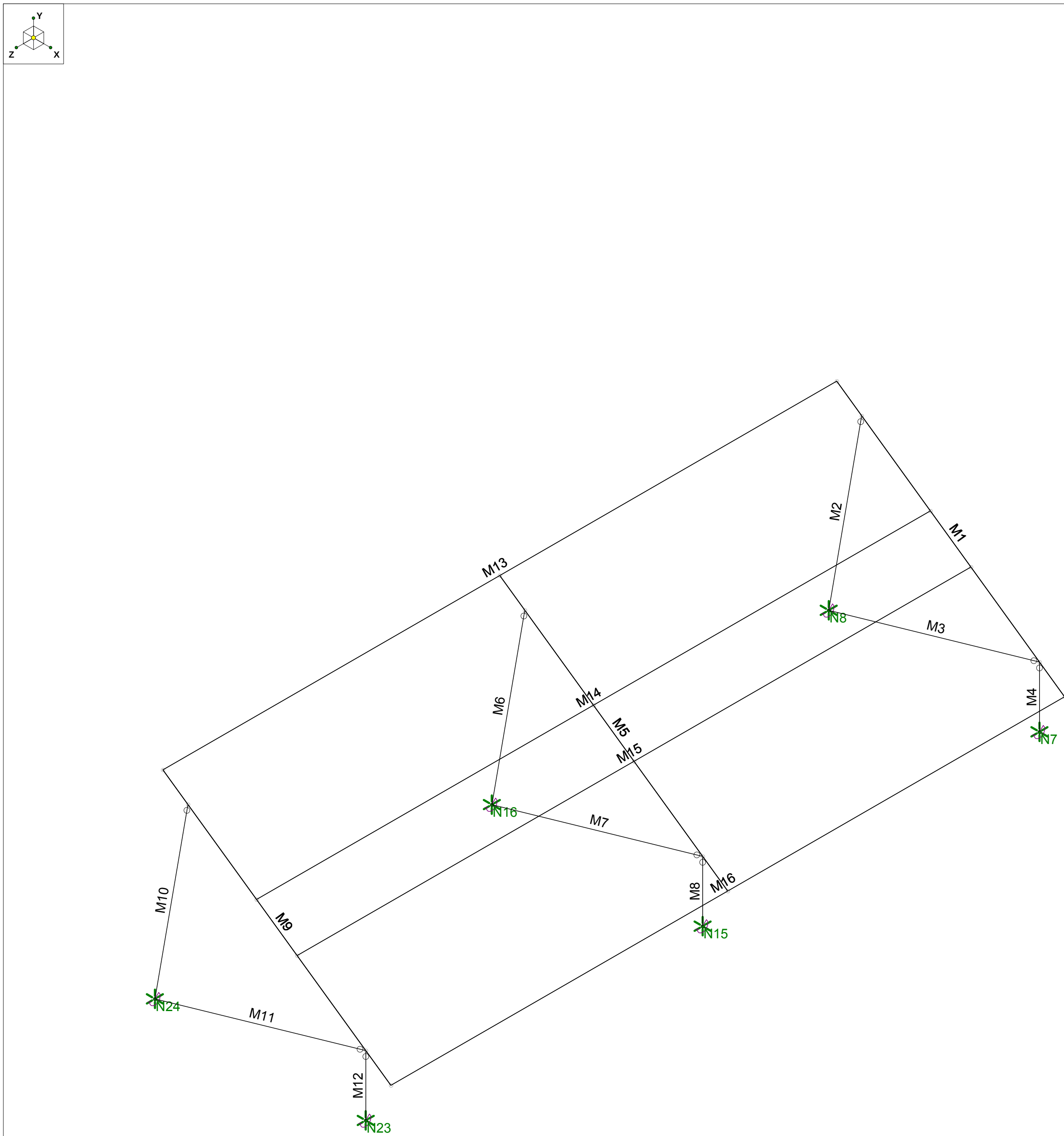


Schletter, Inc.		35° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

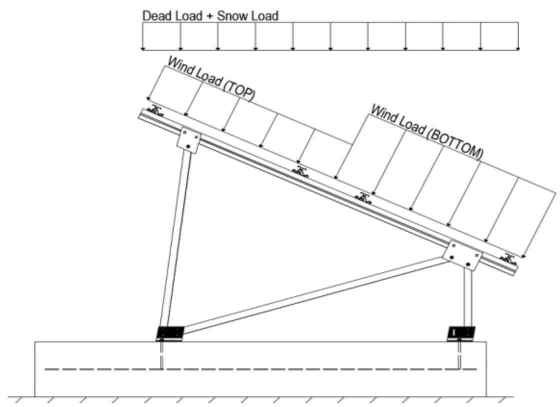
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 = 35°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

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

2.3 Wind Loads
Design Wind Speed, V = 100 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.200	*(Pressure)*
$Cf+_{BOTTOM}$	=	2.000	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.700	
$Cf-_{TOP, INNER PURLIN}$	=	-2.100	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.200	

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

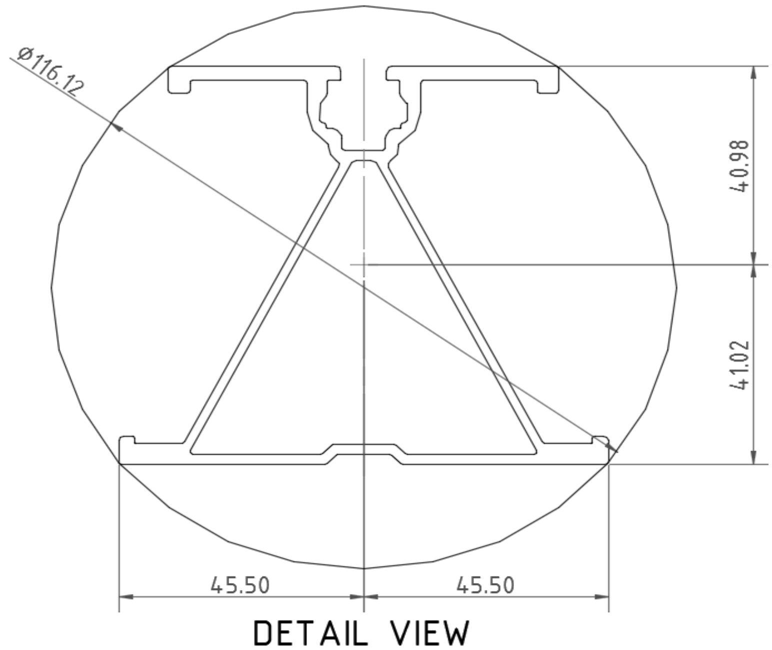
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

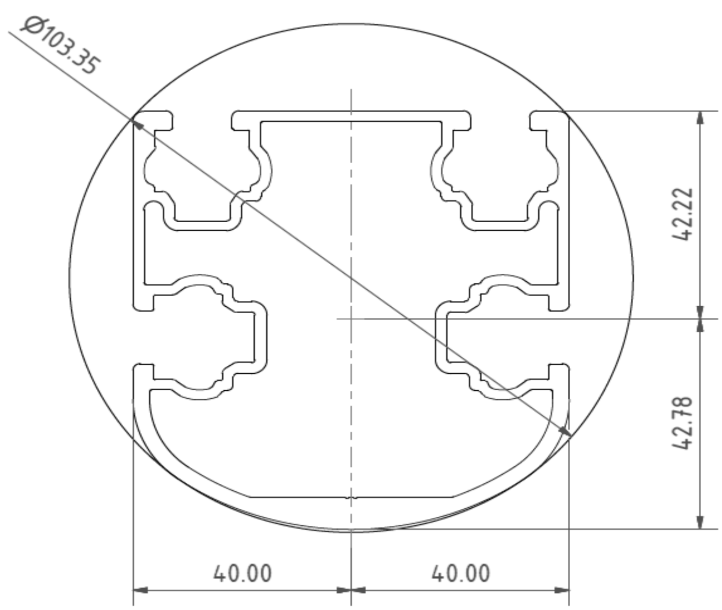
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	120	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	2.080	k-ft
M_z =	0.150	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	88%	



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).

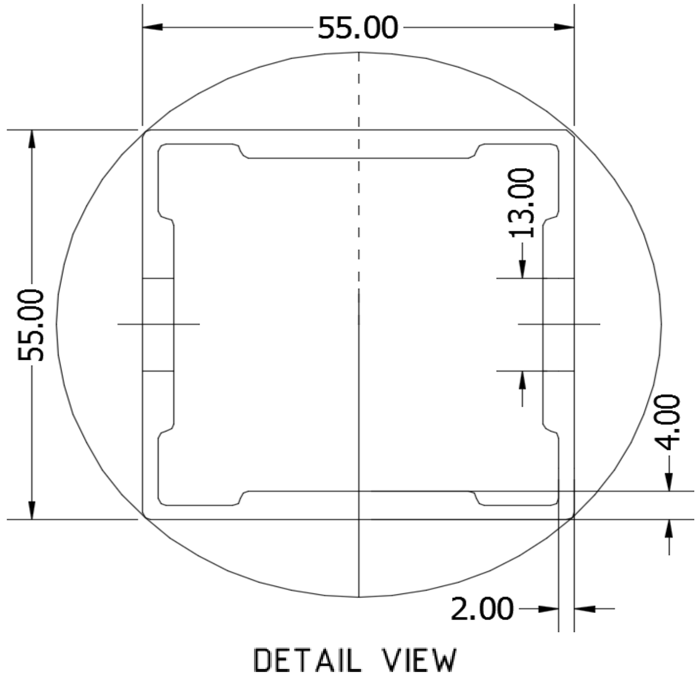
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.931	k-ft
M_z =	0.000	k-ft
P_n =	-0.970	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	86%	



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).

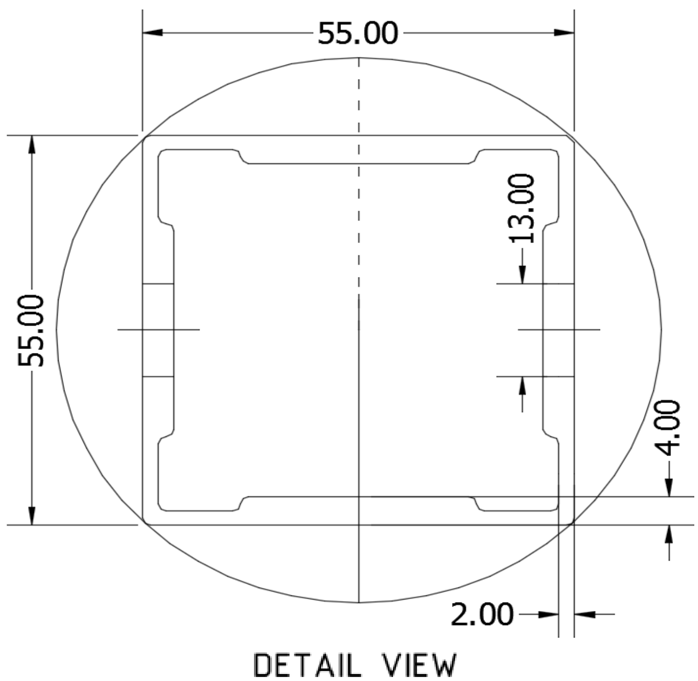
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.270	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	8%	



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).

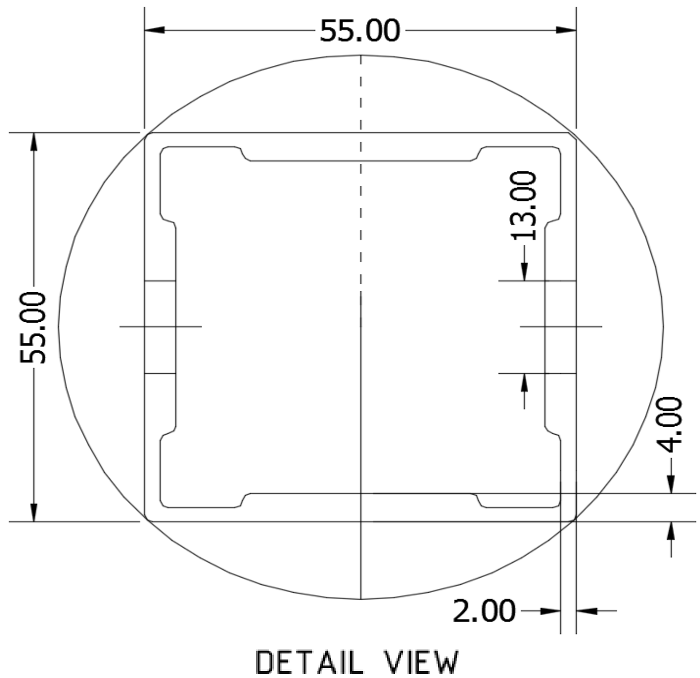
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.856	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	39%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M12 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	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 =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	3.133	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	36%	



5. FOUNDATION DESIGN CALCULATIONS

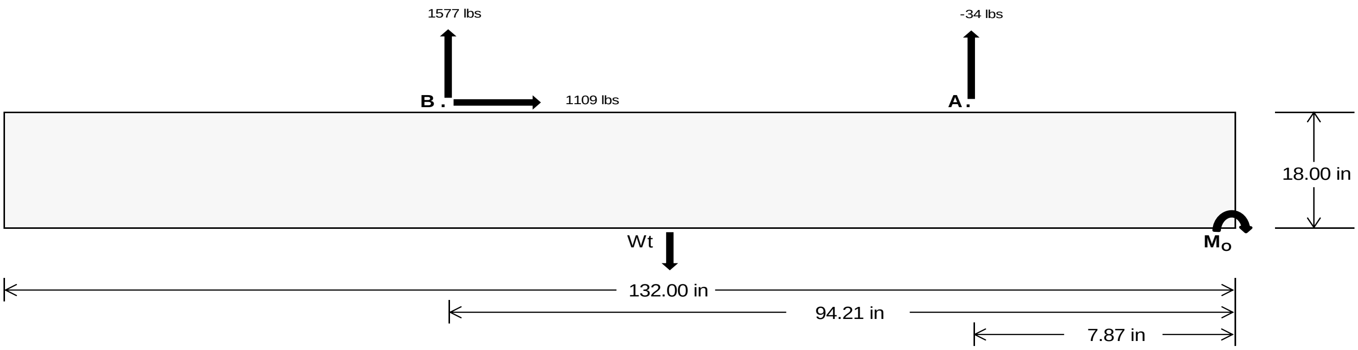
5.1 Helical Pile Foundations

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 =	92.41	6570.54	k
Compressive Load =	2951.53	5044.00	k
Lateral Load =	15.49	4616.60	k
Moment (Weak Axis) =	0.03	0.00	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement
Use fiber reinforcing with (2) #5 rebar.

Overturning Check
M_O = 168271.7 in-lbs
Resisting Force Required = 2549.57 lbs
S.F. = 1.67
Weight Required = 4249.29 lbs
Minimum Width = 33 in in
Weight Provided = 6579.38 lbs

A minimum 132in long x 33in wide x 18in tall ballast foundation is required to resist overturning.

