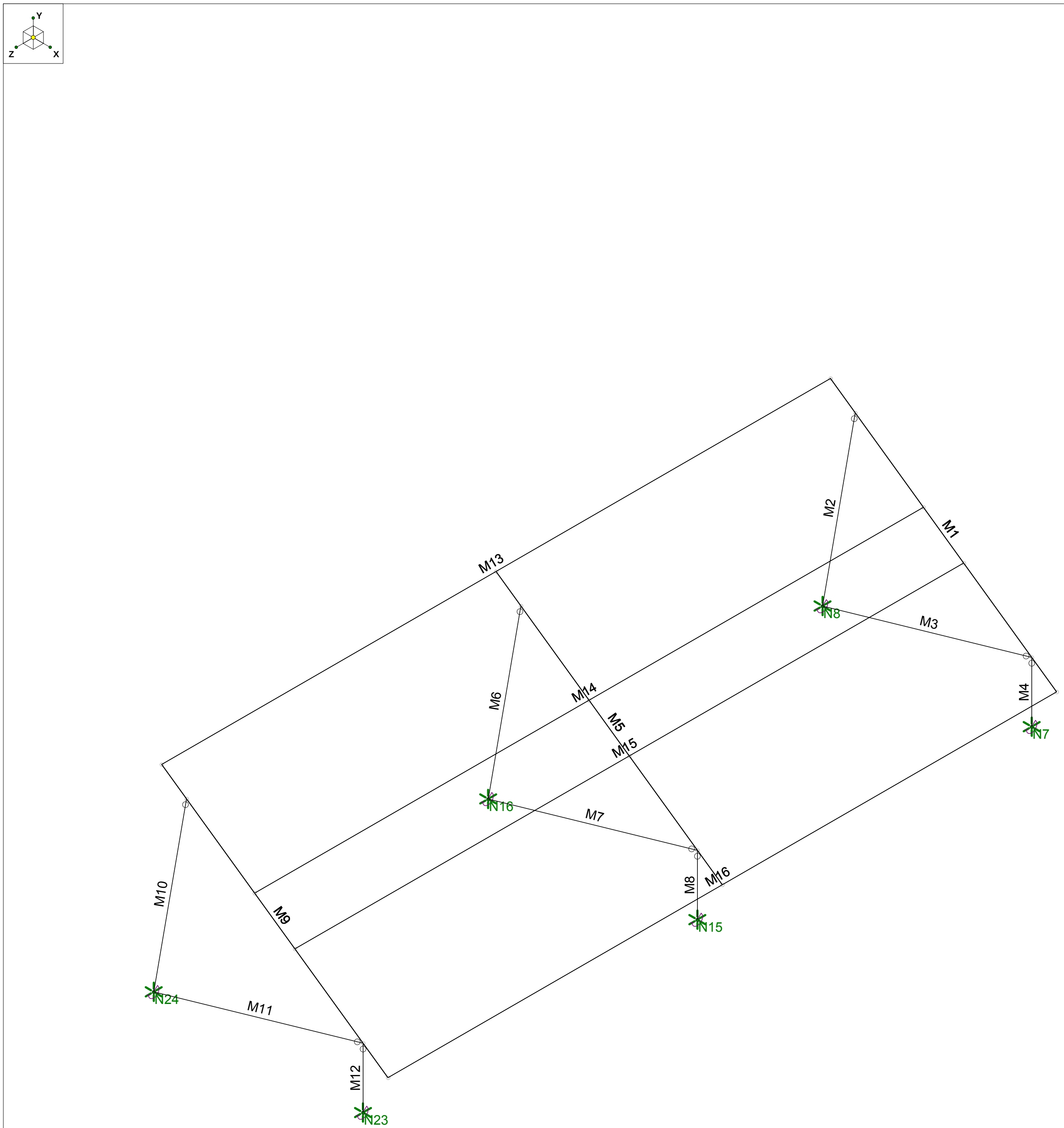


Schletter, Inc.	Standard PVMax Racking System	35° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

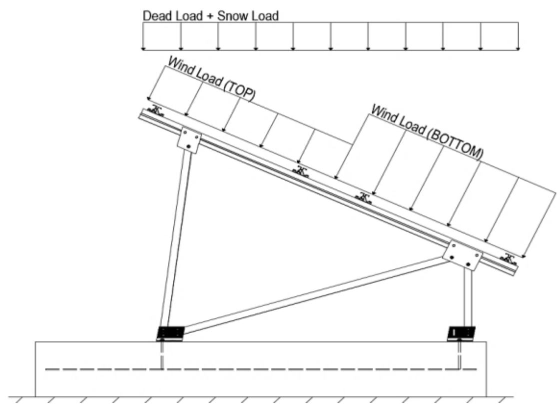
1.2 Construction

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 2
Module Tilt = 35°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 14.43 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.64
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 115 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 20.76 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{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 + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W ^{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

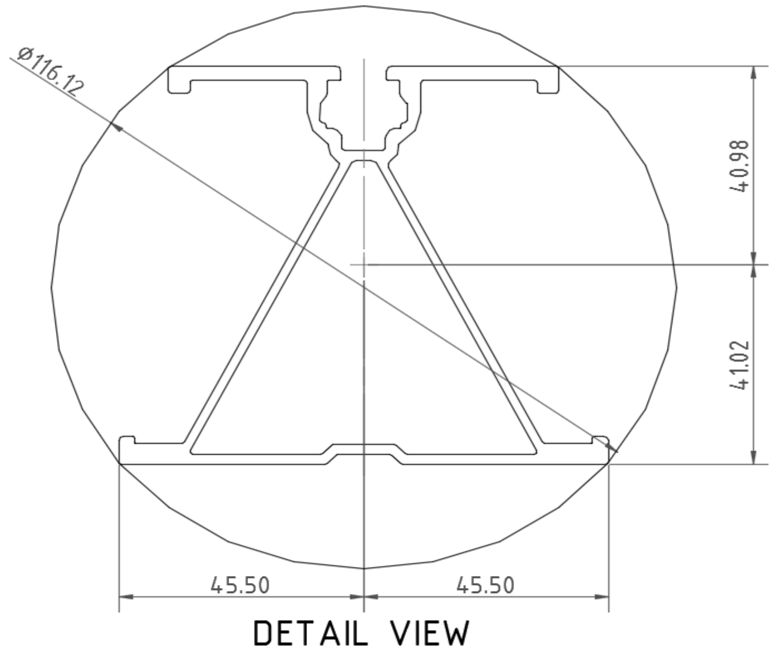
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

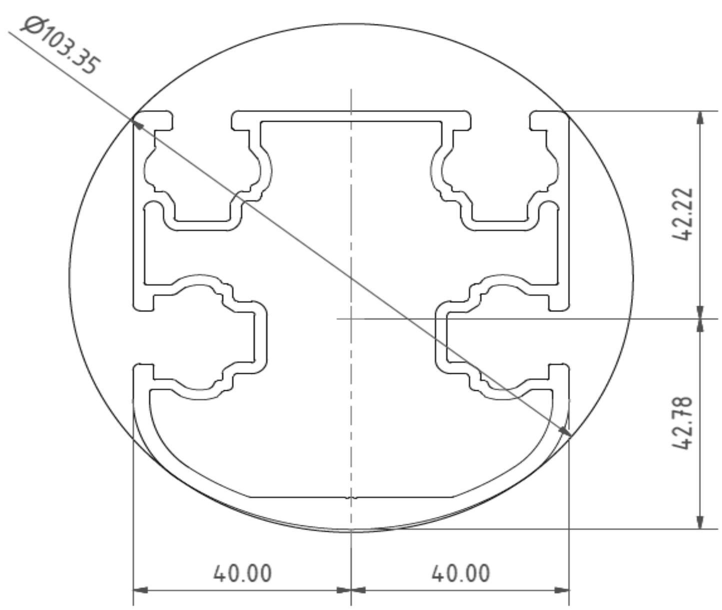
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	135	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.785	k-ft
M_z =	0.418	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	100%	



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).

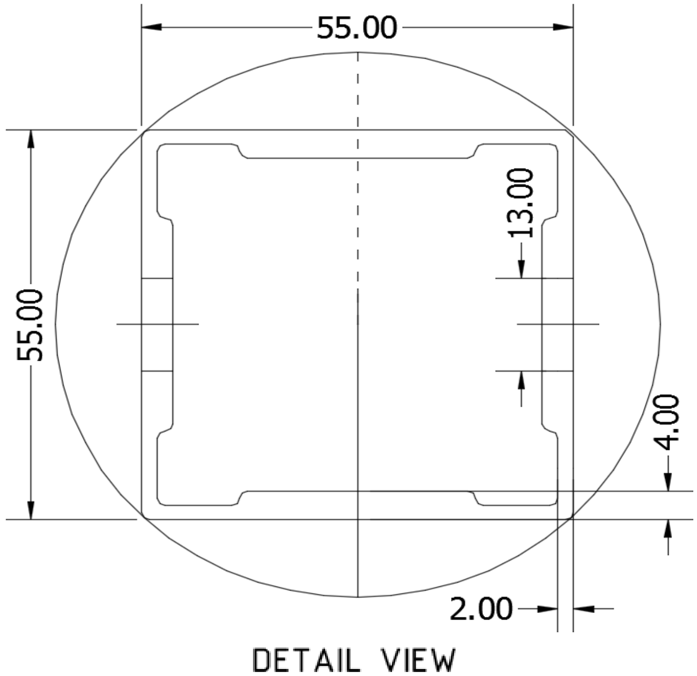
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.862	k-ft
M_z =	0.000	k-ft
P_n =	-0.895	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).

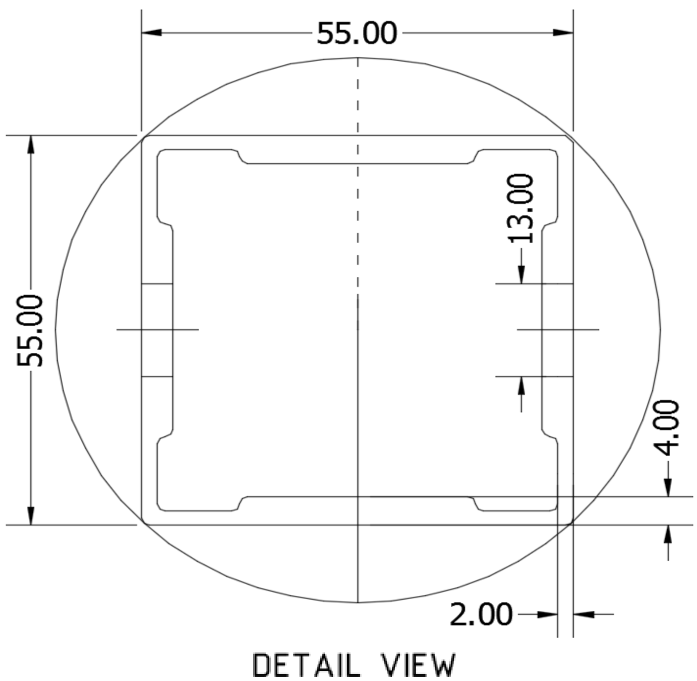
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.638	k-ft
P_n =	0.179	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	46%	



4.4 Diagonal Strut Design

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

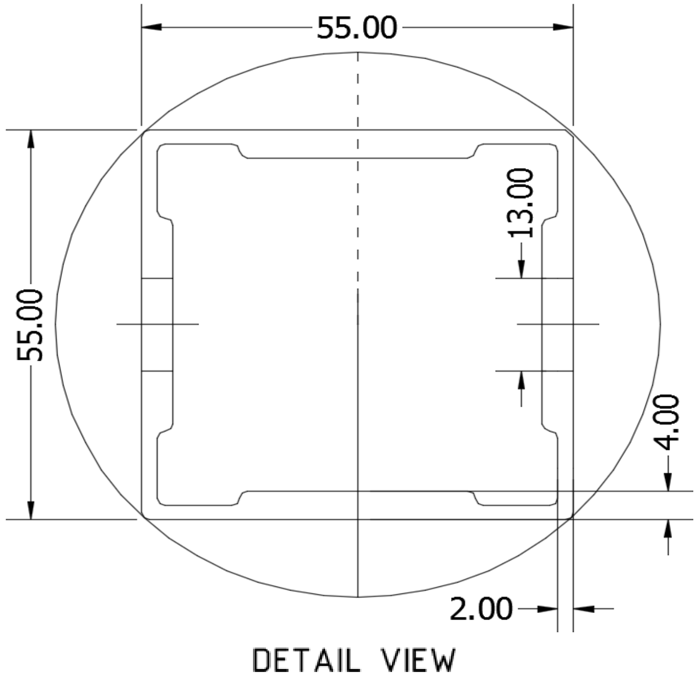
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.669	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	37%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	3.049	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	35%	



5. FOUNDATION DESIGN CALCULATIONS

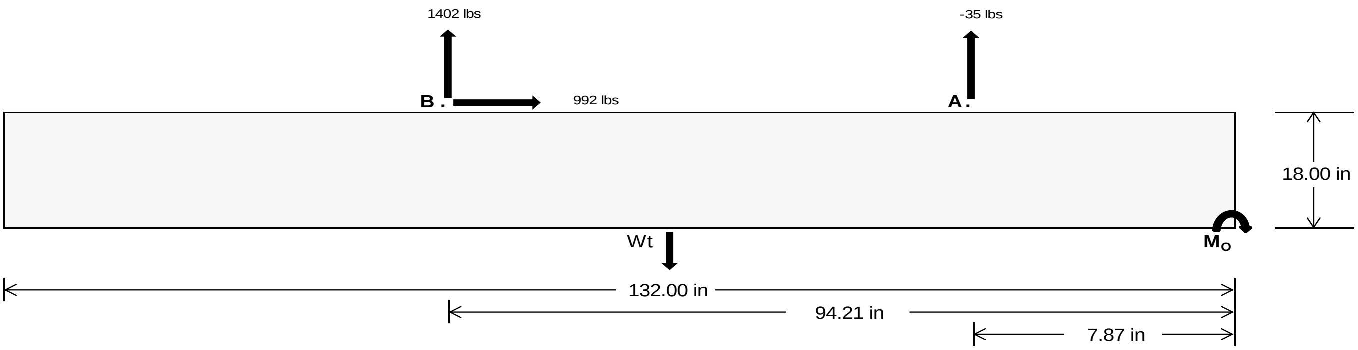
5.1 Helical Pile Foundations

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 =	48.23	6095.32	k
Compressive Load =	3147.24	4868.49	k
Lateral Load =	433.19	4301.55	k
Moment (Weak Axis) =	0.83	0.27	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 table 1806.2 (2012, 2015).



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (2) #5 rebar.

<u>Overturning Check</u>

M_O = 149644.2 in-lbs
Resisting Force Required = 2267.34 lbs
S.F. = 1.67
Weight Required = 3778.89 lbs
Minimum Width = <u>30 in</u> in
Weight Provided = 5981.25 lbs

A minimum 132in long x 30in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>

Force = 991.91 lbs
Friction = 0.4
Weight Required = 2479.79 lbs
Resisting Weight = 5981.25 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 30in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>

Sliding Force = 991.91 lbs
Cohesion = 130 psf
Area = 27.50 ft^2
Resisting = 2990.63 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 30in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>

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.

<u>Bearing Pressure</u>

	Ballast Width			
	<u>30 in</u>	<u>31 in</u>	<u>32 in</u>	<u>33 in</u>
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.5 ft) =	<u>5981 lbs</u>	<u>6181 lbs</u>	<u>6380 lbs</u>	<u>6579 lbs</u>

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	30 in	31 in	32 in	33 in	30 in	31 in	32 in	33 in	30 in	31 in	32 in	33 in	30 in	31 in	32 in	33 in
F_A	1205 lbs	1205 lbs	1205 lbs	1205 lbs	1030 lbs	1030 lbs	1030 lbs	1030 lbs	1529 lbs	1529 lbs	1529 lbs	1529 lbs	71 lbs	71 lbs	71 lbs	71 lbs
F_B	1088 lbs	1088 lbs	1088 lbs	1088 lbs	2074 lbs	2074 lbs	2074 lbs	2074 lbs	2239 lbs	2239 lbs	2239 lbs	2239 lbs	-2804 lbs	-2804 lbs	-2804 lbs	-2804 lbs
F_V	200 lbs	200 lbs	200 lbs	200 lbs	1824 lbs	1824 lbs	1824 lbs	1824 lbs	1495 lbs	1495 lbs	1495 lbs	1495 lbs	-1984 lbs	-1984 lbs	-1984 lbs	-1984 lbs
P_{total}	8274 lbs	8474 lbs	8673 lbs	8872 lbs	9085 lbs	9285 lbs	9484 lbs	9683 lbs	9749 lbs	9948 lbs	10148 lbs	10347 lbs	856 lbs	976 lbs	1095 lbs	1215 lbs
M	3576 lbs-ft	3576 lbs-ft	3576 lbs-ft	3576 lbs-ft	2850 lbs-ft	2850 lbs-ft	2850 lbs-ft	2850 lbs-ft	4383 lbs-ft	4383 lbs-ft	4383 lbs-ft	4383 lbs-ft	3959 lbs-ft	3959 lbs-ft	3959 lbs-ft	3959 lbs-ft
e	0.43 ft	0.42 ft	0.41 ft	0.40 ft	0.31 ft	0.31 ft	0.30 ft	0.29 ft	0.45 ft	0.44 ft	0.43 ft	0.42 ft	4.63 ft	4.06 ft	3.61 ft	3.26 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}	230.0 psf	229.6 psf	229.2 psf	228.8 psf	273.8 psf	272.0 psf	270.3 psf	268.7 psf	267.6 psf	266.0 psf	264.4 psf	263.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	371.8 psf	366.8 psf	362.2 psf	357.8 psf	386.9 psf	381.4 psf	376.3 psf	371.5 psf	441.4 psf	434.2 psf	427.4 psf	421.1 psf	260.9 psf	174.6 psf	145.2 psf	131.4 psf

