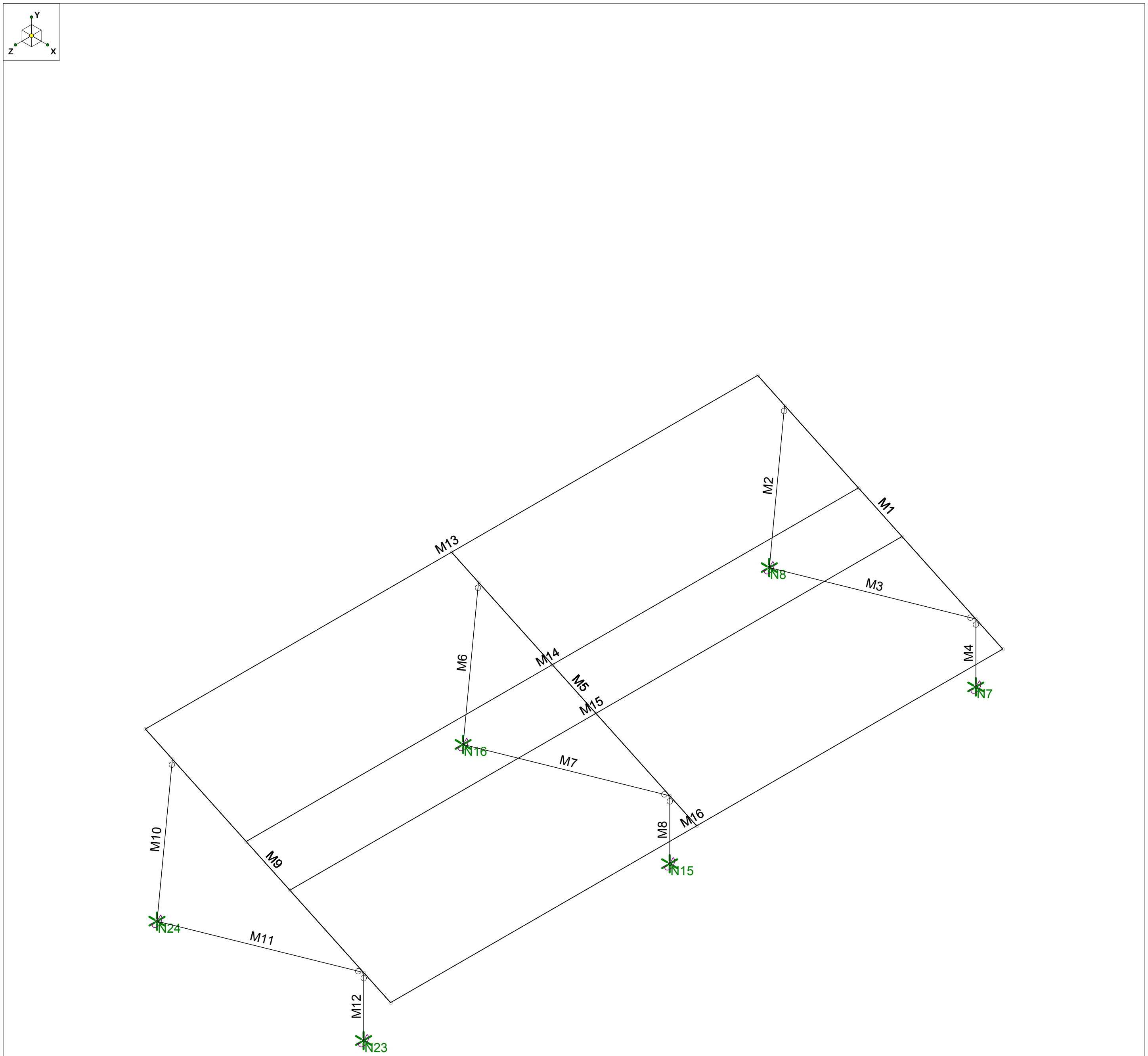


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

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.

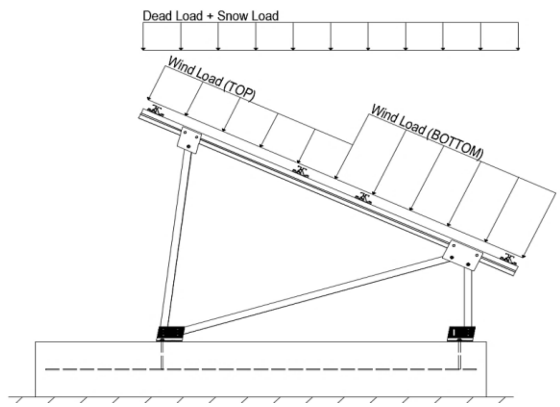
1.2 Construction

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 = 130 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 26.53 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

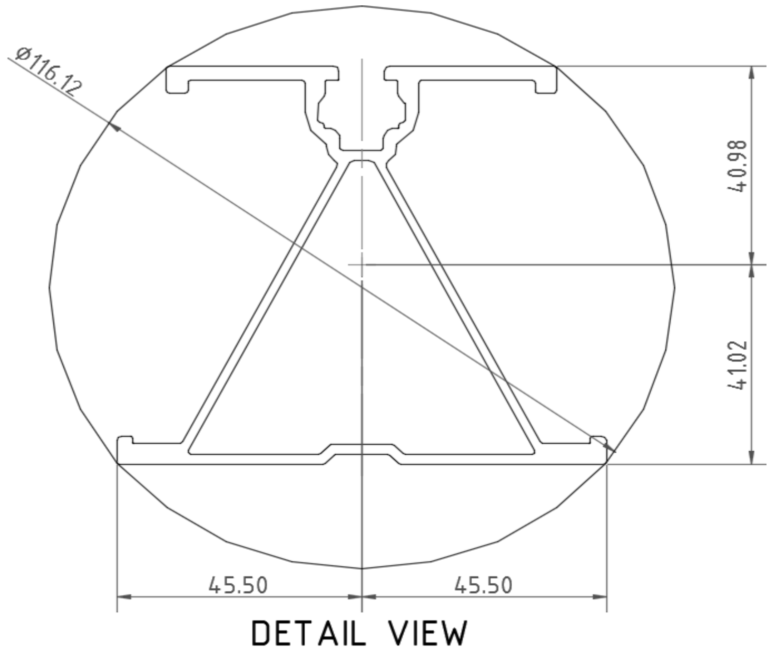
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

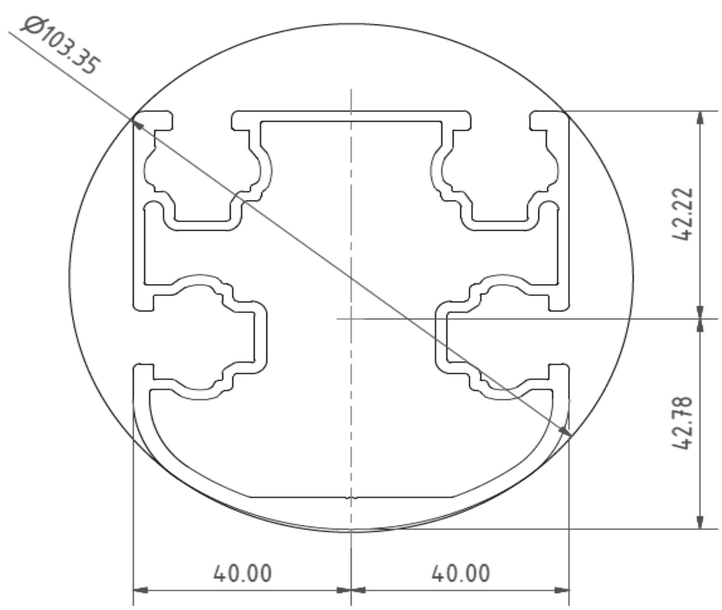
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	123	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.906	k-ft
M_z =	0.346	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	99%	



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).

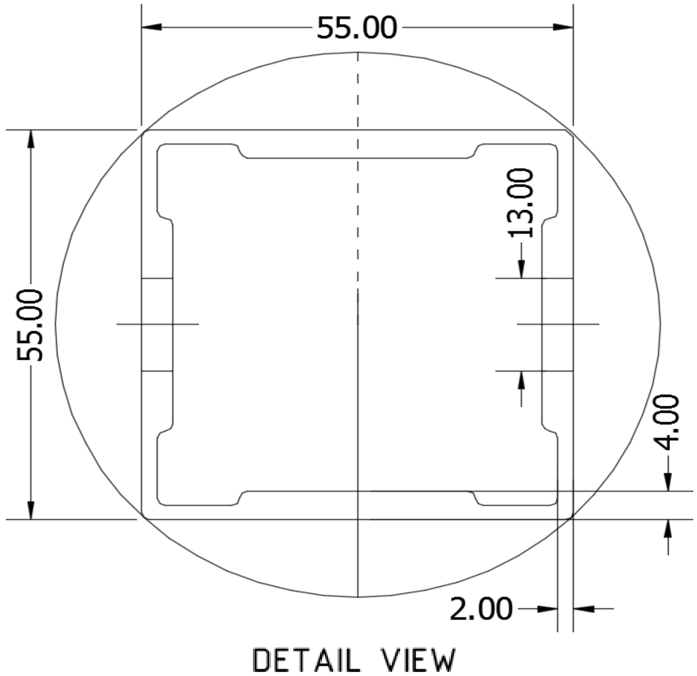
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.018	k-ft
M_z =	0.000	k-ft
P_n =	-0.726	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	88%	



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).

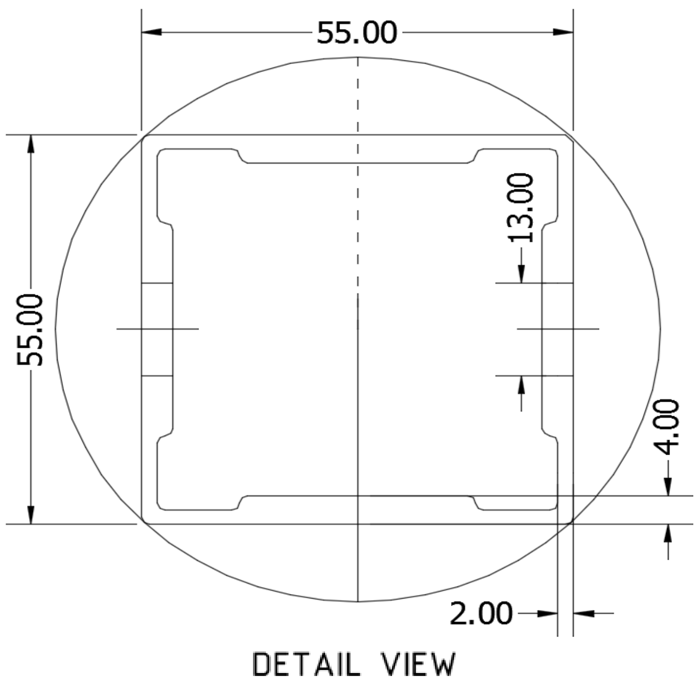
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.542	k-ft
P_n =	0.636	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	41%	



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).

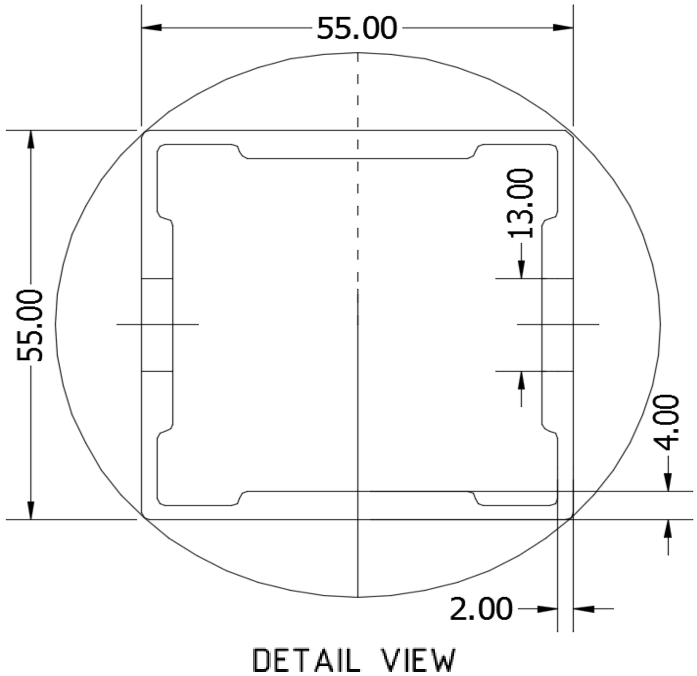
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	2.091	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	29%	



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 =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	3.305	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	27%	



5. FOUNDATION DESIGN CALCULATIONS

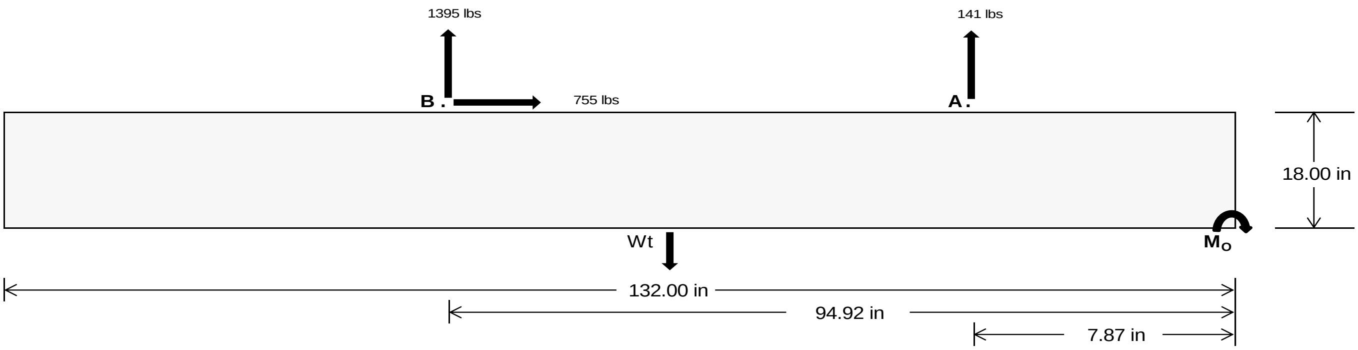
5.1 Helical Pile Foundations

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 =	635.12	6066.83	k
Compressive Load =	4039.46	4905.82	k
Lateral Load =	367.62	3272.15	k
Moment (Weak Axis) =	0.73	0.33	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 =	147141.1 in-lbs
Resisting Force Required =	2229.41 lbs
S.F. =	1.67
Weight Required =	3715.69 lbs
Minimum Width =	31 in in
Weight Provided =	6180.63 lbs

A minimum 132in long x 31in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	754.63 lbs
Friction =	0.4
Weight Required =	1886.57 lbs
Resisting Weight =	6180.63 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 31in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	754.63 lbs
Cohesion =	130 psf
Area =	28.42 ft^2
Resisting =	3090.31 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 31in 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			
	31 in	32 in	33 in	34 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.58 ft) =	6181 lbs	6380 lbs	6579 lbs	6779 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in
F_A	1421 lbs	1421 lbs	1421 lbs	1421 lbs	1394 lbs	1394 lbs	1394 lbs	1394 lbs	1979 lbs	1979 lbs	1979 lbs	1979 lbs	-283 lbs	-283 lbs	-283 lbs	-283 lbs
F_B	1411 lbs	1411 lbs	1411 lbs	1411 lbs	1992 lbs	1992 lbs	1992 lbs	1992 lbs	2422 lbs	2422 lbs	2422 lbs	2422 lbs	-2791 lbs	-2791 lbs	-2791 lbs	-2791 lbs
F_V	193 lbs	193 lbs	193 lbs	193 lbs	1364 lbs	1364 lbs	1364 lbs	1364 lbs	1151 lbs	1151 lbs	1151 lbs	1151 lbs	-1509 lbs	-1509 lbs	-1509 lbs	-1509 lbs
P_{total}	9012 lbs	9212 lbs	9411 lbs	9610 lbs	9567 lbs	9766 lbs	9965 lbs	10165 lbs	10581 lbs	10781 lbs	10980 lbs	11179 lbs	635 lbs	754 lbs	874 lbs	994 lbs
M	3769 lbs-ft	3769 lbs-ft	3769 lbs-ft	3769 lbs-ft	3999 lbs-ft	3999 lbs-ft	3999 lbs-ft	3999 lbs-ft	5476 lbs-ft	5476 lbs-ft	5476 lbs-ft	5476 lbs-ft	3091 lbs-ft	3091 lbs-ft	3091 lbs-ft	3091 lbs-ft
e	0.42 ft	0.41 ft	0.40 ft	0.39 ft	0.42 ft	0.41 ft	0.40 ft	0.39 ft	0.52 ft	0.51 ft	0.50 ft	0.49 ft	4.87 ft	4.10 ft	3.54 ft	3.11 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}	244.8 psf	243.9 psf	243.1 psf	242.4 psf	259.9 psf	258.6 psf	257.3 psf	256.2 psf	267.3 psf	265.7 psf	264.2 psf	262.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	389.5 psf	384.1 psf	379.1 psf	374.3 psf	413.4 psf	407.3 psf	401.5 psf	396.1 psf	477.5 psf	469.3 psf	461.7 psf	454.5 psf	259.8 psf	134.5 psf	107.9 psf	97.9 psf

Maximum Bearing Pressure =	477 psf
Allowable Bearing Pressure =	1500 psf

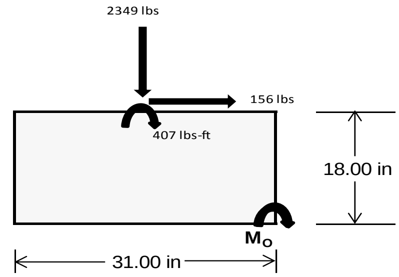
Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 2393.0 ft-lbs
Resisting Force Required = 1852.63 lbs
S.F. = 1.67
Weight Required = 3087.71 lbs
Minimum Width = 31 in in
Weight Provided = 6180.63 lbs