Sliding
Force = 1109.44 lbs
Friction = 0.4
Weight Required = 2773.61 lbs
Resisting Weight = 6579.38 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 33in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion
Sliding Force = 1109.44 lbs
Cohesion = 130 psf
Area = 30.25 ft^2
Resisting = 3289.69 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 33in 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			
	33 in	34 in	35 in	36 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.75 ft) =	6579 lbs	6779 lbs	6978 lbs	7178 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in
F_A	1074 lbs	1074 lbs	1074 lbs	1074 lbs	1088 lbs	1088 lbs	1088 lbs	1088 lbs	1489 lbs	1489 lbs	1489 lbs	1489 lbs	68 lbs	68 lbs	68 lbs	68 lbs
F_B	966 lbs	966 lbs	966 lbs	966 lbs	2256 lbs	2256 lbs	2256 lbs	2256 lbs	2298 lbs	2298 lbs	2298 lbs	2298 lbs	-3154 lbs	-3154 lbs	-3154 lbs	-3154 lbs
F_V	173 lbs	173 lbs	173 lbs	173 lbs	2024 lbs	2024 lbs	2024 lbs	2024 lbs	1628 lbs	1628 lbs	1628 lbs	1628 lbs	-2219 lbs	-2219 lbs	-2219 lbs	-2219 lbs
P_{total}	8619 lbs	8819 lbs	9018 lbs	9217 lbs	9923 lbs	10123 lbs	10322 lbs	10521 lbs	10366 lbs	10566 lbs	10765 lbs	10964 lbs	862 lbs	982 lbs	1101 lbs	1221 lbs
M	3192 lbs-ft	3192 lbs-ft	3192 lbs-ft	3192 lbs-ft	3003 lbs-ft	3003 lbs-ft	3003 lbs-ft	3003 lbs-ft	4254 lbs-ft	4254 lbs-ft	4254 lbs-ft	4254 lbs-ft	4418 lbs-ft	4418 lbs-ft	4418 lbs-ft	4418 lbs-ft
e	0.37 ft	0.36 ft	0.35 ft	0.35 ft	0.30 ft	0.30 ft	0.29 ft	0.29 ft	0.41 ft	0.40 ft	0.40 ft	0.39 ft	5.12 ft	4.50 ft	4.01 ft	3.62 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}	227.4 psf	227.1 psf	226.8 psf	226.6 psf	273.9 psf	272.2 psf	270.7 psf	269.2 psf	266.0 psf	264.6 psf	263.2 psf	261.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	342.5 psf	338.8 psf	335.3 psf	332.1 psf	382.2 psf	377.4 psf	372.8 psf	368.5 psf	419.4 psf	413.5 psf	407.9 psf	402.6 psf	557.3 psf	231.1 psf	169.2 psf	144.2 psf

Maximum Bearing Pressure = 557 psf
Allowable Bearing Pressure = 1500 psf

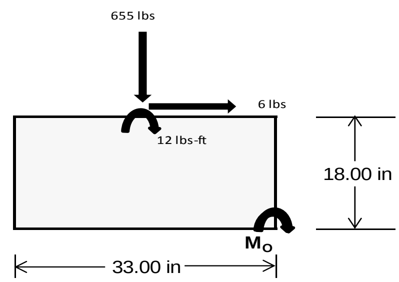
Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 878.8 ft-lbs
Resisting Force Required = 639.13 lbs
S.F. = 1.67
Weight Required = 1065.22 lbs
Minimum Width = 33 in in
Weight Provided = 6579.38 lbs

A minimum 132in long x 33in 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	33 in			33 in			33 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	255 lbs	621 lbs	255 lbs	655 lbs	1745 lbs	655 lbs	74 lbs	182 lbs	74 lbs
F_V	2 lbs	0 lbs	2 lbs	6 lbs	0 lbs	6 lbs	1 lbs	0 lbs	1 lbs
P_{total}	8400 lbs	6579 lbs	8400 lbs	8409 lbs	6579 lbs	8409 lbs	2456 lbs	6579 lbs	2456 lbs
M	7 lbs-ft	0 lbs-ft	7 lbs-ft	22 lbs-ft	0 lbs-ft	22 lbs-ft	2 lbs-ft	0 lbs-ft	2 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	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft
f_{min}	277.2 psf	217.5 psf	277.2 psf	276.4 psf	217.5 psf	276.4 psf	81.1 psf	217.5 psf	81.1 psf
f_{max}	278.2 psf	217.5 psf	278.2 psf	279.5 psf	217.5 psf	279.5 psf	81.3 psf	217.5 psf	81.3 psf

Maximum Bearing Pressure = 280 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

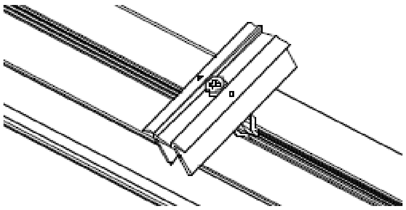
6. DESIGN OF JOINTS AND CONNECTIONS

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

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 80mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

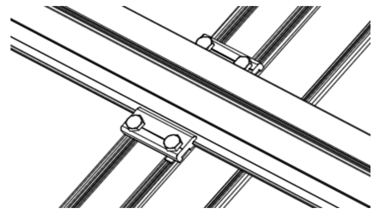
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.636	k
Allowable Uplift =	1.214	k
Utilization =	52%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.274	k
Allowable Uplift =	4.357	k
Utilization =	52%	



6.2 Strut Connections

The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut

Maximum Axial Load =	2.270	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	31%	

Rear Strut

Maximum Axial Load =	4.331	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	58%	

Diagonal Strut

Maximum Axial Load =	2.904	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	39%	

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.

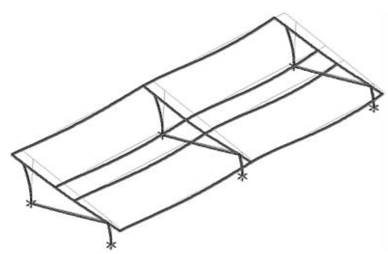
7. SEISMIC DESIGN

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} =	53.78	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.076	in
Max Drift, Δ_{MAX} =	0.061	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

φF_LSt= 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

φF_LWk= 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 = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