Maximum Bearing Pressure = 441 psf
Allowable Bearing Pressure = 1500 psf

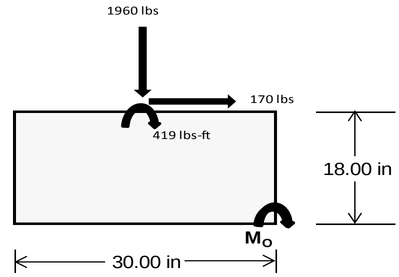
Use a 132in long x 30in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 1775.5 ft-lbs
Resisting Force Required = 1420.42 lbs
S.F. = 1.67
Weight Required = 2367.37 lbs
Minimum Width = 30 in in
Weight Provided = 5981.25 lbs

A minimum 132in long x 30in 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	30 in			30 in			30 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	335 lbs	693 lbs	224 lbs	772 lbs	1960 lbs	687 lbs	137 lbs	203 lbs	27 lbs
F_V	236 lbs	231 lbs	242 lbs	172 lbs	170 lbs	189 lbs	237 lbs	232 lbs	239 lbs
P_{total}	7740 lbs	8098 lbs	7629 lbs	7821 lbs	9009 lbs	7736 lbs	2302 lbs	2368 lbs	2192 lbs
M	904 lbs-ft	892 lbs-ft	924 lbs-ft	669 lbs-ft	675 lbs-ft	723 lbs-ft	904 lbs-ft	890 lbs-ft	911 lbs-ft
e	0.12 ft	0.11 ft	0.12 ft	0.09 ft	0.07 ft	0.09 ft	0.39 ft	0.38 ft	0.42 ft
L/6	0.42 ft	0.42 ft	0.42 ft	0.42 ft	0.42 ft	0.42 ft	0.42 ft	0.42 ft	0.42 ft
f_{min}	202.5 psf	216.6 psf	196.8 psf	226.0 psf	268.7 psf	218.2 psf	4.8 psf	8.4 psf	0.2 psf
f_{max}	360.4 psf	372.4 psf	358.0 psf	342.8 psf	386.5 psf	344.4 psf	162.6 psf	163.8 psf	159.2 psf

Maximum Bearing Pressure = 386 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 30in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 30in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

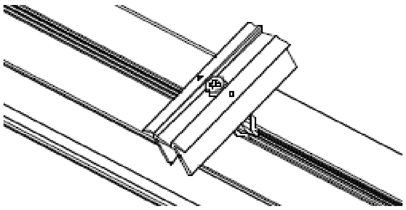
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

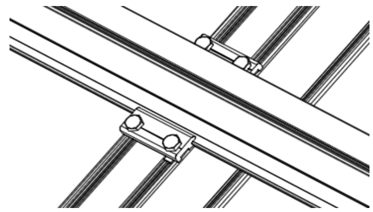
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.523	k
Allowable Uplift =	1.214	k
Utilization =	43%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.097	k
Allowable Uplift =	4.357	k
Utilization =	48%	



6.2 Strut Connections

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

Front Strut

Maximum Axial Load =	2.421	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	33%	

Rear Strut

Maximum Axial Load =	4.014	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	54%	

Diagonal Strut

Maximum Axial Load =	2.710	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	37%	

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

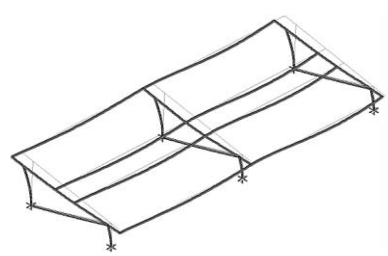
7.1 Seismic Drift

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} =	53.78	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.076	in
Max Drift, Δ_{MAX} =	0.827	in

$0.827 \leq 1.076$, 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 = 135 in

J = 0.432

373.473

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

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= 27.0 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 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 = 135

J = 0.432

237.507

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

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= 28.3

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 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

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 = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = __**55x55**__

