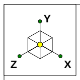
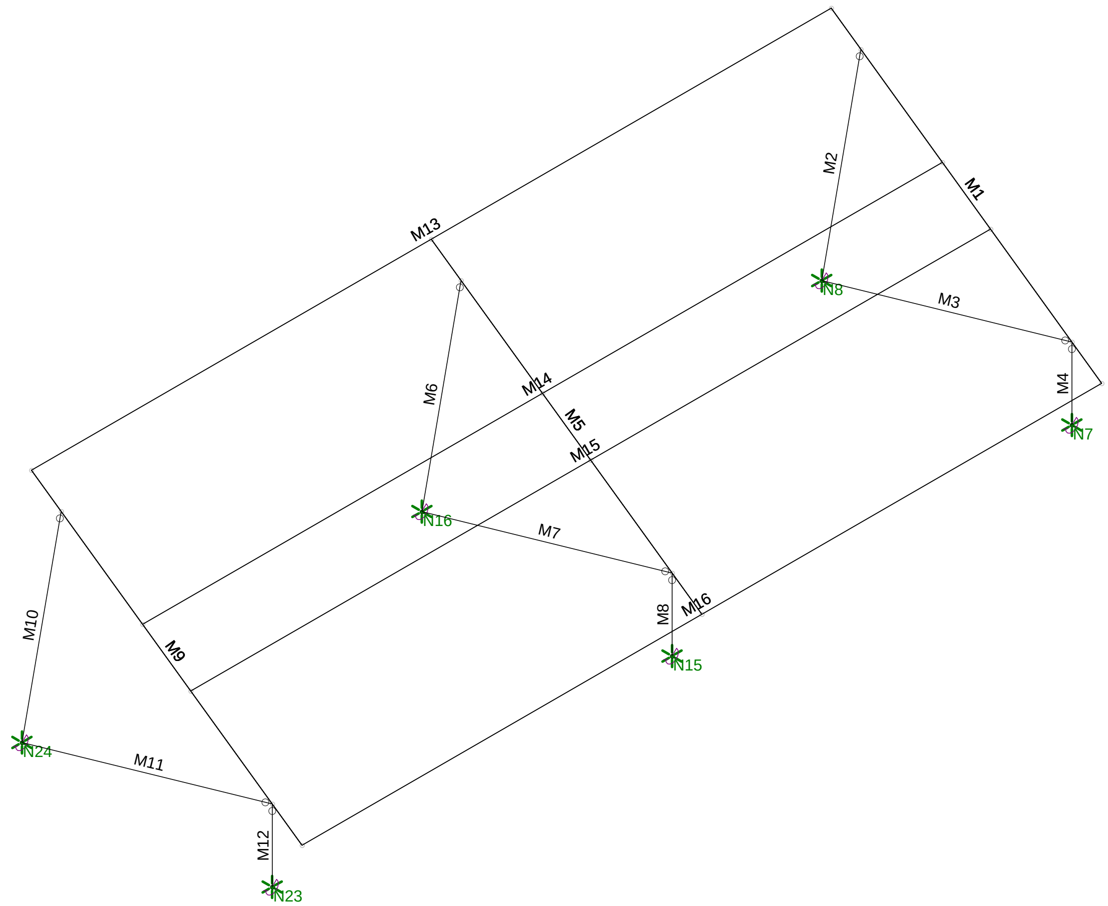




Schletter, Inc.		35ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

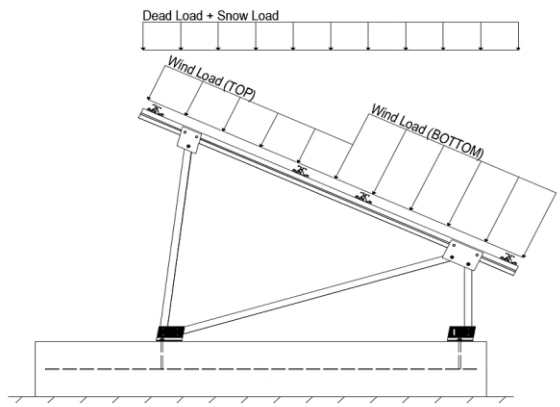
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

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

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



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

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

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

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

2.3 Wind Loads
Design Wind Speed, V = 110 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads - 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

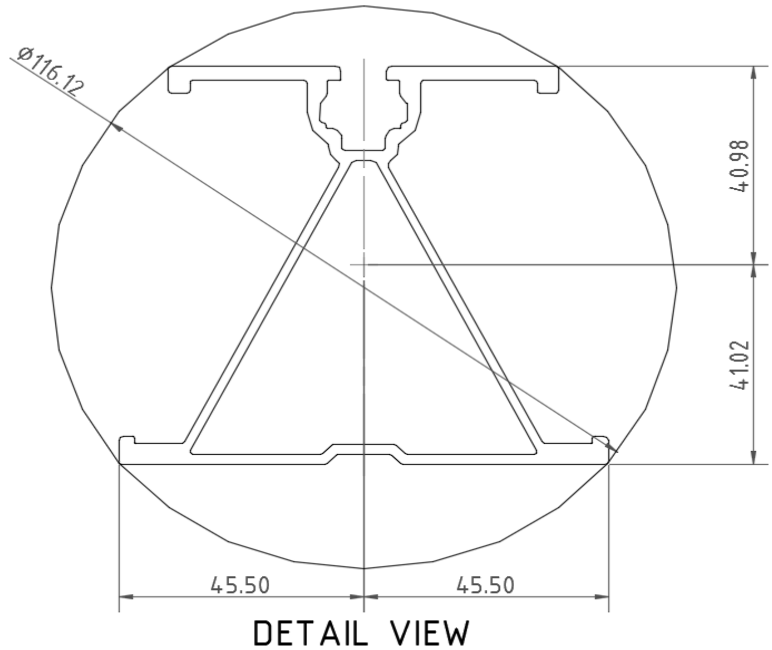
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

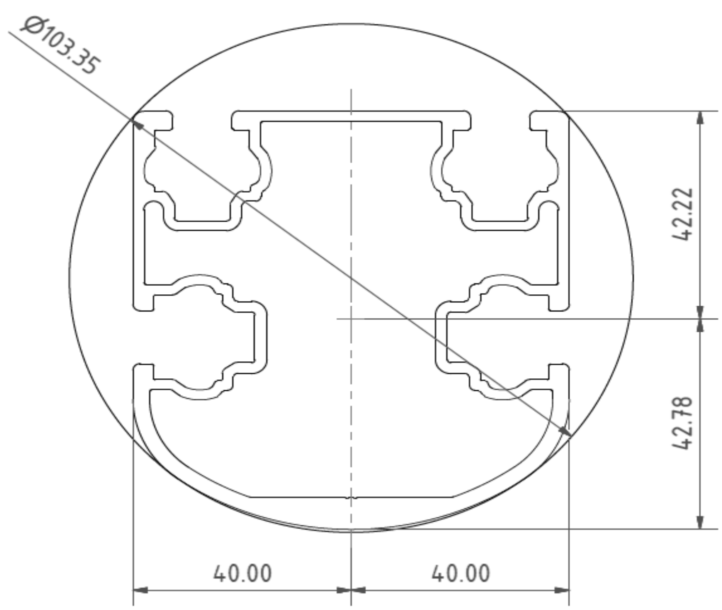
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	135	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.706	k-ft
M_z =	0.418	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	98%	



4.2 Girder Design

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

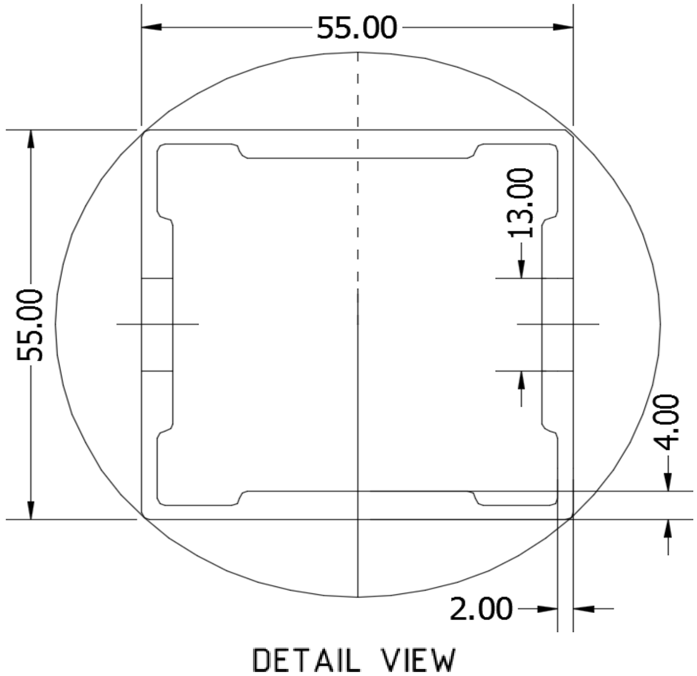
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.672	k-ft
M_z =	0.000	k-ft
P_n =	-0.813	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	79%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M12 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

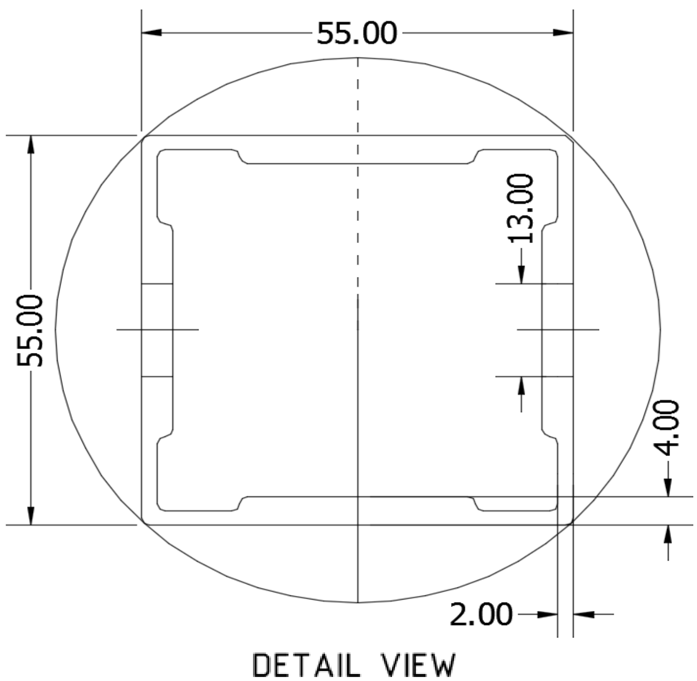
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.369	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	9%	



4.4 Diagonal Strut Design

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

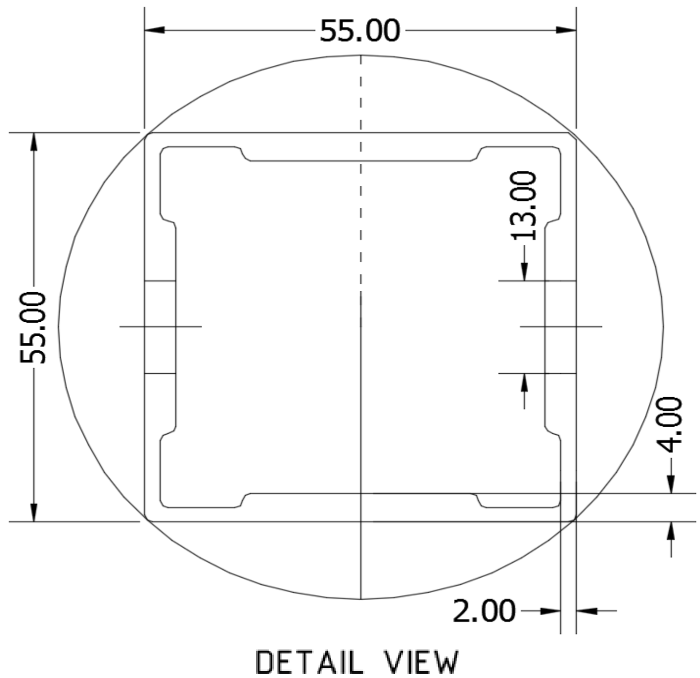
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.442	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	34%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.852	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	33%	



5. FOUNDATION DESIGN CALCULATIONS

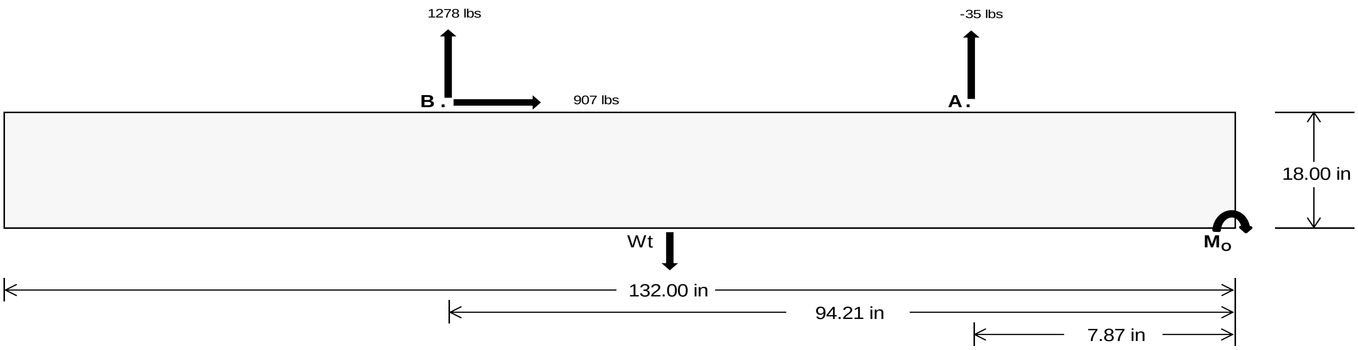
5.1 Helical Pile Foundations

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 =	102.21	5560.26	k
Compressive Load =	3079.62	4534.99	k
Lateral Load =	19.66	3932.96	k
Moment (Weak Axis) =	0.04	0.00	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 = 136480.3 in-lbs
Resisting Force Required = 2067.88 lbs
S.F. = 1.67
Weight Required = 3446.47 lbs
Minimum Width = 27 in in
Weight Provided = 5383.13 lbs

A minimum 132in long x 27in wide x 18in tall ballast foundation is required to resist overturning.

