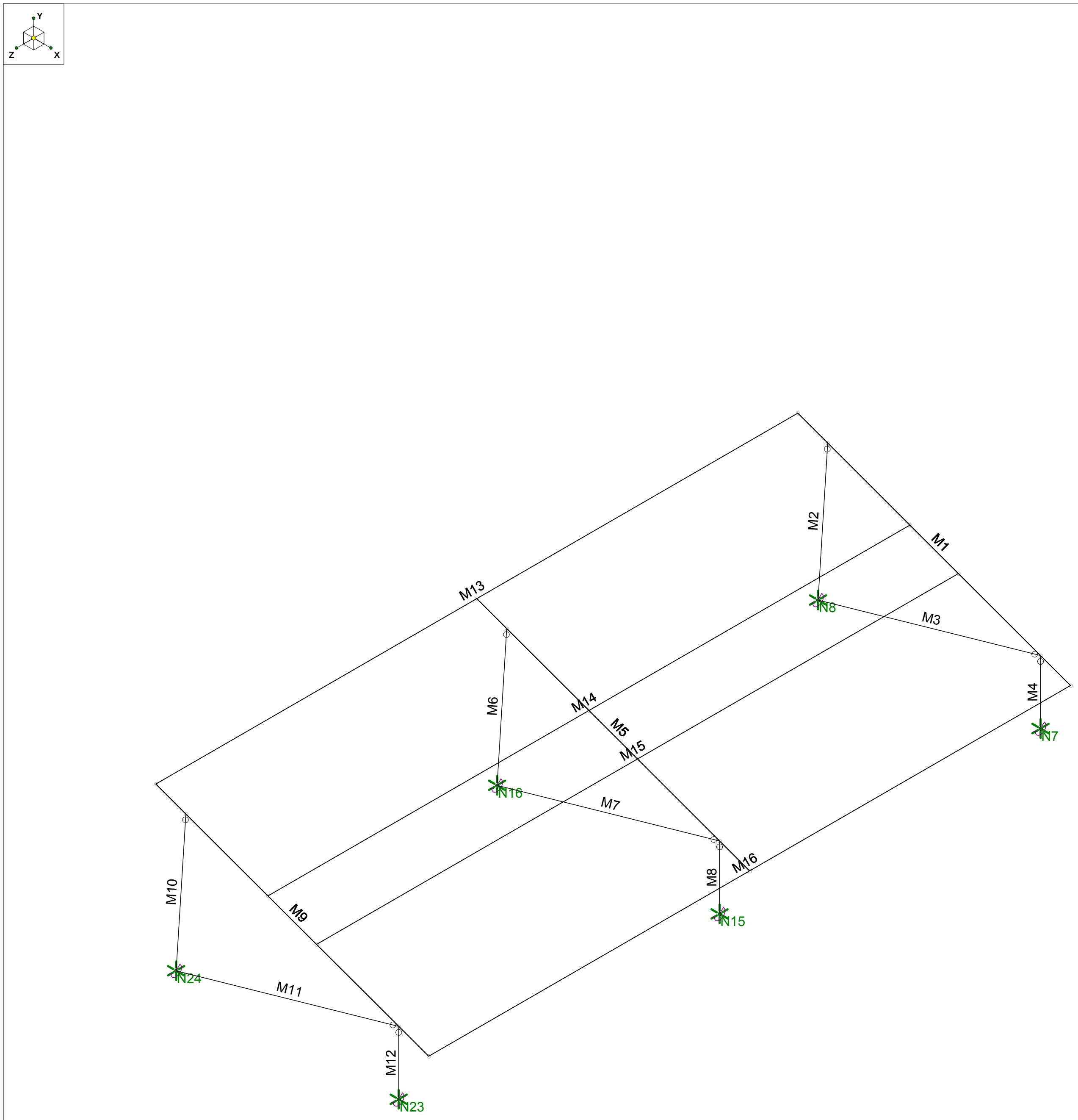


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

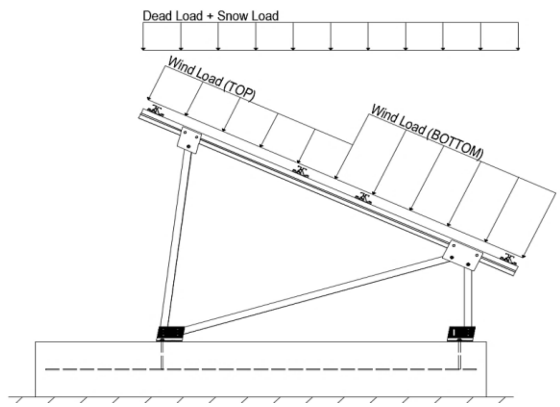
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

Modules Per Row = 2
Module Tilt = 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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	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 = 85 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.050	*(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 =	0.05	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.

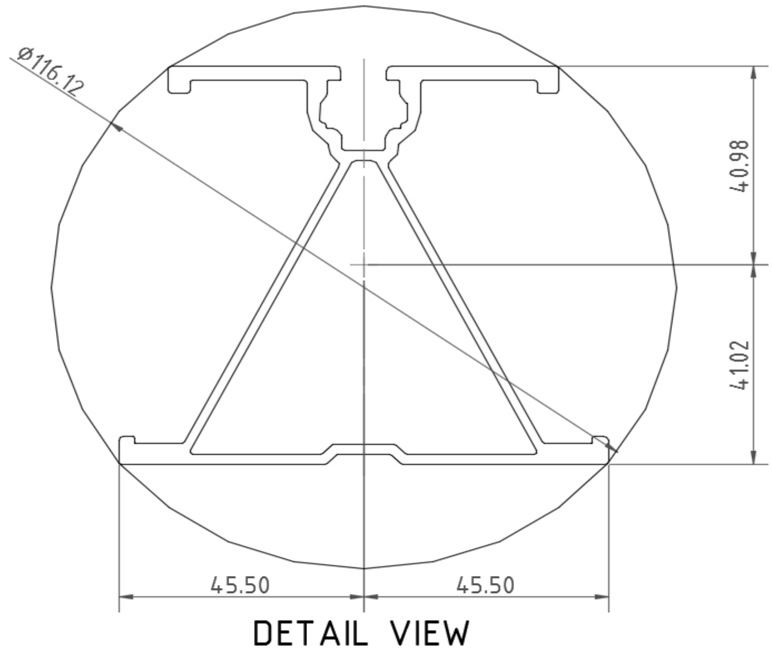
Purlins	Location	Diagonal Struts	Location	Front Reactions	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9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

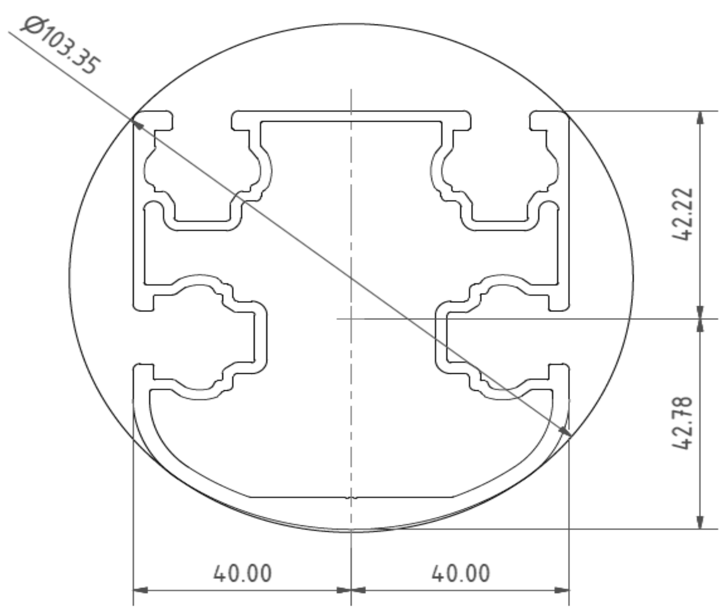
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	126	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.894	k-ft
M_z =	0.331	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	97%	



4.2 Girder Design

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

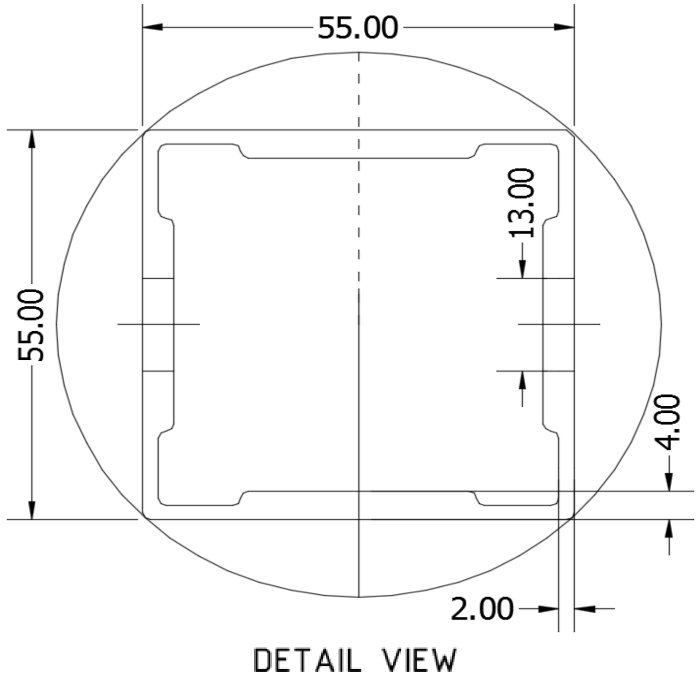
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.887	k-ft
M_z =	0.000	k-ft
P_n =	-0.182	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	84%	



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).

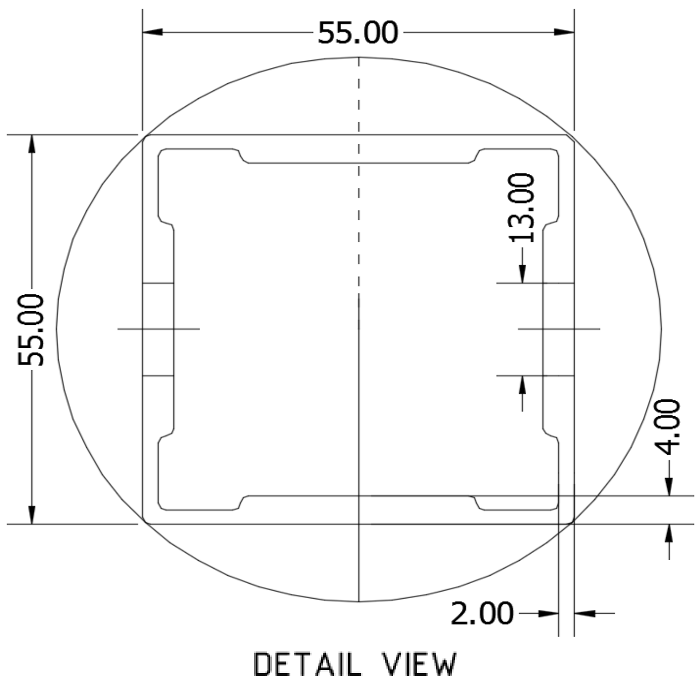
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.528	k-ft
P_n =	0.685	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	40%	



4.4 Diagonal Strut Design

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

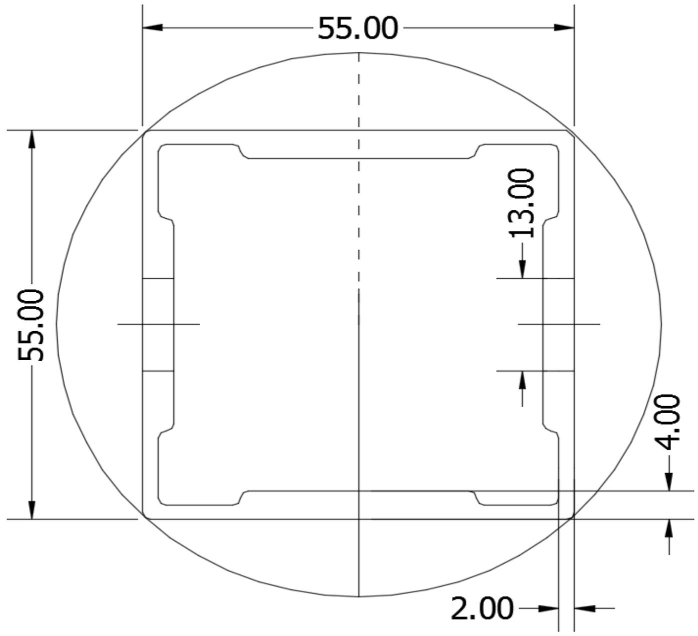
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	1.200	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	17%	



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 =	55.91	in
$\Phi F_{ty\ AXIAL}$ =	15.92	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 =	-0.008	k-ft
M_z =	-0.307	k-ft
P_n =	0.686	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	27%	



DETAIL VIEW

5. FOUNDATION DESIGN CALCULATIONS

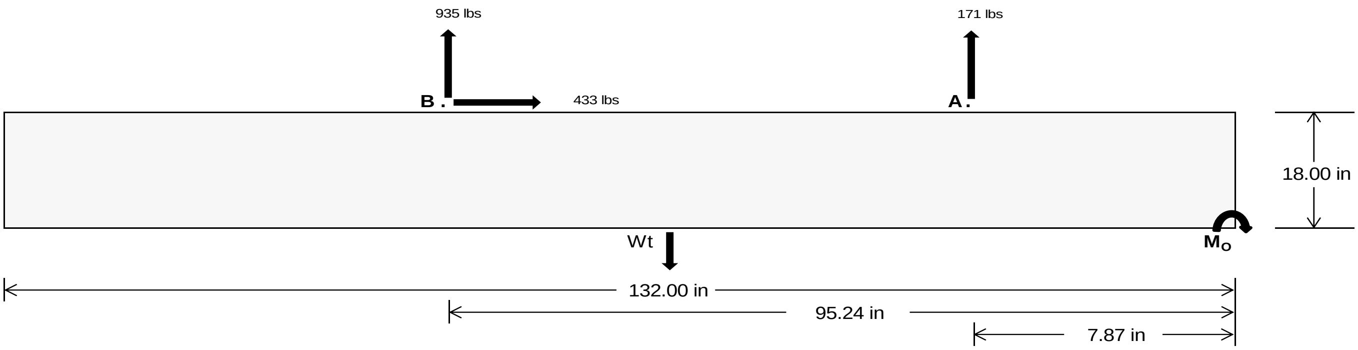
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	722.78	3902.09	k
Compressive Load =	4218.36	4527.40	k
Lateral Load =	350.77	1803.09	k
Moment (Weak Axis) =	0.71	0.39	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O =	98169.5 in-lbs
Resisting Force Required =	1487.42 lbs
S.F. =	1.67
Weight Required =	2479.03 lbs
Minimum Width =	21 in in
Weight Provided =	4186.88 lbs

A minimum 132in long x 21in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	433.16 lbs
Friction =	0.4
Weight Required =	1082.90 lbs
Resisting Weight =	4186.88 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	433.16 lbs
Cohesion =	130 psf
Area =	19.25 ft^2
Resisting =	2093.44 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 21in 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			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(1.75 ft) =	4187 lbs	4386 lbs	4586 lbs	4785 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	1630 lbs	1630 lbs	1630 lbs	1630 lbs	1200 lbs	1200 lbs	1200 lbs	1200 lbs	1989 lbs	1989 lbs	1989 lbs	1989 lbs	-341 lbs	-341 lbs	-341 lbs	-341 lbs
F_B	1665 lbs	1665 lbs	1665 lbs	1665 lbs	1431 lbs	1431 lbs	1431 lbs	1431 lbs	2185 lbs	2185 lbs	2185 lbs	2185 lbs	-1870 lbs	-1870 lbs	-1870 lbs	-1870 lbs
F_V	187 lbs	187 lbs	187 lbs	187 lbs	788 lbs	788 lbs	788 lbs	788 lbs	717 lbs	717 lbs	717 lbs	717 lbs	-866 lbs	-866 lbs	-866 lbs	-866 lbs
P_{total}	7483 lbs	7682 lbs	7881 lbs	8081 lbs	6818 lbs	7017 lbs	7216 lbs	7416 lbs	8361 lbs	8560 lbs	8760 lbs	8959 lbs	301 lbs	421 lbs	541 lbs	660 lbs
M	4121 lbs-ft	4121 lbs-ft	4121 lbs-ft	4121 lbs-ft	3510 lbs-ft	3510 lbs-ft	3510 lbs-ft	3510 lbs-ft	5384 lbs-ft	5384 lbs-ft	5384 lbs-ft	5384 lbs-ft	1603 lbs-ft	1603 lbs-ft	1603 lbs-ft	1603 lbs-ft
e	0.55 ft	0.54 ft	0.52 ft	0.51 ft	0.51 ft	0.50 ft	0.49 ft	0.47 ft	0.64 ft	0.63 ft	0.61 ft	0.60 ft	5.32 ft	3.81 ft	2.97 ft	2.43 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	271.9 psf	269.5 psf	267.2 psf	265.1 psf	254.7 psf	253.0 psf	251.5 psf	250.1 psf	281.8 psf	278.8 psf	276.2 psf	273.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	505.5 psf	492.4 psf	480.4 psf	469.5 psf	453.6 psf	442.9 psf	433.1 psf	424.1 psf	586.9 psf	570.1 psf	554.8 psf	540.7 psf	640.2 psf	90.5 psf	74.2 psf	71.7 psf

Maximum Bearing Pressure =	640 psf
Allowable Bearing Pressure =	1500 psf

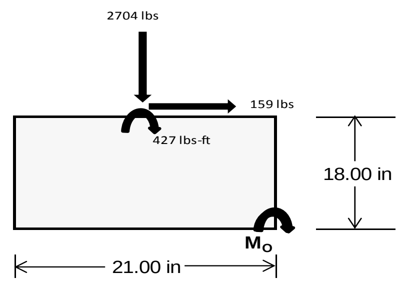
Use a 132in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 1701.4 ft-lbs
Resisting Force Required = 1944.49 lbs
S.F. = 1.67
Weight Required = 3240.81 lbs
Minimum Width = 21 in in
Weight Provided = 4186.88 lbs

