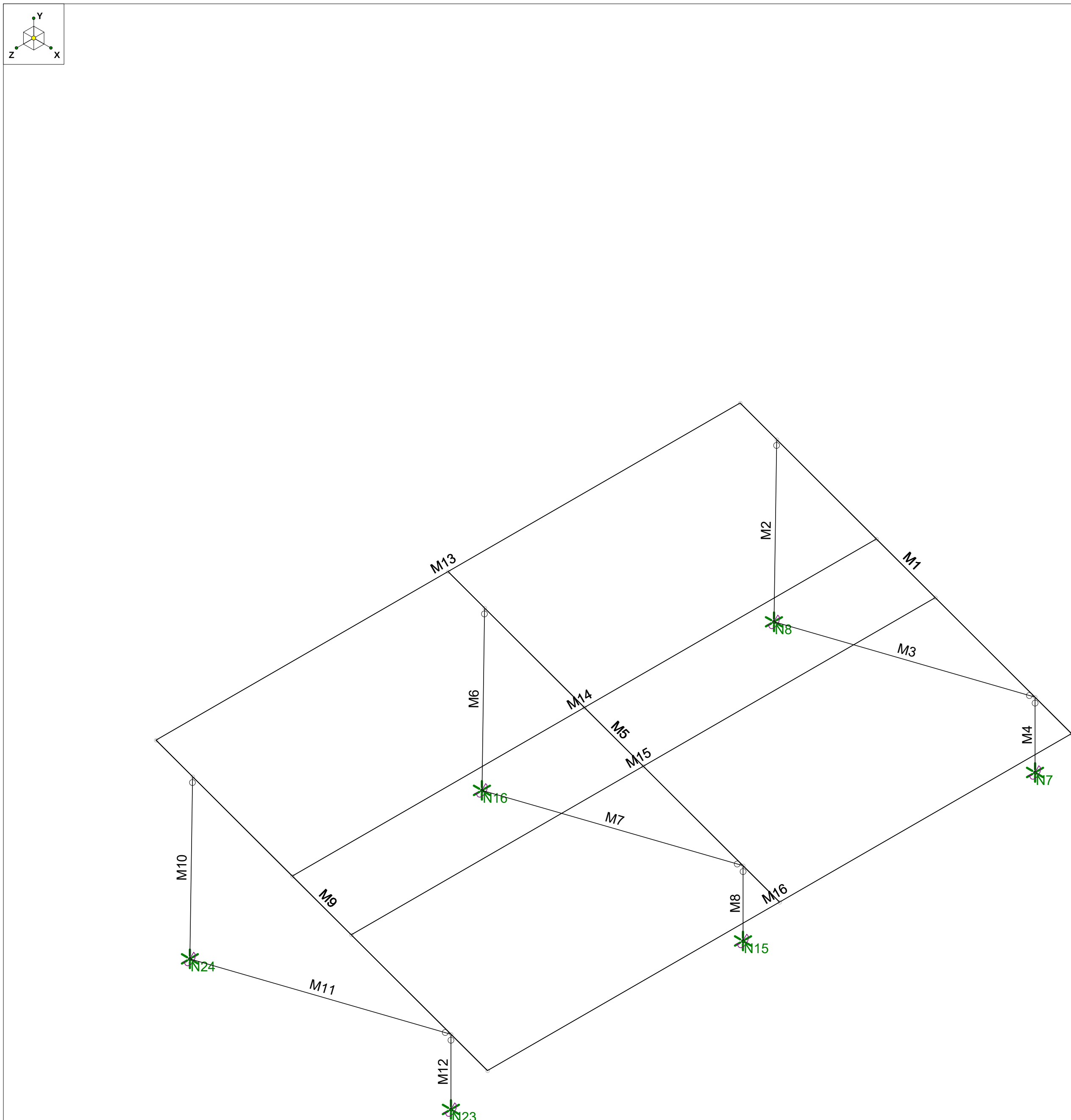


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

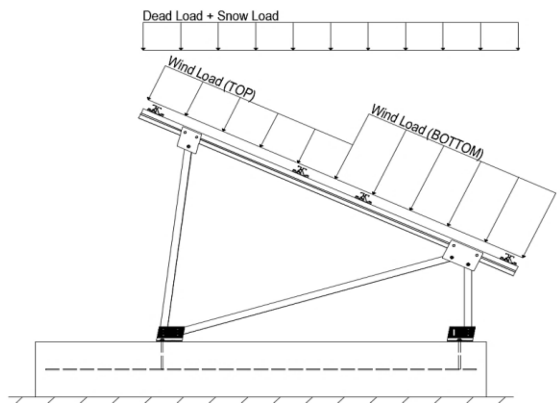
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row =	2
Module Tilt =	20°
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	*Self-weight of the PV modules.*
g_{MIN} =	1.75 psf	

2.2 Snow Loads

Ground Snow Load, P_g =	30.00 psf	
Sloped Roof Snow Load, P_s =	20.62 psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00	
C_s =	0.91	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V =	110 mph	Exposure Category = C
Height <	15 ft	Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.050	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.650	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.400	
$Cf-_{TOP, INNER PURLIN}$	=	-1.840	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.06	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

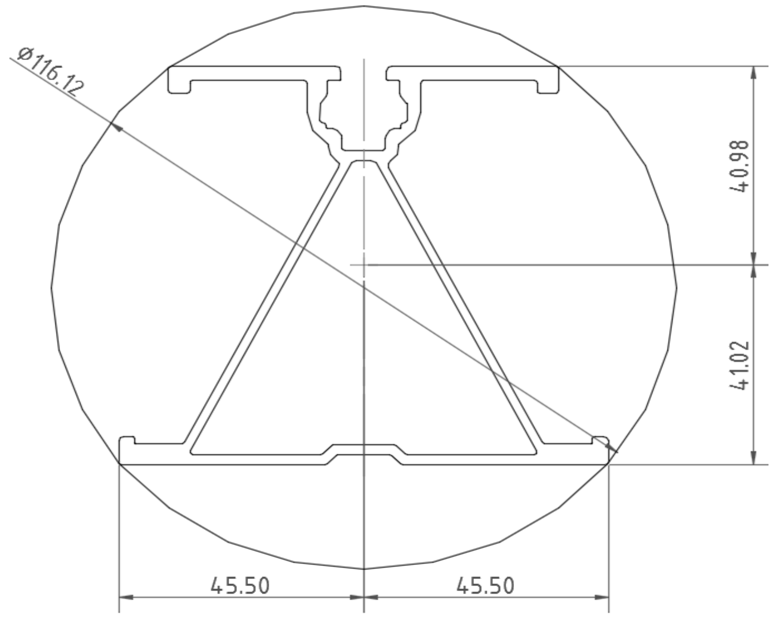
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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 =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.601	k-ft
M_z =	0.234	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	78%	

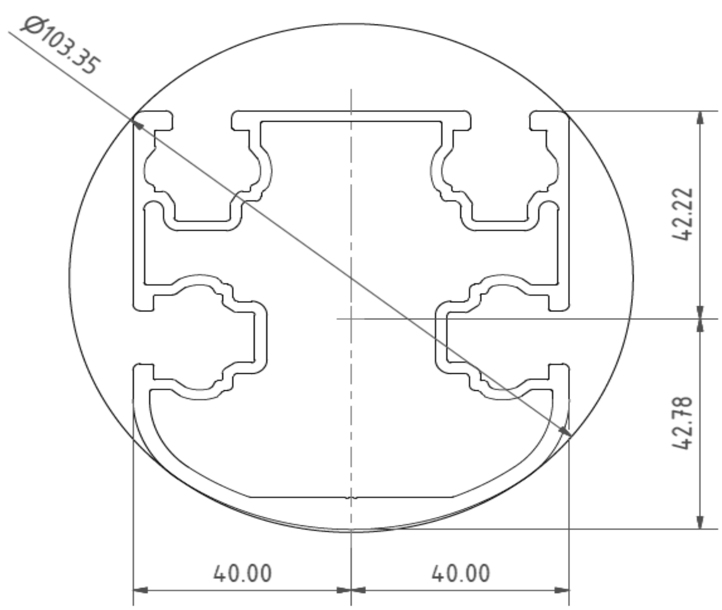


DETAIL VIEW

4.2 Girder Design

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

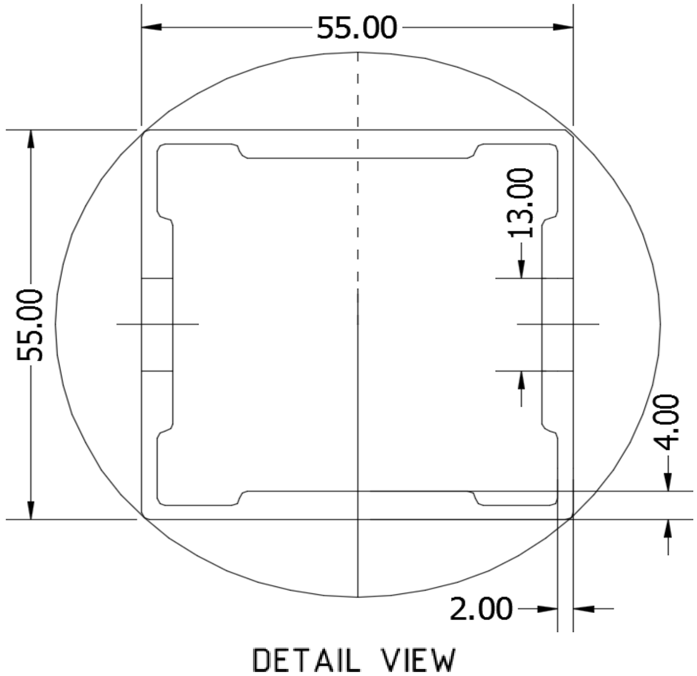
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.344	k-ft
M_z =	0.000	k-ft
P_n =	-0.775	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



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).

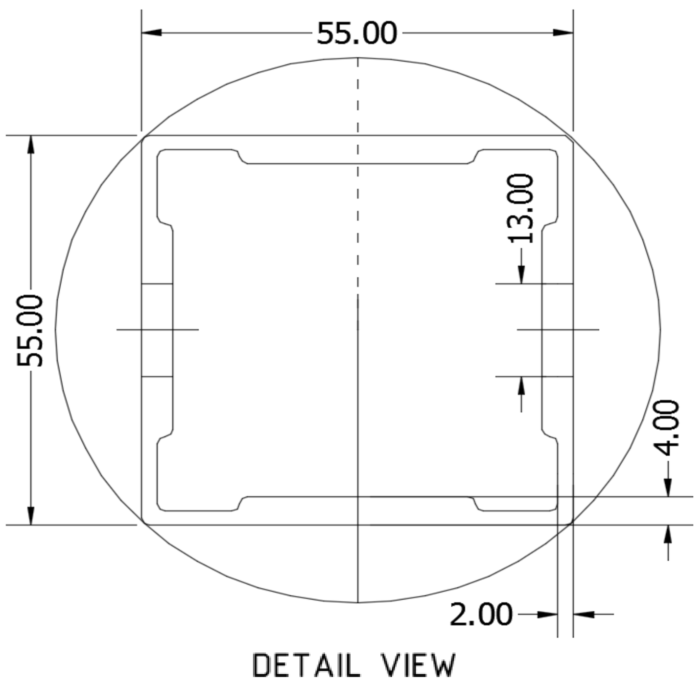
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.484	k-ft
P_n =	0.590	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	37%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M12 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

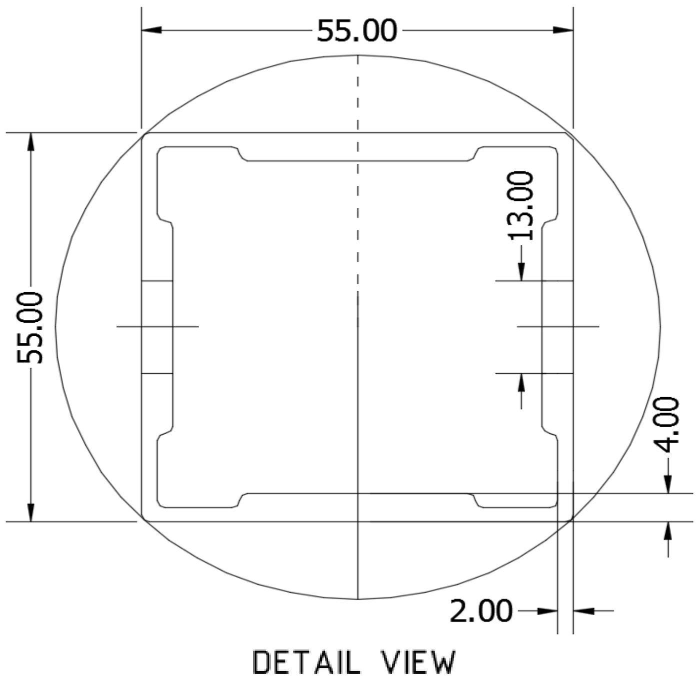
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.013	k-ft
M_z =	0.000	k-ft
P_n =	1.875	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	32%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	61.10	in
$\Phi F_{ty\ AXIAL}$ =	13.63	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.410	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	13.386	k
Utilization =	26%	



5. FOUNDATION DESIGN CALCULATIONS

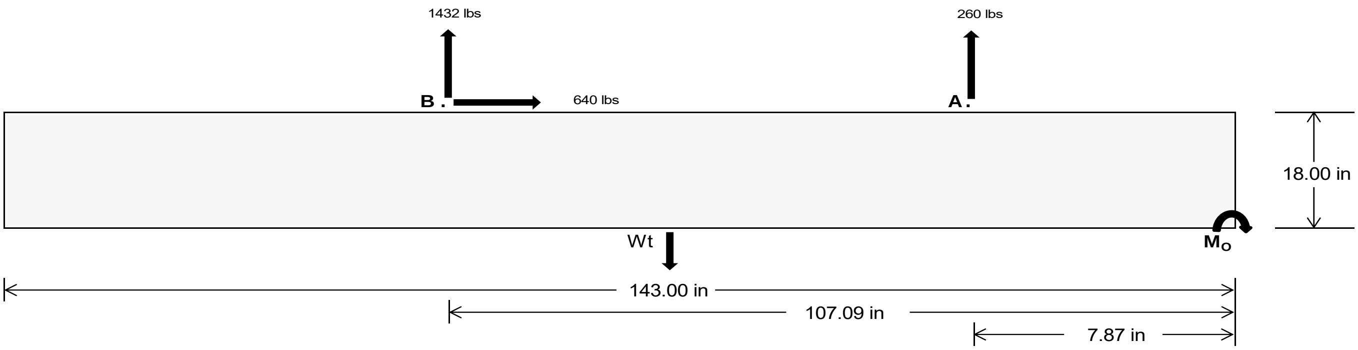
5.1 Helical Pile Foundations

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 =	1091.14	5965.85	k
Compressive Load =	4220.72	4784.73	k
Lateral Load =	321.34	2662.66	k
Moment (Weak Axis) =	0.65	0.35	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 = 166868.8 in-lbs
Resisting Force Required = 2333.83 lbs
S.F. = 1.67
Weight Required = 3889.72 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

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

Sliding
Force = 640.10 lbs
Friction = 0.4
Weight Required = 1600.24 lbs
Resisting Weight = 7559.64 lbs
Additional Weight Required = 0 lbs

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

Cohesion
Sliding Force = 640.10 lbs
Cohesion = 130 psf
Area = 34.76 ft^2
Resisting = 3779.82 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation. Cohesion is OK.

