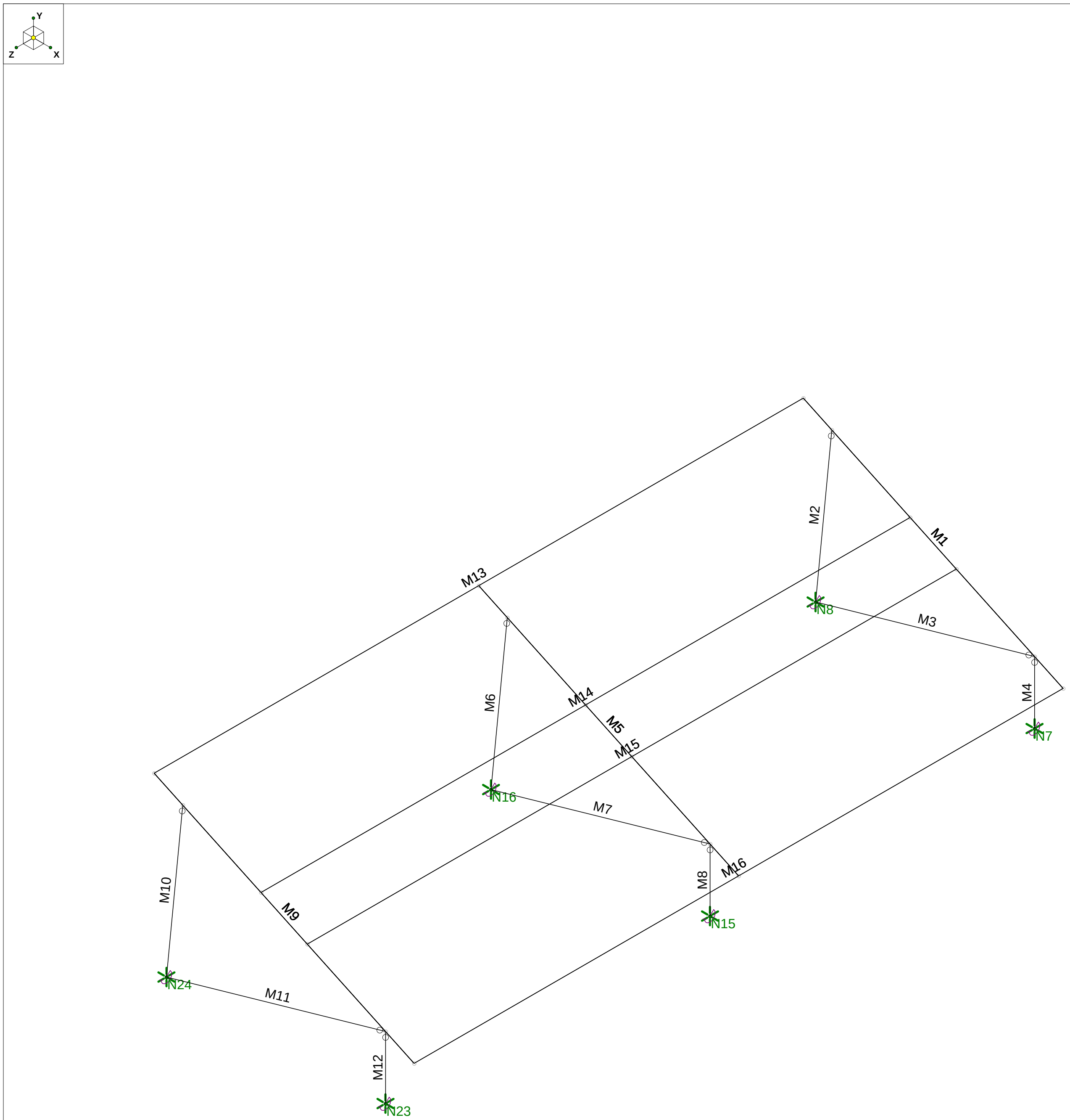


Schletter, Inc.	Standard PVMax Racking System	25ÁTilt w/o Seismic Design
HCV	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

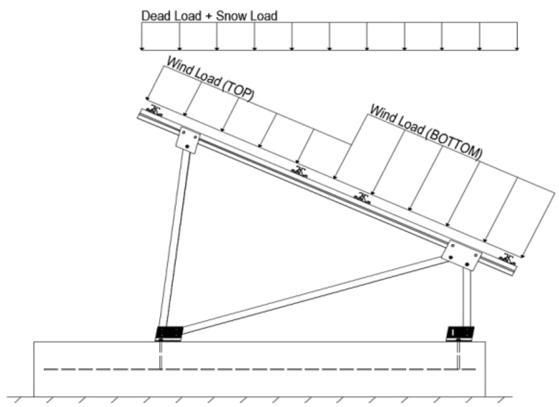
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 2
Module Tilt = 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 — Exposure Category = C
Height < 15 ft — 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 - N/A

S_S =	0.00	R =	1.25
S_{DS} =	0.00	C_S =	0
S_1 =	0.00	ρ =	1.3
S_{D1} =	0.00	Ω =	1.25
T_a =	0.00	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

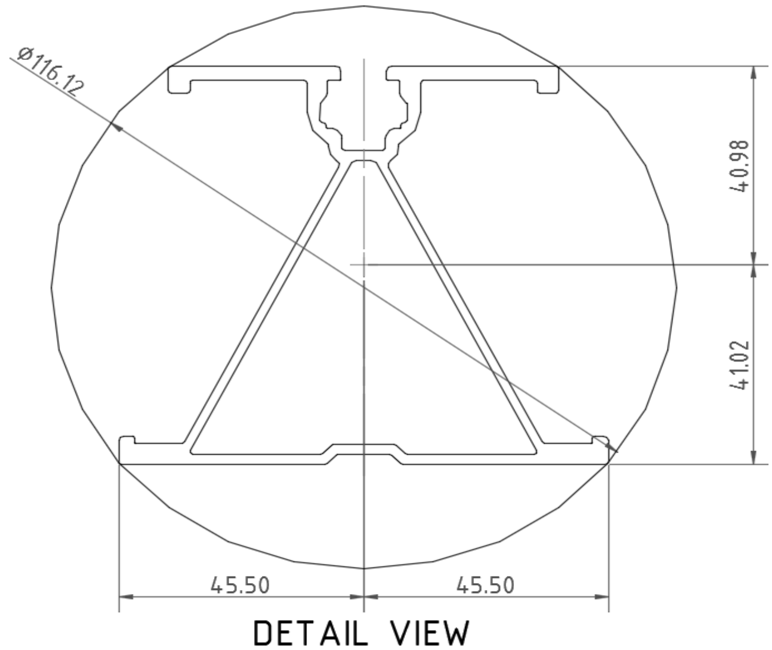
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

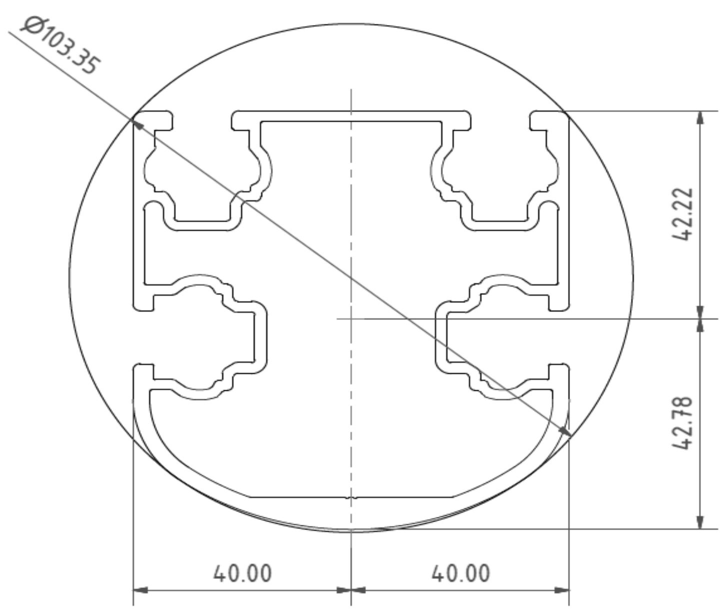
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	123	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.906	k-ft
M_z =	0.346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

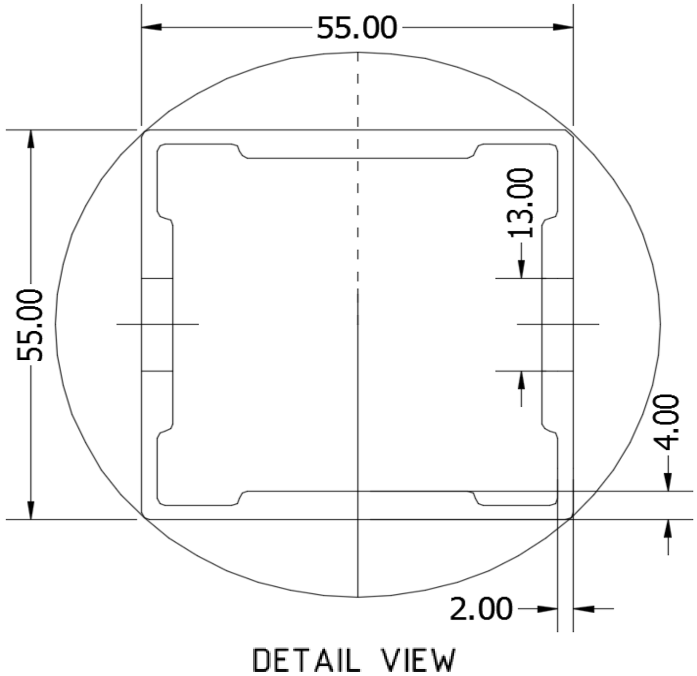
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26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

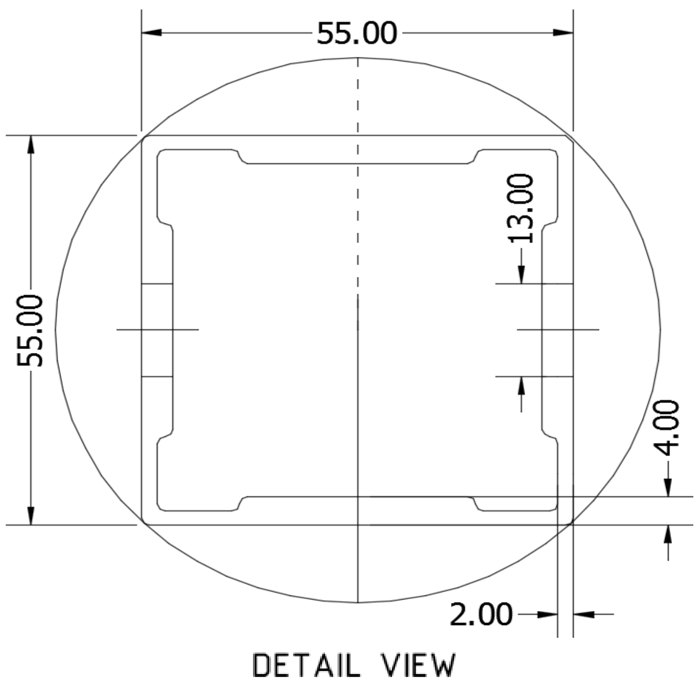
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.107	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	



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).

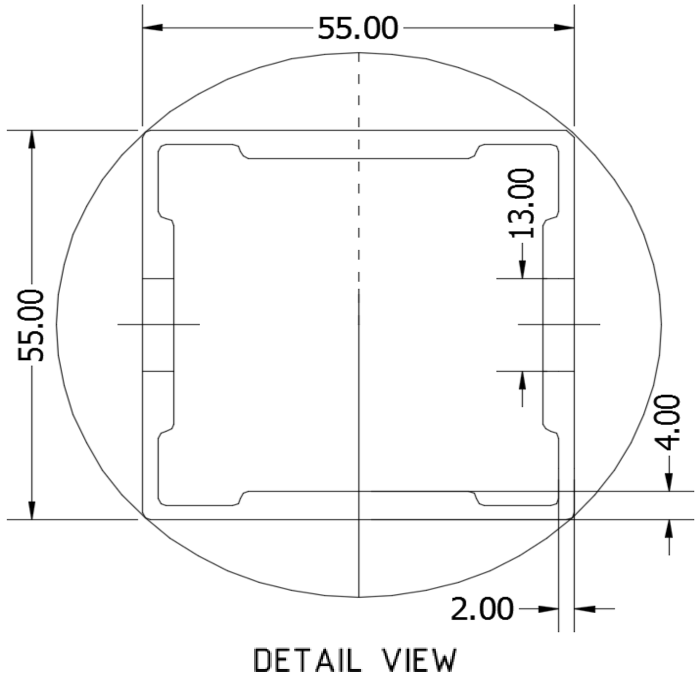
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	2.091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

