.038	3	0	1	0	4	0	5	-.012	4
329		13	max	2494.265	2	-.36	15	8.513	4	0	1	.003	4	-.003	15
330			min	-2612.388	3	-1.546	3	0	1	0	4	0	1	-.012	4
331		14	max	2494.095	2	-.564	15	9.118	4	0	1	.008	4	-.003	15
332			min	-2612.516	3	-2.392	4	0	1	0	4	0	1	-.011	4
333		15	max	2493.924	2	-.769	15	9.723	4	0	1	.012	4	-.002	15
334			min	-2612.643	3	-3.261	4	0	1	0	4	0	1	-.009	4
335		16	max	2493.754	2	-.973	15	10.328	4	0	1	.017	4	-.002	15
336			min	-2612.771	3	-4.13	4	0	1	0	4	0	1	-.008	4
337		17	max	2493.584	2	-1.177	15	10.933	4	0	1	.022	4	-.001	15
338			min	-2612.899	3	-4.999	4	0	1	0	4	0	1	-.006	4
339		18	max	2493.413	2	-1.381	15	11.538	4	0	1	.027	4	0	15
340			min	-2613.027	3	-5.867	4	0	1	0	4	0	1	-.003	4
341		19	max	2493.243	2	-1.586	15	12.143	4	0	1	.033	4	0	1
342			min	-2613.154	3	-6.736	4	0	1	0	4	0	1	0	1
343	M8	1	max	2660.731	1	0	1	0	1	0	1	.026	4	0	1
344			min	-125.799	3	0	1	-283.428	4	0	1	0	1	0	1
345		2	max	2660.902	1	0	1	0	1	0	1	0	1	0	1
346			min	-125.672	3	0	1	-283.575	4	0	1	-.006	4	0	1
347		3	max	2661.072	1	0	1	0	1	0	1	0	1	0	1
348			min	-125.544	3	0	1	-283.723	4	0	1	-.039	4	0	1
349		4	max	2661.242	1	0	1	0	1	0	1	0	1	0	1
350			min	-125.416	3	0	1	-283.871	4	0	1	-.072	4	0	1
351		5	max	2661.413	1	0	1	0	1	0	1	0	1	0	1
352			min	-125.288	3	0	1	-284.018	4	0	1	-.104	4	0	1
353		6	max	2661.583	1	0	1	0	1	0	1	0	1	0	1
354			min	-125.161	3	0	1	-284.166	4	0	1	-.137	4	0	1
355		7	max	2661.753	1	0	1	0	1	0	1	0	1	0	1
356			min	-125.033	3	0	1	-284.314	4	0	1	-.169	4	0	1
357		8	max	2661.924	1	0	1	0	1	0	1	0	1	0	1
358			min	-124.905	3	0	1	-284.461	4	0	1	-.202	4	0	1
359		9	max	2662.094	1	0	1	0	1	0	1	0	1	0	1
360			min	-124.777	3	0	1	-284.609	4	0	1	-.235	4	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
361		10	max	2662.264	1	0	1	0	1	0	1	0	1	0	1
362			min	-124.65	3	0	1	-284.757	4	0	1	-.267	4	0	1
363		11	max	2662.435	1	0	1	0	1	0	1	0	1	0	1
364			min	-124.522	3	0	1	-284.904	4	0	1	-.3	4	0	1
365		12	max	2662.605	1	0	1	0	1	0	1	0	1	0	1
366			min	-124.394	3	0	1	-285.052	4	0	1	-.333	4	0	1
367		13	max	2662.775	1	0	1	0	1	0	1	0	1	0	1
368			min	-124.266	3	0	1	-285.199	4	0	1	-.366	4	0	1
369		14	max	2662.946	1	0	1	0	1	0	1	0	1	0	1
370			min	-124.139	3	0	1	-285.347	4	0	1	-.398	4	0	1
371		15	max	2663.116	1	0	1	0	1	0	1	0	1	0	1
372			min	-124.011	3	0	1	-285.495	4	0	1	-.431	4	0	1
373		16	max	2663.286	1	0	1	0	1	0	1	0	1	0	1
374			min	-123.883	3	0	1	-285.642	4	0	1	-.464	4	0	1
375		17	max	2663.457	1	0	1	0	1	0	1	0	1	0	1
376			min	-123.755	3	0	1	-285.79	4	0	1	-.497	4	0	1
377		18	max	2663.627	1	0	1	0	1	0	1	0	1	0	1
378			min	-123.627	3	0	1	-285.938	4	0	1	-.53	4	0	1
379		19	max	2663.797	1	0	1	0	1	0	1	0	1	0	1
380			min	-123.5	3	0	1	-286.085	4	0	1	-.562	4	0	1
381	M10	1	max	1014.469	2	1.99	6	-.03	12	0	1	0	4	0	1
382			min	-1314.307	3	.453	15	-30.705	4	0	5	0	3	0	1
383		2	max	1014.998	2	1.919	6	-.03	12	0	1	0	10	0	15
384			min	-1313.91	3	.436	15	-31.166	4	0	5	-.011	4	0	6
385		3	max	1015.527	2	1.848	6	-.03	12	0	1	0	10	0	15
386			min	-1313.513	3	.419	15	-31.628	4	0	5	-.022	4	-.001	6
387		4	max	1016.057	2	1.777	6	-.03	12	0	1	0	12	0	15
388			min	-1313.116	3	.403	15	-32.089	4	0	5	-.034	4	-.002	6
389		5	max	1016.586	2	1.706	6	-.03	12	0	1	0	12	0	15
390			min	-1312.719	3	.386	15	-32.55	4	0	5	-.045	4	-.003	6
391		6	max	1017.115	2	1.635	6	-.03	12	0	1	0	12	0	15
392			min	-1312.322	3	.369	15	-33.011	4	0	5	-.057	4	-.003	6
393		7	max	1017.644	2	1.563	6	-.03	12	0	1	0	12	0	15
394			min	-1311.925	3	.353	15	-33.472	4	0	5	-.069	4	-.004	6
395		8	max	1018.174	2	1.492	6	-.03	12	0	1	0	12	0	15
396			min	-1311.528	3	.336	15	-33.934	4	0	5	-.081	4	-.004	6
397		9	max	1018.703	2	1.421	6	-.03	12	0	1	0	12	-.001	15
398			min	-1311.131	3	.319	15	-34.395	4	0	5	-.093	4	-.005	6
399		10	max	1019.232	2	1.35	6	-.03	12	0	1	0	12	-.001	15
400			min	-1310.734	3	.303	15	-34.856	4	0	5	-.106	4	-.005	6
401		11	max	1019.762	2	1.279	6	-.03	12	0	1	0	12	-.001	15
402			min	-1310.337	3	.286	15	-35.317	4	0	5	-.118	4	-.006	6
403		12	max	1020.291	2	1.208	6	-.03	12	0	1	0	12	-.001	15
404			min	-1309.94	3	.269	15	-35.779	4	0	5	-.131	4	-.006	6
405		13	max	1020.82	2	1.137	6	-.03	12	0	1	0	12	-.002	15
406			min	-1309.543	3	.252	15	-36.24	4	0	5	-.144	4	-.007	6
407		14	max	1021.35	2	1.066	6	-.03	12	0	1	0	12	-.002	15
408			min	-1309.146	3	.236	15	-36.701	4	0	5	-.157	4	-.007	6
409		15	max	1021.879	2	.998	2	-.03	12	0	1	0	12	-.002	15
410			min	-1308.749	3	.219	15	-37.162	4	0	5	-.17	4	-.007	6
411		16	max	1022.408	2	.942	2	-.03	12	0	1	0	12	-.002	15
412			min	-1308.352	3	.202	15	-37.623	4	0	5	-.184	4	-.008	6
413		17	max	1022.937	2	.887	2	-.03	12	0	1	0	12	-.002	15
414			min	-1307.955	3	.177	12	-38.085	4	0	5	-.197	4	-.008	6
415		18	max	1023.467	2	.832	2	-.03	12	0	1	0	12	-.002	15
416			min	-1307.558	3	.149	12	-38.546	4	0	5	-.211	4	-.008	6
417		19	max	1023.996	2	.776	2	-.03	12	0	1	0	12	-.002	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
418			min	-1307.161	3	.121	12	-39.007	4	0	5	-.225	4	-.009	6
419	M11	1	max	707.143	2	8.849	6	1.496	4	0	1	0	12	.009	6
420			min	-855.303	3	2.069	15	-.362	1	0	4	-.024	4	.002	15
421		2	max	706.973	2	7.98	6	2.101	4	0	1	0	12	.005	2
422			min	-855.431	3	1.865	15	-.362	1	0	4	-.023	4	0	12
423		3	max	706.802	2	7.112	6	2.706	4	0	1	0	12	.002	2
424			min	-855.559	3	1.66	15	-.362	1	0	4	-.022	4	0	3
425		4	max	706.632	2	6.243	6	3.311	4	0	1	0	12	0	2
426			min	-855.687	3	1.456	15	-.362	1	0	4	-.021	4	-.002	3
427		5	max	706.462	2	5.374	6	3.916	4	0	1	0	12	-.001	15
428			min	-855.814	3	1.252	15	-.362	1	0	4	-.019	4	-.005	4
429		6	max	706.291	2	4.505	6	4.521	4	0	1	0	12	-.002	15
430			min	-855.942	3	1.048	15	-.362	1	0	4	-.017	4	-.007	4
431		7	max	706.121	2	3.636	6	5.126	4	0	1	0	12	-.002	15
432			min	-856.07	3	.843	15	-.362	1	0	4	-.015	4	-.009	4
433		8	max	705.951	2	2.767	6	5.731	4	0	1	0	12	-.003	15
434			min	-856.198	3	.639	15	-.362	1	0	4	-.012	4	-.01	4
435		9	max	705.78	2	1.898	6	6.336	4	0	1	0	12	-.003	15
436			min	-856.325	3	.435	15	-.362	1	0	4	-.009	4	-.012	4
437		10	max	705.61	2	1.029	6	6.941	4	0	1	0	12	-.003	15
438			min	-856.453	3	.231	15	-.362	1	0	4	-.006	4	-.012	4
439		11	max	705.44	2	.294	2	7.546	4	0	1	0	12	-.003	15
440			min	-856.581	3	-.097	3	-.362	1	0	4	-.003	4	-.012	4
441		12	max	705.269	2	-.178	15	8.151	4	0	1	.001	5	-.003	15
442			min	-856.709	3	-.709	4	-.362	1	0	4	-.002	1	-.012	4
443		13	max	705.099	2	-.382	15	8.757	4	0	1	.005	5	-.003	15
444			min	-856.837	3	-1.578	4	-.362	1	0	4	-.002	1	-.012	4
445		14	max	704.929	2	-.586	15	9.362	4	0	1	.009	5	-.003	15
446			min	-856.964	3	-2.447	4	-.362	1	0	4	-.003	1	-.011	4
447		15	max	704.758	2	-.791	15	9.967	4	0	1	.014	5	-.002	15
448			min	-857.092	3	-3.316	4	-.362	1	0	4	-.003	1	-.01	4
449		16	max	704.588	2	-.995	15	10.572	4	0	1	.019	5	-.002	15
450			min	-857.22	3	-4.185	4	-.362	1	0	4	-.003	1	-.008	4
451		17	max	704.417	2	-1.199	15	11.177	4	0	1	.024	5	-.001	15
452			min	-857.348	3	-5.054	4	-.362	1	0	4	-.003	1	-.006	4
453		18	max	704.247	2	-1.403	15	11.782	4	0	1	.029	5	0	15
454			min	-857.475	3	-5.923	4	-.362	1	0	4	-.003	1	-.003	4
455		19	max	704.077	2	-1.608	15	12.387	4	0	1	.035	5	0	1
456			min	-857.603	3	-6.792	4	-.362	1	0	4	-.003	1	0	1
457	M12	1	max	1032.747	1	0	1	14.48	1	0	1	.028	5	0	1
458			min	-9.569	3	0	1	-288.486	4	0	1	-.003	1	0	1
459		2	max	1032.917	1	0	1	14.48	1	0	1	0	12	0	1
460			min	-9.442	3	0	1	-288.633	4	0	1	-.005	4	0	1
461		3	max	1033.088	1	0	1	14.48	1	0	1	0	1	0	1
462			min	-9.314	3	0	1	-288.781	4	0	1	-.038	4	0	1
463		4	max	1033.258	1	0	1	14.48	1	0	1	.002	1	0	1
464			min	-9.186	3	0	1	-288.929	4	0	1	-.072	4	0	1
465		5	max	1033.428	1	0	1	14.48	1	0	1	.004	1	0	1
466			min	-9.058	3	0	1	-289.076	4	0	1	-.105	4	0	1
467		6	max	1033.599	1	0	1	14.48	1	0	1	.006	1	0	1
468			min	-8.93	3	0	1	-289.224	4	0	1	-.138	4	0	1
469		7	max	1033.769	1	0	1	14.48	1	0	1	.007	1	0	1
470			min	-8.803	3	0	1	-289.372	4	0	1	-.171	4	0	1
471		8	max	1033.939	1	0	1	14.48	1	0	1	.009	1	0	1