Sliding
Force = 906.84 lbs
Friction = 0.4
Weight Required = 2267.10 lbs
Resisting Weight = 5383.13 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 27in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion
Sliding Force = 906.84 lbs
Cohesion = 130 psf
Area = 24.75 ft^2
Resisting = 2691.56 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 27in 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			
	27 in	28 in	29 in	30 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.25 ft) =	5383 lbs	5583 lbs	5782 lbs	5981 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in
F_A	1205 lbs	1205 lbs	1205 lbs	1205 lbs	967 lbs	967 lbs	967 lbs	967 lbs	1482 lbs	1482 lbs	1482 lbs	1482 lbs	70 lbs	70 lbs	70 lbs	70 lbs
F_B	1088 lbs	1088 lbs	1088 lbs	1088 lbs	1920 lbs	1920 lbs	1920 lbs	1920 lbs	2124 lbs	2124 lbs	2124 lbs	2124 lbs	-2557 lbs	-2557 lbs	-2557 lbs	-2557 lbs
F_V	200 lbs	200 lbs	200 lbs	200 lbs	1673 lbs	1673 lbs	1673 lbs	1673 lbs	1381 lbs	1381 lbs	1381 lbs	1381 lbs	-1814 lbs	-1814 lbs	-1814 lbs	-1814 lbs
P_{total}	7676 lbs	7876 lbs	8075 lbs	8274 lbs	8271 lbs	8470 lbs	8669 lbs	8869 lbs	8989 lbs	9188 lbs	9387 lbs	9587 lbs	743 lbs	863 lbs	982 lbs	1102 lbs
M	3576 lbs-ft	3576 lbs-ft	3576 lbs-ft	3576 lbs-ft	2681 lbs-ft	2681 lbs-ft	2681 lbs-ft	2681 lbs-ft	4257 lbs-ft	4257 lbs-ft	4257 lbs-ft	4257 lbs-ft	3627 lbs-ft	3627 lbs-ft	3627 lbs-ft	3627 lbs-ft
e	0.47 ft	0.45 ft	0.44 ft	0.43 ft	0.32 ft	0.32 ft	0.31 ft	0.30 ft	0.47 ft	0.46 ft	0.45 ft	0.44 ft	4.88 ft	4.21 ft	3.69 ft	3.29 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}	231.3 psf	230.9 psf	230.4 psf	230.0 psf	275.1 psf	273.0 psf	271.1 psf	269.3 psf	269.4 psf	267.5 psf	265.8 psf	264.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	388.9 psf	382.8 psf	377.1 psf	371.8 psf	393.3 psf	387.0 psf	381.1 psf	375.7 psf	457.0 psf	448.4 psf	440.5 psf	433.0 psf	356.6 psf	190.4 psf	150.0 psf	133.1 psf

Maximum Bearing Pressure = 457 psf
Allowable Bearing Pressure = 1500 psf

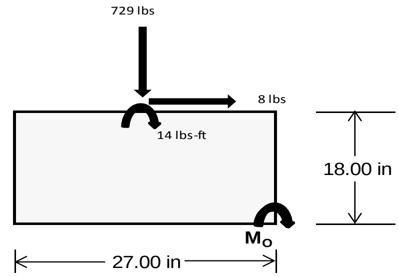
Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 794.1 ft-lbs
Resisting Force Required = 705.91 lbs
S.F. = 1.67
Weight Required = 1176.51 lbs
Minimum Width = 27 in in
Weight Provided = 5383.13 lbs

A minimum 132in long x 27in 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	27 in			27 in			27 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	280 lbs	693 lbs	280 lbs	729 lbs	1960 lbs	729 lbs	82 lbs	203 lbs	82 lbs
F_V	3 lbs	0 lbs	3 lbs	8 lbs	0 lbs	8 lbs	1 lbs	0 lbs	1 lbs
P_{total}	6944 lbs	5383 lbs	6944 lbs	7073 lbs	5383 lbs	7073 lbs	2030 lbs	5383 lbs	2030 lbs
M	9 lbs-ft	0 lbs-ft	9 lbs-ft	26 lbs-ft	0 lbs-ft	26 lbs-ft	3 lbs-ft	0 lbs-ft	3 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	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft
f_{min}	279.6 psf	217.5 psf	279.6 psf	283.0 psf	217.5 psf	283.0 psf	81.7 psf	217.5 psf	81.7 psf
f_{max}	281.6 psf	217.5 psf	281.6 psf	288.6 psf	217.5 psf	288.6 psf	82.4 psf	217.5 psf	82.4 psf

Maximum Bearing Pressure = 289 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 27in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

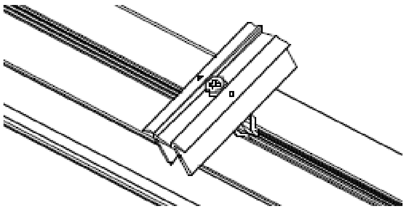
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

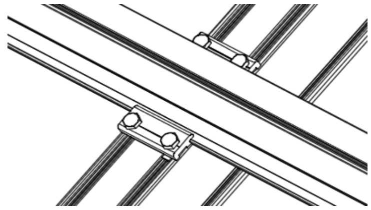
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.478	k
Allowable Uplift =	1.214	k
Utilization =	39%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.910	k
Allowable Uplift =	4.357	k
Utilization =	44%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	2.369	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	32%	

Rear Strut		
Maximum Axial Load =	3.661	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	49%	

Diagonal Strut		
Maximum Axial Load =	2.480	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	33%	

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.

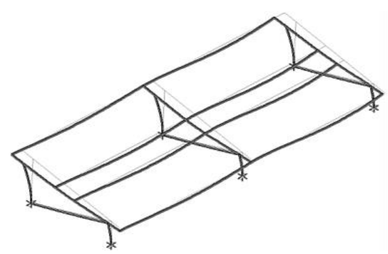
7. SEISMIC DESIGN

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} =	53.78	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.076	in
Max Drift, Δ_{MAX} =	0.095	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 = 135 in

J = 0.432

373.473

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 27.0 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

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

Weak Axis:

3.4.14

L_b = 135

J = 0.432

237.507

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.3

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

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

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18 (strong direction)

h/t = 7.4

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

S1 = 35.2

m = 0.68

$C_0 =$ 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18 (weak direction)

h/t = 16.2

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

S1 = 36.9

m = 0.65

$C_0 =$ 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

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

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

$P_{max} =$ 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

$M_{max}St$ = 1.460 k-ft

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

$\varphi F_L Wk$= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

$M_{max}Wk$ = 1.460 k-ft

Compression

3.4.7

λ = 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)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.8 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

$L_b =$ 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.8

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = 1.17φyFcy

φF_L = 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LSt = 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LWk = 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L = (φccFcy)/(λ²)

