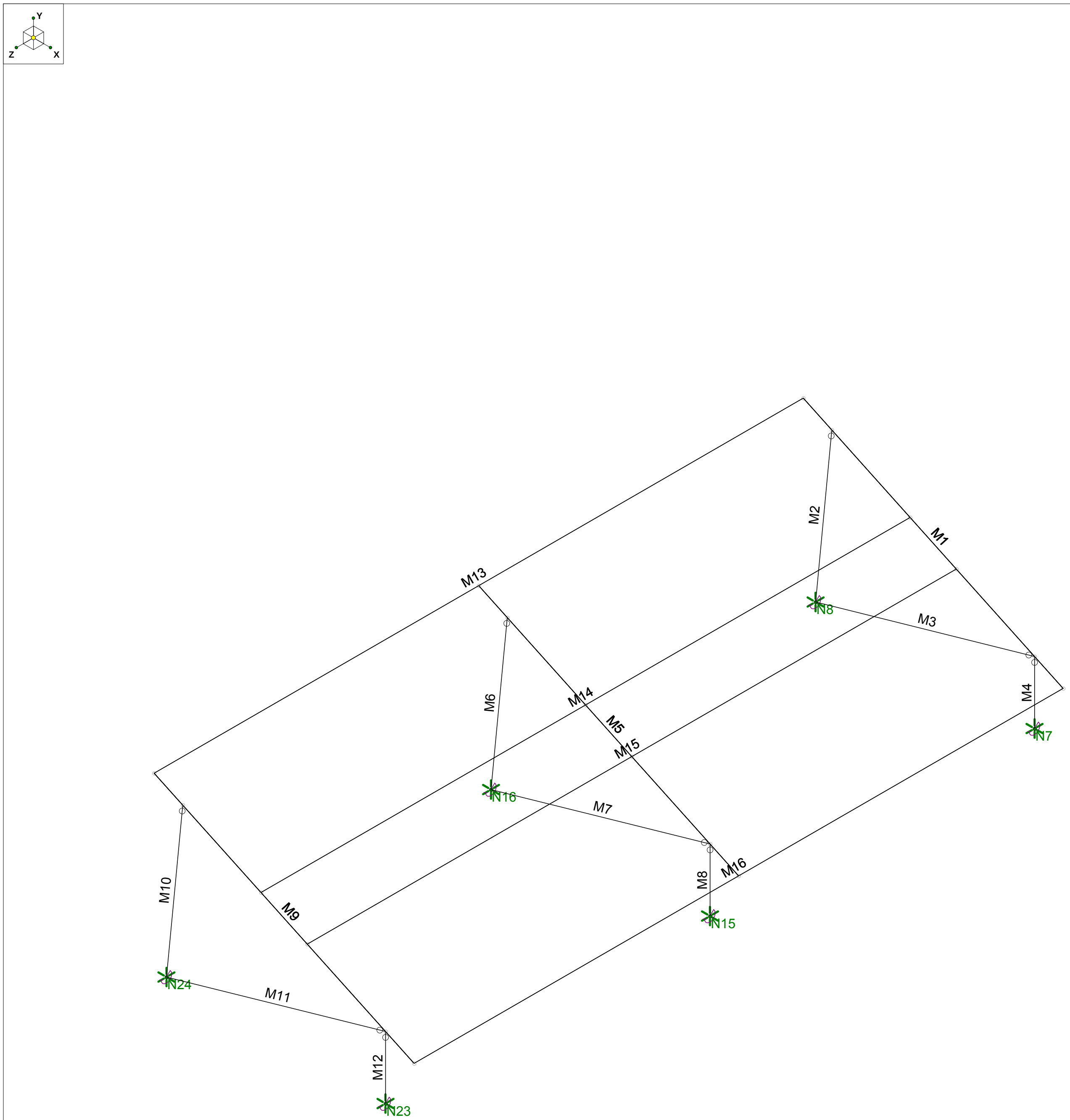


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

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.

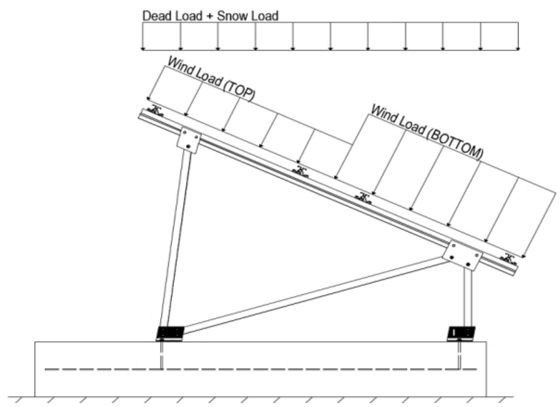
1.2 Construction

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 = 25°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - 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 = 18.56 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.82
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

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

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

2.4 Seismic Loads

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

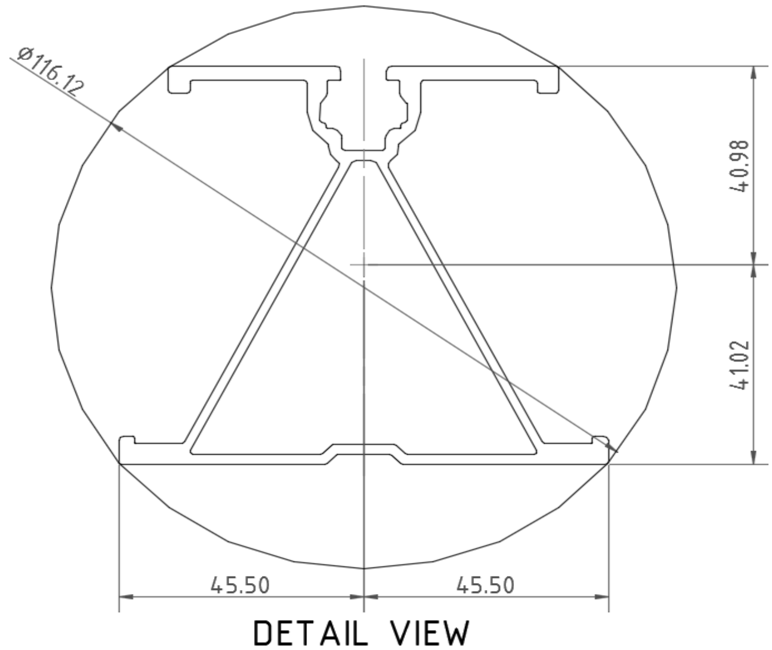
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

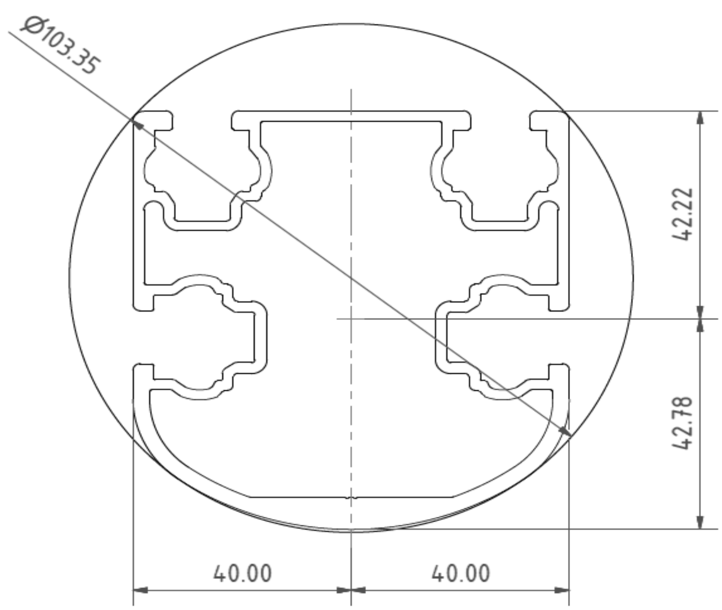
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	126	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.805	k-ft
M_z =	0.362	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	96%	



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).

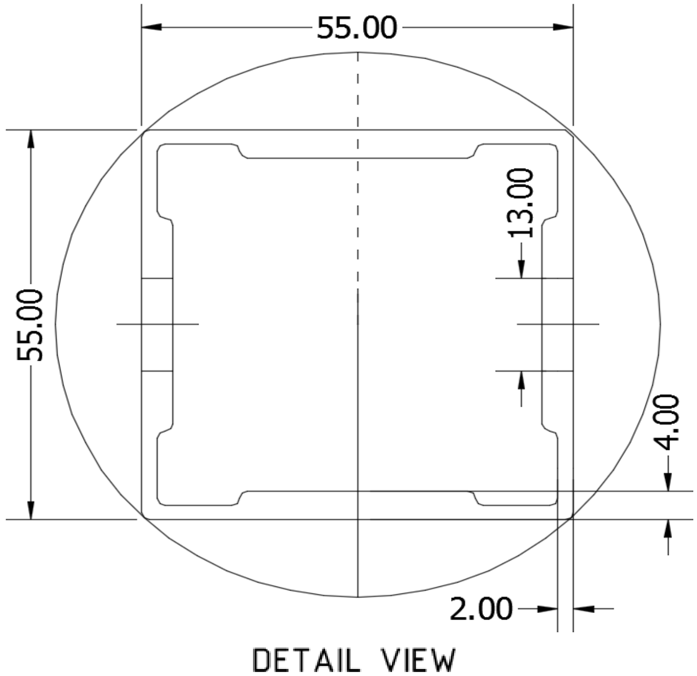
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.725	k-ft
M_z =	0.000	k-ft
P_n =	-0.225	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	79%	



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).

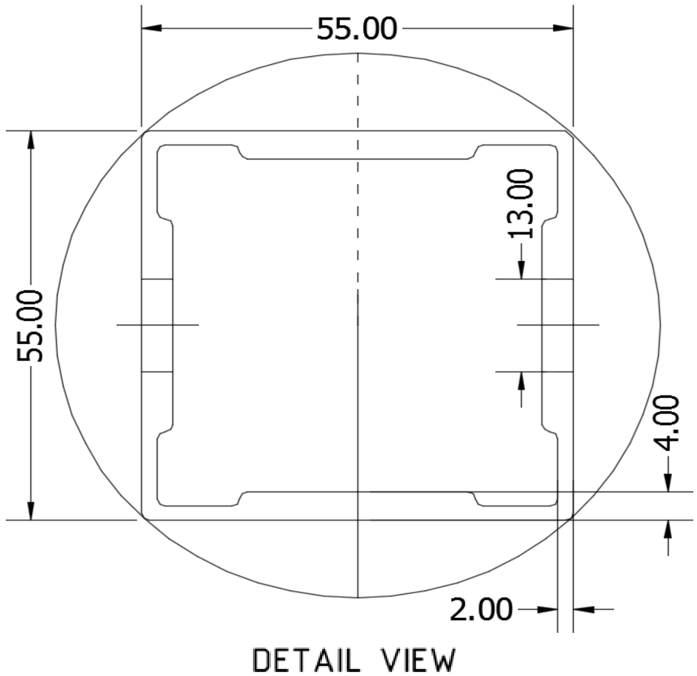
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.554	k-ft
P_n =	0.651	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	42%	



4.4 Diagonal Strut Design

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

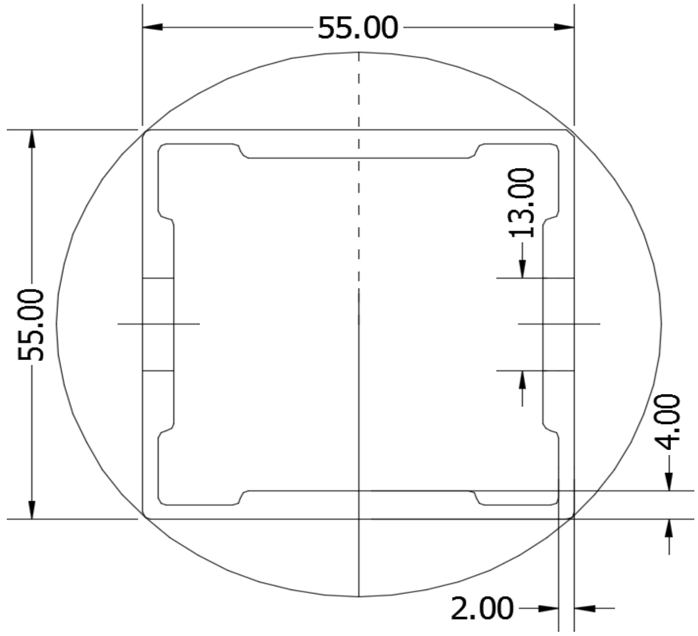
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	1.685	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	23%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	63.42	in
$\Phi F_{ty\ AXIAL}$ =	12.77	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.008	k-ft
M_z =	0.000	k-ft
P_n =	3.127	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	25%	



DETAIL VIEW

5. FOUNDATION DESIGN CALCULATIONS

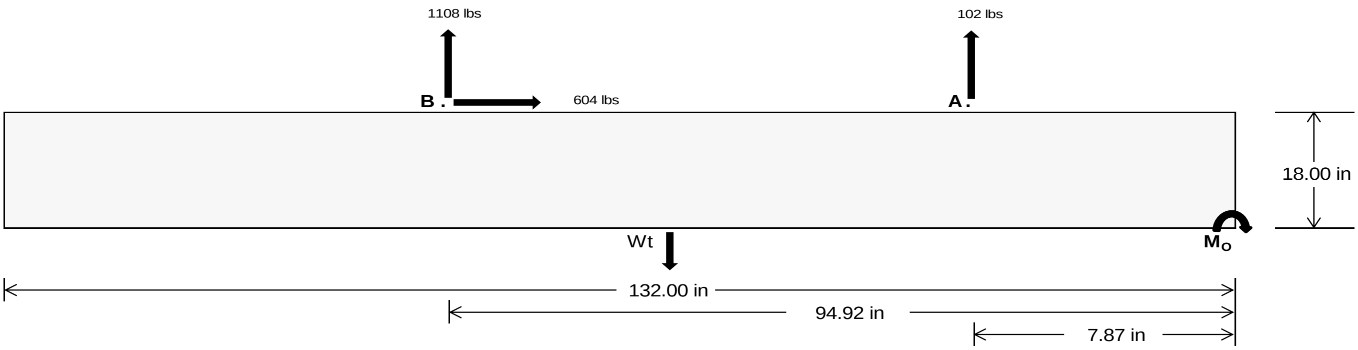
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	466.32	4823.75	k
Compressive Load =	3865.38	4375.31	k
Lateral Load =	375.13	2619.84	k
Moment (Weak Axis) =	0.74	0.34	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).



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O = 116873.0 in-lbs
Resisting Force Required = 1770.80 lbs
S.F. = 1.67
Weight Required = 2951.34 lbs
Minimum Width = 25 in in
Weight Provided = 4984.38 lbs

A minimum 132in long x 25in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 604.03 lbs
Friction = 0.4
Weight Required = 1510.07 lbs
Resisting Weight = 4984.38 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 25in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 604.03 lbs
Cohesion = 130 psf
Area = 22.92 ft^2
Resisting = 2492.19 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 25in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	25 in	26 in	27 in	28 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.08 ft) =	4984 lbs	5184 lbs	5383 lbs	5583 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	25 in	26 in	27 in	28 in	25 in	26 in	27 in	28 in	25 in	26 in	27 in	28 in	25 in	26 in	27 in	28 in
F_A	1455 lbs	1455 lbs	1455 lbs	1455 lbs	1176 lbs	1176 lbs	1176 lbs	1176 lbs	1838 lbs	1838 lbs	1838 lbs	1838 lbs	-205 lbs	-205 lbs	-205 lbs	-205 lbs
F_B	1446 lbs	1446 lbs	1446 lbs	1446 lbs	1656 lbs	1656 lbs	1656 lbs	1656 lbs	2193 lbs	2193 lbs	2193 lbs	2193 lbs	-2216 lbs	-2216 lbs	-2216 lbs	-2216 lbs
F_V	198 lbs	198 lbs	198 lbs	198 lbs	1102 lbs	1102 lbs	1102 lbs	1102 lbs	958 lbs	958 lbs	958 lbs	958 lbs	-1208 lbs	-1208 lbs	-1208 lbs	-1208 lbs
P_{total}	7885 lbs	8085 lbs	8284 lbs	8483 lbs	7816 lbs	8016 lbs	8215 lbs	8414 lbs	9015 lbs	9215 lbs	9414 lbs	9614 lbs	569 lbs	689 lbs	809 lbs	928 lbs
M	3859 lbs-ft	3859 lbs-ft	3859 lbs-ft	3859 lbs-ft	3360 lbs-ft	3360 lbs-ft	3360 lbs-ft	3360 lbs-ft	5057 lbs-ft	5057 lbs-ft	5057 lbs-ft	5057 lbs-ft	2537 lbs-ft	2537 lbs-ft	2537 lbs-ft	2537 lbs-ft
e	0.49 ft	0.48 ft	0.47 ft	0.45 ft	0.43 ft	0.42 ft	0.41 ft	0.40 ft	0.56 ft	0.55 ft	0.54 ft	0.53 ft	4.46 ft	3.68 ft	3.14 ft	2.73 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}	252.2 psf	250.9 psf	249.7 psf	248.5 psf	261.1 psf	259.4 psf	257.9 psf	256.4 psf	273.0 psf	270.9 psf	268.9 psf	267.1 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	435.9 psf	427.5 psf	419.8 psf	412.5 psf	421.0 psf	413.2 psf	406.0 psf	399.2 psf	513.8 psf	502.4 psf	491.8 psf	482.0 psf	174.6 psf	116.7 psf	101.4 psf	95.9 psf