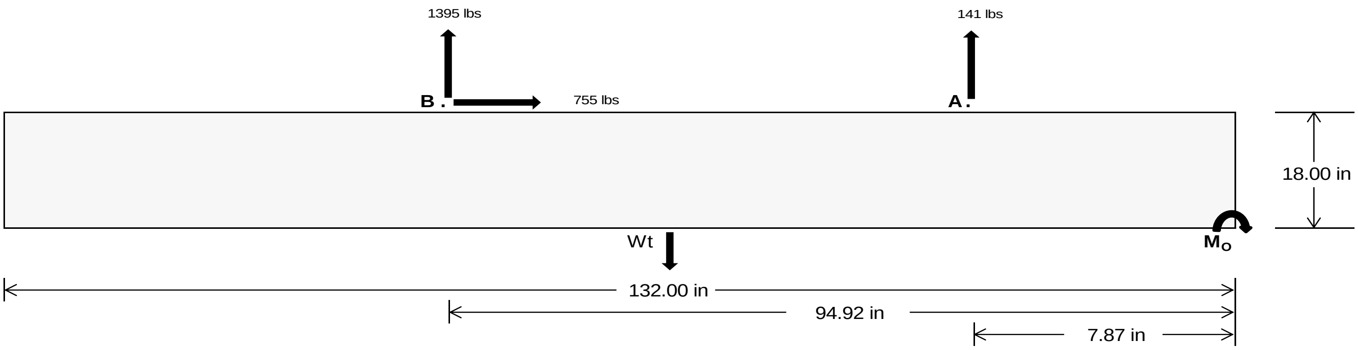
5.1 Helical Pile Foundations

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 =	14.57	3272.15	k
Moment (Weak Axis) =	0.03	0.01	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

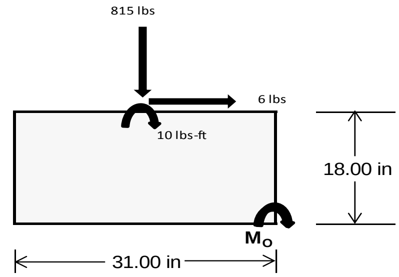
Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1034.4 ft-lbs
Resisting Force Required = 800.83 lbs
S.F. = 1.67
Weight Required = 1334.72 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	250 lbs	650 lbs	250 lbs	815 lbs	2349 lbs	815 lbs	73 lbs	190 lbs	73 lbs
F_V	2 lbs	0 lbs	2 lbs	6 lbs	0 lbs	6 lbs	0 lbs	0 lbs	0 lbs
P_{total}	7901 lbs	6181 lbs	7901 lbs	8099 lbs	6181 lbs	8099 lbs	2310 lbs	6181 lbs	2310 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	19 lbs-ft	0 lbs-ft	19 lbs-ft	1 lbs-ft	0 lbs-ft	1 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 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}	277.6 psf	217.5 psf	277.6 psf	283.5 psf	217.5 psf	283.5 psf	81.3 psf	217.5 psf	81.3 psf
f_{max}	278.5 psf	217.5 psf	278.5 psf	286.5 psf	217.5 psf	286.5 psf	81.4 psf	217.5 psf	81.4 psf

Maximum Bearing Pressure = 287 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

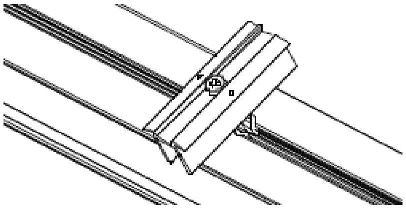
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

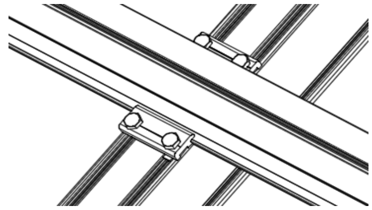
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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.

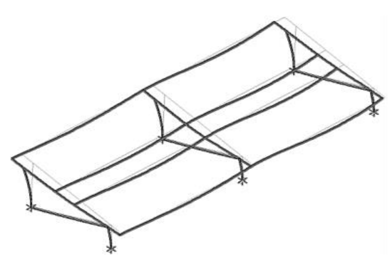
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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} =	0.055	in
N/A		

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

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

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

Weak Axis:

3.4.14

L_b = 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

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18 (Strong)

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

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

<u>Strong Axis:</u>

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

<u>Weak Axis:</u>

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 in³

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 in³

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								

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

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												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	.037	15	0	15	0	1	0	1
3	N7	max	.039	9	1148.949	1	-.478	15	0	15	0	1	0	1
4		min	-.162	2	-123.466	3	-11.209	1	-.023	1	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	0	1	0	1	0	1	0	1
7	N16	max	2339.094	2	3773.706	2	0	3	0	14	0	1	0	1
8		min	-2517.038	3	-4666.793	3	0	13	0	13	0	1	0	1
9	N23	max	.039	9	1148.949	1	11.209	1	.023	1	0	1	0	1
10		min	-.162	2	-123.466	3	.478	15	0	15	0	1	0	1
11	N24	max	626.621	2	1153.35	2	-.037	15	0	15	0	1	0	1
12		min	-792.743	3	-1424.807	3	-.767	1	-.004	1	0	1	0	1
13	Totals:	max	3590.105	2	11117.384	1	0	2						
14		min	-4102.969	3	-8251.895	3	0	1						