<u>Compression</u>

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 = **<u>55x55</u>**

<u>Strong Axis:</u>
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

<u>Weak Axis:</u>
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

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		φF_LWk=	28.2 ksi	
Ix =	279836	mm^4	Iy =	279836	mm^4
	0.672	in^4		0.672	in^4
y =	27.5	mm	x =	27.5	mm
Sx =	0.621	in^3	Sy =	0.621	in^3
M_{max}St =	1.460	k-ft	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 = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:
3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 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 = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 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	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-52.543	-52.543	0	0
2	M14	y	-52.543	-52.543	0	0
3	M15	y	-87.571	-87.571	0	0
4	M16	y	-87.571	-87.571	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	118.221	118.221	0	0
2	M14	y	91.95	91.95	0	0
3	M15	y	52.543	52.543	0	0
4	M16	y	52.543	52.543	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	927.355	2	1190.941	2	.624	1	.002	1	0	1	0	1
2		min	-1117.722	3	-1549.984	3	.039	15	0	15	0	1	0	1
3	N7	max	.035	3	921.637	1	-.68	15	-.001	15	0	1	0	1
4		min	-.193	2	45.949	15	-11.918	1	-.023	1	0	1	0	1
5	N15	max	.234	3	2270.41	1	0	2	0	2	0	1	0	1
6		min	-1.994	2	95.296	15	0	3	0	3	0	1	0	1
7	N16	max	3291.099	2	3880.001	2	0	3	0	3	0	1	0	1
8		min	-3551.227	3	-5054.264	3	0	2	0	11	0	1	0	1
9	N23	max	.035	3	921.637	1	11.918	1	.023	1	0	1	0	1
10		min	-.193	2	45.949	15	.68	15	.001	15	0	1	0	1
11	N24	max	927.355	2	1190.941	2	-.039	15	0	15	0	1	0	1
12		min	-1117.722	3	-1549.984	3	-.624	1	-.002	1	0	1	0	1
13	Totals:	max	5143.43	2	9760.337	2	0	2						
14		min	-5786.368	3	-7723.773	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	108.804	1	397.339	2	-9.865	15	.002	3	.26	1	0	2
2			min	6.076	15	-692.945	3	-177.817	1	-.013	2	.015	15	0	3
3		2	max	108.804	1	278.145	2	-7.588	15	.002	3	.085	1	.656	3
4			min	6.076	15	-487.651	3	-136.65	1	-.013	2	.005	15	-.375	2
5		3	max	108.804	1	158.95	2	-5.311	15	.002	3	0	3	1.084	3
6			min	6.076	15	-282.358	3	-95.482	1	-.013	2	-.044	1	-.618	2
7		4	max	108.804	1	39.756	2	-3.034	15	.002	3	-.006	12	1.283	3
8			min	6.076	15	-77.065	3	-54.314	1	-.013	2	-.127	1	-.728	2
9		5	max	108.804	1	128.229	3	-.757	15	.002	3	-.009	12	1.255	3
10			min	6.076	15	-79.438	2	-13.147	1	-.013	2	-.164	1	-.706	2
11		6	max	108.804	1	333.522	3	28.021	1	.002	3	-.009	15	.998	3
12			min	6.076	15	-198.632	2	.652	12	-.013	2	-.156	1	-.552	2
13		7	max	108.804	1	538.815	3	69.188	1	.002	3	-.006	15	.514	3
14			min	6.076	15	-317.826	2	2.929	12	-.013	2	-.102	1	-.265	2
15		8	max	108.804	1	744.109	3	110.356	1	.002	3	.002	2	.154	2
16			min	6.076	15	-437.02	2	5.206	12	-.013	2	-.004	3	-.199	3
17		9	max	108.804	1	949.402	3	151.524	1	.002	3	.143	1	.706	2
18			min	6.076	15	-556.214	2	7.483	12	-.013	2	.004	12	-1.14	3
19		10	max	108.804	1	675.408	2	-9.759	12	.013	2	.335	1	1.39	2
20			min	6.076	15	-1154.695	3	-192.691	1	-.002	3	.014	12	-2.309	3
21		11	max	108.804	1	556.214	2	-7.483	12	.013	2	.143	1	.706	2
22			min	6.076	15	-949.402	3	-151.524	1	-.002	3	.004	12	-1.14	3
23		12	max	108.804	1	437.02	2	-5.206	12	.013	2	.002	2	.154	2
24			min	6.076	15	-744.109	3	-110.356	1	-.002	3	-.004	3	-.199	3
25		13	max	108.804	1	317.826	2	-2.929	12	.013	2	-.006	15	.514	3
26			min	6.076	15	-538.815	3	-69.188	1	-.002	3	-.102	1	-.265	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
27		14	max	108.804	1	198.632	2	-.652	12	.013	2	-.009	15	.998	3
28			min	6.076	15	-333.522	3	-28.021	1	-.002	3	-.156	1	-.552	2
29		15	max	108.804	1	79.438	2	13.147	1	.013	2	-.009	12	1.255	3
30			min	6.076	15	-128.229	3	.757	15	-.002	3	-.164	1	-.706	2
31		16	max	108.804	1	77.065	3	54.314	1	.013	2	-.006	12	1.283	3
32			min	6.076	15	-39.756	2	3.034	15	-.002	3	-.127	1	-.728	2
33		17	max	108.804	1	282.358	3	95.482	1	.013	2	0	3	1.084	3
34			min	6.076	15	-158.95	2	5.311	15	-.002	3	-.044	1	-.618	2
35		18	max	108.804	1	487.651	3	136.65	1	.013	2	.085	1	.656	3
36			min	6.076	15	-278.145	2	7.588	15	-.002	3	.005	15	-.375	2
37		19	max	108.804	1	692.945	3	177.817	1	.013	2	.26	1	0	2
38			min	6.076	15	-397.339	2	9.865	15	-.002	3	.015	15	0	3
39	M14	1	max	50.432	1	424.208	2	-10.171	15	.009	3	.297	1	0	1
40			min	2.818	15	-552.412	3	-183.335	1	-.01	2	.017	15	0	3
41		2	max	50.432	1	305.014	2	-7.894	15	.009	3	.116	1	.526	3
42			min	2.818	15	-393.822	3	-142.168	1	-.01	2	.007	15	-.405	2
43		3	max	50.432	1	185.82	2	-5.617	15	.009	3	.002	3	.875	3
44			min	2.818	15	-235.233	3	-101	1	-.01	2	-.019	1	-.678	2
45		4	max	50.432	1	66.626	2	-3.34	15	.009	3	-.005	12	1.048	3
46			min	2.818	15	-76.644	3	-59.833	1	-.01	2	-.108	1	-.818	2
47		5	max	50.432	1	81.946	3	-1.062	15	.009	3	-.008	12	1.045	3
48			min	2.818	15	-52.568	2	-18.665	1	-.01	2	-.152	1	-.826	2
49		6	max	50.432	1	240.535	3	22.503	1	.009	3	-.008	15	.866	3
50			min	2.818	15	-171.763	2	.362	12	-.01	2	-.15	1	-.701	2
51		7	max	50.432	1	399.124	3	63.67	1	.009	3	-.006	15	.511	3
52			min	2.818	15	-290.957	2	2.639	12	-.01	2	-.102	1	-.444	2
53		8	max	50.432	1	557.714	3	104.838	1	.009	3	0	10	0	15
54			min	2.818	15	-410.151	2	4.915	12	-.01	2	-.008	1	-.055	2
55		9	max	50.432	1	716.303	3	146.005	1	.009	3	.131	1	.467	2
56			min	2.818	15	-529.345	2	7.192	12	-.01	2	.004	12	-.728	3
57		10	max	50.432	1	648.539	2	-9.469	12	.01	2	.316	1	1.122	2
58			min	2.818	15	-874.892	3	-187.173	1	-.009	3	.013	12	-1.612	3
59		11	max	50.432	1	529.345	2	-7.192	12	.01	2	.131	1	.467	2
60			min	2.818	15	-716.303	3	-146.005	1	-.009	3	.004	12	-.728	3
61		12	max	50.432	1	410.151	2	-4.915	12	.01	2	0	10	0	15
62			min	2.818	15	-557.714	3	-104.838	1	-.009	3	-.008	1	-.055	2
63		13	max	50.432	1	290.957	2	-2.639	12	.01	2	-.006	15	.511	3
64			min	2.818	15	-399.124	3	-63.67	1	-.009	3	-.102	1	-.444	2
65		14	max	50.432	1	171.763	2	-.362	12	.01	2	-.008	15	.866	3
66			min	2.818	15	-240.535	3	-22.503	1	-.009	3	-.15	1	-.701	2
67		15	max	50.432	1	52.568	2	18.665	1	.01	2	-.008	12	1.045	3
68			min	2.818	15	-81.946	3	1.062	15	-.009	3	-.152	1	-.826	2
69		16	max	50.432	1	76.644	3	59.833	1	.01	2	-.005	12	1.048	3
70			min	2.818	15	-66.626	2	3.34	15	-.009	3	-.108	1	-.818	2
71		17	max	50.432	1	235.233	3	101	1	.01	2	.002	3	.875	3
72			min	2.818	15	-185.82	2	5.617	15	-.009	3	-.019	1	-.678	2
73		18	max	50.432	1	393.822	3	142.168	1	.01	2	.116	1	.526	3
74			min	2.818	15	-305.014	2	7.894	15	-.009	3	.007	15	-.405	2
75		19	max	50.432	1	552.412	3	183.335	1	.01	2	.297	1	0	1
76			min	2.818	15	-424.208	2	10.171	15	-.009	3	.017	15	0	3
77	M15	1	max	-2.961	15	634.394	2	-10.168	15	.011	2	.297	1	0	2
78			min	-52.892	1	-316.106	3	-183.316	1	-.008	3	.017	15	0	3
79		2	max	-2.961	15	452.928	2	-7.891	15	.011	2	.116	1	.302	3
80			min	-52.892	1	-227.573	3	-142.148	1	-.008	3	.007	15	-.604	2
81		3	max	-2.961	15	271.462	2	-5.614	15	.011	2	.002	3	.506	3
82			min	-52.892	1	-139.041	3	-100.98	1	-.008	3	-.019	1	-1.006	2
83		4	max	-2.961	15	89.996	2	-3.337	15	.011	2	-.005	12	.611	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	-52.892	1	-50.508	3	-59.813	1	-.008	3	-.109	1	-1.207	2
85		5	max	-2.961	15	38.024	3	-1.06	15	.011	2	-.008	12	.618	3
86			min	-52.892	1	-91.47	2	-18.645	1	-.008	3	-.152	1	-1.206	2
87		6	max	-2.961	15	126.557	3	22.522	1	.011	2	-.008	15	.527	3
88			min	-52.892	1	-272.936	2	.433	12	-.008	3	-.15	1	-1.004	2
89		7	max	-2.961	15	215.089	3	63.69	1	.011	2	-.006	15	.337	3
90			min	-52.892	1	-454.402	2	2.71	12	-.008	3	-.102	1	-.6	2
91		8	max	-2.961	15	303.622	3	104.858	1	.011	2	0	10	.049	3
92			min	-52.892	1	-635.868	2	4.987	12	-.008	3	-.008	1	-.007	9
93		9	max	-2.961	15	392.154	3	146.025	1	.011	2	.131	1	.813	2
94			min	-52.892	1	-817.334	2	7.263	12	-.008	3	.004	12	-.338	3
95		10	max	-2.961	15	998.801	2	-9.54	12	.008	3	.316	1	1.822	2
96			min	-52.892	1	-480.686	3	-187.193	1	-.011	2	.013	12	-.823	3
97		11	max	-2.961	15	817.334	2	-7.263	12	.008	3	.131	1	.813	2
98			min	-52.892	1	-392.154	3	-146.025	1	-.011	2	.004	12	-.338	3
99		12	max	-2.961	15	635.868	2	-4.987	12	.008	3	0	10	.049	3
100			min	-52.892	1	-303.622	3	-104.858	1	-.011	2	-.008	1	-.007	9
101		13	max	-2.961	15	454.402	2	-2.71	12	.008	3	-.006	15	.337	3
102			min	-52.892	1	-215.089	3	-63.69	1	-.011	2	-.102	1	-.6	2
103		14	max	-2.961	15	272.936	2	-.433	12	.008	3	-.008	15	.527	3
104			min	-52.892	1	-126.557	3	-22.522	1	-.011	2	-.15	1	-1.004	2
105		15	max	-2.961	15	91.47	2	18.645	1	.008	3	-.008	12	.618	3
106			min	-52.892	1	-38.024	3	1.06	15	-.011	2	-.152	1	-1.206	2
107		16	max	-2.961	15	50.508	3	59.813	1	.008	3	-.005	12	.611	3
108			min	-52.892	1	-89.996	2	3.337	15	-.011	2	-.109	1	-1.207	2
109		17	max	-2.961	15	139.041	3	100.98	1	.008	3	.002	3	.506	3
110			min	-52.892	1	-271.462	2	5.614	15	-.011	2	-.019	1	-1.006	2
111		18	max	-2.961	15	227.573	3	142.148	1	.008	3	.116	1	.302	3
112			min	-52.892	1	-452.928	2	7.891	15	-.011	2	.007	15	-.604	2
113		19	max	-2.961	15	316.106	3	183.316	1	.008	3	.297	1	0	2
114			min	-52.892	1	-634.394	2	10.168	15	-.011	2	.017	15	0	3
115	M16	1	max	-6.574	15	608.564	2	-9.874	15	.009	2	.262	1	0	2
116			min	-117.639	1	-294.192	3	-178.09	1	-.011	3	.015	15	0	3
117		2	max	-6.574	15	427.097	2	-7.597	15	.009	2	.087	1	.278	3
118			min	-117.639	1	-205.659	3	-136.923	1	-.011	3	.005	15	-.575	2
119		3	max	-6.574	15	245.631	2	-5.32	15	.009	2	0	12	.457	3
120			min	-117.639	1	-117.127	3	-95.755	1	-.011	3	-.043	1	-.949	2
121		4	max	-6.574	15	64.165	2	-3.043	15	.009	2	-.006	12	.538	3
122			min	-117.639	1	-28.594	3	-54.588	1	-.011	3	-.126	1	-1.121	2
123		5	max	-6.574	15	59.938	3	-.766	15	.009	2	-.009	12	.521	3
124			min	-117.639	1	-117.301	2	-13.42	1	-.011	3	-.164	1	-1.092	2
125		6	max	-6.574	15	148.471	3	27.748	1	.009	2	-.009	15	.405	3
126			min	-117.639	1	-298.767	2	.888	12	-.011	3	-.156	1	-.861	2
127		7	max	-6.574	15	237.003	3	68.915	1	.009	2	-.006	15	.191	3
128			min	-117.639	1	-480.233	2	3.165	12	-.011	3	-.102	1	-.428	2
129		8	max	-6.574	15	325.535	3	110.083	1	.009	2	0	10	.207	2
130			min	-117.639	1	-661.699	2	5.442	12	-.011	3	-.003	3	-.122	3
131		9	max	-6.574	15	414.068	3	151.25	1	.009	2	.142	1	1.043	2
132			min	-117.639	1	-843.165	2	7.719	12	-.011	3	.005	12	-.533	3
133		10	max	-6.574	15	1024.631	2	-9.996	12	.011	3	.333	1	2.08	2
134			min	-117.639	1	-502.6	3	-192.418	1	-.009	2	.015	12	-1.042	3
135		11	max	-6.574	15	843.165	2	-7.719	12	.011	3	.142	1	1.043	2
136			min	-117.639	1	-414.068	3	-151.25	1	-.009	2	.005	12	-.533	3
137		12	max	-6.574	15	661.699	2	-5.442	12	.011	3	0	10	.207	2
138			min	-117.639	1	-325.535	3	-110.083	1	-.009	2	-.003	3	-.122	3
139		13	max	-6.574	15	480.233	2	-3.165	12	.011	3	-.006	15	.191	3
140			min	-117.639	1	-237.003	3	-68.915	1	-.009	2	-.102	1	-.428	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	-6.574	15	298.767	2	-.888	12	.011	3	-.009	15	.405	3
142			min	-117.639	1	-148.471	3	-27.748	1	-.009	2	-.156	1	-.861	2
143		15	max	-6.574	15	117.301	2	13.42	1	.011	3	-.009	12	.521	3
144			min	-117.639	1	-59.938	3	.766	15	-.009	2	-.164	1	-1.092	2
145		16	max	-6.574	15	28.594	3	54.588	1	.011	3	-.006	12	.538	3
146			min	-117.639	1	-64.165	2	3.043	15	-.009	2	-.126	1	-1.121	2
147		17	max	-6.574	15	117.127	3	95.755	1	.011	3	0	12	.457	3
148			min	-117.639	1	-245.631	2	5.32	15	-.009	2	-.043	1	-.949	2
149		18	max	-6.574	15	205.659	3	136.923	1	.011	3	.087	1	.278	3
150			min	-117.639	1	-427.097	2	7.597	15	-.009	2	.005	15	-.575	2
151		19	max	-6.574	15	294.192	3	178.09	1	.011	3	.262	1	0	2
152			min	-117.639	1	-608.564	2	9.874	15	-.009	2	.015	15	0	3
153	M2	1	max	973.395	2	2.017	4	.369	1	0	5	0	3	0	1
154			min	-1327.477	3	.475	15	.021	15	0	1	0	2	0	1
155		2	max	973.916	2	1.898	4	.369	1	0	5	0	1	0	15
156			min	-1327.087	3	.447	15	.021	15	0	1	0	15	0	4
157		3	max	974.436	2	1.78	4	.369	1	0	5	0	1	0	15
158			min	-1326.696	3	.419	15	.021	15	0	1	0	15	-.001	4
159		4	max	974.957	2	1.661	4	.369	1	0	5	0	1	0	15
160			min	-1326.306	3	.391	15	.021	15	0	1	0	15	-.002	4
161		5	max	975.478	2	1.542	4	.369	1	0	5	0	1	0	15
162			min	-1325.915	3	.363	15	.021	15	0	1	0	15	-.003	4
163		6	max	975.998	2	1.423	4	.369	1	0	5	0	1	0	15
164			min	-1325.525	3	.335	15	.021	15	0	1	0	15	-.003	4
165		7	max	976.519	2	1.304	4	.369	1	0	5	0	1	0	15
166			min	-1325.134	3	.307	15	.021	15	0	1	0	15	-.004	4
167		8	max	977.04	2	1.185	4	.369	1	0	5	0	1	0	15
168			min	-1324.744	3	.279	15	.021	15	0	1	0	15	-.004	4
169		9	max	977.56	2	1.066	4	.369	1	0	5	.001	1	-.001	15
170			min	-1324.353	3	.248	12	.021	15	0	1	0	15	-.004	4
171		10	max	978.081	2	.948	4	.369	1	0	5	.001	1	-.001	15
172			min	-1323.963	3	.202	12	.021	15	0	1	0	15	-.005	4
173		11	max	978.602	2	.841	2	.369	1	0	5	.001	1	-.001	15
174			min	-1323.572	3	.156	12	.021	15	0	1	0	15	-.005	4
175		12	max	979.123	2	.748	2	.369	1	0	5	.001	1	-.001	15
176			min	-1323.182	3	.11	12	.021	15	0	1	0	15	-.005	4
177		13	max	979.643	2	.655	2	.369	1	0	5	.002	1	-.001	15
178			min	-1322.791	3	.063	12	.021	15	0	1	0	15	-.006	4
179		14	max	980.164	2	.563	2	.369	1	0	5	.002	1	-.001	15
180			min	-1322.401	3	.008	3	.021	15	0	1	0	15	-.006	4
181		15	max	980.685	2	.47	2	.369	1	0	5	.002	1	-.001	15
182			min	-1322.01	3	-.061	3	.021	15	0	1	0	15	-.006	4
183		16	max	981.205	2	.377	2	.369	1	0	5	.002	1	-.001	15
184			min	-1321.62	3	-.13	3	.021	15	0	1	0	15	-.006	4
185		17	max	981.726	2	.285	2	.369	1	0	5	.002	1	-.001	12
186			min	-1321.229	3	-.2	3	.021	15	0	1	0	15	-.006	4
187		18	max	982.247	2	.192	2	.369	1	0	5	.002	1	-.001	12
188			min	-1320.838	3	-.269	3	.021	15	0	1	0	15	-.006	4
189		19	max	982.767	2	.1	2	.369	1	0	5	.002	1	-.001	12
190			min	-1320.448	3	-.339	3	.021	15	0	1	0	15	-.006	4
191	M3	1	max	787.578	2	7.661	4	.328	1	0	12	0	1	.006	4
192			min	-920.486	3	1.801	15	.018	15	0	1	0	15	.001	12
193		2	max	787.408	2	6.9	4	.328	1	0	12	0	1	.004	2
194			min	-920.614	3	1.622	15	.018	15	0	1	0	15	0	3
195		3	max	787.238	2	6.139	4	.328	1	0	12	0	1	.001	2
196			min	-920.742	3	1.443	15	.018	15	0	1	0	15	-.001	3
197		4	max	787.067	2	5.378	4	.328	1	0	12	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-920.869	3	1.264	15	.018	15	0	1	0	15	-.003	3
199		5	max	786.897	2	4.617	4	.328	1	0	12	0	1	0	15
200			min	-920.997	3	1.086	15	.018	15	0	1	0	15	-.004	4
201		6	max	786.727	2	3.856	4	.328	1	0	12	.001	1	-.001	15
202			min	-921.125	3	.907	15	.018	15	0	1	0	15	-.006	4
203		7	max	786.556	2	3.095	4	.328	1	0	12	.001	1	-.002	15
204			min	-921.253	3	.728	15	.018	15	0	1	0	15	-.007	4
205		8	max	786.386	2	2.334	4	.328	1	0	12	.001	1	-.002	15
206			min	-921.38	3	.549	15	.018	15	0	1	0	15	-.008	4
207		9	max	786.215	2	1.573	4	.328	1	0	12	.002	1	-.002	15
208			min	-921.508	3	.37	15	.018	15	0	1	0	15	-.009	4
209		10	max	786.045	2	.812	4	.328	1	0	12	.002	1	-.002	15
210			min	-921.636	3	.173	12	.018	15	0	1	0	15	-.01	4
211		11	max	785.875	2	.207	2	.328	1	0	12	.002	1	-.002	15
212			min	-921.764	3	-.199	3	.018	15	0	1	0	15	-.01	4
213		12	max	785.704	2	-.167	15	.328	1	0	12	.002	1	-.002	15
214			min	-921.892	3	-.71	4	.018	15	0	1	0	15	-.01	4
215		13	max	785.534	2	-.345	15	.328	1	0	12	.002	1	-.002	15
216			min	-922.019	3	-1.471	4	.018	15	0	1	0	15	-.009	4
217		14	max	785.364	2	-.524	15	.328	1	0	12	.002	1	-.002	15
218			min	-922.147	3	-2.232	4	.018	15	0	1	0	15	-.009	4
219		15	max	785.193	2	-.703	15	.328	1	0	12	.002	1	-.002	15
220			min	-922.275	3	-2.993	4	.018	15	0	1	0	15	-.008	4
221		16	max	785.023	2	-.882	15	.328	1	0	12	.002	1	-.001	15
222			min	-922.403	3	-3.754	4	.018	15	0	1	0	15	-.006	4
223		17	max	784.853	2	-1.061	15	.328	1	0	12	.003	1	-.001	15
224			min	-922.53	3	-4.515	4	.018	15	0	1	0	15	-.004	4
225		18	max	784.682	2	-1.24	15	.328	1	0	12	.003	1	0	15
226			min	-922.658	3	-5.276	4	.018	15	0	1	0	15	-.002	4
227		19	max	784.512	2	-1.419	15	.328	1	0	12	.003	1	0	1
228			min	-922.786	3	-6.036	4	.018	15	0	1	0	15	0	1
229	M4	1	max	918.571	1	0	1	-.68	15	0	1	.003	1	0	1
230			min	45.024	15	0	1	-12.216	1	0	1	0	15	0	1
231		2	max	918.741	1	0	1	-.68	15	0	1	.001	1	0	1
232			min	45.076	15	0	1	-12.216	1	0	1	0	15	0	1
233		3	max	918.912	1	0	1	-.68	15	0	1	0	3	0	1
234			min	45.127	15	0	1	-12.216	1	0	1	0	1	0	1
235		4	max	919.082	1	0	1	-.68	15	0	1	0	15	0	1
236			min	45.179	15	0	1	-12.216	1	0	1	-.001	1	0	1
237		5	max	919.252	1	0	1	-.68	15	0	1	0	15	0	1
238			min	45.23	15	0	1	-12.216	1	0	1	-.003	1	0	1
239		6	max	919.423	1	0	1	-.68	15	0	1	0	15	0	1
240			min	45.281	15	0	1	-12.216	1	0	1	-.004	1	0	1
241		7	max	919.593	1	0	1	-.68	15	0	1	0	15	0	1
242			min	45.333	15	0	1	-12.216	1	0	1	-.006	1	0	1
243		8	max	919.763	1	0	1	-.68	15	0	1	0	15	0	1
244			min	45.384	15	0	1	-12.216	1	0	1	-.007	1	0	1
245		9	max	919.934	1	0	1	-.68	15	0	1	0	15	0	1
246			min	45.436	15	0	1	-12.216	1	0	1	-.008	1	0	1
247		10	max	920.104	1	0	1	-.68	15	0	1	0	15	0	1
248			min	45.487	15	0	1	-12.216	1	0	1	-.01	1	0	1
249		11	max	920.274	1	0	1	-.68	15	0	1	0	15	0	1
250			min	45.538	15	0	1	-12.216	1	0	1	-.011	1	0	1
251		12	max	920.445	1	0	1	-.68	15	0	1	0	15	0	1
252			min	45.59	15	0	1	-12.216	1	0	1	-.013	1	0	1
253		13	max	920.615	1	0	1	-.68	15	0	1	0	15	0	1
254			min	45.641	15	0	1	-12.216	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	920.785	1	0	1	-.68	15	0	1	0	15	0	1
256			min	45.692	15	0	1	-12.216	1	0	1	-.016	1	0	1
257		15	max	920.956	1	0	1	-.68	15	0	1	0	15	0	1
258			min	45.744	15	0	1	-12.216	1	0	1	-.017	1	0	1
259		16	max	921.126	1	0	1	-.68	15	0	1	-.001	15	0	1
260			min	45.795	15	0	1	-12.216	1	0	1	-.018	1	0	1
261		17	max	921.297	1	0	1	-.68	15	0	1	-.001	15	0	1
262			min	45.847	15	0	1	-12.216	1	0	1	-.02	1	0	1
263		18	max	921.467	1	0	1	-.68	15	0	1	-.001	15	0	1
264			min	45.898	15	0	1	-12.216	1	0	1	-.021	1	0	1
265		19	max	921.637	1	0	1	-.68	15	0	1	-.001	15	0	1
266			min	45.949	15	0	1	-12.216	1	0	1	-.023	1	0	1
267	M6	1	max	3123.969	2	2.25	2	0	1	0	1	0	1	0	1
268			min	-4331.319	3	.249	12	0	1	0	1	0	1	0	1
269		2	max	3124.49	2	2.157	2	0	1	0	1	0	1	0	12
270			min	-4330.928	3	.203	12	0	1	0	1	0	1	0	2
271		3	max	3125.011	2	2.064	2	0	1	0	1	0	1	0	12
272			min	-4330.538	3	.157	12	0	1	0	1	0	1	-.002	2
273		4	max	3125.531	2	1.972	2	0	1	0	1	0	1	0	12
274			min	-4330.147	3	.11	12	0	1	0	1	0	1	-.002	2
