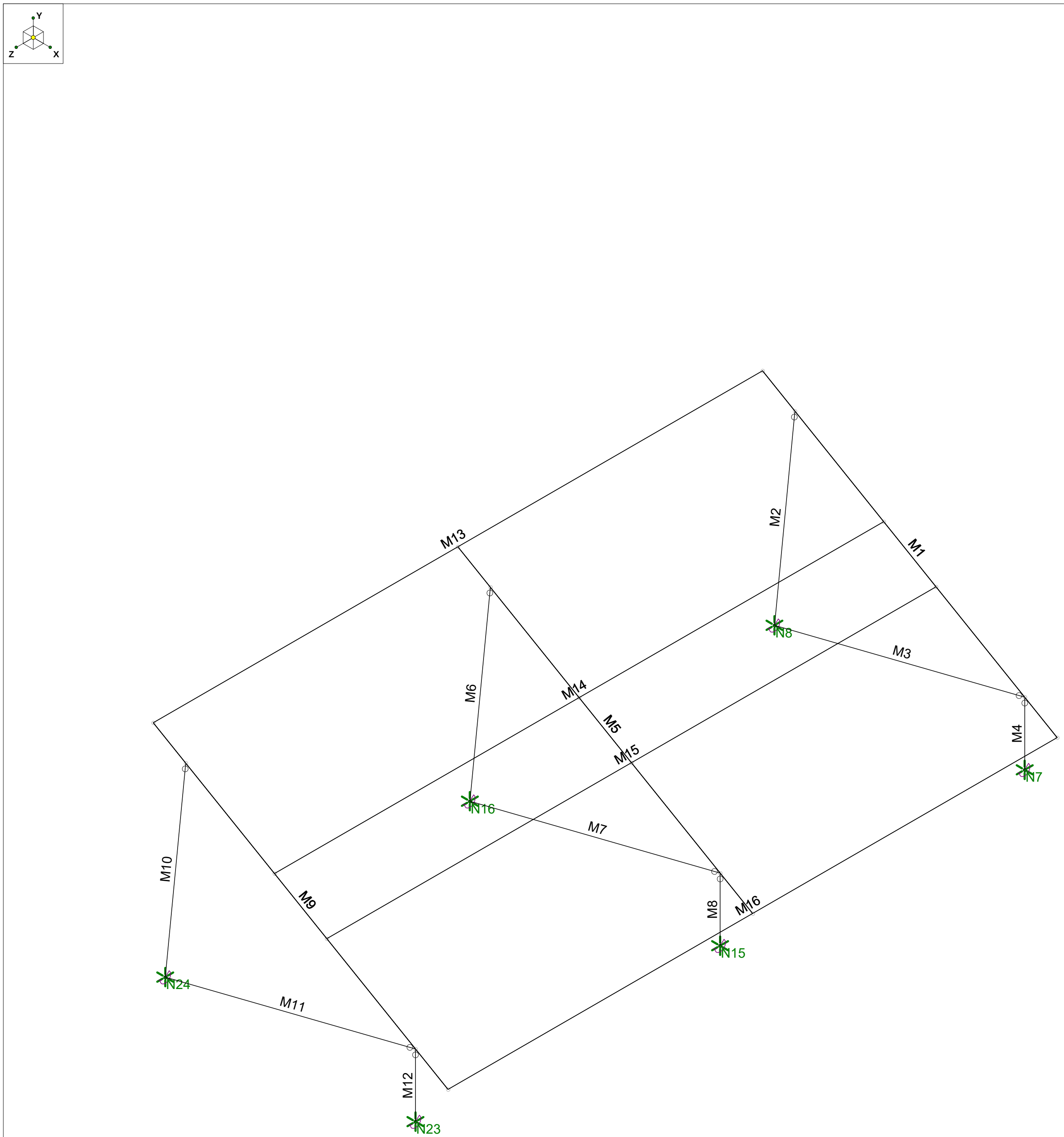


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

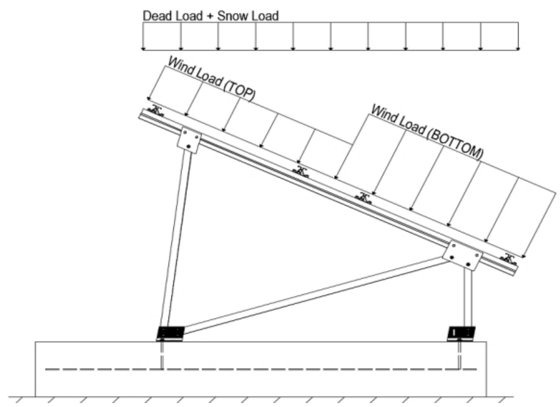
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 =	2000	mm	Height =	1900	mm
Width =	1050	mm	Width =	970	mm
Dead Load =	3.00	psf	Dead Load =	1.75	psf