Maximum Bearing Pressure = 514 psf
Allowable Bearing Pressure = 1500 psf

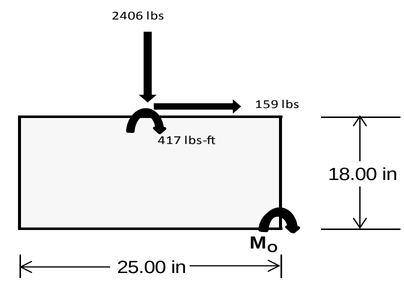
Use a 132in long x 25in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 1850.6 ft-lbs
Resisting Force Required = 1776.58 lbs
S.F. = 1.67
Weight Required = 2960.97 lbs
Minimum Width = 25 in in
Weight Provided = 4984.38 lbs

A minimum 132in long x 25in 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	25 in			25 in			25 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	289 lbs	665 lbs	220 lbs	860 lbs	2406 lbs	807 lbs	109 lbs	194 lbs	40 lbs
F_V	222 lbs	217 lbs	225 lbs	163 lbs	159 lbs	175 lbs	222 lbs	219 lbs	223 lbs
P_{total}	6460 lbs	6836 lbs	6391 lbs	6734 lbs	8280 lbs	6681 lbs	1913 lbs	1999 lbs	1845 lbs
M	877 lbs-ft	867 lbs-ft	887 lbs-ft	656 lbs-ft	656 lbs-ft	696 lbs-ft	875 lbs-ft	864 lbs-ft	878 lbs-ft
e	0.14 ft	0.13 ft	0.14 ft	0.10 ft	0.08 ft	0.10 ft	0.46 ft	0.43 ft	0.48 ft
L/6	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft
f_{min}	171.6 psf	189.3 psf	167.4 psf	211.5 psf	278.9 psf	204.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	392.1 psf	407.2 psf	390.3 psf	376.3 psf	443.7 psf	379.0 psf	198.5 psf	198.8 psf	197.6 psf

Maximum Bearing Pressure = 444 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 25in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 25in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

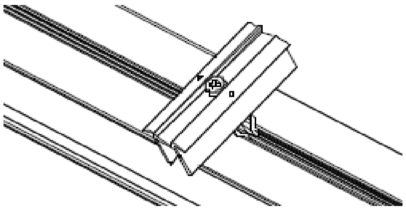
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

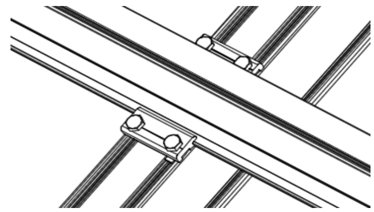
6. DESIGN OF JOINTS AND CONNECTIONS

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		Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.484 k	Maximum Uplifting Force =	1.796 k
Allowable Uplift =	1.214 k	Allowable Uplift =	4.357 k
Utilization =	40%	Utilization =	41%





6.2 Strut Connections

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

Front Strut		Rear Strut	
Maximum Axial Load =	2.973 k	Maximum Axial Load =	3.260 k
M12 Bolt Capacity =	12.808 k	M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k	Strut Bearing Capacity =	7.421 k
Utilization =	40%	Utilization =	44%

Diagonal Strut	
Maximum Axial Load =	1.747 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	24%

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).

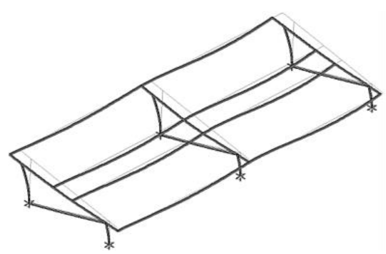
Mean Height, h_{sx} = 46.89 in

Allowable Story Drift for All Other Structures, Δ = { $0.020h_{sx}$; 0.938 in

Max Drift, Δ_{MAX} = 0.653 in

$0.653 \le 0.938$, OK.

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 126 in

J = 0.432

348.575

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 27.2 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 126

J = 0.432

221.673

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:
3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:
3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

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

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

$C_0 =$ 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

$C_0 =$ 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

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

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

$P_{max} =$ 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

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

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

$\varphi F_L =$ 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

$C_0 =$ 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 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

$\varphi F_L Wk =$ 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

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 7.50396 ksi

3.4.9

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

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

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

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

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

Strong Axis:

3.4.14

$L_b =$ 63.42 in
J = 0.942
98.9729

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:

3.4.14

$L_b =$ 63.42
J = 0.942
98.9729

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.2

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.46712

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7854

φF_L= (φccFcy)/(λ²)