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1404 lbs	1404 lbs	1404 lbs	1404 lbs	1600 lbs	1600 lbs	1600 lbs	1600 lbs	2137 lbs	2137 lbs	2137 lbs	2137 lbs	-519 lbs	-519 lbs	-519 lbs	-519 lbs
F_B	1504 lbs	1504 lbs	1504 lbs	1504 lbs	1959 lbs	1959 lbs	1959 lbs	1959 lbs	2474 lbs	2474 lbs	2474 lbs	2474 lbs	-2863 lbs	-2863 lbs	-2863 lbs	-2863 lbs
F_V	142 lbs	142 lbs	142 lbs	142 lbs	1136 lbs	1136 lbs	1136 lbs	1136 lbs	948 lbs	948 lbs	948 lbs	948 lbs	-1280 lbs	-1280 lbs	-1280 lbs	-1280 lbs
P_{total}	10468 lbs	10684 lbs	10900 lbs	11116 lbs	11118 lbs	11334 lbs	11550 lbs	11766 lbs	12171 lbs	12387 lbs	12603 lbs	12819 lbs	1153 lbs	1283 lbs	1413 lbs	1542 lbs
M	3199 lbs-ft	3199 lbs-ft	3199 lbs-ft	3199 lbs-ft	4378 lbs-ft	4378 lbs-ft	4378 lbs-ft	4378 lbs-ft	5417 lbs-ft	5417 lbs-ft	5417 lbs-ft	5417 lbs-ft	3818 lbs-ft	3818 lbs-ft	3818 lbs-ft	3818 lbs-ft
e	0.31 ft	0.30 ft	0.29 ft	0.29 ft	0.39 ft	0.39 ft	0.38 ft	0.37 ft	0.45 ft	0.44 ft	0.43 ft	0.42 ft	3.31 ft	2.98 ft	2.70 ft	2.48 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	254.8 psf	253.8 psf	252.8 psf	251.9 psf	256.5 psf	255.4 psf	254.4 psf	253.4 psf	271.7 psf	270.2 psf	268.8 psf	267.4 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	347.5 psf	343.9 psf	340.5 psf	337.2 psf	383.3 psf	378.7 psf	374.3 psf	370.2 psf	428.6 psf	422.8 psf	417.2 psf	412.0 psf	99.6 psf	95.6 psf	93.8 psf	93.2 psf

Maximum Bearing Pressure = 429 psf
Allowable Bearing Pressure = 1500 psf

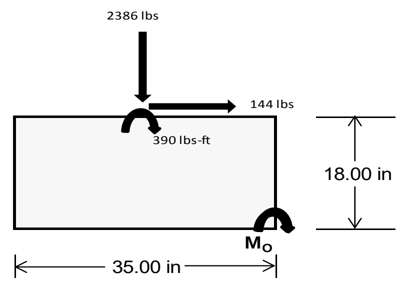
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 2874.0 ft-lbs
Resisting Force Required = 1970.76 lbs
S.F. = 1.67
Weight Required = 3284.60 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	271 lbs	592 lbs	202 lbs	866 lbs	2386 lbs	812 lbs	104 lbs	173 lbs	35 lbs
F_V	201 lbs	197 lbs	204 lbs	149 lbs	144 lbs	158 lbs	202 lbs	198 lbs	203 lbs
P_{total}	9630 lbs	9951 lbs	9560 lbs	9775 lbs	11295 lbs	9721 lbs	2840 lbs	2910 lbs	2771 lbs
M	811 lbs-ft	799 lbs-ft	819 lbs-ft	609 lbs-ft	606 lbs-ft	641 lbs-ft	808 lbs-ft	797 lbs-ft	812 lbs-ft
e	0.08 ft	0.08 ft	0.09 ft	0.06 ft	0.05 ft	0.07 ft	0.28 ft	0.27 ft	0.29 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	229.1 psf	239.0 psf	226.6 psf	245.2 psf	289.1 psf	241.8 psf	33.9 psf	36.6 psf	31.7 psf
f_{max}	325.1 psf	333.6 psf	323.5 psf	317.3 psf	360.9 psf	317.6 psf	129.6 psf	130.9 psf	127.8 psf

Maximum Bearing Pressure = 361 psf
Allowable Bearing Pressure = 1500 psf

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

Foundation Requirements: 143in long x 32in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

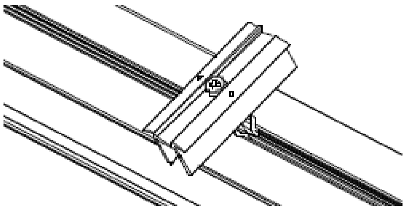
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

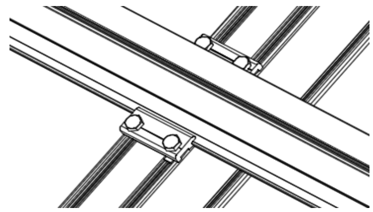
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.807	k
Allowable Uplift =	1.214	k
Utilization =	66%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.296	k
Allowable Uplift =	4.357	k
Utilization =	53%	



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 =	3.247	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	44%	

Rear Strut		
Maximum Axial Load =	4.105	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	55%	

Diagonal Strut		
Maximum Axial Load =	2.041	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	28%	

Bolt and bearing capacities are accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)

Struts under compression are shown to demonstrate the load transfer from the girder. Single M12 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

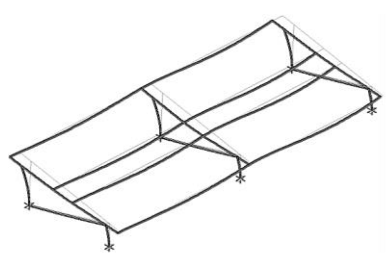
7.1 Seismic Drift

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

Mean Height, h_{sx} =	51.89	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.038	in
Max Drift, Δ_{MAX} =	0.601	in

$0.601 \leq 1.038$, OK.

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 96 in

J = 0.432

265.581

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

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= 28.0 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 in³

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 96

J = 0.432

168.894

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

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= 29.1

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 in³

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.9 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 104.56 in
J = 1.08
179.85

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.0 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 104.56
J = 1.08
190.335

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 28.9

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

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

$\varphi F_L =$ 31.1 ksi

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

$\varphi F_L St =$ 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St =$ 3.323 k-ft

3.4.16.1

N/A for Weak Direction

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

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4 ksi

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

M_{max}St = 1.460 k-ft

3.4.16

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 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 ksi

3.4.9

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

b/t = 24.5
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 6.11 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 6.29 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 61.10 in
J = 0.942
95.3524

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 61.1
J = 0.942
95.3524

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.41345

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.77788

φF_L= (φccFcy)/(λ²)

φF_L= 13.6277 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

$\varphi F_L =$ 13.63 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 14.03 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-63.565	-63.565	0	0
2	M14	Y	-63.565	-63.565	0	0
3	M15	Y	-63.565	-63.565	0	0
4	M16	Y	-63.565	-63.565	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	-65.446	-65.446	0	0
2	M14	y	-65.446	-65.446	0	0
3	M15	y	-102.844	-102.844	0	0
4	M16	y	-102.844	-102.844	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	149.592	149.592	0	0
2	M14	y	114.687	114.687	0	0
3	M15	y	62.33	62.33	0	0
4	M16	y	62.33	62.33	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8												
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6												
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6										
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3										
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3										
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25										
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25										
8																						
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1														
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1												
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75												
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1										
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875										
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656										
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875										