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	-7.455	15	0	3	.273	1	0	1
2			min	4.725	15	-692.685	3	-180.905	1	-.013	2	.011	15	0	3
3		2	max	114.117	1	318.398	1	-5.735	15	0	3	.09	1	.672	3
4			min	4.725	15	-487.529	3	-139.086	1	-.013	2	.004	15	-.44	1
5		3	max	114.117	1	182.366	1	-4.015	15	0	3	0	3	1.11	3
6			min	4.725	15	-282.372	3	-97.267	1	-.013	2	-.044	1	-.725	1
7		4	max	114.117	1	46.335	1	-2.296	15	0	3	-.004	12	1.315	3
8			min	4.725	15	-77.216	3	-55.449	1	-.013	2	-.131	1	-.855	1
9		5	max	114.117	1	127.94	3	-.576	15	0	3	-.007	12	1.286	3
10			min	4.725	15	-89.697	1	-13.63	1	-.013	2	-.171	1	-.831	1
11		6	max	114.117	1	333.097	3	28.189	1	0	3	-.007	15	1.024	3
12			min	4.725	15	-225.728	1	.545	12	-.013	2	-.162	1	-.651	1
13		7	max	114.117	1	538.253	3	70.007	1	0	3	-.004	15	.528	3
14			min	4.725	15	-361.76	1	2.265	12	-.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	4.725	15	-497.791	1	3.984	12	-.013	2	-.003	3	-.202	3
17		9	max	114.117	1	948.566	3	153.645	1	0	3	.148	1	.817	1
18			min	4.725	15	-633.823	1	5.704	12	-.013	2	.004	12	-1.166	3
19		10	max	114.117	1	769.854	1	-7.423	12	0	3	.347	1	1.617	1
20			min	4.725	15	-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	4.725	15	-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	0	10	.173	1
24			min	4.725	15	-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	-.004	15	.528	3
26			min	4.725	15	-538.253	3	-70.007	1	0	3	-.106	1	-.317	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
27		14	max	114.117	1	225.728	1	-.545	12	.013	2	-.007	15	1.024	3
28			min	4.725	15	-333.097	3	-28.189	1	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	4.725	15	-127.94	3	.576	15	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	4.725	15	-46.335	1	2.296	15	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	4.725	15	-182.366	1	4.015	15	0	3	-.044	1	-.725	1
35		18	max	114.117	1	487.529	3	139.086	1	.013	2	.09	1	.672	3
36			min	4.725	15	-318.398	1	5.735	15	0	3	.004	15	-.44	1
37		19	max	114.117	1	692.685	3	180.905	1	.013	2	.273	1	0	1
38			min	4.725	15	-454.429	1	7.455	15	0	3	.011	15	0	3
39	M14	1	max	52.19	1	479.667	1	-7.681	15	.008	3	.31	1	0	1
40			min	2.165	15	-536.065	3	-186.4	1	-.01	2	.013	15	0	3
41		2	max	52.19	1	343.636	1	-5.961	15	.008	3	.121	1	.522	3
42			min	2.165	15	-381.474	3	-144.581	1	-.01	2	.005	15	-.469	1
43		3	max	52.19	1	207.604	1	-4.241	15	.008	3	.002	3	.869	3
44			min	2.165	15	-226.883	3	-102.763	1	-.01	2	-.019	1	-.783	1
45		4	max	52.19	1	71.573	1	-2.522	15	.008	3	-.004	12	1.039	3
46			min	2.165	15	-72.293	3	-60.944	1	-.01	2	-.113	1	-.942	1
47		5	max	52.19	1	82.298	3	-.802	15	.008	3	-.006	12	1.034	3
48			min	2.165	15	-64.459	1	-19.125	1	-.01	2	-.158	1	-.946	1
49		6	max	52.19	1	236.889	3	22.693	1	.008	3	-.006	15	.852	3
50			min	2.165	15	-200.49	1	.328	12	-.01	2	-.156	1	-.795	1
51		7	max	52.19	1	391.48	3	64.512	1	.008	3	-.004	15	.494	3
52			min	2.165	15	-336.522	1	2.047	12	-.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	2.165	15	-472.553	1	3.767	12	-.01	2	-.009	1	-.04	3
55		9	max	52.19	1	700.662	3	148.149	1	.008	3	.136	1	.587	1
56			min	2.165	15	-608.585	1	5.486	12	-.01	2	.003	12	-.75	3
57		10	max	52.19	1	744.616	1	-7.206	12	.008	3	.328	1	1.358	1
58			min	2.165	15	-855.253	3	-189.968	1	-.01	2	.01	12	-1.636	3
59		11	max	52.19	1	608.585	1	-5.486	12	.01	2	.136	1	.587	1
60			min	2.165	15	-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	0	10	0	15
62			min	2.165	15	-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	-.004	15	.494	3
64			min	2.165	15	-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	-.006	15	.852	3
66			min	2.165	15	-236.889	3	-22.693	1	-.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	2.165	15	-82.298	3	.802	15	-.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	2.165	15	-71.573	1	2.522	15	-.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	2.165	15	-207.604	1	4.241	15	-.008	3	-.019	1	-.783	1
73		18	max	52.19	1	381.474	3	144.581	1	.01	2	.121	1	.522	3
74			min	2.165	15	-343.636	1	5.961	15	-.008	3	.005	15	-.469	1
75		19	max	52.19	1	536.065	3	186.4	1	.01	2	.31	1	0	1
76			min	2.165	15	-479.667	1	7.681	15	-.008	3	.013	15	0	3
77	M15	1	max	-2.28	15	627.585	2	-7.679	15	.011	2	.31	1	0	2
78			min	-54.919	1	-280.286	3	-186.374	1	-.007	3	.013	15	0	15
79		2	max	-2.28	15	447.888	2	-5.959	15	.011	2	.121	1	.274	3
80			min	-54.919	1	-201.543	3	-144.556	1	-.007	3	.005	15	-.612	2
81		3	max	-2.28	15	268.19	2	-4.24	15	.011	2	.001	3	.459	3
82			min	-54.919	1	-122.8	3	-102.737	1	-.007	3	-.02	1	-1.02	2
83		4	max	-2.28	15	88.492	2	-2.52	15	.011	2	-.004	12	.554	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
84			min	-54.919	1	-44.057	3	-60.918	1	-.007	3	-.113	1	-1.223	2
85		5	max	-2.28	15	34.686	3	-.8	15	.011	2	-.006	12	.559	3
86			min	-54.919	1	-91.206	2	-19.1	1	-.007	3	-.158	1	-1.222	2
87		6	max	-2.28	15	113.43	3	22.719	1	.011	2	-.006	15	.475	3
88			min	-54.919	1	-270.903	2	.375	12	-.007	3	-.156	1	-1.016	2
89		7	max	-2.28	15	192.173	3	64.538	1	.011	2	-.004	15	.301	3
90			min	-54.919	1	-450.601	2	2.094	12	-.007	3	-.107	1	-.605	2
91		8	max	-2.28	15	270.916	3	106.356	1	.011	2	0	10	.037	3
92			min	-54.919	1	-630.299	2	3.814	12	-.007	3	-.009	1	-.007	9
93		9	max	-2.28	15	349.659	3	148.175	1	.011	2	.136	1	.831	2
94			min	-54.919	1	-809.996	2	5.533	12	-.007	3	.003	12	-.316	3
95		10	max	-2.28	15	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	-2.28	15	809.996	2	-5.533	12	.007	3	.136	1	.831	2
98			min	-54.919	1	-349.659	3	-148.175	1	-.011	2	.003	12	-.316	3
99		12	max	-2.28	15	630.299	2	-3.814	12	.007	3	0	10	.037	3
100			min	-54.919	1	-270.916	3	-106.356	1	-.011	2	-.009	1	-.007	9
101		13	max	-2.28	15	450.601	2	-2.094	12	.007	3	-.004	15	.301	3
102			min	-54.919	1	-192.173	3	-64.538	1	-.011	2	-.107	1	-.605	2
103		14	max	-2.28	15	270.903	2	-.375	12	.007	3	-.006	15	.475	3
104			min	-54.919	1	-113.43	3	-22.719	1	-.011	2	-.156	1	-1.016	2
105		15	max	-2.28	15	91.206	2	19.1	1	.007	3	-.006	12	.559	3
106			min	-54.919	1	-34.686	3	.8	15	-.011	2	-.158	1	-1.222	2
107		16	max	-2.28	15	44.057	3	60.918	1	.007	3	-.004	12	.554	3
108			min	-54.919	1	-88.492	2	2.52	15	-.011	2	-.113	1	-1.223	2
109		17	max	-2.28	15	122.8	3	102.737	1	.007	3	.001	3	.459	3
110			min	-54.919	1	-268.19	2	4.24	15	-.011	2	-.02	1	-1.02	2
111		18	max	-2.28	15	201.543	3	144.556	1	.007	3	.121	1	.274	3
112			min	-54.919	1	-447.888	2	5.959	15	-.011	2	.005	15	-.612	2
113		19	max	-2.28	15	280.286	3	186.374	1	.007	3	.31	1	0	2
114			min	-54.919	1	-627.585	2	7.679	15	-.011	2	.013	15	0	15
115	M16	1	max	-5.051	15	602.342	2	-7.462	15	.011	1	.274	1	0	2
116			min	-121.831	1	-261.708	3	-181.148	1	-.01	3	.011	15	0	3
117		2	max	-5.051	15	422.644	2	-5.742	15	.011	1	.091	1	.253	3
118			min	-121.831	1	-182.965	3	-139.33	1	-.01	3	.004	15	-.584	2
119		3	max	-5.051	15	242.946	2	-4.022	15	.011	1	0	12	.417	3
120			min	-121.831	1	-104.222	3	-97.511	1	-.01	3	-.043	1	-.963	2
121		4	max	-5.051	15	63.248	2	-2.303	15	.011	1	-.005	12	.491	3
122			min	-121.831	1	-25.479	3	-55.692	1	-.01	3	-.131	1	-1.137	2
123		5	max	-5.051	15	53.264	3	-.583	15	.011	1	-.007	12	.475	3
124			min	-121.831	1	-116.449	2	-13.874	1	-.01	3	-.17	1	-1.107	2
125		6	max	-5.051	15	132.007	3	27.945	1	.011	1	-.007	15	.369	3
126			min	-121.831	1	-296.147	2	.7	12	-.01	3	-.162	1	-.872	2
127		7	max	-5.051	15	210.751	3	69.764	1	.011	1	-.004	15	.174	3
128			min	-121.831	1	-475.845	2	2.42	12	-.01	3	-.107	1	-.432	2
129		8	max	-5.051	15	289.494	3	111.582	1	.011	1	0	10	.212	2
130			min	-121.831	1	-655.543	2	4.139	12	-.01	3	-.003	1	-.111	3
131		9	max	-5.051	15	368.237	3	153.401	1	.011	1	.148	1	1.061	2
132			min	-121.831	1	-835.24	2	5.859	12	-.01	3	.004	12	-.485	3
133		10	max	-5.051	15	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	-5.051	15	835.24	2	-5.859	12	.01	3	.148	1	1.061	2
136			min	-121.831	1	-368.237	3	-153.401	1	-.011	1	.004	12	-.485	3
137		12	max	-5.051	15	655.543	2	-4.139	12	.01	3	0	10	.212	2
138			min	-121.831	1	-289.494	3	-111.582	1	-.011	1	-.003	1	-.111	3
139		13	max	-5.051	15	475.845	2	-2.42	12	.01	3	-.004	15	.174	3
140			min	-121.831	1	-210.751	3	-69.764	1	-.011	1	-.107	1	-.432	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
141		14	max	-5.051	15	296.147	2	-.7	12	.01	3	-.007	15	.369	3
142			min	-121.831	1	-132.007	3	-27.945	1	-.011	1	-.162	1	-.872	2
143		15	max	-5.051	15	116.449	2	13.874	1	.01	3	-.007	12	.475	3
144			min	-121.831	1	-53.264	3	.583	15	-.011	1	-.17	1	-1.107	2
145		16	max	-5.051	15	25.479	3	55.692	1	.01	3	-.005	12	.491	3
146			min	-121.831	1	-63.248	2	2.303	15	-.011	1	-.131	1	-1.137	2
147		17	max	-5.051	15	104.222	3	97.511	1	.01	3	0	12	.417	3
148			min	-121.831	1	-242.946	2	4.022	15	-.011	1	-.043	1	-.963	2
149		18	max	-5.051	15	182.965	3	139.33	1	.01	3	.091	1	.253	3
150			min	-121.831	1	-422.644	2	5.742	15	-.011	1	.004	15	-.584	2
151		19	max	-5.051	15	261.708	3	181.148	1	.01	3	.274	1	0	2
152			min	-121.831	1	-602.342	2	7.462	15	-.011	1	.011	15	0	3
153	M2	1	max	1023.418	1	1.921	4	.735	1	0	5	0	3	0	1
154			min	-1252.362	3	.452	15	.03	15	0	1	0	1	0	1
155		2	max	1023.847	1	1.864	4	.735	1	0	5	0	1	0	15
156			min	-1252.041	3	.439	15	.03	15	0	1	0	15	0	4
157		3	max	1024.275	1	1.807	4	.735	1	0	5	0	1	0	15
158			min	-1251.72	3	.426	15	.03	15	0	1	0	15	-.001	4
159		4	max	1024.704	1	1.75	4	.735	1	0	5	0	1	0	15
160			min	-1251.398	3	.412	15	.03	15	0	1	0	15	-.002	4
161		5	max	1025.132	1	1.694	4	.735	1	0	5	0	1	0	15
162			min	-1251.077	3	.399	15	.03	15	0	1	0	15	-.002	4
163		6	max	1025.561	1	1.637	4	.735	1	0	5	.001	1	0	15
164			min	-1250.756	3	.386	15	.03	15	0	1	0	15	-.003	4
165		7	max	1025.989	1	1.58	4	.735	1	0	5	.001	1	0	15
166			min	-1250.434	3	.372	15	.03	15	0	1	0	15	-.003	4
167		8	max	1026.418	1	1.523	4	.735	1	0	5	.001	1	0	15
168			min	-1250.113	3	.359	15	.03	15	0	1	0	15	-.004	4
169		9	max	1026.846	1	1.466	4	.735	1	0	5	.002	1	0	15
170			min	-1249.792	3	.346	15	.03	15	0	1	0	15	-.004	4
171		10	max	1027.275	1	1.41	4	.735	1	0	5	.002	1	-.001	15
172			min	-1249.47	3	.332	15	.03	15	0	1	0	15	-.004	4
173		11	max	1027.703	1	1.353	4	.735	1	0	5	.002	1	-.001	15
174			min	-1249.149	3	.319	15	.03	15	0	1	0	15	-.005	4
175		12	max	1028.132	1	1.296	4	.735	1	0	5	.002	1	-.001	15
176			min	-1248.827	3	.305	15	.03	15	0	1	0	15	-.005	4
177		13	max	1028.56	1	1.239	4	.735	1	0	5	.003	1	-.001	15
178			min	-1248.506	3	.292	15	.03	15	0	1	0	15	-.006	4
179		14	max	1028.989	1	1.182	4	.735	1	0	5	.003	1	-.001	15
180			min	-1248.185	3	.27	12	.03	15	0	1	0	15	-.006	4
181		15	max	1029.417	1	1.126	4	.735	1	0	5	.003	1	-.001	15
182			min	-1247.863	3	.248	12	.03	15	0	1	0	15	-.006	4
183		16	max	1029.846	1	1.069	4	.735	1	0	5	.003	1	-.002	15
184			min	-1247.542	3	.226	12	.03	15	0	1	0	15	-.007	4
185		17	max	1030.274	1	1.022	2	.735	1	0	5	.003	1	-.002	15
186			min	-1247.221	3	.204	12	.03	15	0	1	0	15	-.007	4
187		18	max	1030.703	1	.978	2	.735	1	0	5	.004	1	-.002	15
188			min	-1246.899	3	.182	12	.03	15	0	1	0	15	-.007	4
189		19	max	1031.131	1	.933	2	.735	1	0	5	.004	1	-.002	15
190			min	-1246.578	3	.16	12	.03	15	0	1	0	15	-.007	4
191	M3	1	max	545.332	2	7.882	4	.167	1	0	5	0	1	.007	4
192			min	-689.891	3	1.853	15	.007	15	0	1	0	15	.002	15
193		2	max	545.162	2	7.115	4	.167	1	0	5	0	1	.004	2
194			min	-690.019	3	1.673	15	.007	15	0	1	0	15	0	12
195		3	max	544.992	2	6.347	4	.167	1	0	5	0	1	.002	2
196			min	-690.146	3	1.493	15	.007	15	0	1	0	15	0	3
197		4	max	544.821	2	5.58	4	.167	1	0	5	0	1	0	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
198			min	-690.274	3	1.312	15	.007	15	0	1	0	15	-.002	3
199		5	max	544.651	2	4.813	4	.167	1	0	5	0	1	0	15
200			min	-690.402	3	1.132	15	.007	15	0	1	0	15	-.003	4
201		6	max	544.481	2	4.046	4	.167	1	0	5	0	1	-.001	15
202			min	-690.53	3	.952	15	.007	15	0	1	0	15	-.005	4
203		7	max	544.31	2	3.278	4	.167	1	0	5	0	1	-.002	15
204			min	-690.657	3	.771	15	.007	15	0	1	0	15	-.007	4
205		8	max	544.14	2	2.511	4	.167	1	0	5	0	1	-.002	15
206			min	-690.785	3	.591	15	.007	15	0	1	0	15	-.008	4
207		9	max	543.969	2	1.744	4	.167	1	0	5	0	1	-.002	15
208			min	-690.913	3	.411	15	.007	15	0	1	0	15	-.009	4
209		10	max	543.799	2	.977	4	.167	1	0	5	.001	1	-.002	15
210			min	-691.041	3	.23	15	.007	15	0	1	0	15	-.009	4
211		11	max	543.629	2	.325	2	.167	1	0	5	.001	1	-.002	15
212			min	-691.169	3	-.098	3	.007	15	0	1	0	15	-.01	4
213		12	max	543.458	2	-.131	15	.167	1	0	5	.001	1	-.002	15
214			min	-691.296	3	-.558	4	.007	15	0	1	0	15	-.01	4
215		13	max	543.288	2	-.311	15	.167	1	0	5	.001	1	-.002	15
216			min	-691.424	3	-1.325	4	.007	15	0	1	0	15	-.009	4
217		14	max	543.118	2	-.491	15	.167	1	0	5	.001	1	-.002	15
218			min	-691.552	3	-2.092	4	.007	15	0	1	0	15	-.008	4
219		15	max	542.947	2	-.672	15	.167	1	0	5	.001	1	-.002	15
220			min	-691.68	3	-2.859	4	.007	15	0	1	0	15	-.007	4
221		16	max	542.777	2	-.852	15	.167	1	0	5	.001	1	-.001	15
222			min	-691.807	3	-3.627	4	.007	15	0	1	0	15	-.006	4
223		17	max	542.607	2	-1.032	15	.167	1	0	5	.002	1	-.001	15
224			min	-691.935	3	-4.394	4	.007	15	0	1	0	15	-.004	4
225		18	max	542.436	2	-1.213	15	.167	1	0	5	.002	1	0	15
226			min	-692.063	3	-5.161	4	.007	15	0	1	0	15	-.002	4
227		19	max	542.266	2	-1.393	15	.167	1	0	5	.002	1	0	1
228			min	-692.191	3	-5.928	4	.007	15	0	1	0	15	0	1
229	M4	1	max	1145.883	1	0	1	-.479	15	0	1	.001	1	0	1
230			min	-125.766	3	0	1	-11.597	1	0	1	0	15	0	1
231		2	max	1146.053	1	0	1	-.479	15	0	1	0	3	0	1
232			min	-125.638	3	0	1	-11.597	1	0	1	0	1	0	1
233		3	max	1146.224	1	0	1	-.479	15	0	1	0	15	0	1
234			min	-125.51	3	0	1	-11.597	1	0	1	-.001	1	0	1
235		4	max	1146.394	1	0	1	-.479	15	0	1	0	15	0	1
236			min	-125.383	3	0	1	-11.597	1	0	1	-.003	1	0	1
237		5	max	1146.565	1	0	1	-.479	15	0	1	0	15	0	1
238			min	-125.255	3	0	1	-11.597	1	0	1	-.004	1	0	1
239		6	max	1146.735	1	0	1	-.479	15	0	1	0	15	0	1
240			min	-125.127	3	0	1	-11.597	1	0	1	-.005	1	0	1
241		7	max	1146.905	1	0	1	-.479	15	0	1	0	15	0	1
242			min	-124.999	3	0	1	-11.597	1	0	1	-.007	1	0	1
243		8	max	1147.076	1	0	1	-.479	15	0	1	0	15	0	1
244			min	-124.872	3	0	1	-11.597	1	0	1	-.008	1	0	1
245		9	max	1147.246	1	0	1	-.479	15	0	1	0	15	0	1
246			min	-124.744	3	0	1	-11.597	1	0	1	-.009	1	0	1
247		10	max	1147.416	1	0	1	-.479	15	0	1	0	15	0	1
248			min	-124.616	3	0	1	-11.597	1	0	1	-.011	1	0	1
249		11	max	1147.587	1	0	1	-.479	15	0	1	0	15	0	1
250			min	-124.488	3	0	1	-11.597	1	0	1	-.012	1	0	1
251		12	max	1147.757	1	0	1	-.479	15	0	1	0	15	0	1
252			min	-124.361	3	0	1	-11.597	1	0	1	-.013	1	0	1
253		13	max	1147.927	1	0	1	-.479	15	0	1	0	15	0	1
254			min	-124.233	3	0	1	-11.597	1	0	1	-.015	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
255		14	max	1148.098	1	0	1	-.479	15	0	1	0	15	0	1
256			min	-124.105	3	0	1	-11.597	1	0	1	-.016	1	0	1
257		15	max	1148.268	1	0	1	-.479	15	0	1	0	15	0	1
258			min	-123.977	3	0	1	-11.597	1	0	1	-.017	1	0	1
259		16	max	1148.438	1	0	1	-.479	15	0	1	0	15	0	1
260			min	-123.849	3	0	1	-11.597	1	0	1	-.019	1	0	1
261		17	max	1148.609	1	0	1	-.479	15	0	1	0	15	0	1
262			min	-123.722	3	0	1	-11.597	1	0	1	-.02	1	0	1
263		18	max	1148.779	1	0	1	-.479	15	0	1	0	15	0	1
264			min	-123.594	3	0	1	-11.597	1	0	1	-.021	1	0	1
265		19	max	1148.949	1	0	1	-.479	15	0	1	0	15	0	1
266			min	-123.466	3	0	1	-11.597	1	0	1	-.023	1	0	1
267	M6	1	max	3297.165	1	2.34	2	0	1	0	1	0	1	0	1
268			min	-4102.14	3	.098	3	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.01	2
303		19	max	3304.877	1	1.543	2	0	1	0	1	0	1	.001	3
304			min	-4096.355	3	-.499	3	0	1	0	1	0	1	-.01	2
305	M7	1	max	2090.745	2	7.918	4	0	1	0	1	0	1	.01	2
306			min	-2175.764	3	1.859	15	0	1	0	1	0	1	-.001	3
307		2	max	2090.575	2	7.151	4	0	1	0	1	0	1	.007	2
308			min	-2175.892	3	1.678	15	0	1	0	1	0	1	-.003	3
309		3	max	2090.404	2	6.384	4	0	1	0	1	0	1	.005	2
310			min	-2176.02	3	1.498	15	0	1	0	1	0	1	-.004	3
311		4	max	2090.234	2	5.617	4	0	1	0	1	0	1	.003	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
312			min	-2176.147	3	1.318	15	0	1	0	1	0	1	-.005	3
313		5	max	2090.064	2	4.85	4	0	1	0	1	0	1	0	2
314			min	-2176.275	3	1.137	15	0	1	0	1	0	1	-.006	3
315		6	max	2089.893	2	4.082	4	0	1	0	1	0	1	0	2
316			min	-2176.403	3	.957	15	0	1	0	1	0	1	-.007	3
317		7	max	2089.723	2	3.315	4	0	1	0	1	0	1	-.002	15
318			min	-2176.531	3	.777	15	0	1	0	1	0	1	-.007	3
319		8	max	2089.553	2	2.548	4	0	1	0	1	0	1	-.002	15
320			min	-2176.659	3	.553	12	0	1	0	1	0	1	-.008	3
321		9	max	2089.382	2	1.943	2	0	1	0	1	0	1	-.002	15
322			min	-2176.786	3	.254	12	0	1	0	1	0	1	-.009	4
323		10	max	2089.212	2	1.346	2	0	1	0	1	0	1	-.002	15
324			min	-2176.914	3	-.139	3	0	1	0	1	0	1	-.009	4
325		11	max	2089.041	2	.748	2	0	1	0	1	0	1	-.002	15
326			min	-2177.042	3	-.587	3	0	1	0	1	0	1	-.009	4
327		12	max	2088.871	2	.15	2	0	1	0	1	0	1	-.002	15
328			min	-2177.17	3	-1.036	3	0	1	0	1	0	1	-.009	4
329		13	max	2088.701	2	-.306	15	0	1	0	1	0	1	-.002	15
330			min	-2177.297	3	-1.484	3	0	1	0	1	0	1	-.009	4
331		14	max	2088.53	2	-.486	15	0	1	0	1	0	1	-.002	15
332			min	-2177.425	3	-2.055	4	0	1	0	1	0	1	-.008	4
333		15	max	2088.36	2	-.666	15	0	1	0	1	0	1	-.002	15
334			min	-2177.553	3	-2.823	4	0	1	0	1	0	1	-.007	4
335		16	max	2088.19	2	-.847	15	0	1	0	1	0	1	-.001	15
336			min	-2177.681	3	-3.59	4	0	1	0	1	0	1	-.006	4