φF_L= 12.7711 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y F c y$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 12.77 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 13.14 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.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	-46.9	-46.9	0	0
2	M14	Y	-46.9	-46.9	0	0
3	M15	Y	-46.9	-46.9	0	0
4	M16	Y	-46.9	-46.9	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-63.697	-63.697	0	0
2	M14	y	-63.697	-63.697	0	0
3	M15	y	-98.441	-98.441	0	0
4	M16	y	-98.441	-98.441	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	144.766	144.766	0	0
2	M14	y	110.022	110.022	0	0
3	M15	y	57.906	57.906	0	0
4	M16	y	57.906	57.906	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	487.955	2	982.147	1	.806	1	.004	1	0	1	0	1
2		min	-636.772	3	-1129.308	3	-49.125	5	-.256	4	0	1	0	1
3	N7	max	.041	9	1112.124	1	-.573	12	-.001	12	0	1	0	1
4		min	-.107	2	-83.933	3	-288.558	4	-.571	4	0	1	0	1
5	N15	max	.03	9	2973.373	1	0	10	0	10	0	1	0	1
6		min	-1.329	2	-358.708	3	-275.759	4	-.554	4	0	1	0	1
7	N16	max	1903.577	2	3365.62	1	0	10	0	2	0	1	0	1
8		min	-2015.265	3	-3710.574	3	-48.858	5	-.258	4	0	1	0	1
9	N23	max	.043	14	1112.124	1	11.799	1	.024	1	0	1	0	1
10		min	-.107	2	-83.933	3	-280.266	4	-.557	4	0	1	0	1
11	N24	max	487.955	2	982.147	1	-.046	12	0	12	0	1	0	1
12		min	-636.772	3	-1129.308	3	-49.759	5	-.258	4	0	1	0	1
13	Totals:	max	2877.944	2	10527.535	1	0	10						
14		min	-3289.069	3	-6495.763	3	-986.54	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	120.333	1	431.335	1	-8.09	12	0	3	.287	1	0	4
2			min	5.9	12	-551.157	3	-185.56	1	-.011	1	.014	12	0	3
3		2	max	120.333	1	302.31	1	-6.328	12	0	3	.118	4	.548	3
4			min	5.9	12	-387.929	3	-142.721	1	-.011	1	.006	12	-.428	1
5		3	max	120.333	1	173.286	1	-4.567	12	0	3	.061	5	.905	3
6			min	5.9	12	-224.701	3	-99.882	1	-.011	1	-.046	1	-.705	1
7		4	max	120.333	1	44.262	1	-2.805	12	0	3	.031	5	1.072	3
8			min	5.9	12	-61.474	3	-57.044	1	-.011	1	-.137	1	-.832	1
9		5	max	120.333	1	101.754	3	-1.044	12	0	3	.005	5	1.049	3
10			min	5.9	12	-84.763	1	-25.232	4	-.011	1	-.179	1	-.809	1
11		6	max	120.333	1	264.981	3	28.634	1	0	3	-.007	12	.835	3
12			min	3.544	15	-213.787	1	-18.908	5	-.011	1	-.17	1	-.635	1
13		7	max	120.333	1	428.209	3	71.472	1	0	3	-.006	12	.43	3
14			min	-6.388	5	-342.811	1	-16.183	5	-.011	1	-.112	1	-.31	1
15		8	max	120.333	1	591.436	3	114.311	1	0	3	0	10	.165	1
16			min	-18.364	5	-471.836	1	-13.458	5	-.011	1	-.059	4	-.164	3
17		9	max	120.333	1	754.664	3	157.15	1	0	3	.155	1	.791	1
18			min	-30.34	5	-600.86	1	-10.733	5	-.011	1	-.071	5	-.95	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	120.333	1	917.892	3	199.988	1	.005	9	.363	1	1.567	1
20			min	5.9	12	-729.884	1	-118.505	14	-.011	1	.012	12	-1.925	3
21		11	max	120.333	1	600.86	1	-6.002	12	.011	1	.155	1	.791	1
22			min	5.9	12	-754.664	3	-157.15	1	0	3	.004	12	-.95	3
23		12	max	120.333	1	471.836	1	-4.24	12	.011	1	.056	4	.165	1
24			min	5.9	12	-591.436	3	-114.311	1	0	3	-.003	1	-.164	3
25		13	max	120.333	1	342.811	1	-2.479	12	.011	1	.025	5	.43	3
26			min	5.9	12	-428.209	3	-71.472	1	0	3	-.112	1	-.31	1
27		14	max	120.333	1	213.787	1	-.717	12	.011	1	-.001	15	.835	3
28			min	5.9	12	-264.981	3	-29.155	4	0	3	-.17	1	-.635	1
29		15	max	120.333	1	84.763	1	14.205	1	.011	1	-.007	12	1.049	3
30			min	-2.32	5	-101.754	3	-19.791	5	0	3	-.179	1	-.809	1
31		16	max	120.333	1	61.474	3	57.044	1	.011	1	-.005	12	1.072	3
32			min	-14.296	5	-44.262	1	-17.065	5	0	3	-.137	1	-.832	1
33		17	max	120.333	1	224.701	3	99.882	1	.011	1	0	12	.905	3
34			min	-26.272	5	-173.286	1	-14.34	5	0	3	-.078	4	-.705	1
35		18	max	120.333	1	387.929	3	142.721	1	.011	1	.096	1	.548	3
36			min	-38.248	5	-302.31	1	-11.615	5	0	3	-.082	5	-.428	1
37		19	max	120.333	1	551.157	3	185.56	1	.011	1	.287	1	0	1
38			min	-50.224	5	-431.335	1	-8.89	5	0	3	-.094	5	0	3
39	M14	1	max	62.661	4	453.55	1	-8.309	12	.006	3	.326	1	0	1
40			min	2.502	12	-424.583	3	-191.084	1	-.009	1	.016	12	0	3
41		2	max	54.232	1	324.526	1	-6.548	12	.006	3	.166	4	.424	3
42			min	2.502	12	-301.89	3	-148.245	1	-.009	1	.007	12	-.454	1
43		3	max	54.232	1	195.501	1	-4.787	12	.006	3	.09	5	.704	3
44			min	2.502	12	-179.197	3	-105.406	1	-.009	1	-.02	1	-.757	1
45		4	max	54.232	1	66.477	1	-3.025	12	.006	3	.048	5	.842	3
46			min	2.502	12	-56.504	3	-62.568	1	-.009	1	-.118	1	-.91	1
47		5	max	54.232	1	66.189	3	-1.264	12	.006	3	.009	5	.836	3
48			min	1.841	15	-62.547	1	-37.134	4	-.009	1	-.166	1	-.912	1
49		6	max	54.232	1	188.882	3	23.11	1	.006	3	-.007	12	.687	3
50			min	-9.176	5	-191.572	1	-29.375	5	-.009	1	-.164	1	-.764	1
51		7	max	54.232	1	311.575	3	65.948	1	.006	3	-.005	12	.396	3
52			min	-21.152	5	-320.596	1	-26.65	5	-.009	1	-.112	1	-.465	1
53		8	max	54.232	1	434.268	3	108.787	1	.006	3	0	10	0	15
54			min	-33.128	5	-449.62	1	-23.925	5	-.009	1	-.094	4	-.04	3
55		9	max	54.232	1	556.96	3	151.626	1	.006	3	.142	1	.584	1
56			min	-45.104	5	-578.645	1	-21.2	5	-.009	1	-.116	5	-.618	3
57		10	max	75.563	4	679.653	3	194.464	1	.009	1	.344	1	1.334	1
58			min	2.502	12	-707.669	1	-120.873	14	-.006	3	.012	12	-1.339	3
59		11	max	63.587	4	578.645	1	-5.782	12	.009	1	.167	4	.584	1
60			min	2.502	12	-556.96	3	-151.626	1	-.006	3	.004	12	-.618	3
61		12	max	54.232	1	449.62	1	-4.021	12	.009	1	.088	5	0	15
62			min	2.502	12	-434.268	3	-108.787	1	-.006	3	-.01	1	-.04	3
63		13	max	54.232	1	320.596	1	-2.259	12	.009	1	.046	5	.396	3
64			min	2.502	12	-311.575	3	-65.948	1	-.006	3	-.112	1	-.465	1
65		14	max	54.232	1	191.572	1	-.498	12	.009	1	.006	5	.687	3
66			min	2.502	12	-188.882	3	-37.931	4	-.006	3	-.164	1	-.764	1
67		15	max	54.232	1	62.547	1	19.729	1	.009	1	-.007	12	.836	3
68			min	2.459	15	-66.189	3	-29.555	5	-.006	3	-.166	1	-.912	1
69		16	max	54.232	1	56.504	3	62.568	1	.009	1	-.004	12	.842	3
70			min	-8.253	5	-66.477	1	-26.83	5	-.006	3	-.118	1	-.91	1
71		17	max	54.232	1	179.197	3	105.406	1	.009	1	0	3	.704	3
72			min	-20.229	5	-195.501	1	-24.105	5	-.006	3	-.098	4	-.757	1
73		18	max	54.232	1	301.89	3	148.245	1	.009	1	.128	1	.424	3
74			min	-32.205	5	-324.526	1	-21.379	5	-.006	3	-.119	5	-.454	1
75		19	max	54.232	1	424.583	3	191.084	1	.009	1	.326	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	-44.181	5	-453.55	1	-18.654	5	-.006	3	-.142	5	0	3
77	M15	1	max	87.03	5	530.548	2	-8.274	12	.01	1	.326	1	0	2
78			min	-57.162	1	-219.53	3	-191.052	1	-.005	3	.016	12	0	12
79		2	max	75.054	5	378.382	2	-6.512	12	.01	1	.204	4	.22	3
80			min	-57.162	1	-157.64	3	-148.213	1	-.005	3	.007	12	-.53	2
81		3	max	63.078	5	226.215	2	-4.751	12	.01	1	.117	5	.368	3
82			min	-57.162	1	-95.749	3	-105.374	1	-.005	3	-.02	1	-.883	2
83		4	max	51.102	5	74.049	1	-2.99	12	.01	1	.064	5	.443	3
84			min	-57.162	1	-33.858	3	-62.536	1	-.005	3	-.118	1	-1.058	2
85		5	max	39.126	5	28.033	3	-1.228	12	.01	1	.015	5	.447	3
86			min	-57.162	1	-78.118	2	-46.116	4	-.005	3	-.166	1	-1.056	2
87		6	max	27.15	5	89.924	3	23.141	1	.01	1	-.007	12	.378	3
88			min	-57.162	1	-230.284	2	-38.331	5	-.005	3	-.164	1	-.876	2
89		7	max	15.174	5	151.815	3	65.98	1	.01	1	-.005	12	.237	3
90			min	-57.162	1	-382.451	2	-35.606	5	-.005	3	-.112	1	-.518	1
91		8	max	3.198	5	213.706	3	108.819	1	.01	1	0	10	.024	3
92			min	-57.162	1	-534.617	2	-32.88	5	-.005	3	-.119	4	-.003	9
93		9	max	-2.861	12	275.597	3	151.657	1	.01	1	.142	1	.729	2
94			min	-57.162	1	-686.784	2	-30.155	5	-.005	3	-.152	5	-.262	3
95		10	max	-2.861	12	337.488	3	194.496	1	.01	1	.344	1	1.619	2
96			min	-57.162	1	-838.95	2	-125.458	14	-.005	3	.012	12	-.619	3
97		11	max	1.096	5	686.784	2	-5.818	12	.005	3	.203	4	.729	2
98			min	-57.162	1	-275.597	3	-151.657	1	-.01	1	.004	12	-.262	3
99		12	max	-2.861	12	534.617	2	-4.056	12	.005	3	.113	5	.024	3
100			min	-57.162	1	-213.706	3	-108.819	1	-.01	1	-.01	1	-.003	9
101		13	max	-2.861	12	382.451	2	-2.295	12	.005	3	.061	5	.237	3
102			min	-57.162	1	-151.815	3	-65.98	1	-.01	1	-.112	1	-.518	1
103		14	max	-2.861	12	230.284	2	-.533	12	.005	3	.011	5	.378	3
104			min	-57.162	1	-89.924	3	-46.938	4	-.01	1	-.164	1	-.876	2
105		15	max	-2.861	12	78.118	2	19.697	1	.005	3	-.007	12	.447	3
106			min	-60.07	4	-28.033	3	-38.514	5	-.01	1	-.166	1	-1.056	2
107		16	max	-2.861	12	33.858	3	62.536	1	.005	3	-.004	12	.443	3
108			min	-72.046	4	-74.049	1	-35.789	5	-.01	1	-.118	1	-1.058	2
109		17	max	-2.861	12	95.749	3	105.374	1	.005	3	0	3	.368	3
110			min	-84.022	4	-226.215	2	-33.064	5	-.01	1	-.125	4	-.883	2
111		18	max	-2.861	12	157.64	3	148.213	1	.005	3	.128	1	.22	3
112			min	-95.998	4	-378.382	2	-30.338	5	-.01	1	-.156	5	-.53	2
113		19	max	-2.861	12	219.53	3	191.052	1	.005	3	.326	1	0	2
114			min	-107.974	4	-530.548	2	-27.613	5	-.01	1	-.19	5	0	5
115	M16	1	max	85.352	5	510.141	2	-7.975	12	.01	1	.289	1	0	2
116			min	-128.396	1	-205.91	3	-185.785	1	-.008	3	.014	12	0	3
117		2	max	73.376	5	357.975	2	-6.214	12	.01	1	.155	4	.204	3
118			min	-128.396	1	-144.019	3	-142.946	1	-.008	3	.005	12	-.506	2
119		3	max	61.4	5	205.809	2	-4.452	12	.01	1	.088	5	.336	3
120			min	-128.396	1	-82.128	3	-100.108	1	-.008	3	-.045	1	-.835	2
121		4	max	49.424	5	53.642	2	-2.691	12	.01	1	.048	5	.396	3
122			min	-128.396	1	-20.237	3	-57.269	1	-.008	3	-.136	1	-.987	2
123		5	max	37.448	5	41.654	3	-.929	12	.01	1	.011	5	.383	3
124			min	-128.396	1	-98.524	2	-33.964	4	-.008	3	-.178	1	-.96	2
125		6	max	25.472	5	103.544	3	28.408	1	.01	1	-.007	12	.299	3
126			min	-128.396	1	-250.691	2	-27.52	5	-.008	3	-.17	1	-.757	2
127		7	max	13.496	5	165.435	3	71.247	1	.01	1	-.005	12	.142	3
128			min	-128.396	1	-402.857	2	-24.795	5	-.008	3	-.112	1	-.375	2
129		8	max	1.52	5	227.326	3	114.086	1	.01	1	0	10	.185	1
130			min	-128.396	1	-555.024	2	-22.069	5	-.008	3	-.083	4	-.087	3
131		9	max	-6.069	12	289.217	3	156.924	1	.01	1	.154	1	.92	2
132			min	-128.396	1	-707.19	2	-19.344	5	-.008	3	-.105	5	-.389	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	-6.069	12	351.108	3	199.763	1	.008	3	.362	1	1.833	2
134			min	-128.396	1	-859.357	2	-122.844	14	-.01	1	.013	12	-.762	3
135		11	max	-3.714	15	707.19	2	-6.116	12	.008	3	.16	4	.92	2
136			min	-128.396	1	-289.217	3	-156.924	1	-.01	1	.005	12	-.389	3
137		12	max	-6.069	12	555.024	2	-4.355	12	.008	3	.08	4	.185	1
138			min	-128.396	1	-227.326	3	-114.086	1	-.01	1	-.004	1	-.087	3
139		13	max	-6.069	12	402.857	2	-2.593	12	.008	3	.039	5	.142	3
140			min	-128.396	1	-165.435	3	-71.247	1	-.01	1	-.112	1	-.375	2
141		14	max	-6.069	12	250.691	2	-.832	12	.008	3	.001	5	.299	3
142			min	-128.396	1	-103.544	3	-37.797	4	-.01	1	-.17	1	-.757	2
143		15	max	-6.069	12	98.524	2	14.43	1	.008	3	-.007	12	.383	3
144			min	-128.396	1	-41.654	3	-28.386	5	-.01	1	-.178	1	-.96	2
145		16	max	-6.069	12	20.237	3	57.269	1	.008	3	-.005	12	.396	3
146			min	-128.396	1	-53.642	2	-25.661	5	-.01	1	-.136	1	-.987	2
147		17	max	-6.069	12	82.128	3	100.108	1	.008	3	0	12	.336	3
148			min	-128.396	1	-205.809	2	-22.936	5	-.01	1	-.105	4	-.835	2
149		18	max	-6.069	12	144.019	3	142.946	1	.008	3	.097	1	.204	3
150			min	-128.396	1	-357.975	2	-20.211	5	-.01	1	-.119	5	-.506	2
151		19	max	-6.069	12	205.91	3	185.785	1	.008	3	.289	1	0	2
152			min	-130.97	4	-510.141	2	-17.485	5	-.01	1	-.141	5	0	5
153	M2	1	max	966.965	1	1.957	4	.775	1	0	12	0	3	0	1
154			min	-992.307	3	.476	15	-47.342	4	0	4	0	1	0	1
155		2	max	967.394	1	1.9	4	.775	1	0	12	0	1	0	15
156			min	-991.985	3	.463	15	-47.715	4	0	4	-.014	4	0	4
157		3	max	967.822	1	1.843	4	.775	1	0	12	0	1	0	15
158			min	-991.664	3	.45	15	-48.089	4	0	4	-.028	4	-.001	4
159		4	max	968.25	1	1.786	4	.775	1	0	12	0	1	0	15
160			min	-991.342	3	.436	15	-48.462	4	0	4	-.042	4	-.002	4
161		5	max	968.679	1	1.73	4	.775	1	0	12	0	1	0	15
162			min	-991.021	3	.423	15	-48.835	4	0	4	-.056	4	-.002	4
163		6	max	969.107	1	1.673	4	.775	1	0	12	.001	1	0	15
164			min	-990.7	3	.41	15	-49.209	4	0	4	-.07	4	-.003	4
165		7	max	969.536	1	1.616	4	.775	1	0	12	.001	1	0	15
166			min	-990.378	3	.396	15	-49.582	4	0	4	-.084	4	-.003	4
167		8	max	969.964	1	1.559	4	.775	1	0	12	.002	1	0	15
168			min	-990.057	3	.383	15	-49.955	4	0	4	-.099	4	-.004	4
169		9	max	970.393	1	1.503	4	.775	1	0	12	.002	1	0	15
170			min	-989.736	3	.37	15	-50.329	4	0	4	-.113	4	-.004	4
171		10	max	970.821	1	1.446	4	.775	1	0	12	.002	1	-.001	15
172			min	-989.414	3	.356	15	-50.702	4	0	4	-.128	4	-.004	4
173		11	max	971.25	1	1.389	4	.775	1	0	12	.002	1	-.001	15
174			min	-989.093	3	.343	15	-51.075	4	0	4	-.143	4	-.005	4
175		12	max	971.678	1	1.332	4	.775	1	0	12	.002	1	-.001	15
176			min	-988.771	3	.329	15	-51.449	4	0	4	-.158	4	-.005	4
177		13	max	972.107	1	1.275	4	.775	1	0	12	.003	1	-.001	15
178			min	-988.45	3	.316	15	-51.822	4	0	4	-.173	4	-.006	4
179		14	max	972.535	1	1.219	4	.775	1	0	12	.003	1	-.001	15
180			min	-988.129	3	.303	15	-52.195	4	0	4	-.188	4	-.006	4
181		15	max	972.964	1	1.162	4	.775	1	0	12	.003	1	-.002	15
182			min	-987.807	3	.287	12	-52.569	4	0	4	-.203	4	-.006	4
183		16	max	973.392	1	1.105	4	.775	1	0	12	.003	1	-.002	15
184			min	-987.486	3	.264	12	-52.942	4	0	4	-.218	4	-.007	4
185		17	max	973.821	1	1.048	4	.775	1	0	12	.004	1	-.002	15
186			min	-987.165	3	.242	12	-53.315	4	0	4	-.234	4	-.007	4
187		18	max	974.249	1	.991	4	.775	1	0	12	.004	1	-.002	15
188			min	-986.843	3	.22	12	-53.689	4	0	4	-.249	4	-.007	4
189		19	max	974.678	1	.935	4	.775	1	0	12	.004	1	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
190			min	-986.522	3	.198	12	-54.062	4	0	4	-.265	4	-.008	4
191	M3	1	max	415.793	2	7.907	4	3.668	4	0	12	0	1	.008	4
192			min	-555.622	3	1.87	15	.008	12	0	4	-.028	4	.002	15
193		2	max	415.623	2	7.14	4	4.206	4	0	12	0	1	.004	4
194			min	-555.75	3	1.69	15	.008	12	0	4	-.027	4	0	12
195		3	max	415.453	2	6.372	4	4.745	4	0	12	0	1	.002	2
196			min	-555.878	3	1.509	15	.008	12	0	4	-.025	4	0	3
197		4	max	415.282	2	5.605	4	5.284	4	0	12	0	1	0	2
198			min	-556.006	3	1.329	15	.008	12	0	4	-.023	4	-.002	3
199		5	max	415.112	2	4.838	4	5.823	4	0	12	0	1	0	15
200			min	-556.133	3	1.149	15	.008	12	0	4	-.02	4	-.003	6
201		6	max	414.942	2	4.071	4	6.361	4	0	12	0	1	-.001	15
202			min	-556.261	3	.968	15	.008	12	0	4	-.018	4	-.005	6
203		7	max	414.771	2	3.304	4	6.9	4	0	12	0	1	-.001	15
204			min	-556.389	3	.788	15	.008	12	0	4	-.015	5	-.007	6
205		8	max	414.601	2	2.536	4	7.439	4	0	12	0	1	-.002	15
206			min	-556.517	3	.607	15	.008	12	0	4	-.012	5	-.008	6
207		9	max	414.43	2	1.769	4	7.978	4	0	12	.001	1	-.002	15
208			min	-556.644	3	.427	15	.008	12	0	4	-.009	5	-.009	6
209		10	max	414.26	2	1.002	4	8.516	4	0	12	.001	1	-.002	15