472			min	-8.675	3	0	1	-289.519	4	0	1	-.204	4	0	1
473		9	max	1034.11	1	0	1	14.48	1	0	1	.011	1	0	1
474			min	-8.547	3	0	1	-289.667	4	0	1	-.238	4	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
475		10	max	1034.28	1	0	1	14.48	1	0	1	.012	1	0	1
476			min	-8.419	3	0	1	-289.814	4	0	1	-.271	4	0	1
477		11	max	1034.45	1	0	1	14.48	1	0	1	.014	1	0	1
478			min	-8.292	3	0	1	-289.962	4	0	1	-.304	4	0	1
479		12	max	1034.621	1	0	1	14.48	1	0	1	.016	1	0	1
480			min	-8.164	3	0	1	-290.11	4	0	1	-.338	4	0	1
481		13	max	1034.791	1	0	1	14.48	1	0	1	.017	1	0	1
482			min	-8.036	3	0	1	-290.257	4	0	1	-.371	4	0	1
483		14	max	1034.961	1	0	1	14.48	1	0	1	.019	1	0	1
484			min	-7.908	3	0	1	-290.405	4	0	1	-.404	4	0	1
485		15	max	1035.132	1	0	1	14.48	1	0	1	.021	1	0	1
486			min	-7.781	3	0	1	-290.553	4	0	1	-.438	4	0	1
487		16	max	1035.302	1	0	1	14.48	1	0	1	.022	1	0	1
488			min	-7.653	3	0	1	-290.7	4	0	1	-.471	4	0	1
489		17	max	1035.472	1	0	1	14.48	1	0	1	.024	1	0	1
490			min	-7.525	3	0	1	-290.848	4	0	1	-.504	4	0	1
491		18	max	1035.643	1	0	1	14.48	1	0	1	.026	1	0	1
492			min	-7.397	3	0	1	-290.996	4	0	1	-.538	4	0	1
493		19	max	1035.813	1	0	1	14.48	1	0	1	.027	1	0	1
494			min	-7.27	3	0	1	-291.143	4	0	1	-.571	4	0	1
495	M1	1	max	183.808	1	686.643	3	48.712	5	0	1	.226	1	0	15
496			min	-17.654	5	-405.932	2	-80.386	1	0	3	-.125	5	-.015	2
497		2	max	184.65	1	685.549	3	50.173	5	0	1	.176	1	.237	2
498			min	-17.261	5	-407.391	2	-80.386	1	0	3	-.094	5	-.427	3
499		3	max	552.182	3	512.623	2	22.092	5	0	3	.126	1	.481	2
500			min	-334.298	2	-520.647	3	-80.154	1	0	2	-.063	5	-.839	3
501		4	max	552.814	3	511.164	2	23.552	5	0	3	.076	1	.175	1
502			min	-333.456	2	-521.741	3	-80.154	1	0	2	-.049	5	-.516	3
503		5	max	553.446	3	509.705	2	25.012	5	0	3	.026	1	-.005	15
504			min	-332.613	2	-522.835	3	-80.154	1	0	2	-.034	5	-.192	3
505		6	max	554.078	3	508.246	2	26.472	5	0	3	-.002	12	.133	3
506			min	-331.771	2	-523.93	3	-80.154	1	0	2	-.023	1	-.47	2
507		7	max	554.709	3	506.787	2	27.932	5	0	3	0	15	.459	3
508			min	-330.929	2	-525.024	3	-80.154	1	0	2	-.073	1	-.785	2
509		8	max	555.341	3	505.328	2	29.393	5	0	3	.017	5	.785	3
510			min	-330.086	2	-526.118	3	-80.154	1	0	2	-.123	1	-1.099	2
511		9	max	571.63	3	47.65	2	64.505	5	0	9	.078	1	.915	3
512			min	-250.618	2	.438	15	-127.653	1	0	3	-.15	5	-1.257	2
513		10	max	572.262	3	46.191	2	65.965	5	0	9	0	10	.894	3
514			min	-249.776	2	-.006	5	-127.653	1	0	3	-.111	4	-1.286	2
515		11	max	572.894	3	44.732	2	67.425	5	0	9	-.006	12	.874	3
516			min	-248.933	2	-1.815	4	-127.653	1	0	3	-.087	4	-1.314	2
517		12	max	588.998	3	350.671	3	167.687	5	0	2	.12	1	.764	3
518			min	-169.412	2	-604.932	2	-77.259	1	0	3	-.268	5	-1.165	2
519		13	max	589.63	3	349.577	3	169.147	5	0	2	.072	1	.547	3
520			min	-168.569	2	-606.391	2	-77.259	1	0	3	-.163	5	-.789	2
521		14	max	590.261	3	348.482	3	170.607	5	0	2	.025	1	.331	3
522			min	-167.727	2	-607.85	2	-77.259	1	0	3	-.058	5	-.412	2
523		15	max	590.893	3	347.388	3	172.067	5	0	2	.049	5	.115	3
524			min	-166.885	2	-609.309	2	-77.259	1	0	3	-.023	1	-.06	1
525		16	max	591.525	3	346.294	3	173.527	5	0	2	.156	5	.344	2
526			min	-166.042	2	-610.768	2	-77.259	1	0	3	-.071	1	-.101	3
527		17	max	592.157	3	345.199	3	174.987	5	0	2	.264	5	.723	2
528			min	-165.2	2	-612.227	2	-77.259	1	0	3	-.119	1	-.315	3
529		18	max	29.962	5	601.078	2	-5.909	12	0	5	.244	5	.363	2
530			min	-185.174	1	-270.003	3	-122.433	4	0	2	-.172	1	-.155	3
531		19	max	30.355	5	599.619	2	-5.909	12	0	5	.183	5	.013	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
532			min	-184.331	1	-271.097	3	-120.973	4	0	2	-.228	1	-.01	1
533	M5	1	max	407.653	1	2281.639	3	97.582	5	0	1	0	1	.03	2
534			min	16.532	12	-1401.576	2	0	1	0	4	-.262	4	0	15
535		2	max	408.495	1	2280.544	3	99.042	5	0	1	0	1	.9	2
536			min	16.953	12	-1403.035	2	0	1	0	4	-.202	4	-1.413	3
537		3	max	1726.853	3	1431.067	2	74.437	4	0	4	0	1	1.741	2
538			min	-1107.154	2	-1580.927	3	0	1	0	1	-.14	4	-2.785	3
539		4	max	1727.484	3	1429.608	2	75.897	4	0	4	0	1	.856	1
540			min	-1106.312	2	-1582.022	3	0	1	0	1	-.093	4	-1.804	3
541		5	max	1728.116	3	1428.149	2	77.358	4	0	4	0	1	.032	9
542			min	-1105.469	2	-1583.116	3	0	1	0	1	-.046	4	-.822	3
543		6	max	1728.748	3	1426.69	2	78.818	4	0	4	.003	4	.161	3
544			min	-1104.627	2	-1584.21	3	0	1	0	1	0	1	-.92	2
545		7	max	1729.38	3	1425.231	2	80.278	4	0	4	.052	4	1.145	3
546			min	-1103.785	2	-1585.304	3	0	1	0	1	0	1	-1.805	2
547		8	max	1730.012	3	1423.772	2	81.738	4	0	4	.102	4	2.129	3
548			min	-1102.942	2	-1586.399	3	0	1	0	1	0	1	-2.689	2
549		9	max	1754.125	3	160.629	2	216.739	4	0	1	0	1	2.452	3
550			min	-935.168	2	.442	15	0	1	0	1	-.231	4	-3.074	2
551		10	max	1754.757	3	159.17	2	218.199	4	0	1	0	1	2.373	3
552			min	-934.325	2	.002	15	0	1	0	1	-.096	4	-3.174	2
553		11	max	1755.388	3	157.711	2	219.659	4	0	1	.039	4	2.295	3
554			min	-933.483	2	-1.57	6	0	1	0	1	0	1	-3.272	2
555		12	max	1779.871	3	1032.616	3	236.746	4	0	1	0	1	2.013	3
556			min	-765.815	2	-1746.899	2	0	1	0	4	-.387	4	-2.926	2
557		13	max	1780.502	3	1031.522	3	238.206	4	0	1	0	1	1.372	3
558			min	-764.972	2	-1748.359	2	0	1	0	4	-.239	4	-1.841	2
559		14	max	1781.134	3	1030.428	3	239.666	4	0	1	0	1	.732	3
560			min	-764.13	2	-1749.818	2	0	1	0	4	-.091	4	-.756	2
561		15	max	1781.766	3	1029.333	3	241.126	4	0	1	.058	4	.331	2
562			min	-763.288	2	-1751.277	2	0	1	0	4	0	1	0	15
563		16	max	1782.398	3	1028.239	3	242.587	4	0	1	.208	4	1.418	2
564			min	-762.445	2	-1752.736	2	0	1	0	4	0	1	-.545	3
565		17	max	1783.03	3	1027.145	3	244.047	4	0	1	.359	4	2.506	2
566			min	-761.603	2	-1754.195	2	0	1	0	4	0	1	-1.183	3
567		18	max	-17.675	12	2037.542	2	0	1	0	4	.384	4	1.283	2
568			min	-407.449	1	-949.224	3	-23.708	5	0	1	0	1	-.616	3
569		19	max	-17.253	12	2036.082	2	0	1	0	4	.371	4	.02	1
570			min	-406.607	1	-950.318	3	-22.248	5	0	1	0	1	-.026	3
571	M9	1	max	183.808	1	686.643	3	80.386	1	0	3	-.016	12	0	15
572			min	9.999	12	-405.932	2	5.729	12	0	4	-.226	1	-.015	2
573		2	max	184.65	1	685.549	3	81.232	4	0	3	-.013	12	.237	2
574			min	10.42	12	-407.391	2	5.729	12	0	4	-.176	1	-.427	3
575		3	max	552.182	3	512.623	2	80.154	1	0	2	-.009	12	.481	2
576			min	-334.298	2	-520.647	3	5.699	12	0	3	-.126	1	-.839	3
577		4	max	552.814	3	511.164	2	80.154	1	0	2	-.006	12	.175	1
578			min	-333.456	2	-521.741	3	5.699	12	0	3	-.079	4	-.516	3
579		5	max	553.446	3	509.705	2	80.154	1	0	2	-.002	12	-.005	15
580			min	-332.613	2	-522.835	3	5.699	12	0	3	-.045	4	-.192	3
581		6	max	554.078	3	508.246	2	80.154	1	0	2	.023	1	.133	3
582			min	-331.771	2	-523.93	3	5.699	12	0	3	-.015	5	-.47	2
583		7	max	554.709	3	506.787	2	80.154	1	0	2	.073	1	.459	3
584			min	-330.929	2	-525.024	3	5.699	12	0	3	.005	12	-.785	2
585		8	max	555.341	3	505.328	2	80.154	1	0	2	.123	1	.785	3
586			min	-330.086	2	-526.118	3	5.699	12	0	3	.009	12	-1.099	2
587		9	max	571.63	3	47.65	2	127.653	1	0	3	-.005	12	.915	3
588			min	-250.618	2	.454	15	8.673	12	0	9	-.181	4	-1.257	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
589		10	max	572.262	3	46.191	2	127.653	1	0	3	.001	1	.894	3
590			min	-249.776	2	.013	15	8.673	12	0	9	-.11	4	-1.286	2
591		11	max	572.894	3	44.732	2	127.653	1	0	3	.081	1	.874	3
592			min	-248.933	2	-1.698	6	8.673	12	0	9	-.056	5	-1.314	2
593		12	max	588.998	3	350.671	3	199.69	4	0	3	-.008	12	.764	3
594			min	-169.412	2	-604.932	2	5.014	12	0	2	-.317	4	-1.165	2
595		13	max	589.63	3	349.577	3	201.15	4	0	3	-.005	12	.547	3
596			min	-168.569	2	-606.391	2	5.014	12	0	2	-.193	4	-.789	2
597		14	max	590.261	3	348.482	3	202.61	4	0	3	-.002	12	.331	3
598			min	-167.727	2	-607.85	2	5.014	12	0	2	-.067	4	-.412	2
599		15	max	590.893	3	347.388	3	204.07	4	0	3	.059	4	.115	3
600			min	-166.885	2	-609.309	2	5.014	12	0	2	.001	12	-.06	1
601		16	max	591.525	3	346.294	3	205.53	4	0	3	.186	4	.344	2
602			min	-166.042	2	-610.768	2	5.014	12	0	2	.005	12	-.101	3
603		17	max	592.157	3	345.199	3	206.991	4	0	3	.314	4	.723	2