A minimum 132in long x 31in 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	31 in			31 in			31 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	285 lbs	650 lbs	215 lbs	842 lbs	2349 lbs	788 lbs	108 lbs	190 lbs	39 lbs
F_V	217 lbs	213 lbs	220 lbs	160 lbs	156 lbs	172 lbs	217 lbs	214 lbs	219 lbs
P_{total}	7936 lbs	8302 lbs	7867 lbs	8126 lbs	9633 lbs	8072 lbs	2345 lbs	2428 lbs	2276 lbs
M	856 lbs-ft	847 lbs-ft	867 lbs-ft	641 lbs-ft	641 lbs-ft	679 lbs-ft	855 lbs-ft	844 lbs-ft	858 lbs-ft
e	0.11 ft	0.10 ft	0.11 ft	0.08 ft	0.07 ft	0.08 ft	0.36 ft	0.35 ft	0.38 ft
L/6	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft
f_{min}	209.3 psf	222.9 psf	206.0 psf	233.6 psf	286.6 psf	228.5 psf	12.6 psf	16.4 psf	10.0 psf
f_{max}	349.3 psf	361.4 psf	347.7 psf	338.3 psf	391.4 psf	339.6 psf	152.4 psf	154.4 psf	150.2 psf

Maximum Bearing Pressure = 391 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 31in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

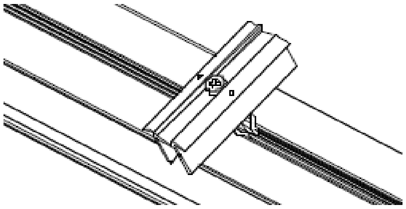
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

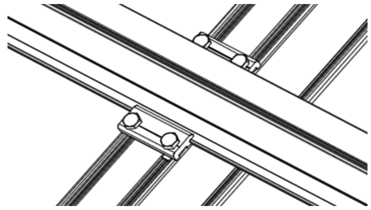
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.622	k
Allowable Uplift =	1.214	k
Utilization =	51%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.268	k
Allowable Uplift =	4.357	k
Utilization =	52%	



6.2 Strut Connections

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

Front Strut

Maximum Axial Load =	3.107	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	42%	

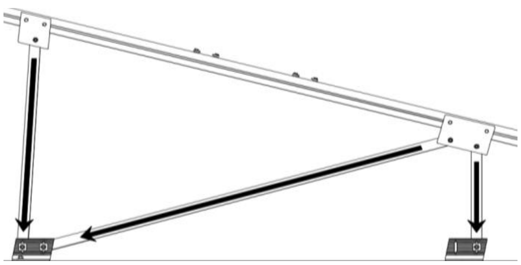
Rear Strut

Maximum Axial Load =	4.102	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	55%	

Diagonal Strut

Maximum Axial Load =	2.178	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	29%	

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

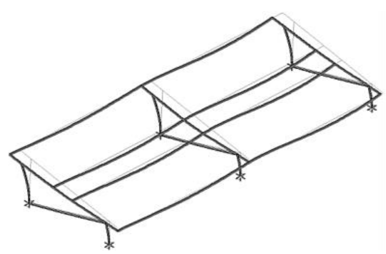
7.1 Seismic Drift

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} =	0.632	in

$0.632 \le 0.938$, 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 = 123 in

J = 0.432

340.276

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

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= 27.3 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 = 123

J = 0.432

216.395

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_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

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LSt= 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

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LWk= 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

<u>Compression</u>

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)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_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

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_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
$\lambda =$ 0.57371
r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671
φcc = 0.87952
φF_L= φcc(Bc-Dc*λ)
φF_L= 28.0279 ksi

3.4.9
b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

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

3.4.10
Rb/t = 0.0

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

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

φF_L= 28.03 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:
3.4.14
L_b = 86.60 in
J = 0.942
135.148

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.6 ksi

Weak Axis:
3.4.14
L_b = 86.6
J = 0.942
135.148

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 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

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.46712

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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 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	-81.397	-81.397	0	0
2	M14	y	-81.397	-81.397	0	0
3	M15	y	-125.796	-125.796	0	0
4	M16	y	-125.796	-125.796	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	184.994	184.994	0	0
2	M14	y	140.595	140.595	0	0
3	M15	y	73.997	73.997	0	0
4	M16	y	73.997	73.997	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	626.621	2	1153.35	2	.767	1	.004	1	0	1	0	1
2		min	-792.743	3	-1424.807	3	-47.701	5	-.248	4	0	1	0	1
3	N7	max	.039	9	1148.949	1	-.57	12	-.001	12	0	1	0	1
4		min	-.162	2	-123.466	3	-282.781	4	-.559	4	0	1	0	1
5	N15	max	.029	9	3107.277	1	0	2	0	2	0	1	0	1
6		min	-1.907	2	-488.556	3	-270.396	4	-.542	4	0	1	0	1
7	N16	max	2339.094	2	3773.706	2	0	3	0	3	0	1	0	1
8		min	-2517.038	3	-4666.793	3	-47.474	5	-.25	4	0	1	0	1
9	N23	max	.042	14	1148.949	1	11.209	1	.023	1	0	1	0	1
10		min	-.162	2	-123.466	3	-274.838	4	-.546	4	0	1	0	1
11	N24	max	626.621	2	1153.35	2	-.047	12	0	12	0	1	0	1
12		min	-792.743	3	-1424.807	3	-48.322	5	-.25	4	0	1	0	1
13	Totals:	max	3590.105	2	11117.384	1	0	2						
14		min	-4102.969	3	-8251.895	3	-966.009	5						