210			min	-556.772	3	.247	15	.008	12	0	4	-.006	5	-.009	6
211		11	max	414.09	2	.292	2	9.055	4	0	12	.001	1	-.002	15
212			min	-556.9	3	-.053	3	.008	12	0	4	-.002	5	-.01	6
213		12	max	413.919	2	-.114	15	9.594	4	0	12	.002	4	-.002	15
214			min	-557.028	3	-.534	6	.008	12	0	4	0	12	-.009	6
215		13	max	413.749	2	-.294	15	10.133	4	0	12	.006	4	-.002	15
216			min	-557.156	3	-1.301	6	.008	12	0	4	0	12	-.009	6
217		14	max	413.579	2	-.475	15	10.671	4	0	12	.011	4	-.002	15
218			min	-557.283	3	-2.068	6	.008	12	0	4	0	12	-.008	6
219		15	max	413.408	2	-.655	15	11.21	4	0	12	.015	4	-.002	15
220			min	-557.411	3	-2.835	6	.008	12	0	4	0	12	-.007	6
221		16	max	413.238	2	-.835	15	11.749	4	0	12	.02	4	-.001	15
222			min	-557.539	3	-3.602	6	.008	12	0	4	0	12	-.006	6
223		17	max	413.068	2	-1.016	15	12.288	4	0	12	.025	4	-.001	15
224			min	-557.667	3	-4.37	6	.008	12	0	4	0	12	-.004	6
225		18	max	412.897	2	-1.196	15	12.826	4	0	12	.03	4	0	15
226			min	-557.794	3	-5.137	6	.008	12	0	4	0	12	-.002	6
227		19	max	412.727	2	-1.376	15	13.365	4	0	12	.036	4	0	1
228			min	-557.922	3	-5.904	6	.008	12	0	4	0	12	0	1
229	M4	1	max	1109.058	1	0	1	-.572	12	0	1	.026	4	0	1
230			min	-86.233	3	0	1	-287.488	4	0	1	0	12	0	1
231		2	max	1109.228	1	0	1	-.572	12	0	1	0	3	0	1
232			min	-86.105	3	0	1	-287.636	4	0	1	-.007	4	0	1
233		3	max	1109.398	1	0	1	-.572	12	0	1	0	12	0	1
234			min	-85.977	3	0	1	-287.783	4	0	1	-.04	4	0	1
235		4	max	1109.569	1	0	1	-.572	12	0	1	0	12	0	1
236			min	-85.849	3	0	1	-287.931	4	0	1	-.073	4	0	1
237		5	max	1109.739	1	0	1	-.572	12	0	1	0	12	0	1
238			min	-85.721	3	0	1	-288.079	4	0	1	-.106	4	0	1
239		6	max	1109.909	1	0	1	-.572	12	0	1	0	12	0	1
240			min	-85.594	3	0	1	-288.226	4	0	1	-.139	4	0	1
241		7	max	1110.08	1	0	1	-.572	12	0	1	0	12	0	1
242			min	-85.466	3	0	1	-288.374	4	0	1	-.172	4	0	1
243		8	max	1110.25	1	0	1	-.572	12	0	1	0	12	0	1
244			min	-85.338	3	0	1	-288.522	4	0	1	-.206	4	0	1
245		9	max	1110.42	1	0	1	-.572	12	0	1	0	12	0	1
246			min	-85.21	3	0	1	-288.669	4	0	1	-.239	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	1110.591	1	0	1	-.572	12	0	1	0	12	0	1
248			min	-85.083	3	0	1	-288.817	4	0	1	-.272	4	0	1
249		11	max	1110.761	1	0	1	-.572	12	0	1	0	12	0	1
250			min	-84.955	3	0	1	-288.964	4	0	1	-.305	4	0	1
251		12	max	1110.931	1	0	1	-.572	12	0	1	0	12	0	1
252			min	-84.827	3	0	1	-289.112	4	0	1	-.338	4	0	1
253		13	max	1111.102	1	0	1	-.572	12	0	1	0	12	0	1
254			min	-84.699	3	0	1	-289.26	4	0	1	-.371	4	0	1
255		14	max	1111.272	1	0	1	-.572	12	0	1	0	12	0	1
256			min	-84.572	3	0	1	-289.407	4	0	1	-.405	4	0	1
257		15	max	1111.443	1	0	1	-.572	12	0	1	0	12	0	1
258			min	-84.444	3	0	1	-289.555	4	0	1	-.438	4	0	1
259		16	max	1111.613	1	0	1	-.572	12	0	1	0	12	0	1
260			min	-84.316	3	0	1	-289.703	4	0	1	-.471	4	0	1
261		17	max	1111.783	1	0	1	-.572	12	0	1	0	12	0	1
262			min	-84.188	3	0	1	-289.85	4	0	1	-.504	4	0	1
263		18	max	1111.954	1	0	1	-.572	12	0	1	-.001	12	0	1
264			min	-84.061	3	0	1	-289.998	4	0	1	-.538	4	0	1
265		19	max	1112.124	1	0	1	-.572	12	0	1	-.001	12	0	1
266			min	-83.933	3	0	1	-290.146	4	0	1	-.571	4	0	1
267	M6	1	max	3119.372	1	2.189	2	0	1	0	1	0	4	0	1
268			min	-3259.5	3	.258	12	-47.832	4	0	4	0	1	0	1
269		2	max	3119.801	1	2.144	2	0	1	0	1	0	1	0	12
270			min	-3259.179	3	.236	12	-48.205	4	0	4	-.014	4	0	2
271		3	max	3120.229	1	2.1	2	0	1	0	1	0	1	0	12
272			min	-3258.858	3	.214	12	-48.579	4	0	4	-.028	4	-.001	2
273		4	max	3120.658	1	2.056	2	0	1	0	1	0	1	0	12
274			min	-3258.536	3	.192	12	-48.952	4	0	4	-.042	4	-.002	2
275		5	max	3121.086	1	2.012	2	0	1	0	1	0	1	0	12
276			min	-3258.215	3	.169	12	-49.325	4	0	4	-.056	4	-.002	2
277		6	max	3121.515	1	1.967	2	0	1	0	1	0	1	0	12
278			min	-3257.893	3	.138	3	-49.699	4	0	4	-.071	4	-.003	2
279		7	max	3121.943	1	1.923	2	0	1	0	1	0	1	0	12
280			min	-3257.572	3	.105	3	-50.072	4	0	4	-.085	4	-.004	2
281		8	max	3122.371	1	1.879	2	0	1	0	1	0	1	0	12
282			min	-3257.251	3	.071	3	-50.445	4	0	4	-.1	4	-.004	2
283		9	max	3122.8	1	1.835	2	0	1	0	1	0	1	0	12
284			min	-3256.929	3	.038	3	-50.819	4	0	4	-.115	4	-.005	2
285		10	max	3123.228	1	1.79	2	0	1	0	1	0	1	0	3
286			min	-3256.608	3	.005	3	-51.192	4	0	4	-.129	4	-.005	2
287		11	max	3123.657	1	1.746	2	0	1	0	1	0	1	0	3
288			min	-3256.287	3	-.028	3	-51.565	4	0	4	-.144	4	-.006	2
289		12	max	3124.085	1	1.702	2	0	1	0	1	0	1	0	3
290			min	-3255.965	3	-.061	3	-51.939	4	0	4	-.159	4	-.006	2
291		13	max	3124.514	1	1.658	2	0	1	0	1	0	1	0	3
292			min	-3255.644	3	-.094	3	-52.312	4	0	4	-.174	4	-.007	2
293		14	max	3124.942	1	1.613	2	0	1	0	1	0	1	0	3
294			min	-3255.323	3	-.128	3	-52.685	4	0	4	-.19	4	-.007	2
295		15	max	3125.371	1	1.569	2	0	1	0	1	0	1	0	3
296			min	-3255.001	3	-.161	3	-53.059	4	0	4	-.205	4	-.008	2
297		16	max	3125.799	1	1.525	2	0	1	0	1	0	1	0	3
298			min	-3254.68	3	-.194	3	-53.432	4	0	4	-.221	4	-.008	2
299		17	max	3126.228	1	1.481	2	0	1	0	1	0	1	0	3
300			min	-3254.358	3	-.227	3	-53.805	4	0	4	-.236	4	-.009	2
301		18	max	3126.656	1	1.436	2	0	1	0	1	0	1	0	3
302			min	-3254.037	3	-.26	3	-54.179	4	0	4	-.252	4	-.009	2
303		19	max	3127.085	1	1.392	2	0	1	0	1	0	1	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
304			min	-3253.716	3	-.294	3	-54.552	4	0	4	-.268	4	-.009	2
305	M7	1	max	1684.626	2	7.919	6	3.447	4	0	1	0	1	.009	2
306			min	-1745.026	3	1.859	15	0	1	0	4	-.029	4	0	3
307		2	max	1684.456	2	7.152	6	3.985	4	0	1	0	1	.007	2
308			min	-1745.154	3	1.678	15	0	1	0	4	-.027	4	-.002	3
309		3	max	1684.285	2	6.385	6	4.524	4	0	1	0	1	.004	2
310			min	-1745.281	3	1.498	15	0	1	0	4	-.025	4	-.003	3
311		4	max	1684.115	2	5.618	6	5.063	4	0	1	0	1	.002	2
312			min	-1745.409	3	1.318	15	0	1	0	4	-.023	4	-.004	3
313		5	max	1683.944	2	4.85	6	5.602	4	0	1	0	1	0	2
314			min	-1745.537	3	1.137	15	0	1	0	4	-.021	4	-.005	3
315		6	max	1683.774	2	4.083	6	6.14	4	0	1	0	1	-.001	15
316			min	-1745.665	3	.957	15	0	1	0	4	-.019	4	-.006	3
317		7	max	1683.604	2	3.316	6	6.679	4	0	1	0	1	-.002	15
318			min	-1745.793	3	.777	15	0	1	0	4	-.016	4	-.007	3
319		8	max	1683.433	2	2.549	6	7.218	4	0	1	0	1	-.002	15
320			min	-1745.92	3	.596	15	0	1	0	4	-.013	4	-.008	4
321		9	max	1683.263	2	1.839	2	7.757	4	0	1	0	1	-.002	15
322			min	-1746.048	3	.34	12	0	1	0	4	-.01	4	-.009	4
323		10	max	1683.093	2	1.241	2	8.295	4	0	1	0	1	-.002	15
324			min	-1746.176	3	.004	3	0	1	0	4	-.006	4	-.009	4
325		11	max	1682.922	2	.643	2	8.834	4	0	1	0	1	-.002	15
326			min	-1746.304	3	-.445	3	0	1	0	4	-.003	5	-.009	4
327		12	max	1682.752	2	.045	2	9.373	4	0	1	0	4	-.002	15
328			min	-1746.431	3	-.893	3	0	1	0	4	0	1	-.009	4
329		13	max	1682.582	2	-.305	15	9.912	4	0	1	.005	4	-.002	15
330			min	-1746.559	3	-1.342	3	0	1	0	4	0	1	-.009	4
331		14	max	1682.411	2	-.486	15	10.45	4	0	1	.009	4	-.002	15
332			min	-1746.687	3	-2.055	4	0	1	0	4	0	1	-.008	4
333		15	max	1682.241	2	-.666	15	10.989	4	0	1	.014	4	-.002	15
334			min	-1746.815	3	-2.822	4	0	1	0	4	0	1	-.007	4
335		16	max	1682.071	2	-.846	15	11.528	4	0	1	.018	4	-.001	15
336			min	-1746.942	3	-3.589	4	0	1	0	4	0	1	-.006	4
337		17	max	1681.9	2	-1.027	15	12.066	4	0	1	.023	4	-.001	15
338			min	-1747.07	3	-4.356	4	0	1	0	4	0	1	-.004	4
339		18	max	1681.73	2	-1.207	15	12.605	4	0	1	.029	4	0	15
340			min	-1747.198	3	-5.123	4	0	1	0	4	0	1	-.002	4
341		19	max	1681.56	2	-1.387	15	13.144	4	0	1	.034	4	0	1
342			min	-1747.326	3	-5.891	4	0	1	0	4	0	1	0	1
343	M8	1	max	2970.307	1	0	1	0	1	0	1	.025	4	0	1
344			min	-361.008	3	0	1	-278.455	4	0	1	0	1	0	1
345		2	max	2970.477	1	0	1	0	1	0	1	0	1	0	1
346			min	-360.88	3	0	1	-278.603	4	0	1	-.007	4	0	1
347		3	max	2970.647	1	0	1	0	1	0	1	0	1	0	1
348			min	-360.752	3	0	1	-278.75	4	0	1	-.039	4	0	1
349		4	max	2970.818	1	0	1	0	1	0	1	0	1	0	1
350			min	-360.624	3	0	1	-278.898	4	0	1	-.071	4	0	1
351		5	max	2970.988	1	0	1	0	1	0	1	0	1	0	1
352			min	-360.497	3	0	1	-279.046	4	0	1	-.103	4	0	1
353		6	max	2971.158	1	0	1	0	1	0	1	0	1	0	1
354			min	-360.369	3	0	1	-279.193	4	0	1	-.136	4	0	1
355		7	max	2971.329	1	0	1	0	1	0	1	0	1	0	1
356			min	-360.241	3	0	1	-279.341	4	0	1	-.168	4	0	1
357		8	max	2971.499	1	0	1	0	1	0	1	0	1	0	1
358			min	-360.113	3	0	1	-279.488	4	0	1	-.2	4	0	1
359		9	max	2971.67	1	0	1	0	1	0	1	0	1	0	1
360			min	-359.986	3	0	1	-279.636	4	0	1	-.232	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
361		10	max	2971.84	1	0	1	0	1	0	1	0	1	0	1
362			min	-359.858	3	0	1	-279.784	4	0	1	-.264	4	0	1
363		11	max	2972.01	1	0	1	0	1	0	1	0	1	0	1
364			min	-359.73	3	0	1	-279.931	4	0	1	-.296	4	0	1
365		12	max	2972.181	1	0	1	0	1	0	1	0	1	0	1
366			min	-359.602	3	0	1	-280.079	4	0	1	-.328	4	0	1
367		13	max	2972.351	1	0	1	0	1	0	1	0	1	0	1
368			min	-359.475	3	0	1	-280.227	4	0	1	-.36	4	0	1
369		14	max	2972.521	1	0	1	0	1	0	1	0	1	0	1
370			min	-359.347	3	0	1	-280.374	4	0	1	-.393	4	0	1
371		15	max	2972.692	1	0	1	0	1	0	1	0	1	0	1
372			min	-359.219	3	0	1	-280.522	4	0	1	-.425	4	0	1
373		16	max	2972.862	1	0	1	0	1	0	1	0	1	0	1
374			min	-359.091	3	0	1	-280.67	4	0	1	-.457	4	0	1
375		17	max	2973.032	1	0	1	0	1	0	1	0	1	0	1
376			min	-358.964	3	0	1	-280.817	4	0	1	-.489	4	0	1
377		18	max	2973.203	1	0	1	0	1	0	1	0	1	0	1
378			min	-358.836	3	0	1	-280.965	4	0	1	-.521	4	0	1
379		19	max	2973.373	1	0	1	0	1	0	1	0	1	0	1
380			min	-358.708	3	0	1	-281.112	4	0	1	-.554	4	0	1
381	M10	1	max	966.965	1	1.885	6	-.035	12	0	1	0	1	0	1
382			min	-992.307	3	.428	15	-47.782	4	0	5	0	3	0	1
383		2	max	967.394	1	1.829	6	-.035	12	0	1	0	10	0	15
384			min	-991.985	3	.415	15	-48.155	4	0	5	-.014	4	0	6
385		3	max	967.822	1	1.772	6	-.035	12	0	1	0	12	0	15
386			min	-991.664	3	.402	15	-48.528	4	0	5	-.028	4	-.001	6
387		4	max	968.25	1	1.715	6	-.035	12	0	1	0	12	0	15
388			min	-991.342	3	.388	15	-48.902	4	0	5	-.042	4	-.002	6
389		5	max	968.679	1	1.658	6	-.035	12	0	1	0	12	0	15
390			min	-991.021	3	.375	15	-49.275	4	0	5	-.056	4	-.002	6
391		6	max	969.107	1	1.601	6	-.035	12	0	1	0	12	0	15
392			min	-990.7	3	.361	15	-49.648	4	0	5	-.071	4	-.003	6
393		7	max	969.536	1	1.545	6	-.035	12	0	1	0	12	0	15
394			min	-990.378	3	.348	15	-50.022	4	0	5	-.085	4	-.003	6
395		8	max	969.964	1	1.488	6	-.035	12	0	1	0	12	0	15
396			min	-990.057	3	.335	15	-50.395	4	0	5	-.1	4	-.003	6
397		9	max	970.393	1	1.431	6	-.035	12	0	1	0	12	0	15
398			min	-989.736	3	.321	15	-50.768	4	0	5	-.114	4	-.004	6
399		10	max	970.821	1	1.374	6	-.035	12	0	1	0	12	0	15
400			min	-989.414	3	.308	15	-51.142	4	0	5	-.129	4	-.004	6
401		11	max	971.25	1	1.317	6	-.035	12	0	1	0	12	-.001	15
402			min	-989.093	3	.295	15	-51.515	4	0	5	-.144	4	-.005	6
403		12	max	971.678	1	1.261	6	-.035	12	0	1	0	12	-.001	15
404			min	-988.771	3	.281	15	-51.888	4	0	5	-.159	4	-.005	6
405		13	max	972.107	1	1.204	6	-.035	12	0	1	0	12	-.001	15
406			min	-988.45	3	.268	15	-52.262	4	0	5	-.174	4	-.005	6
407		14	max	972.535	1	1.147	6	-.035	12	0	1	0	12	-.001	15
408			min	-988.129	3	.255	15	-52.635	4	0	5	-.19	4	-.006	6
409		15	max	972.964	1	1.09	6	-.035	12	0	1	0	12	-.001	15
410			min	-987.807	3	.241	15	-53.008	4	0	5	-.205	4	-.006	6
411		16	max	973.392	1	1.033	6	-.035	12	0	1	0	12	-.001	15
412			min	-987.486	3	.228	15	-53.382	4	0	5	-.22	4	-.006	6
413		17	max	973.821	1	.977	6	-.035	12	0	1	0	12	-.001	15
414			min	-987.165	3	.215	15	-53.755	4	0	5	-.236	4	-.007	6
415		18	max	974.249	1	.93	2	-.035	12	0	1	0	12	-.002	15
416			min	-986.843	3	.201	15	-54.128	4	0	5	-.252	4	-.007	6
417		19	max	974.678	1	.885	2	-.035	12	0	1	0	12	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
418			min	-986.522	3	.188	15	-54.502	4	0	5	-.267	4	-.007	6
419	M11	1	max	415.793	2	7.857	6	3.57	4	0	1	0	12	.007	6
420			min	-555.622	3	1.837	15	-.173	1	0	4	-.029	4	.002	15
421		2	max	415.623	2	7.09	6	4.109	4	0	1	0	12	.004	2
422			min	-555.75	3	1.656	15	-.173	1	0	4	-.027	4	0	15
423		3	max	415.453	2	6.323	6	4.647	4	0	1	0	12	.002	2
424			min	-555.878	3	1.476	15	-.173	1	0	4	-.025	4	0	3
425		4	max	415.282	2	5.556	6	5.186	4	0	1	0	12	0	2
426			min	-556.006	3	1.296	15	-.173	1	0	4	-.023	4	-.002	3
427		5	max	415.112	2	4.788	6	5.725	4	0	1	0	12	0	15
428			min	-556.133	3	1.115	15	-.173	1	0	4	-.021	4	-.003	4
429		6	max	414.942	2	4.021	6	6.264	4	0	1	0	12	-.001	15
430			min	-556.261	3	.935	15	-.173	1	0	4	-.018	4	-.005	4
431		7	max	414.771	2	3.254	6	6.802	4	0	1	0	12	-.002	15
432			min	-556.389	3	.755	15	-.173	1	0	4	-.016	4	-.007	4
433		8	max	414.601	2	2.487	6	7.341	4	0	1	0	12	-.002	15
434			min	-556.517	3	.574	15	-.173	1	0	4	-.013	4	-.008	4
435		9	max	414.43	2	1.72	6	7.88	4	0	1	0	12	-.002	15
436			min	-556.644	3	.394	15	-.173	1	0	4	-.009	4	-.009	4
437		10	max	414.26	2	.952	6	8.419	4	0	1	0	12	-.002	15
438			min	-556.772	3	.213	15	-.173	1	0	4	-.006	4	-.009	4
439		11	max	414.09	2	.292	2	8.957	4	0	1	0	12	-.002	15
440			min	-556.9	3	-.053	3	-.173	1	0	4	-.002	4	-.01	4
441		12	max	413.919	2	-.147	15	9.496	4	0	1	.002	5	-.002	15
442			min	-557.028	3	-.583	4	-.173	1	0	4	-.001	1	-.01	4
443		13	max	413.749	2	-.328	15	10.035	4	0	1	.006	5	-.002	15
444			min	-557.156	3	-1.35	4	-.173	1	0	4	-.001	1	-.009	4
445		14	max	413.579	2	-.508	15	10.574	4	0	1	.01	5	-.002	15
446			min	-557.283	3	-2.118	4	-.173	1	0	4	-.001	1	-.008	4
447		15	max	413.408	2	-.688	15	11.112	4	0	1	.015	5	-.002	15
448			min	-557.411	3	-2.885	4	-.173	1	0	4	-.001	1	-.007	4
449		16	max	413.238	2	-.869	15	11.651	4	0	1	.019	5	-.001	15
450			min	-557.539	3	-3.652	4	-.173	1	0	4	-.002	1	-.006	4
451		17	max	413.068	2	-1.049	15	12.19	4	0	1	.024	5	-.001	15
452			min	-557.667	3	-4.419	4	-.173	1	0	4	-.002	1	-.004	4
453		18	max	412.897	2	-1.229	15	12.729	4	0	1	.03	4	0	15
454			min	-557.794	3	-5.186	4	-.173	1	0	4	-.002	1	-.002	4
455		19	max	412.727	2	-1.41	15	13.267	4	0	1	.035	4	0	1
456			min	-557.922	3	-5.954	4	-.173	1	0	4	-.002	1	0	1
457	M12	1	max	1109.058	1	0	1	12.195	1	0	1	.025	4	0	1
458			min	-86.233	3	0	1	-280.546	4	0	1	-.001	1	0	1
459		2	max	1109.228	1	0	1	12.195	1	0	1	0	1	0	1
460			min	-86.105	3	0	1	-280.693	4	0	1	-.007	4	0	1
461		3	max	1109.398	1	0	1	12.195	1	0	1	.002	1	0	1
462			min	-85.977	3	0	1	-280.841	4	0	1	-.039	4	0	1
463		4	max	1109.569	1	0	1	12.195	1	0	1	.003	1	0	1
464			min	-85.849	3	0	1	-280.988	4	0	1	-.071	4	0	1
465		5	max	1109.739	1	0	1	12.195	1	0	1	.004	1	0	1
466			min	-85.721	3	0	1	-281.136	4	0	1	-.104	4	0	1
467		6	max	1109.909	1	0	1	12.195	1	0	1	.006	1	0	1
468			min	-85.594	3	0	1	-281.284	4	0	1	-.136	4	0	1
469		7	max	1110.08	1	0	1	12.195	1	0	1	.007	1	0	1
470			min	-85.466	3	0	1	-281.431	4	0	1	-.168	4	0	1
471		8	max	1110.25	1	0	1	12.195	1	0	1	.009	1	0	1
472			min	-85.338	3	0	1	-281.579	4	0	1	-.201	4	0	1
473		9	max	1110.42	1	0	1	12.195	1	0	1	.01	1	0	1