604			min	-165.2	2	-612.227	2	5.014	12	0	2	.008	12	-.315	3
605		18	max	-10.06	12	601.078	2	91.035	1	0	2	.314	4	.363	2
606			min	-185.174	1	-270.003	3	-87.395	5	0	3	.011	12	-.155	3
607		19	max	-9.638	12	599.619	2	91.035	1	0	2	.272	4	.013	3
608			min	-184.331	1	-271.097	3	-85.935	5	0	3	.015	12	-.01	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	M13	1	max	0	1	.191	2	.011	3	1.321e-2	2	NC	1	NC	1
2			min	-.859	4	-.047	3	-.006	2	-3.285e-3	3	NC	1	NC	1
3		2	max	0	1	.174	3	.031	1	1.45e-2	2	NC	4	NC	2
4			min	-.859	4	.003	15	-.02	5	-3.149e-3	3	951.801	3	6856.812	1
5		3	max	0	1	.353	3	.072	1	1.579e-2	2	NC	5	NC	3
6			min	-.859	4	-.015	1	-.026	5	-3.014e-3	3	525.223	3	2916.193	1
7		4	max	0	1	.463	3	.107	1	1.708e-2	2	NC	5	NC	3
8			min	-.859	4	-.056	1	-.019	5	-2.878e-3	3	411.989	3	1968.315	1
9		5	max	0	1	.49	3	.124	1	1.837e-2	2	NC	5	NC	3
10			min	-.859	4	-.05	1	-.006	5	-2.743e-3	3	390.877	3	1700.3	1
11		6	max	0	1	.437	3	.118	1	1.966e-2	2	NC	5	NC	5
12			min	-.859	4	-.012	9	.005	10	-2.608e-3	3	433.727	3	1785.402	1
13		7	max	0	1	.32	3	.091	1	2.095e-2	2	NC	4	NC	10
14			min	-.859	4	.003	15	0	10	-2.472e-3	3	572.131	3	2320.528	1
15		8	max	0	1	.228	2	.05	1	2.224e-2	2	NC	1	NC	2
16			min	-.859	4	.006	15	-.006	10	-2.337e-3	3	966.666	3	4207.194	1
17		9	max	0	1	.32	2	.033	3	2.353e-2	2	NC	4	NC	1
18			min	-.859	4	.008	15	-.014	2	-2.201e-3	3	1636.489	2	8248.628	4
19		10	max	0	1	.36	2	.032	3	2.482e-2	2	NC	3	NC	1
20			min	-.859	4	-.028	3	-.023	2	-2.066e-3	3	1241.697	2	9702.996	3
21		11	max	0	12	.32	2	.033	3	2.353e-2	2	NC	4	NC	1
22			min	-.859	4	.008	15	-.016	5	-2.201e-3	3	1636.489	2	9424.251	3
23		12	max	0	12	.228	2	.05	1	2.224e-2	2	NC	1	NC	2
24			min	-.859	4	.005	15	-.016	5	-2.337e-3	3	966.666	3	4207.194	1
25		13	max	0	12	.32	3	.091	1	2.095e-2	2	NC	4	NC	4
26			min	-.859	4	.002	15	-.005	5	-2.472e-3	3	572.131	3	2320.528	1
27		14	max	0	12	.437	3	.118	1	1.966e-2	2	NC	5	NC	5
28			min	-.859	4	-.012	9	.005	10	-2.608e-3	3	433.727	3	1785.402	1
29		15	max	0	12	.49	3	.124	1	1.837e-2	2	NC	5	NC	3
30			min	-.859	4	-.05	1	.007	10	-2.743e-3	3	390.877	3	1700.3	1
31		16	max	0	12	.463	3	.107	1	1.708e-2	2	NC	5	NC	3
32			min	-.859	4	-.056	1	.007	10	-2.878e-3	3	411.989	3	1968.315	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
33		17	max	0	12	.353	3	.072	1	1.579e-2	2	NC	5	NC	3
34			min	-.859	4	-.015	1	.003	10	-3.014e-3	3	525.223	3	2916.193	1
35		18	max	0	12	.174	3	.034	4	1.45e-2	2	NC	4	NC	2
36			min	-.859	4	.002	15	0	10	-3.149e-3	3	951.801	3	5971.364	4
37		19	max	0	12	.191	2	.011	3	1.321e-2	2	NC	1	NC	1
38			min	-.859	4	-.047	3	-.006	2	-3.285e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.382	3	.009	3	7.472e-3	2	NC	1	NC	1
40			min	-.629	4	-.582	2	-.005	2	-5.722e-3	3	NC	1	NC	1
41		2	max	0	1	.646	3	.02	1	8.687e-3	2	NC	5	NC	1
42			min	-.629	4	-.845	2	-.031	5	-6.775e-3	3	795.044	3	7112.883	5
43		3	max	0	1	.876	3	.055	1	9.903e-3	2	NC	5	NC	3
44			min	-.629	4	-1.08	2	-.038	5	-7.828e-3	3	421.31	2	3821.394	1
45		4	max	0	1	1.049	3	.088	1	1.112e-2	2	NC	15	NC	3
46			min	-.629	4	-1.267	2	-.027	5	-8.881e-3	3	306.581	2	2385.806	1
47		5	max	0	1	1.151	3	.107	1	1.233e-2	2	NC	15	NC	3
48			min	-.629	4	-1.394	2	-.006	5	-9.934e-3	3	258.666	2	1973.468	1
49		6	max	0	1	1.183	3	.105	1	1.355e-2	2	9530.118	15	NC	3
50			min	-.629	4	-1.459	2	.005	10	-1.099e-2	3	239.464	2	2015.086	1
51		7	max	0	1	1.154	3	.082	1	1.476e-2	2	9560.944	15	NC	3
52			min	-.629	4	-1.469	2	0	10	-1.204e-2	3	236.719	2	2566.44	1
53		8	max	0	1	1.085	3	.058	4	1.598e-2	2	NC	15	NC	2
54			min	-.629	4	-1.44	2	-.005	10	-1.309e-2	3	244.694	2	3553.081	4
55		9	max	0	1	1.01	3	.04	4	1.72e-2	2	NC	15	NC	1
56			min	-.629	4	-1.397	2	-.013	2	-1.415e-2	3	257.65	2	5189.372	4
57		10	max	0	1	.974	3	.029	3	1.841e-2	2	NC	15	NC	1
58			min	-.629	4	-1.373	2	-.02	2	-1.52e-2	3	265.319	2	NC	1
59		11	max	0	12	1.01	3	.029	3	1.72e-2	2	NC	15	NC	1
60			min	-.629	4	-1.397	2	-.031	5	-1.415e-2	3	257.65	2	7181.033	5
61		12	max	0	12	1.085	3	.046	1	1.598e-2	2	NC	15	NC	2
62			min	-.629	4	-1.44	2	-.036	5	-1.309e-2	3	244.694	2	4569.674	1
63		13	max	0	12	1.154	3	.082	1	1.476e-2	2	9560.765	15	NC	3
64			min	-.629	4	-1.469	2	-.024	5	-1.204e-2	3	236.719	2	2566.44	1
65		14	max	0	12	1.183	3	.105	1	1.355e-2	2	9529.854	15	NC	3
66			min	-.629	4	-1.459	2	-.002	5	-1.099e-2	3	239.464	2	2015.086	1
67		15	max	0	12	1.151	3	.107	1	1.233e-2	2	NC	15	NC	3
68			min	-.629	4	-1.394	2	.006	10	-9.934e-3	3	258.666	2	1973.468	1
69		16	max	0	12	1.049	3	.088	1	1.112e-2	2	NC	15	NC	3
70			min	-.629	4	-1.267	2	.005	10	-8.881e-3	3	306.581	2	2385.806	1
71		17	max	0	12	.876	3	.062	4	9.903e-3	2	NC	5	NC	3
72			min	-.629	4	-1.08	2	.002	10	-7.828e-3	3	421.31	2	3355.783	4
73		18	max	0	12	.646	3	.041	4	8.687e-3	2	NC	5	NC	1
74			min	-.629	4	-.845	2	-.002	10	-6.775e-3	3	795.044	3	5022.506	4
75		19	max	0	12	.382	3	.009	3	7.472e-3	2	NC	1	NC	1
76			min	-.629	4	-.582	2	-.005	2	-5.722e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.39	3	.009	3	4.892e-3	3	NC	1	NC	1
78			min	-.504	4	-.58	2	-.005	2	-7.78e-3	2	NC	1	NC	1
79		2	max	0	12	.579	3	.02	1	5.789e-3	3	NC	5	NC	1
80			min	-.504	4	-.904	2	-.043	5	-9.054e-3	2	649.38	2	5111.291	5
81		3	max	0	12	.749	3	.056	1	6.686e-3	3	NC	5	NC	3
82			min	-.504	4	-1.187	2	-.053	5	-1.033e-2	2	345.98	2	3799.496	1
83		4	max	0	12	.885	3	.089	1	7.582e-3	3	NC	15	NC	3
84			min	-.504	4	-1.403	2	-.039	5	-1.16e-2	2	255.177	2	2374.741	1
85		5	max	0	12	.98	3	.107	1	8.479e-3	3	NC	15	NC	3
86			min	-.504	4	-1.537	2	-.012	5	-1.287e-2	2	219.523	2	1964.796	1
87		6	max	0	12	1.033	3	.105	1	9.376e-3	3	9555.527	15	NC	3
88			min	-.504	4	-1.587	2	.005	10	-1.415e-2	2	208.679	2	2005.417	1
89		7	max	0	12	1.048	3	.083	1	1.027e-2	3	9590.114	15	NC	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
90			min	-.504	4	-1.564	2	.001	10	-1.542e-2	2	213.515	2	2550.37	1
91		8	max	0	12	1.034	3	.07	4	1.117e-2	3	NC	15	NC	2
92			min	-.504	4	-1.493	2	-.005	10	-1.67e-2	2	230.067	2	2972.631	4
93		9	max	0	12	1.008	3	.049	4	1.207e-2	3	NC	15	NC	1
94			min	-.504	4	-1.412	2	-.012	2	-1.797e-2	2	252.503	2	4196.01	4
95		10	max	0	1	.994	3	.026	3	1.296e-2	3	NC	15	NC	1
96			min	-.504	4	-1.371	2	-.019	2	-1.924e-2	2	265.51	2	NC	1
97		11	max	0	1	1.008	3	.027	3	1.207e-2	3	NC	15	NC	1
98			min	-.504	4	-1.412	2	-.041	5	-1.797e-2	2	252.503	2	5388.824	5
99		12	max	0	1	1.034	3	.047	1	1.117e-2	3	NC	15	NC	2
100			min	-.504	4	-1.493	2	-.048	5	-1.67e-2	2	230.067	2	4518.922	1
101		13	max	0	1	1.048	3	.083	1	1.027e-2	3	9589.976	15	NC	3
102			min	-.504	4	-1.564	2	-.032	5	-1.542e-2	2	213.515	2	2550.37	1
103		14	max	0	1	1.033	3	.105	1	9.376e-3	3	9555.328	15	NC	3
104			min	-.504	4	-1.587	2	-.003	5	-1.415e-2	2	208.679	2	2005.417	1
105		15	max	0	1	.98	3	.107	1	8.479e-3	3	NC	15	NC	3
106			min	-.504	4	-1.537	2	.007	10	-1.287e-2	2	219.523	2	1964.796	1
107		16	max	0	1	.885	3	.089	1	7.582e-3	3	NC	15	NC	3
108			min	-.504	4	-1.403	2	.006	10	-1.16e-2	2	255.177	2	2374.741	1
109		17	max	0	1	.749	3	.077	4	6.686e-3	3	NC	5	NC	3
110			min	-.503	4	-1.187	2	.002	10	-1.033e-2	2	345.98	2	2712.129	4
111		18	max	0	1	.579	3	.053	4	5.789e-3	3	NC	5	NC	1
112			min	-.503	4	-.904	2	-.001	10	-9.054e-3	2	649.38	2	3938.192	4
113		19	max	0	1	.39	3	.009	3	4.892e-3	3	NC	1	NC	1
114			min	-.503	4	-.58	2	-.005	2	-7.78e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.17	2	.007	3	9.087e-3	3	NC	1	NC	1
116			min	-.137	4	-.135	3	-.005	2	-1.106e-2	2	NC	1	NC	1
117		2	max	0	12	.025	1	.03	1	1.022e-2	3	NC	4	NC	2
118			min	-.137	4	-.072	3	-.031	5	-1.187e-2	2	1226.161	2	6940.916	1
119		3	max	0	12	.002	13	.072	1	1.135e-2	3	NC	5	NC	3
120			min	-.137	4	-.137	2	-.039	5	-1.267e-2	2	685.149	2	2932.662	1
121		4	max	0	12	0	12	.107	1	1.247e-2	3	NC	5	NC	3
122			min	-.137	4	-.212	2	-.031	5	-1.348e-2	2	550.208	2	1971.611	1
123		5	max	0	12	0	15	.124	1	1.36e-2	3	NC	5	NC	3
124			min	-.137	4	-.216	2	-.013	5	-1.429e-2	2	544.282	2	1697.16	1
125		6	max	0	12	.003	13	.119	1	1.473e-2	3	NC	5	NC	3