A minimum 132in long x 21in 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	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	274 lbs	671 lbs	226 lbs	926 lbs	2704 lbs	889 lbs	97 lbs	196 lbs	50 lbs
F_V	221 lbs	217 lbs	224 lbs	164 lbs	159 lbs	174 lbs	222 lbs	219 lbs	222 lbs
P_{total}	5457 lbs	5854 lbs	5410 lbs	5860 lbs	7639 lbs	5823 lbs	1612 lbs	1712 lbs	1565 lbs
M	886 lbs-ft	878 lbs-ft	894 lbs-ft	668 lbs-ft	665 lbs-ft	701 lbs-ft	883 lbs-ft	875 lbs-ft	887 lbs-ft
e	0.16 ft	0.15 ft	0.17 ft	0.11 ft	0.09 ft	0.12 ft	0.55 ft	0.51 ft	0.57 ft
L/6	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft
f_{min}	125.7 psf	147.8 psf	121.8 psf	185.5 psf	278.4 psf	177.6 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	441.3 psf	460.5 psf	440.2 psf	423.4 psf	515.2 psf	427.4 psf	298.6 psf	285.0 psf	307.5 psf

Maximum Bearing Pressure = 515 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 21in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

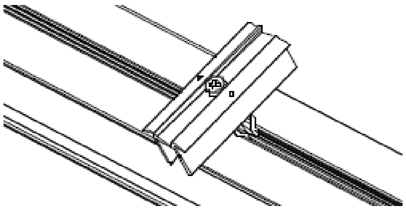
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

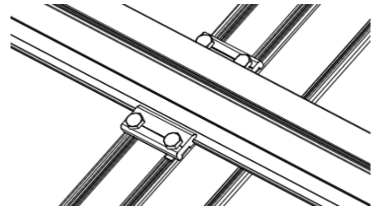
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 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 =	0.403	k
Allowable Uplift =	1.214	k
Utilization =	33%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.486	k
Allowable Uplift =	4.357	k
Utilization =	34%	



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 =	3.245	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	44%	

Rear Strut		
Maximum Axial Load =	3.294	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	44%	

Diagonal Strut		
Maximum Axial Load =	1.252	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	17%	

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

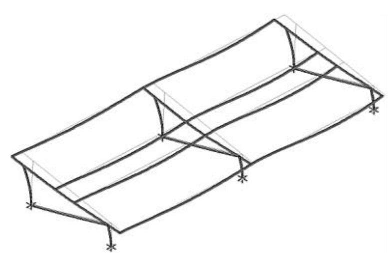
7.1 Seismic Drift

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} =	40.12	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.802	in
Max Drift, Δ_{MAX} =	0.578	in

$0.578 \leq 0.802$, 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 = 126 in

J = 0.432

348.575

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 27.2 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

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

Weak Axis:

3.4.14

L_b = 126

J = 0.432

221.673

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

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= 28.5

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.4 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.2

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

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

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

$M_{max}Wk$ = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

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

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **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 = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 <u>Not Used</u>

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

<u>Compression</u>

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 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

$\varphi F_L =$ 7.50 ksi
A = 663.99 mm^2
1.03 in^2
$P_{max} =$ 7.72 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 55.91 in
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.4 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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:

3.4.14

$L_b =$ 55.91
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.4

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

$$S2=\frac{k_1Bbr}{mDbr}$$

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

$$S2=\frac{k_1Bbr}{mDbr}$$

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 = 1.29339

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76107

φF_L= (φccFcy)/(λ^2)

φF_L= 15.9235 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

$\varphi F_L =$ 15.92 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 16.39 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	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-54.031	-54.031	0	0
2	M14	Y	-54.031	-54.031	0	0
3	M15	Y	-54.031	-54.031	0	0
4	M16	Y	-54.031	-54.031	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	-33.217	-33.217	0	0
2	M14	y	-33.217	-33.217	0	0
3	M15	y	-52.198	-52.198	0	0
4	M16	y	-52.198	-52.198	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	75.924	75.924	0	0
2	M14	y	58.208	58.208	0	0
3	M15	y	31.635	31.635	0	0
4	M16	y	31.635	31.635	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	6.693	6.693	0	0
2	M14	Z	6.693	6.693	0	0
3	M15	Z	6.693	6.693	0	0
4	M16	Z	6.693	6.693	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	0	0