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	539.487	2	1189.047	2	.732	1	.003	1	0	1	0	1
2		min	-678.21	3	-1456.531	3	-58.528	5	-.27	4	0	1	0	1
3	N7	max	.025	9	1167.962	1	-.566	12	-.001	12	0	1	0	1
4		min	-.201	2	-246.821	3	-247.184	4	-.501	4	0	1	0	1
5	N15	max	0	15	3246.706	1	0	10	0	2	0	1	0	1
6		min	-2.114	2	-839.336	3	-235.438	4	-.484	4	0	1	0	1
7	N16	max	1870.54	2	3680.56	1	0	3	0	3	0	1	0	1
8		min	-2048.2	3	-4589.116	3	-58.513	5	-.272	4	0	1	0	1
9	N23	max	.035	14	1167.962	1	9.464	1	.019	1	0	1	0	1
10		min	-.201	2	-246.821	3	-240.671	4	-.491	4	0	1	0	1
11	N24	max	539.487	2	1189.047	2	-.061	12	0	12	0	1	0	1
12		min	-678.21	3	-1456.531	3	-59.141	5	-.272	4	0	1	0	1
13	Totals:	max	2946.999	2	11589.487	1	0	2						
14		min	-3405.439	3	-8835.155	3	-894.388	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	69.213	4	471.354	1	-6.758	12	0	15	.164	1	0	4
2			min	3.947	12	-703.019	3	-148.801	1	-.015	2	.011	12	0	3
3		2	max	58.854	1	328.489	1	-5.489	12	0	15	.093	4	.533	3
4			min	3.947	12	-495.497	3	-113.742	1	-.015	2	.002	10	-.355	1
5		3	max	58.854	1	185.625	1	-4.219	12	0	15	.055	5	.881	3
6			min	3.947	12	-287.975	3	-78.682	1	-.015	2	-.038	1	-.584	1
7		4	max	58.854	1	42.76	1	-2.95	12	0	15	.031	5	1.045	3
8			min	3.947	12	-80.452	3	-43.623	1	-.015	2	-.093	1	-.685	1
9		5	max	58.854	1	127.07	3	.029	10	0	15	.009	5	1.024	3
10			min	3.947	12	-100.105	1	-26.451	4	-.015	2	-.116	1	-.66	1
11		6	max	58.854	1	334.592	3	26.496	1	0	15	-.005	12	.819	3
12			min	2.556	15	-242.969	1	-22.075	5	-.015	2	-.108	1	-.508	1
13		7	max	58.854	1	542.114	3	61.556	1	0	15	-.005	12	.429	3
14			min	-6.541	5	-385.834	1	-20.144	5	-.015	2	-.069	1	-.228	1
15		8	max	58.854	1	749.637	3	96.615	1	0	15	.004	2	.178	1
16			min	-17.03	5	-528.698	1	-18.212	5	-.015	2	-.048	4	-.145	3
17		9	max	58.854	1	957.159	3	131.675	1	0	15	.103	1	.712	1
18			min	-27.52	5	-671.563	1	-16.28	5	-.015	2	-.063	5	-.904	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
19		10	max	58.854	1	814.428	1	4.665	12	.004	14	.236	1	1.372	1
20			min	3.947	12	-1164.681	3	-166.734	1	-.015	2	.003	12	-1.847	3
21		11	max	58.854	1	671.563	1	-3.396	12	.015	2	.103	1	.712	1
22			min	3.947	12	-957.159	3	-131.675	1	0	15	-.002	3	-.904	3
23		12	max	58.854	1	528.698	1	-2.127	12	.015	2	.048	4	.178	1
24			min	3.947	12	-749.637	3	-96.615	1	0	15	-.005	3	-.145	3
25		13	max	58.854	1	385.834	1	-.858	12	.015	2	.023	5	.429	3
26			min	3.947	12	-542.114	3	-61.556	1	0	15	-.069	1	-.228	1
27		14	max	58.854	1	242.969	1	.749	3	.015	2	0	15	.819	3
28			min	1.66	15	-334.592	3	-30.744	4	0	15	-.108	1	-.508	1
29		15	max	58.854	1	100.105	1	8.563	1	.015	2	-.004	12	1.024	3
30			min	-7.951	5	-127.07	3	-22.979	5	0	15	-.116	1	-.66	1
31		16	max	58.854	1	80.452	3	43.623	1	.015	2	-.002	12	1.045	3
32			min	-18.44	5	-42.76	1	-21.047	5	0	15	-.093	1	-.685	1
33		17	max	58.854	1	287.975	3	78.682	1	.015	2	.002	3	.881	3
34			min	-28.93	5	-185.625	1	-19.116	5	0	15	-.068	4	-.584	1
35		18	max	58.854	1	495.497	3	113.742	1	.015	2	.047	1	.533	3
36			min	-39.419	5	-328.489	1	-17.184	5	0	15	-.075	5	-.355	1
37		19	max	58.854	1	703.019	3	148.801	1	.015	2	.164	1	0	1
38			min	-49.908	5	-471.354	1	-15.252	5	0	15	-.09	5	0	3
39	M14	1	max	47.664	4	539.398	1	-7.012	12	.013	3	.209	4	0	1
40			min	2.092	12	-573.172	3	-155.124	1	-.016	1	.013	12	0	3
41		2	max	37.175	4	396.533	1	-5.743	12	.013	3	.143	4	.439	3
42			min	2.092	12	-415.292	3	-120.065	1	-.016	1	.005	10	-.416	1
43		3	max	36.801	1	253.669	1	-4.474	12	.013	3	.085	5	.738	3
44			min	2.092	12	-257.412	3	-85.005	1	-.016	1	-.016	1	-.705	1
45		4	max	36.801	1	110.804	1	-3.205	12	.013	3	.048	5	.897	3
46			min	2.092	12	-99.533	3	-52.108	4	-.016	1	-.076	1	-.867	1
47		5	max	36.801	1	58.347	3	-.551	10	.013	3	.013	5	.915	3
48			min	-1.951	5	-32.061	1	-42.931	4	-.016	1	-.105	1	-.902	1
49		6	max	36.801	1	216.226	3	20.173	1	.013	3	-.004	12	.793	3
50			min	-12.44	5	-174.925	1	-36.89	5	-.016	1	-.102	1	-.81	1
51		7	max	36.801	1	374.106	3	55.233	1	.013	3	-.004	12	.531	3
52			min	-22.929	5	-317.79	1	-34.958	5	-.016	1	-.069	1	-.591	1
53		8	max	36.801	1	531.985	3	90.292	1	.013	3	.002	10	.128	3
54			min	-33.419	5	-460.655	1	-33.026	5	-.016	1	-.086	4	-.253	2
55		9	max	36.801	1	689.865	3	125.352	1	.013	3	.092	1	.228	1
56			min	-43.908	5	-603.519	1	-31.094	5	-.016	1	-.112	5	-.415	3
57		10	max	65.868	4	746.384	1	-4.411	12	.013	3	.219	1	.828	1
58			min	2.092	12	-847.745	3	-160.412	1	-.016	1	.002	12	-1.098	3
59		11	max	55.378	4	603.519	1	-3.141	12	.016	1	.143	4	.228	1
60			min	2.092	12	-689.865	3	-125.352	1	-.013	3	-.002	3	-.415	3
61		12	max	44.889	4	460.655	1	-1.872	12	.016	1	.083	4	.128	3
62			min	2.092	12	-531.985	3	-90.292	1	-.013	3	-.005	3	-.253	2
63		13	max	36.801	1	317.79	1	-.603	12	.016	1	.045	5	.531	3
64			min	2.092	12	-374.106	3	-55.233	1	-.013	3	-.069	1	-.591	1
65		14	max	36.801	1	174.925	1	1.133	3	.016	1	.01	5	.793	3
66			min	2.092	12	-216.226	3	-43.899	4	-.013	3	-.102	1	-.81	1
67		15	max	36.801	1	32.061	1	14.886	1	.016	1	-.003	12	.915	3
68			min	2.092	12	-58.347	3	-37.095	5	-.013	3	-.105	1	-.902	1
69		16	max	36.801	1	99.533	3	49.946	1	.016	1	0	12	.897	3
70			min	-4.853	5	-110.804	1	-35.163	5	-.013	3	-.076	1	-.867	1
71		17	max	36.801	1	257.412	3	85.005	1	.016	1	.004	3	.738	3
72			min	-15.342	5	-253.669	1	-33.232	5	-.013	3	-.092	4	-.705	1
73		18	max	36.801	1	415.292	3	120.065	1	.016	1	.075	1	.439	3
74			min	-25.831	5	-396.533	1	-31.3	5	-.013	3	-.115	5	-.416	1
75		19	max	36.801	1	573.172	3	155.124	1	.016	1	.198	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
76			min	-36.321	5	-539.398	1	-29.368	5	-.013	3	-.142	5	0	3
77	M15	1	max	80.563	5	678.818	2	-6.895	12	.016	2	.274	4	0	2
78			min	-38.831	1	-322.724	3	-155.111	1	-.011	3	.012	12	0	3
79		2	max	70.074	5	494.63	2	-5.626	12	.016	2	.194	4	.25	3
80			min	-38.831	1	-239.308	3	-120.052	1	-.011	3	.005	10	-.522	2
81		3	max	59.585	5	310.442	2	-4.357	12	.016	2	.122	5	.425	3
82			min	-38.831	1	-155.891	3	-84.992	1	-.011	3	-.016	1	-.879	2
83		4	max	49.095	5	126.254	2	-3.088	12	.016	2	.071	5	.527	3
84			min	-38.831	1	-72.475	3	-67.961	4	-.011	3	-.076	1	-1.073	2
85		5	max	38.606	5	10.941	3	-.607	10	.016	2	.021	5	.554	3
86			min	-38.831	1	-57.934	2	-58.784	4	-.011	3	-.105	1	-1.104	2
87		6	max	28.117	5	94.357	3	20.186	1	.016	2	-.004	12	.507	3
88			min	-38.831	1	-242.122	2	-52.725	5	-.011	3	-.102	1	-.97	2
89		7	max	17.627	5	177.774	3	55.246	1	.016	2	-.004	12	.387	3
90			min	-38.831	1	-426.31	2	-50.793	5	-.011	3	-.088	4	-.673	2
91		8	max	7.138	5	261.19	3	90.305	1	.016	2	.002	10	.191	3
92			min	-38.831	1	-610.499	2	-48.861	5	-.011	3	-.12	4	-.224	1
93		9	max	-2.189	15	344.606	3	125.365	1	.016	2	.092	1	.412	2
94			min	-38.831	1	-794.687	2	-46.929	5	-.011	3	-.159	5	-.078	3
95		10	max	-2.662	12	978.875	2	6.669	3	.016	2	.272	4	1.2	2
96			min	-38.831	1	-266.908	12	-160.424	1	-.011	3	.003	12	-.421	3
97		11	max	-.827	15	794.687	2	-3.259	12	.011	3	.19	4	.412	2
98			min	-38.831	1	-344.606	3	-125.365	1	-.016	2	-.001	3	-.078	3
99		12	max	-2.662	12	610.499	2	-1.989	12	.011	3	.117	4	.191	3
100			min	-38.831	1	-261.19	3	-90.305	1	-.016	2	-.005	3	-.224	1
101		13	max	-2.662	12	426.31	2	-.72	12	.011	3	.065	5	.387	3
102			min	-38.831	1	-177.774	3	-68.956	4	-.016	2	-.069	1	-.673	2
103		14	max	-2.662	12	242.122	2	.946	3	.011	3	.015	5	.507	3
104			min	-41.701	4	-94.357	3	-59.778	4	-.016	2	-.102	1	-.97	2
105		15	max	-2.662	12	57.934	2	14.873	1	.011	3	-.003	12	.554	3
106			min	-52.19	4	-10.941	3	-52.93	5	-.016	2	-.105	1	-1.104	2
107		16	max	-2.662	12	72.475	3	49.933	1	.011	3	-.001	12	.527	3
108			min	-62.679	4	-126.254	2	-50.998	5	-.016	2	-.096	4	-1.073	2
109		17	max	-2.662	12	155.891	3	84.992	1	.011	3	.004	3	.425	3
110			min	-73.169	4	-310.442	2	-49.066	5	-.016	2	-.128	4	-.879	2
111		18	max	-2.662	12	239.308	3	120.052	1	.011	3	.075	1	.25	3
112			min	-83.658	4	-494.63	2	-47.134	5	-.016	2	-.166	5	-.522	2
113		19	max	-2.662	12	322.724	3	155.111	1	.011	3	.197	1	0	2
114			min	-94.147	4	-678.818	2	-45.203	5	-.016	2	-.207	5	0	5
115	M16	1	max	76.165	5	613.433	2	-6.389	12	.011	1	.192	4	0	2
116			min	-65.556	1	-271.422	3	-149.326	1	-.012	3	.01	12	0	3
117		2	max	65.676	5	429.245	2	-5.12	12	.011	1	.129	4	.204	3
118			min	-65.556	1	-188.005	3	-114.267	1	-.012	3	.003	10	-.463	2
119		3	max	55.186	5	245.057	2	-3.851	12	.011	1	.081	5	.334	3
120			min	-65.556	1	-104.589	3	-79.207	1	-.012	3	-.037	1	-.763	2
121		4	max	44.697	5	60.869	2	-2.581	12	.011	1	.048	5	.39	3
122			min	-65.556	1	-21.173	3	-46.917	4	-.012	3	-.092	1	-.899	2
123		5	max	34.208	5	62.243	3	-.21	10	.011	1	.016	5	.372	3
124			min	-65.556	1	-123.319	2	-37.74	4	-.012	3	-.115	1	-.871	2
125		6	max	23.718	5	145.66	3	25.972	1	.011	1	-.005	12	.279	3
126			min	-65.556	1	-307.507	2	-33.221	5	-.012	3	-.108	1	-.68	2
127		7	max	13.229	5	229.076	3	61.031	1	.011	1	-.004	12	.113	3
128			min	-65.556	1	-491.695	2	-31.29	5	-.012	3	-.069	1	-.325	2
129		8	max	2.74	5	312.492	3	96.091	1	.011	1	.003	2	.194	2
130			min	-65.556	1	-675.883	2	-29.358	5	-.012	3	-.072	4	-.128	3
131		9	max	-3.882	12	395.909	3	131.15	1	.011	1	.102	1	.877	2
132			min	-65.556	1	-860.072	2	-27.426	5	-.012	3	-.096	5	-.443	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
133		10	max	-3.882	12	1044.26	2	-5.034	12	.011	1	.234	1	1.723	2
134			min	-65.556	1	-479.325	3	-166.21	1	-.012	3	.004	12	-.832	3
135		11	max	.578	5	860.072	2	-3.765	12	.012	3	.129	4	.877	2
136			min	-65.556	1	-395.909	3	-131.15	1	-.011	1	0	3	-.443	3
137		12	max	-3.882	12	675.883	2	-2.495	12	.012	3	.072	4	.194	2
138			min	-65.556	1	-312.492	3	-96.091	1	-.011	1	-.004	3	-.128	3
139		13	max	-3.882	12	491.695	2	-1.226	12	.012	3	.036	5	.113	3
140			min	-65.556	1	-229.076	3	-61.031	1	-.011	1	-.069	1	-.325	2
141		14	max	-3.882	12	307.507	2	.158	3	.012	3	.003	5	.279	3
142			min	-65.556	1	-145.66	3	-41.862	4	-.011	1	-.108	1	-.68	2
143		15	max	-3.882	12	123.319	2	9.088	1	.012	3	-.004	12	.372	3
144			min	-65.556	1	-62.243	3	-34.103	5	-.011	1	-.115	1	-.871	2
145		16	max	-3.882	12	21.173	3	44.147	1	.012	3	-.002	12	.39	3
146			min	-66.384	4	-60.869	2	-32.171	5	-.011	1	-.092	1	-.899	2
147		17	max	-3.882	12	104.589	3	79.207	1	.012	3	.001	3	.334	3
148			min	-76.873	4	-245.057	2	-30.239	5	-.011	1	-.094	4	-.763	2
149		18	max	-3.882	12	188.005	3	114.267	1	.012	3	.049	1	.204	3
150			min	-87.363	4	-429.245	2	-28.307	5	-.011	1	-.111	5	-.463	2
151		19	max	-3.882	12	271.422	3	149.326	1	.012	3	.166	1	0	2
152			min	-97.852	4	-613.433	2	-26.376	5	-.011	1	-.136	5	0	5
153	M2	1	max	1108.012	1	2.214	4	.693	1	0	3	0	3	0	1
154			min	-1303.178	3	.545	15	-50.432	4	0	1	0	1	0	1
155		2	max	1108.428	1	2.205	4	.693	1	0	3	0	1	0	15
156			min	-1302.866	3	.543	15	-50.792	4	0	1	-.014	4	0	4
157		3	max	1108.843	1	2.197	4	.693	1	0	3	0	1	0	15
158			min	-1302.554	3	.541	15	-51.153	4	0	1	-.028	4	-.001	4
159		4	max	1109.259	1	2.188	4	.693	1	0	3	0	1	0	15
160			min	-1302.242	3	.538	15	-51.513	4	0	1	-.043	4	-.002	4
161		5	max	1109.675	1	2.179	4	.693	1	0	3	0	1	0	15
162			min	-1301.93	3	.536	15	-51.874	4	0	1	-.057	4	-.002	4
163		6	max	1110.091	1	2.171	4	.693	1	0	3	0	1	0	15
164			min	-1301.618	3	.534	15	-52.234	4	0	1	-.072	4	-.003	4
165		7	max	1110.507	1	2.162	4	.693	1	0	3	.001	1	0	15
166			min	-1301.306	3	.532	15	-52.595	4	0	1	-.087	4	-.004	4
167		8	max	1110.923	1	2.153	4	.693	1	0	3	.001	1	-.001	15
168			min	-1300.994	3	.53	15	-52.955	4	0	1	-.101	4	-.004	4
169		9	max	1111.339	1	2.144	4	.693	1	0	3	.002	1	-.001	15
170			min	-1300.682	3	.528	15	-53.316	4	0	1	-.116	4	-.005	4
171		10	max	1111.755	1	2.136	4	.693	1	0	3	.002	1	-.001	15
172			min	-1300.371	3	.526	15	-53.676	4	0	1	-.131	4	-.005	4
173		11	max	1112.17	1	2.127	4	.693	1	0	3	.002	1	-.001	15
174			min	-1300.059	3	.524	15	-54.037	4	0	1	-.146	4	-.006	4
175		12	max	1112.586	1	2.118	4	.693	1	0	3	.002	1	-.002	15
176			min	-1299.747	3	.522	15	-54.397	4	0	1	-.162	4	-.007	4
177		13	max	1113.002	1	2.11	4	.693	1	0	3	.002	1	-.002	15
178			min	-1299.435	3	.52	15	-54.758	4	0	1	-.177	4	-.007	4
179		14	max	1113.418	1	2.101	4	.693	1	0	3	.003	1	-.002	15
180			min	-1299.123	3	.518	15	-55.118	4	0	1	-.192	4	-.008	4
181		15	max	1113.834	1	2.092	4	.693	1	0	3	.003	1	-.002	15
182			min	-1298.811	3	.516	15	-55.479	4	0	1	-.208	4	-.008	4
183		16	max	1114.25	1	2.083	4	.693	1	0	3	.003	1	-.002	15
184			min	-1298.499	3	.514	15	-55.839	4	0	1	-.223	4	-.009	4
185		17	max	1114.666	1	2.075	4	.693	1	0	3	.003	1	-.002	15
186			min	-1298.187	3	.512	15	-56.2	4	0	1	-.239	4	-.01	4
187		18	max	1115.082	1	2.066	4	.693	1	0	3	.003	1	-.003	15
188			min	-1297.875	3	.51	15	-56.56	4	0	1	-.255	4	-.01	4
189		19	max	1115.497	1	2.057	4	.693	1	0	3	.003	1	-.003	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
190			min	-1297.563	3	.508	15	-56.92	4	0	1	-.271	4	-.011	4
191	M3	1	max	538.447	2	9.135	4	.167	1	0	3	0	1	.011	4
192			min	-676.527	3	2.162	15	-3.112	5	0	4	-.005	4	.003	15
193		2	max	538.277	2	8.26	4	.167	1	0	3	0	1	.007	4
194			min	-676.655	3	1.956	15	-2.504	5	0	4	-.006	4	.001	12
195		3	max	538.106	2	7.386	4	.167	1	0	3	0	1	.003	2
196			min	-676.782	3	1.75	15	-1.895	5	0	4	-.007	4	0	3
197		4	max	537.936	2	6.511	4	.167	1	0	3	0	1	0	2
198			min	-676.91	3	1.545	15	-1.286	5	0	4	-.008	5	-.002	3
199		5	max	537.766	2	5.637	4	.167	1	0	3	0	1	0	15
200			min	-677.038	3	1.339	15	-.677	5	0	4	-.008	5	-.003	3
201		6	max	537.595	2	4.763	4	.167	1	0	3	0	1	-.001	15
202			min	-677.166	3	1.134	15	-.069	5	0	4	-.008	5	-.006	6
203		7	max	537.425	2	3.888	4	.598	4	0	3	0	1	-.002	15
204			min	-677.293	3	.928	15	.01	12	0	4	-.008	5	-.008	6
205		8	max	537.255	2	3.014	4	1.207	4	0	3	0	1	-.002	15
206			min	-677.421	3	.723	15	.01	12	0	4	-.008	5	-.009	6
207		9	max	537.084	2	2.139	4	1.815	4	0	3	0	1	-.002	15
208			min	-677.549	3	.517	15	.01	12	0	4	-.007	5	-.011	6
209		10	max	536.914	2	1.265	4	2.424	4	0	3	0	1	-.003	15
210			min	-677.677	3	.312	15	.01	12	0	4	-.006	5	-.011	6
211		11	max	536.744	2	.439	2	3.033	4	0	3	0	1	-.003	15
212			min	-677.804	3	-.015	3	.01	12	0	4	-.005	5	-.012	6
213		12	max	536.573	2	-.099	15	3.642	4	0	3	0	1	-.003	15
214			min	-677.932	3	-.526	3	.01	12	0	4	-.003	5	-.012	6
215		13	max	536.403	2	-.305	15	4.25	4	0	3	.001	1	-.003	15
216			min	-678.06	3	-1.36	6	.01	12	0	4	-.001	5	-.011	6
217		14	max	536.233	2	-.511	15	4.859	4	0	3	.001	1	-.002	15
218			min	-678.188	3	-2.234	6	.01	12	0	4	0	12	-.01	6
219		15	max	536.062	2	-.716	15	5.468	4	0	3	.003	4	-.002	15
220			min	-678.315	3	-3.109	6	.01	12	0	4	0	12	-.009	6
221		16	max	535.892	2	-.922	15	6.076	4	0	3	.006	4	-.002	15
222			min	-678.443	3	-3.983	6	.01	12	0	4	0	12	-.008	6
223		17	max	535.722	2	-1.127	15	6.685	4	0	3	.009	4	-.001	15
224			min	-678.571	3	-4.858	6	.01	12	0	4	0	12	-.005	6
225		18	max	535.551	2	-1.333	15	7.294	4	0	3	.013	4	0	15
226			min	-678.699	3	-5.732	6	.01	12	0	4	0	12	-.003	6
227		19	max	535.381	2	-1.538	15	7.903	4	0	3	.016	4	0	1
228			min	-678.826	3	-6.607	6	.01	12	0	4	0	12	0	1
229	M4	1	max	1164.896	1	0	1	-.563	12	0	1	.01	4	0	1
230			min	-249.12	3	0	1	-245.662	4	0	1	0	12	0	1
231		2	max	1165.066	1	0	1	-.563	12	0	1	0	12	0	1
232			min	-248.993	3	0	1	-245.81	4	0	1	-.019	4	0	1
233		3	max	1165.236	1	0	1	-.563	12	0	1	0	12	0	1
234			min	-248.865	3	0	1	-245.957	4	0	1	-.047	4	0	1
235		4	max	1165.407	1	0	1	-.563	12	0	1	0	12	0	1
236			min	-248.737	3	0	1	-246.105	4	0	1	-.075	4	0	1
237		5	max	1165.577	1	0	1	-.563	12	0	1	0	12	0	1
238			min	-248.609	3	0	1	-246.253	4	0	1	-.103	4	0	1
239		6	max	1165.747	1	0	1	-.563	12	0	1	0	12	0	1
240			min	-248.482	3	0	1	-246.4	4	0	1	-.132	4	0	1
241		7	max	1165.918	1	0	1	-.563	12	0	1	0	12	0	1
242			min	-248.354	3	0	1	-246.548	4	0	1	-.16	4	0	1
243		8	max	1166.088	1	0	1	-.563	12	0	1	0	12	0	1
244			min	-248.226	3	0	1	-246.696	4	0	1	-.188	4	0	1
245		9	max	1166.258	1	0	1	-.563	12	0	1	0	12	0	1
246			min	-248.098	3	0	1	-246.843	4	0	1	-.217	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
247		10	max	1166.429	1	0	1	-.563	12	0	1	0	12	0	1
248			min	-247.971	3	0	1	-246.991	4	0	1	-.245	4	0	1
249		11	max	1166.599	1	0	1	-.563	12	0	1	0	12	0	1
250			min	-247.843	3	0	1	-247.138	4	0	1	-.273	4	0	1
251		12	max	1166.769	1	0	1	-.563	12	0	1	0	12	0	1
252			min	-247.715	3	0	1	-247.286	4	0	1	-.302	4	0	1
253		13	max	1166.94	1	0	1	-.563	12	0	1	0	12	0	1
254			min	-247.587	3	0	1	-247.434	4	0	1	-.33	4	0	1
255		14	max	1167.11	1	0	1	-.563	12	0	1	0	12	0	1
256			min	-247.459	3	0	1	-247.581	4	0	1	-.359	4	0	1
257		15	max	1167.28	1	0	1	-.563	12	0	1	0	12	0	1
258			min	-247.332	3	0	1	-247.729	4	0	1	-.387	4	0	1
259		16	max	1167.451	1	0	1	-.563	12	0	1	0	12	0	1
260			min	-247.204	3	0	1	-247.877	4	0	1	-.415	4	0	1
261		17	max	1167.621	1	0	1	-.563	12	0	1	0	12	0	1
262			min	-247.076	3	0	1	-248.024	4	0	1	-.444	4	0	1
263		18	max	1167.791	1	0	1	-.563	12	0	1	-.001	12	0	1
264			min	-246.948	3	0	1	-248.172	4	0	1	-.472	4	0	1
265		19	max	1167.962	1	0	1	-.563	12	0	1	-.001	12	0	1
266			min	-246.821	3	0	1	-248.32	4	0	1	-.501	4	0	1
267	M6	1	max	3402.266	1	2.602	2	0	1	0	1	0	4	0	1
268			min	-4105.44	3	.112	3	-50.959	4	0	1	0	1	0	1
269		2	max	3402.682	1	2.595	2	0	1	0	1	0	1	0	3
270			min	-4105.128	3	.107	3	-51.319	4	0	1	-.014	4	0	2
271		3	max	3403.098	1	2.588	2	0	1	0	1	0	1	0	3
272			min	-4104.816	3	.102	3	-51.679	4	0	1	-.029	4	-.001	2
273		4	max	3403.514	1	2.581	2	0	1	0	1	0	1	0	3
274			min	-4104.505	3	.097	3	-52.04	4	0	1	-.043	4	-.002	2
275		5	max	3403.93	1	2.575	2	0	1	0	1	0	1	0	3
276			min	-4104.193	3	.091	3	-52.4	4	0	1	-.058	4	-.003	2
277		6	max	3404.346	1	2.568	2	0	1	0	1	0	1	0	3
278			min	-4103.881	3	.086	3	-52.761	4	0	1	-.073	4	-.004	2
279		7	max	3404.761	1	2.561	2	0	1	0	1	0	1	0	3
280			min	-4103.569	3	.081	3	-53.121	4	0	1	-.088	4	-.004	2
281		8	max	3405.177	1	2.554	2	0	1	0	1	0	1	0	3
282			min	-4103.257	3	.076	3	-53.482	4	0	1	-.102	4	-.005	2
283		9	max	3405.593	1	2.547	2	0	1	0	1	0	1	0	3
284			min	-4102.945	3	.071	3	-53.842	4	0	1	-.118	4	-.006	2
285		10	max	3406.009	1	2.541	2	0	1	0	1	0	1	0	3
286			min	-4102.633	3	.066	3	-54.203	4	0	1	-.133	4	-.006	2