Strong Axis:
3.4.14

L_b = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:
3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.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	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-69.488	-69.488	0	0
2	M14	y	-69.488	-69.488	0	0
3	M15	y	-115.813	-115.813	0	0
4	M16	y	-115.813	-115.813	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	156.347	156.347	0	0
2	M14	y	121.603	121.603	0	0
3	M15	y	69.488	69.488	0	0
4	M16	y	69.488	69.488	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 + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
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 + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
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	844.281	2	1135.081	2	.772	1	.003	1	0	1	0	1
2		min	-1036.02	3	-1427.349	3	-29.434	5	-.204	4	0	1	0	1
3	N7	max	.041	9	995.443	1	-.959	12	-.002	12	0	1	0	1
4		min	-.174	2	-37.103	5	-333.22	4	-.638	4	0	1	0	1
5	N15	max	.231	3	2420.957	1	0	1	0	3	0	1	0	1
6		min	-1.851	2	106.198	15	-315.769	4	-.614	4	0	1	0	1
7	N16	max	3096.43	2	3744.992	2	0	3	0	3	0	1	0	1
8		min	-3308.885	3	-4688.707	3	-29.238	5	-.206	4	0	1	0	1
9	N23	max	.047	14	995.443	1	15.113	1	.029	1	0	1	0	1
10		min	-.174	2	70.915	12	-321.773	5	-.618	4	0	1	0	1
11	N24	max	844.281	2	1135.081	2	-.055	12	0	12	0	1	0	1
12		min	-1036.02	3	-1427.349	3	-30.192	5	-.206	4	0	1	0	1
13	Totals:	max	4782.793	2	9528.586	2	0	1						
14		min	-5380.626	3	-7090.727	3	-1052.503	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	140.267	1	387.463	2	-11.692	12	.002	3	.336	1	0	4
2			min	9.029	12	-641.012	3	-201.006	1	-.012	2	.022	12	0	3
3		2	max	140.267	1	271.595	2	-9.13	12	.002	3	.156	4	.683	3
4			min	9.029	12	-451.066	3	-154.692	1	-.012	2	.009	12	-.412	2
5		3	max	140.267	1	155.728	2	-6.569	12	.002	3	.079	5	1.128	3
6			min	9.029	12	-261.119	3	-108.379	1	-.012	2	-.051	1	-.679	2
7		4	max	140.267	1	39.861	2	-4.008	12	.002	3	.039	5	1.335	3
8			min	9.029	12	-71.172	3	-62.065	1	-.012	2	-.157	1	-.801	2
9		5	max	140.267	1	118.774	3	-1.446	12	.002	3	.003	5	1.306	3
10			min	9.029	12	-76.007	2	-31.099	4	-.012	2	-.206	1	-.779	2
11		6	max	140.267	1	308.721	3	30.562	1	.002	3	-.011	12	1.038	3
12			min	3.948	15	-191.874	2	-22.64	5	-.012	2	-.197	1	-.611	2
13		7	max	140.267	1	498.668	3	76.876	1	.002	3	-.008	12	.534	3
14			min	-6.495	5	-307.741	2	-18.678	5	-.012	2	-.13	1	-.299	2
15		8	max	140.267	1	688.615	3	123.189	1	.002	3	0	10	.158	2
16			min	-19.327	5	-423.609	2	-14.715	5	-.012	2	-.077	4	-.208	3
17		9	max	140.267	1	878.561	3	169.503	1	.002	3	.178	1	.76	2
18			min	-32.158	5	-539.476	2	-10.752	5	-.012	2	-.091	5	-1.188	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	140.267	1	638.963	12	215.816	1	.012	2	.419	1	1.507	2
20			min	9.029	12	-1068.508	3	-134.43	14	-.002	3	.02	12	-2.405	3
21		11	max	140.267	1	539.476	2	-8.799	12	.012	2	.178	1	.76	2
22			min	9.029	12	-878.561	3	-169.503	1	-.002	3	.007	12	-1.188	3
23		12	max	140.267	1	423.609	2	-6.238	12	.012	2	.074	5	.158	2
24			min	9.029	12	-688.615	3	-123.189	1	-.002	3	-.004	1	-.208	3
25		13	max	140.267	1	307.741	2	-3.676	12	.012	2	.031	5	.534	3
26			min	9.029	12	-498.668	3	-76.876	1	-.002	3	-.13	1	-.299	2
27		14	max	140.267	1	191.874	2	-1.115	12	.012	2	-.003	15	1.038	3
28			min	9.029	12	-308.721	3	-35.853	4	-.002	3	-.197	1	-.611	2
29		15	max	140.267	1	76.007	2	15.751	1	.012	2	-.011	12	1.306	3
30			min	2.91	15	-118.774	3	-23.847	5	-.002	3	-.206	1	-.779	2
31		16	max	140.267	1	71.172	3	62.065	1	.012	2	-.008	12	1.335	3
32			min	-8.104	5	-39.861	2	-19.884	5	-.002	3	-.157	1	-.801	2
33		17	max	140.267	1	261.119	3	108.379	1	.012	2	-.001	12	1.128	3
34			min	-20.936	5	-155.728	2	-15.921	5	-.002	3	-.102	4	-.679	2
35		18	max	140.267	1	451.066	3	154.692	1	.012	2	.114	1	.683	3
36			min	-33.767	5	-271.595	2	-11.958	5	-.002	3	-.105	5	-.412	2
37		19	max	140.267	1	641.012	3	201.006	1	.012	2	.336	1	0	2
38			min	-46.599	5	-387.463	2	-7.995	5	-.002	3	-.118	5	0	3
39	M14	1	max	67.808	4	406.481	2	-11.99	12	.007	3	.378	1	0	4
40			min	3.686	12	-505.979	3	-206.66	1	-.009	2	.024	12	0	3
41		2	max	60.567	1	290.614	2	-9.428	12	.007	3	.217	4	.541	3
42			min	3.686	12	-359.462	3	-160.347	1	-.009	2	.011	12	-.436	2
43		3	max	60.567	1	174.746	2	-6.867	12	.007	3	.115	5	.899	3
44			min	3.686	12	-212.945	3	-114.033	1	-.009	2	-.023	1	-.727	2
45		4	max	60.567	1	58.879	2	-4.305	12	.007	3	.059	5	1.073	3
46			min	3.686	12	-66.429	3	-67.72	1	-.009	2	-.136	1	-.873	2
47		5	max	60.567	1	80.088	3	-1.744	12	.007	3	.008	5	1.065	3
48			min	.756	15	-56.988	2	-45.05	4	-.009	2	-.192	1	-.874	2
49		6	max	60.567	1	226.605	3	24.907	1	.007	3	-.011	12	.873	3
50			min	-11.619	5	-172.856	2	-34.943	5	-.009	2	-.19	1	-.73	2
51		7	max	60.567	1	373.122	3	71.221	1	.007	3	-.008	12	.498	3
52			min	-24.45	5	-288.723	2	-30.98	5	-.009	2	-.13	1	-.442	2
53		8	max	60.567	1	519.638	3	117.534	1	.007	3	0	10	.006	9
54			min	-37.282	5	-404.59	2	-27.017	5	-.009	2	-.121	4	-.06	3
55		9	max	60.567	1	666.155	3	163.848	1	.007	3	.164	1	.57	2
56			min	-50.113	5	-520.458	2	-23.054	5	-.009	2	-.147	5	-.801	3
57		10	max	88.154	4	812.672	3	210.161	1	.009	2	.398	1	1.293	2
58			min	3.686	12	-636.325	2	-137.42	14	-.007	3	.019	12	-1.725	3
59		11	max	75.322	4	520.458	2	-8.501	12	.009	2	.218	4	.57	2
60			min	3.686	12	-666.155	3	-163.848	1	-.007	3	.007	12	-.801	3
61		12	max	62.491	4	404.59	2	-5.94	12	.009	2	.113	5	.006	9
62			min	3.686	12	-519.638	3	-117.534	1	-.007	3	-.012	1	-.06	3
63		13	max	60.567	1	288.723	2	-3.379	12	.009	2	.057	5	.498	3
64			min	3.686	12	-373.122	3	-71.221	1	-.007	3	-.13	1	-.442	2
65		14	max	60.567	1	172.856	2	-.817	12	.009	2	.005	5	.873	3
66			min	3.686	12	-226.605	3	-45.99	4	-.007	3	-.19	1	-.73	2
67		15	max	60.567	1	56.988	2	21.406	1	.009	2	-.01	12	1.065	3
68			min	3.686	12	-80.088	3	-35.181	5	-.007	3	-.192	1	-.874	2
69		16	max	60.567	1	66.429	3	67.72	1	.009	2	-.006	12	1.073	3
70			min	-4.246	5	-58.879	2	-31.219	5	-.007	3	-.136	1	-.873	2
71		17	max	60.567	1	212.945	3	114.033	1	.009	2	.001	3	.899	3
72			min	-17.078	5	-174.746	2	-27.256	5	-.007	3	-.127	4	-.727	2
73		18	max	60.567	1	359.462	3	160.347	1	.009	2	.149	1	.541	3
74			min	-29.909	5	-290.614	2	-23.293	5	-.007	3	-.151	5	-.436	2
75		19	max	60.567	1	505.979	3	206.66	1	.009	2	.378	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	-42.741	5	-406.481	2	-19.33	5	-.007	3	-.177	5	0	3
77	M15	1	max	94.239	5	601.927	2	-11.944	12	.009	2	.393	4	0	2
78			min	-63.898	1	-286.207	3	-206.628	1	-.007	3	.024	12	0	3
79		2	max	81.407	5	428.154	2	-9.382	12	.009	2	.257	4	.307	3
80			min	-63.898	1	-204.834	3	-160.314	1	-.007	3	.01	12	-.644	2
81		3	max	68.576	5	254.38	2	-6.821	12	.009	2	.144	5	.512	3
82			min	-63.898	1	-123.461	3	-114.001	1	-.007	3	-.023	1	-1.07	2
83		4	max	55.744	5	80.606	2	-4.26	12	.009	2	.077	5	.616	3
84			min	-63.898	1	-42.088	3	-69.574	4	-.007	3	-.136	1	-1.28	2
85		5	max	42.913	5	39.285	3	-1.698	12	.009	2	.014	5	.617	3
86			min	-63.898	1	-93.167	2	-53.948	4	-.007	3	-.192	1	-1.272	2
87		6	max	30.081	5	120.658	3	24.94	1	.009	2	-.011	12	.517	3
88			min	-63.898	1	-266.941	2	-43.791	5	-.007	3	-.19	1	-1.047	2
89		7	max	17.25	5	202.031	3	71.253	1	.009	2	-.008	12	.316	3
90			min	-63.898	1	-440.715	2	-39.828	5	-.007	3	-.13	1	-.605	2
91		8	max	4.418	5	283.404	3	117.567	1	.009	2	0	10	.055	2
92			min	-63.898	1	-614.488	2	-35.865	5	-.007	3	-.148	4	0	15
93		9	max	-4.198	12	364.777	3	163.88	1	.009	2	.164	1	.932	2
94			min	-63.898	1	-788.262	2	-31.902	5	-.007	3	-.185	5	-.393	3
95		10	max	-4.198	12	962.035	2	32.472	10	.007	3	.398	1	2.026	2
96			min	-63.898	1	-536.836	10	-210.194	1	-.009	2	.019	12	-.9	3
97		11	max	-1.885	15	788.262	2	-8.547	12	.007	3	.257	4	.932	2
98			min	-63.898	1	-364.777	3	-163.88	1	-.009	2	.007	12	-.393	3
99		12	max	-4.198	12	614.488	2	-5.986	12	.007	3	.14	5	.055	2
100			min	-63.898	1	-283.404	3	-117.567	1	-.009	2	-.012	1	0	15
101		13	max	-4.198	12	440.715	2	-3.425	12	.007	3	.073	5	.316	3
102			min	-63.898	1	-202.031	3	-71.253	1	-.009	2	-.13	1	-.605	2
103		14	max	-4.198	12	266.941	2	-.863	12	.007	3	.01	5	.517	3
104			min	-63.898	1	-120.658	3	-54.921	4	-.009	2	-.19	1	-1.047	2
105		15	max	-4.198	12	93.167	2	21.374	1	.007	3	-.01	12	.617	3
106			min	-71.42	4	-39.285	3	-44.036	5	-.009	2	-.192	1	-1.272	2
107		16	max	-4.198	12	42.088	3	67.687	1	.007	3	-.007	12	.616	3
108			min	-84.252	4	-80.606	2	-40.073	5	-.009	2	-.136	1	-1.28	2
109		17	max	-4.198	12	123.461	3	114.001	1	.007	3	0	3	.512	3
110			min	-97.083	4	-254.38	2	-36.11	5	-.009	2	-.155	4	-1.07	2
111		18	max	-4.198	12	204.834	3	160.314	1	.007	3	.149	1	.307	3
112			min	-109.915	4	-428.154	2	-32.147	5	-.009	2	-.19	5	-.644	2
113		19	max	-4.198	12	286.207	3	206.628	1	.007	3	.378	1	0	2
114			min	-122.746	4	-601.927	2	-28.184	5	-.009	2	-.228	5	0	5
115	M16	1	max	91.815	5	583.582	2	-11.544	12	.009	2	.338	1	0	2
116			min	-151.279	1	-271.481	3	-201.247	1	-.01	3	.021	12	0	3
117		2	max	78.983	5	409.808	2	-8.983	12	.009	2	.201	4	.288	3
118			min	-151.279	1	-190.108	3	-154.933	1	-.01	3	.008	12	-.621	2
119		3	max	66.152	5	236.035	2	-6.421	12	.009	2	.111	5	.475	3
120			min	-151.279	1	-108.735	3	-108.62	1	-.01	3	-.05	1	-1.025	2
121		4	max	53.32	5	62.261	2	-3.86	12	.009	2	.058	5	.56	3
122			min	-151.279	1	-27.362	3	-62.306	1	-.01	3	-.157	1	-1.211	2
123		5	max	40.489	5	54.01	3	-1.298	12	.009	2	.011	5	.544	3
124			min	-151.279	1	-111.512	2	-40.959	4	-.01	3	-.206	1	-1.18	2
125		6	max	27.657	5	135.383	3	30.321	1	.009	2	-.011	12	.425	3
126			min	-151.279	1	-285.286	2	-32.342	5	-.01	3	-.197	1	-.932	2
127		7	max	14.826	5	216.756	3	76.635	1	.009	2	-.008	12	.205	3
128			min	-151.279	1	-459.06	2	-28.379	5	-.01	3	-.13	1	-.467	2
129		8	max	1.994	5	298.129	3	122.948	1	.009	2	0	10	.215	2
130			min	-151.279	1	-632.833	2	-24.416	5	-.01	3	-.106	4	-.117	3
131		9	max	-7.018	15	379.502	3	169.262	1	.009	2	.178	1	1.115	2
132			min	-151.279	1	-806.607	2	-20.453	5	-.01	3	-.131	5	-.54	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	-9.421	12	782.049	1	142.779	9	.01	3	.418	1	2.232	2
134			min	-151.279	1	-980.381	2	-215.575	1	-.009	2	.021	12	-1.065	3
135		11	max	-9.421	12	806.607	2	-8.947	12	.01	3	.208	4	1.115	2
136			min	-151.279	1	-379.502	3	-169.262	1	-.009	2	.008	12	-.54	3
137		12	max	-9.421	12	632.833	2	-6.386	12	.01	3	.102	4	.215	2
138			min	-151.279	1	-298.129	3	-122.948	1	-.009	2	-.005	1	-.117	3
139		13	max	-9.421	12	459.06	2	-3.824	12	.01	3	.048	5	.205	3
140			min	-151.279	1	-216.756	3	-76.635	1	-.009	2	-.13	1	-.467	2
141		14	max	-9.421	12	285.286	2	-1.263	12	.01	3	0	15	.425	3
142			min	-151.279	1	-135.383	3	-45.606	4	-.009	2	-.197	1	-.932	2
143		15	max	-9.421	12	111.512	2	15.992	1	.01	3	-.011	12	.544	3
144			min	-151.279	1	-54.01	3	-33.525	5	-.009	2	-.206	1	-1.18	2
145		16	max	-9.421	12	27.362	3	62.306	1	.01	3	-.008	12	.56	3
146			min	-151.279	1	-62.261	2	-29.562	5	-.009	2	-.157	1	-1.211	2
147		17	max	-9.421	12	108.735	3	108.62	1	.01	3	-.002	12	.475	3
148			min	-151.279	1	-236.035	2	-25.599	5	-.009	2	-.134	4	-1.025	2
149		18	max	-9.421	12	190.108	3	154.933	1	.01	3	.115	1	.288	3
150			min	-151.279	1	-409.808	2	-21.636	5	-.009	2	-.149	5	-.621	2
151		19	max	-9.421	12	271.481	3	201.247	1	.01	3	.338	1	0	2
152			min	-157.173	4	-583.582	2	-17.674	5	-.009	2	-.174	5	0	3
153	M2	1	max	939.165	2	2.039	4	.475	1	0	12	0	3	0	1
154			min	-1221.32	3	.489	15	-29.851	4	0	4	0	2	0	1
155		2	max	939.686	2	1.92	4	.475	1	0	12	0	1	0	15
156			min	-1220.929	3	.461	15	-30.309	4	0	4	-.011	4	0	4
157		3	max	940.207	2	1.801	4	.475	1	0	12	0	1	0	15
158			min	-1220.539	3	.433	15	-30.768	4	0	4	-.022	4	-.001	4
159		4	max	940.728	2	1.682	4	.475	1	0	12	0	1	0	15
160			min	-1220.148	3	.405	15	-31.226	4	0	4	-.033	4	-.002	4
161		5	max	941.248	2	1.563	4	.475	1	0	12	0	1	0	15
162			min	-1219.758	3	.377	15	-31.684	4	0	4	-.044	4	-.003	4
163		6	max	941.769	2	1.444	4	.475	1	0	12	0	1	0	15
164			min	-1219.367	3	.349	15	-32.143	4	0	4	-.055	4	-.003	4
165		7	max	942.29	2	1.326	4	.475	1	0	12	0	1	0	15
166			min	-1218.977	3	.321	15	-32.601	4	0	4	-.067	4	-.004	4
167		8	max	942.81	2	1.207	4	.475	1	0	12	.001	1	0	15
168			min	-1218.586	3	.294	15	-33.06	4	0	4	-.078	4	-.004	4
169		9	max	943.331	2	1.088	4	.475	1	0	12	.001	1	-.001	15
170			min	-1218.196	3	.266	15	-33.518	4	0	4	-.09	4	-.004	4
171		10	max	943.852	2	.969	4	.475	1	0	12	.002	1	-.001	15
172			min	-1217.805	3	.221	12	-33.976	4	0	4	-.102	4	-.005	4
173		11	max	944.372	2	.85	4	.475	1	0	12	.002	1	-.001	15
174			min	-1217.415	3	.175	12	-34.435	4	0	4	-.115	4	-.005	4
175		12	max	944.893	2	.732	2	.475	1	0	12	.002	1	-.001	15
176			min	-1217.024	3	.128	12	-34.893	4	0	4	-.127	4	-.005	4
177		13	max	945.414	2	.639	2	.475	1	0	12	.002	1	-.001	15
178			min	-1216.634	3	.082	12	-35.351	4	0	4	-.139	4	-.006	4
179		14	max	945.934	2	.547	2	.475	1	0	12	.002	1	-.001	15
180			min	-1216.243	3	.028	3	-35.81	4	0	4	-.152	4	-.006	4
181		15	max	946.455	2	.454	2	.475	1	0	12	.002	1	-.001	15
182			min	-1215.853	3	-.041	3	-36.268	4	0	4	-.165	4	-.006	4
183		16	max	946.976	2	.361	2	.475	1	0	12	.003	1	-.001	15
184			min	-1215.462	3	-.11	3	-36.726	4	0	4	-.178	4	-.006	4
185		17	max	947.497	2	.269	2	.475	1	0	12	.003	1	-.002	15
186			min	-1215.072	3	-.18	3	-37.185	4	0	4	-.191	4	-.006	4
187		18	max	948.017	2	.176	2	.475	1	0	12	.003	1	-.001	12
188			min	-1214.681	3	-.249	3	-37.643	4	0	4	-.205	4	-.006	4
189		19	max	948.538	2	.084	2	.475	1	0	12	.003	1	-.001	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
190			min	-1214.291	3	-.319	3	-38.101	4	0	4	-.218	4	-.006	4
191	M3	1	max	707.376	2	7.679	4	7.766	4	0	12	0	1	.006	4
192			min	-854.879	3	1.814	15	.025	12	0	4	-.04	4	.001	12
193		2	max	707.206	2	6.918	4	8.3	4	0	12	0	1	.003	2
194			min	-855.006	3	1.635	15	.025	12	0	4	-.036	4	0	3
195		3	max	707.036	2	6.157	4	8.835	4	0	12	0	1	.001	2
196			min	-855.134	3	1.456	15	.025	12	0	4	-.033	4	-.001	3
197		4	max	706.865	2	5.397	4	9.37	4	0	12	.001	1	0	15
198			min	-855.262	3	1.277	15	.025	12	0	4	-.029	4	-.003	3
199		5	max	706.695	2	4.636	4	9.904	4	0	12	.001	1	0	15
200			min	-855.39	3	1.098	15	.025	12	0	4	-.025	4	-.004	6
201		6	max	706.524	2	3.875	4	10.439	4	0	12	.001	1	-.001	15