Modules Per Row = 2
Module Tilt = 30°
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 = 16.49 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

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

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.150	(Pressure)
$Cf+_{BOTTOM}$	=	1.850	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.600	
$Cf-_{TOP, INNER PURLIN}$	=	-2.000	(Suction)
$Cf-_{BOTTOM}$	=	-1.100	

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}	*(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)*
0.56D + 1.3E ^{R}	
1.54D + 1.25E + 0.2S ^{O}	
0.56D + 1.25E ^{O}	

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}	*(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)*
1.238D + 0.875E ^{O}	
1.1785D + 0.65625E + 0.75S ^{O}	
0.362D + 0.875E ^{O}	

^{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.

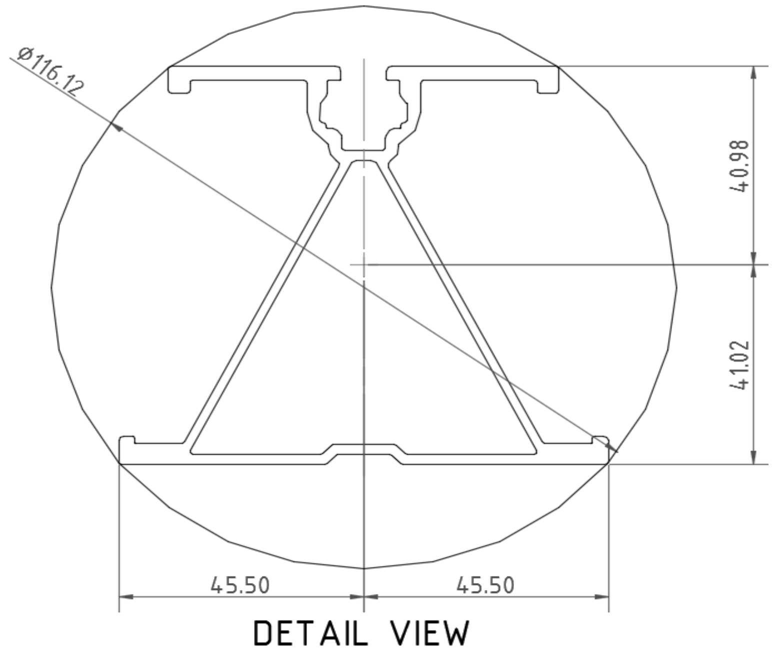
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	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).

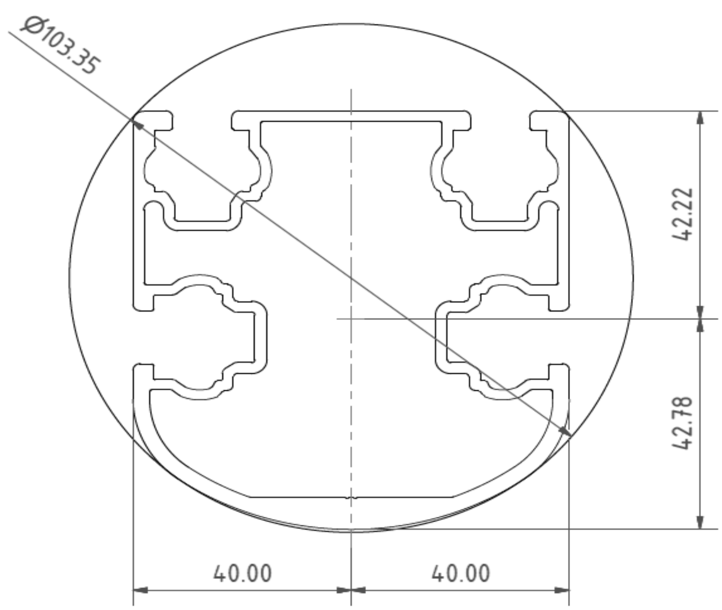
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	120	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.809	k-ft
M_z =	0.402	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	100%	