287		11	max	3406.425	1	2.534	2	0	1	0	1	0	1	0	3
288			min	-4102.321	3	.061	3	-54.563	4	0	1	-.148	4	-.007	2
289		12	max	3406.841	1	2.527	2	0	1	0	1	0	1	0	3
290			min	-4102.009	3	.056	3	-54.924	4	0	1	-.163	4	-.008	2
291		13	max	3407.257	1	2.52	2	0	1	0	1	0	1	0	3
292			min	-4101.697	3	.051	3	-55.284	4	0	1	-.179	4	-.009	2
293		14	max	3407.673	1	2.514	2	0	1	0	1	0	1	0	3
294			min	-4101.385	3	.046	3	-55.645	4	0	1	-.194	4	-.009	2
295		15	max	3408.088	1	2.507	2	0	1	0	1	0	1	0	3
296			min	-4101.074	3	.041	3	-56.005	4	0	1	-.21	4	-.01	2
297		16	max	3408.504	1	2.5	2	0	1	0	1	0	1	0	3
298			min	-4100.762	3	.035	3	-56.366	4	0	1	-.226	4	-.011	2
299		17	max	3408.92	1	2.493	2	0	1	0	1	0	1	0	3
300			min	-4100.45	3	.03	3	-56.726	4	0	1	-.242	4	-.011	2
301		18	max	3409.336	1	2.486	2	0	1	0	1	0	1	0	3
302			min	-4100.138	3	.025	3	-57.087	4	0	1	-.257	4	-.012	2
303		19	max	3409.752	1	2.48	2	0	1	0	1	0	1	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
304			min	-4099.826	3	.02	3	-57.447	4	0	1	-.274	4	-.013	2
305	M7	1	max	1874.908	2	9.136	6	0	1	0	1	0	1	.013	2
306			min	-2038.599	3	2.144	15	-3.315	5	0	4	-.005	4	0	3
307		2	max	1874.737	2	8.261	6	0	1	0	1	0	1	.009	2
308			min	-2038.727	3	1.939	15	-2.706	5	0	4	-.006	4	-.002	3
309		3	max	1874.567	2	7.387	6	0	1	0	1	0	1	.006	2
310			min	-2038.855	3	1.733	15	-2.097	5	0	4	-.007	4	-.004	3
311		4	max	1874.397	2	6.512	6	0	1	0	1	0	1	.003	2
312			min	-2038.983	3	1.527	15	-1.489	5	0	4	-.008	4	-.005	3
313		5	max	1874.226	2	5.638	6	0	1	0	1	0	1	0	2
314			min	-2039.11	3	1.322	15	-.88	5	0	4	-.009	4	-.007	3
315		6	max	1874.056	2	4.764	6	0	1	0	1	0	1	-.001	2
316			min	-2039.238	3	1.116	15	-.271	5	0	4	-.009	4	-.008	3
317		7	max	1873.886	2	3.889	6	.355	4	0	1	0	1	-.002	15
318			min	-2039.366	3	.911	15	0	1	0	4	-.009	4	-.008	3
319		8	max	1873.715	2	3.015	6	.964	4	0	1	0	1	-.002	15
320			min	-2039.494	3	.705	15	0	1	0	4	-.008	4	-.009	4
321		9	max	1873.545	2	2.186	2	1.572	4	0	1	0	1	-.003	15
322			min	-2039.621	3	.395	12	0	1	0	4	-.008	4	-.011	4
323		10	max	1873.375	2	1.505	2	2.181	4	0	1	0	1	-.003	15
324			min	-2039.749	3	.039	3	0	1	0	4	-.007	4	-.011	4
325		11	max	1873.204	2	.823	2	2.79	4	0	1	0	1	-.003	15
326			min	-2039.877	3	-.472	3	0	1	0	4	-.006	4	-.012	4
327		12	max	1873.034	2	.142	2	3.398	4	0	1	0	1	-.003	15
328			min	-2040.005	3	-.983	3	0	1	0	4	-.004	5	-.012	4
329		13	max	1872.864	2	-.323	15	4.007	4	0	1	0	1	-.003	15
330			min	-2040.132	3	-1.494	3	0	1	0	4	-.003	5	-.011	4
331		14	max	1872.693	2	-.528	15	4.616	4	0	1	0	1	-.002	15
332			min	-2040.26	3	-2.232	4	0	1	0	4	0	5	-.01	4
333		15	max	1872.523	2	-.734	15	5.224	4	0	1	.002	4	-.002	15
334			min	-2040.388	3	-3.106	4	0	1	0	4	0	1	-.009	4
335		16	max	1872.353	2	-.939	15	5.833	4	0	1	.004	4	-.002	15
336			min	-2040.516	3	-3.981	4	0	1	0	4	0	1	-.008	4
337		17	max	1872.182	2	-1.145	15	6.442	4	0	1	.007	4	-.001	15
338			min	-2040.644	3	-4.855	4	0	1	0	4	0	1	-.005	4
339		18	max	1872.012	2	-1.35	15	7.051	4	0	1	.011	4	0	15
340			min	-2040.771	3	-5.73	4	0	1	0	4	0	1	-.003	4
341		19	max	1871.841	2	-1.556	15	7.659	4	0	1	.014	4	0	1
342			min	-2040.899	3	-6.604	4	0	1	0	4	0	1	0	1
343	M8	1	max	3243.64	1	0	1	0	1	0	1	.008	4	0	1
344			min	-841.636	3	0	1	-237.074	4	0	1	0	1	0	1
345		2	max	3243.81	1	0	1	0	1	0	1	0	1	0	1
346			min	-841.508	3	0	1	-237.222	4	0	1	-.019	4	0	1
347		3	max	3243.981	1	0	1	0	1	0	1	0	1	0	1
348			min	-841.38	3	0	1	-237.37	4	0	1	-.046	4	0	1
349		4	max	3244.151	1	0	1	0	1	0	1	0	1	0	1
350			min	-841.253	3	0	1	-237.517	4	0	1	-.073	4	0	1
351		5	max	3244.321	1	0	1	0	1	0	1	0	1	0	1
352			min	-841.125	3	0	1	-237.665	4	0	1	-.101	4	0	1
353		6	max	3244.492	1	0	1	0	1	0	1	0	1	0	1
354			min	-840.997	3	0	1	-237.812	4	0	1	-.128	4	0	1
355		7	max	3244.662	1	0	1	0	1	0	1	0	1	0	1
356			min	-840.869	3	0	1	-237.96	4	0	1	-.155	4	0	1
357		8	max	3244.832	1	0	1	0	1	0	1	0	1	0	1
358			min	-840.742	3	0	1	-238.108	4	0	1	-.183	4	0	1
359		9	max	3245.003	1	0	1	0	1	0	1	0	1	0	1
360			min	-840.614	3	0	1	-238.255	4	0	1	-.21	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
361		10	max	3245.173	1	0	1	0	1	0	1	0	1	0	1
362			min	-840.486	3	0	1	-238.403	4	0	1	-.237	4	0	1
363		11	max	3245.343	1	0	1	0	1	0	1	0	1	0	1
364			min	-840.358	3	0	1	-238.551	4	0	1	-.265	4	0	1
365		12	max	3245.514	1	0	1	0	1	0	1	0	1	0	1
366			min	-840.23	3	0	1	-238.698	4	0	1	-.292	4	0	1
367		13	max	3245.684	1	0	1	0	1	0	1	0	1	0	1
368			min	-840.103	3	0	1	-238.846	4	0	1	-.32	4	0	1
369		14	max	3245.854	1	0	1	0	1	0	1	0	1	0	1
370			min	-839.975	3	0	1	-238.994	4	0	1	-.347	4	0	1
371		15	max	3246.025	1	0	1	0	1	0	1	0	1	0	1
372			min	-839.847	3	0	1	-239.141	4	0	1	-.374	4	0	1
373		16	max	3246.195	1	0	1	0	1	0	1	0	1	0	1
374			min	-839.719	3	0	1	-239.289	4	0	1	-.402	4	0	1
375		17	max	3246.365	1	0	1	0	1	0	1	0	1	0	1
376			min	-839.592	3	0	1	-239.436	4	0	1	-.429	4	0	1
377		18	max	3246.536	1	0	1	0	1	0	1	0	1	0	1
378			min	-839.464	3	0	1	-239.584	4	0	1	-.457	4	0	1
379		19	max	3246.706	1	0	1	0	1	0	1	0	1	0	1
380			min	-839.336	3	0	1	-239.732	4	0	1	-.484	4	0	1
381	M10	1	max	1108.012	1	2.102	6	-.045	12	0	1	0	4	0	1
382			min	-1303.178	3	.47	15	-50.801	4	0	3	0	3	0	1
383		2	max	1108.428	1	2.094	6	-.045	12	0	1	0	10	0	15
384			min	-1302.866	3	.468	15	-51.161	4	0	3	-.014	4	0	6
385		3	max	1108.843	1	2.085	6	-.045	12	0	1	0	10	0	15
386			min	-1302.554	3	.465	15	-51.522	4	0	3	-.029	4	-.001	6
387		4	max	1109.259	1	2.076	6	-.045	12	0	1	0	10	0	15
388			min	-1302.242	3	.463	15	-51.882	4	0	3	-.043	4	-.002	6
389		5	max	1109.675	1	2.068	6	-.045	12	0	1	0	10	0	15
390			min	-1301.93	3	.461	15	-52.243	4	0	3	-.058	4	-.002	6
391		6	max	1110.091	1	2.059	6	-.045	12	0	1	0	12	0	15
392			min	-1301.618	3	.459	15	-52.603	4	0	3	-.072	4	-.003	6
393		7	max	1110.507	1	2.05	6	-.045	12	0	1	0	12	0	15
394			min	-1301.306	3	.457	15	-52.963	4	0	3	-.087	4	-.003	6
395		8	max	1110.923	1	2.041	6	-.045	12	0	1	0	12	0	15
396			min	-1300.994	3	.455	15	-53.324	4	0	3	-.102	4	-.004	6
397		9	max	1111.339	1	2.033	6	-.045	12	0	1	0	12	-.001	15
398			min	-1300.682	3	.453	15	-53.684	4	0	3	-.117	4	-.005	6
399		10	max	1111.755	1	2.024	6	-.045	12	0	1	0	12	-.001	15
400			min	-1300.371	3	.451	15	-54.045	4	0	3	-.132	4	-.005	6
401		11	max	1112.17	1	2.015	6	-.045	12	0	1	0	12	-.001	15
402			min	-1300.059	3	.449	15	-54.405	4	0	3	-.147	4	-.006	6
403		12	max	1112.586	1	2.007	6	-.045	12	0	1	0	12	-.001	15
404			min	-1299.747	3	.447	15	-54.766	4	0	3	-.163	4	-.006	6
405		13	max	1113.002	1	1.998	6	-.045	12	0	1	0	12	-.002	15
406			min	-1299.435	3	.445	15	-55.126	4	0	3	-.178	4	-.007	6
407		14	max	1113.418	1	1.989	6	-.045	12	0	1	0	12	-.002	15
408			min	-1299.123	3	.443	15	-55.487	4	0	3	-.194	4	-.007	6
409		15	max	1113.834	1	1.98	6	-.045	12	0	1	0	12	-.002	15
410			min	-1298.811	3	.441	15	-55.847	4	0	3	-.209	4	-.008	6
411		16	max	1114.25	1	1.972	6	-.045	12	0	1	0	12	-.002	15
412			min	-1298.499	3	.439	15	-56.208	4	0	3	-.225	4	-.009	6
413		17	max	1114.666	1	1.963	6	-.045	12	0	1	0	12	-.002	15
414			min	-1298.187	3	.437	15	-56.568	4	0	3	-.241	4	-.009	6
415		18	max	1115.082	1	1.954	6	-.045	12	0	1	0	12	-.002	15
416			min	-1297.875	3	.435	15	-56.929	4	0	3	-.257	4	-.01	6
417		19	max	1115.497	1	1.946	6	-.045	12	0	1	0	12	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
418			min	-1297.563	3	.433	15	-57.289	4	0	3	-.273	4	-.01	6
419	M11	1	max	538.447	2	9.069	6	-.01	12	0	1	0	12	.01	6
420			min	-676.527	3	2.117	15	-3.142	4	0	4	-.005	4	.002	15
421		2	max	538.277	2	8.194	6	-.01	12	0	1	0	12	.006	2
422			min	-676.655	3	1.912	15	-2.534	4	0	4	-.006	4	.001	15
423		3	max	538.106	2	7.32	6	-.01	12	0	1	0	12	.003	2
424			min	-676.782	3	1.706	15	-1.925	4	0	4	-.007	4	0	3
425		4	max	537.936	2	6.445	6	-.01	12	0	1	0	12	0	2
426			min	-676.91	3	1.5	15	-1.316	4	0	4	-.008	4	-.002	3
427		5	max	537.766	2	5.571	6	-.01	12	0	1	0	12	0	15
428			min	-677.038	3	1.295	15	-.708	4	0	4	-.008	4	-.004	4
429		6	max	537.595	2	4.696	6	-.01	12	0	1	0	12	-.002	15
430			min	-677.166	3	1.089	15	-.167	1	0	4	-.008	4	-.006	4
431		7	max	537.425	2	3.822	6	.522	5	0	1	0	12	-.002	15
432			min	-677.293	3	.884	15	-.167	1	0	4	-.008	4	-.008	4
433		8	max	537.255	2	2.947	6	1.131	5	0	1	0	12	-.002	15
434			min	-677.421	3	.678	15	-.167	1	0	4	-.008	4	-.01	4
435		9	max	537.084	2	2.073	6	1.739	5	0	1	0	12	-.003	15
436			min	-677.549	3	.473	15	-.167	1	0	4	-.007	4	-.011	4
437		10	max	536.914	2	1.199	6	2.348	5	0	1	0	12	-.003	15
438			min	-677.677	3	.267	15	-.167	1	0	4	-.006	4	-.012	4
439		11	max	536.744	2	.439	2	2.957	5	0	1	0	12	-.003	15
440			min	-677.804	3	-.015	3	-.167	1	0	4	-.005	4	-.012	4
441		12	max	536.573	2	-.144	15	3.565	5	0	1	0	12	-.003	15
442			min	-677.932	3	-.552	4	-.167	1	0	4	-.004	4	-.012	4
443		13	max	536.403	2	-.349	15	4.174	5	0	1	0	12	-.003	15
444			min	-678.06	3	-1.426	4	-.167	1	0	4	-.002	4	-.012	4
445		14	max	536.233	2	-.555	15	4.783	5	0	1	0	5	-.003	15
446			min	-678.188	3	-2.3	4	-.167	1	0	4	-.001	1	-.011	4
447		15	max	536.062	2	-.761	15	5.392	5	0	1	.003	5	-.002	15
448			min	-678.315	3	-3.175	4	-.167	1	0	4	-.001	1	-.009	4
449		16	max	535.892	2	-.966	15	6	5	0	1	.006	5	-.002	15
450			min	-678.443	3	-4.049	4	-.167	1	0	4	-.001	1	-.008	4
451		17	max	535.722	2	-1.172	15	6.609	5	0	1	.009	5	-.001	15
452			min	-678.571	3	-4.924	4	-.167	1	0	4	-.001	1	-.005	4
453		18	max	535.551	2	-1.377	15	7.218	5	0	1	.012	5	0	15
454			min	-678.699	3	-5.798	4	-.167	1	0	4	-.001	1	-.003	4
455		19	max	535.381	2	-1.583	15	7.826	5	0	1	.016	5	0	1
456			min	-678.826	3	-6.673	4	-.167	1	0	4	-.001	1	0	1
457	M12	1	max	1164.896	1	0	1	9.801	1	0	1	.009	5	0	1
458			min	-249.12	3	0	1	-240.427	4	0	1	0	1	0	1
459		2	max	1165.066	1	0	1	9.801	1	0	1	0	1	0	1
460			min	-248.993	3	0	1	-240.575	4	0	1	-.018	4	0	1
461		3	max	1165.236	1	0	1	9.801	1	0	1	.001	1	0	1
462			min	-248.865	3	0	1	-240.722	4	0	1	-.046	4	0	1
463		4	max	1165.407	1	0	1	9.801	1	0	1	.003	1	0	1
464			min	-248.737	3	0	1	-240.87	4	0	1	-.074	4	0	1
465		5	max	1165.577	1	0	1	9.801	1	0	1	.004	1	0	1
466			min	-248.609	3	0	1	-241.018	4	0	1	-.101	4	0	1
467		6	max	1165.747	1	0	1	9.801	1	0	1	.005	1	0	1
468			min	-248.482	3	0	1	-241.165	4	0	1	-.129	4	0	1
469		7	max	1165.918	1	0	1	9.801	1	0	1	.006	1	0	1
470			min	-248.354	3	0	1	-241.313	4	0	1	-.157	4	0	1
471		8	max	1166.088	1	0	1	9.801	1	0	1	.007	1	0	1
472			min	-248.226	3	0	1	-241.46	4	0	1	-.185	4	0	1
473		9	max	1166.258	1	0	1	9.801	1	0	1	.008	1	0	1
474			min	-248.098	3	0	1	-241.608	4	0	1	-.212	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
475		10	max	1166.429	1	0	1	9.801	1	0	1	.009	1	0	1
476			min	-247.971	3	0	1	-241.756	4	0	1	-.24	4	0	1
477		11	max	1166.599	1	0	1	9.801	1	0	1	.01	1	0	1
478			min	-247.843	3	0	1	-241.903	4	0	1	-.268	4	0	1
479		12	max	1166.769	1	0	1	9.801	1	0	1	.012	1	0	1
480			min	-247.715	3	0	1	-242.051	4	0	1	-.296	4	0	1
481		13	max	1166.94	1	0	1	9.801	1	0	1	.013	1	0	1
482			min	-247.587	3	0	1	-242.199	4	0	1	-.323	4	0	1
483		14	max	1167.11	1	0	1	9.801	1	0	1	.014	1	0	1
484			min	-247.459	3	0	1	-242.346	4	0	1	-.351	4	0	1
485		15	max	1167.28	1	0	1	9.801	1	0	1	.015	1	0	1
486			min	-247.332	3	0	1	-242.494	4	0	1	-.379	4	0	1
487		16	max	1167.451	1	0	1	9.801	1	0	1	.016	1	0	1
488			min	-247.204	3	0	1	-242.641	4	0	1	-.407	4	0	1
489		17	max	1167.621	1	0	1	9.801	1	0	1	.017	1	0	1
490			min	-247.076	3	0	1	-242.789	4	0	1	-.435	4	0	1
491		18	max	1167.791	1	0	1	9.801	1	0	1	.018	1	0	1
492			min	-246.948	3	0	1	-242.937	4	0	1	-.463	4	0	1
493		19	max	1167.962	1	0	1	9.801	1	0	1	.019	1	0	1
494			min	-246.821	3	0	1	-243.084	4	0	1	-.491	4	0	1
495	M1	1	max	148.806	1	702.97	3	49.874	5	0	1	.164	1	0	15
496			min	-15.252	5	-469.288	1	-58.773	1	0	3	-.09	5	-.015	2
497		2	max	149.382	1	701.782	3	51.334	5	0	1	.128	1	.278	1
498			min	-14.983	5	-470.871	1	-58.773	1	0	3	-.058	5	-.44	3
499		3	max	437.388	3	570.023	1	3.579	5	0	3	.091	1	.559	1
500			min	-280.795	2	-534.974	3	-58.26	1	0	1	-.026	5	-.861	3
501		4	max	437.82	3	568.44	1	5.039	5	0	3	.055	1	.206	1
502			min	-280.219	2	-536.162	3	-58.26	1	0	1	-.024	5	-.529	3
503		5	max	438.253	3	566.856	1	6.499	5	0	3	.019	1	-.005	15
504			min	-279.643	2	-537.349	3	-58.26	1	0	1	-.02	5	-.196	3
505		6	max	438.685	3	565.273	1	7.96	5	0	3	-.001	12	.138	3
506			min	-279.066	2	-538.537	3	-58.26	1	0	1	-.019	4	-.509	2
507		7	max	439.117	3	563.69	1	9.42	5	0	3	-.003	12	.473	3
508			min	-278.49	2	-539.724	3	-58.26	1	0	1	-.054	1	-.848	1
509		8	max	439.549	3	562.107	1	10.88	5	0	3	-.003	15	.808	3
510			min	-277.914	2	-540.911	3	-58.26	1	0	1	-.09	1	-1.197	1
511		9	max	450.633	3	45.104	2	48.537	5	0	9	.058	1	.942	3
512			min	-217.545	2	.475	15	-95.104	1	0	3	-.126	5	-1.362	1
513		10	max	451.065	3	43.521	2	49.997	5	0	9	0	10	.921	3
514			min	-216.968	2	-.007	5	-95.104	1	0	3	-.096	4	-1.377	2
515		11	max	451.497	3	41.937	2	51.458	5	0	9	-.004	12	.9	3
516			min	-216.392	2	-1.995	4	-95.104	1	0	3	-.076	4	-1.404	2
517		12	max	462.395	3	358.921	3	137.965	5	0	2	.088	1	.788	3
518			min	-155.951	2	-636.22	2	-56.291	1	0	3	-.217	5	-1.245	2
519		13	max	462.827	3	357.734	3	139.425	5	0	2	.053	1	.566	3
520			min	-155.375	2	-637.803	2	-56.291	1	0	3	-.131	5	-.85	1
521		14	max	463.26	3	356.547	3	140.885	5	0	2	.018	1	.344	3
522			min	-154.798	2	-639.386	2	-56.291	1	0	3	-.044	5	-.469	1
523		15	max	463.692	3	355.359	3	142.345	5	0	2	.044	5	.123	3
524			min	-154.222	2	-640.97	2	-56.291	1	0	3	-.017	1	-.088	1
525		16	max	464.124	3	354.172	3	143.805	5	0	2	.132	5	.342	2
526			min	-153.646	2	-642.553	2	-56.291	1	0	3	-.052	1	-.097	3
527		17	max	464.556	3	352.985	3	145.266	5	0	2	.222	5	.742	2
528			min	-153.07	2	-644.136	2	-56.291	1	0	3	-.087	1	-.316	3
529		18	max	26.106	5	615.747	2	-3.882	12	0	5	.188	5	.373	2
530			min	-149.898	1	-270.324	3	-99.33	4	0	2	-.126	1	-.156	3
531		19	max	26.375	5	614.164	2	-3.882	12	0	5	.136	5	.012	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
532			min	-149.322	1	-271.512	3	-97.87	4	0	2	-.166	1	-.011	1
533	M5	1	max	333.459	1	2329.311	3	82.542	5	0	1	0	1	.03	2
534			min	9.332	12	-1620.071	1	0	1	0	4	-.182	4	0	15
535		2	max	334.035	1	2328.124	3	84.002	5	0	1	0	1	1.033	1
536			min	9.62	12	-1621.655	1	0	1	0	4	-.131	4	-1.438	3
537		3	max	1353.395	3	1557.998	1	39.247	4	0	4	0	1	2.005	1
538			min	-908.06	2	-1584.215	3	0	1	0	1	-.079	4	-2.839	3
539		4	max	1353.827	3	1556.415	1	40.707	4	0	4	0	1	1.039	1
540			min	-907.484	2	-1585.402	3	0	1	0	1	-.054	4	-1.856	3
541		5	max	1354.26	3	1554.832	1	42.168	4	0	4	0	1	.073	1
542			min	-906.908	2	-1586.589	3	0	1	0	1	-.029	4	-.871	3
543		6	max	1354.692	3	1553.249	1	43.628	4	0	4	0	1	.114	3
544			min	-906.332	2	-1587.777	3	0	1	0	1	-.002	5	-.919	2
545		7	max	1355.124	3	1551.665	1	45.088	4	0	4	.025	4	1.099	3
546			min	-905.755	2	-1588.964	3	0	1	0	1	0	1	-1.855	1
547		8	max	1355.556	3	1550.082	1	46.548	4	0	4	.054	4	2.086	3
548			min	-905.179	2	-1590.151	3	0	1	0	1	0	1	-2.817	1
549		9	max	1368.954	3	152.402	2	160.851	4	0	1	0	1	2.406	3
550			min	-775.751	2	.478	15	0	1	0	1	-.182	4	-3.202	1
551		10	max	1369.387	3	150.819	2	162.312	4	0	1	0	1	2.324	3
552			min	-775.175	2	0	15	0	1	0	1	-.082	5	-3.252	1
553		11	max	1369.819	3	149.236	2	163.772	4	0	1	.019	4	2.242	3
554			min	-774.598	2	-1.803	6	0	1	0	1	0	1	-3.344	2
555		12	max	1383.589	3	1019.334	3	187.361	4	0	1	0	1	1.962	3
556			min	-645.314	2	-1787.869	2	0	1	0	4	-.304	4	-2.987	2
557		13	max	1384.021	3	1018.146	3	188.821	4	0	1	0	1	1.33	3
558			min	-644.738	2	-1789.452	2	0	1	0	4	-.188	4	-1.877	2
559		14	max	1384.453	3	1016.959	3	190.281	4	0	1	0	1	.698	3
560			min	-644.162	2	-1791.035	2	0	1	0	4	-.07	4	-.812	1
561		15	max	1384.885	3	1015.771	3	191.741	4	0	1	.049	4	.346	2
562			min	-643.585	2	-1792.618	2	0	1	0	4	0	1	0	15
563		16	max	1385.317	3	1014.584	3	193.202	4	0	1	.168	4	1.459	2
564			min	-643.009	2	-1794.201	2	0	1	0	4	0	1	-.563	3
565		17	max	1385.749	3	1013.397	3	194.662	4	0	1	.288	4	2.573	2
566			min	-642.433	2	-1795.784	2	0	1	0	4	0	1	-1.192	3
567		18	max	-10.355	12	2093.016	2	0	1	0	4	.287	4	1.316	2
568			min	-333.003	1	-957.78	3	-30.826	5	0	1	0	1	-.62	3
569		19	max	-10.067	12	2091.433	2	0	1	0	4	.269	4	.021	1
570			min	-332.427	1	-958.967	3	-29.366	5	0	1	0	1	-.025	3
571	M9	1	max	148.806	1	702.97	3	69.351	4	0	3	-.011	12	0	15
572			min	6.757	12	-469.288	1	3.947	12	0	4	-.164	1	-.015	2
573		2	max	149.382	1	701.782	3	70.811	4	0	3	-.009	12	.278	1
574			min	7.045	12	-470.871	1	3.947	12	0	4	-.128	1	-.44	3
575		3	max	437.388	3	570.023	1	58.26	1	0	1	-.006	12	.559	1
576			min	-280.795	2	-534.974	3	3.898	12	0	3	-.091	1	-.861	3
577		4	max	437.82	3	568.44	1	58.26	1	0	1	-.004	12	.206	1
578			min	-280.219	2	-536.162	3	3.898	12	0	3	-.055	1	-.529	3
579		5	max	438.253	3	566.856	1	58.26	1	0	1	-.001	12	-.005	15
580			min	-279.643	2	-537.349	3	3.898	12	0	3	-.027	4	-.196	3
581		6	max	438.685	3	565.273	1	58.26	1	0	1	.017	1	.138	3
582			min	-279.066	2	-538.537	3	3.898	12	0	3	-.014	5	-.509	2
583		7	max	439.117	3	563.69	1	58.26	1	0	1	.054	1	.473	3
584			min	-278.49	2	-539.724	3	3.898	12	0	3	-.004	5	-.848	1
585		8	max	439.549	3	562.107	1	58.26	1	0	1	.09	1	.808	3
586			min	-277.914	2	-540.911	3	3.898	12	0	3	.004	15	-1.197	1
587		9	max	450.633	3	45.104	2	95.104	1	0	3	-.004	12	.942	3
588			min	-217.545	2	.489	15	5.986	12	0	9	-.145	4	-1.362	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
589		10	max	451.065	3	43.521	2	95.104	1	0	3	0	1	.921	3
590			min	-216.968	2	.011	15	5.986	12	0	9	-.095	4	-1.377	2
591		11	max	451.497	3	41.937	2	95.104	1	0	3	.06	1	.9	3
592			min	-216.392	2	-1.883	6	5.986	12	0	9	-.057	5	-1.404	2
593		12	max	462.395	3	358.921	3	158.12	4	0	3	-.005	12	.788	3
594			min	-155.951	2	-636.22	2	3.328	12	0	2	-.248	4	-1.245	2
595		13	max	462.827	3	357.734	3	159.58	4	0	3	-.003	12	.566	3
596			min	-155.375	2	-637.803	2	3.328	12	0	2	-.15	4	-.85	1
597		14	max	463.26	3	356.547	3	161.04	4	0	3	-.001	12	.344	3
598			min	-154.798	2	-639.386	2	3.328	12	0	2	-.05	4	-.469	1
599		15	max	463.692	3	355.359	3	162.5	4	0	3	.05	4	.123	3
600			min	-154.222	2	-640.97	2	3.328	12	0	2	0	12	-.088	1
601		16	max	464.124	3	354.172	3	163.96	4	0	3	.151	4	.342	2