φF_L = 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 kips

APPENDIX B

B.1

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

Basic Load Cases

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

Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-63.577	-63.577	0	0
2	M14	y	-63.577	-63.577	0	0
3	M15	y	-105.961	-105.961	0	0
4	M16	y	-105.961	-105.961	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	143.047	143.047	0	0
2	M14	y	111.259	111.259	0	0
3	M15	y	63.577	63.577	0	0
4	M16	y	63.577	63.577	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	766.853	2	1056.458	2	.772	1	.003	1	0	1	0	1
2		min	-948.916	3	-1301.307	3	.048	15	0	15	0	1	0	1
3	N7	max	.041	9	979.698	1	-.861	15	-.002	15	0	1	0	1
4		min	-.149	2	50.826	15	-15.126	1	-.029	1	0	1	0	1
5	N15	max	.206	3	2368.936	1	0	1	0	1	0	1	0	1
6		min	-1.603	2	106.196	15	0	3	0	2	0	1	0	1
7	N16	max	2844.131	2	3488.451	2	0	3	0	12	0	1	0	1
8		min	-3025.357	3	-4277.124	3	0	9	0	1	0	1	0	1
9	N23	max	.041	9	979.698	1	15.126	1	.029	1	0	1	0	1
10		min	-.149	2	50.826	15	.861	15	.002	15	0	1	0	1
11	N24	max	766.853	2	1056.458	2	-.048	15	0	15	0	1	0	1
12		min	-948.916	3	-1301.307	3	-.772	1	-.003	1	0	1	0	1
13	Totals:	max	4375.935	2	9086.821	1	0	1						
14		min	-4922.921	3	-6437.056	3	0	2						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	140.335	1	362.759	2	-11.138	15	.002	3	.336	1	0	2
2			min	7.802	15	-584.945	3	-201.036	1	-.011	2	.019	15	0	3
3		2	max	140.335	1	254.281	2	-8.576	15	.002	3	.114	1	.623	3
4			min	7.802	15	-411.623	3	-154.723	1	-.011	2	.006	15	-.386	2
5		3	max	140.335	1	145.802	2	-6.015	15	.002	3	-.001	12	1.029	3
6			min	7.802	15	-238.301	3	-108.409	1	-.011	2	-.051	1	-.636	2
7		4	max	140.335	1	37.323	2	-3.453	15	.002	3	-.008	12	1.219	3
8			min	7.802	15	-64.98	3	-62.095	1	-.011	2	-.157	1	-.75	2
9		5	max	140.335	1	108.342	3	-.891	15	.002	3	-.011	12	1.191	3
10			min	7.802	15	-71.155	2	-15.782	1	-.011	2	-.206	1	-.729	2
11		6	max	140.335	1	281.664	3	30.532	1	.002	3	-.011	15	.948	3
12			min	7.802	15	-179.634	2	1.162	12	-.011	2	-.197	1	-.572	2
13		7	max	140.335	1	454.985	3	76.845	1	.002	3	-.007	15	.487	3
14			min	7.802	15	-288.113	2	3.724	12	-.011	2	-.13	1	-.28	2
15		8	max	140.335	1	628.307	3	123.159	1	.002	3	0	10	.148	2
16			min	7.802	15	-396.591	2	6.285	12	-.011	2	-.005	1	-.19	3
17		9	max	140.335	1	801.629	3	169.472	1	.002	3	.178	1	.712	2
18			min	7.802	15	-505.07	2	8.846	12	-.011	2	.007	12	-1.083	3
19		10	max	140.335	1	974.951	3	142.891	9	.011	2	.419	1	1.411	2
20			min	7.802	15	-613.548	2	-215.786	1	-.002	3	.02	12	-2.194	3
21		11	max	140.335	1	505.07	2	-8.846	12	.011	2	.178	1	.712	2
22			min	7.802	15	-801.629	3	-169.472	1	-.002	3	.007	12	-1.083	3
23		12	max	140.335	1	396.591	2	-6.285	12	.011	2	0	10	.148	2
24			min	7.802	15	-628.307	3	-123.159	1	-.002	3	-.005	1	-.19	3
25		13	max	140.335	1	288.113	2	-3.724	12	.011	2	-.007	15	.487	3
26			min	7.802	15	-454.985	3	-76.845	1	-.002	3	-.13	1	-.28	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
27		14	max	140.335	1	179.634	2	-1.162	12	.011	2	-.011	15	.948	3
28			min	7.802	15	-281.664	3	-30.532	1	-.002	3	-.197	1	-.572	2
29		15	max	140.335	1	71.155	2	15.782	1	.011	2	-.011	12	1.191	3
30			min	7.802	15	-108.342	3	.891	15	-.002	3	-.206	1	-.729	2
31		16	max	140.335	1	64.98	3	62.095	1	.011	2	-.008	12	1.219	3
32			min	7.802	15	-37.323	2	3.453	15	-.002	3	-.157	1	-.75	2
33		17	max	140.335	1	238.301	3	108.409	1	.011	2	-.001	12	1.029	3
34			min	7.802	15	-145.802	2	6.015	15	-.002	3	-.051	1	-.636	2
35		18	max	140.335	1	411.623	3	154.723	1	.011	2	.114	1	.623	3
36			min	7.802	15	-254.281	2	8.576	15	-.002	3	.006	15	-.386	2
37		19	max	140.335	1	584.945	3	201.036	1	.011	2	.336	1	0	2
38			min	7.802	15	-362.759	2	11.138	15	-.002	3	.019	15	0	3
39	M14	1	max	60.593	1	380.534	2	-11.451	15	.007	3	.378	1	0	1
40			min	3.375	15	-461.254	3	-206.691	1	-.008	2	.021	15	0	3
41		2	max	60.593	1	272.055	2	-8.889	15	.007	3	.149	1	.493	3
42			min	3.375	15	-327.667	3	-160.378	1	-.008	2	.008	15	-.408	2
43		3	max	60.593	1	163.577	2	-6.327	15	.007	3	0	3	.819	3
44			min	3.375	15	-194.08	3	-114.064	1	-.008	2	-.022	1	-.68	2
45		4	max	60.593	1	55.098	2	-3.766	15	.007	3	-.007	12	.978	3
46			min	3.375	15	-60.493	3	-67.75	1	-.008	2	-.136	1	-.817	2
47		5	max	60.593	1	73.093	3	-1.204	15	.007	3	-.01	12	.97	3
48			min	3.375	15	-53.38	2	-21.437	1	-.008	2	-.192	1	-.818	2
49		6	max	60.593	1	206.68	3	24.877	1	.007	3	-.011	15	.796	3
50			min	3.375	15	-161.859	2	.863	12	-.008	2	-.19	1	-.683	2
51		7	max	60.593	1	340.267	3	71.19	1	.007	3	-.007	15	.454	3
52			min	3.375	15	-270.338	2	3.425	12	-.008	2	-.13	1	-.413	2
53		8	max	60.593	1	473.854	3	117.504	1	.007	3	0	10	.006	9
54			min	3.375	15	-378.816	2	5.986	12	-.008	2	-.012	1	-.055	3
55		9	max	60.593	1	607.44	3	163.817	1	.007	3	.164	1	.534	2
56			min	3.375	15	-487.295	2	8.547	12	-.008	2	.007	12	-.731	3
57		10	max	60.593	1	595.773	2	139.141	9	.008	2	.398	1	1.211	2
58			min	3.375	15	-741.027	3	-210.131	1	-.007	3	.019	12	-1.574	3
59		11	max	60.593	1	487.295	2	-8.547	12	.008	2	.164	1	.534	2
60			min	3.375	15	-607.44	3	-163.817	1	-.007	3	.007	12	-.731	3
61		12	max	60.593	1	378.816	2	-5.986	12	.008	2	0	10	.006	9
62			min	3.375	15	-473.854	3	-117.504	1	-.007	3	-.012	1	-.055	3
63		13	max	60.593	1	270.338	2	-3.425	12	.008	2	-.007	15	.454	3
64			min	3.375	15	-340.267	3	-71.19	1	-.007	3	-.13	1	-.413	2
65		14	max	60.593	1	161.859	2	-.863	12	.008	2	-.011	15	.796	3
66			min	3.375	15	-206.68	3	-24.877	1	-.007	3	-.19	1	-.683	2
67		15	max	60.593	1	53.38	2	21.437	1	.008	2	-.01	12	.97	3
68			min	3.375	15	-73.093	3	1.204	15	-.007	3	-.192	1	-.818	2
69		16	max	60.593	1	60.493	3	67.75	1	.008	2	-.007	12	.978	3
70			min	3.375	15	-55.098	2	3.766	15	-.007	3	-.136	1	-.817	2
71		17	max	60.593	1	194.08	3	114.064	1	.008	2	0	3	.819	3
72			min	3.375	15	-163.577	2	6.327	15	-.007	3	-.022	1	-.68	2
73		18	max	60.593	1	327.667	3	160.378	1	.008	2	.149	1	.493	3
74			min	3.375	15	-272.055	2	8.889	15	-.007	3	.008	15	-.408	2
75		19	max	60.593	1	461.254	3	206.691	1	.008	2	.378	1	0	1
76			min	3.375	15	-380.534	2	11.451	15	-.007	3	.021	15	0	3
77	M15	1	max	-3.562	15	559.351	2	-11.448	15	.009	2	.378	1	0	2
78			min	-63.938	1	-260.176	3	-206.657	1	-.006	3	.021	15	0	3
79		2	max	-3.562	15	397.893	2	-8.886	15	.009	2	.149	1	.279	3
80			min	-63.938	1	-186.192	3	-160.343	1	-.006	3	.008	15	-.598	2
81		3	max	-3.562	15	236.434	2	-6.324	15	.009	2	0	3	.465	3
82			min	-63.938	1	-112.208	3	-114.03	1	-.006	3	-.023	1	-.995	2
83		4	max	-3.562	15	74.976	2	-3.763	15	.009	2	-.007	12	.559	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	-63.938	1	-38.223	3	-67.716	1	-.006	3	-.136	1	-1.189	2
85		5	max	-3.562	15	35.761	3	-1.201	15	.009	2	-.01	12	.561	3
86			min	-63.938	1	-86.483	2	-21.403	1	-.006	3	-.192	1	-1.182	2
87		6	max	-3.562	15	109.745	3	24.911	1	.009	2	-.011	15	.47	3
88			min	-63.938	1	-247.942	2	.905	12	-.006	3	-.19	1	-.973	2
89		7	max	-3.562	15	183.729	3	71.224	1	.009	2	-.007	15	.287	3
90			min	-63.938	1	-409.4	2	3.467	12	-.006	3	-.13	1	-.562	2
91		8	max	-3.562	15	257.714	3	117.538	1	.009	2	0	15	.05	2
92			min	-63.938	1	-570.859	2	6.028	12	-.006	3	-.012	1	0	15
93		9	max	-3.562	15	331.698	3	163.852	1	.009	2	.164	1	.865	2
94			min	-63.938	1	-732.317	2	8.59	12	-.006	3	.007	12	-.358	3
95		10	max	-3.562	15	893.776	2	-11.151	12	.006	3	.398	1	1.881	2
96			min	-63.938	1	-405.682	3	-210.165	1	-.009	2	.019	12	-.818	3
97		11	max	-3.562	15	732.317	2	-8.59	12	.006	3	.164	1	.865	2
98			min	-63.938	1	-331.698	3	-163.852	1	-.009	2	.007	12	-.358	3
99		12	max	-3.562	15	570.859	2	-6.028	12	.006	3	0	15	.05	2
100			min	-63.938	1	-257.714	3	-117.538	1	-.009	2	-.012	1	0	15
101		13	max	-3.562	15	409.4	2	-3.467	12	.006	3	-.007	15	.287	3
102			min	-63.938	1	-183.729	3	-71.224	1	-.009	2	-.13	1	-.562	2
103		14	max	-3.562	15	247.942	2	-.905	12	.006	3	-.011	15	.47	3
104			min	-63.938	1	-109.745	3	-24.911	1	-.009	2	-.19	1	-.973	2
105		15	max	-3.562	15	86.483	2	21.403	1	.006	3	-.01	12	.561	3
106			min	-63.938	1	-35.761	3	1.201	15	-.009	2	-.192	1	-1.182	2
107		16	max	-3.562	15	38.223	3	67.716	1	.006	3	-.007	12	.559	3
108			min	-63.938	1	-74.976	2	3.763	15	-.009	2	-.136	1	-1.189	2
109		17	max	-3.562	15	112.208	3	114.03	1	.006	3	0	3	.465	3
110			min	-63.938	1	-236.434	2	6.324	15	-.009	2	-.023	1	-.995	2
111		18	max	-3.562	15	186.192	3	160.343	1	.006	3	.149	1	.279	3
112			min	-63.938	1	-397.893	2	8.886	15	-.009	2	.008	15	-.598	2
113		19	max	-3.562	15	260.176	3	206.657	1	.006	3	.378	1	0	2
114			min	-63.938	1	-559.351	2	11.448	15	-.009	2	.021	15	0	3
115	M16	1	max	-8.427	15	542.186	2	-11.147	15	.008	2	.338	1	0	2
116			min	-151.343	1	-246.851	3	-201.271	1	-.009	3	.019	15	0	3
117		2	max	-8.427	15	380.728	2	-8.586	15	.008	2	.115	1	.262	3
118			min	-151.343	1	-172.867	3	-154.957	1	-.009	3	.006	15	-.577	2
119		3	max	-8.427	15	219.269	2	-6.024	15	.008	2	-.002	12	.432	3
120			min	-151.343	1	-98.883	3	-108.644	1	-.009	3	-.05	1	-.952	2
121		4	max	-8.427	15	57.811	2	-3.462	15	.008	2	-.008	12	.51	3
122			min	-151.343	1	-24.898	3	-62.33	1	-.009	3	-.157	1	-1.125	2
123		5	max	-8.427	15	49.086	3	-.901	15	.008	2	-.011	12	.494	3
124			min	-151.343	1	-103.648	2	-16.017	1	-.009	3	-.205	1	-1.096	2
125		6	max	-8.427	15	123.07	3	30.297	1	.008	2	-.011	15	.387	3
126			min	-151.343	1	-265.107	2	1.297	12	-.009	3	-.197	1	-.866	2
127		7	max	-8.427	15	197.054	3	76.61	1	.008	2	-.007	15	.187	3
128			min	-151.343	1	-426.565	2	3.858	12	-.009	3	-.13	1	-.434	2
129		8	max	-8.427	15	271.038	3	122.924	1	.008	2	0	10	.201	2
130			min	-151.343	1	-588.024	2	6.42	12	-.009	3	-.005	1	-.106	3
131		9	max	-8.427	15	345.023	3	169.237	1	.008	2	.178	1	1.036	2
132			min	-151.343	1	-749.483	2	8.981	12	-.009	3	.008	12	-.491	3
133		10	max	-8.427	15	747.324	1	142.779	9	.009	3	.418	1	2.074	2
134			min	-151.343	1	-910.941	2	-215.551	1	-.008	2	.021	12	-.968	3
135		11	max	-8.427	15	749.483	2	-8.981	12	.009	3	.178	1	1.036	2
136			min	-151.343	1	-345.023	3	-169.237	1	-.008	2	.008	12	-.491	3
137		12	max	-8.427	15	588.024	2	-6.42	12	.009	3	0	10	.201	2
138			min	-151.343	1	-271.038	3	-122.924	1	-.008	2	-.005	1	-.106	3
139		13	max	-8.427	15	426.565	2	-3.858	12	.009	3	-.007	15	.187	3
140			min	-151.343	1	-197.054	3	-76.61	1	-.008	2	-.13	1	-.434	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	-8.427	15	265.107	2	-1.297	12	.009	3	-.011	15	.387	3
142			min	-151.343	1	-123.07	3	-30.297	1	-.008	2	-.197	1	-.866	2
143		15	max	-8.427	15	103.648	2	16.017	1	.009	3	-.011	12	.494	3
144			min	-151.343	1	-49.086	3	.901	15	-.008	2	-.205	1	-1.096	2
145		16	max	-8.427	15	24.898	3	62.33	1	.009	3	-.008	12	.51	3
146			min	-151.343	1	-57.811	2	3.462	15	-.008	2	-.157	1	-1.125	2
147		17	max	-8.427	15	98.883	3	108.644	1	.009	3	-.002	12	.432	3
148			min	-151.343	1	-219.269	2	6.024	15	-.008	2	-.05	1	-.952	2
149		18	max	-8.427	15	172.867	3	154.957	1	.009	3	.115	1	.262	3
150			min	-151.343	1	-380.728	2	8.586	15	-.008	2	.006	15	-.577	2
151		19	max	-8.427	15	246.851	3	201.271	1	.009	3	.338	1	0	2
152			min	-151.343	1	-542.186	2	11.147	15	-.008	2	.019	15	0	3
153	M2	1	max	878.833	2	2.016	4	.475	1	0	12	0	3	0	1
154			min	-1113.178	3	.474	15	.026	15	0	1	0	2	0	1
155		2	max	879.354	2	1.898	4	.475	1	0	12	0	1	0	15
156			min	-1112.788	3	.446	15	.026	15	0	1	0	15	0	4
157		3	max	879.875	2	1.779	4	.475	1	0	12	0	1	0	15
158			min	-1112.397	3	.419	15	.026	15	0	1	0	15	-.001	4
159		4	max	880.395	2	1.66	4	.475	1	0	12	0	1	0	15
160			min	-1112.007	3	.391	15	.026	15	0	1	0	15	-.002	4
161		5	max	880.916	2	1.541	4	.475	1	0	12	0	1	0	15
162			min	-1111.616	3	.363	15	.026	15	0	1	0	15	-.003	4
163		6	max	881.437	2	1.422	4	.475	1	0	12	0	1	0	15
164			min	-1111.226	3	.335	15	.026	15	0	1	0	15	-.003	4
165		7	max	881.958	2	1.303	4	.475	1	0	12	0	1	0	15
166			min	-1110.835	3	.307	15	.026	15	0	1	0	15	-.004	4
167		8	max	882.478	2	1.184	4	.475	1	0	12	.001	1	0	15
168			min	-1110.445	3	.279	15	.026	15	0	1	0	15	-.004	4
169		9	max	882.999	2	1.066	4	.475	1	0	12	.001	1	-.001	15
170			min	-1110.054	3	.251	15	.026	15	0	1	0	15	-.004	4
171		10	max	883.52	2	.947	4	.475	1	0	12	.002	1	-.001	15
172			min	-1109.664	3	.223	15	.026	15	0	1	0	15	-.005	4
173		11	max	884.04	2	.828	4	.475	1	0	12	.002	1	-.001	15
174			min	-1109.273	3	.187	12	.026	15	0	1	0	15	-.005	4
175		12	max	884.561	2	.716	2	.475	1	0	12	.002	1	-.001	15
176			min	-1108.882	3	.141	12	.026	15	0	1	0	15	-.005	4
177		13	max	885.082	2	.624	2	.475	1	0	12	.002	1	-.001	15
178			min	-1108.492	3	.095	12	.026	15	0	1	0	15	-.006	4
179		14	max	885.602	2	.531	2	.475	1	0	12	.002	1	-.001	15
180			min	-1108.101	3	.048	12	.026	15	0	1	0	15	-.006	4
181		15	max	886.123	2	.439	2	.475	1	0	12	.002	1	-.001	15
182			min	-1107.711	3	-.02	3	.026	15	0	1	0	15	-.006	4
183		16	max	886.644	2	.346	2	.475	1	0	12	.003	1	-.001	15
184			min	-1107.32	3	-.089	3	.026	15	0	1	0	15	-.006	4
185		17	max	887.164	2	.253	2	.475	1	0	12	.003	1	-.001	15
186			min	-1106.93	3	-.159	3	.026	15	0	1	0	15	-.006	4
187		18	max	887.685	2	.161	2	.475	1	0	12	.003	1	-.001	15
188			min	-1106.539	3	-.228	3	.026	15	0	1	0	15	-.006	4
189		19	max	888.206	2	.068	2	.475	1	0	12	.003	1	-.001	15
190			min	-1106.149	3	-.298	3	.026	15	0	1	0	15	-.006	4
191	M3	1	max	637.805	2	7.66	4	.401	1	0	12	0	1	.006	4
192			min	-784.011	3	1.801	15	.022	15	0	1	0	15	.001	15
193		2	max	637.634	2	6.899	4	.401	1	0	12	0	1	.003	2
194			min	-784.139	3	1.622	15	.022	15	0	1	0	15	0	12
195		3	max	637.464	2	6.138	4	.401	1	0	12	0	1	.001	2
196			min	-784.267	3	1.443	15	.022	15	0	1	0	15	-.001	3
197		4	max	637.294	2	5.377	4	.401	1	0	12	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-784.395	3	1.264	15	.022	15	0	1	0	15	-.002	3
199		5	max	637.123	2	4.616	4	.401	1	0	12	.001	1	0	15
200			min	-784.522	3	1.085	15	.022	15	0	1	0	15	-.004	4
201		6	max	636.953	2	3.855	4	.401	1	0	12	.001	1	-.001	15
202			min	-784.65	3	.907	15	.022	15	0	1	0	15	-.006	4