474			min	-85.21	3	0	1	-281.727	4	0	1	-.233	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	1110.591	1	0	1	12.195	1	0	1	.011	1	0	1
476			min	-85.083	3	0	1	-281.874	4	0	1	-.265	4	0	1
477		11	max	1110.761	1	0	1	12.195	1	0	1	.013	1	0	1
478			min	-84.955	3	0	1	-282.022	4	0	1	-.298	4	0	1
479		12	max	1110.931	1	0	1	12.195	1	0	1	.014	1	0	1
480			min	-84.827	3	0	1	-282.17	4	0	1	-.33	4	0	1
481		13	max	1111.102	1	0	1	12.195	1	0	1	.016	1	0	1
482			min	-84.699	3	0	1	-282.317	4	0	1	-.363	4	0	1
483		14	max	1111.272	1	0	1	12.195	1	0	1	.017	1	0	1
484			min	-84.572	3	0	1	-282.465	4	0	1	-.395	4	0	1
485		15	max	1111.443	1	0	1	12.195	1	0	1	.018	1	0	1
486			min	-84.444	3	0	1	-282.612	4	0	1	-.427	4	0	1
487		16	max	1111.613	1	0	1	12.195	1	0	1	.02	1	0	1
488			min	-84.316	3	0	1	-282.76	4	0	1	-.46	4	0	1
489		17	max	1111.783	1	0	1	12.195	1	0	1	.021	1	0	1
490			min	-84.188	3	0	1	-282.908	4	0	1	-.492	4	0	1
491		18	max	1111.954	1	0	1	12.195	1	0	1	.023	1	0	1
492			min	-84.061	3	0	1	-283.055	4	0	1	-.525	4	0	1
493		19	max	1112.124	1	0	1	12.195	1	0	1	.024	1	0	1
494			min	-83.933	3	0	1	-283.203	4	0	1	-.557	4	0	1
495	M1	1	max	185.565	1	551.139	3	50.196	5	0	1	.287	1	0	3
496			min	-8.89	5	-429.983	1	-120.177	1	0	3	-.094	5	-.011	1
497		2	max	186.17	1	550.165	3	51.438	5	0	1	.224	1	.216	1
498			min	-8.607	5	-431.282	1	-120.177	1	0	3	-.067	5	-.291	3
499		3	max	338.576	3	479.052	1	6.493	5	0	3	.161	1	.433	1
500			min	-203.282	2	-389.716	3	-119.666	1	0	1	-.04	5	-.569	3
501		4	max	339.03	3	477.754	1	7.734	5	0	3	.097	1	.18	1
502			min	-202.677	2	-390.689	3	-119.666	1	0	1	-.037	5	-.363	3
503		5	max	339.484	3	476.456	1	8.975	5	0	3	.034	1	-.003	15
504			min	-202.071	2	-391.663	3	-119.666	1	0	1	-.032	5	-.157	3
505		6	max	339.938	3	475.158	1	10.217	5	0	3	-.001	12	.05	3
506			min	-201.466	2	-392.637	3	-119.666	1	0	1	-.034	4	-.323	1
507		7	max	340.392	3	473.859	1	11.458	5	0	3	-.004	12	.257	3
508			min	-200.861	2	-393.61	3	-119.666	1	0	1	-.092	1	-.573	1
509		8	max	340.846	3	472.561	1	12.7	5	0	3	-.008	12	.465	3
510			min	-200.255	2	-394.584	3	-119.666	1	0	1	-.155	1	-.823	1
511		9	max	353.837	3	34.922	2	58.023	5	0	9	.091	1	.545	3
512			min	-122.476	2	.392	15	-173.93	1	0	3	-.136	5	-.938	1
513		10	max	354.291	3	33.623	2	59.264	5	0	9	0	12	.529	3
514			min	-121.87	2	0	5	-173.93	1	0	3	-.106	4	-.947	1
515		11	max	354.745	3	32.325	2	60.506	5	0	9	-.005	12	.514	3
516			min	-121.265	2	-1.608	4	-173.93	1	0	3	-.094	4	-.956	1
517		12	max	367.677	3	248.888	3	156.249	5	0	2	.153	1	.447	3
518			min	-70.649	10	-509.321	1	-116.844	1	0	3	-.212	5	-.845	1
519		13	max	368.131	3	247.915	3	157.49	5	0	2	.091	1	.316	3
520			min	-70.145	10	-510.619	1	-116.844	1	0	3	-.129	5	-.575	1
521		14	max	368.585	3	246.941	3	158.732	5	0	2	.03	1	.186	3
522			min	-69.64	10	-511.917	1	-116.844	1	0	3	-.045	5	-.306	1
523		15	max	369.039	3	245.967	3	159.973	5	0	2	.039	5	.055	3
524			min	-69.136	10	-513.216	1	-116.844	1	0	3	-.032	1	-.035	1
525		16	max	369.493	3	244.994	3	161.214	5	0	2	.123	5	.253	2
526			min	-68.631	10	-514.514	1	-116.844	1	0	3	-.094	1	-.074	3
527		17	max	369.947	3	244.02	3	162.456	5	0	2	.209	5	.519	2
528			min	-68.127	10	-515.812	1	-116.844	1	0	3	-.155	1	-.203	3
529		18	max	17.203	5	511.908	2	-6.069	12	0	5	.195	5	.261	2
530			min	-186.386	1	-204.985	3	-132.327	4	0	2	-.221	1	-.101	3
531		19	max	17.485	5	510.609	2	-6.069	12	0	5	.141	5	.008	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	-185.781	1	-205.959	3	-131.085	4	0	2	-.289	1	-.01	1
533	M5	1	max	399.966	1	1835.721	3	99.951	5	0	1	0	1	.023	1
534			min	15.527	12	-1451.675	1	0	1	0	4	-.214	4	0	3
535		2	max	400.571	1	1834.747	3	101.192	5	0	1	0	1	.789	1
536			min	15.83	12	-1452.973	1	0	1	0	4	-.161	4	-.968	3
537		3	max	1089.801	3	1470.892	1	59.816	4	0	4	0	1	1.521	1
538			min	-738.695	2	-1260.853	3	0	1	0	1	-.108	4	-1.899	3
539		4	max	1090.255	3	1469.594	1	61.057	4	0	4	0	1	.745	1
540			min	-738.09	2	-1261.827	3	0	1	0	1	-.076	4	-1.234	3
541		5	max	1090.709	3	1468.295	1	62.298	4	0	4	0	1	.006	9
542			min	-737.485	2	-1262.8	3	0	1	0	1	-.044	4	-.568	3
543		6	max	1091.163	3	1466.997	1	63.54	4	0	4	0	1	.099	3
544			min	-736.879	2	-1263.774	3	0	1	0	1	-.011	5	-.804	1
545		7	max	1091.617	3	1465.699	1	64.781	4	0	4	.023	4	.766	3
546			min	-736.274	2	-1264.748	3	0	1	0	1	0	1	-1.578	1
547		8	max	1092.071	3	1464.401	1	66.023	4	0	4	.058	4	1.434	3
548			min	-735.669	2	-1265.722	3	0	1	0	1	0	1	-2.351	1
549		9	max	1115.01	3	115.731	2	188.408	4	0	1	0	1	1.654	3
550			min	-576.176	2	.393	15	0	1	0	1	-.197	4	-2.66	1
551		10	max	1115.464	3	114.433	2	189.649	4	0	1	0	1	1.598	3
552			min	-575.571	2	.002	15	0	1	0	1	-.097	4	-2.693	1
553		11	max	1115.918	3	113.135	2	190.891	4	0	1	.003	4	1.543	3
554			min	-574.965	2	-1.422	6	0	1	0	1	0	1	-2.725	1
555		12	max	1138.974	3	795.005	3	225.424	4	0	1	0	1	1.353	3
556			min	-415.491	2	-1588.571	1	0	1	0	4	-.31	4	-2.429	1
557		13	max	1139.428	3	794.031	3	226.665	4	0	1	0	1	.934	3
558			min	-414.885	2	-1589.87	1	0	1	0	4	-.19	4	-1.59	1
559		14	max	1139.882	3	793.057	3	227.907	4	0	1	0	1	.515	3
560			min	-414.28	2	-1591.168	1	0	1	0	4	-.07	4	-.751	1
561		15	max	1140.336	3	792.084	3	229.148	4	0	1	.05	4	.148	2
562			min	-413.675	2	-1592.466	1	0	1	0	4	0	1	-.004	13
563		16	max	1140.79	3	791.11	3	230.39	4	0	1	.171	4	.972	2
564			min	-413.069	2	-1593.764	1	0	1	0	4	0	1	-.321	3
565		17	max	1141.244	3	790.136	3	231.631	4	0	1	.293	4	1.796	2
566			min	-412.464	2	-1595.063	1	0	1	0	4	0	1	-.738	3
567		18	max	-16.057	12	1722.74	2	0	1	0	4	.317	4	.926	2
568			min	-400.139	1	-701.551	3	-29.832	5	0	1	0	1	-.386	3
569		19	max	-15.755	12	1721.442	2	0	1	0	4	.303	4	.02	1
570			min	-399.534	1	-702.525	3	-28.59	5	0	1	0	1	-.016	3
571	M9	1	max	185.565	1	551.139	3	120.177	1	0	3	-.014	12	0	3
572			min	8.089	12	-429.983	1	5.9	12	0	4	-.287	1	-.011	1
573		2	max	186.17	1	550.165	3	120.177	1	0	3	-.011	12	.216	1
574			min	8.392	12	-431.282	1	5.9	12	0	4	-.224	1	-.291	3
575		3	max	338.576	3	479.052	1	119.666	1	0	1	-.008	12	.433	1
576			min	-203.282	2	-389.716	3	5.864	12	0	3	-.161	1	-.569	3
577		4	max	339.03	3	477.754	1	119.666	1	0	1	-.005	12	.18	1
578			min	-202.677	2	-390.689	3	5.864	12	0	3	-.097	1	-.363	3
579		5	max	339.484	3	476.456	1	119.666	1	0	1	-.002	12	-.003	15
580			min	-202.071	2	-391.663	3	5.864	12	0	3	-.045	4	-.157	3
581		6	max	339.938	3	475.158	1	119.666	1	0	1	.029	1	.05	3
582			min	-201.466	2	-392.637	3	5.864	12	0	3	-.024	5	-.323	1
583		7	max	340.392	3	473.859	1	119.666	1	0	1	.092	1	.257	3
584			min	-200.861	2	-393.61	3	5.864	12	0	3	-.01	5	-.573	1
585		8	max	340.846	3	472.561	1	119.666	1	0	1	.155	1	.465	3
586			min	-200.255	2	-394.584	3	5.864	12	0	3	.003	15	-.823	1
587		9	max	353.837	3	34.922	2	173.93	1	0	3	-.004	12	.545	3
588			min	-122.476	2	.399	15	8.363	12	0	9	-.169	4	-.938	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
589		10	max	354.291	3	33.623	2	173.93	1	0	3	.001	1	.529	3
590			min	-121.87	2	.007	15	8.363	12	0	9	-.106	4	-.947	1
591		11	max	354.745	3	32.325	2	173.93	1	0	3	.093	1	.514	3
592			min	-121.265	2	-1.558	6	8.363	12	0	9	-.062	5	-.956	1
593		12	max	367.677	3	248.888	3	199.341	4	0	3	-.007	12	.447	3
594			min	-70.649	10	-509.321	1	5.506	12	0	2	-.268	4	-.845	1
595		13	max	368.131	3	247.915	3	200.582	4	0	3	-.004	12	.316	3
596			min	-70.145	10	-510.619	1	5.506	12	0	2	-.162	4	-.575	1
597		14	max	368.585	3	246.941	3	201.824	4	0	3	-.001	12	.186	3
598			min	-69.64	10	-511.917	1	5.506	12	0	2	-.056	4	-.306	1
599		15	max	369.039	3	245.967	3	203.065	4	0	3	.051	4	.055	3
600			min	-69.136	10	-513.216	1	5.506	12	0	2	.001	12	-.035	1
601		16	max	369.493	3	244.994	3	204.306	4	0	3	.158	4	.253	2
602			min	-68.631	10	-514.514	1	5.506	12	0	2	.004	12	-.074	3
603		17	max	369.947	3	244.02	3	205.548	4	0	3	.266	4	.519	2
604			min	-68.127	10	-515.812	1	5.506	12	0	2	.007	12	-.203	3
605		18	max	-8.278	12	511.908	2	128.547	1	0	2	.275	4	.261	2
606			min	-186.386	1	-204.985	3	-86.782	5	0	3	.01	12	-.101	3
607		19	max	-7.975	12	510.609	2	128.547	1	0	2	.289	1	.008	3
608			min	-185.781	1	-205.959	3	-85.54	5	0	3	.014	12	-.01	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.094	1	.006	3	7.556e-3	1	NC	1	NC	1
2			min	-.679	4	-.009	3	-.003	2	-8.747e-4	3	NC	1	NC	1
3		2	max	.001	1	.293	3	.049	1	8.732e-3	1	NC	5	NC	2
4			min	-.679	4	-.123	1	-.023	5	-8.801e-4	3	833.167	3	5329.631	1
5		3	max	0	1	.538	3	.118	1	9.908e-3	1	NC	5	NC	3
6			min	-.679	4	-.296	1	-.028	5	-8.855e-4	3	460.301	3	2166.908	1
7		4	max	0	1	.687	3	.178	1	1.108e-2	1	NC	5	NC	3
8			min	-.679	4	-.393	1	-.019	5	-8.909e-4	3	361.849	3	1429.201	1
9		5	max	0	1	.722	3	.21	1	1.226e-2	1	NC	5	NC	3
10			min	-.679	4	-.402	1	-.003	5	-8.963e-4	3	344.594	3	1214.467	1
11		6	max	0	1	.646	3	.203	1	1.344e-2	1	NC	5	NC	3
12			min	-.679	4	-.325	1	.009	15	-9.017e-4	3	384.955	3	1254.958	1
13		7	max	0	1	.48	3	.16	1	1.461e-2	1	NC	5	NC	3
14			min	-.679	4	-.18	1	.012	10	-9.071e-4	3	514.8	3	1594.293	1
15		8	max	0	1	.271	3	.094	1	1.579e-2	1	NC	4	NC	3
16			min	-.679	4	-.01	9	.004	10	-9.125e-4	3	901.175	3	2740.534	1
17		9	max	0	1	.156	2	.032	4	1.696e-2	1	NC	4	NC	2
18			min	-.679	4	.005	15	-.004	10	-9.179e-4	3	2823.844	3	7947.731	4
19		10	max	0	1	.224	1	.019	3	1.814e-2	1	NC	3	NC	1
20			min	-.679	4	-.006	3	-.012	2	-9.233e-4	3	1934.873	1	NC	1
21		11	max	0	12	.156	2	.028	1	1.696e-2	1	NC	4	NC	2
22			min	-.679	4	.005	15	-.019	5	-9.179e-4	3	2823.844	3	9695.748	1
23		12	max	0	12	.271	3	.094	1	1.579e-2	1	NC	4	NC	3
24			min	-.679	4	-.01	9	-.019	5	-9.125e-4	3	901.175	3	2740.534	1
25		13	max	0	12	.48	3	.16	1	1.461e-2	1	NC	5	NC	3
26			min	-.679	4	-.18	1	-.006	5	-9.071e-4	3	514.8	3	1594.293	1
27		14	max	0	12	.646	3	.203	1	1.344e-2	1	NC	5	NC	3
28			min	-.679	4	-.325	1	.008	15	-9.017e-4	3	384.955	3	1254.958	1
29		15	max	0	12	.722	3	.21	1	1.226e-2	1	NC	5	NC	3
30			min	-.679	4	-.402	1	.016	12	-8.963e-4	3	344.594	3	1214.467	1
31		16	max	0	12	.687	3	.178	1	1.108e-2	1	NC	5	NC	3
32			min	-.679	4	-.393	1	.013	12	-8.909e-4	3	361.849	3	1429.201	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	.538	3	.118	1	9.908e-3	1	NC	5	NC	3
34			min	-.679	4	-.296	1	.01	12	-8.855e-4	3	460.301	3	2166.908	1
35		18	max	0	12	.293	3	.049	1	8.732e-3	1	NC	5	NC	2
36			min	-.679	4	-.123	1	.003	10	-8.801e-4	3	833.167	3	5329.631	1
37		19	max	0	12	.094	1	.006	3	7.556e-3	1	NC	1	NC	1
38			min	-.679	4	-.009	3	-.003	2	-8.747e-4	3	NC	1	NC	1
39	M14	1	max	0	1	.161	3	.005	3	4.723e-3	1	NC	1	NC	1
40			min	-.509	4	-.308	1	-.002	2	-2.905e-3	3	NC	1	NC	1
41		2	max	0	1	.441	3	.035	1	5.687e-3	1	NC	5	NC	2
42			min	-.509	4	-.638	1	-.034	5	-3.554e-3	3	763.547	1	7118.956	5
43		3	max	0	1	.676	3	.096	1	6.651e-3	1	NC	15	NC	3
44			min	-.509	4	-.92	1	-.04	5	-4.203e-3	3	411.49	1	2688.902	1
45		4	max	0	1	.836	3	.154	1	7.615e-3	1	NC	15	NC	3
46			min	-.509	4	-1.122	1	-.027	5	-4.852e-3	3	309.451	1	1663.069	1
47		5	max	0	1	.907	3	.187	1	8.579e-3	1	9593.466	15	NC	3
48			min	-.509	4	-1.227	1	-.003	5	-5.501e-3	3	274.109	1	1364.629	1
49		6	max	0	1	.889	3	.185	1	9.543e-3	1	9557.662	15	NC	3
50			min	-.509	4	-1.235	1	.015	12	-6.15e-3	3	271.8	1	1379.195	1
51		7	max	0	1	.798	3	.148	1	1.051e-2	1	NC	15	NC	3
52			min	-.509	4	-1.162	1	.011	10	-6.799e-3	3	295.155	1	1724.794	1
53		8	max	0	1	.665	3	.088	1	1.147e-2	1	NC	15	NC	3
54			min	-.509	4	-1.04	1	.004	10	-7.448e-3	3	344.49	1	2926.578	1
55		9	max	0	1	.538	3	.046	4	1.243e-2	1	NC	15	NC	1
56			min	-.509	4	-.917	1	-.004	10	-8.097e-3	3	413.884	1	5497.954	4
57		10	max	0	1	.479	3	.017	3	1.34e-2	1	NC	5	NC	1
58			min	-.509	4	-.859	1	-.011	2	-8.746e-3	3	457.661	1	NC	1
59		11	max	0	12	.538	3	.027	1	1.243e-2	1	NC	15	NC	1
60			min	-.509	4	-.917	1	-.033	5	-8.097e-3	3	413.884	1	7517.72	5
61		12	max	0	12	.665	3	.088	1	1.147e-2	1	NC	15	NC	3
62			min	-.509	4	-1.04	1	-.038	5	-7.448e-3	3	344.49	1	2926.578	1
63		13	max	0	12	.798	3	.148	1	1.051e-2	1	NC	15	NC	3
64			min	-.509	4	-1.162	1	-.023	5	-6.799e-3	3	295.155	1	1724.794	1
65		14	max	0	12	.889	3	.185	1	9.543e-3	1	9557.294	15	NC	3
66			min	-.509	4	-1.235	1	0	15	-6.15e-3	3	271.8	1	1379.195	1
67		15	max	0	12	.907	3	.187	1	8.579e-3	1	9593.002	15	NC	3
68			min	-.509	4	-1.227	1	.014	12	-5.501e-3	3	274.109	1	1364.629	1
69		16	max	0	12	.836	3	.154	1	7.615e-3	1	NC	15	NC	3
70			min	-.51	4	-1.122	1	.011	12	-4.852e-3	3	309.451	1	1663.069	1
71		17	max	0	12	.676	3	.096	1	6.651e-3	1	NC	15	NC	3
72			min	-.51	4	-.92	1	.008	12	-4.203e-3	3	411.49	1	2688.902	1
73		18	max	0	12	.441	3	.048	4	5.687e-3	1	NC	5	NC	2
74			min	-.51	4	-.638	1	.002	10	-3.554e-3	3	763.547	1	5290.627	4
75		19	max	0	12	.161	3	.005	3	4.723e-3	1	NC	1	NC	1
76			min	-.51	4	-.308	1	-.002	2	-2.905e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.165	3	.005	3	2.443e-3	3	NC	1	NC	1
78			min	-.416	4	-.307	1	-.002	2	-4.842e-3	1	NC	1	NC	1
79		2	max	0	12	.333	3	.035	1	2.993e-3	3	NC	5	NC	2
80			min	-.416	4	-.675	1	-.045	5	-5.838e-3	1	686.117	1	5413.907	5
81		3	max	0	12	.478	3	.096	1	3.544e-3	3	NC	15	NC	3
82			min	-.416	4	-.987	1	-.054	5	-6.833e-3	1	370.711	1	2681.615	1
83		4	max	0	12	.584	3	.154	1	4.094e-3	3	NC	15	NC	3
84			min	-.416	4	-1.207	1	-.038	5	-7.828e-3	1	280.025	1	1659.585	1
85		5	max	0	12	.643	3	.187	1	4.645e-3	3	9606.711	15	NC	3
86			min	-.416	4	-1.316	1	-.008	5	-8.823e-3	1	249.756	1	1362.049	1
87		6	max	0	12	.654	3	.185	1	5.195e-3	3	9573.472	15	NC	3
88			min	-.416	4	-1.314	1	.014	12	-9.818e-3	1	250.238	1	1376.501	1
89		7	max	0	12	.626	3	.149	1	5.745e-3	3	NC	15	NC	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
90			min	-.416	4	-1.22	1	.011	10	-1.081e-2	1	276.02	1	1720.677	1
91		8	max	0	12	.572	3	.089	1	6.296e-3	3	NC	15	NC	3
92			min	-.416	4	-1.072	1	.004	10	-1.181e-2	1	329.628	1	2915.272	1
93		9	max	0	12	.516	3	.056	4	6.846e-3	3	NC	15	NC	1
94			min	-.416	4	-.925	1	-.003	10	-1.28e-2	1	407.692	1	4514.975	4
95		10	max	0	1	.489	3	.016	3	7.397e-3	3	NC	5	NC	1
96			min	-.416	4	-.857	1	-.011	2	-1.38e-2	1	458.892	1	NC	1
97		11	max	0	1	.516	3	.027	1	6.846e-3	3	NC	15	NC	1
98			min	-.416	4	-.925	1	-.043	5	-1.28e-2	1	407.692	1	5789.341	5
99		12	max	0	1	.572	3	.089	1	6.296e-3	3	NC	15	NC	3
100			min	-.416	4	-1.072	1	-.05	5	-1.181e-2	1	329.628	1	2915.272	1
101		13	max	0	1	.626	3	.149	1	5.745e-3	3	NC	15	NC	3
102			min	-.416	4	-1.22	1	-.032	5	-1.081e-2	1	276.02	1	1720.677	1
103		14	max	0	1	.654	3	.185	1	5.195e-3	3	9573.191	15	NC	3
104			min	-.416	4	-1.314	1	-.001	5	-9.818e-3	1	250.238	1	1376.501	1
105		15	max	0	1	.643	3	.187	1	4.645e-3	3	9606.359	15	NC	3
106			min	-.415	4	-1.316	1	.013	12	-8.823e-3	1	249.756	1	1362.049	1