Load Combinations

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	317.966	2	1021.233	1	.951	1	.005	1	0	1	0	1
2		min	-440.618	3	-910.872	3	-65.952	5	-.297	4	0	1	0	1
3	N7	max	.049	1	1162.163	1	-.444	12	0	12	0	1	0	1
4		min	-.065	2	-148.834	3	-269.826	4	-.543	4	0	1	0	1
5	N15	max	.027	9	3244.895	1	0	1	0	1	0	1	0	1
6		min	-.924	2	-555.984	3	-258.747	4	-.528	4	0	1	0	1
7	N16	max	1328.28	2	3482.614	1	0	1	0	2	0	1	0	1
8		min	-1386.993	3	-3001.608	3	-65.638	5	-.3	4	0	1	0	1
9	N23	max	.049	1	1162.163	1	10.4	1	.022	1	0	1	0	1
10		min	-.065	2	-148.834	3	-263.112	4	-.531	4	0	1	0	1
11	N24	max	317.966	2	1021.233	1	-.047	12	0	12	0	1	0	1
12		min	-440.618	3	-910.872	3	-66.509	5	-.3	4	0	1	0	1
13	Totals:	max	1963.157	2	11094.3	1	0	1						
14		min	-2268.519	3	-5677.004	3	-984.268	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	110.463	1	463.881	1	-6.516	12	0	3	.263	1	0	4
2			min	4.721	12	-458.572	3	-169.942	1	-.012	1	.011	12	0	3
3		2	max	110.463	1	325.118	1	-5.091	12	0	3	.099	4	.456	3
4			min	4.721	12	-322.722	3	-130.72	1	-.012	1	.005	12	-.46	1
5		3	max	110.463	1	186.356	1	-3.665	12	0	3	.051	5	.753	3
6			min	4.721	12	-186.872	3	-91.499	1	-.012	1	-.042	1	-.759	1
7		4	max	110.463	1	47.593	1	-2.24	12	0	3	.026	5	.892	3
8			min	4.721	12	-51.022	3	-52.277	1	-.012	1	-.125	1	-.895	1
9		5	max	110.463	1	84.828	3	-.814	12	0	3	.004	5	.872	3
10			min	4.721	12	-91.17	1	-21.214	4	-.012	1	-.164	1	-.87	1
11		6	max	110.463	1	220.678	3	26.166	1	0	3	-.006	12	.694	3
12			min	4.192	15	-229.933	1	-15.853	5	-.012	1	-.156	1	-.682	1
13		7	max	110.463	1	356.528	3	65.387	1	0	3	-.004	12	.357	3
14			min	-5.468	5	-368.696	1	-13.648	5	-.012	1	-.102	1	-.333	1
15		8	max	110.463	1	492.378	3	104.609	1	0	3	0	10	.178	1
16			min	-17.444	5	-507.458	1	-11.442	5	-.012	1	-.049	4	-.138	3
17		9	max	110.463	1	628.228	3	143.83	1	0	3	.142	1	.851	1
18			min	-29.42	5	-646.221	1	-9.237	5	-.012	1	-.06	5	-.792	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	110.463	1	764.078	3	183.052	1	.005	14	.332	1	1.686	1
20			min	4.721	12	-784.984	1	-106.219	14	-.012	1	.01	12	-1.604	3
21		11	max	110.463	1	646.221	1	-4.888	12	.012	1	.142	1	.851	1
22			min	4.721	12	-628.228	3	-143.83	1	0	3	.004	12	-.792	3
23		12	max	110.463	1	507.458	1	-3.462	12	.012	1	.047	4	.178	1
24			min	4.721	12	-492.378	3	-104.609	1	0	3	-.003	1	-.138	3
25		13	max	110.463	1	368.696	1	-2.037	12	.012	1	.021	5	.357	3
26			min	4.721	12	-356.528	3	-65.387	1	0	3	-.102	1	-.333	1
27		14	max	110.463	1	229.933	1	-.611	12	.012	1	-.001	15	.694	3
28			min	3.827	15	-220.678	3	-26.166	1	0	3	-.156	1	-.682	1
29		15	max	110.463	1	91.17	1	13.056	1	.012	1	-.006	12	.872	3
30			min	-6.108	5	-84.828	3	-16.569	5	0	3	-.164	1	-.87	1
31		16	max	110.463	1	51.022	3	52.277	1	.012	1	-.004	12	.892	3
32			min	-18.084	5	-47.593	1	-14.363	5	0	3	-.125	1	-.895	1
33		17	max	110.463	1	186.872	3	91.499	1	.012	1	0	12	.753	3
34			min	-30.061	5	-186.356	1	-12.158	5	0	3	-.066	4	-.759	1
35		18	max	110.463	1	322.722	3	130.72	1	.012	1	.088	1	.456	3
36			min	-42.037	5	-325.118	1	-9.952	5	0	3	-.069	5	-.46	1
37		19	max	110.463	1	458.572	3	169.942	1	.012	1	.263	1	0	1
38			min	-54.013	5	-463.881	1	-7.747	5	0	3	-.079	5	0	3
39	M14	1	max	63.806	4	487.488	1	-6.695	12	.005	3	.299	1	0	1
40			min	2.017	12	-355.644	3	-174.996	1	-.01	1	.013	12	0	3
41		2	max	51.83	4	348.725	1	-5.269	12	.005	3	.14	4	.355	3
42			min	2.017	12	-252.864	3	-135.775	1	-.01	1	.006	12	-.488	1
43		3	max	49.87	1	209.962	1	-3.844	12	.005	3	.075	5	.59	3
44			min	2.017	12	-150.084	3	-96.553	1	-.01	1	-.018	1	-.814	1
45		4	max	49.87	1	71.199	1	-2.418	12	.005	3	.04	5	.705	3
46			min	2.017	12	-47.304	3	-57.332	1	-.01	1	-.108	1	-.978	1
47		5	max	49.87	1	55.476	3	-.993	12	.005	3	.007	5	.7	3
48			min	2.017	12	-67.564	1	-31.218	4	-.01	1	-.152	1	-.98	1
49		6	max	49.87	1	158.256	3	21.112	1	.005	3	-.006	12	.576	3
50			min	-6.586	5	-206.326	1	-24.596	5	-.01	1	-.15	1	-.82	1
51		7	max	49.87	1	261.036	3	60.333	1	.005	3	-.004	12	.331	3
52			min	-18.562	5	-345.089	1	-22.391	5	-.01	1	-.103	1	-.498	1
53		8	max	49.87	1	363.816	3	99.555	1	.005	3	0	10	0	15
54			min	-30.538	5	-483.852	1	-20.185	5	-.01	1	-.079	4	-.033	3
55		9	max	49.87	1	466.597	3	138.776	1	.005	3	.13	1	.631	1
56			min	-42.514	5	-622.615	1	-17.98	5	-.01	1	-.097	5	-.518	3
57		10	max	70.182	4	569.377	3	177.998	1	.005	3	.315	1	1.438	1
58			min	2.017	12	-761.377	1	-108.042	14	-.01	1	.01	12	-1.122	3
59		11	max	58.206	4	622.615	1	-4.709	12	.01	1	.141	4	.631	1
60			min	2.017	12	-466.597	3	-138.776	1	-.005	3	.003	12	-.518	3
61		12	max	49.87	1	483.852	1	-3.284	12	.01	1	.074	5	0	15
62			min	2.017	12	-363.816	3	-99.555	1	-.005	3	-.009	1	-.033	3
63		13	max	49.87	1	345.089	1	-1.858	12	.01	1	.038	5	.331	3
64			min	2.017	12	-261.036	3	-60.333	1	-.005	3	-.103	1	-.498	1
65		14	max	49.87	1	206.326	1	-.433	12	.01	1	.006	5	.576	3
66			min	2.017	12	-158.256	3	-31.909	4	-.005	3	-.15	1	-.82	1
67		15	max	49.87	1	67.564	1	18.11	1	.01	1	-.005	12	.7	3
68			min	-.082	15	-55.476	3	-24.744	5	-.005	3	-.152	1	-.98	1
69		16	max	49.87	1	47.304	3	57.332	1	.01	1	-.003	12	.705	3
70			min	-12.043	5	-71.199	1	-22.538	5	-.005	3	-.108	1	-.978	1
71		17	max	49.87	1	150.084	3	96.553	1	.01	1	0	3	.59	3
72			min	-24.02	5	-209.962	1	-20.333	5	-.005	3	-.083	4	-.814	1
73		18	max	49.87	1	252.864	3	135.775	1	.01	1	.117	1	.355	3
74			min	-35.996	5	-348.725	1	-18.127	5	-.005	3	-.1	5	-.488	1
75		19	max	49.87	1	355.644	3	174.996	1	.01	1	.299	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	-47.972	5	-487.488	1	-15.922	5	-.005	3	-.119	5	0	3
77	M15	1	max	84.958	5	547.256	1	-6.669	12	.01	1	.299	1	0	2
78			min	-52.569	1	-188.374	3	-174.966	1	-.004	3	.012	12	0	12
79		2	max	72.982	5	390.777	1	-5.243	12	.01	1	.176	4	.189	3
80			min	-52.569	1	-135.196	3	-135.745	1	-.004	3	.006	12	-.547	1
81		3	max	61.006	5	234.299	1	-3.818	12	.01	1	.101	5	.315	3
82			min	-52.569	1	-82.019	3	-96.523	1	-.004	3	-.018	1	-.912	1
83		4	max	49.03	5	77.821	1	-2.392	12	.01	1	.056	5	.38	3
84			min	-52.569	1	-28.842	3	-57.302	1	-.004	3	-.108	1	-1.094	1
85		5	max	37.054	5	24.335	3	-.967	12	.01	1	.013	5	.383	3
86			min	-52.569	1	-78.658	1	-39.976	4	-.004	3	-.152	1	-1.093	1
87		6	max	25.078	5	77.512	3	21.141	1	.01	1	-.006	12	.323	3
88			min	-52.569	1	-235.136	1	-33.34	5	-.004	3	-.15	1	-.91	1
89		7	max	13.102	5	130.689	3	60.363	1	.01	1	-.004	12	.202	3
90			min	-52.569	1	-391.614	1	-31.135	5	-.004	3	-.103	1	-.545	1
91		8	max	1.126	5	183.867	3	99.585	1	.01	1	0	10	.018	3
92			min	-52.569	1	-548.093	1	-28.929	5	-.004	3	-.103	4	-.003	9
93		9	max	-2.289	12	237.044	3	138.806	1	.01	1	.13	1	.734	1
94			min	-52.569	1	-704.571	1	-26.724	5	-.004	3	-.132	5	-.227	3
95		10	max	-2.289	12	314.199	14	178.028	1	.01	1	.315	1	1.647	1
96			min	-52.569	1	-861.05	1	-112.502	14	-.004	3	.01	12	-.535	3
97		11	max	4.655	5	704.571	1	-4.735	12	.004	3	.176	4	.734	1
98			min	-52.569	1	-237.044	3	-138.806	1	-.01	1	.003	12	-.227	3
99		12	max	-2.289	12	548.093	1	-3.31	12	.004	3	.098	5	.018	3
100			min	-52.569	1	-183.867	3	-99.585	1	-.01	1	-.009	1	-.003	9
101		13	max	-2.289	12	391.614	1	-1.884	12	.004	3	.053	5	.202	3
102			min	-52.569	1	-130.689	3	-60.363	1	-.01	1	-.103	1	-.545	1
103		14	max	-2.289	12	235.136	1	-.459	12	.004	3	.01	5	.323	3
104			min	-52.569	1	-77.512	3	-40.687	4	-.01	1	-.15	1	-.91	1
105		15	max	-2.289	12	78.658	1	18.08	1	.004	3	-.005	12	.383	3
106			min	-54.878	4	-24.335	3	-33.49	5	-.01	1	-.152	1	-1.093	1
107		16	max	-2.289	12	28.842	3	57.302	1	.004	3	-.003	12	.38	3
108			min	-66.854	4	-77.821	1	-31.285	5	-.01	1	-.108	1	-1.094	1
109		17	max	-2.289	12	82.019	3	96.523	1	.004	3	0	3	.315	3
110			min	-78.83	4	-234.299	1	-29.079	5	-.01	1	-.109	4	-.912	1
111		18	max	-2.289	12	135.196	3	135.745	1	.004	3	.117	1	.189	3
112			min	-90.806	4	-390.777	1	-26.874	5	-.01	1	-.136	5	-.547	1
113		19	max	-2.289	12	188.374	3	174.966	1	.004	3	.299	1	0	2
114			min	-102.782	4	-547.256	1	-24.668	5	-.01	1	-.166	5	0	5
115	M16	1	max	83.875	5	523.803	1	-6.433	12	.011	1	.265	1	0	1
116			min	-117.213	1	-176.987	3	-170.139	1	-.007	3	.011	12	0	3
117		2	max	71.899	5	367.324	1	-5.008	12	.011	1	.133	4	.175	3
118			min	-117.213	1	-123.809	3	-130.917	1	-.007	3	.004	12	-.52	1
119		3	max	59.922	5	210.846	1	-3.582	12	.011	1	.075	5	.289	3
120			min	-117.213	1	-70.632	3	-91.696	1	-.007	3	-.041	1	-.857	1
121		4	max	47.946	5	54.368	1	-2.157	12	.011	1	.041	5	.34	3
122			min	-117.213	1	-17.455	3	-52.474	1	-.007	3	-.125	1	-1.012	1
123		5	max	35.97	5	35.722	3	-.731	12	.011	1	.01	5	.33	3
124			min	-117.213	1	-102.111	1	-29.123	4	-.007	3	-.163	1	-.984	1
125		6	max	23.994	5	88.899	3	25.969	1	.011	1	-.006	12	.257	3
126			min	-117.213	1	-258.589	1	-23.668	5	-.007	3	-.156	1	-.774	1
127		7	max	12.018	5	142.076	3	65.19	1	.011	1	-.004	12	.122	3
128			min	-117.213	1	-415.067	1	-21.462	5	-.007	3	-.103	1	-.381	1
129		8	max	.135	15	195.254	3	104.412	1	.011	1	0	10	.195	1
130			min	-117.213	1	-571.546	1	-19.257	5	-.007	3	-.071	4	-.075	3
131		9	max	-4.846	12	248.431	3	143.633	1	.011	1	.141	1	.953	1
132			min	-117.213	1	-728.024	1	-17.051	5	-.007	3	-.09	5	-.333	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	-4.846	12	323.444	14	182.855	1	.011	1	.331	1	1.894	1
134			min	-117.213	1	-884.503	1	-110.145	14	-.007	3	.011	12	-.654	3
135		11	max	-.604	15	728.024	1	-4.971	12	.007	3	.141	1	.953	1
136			min	-117.213	1	-248.431	3	-143.633	1	-.011	1	.004	12	-.333	3
137		12	max	-4.846	12	571.546	1	-3.545	12	.007	3	.069	4	.195	1
138			min	-117.213	1	-195.254	3	-104.412	1	-.011	1	-.004	1	-.075	3
139		13	max	-4.846	12	415.067	1	-2.12	12	.007	3	.034	5	.122	3
140			min	-117.213	1	-142.076	3	-65.19	1	-.011	1	-.103	1	-.381	1
141		14	max	-4.846	12	258.589	1	-.694	12	.007	3	.001	5	.257	3
142			min	-117.213	1	-88.899	3	-32.41	4	-.011	1	-.156	1	-.774	1
143		15	max	-4.846	12	102.111	1	13.253	1	.007	3	-.006	12	.33	3
144			min	-117.213	1	-35.722	3	-24.371	5	-.011	1	-.163	1	-.984	1
145		16	max	-4.846	12	17.455	3	52.474	1	.007	3	-.004	12	.34	3
146			min	-117.213	1	-54.368	1	-22.165	5	-.011	1	-.125	1	-1.012	1
147		17	max	-4.846	12	70.632	3	91.696	1	.007	3	0	12	.289	3
148			min	-117.213	1	-210.846	1	-19.96	5	-.011	1	-.09	4	-.857	1
149		18	max	-4.846	12	123.809	3	130.917	1	.007	3	.089	1	.175	3
150			min	-117.213	1	-367.324	1	-17.754	5	-.011	1	-.102	5	-.52	1
151		19	max	-4.846	12	176.987	3	170.139	1	.007	3	.265	1	0	1
152			min	-122.506	4	-523.803	1	-15.548	5	-.011	1	-.121	5	0	5
153	M2	1	max	1018.373	1	2.07	4	1.029	1	0	3	0	3	0	1
154			min	-813.012	3	.507	15	-62.957	4	0	4	0	1	0	1
155		2	max	1018.752	1	2.037	4	1.029	1	0	3	0	1	0	15
156			min	-812.728	3	.499	15	-63.286	4	0	4	-.016	4	0	4
157		3	max	1019.132	1	2.003	4	1.029	1	0	3	0	1	0	15
158			min	-812.443	3	.491	15	-63.616	4	0	4	-.032	4	-.001	4
159		4	max	1019.511	1	1.97	4	1.029	1	0	3	0	1	0	15
160			min	-812.159	3	.483	15	-63.945	4	0	4	-.049	4	-.002	4
161		5	max	1019.89	1	1.937	4	1.029	1	0	3	.001	1	0	15
162			min	-811.874	3	.475	15	-64.275	4	0	4	-.065	4	-.002	4
163		6	max	1020.269	1	1.903	4	1.029	1	0	3	.001	1	0	15
164			min	-811.59	3	.467	15	-64.604	4	0	4	-.082	4	-.003	4
165		7	max	1020.649	1	1.87	4	1.029	1	0	3	.002	1	0	15
166			min	-811.306	3	.46	15	-64.934	4	0	4	-.098	4	-.003	4
167		8	max	1021.028	1	1.836	4	1.029	1	0	3	.002	1	0	15
168			min	-811.021	3	.452	15	-65.263	4	0	4	-.115	4	-.004	4
169		9	max	1021.407	1	1.803	4	1.029	1	0	3	.002	1	0	15
170			min	-810.737	3	.444	15	-65.593	4	0	4	-.132	4	-.004	4
171		10	max	1021.787	1	1.77	4	1.029	1	0	3	.002	1	-.001	15
172			min	-810.452	3	.436	15	-65.922	4	0	4	-.149	4	-.004	4
173		11	max	1022.166	1	1.736	4	1.029	1	0	3	.003	1	-.001	15
174			min	-810.168	3	.428	15	-66.251	4	0	4	-.166	4	-.005	4
175		12	max	1022.545	1	1.703	4	1.029	1	0	3	.003	1	-.001	15
176			min	-809.883	3	.42	15	-66.581	4	0	4	-.183	4	-.005	4
177		13	max	1022.924	1	1.669	4	1.029	1	0	3	.003	1	-.001	15
178			min	-809.599	3	.412	15	-66.91	4	0	4	-.2	4	-.006	4
179		14	max	1023.304	1	1.636	4	1.029	1	0	3	.003	1	-.002	15
180			min	-809.314	3	.405	15	-67.24	4	0	4	-.217	4	-.006	4
181		15	max	1023.683	1	1.603	4	1.029	1	0	3	.004	1	-.002	15
182			min	-809.03	3	.397	15	-67.569	4	0	4	-.234	4	-.007	4
183		16	max	1024.062	1	1.569	4	1.029	1	0	3	.004	1	-.002	15
184			min	-808.746	3	.389	15	-67.899	4	0	4	-.251	4	-.007	4
185		17	max	1024.441	1	1.536	4	1.029	1	0	3	.004	1	-.002	15
186			min	-808.461	3	.381	15	-68.228	4	0	4	-.269	4	-.007	4
187		18	max	1024.821	1	1.502	4	1.029	1	0	3	.004	1	-.002	15
188			min	-808.177	3	.373	15	-68.558	4	0	4	-.286	4	-.008	4
189		19	max	1025.2	1	1.469	4	1.029	1	0	3	.005	1	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
190			min	-807.892	3	.365	15	-68.887	4	0	4	-.304	4	-.008	4
191	M3	1	max	274.349	2	8.008	4	1.335	4	0	3	0	1	.008	4
192			min	-399.792	3	1.895	15	.003	12	0	4	-.022	4	.002	15
193		2	max	274.179	2	7.239	4	1.876	4	0	3	0	1	.005	4
194			min	-399.92	3	1.714	15	.003	12	0	4	-.021	4	.001	12
195		3	max	274.009	2	6.469	4	2.416	4	0	3	0	1	.002	2
196			min	-400.047	3	1.533	15	.003	12	0	4	-.02	4	0	12
197		4	max	273.838	2	5.699	4	2.957	4	0	3	0	1	0	2
198			min	-400.175	3	1.352	15	.003	12	0	4	-.019	4	-.001	3
199		5	max	273.668	2	4.929	4	3.497	4	0	3	0	1	0	15
200			min	-400.303	3	1.171	15	.003	12	0	4	-.018	4	-.003	6
201		6	max	273.498	2	4.159	4	4.038	4	0	3	0	1	-.001	15
202			min	-400.431	3	.99	15	.003	12	0	4	-.016	4	-.005	6
203		7	max	273.327	2	3.389	4	4.579	4	0	3	0	1	-.001	15
204			min	-400.558	3	.809	15	.003	12	0	4	-.014	4	-.006	6
205		8	max	273.157	2	2.619	4	5.119	4	0	3	0	1	-.002	15
206			min	-400.686	3	.628	15	.003	12	0	4	-.012	4	-.007	6
207		9	max	272.987	2	1.849	4	5.66	4	0	3	0	1	-.002	15
208			min	-400.814	3	.447	15	.003	12	0	4	-.01	5	-.008	6
209		10	max	272.816	2	1.079	4	6.2	4	0	3	0	1	-.002	15
210			min	-400.942	3	.266	15	.003	12	0	4	-.007	5	-.009	6
211		11	max	272.646	2	.324	2	6.741	4	0	3	0	1	-.002	15
212			min	-401.069	3	.019	12	.003	12	0	4	-.005	5	-.009	6
213		12	max	272.476	2	-.096	15	7.281	4	0	3	0	1	-.002	15
214			min	-401.197	3	-.463	6	.003	12	0	4	-.002	5	-.009	6
215		13	max	272.305	2	-.277	15	7.822	4	0	3	.001	4	-.002	15
216			min	-401.325	3	-1.233	6	.003	12	0	4	0	12	-.009	6
217		14	max	272.135	2	-.458	15	8.362	4	0	3	.005	4	-.002	15
218			min	-401.453	3	-2.003	6	.003	12	0	4	0	12	-.008	6
219		15	max	271.965	2	-.639	15	8.903	4	0	3	.008	4	-.002	15
220			min	-401.581	3	-2.772	6	.003	12	0	4	0	12	-.007	6
221		16	max	271.794	2	-.82	15	9.444	4	0	3	.012	4	-.001	15
222			min	-401.708	3	-3.542	6	.003	12	0	4	0	12	-.006	6
223		17	max	271.624	2	-1.001	15	9.984	4	0	3	.016	4	0	15
224			min	-401.836	3	-4.312	6	.003	12	0	4	0	12	-.004	6
225		18	max	271.453	2	-1.182	15	10.525	4	0	3	.021	4	0	15
226			min	-401.964	3	-5.082	6	.003	12	0	4	0	12	-.002	6
227		19	max	271.283	2	-1.363	15	11.065	4	0	3	.025	4	0	1
228			min	-402.092	3	-5.852	6	.003	12	0	4	0	12	0	1
229	M4	1	max	1159.096	1	0	1	-.443	12	0	1	.016	4	0	1
230			min	-151.133	3	0	1	-268.831	4	0	1	0	12	0	1
231		2	max	1159.267	1	0	1	-.443	12	0	1	0	12	0	1
232			min	-151.006	3	0	1	-268.979	4	0	1	-.015	4	0	1
233		3	max	1159.437	1	0	1	-.443	12	0	1	0	12	0	1
234			min	-150.878	3	0	1	-269.127	4	0	1	-.046	4	0	1
235		4	max	1159.607	1	0	1	-.443	12	0	1	0	12	0	1
236			min	-150.75	3	0	1	-269.274	4	0	1	-.077	4	0	1
237		5	max	1159.778	1	0	1	-.443	12	0	1	0	12	0	1
238			min	-150.622	3	0	1	-269.422	4	0	1	-.108	4	0	1
239		6	max	1159.948	1	0	1	-.443	12	0	1	0	12	0	1
240			min	-150.495	3	0	1	-269.57	4	0	1	-.139	4	0	1
241		7	max	1160.118	1	0	1	-.443	12	0	1	0	12	0	1
242			min	-150.367	3	0	1	-269.717	4	0	1	-.17	4	0	1
243		8	max	1160.289	1	0	1	-.443	12	0	1	0	12	0	1
244			min	-150.239	3	0	1	-269.865	4	0	1	-.201	4	0	1
245		9	max	1160.459	1	0	1	-.443	12	0	1	0	12	0	1
246			min	-150.111	3	0	1	-270.013	4	0	1	-.232	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	1160.629	1	0	1	-.443	12	0	1	0	12	0	1
248			min	-149.984	3	0	1	-270.16	4	0	1	-.263	4	0	1
249		11	max	1160.8	1	0	1	-.443	12	0	1	0	12	0	1
250			min	-149.856	3	0	1	-270.308	4	0	1	-.294	4	0	1
251		12	max	1160.97	1	0	1	-.443	12	0	1	0	12	0	1
252			min	-149.728	3	0	1	-270.455	4	0	1	-.325	4	0	1
253		13	max	1161.14	1	0	1	-.443	12	0	1	0	12	0	1
254			min	-149.6	3	0	1	-270.603	4	0	1	-.356	4	0	1
255		14	max	1161.311	1	0	1	-.443	12	0	1	0	12	0	1
256			min	-149.473	3	0	1	-270.751	4	0	1	-.387	4	0	1
257		15	max	1161.481	1	0	1	-.443	12	0	1	0	12	0	1
258			min	-149.345	3	0	1	-270.898	4	0	1	-.418	4	0	1
259		16	max	1161.652	1	0	1	-.443	12	0	1	0	12	0	1
260			min	-149.217	3	0	1	-271.046	4	0	1	-.449	4	0	1
261		17	max	1161.822	1	0	1	-.443	12	0	1	0	12	0	1
262			min	-149.089	3	0	1	-271.194	4	0	1	-.48	4	0	1
263		18	max	1161.992	1	0	1	-.443	12	0	1	0	12	0	1
264			min	-148.962	3	0	1	-271.341	4	0	1	-.511	4	0	1
265		19	max	1162.163	1	0	1	-.443	12	0	1	0	12	0	1
266			min	-148.834	3	0	1	-271.489	4	0	1	-.543	4	0	1
267	M6	1	max	3286.947	1	2.255	2	0	1	0	1	0	4	0	1
268			min	-2675.782	3	.309	12	-63.573	4	0	4	0	1	0	1
269		2	max	3287.326	1	2.229	2	0	1	0	1	0	1	0	12
270			min	-2675.497	3	.296	12	-63.902	4	0	4	-.016	4	0	2
271		3	max	3287.705	1	2.203	2	0	1	0	1	0	1	0	12
272			min	-2675.213	3	.283	12	-64.232	4	0	4	-.033	4	-.001	2
273		4	max	3288.084	1	2.177	2	0	1	0	1	0	1	0	12
274			min	-2674.928	3	.27	12	-64.561	4	0	4	-.049	4	-.002	2
275		5	max	3288.464	1	2.151	2	0	1	0	1	0	1	0	12
276			min	-2674.644	3	.257	12	-64.891	4	0	4	-.066	4	-.002	2
277		6	max	3288.843	1	2.125	2	0	1	0	1	0	1	0	12
278			min	-2674.359	3	.244	12	-65.22	4	0	4	-.082	4	-.003	2
279		7	max	3289.222	1	2.099	2	0	1	0	1	0	1	0	12
280			min	-2674.075	3	.231	12	-65.55	4	0	4	-.099	4	-.003	2
281		8	max	3289.601	1	2.073	2	0	1	0	1	0	1	0	12
282			min	-2673.791	3	.218	12	-65.879	4	0	4	-.116	4	-.004	2
283		9	max	3289.981	1	2.047	2	0	1	0	1	0	1	0	12
284			min	-2673.506	3	.205	12	-66.209	4	0	4	-.133	4	-.004	2
285		10	max	3290.36	1	2.021	2	0	1	0	1	0	1	0	12
286			min	-2673.222	3	.192	12	-66.538	4	0	4	-.15	4	-.005	2
287		11	max	3290.739	1	1.995	2	0	1	0	1	0	1	0	12
288			min	-2672.937	3	.179	12	-66.868	4	0	4	-.167	4	-.005	2
289		12	max	3291.118	1	1.969	2	0	1	0	1	0	1	0	12
290			min	-2672.653	3	.166	12	-67.197	4	0	4	-.184	4	-.006	2
291		13	max	3291.498	1	1.943	2	0	1	0	1	0	1	0	12
292			min	-2672.368	3	.153	12	-67.526	4	0	4	-.202	4	-.006	2
293		14	max	3291.877	1	1.917	2	0	1	0	1	0	1	0	12
294			min	-2672.084	3	.14	12	-67.856	4	0	4	-.219	4	-.007	2
295		15	max	3292.256	1	1.891	2	0	1	0	1	0	1	0	12
296			min	-2671.799	3	.127	12	-68.185	4	0	4	-.236	4	-.007	2
297		16	max	3292.636	1	1.865	2	0	1	0	1	0	1	0	12
298			min	-2671.515	3	.114	12	-68.515	4	0	4	-.254	4	-.008	2
299		17	max	3293.015	1	1.839	2	0	1	0	1	0	1	0	12
300			min	-2671.231	3	.101	12	-68.844	4	0	4	-.271	4	-.008	2
301		18	max	3293.394	1	1.813	2	0	1	0	1	0	1	0	12
302			min	-2670.946	3	.083	3	-69.174	4	0	4	-.289	4	-.009	2
303		19	max	3293.773	1	1.787	2	0	1	0	1	0	1	0	12