203		7	max	636.783	2	3.094	4	.401	1	0	12	.002	1	-.002	15
204			min	-784.778	3	.728	15	.022	15	0	1	0	15	-.007	4
205		8	max	636.612	2	2.334	4	.401	1	0	12	.002	1	-.002	15
206			min	-784.906	3	.549	15	.022	15	0	1	0	15	-.008	4
207		9	max	636.442	2	1.573	4	.401	1	0	12	.002	1	-.002	15
208			min	-785.033	3	.37	15	.022	15	0	1	0	15	-.009	4
209		10	max	636.272	2	.812	4	.401	1	0	12	.002	1	-.002	15
210			min	-785.161	3	.191	15	.022	15	0	1	0	15	-.01	4
211		11	max	636.101	2	.18	2	.401	1	0	12	.002	1	-.002	15
212			min	-785.289	3	-.164	3	.022	15	0	1	0	15	-.01	4
213		12	max	635.931	2	-.167	15	.401	1	0	12	.002	1	-.002	15
214			min	-785.417	3	-.71	4	.022	15	0	1	0	15	-.01	4
215		13	max	635.76	2	-.346	15	.401	1	0	12	.003	1	-.002	15
216			min	-785.545	3	-1.471	4	.022	15	0	1	0	15	-.009	4
217		14	max	635.59	2	-.524	15	.401	1	0	12	.003	1	-.002	15
218			min	-785.672	3	-2.232	4	.022	15	0	1	0	15	-.009	4
219		15	max	635.42	2	-.703	15	.401	1	0	12	.003	1	-.002	15
220			min	-785.8	3	-2.993	4	.022	15	0	1	0	15	-.008	4
221		16	max	635.249	2	-.882	15	.401	1	0	12	.003	1	-.001	15
222			min	-785.928	3	-3.754	4	.022	15	0	1	0	15	-.006	4
223		17	max	635.079	2	-1.061	15	.401	1	0	12	.003	1	-.001	15
224			min	-786.056	3	-4.515	4	.022	15	0	1	0	15	-.004	4
225		18	max	634.909	2	-1.24	15	.401	1	0	12	.003	1	0	15
226			min	-786.183	3	-5.276	4	.022	15	0	1	0	15	-.002	4
227		19	max	634.738	2	-1.419	15	.401	1	0	12	.004	1	0	1
228			min	-786.311	3	-6.037	4	.022	15	0	1	0	15	0	1
229	M4	1	max	976.631	1	0	1	-.862	15	0	1	.003	1	0	1
230			min	49.901	15	0	1	-15.531	1	0	1	0	15	0	1
231		2	max	976.802	1	0	1	-.862	15	0	1	.002	1	0	1
232			min	49.952	15	0	1	-15.531	1	0	1	0	15	0	1
233		3	max	976.972	1	0	1	-.862	15	0	1	0	12	0	1
234			min	50.003	15	0	1	-15.531	1	0	1	0	1	0	1
235		4	max	977.142	1	0	1	-.862	15	0	1	0	15	0	1
236			min	50.055	15	0	1	-15.531	1	0	1	-.002	1	0	1
237		5	max	977.313	1	0	1	-.862	15	0	1	0	15	0	1
238			min	50.106	15	0	1	-15.531	1	0	1	-.004	1	0	1
239		6	max	977.483	1	0	1	-.862	15	0	1	0	15	0	1
240			min	50.158	15	0	1	-15.531	1	0	1	-.006	1	0	1
241		7	max	977.653	1	0	1	-.862	15	0	1	0	15	0	1
242			min	50.209	15	0	1	-15.531	1	0	1	-.007	1	0	1
243		8	max	977.824	1	0	1	-.862	15	0	1	0	15	0	1
244			min	50.26	15	0	1	-15.531	1	0	1	-.009	1	0	1
245		9	max	977.994	1	0	1	-.862	15	0	1	0	15	0	1
246			min	50.312	15	0	1	-15.531	1	0	1	-.011	1	0	1
247		10	max	978.164	1	0	1	-.862	15	0	1	0	15	0	1
248			min	50.363	15	0	1	-15.531	1	0	1	-.013	1	0	1
249		11	max	978.335	1	0	1	-.862	15	0	1	0	15	0	1
250			min	50.415	15	0	1	-15.531	1	0	1	-.014	1	0	1
251		12	max	978.505	1	0	1	-.862	15	0	1	0	15	0	1
252			min	50.466	15	0	1	-15.531	1	0	1	-.016	1	0	1
253		13	max	978.675	1	0	1	-.862	15	0	1	-.001	15	0	1
254			min	50.517	15	0	1	-15.531	1	0	1	-.018	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	978.846	1	0	1	-.862	15	0	1	-.001	15	0	1
256			min	50.569	15	0	1	-15.531	1	0	1	-.02	1	0	1
257		15	max	979.016	1	0	1	-.862	15	0	1	-.001	15	0	1
258			min	50.62	15	0	1	-15.531	1	0	1	-.022	1	0	1
259		16	max	979.187	1	0	1	-.862	15	0	1	-.001	15	0	1
260			min	50.672	15	0	1	-15.531	1	0	1	-.023	1	0	1
261		17	max	979.357	1	0	1	-.862	15	0	1	-.001	15	0	1
262			min	50.723	15	0	1	-15.531	1	0	1	-.025	1	0	1
263		18	max	979.527	1	0	1	-.862	15	0	1	-.001	15	0	1
264			min	50.774	15	0	1	-15.531	1	0	1	-.027	1	0	1
265		19	max	979.698	1	0	1	-.862	15	0	1	-.002	15	0	1
266			min	50.826	15	0	1	-15.531	1	0	1	-.029	1	0	1
267	M6	1	max	2842.525	2	2.162	2	0	1	0	1	0	1	0	1
268			min	-3660.792	3	.348	12	0	1	0	1	0	1	0	1
269		2	max	2843.046	2	2.07	2	0	1	0	1	0	1	0	12
270			min	-3660.401	3	.302	12	0	1	0	1	0	1	0	2
271		3	max	2843.566	2	1.977	2	0	1	0	1	0	1	0	12
272			min	-3660.011	3	.255	12	0	1	0	1	0	1	-.001	2
273		4	max	2844.087	2	1.884	2	0	1	0	1	0	1	0	12
274			min	-3659.62	3	.209	12	0	1	0	1	0	1	-.002	2
275		5	max	2844.608	2	1.792	2	0	1	0	1	0	1	0	12
276			min	-3659.23	3	.163	12	0	1	0	1	0	1	-.003	2
277		6	max	2845.128	2	1.699	2	0	1	0	1	0	1	0	12
278			min	-3658.839	3	.101	3	0	1	0	1	0	1	-.003	2
279		7	max	2845.649	2	1.606	2	0	1	0	1	0	1	0	12
280			min	-3658.449	3	.031	3	0	1	0	1	0	1	-.004	2
281		8	max	2846.17	2	1.514	2	0	1	0	1	0	1	0	12
282			min	-3658.058	3	-.038	3	0	1	0	1	0	1	-.005	2
283		9	max	2846.69	2	1.421	2	0	1	0	1	0	1	0	12
284			min	-3657.668	3	-.108	3	0	1	0	1	0	1	-.005	2
285		10	max	2847.211	2	1.329	2	0	1	0	1	0	1	0	3
286			min	-3657.277	3	-.177	3	0	1	0	1	0	1	-.006	2
287		11	max	2847.732	2	1.236	2	0	1	0	1	0	1	0	3
288			min	-3656.887	3	-.247	3	0	1	0	1	0	1	-.006	2
289		12	max	2848.253	2	1.143	2	0	1	0	1	0	1	0	3
290			min	-3656.496	3	-.316	3	0	1	0	1	0	1	-.006	2
291		13	max	2848.773	2	1.051	2	0	1	0	1	0	1	0	3
292			min	-3656.106	3	-.385	3	0	1	0	1	0	1	-.007	2
293		14	max	2849.294	2	.958	2	0	1	0	1	0	1	0	3
294			min	-3655.715	3	-.455	3	0	1	0	1	0	1	-.007	2
295		15	max	2849.815	2	.866	2	0	1	0	1	0	1	0	3
296			min	-3655.325	3	-.524	3	0	1	0	1	0	1	-.008	2
297		16	max	2850.335	2	.773	2	0	1	0	1	0	1	0	3
298			min	-3654.934	3	-.594	3	0	1	0	1	0	1	-.008	2
299		17	max	2850.856	2	.68	2	0	1	0	1	0	1	0	3
300			min	-3654.543	3	-.663	3	0	1	0	1	0	1	-.008	2
301		18	max	2851.377	2	.588	2	0	1	0	1	0	1	0	3
302			min	-3654.153	3	-.733	3	0	1	0	1	0	1	-.008	2
303		19	max	2851.897	2	.495	2	0	1	0	1	0	1	.001	3
304			min	-3653.762	3	-.802	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2442.012	2	7.694	4	0	1	0	1	0	1	.009	2
306			min	-2477.97	3	1.806	15	0	1	0	1	0	1	-.001	3
307		2	max	2441.842	2	6.933	4	0	1	0	1	0	1	.006	2
308			min	-2478.097	3	1.628	15	0	1	0	1	0	1	-.003	3
309		3	max	2441.671	2	6.172	4	0	1	0	1	0	1	.004	2
310			min	-2478.225	3	1.449	15	0	1	0	1	0	1	-.004	3
311		4	max	2441.501	2	5.411	4	0	1	0	1	0	1	.002	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	-2478.353	3	1.27	15	0	1	0	1	0	1	-.005	3
313		5	max	2441.331	2	4.65	4	0	1	0	1	0	1	0	2
314			min	-2478.481	3	1.091	15	0	1	0	1	0	1	-.006	3
315		6	max	2441.16	2	3.889	4	0	1	0	1	0	1	-.001	15
316			min	-2478.608	3	.912	15	0	1	0	1	0	1	-.007	3
317		7	max	2440.99	2	3.128	4	0	1	0	1	0	1	-.002	15
318			min	-2478.736	3	.733	15	0	1	0	1	0	1	-.007	3
319		8	max	2440.82	2	2.367	4	0	1	0	1	0	1	-.002	15
320			min	-2478.864	3	.534	12	0	1	0	1	0	1	-.008	4
321		9	max	2440.649	2	1.732	2	0	1	0	1	0	1	-.002	15
322			min	-2478.992	3	.238	12	0	1	0	1	0	1	-.009	4
323		10	max	2440.479	2	1.139	2	0	1	0	1	0	1	-.002	15
324			min	-2479.119	3	-.152	3	0	1	0	1	0	1	-.01	4
325		11	max	2440.309	2	.546	2	0	1	0	1	0	1	-.002	15
326			min	-2479.247	3	-.597	3	0	1	0	1	0	1	-.01	4
327		12	max	2440.138	2	-.047	2	0	1	0	1	0	1	-.002	15
328			min	-2479.375	3	-1.041	3	0	1	0	1	0	1	-.01	4
329		13	max	2439.968	2	-.34	15	0	1	0	1	0	1	-.002	15
330			min	-2479.503	3	-1.486	3	0	1	0	1	0	1	-.009	4
331		14	max	2439.798	2	-.519	15	0	1	0	1	0	1	-.002	15
332			min	-2479.63	3	-2.199	4	0	1	0	1	0	1	-.009	4
333		15	max	2439.627	2	-.698	15	0	1	0	1	0	1	-.002	15
334			min	-2479.758	3	-2.96	4	0	1	0	1	0	1	-.007	4
335		16	max	2439.457	2	-.877	15	0	1	0	1	0	1	-.001	15
336			min	-2479.886	3	-3.721	4	0	1	0	1	0	1	-.006	4
337		17	max	2439.287	2	-1.056	15	0	1	0	1	0	1	-.001	15
338			min	-2480.014	3	-4.482	4	0	1	0	1	0	1	-.004	4
339		18	max	2439.116	2	-1.234	15	0	1	0	1	0	1	0	15
340			min	-2480.141	3	-5.243	4	0	1	0	1	0	1	-.002	4
341		19	max	2438.946	2	-1.413	15	0	1	0	1	0	1	0	1
342			min	-2480.269	3	-6.004	4	0	1	0	1	0	1	0	1
343	M8	1	max	2365.87	1	0	1	0	1	0	1	0	1	0	1
344			min	105.271	15	0	1	0	1	0	1	0	1	0	1
345		2	max	2366.04	1	0	1	0	1	0	1	0	1	0	1
346			min	105.323	15	0	1	0	1	0	1	0	1	0	1
347		3	max	2366.21	1	0	1	0	1	0	1	0	1	0	1
348			min	105.374	15	0	1	0	1	0	1	0	1	0	1
349		4	max	2366.381	1	0	1	0	1	0	1	0	1	0	1
350			min	105.425	15	0	1	0	1	0	1	0	1	0	1
351		5	max	2366.551	1	0	1	0	1	0	1	0	1	0	1
352			min	105.477	15	0	1	0	1	0	1	0	1	0	1
353		6	max	2366.721	1	0	1	0	1	0	1	0	1	0	1
354			min	105.528	15	0	1	0	1	0	1	0	1	0	1
355		7	max	2366.892	1	0	1	0	1	0	1	0	1	0	1
356			min	105.58	15	0	1	0	1	0	1	0	1	0	1
357		8	max	2367.062	1	0	1	0	1	0	1	0	1	0	1
358			min	105.631	15	0	1	0	1	0	1	0	1	0	1
359		9	max	2367.232	1	0	1	0	1	0	1	0	1	0	1
360			min	105.682	15	0	1	0	1	0	1	0	1	0	1
361		10	max	2367.403	1	0	1	0	1	0	1	0	1	0	1
362			min	105.734	15	0	1	0	1	0	1	0	1	0	1
363		11	max	2367.573	1	0	1	0	1	0	1	0	1	0	1
364			min	105.785	15	0	1	0	1	0	1	0	1	0	1
365		12	max	2367.743	1	0	1	0	1	0	1	0	1	0	1
366			min	105.837	15	0	1	0	1	0	1	0	1	0	1
367		13	max	2367.914	1	0	1	0	1	0	1	0	1	0	1
368			min	105.888	15	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	2368.084	1	0	1	0	1	0	1	0	1	0	1
370			min	105.939	15	0	1	0	1	0	1	0	1	0	1
371		15	max	2368.254	1	0	1	0	1	0	1	0	1	0	1
372			min	105.991	15	0	1	0	1	0	1	0	1	0	1
373		16	max	2368.425	1	0	1	0	1	0	1	0	1	0	1
374			min	106.042	15	0	1	0	1	0	1	0	1	0	1
375		17	max	2368.595	1	0	1	0	1	0	1	0	1	0	1
376			min	106.093	15	0	1	0	1	0	1	0	1	0	1
377		18	max	2368.765	1	0	1	0	1	0	1	0	1	0	1
378			min	106.145	15	0	1	0	1	0	1	0	1	0	1
379		19	max	2368.936	1	0	1	0	1	0	1	0	1	0	1
380			min	106.196	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	878.833	2	2.016	4	-.026	15	0	1	0	2	0	1
382			min	-1113.178	3	.474	15	-.475	1	0	12	0	3	0	1
383		2	max	879.354	2	1.898	4	-.026	15	0	1	0	15	0	15
384			min	-1112.788	3	.446	15	-.475	1	0	12	0	1	0	4
385		3	max	879.875	2	1.779	4	-.026	15	0	1	0	15	0	15
386			min	-1112.397	3	.419	15	-.475	1	0	12	0	1	-.001	4
387		4	max	880.395	2	1.66	4	-.026	15	0	1	0	15	0	15
388			min	-1112.007	3	.391	15	-.475	1	0	12	0	1	-.002	4
389		5	max	880.916	2	1.541	4	-.026	15	0	1	0	15	0	15
390			min	-1111.616	3	.363	15	-.475	1	0	12	0	1	-.003	4
391		6	max	881.437	2	1.422	4	-.026	15	0	1	0	15	0	15
392			min	-1111.226	3	.335	15	-.475	1	0	12	0	1	-.003	4
393		7	max	881.958	2	1.303	4	-.026	15	0	1	0	15	0	15
394			min	-1110.835	3	.307	15	-.475	1	0	12	0	1	-.004	4
395		8	max	882.478	2	1.184	4	-.026	15	0	1	0	15	0	15
396			min	-1110.445	3	.279	15	-.475	1	0	12	-.001	1	-.004	4
397		9	max	882.999	2	1.066	4	-.026	15	0	1	0	15	-.001	15
398			min	-1110.054	3	.251	15	-.475	1	0	12	-.001	1	-.004	4
399		10	max	883.52	2	.947	4	-.026	15	0	1	0	15	-.001	15
400			min	-1109.664	3	.223	15	-.475	1	0	12	-.002	1	-.005	4
401		11	max	884.04	2	.828	4	-.026	15	0	1	0	15	-.001	15
402			min	-1109.273	3	.187	12	-.475	1	0	12	-.002	1	-.005	4
403		12	max	884.561	2	.716	2	-.026	15	0	1	0	15	-.001	15
404			min	-1108.882	3	.141	12	-.475	1	0	12	-.002	1	-.005	4
405		13	max	885.082	2	.624	2	-.026	15	0	1	0	15	-.001	15
406			min	-1108.492	3	.095	12	-.475	1	0	12	-.002	1	-.006	4
407		14	max	885.602	2	.531	2	-.026	15	0	1	0	15	-.001	15
408			min	-1108.101	3	.048	12	-.475	1	0	12	-.002	1	-.006	4
409		15	max	886.123	2	.439	2	-.026	15	0	1	0	15	-.001	15
410			min	-1107.711	3	-.02	3	-.475	1	0	12	-.002	1	-.006	4
411		16	max	886.644	2	.346	2	-.026	15	0	1	0	15	-.001	15
412			min	-1107.32	3	-.089	3	-.475	1	0	12	-.003	1	-.006	4
413		17	max	887.164	2	.253	2	-.026	15	0	1	0	15	-.001	15
414			min	-1106.93	3	-.159	3	-.475	1	0	12	-.003	1	-.006	4
415		18	max	887.685	2	.161	2	-.026	15	0	1	0	15	-.001	15
416			min	-1106.539	3	-.228	3	-.475	1	0	12	-.003	1	-.006	4
417		19	max	888.206	2	.068	2	-.026	15	0	1	0	15	-.001	15
418			min	-1106.149	3	-.298	3	-.475	1	0	12	-.003	1	-.006	4
419	M11	1	max	637.805	2	7.66	4	-.022	15	0	1	0	15	.006	4
420			min	-784.011	3	1.801	15	-.401	1	0	12	0	1	.001	15
421		2	max	637.634	2	6.899	4	-.022	15	0	1	0	15	.003	2
422			min	-784.139	3	1.622	15	-.401	1	0	12	0	1	0	12
423		3	max	637.464	2	6.138	4	-.022	15	0	1	0	15	.001	2
424			min	-784.267	3	1.443	15	-.401	1	0	12	0	1	-.001	3
425		4	max	637.294	2	5.377	4	-.022	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-784.395	3	1.264	15	-.401	1	0	12	-.001	1	-.002	3
427		5	max	637.123	2	4.616	4	-.022	15	0	1	0	15	0	15
428			min	-784.522	3	1.085	15	-.401	1	0	12	-.001	1	-.004	4
429		6	max	636.953	2	3.855	4	-.022	15	0	1	0	15	-.001	15
430			min	-784.65	3	.907	15	-.401	1	0	12	-.001	1	-.006	4
431		7	max	636.783	2	3.094	4	-.022	15	0	1	0	15	-.002	15
432			min	-784.778	3	.728	15	-.401	1	0	12	-.002	1	-.007	4
433		8	max	636.612	2	2.334	4	-.022	15	0	1	0	15	-.002	15
434			min	-784.906	3	.549	15	-.401	1	0	12	-.002	1	-.008	4
435		9	max	636.442	2	1.573	4	-.022	15	0	1	0	15	-.002	15
436			min	-785.033	3	.37	15	-.401	1	0	12	-.002	1	-.009	4
437		10	max	636.272	2	.812	4	-.022	15	0	1	0	15	-.002	15
438			min	-785.161	3	.191	15	-.401	1	0	12	-.002	1	-.01	4
439		11	max	636.101	2	.18	2	-.022	15	0	1	0	15	-.002	15
440			min	-785.289	3	-.164	3	-.401	1	0	12	-.002	1	-.01	4
441		12	max	635.931	2	-.167	15	-.022	15	0	1	0	15	-.002	15
442			min	-785.417	3	-.71	4	-.401	1	0	12	-.002	1	-.01	4
443		13	max	635.76	2	-.346	15	-.022	15	0	1	0	15	-.002	15
444			min	-785.545	3	-1.471	4	-.401	1	0	12	-.003	1	-.009	4
445		14	max	635.59	2	-.524	15	-.022	15	0	1	0	15	-.002	15
446			min	-785.672	3	-2.232	4	-.401	1	0	12	-.003	1	-.009	4
447		15	max	635.42	2	-.703	15	-.022	15	0	1	0	15	-.002	15
448			min	-785.8	3	-2.993	4	-.401	1	0	12	-.003	1	-.008	4
449		16	max	635.249	2	-.882	15	-.022	15	0	1	0	15	-.001	15
450			min	-785.928	3	-3.754	4	-.401	1	0	12	-.003	1	-.006	4
451		17	max	635.079	2	-1.061	15	-.022	15	0	1	0	15	-.001	15
452			min	-786.056	3	-4.515	4	-.401	1	0	12	-.003	1	-.004	4
453		18	max	634.909	2	-1.24	15	-.022	15	0	1	0	15	0	15
454			min	-786.183	3	-5.276	4	-.401	1	0	12	-.003	1	-.002	4
455		19	max	634.738	2	-1.419	15	-.022	15	0	1	0	15	0	1
456			min	-786.311	3	-6.037	4	-.401	1	0	12	-.004	1	0	1
457	M12	1	max	976.631	1	0	1	15.531	1	0	1	0	15	0	1
458			min	49.901	15	0	1	.862	15	0	1	-.003	1	0	1
459		2	max	976.802	1	0	1	15.531	1	0	1	0	15	0	1
460			min	49.952	15	0	1	.862	15	0	1	-.002	1	0	1
461		3	max	976.972	1	0	1	15.531	1	0	1	0	1	0	1
462			min	50.003	15	0	1	.862	15	0	1	0	12	0	1
463		4	max	977.142	1	0	1	15.531	1	0	1	.002	1	0	1
464			min	50.055	15	0	1	.862	15	0	1	0	15	0	1
465		5	max	977.313	1	0	1	15.531	1	0	1	.004	1	0	1
466			min	50.106	15	0	1	.862	15	0	1	0	15	0	1
467		6	max	977.483	1	0	1	15.531	1	0	1	.006	1	0	1
