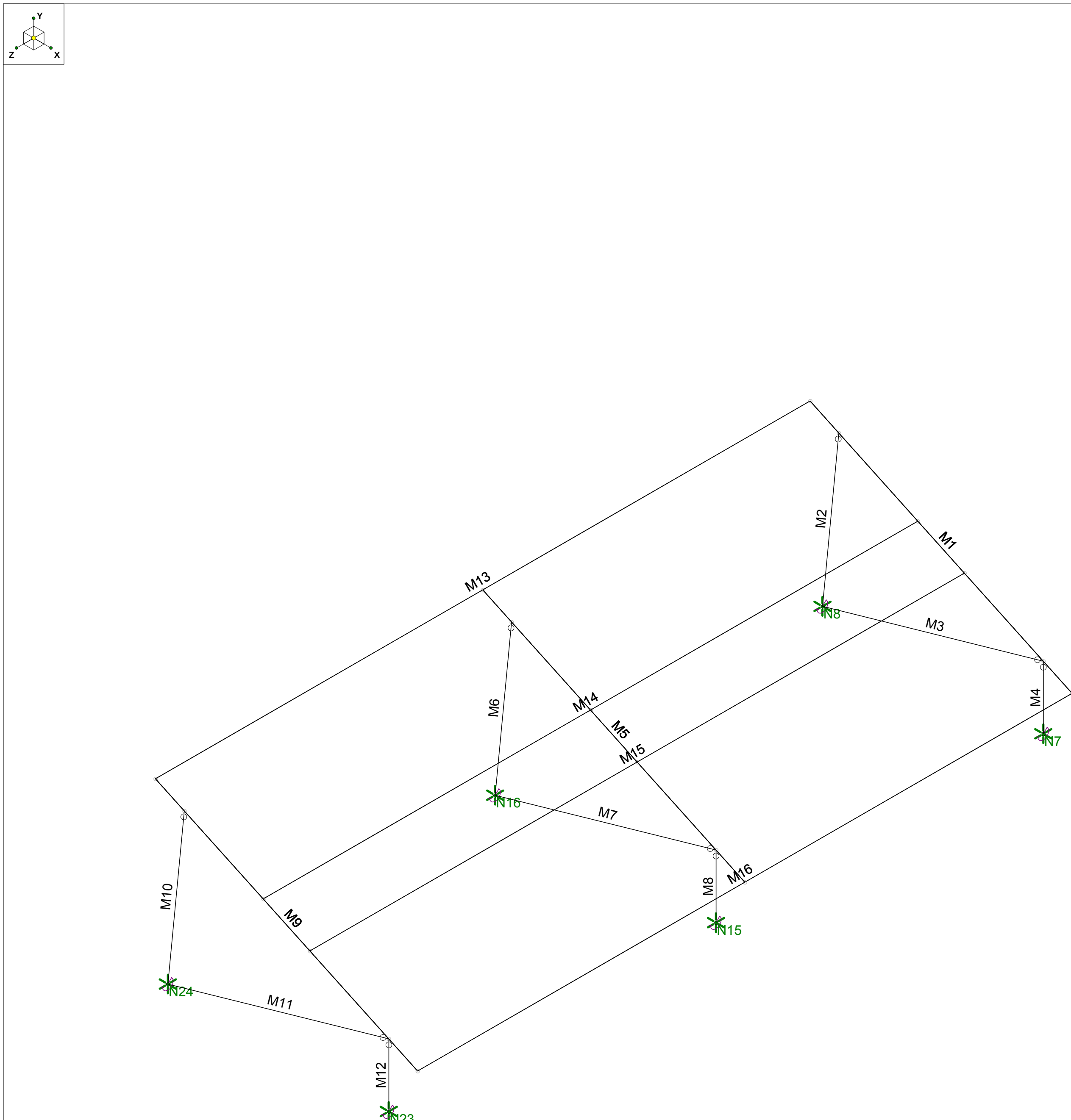


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

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.

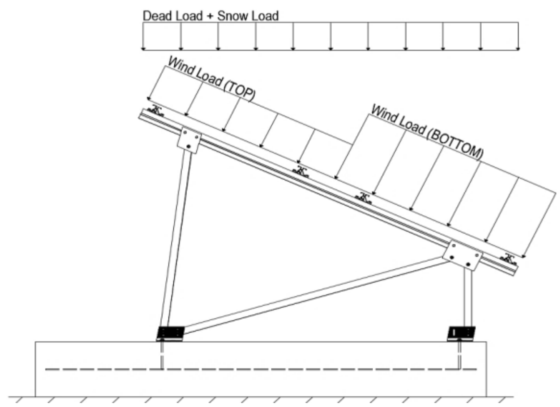
1.2 Construction

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

Modules Per Row = 2
Module Tilt = 25°
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 = 18.56 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 110 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.100	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.700	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.500	
$Cf-_{TOP, INNER PURLIN}$	=	-1.900	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
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

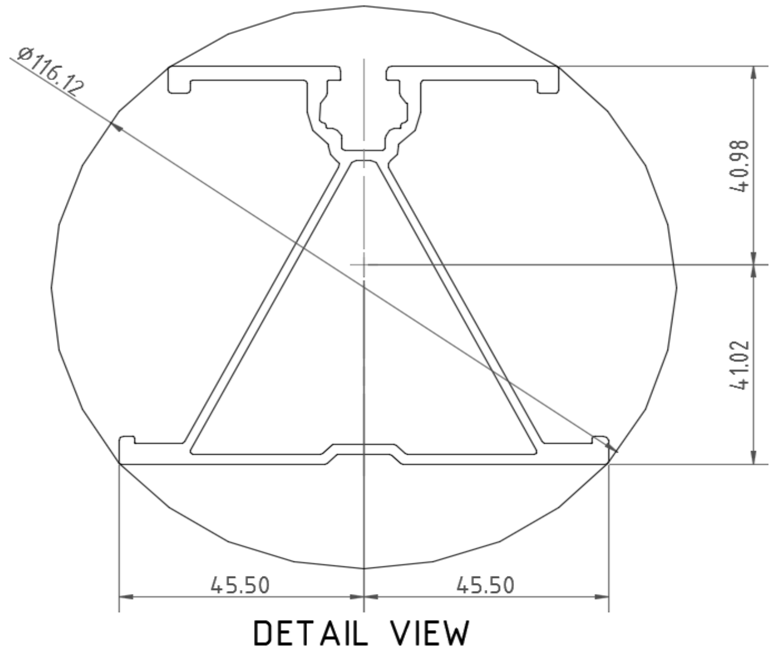
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

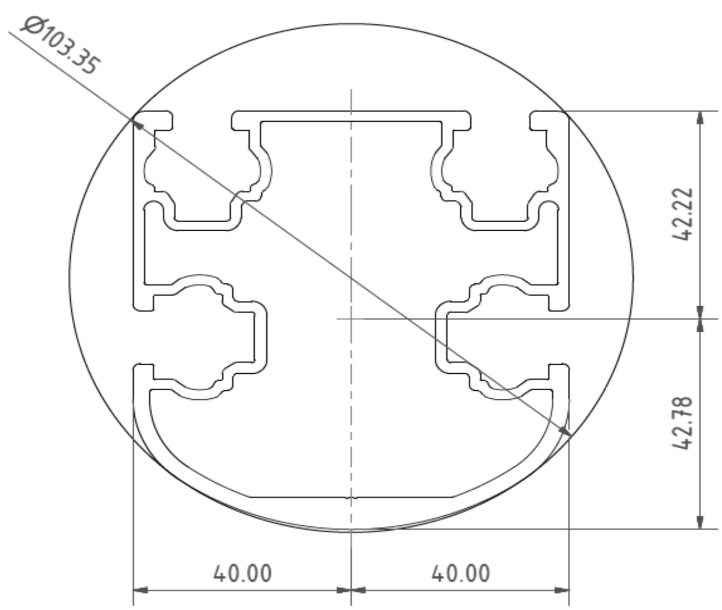
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	120	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.933	k-ft
M_z =	0.330	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	98%	



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).

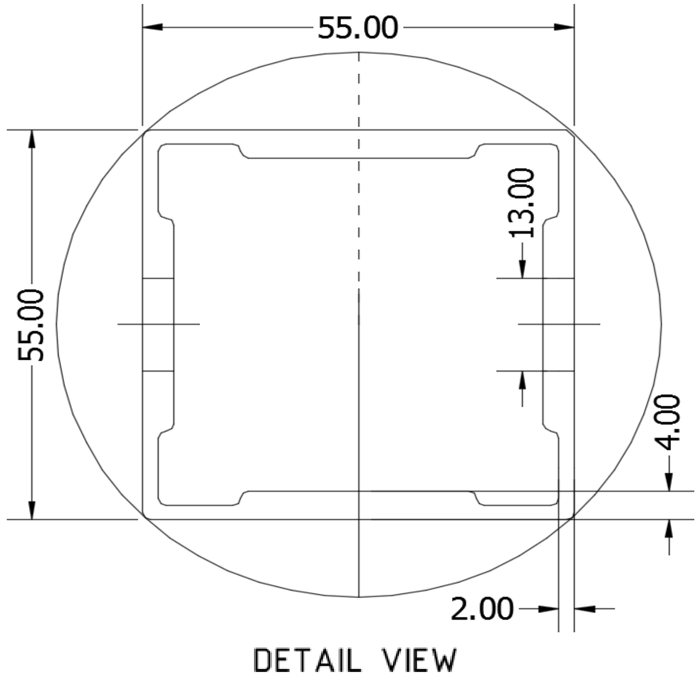
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.257	k-ft
M_z =	0.000	k-ft
P_n =	-0.815	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	95%	



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).

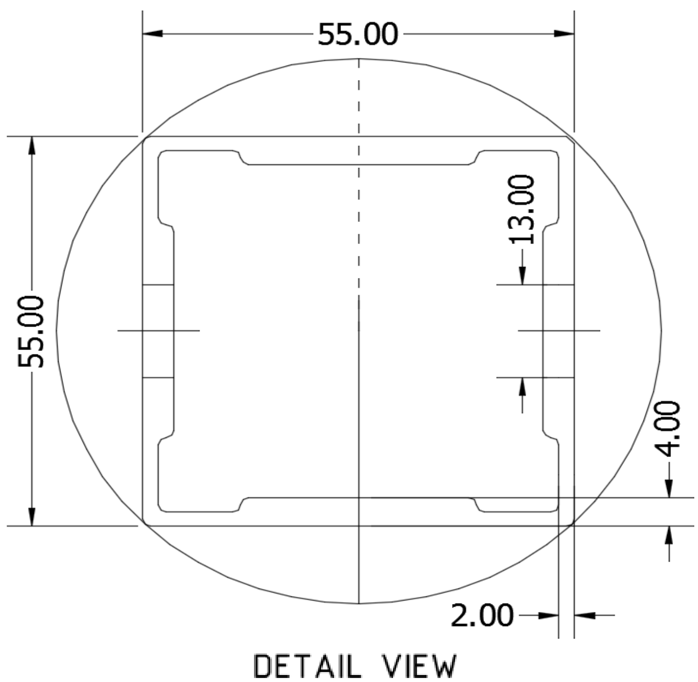
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.165	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	



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).

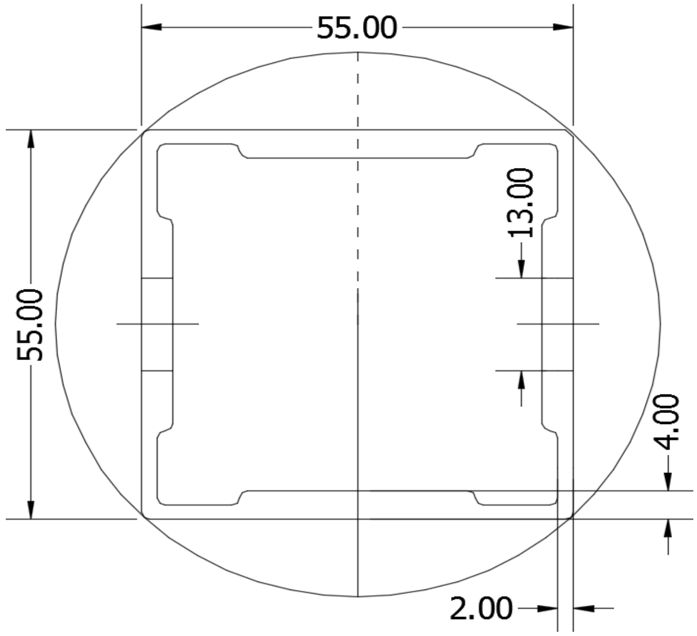
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.330	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	32%	



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 =	63.42	in
$\Phi F_{ty\ AXIAL}$ =	12.77	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 =	3.462	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	28%	



DETAIL VIEW

5. FOUNDATION DESIGN CALCULATIONS

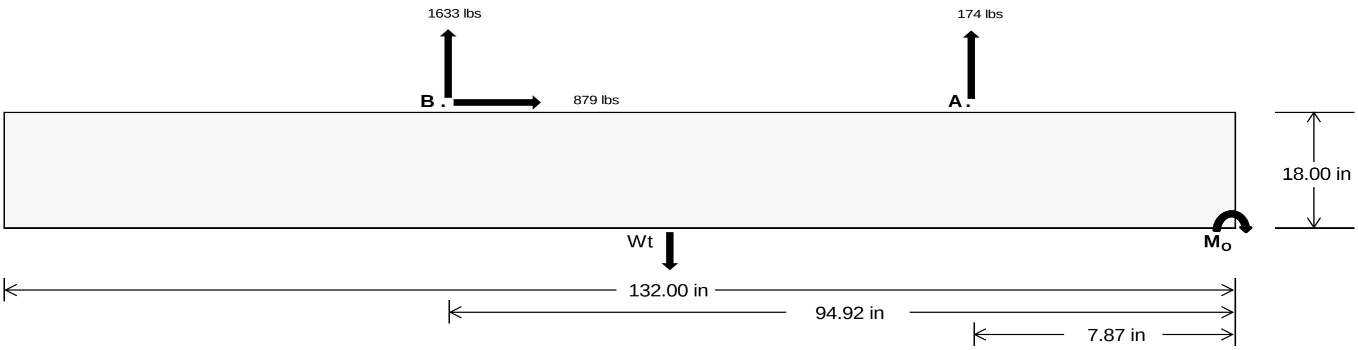
5.1 Helical Pile Foundations

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 =	736.82	6802.89	k
Compressive Load =	4114.59	5315.44	k
Lateral Load =	13.84	3657.33	k
Moment (Weak Axis) =	0.03	0.01	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 (3) #5 rebar.