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	114.117	1	454.429	1	-8.052	12	0	3	.273	1	0	4
2			min	5.932	12	-692.685	3	-180.905	1	-.013	2	.014	12	0	3
3		2	max	114.117	1	318.398	1	-6.333	12	0	3	.114	4	.672	3
4			min	5.932	12	-487.529	3	-139.086	1	-.013	2	.006	12	-.44	1
5		3	max	114.117	1	182.366	1	-4.613	12	0	3	.06	5	1.11	3
6			min	5.932	12	-282.372	3	-97.267	1	-.013	2	-.044	1	-.725	1
7		4	max	114.117	1	46.335	1	-2.894	12	0	3	.031	5	1.315	3
8			min	5.932	12	-77.216	3	-55.449	1	-.013	2	-.131	1	-.855	1
9		5	max	114.117	1	127.94	3	-1.146	10	0	3	.005	5	1.286	3
10			min	5.932	12	-89.697	1	-25.122	4	-.013	2	-.171	1	-.831	1
11		6	max	114.117	1	333.097	3	28.189	1	0	3	-.007	12	1.024	3
12			min	3.323	15	-225.728	1	-18.981	5	-.013	2	-.162	1	-.651	1
13		7	max	114.117	1	538.253	3	70.007	1	0	3	-.006	12	.528	3
14			min	-6.447	5	-361.76	1	-16.321	5	-.013	2	-.106	1	-.317	1
15		8	max	114.117	1	743.41	3	111.826	1	0	3	0	10	.173	1
16			min	-18.138	5	-497.791	1	-13.661	5	-.013	2	-.057	4	-.202	3
17		9	max	114.117	1	948.566	3	153.645	1	0	3	.148	1	.817	1
18			min	-29.829	5	-633.823	1	-11	5	-.013	2	-.07	5	-1.166	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	114.117	1	769.854	1	-7.423	12	.004	14	.347	1	1.617	1
20			min	5.932	12	-1153.722	3	-195.463	1	-.013	2	.011	12	-2.363	3
21		11	max	114.117	1	633.823	1	-5.704	12	.013	2	.148	1	.817	1
22			min	5.932	12	-948.566	3	-153.645	1	0	3	.004	12	-1.166	3
23		12	max	114.117	1	497.791	1	-3.984	12	.013	2	.055	4	.173	1
24			min	5.932	12	-743.41	3	-111.826	1	0	3	-.003	3	-.202	3
25		13	max	114.117	1	361.76	1	-2.265	12	.013	2	.025	5	.528	3
26			min	5.932	12	-538.253	3	-70.007	1	0	3	-.106	1	-.317	1
27		14	max	114.117	1	225.728	1	-.545	12	.013	2	-.001	15	1.024	3
28			min	5.932	12	-333.097	3	-29.029	4	0	3	-.162	1	-.651	1
29		15	max	114.117	1	89.697	1	13.63	1	.013	2	-.007	12	1.286	3
30			min	-2.453	5	-127.94	3	-19.86	5	0	3	-.171	1	-.831	1
31		16	max	114.117	1	77.216	3	55.449	1	.013	2	-.004	12	1.315	3
32			min	-14.144	5	-46.335	1	-17.2	5	0	3	-.131	1	-.855	1
33		17	max	114.117	1	282.372	3	97.267	1	.013	2	0	3	1.11	3
34			min	-25.835	5	-182.366	1	-14.539	5	0	3	-.076	4	-.725	1
35		18	max	114.117	1	487.529	3	139.086	1	.013	2	.09	1	.672	3
36			min	-37.526	5	-318.398	1	-11.879	5	0	3	-.081	5	-.44	1
37		19	max	114.117	1	692.685	3	180.905	1	.013	2	.273	1	0	1
38			min	-49.217	5	-454.429	1	-9.219	5	0	3	-.093	5	0	3
39	M14	1	max	60.545	4	479.667	1	-8.27	12	.008	3	.31	1	0	1
40			min	2.505	12	-536.065	3	-186.4	1	-.01	2	.016	12	0	3
41		2	max	52.19	1	343.636	1	-6.55	12	.008	3	.162	4	.522	3
42			min	2.505	12	-381.474	3	-144.581	1	-.01	2	.007	12	-.469	1
43		3	max	52.19	1	207.604	1	-4.831	12	.008	3	.088	5	.869	3
44			min	2.505	12	-226.883	3	-102.763	1	-.01	2	-.019	1	-.783	1
45		4	max	52.19	1	71.573	1	-3.111	12	.008	3	.047	5	1.039	3
46			min	2.505	12	-72.293	3	-60.944	1	-.01	2	-.113	1	-.942	1
47		5	max	52.19	1	82.298	3	-1.392	12	.008	3	.009	5	1.034	3
48			min	1.484	15	-64.459	1	-37.196	4	-.01	2	-.158	1	-.946	1
49		6	max	52.19	1	236.889	3	22.693	1	.008	3	-.007	12	.852	3
50			min	-9.424	5	-200.49	1	-29.63	5	-.01	2	-.156	1	-.795	1
51		7	max	52.19	1	391.48	3	64.512	1	.008	3	-.005	12	.494	3
52			min	-21.115	5	-336.522	1	-26.97	5	-.01	2	-.106	1	-.489	1
53		8	max	52.19	1	546.071	3	106.331	1	.008	3	0	10	0	15
54			min	-32.806	5	-472.553	1	-24.309	5	-.01	2	-.092	4	-.04	3
55		9	max	52.19	1	700.662	3	148.149	1	.008	3	.136	1	.587	1
56			min	-44.497	5	-608.585	1	-21.649	5	-.01	2	-.114	5	-.75	3
57		10	max	74.007	4	744.616	1	-7.206	12	.008	3	.328	1	1.358	1
58			min	2.505	12	-855.253	3	-189.968	1	-.01	2	.01	12	-1.636	3
59		11	max	62.316	4	608.585	1	-5.486	12	.01	2	.163	4	.587	1
60			min	2.505	12	-700.662	3	-148.149	1	-.008	3	.003	12	-.75	3
61		12	max	52.19	1	472.553	1	-3.767	12	.01	2	.087	5	0	15
62			min	2.505	12	-546.071	3	-106.331	1	-.008	3	-.009	1	-.04	3
63		13	max	52.19	1	336.522	1	-2.047	12	.01	2	.045	5	.494	3
64			min	2.505	12	-391.48	3	-64.512	1	-.008	3	-.106	1	-.489	1
65		14	max	52.19	1	200.49	1	-.328	12	.01	2	.007	5	.852	3
66			min	2.505	12	-236.889	3	-37.993	4	-.008	3	-.156	1	-.795	1
67		15	max	52.19	1	64.459	1	19.125	1	.01	2	-.006	12	1.034	3
68			min	2.505	12	-82.298	3	-29.81	5	-.008	3	-.158	1	-.946	1
69		16	max	52.19	1	72.293	3	60.944	1	.01	2	-.004	12	1.039	3
70			min	-7.673	5	-71.573	1	-27.149	5	-.008	3	-.113	1	-.942	1
71		17	max	52.19	1	226.883	3	102.763	1	.01	2	.002	3	.869	3
72			min	-19.364	5	-207.604	1	-24.489	5	-.008	3	-.097	4	-.783	1
73		18	max	52.19	1	381.474	3	144.581	1	.01	2	.121	1	.522	3
74			min	-31.055	5	-343.636	1	-21.828	5	-.008	3	-.117	5	-.469	1
75		19	max	52.19	1	536.065	3	186.4	1	.01	2	.31	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
76			min	-42.746	5	-479.667	1	-19.168	5	-.008	3	-.141	5	0	3
77	M15	1	max	85.314	5	627.585	2	-8.223	12	.011	2	.31	1	0	2
78			min	-54.919	1	-280.286	3	-186.374	1	-.007	3	.016	12	0	12
79		2	max	73.623	5	447.888	2	-6.503	12	.011	2	.2	4	.274	3
80			min	-54.919	1	-201.543	3	-144.556	1	-.007	3	.007	12	-.612	2
81		3	max	61.932	5	268.19	2	-4.784	12	.011	2	.115	5	.459	3
82			min	-54.919	1	-122.8	3	-102.737	1	-.007	3	-.02	1	-1.02	2
83		4	max	50.241	5	88.492	2	-3.064	12	.011	2	.063	5	.554	3
84			min	-54.919	1	-44.057	3	-60.918	1	-.007	3	-.113	1	-1.223	2
85		5	max	38.55	5	34.686	3	-1.345	12	.011	2	.015	5	.559	3
86			min	-54.919	1	-91.206	2	-46.368	4	-.007	3	-.158	1	-1.222	2
87		6	max	26.859	5	113.43	3	22.719	1	.011	2	-.007	12	.475	3
88			min	-54.919	1	-270.903	2	-38.775	5	-.007	3	-.156	1	-1.016	2
89		7	max	15.169	5	192.173	3	64.538	1	.011	2	-.005	12	.301	3
90			min	-54.919	1	-450.601	2	-36.115	5	-.007	3	-.107	1	-.605	2
91		8	max	3.478	5	270.916	3	106.356	1	.011	2	0	10	.037	3
92			min	-54.919	1	-630.299	2	-33.454	5	-.007	3	-.117	4	-.007	9
93		9	max	-2.928	12	349.659	3	148.175	1	.011	2	.136	1	.831	2
94			min	-54.919	1	-809.996	2	-30.794	5	-.007	3	-.15	5	-.316	3
95		10	max	-2.928	12	989.694	2	-7.253	12	.011	2	.328	1	1.856	2
96			min	-54.919	1	-428.402	3	-189.994	1	-.007	3	.011	12	-.759	3
97		11	max	.805	5	809.996	2	-5.533	12	.007	3	.199	4	.831	2
98			min	-54.919	1	-349.659	3	-148.175	1	-.011	2	.003	12	-.316	3
99		12	max	-2.928	12	630.299	2	-3.814	12	.007	3	.112	5	.037	3
100			min	-54.919	1	-270.916	3	-106.356	1	-.011	2	-.009	1	-.007	9
101		13	max	-2.928	12	450.601	2	-2.094	12	.007	3	.06	5	.301	3
102			min	-54.919	1	-192.173	3	-64.538	1	-.011	2	-.107	1	-.605	2
103		14	max	-2.928	12	270.903	2	-.375	12	.007	3	.011	5	.475	3
104			min	-54.919	1	-113.43	3	-47.188	4	-.011	2	-.156	1	-1.016	2
105		15	max	-2.928	12	91.206	2	19.1	1	.007	3	-.006	12	.559	3
106			min	-58.726	4	-34.686	3	-38.958	5	-.011	2	-.158	1	-1.222	2
107		16	max	-2.928	12	44.057	3	60.918	1	.007	3	-.004	12	.554	3
108			min	-70.417	4	-88.492	2	-36.297	5	-.011	2	-.113	1	-1.223	2
109		17	max	-2.928	12	122.8	3	102.737	1	.007	3	.001	3	.459	3
110			min	-82.107	4	-268.19	2	-33.637	5	-.011	2	-.124	4	-1.02	2
111		18	max	-2.928	12	201.543	3	144.556	1	.007	3	.121	1	.274	3
112			min	-93.798	4	-447.888	2	-30.977	5	-.011	2	-.154	5	-.612	2
113		19	max	-2.928	12	280.286	3	186.374	1	.007	3	.31	1	0	2
114			min	-105.489	4	-627.585	2	-28.316	5	-.011	2	-.188	5	0	5
115	M16	1	max	83.65	5	602.342	2	-7.897	12	.011	1	.274	1	0	2
116			min	-121.831	1	-261.708	3	-181.148	1	-.01	3	.013	12	0	3
117		2	max	71.959	5	422.644	2	-6.178	12	.011	1	.151	4	.253	3
118			min	-121.831	1	-182.965	3	-139.33	1	-.01	3	.005	12	-.584	2
119		3	max	60.268	5	242.946	2	-4.458	12	.011	1	.087	5	.417	3
120			min	-121.831	1	-104.222	3	-97.511	1	-.01	3	-.043	1	-.963	2
121		4	max	48.577	5	63.248	2	-2.739	12	.011	1	.047	5	.491	3
122			min	-121.831	1	-25.479	3	-55.692	1	-.01	3	-.131	1	-1.137	2
123		5	max	36.886	5	53.264	3	-1.019	12	.011	1	.011	5	.475	3
124			min	-121.831	1	-116.449	2	-34.03	4	-.01	3	-.17	1	-1.107	2
125		6	max	25.196	5	132.007	3	27.945	1	.011	1	-.007	12	.369	3
126			min	-121.831	1	-296.147	2	-27.769	5	-.01	3	-.162	1	-.872	2
127		7	max	13.505	5	210.751	3	69.764	1	.011	1	-.005	12	.174	3
128			min	-121.831	1	-475.845	2	-25.109	5	-.01	3	-.107	1	-.432	2
129		8	max	1.814	5	289.494	3	111.582	1	.011	1	0	10	.212	2
130			min	-121.831	1	-655.543	2	-22.449	5	-.01	3	-.081	4	-.111	3
131		9	max	-6.033	12	368.237	3	153.401	1	.011	1	.148	1	1.061	2
132			min	-121.831	1	-835.24	2	-19.788	5	-.01	3	-.103	5	-.485	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	-6.033	12	1014.938	2	-7.578	12	.011	1	.346	1	2.115	2
134			min	-121.831	1	-446.98	3	-195.22	1	-.01	3	.012	12	-.95	3
135		11	max	-3.572	15	835.24	2	-5.859	12	.01	3	.156	4	1.061	2
136			min	-121.831	1	-368.237	3	-153.401	1	-.011	1	.004	12	-.485	3
137		12	max	-6.033	12	655.543	2	-4.139	12	.01	3	.079	4	.212	2
138			min	-121.831	1	-289.494	3	-111.582	1	-.011	1	-.003	1	-.111	3
139		13	max	-6.033	12	475.845	2	-2.42	12	.01	3	.038	5	.174	3
140			min	-121.831	1	-210.751	3	-69.764	1	-.011	1	-.107	1	-.432	2
141		14	max	-6.033	12	296.147	2	-.7	12	.01	3	.001	5	.369	3
142			min	-121.831	1	-132.007	3	-37.847	4	-.011	1	-.162	1	-.872	2
143		15	max	-6.033	12	116.449	2	13.874	1	.01	3	-.007	12	.475	3
144			min	-121.831	1	-53.264	3	-28.632	5	-.011	1	-.17	1	-1.107	2
145		16	max	-6.033	12	25.479	3	55.692	1	.01	3	-.005	12	.491	3
146			min	-121.831	1	-63.248	2	-25.972	5	-.011	1	-.131	1	-1.137	2
147		17	max	-6.033	12	104.222	3	97.511	1	.01	3	0	12	.417	3
148			min	-121.831	1	-242.946	2	-23.312	5	-.011	1	-.103	4	-.963	2
149		18	max	-6.033	12	182.965	3	139.33	1	.01	3	.091	1	.253	3
150			min	-121.831	1	-422.644	2	-20.651	5	-.011	1	-.117	5	-.584	2
151		19	max	-6.033	12	261.708	3	181.148	1	.01	3	.274	1	0	2
152			min	-127.008	4	-602.342	2	-17.991	5	-.011	1	-.139	5	0	5
153	M2	1	max	1023.418	1	1.957	4	.735	1	0	12	0	3	0	1
154			min	-1252.362	3	.477	15	-45.781	4	0	4	0	1	0	1
155		2	max	1023.847	1	1.901	4	.735	1	0	12	0	1	0	15
156			min	-1252.041	3	.463	15	-46.154	4	0	4	-.013	4	0	4
157		3	max	1024.275	1	1.844	4	.735	1	0	12	0	1	0	15
158			min	-1251.72	3	.45	15	-46.527	4	0	4	-.027	4	-.001	4
159		4	max	1024.704	1	1.787	4	.735	1	0	12	0	1	0	15
160			min	-1251.398	3	.436	15	-46.901	4	0	4	-.04	4	-.002	4
161		5	max	1025.132	1	1.73	4	.735	1	0	12	0	1	0	15
162			min	-1251.077	3	.423	15	-47.274	4	0	4	-.054	4	-.002	4
163		6	max	1025.561	1	1.673	4	.735	1	0	12	.001	1	0	15
164			min	-1250.756	3	.41	15	-47.647	4	0	4	-.068	4	-.003	4
165		7	max	1025.989	1	1.617	4	.735	1	0	12	.001	1	0	15
166			min	-1250.434	3	.396	15	-48.021	4	0	4	-.082	4	-.003	4
167		8	max	1026.418	1	1.56	4	.735	1	0	12	.001	1	0	15
168			min	-1250.113	3	.383	15	-48.394	4	0	4	-.096	4	-.004	4
169		9	max	1026.846	1	1.503	4	.735	1	0	12	.002	1	0	15
170			min	-1249.792	3	.37	15	-48.767	4	0	4	-.11	4	-.004	4
171		10	max	1027.275	1	1.446	4	.735	1	0	12	.002	1	-.001	15
172			min	-1249.47	3	.356	15	-49.141	4	0	4	-.124	4	-.004	4
173		11	max	1027.703	1	1.39	4	.735	1	0	12	.002	1	-.001	15
174			min	-1249.149	3	.337	12	-49.514	4	0	4	-.138	4	-.005	4
175		12	max	1028.132	1	1.333	4	.735	1	0	12	.002	1	-.001	15
176			min	-1248.827	3	.315	12	-49.887	4	0	4	-.153	4	-.005	4
177		13	max	1028.56	1	1.276	4	.735	1	0	12	.003	1	-.001	15
178			min	-1248.506	3	.292	12	-50.261	4	0	4	-.167	4	-.006	4
179		14	max	1028.989	1	1.219	4	.735	1	0	12	.003	1	-.001	15
180			min	-1248.185	3	.27	12	-50.634	4	0	4	-.182	4	-.006	4
181		15	max	1029.417	1	1.162	4	.735	1	0	12	.003	1	-.002	15
182			min	-1247.863	3	.248	12	-51.007	4	0	4	-.197	4	-.006	4
183		16	max	1029.846	1	1.106	4	.735	1	0	12	.003	1	-.002	15
184			min	-1247.542	3	.226	12	-51.381	4	0	4	-.212	4	-.007	4
185		17	max	1030.274	1	1.049	4	.735	1	0	12	.003	1	-.002	15
186			min	-1247.221	3	.204	12	-51.754	4	0	4	-.227	4	-.007	4
187		18	max	1030.703	1	.992	4	.735	1	0	12	.004	1	-.002	15
188			min	-1246.899	3	.182	12	-52.127	4	0	4	-.242	4	-.007	4
189		19	max	1031.131	1	.935	4	.735	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	-1246.578	3	.16	12	-52.501	4	0	4	-.257	4	-.008	4
191	M3	1	max	545.332	2	7.907	4	3.598	4	0	12	0	1	.008	4
192			min	-689.891	3	1.87	15	.008	12	0	4	-.027	4	.002	15
193		2	max	545.162	2	7.14	4	4.136	4	0	12	0	1	.004	2
194			min	-690.019	3	1.69	15	.008	12	0	4	-.026	4	0	12
195		3	max	544.992	2	6.373	4	4.675	4	0	12	0	1	.002	2
196			min	-690.146	3	1.509	15	.008	12	0	4	-.024	4	0	3
197		4	max	544.821	2	5.606	4	5.214	4	0	12	0	1	0	2
198			min	-690.274	3	1.329	15	.008	12	0	4	-.022	4	-.002	3
199		5	max	544.651	2	4.838	4	5.753	4	0	12	0	1	0	15
200			min	-690.402	3	1.149	15	.008	12	0	4	-.02	4	-.003	3
201		6	max	544.481	2	4.071	4	6.291	4	0	12	0	1	-.001	15
202			min	-690.53	3	.968	15	.008	12	0	4	-.017	4	-.005	6
203		7	max	544.31	2	3.304	4	6.83	4	0	12	0	1	-.001	15
204			min	-690.657	3	.788	15	.008	12	0	4	-.014	5	-.007	6
205		8	max	544.14	2	2.537	4	7.369	4	0	12	0	1	-.002	15
206			min	-690.785	3	.608	15	.008	12	0	4	-.011	5	-.008	6
207		9	max	543.969	2	1.769	4	7.908	4	0	12	0	1	-.002	15
208			min	-690.913	3	.427	15	.008	12	0	4	-.008	5	-.009	6
209		10	max	543.799	2	1.002	4	8.446	4	0	12	.001	1	-.002	15
210			min	-691.041	3	.247	15	.008	12	0	4	-.005	5	-.009	6
211		11	max	543.629	2	.325	2	8.985	4	0	12	.001	1	-.002	15
212			min	-691.169	3	-.098	3	.008	12	0	4	-.001	5	-.01	6
213		12	max	543.458	2	-.114	15	9.524	4	0	12	.003	4	-.002	15
214			min	-691.296	3	-.546	3	.008	12	0	4	0	12	-.009	6
215		13	max	543.288	2	-.294	15	10.063	4	0	12	.007	4	-.002	15
216			min	-691.424	3	-1.3	6	.008	12	0	4	0	12	-.009	6
217		14	max	543.118	2	-.474	15	10.601	4	0	12	.011	4	-.002	15
218			min	-691.552	3	-2.068	6	.008	12	0	4	0	12	-.008	6
219		15	max	542.947	2	-.655	15	11.14	4	0	12	.016	4	-.002	15
220			min	-691.68	3	-2.835	6	.008	12	0	4	0	12	-.007	6
221		16	max	542.777	2	-.835	15	11.679	4	0	12	.021	4	-.001	15
222			min	-691.807	3	-3.602	6	.008	12	0	4	0	12	-.006	6
223		17	max	542.607	2	-1.015	15	12.218	4	0	12	.026	4	-.001	15
224			min	-691.935	3	-4.369	6	.008	12	0	4	0	12	-.004	6
225		18	max	542.436	2	-1.196	15	12.756	4	0	12	.031	4	0	15
226			min	-692.063	3	-5.137	6	.008	12	0	4	0	12	-.002	6
227		19	max	542.266	2	-1.376	15	13.295	4	0	12	.036	4	0	1
228			min	-692.191	3	-5.904	6	.008	12	0	4	0	12	0	1
229	M4	1	max	1145.883	1	0	1	-.569	12	0	1	.026	4	0	1