468			min	50.158	15	0	1	.862	15	0	1	0	15	0	1
469		7	max	977.653	1	0	1	15.531	1	0	1	.007	1	0	1
470			min	50.209	15	0	1	.862	15	0	1	0	15	0	1
471		8	max	977.824	1	0	1	15.531	1	0	1	.009	1	0	1
472			min	50.26	15	0	1	.862	15	0	1	0	15	0	1
473		9	max	977.994	1	0	1	15.531	1	0	1	.011	1	0	1
474			min	50.312	15	0	1	.862	15	0	1	0	15	0	1
475		10	max	978.164	1	0	1	15.531	1	0	1	.013	1	0	1
476			min	50.363	15	0	1	.862	15	0	1	0	15	0	1
477		11	max	978.335	1	0	1	15.531	1	0	1	.014	1	0	1
478			min	50.415	15	0	1	.862	15	0	1	0	15	0	1
479		12	max	978.505	1	0	1	15.531	1	0	1	.016	1	0	1
480			min	50.466	15	0	1	.862	15	0	1	0	15	0	1
481		13	max	978.675	1	0	1	15.531	1	0	1	.018	1	0	1
482			min	50.517	15	0	1	.862	15	0	1	.001	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	978.846	1	0	1	15.531	1	0	1	.02	1	0	1
484			min	50.569	15	0	1	.862	15	0	1	.001	15	0	1
485		15	max	979.016	1	0	1	15.531	1	0	1	.022	1	0	1
486			min	50.62	15	0	1	.862	15	0	1	.001	15	0	1
487		16	max	979.187	1	0	1	15.531	1	0	1	.023	1	0	1
488			min	50.672	15	0	1	.862	15	0	1	.001	15	0	1
489		17	max	979.357	1	0	1	15.531	1	0	1	.025	1	0	1
490			min	50.723	15	0	1	.862	15	0	1	.001	15	0	1
491		18	max	979.527	1	0	1	15.531	1	0	1	.027	1	0	1
492			min	50.774	15	0	1	.862	15	0	1	.001	15	0	1
493		19	max	979.698	1	0	1	15.531	1	0	1	.029	1	0	1
494			min	50.826	15	0	1	.862	15	0	1	.002	15	0	1
495	M1	1	max	201.043	1	584.909	3	-7.801	15	0	2	.336	1	.002	3
496			min	11.138	15	-362.126	2	-140.137	1	0	3	.019	15	-.011	2
497		2	max	201.865	1	584.028	3	-7.801	15	0	2	.262	1	.18	2
498			min	11.386	15	-363.299	2	-140.137	1	0	3	.015	15	-.307	3
499		3	max	488.41	3	430.271	2	-7.776	15	0	3	.188	1	.362	2
500			min	-279.415	2	-428.598	3	-139.93	1	0	2	.01	15	-.603	3
501		4	max	489.026	3	429.098	2	-7.776	15	0	3	.114	1	.144	1
502			min	-278.593	2	-429.478	3	-139.93	1	0	2	.006	15	-.376	3
503		5	max	489.642	3	427.925	2	-7.776	15	0	3	.041	1	-.003	15
504			min	-277.772	2	-430.358	3	-139.93	1	0	2	.002	15	-.149	3
505		6	max	490.258	3	426.751	2	-7.776	15	0	3	-.002	15	.078	3
506			min	-276.95	2	-431.238	3	-139.93	1	0	2	-.033	1	-.316	2
507		7	max	490.874	3	425.578	2	-7.776	15	0	3	-.006	15	.306	3
508			min	-276.128	2	-432.118	3	-139.93	1	0	2	-.107	1	-.541	2
509		8	max	491.491	3	424.404	2	-7.776	15	0	3	-.01	15	.534	3
510			min	-275.307	2	-432.998	3	-139.93	1	0	2	-.181	1	-.765	2
511		9	max	510.103	3	45.119	2	-11.151	15	0	9	.104	1	.622	3
512			min	-184.35	2	.359	15	-200.567	1	0	3	.006	15	-.877	2
513		10	max	510.72	3	43.945	2	-11.151	15	0	9	0	15	.607	3
514			min	-183.528	2	.005	15	-200.567	1	0	3	-.001	1	-.901	2
515		11	max	511.336	3	42.772	2	-11.151	15	0	9	-.006	15	.592	3
516			min	-182.707	2	-1.413	4	-200.567	1	0	3	-.107	1	-.923	2
517		12	max	529.88	3	290.349	3	-7.589	15	0	2	.179	1	.516	3
518			min	-98.313	10	-517.112	2	-136.72	1	0	3	.01	15	-.819	2
519		13	max	530.496	3	289.469	3	-7.589	15	0	2	.106	1	.363	3
520			min	-97.629	10	-518.285	2	-136.72	1	0	3	.006	15	-.546	2
521		14	max	531.113	3	288.588	3	-7.589	15	0	2	.034	1	.21	3
522			min	-96.944	10	-519.459	2	-136.72	1	0	3	.002	15	-.272	2
523		15	max	531.729	3	287.708	3	-7.589	15	0	2	-.002	15	.058	3
524			min	-96.259	10	-520.632	2	-136.72	1	0	3	-.038	1	-.019	1
525		16	max	532.345	3	286.828	3	-7.589	15	0	2	-.006	15	.277	2
526			min	-95.575	10	-521.806	2	-136.72	1	0	3	-.11	1	-.093	3
527		17	max	532.961	3	285.948	3	-7.589	15	0	2	-.01	15	.553	2
528			min	-94.89	10	-522.979	2	-136.72	1	0	3	-.182	1	-.244	3
529		18	max	-11.395	15	543.893	2	-8.428	15	0	3	-.014	15	.278	2
530			min	-202.087	1	-246.052	3	-151.535	1	0	2	-.258	1	-.121	3
531		19	max	-11.147	15	542.72	2	-8.428	15	0	3	-.019	15	.009	3
532			min	-201.265	1	-246.932	3	-151.535	1	0	2	-.338	1	-.008	2
533	M5	1	max	431.557	1	1949.731	3	0	1	0	1	0	1	.023	2
534			min	22.817	12	-1223.161	2	0	1	0	1	0	1	-.003	3
535		2	max	432.379	1	1948.851	3	0	1	0	1	0	1	.668	2
536			min	23.228	12	-1224.334	2	0	1	0	1	0	1	-1.032	3
537		3	max	1576.045	3	1325.676	2	0	1	0	1	0	1	1.284	2
538			min	-1004.552	2	-1397.204	3	0	1	0	1	0	1	-2.02	3
539		4	max	1576.661	3	1324.503	2	0	1	0	1	0	1	.594	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	-1003.73	2	-1398.085	3	0	1	0	1	0	1	-1.282	3
541		5	max	1577.277	3	1323.329	2	0	1	0	1	0	1	0	9
542			min	-1002.909	2	-1398.965	3	0	1	0	1	0	1	-.544	3
543		6	max	1577.893	3	1322.156	2	0	1	0	1	0	1	.194	3
544			min	-1002.087	2	-1399.845	3	0	1	0	1	0	1	-.812	2
545		7	max	1578.509	3	1320.983	2	0	1	0	1	0	1	.933	3
546			min	-1001.265	2	-1400.725	3	0	1	0	1	0	1	-1.509	2
547		8	max	1579.126	3	1319.809	2	0	1	0	1	0	1	1.673	3
548			min	-1000.444	2	-1401.605	3	0	1	0	1	0	1	-2.206	2
549		9	max	1612.905	3	150.417	2	0	1	0	1	0	1	1.921	3
550			min	-814.291	2	.357	15	0	1	0	1	0	1	-2.515	2
551		10	max	1613.522	3	149.244	2	0	1	0	1	0	1	1.867	3
552			min	-813.47	2	.003	15	0	1	0	1	0	1	-2.594	2
553		11	max	1614.138	3	148.07	2	0	1	0	1	0	1	1.813	3
554			min	-812.648	2	-1.233	4	0	1	0	1	0	1	-2.672	2
555		12	max	1648.055	3	940.373	3	0	1	0	1	0	1	1.595	3
556			min	-626.513	2	-1625.665	2	0	1	0	1	0	1	-2.394	2
557		13	max	1648.671	3	939.493	3	0	1	0	1	0	1	1.099	3
558			min	-625.692	2	-1626.838	2	0	1	0	1	0	1	-1.536	2
559		14	max	1649.287	3	938.613	3	0	1	0	1	0	1	.603	3
560			min	-624.87	2	-1628.011	2	0	1	0	1	0	1	-.678	2
561		15	max	1649.903	3	937.733	3	0	1	0	1	0	1	.182	2
562			min	-624.049	2	-1629.185	2	0	1	0	1	0	1	-.004	13
563		16	max	1650.52	3	936.853	3	0	1	0	1	0	1	1.042	2
564			min	-623.227	2	-1630.358	2	0	1	0	1	0	1	-.386	3
565		17	max	1651.136	3	935.973	3	0	1	0	1	0	1	1.902	2
566			min	-622.405	2	-1631.532	2	0	1	0	1	0	1	-.88	3
567		18	max	-23.494	12	1826.24	2	0	1	0	1	0	1	.98	2
568			min	-431.936	1	-837.668	3	0	1	0	1	0	1	-.46	3
569		19	max	-23.083	12	1825.067	2	0	1	0	1	0	1	.017	2
570			min	-431.114	1	-838.548	3	0	1	0	1	0	1	-.018	3
571	M9	1	max	201.043	1	584.909	3	140.137	1	0	3	-.019	15	.002	3
572			min	11.138	15	-362.126	2	7.801	15	0	2	-.336	1	-.011	2
573		2	max	201.865	1	584.028	3	140.137	1	0	3	-.015	15	.18	2
574			min	11.386	15	-363.299	2	7.801	15	0	2	-.262	1	-.307	3
575		3	max	488.41	3	430.271	2	139.93	1	0	2	-.01	15	.362	2
576			min	-279.415	2	-428.598	3	7.776	15	0	3	-.188	1	-.603	3
577		4	max	489.026	3	429.098	2	139.93	1	0	2	-.006	15	.144	1
578			min	-278.593	2	-429.478	3	7.776	15	0	3	-.114	1	-.376	3
579		5	max	489.642	3	427.925	2	139.93	1	0	2	-.002	15	-.003	15
580			min	-277.772	2	-430.358	3	7.776	15	0	3	-.041	1	-.149	3
581		6	max	490.258	3	426.751	2	139.93	1	0	2	.033	1	.078	3
582			min	-276.95	2	-431.238	3	7.776	15	0	3	.002	15	-.316	2
583		7	max	490.874	3	425.578	2	139.93	1	0	2	.107	1	.306	3
584			min	-276.128	2	-432.118	3	7.776	15	0	3	.006	15	-.541	2
585		8	max	491.491	3	424.404	2	139.93	1	0	2	.181	1	.534	3
586			min	-275.307	2	-432.998	3	7.776	15	0	3	.01	15	-.765	2
587		9	max	510.103	3	45.119	2	200.567	1	0	3	-.006	15	.622	3
588			min	-184.35	2	.359	15	11.151	15	0	9	-.104	1	-.877	2
589		10	max	510.72	3	43.945	2	200.567	1	0	3	.001	1	.607	3
590			min	-183.528	2	.005	15	11.151	15	0	9	0	15	-.901	2
591		11	max	511.336	3	42.772	2	200.567	1	0	3	.107	1	.592	3
592			min	-182.707	2	-1.413	4	11.151	15	0	9	.006	15	-.923	2
593		12	max	529.88	3	290.349	3	136.72	1	0	3	-.01	15	.516	3
594			min	-98.313	10	-517.112	2	7.589	15	0	2	-.179	1	-.819	2
595		13	max	530.496	3	289.469	3	136.72	1	0	3	-.006	15	.363	3
596			min	-97.629	10	-518.285	2	7.589	15	0	2	-.106	1	-.546	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	531.113	3	288.588	3	136.72	1	0	3	-.002	15	.21	3
598			min	-96.944	10	-519.459	2	7.589	15	0	2	-.034	1	-.272	2
599		15	max	531.729	3	287.708	3	136.72	1	0	3	.038	1	.058	3
600			min	-96.259	10	-520.632	2	7.589	15	0	2	.002	15	-.019	1
601		16	max	532.345	3	286.828	3	136.72	1	0	3	.11	1	.277	2
602			min	-95.575	10	-521.806	2	7.589	15	0	2	.006	15	-.093	3
603		17	max	532.961	3	285.948	3	136.72	1	0	3	.182	1	.553	2
604			min	-94.89	10	-522.979	2	7.589	15	0	2	.01	15	-.244	3
605		18	max	-11.395	15	543.893	2	151.535	1	0	2	.258	1	.278	2
606			min	-202.087	1	-246.052	3	8.428	15	0	3	.014	15	-.121	3
607		19	max	-11.147	15	542.72	2	151.535	1	0	2	.338	1	.009	3
608			min	-201.265	1	-246.932	3	8.428	15	0	3	.019	15	-.008	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.089	2	.008	3	7.512e-3	2	NC	1	NC	1
2			min	0	15	-.013	3	-.004	2	-1.494e-3	3	NC	1	NC	1
3		2	max	.001	1	.381	3	.063	1	8.763e-3	2	NC	5	NC	2
4			min	0	15	-.144	1	.004	15	-1.663e-3	3	686.57	3	4388.338	1
5		3	max	.001	1	.699	3	.154	1	1.001e-2	2	NC	5	NC	3
6			min	0	15	-.32	1	.009	15	-1.832e-3	3	379.464	3	1769.316	1
7		4	max	0	1	.892	3	.234	1	1.127e-2	2	NC	15	NC	3
8			min	0	15	-.421	1	.013	15	-2.001e-3	3	298.525	3	1162.535	1
9		5	max	0	1	.936	3	.275	1	1.252e-2	2	NC	15	NC	5
10			min	0	15	-.433	1	.016	15	-2.17e-3	3	284.658	3	985.666	1
11		6	max	0	1	.834	3	.267	1	1.377e-2	2	NC	5	NC	5
12			min	0	15	-.357	1	.015	15	-2.339e-3	3	318.747	3	1016.946	1
13		7	max	0	1	.618	3	.211	1	1.502e-2	2	NC	5	NC	5
14			min	0	15	-.213	1	.012	15	-2.508e-3	3	428.329	3	1290.193	1
15		8	max	0	1	.343	3	.123	1	1.627e-2	2	NC	5	NC	3
16			min	0	15	-.037	1	.007	15	-2.677e-3	3	759.58	3	2213.897	1
17		9	max	0	1	.146	2	.036	1	1.752e-2	2	NC	4	NC	2
18			min	0	15	.004	15	-.005	10	-2.845e-3	3	2539.375	3	7780.633	1
19		10	max	0	1	.219	2	.026	3	1.877e-2	2	NC	3	NC	1
20			min	0	1	-.019	3	-.018	2	-3.014e-3	3	2076.628	2	NC	1
21		11	max	0	15	.146	2	.036	1	1.752e-2	2	NC	4	NC	2
22			min	0	1	.004	15	-.005	10	-2.845e-3	3	2539.375	3	7780.633	1
23		12	max	0	15	.343	3	.123	1	1.627e-2	2	NC	5	NC	3
24			min	0	1	-.037	1	.007	15	-2.677e-3	3	759.58	3	2213.897	1
25		13	max	0	15	.618	3	.211	1	1.502e-2	2	NC	5	NC	5
26			min	0	1	-.213	1	.012	15	-2.508e-3	3	428.329	3	1290.193	1
27		14	max	0	15	.834	3	.267	1	1.377e-2	2	NC	5	NC	5
28			min	0	1	-.357	1	.015	15	-2.339e-3	3	318.747	3	1016.946	1
29		15	max	0	15	.936	3	.275	1	1.252e-2	2	NC	15	NC	5
30			min	0	1	-.433	1	.016	15	-2.17e-3	3	284.658	3	985.666	1
31		16	max	0	15	.892	3	.234	1	1.127e-2	2	NC	15	NC	3
32			min	0	1	-.421	1	.013	15	-2.001e-3	3	298.525	3	1162.535	1
33		17	max	0	15	.699	3	.154	1	1.001e-2	2	NC	5	NC	3
34			min	-.001	1	-.32	1	.009	15	-1.832e-3	3	379.464	3	1769.316	1
35		18	max	0	15	.381	3	.063	1	8.763e-3	2	NC	5	NC	2
36			min	-.001	1	-.144	1	.004	15	-1.663e-3	3	686.57	3	4388.338	1
37		19	max	0	15	.089	2	.008	3	7.512e-3	2	NC	1	NC	1
38			min	-.001	1	-.013	3	-.004	2	-1.494e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.189	3	.007	3	4.434e-3	2	NC	1	NC	1
40			min	0	15	-.295	2	-.004	2	-3.257e-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	.558	3	.044	1	5.359e-3	2	NC	5	NC	2
42			min	0	15	-.631	2	.003	15	-4.004e-3	3	733.261	3	6293.032	1
43		3	max	0	1	.866	3	.126	1	6.283e-3	2	NC	15	NC	3
44			min	0	15	-.919	2	.007	15	-4.751e-3	3	398.803	3	2174.867	1
45		4	max	0	1	1.075	3	.203	1	7.207e-3	2	NC	15	NC	3
46			min	0	15	-1.123	2	.011	15	-5.498e-3	3	304.744	3	1343.357	1
47		5	max	0	1	1.165	3	.247	1	8.131e-3	2	9173.649	15	NC	5
48			min	0	15	-1.227	2	.014	15	-6.246e-3	3	276.815	3	1101.483	1
49		6	max	0	1	1.136	3	.244	1	9.056e-3	2	9253.711	15	NC	5
50			min	0	15	-1.232	2	.014	15	-6.993e-3	3	285.359	3	1112.652	1
51		7	max	0	1	1.009	3	.196	1	9.98e-3	2	NC	15	NC	5
52			min	0	15	-1.153	2	.011	15	-7.74e-3	3	314.776	2	1390.729	1
53		8	max	0	1	.829	3	.116	1	1.09e-2	2	NC	15	NC	3
54			min	0	15	-1.024	2	.007	15	-8.487e-3	3	370.378	2	2357.654	1
55		9	max	0	1	.657	3	.035	1	1.183e-2	2	NC	5	NC	2
56			min	0	15	-.896	2	-.004	10	-9.234e-3	3	449.487	2	8137.656	1
57		10	max	0	1	.577	3	.023	3	1.275e-2	2	NC	5	NC	1
58			min	0	1	-.835	2	-.016	2	-9.981e-3	3	500.025	2	NC	1
59		11	max	0	15	.657	3	.035	1	1.183e-2	2	NC	5	NC	2
60			min	0	1	-.896	2	-.004	10	-9.234e-3	3	449.487	2	8137.656	1
61		12	max	0	15	.829	3	.116	1	1.09e-2	2	NC	15	NC	3
62			min	0	1	-1.024	2	.007	15	-8.487e-3	3	370.378	2	2357.654	1
63		13	max	0	15	1.009	3	.196	1	9.98e-3	2	NC	15	NC	5
64			min	0	1	-1.153	2	.011	15	-7.74e-3	3	314.776	2	1390.729	1
65		14	max	0	15	1.136	3	.244	1	9.056e-3	2	9253.711	15	NC	5
66			min	0	1	-1.232	2	.014	15	-6.993e-3	3	285.359	3	1112.652	1
67		15	max	0	15	1.165	3	.247	1	8.131e-3	2	9173.649	15	NC	5
68			min	0	1	-1.227	2	.014	15	-6.246e-3	3	276.815	3	1101.483	1
69		16	max	0	15	1.075	3	.203	1	7.207e-3	2	NC	15	NC	3
70			min	0	1	-1.123	2	.011	15	-5.498e-3	3	304.744	3	1343.357	1
71		17	max	0	15	.866	3	.126	1	6.283e-3	2	NC	15	NC	3
72			min	0	1	-.919	2	.007	15	-4.751e-3	3	398.803	3	2174.867	1
73		18	max	0	15	.558	3	.044	1	5.359e-3	2	NC	5	NC	2
74			min	0	1	-.631	2	.003	15	-4.004e-3	3	733.261	3	6293.032	1
75		19	max	0	15	.189	3	.007	3	4.434e-3	2	NC	1	NC	1
76			min	0	1	-.295	2	-.004	2	-3.257e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.192	3	.007	3	2.875e-3	3	NC	1	NC	1
78			min	0	1	-.294	2	-.003	2	-4.66e-3	2	NC	1	NC	1
79		2	max	0	15	.426	3	.045	1	3.542e-3	3	NC	5	NC	2
80			min	0	1	-.751	2	.003	15	-5.635e-3	2	591.219	2	6265.213	1
81		3	max	0	15	.626	3	.126	1	4.209e-3	3	NC	15	NC	3
82			min	0	1	-1.135	2	.007	15	-6.611e-3	2	320.943	2	2169.299	1
83		4	max	0	15	.769	3	.203	1	4.876e-3	3	NC	15	NC	3
84			min	0	1	-1.399	2	.011	15	-7.587e-3	2	244.431	2	1340.722	1
85		5	max	0	15	.843	3	.247	1	5.542e-3	3	9189.477	15	NC	3
86			min	0	1	-1.517	2	.014	15	-8.563e-3	2	220.848	2	1099.552	1
87		6	max	0	15	.849	3	.245	1	6.209e-3	3	9273.053	15	NC	5
88			min	0	1	-1.49	2	.014	15	-9.538e-3	2	225.749	2	1110.658	1
89		7	max	0	15	.798	3	.196	1	6.876e-3	3	NC	15	NC	5
90			min	0	1	-1.345	2	.011	15	-1.051e-2	2	256.923	2	1387.721	1
91		8	max	0	15	.712	3	.116	1	7.542e-3	3	NC	15	NC	3
92			min	0	1	-1.132	2	.007	15	-1.149e-2	2	322.141	2	2349.507	1
93		9	max	0	15	.626	3	.035	1	8.209e-3	3	NC	5	NC	2
94			min	0	1	-.928	2	-.003	10	-1.247e-2	2	426.058	2	8046.712	1
95		10	max	0	1	.585	3	.022	3	8.876e-3	3	NC	5	NC	1
96			min	0	1	-.833	2	-.015	2	-1.344e-2	2	501.291	2	NC	1
97		11	max	0	1	.626	3	.035	1	8.209e-3	3	NC	5	NC	2