Overturning Check

M_O =	172158.1 in-lbs
Resisting Force Required =	2608.46 lbs
S.F. =	1.67
Weight Required =	4347.43 lbs
Minimum Width =	36 in in
Weight Provided =	7177.50 lbs

A minimum 132in long x 36in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	878.96 lbs
Friction =	0.4
Weight Required =	2197.39 lbs
Resisting Weight =	7177.50 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 36in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	878.96 lbs
Cohesion =	130 psf
Area =	33.00 ft^2
Resisting =	3588.75 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 36in 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			
	36 in	37 in	38 in	39 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3 ft) =	7178 lbs	7377 lbs	7576 lbs	7776 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in
F_A	1386 lbs	1386 lbs	1386 lbs	1386 lbs	1573 lbs	1573 lbs	1573 lbs	1573 lbs	2090 lbs	2090 lbs	2090 lbs	2090 lbs	-348 lbs	-348 lbs	-348 lbs	-348 lbs
F_B	1376 lbs	1376 lbs	1376 lbs	1376 lbs	2268 lbs	2268 lbs	2268 lbs	2268 lbs	2606 lbs	2606 lbs	2606 lbs	2606 lbs	-3265 lbs	-3265 lbs	-3265 lbs	-3265 lbs
F_V	187 lbs	187 lbs	187 lbs	187 lbs	1581 lbs	1581 lbs	1581 lbs	1581 lbs	1310 lbs	1310 lbs	1310 lbs	1310 lbs	-1758 lbs	-1758 lbs	-1758 lbs	-1758 lbs
P_{total}	9940 lbs	10139 lbs	10338 lbs	10538 lbs	11019 lbs	11218 lbs	11418 lbs	11617 lbs	11874 lbs	12073 lbs	12272 lbs	12472 lbs	693 lbs	813 lbs	933 lbs	1052 lbs
M	3679 lbs-ft	3679 lbs-ft	3679 lbs-ft	3679 lbs-ft	4525 lbs-ft	4525 lbs-ft	4525 lbs-ft	4525 lbs-ft	5810 lbs-ft	5810 lbs-ft	5810 lbs-ft	5810 lbs-ft	3547 lbs-ft	3547 lbs-ft	3547 lbs-ft	3547 lbs-ft
e	0.37 ft	0.36 ft	0.36 ft	0.35 ft	0.41 ft	0.40 ft	0.40 ft	0.39 ft	0.49 ft	0.48 ft	0.47 ft	0.47 ft	5.12 ft	4.36 ft	3.80 ft	3.37 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	240.4 psf	239.8 psf	239.2 psf	238.6 psf	259.1 psf	258.0 psf	256.9 psf	255.9 psf	263.8 psf	262.5 psf	261.3 psf	260.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	362.0 psf	358.1 psf	354.4 psf	350.9 psf	408.7 psf	403.5 psf	398.6 psf	394.0 psf	455.8 psf	449.4 psf	443.3 psf	437.5 psf	401.0 psf	154.6 psf	115.7 psf	101.4 psf

Maximum Bearing Pressure =	456 psf
Allowable Bearing Pressure =	1500 psf

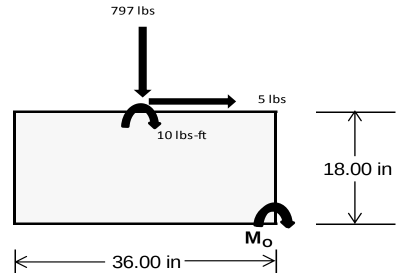
Use a 132in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1177.4 ft-lbs
Resisting Force Required = 784.94 lbs
S.F. = 1.67
Weight Required = 1308.24 lbs
Minimum Width = 36 in in
Weight Provided = 7177.50 lbs

A minimum 132in long x 36in 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	36 in			36 in			36 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	245 lbs	635 lbs	245 lbs	797 lbs	2292 lbs	797 lbs	72 lbs	186 lbs	72 lbs
F_V	1 lbs	0 lbs	1 lbs	5 lbs	0 lbs	5 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9131 lbs	7178 lbs	9131 lbs	9256 lbs	7178 lbs	9256 lbs	2670 lbs	7178 lbs	2670 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	18 lbs-ft	0 lbs-ft	18 lbs-ft	1 lbs-ft	0 lbs-ft	1 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft
f_{min}	276.4 psf	217.5 psf	276.4 psf	279.4 psf	217.5 psf	279.4 psf	80.9 psf	217.5 psf	80.9 psf
f_{max}	277.0 psf	217.5 psf	277.0 psf	281.6 psf	217.5 psf	281.6 psf	80.9 psf	217.5 psf	80.9 psf

Maximum Bearing Pressure = 282 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 36in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

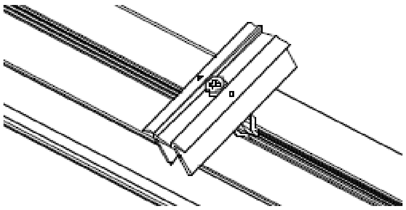
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

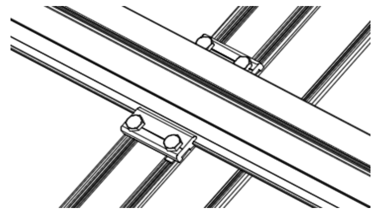
6. DESIGN OF JOINTS AND CONNECTIONS

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		Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.715 k	Maximum Uplifting Force =	2.550 k
Allowable Uplift =	1.214 k	Allowable Uplift =	4.357 k
Utilization =	59%	Utilization =	59%





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		Rear Strut	
Maximum Axial Load =	3.165 k	Maximum Axial Load =	4.601 k
M12 Bolt Capacity =	12.808 k	M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k	Strut Bearing Capacity =	7.421 k
Utilization =	43%	Utilization =	62%

Diagonal Strut	
Maximum Axial Load =	2.432 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	33%

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.

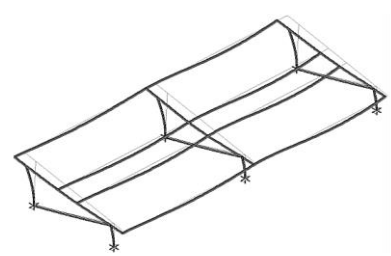
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	46.89 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.938 in
Max Drift, Δ_{MAX} =	0.05 in
N/A	

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 120 in
J = 0.432
331.976

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

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= 27.4 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 in^3
$M_{max}St$ = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 120
J = 0.432
211.117

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 28.6

3.4.16

b/t = 37.0588

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

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 in^3
$M_{max}Wk$ = 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 = 88.9 in
J = 1.08
152.913

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

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

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 = 88.9
J = 1.08
161.829

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

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= 29.2

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

$\varphi F_L = \varphi b[Bt-Dt^*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.363 k-ft

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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 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)

$\varphi F_L = \varphi c[Bp-1.6Dp^*b/t]$

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi c[Bt-Dt^*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 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 = <u>**55x55**</u>

<u>Strong Axis:</u>

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 <u>Not Used</u>

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

<u>Weak Axis:</u>

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 = 86.60 in

J = 0.942

135.148

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

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= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

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= 29.6

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

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 in^3

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 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 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= 7.50 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 7.72 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 63.42 in
J = 0.942
98.9729

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.2 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 = 63.42
J = 0.942
98.9729

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.2

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 in^3

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 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.46712

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7854

φF_L= (φccFcy)/(λ²)

φF_L= 12.7711 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 12.77 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 13.14 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								

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-4.45	-4.45	0	0
2	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	M16	Y	-4.45	-4.45	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-46.9	-46.9	0	0
2	M14	Y	-46.9	-46.9	0	0
3	M15	Y	-46.9	-46.9	0	0
4	M16	Y	-46.9	-46.9	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	-58.278	-58.278	0	0
2	M14	y	-58.278	-58.278	0	0
3	M15	y	-90.067	-90.067	0	0
4	M16	y	-90.067	-90.067	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	132.451	132.451	0	0
2	M14	y	100.663	100.663	0	0
3	M15	y	52.98	52.98	0	0
4	M16	y	52.98	52.98	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												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	710.217	2	1253.798	2	.73	1	.004	1	0	1	0	1
2		min	-885.826	3	-1601.382	3	.035	15	0	15	0	1	0	1
3	N7	max	.037	9	1162.664	1	-.455	15	0	15	0	1	0	1
4		min	-.199	2	-147.5	3	-10.643	1	-.022	1	0	1	0	1
5	N15	max	.028	9	3165.066	1	0	14	0	14	0	1	0	1
6		min	-2.287	2	-566.781	3	0	11	0	12	0	1	0	1
7	N16	max	2594.623	2	4088.802	2	0	11	0	2	0	1	0	1
8		min	-2813.334	3	-5232.996	3	0	15	0	1	0	1	0	1
9	N23	max	.037	9	1162.664	1	10.643	1	.022	1	0	1	0	1
10		min	-.199	2	-147.5	3	.455	15	0	15	0	1	0	1
11	N24	max	710.217	2	1253.798	2	-.035	15	0	15	0	1	0	1
12		min	-885.826	3	-1601.382	3	-.73	1	-.004	1	0	1	0	1
13	Totals:	max	4012.372	2	11571.472	2	0	2						
14		min	-4585.564	3	-9297.54	3	0	3						