337		17	max	2088.019	2	-1.027	15	0	1	0	1	0	1	-.001	15
338			min	-2177.808	3	-4.357	4	0	1	0	1	0	1	-.004	4
339		18	max	2087.849	2	-1.207	15	0	1	0	1	0	1	0	15
340			min	-2177.936	3	-5.124	4	0	1	0	1	0	1	-.002	4
341		19	max	2087.679	2	-1.388	15	0	1	0	1	0	1	0	1
342			min	-2178.064	3	-5.892	4	0	1	0	1	0	1	0	1
343	M8	1	max	3104.21	1	0	1	0	1	0	1	0	1	0	1
344			min	-490.856	3	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	0	1
361		10	max	3105.743	1	0	1	0	1	0	1	0	1	0	1
362			min	-489.706	3	0	1	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	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
369		14	max	3106.425	1	0	1	0	1	0	1	0	1	0	1
370			min	-489.195	3	0	1	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	0	1
381	M10	1	max	1023.418	1	1.921	4	-.03	15	0	1	0	1	0	1
382			min	-1252.362	3	.452	15	-.735	1	0	5	0	3	0	1
383		2	max	1023.847	1	1.864	4	-.03	15	0	1	0	15	0	15
384			min	-1252.041	3	.439	15	-.735	1	0	5	0	1	0	4
385		3	max	1024.275	1	1.807	4	-.03	15	0	1	0	15	0	15
386			min	-1251.72	3	.426	15	-.735	1	0	5	0	1	-.001	4
387		4	max	1024.704	1	1.75	4	-.03	15	0	1	0	15	0	15
388			min	-1251.398	3	.412	15	-.735	1	0	5	0	1	-.002	4
389		5	max	1025.132	1	1.694	4	-.03	15	0	1	0	15	0	15
390			min	-1251.077	3	.399	15	-.735	1	0	5	0	1	-.002	4
391		6	max	1025.561	1	1.637	4	-.03	15	0	1	0	15	0	15
392			min	-1250.756	3	.386	15	-.735	1	0	5	-.001	1	-.003	4
393		7	max	1025.989	1	1.58	4	-.03	15	0	1	0	15	0	15
394			min	-1250.434	3	.372	15	-.735	1	0	5	-.001	1	-.003	4
395		8	max	1026.418	1	1.523	4	-.03	15	0	1	0	15	0	15
396			min	-1250.113	3	.359	15	-.735	1	0	5	-.001	1	-.004	4
397		9	max	1026.846	1	1.466	4	-.03	15	0	1	0	15	0	15
398			min	-1249.792	3	.346	15	-.735	1	0	5	-.002	1	-.004	4
399		10	max	1027.275	1	1.41	4	-.03	15	0	1	0	15	-.001	15
400			min	-1249.47	3	.332	15	-.735	1	0	5	-.002	1	-.004	4
401		11	max	1027.703	1	1.353	4	-.03	15	0	1	0	15	-.001	15
402			min	-1249.149	3	.319	15	-.735	1	0	5	-.002	1	-.005	4
403		12	max	1028.132	1	1.296	4	-.03	15	0	1	0	15	-.001	15
404			min	-1248.827	3	.305	15	-.735	1	0	5	-.002	1	-.005	4
405		13	max	1028.56	1	1.239	4	-.03	15	0	1	0	15	-.001	15
406			min	-1248.506	3	.292	15	-.735	1	0	5	-.003	1	-.006	4
407		14	max	1028.989	1	1.182	4	-.03	15	0	1	0	15	-.001	15
408			min	-1248.185	3	.27	12	-.735	1	0	5	-.003	1	-.006	4
409		15	max	1029.417	1	1.126	4	-.03	15	0	1	0	15	-.001	15
410			min	-1247.863	3	.248	12	-.735	1	0	5	-.003	1	-.006	4
411		16	max	1029.846	1	1.069	4	-.03	15	0	1	0	15	-.002	15
412			min	-1247.542	3	.226	12	-.735	1	0	5	-.003	1	-.007	4
413		17	max	1030.274	1	1.022	2	-.03	15	0	1	0	15	-.002	15
414			min	-1247.221	3	.204	12	-.735	1	0	5	-.003	1	-.007	4
415		18	max	1030.703	1	.978	2	-.03	15	0	1	0	15	-.002	15
416			min	-1246.899	3	.182	12	-.735	1	0	5	-.004	1	-.007	4
417		19	max	1031.131	1	.933	2	-.03	15	0	1	0	15	-.002	15
418			min	-1246.578	3	.16	12	-.735	1	0	5	-.004	1	-.007	4
419	M11	1	max	545.332	2	7.882	4	-.007	15	0	1	0	15	.007	4
420			min	-689.891	3	1.853	15	-.167	1	0	5	0	1	.002	15
421		2	max	545.162	2	7.115	4	-.007	15	0	1	0	15	.004	2
422			min	-690.019	3	1.673	15	-.167	1	0	5	0	1	0	12
423		3	max	544.992	2	6.347	4	-.007	15	0	1	0	15	.002	2
424			min	-690.146	3	1.493	15	-.167	1	0	5	0	1	0	3
425		4	max	544.821	2	5.58	4	-.007	15	0	1	0	15	0	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
426			min	-690.274	3	1.312	15	-.167	1	0	5	0	1	-.002	3
427		5	max	544.651	2	4.813	4	-.007	15	0	1	0	15	0	15
428			min	-690.402	3	1.132	15	-.167	1	0	5	0	1	-.003	4
429		6	max	544.481	2	4.046	4	-.007	15	0	1	0	15	-.001	15
430			min	-690.53	3	.952	15	-.167	1	0	5	0	1	-.005	4
431		7	max	544.31	2	3.278	4	-.007	15	0	1	0	15	-.002	15
432			min	-690.657	3	.771	15	-.167	1	0	5	0	1	-.007	4
433		8	max	544.14	2	2.511	4	-.007	15	0	1	0	15	-.002	15
434			min	-690.785	3	.591	15	-.167	1	0	5	0	1	-.008	4
435		9	max	543.969	2	1.744	4	-.007	15	0	1	0	15	-.002	15
436			min	-690.913	3	.411	15	-.167	1	0	5	0	1	-.009	4
437		10	max	543.799	2	.977	4	-.007	15	0	1	0	15	-.002	15
438			min	-691.041	3	.23	15	-.167	1	0	5	-.001	1	-.009	4
439		11	max	543.629	2	.325	2	-.007	15	0	1	0	15	-.002	15
440			min	-691.169	3	-.098	3	-.167	1	0	5	-.001	1	-.01	4
441		12	max	543.458	2	-.131	15	-.007	15	0	1	0	15	-.002	15
442			min	-691.296	3	-.558	4	-.167	1	0	5	-.001	1	-.01	4
443		13	max	543.288	2	-.311	15	-.007	15	0	1	0	15	-.002	15
444			min	-691.424	3	-1.325	4	-.167	1	0	5	-.001	1	-.009	4
445		14	max	543.118	2	-.491	15	-.007	15	0	1	0	15	-.002	15
446			min	-691.552	3	-2.092	4	-.167	1	0	5	-.001	1	-.008	4
447		15	max	542.947	2	-.672	15	-.007	15	0	1	0	15	-.002	15
448			min	-691.68	3	-2.859	4	-.167	1	0	5	-.001	1	-.007	4
449		16	max	542.777	2	-.852	15	-.007	15	0	1	0	15	-.001	15
450			min	-691.807	3	-3.627	4	-.167	1	0	5	-.001	1	-.006	4
451		17	max	542.607	2	-1.032	15	-.007	15	0	1	0	15	-.001	15
452			min	-691.935	3	-4.394	4	-.167	1	0	5	-.002	1	-.004	4
453		18	max	542.436	2	-1.213	15	-.007	15	0	1	0	15	0	15
454			min	-692.063	3	-5.161	4	-.167	1	0	5	-.002	1	-.002	4
455		19	max	542.266	2	-1.393	15	-.007	15	0	1	0	15	0	1
456			min	-692.191	3	-5.928	4	-.167	1	0	5	-.002	1	0	1
457	M12	1	max	1145.883	1	0	1	11.597	1	0	1	0	15	0	1
458			min	-125.766	3	0	1	.479	15	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	.479	15	0	1	0	3	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	0	1
475		10	max	1147.416	1	0	1	11.597	1	0	1	.011	1	0	1
476			min	-124.616	3	0	1	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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
483		14	max	1148.098	1	0	1	11.597	1	0	1	.016	1	0	1
484			min	-124.105	3	0	1	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	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	.479	15	0	1	0	15	0	1
495	M1	1	max	180.911	1	692.661	3	-4.725	15	0	1	.273	1	0	3
496			min	7.455	15	-453.006	1	-113.973	1	0	3	.011	15	-.013	2
497		2	max	181.516	1	691.687	3	-4.725	15	0	1	.212	1	.227	1
498			min	7.638	15	-454.304	1	-113.973	1	0	3	.009	15	-.365	3
499		3	max	423.524	3	509.005	1	-4.695	15	0	3	.152	1	.455	1
500			min	-250.168	2	-494.887	3	-113.485	1	0	1	.006	15	-.715	3
501		4	max	423.978	3	507.707	1	-4.695	15	0	3	.092	1	.187	1
502			min	-249.563	2	-495.861	3	-113.485	1	0	1	.004	15	-.454	3
503		5	max	424.432	3	506.409	1	-4.695	15	0	3	.032	1	-.003	15
504			min	-248.958	2	-496.834	3	-113.485	1	0	1	.001	15	-.192	3
505		6	max	424.886	3	505.111	1	-4.695	15	0	3	-.001	15	.07	3
506			min	-248.352	2	-497.808	3	-113.485	1	0	1	-.027	1	-.366	2
507		7	max	425.34	3	503.813	1	-4.695	15	0	3	-.004	15	.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	-4.695	15	0	3	-.006	15	.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	-6.859	15	0	9	.086	1	.698	3
512			min	-171.416	2	.395	15	-165.714	1	0	3	.004	15	-1.023	2
513		10	max	439.203	3	41.873	2	-6.859	15	0	9	0	15	.678	3
514			min	-170.811	2	.004	15	-165.714	1	0	3	-.001	1	-1.046	2
515		11	max	439.657	3	40.575	2	-6.859	15	0	9	-.004	15	.659	3
516			min	-170.205	2	-1.585	4	-165.714	1	0	3	-.089	1	-1.067	2
517		12	max	452.535	3	317.892	3	-4.58	15	0	2	.145	1	.574	3
518			min	-100.093	10	-587.507	2	-110.857	1	0	3	.006	15	-.946	2
519		13	max	452.989	3	316.918	3	-4.58	15	0	2	.087	1	.407	3
520			min	-99.588	10	-588.805	2	-110.857	1	0	3	.004	15	-.635	2
521		14	max	453.443	3	315.944	3	-4.58	15	0	2	.028	1	.24	3
522			min	-99.084	10	-590.104	2	-110.857	1	0	3	.001	15	-.326	1
523		15	max	453.897	3	314.971	3	-4.58	15	0	2	-.001	15	.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	-4.58	15	0	2	-.004	15	.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	-4.58	15	0	2	-.006	15	.613	2
528			min	-97.57	10	-593.998	2	-110.857	1	0	3	-.147	1	-.258	3
529		18	max	-7.645	15	604.172	2	-5.051	15	0	3	-.009	15	.308	2
530			min	-181.749	1	-260.798	3	-121.97	1	0	2	-.21	1	-.128	3
531		19	max	-7.462	15	602.874	2	-5.051	15	0	3	-.011	15	.01	3
532			min	-181.143	1	-261.771	3	-121.97	1	0	2	-.274	1	-.011	1
533	M5	1	max	390.914	1	2307.363	3	0	1	0	1	0	1	.027	2
534			min	14.847	12	-1531.286	1	0	1	0	1	0	1	0	3
535		2	max	391.52	1	2306.389	3	0	1	0	1	0	1	.833	1
536			min	15.15	12	-1532.584	1	0	1	0	1	0	1	-1.218	3
537		3	max	1363.569	3	1556.259	1	0	1	0	1	0	1	1.605	1
538			min	-886.249	2	-1594.318	3	0	1	0	1	0	1	-2.388	3
539		4	max	1364.023	3	1554.96	1	0	1	0	1	0	1	.784	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
540			min	-885.644	2	-1595.291	3	0	1	0	1	0	1	-1.546	3
541		5	max	1364.477	3	1553.662	1	0	1	0	1	0	1	.007	9
542			min	-885.038	2	-1596.265	3	0	1	0	1	0	1	-.704	3
543		6	max	1364.931	3	1552.364	1	0	1	0	1	0	1	.139	3
544			min	-884.433	2	-1597.239	3	0	1	0	1	0	1	-.901	2
545		7	max	1365.385	3	1551.066	1	0	1	0	1	0	1	.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	0	1	0	1	0	1	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	0	1	0	1	0	1	2.103	3
550			min	-727.079	2	.393	15	0	1	0	1	0	1	-2.867	2
551		10	max	1388.171	3	142.58	2	0	1	0	1	0	1	2.034	3
552			min	-726.474	2	.001	15	0	1	0	1	0	1	-2.943	2
553		11	max	1388.625	3	141.282	2	0	1	0	1	0	1	1.965	3
554			min	-725.869	2	-1.436	4	0	1	0	1	0	1	-3.018	2
555		12	max	1410.657	3	1012.396	3	0	1	0	1	0	1	1.724	3
556			min	-569.764	2	-1823.963	2	0	1	0	1	0	1	-2.7	2
557		13	max	1411.111	3	1011.422	3	0	1	0	1	0	1	1.19	3
558			min	-569.158	2	-1825.261	2	0	1	0	1	0	1	-1.737	2
559		14	max	1411.565	3	1010.449	3	0	1	0	1	0	1	.657	3
560			min	-568.553	2	-1826.56	2	0	1	0	1	0	1	-.79	1
561		15	max	1412.019	3	1009.475	3	0	1	0	1	0	1	.19	2
562			min	-567.948	2	-1827.858	2	0	1	0	1	0	1	-.004	13
563		16	max	1412.473	3	1008.501	3	0	1	0	1	0	1	1.155	2
564			min	-567.342	2	-1829.156	2	0	1	0	1	0	1	-.408	3
565		17	max	1412.927	3	1007.528	3	0	1	0	1	0	1	2.121	2
566			min	-566.737	2	-1830.454	2	0	1	0	1	0	1	-.94	3
567		18	max	-15.459	12	2034.229	2	0	1	0	1	0	1	1.093	2
568			min	-391.055	1	-893.366	3	0	1	0	1	0	1	-.492	3
569		19	max	-15.156	12	2032.931	2	0	1	0	1	0	1	.022	1
570			min	-390.449	1	-894.34	3	0	1	0	1	0	1	-.02	3
571	M9	1	max	180.911	1	692.661	3	113.973	1	0	3	-.011	15	0	3
572			min	7.455	15	-453.006	1	4.725	15	0	1	-.273	1	-.013	2
573		2	max	181.516	1	691.687	3	113.973	1	0	3	-.009	15	.227	1
574			min	7.638	15	-454.304	1	4.725	15	0	1	-.212	1	-.365	3
575		3	max	423.524	3	509.005	1	113.485	1	0	1	-.006	15	.455	1
576			min	-250.168	2	-494.887	3	4.695	15	0	3	-.152	1	-.715	3
577		4	max	423.978	3	507.707	1	113.485	1	0	1	-.004	15	.187	1
578			min	-249.563	2	-495.861	3	4.695	15	0	3	-.092	1	-.454	3
579		5	max	424.432	3	506.409	1	113.485	1	0	1	-.001	15	-.003	15
580			min	-248.958	2	-496.834	3	4.695	15	0	3	-.032	1	-.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	4.695	15	0	3	.001	15	-.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	4.695	15	0	3	.004	15	-.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	4.695	15	0	3	.006	15	-.894	2
587		9	max	438.749	3	43.172	2	165.714	1	0	3	-.004	15	.698	3
588			min	-171.416	2	.395	15	6.859	15	0	9	-.086	1	-1.023	2
589		10	max	439.203	3	41.873	2	165.714	1	0	3	.001	1	.678	3
590			min	-170.811	2	.004	15	6.859	15	0	9	0	15	-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	-1.585	4	6.859	15	0	9	.004	15	-1.067	2
593		12	max	452.535	3	317.892	3	110.857	1	0	3	-.006	15	.574	3
594			min	-100.093	10	-587.507	2	4.58	15	0	2	-.145	1	-.946	2
595		13	max	452.989	3	316.918	3	110.857	1	0	3	-.004	15	.407	3
596			min	-99.588	10	-588.805	2	4.58	15	0	2	-.087	1	-.635	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
597		14	max	453.443	3	315.944	3	110.857	1	0	3	-.001	15	.24	3
598			min	-99.084	10	-590.104	2	4.58	15	0	2	-.028	1	-.326	1
599		15	max	453.897	3	314.971	3	110.857	1	0	3	.03	1	.073	3
600			min	-98.579	10	-591.402	2	4.58	15	0	2	.001	15	-.035	1
601		16	max	454.351	3	313.997	3	110.857	1	0	3	.089	1	.3	2
602			min	-98.075	10	-592.7	2	4.58	15	0	2	.004	15	-.093	3
603		17	max	454.805	3	313.023	3	110.857	1	0	3	.147	1	.613	2
604			min	-97.57	10	-593.998	2	4.58	15	0	2	.006	15	-.258	3
605		18	max	-7.645	15	604.172	2	121.97	1	0	2	.21	1	.308	2
606			min	-181.749	1	-260.798	3	5.051	15	0	3	.009	15	-.128	3
607		19	max	-7.462	15	602.874	2	121.97	1	0	2	.274	1	.01	3
608			min	-181.143	1	-261.771	3	5.051	15	0	3	.011	15	-.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	0	15	-.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	0	15	-.11	1	.002	10	-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	0	15	-.278	1	.005	15	-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	0	15	-.372	1	.007	15	-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	0	15	-.379	1	.008	15	-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	0	15	-.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	0	15	-.16	1	.006	15	-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	0	15	-.004	9	0	10	-1.441e-3	3	755.9	3	2992.556	1
17		9	max	0	1	.186	2	.025	3	1.939e-2	2	NC	4	NC	1
18			min	0	15	.005	15	-.007	10	-1.465e-3	3	2394.742	3	NC	1
19		10	max	0	1	.252	2	.024	3	2.072e-2	2	NC	3	NC	1
20			min	0	1	-.012	3	-.016	2	-1.488e-3	3	1685.263	2	NC	1
21		11	max	0	15	.186	2	.025	3	1.939e-2	2	NC	4	NC	1
22			min	0	1	.005	15	-.007	10	-1.465e-3	3	2394.742	3	NC	1
23		12	max	0	15	.312	3	.084	1	1.805e-2	2	NC	4	NC	3
24			min	0	1	-.004	9	0	10	-1.441e-3	3	755.9	3	2992.556	1
25		13	max	0	15	.557	3	.144	1	1.671e-2	2	NC	5	NC	3
26			min	0	1	-.16	1	.006	15	-1.418e-3	3	430.844	3	1725.303	1
27		14	max	0	15	.751	3	.183	1	1.538e-2	2	NC	5	NC	3
28			min	0	1	-.302	1	.008	15	-1.395e-3	3	321.905	3	1353.285	1
29		15	max	0	15	.84	3	.19	1	1.404e-2	2	NC	5	NC	3
30			min	0	1	-.379	1	.008	15	-1.371e-3	3	288.038	3	1306.925	1
31		16	max	0	15	.8	3	.162	1	1.27e-2	2	NC	5	NC	3
32			min	0	1	-.372	1	.007	15	-1.348e-3	3	302.394	3	1535.449	1
33		17	max	0	15	.626	3	.107	1	1.137e-2	2	NC	5	NC	3
34			min	0	1	-.278	1	.005	15	-1.324e-3	3	384.621	3	2323.554	1
35		18	max	0	15	.34	3	.045	1	1.003e-2	2	NC	5	NC	2
36			min	0	1	-.11	1	.002	10	-1.301e-3	3	696.134	3	5695.867	1
37		19	max	0	15	.106	2	.008	3	8.694e-3	2	NC	1	NC	1
38			min	-.001	1	-.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	0	15	-.341	2	-.003	2	-3.716e-3	3	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
41		2	max	0	1	.54	3	.031	1	6.221e-3	2	NC	5	NC	2
42			min	0	15	-.662	2	0	10	-4.538e-3	3	738.675	3	8327.153	1
43		3	max	0	1	.821	3	.087	1	7.264e-3	2	NC	15	NC	3
44			min	0	15	-.945	1	.004	15	-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	0	15	-1.149	1	.006	15	-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	0	15	-1.258	1	.007	15	-7.003e-3	3	265.095	1	1471.368	1
49		6	max	0	1	1.083	3	.167	1	1.039e-2	2	9990.072	15	NC	3
50			min	0	15	-1.271	1	.007	15	-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	0	15	-1.208	2	.006	15	-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	0	15	-1.101	2	.001	10	-9.468e-3	3	323.715	2	3197.944	1
55		9	max	0	1	.679	3	.023	1	1.352e-2	2	NC	15	NC	1
56			min	0	15	-.991	2	-.006	10	-1.029e-2	3	378.445	2	NC	1
57		10	max	0	1	.611	3	.021	3	1.456e-2	2	NC	5	NC	1
58			min	0	1	-.938	2	-.014	2	-1.111e-2	3	411.849	2	NC	1
59		11	max	0	15	.679	3	.023	1	1.352e-2	2	NC	15	NC	1
60			min	0	1	-.991	2	-.006	10	-1.029e-2	3	378.445	2	NC	1
61		12	max	0	15	.827	3	.078	1	1.248e-2	2	NC	15	NC	2
62			min	0	1	-1.101	2	.001	10	-9.468e-3	3	323.715	2	3197.944	1
63		13	max	0	15	.98	3	.133	1	1.143e-2	2	NC	15	NC	3
64			min	0	1	-1.208	2	.006	15	-8.646e-3	3	281.678	1	1868.773	1
65		14	max	0	15	1.083	3	.167	1	1.039e-2	2	9990.072	15	NC	3
66			min	0	1	-1.271	1	.007	15	-7.824e-3	3	261.453	1	1489.559	1
67		15	max	0	15	1.101	3	.169	1	9.349e-3	2	NC	15	NC	3
68			min	0	1	-1.258	1	.007	15	-7.003e-3	3	265.095	1	1471.368	1
69		16	max	0	15	1.014	3	.139	1	8.306e-3	2	NC	15	NC	3
70			min	0	1	-1.149	1	.006	15	-6.181e-3	3	300.357	1	1791.143	1
71		17	max	0	15	.821	3	.087	1	7.264e-3	2	NC	15	NC	3
72			min	0	1	-.945	1	.004	15	-5.359e-3	3	400.337	1	2893.005	1
73		18	max	0	15	.54	3	.031	1	6.221e-3	2	NC	5	NC	2
74			min	0	1	-.662	2	0	10	-4.538e-3	3	738.675	3	8327.153	1
75		19	max	0	15	.207	3	.007	3	5.179e-3	2	NC	1	NC	1
76			min	0	1	-.341	2	-.003	2	-3.716e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.212	3	.006	3	3.139e-3	3	NC	1	NC	1
78			min	0	1	-.34	2	-.003	2	-5.379e-3	2	NC	1	NC	1
79		2	max	0	15	.415	3	.031	1	3.838e-3	3	NC	5	NC	2
80			min	0	1	-.749	2	0	10	-6.466e-3	2	602.63	2	8287.546	1
81		3	max	0	15	.592	3	.087	1	4.538e-3	3	NC	15	NC	3
82			min	0	1	-1.096	2	.004	15	-7.553e-3	2	325.767	2	2884.762	1
83		4	max	0	15	.722	3	.139	1	5.237e-3	3	NC	15	NC	3
84			min	0	1	-1.339	2	.006	15	-8.639e-3	2	246.29	2	1787.091	1
85		5	max	0	15	.795	3	.169	1	5.936e-3	3	NC	15	NC	3
86			min	0	1	-1.459	2	.007	15	-9.726e-3	2	219.967	2	1468.271	1
87		6	max	0	15	.812	3	.167	1	6.636e-3	3	NC	15	NC	3
88			min	0	1	-1.454	2	.007	15	-1.081e-2	2	220.851	2	1486.204	1
89		7	max	0	15	.781	3	.134	1	7.335e-3	3	NC	15	NC	3
90			min	0	1	-1.347	2	.006	15	-1.19e-2	2	244.38	2	1863.425	1
91		8	max	0	15	.719	3	.079	1	8.035e-3	3	NC	15	NC	2
92			min	0	1	-1.179	2	.001	10	-1.299e-2	2	293.241	2	3182.475	1
93		9	max	0	15	.655	3	.023	1	8.734e-3	3	NC	15	NC	1
94			min	0	1	-1.014	2	-.005	10	-1.407e-2	2	364.964	2	NC	1
95		10	max	0	1	.624	3	.02	3	9.433e-3	3	NC	5	NC	1
96			min	0	1	-.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