602			min	-153.646	2	-642.553	2	3.328	12	0	2	.003	12	-.097	3
603		17	max	464.556	3	352.985	3	165.42	4	0	3	.254	4	.742	2
604			min	-153.07	2	-644.136	2	3.328	12	0	2	.005	12	-.316	3
605		18	max	-6.678	12	615.747	2	65.634	1	0	2	.231	4	.373	2
606			min	-149.898	1	-270.324	3	-77.775	5	0	3	.007	12	-.156	3
607		19	max	-6.389	12	614.164	2	65.634	1	0	2	.192	4	.012	3
608			min	-149.322	1	-271.512	3	-76.315	5	0	3	.01	12	-.011	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.211	2	.009	3	1.43e-2	2	NC	1	NC	1
2			min	-.625	4	-.054	3	-.005	2	-3.449e-3	3	NC	1	NC	1
3		2	max	0	1	.13	2	.019	1	1.546e-2	2	NC	4	NC	2
4			min	-.625	4	.004	15	-.012	5	-3.148e-3	3	1096.985	3	9832.153	1
5		3	max	0	1	.263	3	.045	1	1.661e-2	2	NC	5	NC	2
6			min	-.625	4	.002	15	-.015	5	-2.848e-3	3	604.503	3	4233.635	1
7		4	max	0	1	.352	3	.067	1	1.777e-2	2	NC	5	NC	3
8			min	-.625	4	-.007	9	-.012	5	-2.547e-3	3	472.976	3	2878.751	1
9		5	max	0	1	.375	3	.077	1	1.892e-2	2	NC	5	NC	3
10			min	-.625	4	-.005	9	-.005	5	-2.247e-3	3	446.793	3	2502.836	1
11		6	max	0	1	.336	3	.072	1	2.008e-2	2	NC	5	NC	3
12			min	-.625	4	.002	15	0	10	-1.946e-3	3	491.949	3	2648.96	1
13		7	max	0	1	.246	3	.055	1	2.124e-2	2	NC	4	NC	2
14			min	-.625	4	.004	15	-.003	10	-1.646e-3	3	639	3	3490.619	1
15		8	max	0	1	.261	2	.029	1	2.239e-2	2	NC	4	NC	2
16			min	-.625	4	.006	15	-.007	10	-1.345e-3	3	1039.437	3	6572.367	1
17		9	max	0	1	.337	2	.026	3	2.355e-2	2	NC	4	NC	1
18			min	-.625	4	.008	15	-.013	2	-1.044e-3	3	1521.558	2	NC	1
19		10	max	0	1	.371	2	.026	3	2.471e-2	2	NC	5	NC	1
20			min	-.625	4	-.023	3	-.018	2	-7.439e-4	3	1201.829	2	NC	1
21		11	max	0	12	.337	2	.026	3	2.355e-2	2	NC	4	NC	1
22			min	-.625	4	.008	15	-.013	2	-1.044e-3	3	1521.558	2	NC	1
23		12	max	0	12	.261	2	.029	1	2.239e-2	2	NC	4	NC	2
24			min	-.625	4	.006	15	-.009	5	-1.345e-3	3	1039.437	3	6572.367	1
25		13	max	0	12	.246	3	.055	1	2.124e-2	2	NC	4	NC	2
26			min	-.625	4	.004	15	-.004	5	-1.646e-3	3	639	3	3490.619	1
27		14	max	0	12	.336	3	.072	1	2.008e-2	2	NC	5	NC	3
28			min	-.625	4	.002	15	0	10	-1.946e-3	3	491.949	3	2648.96	1
29		15	max	0	12	.375	3	.077	1	1.892e-2	2	NC	5	NC	3
30			min	-.625	4	-.005	9	0	10	-2.247e-3	3	446.793	3	2502.836	1
31		16	max	0	12	.352	3	.067	1	1.777e-2	2	NC	5	NC	3
32			min	-.625	4	-.007	9	0	10	-2.547e-3	3	472.976	3	2878.751	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
33		17	max	0	12	.263	3	.045	1	1.661e-2	2	NC	5	NC	2
34			min	-.625	4	.002	15	0	10	-2.848e-3	3	604.503	3	4233.635	1
35		18	max	0	12	.13	2	.019	4	1.546e-2	2	NC	4	NC	2
36			min	-.625	4	.003	15	-.002	10	-3.148e-3	3	1096.985	3	9366.349	4
37		19	max	0	12	.211	2	.009	3	1.43e-2	2	NC	1	NC	1
38			min	-.625	4	-.054	3	-.005	2	-3.449e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.39	3	.008	3	8.08e-3	1	NC	1	NC	1
40			min	-.479	4	-.623	2	-.004	2	-5.934e-3	3	NC	1	NC	1
41		2	max	0	1	.61	3	.012	1	9.299e-3	1	NC	5	NC	1
42			min	-.479	4	-.867	1	-.018	5	-6.944e-3	3	783.054	1	NC	1
43		3	max	0	1	.802	3	.034	1	1.052e-2	1	NC	5	NC	2
44			min	-.479	4	-1.087	1	-.023	5	-7.955e-3	3	412.93	1	5617.22	1
45		4	max	0	1	.949	3	.055	1	1.174e-2	1	NC	15	NC	2
46			min	-.479	4	-1.263	1	-.016	5	-8.965e-3	3	299.434	1	3522.416	1
47		5	max	0	1	1.041	3	.066	1	1.296e-2	1	NC	15	NC	3
48			min	-.479	4	-1.386	1	-.004	5	-9.976e-3	3	251.389	1	2926.394	1
49		6	max	0	1	1.076	3	.064	1	1.418e-2	1	NC	15	NC	3
50			min	-.479	4	-1.453	1	0	10	-1.099e-2	3	231.21	1	3006.784	1
51		7	max	0	1	1.062	3	.05	1	1.54e-2	1	9953.375	15	NC	2
52			min	-.479	4	-1.469	1	-.003	10	-1.2e-2	3	226.695	1	3875.526	1
53		8	max	0	1	1.015	3	.034	4	1.662e-2	1	NC	15	NC	2
54			min	-.479	4	-1.449	1	-.006	10	-1.301e-2	3	232.135	1	5552.334	4
55		9	max	0	1	.961	3	.023	4	1.783e-2	1	NC	15	NC	1
56			min	-.479	4	-1.415	1	-.011	2	-1.402e-2	3	242.254	1	7984.891	4
57		10	max	0	1	.934	3	.023	3	1.905e-2	1	NC	15	NC	1
58			min	-.479	4	-1.395	1	-.016	2	-1.503e-2	3	248.393	1	NC	1
59		11	max	0	12	.961	3	.023	3	1.783e-2	1	NC	15	NC	1
60			min	-.479	4	-1.415	1	-.019	5	-1.402e-2	3	242.254	1	NC	1
61		12	max	0	12	1.015	3	.027	1	1.662e-2	1	NC	15	NC	2
62			min	-.479	4	-1.449	1	-.022	5	-1.301e-2	3	232.135	1	7140.159	1
63		13	max	0	12	1.062	3	.05	1	1.54e-2	1	9953.203	15	NC	2
64			min	-.479	4	-1.469	1	-.015	5	-1.2e-2	3	226.695	1	3875.526	1
65		14	max	0	12	1.076	3	.064	1	1.418e-2	1	NC	15	NC	3
66			min	-.479	4	-1.453	1	-.002	5	-1.099e-2	3	231.21	1	3006.784	1
67		15	max	0	12	1.041	3	.066	1	1.296e-2	1	NC	15	NC	3
68			min	-.479	4	-1.386	1	0	10	-9.976e-3	3	251.389	1	2926.394	1
69		16	max	0	12	.949	3	.055	1	1.174e-2	1	NC	15	NC	2
70			min	-.479	4	-1.263	1	0	10	-8.965e-3	3	299.434	1	3522.416	1
71		17	max	0	12	.802	3	.035	4	1.052e-2	1	NC	5	NC	2
72			min	-.479	4	-1.087	1	0	10	-7.955e-3	3	412.93	1	5288.841	4
73		18	max	0	12	.61	3	.024	4	9.299e-3	1	NC	5	NC	1
74			min	-.479	4	-.867	1	-.002	10	-6.944e-3	3	783.054	1	7825.715	4
75		19	max	0	12	.39	3	.008	3	8.08e-3	1	NC	1	NC	1
76			min	-.479	4	-.623	2	-.004	2	-5.934e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.4	3	.007	3	4.997e-3	3	NC	1	NC	1
78			min	-.394	4	-.622	2	-.004	2	-8.304e-3	2	NC	1	NC	1
79		2	max	0	12	.56	3	.013	1	5.837e-3	3	NC	5	NC	1
80			min	-.394	4	-.901	2	-.027	5	-9.562e-3	2	688.76	2	7472.185	5
81		3	max	0	12	.706	3	.035	1	6.676e-3	3	NC	5	NC	2
82			min	-.394	4	-1.148	2	-.034	5	-1.082e-2	2	365.242	2	5581.144	1
83		4	max	0	12	.825	3	.055	1	7.515e-3	3	NC	15	NC	3
84			min	-.394	4	-1.34	2	-.026	5	-1.208e-2	2	267.291	2	3502.905	1
85		5	max	0	12	.911	3	.066	1	8.354e-3	3	NC	15	NC	3
86			min	-.394	4	-1.466	2	-.009	5	-1.334e-2	2	227.351	2	2910	1
87		6	max	0	12	.964	3	.065	1	9.193e-3	3	NC	15	NC	3
88			min	-.394	4	-1.524	2	0	10	-1.459e-2	2	212.779	2	2987.116	1
89		7	max	0	12	.984	3	.05	1	1.003e-2	3	9976.556	15	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
90			min	-.394	4	-1.522	2	-.003	10	-1.585e-2	2	213.287	2	3840.067	1
91		8	max	0	12	.981	3	.042	4	1.087e-2	3	NC	15	NC	2
92			min	-.394	4	-1.479	2	-.006	10	-1.711e-2	2	224.121	2	4417.26	4
93		9	max	0	12	.966	3	.03	4	1.171e-2	3	NC	15	NC	1
94			min	-.394	4	-1.423	2	-.01	2	-1.837e-2	2	239.793	2	6099.26	4
95		10	max	0	1	.957	3	.021	3	1.255e-2	3	NC	15	NC	1
96			min	-.394	4	-1.394	1	-.015	2	-1.963e-2	2	248.646	1	NC	1
97		11	max	0	1	.966	3	.021	3	1.171e-2	3	NC	15	NC	1
98			min	-.394	4	-1.423	2	-.026	5	-1.837e-2	2	239.793	2	7849.732	5
99		12	max	0	1	.981	3	.028	1	1.087e-2	3	NC	15	NC	2
100			min	-.394	4	-1.479	2	-.031	5	-1.711e-2	2	224.121	2	6558.584	5
101		13	max	0	1	.984	3	.05	1	1.003e-2	3	9976.43	15	NC	2
102			min	-.394	4	-1.522	2	-.021	5	-1.585e-2	2	213.287	2	3840.067	1
103		14	max	0	1	.964	3	.065	1	9.193e-3	3	NC	15	NC	3
104			min	-.394	4	-1.524	2	-.003	5	-1.459e-2	2	212.779	2	2987.116	1
105		15	max	0	1	.911	3	.066	1	8.354e-3	3	NC	15	NC	3
106			min	-.394	4	-1.466	2	0	10	-1.334e-2	2	227.351	2	2910	1
107		16	max	0	1	.825	3	.055	1	7.515e-3	3	NC	15	NC	3
108			min	-.394	4	-1.34	2	0	10	-1.208e-2	2	267.291	2	3502.905	1
109		17	max	0	1	.706	3	.047	4	6.676e-3	3	NC	5	NC	2
110			min	-.394	4	-1.148	2	0	10	-1.082e-2	2	365.242	2	3989.317	4
111		18	max	0	1	.56	3	.033	4	5.837e-3	3	NC	5	NC	1
112			min	-.394	4	-.901	2	-.002	10	-9.562e-3	2	688.76	2	5703.507	4
113		19	max	0	1	.4	3	.007	3	4.997e-3	3	NC	1	NC	1
114			min	-.394	4	-.622	2	-.004	2	-8.304e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.197	1	.006	3	9.43e-3	3	NC	1	NC	1
116			min	-.133	4	-.141	3	-.004	2	-1.282e-2	1	NC	1	NC	1
117		2	max	0	12	.08	1	.019	1	1.04e-2	3	NC	4	NC	2
118			min	-.133	4	-.096	3	-.019	5	-1.365e-2	1	1458.58	2	9917.294	1
119		3	max	0	12	.013	9	.045	1	1.137e-2	3	NC	5	NC	2
120			min	-.133	4	-.063	3	-.024	5	-1.449e-2	1	816.779	2	4242.55	1
121		4	max	0	12	.004	13	.067	1	1.234e-2	3	NC	5	NC	3
122			min	-.133	4	-.103	2	-.02	5	-1.532e-2	1	658.631	2	2871.936	1
123		5	max	0	12	.005	4	.077	1	1.331e-2	3	NC	5	NC	3
124			min	-.133	4	-.104	2	-.009	5	-1.615e-2	1	656.541	2	2485.525	1
125		6	max	0	12	.021	9	.074	1	1.429e-2	3	NC	5	NC	3
126			min	-.133	4	-.097	3	.001	10	-1.699e-2	1	801.355	2	2613.839	1
127		7	max	0	12	.086	1	.057	1	1.526e-2	3	NC	3	NC	2
128			min	-.133	4	-.149	3	-.001	10	-1.782e-2	1	1324.349	2	3402.866	1
129		8	max	0	12	.193	1	.031	1	1.623e-2	3	NC	1	NC	2
130			min	-.133	4	-.208	3	-.004	10	-1.865e-2	1	2875.288	3	6189.095	1
131		9	max	0	12	.288	1	.019	4	1.72e-2	3	NC	4	NC	1
132			min	-.133	4	-.258	3	-.009	2	-1.949e-2	1	1641.557	3	9781.676	4
133		10	max	0	1	.33	1	.018	3	1.817e-2	3	NC	5	NC	1
134			min	-.133	4	-.28	3	-.014	2	-2.032e-2	1	1381.211	3	NC	1
135		11	max	0	1	.288	1	.019	3	1.72e-2	3	NC	4	NC	1
136			min	-.133	4	-.258	3	-.014	5	-1.949e-2	1	1641.557	3	NC	1
137		12	max	0	1	.193	1	.031	1	1.623e-2	3	NC	1	NC	2
138			min	-.133	4	-.208	3	-.015	5	-1.865e-2	1	2875.288	3	6189.095	1
139		13	max	0	1	.086	1	.057	1	1.526e-2	3	NC	3	NC	2
140			min	-.133	4	-.149	3	-.007	5	-1.782e-2	1	1324.349	2	3402.866	1
141		14	max	0	1	.021	9	.074	1	1.429e-2	3	NC	5	NC	3
142			min	-.133	4	-.097	3	.001	10	-1.699e-2	1	801.355	2	2613.839	1
143		15	max	0	1	.005	6	.077	1	1.331e-2	3	NC	5	NC	3
144			min	-.133	4	-.104	2	.002	10	-1.615e-2	1	656.541	2	2485.525	1
145		16	max	0	1	.004	13	.067	1	1.234e-2	3	NC	5	NC	3
146			min	-.133	4	-.103	2	.002	10	-1.532e-2	1	658.631	2	2871.936	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
147		17	max	0	1	.013	9	.045	1	1.137e-2	3	NC	5	NC	2
148			min	-.133	4	-.063	3	0	10	-1.449e-2	1	816.779	2	4242.55	1
149		18	max	0	1	.08	1	.026	4	1.04e-2	3	NC	4	NC	2
150			min	-.133	4	-.096	3	-.001	10	-1.365e-2	1	1458.58	2	7104.855	4
151		19	max	0	1	.197	1	.006	3	9.43e-3	3	NC	1	NC	1
152			min	-.133	4	-.141	3	-.004	2	-1.282e-2	1	NC	1	NC	1
153	M2	1	max	.006	1	.007	2	.008	1	2.295e-3	5	NC	1	NC	2
154			min	-.008	3	-.012	3	-.589	4	-1.683e-4	1	8314.684	2	102.842	4
155		2	max	.006	1	.006	2	.007	1	2.297e-3	5	NC	1	NC	2
156			min	-.007	3	-.011	3	-.54	4	-1.577e-4	1	9618.018	2	112.069	4
157		3	max	.006	1	.005	2	.006	1	2.299e-3	5	NC	1	NC	2
158			min	-.007	3	-.011	3	-.492	4	-1.471e-4	1	NC	1	123.045	4
159		4	max	.005	1	.004	2	.006	1	2.301e-3	5	NC	1	NC	1
160			min	-.006	3	-.011	3	-.445	4	-1.365e-4	1	NC	1	136.228	4
161		5	max	.005	1	.003	2	.005	1	2.303e-3	5	NC	1	NC	1
162			min	-.006	3	-.01	3	-.398	4	-1.259e-4	1	NC	1	152.245	4
163		6	max	.005	1	.003	2	.005	1	2.305e-3	5	NC	1	NC	1
164			min	-.005	3	-.01	3	-.352	4	-1.152e-4	1	NC	1	171.966	4
165		7	max	.004	1	.002	2	.004	1	2.309e-3	4	NC	1	NC	1
166			min	-.005	3	-.009	3	-.308	4	-1.046e-4	1	NC	1	196.63	4
167		8	max	.004	1	0	2	.003	1	2.313e-3	4	NC	1	NC	1
168			min	-.005	3	-.009	3	-.266	4	-9.399e-5	1	NC	1	228.049	4
169		9	max	.004	1	0	2	.003	1	2.318e-3	4	NC	1	NC	1
170			min	-.004	3	-.008	3	-.225	4	-8.337e-5	1	NC	1	268.964	4
171		10	max	.003	1	0	2	.002	1	2.323e-3	4	NC	1	NC	1
172			min	-.004	3	-.008	3	-.187	4	-7.275e-5	1	NC	1	323.679	4
173		11	max	.003	1	0	15	.002	1	2.328e-3	4	NC	1	NC	1
174			min	-.003	3	-.007	3	-.152	4	-6.213e-5	1	NC	1	399.276	4
175		12	max	.003	1	0	15	.002	1	2.332e-3	4	NC	1	NC	1
176			min	-.003	3	-.006	3	-.119	4	-5.15e-5	1	NC	1	508.097	4
177		13	max	.002	1	0	15	.001	1	2.337e-3	4	NC	1	NC	1
178			min	-.003	3	-.006	3	-.09	4	-4.088e-5	1	NC	1	673.262	4
179		14	max	.002	1	0	15	0	1	2.342e-3	4	NC	1	NC	1
180			min	-.002	3	-.005	3	-.064	4	-3.026e-5	1	NC	1	942.383	4
181		15	max	.001	1	0	15	0	1	2.347e-3	4	NC	1	NC	1
182			min	-.002	3	-.004	3	-.042	4	-1.964e-5	1	NC	1	1427.077	4
183		16	max	.001	1	0	15	0	1	2.351e-3	4	NC	1	NC	1
184			min	-.001	3	-.003	3	-.025	4	-9.018e-6	1	NC	1	2443.633	4
185		17	max	0	1	0	15	0	1	2.356e-3	4	NC	1	NC	1
186			min	0	3	-.002	3	-.012	4	-7.129e-7	3	NC	1	5213.961	4
187		18	max	0	1	0	15	0	1	2.361e-3	4	NC	1	NC	1
188			min	0	3	-.001	3	-.003	4	2.936e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.366e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	1.03e-6	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.517e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.571e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.013	4	1.715e-4	4	NC	1	NC	1
194			min	0	2	-.002	6	0	12	8.816e-7	12	NC	1	NC	1
195		3	max	0	3	-.001	15	.026	4	8.001e-4	4	NC	1	NC	1
196			min	0	2	-.005	6	0	12	2.115e-6	12	NC	1	NC	1
197		4	max	.001	3	-.002	15	.038	4	1.429e-3	4	NC	1	NC	1
198			min	0	2	-.008	6	0	12	3.348e-6	12	NC	1	NC	1
199		5	max	.001	3	-.002	15	.05	4	2.057e-3	4	NC	1	NC	1
200			min	-.001	2	-.011	6	0	12	4.582e-6	12	9481.517	6	NC	1
201		6	max	.002	3	-.003	15	.062	4	2.686e-3	4	NC	1	NC	1
202			min	-.001	2	-.013	6	0	12	5.815e-6	12	7593.352	6	NC	1
203		7	max	.002	3	-.003	15	.073	4	3.314e-3	4	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
204			min	-.002	2	-.016	6	0	12	7.048e-6	12	6461.591	6	9847.687	5
205		8	max	.003	3	-.004	15	.083	4	3.943e-3	4	NC	5	NC	1
206			min	-.002	2	-.018	6	0	12	8.282e-6	12	5762.959	6	9695.606	5
207		9	max	.003	3	-.004	15	.093	4	4.572e-3	4	NC	5	NC	1
208			min	-.002	2	-.019	6	0	12	9.515e-6	12	5345.763	6	9959.087	5
209		10	max	.003	3	-.004	15	.103	4	5.2e-3	4	NC	5	NC	1
210			min	-.003	2	-.02	6	0	12	1.075e-5	12	5135.991	6	NC	1
211		11	max	.004	3	-.004	15	.112	4	5.829e-3	4	NC	5	NC	1
212			min	-.003	2	-.02	6	0	12	1.198e-5	12	5102.24	6	NC	1
213		12	max	.004	3	-.004	15	.121	4	6.457e-3	4	NC	5	NC	1
214			min	-.003	2	-.02	6	0	12	1.321e-5	12	5243.59	6	NC	1
215		13	max	.004	3	-.004	15	.13	4	7.086e-3	4	NC	5	NC	1
216			min	-.004	2	-.018	6	0	12	1.445e-5	12	5590.741	6	NC	1
217		14	max	.005	3	-.004	15	.139	4	7.715e-3	4	NC	5	NC	1
218			min	-.004	2	-.017	6	0	12	1.568e-5	12	6222.34	6	NC	1
219		15	max	.005	3	-.003	15	.148	4	8.343e-3	4	NC	2	NC	1
220			min	-.004	2	-.014	6	0	12	1.691e-5	12	7314.35	6	NC	1
221		16	max	.006	3	-.002	15	.157	4	8.972e-3	4	NC	1	NC	1
222			min	-.004	2	-.011	6	0	12	1.815e-5	12	9294.198	6	NC	1
223		17	max	.006	3	-.001	15	.167	4	9.6e-3	4	NC	1	NC	1
224			min	-.005	2	-.008	1	0	12	1.938e-5	12	NC	1	NC	1
225		18	max	.006	3	0	15	.177	4	1.023e-2	4	NC	1	NC	1
226			min	-.005	2	-.005	1	0	12	2.061e-5	12	NC	1	NC	1
227		19	max	.007	3	0	5	.187	4	1.086e-2	4	NC	1	NC	1
228			min	-.005	2	-.002	1	0	12	2.185e-5	12	NC	1	NC	1
229	M4	1	max	.003	1	.005	2	0	12	6.258e-5	1	NC	1	NC	3
230			min	0	3	-.007	3	-.187	4	-7.343e-4	5	NC	1	132.428	4
231		2	max	.003	1	.005	2	0	12	6.258e-5	1	NC	1	NC	2
232			min	0	3	-.006	3	-.172	4	-7.343e-4	5	NC	1	144.172	4
233		3	max	.002	1	.004	2	0	12	6.258e-5	1	NC	1	NC	2
234			min	0	3	-.006	3	-.157	4	-7.343e-4	5	NC	1	158.14	4
235		4	max	.002	1	.004	2	0	12	6.258e-5	1	NC	1	NC	2
236			min	0	3	-.006	3	-.142	4	-7.343e-4	5	NC	1	174.909	4
237		5	max	.002	1	.004	2	0	12	6.258e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.127	4	-7.343e-4	5	NC	1	195.267	4
239		6	max	.002	1	.003	2	0	12	6.258e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.113	4	-7.343e-4	5	NC	1	220.306	4
241		7	max	.002	1	.003	2	0	12	6.258e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.099	4	-7.343e-4	5	NC	1	251.573	4
243		8	max	.002	1	.003	2	0	12	6.258e-5	1	NC	1	NC	2
244			min	0	3	-.004	3	-.085	4	-7.343e-4	5	NC	1	291.329	4
245		9	max	.002	1	.003	2	0	12	6.258e-5	1	NC	1	NC	2
246			min	0	3	-.004	3	-.072	4	-7.343e-4	5	NC	1	342.976	4
247		10	max	.001	1	.002	2	0	12	6.258e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.06	4	-7.343e-4	5	NC	1	411.832	4
249		11	max	.001	1	.002	2	0	12	6.258e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.049	4	-7.343e-4	5	NC	1	506.599	4
251		12	max	.001	1	.002	2	0	12	6.258e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.039	4	-7.343e-4	5	NC	1	642.33	4
253		13	max	0	1	.002	2	0	12	6.258e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.029	4	-7.343e-4	5	NC	1	846.973	4
255		14	max	0	1	.001	2	0	12	6.258e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	-.021	4	-7.343e-4	5	NC	1	1177.392	4
257		15	max	0	1	.001	2	0	12	6.258e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	-.014	4	-7.343e-4	5	NC	1	1764.697	4
259		16	max	0	1	0	2	0	12	6.258e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	-.008	4	-7.343e-4	5	NC	1	2971.422	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
261		17	max	0	1	0	2	0	12	6.258e-5	1	NC	1	NC	1
262			min	0	3	0	3	-.004	4	-7.343e-4	5	NC	1	6142.237	4
263		18	max	0	1	0	2	0	12	6.258e-5	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-7.343e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.258e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-7.343e-4	5	NC	1	NC	1
267	M6	1	max	.02	1	.025	2	0	1	2.389e-3	4	NC	3	NC	1
268			min	-.024	3	-.036	3	-.595	4	0	1	2384.47	2	101.831	4
269		2	max	.019	1	.023	2	0	1	2.388e-3	4	NC	3	NC	1
270			min	-.023	3	-.034	3	-.546	4	0	1	2609.481	2	110.969	4
271		3	max	.018	1	.021	2	0	1	2.387e-3	4	NC	3	NC	1
272			min	-.021	3	-.032	3	-.497	4	0	1	2879.38	2	121.837	4
273		4	max	.017	1	.019	2	0	1	2.386e-3	4	NC	3	NC	1
274			min	-.02	3	-.03	3	-.449	4	0	1	3206.586	2	134.892	4
275		5	max	.015	1	.017	2	0	1	2.385e-3	4	NC	3	NC	1
276			min	-.019	3	-.028	3	-.402	4	0	1	3608.26	2	150.753	4
277		6	max	.014	1	.015	2	0	1	2.385e-3	4	NC	3	NC	1
278			min	-.017	3	-.026	3	-.356	4	0	1	4108.67	2	170.282	4
279		7	max	.013	1	.013	2	0	1	2.384e-3	4	NC	3	NC	1
280			min	-.016	3	-.024	3	-.311	4	0	1	4743.053	2	194.706	4
281		8	max	.012	1	.011	2	0	1	2.383e-3	4	NC	1	NC	1
282			min	-.015	3	-.022	3	-.268	4	0	1	5564.181	2	225.82	4
283		9	max	.011	1	.009	2	0	1	2.382e-3	4	NC	1	NC	1
284			min	-.013	3	-.02	3	-.227	4	0	1	6654.054	2	266.338	4
285		10	max	.01	1	.007	2	0	1	2.381e-3	4	NC	1	NC	1
286			min	-.012	3	-.018	3	-.189	4	0	1	8145.853	2	320.522	4
287		11	max	.009	1	.006	2	0	1	2.38e-3	4	NC	1	NC	1
288			min	-.011	3	-.016	3	-.153	4	0	1	NC	1	395.387	4
289		12	max	.008	1	.005	2	0	1	2.38e-3	4	NC	1	NC	1
290			min	-.009	3	-.014	3	-.12	4	0	1	NC	1	503.155	4
291		13	max	.007	1	.003	2	0	1	2.379e-3	4	NC	1	NC	1
292			min	-.008	3	-.012	3	-.091	4	0	1	NC	1	666.723	4
293		14	max	.006	1	.002	2	0	1	2.378e-3	4	NC	1	NC	1
294			min	-.007	3	-.01	3	-.065	4	0	1	NC	1	933.249	4
295		15	max	.004	1	.001	2	0	1	2.377e-3	4	NC	1	NC	1
296			min	-.005	3	-.008	3	-.043	4	0	1	NC	1	1413.277	4