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	108.107	1	465.003	1	-7.267	15	0	3	.258	1	0	1
2			min	4.483	15	-776.817	3	-176.271	1	-.015	2	.011	15	0	3
3		2	max	108.107	1	325.707	1	-5.59	15	0	3	.085	1	.735	3
4			min	4.483	15	-546.745	3	-135.472	1	-.015	2	.004	15	-.439	1
5		3	max	108.107	1	186.412	1	-3.912	15	0	3	0	3	1.215	3
6			min	4.483	15	-316.672	3	-94.674	1	-.015	2	-.043	1	-.724	1
7		4	max	108.107	1	47.116	1	-2.234	15	0	3	-.004	12	1.439	3
8			min	4.483	15	-86.6	3	-53.875	1	-.015	2	-.126	1	-.854	1
9		5	max	108.107	1	143.472	3	-.556	15	0	3	-.006	12	1.407	3
10			min	4.483	15	-92.681	2	-13.076	1	-.015	2	-.163	1	-.828	1
11		6	max	108.107	1	373.544	3	27.722	1	0	3	-.006	15	1.12	3
12			min	4.483	15	-231.828	2	.375	12	-.015	2	-.155	1	-.649	1
13		7	max	108.107	1	603.616	3	68.521	1	0	3	-.004	15	.577	3
14			min	4.483	15	-370.975	2	2.052	12	-.015	2	-.101	1	-.314	1
15		8	max	108.107	1	833.688	3	109.32	1	0	3	.001	10	.18	2
16			min	4.483	15	-510.122	2	3.73	12	-.015	2	-.004	3	-.221	3
17		9	max	108.107	1	1063.761	3	150.119	1	0	3	.142	1	.824	2
18			min	4.483	15	-649.363	1	5.407	12	-.015	2	.003	12	-1.275	3
19		10	max	108.107	1	788.659	1	-7.085	12	.015	2	.331	1	1.623	2
20			min	4.483	15	-1293.833	3	-190.917	1	0	3	.01	12	-2.585	3
21		11	max	108.107	1	649.363	1	-5.407	12	.015	2	.142	1	.824	2
22			min	4.483	15	-1063.761	3	-150.119	1	0	3	.003	12	-1.275	3
23		12	max	108.107	1	510.122	2	-3.73	12	.015	2	.001	10	.18	2
24			min	4.483	15	-833.688	3	-109.32	1	0	3	-.004	3	-.221	3
25		13	max	108.107	1	370.975	2	-2.052	12	.015	2	-.004	15	.577	3
26			min	4.483	15	-603.616	3	-68.521	1	0	3	-.101	1	-.314	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
27		14	max	108.107	1	231.828	2	-.375	12	.015	2	-.006	15	1.12	3
28			min	4.483	15	-373.544	3	-27.722	1	0	3	-.155	1	-.649	1
29		15	max	108.107	1	92.681	2	13.076	1	.015	2	-.006	12	1.407	3
30			min	4.483	15	-143.472	3	.556	15	0	3	-.163	1	-.828	1
31		16	max	108.107	1	86.6	3	53.875	1	.015	2	-.004	12	1.439	3
32			min	4.483	15	-47.116	1	2.234	15	0	3	-.126	1	-.854	1
33		17	max	108.107	1	316.672	3	94.674	1	.015	2	0	3	1.215	3
34			min	4.483	15	-186.412	1	3.912	15	0	3	-.043	1	-.724	1
35		18	max	108.107	1	546.745	3	135.472	1	.015	2	.085	1	.735	3
36			min	4.483	15	-325.707	1	5.59	15	0	3	.004	15	-.439	1
37		19	max	108.107	1	776.817	3	176.271	1	.015	2	.258	1	0	1
38			min	4.483	15	-465.003	1	7.267	15	0	3	.011	15	0	3
39	M14	1	max	50.195	1	493.95	2	-7.492	15	.009	3	.294	1	0	1
40			min	2.084	15	-603.073	3	-181.737	1	-.011	2	.012	15	0	3
41		2	max	50.195	1	354.803	2	-5.814	15	.009	3	.115	1	.574	3
42			min	2.084	15	-429.513	3	-140.938	1	-.011	2	.005	15	-.472	2
43		3	max	50.195	1	215.656	2	-4.137	15	.009	3	.002	3	.954	3
44			min	2.084	15	-255.953	3	-100.139	1	-.011	2	-.019	1	-.788	2
45		4	max	50.195	1	76.509	2	-2.459	15	.009	3	-.003	12	1.142	3
46			min	2.084	15	-82.393	3	-59.341	1	-.011	2	-.107	1	-.951	2
47		5	max	50.195	1	91.168	3	-.781	15	.009	3	-.006	12	1.138	3
48			min	2.084	15	-64.442	1	-18.542	1	-.011	2	-.151	1	-.958	2
49		6	max	50.195	1	264.728	3	22.257	1	.009	3	-.006	15	.94	3
50			min	2.084	15	-203.738	1	.159	12	-.011	2	-.149	1	-.812	2
51		7	max	50.195	1	438.288	3	63.056	1	.009	3	-.004	15	.549	3
52			min	2.084	15	-343.034	1	1.837	12	-.011	2	-.101	1	-.51	2
53		8	max	50.195	1	611.848	3	103.854	1	.009	3	0	10	0	15
54			min	2.084	15	-482.33	1	3.514	12	-.011	2	-.008	1	-.054	2
55		9	max	50.195	1	785.408	3	144.653	1	.009	3	.13	1	.573	1
56			min	2.084	15	-621.626	1	5.192	12	-.011	2	.002	12	-.81	3
57		10	max	50.195	1	760.921	1	-6.869	12	.011	2	.313	1	1.341	1
58			min	2.084	15	-958.968	3	-185.452	1	-.009	3	.009	12	-1.779	3
59		11	max	50.195	1	621.626	1	-5.192	12	.011	2	.13	1	.573	1
60			min	2.084	15	-785.408	3	-144.653	1	-.009	3	.002	12	-.81	3
61		12	max	50.195	1	482.33	1	-3.514	12	.011	2	0	10	0	15
62			min	2.084	15	-611.848	3	-103.854	1	-.009	3	-.008	1	-.054	2
63		13	max	50.195	1	343.034	1	-1.837	12	.011	2	-.004	15	.549	3
64			min	2.084	15	-438.288	3	-63.056	1	-.009	3	-.101	1	-.51	2
65		14	max	50.195	1	203.738	1	-.159	12	.011	2	-.006	15	.94	3
66			min	2.084	15	-264.728	3	-22.257	1	-.009	3	-.149	1	-.812	2
67		15	max	50.195	1	64.442	1	18.542	1	.011	2	-.006	12	1.138	3
68			min	2.084	15	-91.168	3	.781	15	-.009	3	-.151	1	-.958	2
69		16	max	50.195	1	82.393	3	59.341	1	.011	2	-.003	12	1.142	3
70			min	2.084	15	-76.509	2	2.459	15	-.009	3	-.107	1	-.951	2
71		17	max	50.195	1	255.953	3	100.139	1	.011	2	.002	3	.954	3
72			min	2.084	15	-215.656	2	4.137	15	-.009	3	-.019	1	-.788	2
73		18	max	50.195	1	429.513	3	140.938	1	.011	2	.115	1	.574	3
74			min	2.084	15	-354.803	2	5.814	15	-.009	3	.005	15	-.472	2
75		19	max	50.195	1	603.073	3	181.737	1	.011	2	.294	1	0	1
76			min	2.084	15	-493.95	2	7.492	15	-.009	3	.012	15	0	3
77	M15	1	max	-2.193	15	684.714	2	-7.49	15	.012	2	.294	1	0	2
78			min	-52.737	1	-317.224	3	-181.716	1	-.008	3	.012	15	0	15
79		2	max	-2.193	15	489.053	2	-5.813	15	.012	2	.115	1	.303	3
80			min	-52.737	1	-228.434	3	-140.917	1	-.008	3	.005	15	-.652	2
81		3	max	-2.193	15	293.392	2	-4.135	15	.012	2	.002	3	.508	3
82			min	-52.737	1	-139.644	3	-100.118	1	-.008	3	-.019	1	-1.087	2
83		4	max	-2.193	15	97.732	2	-2.457	15	.012	2	-.003	12	.613	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
84			min	-52.737	1	-50.853	3	-59.32	1	-.008	3	-.108	1	-1.304	2
85		5	max	-2.193	15	37.937	3	-.779	15	.012	2	-.006	12	.621	3
86			min	-52.737	1	-97.929	2	-18.521	1	-.008	3	-.151	1	-1.304	2
87		6	max	-2.193	15	126.728	3	22.278	1	.012	2	-.006	15	.529	3
88			min	-52.737	1	-293.59	2	.218	12	-.008	3	-.149	1	-1.086	2
89		7	max	-2.193	15	215.518	3	63.076	1	.012	2	-.004	15	.339	3
90			min	-52.737	1	-489.25	2	1.895	12	-.008	3	-.101	1	-.652	2
91		8	max	-2.193	15	304.308	3	103.875	1	.012	2	0	10	.05	3
92			min	-52.737	1	-684.911	2	3.573	12	-.008	3	-.009	1	-.013	1
93		9	max	-2.193	15	393.099	3	144.674	1	.012	2	.13	1	.87	2
94			min	-52.737	1	-880.571	2	5.25	12	-.008	3	.003	12	-.337	3
95		10	max	-2.193	15	1076.232	2	-6.928	12	.008	3	.313	1	1.958	2
96			min	-52.737	1	-481.889	3	-185.473	1	-.012	2	.009	12	-.823	3
97		11	max	-2.193	15	880.571	2	-5.25	12	.008	3	.13	1	.87	2
98			min	-52.737	1	-393.099	3	-144.674	1	-.012	2	.003	12	-.337	3
99		12	max	-2.193	15	684.911	2	-3.573	12	.008	3	0	10	.05	3
100			min	-52.737	1	-304.308	3	-103.875	1	-.012	2	-.009	1	-.013	1
101		13	max	-2.193	15	489.25	2	-1.895	12	.008	3	-.004	15	.339	3
102			min	-52.737	1	-215.518	3	-63.076	1	-.012	2	-.101	1	-.652	2
103		14	max	-2.193	15	293.59	2	-.218	12	.008	3	-.006	15	.529	3
104			min	-52.737	1	-126.728	3	-22.278	1	-.012	2	-.149	1	-1.086	2
105		15	max	-2.193	15	97.929	2	18.521	1	.008	3	-.006	12	.621	3
106			min	-52.737	1	-37.937	3	.779	15	-.012	2	-.151	1	-1.304	2
107		16	max	-2.193	15	50.853	3	59.32	1	.008	3	-.003	12	.613	3
108			min	-52.737	1	-97.732	2	2.457	15	-.012	2	-.108	1	-1.304	2
109		17	max	-2.193	15	139.644	3	100.118	1	.008	3	.002	3	.508	3
110			min	-52.737	1	-293.392	2	4.135	15	-.012	2	-.019	1	-1.087	2
111		18	max	-2.193	15	228.434	3	140.917	1	.008	3	.115	1	.303	3
112			min	-52.737	1	-489.053	2	5.813	15	-.012	2	.005	15	-.652	2
113		19	max	-2.193	15	317.224	3	181.716	1	.008	3	.294	1	0	2
114			min	-52.737	1	-684.714	2	7.49	15	-.012	2	.012	15	0	15
115	M16	1	max	-4.794	15	655.673	2	-7.274	15	.011	1	.26	1	0	2
116			min	-115.477	1	-294.788	3	-176.529	1	-.012	3	.011	15	0	3
117		2	max	-4.794	15	460.012	2	-5.597	15	.011	1	.086	1	.278	3
118			min	-115.477	1	-205.998	3	-135.73	1	-.012	3	.004	15	-.62	2
119		3	max	-4.794	15	264.352	2	-3.919	15	.011	1	0	12	.458	3
120			min	-115.477	1	-117.207	3	-94.931	1	-.012	3	-.042	1	-1.022	2
121		4	max	-4.794	15	68.691	2	-2.241	15	.011	1	-.004	12	.539	3
122			min	-115.477	1	-28.417	3	-54.133	1	-.012	3	-.125	1	-1.207	2
123		5	max	-4.794	15	60.373	3	-.563	15	.011	1	-.006	12	.521	3
124			min	-115.477	1	-126.969	2	-13.334	1	-.012	3	-.162	1	-1.175	2
125		6	max	-4.794	15	149.164	3	27.465	1	.011	1	-.006	15	.405	3
126			min	-115.477	1	-322.63	2	.57	12	-.012	3	-.155	1	-.925	2
127		7	max	-4.794	15	237.954	3	68.263	1	.011	1	-.004	15	.189	3
128			min	-115.477	1	-518.291	2	2.248	12	-.012	3	-.101	1	-.458	2
129		8	max	-4.794	15	326.744	3	109.062	1	.011	1	0	10	.227	2
130			min	-115.477	1	-713.951	2	3.925	12	-.012	3	-.003	3	-.124	3
131		9	max	-4.794	15	415.535	3	149.861	1	.011	1	.141	1	1.129	2
132			min	-115.477	1	-909.612	2	5.603	12	-.012	3	.004	12	-.537	3
133		10	max	-4.794	15	1105.273	2	-7.28	12	.012	3	.33	1	2.248	2
134			min	-115.477	1	-504.325	3	-190.66	1	-.011	1	.011	12	-1.048	3
135		11	max	-4.794	15	909.612	2	-5.603	12	.012	3	.141	1	1.129	2
136			min	-115.477	1	-415.535	3	-149.861	1	-.011	1	.004	12	-.537	3
137		12	max	-4.794	15	713.951	2	-3.925	12	.012	3	0	10	.227	2
138			min	-115.477	1	-326.744	3	-109.062	1	-.011	1	-.003	3	-.124	3
139		13	max	-4.794	15	518.291	2	-2.248	12	.012	3	-.004	15	.189	3
140			min	-115.477	1	-237.954	3	-68.263	1	-.011	1	-.101	1	-.458	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
141		14	max	-4.794	15	322.63	2	-.57	12	.012	3	-.006	15	.405	3
142			min	-115.477	1	-149.164	3	-27.465	1	-.011	1	-.155	1	-.925	2
143		15	max	-4.794	15	126.969	2	13.334	1	.012	3	-.006	12	.521	3
144			min	-115.477	1	-60.373	3	.563	15	-.011	1	-.162	1	-1.175	2
145		16	max	-4.794	15	28.417	3	54.133	1	.012	3	-.004	12	.539	3
146			min	-115.477	1	-68.691	2	2.241	15	-.011	1	-.125	1	-1.207	2
147		17	max	-4.794	15	117.207	3	94.931	1	.012	3	0	12	.458	3
148			min	-115.477	1	-264.352	2	3.919	15	-.011	1	-.042	1	-1.022	2
149		18	max	-4.794	15	205.998	3	135.73	1	.012	3	.086	1	.278	3
150			min	-115.477	1	-460.012	2	5.597	15	-.011	1	.004	15	-.62	2
151		19	max	-4.794	15	294.788	3	176.529	1	.012	3	.26	1	0	2
152			min	-115.477	1	-655.673	2	7.274	15	-.011	1	.011	15	0	3
153	M2	1	max	1074.889	2	1.921	4	.697	1	0	5	0	3	0	1
154			min	-1407.797	3	.452	15	.029	15	0	1	0	1	0	1
155		2	max	1075.317	2	1.864	4	.697	1	0	5	0	1	0	15
156			min	-1407.476	3	.439	15	.029	15	0	1	0	15	0	4
157		3	max	1075.746	2	1.807	4	.697	1	0	5	0	1	0	15
158			min	-1407.155	3	.426	15	.029	15	0	1	0	15	-.001	4
159		4	max	1076.174	2	1.751	4	.697	1	0	5	0	1	0	15
160			min	-1406.833	3	.412	15	.029	15	0	1	0	15	-.002	4
161		5	max	1076.602	2	1.694	4	.697	1	0	5	0	1	0	15
162			min	-1406.512	3	.399	15	.029	15	0	1	0	15	-.002	4
163		6	max	1077.031	2	1.637	4	.697	1	0	5	0	1	0	15
164			min	-1406.191	3	.386	15	.029	15	0	1	0	15	-.003	4
165		7	max	1077.459	2	1.58	4	.697	1	0	5	.001	1	0	15
166			min	-1405.869	3	.372	15	.029	15	0	1	0	15	-.003	4
167		8	max	1077.888	2	1.523	4	.697	1	0	5	.001	1	0	15
168			min	-1405.548	3	.359	15	.029	15	0	1	0	15	-.004	4
169		9	max	1078.316	2	1.467	4	.697	1	0	5	.002	1	0	15
170			min	-1405.226	3	.346	15	.029	15	0	1	0	15	-.004	4
171		10	max	1078.745	2	1.41	4	.697	1	0	5	.002	1	-.001	15
172			min	-1404.905	3	.327	12	.029	15	0	1	0	15	-.004	4
173		11	max	1079.173	2	1.353	4	.697	1	0	5	.002	1	-.001	15
174			min	-1404.584	3	.305	12	.029	15	0	1	0	15	-.005	4
175		12	max	1079.602	2	1.296	4	.697	1	0	5	.002	1	-.001	15
176			min	-1404.262	3	.283	12	.029	15	0	1	0	15	-.005	4
177		13	max	1080.03	2	1.24	4	.697	1	0	5	.002	1	-.001	15
178			min	-1403.941	3	.261	12	.029	15	0	1	0	15	-.006	4
179		14	max	1080.459	2	1.184	2	.697	1	0	5	.003	1	-.001	15
180			min	-1403.62	3	.238	12	.029	15	0	1	0	15	-.006	4
181		15	max	1080.887	2	1.139	2	.697	1	0	5	.003	1	-.001	15
182			min	-1403.298	3	.216	12	.029	15	0	1	0	15	-.006	4
183		16	max	1081.316	2	1.095	2	.697	1	0	5	.003	1	-.002	15
184			min	-1402.977	3	.194	12	.029	15	0	1	0	15	-.007	4
185		17	max	1081.744	2	1.051	2	.697	1	0	5	.003	1	-.002	15
186			min	-1402.656	3	.172	12	.029	15	0	1	0	15	-.007	4
187		18	max	1082.173	2	1.007	2	.697	1	0	5	.003	1	-.002	12
188			min	-1402.334	3	.15	12	.029	15	0	1	0	15	-.007	4
189		19	max	1082.601	2	.962	2	.697	1	0	5	.004	1	-.002	12
190			min	-1402.013	3	.128	12	.029	15	0	1	0	15	-.007	4
191	M3	1	max	623.779	2	7.882	4	.161	1	0	5	0	1	.007	4
192			min	-769.989	3	1.853	15	.007	15	0	1	0	15	.002	12
193		2	max	623.609	2	7.115	4	.161	1	0	5	0	1	.005	2
194			min	-770.116	3	1.673	15	.007	15	0	1	0	15	0	12
195		3	max	623.438	2	6.348	4	.161	1	0	5	0	1	.002	2
196			min	-770.244	3	1.493	15	.007	15	0	1	0	15	0	3
197		4	max	623.268	2	5.58	4	.161	1	0	5	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-770.372	3	1.312	15	.007	15	0	1	0	15	-.002	3
199		5	max	623.098	2	4.813	4	.161	1	0	5	0	1	0	15
200			min	-770.5	3	1.132	15	.007	15	0	1	0	15	-.003	3
201		6	max	622.927	2	4.046	4	.161	1	0	5	0	1	-.001	15
202			min	-770.627	3	.952	15	.007	15	0	1	0	15	-.005	4
203		7	max	622.757	2	3.279	4	.161	1	0	5	0	1	-.002	15
204			min	-770.755	3	.771	15	.007	15	0	1	0	15	-.007	4
205		8	max	622.587	2	2.511	4	.161	1	0	5	0	1	-.002	15
206			min	-770.883	3	.591	15	.007	15	0	1	0	15	-.008	4
207		9	max	622.416	2	1.744	4	.161	1	0	5	0	1	-.002	15
208			min	-771.011	3	.411	15	.007	15	0	1	0	15	-.009	4
209		10	max	622.246	2	.977	4	.161	1	0	5	0	1	-.002	15
210			min	-771.138	3	.227	12	.007	15	0	1	0	15	-.009	4
211		11	max	622.076	2	.345	2	.161	1	0	5	.001	1	-.002	15
212			min	-771.266	3	-.124	3	.007	15	0	1	0	15	-.01	4
213		12	max	621.905	2	-.13	15	.161	1	0	5	.001	1	-.002	15
214			min	-771.394	3	-.572	3	.007	15	0	1	0	15	-.01	4
215		13	max	621.735	2	-.311	15	.161	1	0	5	.001	1	-.002	15
216			min	-771.522	3	-1.325	4	.007	15	0	1	0	15	-.009	4
217		14	max	621.565	2	-.491	15	.161	1	0	5	.001	1	-.002	15
218			min	-771.649	3	-2.092	4	.007	15	0	1	0	15	-.008	4
219		15	max	621.394	2	-.672	15	.161	1	0	5	.001	1	-.002	15
220			min	-771.777	3	-2.859	4	.007	15	0	1	0	15	-.007	4
221		16	max	621.224	2	-.852	15	.161	1	0	5	.001	1	-.001	15
222			min	-771.905	3	-3.626	4	.007	15	0	1	0	15	-.006	4
223		17	max	621.054	2	-1.032	15	.161	1	0	5	.001	1	-.001	15
224			min	-772.033	3	-4.394	4	.007	15	0	1	0	15	-.004	4
225		18	max	620.883	2	-1.213	15	.161	1	0	5	.002	1	0	15
226			min	-772.161	3	-5.161	4	.007	15	0	1	0	15	-.002	4
227		19	max	620.713	2	-1.393	15	.161	1	0	5	.002	1	0	1
228			min	-772.288	3	-5.928	4	.007	15	0	1	0	15	0	1
229	M4	1	max	1159.597	1	0	1	-.455	15	0	1	.001	1	0	1
230			min	-149.799	3	0	1	-11.016	1	0	1	0	15	0	1
231		2	max	1159.768	1	0	1	-.455	15	0	1	0	3	0	1
232			min	-149.672	3	0	1	-11.016	1	0	1	0	1	0	1
233		3	max	1159.938	1	0	1	-.455	15	0	1	0	15	0	1
234			min	-149.544	3	0	1	-11.016	1	0	1	-.001	1	0	1
235		4	max	1160.108	1	0	1	-.455	15	0	1	0	15	0	1
236			min	-149.416	3	0	1	-11.016	1	0	1	-.003	1	0	1
237		5	max	1160.279	1	0	1	-.455	15	0	1	0	15	0	1
238			min	-149.288	3	0	1	-11.016	1	0	1	-.004	1	0	1
239		6	max	1160.449	1	0	1	-.455	15	0	1	0	15	0	1
240			min	-149.161	3	0	1	-11.016	1	0	1	-.005	1	0	1
241		7	max	1160.619	1	0	1	-.455	15	0	1	0	15	0	1
242			min	-149.033	3	0	1	-11.016	1	0	1	-.006	1	0	1
243		8	max	1160.79	1	0	1	-.455	15	0	1	0	15	0	1
244			min	-148.905	3	0	1	-11.016	1	0	1	-.008	1	0	1
245		9	max	1160.96	1	0	1	-.455	15	0	1	0	15	0	1
246			min	-148.777	3	0	1	-11.016	1	0	1	-.009	1	0	1
247		10	max	1161.13	1	0	1	-.455	15	0	1	0	15	0	1
248			min	-148.65	3	0	1	-11.016	1	0	1	-.01	1	0	1
249		11	max	1161.301	1	0	1	-.455	15	0	1	0	15	0	1
250			min	-148.522	3	0	1	-11.016	1	0	1	-.012	1	0	1
251		12	max	1161.471	1	0	1	-.455	15	0	1	0	15	0	1
252			min	-148.394	3	0	1	-11.016	1	0	1	-.013	1	0	1
253		13	max	1161.641	1	0	1	-.455	15	0	1	0	15	0	1
254			min	-148.266	3	0	1	-11.016	1	0	1	-.014	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
255		14	max	1161.812	1	0	1	-.455	15	0	1	0	15	0	1
256			min	-148.138	3	0	1	-11.016	1	0	1	-.015	1	0	1
257		15	max	1161.982	1	0	1	-.455	15	0	1	0	15	0	1
258			min	-148.011	3	0	1	-11.016	1	0	1	-.017	1	0	1
259		16	max	1162.152	1	0	1	-.455	15	0	1	0	15	0	1
260			min	-147.883	3	0	1	-11.016	1	0	1	-.018	1	0	1
261		17	max	1162.323	1	0	1	-.455	15	0	1	0	15	0	1
262			min	-147.755	3	0	1	-11.016	1	0	1	-.019	1	0	1
263		18	max	1162.493	1	0	1	-.455	15	0	1	0	15	0	1
264			min	-147.627	3	0	1	-11.016	1	0	1	-.02	1	0	1
265		19	max	1162.664	1	0	1	-.455	15	0	1	0	15	0	1
266			min	-147.5	3	0	1	-11.016	1	0	1	-.022	1	0	1
267	M6	1	max	3454.488	2	2.428	2	0	1	0	1	0	1	0	1
268			min	-4601.367	3	-.023	3	0	1	0	1	0	1	0	1
269		2	max	3454.916	2	2.384	2	0	1	0	1	0	1	0	3
270			min	-4601.046	3	-.057	3	0	1	0	1	0	1	0	2
271		3	max	3455.345	2	2.34	2	0	1	0	1	0	1	0	3
272			min	-4600.724	3	-.09	3	0	1	0	1	0	1	-.001	2
273		4	max	3455.773	2	2.296	2	0	1	0	1	0	1	0	3
274			min	-4600.403	3	-.123	3	0	1	0	1	0	1	-.002	2
275		5	max	3456.202	2	2.251	2	0	1	0	1	0	1	0	3
276			min	-4600.082	3	-.156	3	0	1	0	1	0	1	-.003	2
277		6	max	3456.63	2	2.207	2	0	1	0	1	0	1	0	3
278			min	-4599.76	3	-.189	3	0	1	0	1	0	1	-.003	2
279		7	max	3457.059	2	2.163	2	0	1	0	1	0	1	0	3
280			min	-4599.439	3	-.222	3	0	1	0	1	0	1	-.004	2
281		8	max	3457.487	2	2.119	2	0	1	0	1	0	1	0	3
282			min	-4599.118	3	-.256	3	0	1	0	1	0	1	-.005	2
283		9	max	3457.916	2	2.074	2	0	1	0	1	0	1	0	3
284			min	-4598.796	3	-.289	3	0	1	0	1	0	1	-.005	2
285		10	max	3458.344	2	2.03	2	0	1	0	1	0	1	0	3