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	-2670.662	3	.064	3	-69.503	4	0	4	-.307	4	-.009	2
305	M7	1	max	1200.124	2	8.022	6	1.196	4	0	1	0	1	.009	2
306			min	-1249.738	3	1.882	15	0	1	0	4	-.022	4	0	12
307		2	max	1199.954	2	7.252	6	1.737	4	0	1	0	1	.007	2
308			min	-1249.866	3	1.701	15	0	1	0	4	-.021	4	0	3
309		3	max	1199.783	2	6.482	6	2.277	4	0	1	0	1	.004	2
310			min	-1249.993	3	1.52	15	0	1	0	4	-.02	4	-.002	3
311		4	max	1199.613	2	5.712	6	2.818	4	0	1	0	1	.002	2
312			min	-1250.121	3	1.339	15	0	1	0	4	-.019	4	-.003	3
313		5	max	1199.443	2	4.942	6	3.358	4	0	1	0	1	0	2
314			min	-1250.249	3	1.158	15	0	1	0	4	-.018	4	-.004	3
315		6	max	1199.272	2	4.172	6	3.899	4	0	1	0	1	-.001	15
316			min	-1250.377	3	.977	15	0	1	0	4	-.016	4	-.005	3
317		7	max	1199.102	2	3.402	6	4.439	4	0	1	0	1	-.001	15
318			min	-1250.504	3	.796	15	0	1	0	4	-.015	4	-.006	4
319		8	max	1198.932	2	2.632	6	4.98	4	0	1	0	1	-.002	15
320			min	-1250.632	3	.615	15	0	1	0	4	-.013	4	-.007	4
321		9	max	1198.761	2	1.862	6	5.52	4	0	1	0	1	-.002	15
322			min	-1250.76	3	.417	12	0	1	0	4	-.011	4	-.008	4
323		10	max	1198.591	2	1.232	2	6.061	4	0	1	0	1	-.002	15
324			min	-1250.888	3	.117	12	0	1	0	4	-.008	4	-.009	4
325		11	max	1198.421	2	.632	2	6.602	4	0	1	0	1	-.002	15
326			min	-1251.015	3	-.304	3	0	1	0	4	-.005	4	-.009	4
327		12	max	1198.25	2	.032	2	7.142	4	0	1	0	1	-.002	15
328			min	-1251.143	3	-.754	3	0	1	0	4	-.003	4	-.009	4
329		13	max	1198.08	2	-.29	15	7.683	4	0	1	0	4	-.002	15
330			min	-1251.271	3	-1.218	4	0	1	0	4	0	1	-.009	4
331		14	max	1197.91	2	-.471	15	8.223	4	0	1	.004	4	-.002	15
332			min	-1251.399	3	-1.988	4	0	1	0	4	0	1	-.008	4
333		15	max	1197.739	2	-.652	15	8.764	4	0	1	.007	4	-.002	15
334			min	-1251.527	3	-2.758	4	0	1	0	4	0	1	-.007	4
335		16	max	1197.569	2	-.833	15	9.304	4	0	1	.011	4	-.001	15
336			min	-1251.654	3	-3.528	4	0	1	0	4	0	1	-.006	4
337		17	max	1197.399	2	-1.014	15	9.845	4	0	1	.015	4	-.001	15
338			min	-1251.782	3	-4.298	4	0	1	0	4	0	1	-.004	4
339		18	max	1197.228	2	-1.195	15	10.385	4	0	1	.02	4	0	15
340			min	-1251.91	3	-5.068	4	0	1	0	4	0	1	-.002	4
341		19	max	1197.058	2	-1.376	15	10.926	4	0	1	.024	4	0	1
342			min	-1252.038	3	-5.838	4	0	1	0	4	0	1	0	1
343	M8	1	max	3241.829	1	0	1	0	1	0	1	.015	4	0	1
344			min	-558.283	3	0	1	-261.502	4	0	1	0	1	0	1
345		2	max	3241.999	1	0	1	0	1	0	1	0	1	0	1
346			min	-558.156	3	0	1	-261.649	4	0	1	-.015	4	0	1
347		3	max	3242.169	1	0	1	0	1	0	1	0	1	0	1
348			min	-558.028	3	0	1	-261.797	4	0	1	-.045	4	0	1
349		4	max	3242.34	1	0	1	0	1	0	1	0	1	0	1
350			min	-557.9	3	0	1	-261.945	4	0	1	-.075	4	0	1
351		5	max	3242.51	1	0	1	0	1	0	1	0	1	0	1
352			min	-557.772	3	0	1	-262.092	4	0	1	-.105	4	0	1
353		6	max	3242.68	1	0	1	0	1	0	1	0	1	0	1
354			min	-557.645	3	0	1	-262.24	4	0	1	-.135	4	0	1
355		7	max	3242.851	1	0	1	0	1	0	1	0	1	0	1
356			min	-557.517	3	0	1	-262.388	4	0	1	-.165	4	0	1
357		8	max	3243.021	1	0	1	0	1	0	1	0	1	0	1
358			min	-557.389	3	0	1	-262.535	4	0	1	-.196	4	0	1
359		9	max	3243.191	1	0	1	0	1	0	1	0	1	0	1
360			min	-557.261	3	0	1	-262.683	4	0	1	-.226	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	3243.362	1	0	1	0	1	0	1	0	1	0	1
362			min	-557.134	3	0	1	-262.831	4	0	1	-.256	4	0	1
363		11	max	3243.532	1	0	1	0	1	0	1	0	1	0	1
364			min	-557.006	3	0	1	-262.978	4	0	1	-.286	4	0	1
365		12	max	3243.702	1	0	1	0	1	0	1	0	1	0	1
366			min	-556.878	3	0	1	-263.126	4	0	1	-.316	4	0	1
367		13	max	3243.873	1	0	1	0	1	0	1	0	1	0	1
368			min	-556.75	3	0	1	-263.273	4	0	1	-.347	4	0	1
369		14	max	3244.043	1	0	1	0	1	0	1	0	1	0	1
370			min	-556.623	3	0	1	-263.421	4	0	1	-.377	4	0	1
371		15	max	3244.213	1	0	1	0	1	0	1	0	1	0	1
372			min	-556.495	3	0	1	-263.569	4	0	1	-.407	4	0	1
373		16	max	3244.384	1	0	1	0	1	0	1	0	1	0	1
374			min	-556.367	3	0	1	-263.716	4	0	1	-.437	4	0	1
375		17	max	3244.554	1	0	1	0	1	0	1	0	1	0	1
376			min	-556.239	3	0	1	-263.864	4	0	1	-.468	4	0	1
377		18	max	3244.724	1	0	1	0	1	0	1	0	1	0	1
378			min	-556.112	3	0	1	-264.012	4	0	1	-.498	4	0	1
379		19	max	3244.895	1	0	1	0	1	0	1	0	1	0	1
380			min	-555.984	3	0	1	-264.159	4	0	1	-.528	4	0	1
381	M10	1	max	1018.373	1	1.983	6	-.041	12	0	1	0	1	0	1
382			min	-813.012	3	.448	15	-63.503	4	0	5	0	3	0	1
383		2	max	1018.752	1	1.949	6	-.041	12	0	1	0	10	0	15
384			min	-812.728	3	.44	15	-63.832	4	0	5	-.016	4	0	6
385		3	max	1019.132	1	1.916	6	-.041	12	0	1	0	12	0	15
386			min	-812.443	3	.432	15	-64.162	4	0	5	-.033	4	0	6
387		4	max	1019.511	1	1.882	6	-.041	12	0	1	0	12	0	15
388			min	-812.159	3	.424	15	-64.491	4	0	5	-.049	4	-.001	6
389		5	max	1019.89	1	1.849	6	-.041	12	0	1	0	12	0	15
390			min	-811.874	3	.416	15	-64.82	4	0	5	-.066	4	-.002	6
391		6	max	1020.269	1	1.816	6	-.041	12	0	1	0	12	0	15
392			min	-811.59	3	.409	15	-65.15	4	0	5	-.082	4	-.002	6
393		7	max	1020.649	1	1.782	6	-.041	12	0	1	0	12	0	15
394			min	-811.306	3	.401	15	-65.479	4	0	5	-.099	4	-.003	6
395		8	max	1021.028	1	1.749	6	-.041	12	0	1	0	12	0	15
396			min	-811.021	3	.393	15	-65.809	4	0	5	-.116	4	-.003	6
397		9	max	1021.407	1	1.715	6	-.041	12	0	1	0	12	0	15
398			min	-810.737	3	.385	15	-66.138	4	0	5	-.133	4	-.004	6
399		10	max	1021.787	1	1.682	6	-.041	12	0	1	0	12	0	15
400			min	-810.452	3	.377	15	-66.468	4	0	5	-.15	4	-.004	6
401		11	max	1022.166	1	1.649	6	-.041	12	0	1	0	12	-.001	15
402			min	-810.168	3	.369	15	-66.797	4	0	5	-.167	4	-.005	6
403		12	max	1022.545	1	1.615	6	-.041	12	0	1	0	12	-.001	15
404			min	-809.883	3	.362	15	-67.127	4	0	5	-.184	4	-.005	6
405		13	max	1022.924	1	1.582	6	-.041	12	0	1	0	12	-.001	15
406			min	-809.599	3	.354	15	-67.456	4	0	5	-.201	4	-.005	6
407		14	max	1023.304	1	1.548	6	-.041	12	0	1	0	12	-.001	15
408			min	-809.314	3	.346	15	-67.786	4	0	5	-.219	4	-.006	6
409		15	max	1023.683	1	1.515	6	-.041	12	0	1	0	12	-.001	15
410			min	-809.03	3	.338	15	-68.115	4	0	5	-.236	4	-.006	6
411		16	max	1024.062	1	1.482	6	-.041	12	0	1	0	12	-.001	15
412			min	-808.746	3	.33	15	-68.445	4	0	5	-.254	4	-.007	6
413		17	max	1024.441	1	1.448	6	-.041	12	0	1	0	12	-.002	15
414			min	-808.461	3	.322	15	-68.774	4	0	5	-.271	4	-.007	6
415		18	max	1024.821	1	1.415	6	-.041	12	0	1	0	12	-.002	15
416			min	-808.177	3	.314	15	-69.103	4	0	5	-.289	4	-.007	6
417		19	max	1025.2	1	1.381	6	-.041	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	-807.892	3	.307	15	-69.433	4	0	5	-.307	4	-.008	6
419	M11	1	max	274.349	2	7.955	6	1.293	4	0	1	0	12	.008	6
420			min	-399.792	3	1.859	15	-.081	1	0	4	-.022	4	.002	15
421		2	max	274.179	2	7.185	6	1.833	4	0	1	0	12	.005	6
422			min	-399.92	3	1.678	15	-.081	1	0	4	-.021	4	0	15
423		3	max	274.009	2	6.415	6	2.374	4	0	1	0	12	.002	2
424			min	-400.047	3	1.497	15	-.081	1	0	4	-.02	4	0	12
425		4	max	273.838	2	5.645	6	2.914	4	0	1	0	12	0	2
426			min	-400.175	3	1.316	15	-.081	1	0	4	-.019	4	-.001	3
427		5	max	273.668	2	4.875	6	3.455	4	0	1	0	12	0	15
428			min	-400.303	3	1.135	15	-.081	1	0	4	-.018	4	-.003	4
429		6	max	273.498	2	4.105	6	3.995	4	0	1	0	12	-.001	15
430			min	-400.431	3	.954	15	-.081	1	0	4	-.016	4	-.005	4
431		7	max	273.327	2	3.335	6	4.536	4	0	1	0	12	-.002	15
432			min	-400.558	3	.773	15	-.081	1	0	4	-.014	4	-.006	4
433		8	max	273.157	2	2.565	6	5.076	4	0	1	0	12	-.002	15
434			min	-400.686	3	.592	15	-.081	1	0	4	-.012	4	-.008	4
435		9	max	272.987	2	1.795	6	5.617	4	0	1	0	12	-.002	15
436			min	-400.814	3	.411	15	-.081	1	0	4	-.01	4	-.009	4
437		10	max	272.816	2	1.025	6	6.157	4	0	1	0	12	-.002	15
438			min	-400.942	3	.23	15	-.081	1	0	4	-.008	4	-.009	4
439		11	max	272.646	2	.324	2	6.698	4	0	1	0	12	-.002	15
440			min	-401.069	3	.019	12	-.081	1	0	4	-.005	4	-.01	4
441		12	max	272.476	2	-.132	15	7.239	4	0	1	0	12	-.002	15
442			min	-401.197	3	-.516	4	-.081	1	0	4	-.002	4	-.009	4
443		13	max	272.305	2	-.313	15	7.779	4	0	1	.001	5	-.002	15
444			min	-401.325	3	-1.286	4	-.081	1	0	4	0	1	-.009	4
445		14	max	272.135	2	-.494	15	8.32	4	0	1	.005	5	-.002	15
446			min	-401.453	3	-2.056	4	-.081	1	0	4	0	1	-.008	4
447		15	max	271.965	2	-.675	15	8.86	4	0	1	.008	5	-.002	15
448			min	-401.581	3	-2.826	4	-.081	1	0	4	0	1	-.007	4
449		16	max	271.794	2	-.856	15	9.401	4	0	1	.012	4	-.001	15
450			min	-401.708	3	-3.596	4	-.081	1	0	4	0	1	-.006	4
451		17	max	271.624	2	-1.037	15	9.941	4	0	1	.016	4	-.001	15
452			min	-401.836	3	-4.366	4	-.081	1	0	4	0	1	-.004	4
453		18	max	271.453	2	-1.218	15	10.482	4	0	1	.02	4	0	15
454			min	-401.964	3	-5.136	4	-.081	1	0	4	0	1	-.002	4
455		19	max	271.283	2	-1.399	15	11.022	4	0	1	.025	4	0	1
456			min	-402.092	3	-5.906	4	-.081	1	0	4	0	1	0	1
457	M12	1	max	1159.096	1	0	1	10.779	1	0	1	.015	4	0	1
458			min	-151.133	3	0	1	-263.097	4	0	1	0	1	0	1
459		2	max	1159.267	1	0	1	10.779	1	0	1	0	1	0	1
460			min	-151.006	3	0	1	-263.245	4	0	1	-.015	4	0	1
461		3	max	1159.437	1	0	1	10.779	1	0	1	.002	1	0	1
462			min	-150.878	3	0	1	-263.392	4	0	1	-.045	4	0	1
463		4	max	1159.607	1	0	1	10.779	1	0	1	.003	1	0	1
464			min	-150.75	3	0	1	-263.54	4	0	1	-.075	4	0	1
465		5	max	1159.778	1	0	1	10.779	1	0	1	.004	1	0	1
466			min	-150.622	3	0	1	-263.688	4	0	1	-.106	4	0	1
467		6	max	1159.948	1	0	1	10.779	1	0	1	.006	1	0	1
468			min	-150.495	3	0	1	-263.835	4	0	1	-.136	4	0	1
469		7	max	1160.118	1	0	1	10.779	1	0	1	.007	1	0	1
470			min	-150.367	3	0	1	-263.983	4	0	1	-.166	4	0	1
471		8	max	1160.289	1	0	1	10.779	1	0	1	.008	1	0	1
472			min	-150.239	3	0	1	-264.131	4	0	1	-.196	4	0	1
473		9	max	1160.459	1	0	1	10.779	1	0	1	.009	1	0	1
474			min	-150.111	3	0	1	-264.278	4	0	1	-.227	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	1160.629	1	0	1	10.779	1	0	1	.011	1	0	1
476			min	-149.984	3	0	1	-264.426	4	0	1	-.257	4	0	1
477		11	max	1160.8	1	0	1	10.779	1	0	1	.012	1	0	1
478			min	-149.856	3	0	1	-264.574	4	0	1	-.287	4	0	1
479		12	max	1160.97	1	0	1	10.779	1	0	1	.013	1	0	1
480			min	-149.728	3	0	1	-264.721	4	0	1	-.318	4	0	1
481		13	max	1161.14	1	0	1	10.779	1	0	1	.014	1	0	1
482			min	-149.6	3	0	1	-264.869	4	0	1	-.348	4	0	1
483		14	max	1161.311	1	0	1	10.779	1	0	1	.016	1	0	1
484			min	-149.473	3	0	1	-265.016	4	0	1	-.379	4	0	1
485		15	max	1161.481	1	0	1	10.779	1	0	1	.017	1	0	1
486			min	-149.345	3	0	1	-265.164	4	0	1	-.409	4	0	1
487		16	max	1161.652	1	0	1	10.779	1	0	1	.018	1	0	1
488			min	-149.217	3	0	1	-265.312	4	0	1	-.44	4	0	1
489		17	max	1161.822	1	0	1	10.779	1	0	1	.019	1	0	1
490			min	-149.089	3	0	1	-265.459	4	0	1	-.47	4	0	1
491		18	max	1161.992	1	0	1	10.779	1	0	1	.02	1	0	1
492			min	-148.962	3	0	1	-265.607	4	0	1	-.501	4	0	1
493		19	max	1162.163	1	0	1	10.779	1	0	1	.022	1	0	1
494			min	-148.834	3	0	1	-265.755	4	0	1	-.531	4	0	1
495	M1	1	max	169.946	1	458.559	3	53.993	5	0	1	.263	1	0	3
496			min	-7.747	5	-462.578	1	-110.332	1	0	3	-.079	5	-.012	1
497		2	max	170.435	1	457.55	3	55.234	5	0	1	.205	1	.232	1
498			min	-7.518	5	-463.924	1	-110.332	1	0	3	-.05	5	-.242	3
499		3	max	236.489	3	511.303	1	-3.271	15	0	3	.147	1	.466	1
500			min	-149.207	2	-325.323	3	-109.562	1	0	1	-.022	5	-.473	3
501		4	max	236.857	3	509.957	1	-2.435	15	0	3	.089	1	.196	1
502			min	-148.717	2	-326.333	3	-109.562	1	0	1	-.024	5	-.301	3
503		5	max	237.224	3	508.611	1	-1.6	15	0	3	.031	1	-.003	15
504			min	-148.227	2	-327.342	3	-109.562	1	0	1	-.026	5	-.129	3
505		6	max	237.592	3	507.265	1	-.764	15	0	3	-.001	12	.044	3
506			min	-147.737	2	-328.352	3	-109.562	1	0	1	-.032	4	-.34	1
507		7	max	237.959	3	505.919	1	.072	15	0	3	-.004	12	.218	3
508			min	-147.247	2	-329.361	3	-109.562	1	0	1	-.084	1	-.608	1
509		8	max	238.327	3	504.573	1	1.208	5	0	3	-.006	12	.392	3
510			min	-146.757	2	-330.371	3	-109.562	1	0	1	-.142	1	-.874	1
511		9	max	248.769	3	30.705	2	50.345	5	0	9	.083	1	.459	3
512			min	-77.396	2	.406	15	-159.457	1	0	3	-.13	5	-.996	1
513		10	max	249.136	3	29.359	2	51.587	5	0	9	0	12	.446	3
514			min	-76.906	2	0	5	-159.457	1	0	3	-.104	4	-1.005	1
515		11	max	249.504	3	28.013	2	52.828	5	0	9	-.004	12	.433	3
516			min	-76.416	2	-1.674	4	-159.457	1	0	3	-.093	4	-1.013	1
517		12	max	259.905	3	211.536	3	145.058	5	0	1	.14	1	.377	3
518			min	-58.601	5	-536.872	1	-106.954	1	0	3	-.194	5	-.894	1
519		13	max	260.272	3	210.527	3	146.299	5	0	1	.084	1	.265	3
520			min	-58.372	5	-538.218	1	-106.954	1	0	3	-.117	5	-.61	1
521		14	max	260.639	3	209.517	3	147.54	5	0	1	.027	1	.155	3
522			min	-58.143	5	-539.564	1	-106.954	1	0	3	-.04	5	-.326	1
523		15	max	261.007	3	208.508	3	148.782	5	0	1	.038	5	.044	3
524			min	-57.915	5	-540.91	1	-106.954	1	0	3	-.029	1	-.041	1
525		16	max	261.374	3	207.498	3	150.023	5	0	1	.117	5	.245	1
526			min	-57.686	5	-542.256	1	-106.954	1	0	3	-.086	1	-.065	3
527		17	max	261.742	3	206.488	3	151.265	5	0	1	.197	5	.532	1
528			min	-57.457	5	-543.603	1	-106.954	1	0	3	-.142	1	-.175	3
529		18	max	15.32	5	526.383	1	-4.846	12	0	5	.173	5	.266	1
530			min	-170.626	1	-176.01	3	-123.832	4	0	1	-.203	1	-.087	3
531		19	max	15.548	5	525.037	1	-4.846	12	0	5	.121	5	.007	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	-170.136	1	-177.02	3	-122.591	4	0	1	-.265	1	-.011	1
533	M5	1	max	366.096	1	1528.11	3	95.218	5	0	1	0	1	.024	1
534			min	12.627	12	-1562.139	1	0	1	0	4	-.179	4	0	3
535		2	max	366.586	1	1527.1	3	96.459	5	0	1	0	1	.849	1
536			min	12.872	12	-1563.485	1	0	1	0	4	-.129	4	-.806	3
537		3	max	760.08	3	1572.462	1	39.76	4	0	4	0	1	1.636	1
538			min	-555.622	2	-1053.598	3	0	1	0	1	-.079	4	-1.581	3
539		4	max	760.448	3	1571.116	1	41.002	4	0	4	0	1	.807	1
540			min	-555.132	2	-1054.607	3	0	1	0	1	-.058	4	-1.025	3
541		5	max	760.815	3	1569.77	1	42.243	4	0	4	0	1	.009	9
542			min	-554.642	2	-1055.617	3	0	1	0	1	-.036	4	-.468	3
543		6	max	761.182	3	1568.424	1	43.485	4	0	4	0	1	.089	3
544			min	-554.152	2	-1056.626	3	0	1	0	1	-.013	5	-.85	1
545		7	max	761.55	3	1567.078	1	44.726	4	0	4	.01	4	.647	3
546			min	-553.662	2	-1057.636	3	0	1	0	1	0	1	-1.677	1
547		8	max	761.917	3	1565.732	1	45.967	4	0	4	.034	4	1.205	3
548			min	-553.172	2	-1058.646	3	0	1	0	1	0	1	-2.503	1
549		9	max	780.624	3	101.311	2	161.685	4	0	1	0	1	1.39	3
550			min	-411.318	2	.407	15	0	1	0	1	-.18	4	-2.831	1
551		10	max	780.992	3	99.965	2	162.926	4	0	1	0	1	1.344	3
552			min	-410.828	2	.001	15	0	1	0	1	-.094	5	-2.859	1
553		11	max	781.359	3	98.619	2	164.168	4	0	1	0	1	1.299	3
554			min	-410.338	2	-1.497	6	0	1	0	1	-.01	5	-2.887	1
555		12	max	800.148	3	674.381	3	204.184	4	0	1	0	1	1.139	3
556			min	-268.491	2	-1675.084	1	0	1	0	4	-.279	4	-2.572	1
557		13	max	800.515	3	673.371	3	205.425	4	0	1	0	1	.783	3
558			min	-268.001	2	-1676.43	1	0	1	0	4	-.17	4	-1.688	1
559		14	max	800.883	3	672.362	3	206.667	4	0	1	0	1	.428	3
560			min	-267.511	2	-1677.776	1	0	1	0	4	-.062	4	-.803	1
561		15	max	801.25	3	671.352	3	207.908	4	0	1	.048	4	.127	2
562			min	-267.021	2	-1679.122	1	0	1	0	4	0	1	-.004	13
563		16	max	801.618	3	670.343	3	209.15	4	0	1	.158	4	.969	1
564			min	-266.531	2	-1680.468	1	0	1	0	4	0	1	-.28	3
565		17	max	801.985	3	669.333	3	210.391	4	0	1	.268	4	1.856	1
566			min	-266.042	2	-1681.814	1	0	1	0	4	0	1	-.634	3
567		18	max	-13.037	12	1777.719	1	0	1	0	4	.277	4	.96	1
568			min	-366.205	1	-602.415	3	-35.971	5	0	1	0	1	-.331	3
569		19	max	-12.792	12	1776.373	1	0	1	0	4	.26	4	.022	1
570			min	-365.715	1	-603.424	3	-34.729	5	0	1	0	1	-.013	3
571	M9	1	max	169.946	1	458.559	3	110.332	1	0	3	-.011	12	0	3
572			min	6.516	12	-462.578	1	4.72	12	0	4	-.263	1	-.012	1
573		2	max	170.435	1	457.55	3	110.332	1	0	3	-.009	12	.232	1
574			min	6.761	12	-463.924	1	4.72	12	0	4	-.205	1	-.242	3
575		3	max	236.489	3	511.303	1	109.562	1	0	1	-.006	12	.466	1
576			min	-149.207	2	-325.323	3	4.678	12	0	3	-.147	1	-.473	3
577		4	max	236.857	3	509.957	1	109.562	1	0	1	-.004	12	.196	1
578			min	-148.717	2	-326.333	3	4.678	12	0	3	-.089	1	-.301	3
579		5	max	237.224	3	508.611	1	109.562	1	0	1	-.001	12	-.003	15
580			min	-148.227	2	-327.342	3	4.678	12	0	3	-.036	4	-.129	3
581		6	max	237.592	3	507.265	1	109.562	1	0	1	.026	1	.044	3
582			min	-147.737	2	-328.352	3	4.678	12	0	3	-.024	5	-.34	1
583		7	max	237.959	3	505.919	1	109.562	1	0	1	.084	1	.218	3
584			min	-147.247	2	-329.361	3	4.678	12	0	3	-.017	5	-.608	1
585		8	max	238.327	3	504.573	1	109.562	1	0	1	.142	1	.392	3
586			min	-146.757	2	-330.371	3	4.678	12	0	3	-.011	5	-.874	1
587		9	max	248.769	3	30.705	2	159.457	1	0	3	-.003	12	.459	3
588			min	-77.396	2	.412	15	6.693	12	0	9	-.158	4	-.996	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	249.136	3	29.359	2	159.457	1	0	3	.001	1	.446	3
590			min	-76.906	2	.006	15	6.693	12	0	9	-.103	4	-1.005	1
591		11	max	249.504	3	28.013	2	159.457	1	0	3	.085	1	.433	3
592			min	-76.416	2	-1.628	6	6.693	12	0	9	-.066	5	-1.013	1
593		12	max	259.905	3	211.536	3	181.718	4	0	3	-.006	12	.377	3
594			min	-48.749	10	-536.872	1	4.406	12	0	1	-.242	4	-.894	1
595		13	max	260.272	3	210.527	3	182.96	4	0	3	-.003	12	.265	3
596			min	-48.34	10	-538.218	1	4.406	12	0	1	-.146	4	-.61	1
597		14	max	260.639	3	209.517	3	184.201	4	0	3	-.001	12	.155	3
598			min	-47.932	10	-539.564	1	4.406	12	0	1	-.049	4	-.326	1
599		15	max	261.007	3	208.508	3	185.443	4	0	3	.049	4	.044	3
600			min	-47.524	10	-540.91	1	4.406	12	0	1	.001	12	-.041	1
601		16	max	261.374	3	207.498	3	186.684	4	0	3	.147	4	.245	1
602			min	-47.116	10	-542.256	1	4.406	12	0	1	.003	12	-.065	3
603		17	max	261.742	3	206.488	3	187.925	4	0	3	.246	4	.532	1
604			min	-46.707	10	-543.603	1	4.406	12	0	1	.006	12	-.175	3
605		18	max	-6.678	12	526.383	1	117.339	1	0	1	.241	4	.266	1
606			min	-170.626	1	-176.01	3	-85.252	5	0	3	.008	12	-.087	3
607		19	max	-6.433	12	525.037	1	117.339	1	0	1	.265	1	.007	3
608			min	-170.136	1	-177.02	3	-84.011	5	0	3	.011	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	.001	1	.1	1	.004	3	7.968e-3	1	NC	1	NC	1
2			min	-.601	4	-.01	3	-.001	10	-8.014e-4	3	NC	1	NC	1
3		2	max	0	1	.241	3	.046	1	9.209e-3	1	NC	5	NC	2
4			min	-.601	4	-.134	1	-.02	5	-8.193e-4	3	1003.94	3	5817.027	1