275		5	max	3126.052	2	1.879	2	0	1	0	1	0	1	0	12
276			min	-4329.757	3	.042	3	0	1	0	1	0	1	-.003	2
277		6	max	3126.573	2	1.787	2	0	1	0	1	0	1	0	12
278			min	-4329.366	3	-.027	3	0	1	0	1	0	1	-.004	2
279		7	max	3127.093	2	1.694	2	0	1	0	1	0	1	0	12
280			min	-4328.976	3	-.097	3	0	1	0	1	0	1	-.004	2
281		8	max	3127.614	2	1.601	2	0	1	0	1	0	1	0	3
282			min	-4328.585	3	-.166	3	0	1	0	1	0	1	-.005	2
283		9	max	3128.135	2	1.509	2	0	1	0	1	0	1	0	3
284			min	-4328.195	3	-.236	3	0	1	0	1	0	1	-.005	2
285		10	max	3128.655	2	1.416	2	0	1	0	1	0	1	0	3
286			min	-4327.804	3	-.305	3	0	1	0	1	0	1	-.006	2
287		11	max	3129.176	2	1.323	2	0	1	0	1	0	1	0	3
288			min	-4327.414	3	-.375	3	0	1	0	1	0	1	-.006	2
289		12	max	3129.697	2	1.231	2	0	1	0	1	0	1	0	3
290			min	-4327.023	3	-.444	3	0	1	0	1	0	1	-.007	2
291		13	max	3130.218	2	1.138	2	0	1	0	1	0	1	0	3
292			min	-4326.633	3	-.514	3	0	1	0	1	0	1	-.007	2
293		14	max	3130.738	2	1.046	2	0	1	0	1	0	1	0	3
294			min	-4326.242	3	-.583	3	0	1	0	1	0	1	-.008	2
295		15	max	3131.259	2	.953	2	0	1	0	1	0	1	0	3
296			min	-4325.852	3	-.653	3	0	1	0	1	0	1	-.008	2
297		16	max	3131.78	2	.86	2	0	1	0	1	0	1	.001	3
298			min	-4325.461	3	-.722	3	0	1	0	1	0	1	-.008	2
299		17	max	3132.3	2	.768	2	0	1	0	1	0	1	.001	3
300			min	-4325.07	3	-.792	3	0	1	0	1	0	1	-.009	2
301		18	max	3132.821	2	.675	2	0	1	0	1	0	1	.002	3
302			min	-4324.68	3	-.861	3	0	1	0	1	0	1	-.009	2
303		19	max	3133.342	2	.582	2	0	1	0	1	0	1	.002	3
304			min	-4324.289	3	-.93	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2856.032	2	7.69	4	0	1	0	1	0	1	.009	2
306			min	-2902.034	3	1.806	15	0	1	0	1	0	1	-.002	3
307		2	max	2855.862	2	6.929	4	0	1	0	1	0	1	.006	2
308			min	-2902.162	3	1.627	15	0	1	0	1	0	1	-.003	3
309		3	max	2855.692	2	6.168	4	0	1	0	1	0	1	.004	2
310			min	-2902.289	3	1.448	15	0	1	0	1	0	1	-.005	3
311		4	max	2855.521	2	5.407	4	0	1	0	1	0	1	.002	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	-2902.417	3	1.269	15	0	1	0	1	0	1	-.006	3
313		5	max	2855.351	2	4.646	4	0	1	0	1	0	1	0	2
314			min	-2902.545	3	1.09	15	0	1	0	1	0	1	-.007	3
315		6	max	2855.181	2	3.885	4	0	1	0	1	0	1	-.001	15
316			min	-2902.673	3	.912	15	0	1	0	1	0	1	-.007	3
317		7	max	2855.01	2	3.124	4	0	1	0	1	0	1	-.002	15
318			min	-2902.8	3	.733	15	0	1	0	1	0	1	-.008	3
319		8	max	2854.84	2	2.4	2	0	1	0	1	0	1	-.002	15
320			min	-2902.928	3	.449	12	0	1	0	1	0	1	-.008	4
321		9	max	2854.67	2	1.807	2	0	1	0	1	0	1	-.002	15
322			min	-2903.056	3	.153	12	0	1	0	1	0	1	-.009	4
323		10	max	2854.499	2	1.214	2	0	1	0	1	0	1	-.002	15
324			min	-2903.184	3	-.262	3	0	1	0	1	0	1	-.01	4
325		11	max	2854.329	2	.621	2	0	1	0	1	0	1	-.002	15
326			min	-2903.311	3	-.706	3	0	1	0	1	0	1	-.01	4
327		12	max	2854.159	2	.028	2	0	1	0	1	0	1	-.002	15
328			min	-2903.439	3	-1.151	3	0	1	0	1	0	1	-.01	4
329		13	max	2853.988	2	-.341	15	0	1	0	1	0	1	-.002	15
330			min	-2903.567	3	-1.596	3	0	1	0	1	0	1	-.009	4
331		14	max	2853.818	2	-.52	15	0	1	0	1	0	1	-.002	15
332			min	-2903.695	3	-2.202	4	0	1	0	1	0	1	-.009	4
333		15	max	2853.648	2	-.698	15	0	1	0	1	0	1	-.002	15
334			min	-2903.823	3	-2.963	4	0	1	0	1	0	1	-.007	4
335		16	max	2853.477	2	-.877	15	0	1	0	1	0	1	-.001	15
336			min	-2903.95	3	-3.724	4	0	1	0	1	0	1	-.006	4
337		17	max	2853.307	2	-1.056	15	0	1	0	1	0	1	-.001	15
338			min	-2904.078	3	-4.485	4	0	1	0	1	0	1	-.004	4
339		18	max	2853.137	2	-1.235	15	0	1	0	1	0	1	0	15
340			min	-2904.206	3	-5.246	4	0	1	0	1	0	1	-.002	4
341		19	max	2852.966	2	-1.414	15	0	1	0	1	0	1	0	1
342			min	-2904.334	3	-6.007	4	0	1	0	1	0	1	0	1
343	M8	1	max	2267.344	1	0	1	0	1	0	1	0	1	0	1
344			min	94.371	15	0	1	0	1	0	1	0	1	0	1
345		2	max	2267.514	1	0	1	0	1	0	1	0	1	0	1
346			min	94.422	15	0	1	0	1	0	1	0	1	0	1
347		3	max	2267.685	1	0	1	0	1	0	1	0	1	0	1
348			min	94.474	15	0	1	0	1	0	1	0	1	0	1
349		4	max	2267.855	1	0	1	0	1	0	1	0	1	0	1
350			min	94.525	15	0	1	0	1	0	1	0	1	0	1
351		5	max	2268.025	1	0	1	0	1	0	1	0	1	0	1
352			min	94.577	15	0	1	0	1	0	1	0	1	0	1
353		6	max	2268.196	1	0	1	0	1	0	1	0	1	0	1
354			min	94.628	15	0	1	0	1	0	1	0	1	0	1
355		7	max	2268.366	1	0	1	0	1	0	1	0	1	0	1
356			min	94.679	15	0	1	0	1	0	1	0	1	0	1
357		8	max	2268.536	1	0	1	0	1	0	1	0	1	0	1
358			min	94.731	15	0	1	0	1	0	1	0	1	0	1
359		9	max	2268.707	1	0	1	0	1	0	1	0	1	0	1
360			min	94.782	15	0	1	0	1	0	1	0	1	0	1
361		10	max	2268.877	1	0	1	0	1	0	1	0	1	0	1
362			min	94.833	15	0	1	0	1	0	1	0	1	0	1
363		11	max	2269.048	1	0	1	0	1	0	1	0	1	0	1
364			min	94.885	15	0	1	0	1	0	1	0	1	0	1
365		12	max	2269.218	1	0	1	0	1	0	1	0	1	0	1
366			min	94.936	15	0	1	0	1	0	1	0	1	0	1
367		13	max	2269.388	1	0	1	0	1	0	1	0	1	0	1
368			min	94.988	15	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	2269.559	1	0	1	0	1	0	1	0	1	0	1
370			min	95.039	15	0	1	0	1	0	1	0	1	0	1
371		15	max	2269.729	1	0	1	0	1	0	1	0	1	0	1
372			min	95.09	15	0	1	0	1	0	1	0	1	0	1
373		16	max	2269.899	1	0	1	0	1	0	1	0	1	0	1
374			min	95.142	15	0	1	0	1	0	1	0	1	0	1
375		17	max	2270.07	1	0	1	0	1	0	1	0	1	0	1
376			min	95.193	15	0	1	0	1	0	1	0	1	0	1
377		18	max	2270.24	1	0	1	0	1	0	1	0	1	0	1
378			min	95.245	15	0	1	0	1	0	1	0	1	0	1
379		19	max	2270.41	1	0	1	0	1	0	1	0	1	0	1
380			min	95.296	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	973.395	2	2.017	4	-.021	15	0	1	0	2	0	1
382			min	-1327.477	3	.475	15	-.369	1	0	5	0	3	0	1
383		2	max	973.916	2	1.898	4	-.021	15	0	1	0	15	0	15
384			min	-1327.087	3	.447	15	-.369	1	0	5	0	1	0	4
385		3	max	974.436	2	1.78	4	-.021	15	0	1	0	15	0	15
386			min	-1326.696	3	.419	15	-.369	1	0	5	0	1	-.001	4
387		4	max	974.957	2	1.661	4	-.021	15	0	1	0	15	0	15
388			min	-1326.306	3	.391	15	-.369	1	0	5	0	1	-.002	4
389		5	max	975.478	2	1.542	4	-.021	15	0	1	0	15	0	15
390			min	-1325.915	3	.363	15	-.369	1	0	5	0	1	-.003	4
391		6	max	975.998	2	1.423	4	-.021	15	0	1	0	15	0	15
392			min	-1325.525	3	.335	15	-.369	1	0	5	0	1	-.003	4
393		7	max	976.519	2	1.304	4	-.021	15	0	1	0	15	0	15
394			min	-1325.134	3	.307	15	-.369	1	0	5	0	1	-.004	4
395		8	max	977.04	2	1.185	4	-.021	15	0	1	0	15	0	15
396			min	-1324.744	3	.279	15	-.369	1	0	5	0	1	-.004	4
397		9	max	977.56	2	1.066	4	-.021	15	0	1	0	15	-.001	15
398			min	-1324.353	3	.248	12	-.369	1	0	5	-.001	1	-.004	4
399		10	max	978.081	2	.948	4	-.021	15	0	1	0	15	-.001	15
400			min	-1323.963	3	.202	12	-.369	1	0	5	-.001	1	-.005	4
401		11	max	978.602	2	.841	2	-.021	15	0	1	0	15	-.001	15
402			min	-1323.572	3	.156	12	-.369	1	0	5	-.001	1	-.005	4
403		12	max	979.123	2	.748	2	-.021	15	0	1	0	15	-.001	15
404			min	-1323.182	3	.11	12	-.369	1	0	5	-.001	1	-.005	4
405		13	max	979.643	2	.655	2	-.021	15	0	1	0	15	-.001	15
406			min	-1322.791	3	.063	12	-.369	1	0	5	-.002	1	-.006	4
407		14	max	980.164	2	.563	2	-.021	15	0	1	0	15	-.001	15
408			min	-1322.401	3	.008	3	-.369	1	0	5	-.002	1	-.006	4
409		15	max	980.685	2	.47	2	-.021	15	0	1	0	15	-.001	15
410			min	-1322.01	3	-.061	3	-.369	1	0	5	-.002	1	-.006	4
411		16	max	981.205	2	.377	2	-.021	15	0	1	0	15	-.001	15
412			min	-1321.62	3	-.13	3	-.369	1	0	5	-.002	1	-.006	4
413		17	max	981.726	2	.285	2	-.021	15	0	1	0	15	-.001	12
414			min	-1321.229	3	-.2	3	-.369	1	0	5	-.002	1	-.006	4
415		18	max	982.247	2	.192	2	-.021	15	0	1	0	15	-.001	12
416			min	-1320.838	3	-.269	3	-.369	1	0	5	-.002	1	-.006	4
417		19	max	982.767	2	.1	2	-.021	15	0	1	0	15	-.001	12
418			min	-1320.448	3	-.339	3	-.369	1	0	5	-.002	1	-.006	4
419	M11	1	max	787.578	2	7.661	4	-.018	15	0	1	0	15	.006	4
420			min	-920.486	3	1.801	15	-.328	1	0	12	0	1	.001	12
421		2	max	787.408	2	6.9	4	-.018	15	0	1	0	15	.004	2
422			min	-920.614	3	1.622	15	-.328	1	0	12	0	1	0	3
423		3	max	787.238	2	6.139	4	-.018	15	0	1	0	15	.001	2
424			min	-920.742	3	1.443	15	-.328	1	0	12	0	1	-.001	3
425		4	max	787.067	2	5.378	4	-.018	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-920.869	3	1.264	15	-.328	1	0	12	0	1	-.003	3
427		5	max	786.897	2	4.617	4	-.018	15	0	1	0	15	0	15
428			min	-920.997	3	1.086	15	-.328	1	0	12	0	1	-.004	4
429		6	max	786.727	2	3.856	4	-.018	15	0	1	0	15	-.001	15
430			min	-921.125	3	.907	15	-.328	1	0	12	-.001	1	-.006	4
431		7	max	786.556	2	3.095	4	-.018	15	0	1	0	15	-.002	15
432			min	-921.253	3	.728	15	-.328	1	0	12	-.001	1	-.007	4
433		8	max	786.386	2	2.334	4	-.018	15	0	1	0	15	-.002	15
434			min	-921.38	3	.549	15	-.328	1	0	12	-.001	1	-.008	4
435		9	max	786.215	2	1.573	4	-.018	15	0	1	0	15	-.002	15
436			min	-921.508	3	.37	15	-.328	1	0	12	-.002	1	-.009	4
437		10	max	786.045	2	.812	4	-.018	15	0	1	0	15	-.002	15
438			min	-921.636	3	.173	12	-.328	1	0	12	-.002	1	-.01	4
439		11	max	785.875	2	.207	2	-.018	15	0	1	0	15	-.002	15
440			min	-921.764	3	-.199	3	-.328	1	0	12	-.002	1	-.01	4
441		12	max	785.704	2	-.167	15	-.018	15	0	1	0	15	-.002	15
442			min	-921.892	3	-.71	4	-.328	1	0	12	-.002	1	-.01	4
443		13	max	785.534	2	-.345	15	-.018	15	0	1	0	15	-.002	15
444			min	-922.019	3	-1.471	4	-.328	1	0	12	-.002	1	-.009	4
445		14	max	785.364	2	-.524	15	-.018	15	0	1	0	15	-.002	15
446			min	-922.147	3	-2.232	4	-.328	1	0	12	-.002	1	-.009	4
447		15	max	785.193	2	-.703	15	-.018	15	0	1	0	15	-.002	15
448			min	-922.275	3	-2.993	4	-.328	1	0	12	-.002	1	-.008	4
449		16	max	785.023	2	-.882	15	-.018	15	0	1	0	15	-.001	15
450			min	-922.403	3	-3.754	4	-.328	1	0	12	-.002	1	-.006	4
451		17	max	784.853	2	-1.061	15	-.018	15	0	1	0	15	-.001	15
452			min	-922.53	3	-4.515	4	-.328	1	0	12	-.003	1	-.004	4
453		18	max	784.682	2	-1.24	15	-.018	15	0	1	0	15	0	15
454			min	-922.658	3	-5.276	4	-.328	1	0	12	-.003	1	-.002	4
455		19	max	784.512	2	-1.419	15	-.018	15	0	1	0	15	0	1
456			min	-922.786	3	-6.036	4	-.328	1	0	12	-.003	1	0	1
457	M12	1	max	918.571	1	0	1	12.216	1	0	1	0	15	0	1
458			min	45.024	15	0	1	.68	15	0	1	-.003	1	0	1
459		2	max	918.741	1	0	1	12.216	1	0	1	0	15	0	1
460			min	45.076	15	0	1	.68	15	0	1	-.001	1	0	1
461		3	max	918.912	1	0	1	12.216	1	0	1	0	1	0	1
462			min	45.127	15	0	1	.68	15	0	1	0	3	0	1
463		4	max	919.082	1	0	1	12.216	1	0	1	.001	1	0	1
464			min	45.179	15	0	1	.68	15	0	1	0	15	0	1
465		5	max	919.252	1	0	1	12.216	1	0	1	.003	1	0	1
466			min	45.23	15	0	1	.68	15	0	1	0	15	0	1
467		6	max	919.423	1	0	1	12.216	1	0	1	.004	1	0	1
468			min	45.281	15	0	1	.68	15	0	1	0	15	0	1
469		7	max	919.593	1	0	1	12.216	1	0	1	.006	1	0	1
470			min	45.333	15	0	1	.68	15	0	1	0	15	0	1
471		8	max	919.763	1	0	1	12.216	1	0	1	.007	1	0	1
472			min	45.384	15	0	1	.68	15	0	1	0	15	0	1
473		9	max	919.934	1	0	1	12.216	1	0	1	.008	1	0	1
474			min	45.436	15	0	1	.68	15	0	1	0	15	0	1
475		10	max	920.104	1	0	1	12.216	1	0	1	.01	1	0	1
476			min	45.487	15	0	1	.68	15	0	1	0	15	0	1
477		11	max	920.274	1	0	1	12.216	1	0	1	.011	1	0	1
478			min	45.538	15	0	1	.68	15	0	1	0	15	0	1
479		12	max	920.445	1	0	1	12.216	1	0	1	.013	1	0	1
480			min	45.59	15	0	1	.68	15	0	1	0	15	0	1
481		13	max	920.615	1	0	1	12.216	1	0	1	.014	1	0	1
482			min	45.641	15	0	1	.68	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	920.785	1	0	1	12.216	1	0	1	.016	1	0	1
484			min	45.692	15	0	1	.68	15	0	1	0	15	0	1
485		15	max	920.956	1	0	1	12.216	1	0	1	.017	1	0	1
486			min	45.744	15	0	1	.68	15	0	1	0	15	0	1
487		16	max	921.126	1	0	1	12.216	1	0	1	.018	1	0	1
488			min	45.795	15	0	1	.68	15	0	1	.001	15	0	1
489		17	max	921.297	1	0	1	12.216	1	0	1	.02	1	0	1
490			min	45.847	15	0	1	.68	15	0	1	.001	15	0	1
491		18	max	921.467	1	0	1	12.216	1	0	1	.021	1	0	1
492			min	45.898	15	0	1	.68	15	0	1	.001	15	0	1
493		19	max	921.637	1	0	1	12.216	1	0	1	.023	1	0	1
494			min	45.949	15	0	1	.68	15	0	1	.001	15	0	1
495	M1	1	max	177.824	1	692.899	3	-6.076	15	0	2	.26	1	.002	3
496			min	9.865	15	-396.691	2	-108.669	1	0	3	.015	15	-.013	2
497		2	max	178.646	1	692.019	3	-6.076	15	0	2	.203	1	.196	2
498			min	10.113	15	-397.864	2	-108.669	1	0	3	.011	15	-.364	3
499		3	max	577.21	3	480.675	2	-6.056	15	0	3	.145	1	.396	2
500			min	-329.759	2	-516.156	3	-108.484	1	0	2	.008	15	-.714	3
501		4	max	577.827	3	479.502	2	-6.056	15	0	3	.088	1	.143	2
502			min	-328.938	2	-517.036	3	-108.484	1	0	2	.005	15	-.441	3
503		5	max	578.443	3	478.329	2	-6.056	15	0	3	.031	1	-.003	15
504			min	-328.116	2	-517.916	3	-108.484	1	0	2	.002	15	-.168	3
505		6	max	579.059	3	477.155	2	-6.056	15	0	3	-.001	15	.105	3
506			min	-327.294	2	-518.796	3	-108.484	1	0	2	-.026	1	-.362	2
507		7	max	579.675	3	475.982	2	-6.056	15	0	3	-.005	15	.379	3
508			min	-326.473	2	-519.676	3	-108.484	1	0	2	-.084	1	-.614	2
509		8	max	580.291	3	474.809	2	-6.056	15	0	3	-.008	15	.654	3
510			min	-325.651	2	-520.557	3	-108.484	1	0	2	-.141	1	-.864	2
511		9	max	597.524	3	52.636	2	-8.873	15	0	9	.083	1	.761	3
512			min	-245.273	2	.359	15	-158.959	1	0	3	.005	15	-.991	2
513		10	max	598.14	3	51.463	2	-8.873	15	0	9	0	15	.743	3
514			min	-244.451	2	.005	15	-158.959	1	0	3	-.001	1	-1.019	2
515		11	max	598.756	3	50.29	2	-8.873	15	0	9	-.005	15	.725	3
516			min	-243.63	2	-1.426	4	-158.959	1	0	3	-.085	1	-1.046	2
517		12	max	615.877	3	352.286	3	-5.913	15	0	2	.139	1	.633	3
518			min	-163.218	2	-583.854	2	-106.119	1	0	3	.008	15	-.928	2
519		13	max	616.493	3	351.405	3	-5.913	15	0	2	.083	1	.447	3
520			min	-162.396	2	-585.027	2	-106.119	1	0	3	.005	15	-.619	2
521		14	max	617.109	3	350.525	3	-5.913	15	0	2	.027	1	.262	3
522			min	-161.574	2	-586.201	2	-106.119	1	0	3	.002	15	-.31	2
523		15	max	617.725	3	349.645	3	-5.913	15	0	2	-.002	15	.077	3
524			min	-160.753	2	-587.374	2	-106.119	1	0	3	-.029	1	-.021	1
525		16	max	618.342	3	348.765	3	-5.913	15	0	2	-.005	15	.309	2
526			min	-159.931	2	-588.547	2	-106.119	1	0	3	-.085	1	-.107	3
527		17	max	618.958	3	347.885	3	-5.913	15	0	2	-.008	15	.62	2
528			min	-159.11	2	-589.721	2	-106.119	1	0	3	-.141	1	-.291	3
529		18	max	-10.122	15	610.282	2	-6.574	15	0	3	-.011	15	.312	2
530			min	-178.906	1	-293.404	3	-117.769	1	0	2	-.2	1	-.144	3
531		19	max	-9.874	15	609.108	2	-6.574	15	0	3	-.015	15	.011	3
532			min	-178.084	1	-294.284	3	-117.769	1	0	2	-.262	1	-.009	2
533	M5	1	max	385.368	1	2309.219	3	0	1	0	1	0	1	.027	2
534			min	19.521	12	-1346.996	2	0	1	0	1	0	1	-.003	3
535		2	max	386.189	1	2308.339	3	0	1	0	1	0	1	.738	2
536			min	19.931	12	-1348.17	2	0	1	0	1	0	1	-1.222	3
537		3	max	1852.754	3	1451.449	2	0	1	0	1	0	1	1.416	2
538			min	-1142.917	2	-1655.858	3	0	1	0	1	0	1	-2.392	3
539		4	max	1853.37	3	1450.276	2	0	1	0	1	0	1	.65	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
540			min	-1142.095	2	-1656.738	3	0	1	0	1	0	1	-1.518	3
541		5	max	1853.986	3	1449.103	2	0	1	0	1	0	1	.004	9
542			min	-1141.274	2	-1657.618	3	0	1	0	1	0	1	-.643	3
543		6	max	1854.602	3	1447.929	2	0	1	0	1	0	1	.232	3
544			min	-1140.452	2	-1658.498	3	0	1	0	1	0	1	-.879	2
545		7	max	1855.218	3	1446.756	2	0	1	0	1	0	1	1.107	3
546			min	-1139.631	2	-1659.378	3	0	1	0	1	0	1	-1.643	2
547		8	max	1855.835	3	1445.582	2	0	1	0	1	0	1	1.983	3
548			min	-1138.809	2	-1660.258	3	0	1	0	1	0	1	-2.406	2
549		9	max	1884.691	3	176.337	2	0	1	0	1	0	1	2.276	3
550			min	-972.122	2	.355	15	0	1	0	1	0	1	-2.746	2
551		10	max	1885.307	3	175.164	2	0	1	0	1	0	1	2.212	3
552			min	-971.3	2	0	15	0	1	0	1	0	1	-2.839	2
553		11	max	1885.924	3	173.99	2	0	1	0	1	0	1	2.148	3
554			min	-970.479	2	-1.3	4	0	1	0	1	0	1	-2.931	2
555		12	max	1915.004	3	1119.418	3	0	1	0	1	0	1	1.89	3
556			min	-803.859	2	-1803.864	2	0	1	0	1	0	1	-2.628	2
557		13	max	1915.62	3	1118.537	3	0	1	0	1	0	1	1.3	3
558			min	-803.037	2	-1805.037	2	0	1	0	1	0	1	-1.676	2
559		14	max	1916.236	3	1117.657	3	0	1	0	1	0	1	.71	3
560			min	-802.216	2	-1806.211	2	0	1	0	1	0	1	-.723	2
561		15	max	1916.853	3	1116.777	3	0	1	0	1	0	1	.231	2
562			min	-801.394	2	-1807.384	2	0	1	0	1	0	1	-.003	13
563		16	max	1917.469	3	1115.897	3	0	1	0	1	0	1	1.185	2
564			min	-800.573	2	-1808.557	2	0	1	0	1	0	1	-.469	3
565		17	max	1918.085	3	1115.017	3	0	1	0	1	0	1	2.139	2
566			min	-799.751	2	-1809.731	2	0	1	0	1	0	1	-1.058	3
567		18	max	-20.401	12	2053.461	2	0	1	0	1	0	1	1.102	2
568			min	-385.67	1	-1004.868	3	0	1	0	1	0	1	-.553	3
569		19	max	-19.99	12	2052.287	2	0	1	0	1	0	1	.019	2
570			min	-384.848	1	-1005.748	3	0	1	0	1	0	1	-.023	3
571	M9	1	max	177.824	1	692.899	3	108.669	1	0	3	-.015	15	.002	3
572			min	9.865	15	-396.691	2	6.076	15	0	2	-.26	1	-.013	2
573		2	max	178.646	1	692.019	3	108.669	1	0	3	-.011	15	.196	2
574			min	10.113	15	-397.864	2	6.076	15	0	2	-.203	1	-.364	3
575		3	max	577.21	3	480.675	2	108.484	1	0	2	-.008	15	.396	2
576			min	-329.759	2	-516.156	3	6.056	15	0	3	-.145	1	-.714	3
577		4	max	577.827	3	479.502	2	108.484	1	0	2	-.005	15	.143	2
578			min	-328.938	2	-517.036	3	6.056	15	0	3	-.088	1	-.441	3
579		5	max	578.443	3	478.329	2	108.484	1	0	2	-.002	15	-.003	15
580			min	-328.116	2	-517.916	3	6.056	15	0	3	-.031	1	-.168	3
581		6	max	579.059	3	477.155	2	108.484	1	0	2	.026	1	.105	3
582			min	-327.294	2	-518.796	3	6.056	15	0	3	.001	15	-.362	2
583		7	max	579.675	3	475.982	2	108.484	1	0	2	.084	1	.379	3
584			min	-326.473	2	-519.676	3	6.056	15	0	3	.005	15	-.614	2
585		8	max	580.291	3	474.809	2	108.484	1	0	2	.141	1	.654	3
586			min	-325.651	2	-520.557	3	6.056	15	0	3	.008	15	-.864	2
587		9	max	597.524	3	52.636	2	158.959	1	0	3	-.005	15	.761	3
588			min	-245.273	2	.359	15	8.873	15	0	9	-.083	1	-.991	2
589		10	max	598.14	3	51.463	2	158.959	1	0	3	.001	1	.743	3
590			min	-244.451	2	.005	15	8.873	15	0	9	0	15	-1.019	2
591		11	max	598.756	3	50.29	2	158.959	1	0	3	.085	1	.725	3
592			min	-243.63	2	-1.426	4	8.873	15	0	9	.005	15	-1.046	2
593		12	max	615.877	3	352.286	3	106.119	1	0	3	-.008	15	.633	3
594			min	-163.218	2	-583.854	2	5.913	15	0	2	-.139	1	-.928	2
595		13	max	616.493	3	351.405	3	106.119	1	0	3	-.005	15	.447	3
596			min	-162.396	2	-585.027	2	5.913	15	0	2	-.083	1	-.619	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	617.109	3	350.525	3	106.119	1	0	3	-.002	15	.262	3
598			min	-161.574	2	-586.201	2	5.913	15	0	2	-.027	1	-.31	2
599		15	max	617.725	3	349.645	3	106.119	1	0	3	.029	1	.077	3
600			min	-160.753	2	-587.374	2	5.913	15	0	2	.002	15	-.021	1
601		16	max	618.342	3	348.765	3	106.119	1	0	3	.085	1	.309	2
602			min	-159.931	2	-588.547	2	5.913	15	0	2	.005	15	-.107	3
603		17	max	618.958	3	347.885	3	106.119	1	0	3	.141	1	.62	2
604			min	-159.11	2	-589.721	2	5.913	15	0	2	.008	15	-.291	3
605		18	max	-10.122	15	610.282	2	117.769	1	0	2	.2	1	.312	2
606			min	-178.906	1	-293.404	3	6.574	15	0	3	.011	15	-.144	3
607		19	max	-9.874	15	609.108	2	117.769	1	0	2	.262	1	.011	3
608			min	-178.084	1	-294.284	3	6.574	15	0	3	.015	15	-.009	2