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
98			min	0	15	-1.014	2	-.005	10	-1.407e-2	2	364.964	2	NC	1
99		12	max	0	1	.719	3	.079	1	8.035e-3	3	NC	15	NC	2
100			min	0	15	-1.179	2	.001	10	-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	0	15	-1.347	2	.006	15	-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	0	15	-1.454	2	.007	15	-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	0	15	-1.459	2	.007	15	-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	0	15	-1.339	2	.006	15	-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	0	15	-1.096	2	.004	15	-7.553e-3	2	325.767	2	2884.762	1
111		18	max	0	1	.415	3	.031	1	3.838e-3	3	NC	5	NC	2
112			min	0	15	-.749	2	0	10	-6.466e-3	2	602.63	2	8287.546	1
113		19	max	0	1	.212	3	.006	3	3.139e-3	3	NC	1	NC	1
114			min	0	15	-.34	2	-.003	2	-5.379e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.097	1	.005	3	5.575e-3	3	NC	1	NC	1
116			min	-.001	1	-.07	3	-.003	2	-7.506e-3	1	NC	1	NC	1
117		2	max	0	15	.046	3	.044	1	6.6e-3	3	NC	5	NC	2
118			min	-.001	1	-.194	2	.002	15	-8.591e-3	1	851.858	2	5732.754	1
119		3	max	0	15	.137	3	.107	1	7.624e-3	3	NC	5	NC	3
120			min	0	1	-.424	2	.005	15	-9.676e-3	1	473.768	2	2330.339	1
121		4	max	0	15	.186	3	.161	1	8.649e-3	3	NC	5	NC	3
122			min	0	1	-.557	2	.007	15	-1.076e-2	1	377.086	2	1536.873	1
123		5	max	0	15	.184	3	.19	1	9.674e-3	3	NC	5	NC	3
124			min	0	1	-.575	2	.008	15	-1.185e-2	1	367.043	2	1305.924	1
125		6	max	0	15	.135	3	.184	1	1.07e-2	3	NC	5	NC	3
126			min	0	1	-.481	2	.008	15	-1.293e-2	1	427.148	2	1349.481	1
127		7	max	0	15	.049	3	.145	1	1.172e-2	3	NC	5	NC	3
128			min	0	1	-.299	2	.006	15	-1.402e-2	1	624.957	2	1714.497	1
129		8	max	0	15	.004	4	.085	1	1.275e-2	3	NC	3	NC	3
130			min	0	1	-.074	2	.003	10	-1.51e-2	1	1458.968	2	2947.881	1
131		9	max	0	15	.147	1	.025	1	1.377e-2	3	NC	4	NC	1
132			min	0	1	-.147	3	-.004	10	-1.619e-2	1	3194.792	3	NC	1
133		10	max	0	1	.229	1	.017	3	1.48e-2	3	NC	5	NC	1
134			min	0	1	-.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	0	15	-.147	3	-.004	10	-1.619e-2	1	3194.792	3	NC	1
137		12	max	0	1	.004	4	.085	1	1.275e-2	3	NC	3	NC	3
138			min	0	15	-.074	2	.003	10	-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	0	15	-.299	2	.006	15	-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	0	15	-.481	2	.008	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	0	15	-.575	2	.008	15	-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	0	15	-.557	2	.007	15	-1.076e-2	1	377.086	2	1536.873	1
147		17	max	0	1	.137	3	.107	1	7.624e-3	3	NC	5	NC	3
148			min	0	15	-.424	2	.005	15	-9.676e-3	1	473.768	2	2330.339	1
149		18	max	.001	1	.046	3	.044	1	6.6e-3	3	NC	5	NC	2
150			min	0	15	-.194	2	.002	15	-8.591e-3	1	851.858	2	5732.754	1
151		19	max	.001	1	.097	1	.005	3	5.575e-3	3	NC	1	NC	1
152			min	0	15	-.07	3	-.003	2	-7.506e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.006	2	.009	1	-1.007e-5	15	NC	1	NC	2
154			min	-.008	3	-.011	3	0	15	-2.437e-4	1	NC	1	7113.359	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.005	2	.008	1	-9.451e-6	15	NC	1	NC	2
156			min	-.007	3	-.01	3	0	15	-2.286e-4	1	NC	1	7759.655	1
157		3	max	.006	1	.004	2	.007	1	-8.828e-6	15	NC	1	NC	2
158			min	-.007	3	-.01	3	0	15	-2.135e-4	1	NC	1	8530.199	1
159		4	max	.005	1	.004	2	.007	1	-8.204e-6	15	NC	1	NC	2
160			min	-.006	3	-.009	3	0	15	-1.984e-4	1	NC	1	9458.017	1
161		5	max	.005	1	.003	2	.006	1	-7.581e-6	15	NC	1	NC	1
162			min	-.006	3	-.009	3	0	15	-1.833e-4	1	NC	1	NC	1
163		6	max	.004	1	.002	2	.005	1	-6.958e-6	15	NC	1	NC	1
164			min	-.005	3	-.009	3	0	15	-1.682e-4	1	NC	1	NC	1
165		7	max	.004	1	.001	2	.005	1	-6.335e-6	15	NC	1	NC	1
166			min	-.005	3	-.008	3	0	15	-1.531e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.004	1	-5.712e-6	15	NC	1	NC	1
168			min	-.005	3	-.008	3	0	15	-1.381e-4	1	NC	1	NC	1
169		9	max	.003	1	0	2	.003	1	-5.088e-6	15	NC	1	NC	1
170			min	-.004	3	-.007	3	0	15	-1.23e-4	1	NC	1	NC	1
171		10	max	.003	1	0	2	.003	1	-4.465e-6	15	NC	1	NC	1
172			min	-.004	3	-.007	3	0	15	-1.079e-4	1	NC	1	NC	1
173		11	max	.003	1	0	2	.002	1	-3.842e-6	15	NC	1	NC	1
174			min	-.003	3	-.006	3	0	15	-9.281e-5	1	NC	1	NC	1
175		12	max	.002	1	0	15	.002	1	-3.219e-6	15	NC	1	NC	1
176			min	-.003	3	-.006	3	0	15	-7.772e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	.001	1	-2.595e-6	15	NC	1	NC	1
178			min	-.003	3	-.005	3	0	15	-6.264e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	0	1	-1.972e-6	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-4.755e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-1.349e-6	15	NC	1	NC	1
182			min	-.002	3	-.003	3	0	15	-3.247e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-7.257e-7	15	NC	1	NC	1
184			min	-.001	3	-.003	3	0	15	-1.738e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-1.025e-7	15	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-2.3e-6	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	1.278e-5	1	NC	1	NC	1
188			min	0	3	-.001	4	0	15	4.158e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.787e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.144e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.79e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-9.223e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.626e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	6.722e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	4.175e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	15	1.723e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	6.724e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	2.774e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	9.273e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	3.826e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.182e-4	1	NC	1	NC	1
202			min	-.001	2	-.009	4	0	15	4.877e-6	15	NC	1	NC	1
203		7	max	.002	3	-.003	15	.001	1	1.437e-4	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	5.928e-6	15	8605.229	4	NC	1
205		8	max	.002	3	-.003	15	.002	1	1.692e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	6.979e-6	15	7725.855	4	NC	1
207		9	max	.003	3	-.003	15	.002	1	1.947e-4	1	NC	2	NC	1
208			min	-.002	2	-.013	4	0	15	8.03e-6	15	7205.926	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	2.202e-4	1	NC	2	NC	1
210			min	-.002	2	-.013	4	0	15	9.081e-6	15	6954.865	4	NC	1
211		11	max	.003	3	-.003	15	.003	1	2.457e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.014	4	0	15	1.013e-5	15	6935.686	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	2.711e-4	1	NC	2	NC	1
214			min	-.003	2	-.013	4	0	15	1.118e-5	15	7150.809	4	NC	1
215		13	max	.004	3	-.003	15	.004	1	2.966e-4	1	NC	1	NC	1
216			min	-.003	2	-.012	4	0	15	1.223e-5	15	7644.805	4	NC	1
217		14	max	.004	3	-.003	15	.004	1	3.221e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	1.329e-5	15	8527.5	4	NC	1
219		15	max	.005	3	-.002	15	.005	1	3.476e-4	1	NC	1	NC	1
220			min	-.004	2	-.01	4	0	15	1.434e-5	15	NC	1	NC	1
221		16	max	.005	3	-.002	15	.006	1	3.731e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	1.539e-5	15	NC	1	NC	1
223		17	max	.005	3	-.001	15	.007	1	3.986e-4	1	NC	1	NC	1
224			min	-.004	2	-.006	1	0	15	1.644e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.007	1	4.241e-4	1	NC	1	NC	1
226			min	-.004	2	-.004	1	0	15	1.749e-5	15	NC	1	NC	1
227		19	max	.006	3	0	15	.008	1	4.495e-4	1	NC	1	NC	1
228			min	-.005	2	-.003	1	0	15	1.854e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.004	2	0	15	6.24e-5	1	NC	1	NC	3
230			min	0	3	-.006	3	-.008	1	2.587e-6	15	NC	1	2953.786	1
231		2	max	.003	1	.004	2	0	15	6.24e-5	1	NC	1	NC	3
232			min	0	3	-.006	3	-.008	1	2.587e-6	15	NC	1	3211.55	1
233		3	max	.002	1	.004	2	0	15	6.24e-5	1	NC	1	NC	3
234			min	0	3	-.005	3	-.007	1	2.587e-6	15	NC	1	3518.358	1
235		4	max	.002	1	.004	2	0	15	6.24e-5	1	NC	1	NC	3
236			min	0	3	-.005	3	-.006	1	2.587e-6	15	NC	1	3886.943	1
237		5	max	.002	1	.003	2	0	15	6.24e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.006	1	2.587e-6	15	NC	1	4334.614	1
239		6	max	.002	1	.003	2	0	15	6.24e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.005	1	2.587e-6	15	NC	1	4885.371	1
241		7	max	.002	1	.003	2	0	15	6.24e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.004	1	2.587e-6	15	NC	1	5573.285	1
243		8	max	.002	1	.003	2	0	15	6.24e-5	1	NC	1	NC	2
244			min	0	3	-.004	3	-.004	1	2.587e-6	15	NC	1	6448.044	1
245		9	max	.002	1	.002	2	0	15	6.24e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.003	1	2.587e-6	15	NC	1	7584.448	1
247		10	max	.001	1	.002	2	0	15	6.24e-5	1	NC	1	NC	2
248			min	0	3	-.003	3	-.003	1	2.587e-6	15	NC	1	9099.428	1
249		11	max	.001	1	.002	2	0	15	6.24e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.002	1	2.587e-6	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	6.24e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	2.587e-6	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	6.24e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	2.587e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	6.24e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	2.587e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	6.24e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	2.587e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	6.24e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	2.587e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	6.24e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.587e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	6.24e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.587e-6	15	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	2.587e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.024	2	0	1	0	1	NC	4	NC	1
268			min	-.025	3	-.034	3	0	1	0	1	1872.028	3	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
269		2	max	.019	1	.022	2	0	1	0	1	NC	4	NC	1
270			min	-.023	3	-.032	3	0	1	0	1	1983.236	3	NC	1
271		3	max	.018	1	.02	2	0	1	0	1	NC	4	NC	1
272			min	-.022	3	-.03	3	0	1	0	1	2108.528	3	NC	1
273		4	max	.017	1	.018	2	0	1	0	1	NC	4	NC	1
274			min	-.021	3	-.028	3	0	1	0	1	2250.781	3	NC	1
275		5	max	.015	1	.016	2	0	1	0	1	NC	4	NC	1
276			min	-.019	3	-.026	3	0	1	0	1	2413.7	3	NC	1
277		6	max	.014	1	.014	2	0	1	0	1	NC	4	NC	1
278			min	-.018	3	-.024	3	0	1	0	1	2602.129	3	NC	1
279		7	max	.013	1	.012	2	0	1	0	1	NC	1	NC	1
280			min	-.016	3	-.022	3	0	1	0	1	2822.527	3	NC	1
281		8	max	.012	1	.01	2	0	1	0	1	NC	1	NC	1
282			min	-.015	3	-.02	3	0	1	0	1	3083.704	3	NC	1
283		9	max	.011	1	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.014	3	-.018	3	0	1	0	1	3397.996	3	NC	1
285		10	max	.01	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.012	3	-.017	3	0	1	0	1	3783.225	3	NC	1
287		11	max	.009	1	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.011	3	-.015	3	0	1	0	1	4266.128	3	NC	1
289		12	max	.008	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.01	3	-.013	3	0	1	0	1	4888.724	3	NC	1
291		13	max	.007	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.011	3	0	1	0	1	5721.055	3	NC	1
293		14	max	.006	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.009	3	0	1	0	1	6889.207	3	NC	1
295		15	max	.004	1	.001	2	0	1	0	1	NC	1	NC	1
296			min	-.005	3	-.007	3	0	1	0	1	8645.365	3	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	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	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	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	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	9280.863	3	NC	1
317		7	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.012	3	0	1	0	1	8267.148	3	NC	1
319		8	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.013	3	0	1	0	1	7663.799	3	NC	1
321		9	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	7346.812	3	NC	1
323		10	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.015	3	0	1	0	1	7091.678	4	NC	1
325		11	max	.011	3	-.003	15	0	1	0	1	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
326			min	-.01	2	-.015	3	0	1	0	1	7064.958	4	NC	1
327		12	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7277.876	4	NC	1
329		13	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.014	3	0	1	0	1	7775.079	4	NC	1
331		14	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.013	2	-.013	3	0	1	0	1	8667.655	4	NC	1
333		15	max	.015	3	-.002	15	0	1	0	1	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	0	1	0	1	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	0	1	0	1	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	0	1	0	1	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	0	1	0	1	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	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.018	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.017	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.014	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.013	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.012	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.011	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.01	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	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	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.006	2	0	15	2.437e-4	1	NC	1	NC	2
382			min	-.008	3	-.011	3	-.009	1	1.007e-5	15	NC	1	7113.359	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.005	2	0	15	2.286e-4	1	NC	1	NC	2
384			min	-.007	3	-.01	3	-.008	1	9.451e-6	15	NC	1	7759.655	1
385		3	max	.006	1	.004	2	0	15	2.135e-4	1	NC	1	NC	2
386			min	-.007	3	-.01	3	-.007	1	8.828e-6	15	NC	1	8530.199	1
387		4	max	.005	1	.004	2	0	15	1.984e-4	1	NC	1	NC	2
388			min	-.006	3	-.009	3	-.007	1	8.204e-6	15	NC	1	9458.017	1
389		5	max	.005	1	.003	2	0	15	1.833e-4	1	NC	1	NC	1
390			min	-.006	3	-.009	3	-.006	1	7.581e-6	15	NC	1	NC	1
391		6	max	.004	1	.002	2	0	15	1.682e-4	1	NC	1	NC	1
392			min	-.005	3	-.009	3	-.005	1	6.958e-6	15	NC	1	NC	1
393		7	max	.004	1	.001	2	0	15	1.531e-4	1	NC	1	NC	1
394			min	-.005	3	-.008	3	-.005	1	6.335e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.381e-4	1	NC	1	NC	1
396			min	-.005	3	-.008	3	-.004	1	5.712e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	1.23e-4	1	NC	1	NC	1
398			min	-.004	3	-.007	3	-.003	1	5.088e-6	15	NC	1	NC	1
399		10	max	.003	1	0	2	0	15	1.079e-4	1	NC	1	NC	1
400			min	-.004	3	-.007	3	-.003	1	4.465e-6	15	NC	1	NC	1
401		11	max	.003	1	0	2	0	15	9.281e-5	1	NC	1	NC	1
402			min	-.003	3	-.006	3	-.002	1	3.842e-6	15	NC	1	NC	1
403		12	max	.002	1	0	15	0	15	7.772e-5	1	NC	1	NC	1
404			min	-.003	3	-.006	3	-.002	1	3.219e-6	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	6.264e-5	1	NC	1	NC	1
406			min	-.003	3	-.005	3	-.001	1	2.595e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	4.755e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	0	1	1.972e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	3.247e-5	1	NC	1	NC	1
410			min	-.002	3	-.003	3	0	1	1.349e-6	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	1.738e-5	1	NC	1	NC	1
412			min	-.001	3	-.003	3	0	1	7.257e-7	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	2.3e-6	1	NC	1	NC	1
414			min	0	3	-.002	4	0	1	1.025e-7	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-4.158e-7	12	NC	1	NC	1
416			min	0	3	-.001	4	0	1	-1.278e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.144e-6	15	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	3.79e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-6.722e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.626e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.723e-6	15	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	0	15	-2.774e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-6.724e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-3.826e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-9.273e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-4.877e-6	15	NC	1	NC	1
430			min	-.001	2	-.009	4	0	1	-1.182e-4	1	NC	1	NC	1
431		7	max	.002	3	-.003	15	0	15	-5.928e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	-.001	1	-1.437e-4	1	8605.229	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-6.979e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.002	1	-1.692e-4	1	7725.855	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-8.03e-6	15	NC	2	NC	1
436			min	-.002	2	-.013	4	-.002	1	-1.947e-4	1	7205.926	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-9.081e-6	15	NC	2	NC	1
438			min	-.002	2	-.013	4	-.002	1	-2.202e-4	1	6954.865	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-1.013e-5	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.014	4	-.003	1	-2.457e-4	1	6935.686	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-1.118e-5	15	NC	2	NC	1
442			min	-.003	2	-.013	4	-.003	1	-2.711e-4	1	7150.809	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-1.223e-5	15	NC	1	NC	1
444			min	-.003	2	-.012	4	-.004	1	-2.966e-4	1	7644.805	4	NC	1
445		14	max	.004	3	-.003	15	0	15	-1.329e-5	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.004	1	-3.221e-4	1	8527.5	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-1.434e-5	15	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.476e-4	1	NC	1	NC	1
449		16	max	.005	3	-.002	15	0	15	-1.539e-5	15	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	-.001	15	0	15	-1.644e-5	15	NC	1	NC	1
452			min	-.004	2	-.006	1	-.007	1	-3.986e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-1.749e-5	15	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	15	0	15	-1.854e-5	15	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	-2.587e-6	15	NC	1	NC	3
458			min	0	3	-.006	3	0	15	-6.24e-5	1	NC	1	2953.786	1
459		2	max	.003	1	.004	2	.008	1	-2.587e-6	15	NC	1	NC	3
460			min	0	3	-.006	3	0	15	-6.24e-5	1	NC	1	3211.55	1
461		3	max	.002	1	.004	2	.007	1	-2.587e-6	15	NC	1	NC	3
462			min	0	3	-.005	3	0	15	-6.24e-5	1	NC	1	3518.358	1
463		4	max	.002	1	.004	2	.006	1	-2.587e-6	15	NC	1	NC	3
464			min	0	3	-.005	3	0	15	-6.24e-5	1	NC	1	3886.943	1
465		5	max	.002	1	.003	2	.006	1	-2.587e-6	15	NC	1	NC	2
466			min	0	3	-.005	3	0	15	-6.24e-5	1	NC	1	4334.614	1
467		6	max	.002	1	.003	2	.005	1	-2.587e-6	15	NC	1	NC	2
468			min	0	3	-.004	3	0	15	-6.24e-5	1	NC	1	4885.371	1
469		7	max	.002	1	.003	2	.004	1	-2.587e-6	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-6.24e-5	1	NC	1	5573.285	1
471		8	max	.002	1	.003	2	.004	1	-2.587e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-6.24e-5	1	NC	1	6448.044	1
473		9	max	.002	1	.002	2	.003	1	-2.587e-6	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-6.24e-5	1	NC	1	7584.448	1
475		10	max	.001	1	.002	2	.003	1	-2.587e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-6.24e-5	1	NC	1	9099.428	1
477		11	max	.001	1	.002	2	.002	1	-2.587e-6	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-6.24e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.002	1	-2.587e-6	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-6.24e-5	1	NC	1	NC	1
481		13	max	0	1	.001	2	.001	1	-2.587e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-6.24e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-2.587e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-6.24e-5	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-2.587e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-6.24e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.587e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-6.24e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.587e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-6.24e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.587e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-6.24e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.587e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-6.24e-5	1	NC	1	NC	1
495	M1	1	max	.008	3	.106	2	.001	1	1.61e-2	1	NC	1	NC	1
496			min	-.004	2	-.014	3	0	15	-2.682e-2	3	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
497		2	max	.008	3	.05	2	0	15	7.814e-3	1	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	0	15	2.317e-5	10	NC	5	NC	1
500			min	-.004	2	-.009	2	-.009	1	-1.732e-4	1	1002.682	2	NC	1
501		4	max	.007	3	.04	3	0	15	4.466e-3	2	NC	5	NC	1
502			min	-.004	2	-.077	2	-.008	1	-4.756e-3	3	631.355	2	NC	1
503		5	max	.007	3	.079	3	0	15	9.101e-3	1	NC	15	NC	1
504			min	-.004	2	-.147	2	-.006	1	-9.384e-3	3	454.686	2	NC	1
505		6	max	.007	3	.121	3	0	15	1.374e-2	1	NC	15	NC	1
506			min	-.003	2	-.216	2	-.002	1	-1.401e-2	3	357.523	2	NC	1
507		7	max	.007	3	.162	3	0	1	1.838e-2	1	NC	15	NC	1
508			min	-.003	2	-.277	2	0	12	-1.864e-2	3	300.248	2	NC	1
509		8	max	.007	3	.196	3	.001	1	2.301e-2	1	9040.965	15	NC	1
510			min	-.003	2	-.326	2	0	15	-2.327e-2	3	266.407	2	NC	1
511		9	max	.007	3	.219	3	0	15	2.548e-2	1	8448.495	15	NC	1
512			min	-.003	2	-.357	2	0	1	-2.327e-2	3	248.805	2	NC	1
513		10	max	.007	3	.227	3	0	1	2.744e-2	2	8268.069	15	NC	1
514			min	-.003	2	-.368	2	0	12	-2.021e-2	3	243.628	2	NC	1
515		11	max	.006	3	.221	3	0	1	2.95e-2	2	8448.226	15	NC	1
516			min	-.003	2	-.357	2	0	15	-1.715e-2	3	249.577	2	NC	1
517		12	max	.006	3	.203	3	0	15	2.849e-2	2	9040.402	15	NC	1
518			min	-.003	2	-.325	2	-.001	1	-1.418e-2	3	268.77	2	NC	1
519		13	max	.006	3	.172	3	0	15	2.286e-2	2	NC	15	NC	1
520			min	-.003	2	-.274	2	0	1	-1.135e-2	3	306.022	2	NC	1
521		14	max	.006	3	.134	3	.002	1	1.722e-2	2	NC	15	NC	1
522			min	-.003	2	-.21	2	0	15	-8.518e-3	3	369.893	2	NC	1
523		15	max	.006	3	.091	3	.005	1	1.159e-2	2	NC	15	NC	1
524			min	-.003	2	-.14	2	0	15	-5.688e-3	3	480.208	2	NC	1
525		16	max	.006	3	.047	3	.008	1	5.95e-3	2	NC	5	NC	1
526			min	-.003	2	-.07	2	0	15	-2.859e-3	3	685.31	2	NC	1
527		17	max	.005	3	.004	3	.008	1	5.825e-4	1	NC	5	NC	1
528			min	-.003	2	-.005	2	0	15	-3.003e-5	3	1120.853	1	NC	1
529		18	max	.005	3	.05	1	.006	1	1.095e-2	2	NC	4	NC	1
530			min	-.003	2	-.034	3	0	15	-4.357e-3	3	2370.456	1	NC	1
531		19	max	.005	3	.097	1	0	15	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	0	1	0	1	NC	1	NC	1
534			min	-.016	2	-.012	3	0	1	0	1	NC	1	NC	1
535		2	max	.024	3	.119	2	0	1	0	1	NC	5	NC	1
536			min	-.016	2	0	3	0	1	0	1	870.763	2	NC	1
537		3	max	.024	3	.036	3	0	1	0	1	NC	5	NC	1
538			min	-.016	2	-.03	2	0	1	0	1	410.319	2	NC	1
539		4	max	.023	3	.116	3	0	1	0	1	9708.645	15	NC	1
540			min	-.016	2	-.207	2	0	1	0	1	251.654	2	NC	1
541		5	max	.023	3	.228	3	0	1	0	1	6795.98	15	NC	1
542			min	-.015	2	-.398	2	0	1	0	1	177.413	2	NC	1
543		6	max	.022	3	.353	3	0	1	0	1	5233.298	15	NC	1
544			min	-.015	2	-.588	2	0	1	0	1	137.297	2	NC	1
545		7	max	.022	3	.476	3	0	1	0	1	4330.639	15	NC	1
546			min	-.015	2	-.759	2	0	1	0	1	113.993	2	NC	1
547		8	max	.021	3	.579	3	0	1	0	1	3805.698	15	NC	1
548			min	-.015	2	-.897	2	0	1	0	1	100.386	2	NC	1
549		9	max	.021	3	.645	3	0	1	0	1	3536.461	15	NC	1
550			min	-.014	2	-.984	2	0	1	0	1	93.387	2	NC	1
551		10	max	.02	3	.669	3	0	1	0	1	3455.343	15	NC	1
552			min	-.014	2	-1.013	2	0	1	0	1	91.333	2	NC	1
553		11	max	.02	3	.653	3	0	1	0	1	3536.556	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
554			min	-.014	2	-.983	2	0	1	0	1	93.687	2	NC	1
555		12	max	.019	3	.596	3	0	1	0	1	3805.924	15	NC	1
556			min	-.014	2	-.893	2	0	1	0	1	101.365	2	NC	1
557		13	max	.019	3	.506	3	0	1	0	1	4331.106	15	NC	1
558			min	-.013	2	-.749	2	0	1	0	1	116.523	2	NC	1
559		14	max	.018	3	.391	3	0	1	0	1	5234.221	15	NC	1
560			min	-.013	2	-.57	2	0	1	0	1	142.978	2	NC	1
561		15	max	.018	3	.264	3	0	1	0	1	6797.819	15	NC	1
562			min	-.013	2	-.375	2	0	1	0	1	189.734	2	NC	1
563		16	max	.018	3	.134	3	0	1	0	1	9712.508	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	0	1	0	1	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	0	1	0	1	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	0	1	0	1	NC	1	NC	1
570			min	-.013	2	-.187	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.106	2	0	15	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	.006	1	1.327e-2	3	NC	4	NC	1
574			min	-.004	2	-.005	3	0	15	-7.814e-3	1	2084.167	2	NC	1
575		3	max	.008	3	.011	3	.009	1	1.732e-4	1	NC	5	NC	1
576			min	-.004	2	-.009	2	0	15	-2.317e-5	10	1002.682	2	NC	1
577		4	max	.007	3	.04	3	.008	1	4.756e-3	3	NC	5	NC	1
578			min	-.004	2	-.077	2	0	15	-4.466e-3	2	631.355	2	NC	1
579		5	max	.007	3	.079	3	.006	1	9.384e-3	3	NC	15	NC	1
580			min	-.004	2	-.147	2	0	15	-9.101e-3	1	454.686	2	NC	1
581		6	max	.007	3	.121	3	.002	1	1.401e-2	3	NC	15	NC	1
582			min	-.003	2	-.216	2	0	15	-1.374e-2	1	357.523	2	NC	1
583		7	max	.007	3	.162	3	0	12	1.864e-2	3	NC	15	NC	1
584			min	-.003	2	-.277	2	0	1	-1.838e-2	1	300.248	2	NC	1
585		8	max	.007	3	.196	3	0	15	2.327e-2	3	9040.965	15	NC	1
586			min	-.003	2	-.326	2	-.001	1	-2.301e-2	1	266.407	2	NC	1
587		9	max	.007	3	.219	3	0	1	2.327e-2	3	8448.495	15	NC	1
588			min	-.003	2	-.357	2	0	15	-2.548e-2	1	248.805	2	NC	1
589		10	max	.007	3	.227	3	0	12	2.021e-2	3	8268.069	15	NC	1
590			min	-.003	2	-.368	2	0	1	-2.744e-2	2	243.628	2	NC	1
591		11	max	.006	3	.221	3	0	15	1.715e-2	3	8448.226	15	NC	1
592			min	-.003	2	-.357	2	0	1	-2.95e-2	2	249.577	2	NC	1
593		12	max	.006	3	.203	3	.001	1	1.418e-2	3	9040.402	15	NC	1
594			min	-.003	2	-.325	2	0	15	-2.849e-2	2	268.77	2	NC	1
595		13	max	.006	3	.172	3	0	1	1.135e-2	3	NC	15	NC	1
596			min	-.003	2	-.274	2	0	15	-2.286e-2	2	306.022	2	NC	1
597		14	max	.006	3	.134	3	0	15	8.518e-3	3	NC	15	NC	1
598			min	-.003	2	-.21	2	-.002	1	-1.722e-2	2	369.893	2	NC	1
599		15	max	.006	3	.091	3	0	15	5.688e-3	3	NC	15	NC	1
600			min	-.003	2	-.14	2	-.005	1	-1.159e-2	2	480.208	2	NC	1
601		16	max	.006	3	.047	3	0	15	2.859e-3	3	NC	5	NC	1
602			min	-.003	2	-.07	2	-.008	1	-5.95e-3	2	685.31	2	NC	1
603		17	max	.005	3	.004	3	0	15	3.003e-5	3	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	0	15	4.357e-3	3	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	.001	1	8.851e-3	3	NC	1	NC	1
608			min	-.003	2	-.07	3	0	15	-2.197e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