4.2 Girder Design

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

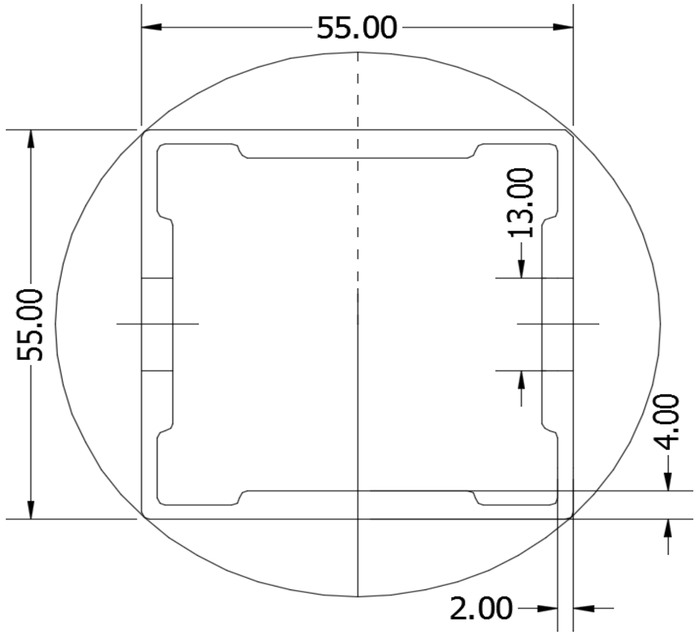
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.308	k-ft
M_z =	0.000	k-ft
P_n =	-0.888	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



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 =	2.883	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	

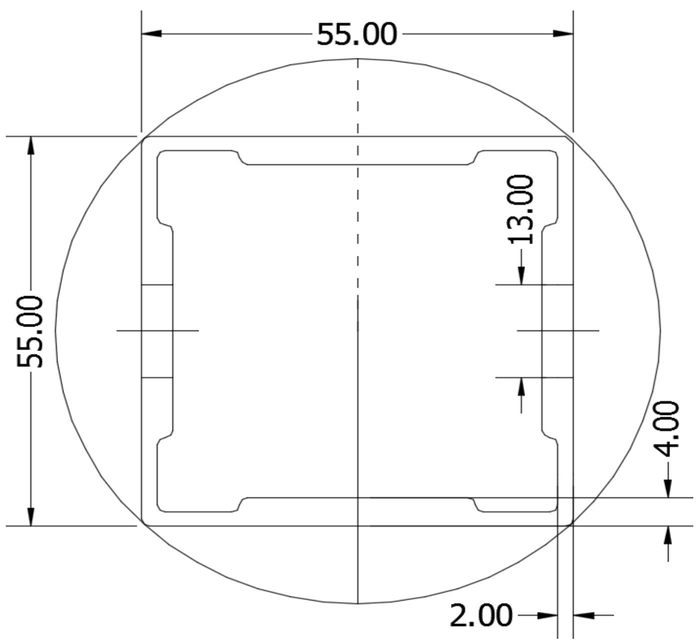


DETAIL VIEW

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 =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	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 =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.389	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	41%	