230			min	-125.766	3	0	1	-281.623	4	0	1	0	12	0	1
231		2	max	1146.053	1	0	1	-.569	12	0	1	0	3	0	1
232			min	-125.638	3	0	1	-281.771	4	0	1	-.006	4	0	1
233		3	max	1146.224	1	0	1	-.569	12	0	1	0	12	0	1
234			min	-125.51	3	0	1	-281.918	4	0	1	-.038	4	0	1
235		4	max	1146.394	1	0	1	-.569	12	0	1	0	12	0	1
236			min	-125.383	3	0	1	-282.066	4	0	1	-.071	4	0	1
237		5	max	1146.565	1	0	1	-.569	12	0	1	0	12	0	1
238			min	-125.255	3	0	1	-282.214	4	0	1	-.103	4	0	1
239		6	max	1146.735	1	0	1	-.569	12	0	1	0	12	0	1
240			min	-125.127	3	0	1	-282.361	4	0	1	-.136	4	0	1
241		7	max	1146.905	1	0	1	-.569	12	0	1	0	12	0	1
242			min	-124.999	3	0	1	-282.509	4	0	1	-.168	4	0	1
243		8	max	1147.076	1	0	1	-.569	12	0	1	0	12	0	1
244			min	-124.872	3	0	1	-282.656	4	0	1	-.201	4	0	1
245		9	max	1147.246	1	0	1	-.569	12	0	1	0	12	0	1
246			min	-124.744	3	0	1	-282.804	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
247		10	max	1147.416	1	0	1	-.569	12	0	1	0	12	0	1
248			min	-124.616	3	0	1	-282.952	4	0	1	-.266	4	0	1
249		11	max	1147.587	1	0	1	-.569	12	0	1	0	12	0	1
250			min	-124.488	3	0	1	-283.099	4	0	1	-.298	4	0	1
251		12	max	1147.757	1	0	1	-.569	12	0	1	0	12	0	1
252			min	-124.361	3	0	1	-283.247	4	0	1	-.331	4	0	1
253		13	max	1147.927	1	0	1	-.569	12	0	1	0	12	0	1
254			min	-124.233	3	0	1	-283.395	4	0	1	-.363	4	0	1
255		14	max	1148.098	1	0	1	-.569	12	0	1	0	12	0	1
256			min	-124.105	3	0	1	-283.542	4	0	1	-.396	4	0	1
257		15	max	1148.268	1	0	1	-.569	12	0	1	0	12	0	1
258			min	-123.977	3	0	1	-283.69	4	0	1	-.428	4	0	1
259		16	max	1148.438	1	0	1	-.569	12	0	1	0	12	0	1
260			min	-123.849	3	0	1	-283.838	4	0	1	-.461	4	0	1
261		17	max	1148.609	1	0	1	-.569	12	0	1	0	12	0	1
262			min	-123.722	3	0	1	-283.985	4	0	1	-.493	4	0	1
263		18	max	1148.779	1	0	1	-.569	12	0	1	-.001	12	0	1
264			min	-123.594	3	0	1	-284.133	4	0	1	-.526	4	0	1
265		19	max	1148.949	1	0	1	-.569	12	0	1	-.001	12	0	1
266			min	-123.466	3	0	1	-284.28	4	0	1	-.559	4	0	1
267	M6	1	max	3297.165	1	2.34	2	0	1	0	1	0	4	0	1
268			min	-4102.14	3	.098	3	-46.252	4	0	4	0	1	0	1
269		2	max	3297.593	1	2.296	2	0	1	0	1	0	1	0	3
270			min	-4101.818	3	.065	3	-46.625	4	0	4	-.013	4	0	2
271		3	max	3298.022	1	2.251	2	0	1	0	1	0	1	0	3
272			min	-4101.497	3	.032	3	-46.998	4	0	4	-.027	4	-.001	2
273		4	max	3298.45	1	2.207	2	0	1	0	1	0	1	0	3
274			min	-4101.176	3	-.001	3	-47.372	4	0	4	-.041	4	-.002	2
275		5	max	3298.879	1	2.163	2	0	1	0	1	0	1	0	3
276			min	-4100.854	3	-.035	3	-47.745	4	0	4	-.055	4	-.003	2
277		6	max	3299.307	1	2.119	2	0	1	0	1	0	1	0	3
278			min	-4100.533	3	-.068	3	-48.118	4	0	4	-.068	4	-.003	2
279		7	max	3299.736	1	2.074	2	0	1	0	1	0	1	0	3
280			min	-4100.212	3	-.101	3	-48.492	4	0	4	-.083	4	-.004	2
281		8	max	3300.164	1	2.03	2	0	1	0	1	0	1	0	3
282			min	-4099.89	3	-.134	3	-48.865	4	0	4	-.097	4	-.004	2
283		9	max	3300.593	1	1.986	2	0	1	0	1	0	1	0	3
284			min	-4099.569	3	-.167	3	-49.238	4	0	4	-.111	4	-.005	2
285		10	max	3301.021	1	1.942	2	0	1	0	1	0	1	0	3
286			min	-4099.247	3	-.201	3	-49.612	4	0	4	-.125	4	-.006	2
287		11	max	3301.45	1	1.897	2	0	1	0	1	0	1	0	3
288			min	-4098.926	3	-.234	3	-49.985	4	0	4	-.14	4	-.006	2
289		12	max	3301.878	1	1.853	2	0	1	0	1	0	1	0	3
290			min	-4098.605	3	-.267	3	-50.358	4	0	4	-.154	4	-.007	2
291		13	max	3302.307	1	1.809	2	0	1	0	1	0	1	0	3
292			min	-4098.283	3	-.3	3	-50.732	4	0	4	-.169	4	-.007	2
293		14	max	3302.735	1	1.765	2	0	1	0	1	0	1	0	3
294			min	-4097.962	3	-.333	3	-51.105	4	0	4	-.184	4	-.008	2
295		15	max	3303.164	1	1.72	2	0	1	0	1	0	1	0	3
296			min	-4097.641	3	-.366	3	-51.478	4	0	4	-.199	4	-.008	2
297		16	max	3303.592	1	1.676	2	0	1	0	1	0	1	0	3
298			min	-4097.319	3	-.4	3	-51.852	4	0	4	-.214	4	-.009	2
299		17	max	3304.021	1	1.632	2	0	1	0	1	0	1	0	3
300			min	-4096.998	3	-.433	3	-52.225	4	0	4	-.229	4	-.009	2
301		18	max	3304.449	1	1.588	2	0	1	0	1	0	1	0	3
302			min	-4096.677	3	-.466	3	-52.598	4	0	4	-.244	4	-.01	2
303		19	max	3304.877	1	1.543	2	0	1	0	1	0	1	.001	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	-4096.355	3	-.499	3	-52.972	4	0	4	-.259	4	-.01	2
305	M7	1	max	2090.745	2	7.918	6	3.38	4	0	1	0	1	.01	2
306			min	-2175.764	3	1.859	15	0	1	0	4	-.028	4	-.001	3
307		2	max	2090.575	2	7.151	6	3.918	4	0	1	0	1	.007	2
308			min	-2175.892	3	1.678	15	0	1	0	4	-.026	4	-.003	3
309		3	max	2090.404	2	6.384	6	4.457	4	0	1	0	1	.005	2
310			min	-2176.02	3	1.498	15	0	1	0	4	-.024	4	-.004	3
311		4	max	2090.234	2	5.617	6	4.996	4	0	1	0	1	.003	2
312			min	-2176.147	3	1.318	15	0	1	0	4	-.022	4	-.005	3
313		5	max	2090.064	2	4.85	6	5.535	4	0	1	0	1	0	2
314			min	-2176.275	3	1.137	15	0	1	0	4	-.02	4	-.006	3
315		6	max	2089.893	2	4.082	6	6.073	4	0	1	0	1	0	2
316			min	-2176.403	3	.957	15	0	1	0	4	-.018	4	-.007	3
317		7	max	2089.723	2	3.315	6	6.612	4	0	1	0	1	-.002	15
318			min	-2176.531	3	.777	15	0	1	0	4	-.015	4	-.007	3
319		8	max	2089.553	2	2.548	6	7.151	4	0	1	0	1	-.002	15
320			min	-2176.659	3	.553	12	0	1	0	4	-.012	4	-.008	3
321		9	max	2089.382	2	1.943	2	7.69	4	0	1	0	1	-.002	15
322			min	-2176.786	3	.254	12	0	1	0	4	-.009	4	-.009	4
323		10	max	2089.212	2	1.346	2	8.228	4	0	1	0	1	-.002	15
324			min	-2176.914	3	-.139	3	0	1	0	4	-.006	4	-.009	4
325		11	max	2089.041	2	.748	2	8.767	4	0	1	0	1	-.002	15
326			min	-2177.042	3	-.587	3	0	1	0	4	-.002	5	-.009	4
327		12	max	2088.871	2	.15	2	9.306	4	0	1	.002	4	-.002	15
328			min	-2177.17	3	-1.036	3	0	1	0	4	0	1	-.009	4
329		13	max	2088.701	2	-.306	15	9.845	4	0	1	.006	4	-.002	15
330			min	-2177.297	3	-1.484	3	0	1	0	4	0	1	-.009	4
331		14	max	2088.53	2	-.486	15	10.383	4	0	1	.01	4	-.002	15
332			min	-2177.425	3	-2.055	4	0	1	0	4	0	1	-.008	4
333		15	max	2088.36	2	-.666	15	10.922	4	0	1	.014	4	-.002	15
334			min	-2177.553	3	-2.823	4	0	1	0	4	0	1	-.007	4
335		16	max	2088.19	2	-.847	15	11.461	4	0	1	.019	4	-.001	15
336			min	-2177.681	3	-3.59	4	0	1	0	4	0	1	-.006	4
337		17	max	2088.019	2	-1.027	15	12	4	0	1	.024	4	-.001	15
338			min	-2177.808	3	-4.357	4	0	1	0	4	0	1	-.004	4
339		18	max	2087.849	2	-1.207	15	12.538	4	0	1	.029	4	0	15
340			min	-2177.936	3	-5.124	4	0	1	0	4	0	1	-.002	4
341		19	max	2087.679	2	-1.388	15	13.077	4	0	1	.034	4	0	1
342			min	-2178.064	3	-5.892	4	0	1	0	4	0	1	0	1
343	M8	1	max	3104.21	1	0	1	0	1	0	1	.025	4	0	1
344			min	-490.856	3	0	1	-272.854	4	0	1	0	1	0	1
345		2	max	3104.381	1	0	1	0	1	0	1	0	1	0	1
346			min	-490.728	3	0	1	-273.001	4	0	1	-.006	4	0	1
347		3	max	3104.551	1	0	1	0	1	0	1	0	1	0	1
348			min	-490.6	3	0	1	-273.149	4	0	1	-.038	4	0	1
349		4	max	3104.721	1	0	1	0	1	0	1	0	1	0	1
350			min	-490.473	3	0	1	-273.297	4	0	1	-.069	4	0	1
351		5	max	3104.892	1	0	1	0	1	0	1	0	1	0	1
352			min	-490.345	3	0	1	-273.444	4	0	1	-.101	4	0	1
353		6	max	3105.062	1	0	1	0	1	0	1	0	1	0	1
354			min	-490.217	3	0	1	-273.592	4	0	1	-.132	4	0	1
355		7	max	3105.232	1	0	1	0	1	0	1	0	1	0	1
356			min	-490.089	3	0	1	-273.74	4	0	1	-.163	4	0	1
357		8	max	3105.403	1	0	1	0	1	0	1	0	1	0	1
358			min	-489.962	3	0	1	-273.887	4	0	1	-.195	4	0	1
359		9	max	3105.573	1	0	1	0	1	0	1	0	1	0	1
360			min	-489.834	3	0	1	-274.035	4	0	1	-.226	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
361		10	max	3105.743	1	0	1	0	1	0	1	0	1	0	1
362			min	-489.706	3	0	1	-274.183	4	0	1	-.258	4	0	1
363		11	max	3105.914	1	0	1	0	1	0	1	0	1	0	1
364			min	-489.578	3	0	1	-274.33	4	0	1	-.289	4	0	1
365		12	max	3106.084	1	0	1	0	1	0	1	0	1	0	1
366			min	-489.451	3	0	1	-274.478	4	0	1	-.321	4	0	1
367		13	max	3106.254	1	0	1	0	1	0	1	0	1	0	1
368			min	-489.323	3	0	1	-274.625	4	0	1	-.352	4	0	1
369		14	max	3106.425	1	0	1	0	1	0	1	0	1	0	1
370			min	-489.195	3	0	1	-274.773	4	0	1	-.384	4	0	1
371		15	max	3106.595	1	0	1	0	1	0	1	0	1	0	1
372			min	-489.067	3	0	1	-274.921	4	0	1	-.415	4	0	1
373		16	max	3106.765	1	0	1	0	1	0	1	0	1	0	1
374			min	-488.94	3	0	1	-275.068	4	0	1	-.447	4	0	1
375		17	max	3106.936	1	0	1	0	1	0	1	0	1	0	1
376			min	-488.812	3	0	1	-275.216	4	0	1	-.479	4	0	1
377		18	max	3107.106	1	0	1	0	1	0	1	0	1	0	1
378			min	-488.684	3	0	1	-275.364	4	0	1	-.51	4	0	1
379		19	max	3107.277	1	0	1	0	1	0	1	0	1	0	1
380			min	-488.556	3	0	1	-275.511	4	0	1	-.542	4	0	1
381	M10	1	max	1023.418	1	1.885	6	-.034	12	0	1	0	1	0	1
382			min	-1252.362	3	.428	15	-46.199	4	0	5	0	3	0	1
383		2	max	1023.847	1	1.829	6	-.034	12	0	1	0	10	0	15
384			min	-1252.041	3	.415	15	-46.572	4	0	5	-.013	4	0	6
385		3	max	1024.275	1	1.772	6	-.034	12	0	1	0	12	0	15
386			min	-1251.72	3	.401	15	-46.945	4	0	5	-.027	4	-.001	6
387		4	max	1024.704	1	1.715	6	-.034	12	0	1	0	12	0	15
388			min	-1251.398	3	.388	15	-47.319	4	0	5	-.041	4	-.002	6
389		5	max	1025.132	1	1.658	6	-.034	12	0	1	0	12	0	15
390			min	-1251.077	3	.375	15	-47.692	4	0	5	-.055	4	-.002	6
391		6	max	1025.561	1	1.601	6	-.034	12	0	1	0	12	0	15
392			min	-1250.756	3	.361	15	-48.065	4	0	5	-.068	4	-.003	6
393		7	max	1025.989	1	1.545	6	-.034	12	0	1	0	12	0	15
394			min	-1250.434	3	.348	15	-48.439	4	0	5	-.082	4	-.003	6
395		8	max	1026.418	1	1.488	6	-.034	12	0	1	0	12	0	15
396			min	-1250.113	3	.335	15	-48.812	4	0	5	-.097	4	-.003	6
397		9	max	1026.846	1	1.431	6	-.034	12	0	1	0	12	0	15
398			min	-1249.792	3	.321	15	-49.185	4	0	5	-.111	4	-.004	6
399		10	max	1027.275	1	1.374	6	-.034	12	0	1	0	12	0	15
400			min	-1249.47	3	.308	15	-49.559	4	0	5	-.125	4	-.004	6
401		11	max	1027.703	1	1.318	6	-.034	12	0	1	0	12	-.001	15
402			min	-1249.149	3	.295	15	-49.932	4	0	5	-.14	4	-.005	6
403		12	max	1028.132	1	1.261	6	-.034	12	0	1	0	12	-.001	15
404			min	-1248.827	3	.281	15	-50.305	4	0	5	-.154	4	-.005	6
405		13	max	1028.56	1	1.204	6	-.034	12	0	1	0	12	-.001	15
406			min	-1248.506	3	.268	15	-50.679	4	0	5	-.169	4	-.005	6
407		14	max	1028.989	1	1.155	2	-.034	12	0	1	0	12	-.001	15
408			min	-1248.185	3	.255	15	-51.052	4	0	5	-.184	4	-.006	6
409		15	max	1029.417	1	1.11	2	-.034	12	0	1	0	12	-.001	15
410			min	-1247.863	3	.241	15	-51.425	4	0	5	-.198	4	-.006	6
411		16	max	1029.846	1	1.066	2	-.034	12	0	1	0	12	-.001	15
412			min	-1247.542	3	.226	12	-51.799	4	0	5	-.213	4	-.006	6
413		17	max	1030.274	1	1.022	2	-.034	12	0	1	0	12	-.001	15
414			min	-1247.221	3	.204	12	-52.172	4	0	5	-.229	4	-.007	6
415		18	max	1030.703	1	.978	2	-.034	12	0	1	0	12	-.002	15
416			min	-1246.899	3	.182	12	-52.545	4	0	5	-.244	4	-.007	6
417		19	max	1031.131	1	.933	2	-.034	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	-1246.578	3	.16	12	-52.919	4	0	5	-.259	4	-.007	6
419	M11	1	max	545.332	2	7.857	6	3.503	4	0	1	0	12	.007	6
420			min	-689.891	3	1.837	15	-.167	1	0	4	-.028	4	.002	15
421		2	max	545.162	2	7.09	6	4.042	4	0	1	0	12	.004	2
422			min	-690.019	3	1.656	15	-.167	1	0	4	-.026	4	0	12
423		3	max	544.992	2	6.323	6	4.581	4	0	1	0	12	.002	2
424			min	-690.146	3	1.476	15	-.167	1	0	4	-.024	4	0	3
425		4	max	544.821	2	5.556	6	5.119	4	0	1	0	12	0	2
426			min	-690.274	3	1.295	15	-.167	1	0	4	-.022	4	-.002	3
427		5	max	544.651	2	4.788	6	5.658	4	0	1	0	12	0	15
428			min	-690.402	3	1.115	15	-.167	1	0	4	-.02	4	-.003	4
429		6	max	544.481	2	4.021	6	6.197	4	0	1	0	12	-.001	15
430			min	-690.53	3	.935	15	-.167	1	0	4	-.018	4	-.005	4
431		7	max	544.31	2	3.254	6	6.736	4	0	1	0	12	-.002	15
432			min	-690.657	3	.754	15	-.167	1	0	4	-.015	4	-.007	4
433		8	max	544.14	2	2.487	6	7.274	4	0	1	0	12	-.002	15
434			min	-690.785	3	.574	15	-.167	1	0	4	-.012	4	-.008	4
435		9	max	543.969	2	1.72	6	7.813	4	0	1	0	12	-.002	15
436			min	-690.913	3	.394	15	-.167	1	0	4	-.009	4	-.009	4
437		10	max	543.799	2	.952	6	8.352	4	0	1	0	12	-.002	15
438			min	-691.041	3	.213	15	-.167	1	0	4	-.005	4	-.009	4
439		11	max	543.629	2	.325	2	8.891	4	0	1	0	12	-.002	15
440			min	-691.169	3	-.098	3	-.167	1	0	4	-.002	4	-.01	4
441		12	max	543.458	2	-.147	15	9.429	4	0	1	.002	5	-.002	15
442			min	-691.296	3	-.583	4	-.167	1	0	4	-.001	1	-.01	4
443		13	max	543.288	2	-.328	15	9.968	4	0	1	.006	5	-.002	15
444			min	-691.424	3	-1.35	4	-.167	1	0	4	-.001	1	-.009	4
445		14	max	543.118	2	-.508	15	10.507	4	0	1	.011	5	-.002	15
446			min	-691.552	3	-2.118	4	-.167	1	0	4	-.001	1	-.008	4
447		15	max	542.947	2	-.688	15	11.046	4	0	1	.015	5	-.002	15
448			min	-691.68	3	-2.885	4	-.167	1	0	4	-.001	1	-.007	4
449		16	max	542.777	2	-.869	15	11.584	4	0	1	.02	5	-.001	15
450			min	-691.807	3	-3.652	4	-.167	1	0	4	-.001	1	-.006	4
451		17	max	542.607	2	-1.049	15	12.123	4	0	1	.025	4	-.001	15
452			min	-691.935	3	-4.419	4	-.167	1	0	4	-.002	1	-.004	4
453		18	max	542.436	2	-1.229	15	12.662	4	0	1	.03	4	0	15
454			min	-692.063	3	-5.186	4	-.167	1	0	4	-.002	1	-.002	4
455		19	max	542.266	2	-1.41	15	13.2	4	0	1	.035	4	0	1
456			min	-692.191	3	-5.954	4	-.167	1	0	4	-.002	1	0	1
457	M12	1	max	1145.883	1	0	1	11.597	1	0	1	.026	4	0	1
458			min	-125.766	3	0	1	-275.011	4	0	1	-.001	1	0	1
459		2	max	1146.053	1	0	1	11.597	1	0	1	0	1	0	1
460			min	-125.638	3	0	1	-275.159	4	0	1	-.006	4	0	1
461		3	max	1146.224	1	0	1	11.597	1	0	1	.001	1	0	1
462			min	-125.51	3	0	1	-275.306	4	0	1	-.038	4	0	1
463		4	max	1146.394	1	0	1	11.597	1	0	1	.003	1	0	1
464			min	-125.383	3	0	1	-275.454	4	0	1	-.069	4	0	1
465		5	max	1146.565	1	0	1	11.597	1	0	1	.004	1	0	1
466			min	-125.255	3	0	1	-275.602	4	0	1	-.101	4	0	1
467		6	max	1146.735	1	0	1	11.597	1	0	1	.005	1	0	1
468			min	-125.127	3	0	1	-275.749	4	0	1	-.133	4	0	1
469		7	max	1146.905	1	0	1	11.597	1	0	1	.007	1	0	1
470			min	-124.999	3	0	1	-275.897	4	0	1	-.164	4	0	1
471		8	max	1147.076	1	0	1	11.597	1	0	1	.008	1	0	1
472			min	-124.872	3	0	1	-276.045	4	0	1	-.196	4	0	1
473		9	max	1147.246	1	0	1	11.597	1	0	1	.009	1	0	1
474			min	-124.744	3	0	1	-276.192	4	0	1	-.228	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	1147.416	1	0	1	11.597	1	0	1	.011	1	0	1
476			min	-124.616	3	0	1	-276.34	4	0	1	-.259	4	0	1
477		11	max	1147.587	1	0	1	11.597	1	0	1	.012	1	0	1
478			min	-124.488	3	0	1	-276.487	4	0	1	-.291	4	0	1
479		12	max	1147.757	1	0	1	11.597	1	0	1	.013	1	0	1
480			min	-124.361	3	0	1	-276.635	4	0	1	-.323	4	0	1
481		13	max	1147.927	1	0	1	11.597	1	0	1	.015	1	0	1
482			min	-124.233	3	0	1	-276.783	4	0	1	-.355	4	0	1
483		14	max	1148.098	1	0	1	11.597	1	0	1	.016	1	0	1
484			min	-124.105	3	0	1	-276.93	4	0	1	-.386	4	0	1
485		15	max	1148.268	1	0	1	11.597	1	0	1	.017	1	0	1
486			min	-123.977	3	0	1	-277.078	4	0	1	-.418	4	0	1
487		16	max	1148.438	1	0	1	11.597	1	0	1	.019	1	0	1
488			min	-123.849	3	0	1	-277.226	4	0	1	-.45	4	0	1
489		17	max	1148.609	1	0	1	11.597	1	0	1	.02	1	0	1