286			min	-4598.475	3	-.322	3	0	1	0	1	0	1	-.006	2
287		11	max	3458.773	2	1.986	2	0	1	0	1	0	1	0	3
288			min	-4598.153	3	-.355	3	0	1	0	1	0	1	-.006	2
289		12	max	3459.201	2	1.942	2	0	1	0	1	0	1	0	3
290			min	-4597.832	3	-.388	3	0	1	0	1	0	1	-.007	2
291		13	max	3459.63	2	1.897	2	0	1	0	1	0	1	0	3
292			min	-4597.511	3	-.422	3	0	1	0	1	0	1	-.008	2
293		14	max	3460.058	2	1.853	2	0	1	0	1	0	1	0	3
294			min	-4597.189	3	-.455	3	0	1	0	1	0	1	-.008	2
295		15	max	3460.487	2	1.809	2	0	1	0	1	0	1	.001	3
296			min	-4596.868	3	-.488	3	0	1	0	1	0	1	-.009	2
297		16	max	3460.915	2	1.765	2	0	1	0	1	0	1	.001	3
298			min	-4596.547	3	-.521	3	0	1	0	1	0	1	-.009	2
299		17	max	3461.344	2	1.72	2	0	1	0	1	0	1	.001	3
300			min	-4596.225	3	-.554	3	0	1	0	1	0	1	-.01	2
301		18	max	3461.772	2	1.676	2	0	1	0	1	0	1	.002	3
302			min	-4595.904	3	-.588	3	0	1	0	1	0	1	-.01	2
303		19	max	3462.201	2	1.632	2	0	1	0	1	0	1	.002	3
304			min	-4595.583	3	-.621	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2329.83	2	7.918	4	0	1	0	1	0	1	.011	2
306			min	-2429.849	3	1.858	15	0	1	0	1	0	1	-.002	3
307		2	max	2329.66	2	7.15	4	0	1	0	1	0	1	.008	2
308			min	-2429.976	3	1.678	15	0	1	0	1	0	1	-.003	3
309		3	max	2329.49	2	6.383	4	0	1	0	1	0	1	.005	2
310			min	-2430.104	3	1.498	15	0	1	0	1	0	1	-.005	3
311		4	max	2329.319	2	5.616	4	0	1	0	1	0	1	.003	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
312			min	-2430.232	3	1.317	15	0	1	0	1	0	1	-.006	3
313		5	max	2329.149	2	4.849	4	0	1	0	1	0	1	.001	2
314			min	-2430.36	3	1.137	15	0	1	0	1	0	1	-.007	3
315		6	max	2328.979	2	4.081	4	0	1	0	1	0	1	0	2
316			min	-2430.487	3	.957	15	0	1	0	1	0	1	-.007	3
317		7	max	2328.808	2	3.314	4	0	1	0	1	0	1	-.002	15
318			min	-2430.615	3	.776	15	0	1	0	1	0	1	-.008	3
319		8	max	2328.638	2	2.603	2	0	1	0	1	0	1	-.002	15
320			min	-2430.743	3	.482	12	0	1	0	1	0	1	-.008	3
321		9	max	2328.468	2	2.005	2	0	1	0	1	0	1	-.002	15
322			min	-2430.871	3	.183	12	0	1	0	1	0	1	-.009	4
323		10	max	2328.297	2	1.407	2	0	1	0	1	0	1	-.002	15
324			min	-2430.999	3	-.223	3	0	1	0	1	0	1	-.009	4
325		11	max	2328.127	2	.809	2	0	1	0	1	0	1	-.002	15
326			min	-2431.126	3	-.672	3	0	1	0	1	0	1	-.009	4
327		12	max	2327.957	2	.211	2	0	1	0	1	0	1	-.002	15
328			min	-2431.254	3	-1.12	3	0	1	0	1	0	1	-.009	4
329		13	max	2327.786	2	-.306	15	0	1	0	1	0	1	-.002	15
330			min	-2431.382	3	-1.568	3	0	1	0	1	0	1	-.009	4
331		14	max	2327.616	2	-.486	15	0	1	0	1	0	1	-.002	15
332			min	-2431.51	3	-2.056	4	0	1	0	1	0	1	-.008	4
333		15	max	2327.446	2	-.666	15	0	1	0	1	0	1	-.002	15
334			min	-2431.637	3	-2.824	4	0	1	0	1	0	1	-.007	4
335		16	max	2327.275	2	-.847	15	0	1	0	1	0	1	-.001	15
336			min	-2431.765	3	-3.591	4	0	1	0	1	0	1	-.006	4
337		17	max	2327.105	2	-1.027	15	0	1	0	1	0	1	-.001	15
338			min	-2431.893	3	-4.358	4	0	1	0	1	0	1	-.004	4
339		18	max	2326.935	2	-1.207	15	0	1	0	1	0	1	0	15
340			min	-2432.021	3	-5.125	4	0	1	0	1	0	1	-.002	4
341		19	max	2326.764	2	-1.388	15	0	1	0	1	0	1	0	1
342			min	-2432.148	3	-5.892	4	0	1	0	1	0	1	0	1
343	M8	1	max	3161.999	1	0	1	0	1	0	1	0	1	0	1
344			min	-569.08	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3162.17	1	0	1	0	1	0	1	0	1	0	1
346			min	-568.952	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3162.34	1	0	1	0	1	0	1	0	1	0	1
348			min	-568.825	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3162.51	1	0	1	0	1	0	1	0	1	0	1
350			min	-568.697	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3162.681	1	0	1	0	1	0	1	0	1	0	1
352			min	-568.569	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3162.851	1	0	1	0	1	0	1	0	1	0	1
354			min	-568.441	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3163.022	1	0	1	0	1	0	1	0	1	0	1
356			min	-568.314	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3163.192	1	0	1	0	1	0	1	0	1	0	1
358			min	-568.186	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3163.362	1	0	1	0	1	0	1	0	1	0	1
360			min	-568.058	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3163.533	1	0	1	0	1	0	1	0	1	0	1
362			min	-567.93	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3163.703	1	0	1	0	1	0	1	0	1	0	1
364			min	-567.803	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3163.873	1	0	1	0	1	0	1	0	1	0	1
366			min	-567.675	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3164.044	1	0	1	0	1	0	1	0	1	0	1
368			min	-567.547	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3164.214	1	0	1	0	1	0	1	0	1	0	1
370			min	-567.419	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3164.384	1	0	1	0	1	0	1	0	1	0	1
372			min	-567.292	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3164.555	1	0	1	0	1	0	1	0	1	0	1
374			min	-567.164	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3164.725	1	0	1	0	1	0	1	0	1	0	1
376			min	-567.036	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3164.895	1	0	1	0	1	0	1	0	1	0	1
378			min	-566.908	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3165.066	1	0	1	0	1	0	1	0	1	0	1
380			min	-566.781	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1074.889	2	1.921	4	-.029	15	0	1	0	1	0	1
382			min	-1407.797	3	.452	15	-.697	1	0	5	0	3	0	1
383		2	max	1075.317	2	1.864	4	-.029	15	0	1	0	15	0	15
384			min	-1407.476	3	.439	15	-.697	1	0	5	0	1	0	4
385		3	max	1075.746	2	1.807	4	-.029	15	0	1	0	15	0	15
386			min	-1407.155	3	.426	15	-.697	1	0	5	0	1	-.001	4
387		4	max	1076.174	2	1.751	4	-.029	15	0	1	0	15	0	15
388			min	-1406.833	3	.412	15	-.697	1	0	5	0	1	-.002	4
389		5	max	1076.602	2	1.694	4	-.029	15	0	1	0	15	0	15
390			min	-1406.512	3	.399	15	-.697	1	0	5	0	1	-.002	4
391		6	max	1077.031	2	1.637	4	-.029	15	0	1	0	15	0	15
392			min	-1406.191	3	.386	15	-.697	1	0	5	0	1	-.003	4
393		7	max	1077.459	2	1.58	4	-.029	15	0	1	0	15	0	15
394			min	-1405.869	3	.372	15	-.697	1	0	5	-.001	1	-.003	4
395		8	max	1077.888	2	1.523	4	-.029	15	0	1	0	15	0	15
396			min	-1405.548	3	.359	15	-.697	1	0	5	-.001	1	-.004	4
397		9	max	1078.316	2	1.467	4	-.029	15	0	1	0	15	0	15
398			min	-1405.226	3	.346	15	-.697	1	0	5	-.002	1	-.004	4
399		10	max	1078.745	2	1.41	4	-.029	15	0	1	0	15	-.001	15
400			min	-1404.905	3	.327	12	-.697	1	0	5	-.002	1	-.004	4
401		11	max	1079.173	2	1.353	4	-.029	15	0	1	0	15	-.001	15
402			min	-1404.584	3	.305	12	-.697	1	0	5	-.002	1	-.005	4
403		12	max	1079.602	2	1.296	4	-.029	15	0	1	0	15	-.001	15
404			min	-1404.262	3	.283	12	-.697	1	0	5	-.002	1	-.005	4
405		13	max	1080.03	2	1.24	4	-.029	15	0	1	0	15	-.001	15
406			min	-1403.941	3	.261	12	-.697	1	0	5	-.002	1	-.006	4
407		14	max	1080.459	2	1.184	2	-.029	15	0	1	0	15	-.001	15
408			min	-1403.62	3	.238	12	-.697	1	0	5	-.003	1	-.006	4
409		15	max	1080.887	2	1.139	2	-.029	15	0	1	0	15	-.001	15
410			min	-1403.298	3	.216	12	-.697	1	0	5	-.003	1	-.006	4
411		16	max	1081.316	2	1.095	2	-.029	15	0	1	0	15	-.002	15
412			min	-1402.977	3	.194	12	-.697	1	0	5	-.003	1	-.007	4
413		17	max	1081.744	2	1.051	2	-.029	15	0	1	0	15	-.002	15
414			min	-1402.656	3	.172	12	-.697	1	0	5	-.003	1	-.007	4
415		18	max	1082.173	2	1.007	2	-.029	15	0	1	0	15	-.002	12
416			min	-1402.334	3	.15	12	-.697	1	0	5	-.003	1	-.007	4
417		19	max	1082.601	2	.962	2	-.029	15	0	1	0	15	-.002	12
418			min	-1402.013	3	.128	12	-.697	1	0	5	-.004	1	-.007	4
419	M11	1	max	623.779	2	7.882	4	-.007	15	0	1	0	15	.007	4
420			min	-769.989	3	1.853	15	-.161	1	0	5	0	1	.002	12
421		2	max	623.609	2	7.115	4	-.007	15	0	1	0	15	.005	2
422			min	-770.116	3	1.673	15	-.161	1	0	5	0	1	0	12
423		3	max	623.438	2	6.348	4	-.007	15	0	1	0	15	.002	2
424			min	-770.244	3	1.493	15	-.161	1	0	5	0	1	0	3
425		4	max	623.268	2	5.58	4	-.007	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-770.372	3	1.312	15	-.161	1	0	5	0	1	-.002	3
427		5	max	623.098	2	4.813	4	-.007	15	0	1	0	15	0	15
428			min	-770.5	3	1.132	15	-.161	1	0	5	0	1	-.003	3
429		6	max	622.927	2	4.046	4	-.007	15	0	1	0	15	-.001	15
430			min	-770.627	3	.952	15	-.161	1	0	5	0	1	-.005	4
431		7	max	622.757	2	3.279	4	-.007	15	0	1	0	15	-.002	15
432			min	-770.755	3	.771	15	-.161	1	0	5	0	1	-.007	4
433		8	max	622.587	2	2.511	4	-.007	15	0	1	0	15	-.002	15
434			min	-770.883	3	.591	15	-.161	1	0	5	0	1	-.008	4
435		9	max	622.416	2	1.744	4	-.007	15	0	1	0	15	-.002	15
436			min	-771.011	3	.411	15	-.161	1	0	5	0	1	-.009	4
437		10	max	622.246	2	.977	4	-.007	15	0	1	0	15	-.002	15
438			min	-771.138	3	.227	12	-.161	1	0	5	0	1	-.009	4
439		11	max	622.076	2	.345	2	-.007	15	0	1	0	15	-.002	15
440			min	-771.266	3	-.124	3	-.161	1	0	5	-.001	1	-.01	4
441		12	max	621.905	2	-.13	15	-.007	15	0	1	0	15	-.002	15
442			min	-771.394	3	-.572	3	-.161	1	0	5	-.001	1	-.01	4
443		13	max	621.735	2	-.311	15	-.007	15	0	1	0	15	-.002	15
444			min	-771.522	3	-1.325	4	-.161	1	0	5	-.001	1	-.009	4
445		14	max	621.565	2	-.491	15	-.007	15	0	1	0	15	-.002	15
446			min	-771.649	3	-2.092	4	-.161	1	0	5	-.001	1	-.008	4
447		15	max	621.394	2	-.672	15	-.007	15	0	1	0	15	-.002	15
448			min	-771.777	3	-2.859	4	-.161	1	0	5	-.001	1	-.007	4
449		16	max	621.224	2	-.852	15	-.007	15	0	1	0	15	-.001	15
450			min	-771.905	3	-3.626	4	-.161	1	0	5	-.001	1	-.006	4
451		17	max	621.054	2	-1.032	15	-.007	15	0	1	0	15	-.001	15
452			min	-772.033	3	-4.394	4	-.161	1	0	5	-.001	1	-.004	4
453		18	max	620.883	2	-1.213	15	-.007	15	0	1	0	15	0	15
454			min	-772.161	3	-5.161	4	-.161	1	0	5	-.002	1	-.002	4
455		19	max	620.713	2	-1.393	15	-.007	15	0	1	0	15	0	1
456			min	-772.288	3	-5.928	4	-.161	1	0	5	-.002	1	0	1
457	M12	1	max	1159.597	1	0	1	11.016	1	0	1	0	15	0	1
458			min	-149.799	3	0	1	.455	15	0	1	-.001	1	0	1
459		2	max	1159.768	1	0	1	11.016	1	0	1	0	1	0	1
460			min	-149.672	3	0	1	.455	15	0	1	0	3	0	1
461		3	max	1159.938	1	0	1	11.016	1	0	1	.001	1	0	1
462			min	-149.544	3	0	1	.455	15	0	1	0	15	0	1
463		4	max	1160.108	1	0	1	11.016	1	0	1	.003	1	0	1
464			min	-149.416	3	0	1	.455	15	0	1	0	15	0	1
465		5	max	1160.279	1	0	1	11.016	1	0	1	.004	1	0	1
466			min	-149.288	3	0	1	.455	15	0	1	0	15	0	1
467		6	max	1160.449	1	0	1	11.016	1	0	1	.005	1	0	1
468			min	-149.161	3	0	1	.455	15	0	1	0	15	0	1
469		7	max	1160.619	1	0	1	11.016	1	0	1	.006	1	0	1
470			min	-149.033	3	0	1	.455	15	0	1	0	15	0	1
471		8	max	1160.79	1	0	1	11.016	1	0	1	.008	1	0	1
472			min	-148.905	3	0	1	.455	15	0	1	0	15	0	1
473		9	max	1160.96	1	0	1	11.016	1	0	1	.009	1	0	1
474			min	-148.777	3	0	1	.455	15	0	1	0	15	0	1
475		10	max	1161.13	1	0	1	11.016	1	0	1	.01	1	0	1
476			min	-148.65	3	0	1	.455	15	0	1	0	15	0	1
477		11	max	1161.301	1	0	1	11.016	1	0	1	.012	1	0	1
478			min	-148.522	3	0	1	.455	15	0	1	0	15	0	1
479		12	max	1161.471	1	0	1	11.016	1	0	1	.013	1	0	1
480			min	-148.394	3	0	1	.455	15	0	1	0	15	0	1
481		13	max	1161.641	1	0	1	11.016	1	0	1	.014	1	0	1
482			min	-148.266	3	0	1	.455	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1161.812	1	0	1	11.016	1	0	1	.015	1	0	1
484			min	-148.138	3	0	1	.455	15	0	1	0	15	0	1
485		15	max	1161.982	1	0	1	11.016	1	0	1	.017	1	0	1
486			min	-148.011	3	0	1	.455	15	0	1	0	15	0	1
487		16	max	1162.152	1	0	1	11.016	1	0	1	.018	1	0	1
488			min	-147.883	3	0	1	.455	15	0	1	0	15	0	1
489		17	max	1162.323	1	0	1	11.016	1	0	1	.019	1	0	1
490			min	-147.755	3	0	1	.455	15	0	1	0	15	0	1
491		18	max	1162.493	1	0	1	11.016	1	0	1	.02	1	0	1
492			min	-147.627	3	0	1	.455	15	0	1	0	15	0	1
493		19	max	1162.664	1	0	1	11.016	1	0	1	.022	1	0	1
494			min	-147.5	3	0	1	.455	15	0	1	0	15	0	1
495	M1	1	max	176.278	1	776.788	3	-4.483	15	0	1	.258	1	0	3
496			min	7.267	15	-463.556	1	-107.974	1	0	3	.011	15	-.015	2
497		2	max	176.883	1	775.814	3	-4.483	15	0	1	.201	1	.232	1
498			min	7.45	15	-464.854	1	-107.974	1	0	3	.008	15	-.409	3
499		3	max	474.224	3	546.751	2	-4.454	15	0	3	.144	1	.466	1
500			min	-278.133	2	-558.326	3	-107.508	1	0	2	.006	15	-.802	3
501		4	max	474.678	3	545.453	2	-4.454	15	0	3	.087	1	.189	1
502			min	-277.528	2	-559.3	3	-107.508	1	0	2	.004	15	-.508	3
503		5	max	475.132	3	544.155	2	-4.454	15	0	3	.031	1	-.003	15
504			min	-276.922	2	-560.273	3	-107.508	1	0	2	.001	15	-.212	3
505		6	max	475.586	3	542.856	2	-4.454	15	0	3	-.001	15	.084	3
506			min	-276.317	2	-561.247	3	-107.508	1	0	2	-.026	1	-.399	2
507		7	max	476.04	3	541.558	2	-4.454	15	0	3	-.003	15	.38	3
508			min	-275.711	2	-562.221	3	-107.508	1	0	2	-.083	1	-.685	2
509		8	max	476.494	3	540.26	2	-4.454	15	0	3	-.006	15	.677	3
510			min	-275.106	2	-563.194	3	-107.508	1	0	2	-.14	1	-.97	2
511		9	max	489.363	3	48.044	2	-6.538	15	0	9	.082	1	.792	3
512			min	-201.396	2	.395	15	-157.744	1	0	3	.003	15	-1.111	2
513		10	max	489.817	3	46.746	2	-6.538	15	0	9	0	15	.77	3
514			min	-200.79	2	.004	15	-157.744	1	0	3	-.001	1	-1.136	2
515		11	max	490.271	3	45.448	2	-6.538	15	0	9	-.003	15	.749	3
516			min	-200.185	2	-1.588	4	-157.744	1	0	3	-.084	1	-1.16	2
517		12	max	503.047	3	359.792	3	-4.346	15	0	2	.138	1	.652	3
518			min	-126.447	2	-639.35	2	-105.058	1	0	3	.006	15	-1.028	2
519		13	max	503.501	3	358.819	3	-4.346	15	0	2	.082	1	.463	3
520			min	-125.842	2	-640.648	2	-105.058	1	0	3	.003	15	-.69	2
521		14	max	503.956	3	357.845	3	-4.346	15	0	2	.027	1	.274	3
522			min	-125.236	2	-641.946	2	-105.058	1	0	3	.001	15	-.352	2
523		15	max	504.41	3	356.871	3	-4.346	15	0	2	-.001	15	.085	3
524			min	-124.631	2	-643.244	2	-105.058	1	0	3	-.029	1	-.036	1
525		16	max	504.864	3	355.898	3	-4.346	15	0	2	-.003	15	.327	2
526			min	-124.026	2	-644.543	2	-105.058	1	0	3	-.084	1	-.103	3
527		17	max	505.318	3	354.924	3	-4.346	15	0	2	-.006	15	.667	2
528			min	-123.42	2	-645.841	2	-105.058	1	0	3	-.139	1	-.291	3
529		18	max	-7.457	15	657.536	2	-4.794	15	0	3	-.008	15	.336	2
530			min	-177.129	1	-293.885	3	-115.606	1	0	2	-.199	1	-.144	3
531		19	max	-7.274	15	656.238	2	-4.794	15	0	3	-.011	15	.012	3
532			min	-176.523	1	-294.859	3	-115.606	1	0	2	-.26	1	-.011	1
533	M5	1	max	381.821	1	2587.574	3	0	1	0	1	0	1	.029	2
534			min	14.171	12	-1572.973	2	0	1	0	1	0	1	0	3
535		2	max	382.427	1	2586.6	3	0	1	0	1	0	1	.859	2
536			min	14.474	12	-1574.271	2	0	1	0	1	0	1	-1.366	3
537		3	max	1525.357	3	1657.476	2	0	1	0	1	0	1	1.652	2
538			min	-971.948	2	-1792.048	3	0	1	0	1	0	1	-2.678	3
539		4	max	1525.811	3	1656.178	2	0	1	0	1	0	1	.803	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
540			min	-971.343	2	-1793.021	3	0	1	0	1	0	1	-1.732	3
541		5	max	1526.265	3	1654.88	2	0	1	0	1	0	1	.008	9
542			min	-970.737	2	-1793.995	3	0	1	0	1	0	1	-.785	3
543		6	max	1526.719	3	1653.582	2	0	1	0	1	0	1	.161	3
544			min	-970.132	2	-1794.969	3	0	1	0	1	0	1	-.969	2
545		7	max	1527.173	3	1652.283	2	0	1	0	1	0	1	1.109	3
546			min	-969.527	2	-1795.942	3	0	1	0	1	0	1	-1.841	2
547		8	max	1527.627	3	1650.985	2	0	1	0	1	0	1	2.057	3
548			min	-968.921	2	-1796.916	3	0	1	0	1	0	1	-2.713	2
549		9	max	1548.545	3	160.556	2	0	1	0	1	0	1	2.369	3
550			min	-816.207	2	.392	15	0	1	0	1	0	1	-3.088	2
551		10	max	1548.999	3	159.257	2	0	1	0	1	0	1	2.291	3
552			min	-815.601	2	0	15	0	1	0	1	0	1	-3.173	2
553		11	max	1549.453	3	157.959	2	0	1	0	1	0	1	2.214	3
554			min	-814.996	2	-1.449	4	0	1	0	1	0	1	-3.257	2
555		12	max	1570.556	3	1141.509	3	0	1	0	1	0	1	1.944	3
556			min	-662.336	2	-1976.503	2	0	1	0	1	0	1	-2.914	2
557		13	max	1571.01	3	1140.536	3	0	1	0	1	0	1	1.342	3
558			min	-661.731	2	-1977.801	2	0	1	0	1	0	1	-1.871	2
559		14	max	1571.464	3	1139.562	3	0	1	0	1	0	1	.74	3
560			min	-661.125	2	-1979.099	2	0	1	0	1	0	1	-.827	2
561		15	max	1571.918	3	1138.588	3	0	1	0	1	0	1	.218	2
562			min	-660.52	2	-1980.398	2	0	1	0	1	0	1	-.004	13
563		16	max	1572.372	3	1137.615	3	0	1	0	1	0	1	1.263	2
564			min	-659.914	2	-1981.696	2	0	1	0	1	0	1	-.461	3
565		17	max	1572.826	3	1136.641	3	0	1	0	1	0	1	2.309	2
566			min	-659.309	2	-1982.994	2	0	1	0	1	0	1	-1.062	3
567		18	max	-14.862	12	2215.03	2	0	1	0	1	0	1	1.19	2
568			min	-381.935	1	-1008.089	3	0	1	0	1	0	1	-.556	3
569		19	max	-14.56	12	2213.732	2	0	1	0	1	0	1	.022	1
570			min	-381.33	1	-1009.063	3	0	1	0	1	0	1	-.023	3
571	M9	1	max	176.278	1	776.788	3	107.974	1	0	3	-.011	15	0	3
572			min	7.267	15	-463.556	1	4.483	15	0	1	-.258	1	-.015	2
573		2	max	176.883	1	775.814	3	107.974	1	0	3	-.008	15	.232	1
574			min	7.45	15	-464.854	1	4.483	15	0	1	-.201	1	-.409	3
575		3	max	474.224	3	546.751	2	107.508	1	0	2	-.006	15	.466	1
576			min	-278.133	2	-558.326	3	4.454	15	0	3	-.144	1	-.802	3
577		4	max	474.678	3	545.453	2	107.508	1	0	2	-.004	15	.189	1
578			min	-277.528	2	-559.3	3	4.454	15	0	3	-.087	1	-.508	3
579		5	max	475.132	3	544.155	2	107.508	1	0	2	-.001	15	-.003	15
580			min	-276.922	2	-560.273	3	4.454	15	0	3	-.031	1	-.212	3
581		6	max	475.586	3	542.856	2	107.508	1	0	2	.026	1	.084	3
582			min	-276.317	2	-561.247	3	4.454	15	0	3	.001	15	-.399	2
583		7	max	476.04	3	541.558	2	107.508	1	0	2	.083	1	.38	3
584			min	-275.711	2	-562.221	3	4.454	15	0	3	.003	15	-.685	2
585		8	max	476.494	3	540.26	2	107.508	1	0	2	.14	1	.677	3
586			min	-275.106	2	-563.194	3	4.454	15	0	3	.006	15	-.97	2
587		9	max	489.363	3	48.044	2	157.744	1	0	3	-.003	15	.792	3
588			min	-201.396	2	.395	15	6.538	15	0	9	-.082	1	-1.111	2
589		10	max	489.817	3	46.746	2	157.744	1	0	3	.001	1	.77	3
590			min	-200.79	2	.004	15	6.538	15	0	9	0	15	-1.136	2