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	-.928	2	-.003	10	-1.247e-2	2	426.058	2	8046.712	1
99		12	max	0	1	.712	3	.116	1	7.542e-3	3	NC	15	NC	3
100			min	0	15	-1.132	2	.007	15	-1.149e-2	2	322.141	2	2349.507	1
101		13	max	0	1	.798	3	.196	1	6.876e-3	3	NC	15	NC	5
102			min	0	15	-1.345	2	.011	15	-1.051e-2	2	256.923	2	1387.721	1
103		14	max	0	1	.849	3	.245	1	6.209e-3	3	9273.053	15	NC	5
104			min	0	15	-1.49	2	.014	15	-9.538e-3	2	225.749	2	1110.658	1
105		15	max	0	1	.843	3	.247	1	5.542e-3	3	9189.477	15	NC	3
106			min	0	15	-1.517	2	.014	15	-8.563e-3	2	220.848	2	1099.552	1
107		16	max	0	1	.769	3	.203	1	4.876e-3	3	NC	15	NC	3
108			min	0	15	-1.399	2	.011	15	-7.587e-3	2	244.431	2	1340.722	1
109		17	max	0	1	.626	3	.126	1	4.209e-3	3	NC	15	NC	3
110			min	0	15	-1.135	2	.007	15	-6.611e-3	2	320.943	2	2169.299	1
111		18	max	0	1	.426	3	.045	1	3.542e-3	3	NC	5	NC	2
112			min	0	15	-.751	2	.003	15	-5.635e-3	2	591.219	2	6265.213	1
113		19	max	0	1	.192	3	.007	3	2.875e-3	3	NC	1	NC	1
114			min	0	15	-.294	2	-.003	2	-4.66e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.078	2	.006	3	4.925e-3	3	NC	1	NC	1
116			min	-.002	1	-.06	3	-.003	2	-6.125e-3	2	NC	1	NC	1
117		2	max	0	15	.09	3	.062	1	5.902e-3	3	NC	5	NC	2
118			min	-.001	1	-.271	2	.004	15	-7.043e-3	2	772.929	2	4420.3	1
119		3	max	0	15	.208	3	.153	1	6.88e-3	3	NC	5	NC	3
120			min	-.001	1	-.551	2	.009	15	-7.961e-3	2	429.111	2	1775.872	1
121		4	max	0	15	.274	3	.233	1	7.858e-3	3	NC	5	NC	3
122			min	-.001	1	-.715	2	.013	15	-8.879e-3	2	340.409	2	1164.684	1
123		5	max	0	15	.278	3	.275	1	8.835e-3	3	NC	15	NC	5
124			min	0	1	-.741	2	.015	15	-9.797e-3	2	329.383	2	986.076	1
125		6	max	0	15	.221	3	.267	1	9.813e-3	3	NC	5	NC	5
126			min	0	1	-.634	2	.015	15	-1.072e-2	2	378.991	2	1015.768	1
127		7	max	0	15	.118	3	.211	1	1.079e-2	3	NC	5	NC	5
128			min	0	1	-.421	2	.012	15	-1.163e-2	2	540.168	2	1285.503	1
129		8	max	0	15	0	15	.124	1	1.177e-2	3	NC	4	NC	3
130			min	0	1	-.157	2	.007	15	-1.255e-2	2	1146.015	2	2192.689	1
131		9	max	0	15	.096	1	.037	1	1.275e-2	3	NC	1	NC	2
132			min	0	1	-.12	3	-.002	10	-1.347e-2	2	4523.176	3	7461.703	1
133		10	max	0	1	.187	2	.019	3	1.372e-2	3	NC	4	NC	1
134			min	0	1	-.17	3	-.014	2	-1.439e-2	2	2462.272	3	NC	1
135		11	max	0	1	.096	1	.037	1	1.275e-2	3	NC	1	NC	2
136			min	0	15	-.12	3	-.002	10	-1.347e-2	2	4523.176	3	7461.703	1
137		12	max	0	1	0	15	.124	1	1.177e-2	3	NC	4	NC	3
138			min	0	15	-.157	2	.007	15	-1.255e-2	2	1146.015	2	2192.689	1
139		13	max	0	1	.118	3	.211	1	1.079e-2	3	NC	5	NC	5
140			min	0	15	-.421	2	.012	15	-1.163e-2	2	540.168	2	1285.503	1
141		14	max	0	1	.221	3	.267	1	9.813e-3	3	NC	5	NC	5
142			min	0	15	-.634	2	.015	15	-1.072e-2	2	378.991	2	1015.768	1
143		15	max	0	1	.278	3	.275	1	8.835e-3	3	NC	15	NC	5
144			min	0	15	-.741	2	.015	15	-9.797e-3	2	329.383	2	986.076	1
145		16	max	.001	1	.274	3	.233	1	7.858e-3	3	NC	5	NC	3
146			min	0	15	-.715	2	.013	15	-8.879e-3	2	340.409	2	1164.684	1
147		17	max	.001	1	.208	3	.153	1	6.88e-3	3	NC	5	NC	3
148			min	0	15	-.551	2	.009	15	-7.961e-3	2	429.111	2	1775.872	1
149		18	max	.001	1	.09	3	.062	1	5.902e-3	3	NC	5	NC	2
150			min	0	15	-.271	2	.004	15	-7.043e-3	2	772.929	2	4420.3	1
151		19	max	.002	1	.078	2	.006	3	4.925e-3	3	NC	1	NC	1
152			min	0	15	-.06	3	-.003	2	-6.125e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.008	2	.011	1	-1.79e-5	15	NC	1	NC	2
154			min	-.008	3	-.013	3	0	15	-3.223e-4	1	NC	1	7111.097	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	2	.006	2	.01	1	-1.694e-5	15	NC	1	NC	2
156			min	-.008	3	-.013	3	0	15	-3.049e-4	1	NC	1	7750.189	1
157		3	max	.006	2	.005	2	.009	1	-1.597e-5	15	NC	1	NC	2
158			min	-.007	3	-.012	3	0	15	-2.875e-4	1	NC	1	8510.815	1
159		4	max	.005	2	.004	2	.008	1	-1.5e-5	15	NC	1	NC	2
160			min	-.007	3	-.012	3	0	15	-2.701e-4	1	NC	1	9424.893	1
161		5	max	.005	2	.003	2	.007	1	-1.404e-5	15	NC	1	NC	1
162			min	-.006	3	-.012	3	0	15	-2.527e-4	1	NC	1	NC	1
163		6	max	.005	2	.002	2	.006	1	-1.307e-5	15	NC	1	NC	1
164			min	-.006	3	-.011	3	0	15	-2.353e-4	1	NC	1	NC	1
165		7	max	.004	2	0	2	.006	1	-1.21e-5	15	NC	1	NC	1
166			min	-.005	3	-.011	3	0	15	-2.179e-4	1	NC	1	NC	1
167		8	max	.004	2	0	2	.005	1	-1.114e-5	15	NC	1	NC	1
168			min	-.005	3	-.01	3	0	15	-2.005e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.004	1	-1.017e-5	15	NC	1	NC	1
170			min	-.005	3	-.01	3	0	15	-1.831e-4	1	NC	1	NC	1
171		10	max	.003	2	-.001	2	.003	1	-9.204e-6	15	NC	1	NC	1
172			min	-.004	3	-.009	3	0	15	-1.657e-4	1	NC	1	NC	1
173		11	max	.003	2	-.001	15	.003	1	-8.238e-6	15	NC	1	NC	1
174			min	-.004	3	-.008	3	0	15	-1.483e-4	1	NC	1	NC	1
175		12	max	.003	2	-.001	15	.002	1	-7.272e-6	15	NC	1	NC	1
176			min	-.003	3	-.008	3	0	15	-1.309e-4	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	.002	1	-6.305e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-1.135e-4	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	.001	1	-5.339e-6	15	NC	1	NC	1
180			min	-.002	3	-.006	3	0	15	-9.606e-5	1	NC	1	NC	1
181		15	max	.001	2	-.001	15	0	1	-4.373e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-7.866e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-3.406e-6	15	NC	1	NC	1
184			min	-.001	3	-.004	4	0	15	-6.125e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-2.44e-6	15	NC	1	NC	1
186			min	0	3	-.003	4	0	15	-4.385e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-1.473e-6	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-2.645e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-5.071e-7	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-9.043e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.379e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	7.802e-8	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	2.925e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	1.623e-6	15	NC	1	NC	1
195		3	max	0	3	0	15	0	15	5.713e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	3.168e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	8.5e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	3	4.713e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	1.129e-4	1	NC	1	NC	1
200			min	-.001	2	-.008	4	0	12	6.258e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.408e-4	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	12	7.803e-6	15	9242.098	4	NC	1
203		7	max	.002	3	-.003	15	0	1	1.686e-4	1	NC	1	NC	1
204			min	-.002	2	-.012	4	0	15	9.348e-6	15	7992.855	4	NC	1
205		8	max	.003	3	-.003	15	0	1	1.965e-4	1	NC	2	NC	1
206			min	-.002	2	-.013	4	0	15	1.089e-5	15	7224.093	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	2.244e-4	1	NC	5	NC	1
208			min	-.002	2	-.014	4	0	15	1.244e-5	15	6775.646	4	NC	1
209		10	max	.003	3	-.003	15	.001	1	2.522e-4	1	NC	5	NC	1
210			min	-.003	2	-.014	4	0	15	1.398e-5	15	6570.406	4	NC	1
211		11	max	.004	3	-.003	15	.002	1	2.801e-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	1.553e-5	15	6578.407	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	3.08e-4	1	NC	3	NC	1
214			min	-.003	2	-.014	4	0	15	1.707e-5	15	6805.316	4	NC	1
215		13	max	.005	3	-.003	15	.003	1	3.359e-4	1	NC	2	NC	1
216			min	-.004	2	-.013	4	0	15	1.862e-5	15	7296.104	4	NC	1
217		14	max	.005	3	-.003	15	.004	1	3.637e-4	1	NC	1	NC	1
218			min	-.004	2	-.012	4	0	15	2.016e-5	15	8157.802	4	NC	1
219		15	max	.005	3	-.002	15	.005	1	3.916e-4	1	NC	1	NC	1
220			min	-.004	2	-.01	4	0	15	2.171e-5	15	9625.531	4	NC	1
221		16	max	.006	3	-.002	15	.006	1	4.195e-4	1	NC	1	NC	1
222			min	-.005	2	-.008	4	0	15	2.325e-5	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.007	1	4.474e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	4	0	15	2.48e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.009	1	4.752e-4	1	NC	1	NC	1
226			min	-.005	2	-.004	1	0	15	2.634e-5	15	NC	1	NC	1
227		19	max	.007	3	0	10	.01	1	5.031e-4	1	NC	1	NC	2
228			min	-.005	2	-.002	3	0	15	2.789e-5	15	NC	1	8753.794	1
229	M4	1	max	.002	1	.005	2	0	15	1.665e-4	1	NC	1	NC	3
230			min	0	15	-.007	3	-.01	1	9.247e-6	15	NC	1	2417.011	1
231		2	max	.002	1	.005	2	0	15	1.665e-4	1	NC	1	NC	3
232			min	0	15	-.007	3	-.009	1	9.247e-6	15	NC	1	2620.64	1
233		3	max	.002	1	.005	2	0	15	1.665e-4	1	NC	1	NC	3
234			min	0	15	-.006	3	-.009	1	9.247e-6	15	NC	1	2863.484	1
235		4	max	.002	1	.004	2	0	15	1.665e-4	1	NC	1	NC	3
236			min	0	15	-.006	3	-.008	1	9.247e-6	15	NC	1	3155.643	1
237		5	max	.002	1	.004	2	0	15	1.665e-4	1	NC	1	NC	3
238			min	0	15	-.006	3	-.007	1	9.247e-6	15	NC	1	3510.851	1
239		6	max	.002	1	.004	2	0	15	1.665e-4	1	NC	1	NC	3
240			min	0	15	-.005	3	-.006	1	9.247e-6	15	NC	1	3948.153	1
241		7	max	.002	1	.003	2	0	15	1.665e-4	1	NC	1	NC	2
242			min	0	15	-.005	3	-.006	1	9.247e-6	15	NC	1	4494.586	1
243		8	max	.001	1	.003	2	0	15	1.665e-4	1	NC	1	NC	2
244			min	0	15	-.004	3	-.005	1	9.247e-6	15	NC	1	5189.572	1
245		9	max	.001	1	.003	2	0	15	1.665e-4	1	NC	1	NC	2
246			min	0	15	-.004	3	-.004	1	9.247e-6	15	NC	1	6092.445	1
247		10	max	.001	1	.003	2	0	15	1.665e-4	1	NC	1	NC	2
248			min	0	15	-.004	3	-.003	1	9.247e-6	15	NC	1	7295.928	1
249		11	max	.001	1	.002	2	0	15	1.665e-4	1	NC	1	NC	2
250			min	0	15	-.003	3	-.003	1	9.247e-6	15	NC	1	8951.641	1
251		12	max	0	1	.002	2	0	15	1.665e-4	1	NC	1	NC	1
252			min	0	15	-.003	3	-.002	1	9.247e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.665e-4	1	NC	1	NC	1
254			min	0	15	-.002	3	-.002	1	9.247e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.665e-4	1	NC	1	NC	1
256			min	0	15	-.002	3	-.001	1	9.247e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	1.665e-4	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	9.247e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.665e-4	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	9.247e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.665e-4	1	NC	1	NC	1
262			min	0	15	0	3	0	1	9.247e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.665e-4	1	NC	1	NC	1
264			min	0	15	0	3	0	1	9.247e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.665e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	9.247e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.03	2	0	1	0	1	NC	3	NC	1
268			min	-.027	3	-.042	3	0	1	0	1	2591.703	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.02	2	.027	2	0	1	0	1	NC	3	NC	1
270			min	-.026	3	-.039	3	0	1	0	1	2854.674	2	NC	1
271		3	max	.019	2	.024	2	0	1	0	1	NC	3	NC	1
272			min	-.024	3	-.037	3	0	1	0	1	3173.843	2	NC	1
273		4	max	.018	2	.022	2	0	1	0	1	NC	3	NC	1
274			min	-.023	3	-.035	3	0	1	0	1	3565.457	2	NC	1
275		5	max	.016	2	.019	2	0	1	0	1	NC	3	NC	1
276			min	-.021	3	-.033	3	0	1	0	1	4052.302	2	NC	1
277		6	max	.015	2	.016	2	0	1	0	1	NC	1	NC	1
278			min	-.02	3	-.03	3	0	1	0	1	4667.125	2	NC	1
279		7	max	.014	2	.014	2	0	1	0	1	NC	1	NC	1
280			min	-.018	3	-.028	3	0	1	0	1	5458.357	2	NC	1
281		8	max	.013	2	.012	2	0	1	0	1	NC	1	NC	1
282			min	-.017	3	-.026	3	0	1	0	1	6500.111	2	NC	1
283		9	max	.012	2	.01	2	0	1	0	1	NC	1	NC	1
284			min	-.015	3	-.023	3	0	1	0	1	7910.529	2	NC	1
285		10	max	.011	2	.008	2	0	1	0	1	NC	1	NC	1
286			min	-.014	3	-.021	3	0	1	0	1	9887.618	2	NC	1
287		11	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.012	3	-.019	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	2	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.011	3	-.016	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	2	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	2	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	2	.001	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.009	3	0	1	0	1	NC	1	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.007	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	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	15	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	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.011	3	0	1	0	1	9413.771	3	NC	1
317		7	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.013	3	0	1	0	1	8153.517	4	NC	1
319		8	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.008	2	-.014	3	0	1	0	1	7359.593	4	NC	1
321		9	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.009	2	-.015	3	0	1	0	1	6895.086	4	NC	1
323		10	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6679.96	4	NC	1
325		11	max	.012	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	-.012	2	-.016	3	0	1	0	1	6682.772	4	NC	1
327		12	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.013	2	-.016	3	0	1	0	1	6908.611	4	NC	1
329		13	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.014	2	-.015	3	0	1	0	1	7402.624	4	NC	1
331		14	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.015	2	-.014	3	0	1	0	1	8272.958	4	NC	1
333		15	max	.017	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.016	2	-.013	3	0	1	0	1	9757.597	4	NC	1
335		16	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.018	2	-.012	3	0	1	0	1	NC	1	NC	1
337		17	max	.019	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.019	2	-.01	3	0	1	0	1	NC	1	NC	1
339		18	max	.02	3	0	10	0	1	0	1	NC	1	NC	1
340			min	-.02	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.021	3	.001	2	0	1	0	1	NC	1	NC	1
342			min	-.021	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.021	2	0	1	0	1	NC	1	NC	1
344			min	0	15	-.022	3	0	1	0	1	NC	1	NC	1
345		2	max	.005	1	.019	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.021	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	1	.018	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.017	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.019	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	1	.016	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.017	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	1	.015	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.014	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.015	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	1	.013	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.014	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.012	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.011	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	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	15	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	15	-.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	.007	2	.008	2	0	15	3.223e-4	1	NC	1	NC	2
382			min	-.008	3	-.013	3	-.011	1	1.79e-5	15	NC	1	7111.097	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	2	.006	2	0	15	3.049e-4	1	NC	1	NC	2
384			min	-.008	3	-.013	3	-.01	1	1.694e-5	15	NC	1	7750.189	1
385		3	max	.006	2	.005	2	0	15	2.875e-4	1	NC	1	NC	2
386			min	-.007	3	-.012	3	-.009	1	1.597e-5	15	NC	1	8510.815	1
387		4	max	.005	2	.004	2	0	15	2.701e-4	1	NC	1	NC	2
388			min	-.007	3	-.012	3	-.008	1	1.5e-5	15	NC	1	9424.893	1
389		5	max	.005	2	.003	2	0	15	2.527e-4	1	NC	1	NC	1
390			min	-.006	3	-.012	3	-.007	1	1.404e-5	15	NC	1	NC	1
391		6	max	.005	2	.002	2	0	15	2.353e-4	1	NC	1	NC	1
392			min	-.006	3	-.011	3	-.006	1	1.307e-5	15	NC	1	NC	1
393		7	max	.004	2	0	2	0	15	2.179e-4	1	NC	1	NC	1
394			min	-.005	3	-.011	3	-.006	1	1.21e-5	15	NC	1	NC	1
395		8	max	.004	2	0	2	0	15	2.005e-4	1	NC	1	NC	1
396			min	-.005	3	-.01	3	-.005	1	1.114e-5	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	1.831e-4	1	NC	1	NC	1
398			min	-.005	3	-.01	3	-.004	1	1.017e-5	15	NC	1	NC	1
399		10	max	.003	2	-.001	2	0	15	1.657e-4	1	NC	1	NC	1
400			min	-.004	3	-.009	3	-.003	1	9.204e-6	15	NC	1	NC	1
401		11	max	.003	2	-.001	15	0	15	1.483e-4	1	NC	1	NC	1
402			min	-.004	3	-.008	3	-.003	1	8.238e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	15	0	15	1.309e-4	1	NC	1	NC	1
404			min	-.003	3	-.008	3	-.002	1	7.272e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	1.135e-4	1	NC	1	NC	1
406			min	-.003	3	-.007	3	-.002	1	6.305e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	9.606e-5	1	NC	1	NC	1
408			min	-.002	3	-.006	3	-.001	1	5.339e-6	15	NC	1	NC	1
409		15	max	.001	2	-.001	15	0	15	7.866e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	4.373e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	6.125e-5	1	NC	1	NC	1
412			min	-.001	3	-.004	4	0	1	3.406e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	4.385e-5	1	NC	1	NC	1
414			min	0	3	-.003	4	0	1	2.44e-6	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	2.645e-5	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	1.473e-6	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	9.043e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	5.071e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-7.802e-8	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.379e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-1.623e-6	15	NC	1	NC	1
422			min	0	2	-.002	4	0	15	-2.925e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-3.168e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	15	-5.713e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	3	-4.713e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-8.5e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	12	-6.258e-6	15	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.129e-4	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	12	-7.803e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-1.408e-4	1	9242.098	4	NC	1
431		7	max	.002	3	-.003	15	0	15	-9.348e-6	15	NC	1	NC	1
432			min	-.002	2	-.012	4	0	1	-1.686e-4	1	7992.855	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-1.089e-5	15	NC	2	NC	1
434			min	-.002	2	-.013	4	0	1	-1.965e-4	1	7224.093	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-1.244e-5	15	NC	5	NC	1
436			min	-.002	2	-.014	4	-.001	1	-2.244e-4	1	6775.646	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-1.398e-5	15	NC	5	NC	1
438			min	-.003	2	-.014	4	-.001	1	-2.522e-4	1	6570.406	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-1.553e-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	-.002	1	-2.801e-4	1	6578.407	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-1.707e-5	15	NC	3	NC	1
442			min	-.003	2	-.014	4	-.003	1	-3.08e-4	1	6805.316	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-1.862e-5	15	NC	2	NC	1
444			min	-.004	2	-.013	4	-.003	1	-3.359e-4	1	7296.104	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-2.016e-5	15	NC	1	NC	1
446			min	-.004	2	-.012	4	-.004	1	-3.637e-4	1	8157.802	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-2.171e-5	15	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.916e-4	1	9625.531	4	NC	1
449		16	max	.006	3	-.002	15	0	15	-2.325e-5	15	NC	1	NC	1
450			min	-.005	2	-.008	4	-.006	1	-4.195e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-2.48e-5	15	NC	1	NC	1
452			min	-.005	2	-.006	4	-.007	1	-4.474e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-2.634e-5	15	NC	1	NC	1
454			min	-.005	2	-.004	1	-.009	1	-4.752e-4	1	NC	1	NC	1
455		19	max	.007	3	0	10	0	15	-2.789e-5	15	NC	1	NC	2
456			min	-.005	2	-.002	3	-.01	1	-5.031e-4	1	NC	1	8753.794	1
457	M12	1	max	.002	1	.005	2	.01	1	-9.247e-6	15	NC	1	NC	3
458			min	0	15	-.007	3	0	15	-1.665e-4	1	NC	1	2417.011	1
459		2	max	.002	1	.005	2	.009	1	-9.247e-6	15	NC	1	NC	3
460			min	0	15	-.007	3	0	15	-1.665e-4	1	NC	1	2620.64	1
461		3	max	.002	1	.005	2	.009	1	-9.247e-6	15	NC	1	NC	3
462			min	0	15	-.006	3	0	15	-1.665e-4	1	NC	1	2863.484	1
463		4	max	.002	1	.004	2	.008	1	-9.247e-6	15	NC	1	NC	3
464			min	0	15	-.006	3	0	15	-1.665e-4	1	NC	1	3155.643	1
465		5	max	.002	1	.004	2	.007	1	-9.247e-6	15	NC	1	NC	3
466			min	0	15	-.006	3	0	15	-1.665e-4	1	NC	1	3510.851	1
467		6	max	.002	1	.004	2	.006	1	-9.247e-6	15	NC	1	NC	3
468			min	0	15	-.005	3	0	15	-1.665e-4	1	NC	1	3948.153	1
469		7	max	.002	1	.003	2	.006	1	-9.247e-6	15	NC	1	NC	2
470			min	0	15	-.005	3	0	15	-1.665e-4	1	NC	1	4494.586	1
471		8	max	.001	1	.003	2	.005	1	-9.247e-6	15	NC	1	NC	2
472			min	0	15	-.004	3	0	15	-1.665e-4	1	NC	1	5189.572	1
473		9	max	.001	1	.003	2	.004	1	-9.247e-6	15	NC	1	NC	2
474			min	0	15	-.004	3	0	15	-1.665e-4	1	NC	1	6092.445	1
475		10	max	.001	1	.003	2	.003	1	-9.247e-6	15	NC	1	NC	2
476			min	0	15	-.004	3	0	15	-1.665e-4	1	NC	1	7295.928	1
477		11	max	.001	1	.002	2	.003	1	-9.247e-6	15	NC	1	NC	2
478			min	0	15	-.003	3	0	15	-1.665e-4	1	NC	1	8951.641	1
479		12	max	0	1	.002	2	.002	1	-9.247e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-1.665e-4	1	NC	1	NC	1
481		13	max	0	1	.002	2	.002	1	-9.247e-6	15	NC	1	NC	1
482			min	0	15	-.002	3	0	15	-1.665e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.001	1	-9.247e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-1.665e-4	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-9.247e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-1.665e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-9.247e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-1.665e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-9.247e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-1.665e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-9.247e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-1.665e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-9.247e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.665e-4	1	NC	1	NC	1
495	M1	1	max	.008	3	.089	2	.001	1	1.562e-2	2	NC	1	NC	1
496			min	-.004	2	-.013	3	0	15	-2.719e-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	.041	2	0	15	7.649e-3	2	NC	4	NC	1
498			min	-.004	2	-.003	3	-.007	1	-1.346e-2	3	2415.154	2	NC	1
499		3	max	.008	3	.013	3	0	15	4.882e-6	10	NC	5	NC	2
500			min	-.004	2	-.01	2	-.011	1	-2.311e-4	1	1163.029	2	9494.062	1
501		4	max	.008	3	.041	3	0	15	4.237e-3	2	NC	5	NC	1
502			min	-.004	2	-.068	2	-.01	1	-4.802e-3	3	733.321	2	NC	1
503		5	max	.008	3	.076	3	0	15	8.515e-3	2	NC	5	NC	1
504			min	-.004	2	-.129	2	-.007	1	-9.465e-3	3	528.734	2	NC	1
505		6	max	.008	3	.114	3	0	15	1.279e-2	2	NC	15	NC	1
506			min	-.004	2	-.188	2	-.003	1	-1.413e-2	3	416.124	2	NC	1
507		7	max	.008	3	.15	3	0	1	1.707e-2	2	NC	15	NC	1
508			min	-.004	2	-.241	2	0	12	-1.879e-2	3	349.699	2	NC	1
509		8	max	.008	3	.18	3	.001	1	2.135e-2	2	9430.853	15	NC	1
510			min	-.004	2	-.282	2	0	15	-2.345e-2	3	310.433	2	NC	1
511		9	max	.007	3	.199	3	0	15	2.462e-2	2	8808.559	15	NC	1
512			min	-.004	2	-.309	2	0	1	-2.357e-2	3	290.003	2	NC	1
513		10	max	.007	3	.206	3	0	1	2.722e-2	2	8619.186	15	NC	1
514			min	-.004	2	-.318	2	0	12	-2.065e-2	3	284.031	2	NC	1
515		11	max	.007	3	.201	3	0	1	2.981e-2	2	8808.223	15	NC	1
516			min	-.004	2	-.309	2	0	15	-1.774e-2	3	291.087	2	NC	1
517		12	max	.007	3	.184	3	0	15	2.908e-2	2	9430.155	15	NC	1
518			min	-.003	2	-.281	2	-.001	1	-1.481e-2	3	313.764	2	NC	1
519		13	max	.007	3	.157	3	0	15	2.334e-2	2	NC	15	NC	1
520			min	-.003	2	-.237	2	0	1	-1.185e-2	3	357.873	2	NC	1
521		14	max	.007	3	.122	3	.003	1	1.76e-2	2	NC	15	NC	1
522			min	-.003	2	-.182	2	0	15	-8.895e-3	3	433.696	2	NC	1
523		15	max	.006	3	.083	3	.007	1	1.186e-2	2	NC	5	NC	1
524			min	-.003	2	-.121	2	0	15	-5.935e-3	3	565.122	2	NC	1
525		16	max	.006	3	.043	3	.01	1	6.116e-3	2	NC	5	NC	1
526			min	-.003	2	-.06	2	0	15	-2.975e-3	3	810.594	2	NC	1
527		17	max	.006	3	.005	3	.01	1	6.712e-4	1	NC	5	NC	2
528			min	-.003	2	-.006	2	0	15	-1.554e-5	3	1339.745	2	9864.83	1
529		18	max	.006	3	.039	2	.007	1	1.208e-2	2	NC	4	NC	1
530			min	-.003	2	-.029	3	0	15	-5.123e-3	3	2867.791	2	NC	1
531		19	max	.006	3	.078	2	0	15	2.419e-2	2	NC	1	NC	1
532			min	-.003	2	-.06	3	-.002	1	-1.042e-2	3	NC	1	NC	1
533	M5	1	max	.026	3	.219	2	0	1	0	1	NC	1	NC	1
534			min	-.018	2	-.019	3	0	1	0	1	NC	1	NC	1
535		2	max	.026	3	.099	2	0	1	0	1	NC	5	NC	1
536			min	-.018	2	.002	3	0	1	0	1	962.712	2	NC	1
537		3	max	.026	3	.043	3	0	1	0	1	NC	5	NC	1
538			min	-.018	2	-.035	2	0	1	0	1	455.549	2	NC	1
539		4	max	.026	3	.123	3	0	1	0	1	9709.607	15	NC	1
540			min	-.018	2	-.192	2	0	1	0	1	280.967	2	NC	1
541		5	max	.025	3	.228	3	0	1	0	1	6801.9	15	NC	1
542			min	-.017	2	-.361	2	0	1	0	1	198.977	2	NC	1
543		6	max	.025	3	.343	3	0	1	0	1	5240.636	15	NC	1
544			min	-.017	2	-.528	2	0	1	0	1	154.503	2	NC	1
545		7	max	.024	3	.455	3	0	1	0	1	4338.225	15	NC	1
546			min	-.017	2	-.678	2	0	1	0	1	128.588	2	NC	1
547		8	max	.024	3	.548	3	0	1	0	1	3813.176	15	NC	1
548			min	-.016	2	-.799	2	0	1	0	1	113.421	2	NC	1
549		9	max	.023	3	.608	3	0	1	0	1	3543.788	15	NC	1
550			min	-.016	2	-.875	2	0	1	0	1	105.604	2	NC	1
551		10	max	.023	3	.629	3	0	1	0	1	3462.62	15	NC	1
552			min	-.016	2	-.9	2	0	1	0	1	103.322	2	NC	1
553		11	max	.022	3	.612	3	0	1	0	1	3543.899	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	-.016	2	-.874	2	0	1	0	1	106.011	2	NC	1
555		12	max	.021	3	.559	3	0	1	0	1	3813.444	15	NC	1
556			min	-.015	2	-.794	2	0	1	0	1	114.743	2	NC	1
557		13	max	.021	3	.475	3	0	1	0	1	4338.791	15	NC	1
558			min	-.015	2	-.666	2	0	1	0	1	131.994	2	NC	1
559		14	max	.02	3	.368	3	0	1	0	1	5241.772	15	NC	1
560			min	-.015	2	-.507	2	0	1	0	1	162.131	2	NC	1
561		15	max	.02	3	.249	3	0	1	0	1	6804.186	15	NC	1
562			min	-.015	2	-.335	2	0	1	0	1	215.479	2	NC	1
563		16	max	.019	3	.128	3	0	1	0	1	9714.445	15	NC	1
564			min	-.014	2	-.166	2	0	1	0	1	317.902	2	NC	1
565		17	max	.019	3	.015	3	0	1	0	1	NC	5	NC	1
566			min	-.014	2	-.019	2	0	1	0	1	545.513	2	NC	1
567		18	max	.019	3	.094	2	0	1	0	1	NC	5	NC	1
568			min	-.014	2	-.082	3	0	1	0	1	1204.347	2	NC	1
569		19	max	.019	3	.187	2	0	1	0	1	NC	1	NC	1
570			min	-.014	2	-.17	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.089	2	0	15	2.719e-2	3	NC	1	NC	1
572			min	-.004	2	-.013	3	-.001	1	-1.562e-2	2	NC	1	NC	1
573		2	max	.008	3	.041	2	.007	1	1.346e-2	3	NC	4	NC	1
574			min	-.004	2	-.003	3	0	15	-7.649e-3	2	2415.154	2	NC	1
575		3	max	.008	3	.013	3	.011	1	2.311e-4	1	NC	5	NC	2
576			min	-.004	2	-.01	2	0	15	-4.882e-6	10	1163.029	2	9494.062	1
577		4	max	.008	3	.041	3	.01	1	4.802e-3	3	NC	5	NC	1
578			min	-.004	2	-.068	2	0	15	-4.237e-3	2	733.321	2	NC	1
579		5	max	.008	3	.076	3	.007	1	9.465e-3	3	NC	5	NC	1
580			min	-.004	2	-.129	2	0	15	-8.515e-3	2	528.734	2	NC	1
581		6	max	.008	3	.114	3	.003	1	1.413e-2	3	NC	15	NC	1
582			min	-.004	2	-.188	2	0	15	-1.279e-2	2	416.124	2	NC	1
583		7	max	.008	3	.15	3	0	12	1.879e-2	3	NC	15	NC	1
584			min	-.004	2	-.241	2	0	1	-1.707e-2	2	349.699	2	NC	1
585		8	max	.008	3	.18	3	0	15	2.345e-2	3	9430.853	15	NC	1
586			min	-.004	2	-.282	2	-.001	1	-2.135e-2	2	310.433	2	NC	1
587		9	max	.007	3	.199	3	0	1	2.357e-2	3	8808.559	15	NC	1
588			min	-.004	2	-.309	2	0	15	-2.462e-2	2	290.003	2	NC	1
589		10	max	.007	3	.206	3	0	12	2.065e-2	3	8619.186	15	NC	1
590			min	-.004	2	-.318	2	0	1	-2.722e-2	2	284.031	2	NC	1
591		11	max	.007	3	.201	3	0	15	1.774e-2	3	8808.223	15	NC	1
592			min	-.004	2	-.309	2	0	1	-2.981e-2	2	291.087	2	NC	1
593		12	max	.007	3	.184	3	.001	1	1.481e-2	3	9430.155	15	NC	1
594			min	-.003	2	-.281	2	0	15	-2.908e-2	2	313.764	2	NC	1
595		13	max	.007	3	.157	3	0	1	1.185e-2	3	NC	15	NC	1
596			min	-.003	2	-.237	2	0	15	-2.334e-2	2	357.873	2	NC	1
597		14	max	.007	3	.122	3	0	15	8.895e-3	3	NC	15	NC	1
598			min	-.003	2	-.182	2	-.003	1	-1.76e-2	2	433.696	2	NC	1
599		15	max	.006	3	.083	3	0	15	5.935e-3	3	NC	5	NC	1
600			min	-.003	2	-.121	2	-.007	1	-1.186e-2	2	565.122	2	NC	1
601		16	max	.006	3	.043	3	0	15	2.975e-3	3	NC	5	NC	1
602			min	-.003	2	-.06	2	-.01	1	-6.116e-3	2	810.594	2	NC	1
603		17	max	.006	3	.005	3	0	15	1.554e-5	3	NC	5	NC	2
604			min	-.003	2	-.006	2	-.01	1	-6.712e-4	1	1339.745	2	9864.83	1
605		18	max	.006	3	.039	2	0	15	5.123e-3	3	NC	4	NC	1
606			min	-.003	2	-.029	3	-.007	1	-1.208e-2	2	2867.791	2	NC	1
607		19	max	.006	3	.078	2	.002	1	1.042e-2	3	NC	1	NC	1
608			min	-.003	2	-.06	3	0	15	-2.419e-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