5		3	max	0	1	.445	3	.109	1	1.045e-2	1	NC	5	NC	3
6			min	-.601	4	-.319	1	-.023	5	-8.372e-4	3	554.793	3	2364.41	1
7		4	max	0	1	.568	3	.164	1	1.169e-2	1	NC	5	NC	3
8			min	-.601	4	-.423	1	-.016	5	-8.551e-4	3	436.341	3	1558.969	1
9		5	max	0	1	.596	3	.193	1	1.293e-2	1	NC	5	NC	3
10			min	-.601	4	-.433	1	-.003	5	-8.73e-4	3	415.882	3	1324.131	1
11		6	max	0	1	.532	3	.187	1	1.417e-2	1	NC	5	NC	3
12			min	-.601	4	-.35	1	.008	15	-8.909e-4	3	465.299	3	1367.232	1
13		7	max	0	1	.394	3	.148	1	1.541e-2	1	NC	5	NC	3
14			min	-.601	4	-.195	1	.01	10	-9.088e-4	3	624.199	3	1734.265	1
15		8	max	0	1	.219	3	.087	1	1.665e-2	1	NC	4	NC	3
16			min	-.601	4	-.011	9	.004	10	-9.267e-4	3	1101.886	3	2968.84	1
17		9	max	0	1	.164	1	.027	1	1.789e-2	1	NC	4	NC	1
18			min	-.601	4	.005	15	-.003	10	-9.446e-4	3	3599.065	3	9442.513	4
19		10	max	0	1	.24	1	.014	3	1.913e-2	1	NC	3	NC	1
20			min	-.601	4	-.011	3	-.008	2	-9.625e-4	3	1795.246	1	NC	1
21		11	max	0	12	.164	1	.027	1	1.789e-2	1	NC	4	NC	1
22			min	-.601	4	.005	15	-.016	5	-9.446e-4	3	3599.065	3	NC	1
23		12	max	0	12	.219	3	.087	1	1.665e-2	1	NC	4	NC	3
24			min	-.601	4	-.011	9	-.016	5	-9.267e-4	3	1101.886	3	2968.84	1
25		13	max	0	12	.394	3	.148	1	1.541e-2	1	NC	5	NC	3
26			min	-.601	4	-.195	1	-.005	5	-9.088e-4	3	624.199	3	1734.265	1
27		14	max	0	12	.532	3	.187	1	1.417e-2	1	NC	5	NC	3
28			min	-.601	4	-.35	1	.006	15	-8.909e-4	3	465.299	3	1367.232	1
29		15	max	0	12	.596	3	.193	1	1.293e-2	1	NC	5	NC	3
30			min	-.601	4	-.433	1	.012	12	-8.73e-4	3	415.882	3	1324.131	1
31		16	max	0	12	.568	3	.164	1	1.169e-2	1	NC	5	NC	3
32			min	-.601	4	-.423	1	.01	12	-8.551e-4	3	436.341	3	1558.969	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	.445	3	.109	1	1.045e-2	1	NC	5	NC	3
34			min	-.601	4	-.319	1	.008	12	-8.372e-4	3	554.793	3	2364.41	1
35		18	max	0	12	.241	3	.046	1	9.209e-3	1	NC	5	NC	2
36			min	-.601	4	-.134	1	.003	10	-8.193e-4	3	1003.94	3	5817.027	1
37		19	max	0	12	.1	1	.004	3	7.968e-3	1	NC	1	NC	1
38			min	-.601	4	-.01	3	-.001	10	-8.014e-4	3	NC	1	NC	1
39	M14	1	max	0	1	.135	3	.004	3	5.022e-3	1	NC	1	NC	1
40			min	-.461	4	-.326	1	-.001	10	-2.449e-3	3	NC	1	NC	1
41		2	max	0	1	.369	3	.032	1	6.049e-3	1	NC	5	NC	2
42			min	-.461	4	-.68	1	-.028	5	-2.995e-3	3	712.977	1	8458.12	1
43		3	max	0	1	.566	3	.088	1	7.077e-3	1	NC	15	NC	3
44			min	-.461	4	-.982	1	-.034	5	-3.542e-3	3	384.342	1	2933.235	1
45		4	max	0	1	.7	3	.141	1	8.104e-3	1	NC	15	NC	3
46			min	-.461	4	-1.198	1	-.022	5	-4.089e-3	3	289.172	1	1813.71	1
47		5	max	0	1	.759	3	.172	1	9.132e-3	1	9260.991	15	NC	3
48			min	-.461	4	-1.309	1	-.003	5	-4.635e-3	3	256.332	1	1487.592	1
49		6	max	0	1	.744	3	.17	1	1.016e-2	1	9228.063	15	NC	3
50			min	-.461	4	-1.316	1	.012	12	-5.182e-3	3	254.451	1	1502.326	1
51		7	max	0	1	.667	3	.137	1	1.119e-2	1	NC	15	NC	3
52			min	-.461	4	-1.237	1	.01	10	-5.729e-3	3	276.764	1	1875.873	1
53		8	max	0	1	.556	3	.082	1	1.221e-2	1	NC	15	NC	3
54			min	-.461	4	-1.104	1	.004	10	-6.276e-3	3	323.782	1	3169.618	1
55		9	max	0	1	.45	3	.039	4	1.324e-2	1	NC	15	NC	1
56			min	-.461	4	-.972	1	-.002	10	-6.822e-3	3	390.133	1	6528.983	4
57		10	max	0	1	.4	3	.012	3	1.427e-2	1	NC	5	NC	1
58			min	-.461	4	-.909	1	-.008	2	-7.369e-3	3	432.146	1	NC	1
59		11	max	0	12	.45	3	.026	1	1.324e-2	1	NC	15	NC	1
60			min	-.461	4	-.972	1	-.028	5	-6.822e-3	3	390.133	1	9298.292	5
61		12	max	0	12	.556	3	.082	1	1.221e-2	1	NC	15	NC	3
62			min	-.461	4	-1.104	1	-.032	5	-6.276e-3	3	323.782	1	3169.618	1
63		13	max	0	12	.667	3	.137	1	1.119e-2	1	NC	15	NC	3
64			min	-.461	4	-1.237	1	-.02	5	-5.729e-3	3	276.764	1	1875.873	1
65		14	max	0	12	.744	3	.17	1	1.016e-2	1	9227.713	15	NC	3
66			min	-.461	4	-1.316	1	0	15	-5.182e-3	3	254.451	1	1502.326	1
67		15	max	0	12	.759	3	.172	1	9.132e-3	1	9260.55	15	NC	3
68			min	-.461	4	-1.309	1	.011	12	-4.635e-3	3	256.332	1	1487.592	1
69		16	max	0	12	.7	3	.141	1	8.104e-3	1	NC	15	NC	3
70			min	-.461	4	-1.198	1	.009	12	-4.089e-3	3	289.172	1	1813.71	1
71		17	max	0	12	.566	3	.088	1	7.077e-3	1	NC	15	NC	3
72			min	-.461	4	-.982	1	.006	12	-3.542e-3	3	384.342	1	2933.235	1
73		18	max	0	12	.369	3	.04	4	6.049e-3	1	NC	5	NC	2
74			min	-.461	4	-.68	1	.002	10	-2.995e-3	3	712.977	1	6290.567	4
75		19	max	0	12	.135	3	.004	3	5.022e-3	1	NC	1	NC	1
76			min	-.461	4	-.326	1	-.001	10	-2.449e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.138	3	.004	3	2.054e-3	3	NC	1	NC	1
78			min	-.381	4	-.326	1	-.001	10	-5.122e-3	1	NC	1	NC	1
79		2	max	0	12	.281	3	.032	1	2.516e-3	3	NC	5	NC	2
80			min	-.381	4	-.712	1	-.039	5	-6.176e-3	1	652.821	1	6217.04	5
81		3	max	0	12	.405	3	.089	1	2.978e-3	3	NC	15	NC	3
82			min	-.381	4	-1.04	1	-.048	5	-7.23e-3	1	352.657	1	2925.416	1
83		4	max	0	12	.495	3	.142	1	3.44e-3	3	NC	15	NC	3
84			min	-.381	4	-1.272	1	-.034	5	-8.284e-3	1	266.302	1	1809.995	1
85		5	max	0	12	.544	3	.172	1	3.901e-3	3	9271.126	15	NC	3
86			min	-.381	4	-1.387	1	-.008	5	-9.338e-3	1	237.399	1	1484.862	1
87		6	max	0	12	.553	3	.17	1	4.363e-3	3	9240.17	15	NC	3
88			min	-.381	4	-1.386	1	.011	12	-1.039e-2	1	237.678	1	1499.502	1
89		7	max	0	12	.527	3	.137	1	4.825e-3	3	NC	15	NC	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
90			min	-.381	4	-1.288	1	.01	10	-1.145e-2	1	261.864	1	1871.607	1
91		8	max	0	12	.481	3	.082	1	5.287e-3	3	NC	15	NC	3
92			min	-.381	4	-1.133	1	.004	10	-1.25e-2	1	312.187	1	3158.103	1
93		9	max	0	12	.432	3	.048	4	5.749e-3	3	NC	15	NC	1
94			min	-.381	4	-.98	1	-.002	10	-1.355e-2	1	385.263	1	5216.355	4
95		10	max	0	1	.409	3	.011	3	6.211e-3	3	NC	5	NC	1
96			min	-.381	4	-.907	1	-.007	2	-1.461e-2	1	433.044	1	NC	1
97		11	max	0	1	.432	3	.026	1	5.749e-3	3	NC	15	NC	1
98			min	-.381	4	-.98	1	-.038	5	-1.355e-2	1	385.263	1	6656.508	5
99		12	max	0	1	.481	3	.082	1	5.287e-3	3	NC	15	NC	3
100			min	-.381	4	-1.133	1	-.044	5	-1.25e-2	1	312.187	1	3158.103	1
101		13	max	0	1	.527	3	.137	1	4.825e-3	3	NC	15	NC	3
102			min	-.381	4	-1.288	1	-.029	5	-1.145e-2	1	261.864	1	1871.607	1
103		14	max	0	1	.553	3	.17	1	4.363e-3	3	9239.911	15	NC	3
104			min	-.381	4	-1.386	1	-.002	5	-1.039e-2	1	237.678	1	1499.502	1
105		15	max	0	1	.544	3	.172	1	3.901e-3	3	9270.801	15	NC	3
106			min	-.381	4	-1.387	1	.011	12	-9.338e-3	1	237.399	1	1484.862	1
107		16	max	0	1	.495	3	.142	1	3.44e-3	3	NC	15	NC	3
108			min	-.381	4	-1.272	1	.009	12	-8.284e-3	1	266.302	1	1809.995	1
109		17	max	0	1	.405	3	.089	1	2.978e-3	3	NC	15	NC	3
110			min	-.381	4	-1.04	1	.006	12	-7.23e-3	1	352.657	1	2925.416	1
111		18	max	0	1	.281	3	.051	4	2.516e-3	3	NC	5	NC	2
112			min	-.381	4	-.712	1	.002	10	-6.176e-3	1	652.821	1	4933.914	4
113		19	max	0	1	.138	3	.004	3	2.054e-3	3	NC	1	NC	1
114			min	-.381	4	-.326	1	-.001	10	-5.122e-3	1	NC	1	NC	1
115	M16	1	max	0	12	.098	1	.003	3	3.587e-3	3	NC	1	NC	1
116			min	-.15	4	-.045	3	-.001	10	-7.516e-3	1	NC	1	NC	1
117		2	max	0	12	.04	3	.045	1	4.257e-3	3	NC	5	NC	2
118			min	-.15	4	-.169	1	-.03	5	-8.645e-3	1	944.728	1	5855.756	1
119		3	max	0	12	.107	3	.108	1	4.927e-3	3	NC	5	NC	3
120			min	-.15	4	-.381	1	-.037	5	-9.774e-3	1	526.113	1	2372.253	1
121		4	max	0	12	.144	3	.163	1	5.596e-3	3	NC	5	NC	3
122			min	-.15	4	-.503	1	-.027	5	-1.09e-2	1	419.793	1	1561.359	1
123		5	max	0	12	.144	3	.192	1	6.266e-3	3	NC	5	NC	3
124			min	-.15	4	-.516	1	-.009	5	-1.203e-2	1	410.446	1	1324.282	1
125		6	max	0	12	.109	3	.187	1	6.936e-3	3	NC	5	NC	3
126			min	-.15	4	-.425	1	.008	15	-1.316e-2	1	481.832	1	1365.195	1
127		7	max	0	12	.047	3	.148	1	7.606e-3	3	NC	5	NC	3
128			min	-.15	4	-.252	1	.011	12	-1.429e-2	1	719.723	1	1727.22	1
129		8	max	0	12	.001	13	.088	1	8.275e-3	3	NC	3	NC	3
130			min	-.15	4	-.063	2	.005	10	-1.542e-2	1	1796.872	2	2938.324	1
131		9	max	0	12	.149	1	.035	4	8.945e-3	3	NC	4	NC	2
132			min	-.15	4	-.094	3	-.001	10	-1.655e-2	1	4862.527	1	7222.543	4
133		10	max	0	1	.235	1	.01	3	9.615e-3	3	NC	5	NC	1
134			min	-.15	4	-.123	3	-.007	2	-1.768e-2	1	1841.139	1	NC	1
135		11	max	0	1	.149	1	.028	1	8.945e-3	3	NC	4	NC	2
136			min	-.15	4	-.094	3	-.024	5	-1.655e-2	1	4862.527	1	9823.606	1
137		12	max	0	1	.001	13	.088	1	8.275e-3	3	NC	3	NC	3
138			min	-.15	4	-.063	2	-.025	5	-1.542e-2	1	1796.872	2	2938.324	1
139		13	max	0	1	.047	3	.148	1	7.606e-3	3	NC	5	NC	3
140			min	-.15	4	-.252	1	-.012	5	-1.429e-2	1	719.723	1	1727.22	1
141		14	max	0	1	.109	3	.187	1	6.936e-3	3	NC	5	NC	3
142			min	-.15	4	-.425	1	.006	15	-1.316e-2	1	481.832	1	1365.195	1
143		15	max	0	1	.144	3	.192	1	6.266e-3	3	NC	5	NC	3
144			min	-.15	4	-.516	1	.011	12	-1.203e-2	1	410.446	1	1324.282	1
145		16	max	0	1	.144	3	.163	1	5.596e-3	3	NC	5	NC	3
146			min	-.15	4	-.503	1	.009	12	-1.09e-2	1	419.793	1	1561.359	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	.107	3	.108	1	4.927e-3	3	NC	5	NC	3
148			min	-.149	4	-.381	1	.007	12	-9.774e-3	1	526.113	1	2372.253	1
149		18	max	.001	1	.04	3	.046	4	4.257e-3	3	NC	5	NC	2
150			min	-.149	4	-.169	1	.003	10	-8.645e-3	1	944.728	1	5519.972	4
151		19	max	.001	1	.098	1	.003	3	3.587e-3	3	NC	1	NC	1
152			min	-.149	4	-.045	3	-.001	10	-7.516e-3	1	NC	1	NC	1
153	M2	1	max	.005	1	.003	2	.008	1	1.381e-3	5	NC	1	NC	2
154			min	-.004	3	-.006	3	-.565	4	-2.29e-4	1	NC	1	97.93	4
155		2	max	.005	1	.002	2	.008	1	1.483e-3	5	NC	1	NC	2
156			min	-.004	3	-.006	3	-.519	4	-2.136e-4	1	NC	1	106.669	4
157		3	max	.005	1	.002	2	.007	1	1.585e-3	5	NC	1	NC	2
158			min	-.004	3	-.006	3	-.473	4	-1.982e-4	1	NC	1	117.053	4
159		4	max	.005	1	.001	2	.006	1	1.687e-3	5	NC	1	NC	2
160			min	-.004	3	-.005	3	-.427	4	-1.828e-4	1	NC	1	129.513	4
161		5	max	.004	1	0	2	.006	1	1.788e-3	5	NC	1	NC	2
162			min	-.003	3	-.005	3	-.383	4	-1.675e-4	1	NC	1	144.631	4
163		6	max	.004	1	0	2	.005	1	1.89e-3	5	NC	1	NC	1
164			min	-.003	3	-.005	3	-.339	4	-1.521e-4	1	NC	1	163.217	4
165		7	max	.004	1	0	15	.004	1	1.992e-3	5	NC	1	NC	1
166			min	-.003	3	-.005	3	-.297	4	-1.367e-4	1	NC	1	186.42	4
167		8	max	.003	1	0	15	.004	1	2.094e-3	5	NC	1	NC	1
168			min	-.003	3	-.005	3	-.256	4	-1.213e-4	1	NC	1	215.917	4
169		9	max	.003	1	0	15	.003	1	2.2e-3	4	NC	1	NC	1
170			min	-.002	3	-.004	3	-.218	4	-1.059e-4	1	NC	1	254.23	4
171		10	max	.003	1	0	15	.003	1	2.307e-3	4	NC	1	NC	1
172			min	-.002	3	-.004	3	-.181	4	-9.052e-5	1	NC	1	305.306	4
173		11	max	.002	1	0	15	.002	1	2.414e-3	4	NC	1	NC	1
174			min	-.002	3	-.004	3	-.147	4	-7.513e-5	1	NC	1	375.604	4
175		12	max	.002	1	0	15	.002	1	2.522e-3	4	NC	1	NC	1
176			min	-.002	3	-.004	3	-.116	4	-5.974e-5	1	NC	1	476.302	4
177		13	max	.002	1	0	15	.001	1	2.629e-3	4	NC	1	NC	1
178			min	-.001	3	-.003	3	-.088	4	-4.436e-5	1	NC	1	628.163	4
179		14	max	.002	1	0	15	0	1	2.737e-3	4	NC	1	NC	1
180			min	-.001	3	-.003	3	-.063	4	-2.897e-5	1	NC	1	873.462	4
181		15	max	.001	1	0	15	0	1	2.844e-3	4	NC	1	NC	1
182			min	0	3	-.002	3	-.042	4	-1.358e-5	1	NC	1	1309.768	4
183		16	max	0	1	0	15	0	1	2.952e-3	4	NC	1	NC	1
184			min	0	3	-.002	6	-.025	4	-1.892e-7	3	NC	1	2207.274	4
185		17	max	0	1	0	15	0	1	3.059e-3	4	NC	1	NC	1
186			min	0	3	-.001	6	-.012	4	5.506e-7	12	NC	1	4570.601	4
187		18	max	0	1	0	15	0	1	3.167e-3	4	NC	1	NC	1
188			min	0	3	0	6	-.004	4	1.216e-6	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.274e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	1.881e-6	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-5.969e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-7.707e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.016	4	1.079e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	12	-8.724e-5	5	NC	1	NC	1
195		3	max	0	3	0	15	.03	4	5.999e-4	4	NC	1	NC	1
196			min	0	2	-.003	6	0	12	1.495e-6	12	NC	1	NC	1
197		4	max	0	3	-.001	15	.044	4	1.285e-3	4	NC	1	NC	1
198			min	0	2	-.005	6	0	12	2.542e-6	12	NC	1	8617.972	4
199		5	max	0	3	-.002	15	.057	4	1.97e-3	4	NC	1	NC	1
200			min	0	2	-.007	6	0	12	3.588e-6	12	NC	1	7390.55	5
201		6	max	0	3	-.002	15	.069	4	2.656e-3	4	NC	1	NC	1
202			min	0	2	-.009	6	0	12	4.634e-6	12	NC	1	6848.374	5
203		7	max	.001	3	-.002	15	.081	4	3.341e-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
204			min	0	2	-.01	6	0	12	5.68e-6	12	9082.49	6	6718.377	5
205		8	max	.001	3	-.002	15	.092	4	4.026e-3	4	NC	1	NC	1
206			min	0	2	-.011	6	0	12	6.727e-6	12	8115.637	6	6912.69	5
207		9	max	.002	3	-.003	15	.102	4	4.712e-3	4	NC	2	NC	1
208			min	-.001	2	-.012	6	0	12	7.773e-6	12	7539.713	6	7437.247	5
209		10	max	.002	3	-.003	15	.112	4	5.397e-3	4	NC	3	NC	1
210			min	-.001	2	-.013	6	0	12	8.819e-6	12	7253.115	6	8379.469	5
211		11	max	.002	3	-.003	15	.121	4	6.082e-3	4	NC	3	NC	1
212			min	-.001	2	-.013	6	0	12	9.865e-6	12	7213.156	6	9948.217	5
213		12	max	.002	3	-.003	15	.13	4	6.767e-3	4	NC	2	NC	1
214			min	-.001	2	-.012	6	0	12	1.091e-5	12	7419.628	6	NC	1
215		13	max	.002	3	-.003	15	.14	4	7.453e-3	4	NC	1	NC	1
216			min	-.002	2	-.012	6	0	12	1.196e-5	12	7916.766	6	NC	1
217		14	max	.003	3	-.002	15	.149	4	8.138e-3	4	NC	1	NC	1
218			min	-.002	2	-.011	6	0	12	1.3e-5	12	8816.602	6	NC	1
219		15	max	.003	3	-.002	15	.158	4	8.823e-3	4	NC	1	NC	1
220			min	-.002	2	-.009	6	0	12	1.405e-5	12	NC	1	NC	1
221		16	max	.003	3	-.001	15	.168	4	9.508e-3	4	NC	1	NC	1
222			min	-.002	2	-.008	1	0	12	1.51e-5	12	NC	1	NC	1
223		17	max	.003	3	0	15	.179	4	1.019e-2	4	NC	1	NC	1
224			min	-.002	2	-.006	1	0	12	1.614e-5	12	NC	1	NC	1
225		18	max	.003	3	0	15	.19	4	1.088e-2	4	NC	1	NC	1
226			min	-.002	2	-.005	1	0	12	1.719e-5	12	NC	1	NC	1
227		19	max	.004	3	0	5	.202	4	1.156e-2	4	NC	1	NC	1
228			min	-.002	2	-.003	1	0	12	1.823e-5	12	NC	1	NC	1
229	M4	1	max	.003	1	.002	2	0	12	2.057e-5	1	NC	1	NC	3
230			min	0	3	-.004	3	-.202	4	-7.457e-4	4	NC	1	122.815	4
231		2	max	.003	1	.002	2	0	12	2.057e-5	1	NC	1	NC	3
232			min	0	3	-.003	3	-.186	4	-7.457e-4	4	NC	1	133.654	4
233		3	max	.002	1	.002	2	0	12	2.057e-5	1	NC	1	NC	3
234			min	0	3	-.003	3	-.169	4	-7.457e-4	4	NC	1	146.547	4
235		4	max	.002	1	.002	2	0	12	2.057e-5	1	NC	1	NC	2
236			min	0	3	-.003	3	-.153	4	-7.457e-4	4	NC	1	162.029	4
237		5	max	.002	1	.001	2	0	12	2.057e-5	1	NC	1	NC	2
238			min	0	3	-.003	3	-.137	4	-7.457e-4	4	NC	1	180.826	4
239		6	max	.002	1	.001	2	0	12	2.057e-5	1	NC	1	NC	2
240			min	0	3	-.003	3	-.122	4	-7.457e-4	4	NC	1	203.947	4
241		7	max	.002	1	.001	2	0	12	2.057e-5	1	NC	1	NC	2
242			min	0	3	-.002	3	-.107	4	-7.457e-4	4	NC	1	232.821	4
243		8	max	.002	1	.001	2	0	12	2.057e-5	1	NC	1	NC	2
244			min	0	3	-.002	3	-.092	4	-7.457e-4	4	NC	1	269.534	4
245		9	max	.002	1	.001	2	0	12	2.057e-5	1	NC	1	NC	2
246			min	0	3	-.002	3	-.078	4	-7.457e-4	4	NC	1	317.228	4
247		10	max	.001	1	0	2	0	12	2.057e-5	1	NC	1	NC	2
248			min	0	3	-.002	3	-.065	4	-7.457e-4	4	NC	1	380.811	4
249		11	max	.001	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
250			min	0	3	-.002	3	-.053	4	-7.457e-4	4	NC	1	468.318	4
251		12	max	.001	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
252			min	0	3	-.001	3	-.042	4	-7.457e-4	4	NC	1	593.643	4
253		13	max	0	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
254			min	0	3	-.001	3	-.032	4	-7.457e-4	4	NC	1	782.581	4
255		14	max	0	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
256			min	0	3	0	3	-.023	4	-7.457e-4	4	NC	1	1087.614	4
257		15	max	0	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
258			min	0	3	0	3	-.015	4	-7.457e-4	4	NC	1	1629.735	4
259		16	max	0	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
260			min	0	3	0	3	-.009	4	-7.457e-4	4	NC	1	2743.456	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	2.057e-5	1	NC	1	NC	1
262			min	0	3	0	3	-.004	4	-7.457e-4	4	NC	1	5669.297	4
263		18	max	0	1	0	2	0	12	2.057e-5	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-7.457e-4	4	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.057e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-7.457e-4	4	NC	1	NC	1
267	M6	1	max	.018	1	.013	2	0	1	1.456e-3	4	NC	3	NC	1
268			min	-.014	3	-.018	3	-.57	4	0	1	4330.166	2	97.044	4
269		2	max	.017	1	.012	2	0	1	1.556e-3	4	NC	3	NC	1
270			min	-.013	3	-.017	3	-.524	4	0	1	4780.697	2	105.705	4
271		3	max	.016	1	.01	2	0	1	1.656e-3	4	NC	1	NC	1
272			min	-.013	3	-.016	3	-.477	4	0	1	5330.92	2	115.997	4
273		4	max	.015	1	.009	2	0	1	1.757e-3	4	NC	1	NC	1
274			min	-.012	3	-.015	3	-.431	4	0	1	6011.74	2	128.347	4
275		5	max	.014	1	.008	2	0	1	1.857e-3	4	NC	1	NC	1
276			min	-.011	3	-.014	3	-.386	4	0	1	6867.498	2	143.331	4
277		6	max	.013	1	.007	2	0	1	1.957e-3	4	NC	1	NC	1
278			min	-.01	3	-.013	3	-.342	4	0	1	7963.709	2	161.754	4
279		7	max	.012	1	.006	2	0	1	2.057e-3	4	NC	1	NC	1
280			min	-.009	3	-.013	3	-.3	4	0	1	9400.641	2	184.754	4
281		8	max	.011	1	.005	2	0	1	2.157e-3	4	NC	1	NC	1
282			min	-.009	3	-.012	3	-.259	4	0	1	NC	1	213.992	4
283		9	max	.01	1	.004	2	0	1	2.257e-3	4	NC	1	NC	1
284			min	-.008	3	-.011	3	-.22	4	0	1	NC	1	251.972	4
285		10	max	.009	1	.003	2	0	1	2.358e-3	4	NC	1	NC	1
286			min	-.007	3	-.01	3	-.183	4	0	1	NC	1	302.607	4
287		11	max	.008	1	.002	2	0	1	2.458e-3	4	NC	1	NC	1
288			min	-.006	3	-.009	3	-.149	4	0	1	NC	1	372.302	4
289		12	max	.007	1	.002	2	0	1	2.558e-3	4	NC	1	NC	1
290			min	-.006	3	-.008	3	-.117	4	0	1	NC	1	472.145	4
291		13	max	.006	1	.001	2	0	1	2.658e-3	4	NC	1	NC	1
292			min	-.005	3	-.007	3	-.089	4	0	1	NC	1	622.731	4
293		14	max	.005	1	0	2	0	1	2.758e-3	4	NC	1	NC	1
294			min	-.004	3	-.005	3	-.064	4	0	1	NC	1	866.002	4
295		15	max	.004	1	0	2	0	1	2.859e-3	4	NC	1	NC	1
296			min	-.003	3	-.004	3	-.043	4	0	1	NC	1	1298.785	4
297		16	max	.003	1	0	2	0	1	2.959e-3	4	NC	1	NC	1
298			min	-.002	3	-.003	3	-.025	4	0	1	NC	1	2189.298	4
299		17	max	.002	1	0	2	0	1	3.059e-3	4	NC	1	NC	1
300			min	-.002	3	-.002	3	-.012	4	0	1	NC	1	4535.364	4
301		18	max	0	1	0	2	0	1	3.159e-3	4	NC	1	NC	1
302			min	0	3	-.001	3	-.004	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.259e-3	4	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	-7.655e-4	4	NC	1	NC	1