490			min	-123.722	3	0	1	-277.373	4	0	1	-.482	4	0	1
491		18	max	1148.779	1	0	1	11.597	1	0	1	.021	1	0	1
492			min	-123.594	3	0	1	-277.521	4	0	1	-.514	4	0	1
493		19	max	1148.949	1	0	1	11.597	1	0	1	.023	1	0	1
494			min	-123.466	3	0	1	-277.669	4	0	1	-.546	4	0	1
495	M1	1	max	180.911	1	692.661	3	49.19	5	0	1	.273	1	0	3
496			min	-9.219	5	-453.006	1	-113.973	1	0	3	-.093	5	-.013	2
497		2	max	181.516	1	691.687	3	50.431	5	0	1	.212	1	.227	1
498			min	-8.936	5	-454.304	1	-113.973	1	0	3	-.066	5	-.365	3
499		3	max	423.524	3	509.005	1	6.98	5	0	3	.152	1	.455	1
500			min	-250.168	2	-494.887	3	-113.485	1	0	1	-.04	5	-.715	3
501		4	max	423.978	3	507.707	1	8.221	5	0	3	.092	1	.187	1
502			min	-249.563	2	-495.861	3	-113.485	1	0	1	-.036	5	-.454	3
503		5	max	424.432	3	506.409	1	9.463	5	0	3	.032	1	-.003	15
504			min	-248.958	2	-496.834	3	-113.485	1	0	1	-.031	5	-.192	3
505		6	max	424.886	3	505.111	1	10.704	5	0	3	-.001	12	.07	3
506			min	-248.352	2	-497.808	3	-113.485	1	0	1	-.032	4	-.366	2
507		7	max	425.34	3	503.813	1	11.946	5	0	3	-.004	12	.333	3
508			min	-247.747	2	-498.782	3	-113.485	1	0	1	-.087	1	-.63	2
509		8	max	425.794	3	502.514	1	13.187	5	0	3	-.008	12	.597	3
510			min	-247.141	2	-499.755	3	-113.485	1	0	1	-.147	1	-.894	2
511		9	max	438.749	3	43.172	2	57.076	5	0	9	.086	1	.698	3
512			min	-171.416	2	.392	15	-165.714	1	0	3	-.133	5	-1.023	2
513		10	max	439.203	3	41.873	2	58.318	5	0	9	0	10	.678	3
514			min	-170.811	2	0	5	-165.714	1	0	3	-.104	4	-1.046	2
515		11	max	439.657	3	40.575	2	59.559	5	0	9	-.005	12	.659	3
516			min	-170.205	2	-1.61	4	-165.714	1	0	3	-.091	4	-1.067	2
517		12	max	452.535	3	317.892	3	153.314	5	0	2	.145	1	.574	3
518			min	-100.093	10	-587.507	2	-110.857	1	0	3	-.208	5	-.946	2
519		13	max	452.989	3	316.918	3	154.555	5	0	2	.087	1	.407	3
520			min	-99.588	10	-588.805	2	-110.857	1	0	3	-.127	5	-.635	2
521		14	max	453.443	3	315.944	3	155.797	5	0	2	.028	1	.24	3
522			min	-99.084	10	-590.104	2	-110.857	1	0	3	-.045	5	-.326	1
523		15	max	453.897	3	314.971	3	157.038	5	0	2	.037	5	.073	3
524			min	-98.579	10	-591.402	2	-110.857	1	0	3	-.03	1	-.035	1
525		16	max	454.351	3	313.997	3	158.28	5	0	2	.12	5	.3	2
526			min	-98.075	10	-592.7	2	-110.857	1	0	3	-.089	1	-.093	3
527		17	max	454.805	3	313.023	3	159.521	5	0	2	.204	5	.613	2
528			min	-97.57	10	-593.998	2	-110.857	1	0	3	-.147	1	-.258	3
529		18	max	17.708	5	604.172	2	-6.033	12	0	5	.192	5	.308	2
530			min	-181.749	1	-260.798	3	-128.353	4	0	2	-.21	1	-.128	3
531		19	max	17.991	5	602.874	2	-6.033	12	0	5	.139	5	.01	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
532			min	-181.143	1	-261.771	3	-127.112	4	0	2	-.274	1	-.011	1
533	M5	1	max	390.914	1	2307.363	3	97.59	5	0	1	0	1	.027	2
534			min	14.847	12	-1531.286	1	0	1	0	4	-.209	4	0	3
535		2	max	391.52	1	2306.389	3	98.832	5	0	1	0	1	.833	1
536			min	15.15	12	-1532.584	1	0	1	0	4	-.157	4	-1.218	3
537		3	max	1363.569	3	1556.259	1	58.756	4	0	4	0	1	1.605	1
538			min	-886.249	2	-1594.318	3	0	1	0	1	-.106	4	-2.388	3
539		4	max	1364.023	3	1554.96	1	59.998	4	0	4	0	1	.784	1
540			min	-885.644	2	-1595.291	3	0	1	0	1	-.074	4	-1.546	3
541		5	max	1364.477	3	1553.662	1	61.239	4	0	4	0	1	.007	9
542			min	-885.038	2	-1596.265	3	0	1	0	1	-.042	4	-.704	3
543		6	max	1364.931	3	1552.364	1	62.481	4	0	4	0	1	.139	3
544			min	-884.433	2	-1597.239	3	0	1	0	1	-.01	5	-.901	2
545		7	max	1365.385	3	1551.066	1	63.722	4	0	4	.024	4	.982	3
546			min	-883.827	2	-1598.212	3	0	1	0	1	0	1	-1.711	2
547		8	max	1365.839	3	1549.768	1	64.964	4	0	4	.057	4	1.825	3
548			min	-883.222	2	-1599.186	3	0	1	0	1	0	1	-2.52	2
549		9	max	1387.717	3	143.879	2	185.315	4	0	1	0	1	2.103	3
550			min	-727.079	2	.393	15	0	1	0	1	-.192	4	-2.867	2
551		10	max	1388.171	3	142.58	2	186.557	4	0	1	0	1	2.034	3
552			min	-726.474	2	.001	15	0	1	0	1	-.094	4	-2.943	2
553		11	max	1388.625	3	141.282	2	187.798	4	0	1	.004	4	1.965	3
554			min	-725.869	2	-1.435	6	0	1	0	1	0	1	-3.018	2
555		12	max	1410.657	3	1012.396	3	220.917	4	0	1	0	1	1.724	3
556			min	-569.764	2	-1823.963	2	0	1	0	4	-.304	4	-2.7	2
557		13	max	1411.111	3	1011.422	3	222.159	4	0	1	0	1	1.19	3
558			min	-569.158	2	-1825.261	2	0	1	0	4	-.187	4	-1.737	2
559		14	max	1411.565	3	1010.449	3	223.4	4	0	1	0	1	.657	3
560			min	-568.553	2	-1826.56	2	0	1	0	4	-.07	4	-.79	1
561		15	max	1412.019	3	1009.475	3	224.641	4	0	1	.048	4	.19	2
562			min	-567.948	2	-1827.858	2	0	1	0	4	0	1	-.004	13
563		16	max	1412.473	3	1008.501	3	225.883	4	0	1	.167	4	1.155	2
564			min	-567.342	2	-1829.156	2	0	1	0	4	0	1	-.408	3
565		17	max	1412.927	3	1007.528	3	227.124	4	0	1	.287	4	2.121	2
566			min	-566.737	2	-1830.454	2	0	1	0	4	0	1	-.94	3
567		18	max	-15.459	12	2034.229	2	0	1	0	4	.311	4	1.093	2
568			min	-391.055	1	-893.366	3	-28.907	5	0	1	0	1	-.492	3
569		19	max	-15.156	12	2032.931	2	0	1	0	4	.297	4	.022	1
570			min	-390.449	1	-894.34	3	-27.665	5	0	1	0	1	-.02	3
571	M9	1	max	180.911	1	692.661	3	113.973	1	0	3	-.014	12	0	3
572			min	8.052	12	-453.006	1	5.932	12	0	4	-.273	1	-.013	2
573		2	max	181.516	1	691.687	3	113.973	1	0	3	-.011	12	.227	1
574			min	8.355	12	-454.304	1	5.932	12	0	4	-.212	1	-.365	3
575		3	max	423.524	3	509.005	1	113.485	1	0	1	-.008	12	.455	1
576			min	-250.168	2	-494.887	3	5.896	12	0	3	-.152	1	-.715	3
577		4	max	423.978	3	507.707	1	113.485	1	0	1	-.005	12	.187	1
578			min	-249.563	2	-495.861	3	5.896	12	0	3	-.092	1	-.454	3
579		5	max	424.432	3	506.409	1	113.485	1	0	1	-.002	12	-.003	15
580			min	-248.958	2	-496.834	3	5.896	12	0	3	-.043	4	-.192	3
581		6	max	424.886	3	505.111	1	113.485	1	0	1	.027	1	.07	3
582			min	-248.352	2	-497.808	3	5.896	12	0	3	-.023	5	-.366	2
583		7	max	425.34	3	503.813	1	113.485	1	0	1	.087	1	.333	3
584			min	-247.747	2	-498.782	3	5.896	12	0	3	-.009	5	-.63	2
585		8	max	425.794	3	502.514	1	113.485	1	0	1	.147	1	.597	3
586			min	-247.141	2	-499.755	3	5.896	12	0	3	.003	15	-.894	2
587		9	max	438.749	3	43.172	2	165.714	1	0	3	-.004	12	.698	3
588			min	-171.416	2	.399	15	8.397	12	0	9	-.165	4	-1.023	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
589		10	max	439.203	3	41.873	2	165.714	1	0	3	.001	1	.678	3
590			min	-170.811	2	.007	15	8.397	12	0	9	-.103	4	-1.046	2
591		11	max	439.657	3	40.575	2	165.714	1	0	3	.089	1	.659	3
592			min	-170.205	2	-1.561	6	8.397	12	0	9	-.06	5	-1.067	2
593		12	max	452.535	3	317.892	3	194.256	4	0	3	-.007	12	.574	3
594			min	-100.093	10	-587.507	2	5.473	12	0	2	-.262	4	-.946	2
595		13	max	452.989	3	316.918	3	195.497	4	0	3	-.004	12	.407	3
596			min	-99.588	10	-588.805	2	5.473	12	0	2	-.159	4	-.635	2
597		14	max	453.443	3	315.944	3	196.739	4	0	3	-.001	12	.24	3
598			min	-99.084	10	-590.104	2	5.473	12	0	2	-.055	4	-.326	1
599		15	max	453.897	3	314.971	3	197.98	4	0	3	.049	4	.073	3
600			min	-98.579	10	-591.402	2	5.473	12	0	2	.001	12	-.035	1
601		16	max	454.351	3	313.997	3	199.221	4	0	3	.153	4	.3	2
602			min	-98.075	10	-592.7	2	5.473	12	0	2	.004	12	-.093	3
603		17	max	454.805	3	313.023	3	200.463	4	0	3	.259	4	.613	2
604			min	-97.57	10	-593.998	2	5.473	12	0	2	.007	12	-.258	3
605		18	max	-8.2	12	604.172	2	121.97	1	0	2	.268	4	.308	2
606			min	-181.749	1	-260.798	3	-85.073	5	0	3	.01	12	-.128	3
607		19	max	-7.897	12	602.874	2	121.97	1	0	2	.274	1	.01	3
608			min	-181.143	1	-261.771	3	-83.831	5	0	3	.013	12	-.011	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.106	2	.008	3	8.694e-3	2	NC	1	NC	1
2			min	-.657	4	-.014	3	-.004	2	-1.277e-3	3	NC	1	NC	1
3		2	max	0	1	.34	3	.045	1	1.003e-2	2	NC	5	NC	2
4			min	-.657	4	-.11	1	-.022	5	-1.301e-3	3	696.134	3	5695.867	1
5		3	max	0	1	.626	3	.107	1	1.137e-2	2	NC	5	NC	3
6			min	-.657	4	-.278	1	-.026	5	-1.324e-3	3	384.621	3	2323.554	1
7		4	max	0	1	.8	3	.162	1	1.27e-2	2	NC	5	NC	3
8			min	-.657	4	-.372	1	-.018	5	-1.348e-3	3	302.394	3	1535.449	1
9		5	max	0	1	.84	3	.19	1	1.404e-2	2	NC	5	NC	3
10			min	-.657	4	-.379	1	-.003	5	-1.371e-3	3	288.038	3	1306.925	1
11		6	max	0	1	.751	3	.183	1	1.538e-2	2	NC	5	NC	3
12			min	-.657	4	-.302	1	.008	15	-1.395e-3	3	321.905	3	1353.285	1
13		7	max	0	1	.557	3	.144	1	1.671e-2	2	NC	5	NC	3
14			min	-.657	4	-.16	1	.009	10	-1.418e-3	3	430.844	3	1725.303	1
15		8	max	0	1	.312	3	.084	1	1.805e-2	2	NC	4	NC	3
16			min	-.657	4	-.004	9	0	10	-1.441e-3	3	755.9	3	2992.556	1
17		9	max	0	1	.186	2	.029	4	1.939e-2	2	NC	4	NC	1
18			min	-.657	4	.005	15	-.007	10	-1.465e-3	3	2394.742	3	8370.919	4
19		10	max	0	1	.252	2	.024	3	2.072e-2	2	NC	3	NC	1
20			min	-.657	4	-.012	3	-.016	2	-1.488e-3	3	1685.263	2	NC	1
21		11	max	0	12	.186	2	.025	3	1.939e-2	2	NC	4	NC	1
22			min	-.657	4	.005	15	-.018	5	-1.465e-3	3	2394.742	3	NC	1
23		12	max	0	12	.312	3	.084	1	1.805e-2	2	NC	4	NC	3
24			min	-.657	4	-.004	9	-.017	5	-1.441e-3	3	755.9	3	2992.556	1
25		13	max	0	12	.557	3	.144	1	1.671e-2	2	NC	5	NC	3
26			min	-.657	4	-.16	1	-.006	5	-1.418e-3	3	430.844	3	1725.303	1
27		14	max	0	12	.751	3	.183	1	1.538e-2	2	NC	5	NC	3
28			min	-.657	4	-.302	1	.007	15	-1.395e-3	3	321.905	3	1353.285	1
29		15	max	0	12	.84	3	.19	1	1.404e-2	2	NC	5	NC	3
30			min	-.657	4	-.379	1	.016	10	-1.371e-3	3	288.038	3	1306.925	1
31		16	max	0	12	.8	3	.162	1	1.27e-2	2	NC	5	NC	3
32			min	-.658	4	-.372	1	.014	10	-1.348e-3	3	302.394	3	1535.449	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	.626	3	.107	1	1.137e-2	2	NC	5	NC	3
34			min	-.658	4	-.278	1	.008	10	-1.324e-3	3	384.621	3	2323.554	1
35		18	max	0	12	.34	3	.045	1	1.003e-2	2	NC	5	NC	2
36			min	-.658	4	-.11	1	.002	10	-1.301e-3	3	696.134	3	5695.867	1
37		19	max	0	12	.106	2	.008	3	8.694e-3	2	NC	1	NC	1
38			min	-.658	4	-.014	3	-.004	2	-1.277e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.207	3	.007	3	5.179e-3	2	NC	1	NC	1
40			min	-.494	4	-.341	2	-.003	2	-3.716e-3	3	NC	1	NC	1
41		2	max	0	1	.54	3	.031	1	6.221e-3	2	NC	5	NC	2
42			min	-.494	4	-.662	2	-.032	5	-4.538e-3	3	738.675	3	7399.53	5
43		3	max	0	1	.821	3	.087	1	7.264e-3	2	NC	15	NC	3
44			min	-.494	4	-.945	1	-.038	5	-5.359e-3	3	400.337	1	2893.005	1
45		4	max	0	1	1.014	3	.139	1	8.306e-3	2	NC	15	NC	3
46			min	-.494	4	-1.149	1	-.025	5	-6.181e-3	3	300.357	1	1791.143	1
47		5	max	0	1	1.101	3	.169	1	9.349e-3	2	NC	15	NC	3
48			min	-.494	4	-1.258	1	-.003	5	-7.003e-3	3	265.095	1	1471.368	1
49		6	max	0	1	1.083	3	.167	1	1.039e-2	2	9990.262	15	NC	3
50			min	-.494	4	-1.271	1	.013	10	-7.824e-3	3	261.453	1	1489.559	1
51		7	max	0	1	.98	3	.133	1	1.143e-2	2	NC	15	NC	3
52			min	-.494	4	-1.208	2	.008	10	-8.646e-3	3	281.678	1	1868.773	1
53		8	max	0	1	.827	3	.078	1	1.248e-2	2	NC	15	NC	2
54			min	-.494	4	-1.101	2	.001	10	-9.468e-3	3	323.715	2	3197.944	1
55		9	max	0	1	.679	3	.043	4	1.352e-2	2	NC	15	NC	1
56			min	-.494	4	-.991	2	-.006	10	-1.029e-2	3	378.445	2	5752.123	4
57		10	max	0	1	.611	3	.021	3	1.456e-2	2	NC	5	NC	1
58			min	-.494	4	-.938	2	-.014	2	-1.111e-2	3	411.849	2	NC	1
59		11	max	0	12	.679	3	.023	1	1.352e-2	2	NC	15	NC	1
60			min	-.494	4	-.991	2	-.031	5	-1.029e-2	3	378.445	2	7825.334	5
61		12	max	0	12	.827	3	.078	1	1.248e-2	2	NC	15	NC	2
62			min	-.494	4	-1.101	2	-.036	5	-9.468e-3	3	323.715	2	3197.944	1
63		13	max	0	12	.98	3	.133	1	1.143e-2	2	NC	15	NC	3
64			min	-.494	4	-1.208	2	-.022	5	-8.646e-3	3	281.678	1	1868.773	1
65		14	max	0	12	1.083	3	.167	1	1.039e-2	2	9989.881	15	NC	3
66			min	-.494	4	-1.271	1	0	15	-7.824e-3	3	261.453	1	1489.559	1
67		15	max	0	12	1.101	3	.169	1	9.349e-3	2	NC	15	NC	3
68			min	-.494	4	-1.258	1	.014	10	-7.003e-3	3	265.095	1	1471.368	1
69		16	max	0	12	1.014	3	.139	1	8.306e-3	2	NC	15	NC	3
70			min	-.494	4	-1.149	1	.012	10	-6.181e-3	3	300.357	1	1791.143	1
71		17	max	0	12	.821	3	.087	1	7.264e-3	2	NC	15	NC	3
72			min	-.495	4	-.945	1	.006	10	-5.359e-3	3	400.337	1	2893.005	1
73		18	max	0	12	.54	3	.044	4	6.221e-3	2	NC	5	NC	2
74			min	-.495	4	-.662	2	0	10	-4.538e-3	3	738.675	3	5541.002	4
75		19	max	0	12	.207	3	.007	3	5.179e-3	2	NC	1	NC	1
76			min	-.495	4	-.341	2	-.003	2	-3.716e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.212	3	.006	3	3.139e-3	3	NC	1	NC	1
78			min	-.404	4	-.34	2	-.003	2	-5.379e-3	2	NC	1	NC	1
79		2	max	0	12	.415	3	.031	1	3.838e-3	3	NC	5	NC	2
80			min	-.404	4	-.749	2	-.042	5	-6.466e-3	2	602.63	2	5610.309	5
81		3	max	0	12	.592	3	.087	1	4.538e-3	3	NC	15	NC	3
82			min	-.404	4	-1.096	2	-.051	5	-7.553e-3	2	325.767	2	2884.762	1
83		4	max	0	12	.722	3	.139	1	5.237e-3	3	NC	15	NC	3
84			min	-.404	4	-1.339	2	-.036	5	-8.639e-3	2	246.29	2	1787.091	1
85		5	max	0	12	.795	3	.169	1	5.936e-3	3	NC	15	NC	3
86			min	-.404	4	-1.459	2	-.008	5	-9.726e-3	2	219.967	2	1468.271	1
87		6	max	0	12	.812	3	.167	1	6.636e-3	3	NC	15	NC	3
88			min	-.404	4	-1.454	2	.013	10	-1.081e-2	2	220.851	2	1486.204	1
89		7	max	0	12	.781	3	.134	1	7.335e-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	-.404	4	-1.347	2	.008	10	-1.19e-2	2	244.38	2	1863.425	1
91		8	max	0	12	.719	3	.079	1	8.035e-3	3	NC	15	NC	2
92			min	-.404	4	-1.179	2	.001	10	-1.299e-2	2	293.241	2	3151.917	4
93		9	max	0	12	.655	3	.052	4	8.734e-3	3	NC	15	NC	1
94			min	-.404	4	-1.014	2	-.005	10	-1.407e-2	2	364.964	2	4709.84	4
95		10	max	0	1	.624	3	.02	3	9.433e-3	3	NC	5	NC	1
96			min	-.404	4	-.937	2	-.014	2	-1.516e-2	2	412.428	2	NC	1
97		11	max	0	1	.655	3	.023	1	8.734e-3	3	NC	15	NC	1
98			min	-.404	4	-1.014	2	-.041	5	-1.407e-2	2	364.964	2	6010.156	5
99		12	max	0	1	.719	3	.079	1	8.035e-3	3	NC	15	NC	2
100			min	-.404	4	-1.179	2	-.047	5	-1.299e-2	2	293.241	2	3182.475	1
101		13	max	0	1	.781	3	.134	1	7.335e-3	3	NC	15	NC	3
102			min	-.404	4	-1.347	2	-.031	5	-1.19e-2	2	244.38	2	1863.425	1
103		14	max	0	1	.812	3	.167	1	6.636e-3	3	NC	15	NC	3
104			min	-.404	4	-1.454	2	-.001	5	-1.081e-2	2	220.851	2	1486.204	1
105		15	max	0	1	.795	3	.169	1	5.936e-3	3	NC	15	NC	3
106			min	-.404	4	-1.459	2	.014	12	-9.726e-3	2	219.967	2	1468.271	1
107		16	max	0	1	.722	3	.139	1	5.237e-3	3	NC	15	NC	3
108			min	-.404	4	-1.339	2	.012	12	-8.639e-3	2	246.29	2	1787.091	1
109		17	max	0	1	.592	3	.087	1	4.538e-3	3	NC	15	NC	3
110			min	-.404	4	-1.096	2	.007	10	-7.553e-3	2	325.767	2	2884.762	1
111		18	max	0	1	.415	3	.055	4	3.838e-3	3	NC	5	NC	2
112			min	-.404	4	-.749	2	0	10	-6.466e-3	2	602.63	2	4463.443	4
113		19	max	0	1	.212	3	.006	3	3.139e-3	3	NC	1	NC	1
114			min	-.404	4	-.34	2	-.003	2	-5.379e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.097	1	.005	3	5.575e-3	3	NC	1	NC	1