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	.102	2	.01	3	8.639e-3	2	NC	1	NC	1
2			min	0	15	-.019	3	-.005	2	-2.085e-3	3	NC	1	NC	1
3		2	max	0	1	.309	3	.04	1	9.939e-3	2	NC	5	NC	2
4			min	0	15	-.068	1	.002	10	-2.251e-3	3	732.949	3	6043.888	1
5		3	max	0	1	.574	3	.097	1	1.124e-2	2	NC	5	NC	3
6			min	0	15	-.199	2	.006	15	-2.418e-3	3	405.066	3	2474.479	1
7		4	max	0	1	.734	3	.147	1	1.254e-2	2	NC	5	NC	3
8			min	0	15	-.272	2	.008	15	-2.584e-3	3	318.621	3	1638.724	1
9		5	max	0	1	.771	3	.172	1	1.384e-2	2	NC	5	NC	3
10			min	0	15	-.275	2	.01	15	-2.75e-3	3	303.747	3	1397.597	1
11		6	max	0	1	.687	3	.166	1	1.514e-2	2	NC	5	NC	5
12			min	0	15	-.209	2	.01	15	-2.916e-3	3	339.974	3	1450.884	1
13		7	max	0	1	.507	3	.129	1	1.644e-2	2	NC	5	NC	5
14			min	0	15	-.098	1	.008	15	-3.082e-3	3	456.454	3	1858.144	1
15		8	max	0	1	.278	3	.074	1	1.774e-2	2	NC	4	NC	2
16			min	0	15	0	15	0	10	-3.248e-3	3	807.589	3	3261.378	1
17		9	max	0	1	.179	2	.032	3	1.904e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.01	10	-3.414e-3	3	2668.872	3	NC	1
19		10	max	0	1	.236	2	.031	3	2.034e-2	2	NC	3	NC	1
20			min	0	1	-.023	3	-.022	2	-3.58e-3	3	1787.596	2	NC	1
21		11	max	0	15	.179	2	.032	3	1.904e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.01	10	-3.414e-3	3	2668.872	3	NC	1
23		12	max	0	15	.278	3	.074	1	1.774e-2	2	NC	4	NC	2
24			min	0	1	0	15	0	10	-3.248e-3	3	807.589	3	3261.378	1
25		13	max	0	15	.507	3	.129	1	1.644e-2	2	NC	5	NC	5
26			min	0	1	-.098	1	.008	15	-3.082e-3	3	456.454	3	1858.144	1
27		14	max	0	15	.687	3	.166	1	1.514e-2	2	NC	5	NC	5
28			min	0	1	-.209	2	.01	15	-2.916e-3	3	339.974	3	1450.884	1
29		15	max	0	15	.771	3	.172	1	1.384e-2	2	NC	5	NC	3
30			min	0	1	-.275	2	.01	15	-2.75e-3	3	303.747	3	1397.597	1
31		16	max	0	15	.734	3	.147	1	1.254e-2	2	NC	5	NC	3
32			min	0	1	-.272	2	.008	15	-2.584e-3	3	318.621	3	1638.724	1
33		17	max	0	15	.574	3	.097	1	1.124e-2	2	NC	5	NC	3
34			min	0	1	-.199	2	.006	15	-2.418e-3	3	405.066	3	2474.479	1
35		18	max	0	15	.309	3	.04	1	9.939e-3	2	NC	5	NC	2
36			min	0	1	-.068	1	.002	10	-2.251e-3	3	732.949	3	6043.888	1
37		19	max	0	15	.102	2	.01	3	8.639e-3	2	NC	1	NC	1
38			min	-.001	1	-.019	3	-.005	2	-2.085e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.233	3	.009	3	5.013e-3	2	NC	1	NC	1
40			min	0	15	-.335	2	-.005	2	-3.98e-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	.561	3	.028	1	6.005e-3	2	NC	5	NC	2
42			min	0	15	-.621	2	0	10	-4.85e-3	3	731.423	3	8885.416	1
43		3	max	0	1	.839	3	.078	1	6.998e-3	2	NC	5	NC	3
44			min	0	15	-.869	2	.005	15	-5.721e-3	3	395.913	3	3092.458	1
45		4	max	0	1	1.033	3	.126	1	7.991e-3	2	NC	15	NC	3
46			min	0	15	-1.051	2	.007	15	-6.591e-3	3	300.015	3	1916.94	1
47		5	max	0	1	1.125	3	.153	1	8.983e-3	2	NC	15	NC	3
48			min	0	15	-1.154	2	.009	15	-7.461e-3	3	268.921	3	1576.917	1
49		6	max	0	1	1.117	3	.151	1	9.976e-3	2	NC	15	NC	3
50			min	0	15	-1.178	2	.009	15	-8.331e-3	3	271.505	3	1599.871	1
51		7	max	0	1	1.025	3	.12	1	1.097e-2	2	NC	15	NC	5
52			min	0	15	-1.134	2	.007	15	-9.201e-3	3	300.478	2	2015.649	1
53		8	max	0	1	.885	3	.069	1	1.196e-2	2	NC	15	NC	2
54			min	0	15	-1.047	2	0	10	-1.007e-2	3	337.027	2	3488.959	1
55		9	max	0	1	.747	3	.029	3	1.295e-2	2	NC	5	NC	1
56			min	0	15	-.956	2	-.009	10	-1.094e-2	3	386.34	2	NC	1
57		10	max	0	1	.683	3	.027	3	1.395e-2	2	NC	5	NC	1
58			min	0	1	-.912	2	-.02	2	-1.181e-2	3	415.814	2	NC	1
59		11	max	0	15	.747	3	.029	3	1.295e-2	2	NC	5	NC	1
60			min	0	1	-.956	2	-.009	10	-1.094e-2	3	386.34	2	NC	1
61		12	max	0	15	.885	3	.069	1	1.196e-2	2	NC	15	NC	2
62			min	0	1	-1.047	2	0	10	-1.007e-2	3	337.027	2	3488.959	1
63		13	max	0	15	1.025	3	.12	1	1.097e-2	2	NC	15	NC	5
64			min	0	1	-1.134	2	.007	15	-9.201e-3	3	300.478	2	2015.649	1
65		14	max	0	15	1.117	3	.151	1	9.976e-3	2	NC	15	NC	3
66			min	0	1	-1.178	2	.009	15	-8.331e-3	3	271.505	3	1599.871	1
67		15	max	0	15	1.125	3	.153	1	8.983e-3	2	NC	15	NC	3
68			min	0	1	-1.154	2	.009	15	-7.461e-3	3	268.921	3	1576.917	1
69		16	max	0	15	1.033	3	.126	1	7.991e-3	2	NC	15	NC	3
70			min	0	1	-1.051	2	.007	15	-6.591e-3	3	300.015	3	1916.94	1
71		17	max	0	15	.839	3	.078	1	6.998e-3	2	NC	5	NC	3
72			min	0	1	-.869	2	.005	15	-5.721e-3	3	395.913	3	3092.458	1
73		18	max	0	15	.561	3	.028	1	6.005e-3	2	NC	5	NC	2
74			min	0	1	-.621	2	0	10	-4.85e-3	3	731.423	3	8885.416	1
75		19	max	0	15	.233	3	.009	3	5.013e-3	2	NC	1	NC	1
76			min	0	1	-.335	2	-.005	2	-3.98e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.237	3	.008	3	3.526e-3	3	NC	1	NC	1
78			min	0	1	-.334	2	-.005	2	-5.275e-3	2	NC	1	NC	1
79		2	max	0	15	.454	3	.028	1	4.304e-3	3	NC	5	NC	2
80			min	0	1	-.719	2	0	10	-6.325e-3	2	622.487	2	8842.141	1
81		3	max	0	15	.642	3	.078	1	5.082e-3	3	NC	5	NC	3
82			min	0	1	-1.047	2	.005	15	-7.375e-3	2	336.338	2	3083.218	1
83		4	max	0	15	.782	3	.126	1	5.86e-3	3	NC	15	NC	3
84			min	0	1	-1.278	2	.007	15	-8.424e-3	2	254.069	2	1912.274	1
85		5	max	0	15	.862	3	.153	1	6.638e-3	3	NC	15	NC	3
86			min	0	1	-1.393	2	.009	15	-9.474e-3	2	226.618	2	1573.244	1
87		6	max	0	15	.883	3	.151	1	7.416e-3	3	NC	15	NC	3
88			min	0	1	-1.391	2	.009	15	-1.052e-2	2	227.074	2	1595.761	1
89		7	max	0	15	.853	3	.12	1	8.194e-3	3	NC	15	NC	3
90			min	0	1	-1.292	2	.007	15	-1.157e-2	2	250.501	2	2008.852	1
91		8	max	0	15	.791	3	.07	1	8.972e-3	3	NC	15	NC	2
92			min	0	1	-1.136	2	0	10	-1.262e-2	2	299.214	2	3468.321	1
93		9	max	0	15	.725	3	.027	3	9.75e-3	3	NC	5	NC	1
94			min	0	1	-.982	2	-.008	10	-1.367e-2	2	370.18	2	NC	1
95		10	max	0	1	.692	3	.025	3	1.053e-2	3	NC	5	NC	1
96			min	0	1	-.91	2	-.019	2	-1.472e-2	2	416.763	2	NC	1
97		11	max	0	1	.725	3	.027	3	9.75e-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	-.982	2	-.008	10	-1.367e-2	2	370.18	2	NC	1
99		12	max	0	1	.791	3	.07	1	8.972e-3	3	NC	15	NC	2
100			min	0	15	-1.136	2	0	10	-1.262e-2	2	299.214	2	3468.321	1
101		13	max	0	1	.853	3	.12	1	8.194e-3	3	NC	15	NC	3
102			min	0	15	-1.292	2	.007	15	-1.157e-2	2	250.501	2	2008.852	1
103		14	max	0	1	.883	3	.151	1	7.416e-3	3	NC	15	NC	3
104			min	0	15	-1.391	2	.009	15	-1.052e-2	2	227.074	2	1595.761	1
105		15	max	0	1	.862	3	.153	1	6.638e-3	3	NC	15	NC	3
106			min	0	15	-1.393	2	.009	15	-9.474e-3	2	226.618	2	1573.244	1
107		16	max	0	1	.782	3	.126	1	5.86e-3	3	NC	15	NC	3
108			min	0	15	-1.278	2	.007	15	-8.424e-3	2	254.069	2	1912.274	1
109		17	max	0	1	.642	3	.078	1	5.082e-3	3	NC	5	NC	3
110			min	0	15	-1.047	2	.005	15	-7.375e-3	2	336.338	2	3083.218	1
111		18	max	0	1	.454	3	.028	1	4.304e-3	3	NC	5	NC	2
112			min	0	15	-.719	2	0	10	-6.325e-3	2	622.487	2	8842.141	1
113		19	max	0	1	.237	3	.008	3	3.526e-3	3	NC	1	NC	1
114			min	0	15	-.334	2	-.005	2	-5.275e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.089	2	.007	3	6.149e-3	3	NC	1	NC	1
116			min	-.001	1	-.075	3	-.004	2	-6.994e-3	2	NC	1	NC	1
117		2	max	0	15	.045	3	.04	1	7.256e-3	3	NC	5	NC	2
118			min	0	1	-.183	2	.002	15	-7.905e-3	2	882.14	2	6083.942	1
119		3	max	0	15	.14	3	.097	1	8.364e-3	3	NC	5	NC	3
120			min	0	1	-.4	2	.006	15	-8.816e-3	2	490.386	2	2481.342	1
121		4	max	0	15	.19	3	.147	1	9.471e-3	3	NC	5	NC	3
122			min	0	1	-.526	2	.008	15	-9.727e-3	2	389.978	2	1639.622	1
123		5	max	0	15	.189	3	.172	1	1.058e-2	3	NC	5	NC	3
124			min	0	1	-.544	2	.01	15	-1.064e-2	2	379.008	2	1395.622	1
125		6	max	0	15	.137	3	.166	1	1.169e-2	3	NC	5	NC	3
126			min	0	1	-.457	2	.01	15	-1.155e-2	2	439.77	2	1445.279	1
127		7	max	0	15	.047	3	.13	1	1.279e-2	3	NC	5	NC	3
128			min	0	1	-.286	2	.008	15	-1.246e-2	2	638.998	2	1843.08	1
129		8	max	0	15	.007	9	.075	1	1.39e-2	3	NC	3	NC	3
130			min	0	1	-.076	2	.002	10	-1.337e-2	2	1452.998	2	3199.394	1
131		9	max	0	15	.113	1	.024	3	1.501e-2	3	NC	2	NC	1
132			min	0	1	-.157	3	-.007	10	-1.428e-2	2	2931.858	3	NC	1
133		10	max	0	1	.197	2	.022	3	1.612e-2	3	NC	4	NC	1
134			min	0	1	-.2	3	-.017	2	-1.519e-2	2	1928.024	3	NC	1
135		11	max	0	1	.113	1	.024	3	1.501e-2	3	NC	2	NC	1
136			min	0	15	-.157	3	-.007	10	-1.428e-2	2	2931.858	3	NC	1
137		12	max	0	1	.007	9	.075	1	1.39e-2	3	NC	3	NC	3
138			min	0	15	-.076	2	.002	10	-1.337e-2	2	1452.998	2	3199.394	1
139		13	max	0	1	.047	3	.13	1	1.279e-2	3	NC	5	NC	3
140			min	0	15	-.286	2	.008	15	-1.246e-2	2	638.998	2	1843.08	1
141		14	max	0	1	.137	3	.166	1	1.169e-2	3	NC	5	NC	3
142			min	0	15	-.457	2	.01	15	-1.155e-2	2	439.77	2	1445.279	1
143		15	max	0	1	.189	3	.172	1	1.058e-2	3	NC	5	NC	3
144			min	0	15	-.544	2	.01	15	-1.064e-2	2	379.008	2	1395.622	1
145		16	max	0	1	.19	3	.147	1	9.471e-3	3	NC	5	NC	3
146			min	0	15	-.526	2	.008	15	-9.727e-3	2	389.978	2	1639.622	1
147		17	max	0	1	.14	3	.097	1	8.364e-3	3	NC	5	NC	3
148			min	0	15	-.4	2	.006	15	-8.816e-3	2	490.386	2	2481.342	1
149		18	max	0	1	.045	3	.04	1	7.256e-3	3	NC	5	NC	2
150			min	0	15	-.183	2	.002	15	-7.905e-3	2	882.14	2	6083.942	1
151		19	max	.001	1	.089	2	.007	3	6.149e-3	3	NC	1	NC	1
152			min	0	15	-.075	3	-.004	2	-6.994e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.009	2	.008	1	-1.366e-5	15	NC	1	NC	2
154			min	-.01	3	-.015	3	0	15	-2.447e-4	1	8138.919	2	9120.513	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	.007	2	.008	2	.008	1	-1.294e-5	15	NC	1	NC	2
156			min	-.009	3	-.015	3	0	15	-2.317e-4	1	9511.963	2	9938.823	1
157		3	max	.006	2	.007	2	.007	1	-1.221e-5	15	NC	1	NC	1
158			min	-.009	3	-.014	3	0	15	-2.186e-4	1	NC	1	NC	1
159		4	max	.006	2	.005	2	.006	1	-1.148e-5	15	NC	1	NC	1
160			min	-.008	3	-.014	3	0	15	-2.056e-4	1	NC	1	NC	1
161		5	max	.006	2	.004	2	.006	1	-1.075e-5	15	NC	1	NC	1
162			min	-.008	3	-.013	3	0	15	-1.925e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.005	1	-1.002e-5	15	NC	1	NC	1
164			min	-.007	3	-.013	3	0	15	-1.795e-4	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.004	1	-9.294e-6	15	NC	1	NC	1
166			min	-.007	3	-.012	3	0	15	-1.664e-4	1	NC	1	NC	1
167		8	max	.004	2	0	2	.004	1	-8.566e-6	15	NC	1	NC	1
168			min	-.006	3	-.011	3	0	15	-1.534e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-7.837e-6	15	NC	1	NC	1
170			min	-.005	3	-.011	3	0	15	-1.403e-4	1	NC	1	NC	1
171		10	max	.004	2	0	2	.003	1	-7.109e-6	15	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-1.273e-4	1	NC	1	NC	1
173		11	max	.003	2	-.001	2	.002	1	-6.38e-6	15	NC	1	NC	1
174			min	-.004	3	-.009	3	0	15	-1.142e-4	1	NC	1	NC	1
175		12	max	.003	2	-.001	15	.002	1	-5.652e-6	15	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-1.012e-4	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	.001	1	-4.923e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-8.81e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-4.195e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-7.505e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-3.467e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-6.2e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-2.738e-6	15	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-4.895e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-2.01e-6	15	NC	1	NC	1
186			min	-.001	3	-.003	4	0	15	-3.59e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-1.281e-6	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-2.285e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-5.528e-7	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-9.798e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.85e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	1.05e-7	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	2.345e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	1.306e-6	15	NC	1	NC	1
195		3	max	0	3	0	15	0	15	4.505e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	2.507e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	15	6.665e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	1	3.709e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	8.825e-5	1	NC	1	NC	1
200			min	-.002	2	-.008	4	0	3	4.91e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.098e-4	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	12	6.111e-6	15	9246.377	4	NC	1
203		7	max	.003	3	-.003	15	0	1	1.314e-4	1	NC	1	NC	1
204			min	-.002	2	-.012	4	0	12	7.313e-6	15	7996.285	4	NC	1
205		8	max	.003	3	-.003	15	0	1	1.53e-4	1	NC	2	NC	1
206			min	-.003	2	-.013	4	0	15	8.514e-6	15	7226.99	4	NC	1
207		9	max	.004	3	-.003	15	0	1	1.746e-4	1	NC	5	NC	1
208			min	-.003	2	-.014	4	0	15	9.715e-6	15	6778.202	4	NC	1
209		10	max	.004	3	-.003	15	.001	1	1.962e-4	1	NC	5	NC	1
210			min	-.003	2	-.014	4	0	15	1.092e-5	15	6572.753	4	NC	1
211		11	max	.004	3	-.003	15	.001	1	2.178e-4	1	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
212			min	-.004	2	-.014	4	0	15	1.212e-5	15	6580.644	4	NC	1
213		12	max	.005	3	-.003	15	.002	1	2.394e-4	1	NC	5	NC	1
214			min	-.004	2	-.014	4	0	15	1.332e-5	15	6807.531	4	NC	1
215		13	max	.005	3	-.003	15	.002	1	2.61e-4	1	NC	2	NC	1
216			min	-.005	2	-.013	4	0	15	1.452e-5	15	7298.39	4	NC	1
217		14	max	.006	3	-.003	15	.003	1	2.826e-4	1	NC	1	NC	1
218			min	-.005	2	-.012	4	0	15	1.572e-5	15	8160.274	4	NC	1
219		15	max	.006	3	-.002	15	.004	1	3.042e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	1.692e-5	15	9628.368	4	NC	1
221		16	max	.007	3	-.002	15	.005	1	3.258e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	1.812e-5	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.006	1	3.474e-4	1	NC	1	NC	1
224			min	-.006	2	-.006	4	0	15	1.933e-5	15	NC	1	NC	1
225		18	max	.008	3	0	15	.007	1	3.69e-4	1	NC	1	NC	1
226			min	-.006	2	-.004	3	0	15	2.053e-5	15	NC	1	NC	1
227		19	max	.008	3	0	10	.008	1	3.906e-4	1	NC	1	NC	1
228			min	-.007	2	-.003	3	0	15	2.173e-5	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	1.364e-4	1	NC	1	NC	3
230			min	0	15	-.008	3	-.008	1	7.603e-6	15	NC	1	3090.879	1
231		2	max	.002	1	.006	2	0	15	1.364e-4	1	NC	1	NC	3
232			min	0	15	-.008	3	-.007	1	7.603e-6	15	NC	1	3350.655	1
233		3	max	.002	1	.006	2	0	15	1.364e-4	1	NC	1	NC	3
234			min	0	15	-.007	3	-.007	1	7.603e-6	15	NC	1	3660.504	1
235		4	max	.002	1	.005	2	0	15	1.364e-4	1	NC	1	NC	3
236			min	0	15	-.007	3	-.006	1	7.603e-6	15	NC	1	4033.315	1
237		5	max	.002	1	.005	2	0	15	1.364e-4	1	NC	1	NC	2
238			min	0	15	-.007	3	-.006	1	7.603e-6	15	NC	1	4486.614	1
239		6	max	.002	1	.005	2	0	15	1.364e-4	1	NC	1	NC	2
240			min	0	15	-.006	3	-.005	1	7.603e-6	15	NC	1	5044.709	1
241		7	max	.001	1	.004	2	0	15	1.364e-4	1	NC	1	NC	2
242			min	0	15	-.006	3	-.004	1	7.603e-6	15	NC	1	5742.102	1
243		8	max	.001	1	.004	2	0	15	1.364e-4	1	NC	1	NC	2
244			min	0	15	-.005	3	-.004	1	7.603e-6	15	NC	1	6629.105	1
245		9	max	.001	1	.004	2	0	15	1.364e-4	1	NC	1	NC	2
246			min	0	15	-.005	3	-.003	1	7.603e-6	15	NC	1	7781.437	1
247		10	max	.001	1	.003	2	0	15	1.364e-4	1	NC	1	NC	2
248			min	0	15	-.004	3	-.003	1	7.603e-6	15	NC	1	9317.424	1
249		11	max	0	1	.003	2	0	15	1.364e-4	1	NC	1	NC	1
250			min	0	15	-.004	3	-.002	1	7.603e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	1.364e-4	1	NC	1	NC	1
252			min	0	15	-.003	3	-.002	1	7.603e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.364e-4	1	NC	1	NC	1
254			min	0	15	-.003	3	-.001	1	7.603e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	1.364e-4	1	NC	1	NC	1
256			min	0	15	-.002	3	0	1	7.603e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	1.364e-4	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	7.603e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	1.364e-4	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	7.603e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.364e-4	1	NC	1	NC	1
262			min	0	15	0	3	0	1	7.603e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.364e-4	1	NC	1	NC	1
264			min	0	15	0	3	0	1	7.603e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.364e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	7.603e-6	15	NC	1	NC	1
267	M6	1	max	.023	2	.035	2	0	1	0	1	NC	4	NC	1
268			min	-.032	3	-.049	3	0	1	0	1	1582.305	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	.022	2	.032	2	0	1	0	1	NC	4	NC	1
270			min	-.03	3	-.046	3	0	1	0	1	1675.237	3	NC	1
271		3	max	.021	2	.029	2	0	1	0	1	NC	4	NC	1
272			min	-.029	3	-.043	3	0	1	0	1	1779.899	3	NC	1
273		4	max	.019	2	.026	2	0	1	0	1	NC	4	NC	1
274			min	-.027	3	-.041	3	0	1	0	1	1898.778	3	NC	1
275		5	max	.018	2	.023	2	0	1	0	1	NC	4	NC	1
276			min	-.025	3	-.038	3	0	1	0	1	2035.072	3	NC	1
277		6	max	.017	2	.02	2	0	1	0	1	NC	4	NC	1
278			min	-.023	3	-.035	3	0	1	0	1	2192.964	3	NC	1
279		7	max	.015	2	.017	2	0	1	0	1	NC	1	NC	1
280			min	-.021	3	-.032	3	0	1	0	1	2378.034	3	NC	1
281		8	max	.014	2	.015	2	0	1	0	1	NC	1	NC	1
282			min	-.02	3	-.03	3	0	1	0	1	2597.893	3	NC	1
283		9	max	.013	2	.012	2	0	1	0	1	NC	1	NC	1
284			min	-.018	3	-.027	3	0	1	0	1	2863.201	3	NC	1
285		10	max	.012	2	.01	2	0	1	0	1	NC	1	NC	1
286			min	-.016	3	-.024	3	0	1	0	1	3189.367	3	NC	1
287		11	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3599.515	3	NC	1
289		12	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.019	3	0	1	0	1	4130.002	3	NC	1