202			min	-855.517	3	.919	15	.025	12	0	4	-.021	5	-.006	6
203		7	max	706.354	2	3.114	4	10.974	4	0	12	.002	1	-.002	15
204			min	-855.645	3	.74	15	.025	12	0	4	-.017	5	-.007	6
205		8	max	706.184	2	2.353	4	11.508	4	0	12	.002	1	-.002	15
206			min	-855.773	3	.561	15	.025	12	0	4	-.012	5	-.008	6
207		9	max	706.013	2	1.592	4	12.043	4	0	12	.002	1	-.002	15
208			min	-855.901	3	.383	15	.025	12	0	4	-.007	5	-.009	6
209		10	max	705.843	2	.831	4	12.578	4	0	12	.002	1	-.002	15
210			min	-856.028	3	.189	12	.025	12	0	4	-.002	5	-.01	6
211		11	max	705.673	2	.193	2	13.112	4	0	12	.004	4	-.002	15
212			min	-856.156	3	-.182	3	.025	12	0	4	0	12	-.01	6
213		12	max	705.502	2	-.154	15	13.647	4	0	12	.009	4	-.002	15
214			min	-856.284	3	-.692	6	.025	12	0	4	0	12	-.01	6
215		13	max	705.332	2	-.333	15	14.182	4	0	12	.015	4	-.002	15
216			min	-856.412	3	-1.453	6	.025	12	0	4	0	12	-.009	6
217		14	max	705.162	2	-.512	15	14.717	4	0	12	.021	4	-.002	15
218			min	-856.539	3	-2.214	6	.025	12	0	4	0	12	-.009	6
219		15	max	704.991	2	-.691	15	15.251	4	0	12	.027	4	-.002	15
220			min	-856.667	3	-2.975	6	.025	12	0	4	0	12	-.007	6
221		16	max	704.821	2	-.87	15	15.786	4	0	12	.034	4	-.001	15
222			min	-856.795	3	-3.736	6	.025	12	0	4	0	12	-.006	6
223		17	max	704.651	2	-1.048	15	16.321	4	0	12	.04	4	-.001	15
224			min	-856.923	3	-4.497	6	.025	12	0	4	0	12	-.004	6
225		18	max	704.48	2	-1.227	15	16.855	4	0	12	.047	4	0	15
226			min	-857.051	3	-5.258	6	.025	12	0	4	0	12	-.002	6
227		19	max	704.31	2	-1.406	15	17.39	4	0	12	.054	4	0	1
228			min	-857.178	3	-6.019	6	.025	12	0	4	0	12	0	1
229	M4	1	max	992.377	1	0	1	-.961	12	0	1	.052	4	0	1
230			min	-38.534	5	0	1	-332.213	4	0	1	0	12	0	1
231		2	max	992.547	1	0	1	-.961	12	0	1	.014	4	0	1
232			min	-38.455	5	0	1	-332.361	4	0	1	0	12	0	1
233		3	max	992.717	1	0	1	-.961	12	0	1	0	12	0	1
234			min	-38.375	5	0	1	-332.508	4	0	1	-.025	4	0	1
235		4	max	992.888	1	0	1	-.961	12	0	1	0	12	0	1
236			min	-38.296	5	0	1	-332.656	4	0	1	-.063	4	0	1
237		5	max	993.058	1	0	1	-.961	12	0	1	0	12	0	1
238			min	-38.216	5	0	1	-332.803	4	0	1	-.101	4	0	1
239		6	max	993.228	1	0	1	-.961	12	0	1	0	12	0	1
240			min	-38.137	5	0	1	-332.951	4	0	1	-.139	4	0	1
241		7	max	993.399	1	0	1	-.961	12	0	1	0	12	0	1
242			min	-38.057	5	0	1	-333.099	4	0	1	-.178	4	0	1
243		8	max	993.569	1	0	1	-.961	12	0	1	0	12	0	1
244			min	-37.978	5	0	1	-333.246	4	0	1	-.216	4	0	1
245		9	max	993.739	1	0	1	-.961	12	0	1	0	12	0	1
246			min	-37.898	5	0	1	-333.394	4	0	1	-.254	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	993.91	1	0	1	-.961	12	0	1	0	12	0	1
248			min	-37.819	5	0	1	-333.542	4	0	1	-.292	4	0	1
249		11	max	994.08	1	0	1	-.961	12	0	1	0	12	0	1
250			min	-37.739	5	0	1	-333.689	4	0	1	-.331	4	0	1
251		12	max	994.251	1	0	1	-.961	12	0	1	0	12	0	1
252			min	-37.66	5	0	1	-333.837	4	0	1	-.369	4	0	1
253		13	max	994.421	1	0	1	-.961	12	0	1	-.001	12	0	1
254			min	-37.58	5	0	1	-333.984	4	0	1	-.407	4	0	1
255		14	max	994.591	1	0	1	-.961	12	0	1	-.001	12	0	1
256			min	-37.501	5	0	1	-334.132	4	0	1	-.446	4	0	1
257		15	max	994.762	1	0	1	-.961	12	0	1	-.001	12	0	1
258			min	-37.421	5	0	1	-334.28	4	0	1	-.484	4	0	1
259		16	max	994.932	1	0	1	-.961	12	0	1	-.001	12	0	1
260			min	-37.342	5	0	1	-334.427	4	0	1	-.522	4	0	1
261		17	max	995.102	1	0	1	-.961	12	0	1	-.002	12	0	1
262			min	-37.262	5	0	1	-334.575	4	0	1	-.561	4	0	1
263		18	max	995.273	1	0	1	-.961	12	0	1	-.002	12	0	1
264			min	-37.183	5	0	1	-334.723	4	0	1	-.599	4	0	1
265		19	max	995.443	1	0	1	-.961	12	0	1	-.002	12	0	1
266			min	-37.103	5	0	1	-334.87	4	0	1	-.638	4	0	1
267	M6	1	max	3039.415	2	2.213	2	0	1	0	1	0	4	0	1
268			min	-4014.361	3	.307	12	-30.186	4	0	4	0	1	0	1
269		2	max	3039.936	2	2.12	2	0	1	0	1	0	1	0	12
270			min	-4013.97	3	.26	12	-30.644	4	0	4	-.011	4	0	2
271		3	max	3040.457	2	2.027	2	0	1	0	1	0	1	0	12
272			min	-4013.579	3	.214	12	-31.103	4	0	4	-.022	4	-.002	2
273		4	max	3040.978	2	1.935	2	0	1	0	1	0	1	0	12
274			min	-4013.189	3	.168	12	-31.561	4	0	4	-.033	4	-.002	2
275		5	max	3041.498	2	1.842	2	0	1	0	1	0	1	0	12
276			min	-4012.798	3	.101	3	-32.019	4	0	4	-.044	4	-.003	2
277		6	max	3042.019	2	1.75	2	0	1	0	1	0	1	0	12
278			min	-4012.408	3	.032	3	-32.478	4	0	4	-.056	4	-.004	2
279		7	max	3042.54	2	1.657	2	0	1	0	1	0	1	0	12
280			min	-4012.017	3	-.038	3	-32.936	4	0	4	-.067	4	-.004	2
281		8	max	3043.06	2	1.564	2	0	1	0	1	0	1	0	3
282			min	-4011.627	3	-.107	3	-33.395	4	0	4	-.079	4	-.005	2
283		9	max	3043.581	2	1.472	2	0	1	0	1	0	1	0	3
284			min	-4011.236	3	-.177	3	-33.853	4	0	4	-.091	4	-.005	2
285		10	max	3044.102	2	1.379	2	0	1	0	1	0	1	0	3
286			min	-4010.846	3	-.246	3	-34.311	4	0	4	-.103	4	-.006	2
287		11	max	3044.622	2	1.287	2	0	1	0	1	0	1	0	3
288			min	-4010.455	3	-.315	3	-34.77	4	0	4	-.116	4	-.006	2
289		12	max	3045.143	2	1.194	2	0	1	0	1	0	1	0	3
290			min	-4010.065	3	-.385	3	-35.228	4	0	4	-.128	4	-.007	2
291		13	max	3045.664	2	1.101	2	0	1	0	1	0	1	0	3
292			min	-4009.674	3	-.454	3	-35.686	4	0	4	-.141	4	-.007	2
293		14	max	3046.184	2	1.009	2	0	1	0	1	0	1	0	3
294			min	-4009.284	3	-.524	3	-36.145	4	0	4	-.154	4	-.007	2
295		15	max	3046.705	2	.916	2	0	1	0	1	0	1	0	3
296			min	-4008.893	3	-.593	3	-36.603	4	0	4	-.167	4	-.008	2
297		16	max	3047.226	2	.823	2	0	1	0	1	0	1	0	3
298			min	-4008.503	3	-.663	3	-37.061	4	0	4	-.18	4	-.008	2
299		17	max	3047.747	2	.731	2	0	1	0	1	0	1	.001	3
300			min	-4008.112	3	-.732	3	-37.52	4	0	4	-.193	4	-.008	2
301		18	max	3048.267	2	.638	2	0	1	0	1	0	1	.001	3
302			min	-4007.722	3	-.802	3	-37.978	4	0	4	-.207	4	-.009	2
303		19	max	3048.788	2	.546	2	0	1	0	1	0	1	.002	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
304			min	-4007.331	3	-.871	3	-38.436	4	0	4	-.22	4	-.009	2
305	M7	1	max	2668.792	2	7.694	6	7.311	4	0	1	0	1	.009	2
306			min	-2708.077	3	1.806	15	0	1	0	4	-.04	4	-.002	3
307		2	max	2668.622	2	6.933	6	7.846	4	0	1	0	1	.006	2
308			min	-2708.205	3	1.628	15	0	1	0	4	-.037	4	-.003	3
309		3	max	2668.452	2	6.172	6	8.38	4	0	1	0	1	.004	2
310			min	-2708.333	3	1.449	15	0	1	0	4	-.034	4	-.004	3
311		4	max	2668.281	2	5.411	6	8.915	4	0	1	0	1	.002	2
312			min	-2708.461	3	1.27	15	0	1	0	4	-.03	4	-.005	3
313		5	max	2668.111	2	4.65	6	9.45	4	0	1	0	1	0	2
314			min	-2708.588	3	1.091	15	0	1	0	4	-.026	4	-.006	3
315		6	max	2667.941	2	3.889	6	9.984	4	0	1	0	1	-.001	15
316			min	-2708.716	3	.912	15	0	1	0	4	-.022	4	-.007	3
317		7	max	2667.77	2	3.128	6	10.519	4	0	1	0	1	-.002	15
318			min	-2708.844	3	.733	15	0	1	0	4	-.018	4	-.008	3
319		8	max	2667.6	2	2.368	2	11.054	4	0	1	0	1	-.002	15
320			min	-2708.972	3	.499	12	0	1	0	4	-.013	4	-.008	4
321		9	max	2667.43	2	1.775	2	11.589	4	0	1	0	1	-.002	15
322			min	-2709.1	3	.202	12	0	1	0	4	-.009	4	-.009	4
323		10	max	2667.259	2	1.182	2	12.123	4	0	1	0	1	-.002	15
324			min	-2709.227	3	-.211	3	0	1	0	4	-.004	4	-.01	4
325		11	max	2667.089	2	.589	2	12.658	4	0	1	.001	4	-.002	15
326			min	-2709.355	3	-.656	3	0	1	0	4	0	1	-.01	4
327		12	max	2666.919	2	-.004	2	13.193	4	0	1	.007	4	-.002	15
328			min	-2709.483	3	-1.1	3	0	1	0	4	0	1	-.01	4
329		13	max	2666.748	2	-.34	15	13.727	4	0	1	.012	4	-.002	15
330			min	-2709.611	3	-1.545	3	0	1	0	4	0	1	-.009	4
331		14	max	2666.578	2	-.519	15	14.262	4	0	1	.018	4	-.002	15
332			min	-2709.738	3	-2.199	4	0	1	0	4	0	1	-.009	4
333		15	max	2666.407	2	-.698	15	14.797	4	0	1	.024	4	-.002	15
334			min	-2709.866	3	-2.96	4	0	1	0	4	0	1	-.007	4
335		16	max	2666.237	2	-.877	15	15.331	4	0	1	.031	4	-.001	15
336			min	-2709.994	3	-3.721	4	0	1	0	4	0	1	-.006	4
337		17	max	2666.067	2	-1.056	15	15.866	4	0	1	.037	4	-.001	15
338			min	-2710.122	3	-4.482	4	0	1	0	4	0	1	-.004	4
339		18	max	2665.896	2	-1.234	15	16.401	4	0	1	.044	4	0	15
340			min	-2710.249	3	-5.243	4	0	1	0	4	0	1	-.002	4
341		19	max	2665.726	2	-1.413	15	16.935	4	0	1	.051	4	0	1
342			min	-2710.377	3	-6.004	4	0	1	0	4	0	1	0	1
343	M8	1	max	2417.89	1	0	1	0	1	0	1	.048	4	0	1
344			min	105.273	15	0	1	-318.792	4	0	1	0	1	0	1
345		2	max	2418.061	1	0	1	0	1	0	1	.011	4	0	1
346			min	105.324	15	0	1	-318.939	4	0	1	0	1	0	1
347		3	max	2418.231	1	0	1	0	1	0	1	0	1	0	1
348			min	105.376	15	0	1	-319.087	4	0	1	-.025	4	0	1
349		4	max	2418.401	1	0	1	0	1	0	1	0	1	0	1
350			min	105.427	15	0	1	-319.235	4	0	1	-.062	4	0	1
351		5	max	2418.572	1	0	1	0	1	0	1	0	1	0	1
352			min	105.479	15	0	1	-319.382	4	0	1	-.098	4	0	1
353		6	max	2418.742	1	0	1	0	1	0	1	0	1	0	1
354			min	105.53	15	0	1	-319.53	4	0	1	-.135	4	0	1
355		7	max	2418.912	1	0	1	0	1	0	1	0	1	0	1
356			min	105.581	15	0	1	-319.677	4	0	1	-.172	4	0	1
357		8	max	2419.083	1	0	1	0	1	0	1	0	1	0	1
358			min	105.633	15	0	1	-319.825	4	0	1	-.209	4	0	1
359		9	max	2419.253	1	0	1	0	1	0	1	0	1	0	1
360			min	105.684	15	0	1	-319.973	4	0	1	-.245	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	2419.423	1	0	1	0	1	0	1	0	1	0	1
362			min	105.735	15	0	1	-320.12	4	0	1	-.282	4	0	1
363		11	max	2419.594	1	0	1	0	1	0	1	0	1	0	1
364			min	105.787	15	0	1	-320.268	4	0	1	-.319	4	0	1
365		12	max	2419.764	1	0	1	0	1	0	1	0	1	0	1
366			min	105.838	15	0	1	-320.416	4	0	1	-.356	4	0	1
367		13	max	2419.934	1	0	1	0	1	0	1	0	1	0	1
368			min	105.89	15	0	1	-320.563	4	0	1	-.392	4	0	1
369		14	max	2420.105	1	0	1	0	1	0	1	0	1	0	1
370			min	105.941	15	0	1	-320.711	4	0	1	-.429	4	0	1
371		15	max	2420.275	1	0	1	0	1	0	1	0	1	0	1
372			min	105.992	15	0	1	-320.859	4	0	1	-.466	4	0	1
373		16	max	2420.445	1	0	1	0	1	0	1	0	1	0	1
374			min	106.044	15	0	1	-321.006	4	0	1	-.503	4	0	1
375		17	max	2420.616	1	0	1	0	1	0	1	0	1	0	1
376			min	106.095	15	0	1	-321.154	4	0	1	-.54	4	0	1
377		18	max	2420.786	1	0	1	0	1	0	1	0	1	0	1
378			min	106.147	15	0	1	-321.301	4	0	1	-.577	4	0	1
379		19	max	2420.957	1	0	1	0	1	0	1	0	1	0	1
380			min	106.198	15	0	1	-321.449	4	0	1	-.614	4	0	1
381	M10	1	max	939.165	2	1.995	6	-.027	12	0	1	0	2	0	1
382			min	-1221.32	3	.46	15	-30.172	4	0	5	0	3	0	1
383		2	max	939.686	2	1.876	6	-.027	12	0	1	0	10	0	15
384			min	-1220.929	3	.432	15	-30.631	4	0	5	-.011	4	0	6
385		3	max	940.207	2	1.757	6	-.027	12	0	1	0	12	0	15
386			min	-1220.539	3	.404	15	-31.089	4	0	5	-.022	4	-.001	6
387		4	max	940.728	2	1.638	6	-.027	12	0	1	0	12	0	15
388			min	-1220.148	3	.376	15	-31.547	4	0	5	-.033	4	-.002	6
389		5	max	941.248	2	1.52	6	-.027	12	0	1	0	12	0	15
390			min	-1219.758	3	.348	15	-32.006	4	0	5	-.044	4	-.003	6
391		6	max	941.769	2	1.401	6	-.027	12	0	1	0	12	0	15
392			min	-1219.367	3	.32	15	-32.464	4	0	5	-.056	4	-.003	6
393		7	max	942.29	2	1.282	6	-.027	12	0	1	0	12	0	15
394			min	-1218.977	3	.292	15	-32.923	4	0	5	-.067	4	-.004	6
395		8	max	942.81	2	1.163	6	-.027	12	0	1	0	12	0	15
396			min	-1218.586	3	.264	15	-33.381	4	0	5	-.079	4	-.004	6
397		9	max	943.331	2	1.044	6	-.027	12	0	1	0	12	0	15
398			min	-1218.196	3	.236	15	-33.839	4	0	5	-.091	4	-.004	6
399		10	max	943.852	2	.925	6	-.027	12	0	1	0	12	-.001	15
400			min	-1217.805	3	.208	15	-34.298	4	0	5	-.103	4	-.005	6
401		11	max	944.372	2	.825	2	-.027	12	0	1	0	12	-.001	15
402			min	-1217.415	3	.175	12	-34.756	4	0	5	-.116	4	-.005	6
403		12	max	944.893	2	.732	2	-.027	12	0	1	0	12	-.001	15
404			min	-1217.024	3	.128	12	-35.214	4	0	5	-.128	4	-.005	6
405		13	max	945.414	2	.639	2	-.027	12	0	1	0	12	-.001	15
406			min	-1216.634	3	.082	12	-35.673	4	0	5	-.141	4	-.005	6
407		14	max	945.934	2	.547	2	-.027	12	0	1	0	12	-.001	15
408			min	-1216.243	3	.028	3	-36.131	4	0	5	-.154	4	-.006	6
409		15	max	946.455	2	.454	2	-.027	12	0	1	0	12	-.001	15
410			min	-1215.853	3	-.041	3	-36.589	4	0	5	-.167	4	-.006	6
411		16	max	946.976	2	.361	2	-.027	12	0	1	0	12	-.001	15
412			min	-1215.462	3	-.11	3	-37.048	4	0	5	-.18	4	-.006	6
413		17	max	947.497	2	.269	2	-.027	12	0	1	0	12	-.001	15
414			min	-1215.072	3	-.18	3	-37.506	4	0	5	-.193	4	-.006	6
415		18	max	948.017	2	.176	2	-.027	12	0	1	0	12	-.001	15
416			min	-1214.681	3	-.249	3	-37.964	4	0	5	-.206	4	-.006	6
417		19	max	948.538	2	.084	2	-.027	12	0	1	0	12	-.001	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	-1214.291	3	-.319	3	-38.423	4	0	5	-.22	4	-.006	6
419	M11	1	max	707.376	2	7.642	6	7.494	4	0	1	0	12	.006	6
420			min	-854.879	3	1.788	15	-.401	1	0	4	-.04	4	.001	15
421		2	max	707.206	2	6.881	6	8.029	4	0	1	0	12	.003	2
422			min	-855.006	3	1.61	15	-.401	1	0	4	-.037	4	0	3
423		3	max	707.036	2	6.12	6	8.564	4	0	1	0	12	.001	2
424			min	-855.134	3	1.431	15	-.401	1	0	4	-.033	4	-.001	3
425		4	max	706.865	2	5.359	6	9.098	4	0	1	0	12	0	15
426			min	-855.262	3	1.252	15	-.401	1	0	4	-.03	4	-.003	3
427		5	max	706.695	2	4.598	6	9.633	4	0	1	0	12	-.001	15
428			min	-855.39	3	1.073	15	-.401	1	0	4	-.026	4	-.004	4
429		6	max	706.524	2	3.837	6	10.168	4	0	1	0	12	-.001	15
430			min	-855.517	3	.894	15	-.401	1	0	4	-.022	4	-.006	4
431		7	max	706.354	2	3.076	6	10.702	4	0	1	0	12	-.002	15
432			min	-855.645	3	.715	15	-.401	1	0	4	-.017	4	-.007	4
433		8	max	706.184	2	2.315	6	11.237	4	0	1	0	12	-.002	15
434			min	-855.773	3	.536	15	-.401	1	0	4	-.013	4	-.009	4
435		9	max	706.013	2	1.554	6	11.772	4	0	1	0	12	-.002	15
436			min	-855.901	3	.357	15	-.401	1	0	4	-.008	4	-.009	4
437		10	max	705.843	2	.793	6	12.306	4	0	1	0	12	-.002	15
438			min	-856.028	3	.178	15	-.401	1	0	4	-.003	4	-.01	4
439		11	max	705.673	2	.193	2	12.841	4	0	1	.003	5	-.002	15
440			min	-856.156	3	-.182	3	-.401	1	0	4	-.002	1	-.01	4
441		12	max	705.502	2	-.179	15	13.376	4	0	1	.008	5	-.002	15
442			min	-856.284	3	-.73	4	-.401	1	0	4	-.002	1	-.01	4
443		13	max	705.332	2	-.358	15	13.91	4	0	1	.014	5	-.002	15
444			min	-856.412	3	-1.49	4	-.401	1	0	4	-.003	1	-.009	4
445		14	max	705.162	2	-.537	15	14.445	4	0	1	.02	5	-.002	15
446			min	-856.539	3	-2.251	4	-.401	1	0	4	-.003	1	-.009	4
447		15	max	704.991	2	-.716	15	14.98	4	0	1	.026	5	-.002	15
448			min	-856.667	3	-3.012	4	-.401	1	0	4	-.003	1	-.008	4
449		16	max	704.821	2	-.895	15	15.514	4	0	1	.032	5	-.001	15
450			min	-856.795	3	-3.773	4	-.401	1	0	4	-.003	1	-.006	4
451		17	max	704.651	2	-1.074	15	16.049	4	0	1	.039	5	-.001	15
452			min	-856.923	3	-4.534	4	-.401	1	0	4	-.003	1	-.004	4
453		18	max	704.48	2	-1.253	15	16.584	4	0	1	.045	5	0	15
454			min	-857.051	3	-5.295	4	-.401	1	0	4	-.003	1	-.002	4
455		19	max	704.31	2	-1.431	15	17.119	4	0	1	.052	5	0	1
456			min	-857.178	3	-6.056	4	-.401	1	0	4	-.004	1	0	1
457	M12	1	max	992.377	1	0	1	15.525	1	0	1	.05	5	0	1
458			min	69.382	12	0	1	-321.67	4	0	1	-.003	1	0	1
459		2	max	992.547	1	0	1	15.525	1	0	1	.013	5	0	1