116			min	-.148	4	-.07	3	-.003	2	-7.506e-3	1	NC	1	NC	1
117		2	max	0	12	.046	3	.044	1	6.6e-3	3	NC	5	NC	2
118			min	-.148	4	-.194	2	-.033	5	-8.591e-3	1	851.858	2	5732.754	1
119		3	max	0	12	.137	3	.107	1	7.624e-3	3	NC	5	NC	3
120			min	-.148	4	-.424	2	-.04	5	-9.676e-3	1	473.768	2	2330.339	1
121		4	max	0	12	.186	3	.161	1	8.649e-3	3	NC	5	NC	3
122			min	-.148	4	-.557	2	-.03	5	-1.076e-2	1	377.086	2	1536.873	1
123		5	max	0	12	.184	3	.19	1	9.674e-3	3	NC	5	NC	3
124			min	-.148	4	-.575	2	-.009	5	-1.185e-2	1	367.043	2	1305.924	1
125		6	max	0	12	.135	3	.184	1	1.07e-2	3	NC	5	NC	3
126			min	-.148	4	-.481	2	.009	15	-1.293e-2	1	427.148	2	1349.481	1
127		7	max	0	12	.049	3	.145	1	1.172e-2	3	NC	5	NC	3
128			min	-.148	4	-.299	2	.01	10	-1.402e-2	1	624.957	2	1714.497	1
129		8	max	0	12	.004	4	.085	1	1.275e-2	3	NC	3	NC	3
130			min	-.148	4	-.074	2	.003	10	-1.51e-2	1	1458.968	2	2947.881	1
131		9	max	0	12	.147	1	.038	4	1.377e-2	3	NC	4	NC	1
132			min	-.148	4	-.147	3	-.004	10	-1.619e-2	1	3194.792	3	6501.861	4
133		10	max	0	1	.229	1	.017	3	1.48e-2	3	NC	5	NC	1
134			min	-.148	4	-.187	3	-.013	2	-1.727e-2	1	1874.845	1	NC	1
135		11	max	0	1	.147	1	.025	1	1.377e-2	3	NC	4	NC	1
136			min	-.148	4	-.147	3	-.026	5	-1.619e-2	1	3194.792	3	9346.208	5
137		12	max	0	1	.004	6	.085	1	1.275e-2	3	NC	3	NC	3
138			min	-.148	4	-.074	2	-.027	5	-1.51e-2	1	1458.968	2	2947.881	1
139		13	max	0	1	.049	3	.145	1	1.172e-2	3	NC	5	NC	3
140			min	-.148	4	-.299	2	-.012	5	-1.402e-2	1	624.957	2	1714.497	1
141		14	max	0	1	.135	3	.184	1	1.07e-2	3	NC	5	NC	3
142			min	-.147	4	-.481	2	.007	15	-1.293e-2	1	427.148	2	1349.481	1
143		15	max	0	1	.184	3	.19	1	9.674e-3	3	NC	5	NC	3
144			min	-.147	4	-.575	2	.014	12	-1.185e-2	1	367.043	2	1305.924	1
145		16	max	0	1	.186	3	.161	1	8.649e-3	3	NC	5	NC	3
146			min	-.147	4	-.557	2	.012	12	-1.076e-2	1	377.086	2	1536.873	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	.137	3	.107	1	7.624e-3	3	NC	5	NC	3
148			min	-.147	4	-.424	2	.009	12	-9.676e-3	1	473.768	2	2330.339	1
149		18	max	.001	1	.046	3	.05	4	6.6e-3	3	NC	5	NC	2
150			min	-.147	4	-.194	2	.002	10	-8.591e-3	1	851.858	2	4948.05	4
151		19	max	.001	1	.097	1	.005	3	5.575e-3	3	NC	1	NC	1
152			min	-.147	4	-.07	3	-.003	2	-7.506e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.006	2	.009	1	1.496e-3	5	NC	1	NC	2
154			min	-.008	3	-.011	3	-.616	4	-2.437e-4	1	NC	1	101.751	4
155		2	max	.006	1	.005	2	.008	1	1.595e-3	5	NC	1	NC	2
156			min	-.007	3	-.01	3	-.566	4	-2.286e-4	1	NC	1	110.776	4
157		3	max	.006	1	.004	2	.007	1	1.694e-3	5	NC	1	NC	2
158			min	-.007	3	-.01	3	-.516	4	-2.135e-4	1	NC	1	121.49	4
159		4	max	.005	1	.004	2	.007	1	1.794e-3	5	NC	1	NC	2
160			min	-.006	3	-.009	3	-.467	4	-1.984e-4	1	NC	1	134.332	4
161		5	max	.005	1	.003	2	.006	1	1.893e-3	5	NC	1	NC	1
162			min	-.006	3	-.009	3	-.418	4	-1.833e-4	1	NC	1	149.898	4
163		6	max	.004	1	.002	2	.005	1	1.992e-3	5	NC	1	NC	1
164			min	-.005	3	-.009	3	-.371	4	-1.682e-4	1	NC	1	169.013	4
165		7	max	.004	1	.001	2	.005	1	2.091e-3	5	NC	1	NC	1
166			min	-.005	3	-.008	3	-.325	4	-1.531e-4	1	NC	1	192.845	4
167		8	max	.004	1	0	2	.004	1	2.19e-3	5	NC	1	NC	1
168			min	-.005	3	-.008	3	-.281	4	-1.381e-4	1	NC	1	223.097	4
169		9	max	.003	1	0	2	.003	1	2.289e-3	4	NC	1	NC	1
170			min	-.004	3	-.007	3	-.239	4	-1.23e-4	1	NC	1	262.325	4
171		10	max	.003	1	0	2	.003	1	2.394e-3	4	NC	1	NC	1
172			min	-.004	3	-.007	3	-.199	4	-1.079e-4	1	NC	1	314.518	4
173		11	max	.003	1	0	15	.002	1	2.499e-3	4	NC	1	NC	1
174			min	-.003	3	-.006	3	-.162	4	-9.281e-5	1	NC	1	386.182	4
175		12	max	.002	1	0	15	.002	1	2.603e-3	4	NC	1	NC	1
176			min	-.003	3	-.006	3	-.128	4	-7.772e-5	1	NC	1	488.536	4
177		13	max	.002	1	0	15	.001	1	2.708e-3	4	NC	1	NC	1
178			min	-.003	3	-.005	3	-.098	4	-6.264e-5	1	NC	1	642.318	4
179		14	max	.002	1	0	15	0	1	2.812e-3	4	NC	1	NC	1
180			min	-.002	3	-.004	3	-.071	4	-4.755e-5	1	NC	1	889.498	4
181		15	max	.001	1	0	15	0	1	2.917e-3	4	NC	1	NC	1
182			min	-.002	3	-.003	3	-.047	4	-3.247e-5	1	NC	1	1326.139	4
183		16	max	.001	1	0	15	0	1	3.021e-3	4	NC	1	NC	1
184			min	-.001	3	-.003	3	-.028	4	-1.738e-5	1	NC	1	2215.115	4
185		17	max	0	1	0	15	0	1	3.126e-3	4	NC	1	NC	1
186			min	0	3	-.002	3	-.014	4	-2.3e-6	1	NC	1	4515.537	4
187		18	max	0	1	0	15	0	1	3.231e-3	4	NC	1	NC	1
188			min	0	3	0	6	-.004	4	4.158e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.335e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	1.219e-6	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-4.142e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.152e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.016	4	1.626e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	12	-1.301e-4	5	NC	1	NC	1
195		3	max	0	3	0	15	.03	4	5.598e-4	4	NC	1	NC	1
196			min	0	2	-.003	6	0	12	2.037e-6	12	NC	1	NC	1
197		4	max	.001	3	-.001	15	.044	4	1.247e-3	4	NC	1	NC	1
198			min	0	2	-.005	6	0	12	3.262e-6	12	NC	1	9258.591	5
199		5	max	.001	3	-.002	15	.057	4	1.935e-3	4	NC	1	NC	1
200			min	-.001	2	-.007	6	0	12	4.487e-6	12	NC	1	8249.329	5
201		6	max	.002	3	-.002	15	.068	4	2.622e-3	4	NC	1	NC	1
202			min	-.001	2	-.009	6	0	12	5.713e-6	12	NC	1	8013.389	5
203		7	max	.002	3	-.002	15	.079	4	3.31e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
204			min	-.002	2	-.01	6	0	12	6.938e-6	12	8742.731	6	8338.022	5
205		8	max	.002	3	-.003	15	.09	4	3.997e-3	4	NC	1	NC	1
206			min	-.002	2	-.012	6	0	12	8.163e-6	12	7840.305	6	9261.384	5
207		9	max	.003	3	-.003	15	.099	4	4.685e-3	4	NC	2	NC	1
208			min	-.002	2	-.013	6	0	12	9.389e-6	12	7305.707	6	NC	1
209		10	max	.003	3	-.003	15	.109	4	5.372e-3	4	NC	2	NC	1
210			min	-.002	2	-.013	6	0	12	1.061e-5	12	7045.542	6	NC	1
211		11	max	.003	3	-.003	15	.118	4	6.06e-3	4	NC	5	NC	1
212			min	-.003	2	-.013	6	0	12	1.184e-5	12	7021.394	6	NC	1
213		12	max	.004	3	-.003	15	.127	4	6.747e-3	4	NC	2	NC	1
214			min	-.003	2	-.013	6	0	12	1.306e-5	12	7235.08	6	NC	1
215		13	max	.004	3	-.003	15	.137	4	7.435e-3	4	NC	1	NC	1
216			min	-.003	2	-.012	6	0	12	1.429e-5	12	7731.223	6	NC	1
217		14	max	.004	3	-.002	15	.146	4	8.122e-3	4	NC	1	NC	1
218			min	-.003	2	-.011	6	0	12	1.552e-5	12	8620.492	6	NC	1
219		15	max	.005	3	-.002	15	.156	4	8.81e-3	4	NC	1	NC	1
220			min	-.004	2	-.009	6	0	12	1.674e-5	12	NC	1	NC	1
221		16	max	.005	3	-.001	15	.167	4	9.497e-3	4	NC	1	NC	1
222			min	-.004	2	-.008	1	0	12	1.797e-5	12	NC	1	NC	1
223		17	max	.005	3	0	15	.179	4	1.018e-2	4	NC	1	NC	1
224			min	-.004	2	-.006	1	0	12	1.919e-5	12	NC	1	NC	1
225		18	max	.006	3	0	15	.192	4	1.087e-2	4	NC	1	NC	1
226			min	-.004	2	-.004	1	0	12	2.042e-5	12	NC	1	NC	1
227		19	max	.006	3	0	5	.206	4	1.156e-2	4	NC	1	NC	1
228			min	-.005	2	-.003	1	0	12	2.164e-5	12	NC	1	NC	1
229	M4	1	max	.003	1	.004	2	0	12	6.24e-5	1	NC	1	NC	3
230			min	0	3	-.006	3	-.206	4	-2.952e-4	5	NC	1	120.328	4
231		2	max	.003	1	.004	2	0	12	6.24e-5	1	NC	1	NC	3
232			min	0	3	-.006	3	-.19	4	-2.952e-4	5	NC	1	130.851	4
233		3	max	.002	1	.004	2	0	12	6.24e-5	1	NC	1	NC	3
234			min	0	3	-.005	3	-.173	4	-2.952e-4	5	NC	1	143.374	4
235		4	max	.002	1	.004	2	0	12	6.24e-5	1	NC	1	NC	3
236			min	0	3	-.005	3	-.157	4	-2.952e-4	5	NC	1	158.416	4
237		5	max	.002	1	.003	2	0	12	6.24e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.14	4	-2.952e-4	5	NC	1	176.683	4
239		6	max	.002	1	.003	2	0	12	6.24e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.125	4	-2.952e-4	5	NC	1	199.155	4
241		7	max	.002	1	.003	2	0	12	6.24e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.109	4	-2.952e-4	5	NC	1	227.222	4
243		8	max	.002	1	.003	2	0	12	6.24e-5	1	NC	1	NC	2
244			min	0	3	-.004	3	-.094	4	-2.952e-4	5	NC	1	262.91	4
245		9	max	.002	1	.002	2	0	12	6.24e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.08	4	-2.952e-4	5	NC	1	309.27	4
247		10	max	.001	1	.002	2	0	12	6.24e-5	1	NC	1	NC	2
248			min	0	3	-.003	3	-.067	4	-2.952e-4	5	NC	1	371.074	4
249		11	max	.001	1	.002	2	0	12	6.24e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.054	4	-2.952e-4	5	NC	1	456.122	4
251		12	max	.001	1	.002	2	0	12	6.24e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.043	4	-2.952e-4	5	NC	1	577.914	4
253		13	max	0	1	.001	2	0	12	6.24e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.033	4	-2.952e-4	5	NC	1	761.499	4
255		14	max	0	1	.001	2	0	12	6.24e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	-.023	4	-2.952e-4	5	NC	1	1057.837	4
257		15	max	0	1	0	2	0	12	6.24e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	-.016	4	-2.952e-4	5	NC	1	1584.392	4
259		16	max	0	1	0	2	0	12	6.24e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	-.009	4	-2.952e-4	5	NC	1	2665.845	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	6.24e-5	1	NC	1	NC	1
262			min	0	3	0	3	-.005	4	-2.952e-4	5	NC	1	5505.856	4
263		18	max	0	1	0	2	0	12	6.24e-5	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-2.952e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.24e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-2.952e-4	5	NC	1	NC	1
267	M6	1	max	.02	1	.024	2	0	1	1.583e-3	4	NC	4	NC	1
268			min	-.025	3	-.034	3	-.622	4	0	1	1872.028	3	100.807	4
269		2	max	.019	1	.022	2	0	1	1.681e-3	4	NC	4	NC	1
270			min	-.023	3	-.032	3	-.571	4	0	1	1983.236	3	109.75	4
271		3	max	.018	1	.02	2	0	1	1.778e-3	4	NC	4	NC	1
272			min	-.022	3	-.03	3	-.521	4	0	1	2108.528	3	120.367	4
273		4	max	.017	1	.018	2	0	1	1.875e-3	4	NC	4	NC	1
274			min	-.021	3	-.028	3	-.471	4	0	1	2250.781	3	133.093	4
275		5	max	.015	1	.016	2	0	1	1.972e-3	4	NC	4	NC	1
276			min	-.019	3	-.026	3	-.422	4	0	1	2413.7	3	148.518	4
277		6	max	.014	1	.014	2	0	1	2.069e-3	4	NC	4	NC	1
278			min	-.018	3	-.024	3	-.375	4	0	1	2602.129	3	167.461	4
279		7	max	.013	1	.012	2	0	1	2.166e-3	4	NC	1	NC	1
280			min	-.016	3	-.022	3	-.328	4	0	1	2822.527	3	191.081	4
281		8	max	.012	1	.01	2	0	1	2.264e-3	4	NC	1	NC	1
282			min	-.015	3	-.02	3	-.284	4	0	1	3083.704	3	221.064	4
283		9	max	.011	1	.009	2	0	1	2.361e-3	4	NC	1	NC	1
284			min	-.014	3	-.018	3	-.241	4	0	1	3397.996	3	259.945	4
285		10	max	.01	1	.007	2	0	1	2.458e-3	4	NC	1	NC	1
286			min	-.012	3	-.017	3	-.201	4	0	1	3783.225	3	311.68	4
287		11	max	.009	1	.006	2	0	1	2.555e-3	4	NC	1	NC	1
288			min	-.011	3	-.015	3	-.164	4	0	1	4266.128	3	382.721	4
289		12	max	.008	1	.004	2	0	1	2.652e-3	4	NC	1	NC	1
290			min	-.01	3	-.013	3	-.13	4	0	1	4888.724	3	484.194	4
291		13	max	.007	1	.003	2	0	1	2.749e-3	4	NC	1	NC	1
292			min	-.008	3	-.011	3	-.099	4	0	1	5721.055	3	636.67	4
293		14	max	.006	1	.002	2	0	1	2.847e-3	4	NC	1	NC	1
294			min	-.007	3	-.009	3	-.071	4	0	1	6889.207	3	881.788	4
295		15	max	.004	1	.001	2	0	1	2.944e-3	4	NC	1	NC	1
296			min	-.005	3	-.007	3	-.048	4	0	1	8645.365	3	1314.88	4
297		16	max	.003	1	0	2	0	1	3.041e-3	4	NC	1	NC	1
298			min	-.004	3	-.005	3	-.029	4	0	1	NC	1	2196.912	4
299		17	max	.002	1	0	2	0	1	3.138e-3	4	NC	1	NC	1
300			min	-.003	3	-.004	3	-.014	4	0	1	NC	1	4480.586	4
301		18	max	.001	1	0	2	0	1	3.235e-3	4	NC	1	NC	1
302			min	-.001	3	-.002	3	-.004	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.332e-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	-8.134e-4	4	NC	1	NC	1
307		2	max	.001	3	0	2	.016	4	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	-1.432e-4	4	NC	1	NC	1
309		3	max	.002	3	0	15	.03	4	5.27e-4	4	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	.044	4	1.197e-3	4	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	8543.209	4
313		5	max	.004	3	-.002	15	.056	4	1.867e-3	4	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	7541.876	4
315		6	max	.005	3	-.002	15	.068	4	2.538e-3	4	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	9280.863	3	7239.858	4
317		7	max	.006	3	-.003	15	.079	4	3.208e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
318			min	-.006	2	-.012	3	0	1	0	1	8267.148	3	7415.612	4
319		8	max	.007	3	-.003	15	.089	4	3.878e-3	4	NC	1	NC	1
320			min	-.007	2	-.013	3	0	1	0	1	7663.799	3	8058.747	4
321		9	max	.008	3	-.003	15	.099	4	4.548e-3	4	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	7346.812	3	9322.514	4
323		10	max	.009	3	-.003	15	.108	4	5.219e-3	4	NC	1	NC	1
324			min	-.009	2	-.015	3	0	1	0	1	7091.676	4	NC	1
325		11	max	.011	3	-.003	15	.117	4	5.889e-3	4	NC	1	NC	1
326			min	-.01	2	-.015	3	0	1	0	1	7064.956	4	NC	1
327		12	max	.012	3	-.003	15	.126	4	6.559e-3	4	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7277.874	4	NC	1
329		13	max	.013	3	-.003	15	.134	4	7.229e-3	4	NC	1	NC	1
330			min	-.012	2	-.014	3	0	1	0	1	7775.077	4	NC	1
331		14	max	.014	3	-.003	15	.144	4	7.9e-3	4	NC	1	NC	1
332			min	-.013	2	-.013	3	0	1	0	1	8667.653	4	NC	1
333		15	max	.015	3	-.002	15	.153	4	8.57e-3	4	NC	1	NC	1
334			min	-.014	2	-.011	3	0	1	0	1	NC	1	NC	1
335		16	max	.016	3	-.002	15	.163	4	9.24e-3	4	NC	1	NC	1
336			min	-.015	2	-.01	3	0	1	0	1	NC	1	NC	1
337		17	max	.017	3	-.001	15	.174	4	9.91e-3	4	NC	1	NC	1
338			min	-.016	2	-.008	3	0	1	0	1	NC	1	NC	1
339		18	max	.018	3	0	15	.187	4	1.058e-2	4	NC	1	NC	1
340			min	-.017	2	-.006	1	0	1	0	1	NC	1	NC	1
341		19	max	.019	3	0	15	.2	4	1.125e-2	4	NC	1	NC	1
342			min	-.018	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.017	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.019	3	-.2	4	-3.7e-4	4	NC	1	123.987	4
345		2	max	.007	1	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.018	3	-.184	4	-3.7e-4	4	NC	1	134.836	4
347		3	max	.007	1	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.017	3	-.168	4	-3.7e-4	4	NC	1	147.746	4
349		4	max	.006	1	.014	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.016	3	-.152	4	-3.7e-4	4	NC	1	163.253	4
351		5	max	.006	1	.013	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.015	3	-.136	4	-3.7e-4	4	NC	1	182.085	4
353		6	max	.005	1	.012	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.014	3	-.121	4	-3.7e-4	4	NC	1	205.252	4
355		7	max	.005	1	.011	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.013	3	-.106	4	-3.7e-4	4	NC	1	234.185	4
357		8	max	.005	1	.01	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.012	3	-.092	4	-3.7e-4	4	NC	1	270.975	4
359		9	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.011	3	-.078	4	-3.7e-4	4	NC	1	318.767	4
361		10	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.01	3	-.065	4	-3.7e-4	4	NC	1	382.479	4
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	-.053	4	-3.7e-4	4	NC	1	470.155	4