126			min	-.137	4	-.151	2	.005	15	-1.509e-2	2	653.994	2	1774.274	1
127		7	max	0	12	.029	9	.092	1	1.586e-2	3	NC	3	NC	3
128			min	-.137	4	-.125	3	.003	10	-1.59e-2	2	1035.926	2	2288.397	1
129		8	max	0	12	.139	1	.052	1	1.699e-2	3	NC	4	NC	2
130			min	-.137	4	-.199	3	-.003	10	-1.671e-2	2	3247.966	3	4064.772	1
131		9	max	0	12	.246	1	.032	4	1.812e-2	3	NC	4	NC	1
132			min	-.137	4	-.263	3	-.009	2	-1.751e-2	2	1632.299	3	6428.809	4
133		10	max	0	1	.296	2	.023	3	1.925e-2	3	NC	5	NC	1
134			min	-.137	4	-.291	3	-.018	2	-1.832e-2	2	1338.938	3	NC	1
135		11	max	0	1	.246	1	.023	3	1.812e-2	3	NC	4	NC	1
136			min	-.137	4	-.263	3	-.023	5	-1.751e-2	2	1632.299	3	9596.549	5
137		12	max	0	1	.139	1	.052	1	1.699e-2	3	NC	4	NC	2
138			min	-.137	4	-.199	3	-.024	5	-1.671e-2	2	3247.966	3	4064.772	1
139		13	max	0	1	.029	9	.092	1	1.586e-2	3	NC	3	NC	3
140			min	-.137	4	-.125	3	-.011	5	-1.59e-2	2	1035.926	2	2288.397	1
141		14	max	0	1	.003	13	.119	1	1.473e-2	3	NC	5	NC	3
142			min	-.137	4	-.151	2	.007	15	-1.509e-2	2	653.994	2	1774.274	1
143		15	max	0	1	0	15	.124	1	1.36e-2	3	NC	5	NC	3
144			min	-.137	4	-.216	2	.009	10	-1.429e-2	2	544.282	2	1697.16	1
145		16	max	0	1	0	12	.107	1	1.247e-2	3	NC	5	NC	3
146			min	-.136	4	-.212	2	.008	10	-1.348e-2	2	550.208	2	1971.611	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
147		17	max	0	1	.001	13	.072	1	1.135e-2	3	NC	5	NC	3
148			min	-.136	4	-.137	2	.005	10	-1.267e-2	2	685.149	2	2932.662	1
149		18	max	0	1	.025	1	.044	4	1.022e-2	3	NC	4	NC	2
150			min	-.136	4	-.072	3	0	10	-1.187e-2	2	1226.161	2	4673.102	4
151		19	max	0	1	.17	2	.007	3	9.087e-3	3	NC	1	NC	1
152			min	-.136	4	-.135	3	-.005	2	-1.106e-2	2	NC	1	NC	1
153	M2	1	max	.008	2	.01	2	.011	1	2.421e-3	5	NC	1	NC	2
154			min	-.01	3	-.016	3	-.803	4	-2.421e-4	1	7705.949	2	96.51	4
155		2	max	.007	2	.009	2	.01	1	2.463e-3	5	NC	1	NC	2
156			min	-.009	3	-.016	3	-.738	4	-2.3e-4	1	9083.695	2	105.045	4
157		3	max	.007	2	.007	2	.009	1	2.504e-3	5	NC	1	NC	2
158			min	-.009	3	-.015	3	-.673	4	-2.178e-4	1	NC	1	115.174	4
159		4	max	.006	2	.006	2	.008	1	2.546e-3	5	NC	1	NC	2
160			min	-.008	3	-.015	3	-.609	4	-2.057e-4	1	NC	1	127.313	4
161		5	max	.006	2	.004	2	.007	1	2.587e-3	5	NC	1	NC	1
162			min	-.008	3	-.014	3	-.546	4	-1.936e-4	1	NC	1	142.024	4
163		6	max	.005	2	.003	2	.006	1	2.629e-3	5	NC	1	NC	1
164			min	-.007	3	-.014	3	-.484	4	-1.814e-4	1	NC	1	160.088	4
165		7	max	.005	2	.002	2	.006	1	2.67e-3	5	NC	1	NC	1
166			min	-.007	3	-.013	3	-.424	4	-1.693e-4	1	NC	1	182.613	4
167		8	max	.005	2	0	2	.005	1	2.712e-3	5	NC	1	NC	1
168			min	-.006	3	-.012	3	-.367	4	-1.571e-4	1	NC	1	211.212	4
169		9	max	.004	2	0	2	.004	1	2.753e-3	5	NC	1	NC	1
170			min	-.005	3	-.012	3	-.312	4	-1.45e-4	1	NC	1	248.308	4
171		10	max	.004	2	-.001	15	.003	1	2.799e-3	4	NC	1	NC	1
172			min	-.005	3	-.011	3	-.26	4	-1.329e-4	1	NC	1	297.689	4
173		11	max	.003	2	-.001	15	.003	1	2.844e-3	4	NC	1	NC	1
174			min	-.004	3	-.01	3	-.212	4	-1.207e-4	1	NC	1	365.54	4
175		12	max	.003	2	-.001	15	.002	1	2.89e-3	4	NC	1	NC	1
176			min	-.004	3	-.009	3	-.168	4	-1.086e-4	1	NC	1	462.546	4
177		13	max	.003	2	-.001	15	.002	1	2.935e-3	4	NC	1	NC	1
178			min	-.003	3	-.008	3	-.127	4	-9.646e-5	1	NC	1	608.499	4
179		14	max	.002	2	-.001	15	.001	1	2.98e-3	4	NC	1	NC	1
180			min	-.003	3	-.007	3	-.092	4	-8.433e-5	1	NC	1	843.571	4
181		15	max	.002	2	-.001	15	0	1	3.026e-3	4	NC	1	NC	1
182			min	-.002	3	-.006	3	-.061	4	-7.219e-5	1	NC	1	1260.079	4
183		16	max	.001	2	0	15	0	1	3.071e-3	4	NC	1	NC	1
184			min	-.002	3	-.005	3	-.037	4	-6.006e-5	1	NC	1	2112.121	4
185		17	max	0	2	0	15	0	1	3.117e-3	4	NC	1	NC	1
186			min	-.001	3	-.003	6	-.018	4	-4.792e-5	1	NC	1	4335.512	4
187		18	max	0	2	0	15	0	1	3.162e-3	4	NC	1	NC	1
188			min	0	3	-.002	6	-.005	4	-3.579e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.208e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	-2.365e-5	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	4.618e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	-6.954e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.017	4	3.165e-5	1	NC	1	NC	1
194			min	0	2	-.003	6	0	1	2.06e-6	12	NC	1	NC	1
195		3	max	0	3	-.001	15	.033	4	7.348e-4	4	NC	1	NC	1
196			min	0	2	-.006	6	0	1	3.745e-6	12	NC	1	NC	1
197		4	max	.001	3	-.002	15	.048	4	1.45e-3	4	NC	1	NC	1
198			min	-.001	2	-.009	6	0	1	5.43e-6	12	NC	1	8527.789	5
199		5	max	.002	3	-.003	15	.061	4	2.165e-3	4	NC	1	NC	1
200			min	-.002	2	-.012	6	0	1	7.115e-6	12	8528.9	6	7523.106	5
201		6	max	.002	3	-.003	15	.074	4	2.88e-3	4	NC	5	NC	1
202			min	-.002	2	-.015	6	0	1	8.8e-6	12	6910.761	6	7228.876	5
203		7	max	.003	3	-.004	15	.085	4	3.595e-3	4	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
204			min	-.002	2	-.017	6	0	1	1.049e-5	12	5936.224	6	7428.838	5
205		8	max	.003	3	-.004	15	.096	4	4.311e-3	4	NC	5	NC	1
206			min	-.003	2	-.019	6	0	3	1.217e-5	12	5335.172	6	8128.25	5
207		9	max	.004	3	-.005	15	.106	4	5.026e-3	4	NC	5	NC	1
208			min	-.003	2	-.02	6	0	12	1.386e-5	12	4980.46	6	9522.134	5
209		10	max	.004	3	-.005	15	.116	4	5.741e-3	4	NC	5	NC	1
210			min	-.003	2	-.021	6	0	12	1.554e-5	12	4810.446	6	NC	1
211		11	max	.005	3	-.005	15	.125	4	6.456e-3	4	NC	5	NC	1
212			min	-.004	2	-.021	6	0	12	1.723e-5	12	4800.133	6	NC	1
213		12	max	.005	3	-.004	15	.134	4	7.171e-3	4	NC	5	NC	1
214			min	-.004	2	-.021	6	0	12	1.891e-5	12	4951.586	6	NC	1
215		13	max	.006	3	-.004	15	.144	4	7.886e-3	4	NC	5	NC	1
216			min	-.005	2	-.019	6	0	12	2.06e-5	12	5295.963	6	NC	1
217		14	max	.006	3	-.004	15	.153	4	8.601e-3	4	NC	5	NC	1
218			min	-.005	2	-.017	6	0	12	2.228e-5	12	5909.596	6	NC	1
219		15	max	.007	3	-.003	15	.164	4	9.316e-3	4	NC	3	NC	1
220			min	-.005	2	-.015	6	0	12	2.397e-5	12	6961.433	6	NC	1
221		16	max	.007	3	-.002	15	.175	4	1.003e-2	4	NC	1	NC	1
222			min	-.006	2	-.012	6	0	12	2.565e-5	12	8860.467	6	NC	1
223		17	max	.007	3	-.001	15	.187	4	1.075e-2	4	NC	1	NC	1
224			min	-.006	2	-.008	6	0	12	2.734e-5	12	NC	1	NC	1
225		18	max	.008	3	0	15	.201	4	1.146e-2	4	NC	1	NC	1
226			min	-.007	2	-.005	1	0	12	2.902e-5	12	NC	1	NC	1
227		19	max	.008	3	0	5	.217	4	1.218e-2	4	NC	1	NC	1
228			min	-.007	2	-.002	3	0	12	3.071e-5	12	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	12	1.795e-4	1	NC	1	NC	3
230			min	0	5	-.009	3	-.217	4	-1.716e-4	5	NC	1	114.506	4
231		2	max	.002	1	.006	2	0	12	1.795e-4	1	NC	1	NC	3
232			min	0	5	-.008	3	-.199	4	-1.716e-4	5	NC	1	124.503	4
233		3	max	.002	1	.006	2	0	12	1.795e-4	1	NC	1	NC	3
234			min	0	5	-.008	3	-.182	4	-1.716e-4	5	NC	1	136.401	4
235		4	max	.002	1	.006	2	0	12	1.795e-4	1	NC	1	NC	3
236			min	0	5	-.007	3	-.165	4	-1.716e-4	5	NC	1	150.694	4
237		5	max	.002	1	.005	2	0	12	1.795e-4	1	NC	1	NC	3
238			min	0	5	-.007	3	-.148	4	-1.716e-4	5	NC	1	168.052	4
239		6	max	.002	1	.005	2	0	12	1.795e-4	1	NC	1	NC	2
240			min	0	5	-.006	3	-.131	4	-1.716e-4	5	NC	1	189.405	4
241		7	max	.002	1	.004	2	0	12	1.795e-4	1	NC	1	NC	2
242			min	0	5	-.006	3	-.115	4	-1.716e-4	5	NC	1	216.075	4
243		8	max	.002	1	.004	2	0	12	1.795e-4	1	NC	1	NC	2
244			min	0	5	-.005	3	-.099	4	-1.716e-4	5	NC	1	249.988	4
245		9	max	.001	1	.004	2	0	12	1.795e-4	1	NC	1	NC	2
246			min	0	5	-.005	3	-.084	4	-1.716e-4	5	NC	1	294.042	4
247		10	max	.001	1	.003	2	0	12	1.795e-4	1	NC	1	NC	2
248			min	0	5	-.004	3	-.07	4	-1.716e-4	5	NC	1	352.771	4
249		11	max	.001	1	.003	2	0	12	1.795e-4	1	NC	1	NC	2
250			min	0	5	-.004	3	-.057	4	-1.716e-4	5	NC	1	433.587	4
251		12	max	0	1	.003	2	0	12	1.795e-4	1	NC	1	NC	1
252			min	0	5	-.003	3	-.045	4	-1.716e-4	5	NC	1	549.316	4
253		13	max	0	1	.002	2	0	12	1.795e-4	1	NC	1	NC	1
254			min	0	5	-.003	3	-.034	4	-1.716e-4	5	NC	1	723.757	4
255		14	max	0	1	.002	2	0	12	1.795e-4	1	NC	1	NC	1
256			min	0	5	-.002	3	-.025	4	-1.716e-4	5	NC	1	1005.328	4
257		15	max	0	1	.001	2	0	12	1.795e-4	1	NC	1	NC	1
258			min	0	5	-.002	3	-.016	4	-1.716e-4	5	NC	1	1505.624	4
259		16	max	0	1	.001	2	0	12	1.795e-4	1	NC	1	NC	1
260			min	0	5	-.001	3	-.01	4	-1.716e-4	5	NC	1	2533.096	4