460			min	69.467	12	0	1	-321.818	4	0	1	-.002	1	0	1
461		3	max	992.717	1	0	1	15.525	1	0	1	0	1	0	1
462			min	69.553	12	0	1	-321.965	4	0	1	-.025	4	0	1
463		4	max	992.888	1	0	1	15.525	1	0	1	.002	1	0	1
464			min	69.638	12	0	1	-322.113	4	0	1	-.061	4	0	1
465		5	max	993.058	1	0	1	15.525	1	0	1	.004	1	0	1
466			min	69.723	12	0	1	-322.261	4	0	1	-.098	4	0	1
467		6	max	993.228	1	0	1	15.525	1	0	1	.006	1	0	1
468			min	69.808	12	0	1	-322.408	4	0	1	-.136	4	0	1
469		7	max	993.399	1	0	1	15.525	1	0	1	.007	1	0	1
470			min	69.893	12	0	1	-322.556	4	0	1	-.173	4	0	1
471		8	max	993.569	1	0	1	15.525	1	0	1	.009	1	0	1
472			min	69.978	12	0	1	-322.704	4	0	1	-.21	4	0	1
473		9	max	993.739	1	0	1	15.525	1	0	1	.011	1	0	1
474			min	70.064	12	0	1	-322.851	4	0	1	-.247	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	993.91	1	0	1	15.525	1	0	1	.013	1	0	1
476			min	70.149	12	0	1	-322.999	4	0	1	-.284	4	0	1
477		11	max	994.08	1	0	1	15.525	1	0	1	.014	1	0	1
478			min	70.234	12	0	1	-323.147	4	0	1	-.321	4	0	1
479		12	max	994.251	1	0	1	15.525	1	0	1	.016	1	0	1
480			min	70.319	12	0	1	-323.294	4	0	1	-.358	4	0	1
481		13	max	994.421	1	0	1	15.525	1	0	1	.018	1	0	1
482			min	70.404	12	0	1	-323.442	4	0	1	-.395	4	0	1
483		14	max	994.591	1	0	1	15.525	1	0	1	.02	1	0	1
484			min	70.489	12	0	1	-323.589	4	0	1	-.432	4	0	1
485		15	max	994.762	1	0	1	15.525	1	0	1	.022	1	0	1
486			min	70.575	12	0	1	-323.737	4	0	1	-.469	4	0	1
487		16	max	994.932	1	0	1	15.525	1	0	1	.023	1	0	1
488			min	70.66	12	0	1	-323.885	4	0	1	-.507	4	0	1
489		17	max	995.102	1	0	1	15.525	1	0	1	.025	1	0	1
490			min	70.745	12	0	1	-324.032	4	0	1	-.544	4	0	1
491		18	max	995.273	1	0	1	15.525	1	0	1	.027	1	0	1
492			min	70.83	12	0	1	-324.18	4	0	1	-.581	4	0	1
493		19	max	995.443	1	0	1	15.525	1	0	1	.029	1	0	1
494			min	70.915	12	0	1	-324.328	4	0	1	-.618	4	0	1
495	M1	1	max	201.014	1	640.972	3	46.565	5	0	2	.336	1	.002	3
496			min	-7.995	5	-386.784	2	-140.069	1	0	3	-.118	5	-.012	2
497		2	max	201.835	1	640.092	3	47.807	5	0	2	.262	1	.192	2
498			min	-7.612	5	-387.958	2	-140.069	1	0	3	-.093	5	-.336	3
499		3	max	533.99	3	459.891	2	20.024	5	0	3	.188	1	.387	2
500			min	-304.891	2	-471.152	3	-139.862	1	0	2	-.068	5	-.66	3
501		4	max	534.607	3	458.718	2	21.265	5	0	3	.114	1	.149	1
502			min	-304.069	2	-472.032	3	-139.862	1	0	2	-.057	5	-.412	3
503		5	max	535.223	3	457.545	2	22.507	5	0	3	.041	1	-.003	15
504			min	-303.248	2	-472.912	3	-139.862	1	0	2	-.045	5	-.162	3
505		6	max	535.839	3	456.371	2	23.748	5	0	3	-.002	12	.088	3
506			min	-302.426	2	-473.792	3	-139.862	1	0	2	-.041	4	-.338	2
507		7	max	536.455	3	455.198	2	24.99	5	0	3	-.007	12	.338	3
508			min	-301.605	2	-474.672	3	-139.862	1	0	2	-.107	1	-.579	2
509		8	max	537.071	3	454.024	2	26.231	5	0	3	-.004	15	.589	3
510			min	-300.783	2	-475.552	3	-139.862	1	0	2	-.181	1	-.819	2
511		9	max	555.761	3	49.19	2	70.08	5	0	9	.104	1	.686	3
512			min	-209.887	2	.355	15	-200.479	1	0	3	-.156	5	-.939	2
513		10	max	556.377	3	48.017	2	71.321	5	0	9	0	12	.669	3
514			min	-209.066	2	.001	15	-200.479	1	0	3	-.12	4	-.964	2
515		11	max	556.993	3	46.844	2	72.563	5	0	9	-.007	12	.652	3
516			min	-208.244	2	-1.439	4	-200.479	1	0	3	-.108	4	-.989	2
517		12	max	575.608	3	319.648	3	179.381	5	0	2	.178	1	.569	3
518			min	-117.336	2	-555.34	2	-136.668	1	0	3	-.248	5	-.878	2
519		13	max	576.224	3	318.768	3	180.622	5	0	2	.106	1	.4	3
520			min	-116.515	2	-556.514	2	-136.668	1	0	3	-.153	5	-.585	2
521		14	max	576.84	3	317.888	3	181.863	5	0	2	.034	1	.232	3
522			min	-115.693	2	-557.687	2	-136.668	1	0	3	-.057	5	-.291	2
523		15	max	577.456	3	317.008	3	183.105	5	0	2	.039	5	.065	3
524			min	-114.871	2	-558.861	2	-136.668	1	0	3	-.038	1	-.019	9
525		16	max	578.073	3	316.128	3	184.346	5	0	2	.136	5	.299	2
526			min	-114.05	2	-560.034	2	-136.668	1	0	3	-.11	1	-.102	3
527		17	max	578.689	3	315.248	3	185.588	5	0	2	.234	5	.595	2
528			min	-113.228	2	-561.207	2	-136.668	1	0	3	-.182	1	-.269	3
529		18	max	17.29	5	585.325	2	-9.421	12	0	3	.236	5	.3	2
530			min	-202.062	1	-270.69	3	-158.635	4	0	2	-.258	1	-.133	3
531		19	max	17.673	5	584.151	2	-9.421	12	0	3	.174	5	.01	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	-201.24	1	-271.571	3	-157.394	4	0	2	-.338	1	-.009	2
533	M5	1	max	431.617	1	2136.825	3	114.023	5	0	1	0	1	.024	2
534			min	22.723	12	-1306.471	2	0	1	0	4	-.279	4	-.004	3
535		2	max	432.438	1	2135.945	3	115.265	5	0	1	0	1	.714	2
536			min	23.134	12	-1307.645	2	0	1	0	4	-.219	4	-1.131	3
537		3	max	1724.414	3	1416.89	2	91.097	4	0	4	0	1	1.372	2
538			min	-1087.494	2	-1536.078	3	0	1	0	1	-.158	4	-2.214	3
539		4	max	1725.03	3	1415.717	2	92.338	4	0	4	0	1	.624	2
540			min	-1086.672	2	-1536.958	3	0	1	0	1	-.109	4	-1.403	3
541		5	max	1725.646	3	1414.543	2	93.579	4	0	4	0	1	0	9
542			min	-1085.85	2	-1537.838	3	0	1	0	1	-.06	4	-.592	3
543		6	max	1726.262	3	1413.37	2	94.821	4	0	4	0	1	.22	3
544			min	-1085.029	2	-1538.718	3	0	1	0	1	-.011	4	-.869	2
545		7	max	1726.878	3	1412.196	2	96.062	4	0	4	.04	4	1.032	3
546			min	-1084.207	2	-1539.598	3	0	1	0	1	0	1	-1.614	2
547		8	max	1727.495	3	1411.023	2	97.304	4	0	4	.091	4	1.845	3
548			min	-1083.386	2	-1540.478	3	0	1	0	1	0	1	-2.359	2
549		9	max	1761.122	3	164.244	2	235.209	4	0	1	0	1	2.118	3
550			min	-897.111	2	.357	15	0	1	0	1	-.236	4	-2.69	2
551		10	max	1761.738	3	163.07	2	236.451	4	0	1	0	1	2.059	3
552			min	-896.289	2	.003	15	0	1	0	1	-.111	4	-2.776	2
553		11	max	1762.354	3	161.897	2	237.692	4	0	1	.014	4	2	3
554			min	-895.468	2	-1.232	6	0	1	0	1	0	1	-2.862	2
555		12	max	1796.13	3	1036.44	3	269.746	4	0	1	0	1	1.76	3
556			min	-709.217	2	-1745.211	2	0	1	0	4	-.374	4	-2.565	2
557		13	max	1796.746	3	1035.56	3	270.987	4	0	1	0	1	1.213	3
558			min	-708.396	2	-1746.385	2	0	1	0	4	-.231	4	-1.644	2
559		14	max	1797.363	3	1034.68	3	272.229	4	0	1	0	1	.667	3
560			min	-707.574	2	-1747.558	2	0	1	0	4	-.088	4	-.722	2
561		15	max	1797.979	3	1033.8	3	273.47	4	0	1	.056	4	.2	2
562			min	-706.752	2	-1748.731	2	0	1	0	4	0	1	-.004	13
563		16	max	1798.595	3	1032.92	3	274.712	4	0	1	.201	4	1.123	2
564			min	-705.931	2	-1749.905	2	0	1	0	4	0	1	-.424	3
565		17	max	1799.211	3	1032.04	3	275.953	4	0	1	.346	4	2.047	2
566			min	-705.109	2	-1751.078	2	0	1	0	4	0	1	-.969	3
567		18	max	-23.426	12	1965.327	2	0	1	0	4	.397	4	1.054	2
568			min	-431.985	1	-921.46	3	-22.686	5	0	1	0	1	-.506	3
569		19	max	-23.016	12	1964.154	2	0	1	0	4	.386	4	.018	2
570			min	-431.164	1	-922.34	3	-21.445	5	0	1	0	1	-.02	3
571	M9	1	max	201.014	1	640.972	3	140.069	1	0	3	-.022	12	.002	3
572			min	11.691	12	-386.784	2	9.028	12	0	4	-.336	1	-.012	2
573		2	max	201.835	1	640.092	3	140.069	1	0	3	-.017	12	.192	2
574			min	12.102	12	-387.958	2	9.028	12	0	4	-.262	1	-.336	3
575		3	max	533.99	3	459.891	2	139.862	1	0	2	-.012	12	.387	2
576			min	-304.891	2	-471.152	3	9.003	12	0	3	-.188	1	-.66	3
577		4	max	534.607	3	458.718	2	139.862	1	0	2	-.007	12	.149	1
578			min	-304.069	2	-472.032	3	9.003	12	0	3	-.114	1	-.412	3
579		5	max	535.223	3	457.545	2	139.862	1	0	2	-.003	12	-.003	15
580			min	-303.248	2	-472.912	3	9.003	12	0	3	-.063	4	-.162	3
581		6	max	535.839	3	456.371	2	139.862	1	0	2	.033	1	.088	3
582			min	-302.426	2	-473.792	3	9.003	12	0	3	-.027	5	-.338	2
583		7	max	536.455	3	455.198	2	139.862	1	0	2	.107	1	.338	3
584			min	-301.605	2	-474.672	3	9.003	12	0	3	-.002	5	-.579	2
585		8	max	537.071	3	454.024	2	139.862	1	0	2	.181	1	.589	3
586			min	-300.783	2	-475.552	3	9.003	12	0	3	.012	12	-.819	2
587		9	max	555.761	3	49.19	2	200.479	1	0	3	-.007	12	.686	3
588			min	-209.887	2	.363	15	12.68	12	0	9	-.202	4	-.939	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
589		10	max	556.377	3	48.017	2	200.479	1	0	3	.001	1	.669	3
590			min	-209.066	2	.009	15	12.68	12	0	9	-.119	4	-.964	2
591		11	max	556.993	3	46.844	2	200.479	1	0	3	.107	1	.652	3
592			min	-208.244	2	-1.389	6	12.68	12	0	9	-.063	5	-.989	2
593		12	max	575.608	3	319.648	3	240.307	4	0	3	-.011	12	.569	3
594			min	-117.336	2	-555.34	2	8.49	12	0	2	-.327	4	-.878	2
595		13	max	576.224	3	318.768	3	241.548	4	0	3	-.007	12	.4	3
596			min	-116.515	2	-556.514	2	8.49	12	0	2	-.2	4	-.585	2
597		14	max	576.84	3	317.888	3	242.79	4	0	3	-.002	12	.232	3
598			min	-115.693	2	-557.687	2	8.49	12	0	2	-.072	4	-.291	2
599		15	max	577.456	3	317.008	3	244.031	4	0	3	.056	4	.065	3
600			min	-114.871	2	-558.861	2	8.49	12	0	2	.002	12	-.019	9
601		16	max	578.073	3	316.128	3	245.273	4	0	3	.185	4	.299	2
602			min	-114.05	2	-560.034	2	8.49	12	0	2	.007	12	-.102	3
603		17	max	578.689	3	315.248	3	246.514	4	0	3	.315	4	.595	2
604			min	-113.228	2	-561.207	2	8.49	12	0	2	.011	12	-.269	3
605		18	max	-11.955	12	585.325	2	151.47	1	0	2	.35	4	.3	2
606			min	-202.062	1	-270.69	3	-93.376	5	0	3	.016	12	-.133	3
607		19	max	-11.544	12	584.151	2	151.47	1	0	2	.338	1	.01	3
608			min	-201.24	1	-271.571	3	-92.135	5	0	3	.021	12	-.009	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.095	2	.009	3	8.048e-3	2	NC	1	NC	1
2			min	-.859	4	-.014	3	-.005	2	-1.689e-3	3	NC	1	NC	1
3		2	max	.001	1	.416	3	.063	1	9.388e-3	2	NC	5	NC	2
4			min	-.859	4	-.148	1	-.034	5	-1.887e-3	3	626.845	3	4390.743	1
5		3	max	.001	1	.765	3	.154	1	1.073e-2	2	NC	5	NC	3
6			min	-.859	4	-.337	2	-.039	5	-2.086e-3	3	346.473	3	1770.464	1
7		4	max	0	1	.976	3	.233	1	1.207e-2	2	NC	15	NC	3
8			min	-.859	4	-.445	2	-.024	5	-2.284e-3	3	272.598	3	1163.468	1
9		5	max	0	1	1.024	3	.275	1	1.341e-2	2	NC	15	NC	5
10			min	-.859	4	-.455	2	0	15	-2.482e-3	3	259.98	3	986.696	1
11		6	max	0	1	.913	3	.266	1	1.475e-2	2	NC	5	NC	5
12			min	-.859	4	-.371	2	.017	15	-2.681e-3	3	291.205	3	1018.438	1
13		7	max	0	1	.675	3	.21	1	1.609e-2	2	NC	5	NC	10
14			min	-.859	4	-.22	1	.023	10	-2.879e-3	3	391.573	3	1293.194	1
15		8	max	0	1	.374	3	.123	1	1.743e-2	2	NC	5	NC	10
16			min	-.859	4	-.037	1	.008	10	-3.077e-3	3	695.626	3	2224.226	1
17		9	max	0	1	.156	2	.048	4	1.877e-2	2	NC	4	NC	2
18			min	-.859	4	.004	15	-.006	10	-3.276e-3	3	2347.185	3	5615.026	4
19		10	max	0	1	.234	2	.029	3	2.011e-2	2	NC	3	NC	1
20			min	-.859	4	-.023	3	-.02	2	-3.474e-3	3	1941.621	2	NC	1
21		11	max	0	12	.156	2	.035	1	1.877e-2	2	NC	4	NC	2
22			min	-.859	4	.004	15	-.028	5	-3.276e-3	3	2347.185	3	7922.599	1
23		12	max	0	12	.374	3	.123	1	1.743e-2	2	NC	5	NC	4
24			min	-.859	4	-.037	1	-.027	5	-3.077e-3	3	695.626	3	2224.226	1
25		13	max	0	12	.675	3	.21	1	1.609e-2	2	NC	5	NC	5
26			min	-.86	4	-.22	1	-.007	5	-2.879e-3	3	391.573	3	1293.194	1
27		14	max	0	12	.913	3	.266	1	1.475e-2	2	NC	5	NC	5
28			min	-.86	4	-.371	2	.014	15	-2.681e-3	3	291.205	3	1018.438	1
29		15	max	0	12	1.024	3	.275	1	1.341e-2	2	NC	15	NC	12
30			min	-.86	4	-.455	2	.026	12	-2.482e-3	3	259.98	3	986.696	1
31		16	max	0	12	.976	3	.233	1	1.207e-2	2	NC	15	NC	3
32			min	-.86	4	-.445	2	.022	12	-2.284e-3	3	272.598	3	1163.468	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	.765	3	.154	1	1.073e-2	2	NC	5	NC	3
34			min	-.86	4	-.337	2	.016	12	-2.086e-3	3	346.473	3	1770.464	1
35		18	max	0	12	.416	3	.063	4	9.388e-3	2	NC	5	NC	2
36			min	-.86	4	-.148	1	.006	10	-1.887e-3	3	626.845	3	4275.736	4
37		19	max	0	12	.095	2	.009	3	8.048e-3	2	NC	1	NC	1
38			min	-.86	4	-.014	3	-.005	2	-1.689e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.209	3	.008	3	4.747e-3	2	NC	1	NC	1
40			min	-.623	4	-.316	2	-.004	2	-3.587e-3	3	NC	1	NC	1
41		2	max	0	1	.613	3	.044	1	5.736e-3	2	NC	5	NC	2
42			min	-.623	4	-.676	2	-.05	5	-4.411e-3	3	667.723	3	5229.243	5
43		3	max	0	1	.952	3	.125	1	6.725e-3	2	NC	15	NC	3
44			min	-.624	4	-.982	2	-.058	5	-5.235e-3	3	363.125	3	2176.227	1
45		4	max	0	1	1.182	3	.202	1	7.714e-3	2	NC	15	NC	3
46			min	-.624	4	-1.201	2	-.037	5	-6.059e-3	3	277.436	3	1344.404	1
47		5	max	0	1	1.281	3	.246	1	8.703e-3	2	9173.874	15	NC	5
48			min	-.624	4	-1.312	2	0	15	-6.883e-3	3	251.943	3	1102.604	1
49		6	max	0	1	1.249	3	.244	1	9.692e-3	2	9253.894	15	NC	12
50			min	-.624	4	-1.317	2	.025	12	-7.707e-3	3	259.611	3	1114.244	1
51		7	max	0	1	1.111	3	.195	1	1.068e-2	2	NC	15	NC	10
52			min	-.624	4	-1.233	2	.021	10	-8.531e-3	3	294.414	2	1393.882	1
53		8	max	0	1	.913	3	.115	1	1.167e-2	2	NC	15	NC	3
54			min	-.624	4	-1.096	2	.008	10	-9.355e-3	3	346.323	2	2368.343	1
55		9	max	0	1	.724	3	.068	4	1.266e-2	2	NC	5	NC	2
56			min	-.624	4	-.959	2	-.005	10	-1.018e-2	3	420.146	2	4056.101	4
57		10	max	0	1	.637	3	.026	3	1.365e-2	2	NC	5	NC	1
58			min	-.624	4	-.894	2	-.018	2	-1.1e-2	3	467.285	2	NC	1
59		11	max	0	12	.724	3	.034	1	1.266e-2	2	NC	5	NC	2
60			min	-.624	4	-.959	2	-.049	5	-1.018e-2	3	420.146	2	5512.223	5
61		12	max	0	12	.913	3	.115	1	1.167e-2	2	NC	15	NC	3
62			min	-.624	4	-1.096	2	-.054	5	-9.355e-3	3	346.323	2	2368.343	1
63		13	max	0	12	1.111	3	.195	1	1.068e-2	2	NC	15	NC	4
64			min	-.624	4	-1.233	2	-.032	5	-8.531e-3	3	294.414	2	1393.882	1
65		14	max	0	12	1.249	3	.244	1	9.692e-3	2	9253.528	15	NC	5
66			min	-.624	4	-1.317	2	.003	15	-7.707e-3	3	259.611	3	1114.244	1
67		15	max	0	12	1.281	3	.246	1	8.703e-3	2	9173.424	15	NC	12
68			min	-.624	4	-1.312	2	.023	12	-6.883e-3	3	251.943	3	1102.604	1
69		16	max	0	12	1.182	3	.202	1	7.714e-3	2	NC	15	NC	3
70			min	-.624	4	-1.201	2	.019	12	-6.059e-3	3	277.436	3	1344.404	1
71		17	max	0	12	.952	3	.125	1	6.725e-3	2	NC	15	NC	3
72			min	-.624	4	-.982	2	.013	12	-5.235e-3	3	363.125	3	2176.227	1
73		18	max	0	12	.613	3	.071	4	5.736e-3	2	NC	5	NC	2
74			min	-.624	4	-.676	2	.003	10	-4.411e-3	3	667.723	3	3810.557	4
75		19	max	0	12	.209	3	.008	3	4.747e-3	2	NC	1	NC	1
76			min	-.624	4	-.316	2	-.004	2	-3.587e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.212	3	.008	3	3.171e-3	3	NC	1	NC	1
78			min	-.498	4	-.315	2	-.004	2	-4.991e-3	2	NC	1	NC	1
79		2	max	0	12	.469	3	.044	1	3.907e-3	3	NC	5	NC	2
80			min	-.498	4	-.806	2	-.064	5	-6.036e-3	2	549.936	2	4148.584	5
81		3	max	0	12	.689	3	.126	1	4.643e-3	3	NC	15	NC	3
82			min	-.498	4	-1.219	2	-.075	5	-7.081e-3	2	298.557	2	2170.596	1
83		4	max	0	12	.847	3	.202	1	5.379e-3	3	NC	15	NC	3
84			min	-.498	4	-1.502	2	-.05	5	-8.125e-3	2	227.414	2	1341.716	1
85		5	max	0	12	.929	3	.247	1	6.115e-3	3	9189.649	15	NC	5
86			min	-.498	4	-1.629	2	-.007	5	-9.17e-3	2	205.52	2	1100.615	1
87		6	max	0	12	.936	3	.244	1	6.851e-3	3	9273.194	15	NC	12
88			min	-.498	4	-1.6	2	.024	12	-1.021e-2	2	210.156	2	1112.166	1
89		7	max	0	12	.88	3	.195	1	7.587e-3	3	NC	15	NC	10