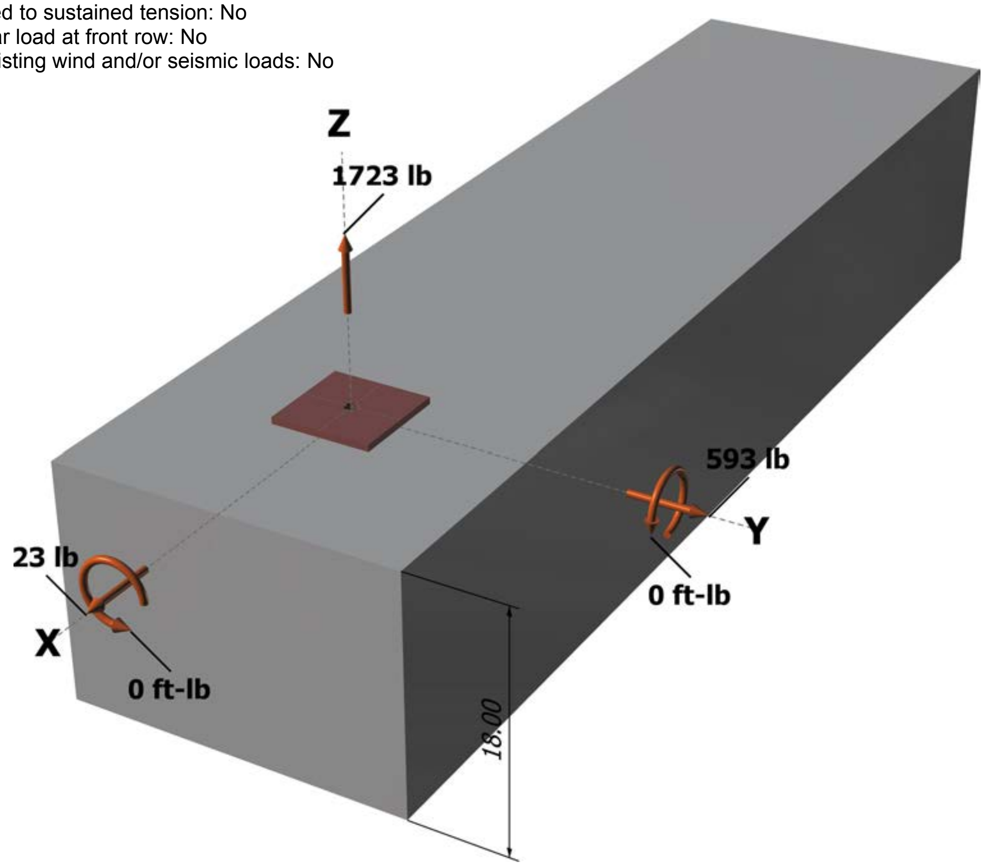
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