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
261		17	max	0	1	0	2	0	12	1.795e-4	1	NC	1	NC	1
262			min	0	5	0	3	-.005	4	-1.716e-4	5	NC	1	5231.167	4
263		18	max	0	1	0	2	0	12	1.795e-4	1	NC	1	NC	1
264			min	0	5	0	3	-.001	4	-1.716e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.795e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.716e-4	5	NC	1	NC	1
267	M6	1	max	.024	2	.035	2	0	1	2.55e-3	4	NC	3	NC	1
268			min	-.031	3	-.049	3	-.811	4	0	1	2185.801	2	95.488	4
269		2	max	.022	2	.032	2	0	1	2.589e-3	4	NC	3	NC	1
270			min	-.029	3	-.047	3	-.746	4	0	1	2405.286	2	103.933	4
271		3	max	.021	2	.029	2	0	1	2.629e-3	4	NC	3	NC	1
272			min	-.028	3	-.044	3	-.68	4	0	1	2671.366	2	113.955	4
273		4	max	.02	2	.026	2	0	1	2.668e-3	4	NC	3	NC	1
274			min	-.026	3	-.041	3	-.615	4	0	1	2997.65	2	125.965	4
275		5	max	.018	2	.023	2	0	1	2.708e-3	4	NC	3	NC	1
276			min	-.024	3	-.039	3	-.551	4	0	1	3403.276	2	140.522	4
277		6	max	.017	2	.02	2	0	1	2.747e-3	4	NC	3	NC	1
278			min	-.023	3	-.036	3	-.489	4	0	1	3915.859	2	158.396	4
279		7	max	.016	2	.017	2	0	1	2.787e-3	4	NC	1	NC	1
280			min	-.021	3	-.033	3	-.429	4	0	1	4576.452	2	180.683	4
281		8	max	.014	2	.014	2	0	1	2.826e-3	4	NC	1	NC	1
282			min	-.019	3	-.031	3	-.371	4	0	1	5448.288	2	208.979	4
283		9	max	.013	2	.012	2	0	1	2.865e-3	4	NC	1	NC	1
284			min	-.017	3	-.028	3	-.315	4	0	1	6633.042	2	245.683	4
285		10	max	.012	2	.009	2	0	1	2.905e-3	4	NC	1	NC	1
286			min	-.016	3	-.025	3	-.263	4	0	1	8303.055	2	294.54	4
287		11	max	.01	2	.007	2	0	1	2.944e-3	4	NC	1	NC	1
288			min	-.014	3	-.022	3	-.214	4	0	1	NC	1	361.671	4
289		12	max	.009	2	.005	2	0	1	2.984e-3	4	NC	1	NC	1
290			min	-.012	3	-.02	3	-.169	4	0	1	NC	1	457.643	4
291		13	max	.008	2	.004	2	0	1	3.023e-3	4	NC	1	NC	1
292			min	-.01	3	-.017	3	-.129	4	0	1	NC	1	602.032	4
293		14	max	.007	2	.002	2	0	1	3.063e-3	4	NC	1	NC	1
294			min	-.009	3	-.014	3	-.093	4	0	1	NC	1	834.569	4
295		15	max	.005	2	.001	2	0	1	3.102e-3	4	NC	1	NC	1
296			min	-.007	3	-.011	3	-.062	4	0	1	NC	1	1246.542	4
297		16	max	.004	2	0	2	0	1	3.141e-3	4	NC	1	NC	1
298			min	-.005	3	-.008	3	-.037	4	0	1	NC	1	2089.171	4
299		17	max	.003	2	0	2	0	1	3.181e-3	4	NC	1	NC	1
300			min	-.003	3	-.006	3	-.018	4	0	1	NC	1	4287.371	4
301		18	max	.001	2	0	2	0	1	3.22e-3	4	NC	1	NC	1
302			min	-.002	3	-.003	3	-.006	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.26e-3	4	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	-7.073e-4	4	NC	1	NC	1
307		2	max	.001	3	0	15	.017	4	0	1	NC	1	NC	1
308			min	-.001	2	-.004	3	0	1	-1.619e-5	5	NC	1	NC	1
309		3	max	.003	3	-.001	15	.034	4	6.768e-4	4	NC	1	NC	1
310			min	-.003	2	-.007	3	0	1	0	1	NC	1	9663.626	4
311		4	max	.004	3	-.002	15	.048	4	1.369e-3	4	NC	1	NC	1
312			min	-.004	2	-.011	3	0	1	0	1	NC	1	7340.618	4
313		5	max	.006	3	-.003	15	.062	4	2.061e-3	4	NC	1	NC	1
314			min	-.005	2	-.014	3	0	1	0	1	8355.747	3	6360.258	4
315		6	max	.007	3	-.004	15	.075	4	2.753e-3	4	NC	1	NC	1
316			min	-.007	2	-.016	3	0	1	0	1	6925.264	4	5975.241	4
317		7	max	.009	3	-.004	15	.086	4	3.445e-3	4	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
318			min	-.008	2	-.018	3	0	1	0	1	5947.693	4	5964.381	4
319		8	max	.01	3	-.005	15	.097	4	4.137e-3	4	NC	2	NC	1
320			min	-.009	2	-.02	3	0	1	0	1	5344.748	4	6275.898	4
321		9	max	.011	3	-.005	15	.107	4	4.829e-3	4	NC	5	NC	1
322			min	-.011	2	-.021	3	0	1	0	1	4988.83	4	6956.607	4
323		10	max	.013	3	-.005	15	.116	4	5.521e-3	4	NC	5	NC	1
324			min	-.012	2	-.022	4	0	1	0	1	4818.069	4	8169.692	4
325		11	max	.014	3	-.005	15	.125	4	6.213e-3	4	NC	5	NC	1
326			min	-.014	2	-.022	4	0	1	0	1	4807.351	4	NC	1
327		12	max	.016	3	-.005	15	.134	4	6.905e-3	4	NC	5	NC	1
328			min	-.015	2	-.021	4	0	1	0	1	4958.695	4	NC	1
329		13	max	.017	3	-.005	15	.143	4	7.598e-3	4	NC	5	NC	1
330			min	-.016	2	-.02	3	0	1	0	1	5303.261	4	NC	1
331		14	max	.018	3	-.004	15	.151	4	8.29e-3	4	NC	2	NC	1
332			min	-.018	2	-.019	3	0	1	0	1	5917.458	4	NC	1
333		15	max	.02	3	-.004	15	.161	4	8.982e-3	4	NC	1	NC	1
334			min	-.019	2	-.017	3	0	1	0	1	6970.424	4	NC	1
335		16	max	.021	3	-.003	15	.171	4	9.674e-3	4	NC	1	NC	1
336			min	-.02	2	-.015	3	0	1	0	1	8871.639	4	NC	1
337		17	max	.023	3	-.002	15	.182	4	1.037e-2	4	NC	1	NC	1
338			min	-.022	2	-.012	3	0	1	0	1	NC	1	NC	1
339		18	max	.024	3	-.001	15	.194	4	1.106e-2	4	NC	1	NC	1
340			min	-.023	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.026	3	0	10	.208	4	1.175e-2	4	NC	1	NC	1
342			min	-.024	2	-.006	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.024	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.026	3	-.208	4	-3.653e-4	4	NC	1	119.497	4
345		2	max	.006	1	.022	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.025	3	-.191	4	-3.653e-4	4	NC	1	129.95	4
347		3	max	.006	1	.021	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.023	3	-.174	4	-3.653e-4	4	NC	1	142.389	4
349		4	max	.005	1	.02	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.022	3	-.158	4	-3.653e-4	4	NC	1	157.33	4
351		5	max	.005	1	.018	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.02	3	-.141	4	-3.653e-4	4	NC	1	175.475	4
353		6	max	.005	1	.017	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.019	3	-.125	4	-3.653e-4	4	NC	1	197.796	4
355		7	max	.004	1	.016	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.018	3	-.11	4	-3.653e-4	4	NC	1	225.673	4
357		8	max	.004	1	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.016	3	-.095	4	-3.653e-4	4	NC	1	261.121	4
359		9	max	.004	1	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.015	3	-.081	4	-3.653e-4	4	NC	1	307.17	4
361		10	max	.003	1	.012	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.013	3	-.067	4	-3.653e-4	4	NC	1	368.558	4
363		11	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.012	3	-.055	4	-3.653e-4	4	NC	1	453.035	4
365		12	max	.002	1	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.01	3	-.043	4	-3.653e-4	4	NC	1	574.008	4
367		13	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.009	3	-.033	4	-3.653e-4	4	NC	1	756.36	4
369		14	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.007	3	-.024	4	-3.653e-4	4	NC	1	1050.71	4
371		15	max	.001	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	-.016	4	-3.653e-4	4	NC	1	1573.734	4
373		16	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	-.009	4	-3.653e-4	4	NC	1	2647.942	4