297		16	max	.003	1	0	2	0	1	2.376e-3	4	NC	1	NC	1
298			min	-.004	3	-.006	3	-.025	4	0	1	NC	1	2420.081	4
299		17	max	.002	1	0	2	0	1	2.375e-3	4	NC	1	NC	1
300			min	-.003	3	-.004	3	-.012	4	0	1	NC	1	5163.982	4
301		18	max	.001	1	0	2	0	1	2.374e-3	4	NC	1	NC	1
302			min	-.001	3	-.002	3	-.003	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	2.374e-3	4	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	-4.579e-4	4	NC	1	NC	1
307		2	max	.001	3	0	15	.013	4	1.538e-4	4	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	-.001	15	.026	4	7.654e-4	4	NC	1	NC	1
310			min	-.002	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.002	15	.038	4	1.377e-3	4	NC	1	NC	1
312			min	-.003	2	-.01	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.003	15	.05	4	1.989e-3	4	NC	1	NC	1
314			min	-.004	2	-.013	3	0	1	0	1	8548.098	3	NC	1
315		6	max	.006	3	-.003	15	.062	4	2.6e-3	4	NC	1	NC	1
316			min	-.005	2	-.015	3	0	1	0	1	7183.938	3	9117.441	4
317		7	max	.007	3	-.004	15	.072	4	3.212e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
318			min	-.006	2	-.017	3	0	1	0	1	6363.011	3	8478.626	4
319		8	max	.008	3	-.004	15	.083	4	3.824e-3	4	NC	2	NC	1
320			min	-.007	2	-.019	3	0	1	0	1	5770.692	4	8243.699	4
321		9	max	.009	3	-.005	15	.093	4	4.435e-3	4	NC	2	NC	1
322			min	-.008	2	-.02	4	0	1	0	1	5352.437	4	8337.641	4
323		10	max	.01	3	-.005	15	.102	4	5.047e-3	4	NC	5	NC	1
324			min	-.009	2	-.021	4	0	1	0	1	5142.006	4	8758.156	4
325		11	max	.011	3	-.005	15	.111	4	5.659e-3	4	NC	5	NC	1
326			min	-.01	2	-.021	4	0	1	0	1	5107.884	4	9567.002	4
327		12	max	.012	3	-.005	15	.12	4	6.27e-3	4	NC	5	NC	1
328			min	-.011	2	-.02	4	0	1	0	1	5249.107	4	NC	1
329		13	max	.013	3	-.004	15	.129	4	6.882e-3	4	NC	2	NC	1
330			min	-.012	2	-.019	4	0	1	0	1	5596.371	4	NC	1
331		14	max	.014	3	-.004	15	.137	4	7.493e-3	4	NC	2	NC	1
332			min	-.013	2	-.017	4	0	1	0	1	6228.373	4	NC	1
333		15	max	.016	3	-.003	15	.145	4	8.105e-3	4	NC	1	NC	1
334			min	-.014	2	-.015	4	0	1	0	1	7321.22	4	NC	1
335		16	max	.017	3	-.003	15	.154	4	8.717e-3	4	NC	1	NC	1
336			min	-.015	2	-.012	4	0	1	0	1	9302.705	4	NC	1
337		17	max	.018	3	-.002	15	.162	4	9.328e-3	4	NC	1	NC	1
338			min	-.016	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.019	3	-.001	15	.172	4	9.94e-3	4	NC	1	NC	1
340			min	-.017	2	-.008	1	0	1	0	1	NC	1	NC	1
341		19	max	.02	3	0	15	.181	4	1.055e-2	4	NC	1	NC	1
342			min	-.018	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.017	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.02	3	-.181	4	-8.383e-4	4	NC	1	136.814	4
345		2	max	.007	1	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.019	3	-.167	4	-8.383e-4	4	NC	1	148.96	4
347		3	max	.007	1	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.018	3	-.152	4	-8.383e-4	4	NC	1	163.403	4
349		4	max	.006	1	.014	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.017	3	-.137	4	-8.383e-4	4	NC	1	180.743	4
351		5	max	.006	1	.013	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.016	3	-.123	4	-8.383e-4	4	NC	1	201.793	4
353		6	max	.006	1	.012	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.015	3	-.109	4	-8.383e-4	4	NC	1	227.683	4
355		7	max	.005	1	.011	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.013	3	-.095	4	-8.383e-4	4	NC	1	260.012	4
357		8	max	.005	1	.01	2	0	1	0	1	NC	1	NC	1
358			min	-.001	3	-.012	3	-.082	4	-8.383e-4	4	NC	1	301.119	4
359		9	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.011	3	-.07	4	-8.383e-4	4	NC	1	354.521	4
361		10	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.01	3	-.058	4	-8.383e-4	4	NC	1	425.717	4
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	-.047	4	-8.383e-4	4	NC	1	523.704	4
365		12	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	-.037	4	-8.383e-4	4	NC	1	664.05	4
367		13	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.007	3	-.028	4	-8.383e-4	4	NC	1	875.654	4
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	-.02	4	-8.383e-4	4	NC	1	1217.318	4
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	-.014	4	-8.383e-4	4	NC	1	1824.625	4
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	-.008	4	-8.383e-4	4	NC	1	3072.481	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	-.004	4	-8.383e-4	4	NC	1	6351.504	4
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	-.001	4	-8.383e-4	4	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	-8.383e-4	4	NC	1	NC	1
381	M10	1	max	.006	1	.007	2	0	12	2.37e-3	4	NC	1	NC	2
382			min	-.008	3	-.012	3	-.593	4	1.223e-5	12	8314.684	2	102.136	4
383		2	max	.006	1	.006	2	0	12	2.369e-3	4	NC	1	NC	2
384			min	-.007	3	-.011	3	-.544	4	1.15e-5	12	9618.018	2	111.301	4
385		3	max	.006	1	.005	2	0	12	2.368e-3	4	NC	1	NC	2
386			min	-.007	3	-.011	3	-.496	4	1.076e-5	12	NC	1	122.202	4
387		4	max	.005	1	.004	2	0	12	2.367e-3	4	NC	1	NC	1
388			min	-.006	3	-.011	3	-.448	4	1.002e-5	12	NC	1	135.295	4
389		5	max	.005	1	.003	2	0	12	2.366e-3	4	NC	1	NC	1
390			min	-.006	3	-.01	3	-.401	4	9.286e-6	12	NC	1	151.204	4
391		6	max	.005	1	.003	2	0	12	2.365e-3	4	NC	1	NC	1
392			min	-.005	3	-.01	3	-.355	4	8.549e-6	12	NC	1	170.791	4
393		7	max	.004	1	.002	2	0	12	2.364e-3	4	NC	1	NC	1
394			min	-.005	3	-.009	3	-.31	4	7.812e-6	12	NC	1	195.288	4
395		8	max	.004	1	0	2	0	12	2.363e-3	4	NC	1	NC	1
396			min	-.005	3	-.009	3	-.267	4	7.e-6	10	NC	1	226.495	4
397		9	max	.004	1	0	2	0	12	2.362e-3	4	NC	1	NC	1
398			min	-.004	3	-.008	3	-.227	4	6.18e-6	10	NC	1	267.134	4
399		10	max	.003	1	0	2	0	12	2.361e-3	4	NC	1	NC	1
400			min	-.004	3	-.008	3	-.188	4	5.361e-6	10	NC	1	321.48	4
401		11	max	.003	1	0	2	0	12	2.361e-3	4	NC	1	NC	1
402			min	-.003	3	-.007	3	-.153	4	4.541e-6	10	NC	1	396.569	4
403		12	max	.003	1	-.001	2	0	12	2.36e-3	4	NC	1	NC	1
404			min	-.003	3	-.006	3	-.12	4	3.722e-6	10	NC	1	504.66	4
405		13	max	.002	1	-.001	15	0	12	2.359e-3	4	NC	1	NC	1
406			min	-.003	3	-.006	3	-.091	4	2.902e-6	10	NC	1	668.72	4
407		14	max	.002	1	-.001	15	0	12	2.358e-3	4	NC	1	NC	1
408			min	-.002	3	-.005	3	-.065	4	2.083e-6	10	NC	1	936.049	4
409		15	max	.001	1	-.001	15	0	12	2.357e-3	4	NC	1	NC	1
410			min	-.002	3	-.004	3	-.043	4	1.263e-6	10	NC	1	1417.53	4
411		16	max	.001	1	0	15	0	12	2.356e-3	4	NC	1	NC	1
412			min	-.001	3	-.003	4	-.025	4	4.435e-7	10	NC	1	2427.404	4
413		17	max	0	1	0	15	0	12	2.355e-3	4	NC	1	NC	1
414			min	0	3	-.002	4	-.012	4	-1.603e-6	1	NC	1	5179.784	4
415		18	max	0	1	0	15	0	12	2.354e-3	4	NC	1	NC	1
416			min	0	3	-.001	4	-.003	4	-1.222e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	2.353e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.285e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	7.045e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-4.533e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.013	4	1.635e-4	4	NC	1	NC	1
422			min	0	2	-.003	4	0	1	-1.491e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	.026	4	7.804e-4	4	NC	1	NC	1
424			min	0	2	-.006	4	0	1	-3.687e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	.038	4	1.397e-3	4	NC	1	NC	1
426			min	0	2	-.009	4	0	1	-5.883e-5	1	NC	1	NC	1
427		5	max	.001	3	-.003	15	.05	4	2.014e-3	4	NC	1	NC	1
428			min	-.001	2	-.012	4	0	1	-8.079e-5	1	9033.107	4	NC	1
429		6	max	.002	3	-.004	15	.061	4	2.631e-3	4	NC	1	NC	1
430			min	-.001	2	-.014	4	0	1	-1.028e-4	1	7268.436	4	NC	1
431		7	max	.002	3	-.004	15	.072	4	3.248e-3	4	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
432			min	-.002	2	-.017	4	0	1	-1.247e-4	1	6208.43	4	9448.407	4
433		8	max	.003	3	-.005	15	.082	4	3.865e-3	4	NC	5	NC	1
434			min	-.002	2	-.019	4	-.001	1	-1.467e-4	1	5554.138	4	9273.767	4
435		9	max	.003	3	-.005	15	.092	4	4.481e-3	4	NC	5	NC	1
436			min	-.002	2	-.02	4	-.001	1	-1.686e-4	1	5165.064	4	9488.439	4
437		10	max	.003	3	-.005	15	.102	4	5.098e-3	4	NC	5	NC	1
438			min	-.003	2	-.021	4	-.002	1	-1.906e-4	1	4972.8	4	NC	1
439		11	max	.004	3	-.005	15	.111	4	5.715e-3	4	NC	5	NC	1
440			min	-.003	2	-.021	4	-.002	1	-2.125e-4	1	4948.797	4	NC	1
441		12	max	.004	3	-.005	15	.12	4	6.332e-3	4	NC	5	NC	1
442			min	-.003	2	-.021	4	-.003	1	-2.345e-4	1	5093.384	4	NC	1
443		13	max	.004	3	-.005	15	.129	4	6.949e-3	4	NC	5	NC	1
444			min	-.004	2	-.02	4	-.003	1	-2.565e-4	1	5437.274	4	NC	1
445		14	max	.005	3	-.004	15	.137	4	7.566e-3	4	NC	5	NC	1
446			min	-.004	2	-.018	4	-.004	1	-2.784e-4	1	6057.704	4	NC	1
447		15	max	.005	3	-.004	15	.146	4	8.182e-3	4	NC	2	NC	1
448			min	-.004	2	-.015	4	-.004	1	-3.004e-4	1	7126.722	4	NC	1
449		16	max	.006	3	-.003	15	.155	4	8.799e-3	4	NC	1	NC	1
450			min	-.004	2	-.012	4	-.005	1	-3.223e-4	1	9061.67	4	NC	1
451		17	max	.006	3	-.002	15	.164	4	9.416e-3	4	NC	1	NC	1
452			min	-.005	2	-.009	4	-.005	1	-3.443e-4	1	NC	1	NC	1
453		18	max	.006	3	-.001	15	.173	4	1.003e-2	4	NC	1	NC	1
454			min	-.005	2	-.005	1	-.006	1	-3.663e-4	1	NC	1	NC	1
455		19	max	.007	3	0	10	.183	4	1.065e-2	4	NC	1	NC	1
456			min	-.005	2	-.002	1	-.007	1	-3.882e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.005	2	.007	1	-4.068e-6	12	NC	1	NC	3
458			min	0	3	-.007	3	-.183	4	-7.627e-4	4	NC	1	135.193	4
459		2	max	.003	1	.005	2	.007	1	-4.068e-6	12	NC	1	NC	2
460			min	0	3	-.006	3	-.169	4	-7.627e-4	4	NC	1	147.186	4
461		3	max	.002	1	.004	2	.006	1	-4.068e-6	12	NC	1	NC	2
462			min	0	3	-.006	3	-.154	4	-7.627e-4	4	NC	1	161.448	4
463		4	max	.002	1	.004	2	.005	1	-4.068e-6	12	NC	1	NC	2
464			min	0	3	-.006	3	-.139	4	-7.627e-4	4	NC	1	178.572	4
465		5	max	.002	1	.004	2	.005	1	-4.068e-6	12	NC	1	NC	2
466			min	0	3	-.005	3	-.124	4	-7.627e-4	4	NC	1	199.36	4
467		6	max	.002	1	.003	2	.004	1	-4.068e-6	12	NC	1	NC	2
468			min	0	3	-.005	3	-.11	4	-7.627e-4	4	NC	1	224.926	4
469		7	max	.002	1	.003	2	.004	1	-4.068e-6	12	NC	1	NC	2
470			min	0	3	-.004	3	-.097	4	-7.627e-4	4	NC	1	256.854	4
471		8	max	.002	1	.003	2	.003	1	-4.068e-6	12	NC	1	NC	2
472			min	0	3	-.004	3	-.083	4	-7.627e-4	4	NC	1	297.449	4
473		9	max	.002	1	.003	2	.003	1	-4.068e-6	12	NC	1	NC	2
474			min	0	3	-.004	3	-.071	4	-7.627e-4	4	NC	1	350.186	4
475		10	max	.001	1	.002	2	.002	1	-4.068e-6	12	NC	1	NC	1
476			min	0	3	-.003	3	-.059	4	-7.627e-4	4	NC	1	420.495	4
477		11	max	.001	1	.002	2	.002	1	-4.068e-6	12	NC	1	NC	1
478			min	0	3	-.003	3	-.048	4	-7.627e-4	4	NC	1	517.261	4
479		12	max	.001	1	.002	2	.001	1	-4.068e-6	12	NC	1	NC	1
480			min	0	3	-.003	3	-.038	4	-7.627e-4	4	NC	1	655.857	4
481		13	max	0	1	.002	2	.001	1	-4.068e-6	12	NC	1	NC	1
482			min	0	3	-.002	3	-.029	4	-7.627e-4	4	NC	1	864.82	4
483		14	max	0	1	.001	2	0	1	-4.068e-6	12	NC	1	NC	1
484			min	0	3	-.002	3	-.021	4	-7.627e-4	4	NC	1	1202.216	4
485		15	max	0	1	.001	2	0	1	-4.068e-6	12	NC	1	NC	1
486			min	0	3	-.001	3	-.014	4	-7.627e-4	4	NC	1	1801.925	4
487		16	max	0	1	0	2	0	1	-4.068e-6	12	NC	1	NC	1
488			min	0	3	-.001	3	-.008	4	-7.627e-4	4	NC	1	3034.145	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
489		17	max	0	1	0	2	0	1	-4.068e-6	12	NC	1	NC	1
490			min	0	3	0	3	-.004	4	-7.627e-4	4	NC	1	6271.984	4
491		18	max	0	1	0	2	0	1	-4.068e-6	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-7.627e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-4.068e-6	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-7.627e-4	4	NC	1	NC	1
495	M1	1	max	.009	3	.211	2	.625	4	9.048e-3	1	NC	1	NC	1
496			min	-.005	2	-.054	3	0	12	-1.702e-2	3	NC	1	NC	1
497		2	max	.009	3	.104	2	.607	4	8.06e-3	4	NC	5	NC	1
498			min	-.005	2	-.027	3	-.005	1	-8.449e-3	3	1266.902	2	NC	1
499		3	max	.009	3	.012	3	.589	4	1.433e-2	4	NC	5	NC	1
500			min	-.005	2	-.01	2	-.008	1	-1.556e-4	1	613.171	2	6833.868	5
501		4	max	.008	3	.073	3	.569	4	1.242e-2	4	NC	15	NC	1
502			min	-.005	2	-.137	2	-.007	1	-3.976e-3	3	389.855	2	4842.513	5
503		5	max	.008	3	.148	3	.55	4	1.05e-2	4	NC	15	NC	1
504			min	-.005	2	-.268	2	-.005	1	-7.859e-3	3	282.95	2	3824.96	5
505		6	max	.008	3	.229	3	.53	4	1.295e-2	1	8003.101	15	NC	1
506			min	-.005	2	-.394	2	-.002	1	-1.174e-2	3	223.8	2	3205.774	5
507		7	max	.008	3	.306	3	.509	4	1.733e-2	1	6763.747	15	NC	1
508			min	-.004	2	-.507	2	0	3	-1.562e-2	3	188.768	2	2779.473	4
509		8	max	.008	3	.37	3	.488	4	2.17e-2	1	6029.34	15	NC	1
510			min	-.004	2	-.596	2	0	12	-1.951e-2	3	168.001	2	2464.679	4
511		9	max	.008	3	.412	3	.466	4	2.384e-2	1	5644.617	15	NC	1
512			min	-.004	2	-.652	2	0	1	-1.999e-2	3	157.014	1	2258.137	4
513		10	max	.007	3	.428	3	.44	4	2.459e-2	2	5526.918	15	NC	1
514			min	-.004	2	-.671	2	0	10	-1.82e-2	3	153.711	1	2191.202	4
515		11	max	.007	3	.418	3	.412	4	2.592e-2	2	5644.388	15	NC	1
516			min	-.004	2	-.652	2	0	12	-1.641e-2	3	157.263	1	2228.669	4
517		12	max	.007	3	.383	3	.381	4	2.475e-2	2	6028.791	15	NC	1
518			min	-.004	2	-.594	2	0	1	-1.42e-2	3	168.795	1	2375.282	4
519		13	max	.007	3	.326	3	.344	4	1.985e-2	2	6762.668	15	NC	1
520			min	-.004	2	-.502	1	0	1	-1.136e-2	3	190.99	1	2813.214	4
521		14	max	.007	3	.254	3	.305	4	1.495e-2	2	8001.119	15	NC	1
522			min	-.004	2	-.386	1	0	12	-8.525e-3	3	228.722	1	3801.775	4
523		15	max	.006	3	.172	3	.264	4	1.004e-2	2	NC	15	NC	1
524			min	-.004	2	-.258	1	0	12	-5.688e-3	3	293.117	1	6187.29	4
525		16	max	.006	3	.087	3	.224	4	8.948e-3	4	NC	15	NC	1
526			min	-.004	2	-.127	1	0	12	-2.851e-3	3	411.011	1	NC	1
527		17	max	.006	3	.004	3	.188	4	1.008e-2	4	NC	5	NC	1
528			min	-.004	2	-.006	2	0	12	-1.391e-5	3	659.93	1	NC	1
529		18	max	.006	3	.101	1	.158	4	6.46e-3	2	NC	5	NC	1
530			min	-.004	2	-.071	3	0	12	-2.202e-3	3	1384.091	1	NC	1
531		19	max	.006	3	.197	1	.133	4	1.288e-2	2	NC	1	NC	1
532			min	-.004	2	-.141	3	0	1	-4.48e-3	3	NC	1	NC	1
533	M5	1	max	.026	3	.371	2	.625	4	0	1	NC	1	NC	1
534			min	-.018	2	-.023	3	0	1	-8.777e-6	4	NC	1	NC	1
535		2	max	.026	3	.183	2	.612	4	7.329e-3	4	NC	5	NC	1
536			min	-.018	2	-.014	3	0	1	0	1	730.944	2	9622.033	4
537		3	max	.026	3	.036	3	.594	4	1.449e-2	4	NC	15	NC	1
538			min	-.018	2	-.03	2	0	1	0	1	340.839	2	5589.864	4
539		4	max	.025	3	.157	3	.575	4	1.181e-2	4	8301.05	15	NC	1
540			min	-.018	2	-.29	2	0	1	0	1	206.451	2	4243.304	4
541		5	max	.025	3	.33	3	.553	4	9.123e-3	4	5766.53	15	NC	1
542			min	-.017	2	-.575	2	0	1	0	1	143.992	2	3566.312	4
543		6	max	.024	3	.526	3	.531	4	6.44e-3	4	4415.686	15	NC	1
544			min	-.017	2	-.861	2	0	1	0	1	110.538	2	3136.657	4
545		7	max	.024	3	.72	3	.509	4	3.757e-3	4	3639.868	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
546			min	-.016	2	-1.121	2	0	1	0	1	91.25	2	2802.801	4
547		8	max	.023	3	.883	3	.487	4	1.073e-3	4	3190.771	15	NC	1
548			min	-.016	2	-1.331	1	0	1	0	1	79.948	1	2497.331	4
549		9	max	.023	3	.989	3	.466	4	3.533e-8	14	2960.934	15	NC	1
550			min	-.016	2	-1.464	1	0	1	-4.636e-6	5	74.105	1	2253.276	4
551		10	max	.022	3	1.027	3	.44	4	1.683e-7	14	2891.694	15	NC	1
552			min	-.016	2	-1.509	1	0	1	-4.397e-6	5	72.373	1	2211.941	4
553		11	max	.022	3	1.002	3	.411	4	3.013e-7	14	2961.073	15	NC	1
554			min	-.015	2	-1.464	1	0	1	-4.157e-6	5	74.239	1	2261.209	4
555		12	max	.021	3	.914	3	.382	4	7.187e-4	4	3191.098	15	NC	1
556			min	-.015	2	-1.327	1	0	1	0	1	80.396	1	2331.506	4
557		13	max	.02	3	.772	3	.346	4	2.516e-3	4	3640.521	15	NC	1
558			min	-.015	2	-1.11	1	0	1	0	1	92.567	1	2737.247	4
559		14	max	.02	3	.594	3	.305	4	4.313e-3	4	4416.94	15	NC	1
560			min	-.014	2	-.84	1	0	1	0	1	113.881	1	3843.036	4
561		15	max	.019	3	.396	3	.261	4	6.111e-3	4	5768.983	15	NC	1
562			min	-.014	2	-.548	1	0	1	0	1	151.701	1	7151.612	5
563		16	max	.019	3	.196	3	.219	4	7.908e-3	4	8306.168	15	NC	1
564			min	-.014	2	-.263	1	0	1	0	1	224.485	1	NC	1
565		17	max	.018	3	.012	3	.182	4	9.705e-3	4	NC	15	NC	1
566			min	-.014	2	-.016	2	0	1	0	1	386.251	1	NC	1
567		18	max	.018	3	.175	1	.153	4	4.91e-3	4	NC	5	NC	1
568			min	-.014	2	-.143	3	0	1	0	1	855.974	1	NC	1
569		19	max	.018	3	.33	1	.133	4	0	1	NC	1	NC	1
570			min	-.014	2	-.28	3	0	1	-4.215e-6	4	NC	1	NC	1
571	M9	1	max	.009	3	.211	2	.625	4	1.702e-2	3	NC	1	NC	1
572			min	-.005	2	-.054	3	0	1	-9.048e-3	1	NC	1	NC	1
573		2	max	.009	3	.104	2	.61	4	8.449e-3	3	NC	5	NC	1
574			min	-.005	2	-.027	3	0	12	-4.367e-3	1	1266.902	2	NC	1
575		3	max	.009	3	.012	3	.593	4	1.443e-2	4	NC	5	NC	1
576			min	-.005	2	-.01	2	0	12	-2.093e-5	10	613.171	2	5993.457	4
577		4	max	.008	3	.073	3	.573	4	1.137e-2	5	NC	15	NC	1
578			min	-.005	2	-.137	2	0	12	-4.215e-3	1	389.855	2	4431.683	4
579		5	max	.008	3	.148	3	.552	4	8.591e-3	5	NC	15	NC	1
580			min	-.005	2	-.268	2	0	12	-8.585e-3	1	282.95	2	3635.504	4
581		6	max	.008	3	.229	3	.531	4	1.174e-2	3	7973.377	15	NC	1
582			min	-.005	2	-.394	2	0	10	-1.295e-2	1	223.8	2	3138.463	4
583		7	max	.008	3	.306	3	.509	4	1.562e-2	3	6739.316	15	NC	1
584			min	-.004	2	-.507	2	0	1	-1.733e-2	1	188.768	2	2777.389	4
585		8	max	.008	3	.37	3	.488	4	1.951e-2	3	6007.978	15	NC	1
586			min	-.004	2	-.596	2	0	1	-2.17e-2	1	168.001	2	2479.716	5
587		9	max	.008	3	.412	3	.466	4	1.999e-2	3	5624.818	15	NC	1
588			min	-.004	2	-.652	2	0	12	-2.384e-2	1	157.014	1	2252.154	4
589		10	max	.007	3	.428	3	.44	4	1.82e-2	3	5507.56	15	NC	1
590			min	-.004	2	-.671	2	0	1	-2.459e-2	2	153.711	1	2192.005	4
591		11	max	.007	3	.418	3	.411	4	1.641e-2	3	5624.542	15	NC	1
592			min	-.004	2	-.652	2	0	1	-2.592e-2	2	157.263	1	2235.7	4
593		12	max	.007	3	.383	3	.381	4	1.42e-2	3	6007.443	15	NC	1
594			min	-.004	2	-.594	2	0	12	-2.475e-2	2	168.795	1	2361.023	4
595		13	max	.007	3	.326	3	.345	4	1.136e-2	3	6738.478	15	NC	1
596			min	-.004	2	-.502	1	0	10	-1.985e-2	2	190.99	1	2811.052	4
597		14	max	.007	3	.254	3	.304	4	8.525e-3	3	7972.096	15	NC	1
598			min	-.004	2	-.386	1	-.002	1	-1.495e-2	2	228.722	1	3876.683	5
599		15	max	.006	3	.172	3	.261	4	5.84e-3	5	NC	15	NC	1
600			min	-.004	2	-.258	1	-.004	1	-1.004e-2	2	293.117	1	6626.801	5
601		16	max	.006	3	.087	3	.22	4	7.805e-3	5	NC	15	NC	1
602			min	-.004	2	-.127	1	-.007	1	-5.142e-3	2	411.011	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
603		17	max	.006	3	.004	3	.184	4	9.83e-3	4	NC	5	NC	1
604			min	-.004	2	-.006	2	-.007	1	-4.939e-4	1	659.93	1	NC	1
605		18	max	.006	3	.101	1	.155	4	4.776e-3	5	NC	5	NC	1
606			min	-.004	2	-.071	3	-.005	1	-6.46e-3	2	1384.091	1	NC	1
607		19	max	.006	3	.197	1	.133	4	4.48e-3	3	NC	1	NC	1
608			min	-.004	2	-.141	3	0	12	-1.288e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