591		11	max	490.271	3	45.448	2	157.744	1	0	3	.084	1	.749	3
592			min	-200.185	2	-1.588	4	6.538	15	0	9	.003	15	-1.16	2
593		12	max	503.047	3	359.792	3	105.058	1	0	3	-.006	15	.652	3
594			min	-126.447	2	-639.35	2	4.346	15	0	2	-.138	1	-1.028	2
595		13	max	503.501	3	358.819	3	105.058	1	0	3	-.003	15	.463	3
596			min	-125.842	2	-640.648	2	4.346	15	0	2	-.082	1	-.69	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
597		14	max	503.956	3	357.845	3	105.058	1	0	3	-.001	15	.274	3
598			min	-125.236	2	-641.946	2	4.346	15	0	2	-.027	1	-.352	2
599		15	max	504.41	3	356.871	3	105.058	1	0	3	.029	1	.085	3
600			min	-124.631	2	-643.244	2	4.346	15	0	2	.001	15	-.036	1
601		16	max	504.864	3	355.898	3	105.058	1	0	3	.084	1	.327	2
602			min	-124.026	2	-644.543	2	4.346	15	0	2	.003	15	-.103	3
603		17	max	505.318	3	354.924	3	105.058	1	0	3	.139	1	.667	2
604			min	-123.42	2	-645.841	2	4.346	15	0	2	.006	15	-.291	3
605		18	max	-7.457	15	657.536	2	115.606	1	0	2	.199	1	.336	2
606			min	-177.129	1	-293.885	3	4.794	15	0	3	.008	15	-.144	3
607		19	max	-7.274	15	656.238	2	115.606	1	0	2	.26	1	.012	3
608			min	-176.523	1	-294.859	3	4.794	15	0	3	.011	15	-.011	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	.001	1	.115	2	.008	3	9.484e-3	2	NC	1	NC	1
2			min	0	15	-.017	3	-.004	2	-1.552e-3	3	NC	1	NC	1
3		2	max	0	1	.351	3	.04	1	1.091e-2	2	NC	5	NC	2
4			min	0	15	-.095	1	0	10	-1.581e-3	3	652.183	3	6094.732	1
5		3	max	0	1	.649	3	.097	1	1.233e-2	2	NC	5	NC	3
6			min	0	15	-.252	1	.004	15	-1.61e-3	3	360.338	3	2494.648	1
7		4	max	0	1	.83	3	.146	1	1.376e-2	2	NC	5	NC	3
8			min	0	15	-.34	1	.006	15	-1.638e-3	3	283.305	3	1651.597	1
9		5	max	0	1	.873	3	.171	1	1.518e-2	2	NC	5	NC	3
10			min	0	15	-.346	1	.007	15	-1.667e-3	3	269.858	3	1407.984	1
11		6	max	0	1	.779	3	.165	1	1.66e-2	2	NC	5	NC	3
12			min	0	15	-.272	1	.007	15	-1.695e-3	3	301.594	3	1460.636	1
13		7	max	0	1	.578	3	.129	1	1.803e-2	2	NC	5	NC	3
14			min	0	15	-.135	1	.006	10	-1.724e-3	3	403.678	3	1867.966	1
15		8	max	0	1	.322	3	.074	1	1.945e-2	2	NC	4	NC	2
16			min	0	15	0	15	-.002	10	-1.752e-3	3	708.34	3	3265.668	1
17		9	max	0	1	.204	2	.027	3	2.087e-2	2	NC	4	NC	1
18			min	0	15	.005	15	-.008	10	-1.781e-3	3	2245.833	3	NC	1
19		10	max	0	1	.271	2	.026	3	2.23e-2	2	NC	3	NC	1
20			min	0	1	-.015	3	-.018	2	-1.809e-3	3	1545.403	2	NC	1
21		11	max	0	15	.204	2	.027	3	2.087e-2	2	NC	4	NC	1
22			min	0	1	.005	15	-.008	10	-1.781e-3	3	2245.833	3	NC	1
23		12	max	0	15	.322	3	.074	1	1.945e-2	2	NC	4	NC	2
24			min	0	1	0	15	-.002	10	-1.752e-3	3	708.34	3	3265.668	1
25		13	max	0	15	.578	3	.129	1	1.803e-2	2	NC	5	NC	3
26			min	0	1	-.135	1	.006	10	-1.724e-3	3	403.678	3	1867.966	1
27		14	max	0	15	.779	3	.165	1	1.66e-2	2	NC	5	NC	3
28			min	0	1	-.272	1	.007	15	-1.695e-3	3	301.594	3	1460.636	1
29		15	max	0	15	.873	3	.171	1	1.518e-2	2	NC	5	NC	3
30			min	0	1	-.346	1	.007	15	-1.667e-3	3	269.858	3	1407.984	1
31		16	max	0	15	.83	3	.146	1	1.376e-2	2	NC	5	NC	3
32			min	0	1	-.34	1	.006	15	-1.638e-3	3	283.305	3	1651.597	1
33		17	max	0	15	.649	3	.097	1	1.233e-2	2	NC	5	NC	3
34			min	0	1	-.252	1	.004	15	-1.61e-3	3	360.338	3	2494.648	1
35		18	max	0	15	.351	3	.04	1	1.091e-2	2	NC	5	NC	2
36			min	0	1	-.095	1	0	10	-1.581e-3	3	652.183	3	6094.732	1
37		19	max	0	15	.115	2	.008	3	9.484e-3	2	NC	1	NC	1
38			min	-.001	1	-.017	3	-.004	2	-1.552e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.235	3	.008	3	5.624e-3	2	NC	1	NC	1
40			min	0	15	-.371	2	-.004	2	-4.212e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.588	3	.028	1	6.743e-3	2	NC	5	NC	2
42			min	0	15	-.699	2	0	10	-5.134e-3	3	680.709	3	8956.613	1
43		3	max	0	1	.886	3	.078	1	7.862e-3	2	NC	5	NC	3
44			min	0	15	-.983	2	.003	15	-6.056e-3	3	368.934	3	3116.873	1
45		4	max	0	1	1.092	3	.125	1	8.981e-3	2	NC	15	NC	3
46			min	0	15	-1.191	2	.005	15	-6.978e-3	3	280.198	3	1931.611	1
47		5	max	0	1	1.188	3	.152	1	1.01e-2	2	NC	15	NC	3
48			min	0	15	-1.307	2	.007	15	-7.9e-3	3	252.047	3	1588.353	1
49		6	max	0	1	1.173	3	.15	1	1.122e-2	2	NC	15	NC	3
50			min	0	15	-1.33	2	.006	15	-8.822e-3	3	250.29	2	1610.34	1
51		7	max	0	1	1.069	3	.12	1	1.234e-2	2	NC	15	NC	3
52			min	0	15	-1.275	2	.005	15	-9.744e-3	3	265.545	2	2025.902	1
53		8	max	0	1	.912	3	.07	1	1.346e-2	2	NC	15	NC	2
54			min	0	15	-1.171	2	-.001	10	-1.067e-2	3	299.998	2	3492.614	1
55		9	max	0	1	.76	3	.024	3	1.458e-2	2	NC	5	NC	1
56			min	0	15	-1.063	2	-.008	10	-1.159e-2	3	346.726	2	NC	1
57		10	max	0	1	.689	3	.024	3	1.569e-2	2	NC	5	NC	1
58			min	0	1	-1.011	2	-.016	2	-1.251e-2	3	374.894	2	NC	1
59		11	max	0	15	.76	3	.024	3	1.458e-2	2	NC	5	NC	1
60			min	0	1	-1.063	2	-.008	10	-1.159e-2	3	346.726	2	NC	1
61		12	max	0	15	.912	3	.07	1	1.346e-2	2	NC	15	NC	2
62			min	0	1	-1.171	2	-.001	10	-1.067e-2	3	299.998	2	3492.614	1
63		13	max	0	15	1.069	3	.12	1	1.234e-2	2	NC	15	NC	3
64			min	0	1	-1.275	2	.005	15	-9.744e-3	3	265.545	2	2025.902	1
65		14	max	0	15	1.173	3	.15	1	1.122e-2	2	NC	15	NC	3
66			min	0	1	-1.33	2	.006	15	-8.822e-3	3	250.29	2	1610.34	1
67		15	max	0	15	1.188	3	.152	1	1.01e-2	2	NC	15	NC	3
68			min	0	1	-1.307	2	.007	15	-7.9e-3	3	252.047	3	1588.353	1
69		16	max	0	15	1.092	3	.125	1	8.981e-3	2	NC	15	NC	3
70			min	0	1	-1.191	2	.005	15	-6.978e-3	3	280.198	3	1931.611	1
71		17	max	0	15	.886	3	.078	1	7.862e-3	2	NC	5	NC	3
72			min	0	1	-.983	2	.003	15	-6.056e-3	3	368.934	3	3116.873	1
73		18	max	0	15	.588	3	.028	1	6.743e-3	2	NC	5	NC	2
74			min	0	1	-.699	2	0	10	-5.134e-3	3	680.709	3	8956.613	1
75		19	max	0	15	.235	3	.008	3	5.624e-3	2	NC	1	NC	1
76			min	0	1	-.371	2	-.004	2	-4.212e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.241	3	.007	3	3.566e-3	3	NC	1	NC	1
78			min	0	1	-.37	2	-.004	2	-5.846e-3	2	NC	1	NC	1
79		2	max	0	15	.459	3	.028	1	4.352e-3	3	NC	5	NC	2
80			min	0	1	-.789	2	0	10	-7.013e-3	2	573.111	2	8912.972	1
81		3	max	0	15	.649	3	.078	1	5.138e-3	3	NC	5	NC	3
82			min	0	1	-1.145	2	.003	15	-8.181e-3	2	309.508	2	3107.598	1
83		4	max	0	15	.79	3	.126	1	5.924e-3	3	NC	15	NC	3
84			min	0	1	-1.397	2	.005	15	-9.348e-3	2	233.602	2	1926.952	1
85		5	max	0	15	.871	3	.153	1	6.709e-3	3	NC	15	NC	3
86			min	0	1	-1.523	2	.007	15	-1.051e-2	2	208.086	2	1584.707	1
87		6	max	0	15	.893	3	.151	1	7.495e-3	3	NC	15	NC	3
88			min	0	1	-1.523	2	.006	15	-1.168e-2	2	208.085	2	1606.288	1
89		7	max	0	15	.863	3	.12	1	8.281e-3	3	NC	15	NC	3
90			min	0	1	-1.419	2	.005	15	-1.285e-2	2	228.851	2	2019.255	1
91		8	max	0	15	.801	3	.07	1	9.067e-3	3	NC	15	NC	2
92			min	0	1	-1.252	2	0	10	-1.402e-2	2	272.106	2	3472.689	1
93		9	max	0	15	.735	3	.023	3	9.853e-3	3	NC	5	NC	1
94			min	0	1	-1.087	2	-.007	10	-1.518e-2	2	334.659	2	NC	1
95		10	max	0	1	.703	3	.022	3	1.064e-2	3	NC	5	NC	1
96			min	0	1	-1.009	2	-.015	2	-1.635e-2	2	375.385	2	NC	1
97		11	max	0	1	.735	3	.023	3	9.853e-3	3	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
98			min	0	15	-1.087	2	-.007	10	-1.518e-2	2	334.659	2	NC	1
99		12	max	0	1	.801	3	.07	1	9.067e-3	3	NC	15	NC	2
100			min	0	15	-1.252	2	0	10	-1.402e-2	2	272.106	2	3472.689	1
101		13	max	0	1	.863	3	.12	1	8.281e-3	3	NC	15	NC	3
102			min	0	15	-1.419	2	.005	15	-1.285e-2	2	228.851	2	2019.255	1
103		14	max	0	1	.893	3	.151	1	7.495e-3	3	NC	15	NC	3
104			min	0	15	-1.523	2	.006	15	-1.168e-2	2	208.085	2	1606.288	1
105		15	max	0	1	.871	3	.153	1	6.709e-3	3	NC	15	NC	3
106			min	0	15	-1.523	2	.007	15	-1.051e-2	2	208.086	2	1584.707	1
107		16	max	0	1	.79	3	.126	1	5.924e-3	3	NC	15	NC	3
108			min	0	15	-1.397	2	.005	15	-9.348e-3	2	233.602	2	1926.952	1
109		17	max	0	1	.649	3	.078	1	5.138e-3	3	NC	5	NC	3
110			min	0	15	-1.145	2	.003	15	-8.181e-3	2	309.508	2	3107.598	1
111		18	max	0	1	.459	3	.028	1	4.352e-3	3	NC	5	NC	2
112			min	0	15	-.789	2	0	10	-7.013e-3	2	573.111	2	8912.972	1
113		19	max	0	1	.241	3	.007	3	3.566e-3	3	NC	1	NC	1
114			min	0	15	-.37	2	-.004	2	-5.846e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.103	2	.006	3	6.364e-3	3	NC	1	NC	1
116			min	-.001	1	-.079	3	-.003	2	-7.974e-3	2	NC	1	NC	1
117		2	max	0	15	.041	3	.04	1	7.509e-3	3	NC	5	NC	2
118			min	0	1	-.188	2	.002	10	-9.04e-3	2	824.231	2	6132.255	1
119		3	max	0	15	.134	3	.097	1	8.654e-3	3	NC	5	NC	3
120			min	0	1	-.42	2	.004	15	-1.011e-2	2	458.528	2	2500.949	1
121		4	max	0	15	.184	3	.146	1	9.8e-3	3	NC	5	NC	3
122			min	0	1	-.554	2	.006	15	-1.117e-2	2	365.144	2	1652.287	1
123		5	max	0	15	.181	3	.172	1	1.095e-2	3	NC	5	NC	3
124			min	0	1	-.572	2	.007	15	-1.224e-2	2	355.748	2	1405.939	1
125		6	max	0	15	.129	3	.166	1	1.209e-2	3	NC	5	NC	3
126			min	0	1	-.476	2	.007	15	-1.33e-2	2	414.744	2	1455.085	1
127		7	max	0	15	.037	3	.13	1	1.324e-2	3	NC	5	NC	3
128			min	0	1	-.291	2	.006	15	-1.437e-2	2	609.373	2	1853.256	1
129		8	max	0	15	.008	9	.076	1	1.438e-2	3	NC	3	NC	2
130			min	0	1	-.072	3	0	10	-1.544e-2	2	1446.332	2	3205.88	1
131		9	max	0	15	.154	1	.021	1	1.553e-2	3	NC	4	NC	1
132			min	0	1	-.168	3	-.006	10	-1.65e-2	2	2700.536	3	NC	1
133		10	max	0	1	.232	2	.019	3	1.667e-2	3	NC	4	NC	1
134			min	0	1	-.211	3	-.014	2	-1.757e-2	2	1821.62	1	NC	1
135		11	max	0	1	.154	1	.021	1	1.553e-2	3	NC	4	NC	1
136			min	0	15	-.168	3	-.006	10	-1.65e-2	2	2700.536	3	NC	1
137		12	max	0	1	.008	9	.076	1	1.438e-2	3	NC	3	NC	2
138			min	0	15	-.072	3	0	10	-1.544e-2	2	1446.332	2	3205.88	1
139		13	max	0	1	.037	3	.13	1	1.324e-2	3	NC	5	NC	3
140			min	0	15	-.291	2	.006	15	-1.437e-2	2	609.373	2	1853.256	1
141		14	max	0	1	.129	3	.166	1	1.209e-2	3	NC	5	NC	3
142			min	0	15	-.476	2	.007	15	-1.33e-2	2	414.744	2	1455.085	1
143		15	max	0	1	.181	3	.172	1	1.095e-2	3	NC	5	NC	3
144			min	0	15	-.572	2	.007	15	-1.224e-2	2	355.748	2	1405.939	1
145		16	max	0	1	.184	3	.146	1	9.8e-3	3	NC	5	NC	3
146			min	0	15	-.554	2	.006	15	-1.117e-2	2	365.144	2	1652.287	1
147		17	max	0	1	.134	3	.097	1	8.654e-3	3	NC	5	NC	3
148			min	0	15	-.42	2	.004	15	-1.011e-2	2	458.528	2	2500.949	1
149		18	max	0	1	.041	3	.04	1	7.509e-3	3	NC	5	NC	2
150			min	0	15	-.188	2	.002	10	-9.04e-3	2	824.231	2	6132.255	1
151		19	max	.001	1	.103	2	.006	3	6.364e-3	3	NC	1	NC	1
152			min	0	15	-.079	3	-.003	2	-7.974e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.007	2	.008	1	-9.517e-6	15	NC	1	NC	2
154			min	-.008	3	-.012	3	0	15	-2.298e-4	1	9039.916	2	7501.287	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
155		2	max	.006	2	.006	2	.008	1	-8.929e-6	15	NC	1	NC	2
156			min	-.008	3	-.011	3	0	15	-2.156e-4	1	NC	1	8182.687	1
157		3	max	.006	2	.005	2	.007	1	-8.342e-6	15	NC	1	NC	2
158			min	-.008	3	-.011	3	0	15	-2.014e-4	1	NC	1	8995.066	1
159		4	max	.005	2	.004	2	.006	1	-7.754e-6	15	NC	1	NC	2
160			min	-.007	3	-.01	3	0	15	-1.872e-4	1	NC	1	9973.234	1
161		5	max	.005	2	.003	2	.006	1	-7.166e-6	15	NC	1	NC	1
162			min	-.007	3	-.01	3	0	15	-1.73e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.005	1	-6.578e-6	15	NC	1	NC	1
164			min	-.006	3	-.009	3	0	15	-1.588e-4	1	NC	1	NC	1
165		7	max	.004	2	.002	2	.004	1	-5.99e-6	15	NC	1	NC	1
166			min	-.006	3	-.009	3	0	15	-1.445e-4	1	NC	1	NC	1
167		8	max	.004	2	.001	2	.004	1	-5.402e-6	15	NC	1	NC	1
168			min	-.005	3	-.008	3	0	15	-1.303e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-4.814e-6	15	NC	1	NC	1
170			min	-.005	3	-.008	3	0	15	-1.161e-4	1	NC	1	NC	1
171		10	max	.003	2	0	2	.003	1	-4.227e-6	15	NC	1	NC	1
172			min	-.004	3	-.007	3	0	15	-1.019e-4	1	NC	1	NC	1
173		11	max	.003	2	0	2	.002	1	-3.639e-6	15	NC	1	NC	1
174			min	-.004	3	-.007	3	0	15	-8.773e-5	1	NC	1	NC	1
175		12	max	.003	2	0	2	.002	1	-3.051e-6	15	NC	1	NC	1
176			min	-.003	3	-.006	3	0	15	-7.352e-5	1	NC	1	NC	1
177		13	max	.002	2	0	15	.001	1	-2.463e-6	15	NC	1	NC	1
178			min	-.003	3	-.005	3	0	15	-5.932e-5	1	NC	1	NC	1
179		14	max	.002	2	0	15	0	1	-1.875e-6	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-4.511e-5	1	NC	1	NC	1
181		15	max	.001	2	0	15	0	1	-1.287e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-3.091e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-6.995e-7	15	NC	1	NC	1
184			min	-.001	3	-.003	3	0	15	-1.67e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-1.117e-7	15	NC	1	NC	1
186			min	0	3	-.002	3	0	15	-2.497e-6	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	1.171e-5	1	NC	1	NC	1
188			min	0	3	-.001	4	0	15	3.407e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.591e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.064e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.537e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.603e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.555e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	6.435e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	3.971e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	15	1.641e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	6.386e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	2.638e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	8.802e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	3.635e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.122e-4	1	NC	1	NC	1
202			min	-.002	2	-.009	4	0	15	4.633e-6	15	NC	1	NC	1
203		7	max	.002	3	-.003	15	.001	1	1.363e-4	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	5.63e-6	15	8606.418	4	NC	1
205		8	max	.003	3	-.003	15	.001	1	1.605e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	6.627e-6	15	7726.846	4	NC	1
207		9	max	.003	3	-.003	15	.002	1	1.846e-4	1	NC	2	NC	1
208			min	-.002	2	-.013	4	0	15	7.625e-6	15	7206.791	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	2.088e-4	1	NC	2	NC	1
210			min	-.003	2	-.013	4	0	15	8.622e-6	15	6955.651	4	NC	1
211		11	max	.004	3	-.003	15	.003	1	2.329e-4	1	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
212			min	-.003	2	-.013	4	0	15	9.619e-6	15	6936.43	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	2.571e-4	1	NC	2	NC	1
214			min	-.003	2	-.013	4	0	15	1.062e-5	15	7151.541	4	NC	1
215		13	max	.004	3	-.003	15	.004	1	2.813e-4	1	NC	1	NC	1
216			min	-.004	2	-.012	4	0	15	1.161e-5	15	7645.555	4	NC	1
217		14	max	.005	3	-.003	15	.004	1	3.054e-4	1	NC	1	NC	1
218			min	-.004	2	-.011	4	0	15	1.261e-5	15	8528.309	4	NC	1
219		15	max	.005	3	-.002	15	.005	1	3.296e-4	1	NC	1	NC	1
220			min	-.004	2	-.01	4	0	15	1.361e-5	15	NC	1	NC	1
221		16	max	.006	3	-.002	15	.006	1	3.537e-4	1	NC	1	NC	1
222			min	-.005	2	-.008	4	0	15	1.461e-5	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.006	1	3.779e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	1	0	15	1.56e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.007	1	4.02e-4	1	NC	1	NC	1
226			min	-.005	2	-.004	1	0	15	1.66e-5	15	NC	1	NC	1
227		19	max	.007	3	0	15	.008	1	4.262e-4	1	NC	1	NC	1
228			min	-.005	2	-.003	1	0	15	1.76e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.005	2	0	15	6.039e-5	1	NC	1	NC	3
230			min	0	3	-.007	3	-.008	1	2.507e-6	15	NC	1	3112.323	1
231		2	max	.003	1	.005	2	0	15	6.039e-5	1	NC	1	NC	3
232			min	0	3	-.006	3	-.007	1	2.507e-6	15	NC	1	3383.834	1
233		3	max	.002	1	.004	2	0	15	6.039e-5	1	NC	1	NC	3
234			min	0	3	-.006	3	-.007	1	2.507e-6	15	NC	1	3707.009	1
235		4	max	.002	1	.004	2	0	15	6.039e-5	1	NC	1	NC	2
236			min	0	3	-.006	3	-.006	1	2.507e-6	15	NC	1	4095.262	1
237		5	max	.002	1	.004	2	0	15	6.039e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.005	1	2.507e-6	15	NC	1	4566.824	1
239		6	max	.002	1	.004	2	0	15	6.039e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.005	1	2.507e-6	15	NC	1	5146.978	1
241		7	max	.002	1	.003	2	0	15	6.039e-5	1	NC	1	NC	2
242			min	0	3	-.005	3	-.004	1	2.507e-6	15	NC	1	5871.612	1
243		8	max	.002	1	.003	2	0	15	6.039e-5	1	NC	1	NC	2
244			min	0	3	-.004	3	-.004	1	2.507e-6	15	NC	1	6793.064	1
245		9	max	.002	1	.003	2	0	15	6.039e-5	1	NC	1	NC	2
246			min	0	3	-.004	3	-.003	1	2.507e-6	15	NC	1	7990.129	1
247		10	max	.001	1	.002	2	0	15	6.039e-5	1	NC	1	NC	2
248			min	0	3	-.003	3	-.003	1	2.507e-6	15	NC	1	9585.974	1
249		11	max	.001	1	.002	2	0	15	6.039e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.002	1	2.507e-6	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	6.039e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.002	1	2.507e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	6.039e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	2.507e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	6.039e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	2.507e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	6.039e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	2.507e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	6.039e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	2.507e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	6.039e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.507e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	6.039e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.507e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.039e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.507e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.026	2	0	1	0	1	NC	4	NC	1
268			min	-.028	3	-.037	3	0	1	0	1	1676.308	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.02	2	.024	2	0	1	0	1	NC	4	NC	1