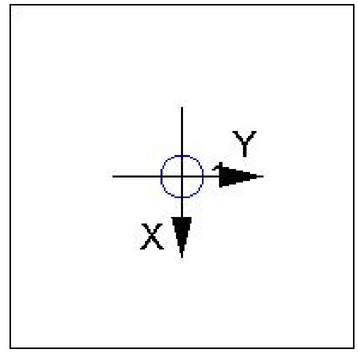
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

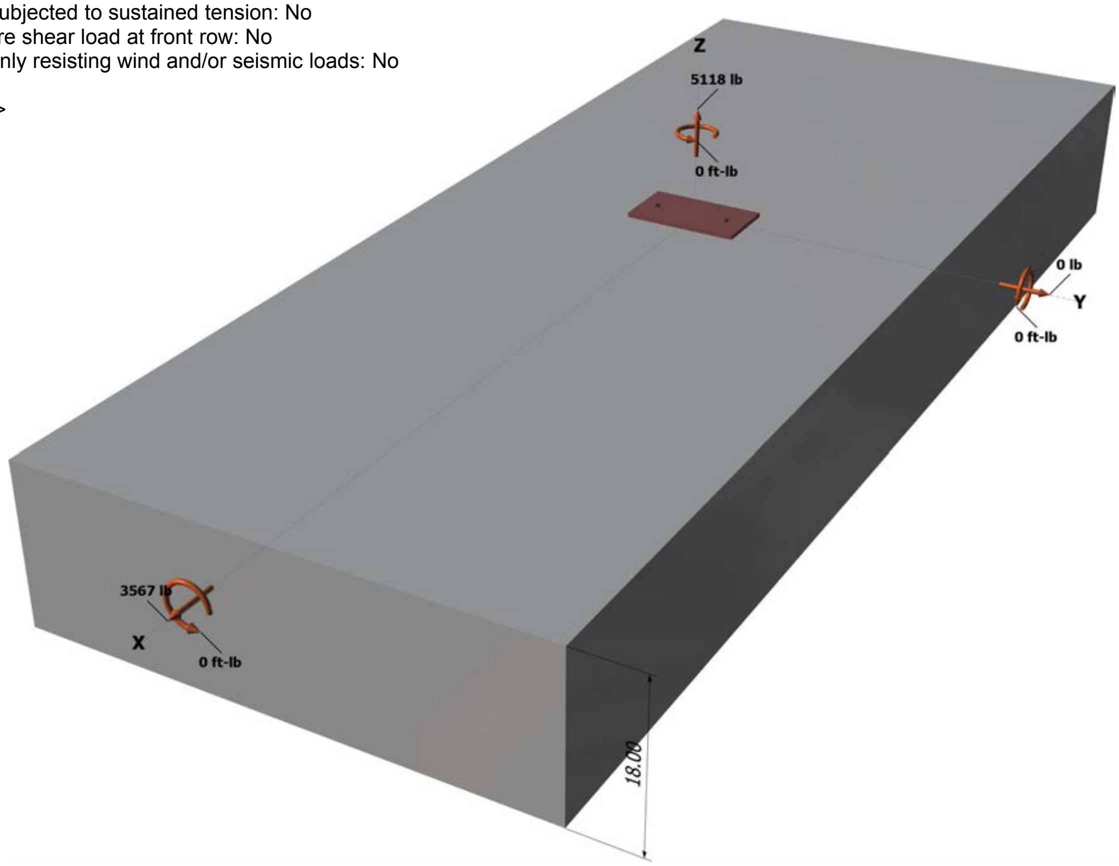
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