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	-.498	4	-1.443	2	.022	10	-1.126e-2	2	239.313	2	1390.7	1
91		8	max	0	12	.786	3	.123	4	8.323e-3	3	NC	15	NC	3
92			min	-.498	4	-1.214	2	.009	10	-1.23e-2	2	300.34	2	2222.068	4
93		9	max	0	12	.691	3	.081	4	9.06e-3	3	NC	5	NC	2
94			min	-.498	4	-.994	2	-.004	10	-1.335e-2	2	397.763	2	3421.871	4
95		10	max	0	1	.646	3	.024	3	9.796e-3	3	NC	5	NC	1
96			min	-.498	4	-.891	2	-.017	2	-1.439e-2	2	468.446	2	NC	1
97		11	max	0	1	.691	3	.034	1	9.06e-3	3	NC	5	NC	2
98			min	-.498	4	-.994	2	-.061	5	-1.335e-2	2	397.763	2	4408.539	5
99		12	max	0	1	.786	3	.116	1	8.323e-3	3	NC	15	NC	3
100			min	-.498	4	-1.214	2	-.069	5	-1.23e-2	2	300.34	2	2359.576	1
101		13	max	0	1	.88	3	.195	1	7.587e-3	3	NC	15	NC	4
102			min	-.498	4	-1.443	2	-.043	5	-1.126e-2	2	239.313	2	1390.7	1
103		14	max	0	1	.936	3	.244	1	6.851e-3	3	9272.909	15	NC	5
104			min	-.498	4	-1.6	2	0	15	-1.021e-2	2	210.156	2	1112.166	1
105		15	max	0	1	.929	3	.247	1	6.115e-3	3	9189.302	15	NC	12
106			min	-.498	4	-1.629	2	.022	12	-9.17e-3	2	205.52	2	1100.615	1
107		16	max	0	1	.847	3	.202	1	5.379e-3	3	NC	15	NC	3
108			min	-.498	4	-1.502	2	.018	12	-8.125e-3	2	227.414	2	1341.716	1
109		17	max	0	1	.689	3	.131	4	4.643e-3	3	NC	15	NC	3
110			min	-.498	4	-1.219	2	.013	12	-7.081e-3	2	298.557	2	2066.002	4
111		18	max	0	1	.469	3	.085	4	3.907e-3	3	NC	5	NC	2
112			min	-.498	4	-.806	2	.003	10	-6.036e-3	2	549.936	2	3195.079	4
113		19	max	0	1	.212	3	.008	3	3.171e-3	3	NC	1	NC	1
114			min	-.497	4	-.315	2	-.004	2	-4.991e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.084	2	.007	3	5.439e-3	3	NC	1	NC	1
116			min	-.15	4	-.067	3	-.004	2	-6.53e-3	2	NC	1	NC	1
117		2	max	0	12	.098	3	.062	1	6.522e-3	3	NC	5	NC	2
118			min	-.15	4	-.293	2	-.05	5	-7.505e-3	2	717.661	2	4422.173	1
119		3	max	0	12	.229	3	.153	1	7.604e-3	3	NC	5	NC	3
120			min	-.15	4	-.594	2	-.06	5	-8.48e-3	2	398.401	2	1776.773	1
121		4	max	0	12	.301	3	.233	1	8.687e-3	3	NC	5	NC	3
122			min	-.15	4	-.771	2	-.042	5	-9.455e-3	2	316.008	2	1165.418	1
123		5	max	0	12	.305	3	.274	1	9.769e-3	3	NC	15	NC	5
124			min	-.15	4	-.8	2	-.009	5	-1.043e-2	2	305.704	2	986.887	1
125		6	max	0	12	.242	3	.266	1	1.085e-2	3	NC	5	NC	5
126			min	-.15	4	-.684	2	.017	15	-1.141e-2	2	351.6	2	1016.942	1
127		7	max	0	12	.128	3	.211	1	1.193e-2	3	NC	5	NC	12
128			min	-.15	4	-.456	2	.022	12	-1.238e-2	2	500.655	2	1287.856	1
129		8	max	0	12	0	15	.124	1	1.302e-2	3	NC	4	NC	3
130			min	-.15	4	-.171	2	.011	10	-1.336e-2	2	1058.753	2	2200.694	1
131		9	max	0	12	.098	1	.061	4	1.41e-2	3	NC	1	NC	2
132			min	-.15	4	-.133	3	-.003	10	-1.433e-2	2	4060.733	3	4563.328	4
133		10	max	0	1	.199	2	.02	3	1.518e-2	3	NC	4	NC	1
134			min	-.15	4	-.188	3	-.016	2	-1.531e-2	2	2222.997	3	NC	1
135		11	max	0	1	.098	1	.037	1	1.41e-2	3	NC	1	NC	2
136			min	-.15	4	-.133	3	-.041	5	-1.433e-2	2	4060.733	3	6605.128	5
137		12	max	0	1	-.001	15	.124	1	1.302e-2	3	NC	4	NC	3
138			min	-.15	4	-.171	2	-.041	5	-1.336e-2	2	1058.753	2	2200.694	1
139		13	max	0	1	.128	3	.211	1	1.193e-2	3	NC	5	NC	5
140			min	-.15	4	-.456	2	-.016	5	-1.238e-2	2	500.655	2	1287.856	1
141		14	max	0	1	.242	3	.266	1	1.085e-2	3	NC	5	NC	5
142			min	-.15	4	-.684	2	.013	15	-1.141e-2	2	351.6	2	1016.942	1
143		15	max	0	1	.305	3	.274	1	9.769e-3	3	NC	15	NC	12
144			min	-.149	4	-.8	2	.023	12	-1.043e-2	2	305.704	2	986.887	1
145		16	max	.001	1	.301	3	.233	1	8.687e-3	3	NC	5	NC	3
146			min	-.149	4	-.771	2	.019	12	-9.455e-3	2	316.008	2	1165.418	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	.001	1	.229	3	.153	1	7.604e-3	3	NC	5	NC	3
148			min	-.149	4	-.594	2	.014	12	-8.48e-3	2	398.401	2	1776.773	1
149		18	max	.001	1	.098	3	.079	4	6.522e-3	3	NC	5	NC	2
150			min	-.149	4	-.293	2	.006	10	-7.505e-3	2	717.661	2	3433.544	4
151		19	max	.002	1	.084	2	.007	3	5.439e-3	3	NC	1	NC	1
152			min	-.149	4	-.067	3	-.004	2	-6.53e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.008	2	.011	1	1.725e-3	5	NC	1	NC	2
154			min	-.009	3	-.014	3	-.8	4	-3.221e-4	1	9072.236	2	96.204	4
155		2	max	.007	2	.007	2	.01	1	1.836e-3	5	NC	1	NC	2
156			min	-.009	3	-.014	3	-.736	4	-3.047e-4	1	NC	1	104.614	4
157		3	max	.006	2	.006	2	.009	1	1.946e-3	5	NC	1	NC	2
158			min	-.008	3	-.013	3	-.672	4	-2.873e-4	1	NC	1	114.576	4
159		4	max	.006	2	.005	2	.008	1	2.057e-3	5	NC	1	NC	2
160			min	-.008	3	-.013	3	-.609	4	-2.699e-4	1	NC	1	126.489	4
161		5	max	.005	2	.003	2	.007	1	2.168e-3	5	NC	1	NC	1
162			min	-.007	3	-.013	3	-.547	4	-2.525e-4	1	NC	1	140.893	4
163		6	max	.005	2	.002	2	.006	1	2.279e-3	5	NC	1	NC	1
164			min	-.007	3	-.012	3	-.486	4	-2.352e-4	1	NC	1	158.533	4
165		7	max	.005	2	.001	2	.006	1	2.39e-3	5	NC	1	NC	1
166			min	-.006	3	-.011	3	-.427	4	-2.178e-4	1	NC	1	180.46	4
167		8	max	.004	2	0	2	.005	1	2.501e-3	5	NC	1	NC	1
168			min	-.006	3	-.011	3	-.37	4	-2.004e-4	1	NC	1	208.198	4
169		9	max	.004	2	0	2	.004	1	2.611e-3	5	NC	1	NC	1
170			min	-.005	3	-.01	3	-.316	4	-1.83e-4	1	NC	1	244.027	4
171		10	max	.003	2	-.001	15	.003	1	2.722e-3	5	NC	1	NC	1
172			min	-.005	3	-.01	3	-.264	4	-1.656e-4	1	NC	1	291.479	4
173		11	max	.003	2	-.001	15	.003	1	2.833e-3	5	NC	1	NC	1
174			min	-.004	3	-.009	3	-.216	4	-1.482e-4	1	NC	1	356.276	4
175		12	max	.003	2	-.001	15	.002	1	2.95e-3	4	NC	1	NC	1
176			min	-.004	3	-.008	3	-.172	4	-1.308e-4	1	NC	1	448.199	4
177		13	max	.002	2	-.001	15	.002	1	3.067e-3	4	NC	1	NC	1
178			min	-.003	3	-.007	3	-.132	4	-1.134e-4	1	NC	1	585.141	4
179		14	max	.002	2	-.001	15	.001	1	3.185e-3	4	NC	1	NC	1
180			min	-.003	3	-.006	3	-.096	4	-9.6e-5	1	NC	1	802.818	4
181		15	max	.002	2	0	15	0	1	3.302e-3	4	NC	1	NC	1
182			min	-.002	3	-.005	3	-.065	4	-7.861e-5	1	NC	1	1181.524	4
183		16	max	.001	2	0	15	0	1	3.419e-3	4	NC	1	NC	1
184			min	-.002	3	-.004	3	-.04	4	-6.122e-5	1	NC	1	1935.504	4
185		17	max	0	2	0	15	0	1	3.537e-3	4	NC	1	NC	1
186			min	-.001	3	-.003	6	-.02	4	-4.382e-5	1	NC	1	3816.995	4
187		18	max	0	2	0	15	0	1	3.654e-3	4	NC	1	NC	1
188			min	0	3	-.001	6	-.007	4	-2.643e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.771e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	-9.034e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.378e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	-9.745e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.018	4	2.924e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	1	-2.274e-4	5	NC	1	9948.379	14
195		3	max	0	3	0	15	.034	4	5.288e-4	4	NC	1	NC	1
196			min	0	2	-.004	6	0	1	3.507e-6	12	NC	1	5207.275	14
197		4	max	.001	3	-.001	15	.048	4	1.28e-3	4	NC	1	NC	1
198			min	-.001	2	-.006	6	0	3	5.204e-6	12	NC	1	3629.875	14
199		5	max	.002	3	-.002	15	.062	4	2.032e-3	4	NC	1	NC	1
200			min	-.001	2	-.008	6	0	12	6.901e-6	12	NC	1	2842.017	14
201		6	max	.002	3	-.002	15	.074	4	2.784e-3	4	NC	1	NC	1
202			min	-.002	2	-.01	6	0	12	8.598e-6	12	9351.164	6	2368.579	14
203		7	max	.002	3	-.002	15	.085	4	3.535e-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	-.002	2	-.011	6	0	12	1.03e-5	12	8080.224	6	2050.936	14
205		8	max	.003	3	-.003	15	.096	4	4.287e-3	4	NC	2	NC	1
206			min	-.002	2	-.012	6	0	12	1.199e-5	12	7297.823	6	1820.901	14
207		9	max	.003	3	-.003	15	.106	4	5.039e-3	4	NC	5	NC	1
208			min	-.003	2	-.013	6	0	12	1.369e-5	12	6840.67	6	1644.221	14
209		10	max	.004	3	-.003	15	.116	4	5.79e-3	4	NC	5	NC	1
210			min	-.003	2	-.014	6	0	12	1.539e-5	12	6630.074	6	1501.771	14
211		11	max	.004	3	-.003	15	.126	4	6.542e-3	4	NC	5	NC	1
212			min	-.003	2	-.014	6	0	12	1.708e-5	12	6635.269	6	1382.045	14
213		12	max	.005	3	-.003	15	.136	4	7.294e-3	4	NC	3	NC	1
214			min	-.004	2	-.013	6	0	12	1.878e-5	12	6861.612	6	1277.763	14
215		13	max	.005	3	-.003	15	.146	4	8.045e-3	4	NC	2	NC	1
216			min	-.004	2	-.012	6	0	12	2.048e-5	12	7354.173	6	1184.182	14
217		14	max	.005	3	-.002	15	.157	4	8.797e-3	4	NC	1	NC	1
218			min	-.004	2	-.011	6	0	12	2.217e-5	12	8220.592	6	1098.189	14
219		15	max	.006	3	-.002	15	.169	4	9.549e-3	4	NC	1	NC	1
220			min	-.005	2	-.01	6	0	12	2.387e-5	12	9697.555	6	1017.78	14
221		16	max	.006	3	-.001	15	.182	4	1.03e-2	4	NC	1	NC	1
222			min	-.005	2	-.008	6	0	12	2.557e-5	12	NC	1	941.725	14
223		17	max	.007	3	0	15	.197	4	1.105e-2	4	NC	1	NC	1
224			min	-.005	2	-.006	1	0	12	2.727e-5	12	NC	1	869.347	14
225		18	max	.007	3	0	15	.213	4	1.18e-2	4	NC	1	NC	1
226			min	-.006	2	-.004	3	0	12	2.896e-5	12	NC	1	800.348	14
227		19	max	.007	3	0	5	.231	4	1.256e-2	4	NC	1	NC	2
228			min	-.006	2	-.002	3	0	12	3.066e-5	12	NC	1	734.676	14
229	M4	1	max	.002	1	.006	2	0	12	3.177e-4	4	NC	1	NC	3
230			min	0	5	-.008	3	-.231	4	1.043e-5	12	NC	1	107.154	4
231		2	max	.002	1	.006	2	0	12	3.177e-4	4	NC	1	NC	3
232			min	0	5	-.007	3	-.213	4	1.043e-5	12	NC	1	116.358	4
233		3	max	.002	1	.005	2	0	12	3.177e-4	4	NC	1	NC	3
234			min	0	5	-.007	3	-.195	4	1.043e-5	12	NC	1	127.321	4
235		4	max	.002	1	.005	2	0	12	3.177e-4	4	NC	1	NC	3
236			min	0	5	-.006	3	-.177	4	1.043e-5	12	NC	1	140.499	4
237		5	max	.002	1	.005	2	0	12	3.177e-4	4	NC	1	NC	3
238			min	0	5	-.006	3	-.158	4	1.043e-5	12	NC	1	156.511	4
239		6	max	.002	1	.004	2	0	12	3.177e-4	4	NC	1	NC	3
240			min	0	5	-.006	3	-.141	4	1.043e-5	12	NC	1	176.214	4
241		7	max	.002	1	.004	2	0	12	3.177e-4	4	NC	1	NC	2
242			min	0	5	-.005	3	-.124	4	1.043e-5	12	NC	1	200.828	4
243		8	max	.001	1	.004	2	0	12	3.177e-4	4	NC	1	NC	2
244			min	0	5	-.005	3	-.107	4	1.043e-5	12	NC	1	232.127	4
245		9	max	.001	1	.003	2	0	12	3.177e-4	4	NC	1	NC	2
246			min	0	5	-.004	3	-.091	4	1.043e-5	12	NC	1	272.787	4
247		10	max	.001	1	.003	2	0	12	3.177e-4	4	NC	1	NC	2
248			min	0	5	-.004	3	-.076	4	1.043e-5	12	NC	1	326.987	4
249		11	max	.001	1	.003	2	0	12	3.177e-4	4	NC	1	NC	2
250			min	0	5	-.003	3	-.062	4	1.043e-5	12	NC	1	401.561	4
251		12	max	0	1	.002	2	0	12	3.177e-4	4	NC	1	NC	1
252			min	0	5	-.003	3	-.049	4	1.043e-5	12	NC	1	508.33	4
253		13	max	0	1	.002	2	0	12	3.177e-4	4	NC	1	NC	1
254			min	0	5	-.003	3	-.037	4	1.043e-5	12	NC	1	669.227	4
255		14	max	0	1	.002	2	0	12	3.177e-4	4	NC	1	NC	1
256			min	0	5	-.002	3	-.027	4	1.043e-5	12	NC	1	928.86	4
257		15	max	0	1	.001	2	0	12	3.177e-4	4	NC	1	NC	1
258			min	0	5	-.002	3	-.018	4	1.043e-5	12	NC	1	1390.009	4
259		16	max	0	1	0	2	0	12	3.177e-4	4	NC	1	NC	1
260			min	0	5	-.001	3	-.011	4	1.043e-5	12	NC	1	2336.647	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	3.177e-4	4	NC	1	NC	1
262			min	0	5	0	3	-.005	4	1.043e-5	12	NC	1	4820.869	4
263		18	max	0	1	0	2	0	12	3.177e-4	4	NC	1	NC	1
264			min	0	5	0	3	-.002	4	1.043e-5	12	NC	1	NC	1
265		19	max	0	1	0	1	0	1	3.177e-4	4	NC	1	NC	1
266			min	0	1	0	1	0	1	1.043e-5	12	NC	1	NC	1
267	M6	1	max	.023	2	.032	2	0	1	1.853e-3	4	NC	3	NC	1
268			min	-.03	3	-.045	3	-.808	4	0	1	2373.989	2	95.256	4
269		2	max	.021	2	.03	2	0	1	1.961e-3	4	NC	3	NC	1
270			min	-.028	3	-.043	3	-.743	4	0	1	2608.832	2	103.585	4
271		3	max	.02	2	.027	2	0	1	2.069e-3	4	NC	3	NC	1
272			min	-.026	3	-.04	3	-.679	4	0	1	2892.521	2	113.45	4
273		4	max	.019	2	.024	2	0	1	2.177e-3	4	NC	3	NC	1
274			min	-.025	3	-.038	3	-.615	4	0	1	3238.752	2	125.248	4
275		5	max	.018	2	.021	2	0	1	2.285e-3	4	NC	3	NC	1
276			min	-.023	3	-.035	3	-.552	4	0	1	3666.545	2	139.514	4
277		6	max	.016	2	.018	2	0	1	2.393e-3	4	NC	3	NC	1
278			min	-.021	3	-.033	3	-.491	4	0	1	4202.933	2	156.984	4
279		7	max	.015	2	.016	2	0	1	2.502e-3	4	NC	1	NC	1
280			min	-.02	3	-.03	3	-.431	4	0	1	4887.368	2	178.701	4
281		8	max	.014	2	.013	2	0	1	2.61e-3	4	NC	1	NC	1
282			min	-.018	3	-.028	3	-.373	4	0	1	5779.269	2	206.175	4
283		9	max	.013	2	.011	2	0	1	2.718e-3	4	NC	1	NC	1
284			min	-.017	3	-.025	3	-.319	4	0	1	6971.529	2	241.663	4
285		10	max	.011	2	.009	2	0	1	2.826e-3	4	NC	1	NC	1
286			min	-.015	3	-.023	3	-.267	4	0	1	8616.075	2	288.665	4
287		11	max	.01	2	.007	2	0	1	2.934e-3	4	NC	1	NC	1
288			min	-.013	3	-.02	3	-.218	4	0	1	NC	1	352.85	4
289		12	max	.009	2	.005	2	0	1	3.042e-3	4	NC	1	NC	1
290			min	-.012	3	-.018	3	-.173	4	0	1	NC	1	443.91	4
291		13	max	.008	2	.004	2	0	1	3.15e-3	4	NC	1	NC	1
292			min	-.01	3	-.015	3	-.133	4	0	1	NC	1	579.573	4
293		14	max	.006	2	.003	2	0	1	3.258e-3	4	NC	1	NC	1
294			min	-.008	3	-.012	3	-.097	4	0	1	NC	1	795.232	4
295		15	max	.005	2	.001	2	0	1	3.366e-3	4	NC	1	NC	1
296			min	-.007	3	-.01	3	-.066	4	0	1	NC	1	1170.463	4
297		16	max	.004	2	0	2	0	1	3.474e-3	4	NC	1	NC	1
298			min	-.005	3	-.007	3	-.04	4	0	1	NC	1	1917.622	4
299		17	max	.003	2	0	2	0	1	3.582e-3	4	NC	1	NC	1
300			min	-.003	3	-.005	3	-.02	4	0	1	NC	1	3782.472	4
301		18	max	.001	2	0	2	0	1	3.69e-3	4	NC	1	NC	1
302			min	-.002	3	-.002	3	-.007	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.799e-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	-9.813e-4	4	NC	1	NC	1
307		2	max	.001	3	0	2	.018	4	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	-2.511e-4	4	NC	1	NC	1
309		3	max	.003	3	0	15	.034	4	4.791e-4	4	NC	1	NC	1
310			min	-.003	2	-.005	3	0	1	0	1	NC	1	9703.545	4
311		4	max	.004	3	-.001	15	.049	4	1.209e-3	4	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	7752.255	4
313		5	max	.005	3	-.002	15	.062	4	1.939e-3	4	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	7132.827	4
315		6	max	.007	3	-.002	15	.074	4	2.67e-3	4	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	9067.551	3	7218.178	4
317		7	max	.008	3	-.003	15	.086	4	3.4e-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	-.008	2	-.014	3	0	1	0	1	8093.744	3	7935.984	4
319		8	max	.009	3	-.003	15	.096	4	4.13e-3	4	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7359.591	4	9551.034	4
321		9	max	.01	3	-.003	15	.106	4	4.86e-3	4	NC	1	NC	1
322			min	-.01	2	-.016	3	0	1	0	1	6895.085	4	NC	1
323		10	max	.012	3	-.003	15	.116	4	5.59e-3	4	NC	1	NC	1
324			min	-.012	2	-.016	3	0	1	0	1	6679.959	4	NC	1
325		11	max	.013	3	-.003	15	.125	4	6.32e-3	4	NC	1	NC	1
326			min	-.013	2	-.016	3	0	1	0	1	6682.77	4	NC	1
327		12	max	.014	3	-.003	15	.134	4	7.051e-3	4	NC	1	NC	1
328			min	-.014	2	-.016	3	0	1	0	1	6908.61	4	NC	1
329		13	max	.016	3	-.003	15	.144	4	7.781e-3	4	NC	1	NC	1
330			min	-.015	2	-.016	3	0	1	0	1	7402.623	4	NC	1
331		14	max	.017	3	-.003	15	.154	4	8.511e-3	4	NC	1	NC	1
332			min	-.017	2	-.015	3	0	1	0	1	8272.957	4	NC	1
333		15	max	.018	3	-.002	15	.165	4	9.241e-3	4	NC	1	NC	1
334			min	-.018	2	-.014	3	0	1	0	1	9757.596	4	NC	1
335		16	max	.02	3	-.002	15	.177	4	9.971e-3	4	NC	1	NC	1
336			min	-.019	2	-.012	3	0	1	0	1	NC	1	NC	1
337		17	max	.021	3	-.001	10	.191	4	1.07e-2	4	NC	1	NC	1
338			min	-.02	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.022	3	0	2	.206	4	1.143e-2	4	NC	1	NC	1
340			min	-.022	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.023	3	.002	2	.223	4	1.216e-2	4	NC	1	NC	1
342			min	-.023	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.023	2	0	1	1.322e-4	5	NC	1	NC	1
344			min	0	15	-.025	3	-.223	4	0	1	NC	1	111.229	4
345		2	max	.005	1	.021	2	0	1	1.322e-4	5	NC	1	NC	1
346			min	0	15	-.023	3	-.205	4	0	1	NC	1	120.796	4
347		3	max	.005	1	.02	2	0	1	1.322e-4	5	NC	1	NC	1
348			min	0	15	-.022	3	-.188	4	0	1	NC	1	132.192	4
349		4	max	.005	1	.019	2	0	1	1.322e-4	5	NC	1	NC	1
350			min	0	15	-.02	3	-.17	4	0	1	NC	1	145.888	4
351		5	max	.004	1	.018	2	0	1	1.322e-4	5	NC	1	NC	1
352			min	0	15	-.019	3	-.153	4	0	1	NC	1	162.53	4
353		6	max	.004	1	.016	2	0	1	1.322e-4	5	NC	1	NC	1
354			min	0	15	-.018	3	-.136	4	0	1	NC	1	183.007	4
355		7	max	.004	1	.015	2	0	1	1.322e-4	5	NC	1	NC	1
356			min	0	15	-.016	3	-.119	4	0	1	NC	1	208.587	4
357		8	max	.004	1	.014	2	0	1	1.322e-4	5	NC	1	NC	1
358			min	0	15	-.015	3	-.103	4	0	1	NC	1	241.115	4
359		9	max	.003	1	.013	2	0	1	1.322e-4	5	NC	1	NC	1
360			min	0	15	-.014	3	-.088	4	0	1	NC	1	283.372	4
361		10	max	.003	1	.011	2	0	1	1.322e-4	5	NC	1	NC	1
362			min	0	15	-.012	3	-.073	4	0	1	NC	1	339.699	4
363		11	max	.003	1	.01	2	0	1	1.322e-4	5	NC	1	NC	1
364			min	0	15	-.011	3	-.059	4	0	1	NC	1	417.202	4
365		12	max	.002	1	.009	2	0	1	1.322e-4	5	NC	1	NC	1
366			min	0	15	-.01	3	-.047	4	0	1	NC	1	528.166	4
367		13	max	.002	1	.008	2	0	1	1.322e-4	5	NC	1	NC	1
368			min	0	15	-.008	3	-.036	4	0	1	NC	1	695.388	4
369		14	max	.002	1	.006	2	0	1	1.322e-4	5	NC	1	NC	1
370			min	0	15	-.007	3	-.026	4	0	1	NC	1	965.233	4
371		15	max	.001	1	.005	2	0	1	1.322e-4	5	NC	1	NC	1
372			min	0	15	-.005	3	-.017	4	0	1	NC	1	1444.536	4
373		16	max	0	1	.004	2	0	1	1.322e-4	5	NC	1	NC	1
374			min	0	15	-.004	3	-.01	4	0	1	NC	1	2428.478	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
375		17	max	0	1	.003	2	0	1	1.322e-4	5	NC	1	NC	1
376			min	0	15	-.003	3	-.005	4	0	1	NC	1	5010.734	4
377		18	max	0	1	.001	2	0	1	1.322e-4	5	NC	1	NC	1
378			min	0	15	-.001	3	-.002	4	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	1.322e-4	5	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.008	2	0	12	1.878e-3	4	NC	1	NC	2
382			min	-.009	3	-.014	3	-.808	4	2.151e-5	12	9072.236	2	95.329	4
383		2	max	.007	2	.007	2	0	12	1.984e-3	4	NC	1	NC	2
384			min	-.009	3	-.014	3	-.743	4	2.035e-5	12	NC	1	103.665	4
385		3	max	.006	2	.006	2	0	12	2.089e-3	4	NC	1	NC	2
386			min	-.008	3	-.013	3	-.678	4	1.919e-5	12	NC	1	113.539	4
387		4	max	.006	2	.005	2	0	12	2.195e-3	4	NC	1	NC	2
388			min	-.008	3	-.013	3	-.614	4	1.803e-5	12	NC	1	125.348	4
389		5	max	.005	2	.003	2	0	12	2.3e-3	4	NC	1	NC	1
390			min	-.007	3	-.013	3	-.552	4	1.688e-5	12	NC	1	139.627	4
391		6	max	.005	2	.002	2	0	12	2.406e-3	4	NC	1	NC	1
392			min	-.007	3	-.012	3	-.49	4	1.572e-5	12	NC	1	157.114	4
393		7	max	.005	2	.001	2	0	12	2.511e-3	4	NC	1	NC	1
394			min	-.006	3	-.011	3	-.431	4	1.456e-5	12	NC	1	178.852	4
395		8	max	.004	2	0	2	0	12	2.617e-3	4	NC	1	NC	1
396			min	-.006	3	-.011	3	-.373	4	1.34e-5	12	NC	1	206.354	4
397		9	max	.004	2	0	2	0	12	2.722e-3	4	NC	1	NC	1
398			min	-.005	3	-.01	3	-.318	4	1.224e-5	12	NC	1	241.88	4
399		10	max	.003	2	-.001	2	0	12	2.828e-3	4	NC	1	NC	1
400			min	-.005	3	-.01	3	-.267	4	1.108e-5	12	NC	1	288.934	4
401		11	max	.003	2	-.002	2	0	12	2.933e-3	4	NC	1	NC	1
402			min	-.004	3	-.009	3	-.218	4	9.927e-6	12	NC	1	353.194	4
403		12	max	.003	2	-.002	15	0	12	3.039e-3	4	NC	1	NC	1
404			min	-.004	3	-.008	3	-.173	4	8.768e-6	12	NC	1	444.367	4
405		13	max	.002	2	-.002	15	0	12	3.144e-3	4	NC	1	NC	1
406			min	-.003	3	-.007	3	-.133	4	7.61e-6	12	NC	1	580.21	4
407		14	max	.002	2	-.001	15	0	12	3.25e-3	4	NC	1	NC	1
408			min	-.003	3	-.006	3	-.097	4	6.452e-6	12	NC	1	796.183	4
409		15	max	.002	2	-.001	15	0	12	3.355e-3	4	NC	1	NC	1
410			min	-.002	3	-.005	4	-.066	4	5.293e-6	12	NC	1	1172.022	4
411		16	max	.001	2	-.001	15	0	12	3.461e-3	4	NC	1	NC	1
412			min	-.002	3	-.004	4	-.04	4	4.135e-6	12	NC	1	1920.576	4
413		17	max	0	2	0	15	0	12	3.566e-3	4	NC	1	NC	1
414			min	-.001	3	-.003	4	-.02	4	2.977e-6	12	NC	1	3789.637	4
415		18	max	0	2	0	15	0	12	3.672e-3	4	NC	1	NC	1
416			min	0	3	-.002	4	-.007	4	1.818e-6	12	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.777e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	6.602e-7	12	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-1.133e-7	12	NC	1	NC	1
420			min	0	1	0	1	0	1	-9.753e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.018	4	-1.81e-6	12	NC	1	NC	1
422			min	0	2	-.002	4	0	12	-2.426e-4	4	NC	1	NC	1
423		3	max	0	3	-.001	15	.034	4	4.963e-4	5	NC	1	NC	1
424			min	0	2	-.004	4	0	12	-5.711e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	.048	4	1.225e-3	5	NC	1	NC	1
426			min	-.001	2	-.006	4	0	1	-8.497e-5	1	NC	1	8135.76	4
427		5	max	.002	3	-.002	15	.062	4	1.956e-3	4	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.128e-4	1	NC	1	7559.696	4
429		6	max	.002	3	-.003	15	.074	4	2.688e-3	4	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-1.407e-4	1	9131.331	4	7755.258	4
431		7	max	.002	3	-.003	15	.085	4	3.421e-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	-.002	2	-.012	4	0	1	-1.686e-4	1	7903.969	4	8700.84	4
433		8	max	.003	3	-.003	15	.096	4	4.154e-3	4	NC	2	NC	1
434			min	-.002	2	-.013	4	0	1	-1.964e-4	1	7148.975	4	NC	1
435		9	max	.003	3	-.003	15	.105	4	4.886e-3	4	NC	5	NC	1
436			min	-.003	2	-.014	4	-.001	1	-2.243e-4	1	6709.316	4	NC	1
437		10	max	.004	3	-.004	15	.115	4	5.619e-3	4	NC	5	NC	1
438			min	-.003	2	-.015	4	-.001	1	-2.522e-4	1	6509.478	4	NC	1
439		11	max	.004	3	-.004	15	.124	4	6.352e-3	4	NC	5	NC	1
440			min	-.003	2	-.015	4	-.002	1	-2.8e-4	1	6520.293	4	NC	1
441		12	max	.005	3	-.004	15	.134	4	7.084e-3	4	NC	3	NC	1
442			min	-.004	2	-.014	4	-.003	1	-3.079e-4	1	6747.736	4	NC	1
443		13	max	.005	3	-.003	15	.144	4	7.817e-3	4	NC	2	NC	1
444			min	-.004	2	-.013	4	-.003	1	-3.358e-4	1	7236.674	4	NC	1
445		14	max	.005	3	-.003	15	.154	4	8.55e-3	4	NC	1	NC	1
446			min	-.004	2	-.012	4	-.004	1	-3.636e-4	1	8093.506	4	NC	1
447		15	max	.006	3	-.003	15	.165	4	9.283e-3	4	NC	1	NC	1
448			min	-.005	2	-.011	4	-.005	1	-3.915e-4	1	9551.75	4	9185.048	5
449		16	max	.006	3	-.002	15	.178	4	1.002e-2	4	NC	1	NC	1
450			min	-.005	2	-.009	4	-.006	1	-4.194e-4	1	NC	1	9215.828	5
451		17	max	.007	3	-.002	15	.192	4	1.075e-2	4	NC	1	NC	1
452			min	-.005	2	-.006	4	-.007	1	-4.472e-4	1	NC	1	NC	1
453		18	max	.007	3	-.001	15	.207	4	1.148e-2	4	NC	1	NC	1
454			min	-.006	2	-.004	4	-.009	1	-4.751e-4	1	NC	1	NC	1
455		19	max	.007	3	0	10	.225	4	1.221e-2	4	NC	1	NC	2
456			min	-.006	2	-.002	3	-.01	1	-5.03e-4	1	NC	1	8756.742	1
457	M12	1	max	.002	1	.006	2	.01	1	2.447e-4	5	NC	1	NC	3
458			min	0	12	-.008	3	-.225	4	-1.665e-4	1	NC	1	110.479	4
459		2	max	.002	1	.006	2	.009	1	2.447e-4	5	NC	1	NC	3
460			min	0	12	-.007	3	-.207	4	-1.665e-4	1	NC	1	119.974	4
461		3	max	.002	1	.005	2	.009	1	2.447e-4	5	NC	1	NC	3
462			min	0	12	-.007	3	-.189	4	-1.665e-4	1	NC	1	131.284	4
463		4	max	.002	1	.005	2	.008	1	2.447e-4	5	NC	1	NC	3
464			min	0	12	-.006	3	-.171	4	-1.665e-4	1	NC	1	144.878	4
465		5	max	.002	1	.005	2	.007	1	2.447e-4	5	NC	1	NC	3
466			min	0	12	-.006	3	-.154	4	-1.665e-4	1	NC	1	161.395	4
467		6	max	.002	1	.004	2	.006	1	2.447e-4	5	NC	1	NC	3
468			min	0	12	-.006	3	-.136	4	-1.665e-4	1	NC	1	181.72	4
469		7	max	.002	1	.004	2	.006	1	2.447e-4	5	NC	1	NC	2
470			min	0	12	-.005	3	-.12	4	-1.665e-4	1	NC	1	207.109	4
471		8	max	.001	1	.004	2	.005	1	2.447e-4	5	NC	1	NC	2
472			min	0	12	-.005	3	-.104	4	-1.665e-4	1	NC	1	239.396	4
473		9	max	.001	1	.003	2	.004	1	2.447e-4	5	NC	1	NC	2
474			min	0	12	-.004	3	-.088	4	-1.665e-4	1	NC	1	281.338	4
475		10	max	.001	1	.003	2	.003	1	2.447e-4	5	NC	1	NC	2
476			min	0	12	-.004	3	-.074	4	-1.665e-4	1	NC	1	337.247	4
477		11	max	.001	1	.003	2	.003	1	2.447e-4	5	NC	1	NC	2
478			min	0	12	-.003	3	-.06	4	-1.665e-4	1	NC	1	414.173	4
479		12	max	0	1	.002	2	.002	1	2.447e-4	5	NC	1	NC	1
480			min	0	12	-.003	3	-.047	4	-1.665e-4	1	NC	1	524.31	4
481		13	max	0	1	.002	2	.002	1	2.447e-4	5	NC	1	NC	1
482			min	0	12	-.003	3	-.036	4	-1.665e-4	1	NC	1	690.284	4
483		14	max	0	1	.002	2	.001	1	2.447e-4	5	NC	1	NC	1
484			min	0	12	-.002	3	-.026	4	-1.665e-4	1	NC	1	958.111	4
485		15	max	0	1	.001	2	0	1	2.447e-4	5	NC	1	NC	1
486			min	0	12	-.002	3	-.017	4	-1.665e-4	1	NC	1	1433.82	4
487		16	max	0	1	0	2	0	1	2.447e-4	5	NC	1	NC	1
488			min	0	12	-.001	3	-.01	4	-1.665e-4	1	NC	1	2410.364	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	2.447e-4	5	NC	1	NC	1
490			min	0	12	0	3	-.005	4	-1.665e-4	1	NC	1	4973.121	4
491		18	max	0	1	0	2	0	1	2.447e-4	5	NC	1	NC	1
492			min	0	12	0	3	-.002	4	-1.665e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	2.447e-4	5	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.665e-4	1	NC	1	NC	1
495	M1	1	max	.009	3	.095	2	.86	4	1.668e-2	2	NC	1	NC	1
496			min	-.005	2	-.014	3	0	12	-2.978e-2	3	NC	1	NC	1
497		2	max	.009	3	.044	2	.83	4	8.876e-3	4	NC	4	NC	1
498			min	-.005	2	-.003	3	-.007	1	-1.474e-2	3	2255.144	2	9651.949	5
499		3	max	.009	3	.015	3	.8	4	1.43e-2	4	NC	5	NC	2
500			min	-.005	2	-.011	2	-.011	1	-2.276e-4	1	1086.094	2	5270.066	5
501		4	max	.009	3	.045	3	.769	4	1.249e-2	4	NC	5	NC	1
502			min	-.005	2	-.073	2	-.01	1	-5.271e-3	3	684.917	2	3803.319	5
503		5	max	.009	3	.084	3	.737	4	1.068e-2	4	NC	5	NC	1
504			min	-.005	2	-.138	2	-.007	1	-1.039e-2	3	493.898	2	3072.809	5
505		6	max	.009	3	.125	3	.705	4	1.368e-2	2	NC	15	NC	1
506			min	-.004	2	-.201	2	-.003	1	-1.551e-2	3	388.744	2	2635.32	5
507		7	max	.008	3	.165	3	.672	4	1.825e-2	2	NC	15	NC	1
508			min	-.004	2	-.258	2	0	12	-2.063e-2	3	326.711	2	2322.261	4
509		8	max	.008	3	.199	3	.638	4	2.282e-2	2	9442.704	15	NC	1
510			min	-.004	2	-.302	2	0	12	-2.575e-2	3	290.04	2	2094.059	4
511		9	max	.008	3	.22	3	.602	4	2.635e-2	2	8819.473	15	NC	1
512			min	-.004	2	-.331	2	0	1	-2.589e-2	3	270.959	2	1953.563	4
513		10	max	.008	3	.228	3	.564	4	2.918e-2	2	8629.822	15	NC	1
514			min	-.004	2	-.34	2	0	12	-2.271e-2	3	265.387	2	1913.322	4
515		11	max	.008	3	.222	3	.523	4	3.202e-2	2	8819.121	15	NC	1
516			min	-.004	2	-.33	2	0	12	-1.952e-2	3	271.994	2	1957.858	4
517		12	max	.007	3	.203	3	.48	4	3.127e-2	2	9441.912	15	NC	1
518			min	-.004	2	-.301	2	-.001	1	-1.631e-2	3	293.219	2	2100.189	4
519		13	max	.007	3	.173	3	.432	4	2.509e-2	2	NC	15	NC	1
520			min	-.004	2	-.253	2	0	1	-1.305e-2	3	334.514	2	2455.611	4
521		14	max	.007	3	.134	3	.382	4	1.891e-2	2	NC	15	NC	1
522			min	-.004	2	-.194	2	0	12	-9.796e-3	3	405.52	2	3182.394	4
523		15	max	.007	3	.092	3	.331	4	1.274e-2	2	NC	5	NC	1
524			min	-.004	2	-.13	2	0	12	-6.538e-3	3	528.651	2	4717.175	4
525		16	max	.007	3	.047	3	.281	4	9.743e-3	4	NC	5	NC	1
526			min	-.004	2	-.065	2	0	12	-3.28e-3	3	758.755	2	8659.552	4
527		17	max	.007	3	.005	3	.233	4	1.093e-2	4	NC	5	NC	2
528			min	-.004	2	-.006	2	0	12	-2.187e-5	3	1255.057	2	9868.238	1
529		18	max	.007	3	.042	2	.189	4	1.3e-2	2	NC	4	NC	1
530			min	-.004	2	-.032	3	0	12	-5.632e-3	3	2688.138	2	NC	1
531		19	max	.007	3	.084	2	.149	4	2.605e-2	2	NC	1	NC	1
532			min	-.004	2	-.067	3	-.002	1	-1.145e-2	3	NC	1	NC	1
533	M5	1	max	.029	3	.234	2	.859	4	0	1	NC	1	NC	1
534			min	-.02	2	-.023	3	0	1	-5.563e-6	4	NC	1	NC	1
535		2	max	.029	3	.105	2	.836	4	7.363e-3	4	NC	5	NC	1
536			min	-.02	2	.001	3	0	1	0	1	899.396	2	7154.88	4
537		3	max	.029	3	.048	3	.808	4	1.45e-2	4	NC	5	NC	1
538			min	-.02	2	-.038	2	0	1	0	1	425.636	2	4195.454	4
539		4	max	.028	3	.136	3	.776	4	1.182e-2	4	9709.615	15	NC	1
540			min	-.02	2	-.206	2	0	1	0	1	262.558	2	3257.279	4
541		5	max	.027	3	.252	3	.742	4	9.129e-3	4	6801.905	15	NC	1
542			min	-.019	2	-.387	2	0	1	0	1	185.962	2	2816.662	4
543		6	max	.027	3	.379	3	.707	4	6.442e-3	4	5240.639	15	NC	1
544			min	-.019	2	-.565	2	0	1	0	1	144.411	2	2553.018	4
545		7	max	.026	3	.503	3	.672	4	3.755e-3	4	4338.228	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	-.018	2	-.726	2	0	1	0	1	120.196	2	2345.512	4
547		8	max	.026	3	.605	3	.637	4	1.068e-3	4	3813.179	15	NC	1
548			min	-.018	2	-.855	2	0	1	0	1	106.023	2	2134.571	4
549		9	max	.025	3	.671	3	.603	4	0	1	3543.79	15	NC	1
550			min	-.018	2	-.936	2	0	1	-4.046e-6	5	98.718	2	1948.64	4
551		10	max	.025	3	.694	3	.564	4	0	1	3462.622	15	NC	1
552			min	-.017	2	-.964	2	0	1	-3.933e-6	5	96.588	2	1924.719	4
553		11	max	.024	3	.676	3	.523	4	0	1	3543.901	15	NC	1
554			min	-.017	2	-.936	2	0	1	-3.82e-6	5	99.107	2	1980.125	4
555		12	max	.023	3	.618	3	.481	4	7.675e-4	4	3813.446	15	NC	1
556			min	-.017	2	-.85	2	0	1	0	1	107.286	2	2060.914	4
557		13	max	.023	3	.524	3	.434	4	2.7e-3	4	4338.794	15	NC	1
558			min	-.017	2	-.713	2	0	1	0	1	123.449	2	2423.16	4
559		14	max	.022	3	.406	3	.381	4	4.632e-3	4	5241.777	15	NC	1
560			min	-.016	2	-.543	2	0	1	0	1	151.7	2	3371.724	4
561		15	max	.022	3	.275	3	.326	4	6.564e-3	4	6804.194	15	NC	1
562			min	-.016	2	-.358	2	0	1	0	1	201.74	2	6100.415	4
563		16	max	.021	3	.141	3	.273	4	8.496e-3	4	9714.46	15	NC	1
564			min	-.016	2	-.178	2	0	1	0	1	297.898	2	NC	1
565		17	max	.02	3	.016	3	.224	4	1.043e-2	4	NC	5	NC	1
566			min	-.016	2	-.02	2	0	1	0	1	511.806	2	NC	1
567		18	max	.02	3	.1	2	.183	4	5.295e-3	4	NC	5	NC	1
568			min	-.016	2	-.091	3	0	1	0	1	1131.042	2	NC	1
569		19	max	.02	3	.199	2	.15	4	0	1	NC	1	NC	1
570			min	-.016	2	-.188	3	0	1	-3.433e-6	4	NC	1	NC	1
571	M9	1	max	.009	3	.095	2	.859	4	2.978e-2	3	NC	1	NC	1
572			min	-.005	2	-.014	3	-.001	1	-1.668e-2	2	NC	1	NC	1
573		2	max	.009	3	.044	2	.835	4	1.474e-2	3	NC	4	NC	1
574			min	-.005	2	-.003	3	0	12	-8.174e-3	2	2255.144	2	7250.024	4
575		3	max	.009	3	.015	3	.807	4	1.449e-2	4	NC	5	NC	2
576			min	-.005	2	-.011	2	0	12	-9.135e-6	10	1086.094	2	4220.079	4
577		4	max	.009	3	.045	3	.776	4	1.135e-2	5	NC	5	NC	1
578			min	-.005	2	-.073	2	0	12	-4.535e-3	2	684.917	2	3251.12	4
579		5	max	.009	3	.084	3	.742	4	1.039e-2	3	NC	5	NC	1
580			min	-.005	2	-.138	2	0	12	-9.106e-3	2	493.898	2	2792.448	4
581		6	max	.009	3	.125	3	.707	4	1.551e-2	3	NC	15	NC	1
582			min	-.004	2	-.201	2	0	12	-1.368e-2	2	388.744	2	2520.405	4
583		7	max	.008	3	.165	3	.672	4	2.063e-2	3	NC	15	NC	1
584			min	-.004	2	-.258	2	0	1	-1.825e-2	2	326.711	2	2315.538	4
585		8	max	.008	3	.199	3	.637	4	2.575e-2	3	9419.047	15	NC	1
586			min	-.004	2	-.302	2	-.001	1	-2.282e-2	2	290.04	2	2119.196	4
587		9	max	.008	3	.22	3	.602	4	2.589e-2	3	8797.688	15	NC	1
588			min	-.004	2	-.331	2	0	12	-2.635e-2	2	270.959	2	1946.928	4
589		10	max	.008	3	.228	3	.564	4	2.271e-2	3	8608.591	15	NC	1
590			min	-.004	2	-.34	2	0	1	-2.918e-2	2	265.387	2	1914.832	4
591		11	max	.008	3	.222	3	.523	4	1.952e-2	3	8797.367	15	NC	1
592			min	-.004	2	-.33	2	0	1	-3.202e-2	2	271.994	2	1967.115	4
593		12	max	.007	3	.203	3	.481	4	1.631e-2	3	9418.445	15	NC	1
594			min	-.004	2	-.301	2	0	12	-3.127e-2	2	293.219	2	2076.161	4
595		13	max	.007	3	.173	3	.433	4	1.305e-2	3	NC	15	NC	1
596			min	-.004	2	-.253	2	0	12	-2.509e-2	2	334.514	2	2459.295	4
597		14	max	.007	3	.134	3	.38	4	9.796e-3	3	NC	15	NC	1
598			min	-.004	2	-.194	2	-.003	1	-1.891e-2	2	405.52	2	3341.284	5
599		15	max	.007	3	.092	3	.327	4	6.538e-3	3	NC	5	NC	1
600			min	-.004	2	-.13	2	-.007	1	-1.274e-2	2	528.651	2	5459.205	5
601		16	max	.007	3	.047	3	.274	4	8.35e-3	5	NC	5	NC	1
602			min	-.004	2	-.065	2	-.01	1	-6.561e-3	2	758.755	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
603		17	max	.007	3	.005	3	.226	4	1.051e-2	4	NC	5	NC	2
604			min	-.004	2	-.006	2	-.01	1	-6.76e-4	1	1255.057	2	9868.238	1
605		18	max	.007	3	.042	2	.184	4	5.632e-3	3	NC	4	NC	1
606			min	-.004	2	-.032	3	-.007	1	-1.3e-2	2	2688.138	2	NC	1
607		19	max	.007	3	.084	2	.15	4	1.145e-2	3	NC	1	NC	1
608			min	-.004	2	-.067	3	0	12	-2.605e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