270			min	-.026	3	-.035	3	0	1	0	1	1777.845	3	NC	1
271		3	max	.019	2	.022	2	0	1	0	1	NC	4	NC	1
272			min	-.025	3	-.033	3	0	1	0	1	1892.461	3	NC	1
273		4	max	.017	2	.02	2	0	1	0	1	NC	4	NC	1
274			min	-.023	3	-.031	3	0	1	0	1	2022.827	3	NC	1
275		5	max	.016	2	.018	2	0	1	0	1	NC	4	NC	1
276			min	-.022	3	-.029	3	0	1	0	1	2172.378	3	NC	1
277		6	max	.015	2	.016	2	0	1	0	1	NC	4	NC	1
278			min	-.02	3	-.027	3	0	1	0	1	2345.609	3	NC	1
279		7	max	.014	2	.014	2	0	1	0	1	NC	1	NC	1
280			min	-.019	3	-.025	3	0	1	0	1	2548.516	3	NC	1
281		8	max	.013	2	.012	2	0	1	0	1	NC	1	NC	1
282			min	-.017	3	-.022	3	0	1	0	1	2789.278	3	NC	1
283		9	max	.012	2	.01	2	0	1	0	1	NC	1	NC	1
284			min	-.015	3	-.02	3	0	1	0	1	3079.35	3	NC	1
285		10	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
286			min	-.014	3	-.018	3	0	1	0	1	3435.285	3	NC	1
287		11	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.012	3	-.016	3	0	1	0	1	3881.917	3	NC	1
289		12	max	.008	2	.005	2	0	1	0	1	NC	1	NC	1
290			min	-.011	3	-.014	3	0	1	0	1	4458.283	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.009	3	-.012	3	0	1	0	1	5229.455	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.01	3	0	1	0	1	6312.582	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.008	3	0	1	0	1	7941.986	3	NC	1
297		16	max	.003	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	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	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	8801.616	3	NC	1
317		7	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.013	3	0	1	0	1	7858.56	3	NC	1
319		8	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.008	2	-.014	3	0	1	0	1	7300.058	3	NC	1
321		9	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.009	2	-.015	3	0	1	0	1	7010.879	3	NC	1
323		10	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.01	2	-.015	3	0	1	0	1	6939.278	3	NC	1
325		11	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.011	2	-.015	3	0	1	0	1	7061.862	4	NC	1
327		12	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.012	2	-.015	3	0	1	0	1	7274.835	4	NC	1
329		13	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.014	2	-.014	3	0	1	0	1	7771.963	4	NC	1
331		14	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.015	2	-.013	3	0	1	0	1	8664.305	4	NC	1
333		15	max	.016	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.016	2	-.012	3	0	1	0	1	NC	1	NC	1
335		16	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.017	2	-.01	3	0	1	0	1	NC	1	NC	1
337		17	max	.019	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.018	2	-.009	3	0	1	0	1	NC	1	NC	1
339		18	max	.02	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.019	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.021	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.02	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.019	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.022	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.018	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.02	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.017	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.019	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.018	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.015	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.017	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.013	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.012	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	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	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.007	2	0	15	2.298e-4	1	NC	1	NC	2
382			min	-.008	3	-.012	3	-.008	1	9.517e-6	15	9039.916	2	7501.287	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
383		2	max	.006	2	.006	2	0	15	2.156e-4	1	NC	1	NC	2
384			min	-.008	3	-.011	3	-.008	1	8.929e-6	15	NC	1	8182.687	1
385		3	max	.006	2	.005	2	0	15	2.014e-4	1	NC	1	NC	2
386			min	-.008	3	-.011	3	-.007	1	8.342e-6	15	NC	1	8995.066	1
387		4	max	.005	2	.004	2	0	15	1.872e-4	1	NC	1	NC	2
388			min	-.007	3	-.01	3	-.006	1	7.754e-6	15	NC	1	9973.234	1
389		5	max	.005	2	.003	2	0	15	1.73e-4	1	NC	1	NC	1
390			min	-.007	3	-.01	3	-.006	1	7.166e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.588e-4	1	NC	1	NC	1
392			min	-.006	3	-.009	3	-.005	1	6.578e-6	15	NC	1	NC	1
393		7	max	.004	2	.002	2	0	15	1.445e-4	1	NC	1	NC	1
394			min	-.006	3	-.009	3	-.004	1	5.99e-6	15	NC	1	NC	1
395		8	max	.004	2	.001	2	0	15	1.303e-4	1	NC	1	NC	1
396			min	-.005	3	-.008	3	-.004	1	5.402e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	1.161e-4	1	NC	1	NC	1
398			min	-.005	3	-.008	3	-.003	1	4.814e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	1.019e-4	1	NC	1	NC	1
400			min	-.004	3	-.007	3	-.003	1	4.227e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	8.773e-5	1	NC	1	NC	1
402			min	-.004	3	-.007	3	-.002	1	3.639e-6	15	NC	1	NC	1
403		12	max	.003	2	0	2	0	15	7.352e-5	1	NC	1	NC	1
404			min	-.003	3	-.006	3	-.002	1	3.051e-6	15	NC	1	NC	1
405		13	max	.002	2	0	15	0	15	5.932e-5	1	NC	1	NC	1
406			min	-.003	3	-.005	3	-.001	1	2.463e-6	15	NC	1	NC	1
407		14	max	.002	2	0	15	0	15	4.511e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	0	1	1.875e-6	15	NC	1	NC	1
409		15	max	.001	2	0	15	0	15	3.091e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	1.287e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.67e-5	1	NC	1	NC	1
412			min	-.001	3	-.003	3	0	1	6.995e-7	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	2.497e-6	1	NC	1	NC	1
414			min	0	3	-.002	3	0	1	1.117e-7	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	-3.407e-7	12	NC	1	NC	1
416			min	0	3	-.001	4	0	1	-1.171e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.064e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.591e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	8.603e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	3.537e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-6.435e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.555e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.641e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-3.971e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-2.638e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-6.386e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-3.635e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-8.802e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-4.633e-6	15	NC	1	NC	1
430			min	-.002	2	-.009	4	0	1	-1.122e-4	1	NC	1	NC	1
431		7	max	.002	3	-.003	15	0	15	-5.63e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	-.001	1	-1.363e-4	1	8606.418	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-6.627e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.605e-4	1	7726.846	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-7.625e-6	15	NC	2	NC	1
436			min	-.002	2	-.013	4	-.002	1	-1.846e-4	1	7206.791	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-8.622e-6	15	NC	2	NC	1
438			min	-.003	2	-.013	4	-.002	1	-2.088e-4	1	6955.651	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-9.619e-6	15	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
440			min	-.003	2	-.013	4	-.003	1	-2.329e-4	1	6936.43	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-1.062e-5	15	NC	2	NC	1
442			min	-.003	2	-.013	4	-.003	1	-2.571e-4	1	7151.541	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-1.161e-5	15	NC	1	NC	1
444			min	-.004	2	-.012	4	-.004	1	-2.813e-4	1	7645.555	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-1.261e-5	15	NC	1	NC	1
446			min	-.004	2	-.011	4	-.004	1	-3.054e-4	1	8528.309	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-1.361e-5	15	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.296e-4	1	NC	1	NC	1
449		16	max	.006	3	-.002	15	0	15	-1.461e-5	15	NC	1	NC	1
450			min	-.005	2	-.008	4	-.006	1	-3.537e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-1.56e-5	15	NC	1	NC	1
452			min	-.005	2	-.006	1	-.006	1	-3.779e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-1.66e-5	15	NC	1	NC	1
454			min	-.005	2	-.004	1	-.007	1	-4.02e-4	1	NC	1	NC	1
455		19	max	.007	3	0	15	0	15	-1.76e-5	15	NC	1	NC	1
456			min	-.005	2	-.003	1	-.008	1	-4.262e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.005	2	.008	1	-2.507e-6	15	NC	1	NC	3
458			min	0	3	-.007	3	0	15	-6.039e-5	1	NC	1	3112.323	1
459		2	max	.003	1	.005	2	.007	1	-2.507e-6	15	NC	1	NC	3
460			min	0	3	-.006	3	0	15	-6.039e-5	1	NC	1	3383.834	1
461		3	max	.002	1	.004	2	.007	1	-2.507e-6	15	NC	1	NC	3
462			min	0	3	-.006	3	0	15	-6.039e-5	1	NC	1	3707.009	1
463		4	max	.002	1	.004	2	.006	1	-2.507e-6	15	NC	1	NC	2
464			min	0	3	-.006	3	0	15	-6.039e-5	1	NC	1	4095.262	1
465		5	max	.002	1	.004	2	.005	1	-2.507e-6	15	NC	1	NC	2
466			min	0	3	-.005	3	0	15	-6.039e-5	1	NC	1	4566.824	1
467		6	max	.002	1	.004	2	.005	1	-2.507e-6	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-6.039e-5	1	NC	1	5146.978	1
469		7	max	.002	1	.003	2	.004	1	-2.507e-6	15	NC	1	NC	2
470			min	0	3	-.005	3	0	15	-6.039e-5	1	NC	1	5871.612	1
471		8	max	.002	1	.003	2	.004	1	-2.507e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-6.039e-5	1	NC	1	6793.064	1
473		9	max	.002	1	.003	2	.003	1	-2.507e-6	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-6.039e-5	1	NC	1	7990.129	1
475		10	max	.001	1	.002	2	.003	1	-2.507e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-6.039e-5	1	NC	1	9585.974	1
477		11	max	.001	1	.002	2	.002	1	-2.507e-6	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-6.039e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.002	1	-2.507e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-6.039e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-2.507e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-6.039e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-2.507e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-6.039e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-2.507e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-6.039e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.507e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-6.039e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.507e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-6.039e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.507e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-6.039e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.507e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-6.039e-5	1	NC	1	NC	1
495	M1	1	max	.008	3	.115	2	.001	1	1.558e-2	1	NC	1	NC	1
496			min	-.004	2	-.017	3	0	15	-2.863e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.008	3	.055	2	0	15	7.566e-3	1	NC	4	NC	1
498			min	-.004	2	-.006	3	-.006	1	-1.416e-2	3	1911.484	2	NC	1
499		3	max	.008	3	.012	3	0	15	3.078e-5	10	NC	5	NC	1
500			min	-.004	2	-.01	2	-.008	1	-1.588e-4	1	920.072	2	NC	1
501		4	max	.008	3	.046	3	0	15	4.688e-3	2	NC	5	NC	1
502			min	-.004	2	-.083	2	-.008	1	-5.158e-3	3	579.753	2	NC	1
503		5	max	.008	3	.09	3	0	15	9.373e-3	2	NC	5	NC	1
504			min	-.004	2	-.16	2	-.005	1	-1.018e-2	3	417.774	2	NC	1
505		6	max	.008	3	.138	3	0	15	1.406e-2	2	NC	15	NC	1
506			min	-.004	2	-.235	2	-.002	1	-1.52e-2	3	328.649	2	NC	1
507		7	max	.008	3	.185	3	0	1	1.874e-2	2	NC	15	NC	1
508			min	-.004	2	-.302	2	0	12	-2.022e-2	3	276.092	2	NC	1
509		8	max	.008	3	.223	3	0	1	2.343e-2	2	9177.069	15	NC	1
510			min	-.004	2	-.355	2	0	15	-2.524e-2	3	245.028	2	NC	1
511		9	max	.007	3	.248	3	0	15	2.661e-2	2	8576.816	15	NC	1
512			min	-.004	2	-.388	2	0	1	-2.528e-2	3	228.868	2	NC	1
513		10	max	.007	3	.258	3	0	1	2.881e-2	2	8393.974	15	NC	1
514			min	-.004	2	-.399	2	0	12	-2.203e-2	3	224.121	2	NC	1
515		11	max	.007	3	.252	3	0	1	3.1e-2	2	8576.53	15	NC	1
516			min	-.004	2	-.388	2	0	15	-1.877e-2	3	229.602	2	NC	1
517		12	max	.007	3	.23	3	0	15	2.995e-2	2	9176.467	15	NC	1
518			min	-.004	2	-.353	2	-.001	1	-1.557e-2	3	247.27	2	NC	1
519		13	max	.007	3	.196	3	0	15	2.402e-2	2	NC	15	NC	1
520			min	-.004	2	-.298	2	0	1	-1.247e-2	3	281.563	2	NC	1
521		14	max	.007	3	.153	3	.002	1	1.809e-2	2	NC	15	NC	1
522			min	-.004	2	-.229	2	0	15	-9.359e-3	3	340.362	2	NC	1
523		15	max	.006	3	.104	3	.005	1	1.217e-2	2	NC	5	NC	1
524			min	-.004	2	-.152	2	0	15	-6.252e-3	3	441.925	2	NC	1
525		16	max	.006	3	.053	3	.007	1	6.238e-3	2	NC	5	NC	1
526			min	-.004	2	-.076	2	0	15	-3.144e-3	3	630.778	2	NC	1
527		17	max	.006	3	.004	3	.008	1	5.596e-4	1	NC	5	NC	1
528			min	-.003	2	-.006	2	0	15	-3.682e-5	3	1036.059	2	NC	1
529		18	max	.006	3	.052	2	.006	1	1.131e-2	2	NC	4	NC	1
530			min	-.003	2	-.039	3	0	15	-4.626e-3	3	2207.309	2	NC	1
531		19	max	.006	3	.103	2	0	15	2.271e-2	2	NC	1	NC	1
532			min	-.003	2	-.079	3	-.001	1	-9.396e-3	3	NC	1	NC	1
533	M5	1	max	.026	3	.271	2	0	1	0	1	NC	1	NC	1
534			min	-.018	2	-.015	3	0	1	0	1	NC	1	NC	1
535		2	max	.026	3	.128	2	0	1	0	1	NC	5	NC	1
536			min	-.018	2	-.001	3	0	1	0	1	809.914	2	NC	1
537		3	max	.026	3	.04	3	0	1	0	1	NC	5	NC	1
538			min	-.018	2	-.032	2	0	1	0	1	381.577	2	NC	1
539		4	max	.026	3	.131	3	0	1	0	1	9975.764	15	NC	1
540			min	-.018	2	-.223	2	0	1	0	1	233.973	2	NC	1
541		5	max	.025	3	.257	3	0	1	0	1	6981.383	15	NC	1
542			min	-.017	2	-.429	2	0	1	0	1	164.918	2	NC	1
543		6	max	.025	3	.398	3	0	1	0	1	5375.232	15	NC	1
544			min	-.017	2	-.633	2	0	1	0	1	127.61	2	NC	1
545		7	max	.024	3	.537	3	0	1	0	1	4447.635	15	NC	1
546			min	-.017	2	-.818	2	0	1	0	1	105.94	2	NC	1
547		8	max	.024	3	.653	3	0	1	0	1	3908.267	15	NC	1
548			min	-.016	2	-.966	2	0	1	0	1	93.288	2	NC	1
549		9	max	.023	3	.727	3	0	1	0	1	3631.66	15	NC	1
550			min	-.016	2	-1.06	2	0	1	0	1	86.781	2	NC	1
551		10	max	.023	3	.754	3	0	1	0	1	3548.326	15	NC	1
552			min	-.016	2	-1.091	2	0	1	0	1	84.874	2	NC	1
553		11	max	.022	3	.736	3	0	1	0	1	3631.764	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
554			min	-.016	2	-1.06	2	0	1	0	1	87.069	2	NC	1
555		12	max	.022	3	.672	3	0	1	0	1	3908.512	15	NC	1
556			min	-.015	2	-.962	2	0	1	0	1	94.231	2	NC	1
557		13	max	.021	3	.57	3	0	1	0	1	4448.138	15	NC	1
558			min	-.015	2	-.806	2	0	1	0	1	108.38	2	NC	1
559		14	max	.021	3	.441	3	0	1	0	1	5376.22	15	NC	1
560			min	-.015	2	-.613	2	0	1	0	1	133.094	2	NC	1
561		15	max	.02	3	.297	3	0	1	0	1	6983.344	15	NC	1
562			min	-.015	2	-.404	2	0	1	0	1	176.828	2	NC	1
563		16	max	.02	3	.151	3	0	1	0	1	9979.876	15	NC	1
564			min	-.014	2	-.198	2	0	1	0	1	260.757	2	NC	1
565		17	max	.019	3	.013	3	0	1	0	1	NC	5	NC	1
566			min	-.014	2	-.018	2	0	1	0	1	447.172	2	NC	1
567		18	max	.019	3	.119	1	0	1	0	1	NC	5	NC	1
568			min	-.014	2	-.105	3	0	1	0	1	986.783	2	NC	1
569		19	max	.019	3	.232	2	0	1	0	1	NC	1	NC	1
570			min	-.014	2	-.211	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.115	2	0	15	2.863e-2	3	NC	1	NC	1
572			min	-.004	2	-.017	3	-.001	1	-1.558e-2	1	NC	1	NC	1
573		2	max	.008	3	.055	2	.006	1	1.416e-2	3	NC	4	NC	1
574			min	-.004	2	-.006	3	0	15	-7.566e-3	1	1911.484	2	NC	1
575		3	max	.008	3	.012	3	.008	1	1.588e-4	1	NC	5	NC	1
576			min	-.004	2	-.01	2	0	15	-3.078e-5	10	920.072	2	NC	1
577		4	max	.008	3	.046	3	.008	1	5.158e-3	3	NC	5	NC	1
578			min	-.004	2	-.083	2	0	15	-4.688e-3	2	579.753	2	NC	1
579		5	max	.008	3	.09	3	.005	1	1.018e-2	3	NC	5	NC	1
580			min	-.004	2	-.16	2	0	15	-9.373e-3	2	417.774	2	NC	1
581		6	max	.008	3	.138	3	.002	1	1.52e-2	3	NC	15	NC	1
582			min	-.004	2	-.235	2	0	15	-1.406e-2	2	328.649	2	NC	1
583		7	max	.008	3	.185	3	0	12	2.022e-2	3	NC	15	NC	1
584			min	-.004	2	-.302	2	0	1	-1.874e-2	2	276.092	2	NC	1
585		8	max	.008	3	.223	3	0	15	2.524e-2	3	9177.069	15	NC	1
586			min	-.004	2	-.355	2	0	1	-2.343e-2	2	245.028	2	NC	1
587		9	max	.007	3	.248	3	0	1	2.528e-2	3	8576.816	15	NC	1
588			min	-.004	2	-.388	2	0	15	-2.661e-2	2	228.868	2	NC	1
589		10	max	.007	3	.258	3	0	12	2.203e-2	3	8393.974	15	NC	1
590			min	-.004	2	-.399	2	0	1	-2.881e-2	2	224.121	2	NC	1
591		11	max	.007	3	.252	3	0	15	1.877e-2	3	8576.53	15	NC	1
592			min	-.004	2	-.388	2	0	1	-3.1e-2	2	229.602	2	NC	1
593		12	max	.007	3	.23	3	.001	1	1.557e-2	3	9176.467	15	NC	1
594			min	-.004	2	-.353	2	0	15	-2.995e-2	2	247.27	2	NC	1
595		13	max	.007	3	.196	3	0	1	1.247e-2	3	NC	15	NC	1
596			min	-.004	2	-.298	2	0	15	-2.402e-2	2	281.563	2	NC	1
597		14	max	.007	3	.153	3	0	15	9.359e-3	3	NC	15	NC	1
598			min	-.004	2	-.229	2	-.002	1	-1.809e-2	2	340.362	2	NC	1
599		15	max	.006	3	.104	3	0	15	6.252e-3	3	NC	5	NC	1
600			min	-.004	2	-.152	2	-.005	1	-1.217e-2	2	441.925	2	NC	1
601		16	max	.006	3	.053	3	0	15	3.144e-3	3	NC	5	NC	1
602			min	-.004	2	-.076	2	-.007	1	-6.238e-3	2	630.778	2	NC	1
603		17	max	.006	3	.004	3	0	15	3.682e-5	3	NC	5	NC	1
604			min	-.003	2	-.006	2	-.008	1	-5.596e-4	1	1036.059	2	NC	1
605		18	max	.006	3	.052	2	0	15	4.626e-3	3	NC	4	NC	1
606			min	-.003	2	-.039	3	-.006	1	-1.131e-2	2	2207.309	2	NC	1
607		19	max	.006	3	.103	2	.001	1	9.396e-3	3	NC	1	NC	1
608			min	-.003	2	-.079	3	0	15	-2.271e-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