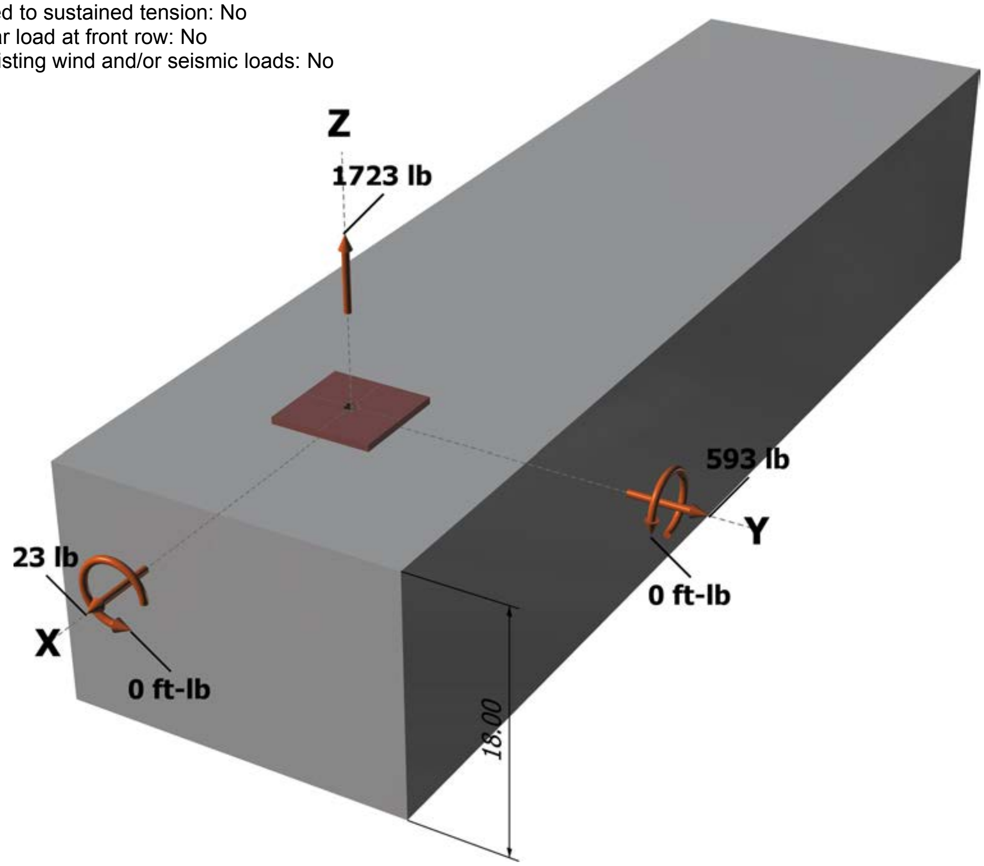
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