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
375		17	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	-.005	4	-3.653e-4	4	NC	1	5468.949	4
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	-.001	4	-3.653e-4	4	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	-3.653e-4	4	NC	1	NC	1
381	M10	1	max	.008	2	.01	2	0	12	2.539e-3	4	NC	1	NC	2
382			min	-.01	3	-.016	3	-.809	4	1.837e-5	12	7705.949	2	95.738	4
383		2	max	.007	2	.009	2	0	12	2.577e-3	4	NC	1	NC	2
384			min	-.009	3	-.016	3	-.744	4	1.746e-5	12	9083.695	2	104.205	4
385		3	max	.007	2	.007	2	0	12	2.615e-3	4	NC	1	NC	2
386			min	-.009	3	-.015	3	-.678	4	1.654e-5	12	NC	1	114.255	4
387		4	max	.006	2	.006	2	0	12	2.653e-3	4	NC	1	NC	2
388			min	-.008	3	-.015	3	-.614	4	1.562e-5	12	NC	1	126.298	4
389		5	max	.006	2	.004	2	0	12	2.69e-3	4	NC	1	NC	1
390			min	-.008	3	-.014	3	-.55	4	1.471e-5	12	NC	1	140.894	4
391		6	max	.005	2	.003	2	0	12	2.728e-3	4	NC	1	NC	1
392			min	-.007	3	-.014	3	-.488	4	1.379e-5	12	NC	1	158.817	4
393		7	max	.005	2	.002	2	0	12	2.766e-3	4	NC	1	NC	1
394			min	-.007	3	-.013	3	-.428	4	1.287e-5	12	NC	1	181.167	4
395		8	max	.005	2	0	2	0	12	2.804e-3	4	NC	1	NC	1
396			min	-.006	3	-.012	3	-.37	4	1.195e-5	12	NC	1	209.543	4
397		9	max	.004	2	0	2	0	12	2.842e-3	4	NC	1	NC	1
398			min	-.005	3	-.012	3	-.315	4	1.104e-5	12	NC	1	246.352	4
399		10	max	.004	2	-.001	2	0	12	2.88e-3	4	NC	1	NC	1
400			min	-.005	3	-.011	3	-.262	4	1.012e-5	12	NC	1	295.351	4
401		11	max	.003	2	-.002	2	0	12	2.918e-3	4	NC	1	NC	1
402			min	-.004	3	-.01	3	-.214	4	9.204e-6	12	NC	1	362.681	4
403		12	max	.003	2	-.002	15	0	12	2.956e-3	4	NC	1	NC	1
404			min	-.004	3	-.009	3	-.169	4	8.287e-6	12	NC	1	458.944	4
405		13	max	.003	2	-.002	15	0	12	2.994e-3	4	NC	1	NC	1
406			min	-.003	3	-.008	3	-.128	4	7.37e-6	12	NC	1	603.786	4
407		14	max	.002	2	-.002	15	0	12	3.032e-3	4	NC	1	NC	1
408			min	-.003	3	-.007	4	-.093	4	6.453e-6	12	NC	1	837.081	4
409		15	max	.002	2	-.002	15	0	12	3.07e-3	4	NC	1	NC	1
410			min	-.002	3	-.006	4	-.062	4	5.536e-6	12	NC	1	1250.471	4
411		16	max	.001	2	-.001	15	0	12	3.108e-3	4	NC	1	NC	1
412			min	-.002	3	-.005	4	-.037	4	4.619e-6	12	NC	1	2096.229	4
413		17	max	0	2	0	15	0	12	3.146e-3	4	NC	1	NC	1
414			min	-.001	3	-.004	4	-.018	4	3.702e-6	12	NC	1	4303.62	4
415		18	max	0	2	0	15	0	12	3.184e-3	4	NC	1	NC	1
416			min	0	3	-.002	4	-.006	4	2.785e-6	12	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.222e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	1.868e-6	12	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-3.745e-7	12	NC	1	NC	1
420			min	0	1	0	1	0	1	-6.982e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.017	4	6.343e-6	5	NC	1	NC	1
422			min	0	2	-.003	4	0	12	-3.165e-5	1	NC	1	NC	1
423		3	max	0	3	-.002	15	.033	4	7.004e-4	5	NC	1	NC	1
424			min	0	2	-.006	4	0	12	-5.867e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	.048	4	1.397e-3	4	NC	1	NC	1
426			min	-.001	2	-.009	4	0	12	-8.57e-5	1	NC	1	7967.416	4
427		5	max	.002	3	-.003	15	.061	4	2.096e-3	4	NC	1	NC	1
428			min	-.002	2	-.013	4	0	12	-1.127e-4	1	8243.336	4	6978.638	4
429		6	max	.002	3	-.004	15	.074	4	2.794e-3	4	NC	5	NC	1
430			min	-.002	2	-.016	4	0	12	-1.398e-4	1	6699.315	4	6644.711	4
431		7	max	.003	3	-.004	15	.085	4	3.493e-3	4	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
432			min	-.002	2	-.018	4	0	10	-1.668e-4	1	5768.575	4	6746.753	4
433		8	max	.003	3	-.005	15	.096	4	4.191e-3	4	NC	5	NC	1
434			min	-.003	2	-.02	4	0	1	-1.938e-4	1	5194.896	4	7260.644	4
435		9	max	.004	3	-.005	15	.106	4	4.889e-3	4	NC	5	NC	1
436			min	-.003	2	-.022	4	0	1	-2.208e-4	1	4857.629	4	8302.525	4
437		10	max	.004	3	-.006	15	.115	4	5.588e-3	4	NC	5	NC	1
438			min	-.003	2	-.022	4	0	1	-2.479e-4	1	4698.411	4	NC	1
439		11	max	.005	3	-.006	15	.124	4	6.286e-3	4	NC	5	NC	1
440			min	-.004	2	-.023	4	-.001	1	-2.749e-4	1	4693.91	4	NC	1
441		12	max	.005	3	-.005	15	.133	4	6.985e-3	4	NC	5	NC	1
442			min	-.004	2	-.022	4	-.002	1	-3.019e-4	1	4846.872	4	NC	1
443		13	max	.006	3	-.005	15	.142	4	7.683e-3	4	NC	5	NC	1
444			min	-.005	2	-.021	4	-.002	1	-3.289e-4	1	5188.344	4	NC	1
445		14	max	.006	3	-.005	15	.151	4	8.382e-3	4	NC	5	NC	1
446			min	-.005	2	-.019	4	-.003	1	-3.56e-4	1	5793.581	4	NC	1
447		15	max	.007	3	-.004	15	.161	4	9.08e-3	4	NC	3	NC	1
448			min	-.005	2	-.016	4	-.004	1	-3.83e-4	1	6828.689	4	NC	1
449		16	max	.007	3	-.003	15	.172	4	9.779e-3	4	NC	1	NC	1
450			min	-.006	2	-.013	4	-.005	1	-4.1e-4	1	8695.443	4	NC	1
451		17	max	.007	3	-.002	15	.183	4	1.048e-2	4	NC	1	NC	1
452			min	-.006	2	-.009	4	-.007	1	-4.371e-4	1	NC	1	NC	1
453		18	max	.008	3	-.002	15	.196	4	1.118e-2	4	NC	1	NC	1
454			min	-.007	2	-.006	4	-.008	1	-4.641e-4	1	NC	1	NC	1
455		19	max	.008	3	0	10	.211	4	1.187e-2	4	NC	1	NC	1
456			min	-.007	2	-.002	3	-.01	1	-4.911e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.01	1	-1.189e-5	12	NC	1	NC	3
458			min	0	3	-.009	3	-.211	4	-2.42e-4	4	NC	1	117.794	4
459		2	max	.002	1	.006	2	.009	1	-1.189e-5	12	NC	1	NC	3
460			min	0	3	-.008	3	-.194	4	-2.42e-4	4	NC	1	128.085	4
461		3	max	.002	1	.006	2	.008	1	-1.189e-5	12	NC	1	NC	3
462			min	0	3	-.008	3	-.177	4	-2.42e-4	4	NC	1	140.333	4
463		4	max	.002	1	.006	2	.007	1	-1.189e-5	12	NC	1	NC	3
464			min	0	3	-.007	3	-.16	4	-2.42e-4	4	NC	1	155.046	4
465		5	max	.002	1	.005	2	.007	1	-1.189e-5	12	NC	1	NC	3
466			min	0	3	-.007	3	-.143	4	-2.42e-4	4	NC	1	172.913	4
467		6	max	.002	1	.005	2	.006	1	-1.189e-5	12	NC	1	NC	2
468			min	0	3	-.006	3	-.127	4	-2.42e-4	4	NC	1	194.894	4
469		7	max	.002	1	.004	2	.005	1	-1.189e-5	12	NC	1	NC	2
470			min	0	3	-.006	3	-.112	4	-2.42e-4	4	NC	1	222.347	4
471		8	max	.002	1	.004	2	.005	1	-1.189e-5	12	NC	1	NC	2
472			min	0	3	-.005	3	-.096	4	-2.42e-4	4	NC	1	257.254	4
473		9	max	.001	1	.004	2	.004	1	-1.189e-5	12	NC	1	NC	2
474			min	0	3	-.005	3	-.082	4	-2.42e-4	4	NC	1	302.601	4
475		10	max	.001	1	.003	2	.003	1	-1.189e-5	12	NC	1	NC	2
476			min	0	3	-.004	3	-.068	4	-2.42e-4	4	NC	1	363.053	4
477		11	max	.001	1	.003	2	.003	1	-1.189e-5	12	NC	1	NC	2
478			min	0	3	-.004	3	-.056	4	-2.42e-4	4	NC	1	446.241	4
479		12	max	0	1	.003	2	.002	1	-1.189e-5	12	NC	1	NC	1
480			min	0	3	-.003	3	-.044	4	-2.42e-4	4	NC	1	565.367	4
481		13	max	0	1	.002	2	.002	1	-1.189e-5	12	NC	1	NC	1
482			min	0	3	-.003	3	-.033	4	-2.42e-4	4	NC	1	744.932	4
483		14	max	0	1	.002	2	.001	1	-1.189e-5	12	NC	1	NC	1
484			min	0	3	-.002	3	-.024	4	-2.42e-4	4	NC	1	1034.775	4
485		15	max	0	1	.001	2	0	1	-1.189e-5	12	NC	1	NC	1
486			min	0	3	-.002	3	-.016	4	-2.42e-4	4	NC	1	1549.779	4
487		16	max	0	1	.001	2	0	1	-1.189e-5	12	NC	1	NC	1
488			min	0	3	-.001	3	-.01	4	-2.42e-4	4	NC	1	2607.479	4