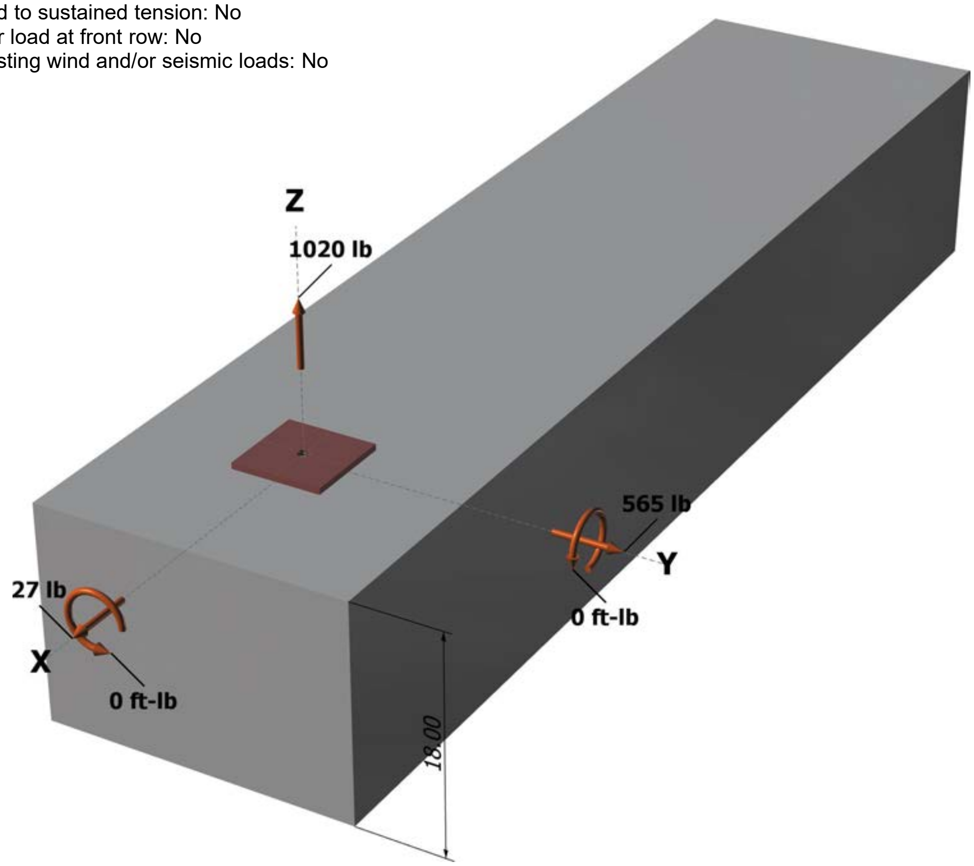
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