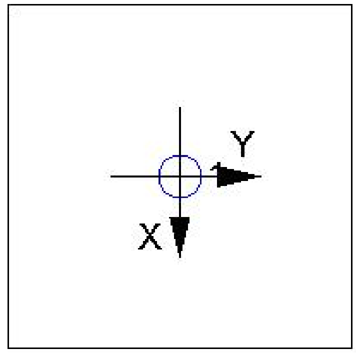
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

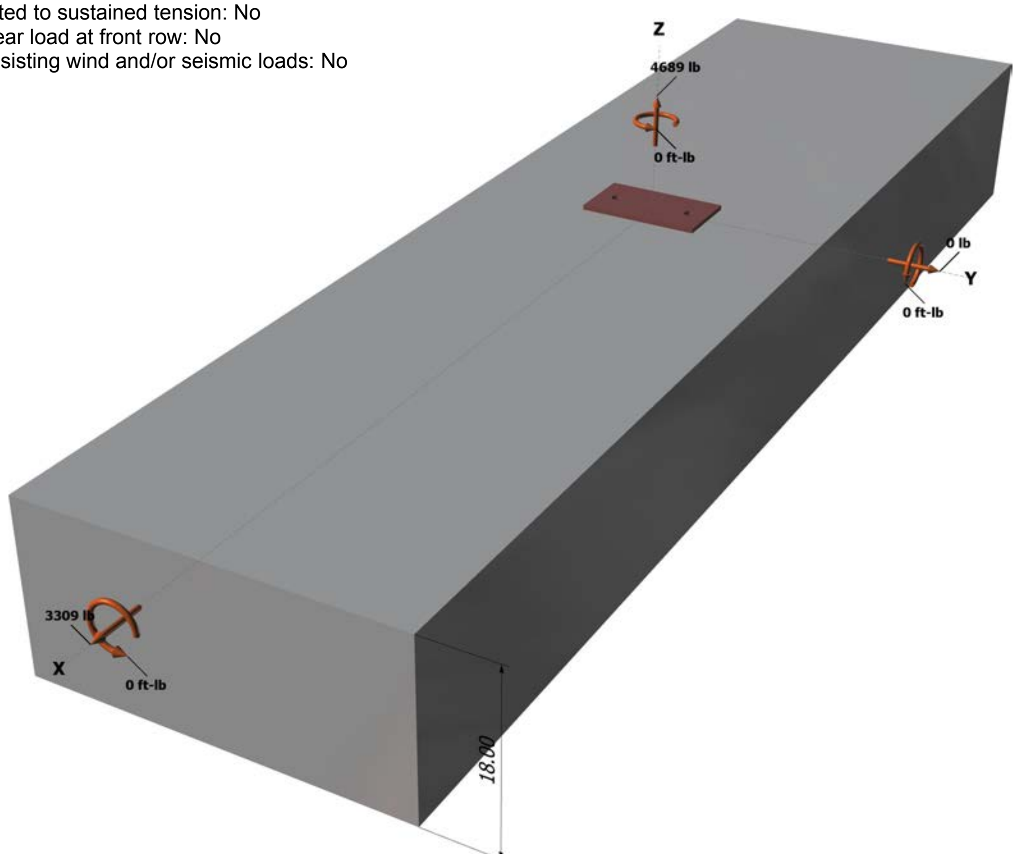
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

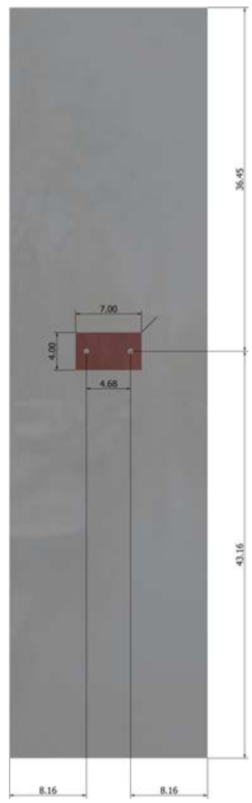
<Figure 1>

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 2>



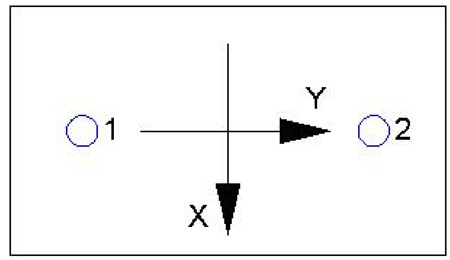
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2344.5	1654.5	0.0	1654.5
2	2344.5	1654.5	0.0	1654.5
Sum	4689.0	3309.0	0.0	3309.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4689
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

11. Results

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

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

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

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

Sec. D.7.3	0.58	0.62	120.1 %	1.2	Pass

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

12. Warnings

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

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

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