107		16	max	0	1	.584	3	.154	1	4.094e-3	3	NC	15	NC	3
108			min	-.415	4	-1.207	1	.011	12	-7.828e-3	1	280.025	1	1659.585	1
109		17	max	0	1	.478	3	.096	1	3.544e-3	3	NC	15	NC	3
110			min	-.415	4	-.987	1	.008	12	-6.833e-3	1	370.711	1	2681.615	1
111		18	max	0	1	.333	3	.059	4	2.993e-3	3	NC	5	NC	2
112			min	-.415	4	-.675	1	.002	10	-5.838e-3	1	686.117	1	4278.043	4
113		19	max	0	1	.165	3	.005	3	2.443e-3	3	NC	1	NC	1
114			min	-.415	4	-.307	1	-.002	2	-4.842e-3	1	NC	1	NC	1
115	M16	1	max	0	12	.092	1	.004	3	4.313e-3	3	NC	1	NC	1
116			min	-.15	4	-.054	3	-.002	2	-7.046e-3	1	NC	1	NC	1
117		2	max	0	12	.045	3	.049	1	5.123e-3	3	NC	5	NC	2
118			min	-.15	4	-.182	2	-.035	5	-8.096e-3	1	957.004	2	5366.209	1
119		3	max	0	12	.123	3	.118	1	5.932e-3	3	NC	5	NC	3
120			min	-.15	4	-.392	2	-.043	5	-9.147e-3	1	532.155	2	2174.255	1
121		4	max	0	12	.165	3	.178	1	6.742e-3	3	NC	5	NC	3
122			min	-.15	4	-.514	2	-.031	5	-1.02e-2	1	423.422	2	1431.385	1
123		5	max	0	12	.165	3	.209	1	7.552e-3	3	NC	5	NC	3
124			min	-.15	4	-.53	2	-.01	5	-1.125e-2	1	411.907	2	1214.511	1
125		6	max	0	12	.124	3	.203	1	8.361e-3	3	NC	5	NC	3
126			min	-.15	4	-.445	2	.01	15	-1.23e-2	1	478.825	2	1252.872	1
127		7	max	0	12	.052	3	.161	1	9.171e-3	3	NC	5	NC	3
128			min	-.15	4	-.279	2	.013	10	-1.335e-2	1	698.736	2	1587.265	1
129		8	max	0	12	.001	13	.095	1	9.98e-3	3	NC	3	NC	3
130			min	-.15	4	-.074	2	.005	10	-1.44e-2	1	1614.802	2	2710.129	1
131		9	max	0	12	.137	1	.041	4	1.079e-2	3	NC	4	NC	2
132			min	-.15	4	-.112	3	-.003	10	-1.545e-2	1	4299.317	3	6198.523	4
133		10	max	0	1	.218	1	.014	3	1.16e-2	3	NC	5	NC	1
134			min	-.15	4	-.147	3	-.01	2	-1.65e-2	1	1987.07	1	NC	1
135		11	max	0	1	.137	1	.029	1	1.079e-2	3	NC	4	NC	2
136			min	-.15	4	-.112	3	-.028	5	-1.545e-2	1	4299.317	3	8960.178	5
137		12	max	0	1	.001	13	.095	1	9.98e-3	3	NC	3	NC	3
138			min	-.15	4	-.074	2	-.029	5	-1.44e-2	1	1614.802	2	2710.129	1
139		13	max	0	1	.052	3	.161	1	9.171e-3	3	NC	5	NC	3
140			min	-.15	4	-.279	2	-.013	5	-1.335e-2	1	698.736	2	1587.265	1
141		14	max	0	1	.124	3	.203	1	8.361e-3	3	NC	5	NC	3
142			min	-.15	4	-.445	2	.008	15	-1.23e-2	1	478.825	2	1252.872	1
143		15	max	0	1	.165	3	.209	1	7.552e-3	3	NC	5	NC	3
144			min	-.15	4	-.53	2	.014	12	-1.125e-2	1	411.907	2	1214.511	1
145		16	max	0	1	.165	3	.178	1	6.742e-3	3	NC	5	NC	3
146			min	-.15	4	-.514	2	.012	12	-1.02e-2	1	423.422	2	1431.385	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
147		17	max	0	1	.123	3	.118	1	5.932e-3	3	NC	5	NC	3
148			min	-.15	4	-.392	2	.008	12	-9.147e-3	1	532.155	2	2174.255	1
149		18	max	.001	1	.045	3	.053	4	5.123e-3	3	NC	5	NC	2
150			min	-.15	4	-.182	2	.003	10	-8.096e-3	1	957.004	2	4729.561	4
151		19	max	.001	1	.092	1	.004	3	4.313e-3	3	NC	1	NC	1
152			min	-.15	4	-.054	3	-.002	2	-7.046e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.005	2	.009	1	1.513e-3	5	NC	1	NC	2
154			min	-.006	3	-.009	3	-.636	4	-2.581e-4	1	NC	1	98.563	4
155		2	max	.006	1	.004	2	.009	1	1.617e-3	5	NC	1	NC	2
156			min	-.006	3	-.008	3	-.585	4	-2.421e-4	1	NC	1	107.307	4
157		3	max	.005	1	.003	2	.008	1	1.721e-3	5	NC	1	NC	2
158			min	-.005	3	-.008	3	-.533	4	-2.261e-4	1	NC	1	117.687	4
159		4	max	.005	1	.002	2	.007	1	1.825e-3	5	NC	1	NC	2
160			min	-.005	3	-.008	3	-.482	4	-2.101e-4	1	NC	1	130.13	4
161		5	max	.005	1	.002	2	.006	1	1.93e-3	5	NC	1	NC	1
162			min	-.005	3	-.008	3	-.432	4	-1.941e-4	1	NC	1	145.212	4
163		6	max	.004	1	.001	2	.006	1	2.034e-3	5	NC	1	NC	1
164			min	-.004	3	-.007	3	-.383	4	-1.781e-4	1	NC	1	163.733	4
165		7	max	.004	1	0	2	.005	1	2.138e-3	5	NC	1	NC	1
166			min	-.004	3	-.007	3	-.336	4	-1.621e-4	1	NC	1	186.825	4
167		8	max	.004	1	0	2	.004	1	2.242e-3	5	NC	1	NC	1
168			min	-.004	3	-.007	3	-.29	4	-1.461e-4	1	NC	1	216.137	4
169		9	max	.003	1	0	15	.003	1	2.346e-3	4	NC	1	NC	1
170			min	-.003	3	-.006	3	-.247	4	-1.301e-4	1	NC	1	254.148	4
171		10	max	.003	1	0	15	.003	1	2.456e-3	4	NC	1	NC	1
172			min	-.003	3	-.006	3	-.206	4	-1.141e-4	1	NC	1	304.721	4
173		11	max	.003	1	0	15	.002	1	2.566e-3	4	NC	1	NC	1
174			min	-.003	3	-.005	3	-.168	4	-9.808e-5	1	NC	1	374.163	4
175		12	max	.002	1	0	15	.002	1	2.676e-3	4	NC	1	NC	1
176			min	-.002	3	-.005	3	-.133	4	-8.208e-5	1	NC	1	473.343	4
177		13	max	.002	1	0	15	.001	1	2.786e-3	4	NC	1	NC	1
178			min	-.002	3	-.004	3	-.101	4	-6.608e-5	1	NC	1	622.357	4
179		14	max	.002	1	0	15	0	1	2.896e-3	4	NC	1	NC	1
180			min	-.002	3	-.004	3	-.073	4	-5.008e-5	1	NC	1	861.871	4
181		15	max	.001	1	0	15	0	1	3.006e-3	4	NC	1	NC	1
182			min	-.001	3	-.003	3	-.049	4	-3.408e-5	1	NC	1	1284.969	4
183		16	max	0	1	0	15	0	1	3.116e-3	4	NC	1	NC	1
184			min	0	3	-.002	3	-.029	4	-1.808e-5	1	NC	1	2146.354	4
185		17	max	0	1	0	15	0	1	3.226e-3	4	NC	1	NC	1
186			min	0	3	-.002	6	-.014	4	-2.083e-6	1	NC	1	4375.27	4
187		18	max	0	1	0	15	0	1	3.336e-3	4	NC	1	NC	1
188			min	0	3	0	6	-.004	4	4.923e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.446e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	1.292e-6	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-4.339e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.423e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.016	4	1.699e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	12	-1.394e-4	5	NC	1	NC	1
195		3	max	0	3	0	15	.031	4	5.681e-4	4	NC	1	NC	1
196			min	0	2	-.003	6	0	12	2.046e-6	12	NC	1	NC	1
197		4	max	0	3	-.001	15	.045	4	1.273e-3	4	NC	1	NC	1
198			min	0	2	-.005	6	0	12	3.286e-6	12	NC	1	8671.54	5
199		5	max	.001	3	-.002	15	.059	4	1.979e-3	4	NC	1	NC	1
200			min	0	2	-.007	6	0	12	4.526e-6	12	NC	1	7680.739	5
201		6	max	.001	3	-.002	15	.071	4	2.684e-3	4	NC	1	NC	1
202			min	-.001	2	-.009	6	0	12	5.765e-6	12	NC	1	7404.035	5
203		7	max	.002	3	-.002	15	.082	4	3.389e-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	-.001	2	-.01	6	0	12	7.005e-6	12	8740.622	6	7625.001	5
205		8	max	.002	3	-.003	15	.093	4	4.094e-3	4	NC	1	NC	1
206			min	-.001	2	-.012	6	0	12	8.245e-6	12	7838.552	6	8347.493	5
207		9	max	.002	3	-.003	15	.103	4	4.799e-3	4	NC	2	NC	1
208			min	-.002	2	-.013	6	0	12	9.485e-6	12	7304.179	6	9759.654	5
209		10	max	.002	3	-.003	15	.112	4	5.504e-3	4	NC	3	NC	1
210			min	-.002	2	-.013	6	0	12	1.072e-5	12	7044.155	6	NC	1
211		11	max	.003	3	-.003	15	.122	4	6.21e-3	4	NC	3	NC	1
212			min	-.002	2	-.013	6	0	12	1.196e-5	12	7020.084	6	NC	1
213		12	max	.003	3	-.003	15	.131	4	6.915e-3	4	NC	3	NC	1
214			min	-.002	2	-.013	6	0	12	1.32e-5	12	7233.792	6	NC	1
215		13	max	.003	3	-.003	15	.141	4	7.62e-3	4	NC	1	NC	1
216			min	-.002	2	-.012	6	0	12	1.444e-5	12	7729.903	6	NC	1
217		14	max	.004	3	-.002	15	.15	4	8.325e-3	4	NC	1	NC	1
218			min	-.003	2	-.011	6	0	12	1.568e-5	12	8619.072	6	NC	1
219		15	max	.004	3	-.002	15	.161	4	9.03e-3	4	NC	1	NC	1
220			min	-.003	2	-.009	6	0	12	1.692e-5	12	NC	1	NC	1
221		16	max	.004	3	-.001	15	.172	4	9.736e-3	4	NC	1	NC	1
222			min	-.003	2	-.008	1	0	12	1.816e-5	12	NC	1	NC	1
223		17	max	.004	3	0	15	.184	4	1.044e-2	4	NC	1	NC	1
224			min	-.003	2	-.006	1	0	12	1.94e-5	12	NC	1	NC	1
225		18	max	.005	3	0	15	.196	4	1.115e-2	4	NC	1	NC	1
226			min	-.003	2	-.004	1	0	12	2.064e-5	12	NC	1	NC	1
227		19	max	.005	3	0	5	.211	4	1.185e-2	4	NC	1	NC	1
228			min	-.004	2	-.003	1	0	12	2.188e-5	12	NC	1	NC	1
229	M4	1	max	.003	1	.003	2	0	12	6.44e-5	1	NC	1	NC	3
230			min	0	3	-.005	3	-.211	4	-3.637e-4	5	NC	1	117.635	4
231		2	max	.003	1	.003	2	0	12	6.44e-5	1	NC	1	NC	3
232			min	0	3	-.005	3	-.194	4	-3.637e-4	5	NC	1	127.93	4
233		3	max	.002	1	.003	2	0	12	6.44e-5	1	NC	1	NC	3
234			min	0	3	-.004	3	-.177	4	-3.637e-4	5	NC	1	140.182	4
235		4	max	.002	1	.003	2	0	12	6.44e-5	1	NC	1	NC	3
236			min	0	3	-.004	3	-.16	4	-3.637e-4	5	NC	1	154.898	4
237		5	max	.002	1	.002	2	0	12	6.44e-5	1	NC	1	NC	2
238			min	0	3	-.004	3	-.144	4	-3.637e-4	5	NC	1	172.769	4
239		6	max	.002	1	.002	2	0	12	6.44e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.127	4	-3.637e-4	5	NC	1	194.752	4
241		7	max	.002	1	.002	2	0	12	6.44e-5	1	NC	1	NC	2
242			min	0	3	-.003	3	-.112	4	-3.637e-4	5	NC	1	222.209	4
243		8	max	.002	1	.002	2	0	12	6.44e-5	1	NC	1	NC	2
244			min	0	3	-.003	3	-.096	4	-3.637e-4	5	NC	1	257.121	4
245		9	max	.001	1	.002	2	0	12	6.44e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.082	4	-3.637e-4	5	NC	1	302.475	4
247		10	max	.001	1	.002	2	0	12	6.44e-5	1	NC	1	NC	2
248			min	0	3	-.002	3	-.068	4	-3.637e-4	5	NC	1	362.935	4
249		11	max	.001	1	.001	2	0	12	6.44e-5	1	NC	1	NC	1
250			min	0	3	-.002	3	-.056	4	-3.637e-4	5	NC	1	446.137	4
251		12	max	.001	1	.001	2	0	12	6.44e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.044	4	-3.637e-4	5	NC	1	565.285	4
253		13	max	0	1	.001	2	0	12	6.44e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.033	4	-3.637e-4	5	NC	1	744.887	4
255		14	max	0	1	0	2	0	12	6.44e-5	1	NC	1	NC	1
256			min	0	3	-.001	3	-.024	4	-3.637e-4	5	NC	1	1034.8	4
257		15	max	0	1	0	2	0	12	6.44e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	-.016	4	-3.637e-4	5	NC	1	1549.949	4
259		16	max	0	1	0	2	0	12	6.44e-5	1	NC	1	NC	1
260			min	0	3	0	3	-.01	4	-3.637e-4	5	NC	1	2608	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
261		17	max	0	1	0	2	0	12	6.44e-5	1	NC	1	NC	1
262			min	0	3	0	3	-.005	4	-3.637e-4	5	NC	1	5386.64	4
263		18	max	0	1	0	2	0	12	6.44e-5	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-3.637e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.44e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-3.637e-4	5	NC	1	NC	1
267	M6	1	max	.019	1	.019	2	0	1	1.604e-3	4	NC	3	NC	1
268			min	-.02	3	-.027	3	-.642	4	0	1	3286.919	2	97.642	4
269		2	max	.018	1	.017	2	0	1	1.706e-3	4	NC	3	NC	1
270			min	-.019	3	-.025	3	-.59	4	0	1	3614.534	2	106.306	4
271		3	max	.017	1	.016	2	0	1	1.808e-3	4	NC	3	NC	1
272			min	-.017	3	-.024	3	-.538	4	0	1	4011.215	2	116.592	4
273		4	max	.016	1	.014	2	0	1	1.91e-3	4	NC	3	NC	1
274			min	-.016	3	-.023	3	-.487	4	0	1	4497.042	2	128.921	4
275		5	max	.015	1	.012	2	0	1	2.012e-3	4	NC	1	NC	1
276			min	-.015	3	-.021	3	-.436	4	0	1	5100.218	2	143.866	4
277		6	max	.014	1	.011	2	0	1	2.115e-3	4	NC	1	NC	1
278			min	-.014	3	-.02	3	-.387	4	0	1	5861.364	2	162.22	4
279		7	max	.013	1	.009	2	0	1	2.217e-3	4	NC	1	NC	1
280			min	-.013	3	-.018	3	-.339	4	0	1	6840.748	2	185.104	4
281		8	max	.012	1	.008	2	0	1	2.319e-3	4	NC	1	NC	1
282			min	-.012	3	-.017	3	-.293	4	0	1	8130.994	2	214.154	4
283		9	max	.01	1	.006	2	0	1	2.421e-3	4	NC	1	NC	1
284			min	-.011	3	-.015	3	-.249	4	0	1	9880.61	2	251.827	4
285		10	max	.009	1	.005	2	0	1	2.523e-3	4	NC	1	NC	1
286			min	-.01	3	-.014	3	-.208	4	0	1	NC	1	301.954	4
287		11	max	.008	1	.004	2	0	1	2.625e-3	4	NC	1	NC	1
288			min	-.009	3	-.012	3	-.169	4	0	1	NC	1	370.788	4
289		12	max	.007	1	.003	2	0	1	2.727e-3	4	NC	1	NC	1
290			min	-.008	3	-.011	3	-.134	4	0	1	NC	1	469.109	4
291		13	max	.006	1	.002	2	0	1	2.829e-3	4	NC	1	NC	1
292			min	-.007	3	-.009	3	-.102	4	0	1	NC	1	616.85	4
293		14	max	.005	1	.001	2	0	1	2.932e-3	4	NC	1	NC	1
294			min	-.005	3	-.008	3	-.073	4	0	1	NC	1	854.357	4
295		15	max	.004	1	0	2	0	1	3.034e-3	4	NC	1	NC	1
296			min	-.004	3	-.006	3	-.049	4	0	1	NC	1	1273.999	4
297		16	max	.003	1	0	2	0	1	3.136e-3	4	NC	1	NC	1
298			min	-.003	3	-.005	3	-.029	4	0	1	NC	1	2128.628	4
299		17	max	.002	1	0	2	0	1	3.238e-3	4	NC	1	NC	1
300			min	-.002	3	-.003	3	-.014	4	0	1	NC	1	4341.275	4
301		18	max	.001	1	0	2	0	1	3.34e-3	4	NC	1	NC	1
302			min	-.001	3	-.002	3	-.005	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.442e-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	-8.403e-4	4	NC	1	NC	1
307		2	max	0	3	0	15	.016	4	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	-1.53e-4	4	NC	1	NC	1
309		3	max	.002	3	0	15	.031	4	5.344e-4	4	NC	1	NC	1
310			min	-.002	2	-.004	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	.045	4	1.222e-3	4	NC	1	NC	1
312			min	-.002	2	-.006	3	0	1	0	1	NC	1	8019.402	4
313		5	max	.003	3	-.002	15	.058	4	1.909e-3	4	NC	1	NC	1
314			min	-.003	2	-.008	3	0	1	0	1	NC	1	7043.351	4
315		6	max	.004	3	-.002	15	.07	4	2.596e-3	4	NC	1	NC	1
316			min	-.004	2	-.01	3	0	1	0	1	NC	1	6717.406	4
317		7	max	.005	3	-.003	15	.081	4	3.284e-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	-.005	2	-.011	3	0	1	0	1	8817.988	4	6822.043	4
319		8	max	.006	3	-.003	15	.092	4	3.971e-3	4	NC	1	NC	1
320			min	-.006	2	-.012	3	0	1	0	1	7902.834	4	7328.24	4
321		9	max	.007	3	-.003	15	.102	4	4.658e-3	4	NC	1	NC	1
322			min	-.007	2	-.013	4	0	1	0	1	7360.141	4	8337.943	4
323		10	max	.008	3	-.003	15	.111	4	5.346e-3	4	NC	1	NC	1
324			min	-.007	2	-.014	4	0	1	0	1	7094.949	4	NC	1
325		11	max	.008	3	-.003	15	.12	4	6.033e-3	4	NC	1	NC	1
326			min	-.008	2	-.014	4	0	1	0	1	7068.046	4	NC	1
327		12	max	.009	3	-.003	15	.129	4	6.72e-3	4	NC	1	NC	1
328			min	-.009	2	-.013	4	0	1	0	1	7280.908	4	NC	1
329		13	max	.01	3	-.003	15	.138	4	7.408e-3	4	NC	1	NC	1
330			min	-.01	2	-.013	4	0	1	0	1	7778.185	4	NC	1
331		14	max	.011	3	-.003	15	.148	4	8.095e-3	4	NC	1	NC	1
332			min	-.011	2	-.012	4	0	1	0	1	8670.995	4	NC	1
333		15	max	.012	3	-.002	15	.157	4	8.782e-3	4	NC	1	NC	1
334			min	-.011	2	-.01	3	0	1	0	1	NC	1	NC	1
335		16	max	.013	3	-.002	15	.168	4	9.47e-3	4	NC	1	NC	1
336			min	-.012	2	-.009	1	0	1	0	1	NC	1	NC	1
337		17	max	.014	3	-.001	15	.179	4	1.016e-2	4	NC	1	NC	1
338			min	-.013	2	-.008	1	0	1	0	1	NC	1	NC	1
339		18	max	.014	3	0	15	.191	4	1.084e-2	4	NC	1	NC	1
340			min	-.014	2	-.006	1	0	1	0	1	NC	1	NC	1
341		19	max	.015	3	0	15	.205	4	1.153e-2	4	NC	1	NC	1
342			min	-.015	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.014	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.016	3	-.205	4	-4.41e-4	4	NC	1	121.244	4
345		2	max	.007	1	.013	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.015	3	-.188	4	-4.41e-4	4	NC	1	131.861	4
347		3	max	.006	1	.012	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.014	3	-.172	4	-4.41e-4	4	NC	1	144.495	4
349		4	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.013	3	-.155	4	-4.41e-4	4	NC	1	159.67	4
351		5	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.012	3	-.139	4	-4.41e-4	4	NC	1	178.098	4
353		6	max	.005	1	.01	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.011	3	-.124	4	-4.41e-4	4	NC	1	200.767	4
355		7	max	.005	1	.009	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.01	3	-.108	4	-4.41e-4	4	NC	1	229.079	4
357		8	max	.004	1	.008	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.01	3	-.094	4	-4.41e-4	4	NC	1	265.079	4
359		9	max	.004	1	.008	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.009	3	-.08	4	-4.41e-4	4	NC	1	311.846	4