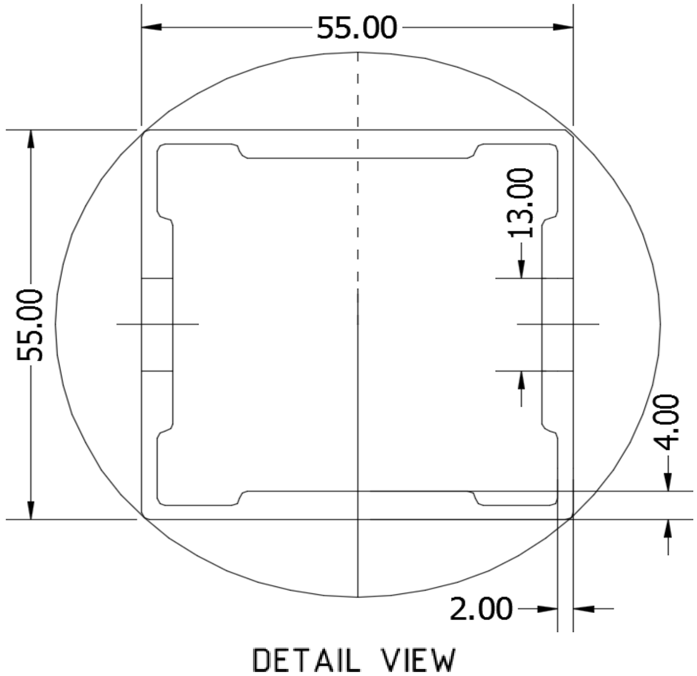


DETAIL VIEW

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 =	78.35	in
$\Phi F_{ty\ AXIAL}$ =	8.88	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.232	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.726	k
Utilization =	38%	



5. FOUNDATION DESIGN CALCULATIONS

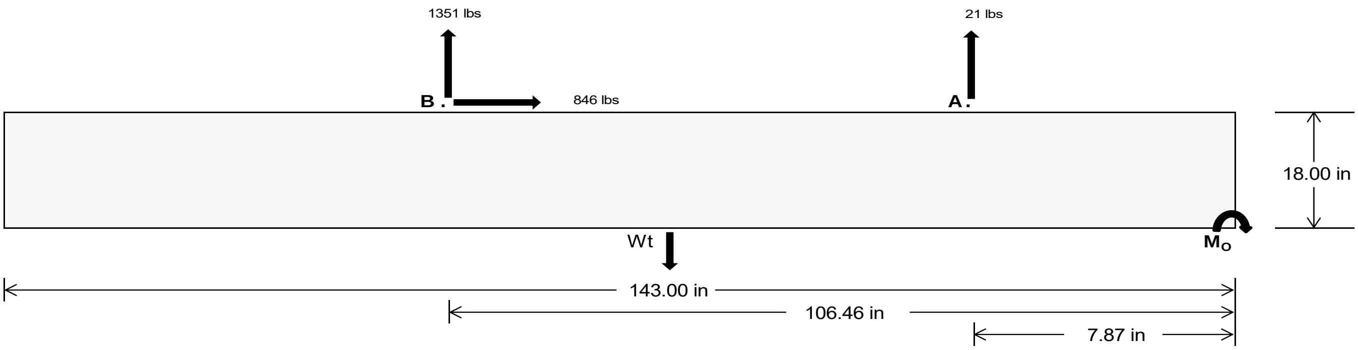
5.1 Helical Pile Foundations

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 =	116.24	5876.99	k
Compressive Load =	3748.48	4848.90	k
Lateral Load =	24.34	3669.35	k
Moment (Weak Axis) =	0.05	0.01	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC table 1806.2 (2012, 2015).



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

Footing Reinforcement
Use fiber reinforcing with (2) #5 rebar.

Overturning Check
M_O = 159225.8 in-lbs
Resisting Force Required = 2226.93 lbs
S.F. = 1.67
Weight Required = 3711.56 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.