291		13	max	.008	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.011	3	-.016	3	0	1	0	1	4841.45	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.013	3	0	1	0	1	5843.022	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.01	3	0	1	0	1	7353.109	3	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	9881.399	3	NC	1
299		17	max	.003	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	3	-.005	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	-.003	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	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.006	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	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	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	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.012	3	0	1	0	1	8789.47	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.014	3	0	1	0	1	7855.927	3	NC	1
319		8	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.01	2	-.015	3	0	1	0	1	7304.377	3	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.011	2	-.016	3	0	1	0	1	6881.964	4	NC	1
323		10	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.012	2	-.017	3	0	1	0	1	6667.935	4	NC	1
325		11	max	.014	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	-.014	2	-.017	3	0	1	0	1	6671.324	4	NC	1
327		12	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.015	2	-.017	3	0	1	0	1	6897.288	4	NC	1
329		13	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.016	2	-.016	3	0	1	0	1	7390.953	4	NC	1
331		14	max	.018	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.018	2	-.015	3	0	1	0	1	8260.346	4	NC	1
333		15	max	.02	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.019	2	-.014	3	0	1	0	1	9743.138	4	NC	1
335		16	max	.021	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.021	2	-.013	3	0	1	0	1	NC	1	NC	1
337		17	max	.022	3	0	2	0	1	0	1	NC	1	NC	1
338			min	-.022	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.024	3	0	2	0	1	0	1	NC	1	NC	1
340			min	-.023	2	-.01	3	0	1	0	1	NC	1	NC	1
341		19	max	.025	3	.002	2	0	1	0	1	NC	1	NC	1
342			min	-.025	2	-.008	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.005	1	.024	2	0	1	0	1	NC	1	NC	1
344			min	0	15	-.026	3	0	1	0	1	NC	1	NC	1
345		2	max	.005	1	.023	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.025	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	1	.022	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.02	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.022	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	1	.019	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	1	.018	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.019	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.016	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.018	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	1	.015	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	1	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.015	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.012	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.002	1	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.012	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	1	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	15	-.003	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	15	-.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	.009	2	0	15	2.447e-4	1	NC	1	NC	2
382			min	-.01	3	-.015	3	-.008	1	1.366e-5	15	8138.919	2	9120.513	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	.007	2	.008	2	0	15	2.317e-4	1	NC	1	NC	2
384			min	-.009	3	-.015	3	-.008	1	1.294e-5	15	9511.963	2	9938.823	1
385		3	max	.006	2	.007	2	0	15	2.186e-4	1	NC	1	NC	1
386			min	-.009	3	-.014	3	-.007	1	1.221e-5	15	NC	1	NC	1
387		4	max	.006	2	.005	2	0	15	2.056e-4	1	NC	1	NC	1
388			min	-.008	3	-.014	3	-.006	1	1.148e-5	15	NC	1	NC	1
389		5	max	.006	2	.004	2	0	15	1.925e-4	1	NC	1	NC	1
390			min	-.008	3	-.013	3	-.006	1	1.075e-5	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.795e-4	1	NC	1	NC	1
392			min	-.007	3	-.013	3	-.005	1	1.002e-5	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	1.664e-4	1	NC	1	NC	1
394			min	-.007	3	-.012	3	-.004	1	9.294e-6	15	NC	1	NC	1
395		8	max	.004	2	0	2	0	15	1.534e-4	1	NC	1	NC	1
396			min	-.006	3	-.011	3	-.004	1	8.566e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	1.403e-4	1	NC	1	NC	1
398			min	-.005	3	-.011	3	-.003	1	7.837e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	1.273e-4	1	NC	1	NC	1
400			min	-.005	3	-.01	3	-.003	1	7.109e-6	15	NC	1	NC	1
401		11	max	.003	2	-.001	2	0	15	1.142e-4	1	NC	1	NC	1
402			min	-.004	3	-.009	3	-.002	1	6.38e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	15	0	15	1.012e-4	1	NC	1	NC	1
404			min	-.004	3	-.008	3	-.002	1	5.652e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	8.81e-5	1	NC	1	NC	1
406			min	-.003	3	-.007	3	-.001	1	4.923e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	7.505e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	4.195e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	6.2e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	3.467e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	4.895e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	2.738e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	3.59e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	4	0	1	2.01e-6	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	2.285e-5	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	1.281e-6	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	9.798e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	5.528e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-1.05e-7	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.85e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-1.306e-6	15	NC	1	NC	1
422			min	0	2	-.002	4	0	15	-2.345e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-2.507e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	15	-4.505e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	1	-3.709e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	15	-6.665e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	3	-4.91e-6	15	NC	1	NC	1
428			min	-.002	2	-.008	4	0	1	-8.825e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	12	-6.111e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-1.098e-4	1	9246.377	4	NC	1
431		7	max	.003	3	-.003	15	0	12	-7.313e-6	15	NC	1	NC	1
432			min	-.002	2	-.012	4	0	1	-1.314e-4	1	7996.285	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-8.514e-6	15	NC	2	NC	1
434			min	-.003	2	-.013	4	0	1	-1.53e-4	1	7226.99	4	NC	1
435		9	max	.004	3	-.003	15	0	15	-9.715e-6	15	NC	5	NC	1
436			min	-.003	2	-.014	4	0	1	-1.746e-4	1	6778.202	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-1.092e-5	15	NC	5	NC	1
438			min	-.003	2	-.014	4	-.001	1	-1.962e-4	1	6572.753	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-1.212e-5	15	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
440			min	-.004	2	-.014	4	-.001	1	-2.178e-4	1	6580.644	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-1.332e-5	15	NC	5	NC	1
442			min	-.004	2	-.014	4	-.002	1	-2.394e-4	1	6807.531	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-1.452e-5	15	NC	2	NC	1
444			min	-.005	2	-.013	4	-.002	1	-2.61e-4	1	7298.39	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-1.572e-5	15	NC	1	NC	1
446			min	-.005	2	-.012	4	-.003	1	-2.826e-4	1	8160.274	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-1.692e-5	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.004	1	-3.042e-4	1	9628.368	4	NC	1
449		16	max	.007	3	-.002	15	0	15	-1.812e-5	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.005	1	-3.258e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-1.933e-5	15	NC	1	NC	1
452			min	-.006	2	-.006	4	-.006	1	-3.474e-4	1	NC	1	NC	1
453		18	max	.008	3	0	15	0	15	-2.053e-5	15	NC	1	NC	1
454			min	-.006	2	-.004	3	-.007	1	-3.69e-4	1	NC	1	NC	1
455		19	max	.008	3	0	10	0	15	-2.173e-5	15	NC	1	NC	1
456			min	-.007	2	-.003	3	-.008	1	-3.906e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.008	1	-7.603e-6	15	NC	1	NC	3
458			min	0	15	-.008	3	0	15	-1.364e-4	1	NC	1	3090.879	1
459		2	max	.002	1	.006	2	.007	1	-7.603e-6	15	NC	1	NC	3
460			min	0	15	-.008	3	0	15	-1.364e-4	1	NC	1	3350.655	1
461		3	max	.002	1	.006	2	.007	1	-7.603e-6	15	NC	1	NC	3
462			min	0	15	-.007	3	0	15	-1.364e-4	1	NC	1	3660.504	1
463		4	max	.002	1	.005	2	.006	1	-7.603e-6	15	NC	1	NC	3
464			min	0	15	-.007	3	0	15	-1.364e-4	1	NC	1	4033.315	1
465		5	max	.002	1	.005	2	.006	1	-7.603e-6	15	NC	1	NC	2
466			min	0	15	-.007	3	0	15	-1.364e-4	1	NC	1	4486.614	1
467		6	max	.002	1	.005	2	.005	1	-7.603e-6	15	NC	1	NC	2
468			min	0	15	-.006	3	0	15	-1.364e-4	1	NC	1	5044.709	1
469		7	max	.001	1	.004	2	.004	1	-7.603e-6	15	NC	1	NC	2
470			min	0	15	-.006	3	0	15	-1.364e-4	1	NC	1	5742.102	1
471		8	max	.001	1	.004	2	.004	1	-7.603e-6	15	NC	1	NC	2
472			min	0	15	-.005	3	0	15	-1.364e-4	1	NC	1	6629.105	1
473		9	max	.001	1	.004	2	.003	1	-7.603e-6	15	NC	1	NC	2
474			min	0	15	-.005	3	0	15	-1.364e-4	1	NC	1	7781.437	1
475		10	max	.001	1	.003	2	.003	1	-7.603e-6	15	NC	1	NC	2
476			min	0	15	-.004	3	0	15	-1.364e-4	1	NC	1	9317.424	1
477		11	max	0	1	.003	2	.002	1	-7.603e-6	15	NC	1	NC	1
478			min	0	15	-.004	3	0	15	-1.364e-4	1	NC	1	NC	1
479		12	max	0	1	.003	2	.002	1	-7.603e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-1.364e-4	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-7.603e-6	15	NC	1	NC	1
482			min	0	15	-.003	3	0	15	-1.364e-4	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-7.603e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-1.364e-4	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-7.603e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-1.364e-4	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-7.603e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-1.364e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-7.603e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-1.364e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-7.603e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-1.364e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.603e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.364e-4	1	NC	1	NC	1
495	M1	1	max	.01	3	.102	2	.001	1	1.314e-2	2	NC	1	NC	1
496			min	-.005	2	-.019	3	0	15	-2.548e-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	.01	3	.047	2	0	15	6.443e-3	2	NC	4	NC	1
498			min	-.006	2	-.005	3	-.006	1	-1.261e-2	3	2102.219	2	NC	1
499		3	max	.01	3	.016	3	0	15	1.799e-5	10	NC	5	NC	1
500			min	-.006	2	-.012	2	-.008	1	-1.694e-4	1	1014.228	2	NC	1
501		4	max	.01	3	.05	3	0	15	4.07e-3	2	NC	5	NC	1
502			min	-.005	2	-.078	2	-.008	1	-4.804e-3	3	641.184	2	NC	1
503		5	max	.009	3	.094	3	0	15	8.153e-3	2	NC	5	NC	1
504			min	-.005	2	-.147	2	-.005	1	-9.473e-3	3	463.33	2	NC	1
505		6	max	.009	3	.14	3	0	15	1.224e-2	2	NC	15	NC	1
506			min	-.005	2	-.214	2	-.002	1	-1.414e-2	3	365.271	2	NC	1
507		7	max	.009	3	.185	3	0	1	1.632e-2	2	NC	15	NC	1
508			min	-.005	2	-.273	2	0	12	-1.881e-2	3	307.348	2	NC	1
509		8	max	.009	3	.222	3	0	1	2.04e-2	2	NC	15	NC	1
510			min	-.005	2	-.32	2	0	15	-2.348e-2	3	273.071	2	NC	1
511		9	max	.009	3	.245	3	0	15	2.348e-2	2	9486.925	15	NC	1
512			min	-.005	2	-.35	2	0	1	-2.372e-2	3	255.222	2	NC	1
513		10	max	.008	3	.254	3	0	1	2.589e-2	2	9284.617	15	NC	1
514			min	-.005	2	-.36	2	0	12	-2.102e-2	3	250.016	2	NC	1
515		11	max	.008	3	.247	3	0	1	2.831e-2	2	9486.472	15	NC	1
516			min	-.005	2	-.35	2	0	15	-1.832e-2	3	256.228	2	NC	1
517		12	max	.008	3	.226	3	0	15	2.758e-2	2	NC	15	NC	1
518			min	-.005	2	-.319	2	-.001	1	-1.547e-2	3	276.142	2	NC	1
519		13	max	.008	3	.193	3	0	15	2.213e-2	2	NC	15	NC	1
520			min	-.005	2	-.269	2	0	1	-1.238e-2	3	314.844	2	NC	1
521		14	max	.008	3	.15	3	.002	1	1.667e-2	2	NC	15	NC	1
522			min	-.005	2	-.206	2	0	15	-9.291e-3	3	381.323	2	NC	1
523		15	max	.007	3	.102	3	.005	1	1.122e-2	2	NC	5	NC	1
524			min	-.004	2	-.138	2	0	15	-6.203e-3	3	496.443	2	NC	1
525		16	max	.007	3	.053	3	.007	1	5.767e-3	2	NC	5	NC	1
526			min	-.004	2	-.069	2	0	15	-3.114e-3	3	711.207	2	NC	1
527		17	max	.007	3	.006	3	.008	1	5.376e-4	1	NC	5	NC	1
528			min	-.004	2	-.006	2	0	15	-2.584e-5	3	1173.619	2	NC	1
529		18	max	.007	3	.044	2	.006	1	1.058e-2	2	NC	4	NC	1
530			min	-.004	2	-.036	3	0	15	-4.65e-3	3	2509.228	2	NC	1
531		19	max	.007	3	.089	2	0	15	2.122e-2	2	NC	1	NC	1
532			min	-.004	2	-.075	3	-.001	1	-9.454e-3	3	NC	1	NC	1
533	M5	1	max	.031	3	.236	2	0	1	0	1	NC	1	NC	1
534			min	-.022	2	-.023	3	0	1	0	1	NC	1	NC	1
535		2	max	.031	3	.106	2	0	1	0	1	NC	5	NC	1
536			min	-.022	2	.002	3	0	1	0	1	889.809	2	NC	1
537		3	max	.031	3	.051	3	0	1	0	1	NC	5	NC	1
538			min	-.022	2	-.039	2	0	1	0	1	420.603	2	NC	1
539		4	max	.03	3	.145	3	0	1	0	1	NC	15	NC	1
540			min	-.021	2	-.21	2	0	1	0	1	259.058	2	NC	1
541		5	max	.029	3	.269	3	0	1	0	1	7722.885	15	NC	1
542			min	-.021	2	-.395	2	0	1	0	1	183.258	2	NC	1
543		6	max	.029	3	.406	3	0	1	0	1	5946.342	15	NC	1
544			min	-.02	2	-.576	2	0	1	0	1	142.181	2	NC	1
545		7	max	.028	3	.539	3	0	1	0	1	4920.309	15	NC	1
546			min	-.02	2	-.741	2	0	1	0	1	118.264	2	NC	1
547		8	max	.028	3	.649	3	0	1	0	1	4323.693	15	NC	1
548			min	-.02	2	-.872	2	0	1	0	1	104.274	2	NC	1
549		9	max	.027	3	.72	3	0	1	0	1	4017.728	15	NC	1
550			min	-.019	2	-.955	2	0	1	0	1	97.067	2	NC	1
551		10	max	.026	3	.744	3	0	1	0	1	3925.563	15	NC	1
552			min	-.019	2	-.983	2	0	1	0	1	94.968	2	NC	1
553		11	max	.026	3	.725	3	0	1	0	1	4017.891	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	-.019	2	-.955	2	0	1	0	1	97.466	2	NC	1
555		12	max	.025	3	.662	3	0	1	0	1	4324.079	15	NC	1
556			min	-.018	2	-.867	2	0	1	0	1	105.575	2	NC	1
557		13	max	.024	3	.562	3	0	1	0	1	4921.1	15	NC	1
558			min	-.018	2	-.727	2	0	1	0	1	121.631	2	NC	1
559		14	max	.024	3	.435	3	0	1	0	1	5947.893	15	NC	1
560			min	-.018	2	-.553	2	0	1	0	1	149.753	2	NC	1
561		15	max	.023	3	.294	3	0	1	0	1	7725.956	15	NC	1
562			min	-.018	2	-.365	2	0	1	0	1	199.719	2	NC	1
563		16	max	.022	3	.151	3	0	1	0	1	NC	15	NC	1
564			min	-.017	2	-.181	2	0	1	0	1	296.141	2	NC	1
565		17	max	.022	3	.017	3	0	1	0	1	NC	5	NC	1
566			min	-.017	2	-.021	2	0	1	0	1	511.699	2	NC	1
567		18	max	.022	3	.099	2	0	1	0	1	NC	5	NC	1
568			min	-.017	2	-.097	3	0	1	0	1	1136.139	2	NC	1
569		19	max	.022	3	.197	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.2	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.102	2	0	15	2.548e-2	3	NC	1	NC	1
572			min	-.005	2	-.019	3	-.001	1	-1.314e-2	2	NC	1	NC	1
573		2	max	.01	3	.047	2	.006	1	1.261e-2	3	NC	4	NC	1
574			min	-.006	2	-.005	3	0	15	-6.443e-3	2	2102.219	2	NC	1
575		3	max	.01	3	.016	3	.008	1	1.694e-4	1	NC	5	NC	1
576			min	-.006	2	-.012	2	0	15	-1.799e-5	10	1014.228	2	NC	1
577		4	max	.01	3	.05	3	.008	1	4.804e-3	3	NC	5	NC	1
578			min	-.005	2	-.078	2	0	15	-4.07e-3	2	641.184	2	NC	1
579		5	max	.009	3	.094	3	.005	1	9.473e-3	3	NC	5	NC	1
580			min	-.005	2	-.147	2	0	15	-8.153e-3	2	463.33	2	NC	1
581		6	max	.009	3	.14	3	.002	1	1.414e-2	3	NC	15	NC	1
582			min	-.005	2	-.214	2	0	15	-1.224e-2	2	365.271	2	NC	1
583		7	max	.009	3	.185	3	0	12	1.881e-2	3	NC	15	NC	1
584			min	-.005	2	-.273	2	0	1	-1.632e-2	2	307.348	2	NC	1
585		8	max	.009	3	.222	3	0	15	2.348e-2	3	NC	15	NC	1
586			min	-.005	2	-.32	2	0	1	-2.04e-2	2	273.071	2	NC	1
587		9	max	.009	3	.245	3	0	1	2.372e-2	3	9486.925	15	NC	1
588			min	-.005	2	-.35	2	0	15	-2.348e-2	2	255.222	2	NC	1
589		10	max	.008	3	.254	3	0	12	2.102e-2	3	9284.617	15	NC	1
590			min	-.005	2	-.36	2	0	1	-2.589e-2	2	250.016	2	NC	1
591		11	max	.008	3	.247	3	0	15	1.832e-2	3	9486.472	15	NC	1
592			min	-.005	2	-.35	2	0	1	-2.831e-2	2	256.228	2	NC	1
593		12	max	.008	3	.226	3	.001	1	1.547e-2	3	NC	15	NC	1
594			min	-.005	2	-.319	2	0	15	-2.758e-2	2	276.142	2	NC	1
595		13	max	.008	3	.193	3	0	1	1.238e-2	3	NC	15	NC	1
596			min	-.005	2	-.269	2	0	15	-2.213e-2	2	314.844	2	NC	1
597		14	max	.008	3	.15	3	0	15	9.291e-3	3	NC	15	NC	1
598			min	-.005	2	-.206	2	-.002	1	-1.667e-2	2	381.323	2	NC	1
599		15	max	.007	3	.102	3	0	15	6.203e-3	3	NC	5	NC	1
600			min	-.004	2	-.138	2	-.005	1	-1.122e-2	2	496.443	2	NC	1
601		16	max	.007	3	.053	3	0	15	3.114e-3	3	NC	5	NC	1
602			min	-.004	2	-.069	2	-.007	1	-5.767e-3	2	711.207	2	NC	1
603		17	max	.007	3	.006	3	0	15	2.584e-5	3	NC	5	NC	1
604			min	-.004	2	-.006	2	-.008	1	-5.376e-4	1	1173.619	2	NC	1
605		18	max	.007	3	.044	2	0	15	4.65e-3	3	NC	4	NC	1
606			min	-.004	2	-.036	3	-.006	1	-1.058e-2	2	2509.228	2	NC	1
607		19	max	.007	3	.089	2	.001	1	9.454e-3	3	NC	1	NC	1
608			min	-.004	2	-.075	3	0	15	-2.122e-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