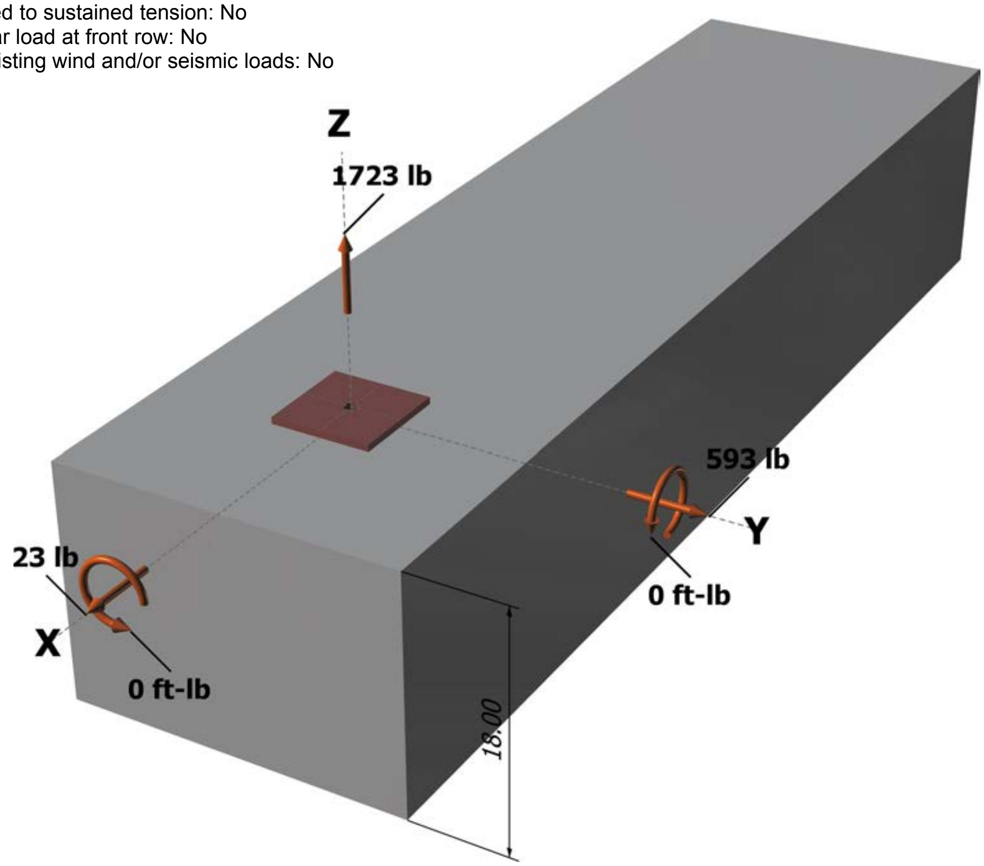
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