361		10	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.008	3	-.066	4	-4.41e-4	4	NC	1	374.19	4
363		11	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.007	3	-.054	4	-4.41e-4	4	NC	1	459.985	4
365		12	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.006	3	-.043	4	-4.41e-4	4	NC	1	582.847	4
367		13	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.005	3	-.032	4	-4.41e-4	4	NC	1	768.049	4
369		14	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.004	3	-.023	4	-4.41e-4	4	NC	1	1067.005	4
371		15	max	.002	1	.003	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.003	3	-.016	4	-4.41e-4	4	NC	1	1598.228	4
373		16	max	.001	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	-.009	4	-4.41e-4	4	NC	1	2689.309	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	-.004	4	-4.41e-4	4	NC	1	5554.756	4
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	3	-.001	4	-4.41e-4	4	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	-4.41e-4	4	NC	1	NC	1
381	M10	1	max	.006	1	.005	2	0	12	1.614e-3	4	NC	1	NC	2
382			min	-.006	3	-.009	3	-.642	4	1.31e-5	12	NC	1	97.752	4
383		2	max	.006	1	.004	2	0	12	1.714e-3	4	NC	1	NC	2
384			min	-.006	3	-.008	3	-.589	4	1.23e-5	12	NC	1	106.426	4
385		3	max	.005	1	.003	2	0	12	1.815e-3	4	NC	1	NC	2
386			min	-.005	3	-.008	3	-.537	4	1.15e-5	12	NC	1	116.723	4
387		4	max	.005	1	.002	2	0	12	1.916e-3	4	NC	1	NC	2
388			min	-.005	3	-.008	3	-.486	4	1.07e-5	12	NC	1	129.067	4
389		5	max	.005	1	.002	2	0	12	2.017e-3	4	NC	1	NC	1
390			min	-.005	3	-.008	3	-.435	4	9.903e-6	12	NC	1	144.029	4
391		6	max	.004	1	.001	2	0	12	2.118e-3	4	NC	1	NC	1
392			min	-.004	3	-.007	3	-.386	4	9.103e-6	12	NC	1	162.404	4
393		7	max	.004	1	0	2	0	12	2.218e-3	4	NC	1	NC	1
394			min	-.004	3	-.007	3	-.338	4	8.304e-6	12	NC	1	185.316	4
395		8	max	.004	1	0	2	0	12	2.319e-3	4	NC	1	NC	1
396			min	-.004	3	-.007	3	-.293	4	7.504e-6	12	NC	1	214.401	4
397		9	max	.003	1	0	2	0	12	2.42e-3	4	NC	1	NC	1
398			min	-.003	3	-.006	3	-.249	4	6.705e-6	12	NC	1	252.119	4
399		10	max	.003	1	-.001	2	0	12	2.521e-3	4	NC	1	NC	1
400			min	-.003	3	-.006	3	-.207	4	5.905e-6	12	NC	1	302.307	4
401		11	max	.003	1	-.001	15	0	12	2.622e-3	4	NC	1	NC	1
402			min	-.003	3	-.005	3	-.169	4	5.105e-6	12	NC	1	371.226	4
403		12	max	.002	1	-.001	15	0	12	2.723e-3	4	NC	1	NC	1
404			min	-.002	3	-.005	3	-.134	4	4.306e-6	12	NC	1	469.672	4
405		13	max	.002	1	-.001	15	0	12	2.823e-3	4	NC	1	NC	1
406			min	-.002	3	-.004	3	-.102	4	3.506e-6	12	NC	1	617.605	4
407		14	max	.002	1	-.001	15	0	12	2.924e-3	4	NC	1	NC	1
408			min	-.002	3	-.004	4	-.073	4	2.706e-6	12	NC	1	855.431	4
409		15	max	.001	1	0	15	0	12	3.025e-3	4	NC	1	NC	1
410			min	-.001	3	-.003	4	-.049	4	1.907e-6	12	NC	1	1275.661	4
411		16	max	0	1	0	15	0	12	3.126e-3	4	NC	1	NC	1
412			min	0	3	-.003	4	-.029	4	1.107e-6	12	NC	1	2131.567	4
413		17	max	0	1	0	15	0	12	3.227e-3	4	NC	1	NC	1
414			min	0	3	-.002	4	-.014	4	1.455e-7	10	NC	1	4347.858	4
415		18	max	0	1	0	15	0	12	3.327e-3	4	NC	1	NC	1
416			min	0	3	-.001	4	-.005	4	-1.392e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.428e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.992e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	9.869e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-8.366e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.016	4	-8.059e-7	12	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.467e-4	4	NC	1	NC	1
423		3	max	0	3	0	15	.031	4	5.432e-4	4	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-4.385e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	.045	4	1.233e-3	4	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-7.071e-5	1	NC	1	8309.399	4
427		5	max	.001	3	-.002	15	.058	4	1.923e-3	4	NC	1	NC	1
428			min	0	2	-.008	4	0	1	-9.757e-5	1	NC	1	7335.518	4
429		6	max	.001	3	-.002	15	.07	4	2.613e-3	4	NC	1	NC	1
430			min	-.001	2	-.01	4	-.001	1	-1.244e-4	1	9855.017	4	7040.975	4
431		7	max	.002	3	-.003	15	.081	4	3.303e-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	-.001	2	-.011	4	-.001	1	-1.513e-4	1	8466.462	4	7209.895	4
433		8	max	.002	3	-.003	15	.092	4	3.993e-3	4	NC	1	NC	1
434			min	-.001	2	-.012	4	-.002	1	-1.781e-4	1	7610.086	4	7831.06	4
435		9	max	.002	3	-.003	15	.101	4	4.683e-3	4	NC	2	NC	1
436			min	-.002	2	-.013	4	-.002	1	-2.05e-4	1	7104.801	4	9050.682	4
437		10	max	.002	3	-.003	15	.111	4	5.372e-3	4	NC	3	NC	1
438			min	-.002	2	-.014	4	-.002	1	-2.319e-4	1	6862.818	4	NC	1
439		11	max	.003	3	-.003	15	.12	4	6.062e-3	4	NC	3	NC	1
440			min	-.002	2	-.014	4	-.003	1	-2.587e-4	1	6848.565	4	NC	1
441		12	max	.003	3	-.003	15	.129	4	6.752e-3	4	NC	3	NC	1
442			min	-.002	2	-.014	4	-.003	1	-2.856e-4	1	7065.052	4	NC	1
443		13	max	.003	3	-.003	15	.138	4	7.442e-3	4	NC	1	NC	1
444			min	-.002	2	-.013	4	-.004	1	-3.124e-4	1	7556.778	4	NC	1
445		14	max	.004	3	-.003	15	.148	4	8.132e-3	4	NC	1	NC	1
446			min	-.003	2	-.012	4	-.005	1	-3.393e-4	1	8432.703	4	NC	1
447		15	max	.004	3	-.003	15	.158	4	8.822e-3	4	NC	1	NC	1
448			min	-.003	2	-.01	4	-.005	1	-3.662e-4	1	9933.945	4	NC	1
449		16	max	.004	3	-.002	15	.168	4	9.512e-3	4	NC	1	NC	1
450			min	-.003	2	-.008	4	-.006	1	-3.93e-4	1	NC	1	NC	1
451		17	max	.004	3	-.002	15	.18	4	1.02e-2	4	NC	1	NC	1
452			min	-.003	2	-.006	4	-.007	1	-4.199e-4	1	NC	1	NC	1
453		18	max	.005	3	-.001	15	.192	4	1.089e-2	4	NC	1	NC	1
454			min	-.003	2	-.004	1	-.008	1	-4.467e-4	1	NC	1	NC	1
455		19	max	.005	3	0	10	.206	4	1.158e-2	4	NC	1	NC	1
456			min	-.004	2	-.003	1	-.009	1	-4.736e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.003	2	.009	1	-3.164e-6	12	NC	1	NC	3
458			min	0	3	-.005	3	-.206	4	-3.913e-4	4	NC	1	120.51	4
459		2	max	.003	1	.003	2	.008	1	-3.164e-6	12	NC	1	NC	3
460			min	0	3	-.005	3	-.189	4	-3.913e-4	4	NC	1	131.058	4
461		3	max	.002	1	.003	2	.007	1	-3.164e-6	12	NC	1	NC	3
462			min	0	3	-.004	3	-.173	4	-3.913e-4	4	NC	1	143.61	4
463		4	max	.002	1	.003	2	.007	1	-3.164e-6	12	NC	1	NC	3
464			min	0	3	-.004	3	-.156	4	-3.913e-4	4	NC	1	158.686	4
465		5	max	.002	1	.002	2	.006	1	-3.164e-6	12	NC	1	NC	2
466			min	0	3	-.004	3	-.14	4	-3.913e-4	4	NC	1	176.995	4
467		6	max	.002	1	.002	2	.005	1	-3.164e-6	12	NC	1	NC	2
468			min	0	3	-.004	3	-.124	4	-3.913e-4	4	NC	1	199.517	4
469		7	max	.002	1	.002	2	.005	1	-3.164e-6	12	NC	1	NC	2
470			min	0	3	-.003	3	-.109	4	-3.913e-4	4	NC	1	227.646	4
471		8	max	.002	1	.002	2	.004	1	-3.164e-6	12	NC	1	NC	2
472			min	0	3	-.003	3	-.094	4	-3.913e-4	4	NC	1	263.414	4
473		9	max	.001	1	.002	2	.003	1	-3.164e-6	12	NC	1	NC	2
474			min	0	3	-.003	3	-.08	4	-3.913e-4	4	NC	1	309.877	4
475		10	max	.001	1	.002	2	.003	1	-3.164e-6	12	NC	1	NC	2
476			min	0	3	-.002	3	-.067	4	-3.913e-4	4	NC	1	371.819	4
477		11	max	.001	1	.001	2	.002	1	-3.164e-6	12	NC	1	NC	1
478			min	0	3	-.002	3	-.054	4	-3.913e-4	4	NC	1	457.058	4
479		12	max	.001	1	.001	2	.002	1	-3.164e-6	12	NC	1	NC	1
480			min	0	3	-.002	3	-.043	4	-3.913e-4	4	NC	1	579.124	4
481		13	max	0	1	.001	2	.001	1	-3.164e-6	12	NC	1	NC	1
482			min	0	3	-.002	3	-.033	4	-3.913e-4	4	NC	1	763.124	4
483		14	max	0	1	0	2	.001	1	-3.164e-6	12	NC	1	NC	1
484			min	0	3	-.001	3	-.023	4	-3.913e-4	4	NC	1	1060.137	4
485		15	max	0	1	0	2	0	1	-3.164e-6	12	NC	1	NC	1
486			min	0	3	-.001	3	-.016	4	-3.913e-4	4	NC	1	1587.903	4
487		16	max	0	1	0	2	0	1	-3.164e-6	12	NC	1	NC	1
488			min	0	3	0	3	-.009	4	-3.913e-4	4	NC	1	2671.867	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	-3.164e-6	12	NC	1	NC	1
490			min	0	3	0	3	-.004	4	-3.913e-4	4	NC	1	5518.567	4
491		18	max	0	1	0	2	0	1	-3.164e-6	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-3.913e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.164e-6	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-3.913e-4	4	NC	1	NC	1
495	M1	1	max	.006	3	.094	1	.679	4	1.613e-2	1	NC	1	NC	1
496			min	-.003	2	-.009	3	0	12	-2.241e-2	3	NC	1	NC	1
497		2	max	.006	3	.046	1	.658	4	8.975e-3	4	NC	3	NC	1
498			min	-.003	2	-.003	3	-.006	1	-1.109e-2	3	2375.192	1	NC	1
499		3	max	.006	3	.009	3	.636	4	1.45e-2	4	NC	5	NC	1
500			min	-.003	2	-.008	2	-.009	1	-1.911e-4	1	1136.3	1	6546.534	5
501		4	max	.006	3	.031	3	.614	4	1.27e-2	4	NC	5	NC	1
502			min	-.003	2	-.067	1	-.009	1	-3.904e-3	3	709.898	1	4655.685	5
503		5	max	.006	3	.061	3	.591	4	1.091e-2	4	NC	15	NC	1
504			min	-.002	2	-.131	1	-.006	1	-7.699e-3	3	507.901	1	3704.768	5
505		6	max	.006	3	.094	3	.568	4	1.338e-2	1	NC	15	NC	1
506			min	-.002	2	-.194	1	-.003	1	-1.149e-2	3	397.361	1	3134.935	5
507		7	max	.006	3	.126	3	.544	4	1.79e-2	1	NC	15	NC	1
508			min	-.002	2	-.25	1	0	12	-1.529e-2	3	332.469	1	2741.34	4
509		8	max	.006	3	.153	3	.52	4	2.243e-2	1	8916.973	15	NC	1
510			min	-.002	2	-.294	1	0	12	-1.908e-2	3	294.239	1	2458.797	4
511		9	max	.005	3	.17	3	.494	4	2.475e-2	1	8331.455	15	NC	1
512			min	-.002	2	-.323	1	0	1	-1.905e-2	3	274.394	1	2288.24	4
513		10	max	.005	3	.176	3	.465	4	2.561e-2	1	8153.195	15	NC	1
514			min	-.002	2	-.332	1	0	12	-1.647e-2	3	268.455	1	2241.318	4
515		11	max	.005	3	.172	3	.435	4	2.648e-2	1	8331.195	15	NC	1
516			min	-.002	2	-.322	1	0	12	-1.389e-2	3	274.755	1	2297.374	4
517		12	max	.005	3	.158	3	.402	4	2.504e-2	1	8916.381	15	NC	1
518			min	-.002	2	-.293	1	-.001	1	-1.143e-2	3	295.371	1	2471.823	4
519		13	max	.005	3	.134	3	.365	4	2.015e-2	1	NC	15	NC	1
520			min	-.002	2	-.248	1	0	1	-9.149e-3	3	335.278	1	2908.245	4
521		14	max	.005	3	.104	3	.327	4	1.527e-2	1	NC	15	NC	1
522			min	-.002	2	-.19	1	0	12	-6.866e-3	3	403.426	1	3811.143	4
523		15	max	.005	3	.071	3	.287	4	1.038e-2	1	NC	15	NC	1
524			min	-.002	2	-.127	1	0	12	-4.583e-3	3	520.462	1	5761.463	4
525		16	max	.005	3	.036	3	.248	4	9.769e-3	4	NC	5	NC	1
526			min	-.002	2	-.063	1	0	12	-2.3e-3	3	736.489	1	NC	1
527		17	max	.004	3	.003	3	.212	4	1.09e-2	4	NC	5	NC	1
528			min	-.002	2	-.004	2	0	12	-1.745e-5	3	1196.744	1	NC	1
529		18	max	.004	3	.047	1	.179	4	9.763e-3	2	NC	4	NC	1
530			min	-.002	2	-.026	3	0	12	-3.628e-3	3	2529.177	1	NC	1
531		19	max	.004	3	.092	1	.15	4	1.955e-2	2	NC	1	NC	1
532			min	-.002	2	-.054	3	-.001	1	-7.377e-3	3	NC	1	NC	1
533	M5	1	max	.019	3	.224	1	.679	4	0	1	NC	1	NC	1
534			min	-.012	2	-.006	3	0	1	-4.253e-6	4	NC	1	NC	1
535		2	max	.019	3	.108	1	.662	4	7.444e-3	4	NC	5	NC	1
536			min	-.013	2	.002	3	0	1	0	1	982.175	1	9119.196	4
537		3	max	.019	3	.028	3	.642	4	1.466e-2	4	NC	5	NC	1
538			min	-.013	2	-.025	2	0	1	0	1	459.721	1	5291.937	4
539		4	max	.019	3	.091	3	.619	4	1.194e-2	4	9456.513	15	NC	1
540			min	-.012	2	-.185	1	0	1	0	1	279.42	1	4039.8	4
541		5	max	.018	3	.178	3	.595	4	9.229e-3	4	6620.859	15	NC	1
542			min	-.012	2	-.36	1	0	1	0	1	195.574	1	3428.003	4
543		6	max	.018	3	.276	3	.57	4	6.513e-3	4	5099.169	15	NC	1
544			min	-.012	2	-.535	1	0	1	0	1	150.552	1	3052.054	4
545		7	max	.018	3	.373	3	.544	4	3.797e-3	4	4220.039	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	-.012	2	-.693	1	0	1	0	1	124.527	1	2765.622	4
547		8	max	.017	3	.454	3	.519	4	1.081e-3	4	3708.715	15	NC	1
548			min	-.011	2	-.82	1	0	1	0	1	109.386	1	2500.644	4
549		9	max	.017	3	.506	3	.494	4	0	1	3446.437	15	NC	1
550			min	-.011	2	-.9	1	0	1	-2.862e-6	5	101.621	1	2284.337	4
551		10	max	.016	3	.525	3	.465	4	0	1	3367.412	15	NC	1
552			min	-.011	2	-.926	1	0	1	-2.762e-6	5	99.311	1	2256.098	4
553		11	max	.016	3	.512	3	.434	4	0	1	3446.524	15	NC	1
554			min	-.011	2	-.899	1	0	1	-2.662e-6	5	101.767	1	2323.101	4
555		12	max	.016	3	.468	3	.403	4	7.756e-4	4	3708.925	15	NC	1
556			min	-.011	2	-.817	1	0	1	0	1	109.868	1	2427.76	4
557		13	max	.015	3	.397	3	.366	4	2.725e-3	4	4220.475	15	NC	1
558			min	-.01	2	-.686	1	0	1	0	1	125.78	1	2862.524	4
559		14	max	.015	3	.307	3	.326	4	4.674e-3	4	5100.035	15	NC	1
560			min	-.01	2	-.523	1	0	1	0	1	153.367	1	3985.085	4
561		15	max	.015	3	.207	3	.284	4	6.624e-3	4	6622.589	15	NC	1
562			min	-.01	2	-.346	1	0	1	0	1	201.67	1	7179.84	4
563		16	max	.014	3	.105	3	.243	4	8.573e-3	4	9460.157	15	NC	1
564			min	-.01	2	-.17	1	0	1	0	1	293.043	1	NC	1
565		17	max	.014	3	.009	3	.205	4	1.052e-2	4	NC	5	NC	1
566			min	-.01	2	-.014	2	0	1	0	1	492.753	1	NC	1
567		18	max	.014	3	.112	1	.174	4	5.343e-3	4	NC	5	NC	1
568			min	-.01	2	-.073	3	0	1	0	1	1070.48	1	NC	1
569		19	max	.014	3	.218	1	.15	4	0	1	NC	1	NC	1
570			min	-.01	2	-.147	3	0	1	-2.36e-6	4	NC	1	NC	1
571	M9	1	max	.006	3	.094	1	.679	4	2.241e-2	3	NC	1	NC	1
572			min	-.003	2	-.009	3	-.001	1	-1.613e-2	1	NC	1	NC	1
573		2	max	.006	3	.046	1	.661	4	1.109e-2	3	NC	3	NC	1
574			min	-.003	2	-.003	3	0	12	-7.825e-3	1	2375.192	1	9369.329	4
575		3	max	.006	3	.009	3	.641	4	1.463e-2	4	NC	5	NC	1
576			min	-.003	2	-.008	2	0	12	-1.353e-5	10	1136.3	1	5384.923	4
577		4	max	.006	3	.031	3	.619	4	1.147e-2	5	NC	5	NC	1
578			min	-.003	2	-.067	1	0	12	-4.333e-3	1	709.898	1	4067.982	4
579		5	max	.006	3	.061	3	.595	4	8.619e-3	5	NC	15	NC	1
580			min	-.002	2	-.131	1	0	12	-8.857e-3	1	507.901	1	3419.755	4
581		6	max	.006	3	.094	3	.57	4	1.149e-2	3	NC	15	NC	1
582			min	-.002	2	-.194	1	0	12	-1.338e-2	1	397.361	1	3024.853	4
583		7	max	.006	3	.126	3	.544	4	1.529e-2	3	NC	15	NC	1
584			min	-.002	2	-.25	1	0	1	-1.79e-2	1	332.469	1	2735.601	4
585		8	max	.006	3	.153	3	.519	4	1.908e-2	3	8898.772	15	NC	1
586			min	-.002	2	-.294	1	-.001	1	-2.243e-2	1	294.239	1	2483.731	4
587		9	max	.005	3	.17	3	.494	4	1.905e-2	3	8314.674	15	NC	1
588			min	-.002	2	-.323	1	0	12	-2.475e-2	1	274.394	1	2281.327	4
589		10	max	.005	3	.176	3	.465	4	1.647e-2	3	8136.832	15	NC	1
590			min	-.002	2	-.332	1	0	1	-2.561e-2	1	268.455	1	2242.56	4
591		11	max	.005	3	.172	3	.435	4	1.389e-2	3	8314.429	15	NC	1
592			min	-.002	2	-.322	1	0	1	-2.648e-2	1	274.755	1	2306.395	4
593		12	max	.005	3	.158	3	.402	4	1.143e-2	3	8898.308	15	NC	1
594			min	-.002	2	-.293	1	0	12	-2.504e-2	1	295.371	1	2447.273	4
595		13	max	.005	3	.134	3	.366	4	9.149e-3	3	NC	15	NC	1
596			min	-.002	2	-.248	1	0	12	-2.015e-2	1	335.278	1	2910.241	4
597		14	max	.005	3	.104	3	.325	4	6.866e-3	3	NC	15	NC	1
598			min	-.002	2	-.19	1	-.002	1	-1.527e-2	1	403.426	1	3956.671	5
599		15	max	.005	3	.071	3	.284	4	6.232e-3	5	NC	15	NC	1
600			min	-.002	2	-.127	1	-.006	1	-1.038e-2	1	520.462	1	6483.248	5
601		16	max	.005	3	.036	3	.244	4	8.383e-3	5	NC	5	NC	1
602			min	-.002	2	-.063	1	-.008	1	-5.49e-3	1	736.489	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
603		17	max	.004	3	.003	3	.207	4	1.058e-2	4	NC	5	NC	1
604			min	-.002	2	-.004	2	-.009	1	-6.016e-4	1	1196.744	1	NC	1
605		18	max	.004	3	.047	1	.176	4	4.99e-3	5	NC	4	NC	1
606			min	-.002	2	-.026	3	-.006	1	-9.763e-3	2	2529.177	1	NC	1
607		19	max	.004	3	.092	1	.15	4	7.377e-3	3	NC	1	NC	1
608			min	-.002	2	-.054	3	0	12	-1.955e-2	2	NC	1	NC	1