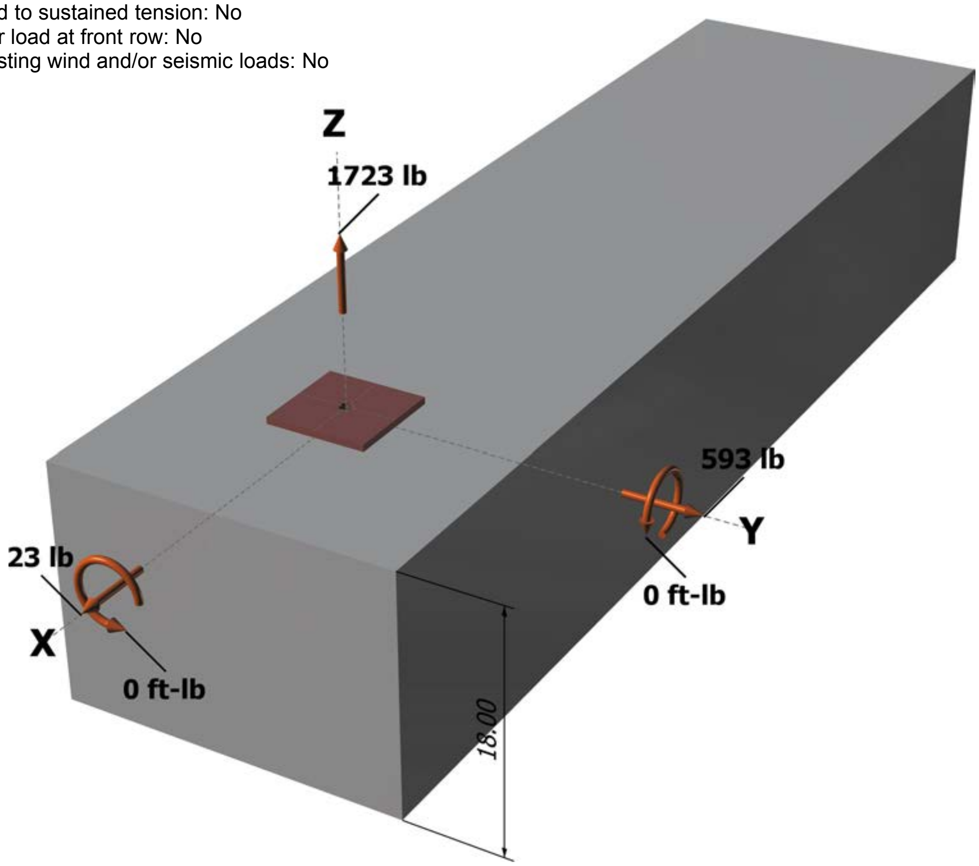
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