365		12	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	-.042	4	-3.7e-4	4	NC	1	595.709	4
367		13	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	-.032	4	-3.7e-4	4	NC	1	784.966	4
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	-.023	4	-3.7e-4	4	NC	1	1090.464	4
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	-.015	4	-3.7e-4	4	NC	1	1633.302	4
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	-.009	4	-3.7e-4	4	NC	1	2748.213	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	-3.7e-4	4	NC	1	5676.15	4
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	-.001	4	-3.7e-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	-3.7e-4	4	NC	1	NC	1
381	M10	1	max	.006	1	.006	2	0	12	1.592e-3	4	NC	1	NC	2
382			min	-.008	3	-.011	3	-.621	4	1.324e-5	12	NC	1	100.929	4
383		2	max	.006	1	.005	2	0	12	1.688e-3	4	NC	1	NC	2
384			min	-.007	3	-.01	3	-.571	4	1.244e-5	12	NC	1	109.883	4
385		3	max	.006	1	.004	2	0	12	1.784e-3	4	NC	1	NC	2
386			min	-.007	3	-.01	3	-.52	4	1.164e-5	12	NC	1	120.513	4
387		4	max	.005	1	.004	2	0	12	1.88e-3	4	NC	1	NC	2
388			min	-.006	3	-.009	3	-.471	4	1.083e-5	12	NC	1	133.254	4
389		5	max	.005	1	.003	2	0	12	1.976e-3	4	NC	1	NC	1
390			min	-.006	3	-.009	3	-.422	4	1.003e-5	12	NC	1	148.699	4
391		6	max	.004	1	.002	2	0	12	2.071e-3	4	NC	1	NC	1
392			min	-.005	3	-.009	3	-.374	4	9.226e-6	12	NC	1	167.666	4
393		7	max	.004	1	.001	2	0	12	2.167e-3	4	NC	1	NC	1
394			min	-.005	3	-.008	3	-.328	4	8.422e-6	12	NC	1	191.316	4
395		8	max	.004	1	0	2	0	12	2.263e-3	4	NC	1	NC	1
396			min	-.005	3	-.008	3	-.283	4	7.619e-6	12	NC	1	221.337	4
397		9	max	.003	1	0	2	0	12	2.359e-3	4	NC	1	NC	1
398			min	-.004	3	-.007	3	-.241	4	6.815e-6	12	NC	1	260.268	4
399		10	max	.003	1	0	2	0	12	2.455e-3	4	NC	1	NC	1
400			min	-.004	3	-.007	3	-.201	4	6.012e-6	12	NC	1	312.071	4
401		11	max	.003	1	0	2	0	12	2.551e-3	4	NC	1	NC	1
402			min	-.003	3	-.006	3	-.164	4	5.208e-6	12	NC	1	383.205	4
403		12	max	.002	1	-.001	2	0	12	2.647e-3	4	NC	1	NC	1
404			min	-.003	3	-.006	3	-.129	4	4.405e-6	12	NC	1	484.815	4
405		13	max	.002	1	-.001	15	0	12	2.743e-3	4	NC	1	NC	1
406			min	-.003	3	-.005	3	-.098	4	3.602e-6	12	NC	1	637.502	4
407		14	max	.002	1	-.001	15	0	12	2.839e-3	4	NC	1	NC	1
408			min	-.002	3	-.004	3	-.071	4	2.798e-6	12	NC	1	882.968	4
409		15	max	.001	1	0	15	0	12	2.935e-3	4	NC	1	NC	1
410			min	-.002	3	-.003	3	-.048	4	1.995e-6	12	NC	1	1316.7	4
411		16	max	.001	1	0	15	0	12	3.031e-3	4	NC	1	NC	1
412			min	-.001	3	-.003	4	-.029	4	1.191e-6	12	NC	1	2200.113	4
413		17	max	0	1	0	15	0	12	3.127e-3	4	NC	1	NC	1
414			min	0	3	-.002	4	-.014	4	1.371e-7	10	NC	1	4487.702	4
415		18	max	0	1	0	15	0	12	3.223e-3	4	NC	1	NC	1
416			min	0	3	-.001	4	-.004	4	-1.278e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.319e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.787e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	9.223e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-8.099e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.016	4	-8.112e-7	12	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.369e-4	4	NC	1	NC	1
423		3	max	0	3	0	15	.03	4	5.361e-4	4	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-4.175e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	.044	4	1.209e-3	4	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-6.724e-5	1	NC	1	8874.431	4
427		5	max	.001	3	-.002	15	.056	4	1.882e-3	4	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-9.273e-5	1	NC	1	7879.149	4
429		6	max	.002	3	-.002	15	.068	4	2.555e-3	4	NC	1	NC	1
430			min	-.001	2	-.01	4	0	1	-1.182e-4	1	9855.365	4	7618.535	4
431		7	max	.002	3	-.003	15	.079	4	3.228e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
432			min	-.002	2	-.011	4	-.001	1	-1.437e-4	1	8466.737	4	7877.833	4
433		8	max	.002	3	-.003	15	.089	4	3.901e-3	4	NC	1	NC	1
434			min	-.002	2	-.012	4	-.002	1	-1.692e-4	1	7610.316	4	8673.146	4
435		9	max	.003	3	-.003	15	.098	4	4.574e-3	4	NC	2	NC	1
436			min	-.002	2	-.013	4	-.002	1	-1.947e-4	1	7105.002	4	NC	1
437		10	max	.003	3	-.003	15	.108	4	5.247e-3	4	NC	2	NC	1
438			min	-.002	2	-.014	4	-.002	1	-2.202e-4	1	6863.001	4	NC	1
439		11	max	.003	3	-.003	15	.117	4	5.92e-3	4	NC	5	NC	1
440			min	-.003	2	-.014	4	-.003	1	-2.457e-4	1	6848.739	4	NC	1
441		12	max	.004	3	-.003	15	.125	4	6.593e-3	4	NC	2	NC	1
442			min	-.003	2	-.014	4	-.003	1	-2.711e-4	1	7065.223	4	NC	1
443		13	max	.004	3	-.003	15	.134	4	7.266e-3	4	NC	1	NC	1
444			min	-.003	2	-.013	4	-.004	1	-2.966e-4	1	7556.953	4	NC	1
445		14	max	.004	3	-.003	15	.144	4	7.939e-3	4	NC	1	NC	1
446			min	-.003	2	-.012	4	-.004	1	-3.221e-4	1	8432.892	4	NC	1
447		15	max	.005	3	-.003	15	.153	4	8.612e-3	4	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.476e-4	1	9934.161	4	NC	1
449		16	max	.005	3	-.002	15	.164	4	9.285e-3	4	NC	1	NC	1
450			min	-.004	2	-.008	4	-.006	1	-3.731e-4	1	NC	1	NC	1
451		17	max	.005	3	-.002	15	.175	4	9.958e-3	4	NC	1	NC	1
452			min	-.004	2	-.006	4	-.007	1	-3.986e-4	1	NC	1	NC	1
453		18	max	.006	3	-.001	15	.188	4	1.063e-2	4	NC	1	NC	1
454			min	-.004	2	-.004	1	-.007	1	-4.241e-4	1	NC	1	NC	1
455		19	max	.006	3	0	10	.201	4	1.13e-2	4	NC	1	NC	1
456			min	-.005	2	-.003	1	-.008	1	-4.495e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.004	2	.008	1	-3.25e-6	12	NC	1	NC	3
458			min	0	3	-.006	3	-.201	4	-3.205e-4	4	NC	1	123.188	4
459		2	max	.003	1	.004	2	.008	1	-3.25e-6	12	NC	1	NC	3
460			min	0	3	-.006	3	-.185	4	-3.205e-4	4	NC	1	133.962	4
461		3	max	.002	1	.004	2	.007	1	-3.25e-6	12	NC	1	NC	3
462			min	0	3	-.005	3	-.169	4	-3.205e-4	4	NC	1	146.783	4
463		4	max	.002	1	.004	2	.006	1	-3.25e-6	12	NC	1	NC	3
464			min	0	3	-.005	3	-.153	4	-3.205e-4	4	NC	1	162.184	4
465		5	max	.002	1	.003	2	.006	1	-3.25e-6	12	NC	1	NC	2
466			min	0	3	-.005	3	-.137	4	-3.205e-4	4	NC	1	180.886	4
467		6	max	.002	1	.003	2	.005	1	-3.25e-6	12	NC	1	NC	2
468			min	0	3	-.004	3	-.122	4	-3.205e-4	4	NC	1	203.893	4
469		7	max	.002	1	.003	2	.004	1	-3.25e-6	12	NC	1	NC	2
470			min	0	3	-.004	3	-.107	4	-3.205e-4	4	NC	1	232.628	4
471		8	max	.002	1	.003	2	.004	1	-3.25e-6	12	NC	1	NC	2
472			min	0	3	-.004	3	-.092	4	-3.205e-4	4	NC	1	269.166	4
473		9	max	.002	1	.002	2	.003	1	-3.25e-6	12	NC	1	NC	2
474			min	0	3	-.003	3	-.078	4	-3.205e-4	4	NC	1	316.63	4
475		10	max	.001	1	.002	2	.003	1	-3.25e-6	12	NC	1	NC	2
476			min	0	3	-.003	3	-.065	4	-3.205e-4	4	NC	1	379.905	4
477		11	max	.001	1	.002	2	.002	1	-3.25e-6	12	NC	1	NC	1
478			min	0	3	-.003	3	-.053	4	-3.205e-4	4	NC	1	466.979	4
479		12	max	.001	1	.002	2	.002	1	-3.25e-6	12	NC	1	NC	1
480			min	0	3	-.002	3	-.042	4	-3.205e-4	4	NC	1	591.67	4
481		13	max	0	1	.001	2	.001	1	-3.25e-6	12	NC	1	NC	1
482			min	0	3	-.002	3	-.032	4	-3.205e-4	4	NC	1	779.626	4
483		14	max	0	1	.001	2	0	1	-3.25e-6	12	NC	1	NC	1
484			min	0	3	-.002	3	-.023	4	-3.205e-4	4	NC	1	1083.019	4
485		15	max	0	1	0	2	0	1	-3.25e-6	12	NC	1	NC	1
486			min	0	3	-.001	3	-.015	4	-3.205e-4	4	NC	1	1622.111	4
487		16	max	0	1	0	2	0	1	-3.25e-6	12	NC	1	NC	1
488			min	0	3	-.001	3	-.009	4	-3.205e-4	4	NC	1	2729.314	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	-3.25e-6	12	NC	1	NC	1
490			min	0	3	0	3	-.004	4	-3.205e-4	4	NC	1	5636.95	4
491		18	max	0	1	0	2	0	1	-3.25e-6	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-3.205e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.25e-6	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-3.205e-4	4	NC	1	NC	1
495	M1	1	max	.008	3	.106	2	.658	4	1.61e-2	1	NC	1	NC	1
496			min	-.004	2	-.014	3	0	12	-2.682e-2	3	NC	1	NC	1
497		2	max	.008	3	.05	2	.637	4	8.628e-3	4	NC	4	NC	1
498			min	-.004	2	-.005	3	-.006	1	-1.327e-2	3	2084.167	2	NC	1
499		3	max	.008	3	.011	3	.616	4	1.405e-2	4	NC	5	NC	1
500			min	-.004	2	-.009	2	-.009	1	-1.732e-4	1	1002.682	2	6705.242	5
501		4	max	.007	3	.04	3	.595	4	1.229e-2	4	NC	5	NC	1
502			min	-.004	2	-.077	2	-.008	1	-4.756e-3	3	631.355	2	4772.157	5
503		5	max	.007	3	.079	3	.573	4	1.053e-2	4	NC	15	NC	1
504			min	-.004	2	-.147	2	-.006	1	-9.384e-3	3	454.686	2	3799.643	5
505		6	max	.007	3	.121	3	.551	4	1.374e-2	1	NC	15	NC	1
506			min	-.003	2	-.216	2	-.002	1	-1.401e-2	3	357.523	2	3216.199	5
507		7	max	.007	3	.162	3	.528	4	1.838e-2	1	NC	15	NC	1
508			min	-.003	2	-.277	2	0	12	-1.864e-2	3	300.248	2	2812.564	4
509		8	max	.007	3	.196	3	.504	4	2.301e-2	1	9050.293	15	NC	1
510			min	-.003	2	-.326	2	0	12	-2.327e-2	3	266.407	2	2521.829	4
511		9	max	.007	3	.219	3	.479	4	2.548e-2	1	8457.099	15	NC	1
512			min	-.003	2	-.357	2	0	1	-2.327e-2	3	248.805	2	2344.649	4
513		10	max	.007	3	.227	3	.452	4	2.744e-2	2	8276.46	15	NC	1
514			min	-.003	2	-.368	2	0	12	-2.021e-2	3	243.628	2	2294.731	4
515		11	max	.006	3	.221	3	.422	4	2.95e-2	2	8456.826	15	NC	1
516			min	-.003	2	-.357	2	0	12	-1.715e-2	3	249.577	2	2349.913	4
517		12	max	.006	3	.203	3	.391	4	2.849e-2	2	9049.669	15	NC	1
518			min	-.003	2	-.325	2	-.001	1	-1.418e-2	3	268.77	2	2524.854	4
519		13	max	.006	3	.172	3	.356	4	2.286e-2	2	NC	15	NC	1
520			min	-.003	2	-.274	2	0	1	-1.135e-2	3	306.022	2	2967.854	4
521		14	max	.006	3	.134	3	.318	4	1.722e-2	2	NC	15	NC	1
522			min	-.003	2	-.21	2	0	12	-8.518e-3	3	369.893	2	3887.975	4
523		15	max	.006	3	.091	3	.28	4	1.159e-2	2	NC	15	NC	1
524			min	-.003	2	-.14	2	0	12	-5.688e-3	3	480.208	2	5880.375	4
525		16	max	.006	3	.047	3	.242	4	9.536e-3	4	NC	5	NC	1
526			min	-.003	2	-.07	2	0	12	-2.859e-3	3	685.31	2	NC	1
527		17	max	.005	3	.004	3	.207	4	1.067e-2	4	NC	5	NC	1
528			min	-.003	2	-.005	2	0	12	-3.003e-5	3	1120.853	1	NC	1
529		18	max	.005	3	.05	1	.175	4	1.095e-2	2	NC	4	NC	1
530			min	-.003	2	-.034	3	0	12	-4.357e-3	3	2370.456	1	NC	1
531		19	max	.005	3	.097	1	.147	4	2.197e-2	2	NC	1	NC	1
532			min	-.003	2	-.07	3	-.001	1	-8.851e-3	3	NC	1	NC	1
533	M5	1	max	.024	3	.252	2	.657	4	0	1	NC	1	NC	1
534			min	-.016	2	-.012	3	0	1	-4.379e-6	4	NC	1	NC	1
535		2	max	.024	3	.119	2	.641	4	7.214e-3	4	NC	5	NC	1
536			min	-.016	2	0	3	0	1	0	1	870.763	2	9355.073	4
537		3	max	.024	3	.036	3	.622	4	1.421e-2	4	NC	5	NC	1
538			min	-.016	2	-.03	2	0	1	0	1	410.319	2	5430.502	4
539		4	max	.023	3	.116	3	.6	4	1.158e-2	4	9708.651	15	NC	1
540			min	-.016	2	-.207	2	0	1	0	1	251.654	2	4146.836	4
541		5	max	.023	3	.228	3	.576	4	8.944e-3	4	6795.984	15	NC	1
542			min	-.015	2	-.398	2	0	1	0	1	177.413	2	3519.484	4
543		6	max	.022	3	.353	3	.552	4	6.312e-3	4	5233.301	15	NC	1
544			min	-.015	2	-.588	2	0	1	0	1	137.297	2	3133.407	4
545		7	max	.022	3	.476	3	.528	4	3.68e-3	4	4330.641	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	-.015	2	-.759	2	0	1	0	1	113.993	2	2838.369	4
547		8	max	.021	3	.579	3	.504	4	1.048e-3	4	3805.7	15	NC	1
548			min	-.015	2	-.897	2	0	1	0	1	100.386	2	2564.58	4
549		9	max	.021	3	.645	3	.48	4	0	1	3536.463	15	NC	1
550			min	-.014	2	-.984	2	0	1	-2.956e-6	5	93.387	2	2340.584	4
551		10	max	.02	3	.669	3	.452	4	0	1	3455.344	15	NC	1
552			min	-.014	2	-1.013	2	0	1	-2.852e-6	5	91.333	2	2309.98	4
553		11	max	.02	3	.653	3	.422	4	0	1	3536.557	15	NC	1
554			min	-.014	2	-.983	2	0	1	-2.749e-6	5	93.687	2	2376.384	4
555		12	max	.019	3	.596	3	.392	4	7.596e-4	4	3805.926	15	NC	1
556			min	-.014	2	-.893	2	0	1	0	1	101.365	2	2479.964	4
557		13	max	.019	3	.506	3	.357	4	2.669e-3	4	4331.108	15	NC	1
558			min	-.013	2	-.749	2	0	1	0	1	116.523	2	2920.298	4
559		14	max	.018	3	.391	3	.317	4	4.579e-3	4	5234.224	15	NC	1
560			min	-.013	2	-.57	2	0	1	0	1	142.978	2	4059.745	4
561		15	max	.018	3	.264	3	.277	4	6.488e-3	4	6797.823	15	NC	1
562			min	-.013	2	-.375	2	0	1	0	1	189.734	2	7296.617	4
563		16	max	.018	3	.134	3	.237	4	8.397e-3	4	9712.517	15	NC	1
564			min	-.013	2	-.184	2	0	1	0	1	277.861	1	NC	1
565		17	max	.017	3	.012	3	.201	4	1.031e-2	4	NC	5	NC	1
566			min	-.013	2	-.017	2	0	1	0	1	468.609	1	NC	1
567		18	max	.017	3	.117	1	.171	4	5.234e-3	4	NC	5	NC	1
568			min	-.013	2	-.093	3	0	1	0	1	1020.399	1	NC	1
569		19	max	.017	3	.229	1	.148	4	0	1	NC	1	NC	1
570			min	-.013	2	-.187	3	0	1	-2.429e-6	4	NC	1	NC	1
571	M9	1	max	.008	3	.106	2	.657	4	2.682e-2	3	NC	1	NC	1
572			min	-.004	2	-.014	3	-.001	1	-1.61e-2	1	NC	1	NC	1
573		2	max	.008	3	.05	2	.641	4	1.327e-2	3	NC	4	NC	1
574			min	-.004	2	-.005	3	0	12	-7.814e-3	1	2084.167	2	9651.354	4
575		3	max	.008	3	.011	3	.621	4	1.417e-2	4	NC	5	NC	1
576			min	-.004	2	-.009	2	0	12	-2.317e-5	10	1002.682	2	5543.128	4
577		4	max	.007	3	.04	3	.599	4	1.113e-2	5	NC	5	NC	1
578			min	-.004	2	-.077	2	0	12	-4.466e-3	2	631.355	2	4184.418	4
579		5	max	.007	3	.079	3	.576	4	9.384e-3	3	NC	15	NC	1
580			min	-.004	2	-.147	2	0	12	-9.101e-3	1	454.686	2	3514.878	4
581		6	max	.007	3	.121	3	.552	4	1.401e-2	3	NC	15	NC	1
582			min	-.003	2	-.216	2	0	12	-1.374e-2	1	357.523	2	3106.46	4
583		7	max	.007	3	.162	3	.528	4	1.864e-2	3	NC	15	NC	1
584			min	-.003	2	-.277	2	0	1	-1.838e-2	1	300.248	2	2807.143	4
585		8	max	.007	3	.196	3	.504	4	2.327e-2	3	9031.668	15	NC	1
586			min	-.003	2	-.326	2	-.001	1	-2.301e-2	1	266.407	2	2546.812	4
587		9	max	.007	3	.219	3	.479	4	2.327e-2	3	8439.921	15	NC	1
588			min	-.003	2	-.357	2	0	12	-2.548e-2	1	248.805	2	2337.674	4
589		10	max	.007	3	.227	3	.452	4	2.021e-2	3	8259.707	15	NC	1
590			min	-.003	2	-.368	2	0	1	-2.744e-2	2	243.628	2	2295.954	4
591		11	max	.006	3	.221	3	.422	4	1.715e-2	3	8439.658	15	NC	1
592			min	-.003	2	-.357	2	0	1	-2.95e-2	2	249.577	2	2358.932	4
593		12	max	.006	3	.203	3	.391	4	1.418e-2	3	9031.167	15	NC	1
594			min	-.003	2	-.325	2	0	12	-2.849e-2	2	268.77	2	2500.424	4
595		13	max	.006	3	.172	3	.356	4	1.135e-2	3	NC	15	NC	1
596			min	-.003	2	-.274	2	0	12	-2.286e-2	2	306.022	2	2969.467	4
597		14	max	.006	3	.134	3	.317	4	8.518e-3	3	NC	15	NC	1
598			min	-.003	2	-.21	2	-.002	1	-1.722e-2	2	369.893	2	4031.656	5
599		15	max	.006	3	.091	3	.277	4	6.121e-3	5	NC	15	NC	1
600			min	-.003	2	-.14	2	-.005	1	-1.159e-2	2	480.208	2	6591.656	5
601		16	max	.006	3	.047	3	.238	4	8.223e-3	5	NC	5	NC	1
602			min	-.003	2	-.07	2	-.008	1	-5.95e-3	2	685.31	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
603		17	max	.005	3	.004	3	.202	4	1.037e-2	4	NC	5	NC	1
604			min	-.003	2	-.005	2	-.008	1	-5.825e-4	1	1120.853	1	NC	1
605		18	max	.005	3	.05	1	.172	4	4.91e-3	5	NC	4	NC	1
606			min	-.003	2	-.034	3	-.006	1	-1.095e-2	2	2370.456	1	NC	1
607		19	max	.005	3	.097	1	.148	4	8.851e-3	3	NC	1	NC	1
608			min	-.003	2	-.07	3	0	12	-2.197e-2	2	NC	1	NC	1