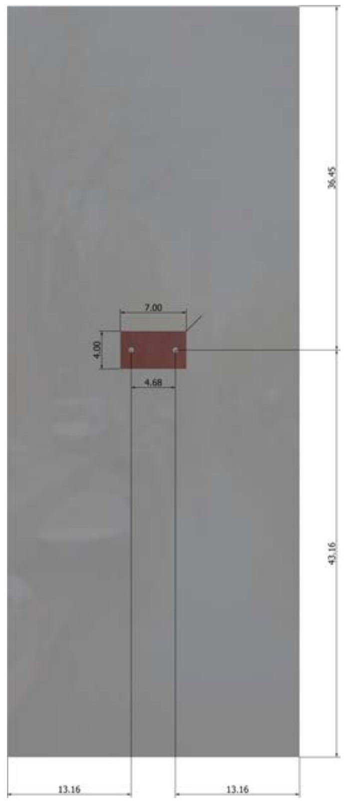
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'$_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



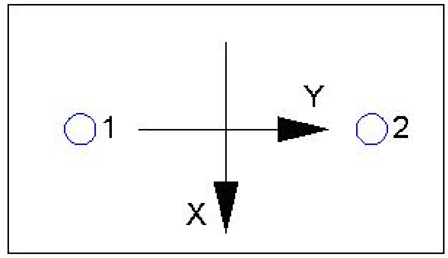
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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