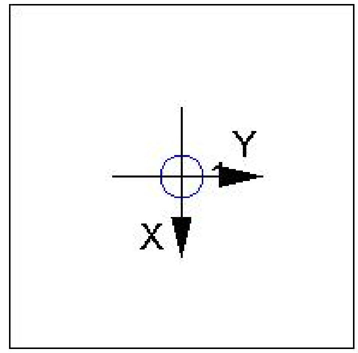
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.247	10215

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	7.00	6947

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
192.89	220.50	0.925	1.000	1.000	6947	0.70	3934

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
165.27	278.72	0.878	1.000	1.000	8282	0.70	3018

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	7.00	6947

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
192.89	220.50	1.000	1.000	1.000	6947	0.70	8508

Shear parallel to edge in y-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
165.27	278.72	1.000	1.000	1.000	8282	0.70	6875

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
220.36	247.75	0.967	1.000	1.000	10215	8785	0.70	12298

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	1.0	Pass

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

12. Warnings

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

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

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

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 32-40 Inch Width		
Address:			
Phone:			
E-mail:			

SIMPSON Strong-Tie® Anchor Designer™ Software
Version 2.4.6025.0

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

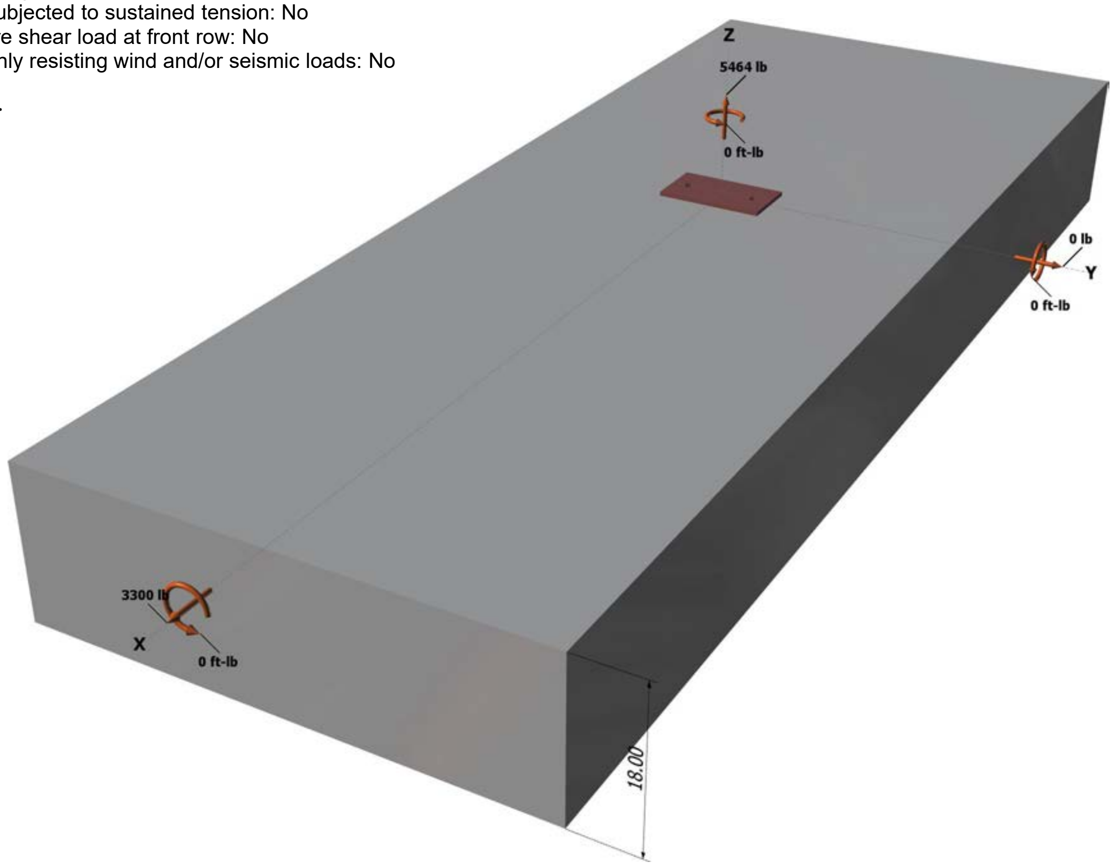
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

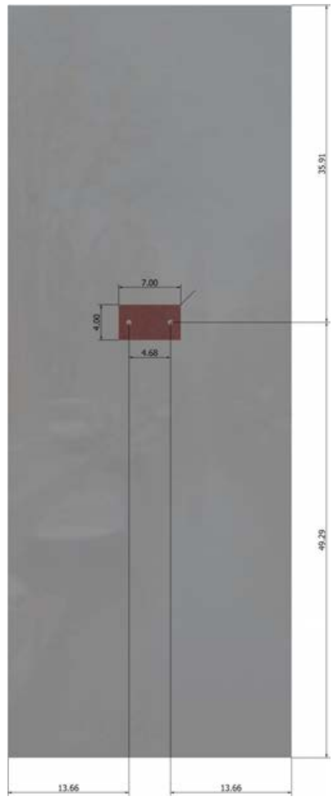
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



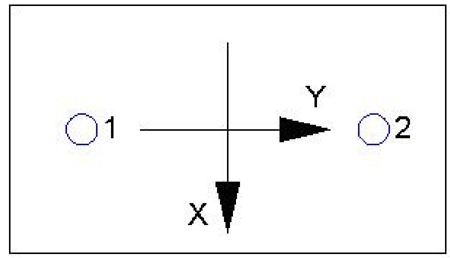
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2732.0	1650.0	0.0	1650.0
2	2732.0	1650.0	0.0	1650.0
Sum	5464.0	3300.0	0.0	3300.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5464
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	6.000	12492

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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

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

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

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

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

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

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	13.66	18939

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
737.64	839.68	1.000	1.000	1.000	18939	0.70	23292

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

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

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
408.24	324.00	1.000	1.000	1.000	1.000	12492	15740	0.70

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2732	6071	0.45	Pass
Concrete breakout	5464	10231	0.53	Pass
Adhesive	**5464**	**8093**	**0.68**	**Pass (Governs)**

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

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.68	0.52	119.8 %	1.2	Pass

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

12. Warnings

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

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

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