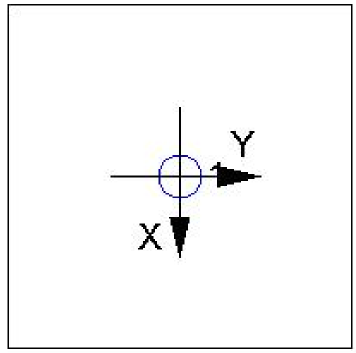
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
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)

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

$\tau_{k,cr}$ (psi)	$f_{short-term}$	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	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**593**	**3156**	**0.19**	**Pass (Governs)**
T Concrete breakout y+	593	3934	0.15	Pass
T Concrete breakout x+	23	3018	0.01	Pass
|| Concrete breakout y+	23	8508	0.00	Pass
|| Concrete breakout x+	593	6875	0.09	Pass
Concrete breakout, combined	-	-	0.15	Pass
Pryout	593	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.32	0.00	32.1 %	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

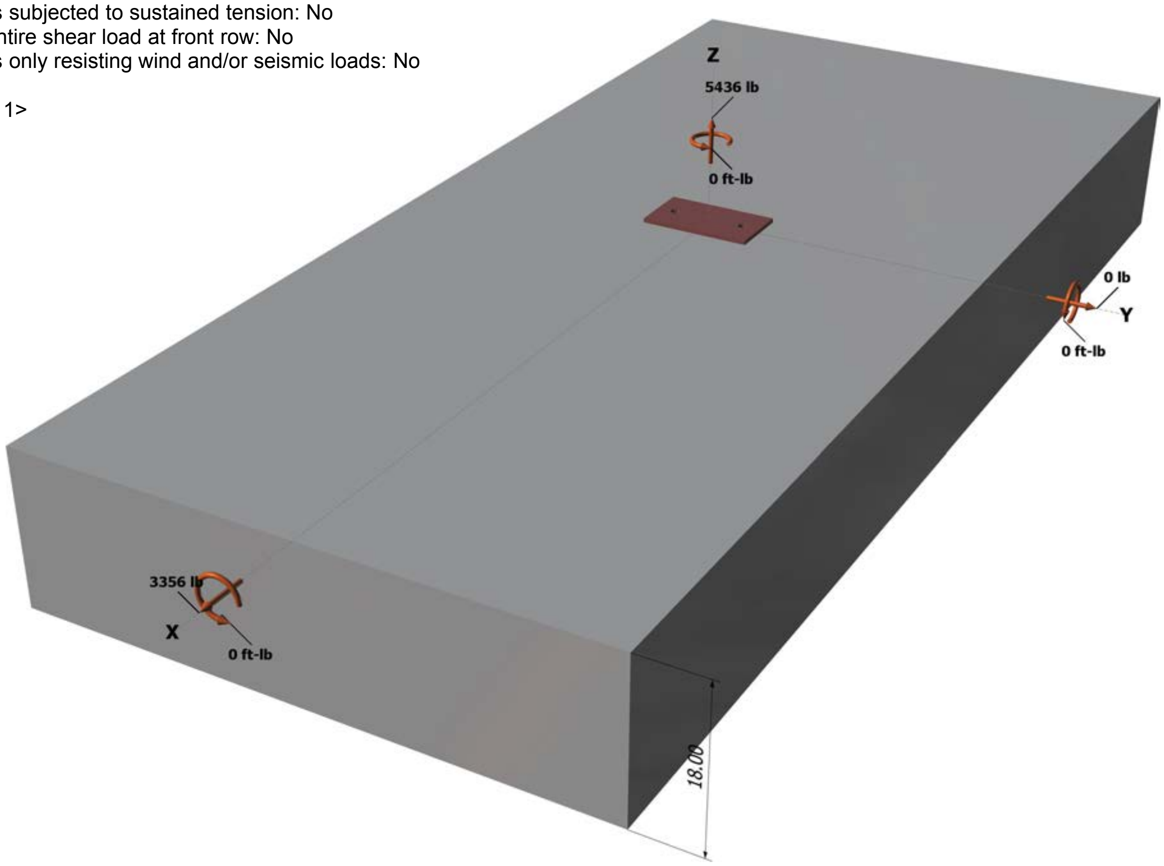
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

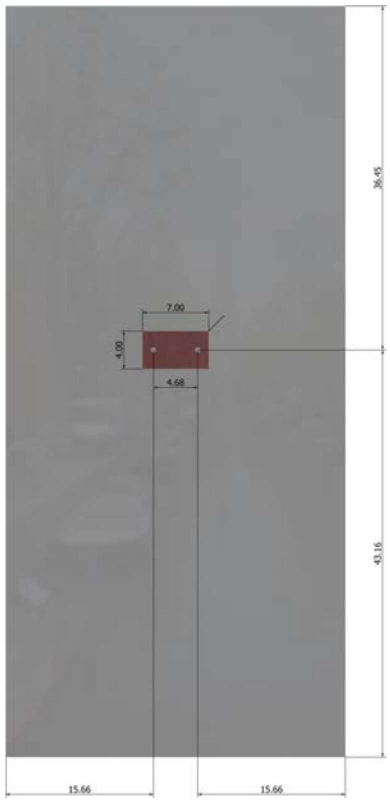
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Base Plate
Length x Width x Thickness (inch): 4.00 x 7.00 x 0.28

<Figure 1>



<Figure 2>



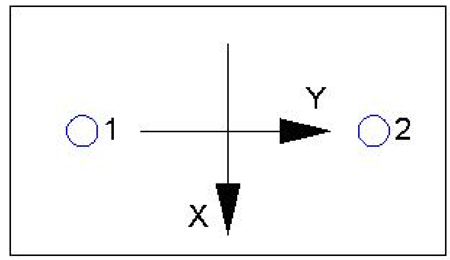
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2718.0	1678.0	0.0	1678.0
2	2718.0	1678.0	0.0	1678.0
Sum	5436.0	3356.0	0.0	3356.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5436
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)
648.00	648.00	1.000	0.961	1.000	1.000	15593	0.70	10490

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	15.66	23247

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
845.64	1103.56	1.000	1.000	1.000	23247	0.70	24939

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	2718	6071	0.45	Pass
Concrete breakout	5436	10231	0.53	Pass
Adhesive	**5436**	**8093**	**0.67**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1678**	**3156**	**0.53**	**Pass (Governs)**
T Concrete breakout x+	3356	10490	0.32	Pass
|| Concrete breakout y-	1678	24939	0.07	Pass
Pryout	3356	20601	0.16	Pass

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

Sec. D.7.3	0.67	0.53	120.3 %	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.