307		2	max	0	3	0	15	.016	4	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	-9.605e-5	4	NC	1	NC	1
309		3	max	.001	3	0	15	.03	4	5.734e-4	4	NC	1	NC	1
310			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
311		4	max	.002	3	-.001	15	.044	4	1.243e-3	4	NC	1	NC	1
312			min	-.002	2	-.006	3	0	1	0	1	NC	1	8138.135	4
313		5	max	.002	3	-.002	15	.057	4	1.912e-3	4	NC	1	NC	1
314			min	-.002	2	-.007	4	0	1	0	1	NC	1	6944.786	4
315		6	max	.003	3	-.002	15	.069	4	2.582e-3	4	NC	1	NC	1
316			min	-.003	2	-.009	4	0	1	0	1	NC	1	6403.42	4
317		7	max	.004	3	-.002	15	.08	4	3.251e-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	-.003	2	-.01	4	0	1	0	1	9173.392	4	6243.857	4
319		8	max	.004	3	-.003	15	.091	4	3.92e-3	4	NC	1	NC	1
320			min	-.004	2	-.012	4	0	1	0	1	8190.612	4	6376.054	4
321		9	max	.005	3	-.003	15	.101	4	4.59e-3	4	NC	1	NC	1
322			min	-.005	2	-.013	4	0	1	0	1	7604.587	4	6793.991	4
323		10	max	.005	3	-.003	15	.11	4	5.259e-3	4	NC	1	NC	1
324			min	-.005	2	-.013	4	0	1	0	1	7311.699	4	7557.96	4
325		11	max	.006	3	-.003	15	.12	4	5.929e-3	4	NC	1	NC	1
326			min	-.006	2	-.013	4	0	1	0	1	7268.238	4	8817.35	4
327		12	max	.007	3	-.003	15	.129	4	6.598e-3	4	NC	1	NC	1
328			min	-.006	2	-.013	4	0	1	0	1	7473.546	4	NC	1
329		13	max	.007	3	-.003	15	.137	4	7.268e-3	4	NC	1	NC	1
330			min	-.007	2	-.012	4	0	1	0	1	7971.852	4	NC	1
331		14	max	.008	3	-.003	15	.146	4	7.937e-3	4	NC	1	NC	1
332			min	-.008	2	-.011	4	0	1	0	1	8875.695	4	NC	1
333		15	max	.009	3	-.002	15	.155	4	8.606e-3	4	NC	1	NC	1
334			min	-.008	2	-.011	1	0	1	0	1	NC	1	NC	1
335		16	max	.009	3	-.002	15	.165	4	9.276e-3	4	NC	1	NC	1
336			min	-.009	2	-.01	1	0	1	0	1	NC	1	NC	1
337		17	max	.01	3	-.001	15	.175	4	9.945e-3	4	NC	1	NC	1
338			min	-.009	2	-.009	1	0	1	0	1	NC	1	NC	1
339		18	max	.01	3	0	15	.185	4	1.061e-2	4	NC	1	NC	1
340			min	-.01	2	-.008	1	0	1	0	1	NC	1	NC	1
341		19	max	.011	3	0	15	.197	4	1.128e-2	4	NC	1	NC	1
342			min	-.01	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.009	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.011	3	-.197	4	-7.953e-4	4	NC	1	126.119	4
345		2	max	.007	1	.009	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.01	3	-.181	4	-7.953e-4	4	NC	1	137.253	4
347		3	max	.007	1	.008	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.01	3	-.165	4	-7.953e-4	4	NC	1	150.497	4
349		4	max	.006	1	.008	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.009	3	-.149	4	-7.953e-4	4	NC	1	166.4	4
351		5	max	.006	1	.007	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.009	3	-.134	4	-7.953e-4	4	NC	1	185.709	4
353		6	max	.006	1	.007	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.008	3	-.118	4	-7.953e-4	4	NC	1	209.458	4
355		7	max	.005	1	.006	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.007	3	-.104	4	-7.953e-4	4	NC	1	239.117	4
357		8	max	.005	1	.006	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.007	3	-.09	4	-7.953e-4	4	NC	1	276.829	4
359		9	max	.004	1	.005	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.006	3	-.076	4	-7.953e-4	4	NC	1	325.819	4
361		10	max	.004	1	.005	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.005	3	-.063	4	-7.953e-4	4	NC	1	391.131	4
363		11	max	.003	1	.004	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.005	3	-.052	4	-7.953e-4	4	NC	1	481.017	4
365		12	max	.003	1	.004	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.004	3	-.041	4	-7.953e-4	4	NC	1	609.75	4
367		13	max	.003	1	.003	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.004	3	-.031	4	-7.953e-4	4	NC	1	803.827	4
369		14	max	.002	1	.003	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.003	3	-.022	4	-7.953e-4	4	NC	1	1117.158	4
371		15	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.002	3	-.015	4	-7.953e-4	4	NC	1	1674.03	4
373		16	max	.001	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.002	3	-.009	4	-7.953e-4	4	NC	1	2818.067	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	.001	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.001	3	-.004	4	-7.953e-4	4	NC	1	5823.589	4
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	3	-.001	4	-7.953e-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	-7.953e-4	4	NC	1	NC	1
381	M10	1	max	.005	1	.003	2	0	12	1.461e-3	4	NC	1	NC	2
382			min	-.004	3	-.006	3	-.57	4	1.009e-5	12	NC	1	97.154	4
383		2	max	.005	1	.002	2	0	12	1.561e-3	4	NC	1	NC	2
384			min	-.004	3	-.006	3	-.523	4	9.426e-6	12	NC	1	105.825	4
385		3	max	.005	1	.002	2	0	12	1.66e-3	4	NC	1	NC	2
386			min	-.004	3	-.006	3	-.477	4	8.761e-6	12	NC	1	116.129	4
387		4	max	.005	1	.001	2	0	12	1.759e-3	4	NC	1	NC	2
388			min	-.004	3	-.005	3	-.431	4	8.096e-6	12	NC	1	128.493	4
389		5	max	.004	1	0	2	0	12	1.859e-3	4	NC	1	NC	2
390			min	-.003	3	-.005	3	-.386	4	7.431e-6	12	NC	1	143.495	4
391		6	max	.004	1	0	2	0	12	1.958e-3	4	NC	1	NC	1
392			min	-.003	3	-.005	3	-.342	4	6.766e-6	12	NC	1	161.939	4
393		7	max	.004	1	0	2	0	12	2.057e-3	4	NC	1	NC	1
394			min	-.003	3	-.005	3	-.299	4	6.101e-6	12	NC	1	184.965	4
395		8	max	.003	1	0	10	0	12	2.156e-3	4	NC	1	NC	1
396			min	-.003	3	-.005	3	-.258	4	5.436e-6	12	NC	1	214.238	4
397		9	max	.003	1	0	10	0	12	2.256e-3	4	NC	1	NC	1
398			min	-.002	3	-.004	3	-.219	4	4.77e-6	12	NC	1	252.262	4
399		10	max	.003	1	-.001	10	0	12	2.355e-3	4	NC	1	NC	1
400			min	-.002	3	-.004	3	-.183	4	4.105e-6	12	NC	1	302.957	4
401		11	max	.002	1	-.001	15	0	12	2.454e-3	4	NC	1	NC	1
402			min	-.002	3	-.004	3	-.148	4	3.44e-6	12	NC	1	372.735	4
403		12	max	.002	1	-.001	15	0	12	2.553e-3	4	NC	1	NC	1
404			min	-.002	3	-.004	4	-.117	4	2.775e-6	12	NC	1	472.698	4
405		13	max	.002	1	0	15	0	12	2.653e-3	4	NC	1	NC	1
406			min	-.001	3	-.003	4	-.089	4	2.11e-6	12	NC	1	623.467	4
407		14	max	.002	1	0	15	0	12	2.752e-3	4	NC	1	NC	1
408			min	-.001	3	-.003	4	-.064	4	1.445e-6	12	NC	1	867.04	4
409		15	max	.001	1	0	15	0	12	2.851e-3	4	NC	1	NC	1
410			min	0	3	-.003	4	-.043	4	7.797e-7	12	NC	1	1300.372	4
411		16	max	0	1	0	15	0	12	2.951e-3	4	NC	1	NC	1
412			min	0	3	-.002	4	-.025	4	-1.808e-6	1	NC	1	2192.056	4
413		17	max	0	1	0	15	0	12	3.05e-3	4	NC	1	NC	1
414			min	0	3	-.002	4	-.012	4	-1.72e-5	1	NC	1	4541.398	4
415		18	max	0	1	0	15	0	12	3.149e-3	4	NC	1	NC	1
416			min	0	3	0	4	-.004	4	-3.258e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.248e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-4.797e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.509e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-7.626e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.016	4	-4.493e-7	12	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-9.11e-5	4	NC	1	NC	1
423		3	max	0	3	0	15	.03	4	5.804e-4	4	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-3.667e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	.044	4	1.252e-3	4	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-6.255e-5	1	NC	1	8372.29	4
427		5	max	0	3	-.002	15	.057	4	1.923e-3	4	NC	1	NC	1
428			min	0	2	-.007	4	-.001	1	-8.843e-5	1	NC	1	7167.02	4
429		6	max	0	3	-.002	15	.069	4	2.595e-3	4	NC	1	NC	1
430			min	0	2	-.009	4	-.001	1	-1.143e-4	1	NC	1	6632.812	4
431		7	max	.001	3	-.003	15	.08	4	3.266e-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
432			min	0	2	-.011	4	-.002	1	-1.402e-4	1	8763.091	4	6496.338	4
433		8	max	.001	3	-.003	15	.09	4	3.938e-3	4	NC	1	NC	1
434			min	0	2	-.012	4	-.002	1	-1.661e-4	1	7851.293	4	6670.169	4
435		9	max	.002	3	-.003	15	.101	4	4.609e-3	4	NC	2	NC	1
436			min	-.001	2	-.013	4	-.002	1	-1.919e-4	1	7310.332	4	7156.402	4
437		10	max	.002	3	-.003	15	.11	4	5.281e-3	4	NC	3	NC	1
438			min	-.001	2	-.013	4	-.003	1	-2.178e-4	1	7045.48	4	8032.673	4
439		11	max	.002	3	-.003	15	.119	4	5.952e-3	4	NC	3	NC	1
440			min	-.001	2	-.014	4	-.003	1	-2.437e-4	1	7017.546	4	9485.761	4
441		12	max	.002	3	-.003	15	.128	4	6.624e-3	4	NC	2	NC	1
442			min	-.001	2	-.013	4	-.004	1	-2.696e-4	1	7227.833	4	NC	1
443		13	max	.002	3	-.003	15	.137	4	7.295e-3	4	NC	1	NC	1
444			min	-.002	2	-.013	4	-.004	1	-2.955e-4	1	7720.54	4	NC	1
445		14	max	.003	3	-.003	15	.146	4	7.967e-3	4	NC	1	NC	1
446			min	-.002	2	-.011	4	-.005	1	-3.213e-4	1	8605.859	4	NC	1
447		15	max	.003	3	-.002	15	.155	4	8.638e-3	4	NC	1	NC	1
448			min	-.002	2	-.01	4	-.005	1	-3.472e-4	1	NC	1	NC	1
449		16	max	.003	3	-.002	15	.165	4	9.31e-3	4	NC	1	NC	1
450			min	-.002	2	-.008	4	-.006	1	-3.731e-4	1	NC	1	NC	1
451		17	max	.003	3	-.002	15	.175	4	9.981e-3	4	NC	1	NC	1
452			min	-.002	2	-.006	1	-.007	1	-3.99e-4	1	NC	1	NC	1
453		18	max	.003	3	0	15	.186	4	1.065e-2	4	NC	1	NC	1
454			min	-.002	2	-.005	1	-.007	1	-4.249e-4	1	NC	1	NC	1
455		19	max	.004	3	0	15	.198	4	1.132e-2	4	NC	1	NC	1
456			min	-.002	2	-.003	1	-.008	1	-4.507e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.002	2	.008	1	-9.625e-7	12	NC	1	NC	3
458			min	0	3	-.004	3	-.198	4	-7.564e-4	4	NC	1	125.492	4
459		2	max	.003	1	.002	2	.007	1	-9.625e-7	12	NC	1	NC	3
460			min	0	3	-.003	3	-.182	4	-7.564e-4	4	NC	1	136.566	4
461		3	max	.002	1	.002	2	.007	1	-9.625e-7	12	NC	1	NC	3
462			min	0	3	-.003	3	-.166	4	-7.564e-4	4	NC	1	149.74	4
463		4	max	.002	1	.002	2	.006	1	-9.625e-7	12	NC	1	NC	2
464			min	0	3	-.003	3	-.15	4	-7.564e-4	4	NC	1	165.559	4
465		5	max	.002	1	.001	2	.005	1	-9.625e-7	12	NC	1	NC	2
466			min	0	3	-.003	3	-.134	4	-7.564e-4	4	NC	1	184.765	4
467		6	max	.002	1	.001	2	.005	1	-9.625e-7	12	NC	1	NC	2
468			min	0	3	-.003	3	-.119	4	-7.564e-4	4	NC	1	208.389	4
469		7	max	.002	1	.001	2	.004	1	-9.625e-7	12	NC	1	NC	2
470			min	0	3	-.002	3	-.104	4	-7.564e-4	4	NC	1	237.891	4
471		8	max	.002	1	.001	2	.004	1	-9.625e-7	12	NC	1	NC	2
472			min	0	3	-.002	3	-.09	4	-7.564e-4	4	NC	1	275.403	4
473		9	max	.002	1	.001	2	.003	1	-9.625e-7	12	NC	1	NC	2
474			min	0	3	-.002	3	-.077	4	-7.564e-4	4	NC	1	324.134	4
475		10	max	.001	1	0	2	.003	1	-9.625e-7	12	NC	1	NC	2
476			min	0	3	-.002	3	-.064	4	-7.564e-4	4	NC	1	389.1	4
477		11	max	.001	1	0	2	.002	1	-9.625e-7	12	NC	1	NC	1
478			min	0	3	-.002	3	-.052	4	-7.564e-4	4	NC	1	478.51	4
479		12	max	.001	1	0	2	.002	1	-9.625e-7	12	NC	1	NC	1
480			min	0	3	-.001	3	-.041	4	-7.564e-4	4	NC	1	606.561	4
481		13	max	0	1	0	2	.001	1	-9.625e-7	12	NC	1	NC	1
482			min	0	3	-.001	3	-.031	4	-7.564e-4	4	NC	1	799.608	4
483		14	max	0	1	0	2	0	1	-9.625e-7	12	NC	1	NC	1
484			min	0	3	0	3	-.022	4	-7.564e-4	4	NC	1	1111.274	4
485		15	max	0	1	0	2	0	1	-9.625e-7	12	NC	1	NC	1
486			min	0	3	0	3	-.015	4	-7.564e-4	4	NC	1	1665.182	4
487		16	max	0	1	0	2	0	1	-9.625e-7	12	NC	1	NC	1
488			min	0	3	0	3	-.009	4	-7.564e-4	4	NC	1	2803.118	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	-9.625e-7	12	NC	1	NC	1
490			min	0	3	0	3	-.004	4	-7.564e-4	4	NC	1	5792.566	4
491		18	max	0	1	0	2	0	1	-9.625e-7	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-7.564e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-9.625e-7	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-7.564e-4	4	NC	1	NC	1
495	M1	1	max	.004	3	.1	1	.601	4	1.735e-2	1	NC	1	NC	1
496			min	-.001	10	-.01	3	0	12	-1.86e-2	3	NC	1	NC	1
497		2	max	.004	3	.049	1	.583	4	9.28e-3	4	NC	3	NC	1
498			min	-.001	2	-.004	3	-.006	1	-9.202e-3	3	2251.688	1	NC	1
499		3	max	.004	3	.006	3	.565	4	1.48e-2	4	NC	5	NC	1
500			min	-.001	2	-.006	1	-.009	1	-1.742e-4	1	1076.247	1	7295.677	5
501		4	max	.004	3	.025	3	.547	4	1.303e-2	4	NC	5	NC	1
502			min	-.001	2	-.07	1	-.008	1	-3.268e-3	3	671.539	1	5094.894	5
503		5	max	.004	3	.05	3	.528	4	1.126e-2	4	NC	15	NC	1
504			min	-.001	10	-.138	1	-.006	1	-6.445e-3	3	479.957	1	3984.534	5
505		6	max	.004	3	.078	3	.51	4	1.434e-2	1	NC	15	NC	1
506			min	-.001	10	-.205	1	-.002	1	-9.622e-3	3	375.201	1	3323.935	5
507		7	max	.004	3	.105	3	.49	4	1.918e-2	1	9683.113	15	NC	1
508			min	-.001	10	-.264	1	0	12	-1.28e-2	3	313.745	1	2882.437	4
509		8	max	.004	3	.128	3	.47	4	2.402e-2	1	8599.544	15	NC	1
510			min	-.001	10	-.312	1	0	12	-1.598e-2	3	277.557	1	2574.457	4
511		9	max	.004	3	.142	3	.448	4	2.641e-2	1	8034.912	15	NC	1
512			min	-.001	10	-.342	1	0	1	-1.598e-2	3	258.779	1	2395.488	4
513		10	max	.004	3	.148	3	.424	4	2.716e-2	1	7863.026	15	NC	1
514			min	-.001	10	-.352	1	0	12	-1.388e-2	3	253.149	1	2348.325	4
515		11	max	.004	3	.144	3	.397	4	2.791e-2	1	8034.713	15	NC	1
516			min	-.001	10	-.341	1	0	12	-1.178e-2	3	259.059	1	2411.651	4
517		12	max	.004	3	.132	3	.369	4	2.631e-2	1	8599.09	15	NC	1
518			min	-.001	10	-.311	1	-.001	1	-9.738e-3	3	278.437	1	2603.71	4
519		13	max	.004	3	.112	3	.337	4	2.117e-2	1	9682.242	15	NC	1
520			min	-.001	10	-.262	1	0	1	-7.794e-3	3	315.932	1	3072.219	4
521		14	max	.003	3	.087	3	.303	4	1.602e-2	1	NC	15	NC	1
522			min	-.001	10	-.202	1	0	12	-5.85e-3	3	379.928	1	4034.061	4
523		15	max	.003	3	.059	3	.268	4	1.087e-2	1	NC	15	NC	1
524			min	-.001	10	-.135	1	0	12	-3.905e-3	3	489.752	1	6103.546	4
525		16	max	.003	3	.03	3	.234	4	9.788e-3	4	NC	5	NC	1
526			min	-.001	10	-.067	1	0	12	-1.961e-3	3	692.281	1	NC	1
527		17	max	.003	3	.002	3	.203	4	1.082e-2	4	NC	5	NC	1
528			min	-.001	10	-.004	2	0	12	-1.654e-5	3	1123.4	1	NC	1
529		18	max	.003	3	.05	1	.175	4	1.002e-2	1	NC	4	NC	1
530			min	-.001	10	-.022	3	0	12	-3.131e-3	3	2371.815	1	NC	1
531		19	max	.003	3	.098	1	.149	4	1.982e-2	1	NC	1	NC	1
532			min	-.001	10	-.045	3	-.001	1	-6.363e-3	3	NC	1	NC	1
533	M5	1	max	.014	3	.24	1	.601	4	0	1	NC	1	NC	1
534			min	-.008	2	-.011	3	0	1	-3.194e-6	4	NC	1	NC	1
535		2	max	.014	3	.117	1	.587	4	7.587e-3	4	NC	5	NC	1
536			min	-.008	2	-.004	3	0	1	0	1	930.897	1	NC	1
537		3	max	.014	3	.02	3	.57	4	1.494e-2	4	NC	15	NC	1
538			min	-.009	2	-.022	1	0	1	0	1	435.183	1	5964.644	4
539		4	max	.013	3	.073	3	.551	4	1.217e-2	4	9121.389	15	NC	1
540			min	-.008	2	-.192	1	0	1	0	1	264.074	1	4464.517	4
541		5	max	.013	3	.146	3	.531	4	9.406e-3	4	6386.097	15	NC	1
542			min	-.008	2	-.379	1	0	1	0	1	184.594	1	3711.194	4
543		6	max	.013	3	.229	3	.511	4	6.638e-3	4	4918.289	15	NC	1
544			min	-.008	2	-.564	1	0	1	0	1	141.966	1	3244.597	4
545		7	max	.013	3	.311	3	.49	4	3.87e-3	4	4070.301	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	-.008	2	-.733	1	0	1	0	1	117.347	1	2902.83	4
547		8	max	.012	3	.379	3	.469	4	1.103e-3	4	3577.093	15	NC	1
548			min	-.008	2	-.868	1	0	1	0	1	103.033	1	2613.008	4
549		9	max	.012	3	.423	3	.448	4	0	1	3324.108	15	NC	1
550			min	-.007	2	-.953	1	0	1	-2.008e-6	5	95.697	1	2393.332	4
551		10	max	.012	3	.439	3	.424	4	0	1	3247.878	15	NC	1
552			min	-.007	2	-.982	1	0	1	-1.923e-6	5	93.51	1	2364.423	4
553		11	max	.011	3	.428	3	.397	4	0	1	3324.175	15	NC	1
554			min	-.007	2	-.953	1	0	1	-1.839e-6	5	95.81	1	2437.367	4
555		12	max	.011	3	.391	3	.37	4	7.742e-4	4	3577.254	15	NC	1
556			min	-.007	2	-.866	1	0	1	0	1	103.408	1	2560.733	4
557		13	max	.011	3	.331	3	.338	4	2.718e-3	4	4070.636	15	NC	1
558			min	-.007	2	-.727	1	0	1	0	1	118.322	1	3023.902	4
559		14	max	.011	3	.256	3	.302	4	4.662e-3	4	4918.955	15	NC	1
560			min	-.007	2	-.555	1	0	1	0	1	144.16	1	4187.971	4
561		15	max	.01	3	.172	3	.266	4	6.606e-3	4	6387.428	15	NC	1
562			min	-.007	2	-.366	1	0	1	0	1	189.345	1	7394.309	4
563		16	max	.01	3	.087	3	.23	4	8.55e-3	4	9124.194	15	NC	1
564			min	-.007	2	-.179	1	0	1	0	1	274.69	1	NC	1
565		17	max	.01	3	.007	3	.197	4	1.049e-2	4	NC	15	NC	1
566			min	-.007	2	-.012	1	0	1	0	1	460.916	1	NC	1
567		18	max	.01	3	.121	1	.171	4	5.329e-3	4	NC	5	NC	1
568			min	-.007	2	-.061	3	0	1	0	1	999.663	1	NC	1
569		19	max	.01	3	.235	1	.15	4	0	1	NC	1	NC	1
570			min	-.007	2	-.123	3	0	1	-1.591e-6	4	NC	1	NC	1
571	M9	1	max	.004	3	.1	1	.601	4	1.86e-2	3	NC	1	NC	1
572			min	-.001	10	-.01	3	-.001	1	-1.735e-2	1	NC	1	NC	1
573		2	max	.004	3	.049	1	.586	4	9.202e-3	3	NC	3	NC	1
574			min	-.001	2	-.004	3	0	12	-8.43e-3	1	2251.688	1	NC	1
575		3	max	.004	3	.006	3	.569	4	1.49e-2	4	NC	5	NC	1
576			min	-.001	2	-.006	1	0	12	-1.351e-5	10	1076.247	1	6065.74	4
577		4	max	.004	3	.025	3	.551	4	1.168e-2	5	NC	5	NC	1
578			min	-.001	2	-.07	1	0	12	-4.665e-3	1	671.539	1	4497.108	4
579		5	max	.004	3	.05	3	.531	4	8.77e-3	5	NC	15	NC	1
580			min	-.001	10	-.138	1	0	12	-9.505e-3	1	479.957	1	3707.015	4
581		6	max	.004	3	.078	3	.511	4	9.622e-3	3	NC	15	NC	1
582			min	-.001	10	-.205	1	0	12	-1.434e-2	1	375.201	1	3222.143	4
583		7	max	.004	3	.105	3	.49	4	1.28e-2	3	9666.594	15	NC	1
584			min	-.001	10	-.264	1	0	1	-1.918e-2	1	313.745	1	2877.185	4
585		8	max	.004	3	.128	3	.469	4	1.598e-2	3	8585.214	15	NC	1
586			min	-.001	10	-.312	1	0	1	-2.402e-2	1	277.557	1	2597.848	4
587		9	max	.004	3	.142	3	.448	4	1.598e-2	3	8021.697	15	NC	1
588			min	-.001	10	-.342	1	0	12	-2.641e-2	1	258.779	1	2388.947	4
589		10	max	.004	3	.148	3	.424	4	1.388e-2	3	7850.139	15	NC	1
590			min	-.001	10	-.352	1	0	1	-2.716e-2	1	253.149	1	2349.411	4
591		11	max	.004	3	.144	3	.397	4	1.178e-2	3	8021.509	15	NC	1
592			min	-.001	10	-.341	1	0	1	-2.791e-2	1	259.059	1	2420.049	4
593		12	max	.004	3	.132	3	.369	4	9.738e-3	3	8584.861	15	NC	1
594			min	-.001	10	-.311	1	0	12	-2.631e-2	1	278.437	1	2580.198	4
595		13	max	.004	3	.112	3	.337	4	7.794e-3	3	9666.043	15	NC	1
596			min	-.001	10	-.262	1	0	12	-2.117e-2	1	315.932	1	3073.776	4
597		14	max	.003	3	.087	3	.302	4	5.85e-3	3	NC	15	NC	1
598			min	-.001	10	-.202	1	-.002	1	-1.602e-2	1	379.928	1	4163.073	5
599		15	max	.003	3	.059	3	.266	4	6.177e-3	5	NC	15	NC	1
600			min	-.001	10	-.135	1	-.005	1	-1.087e-2	1	489.752	1	6758.695	5
601		16	max	.003	3	.03	3	.23	4	8.323e-3	5	NC	5	NC	1
602			min	-.001	10	-.067	1	-.008	1	-5.719e-3	1	692.281	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	.003	3	.002	3	.198	4	1.053e-2	4	NC	5	NC	1
604			min	-.001	10	-.004	2	-.008	1	-5.702e-4	1	1123.4	1	NC	1
605		18	max	.003	3	.05	1	.172	4	4.944e-3	5	NC	4	NC	1
606			min	-.001	10	-.022	3	-.006	1	-1.002e-2	1	2371.815	1	NC	1
607		19	max	.003	3	.098	1	.15	4	6.363e-3	3	NC	1	NC	1
608			min	-.001	10	-.045	3	0	12	-1.982e-2	1	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