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

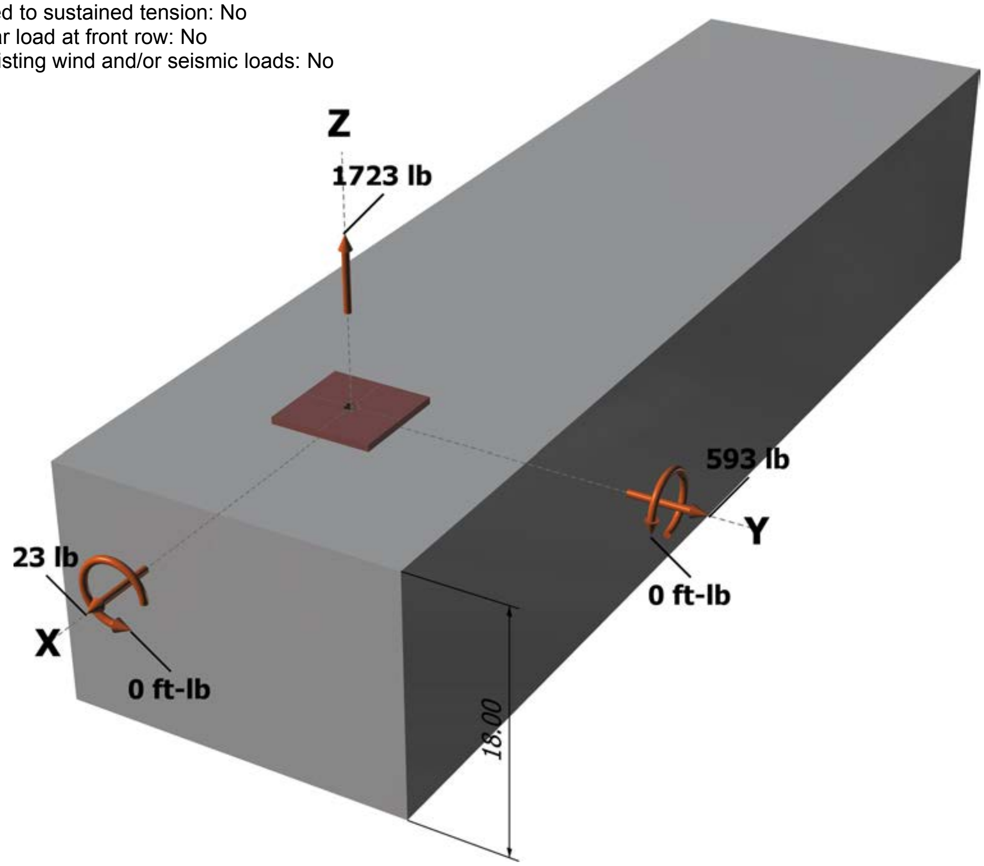
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

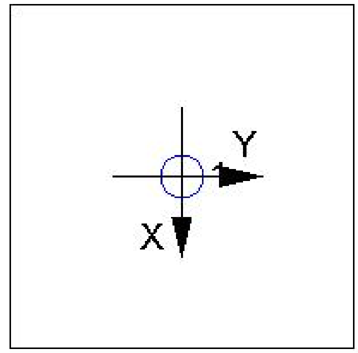
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

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

Anchor Designer™
Software
Version 2.4.5673.0

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

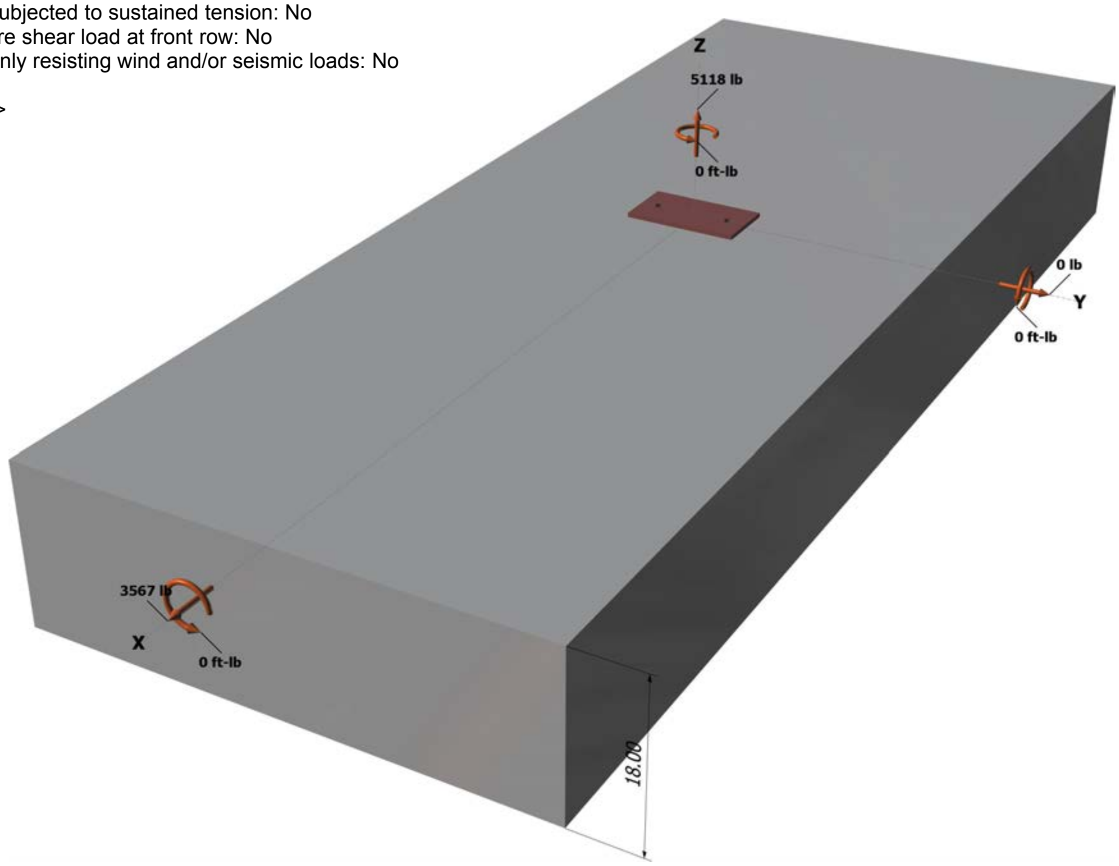
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

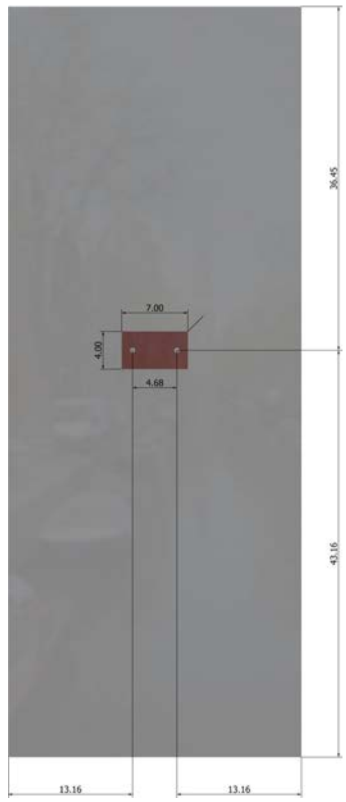
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'$_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



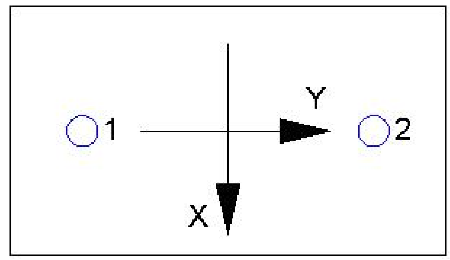
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

Shear parallel to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

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

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

Sec. D.7.3	0.63	0.57	119.8 %	1.2	Pass

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

12. Warnings

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

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

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