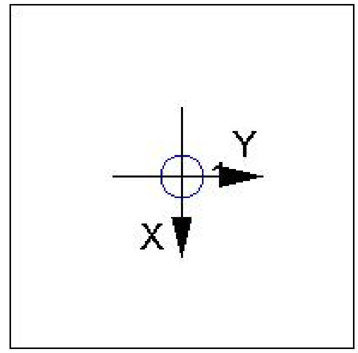
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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

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

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

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

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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	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.

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 31-33 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

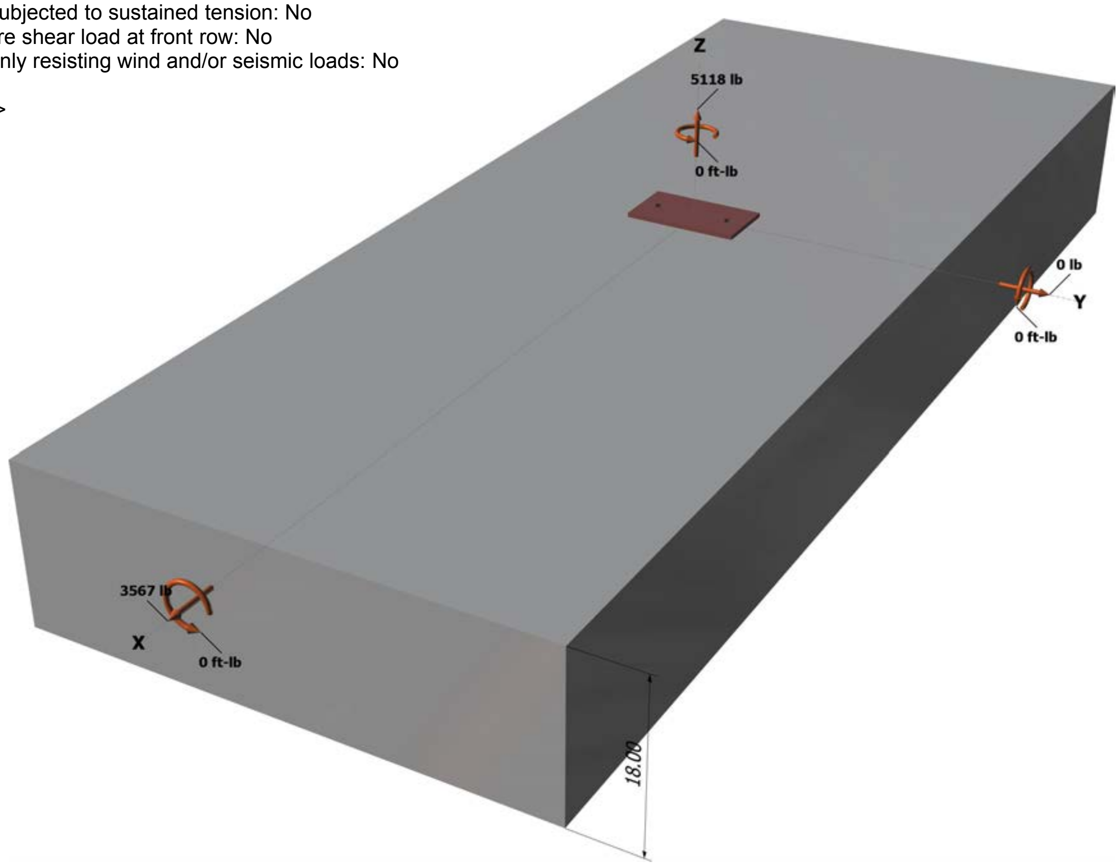
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

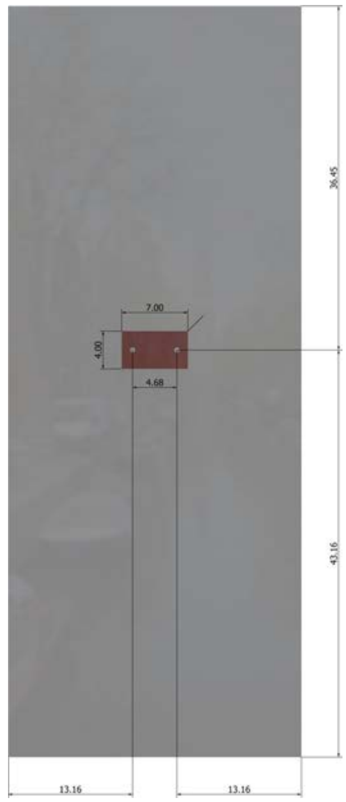
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



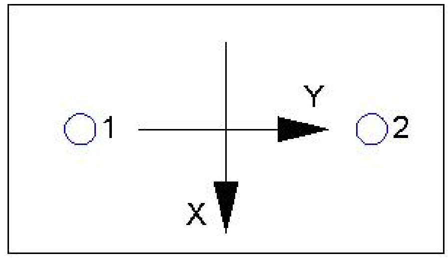
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
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)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	13.16	17908

$\phi V_{cbx} = \phi\,(2)(A_{Vc}/A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

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

Sec. D.7.3	0.63	0.57	119.8 %	1.2	Pass

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

12. Warnings

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

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

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