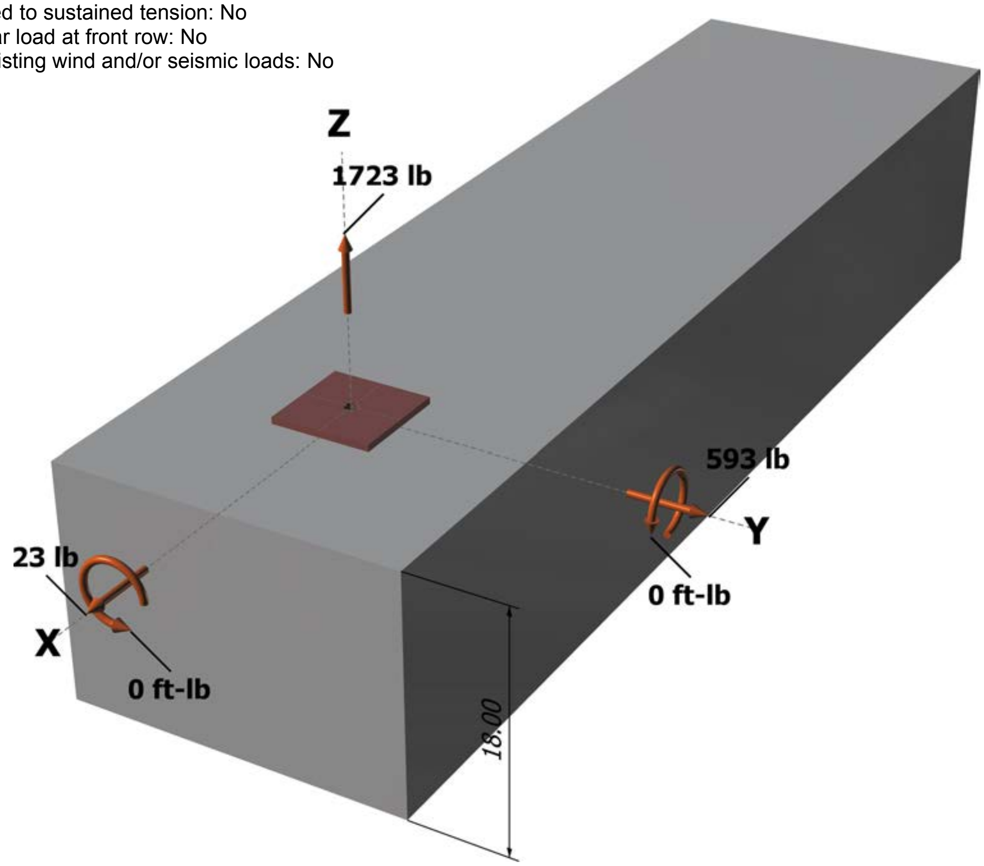
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