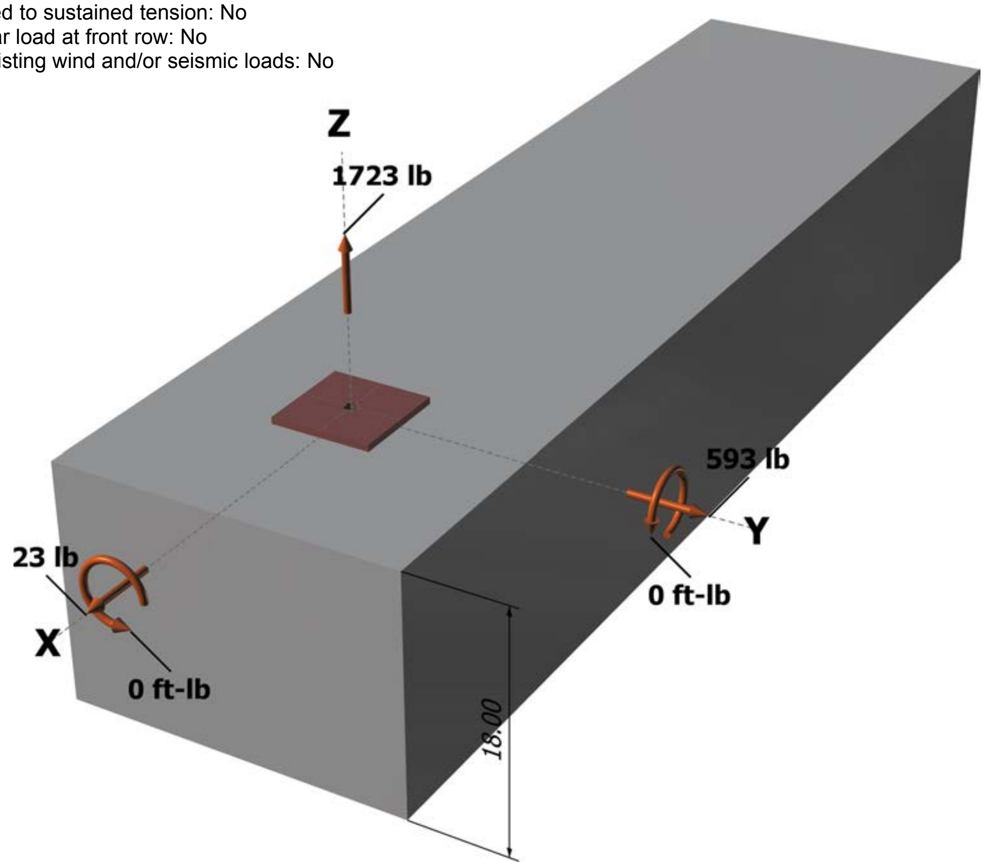
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