SIMPSON Strong-Tie

Anchor Designer™ Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-42 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

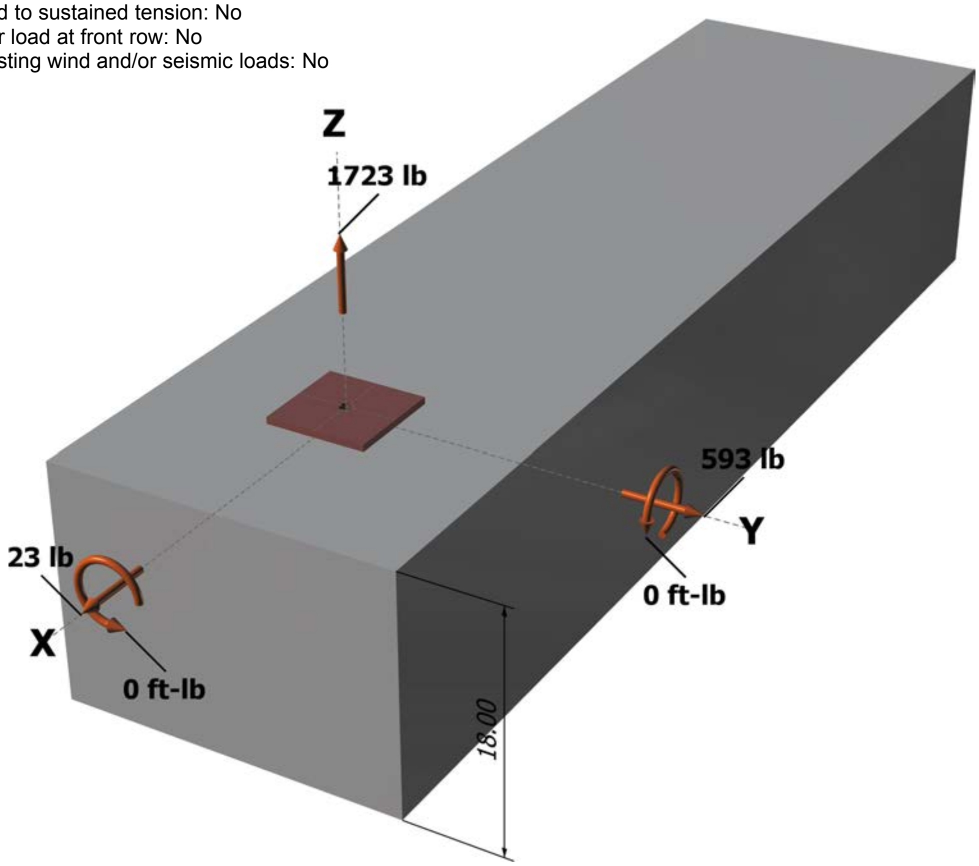
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch): 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 4.00 x 0.28

<Figure 1>



<Figure 2>

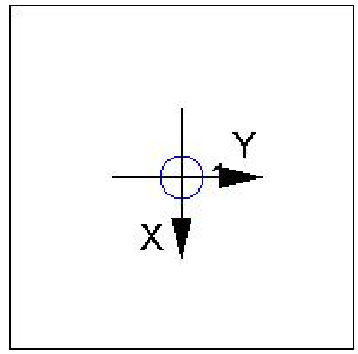
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

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

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

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

12. Warnings

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

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

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

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

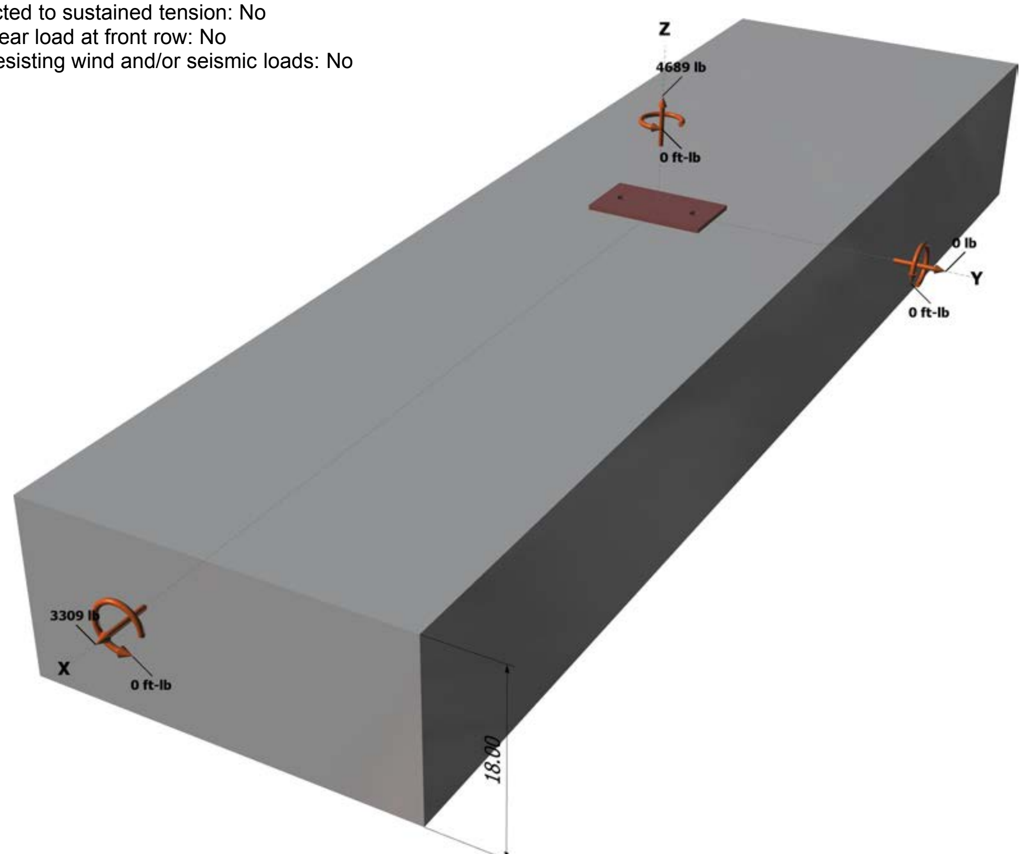
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

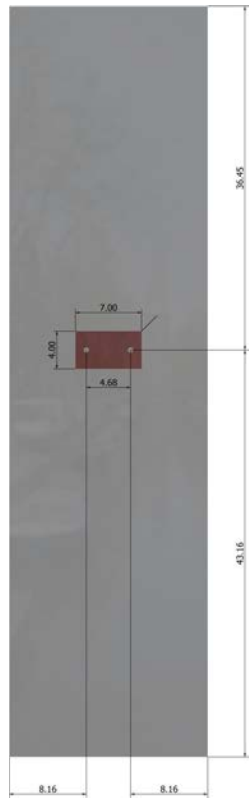
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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>



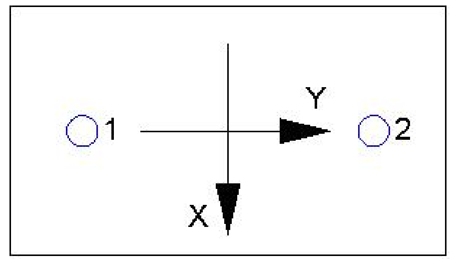
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, ϕN_n (lb)	Ratio	Status
Steel	2345	6071	0.39	Pass
Concrete breakout	4689	9208	0.51	Pass
Adhesive	**4689**	**8093**	**0.58**	**Pass (Governs)**

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

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

Sec. D.7.3	0.58	0.62	120.1 %	1.2	Pass

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

12. Warnings

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

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

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