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
489		17	max	0	1	0	2	0	1	-1.189e-5	12	NC	1	NC	1
490			min	0	3	0	3	-.005	4	-2.42e-4	4	NC	1	5385.004	4
491		18	max	0	1	0	2	0	1	-1.189e-5	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-2.42e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-1.189e-5	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.42e-4	4	NC	1	NC	1
495	M1	1	max	.011	3	.191	2	.859	4	9.396e-3	1	NC	1	NC	1
496			min	-.006	2	-.047	3	0	12	-1.962e-2	3	NC	1	NC	1
497		2	max	.011	3	.092	2	.832	4	8.37e-3	4	NC	5	NC	1
498			min	-.006	2	-.021	3	-.008	1	-9.74e-3	3	1372.048	2	9324.239	5
499		3	max	.011	3	.016	3	.802	4	1.478e-2	4	NC	5	NC	1
500			min	-.006	2	-.013	2	-.011	1	-2.111e-4	1	663.676	2	5165.383	5
501		4	max	.01	3	.075	3	.772	4	1.277e-2	4	NC	15	NC	1
502			min	-.006	2	-.13	2	-.01	1	-4.385e-3	3	421.575	2	3766.125	5
503		5	max	.01	3	.148	3	.741	4	1.075e-2	4	NC	15	NC	1
504			min	-.006	2	-.252	2	-.007	1	-8.663e-3	3	305.722	2	3061.707	5
505		6	max	.01	3	.226	3	.709	4	1.279e-2	2	8336.432	15	NC	1
506			min	-.006	2	-.369	2	-.003	1	-1.294e-2	3	241.655	2	2630.089	5
507		7	max	.01	3	.301	3	.676	4	1.706e-2	2	7035.786	15	NC	1
508			min	-.006	2	-.474	2	0	3	-1.722e-2	3	203.73	2	2312.655	4
509		8	max	.01	3	.363	3	.643	4	2.133e-2	2	6265.785	15	NC	1
510			min	-.005	2	-.557	2	0	12	-2.149e-2	3	181.257	2	2066.949	4
511		9	max	.009	3	.403	3	.608	4	2.405e-2	2	5862.807	15	NC	1
512			min	-.005	2	-.609	2	0	1	-2.195e-2	3	169.531	2	1896.163	4
513		10	max	.009	3	.418	3	.571	4	2.571e-2	2	5739.601	15	NC	1
514			min	-.005	2	-.626	2	0	12	-1.986e-2	3	166.096	2	1838.694	4
515		11	max	.009	3	.408	3	.529	4	2.738e-2	2	5862.488	15	NC	1
516			min	-.005	2	-.608	2	0	12	-1.777e-2	3	170.139	2	1866.133	4
517		12	max	.009	3	.374	3	.485	4	2.63e-2	2	6265.033	15	NC	1
518			min	-.005	2	-.554	2	-.001	1	-1.528e-2	3	183.059	2	1981.368	4
519		13	max	.008	3	.318	3	.435	4	2.11e-2	2	7034.327	15	NC	1
520			min	-.005	2	-.467	2	0	1	-1.223e-2	3	208.02	2	2336.276	4
521		14	max	.008	3	.248	3	.38	4	1.591e-2	2	8333.765	15	NC	1
522			min	-.005	2	-.359	2	0	12	-9.17e-3	3	250.683	2	3139.256	4
523		15	max	.008	3	.168	3	.323	4	1.071e-2	2	NC	15	NC	1
524			min	-.005	2	-.239	2	0	12	-6.113e-3	3	324.051	2	5064.335	4
525		16	max	.008	3	.086	3	.268	4	9.486e-3	4	NC	15	NC	1
526			min	-.005	2	-.118	2	0	12	-3.056e-3	3	459.637	2	NC	1
527		17	max	.007	3	.006	3	.217	4	1.076e-2	4	NC	5	NC	1
528			min	-.005	2	-.007	2	0	12	9.547e-7	3	748.365	2	NC	1
529		18	max	.007	3	.087	2	.174	4	7.697e-3	2	NC	5	NC	1
530			min	-.005	2	-.067	3	0	12	-2.777e-3	3	1585.836	2	NC	1
531		19	max	.007	3	.17	2	.136	4	1.53e-2	2	NC	1	NC	1
532			min	-.005	2	-.135	3	0	1	-5.659e-3	3	NC	1	NC	1
533	M5	1	max	.032	3	.36	2	.859	4	0	1	NC	1	NC	1
534			min	-.023	2	-.028	3	0	1	-1.136e-5	4	NC	1	NC	1
535		2	max	.032	3	.173	2	.838	4	7.577e-3	4	NC	5	NC	1
536			min	-.023	2	-.008	3	0	1	0	1	727.696	2	6991.454	4
537		3	max	.032	3	.05	3	.811	4	1.498e-2	4	NC	15	NC	1
538			min	-.023	2	-.04	2	0	1	0	1	340.772	2	4141.935	4
539		4	max	.032	3	.179	3	.78	4	1.221e-2	4	8056.213	15	NC	1
540			min	-.022	2	-.296	2	0	1	0	1	207.566	2	3242.282	4
541		5	max	.031	3	.358	3	.746	4	9.433e-3	4	5607.131	15	NC	1
542			min	-.022	2	-.576	2	0	1	0	1	145.415	2	2819.142	4
543		6	max	.03	3	.56	3	.711	4	6.658e-3	4	4299.371	15	NC	1
544			min	-.021	2	-.854	2	0	1	0	1	111.994	2	2558.438	4
545		7	max	.03	3	.757	3	.675	4	3.883e-3	4	3547.197	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
546			min	-.021	2	-1.108	2	0	1	0	1	92.665	2	2338.684	4
547		8	max	.029	3	.922	3	.642	4	1.108e-3	4	3111.324	15	NC	1
548			min	-.021	2	-1.311	2	0	1	0	1	81.419	2	2101.55	4
549		9	max	.028	3	1.029	3	.609	4	0	1	2888.089	15	NC	1
550			min	-.02	2	-1.44	2	0	1	-6.981e-6	5	75.644	2	1888.719	4
551		10	max	.027	3	1.068	3	.57	4	0	1	2820.824	15	NC	1
552			min	-.02	2	-1.484	2	0	1	-6.736e-6	5	73.96	2	1854.101	4
553		11	max	.027	3	1.041	3	.529	4	0	1	2888.25	15	NC	1
554			min	-.02	2	-1.441	2	0	1	-6.49e-6	5	75.943	2	1894.366	4
555		12	max	.026	3	.95	3	.487	4	7.531e-4	4	3111.705	15	NC	1
556			min	-.019	2	-1.306	2	0	1	0	1	82.398	2	1941.736	4
557		13	max	.025	3	.804	3	.436	4	2.642e-3	4	3547.97	15	NC	1
558			min	-.019	2	-1.091	2	0	1	0	1	95.212	2	2277.561	4
559		14	max	.025	3	.62	3	.379	4	4.531e-3	4	4300.872	15	NC	1
560			min	-.019	2	-.824	2	0	1	0	1	117.784	2	3224.113	4
561		15	max	.024	3	.415	3	.319	4	6.42e-3	4	5610.091	15	NC	1
562			min	-.018	2	-.537	2	0	1	0	1	158.187	2	6205.748	4
563		16	max	.023	3	.208	3	.261	4	8.308e-3	4	8062.415	15	NC	1
564			min	-.018	2	-.259	2	0	1	0	1	236.895	2	NC	1
565		17	max	.023	3	.017	3	.208	4	1.02e-2	4	NC	15	NC	1
566			min	-.018	2	-.021	2	0	1	0	1	414.356	2	NC	1
567		18	max	.023	3	.155	2	.167	4	5.157e-3	4	NC	5	NC	1
568			min	-.018	2	-.146	3	0	1	0	1	930.989	2	NC	1
569		19	max	.023	3	.296	2	.137	4	0	1	NC	1	NC	1
570			min	-.018	2	-.291	3	0	1	-6.68e-6	4	NC	1	NC	1
571	M9	1	max	.011	3	.191	2	.859	4	1.962e-2	3	NC	1	NC	1
572			min	-.006	2	-.047	3	0	1	-9.396e-3	1	NC	1	NC	1
573		2	max	.011	3	.092	2	.836	4	9.74e-3	3	NC	5	NC	1
574			min	-.006	2	-.021	3	0	12	-4.572e-3	2	1372.048	2	7589.236	4
575		3	max	.011	3	.016	3	.809	4	1.493e-2	4	NC	5	NC	1
576			min	-.006	2	-.013	2	0	12	-1.059e-5	10	663.676	2	4399.867	4
577		4	max	.01	3	.075	3	.778	4	1.175e-2	5	NC	15	NC	1
578			min	-.006	2	-.13	2	0	12	-4.238e-3	2	421.575	2	3363.494	4
579		5	max	.01	3	.148	3	.745	4	8.866e-3	5	NC	15	NC	1
580			min	-.006	2	-.252	2	0	12	-8.512e-3	2	305.722	2	2858.914	4
581		6	max	.01	3	.226	3	.711	4	1.294e-2	3	8295.996	15	NC	1
582			min	-.006	2	-.369	2	0	12	-1.279e-2	2	241.655	2	2548.324	4
583		7	max	.01	3	.301	3	.676	4	1.722e-2	3	7002.683	15	NC	1
584			min	-.006	2	-.474	2	0	1	-1.706e-2	2	203.73	2	2308.938	4
585		8	max	.01	3	.363	3	.642	4	2.149e-2	3	6236.925	15	NC	1
586			min	-.005	2	-.557	2	0	1	-2.133e-2	2	181.257	2	2083.58	4
587		9	max	.009	3	.403	3	.609	4	2.195e-2	3	5836.113	15	NC	1
588			min	-.005	2	-.609	2	0	12	-2.405e-2	2	169.531	2	1889.863	4
589		10	max	.009	3	.418	3	.571	4	1.986e-2	3	5713.535	15	NC	1
590			min	-.005	2	-.626	2	0	1	-2.571e-2	2	166.096	2	1839.75	4
591		11	max	.009	3	.408	3	.529	4	1.777e-2	3	5835.777	15	NC	1
592			min	-.005	2	-.608	2	0	1	-2.738e-2	2	170.139	2	1873.862	4
593		12	max	.009	3	.374	3	.486	4	1.528e-2	3	6236.285	15	NC	1
594			min	-.005	2	-.554	2	0	12	-2.63e-2	2	183.059	2	1966.044	4
595		13	max	.008	3	.318	3	.435	4	1.223e-2	3	7001.698	15	NC	1
596			min	-.005	2	-.467	2	0	10	-2.11e-2	2	208.02	2	2335.141	4
597		14	max	.008	3	.248	3	.378	4	9.17e-3	3	8294.518	15	NC	1
598			min	-.005	2	-.359	2	-.003	1	-1.591e-2	2	250.683	2	3239.256	5
599		15	max	.008	3	.168	3	.32	4	6.182e-3	5	NC	15	NC	1
600			min	-.005	2	-.239	2	-.006	1	-1.071e-2	2	324.051	2	5603.252	5
601		16	max	.008	3	.086	3	.263	4	8.272e-3	5	NC	15	NC	1
602			min	-.005	2	-.118	2	-.009	1	-5.515e-3	2	459.637	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
603		17	max	.007	3	.006	3	.211	4	1.038e-2	4	NC	5	NC	1
604			min	-.005	2	-.007	2	-.01	1	-6.449e-4	1	748.365	2	NC	1
605		18	max	.007	3	.087	2	.169	4	5.035e-3	5	NC	5	NC	1
606			min	-.005	2	-.067	3	-.007	1	-7.697e-3	2	1585.836	2	NC	1
607		19	max	.007	3	.17	2	.137	4	5.659e-3	3	NC	1	NC	1
608			min	-.005	2	-.135	3	0	12	-1.53e-2	2	NC	1	NC	1