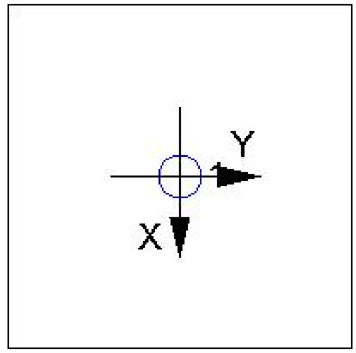
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

$\tau_{k,cr}$ (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, ϕN_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, ϕV_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:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

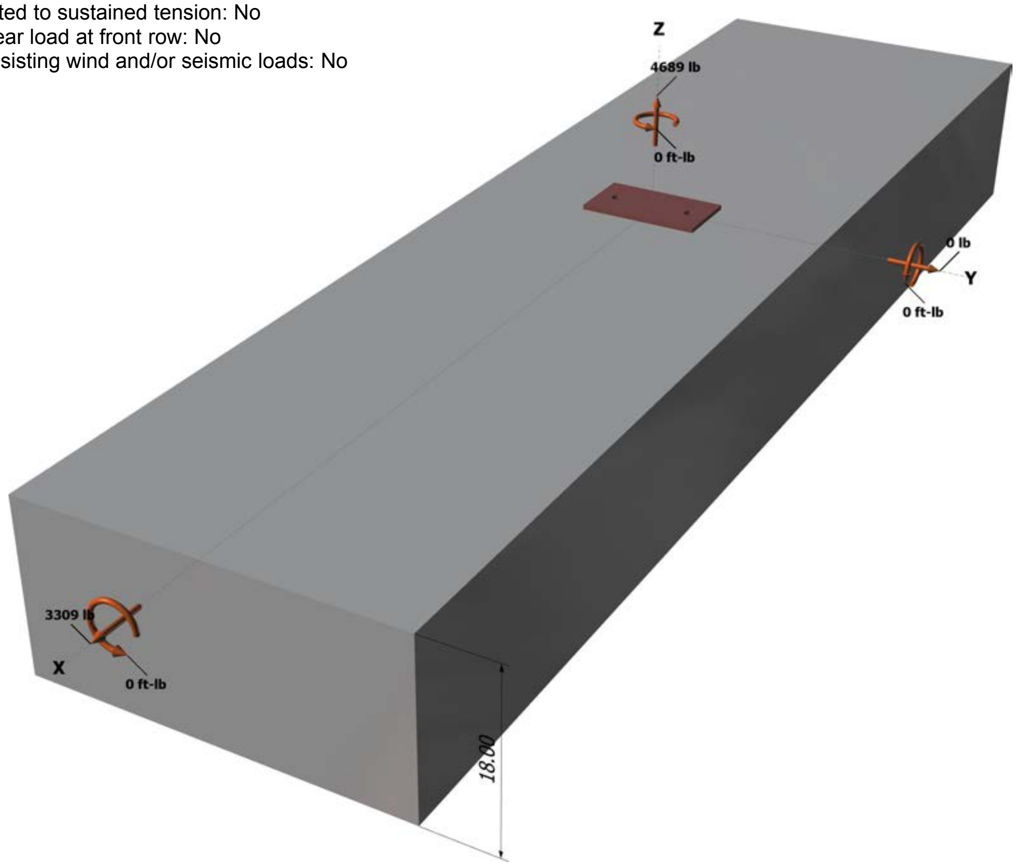
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

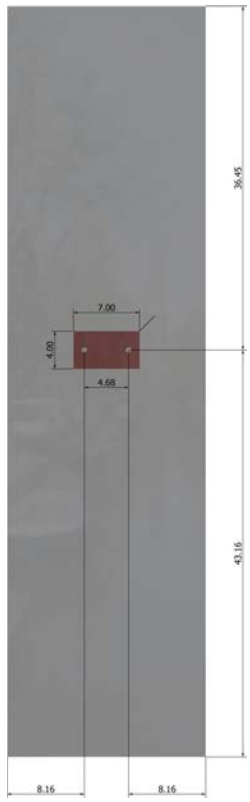
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



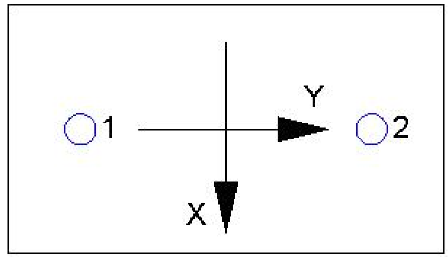
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	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, $øN_n$ (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, $øV_n$ (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.