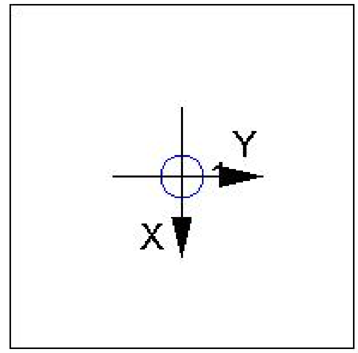
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.32	0.00	32.1 %	1.0	Pass

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

12. Warnings

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

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

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

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 21-30 Inch Width		
Address:			
Phone:			
E-mail:			

SIMPSON Strong-Tie

Anchor Designer™ Software
Version 2.4.5673.0

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

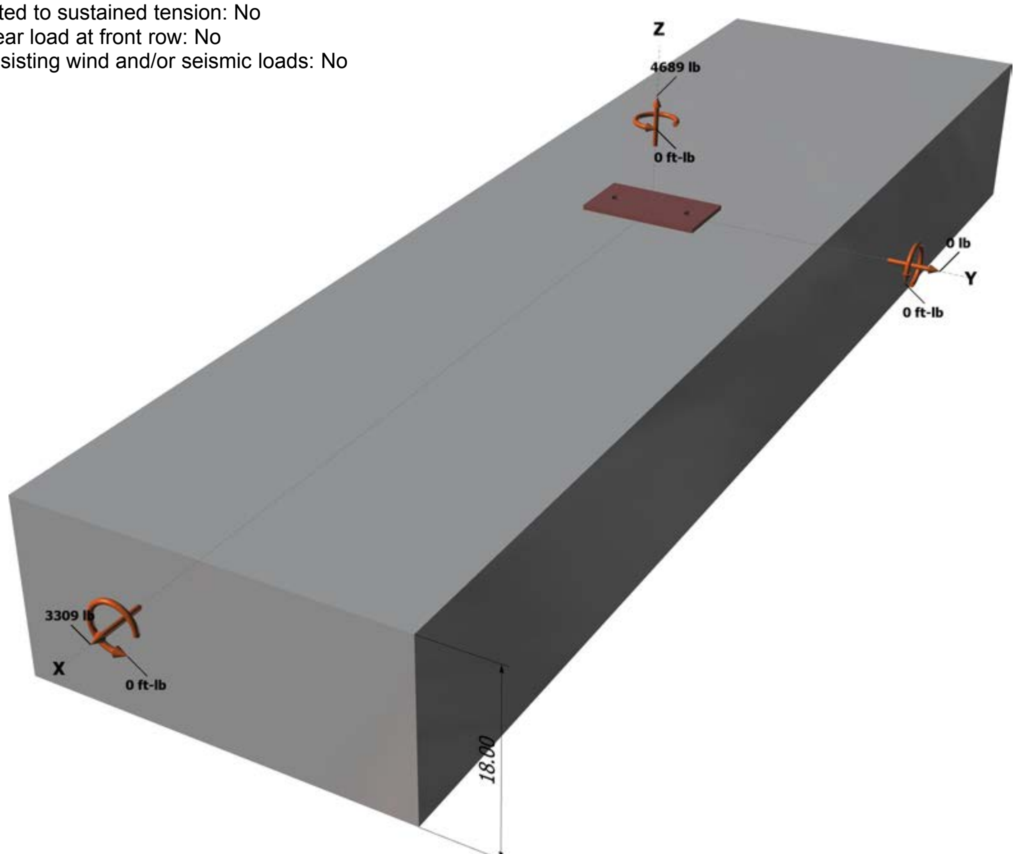
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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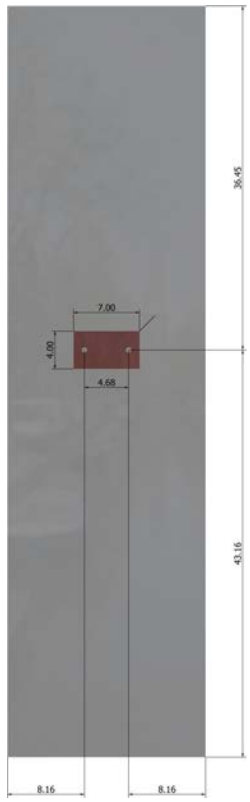


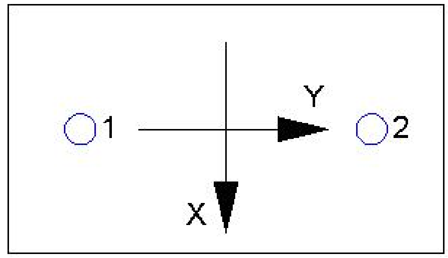
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2344.5	1654.5	0.0	1654.5
2	2344.5	1654.5	0.0	1654.5
Sum	4689.0	3309.0	0.0	3309.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4689
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)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.16	8744

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2345	6071	0.39	Pass
Concrete breakout	4689	9208	0.51	Pass
Adhesive	**4689**	**8093**	**0.58**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	1655	3156	0.52	Pass
T Concrete breakout x+	**3309**	**5323**	**0.62**	**Pass (Governs)**
|| Concrete breakout y-	**1655**	**12241**	**0.14**	**Pass (Governs)**
Pryout	3309	19833	0.17	Pass

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

Sec. D.7.3	0.58	0.62	120.1 %	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.