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

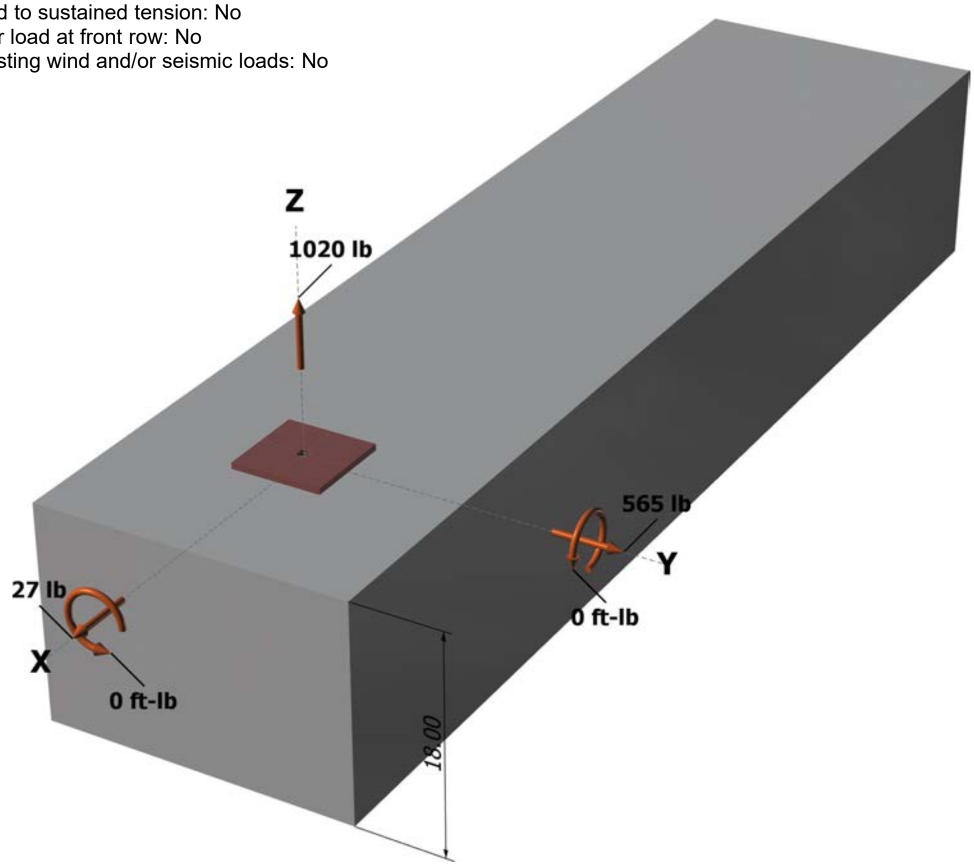
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

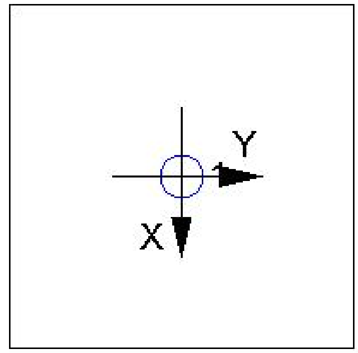
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
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	5.247	10215

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (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)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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	7.00	6947

$\phi V_{cby} = \phi\ (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
192.89	220.50	0.925	1.000	1.000	6947	0.70	3934

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)
165.27	278.72	0.878	1.000	1.000	8282	0.70	3018

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	7.00	6947

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
192.89	220.50	1.000	1.000	1.000	6947	0.70	8508

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)
165.27	278.72	1.000	1.000	1.000	8282	0.70	6875

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)
220.36	247.75	0.967	1.000	1.000	10215	8785	0.70	12298

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	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**566**	**3156**	**0.18**	**Pass (Governs)**
T Concrete breakout y+	565	3934	0.14	Pass
T Concrete breakout x+	27	3018	0.01	Pass
|| Concrete breakout y+	27	8508	0.00	Pass
|| Concrete breakout x+	565	6875	0.08	Pass
Concrete breakout, combined	-	-	0.14	Pass
Pryout	566	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	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

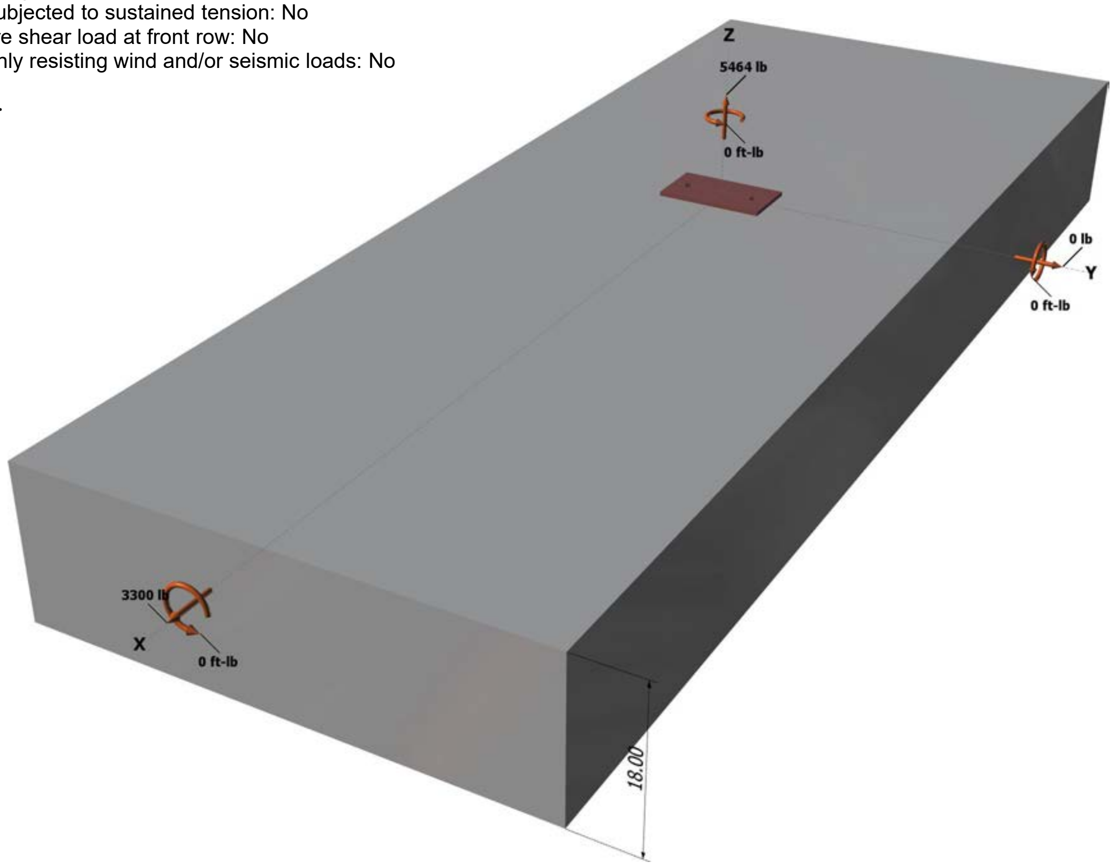
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

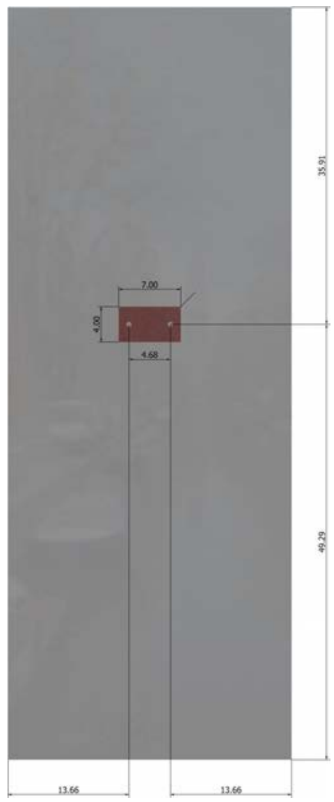
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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 7.00 x 0.28

<Figure 1>



<Figure 2>



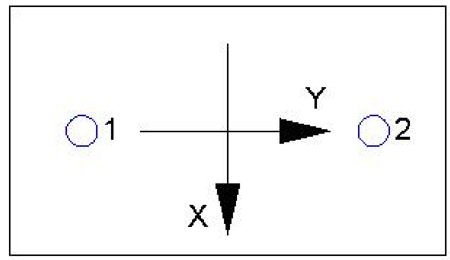
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2732.0	1650.0	0.0	1650.0
2	2732.0	1650.0	0.0	1650.0
Sum	5464.0	3300.0	0.0	3300.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5464
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	6.000	12492

$\phi N_{cbg} = \phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (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)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
576.00	648.00	1.000	0.928	1.000	1.000	15593	0.70	9001

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	13.66	18939

$\phi V_{cbx} = \phi\,(2)(A_{Vc}/A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
737.64	839.68	1.000	1.000	1.000	18939	0.70	23292

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	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

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
408.24	324.00	1.000	1.000	1.000	1.000	12492	15740	0.70

ϕV_{cpg} (lb)
20601

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	2732	6071	0.45	Pass
Concrete breakout	5464	10231	0.53	Pass
Adhesive	**5464**	**8093**	**0.68**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1650**	**3156**	**0.52**	**Pass (Governs)**
T Concrete breakout x+	3300	9001	0.37	Pass

|| Concrete breakout y-	1650	23292	0.07	Pass
Pryout	3300	20601	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.68	0.52	119.8 %	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.