Sliding
Force = 846.28 lbs
Friction = 0.4
Weight Required = 2115.69 lbs
Resisting Weight = 7559.64 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion
Sliding Force = 846.28 lbs
Cohesion = 130 psf
Area = 34.76 ft^2
Resisting = 3779.82 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in 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			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1398 lbs	1398 lbs	1398 lbs	1398 lbs	1211 lbs	1211 lbs	1211 lbs	1211 lbs	1811 lbs	1811 lbs	1811 lbs	1811 lbs	-42 lbs	-42 lbs	-42 lbs	-42 lbs
F_B	1394 lbs	1394 lbs	1394 lbs	1394 lbs	1987 lbs	1987 lbs	1987 lbs	1987 lbs	2391 lbs	2391 lbs	2391 lbs	2391 lbs	-2702 lbs	-2702 lbs	-2702 lbs	-2702 lbs
F_V	207 lbs	207 lbs	207 lbs	207 lbs	1546 lbs	1546 lbs	1546 lbs	1546 lbs	1295 lbs	1295 lbs	1295 lbs	1295 lbs	-1693 lbs	-1693 lbs	-1693 lbs	-1693 lbs
P_{total}	10352 lbs	10568 lbs	10784 lbs	11000 lbs	10757 lbs	10973 lbs	11189 lbs	11405 lbs	11762 lbs	11978 lbs	12194 lbs	12410 lbs	1791 lbs	1921 lbs	2051 lbs	2180 lbs
M	3663 lbs-ft	3663 lbs-ft	3663 lbs-ft	3663 lbs-ft	2954 lbs-ft	2954 lbs-ft	2954 lbs-ft	2954 lbs-ft	4578 lbs-ft	4578 lbs-ft	4578 lbs-ft	4578 lbs-ft	5108 lbs-ft	5108 lbs-ft	5108 lbs-ft	5108 lbs-ft
e	0.35 ft	0.35 ft	0.34 ft	0.33 ft	0.27 ft	0.27 ft	0.26 ft	0.26 ft	0.39 ft	0.38 ft	0.38 ft	0.37 ft	2.85 ft	2.66 ft	2.49 ft	2.34 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	244.8 psf	244.0 psf	243.3 psf	242.6 psf	266.7 psf	265.3 psf	264.1 psf	262.8 psf	272.1 psf	270.6 psf	269.1 psf	267.8 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	350.9 psf	347.2 psf	343.7 psf	340.4 psf	352.3 psf	348.6 psf	345.0 psf	341.7 psf	404.7 psf	399.5 psf	394.6 psf	389.9 psf	131.8 psf	129.4 psf	127.9 psf	126.9 psf

Maximum Bearing Pressure = 405 psf
Allowable Bearing Pressure = 1500 psf

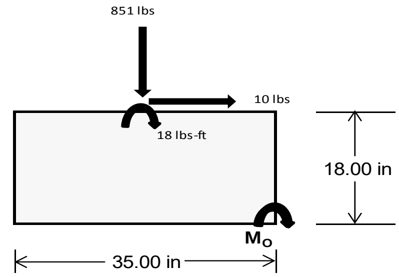
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1208.3 ft-lbs
Resisting Force Required = 828.53 lbs
S.F. = 1.67
Weight Required = 1380.88 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in 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	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	288 lbs	720 lbs	288 lbs	851 lbs	2344 lbs	851 lbs	84 lbs	211 lbs	84 lbs
F_V	3 lbs	0 lbs	3 lbs	10 lbs	0 lbs	10 lbs	1 lbs	0 lbs	1 lbs
P_{total}	9647 lbs	7560 lbs	9647 lbs	9760 lbs	7560 lbs	9760 lbs	2821 lbs	7560 lbs	2821 lbs
M	10 lbs-ft	0 lbs-ft	10 lbs-ft	33 lbs-ft	0 lbs-ft	33 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	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	276.9 psf	217.5 psf	276.9 psf	278.9 psf	217.5 psf	278.9 psf	81.0 psf	217.5 psf	81.0 psf
f_{max}	278.2 psf	217.5 psf	278.2 psf	282.8 psf	217.5 psf	282.8 psf	81.4 psf	217.5 psf	81.4 psf

Maximum Bearing Pressure = 283 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 143in long x 29in 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.

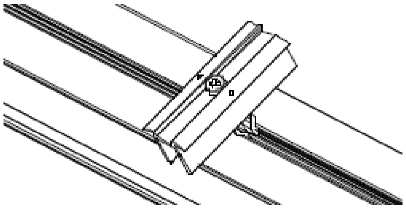
6. DESIGN OF JOINTS AND CONNECTIONS

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.

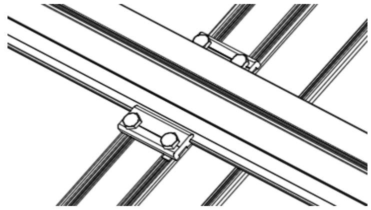
<u>Fastening of Modules to Purlins</u>

Maximum Uplifting Force =	0.592	k
Allowable Uplift =	1.214	k
Utilization =	49%	



<u>Fastening of Purlins to Girders</u>

Maximum Uplifting Force =	2.102	k
Allowable Uplift =	4.357	k
Utilization =	48%	



6.2 Strut Connections

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

<u>Front Strut</u>

Maximum Axial Load =	2.883	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	39%	

<u>Rear Strut</u>

Maximum Axial Load =	3.948	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	53%	

<u>Diagonal Strut</u>

Maximum Axial Load =	2.486	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	34%	

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.

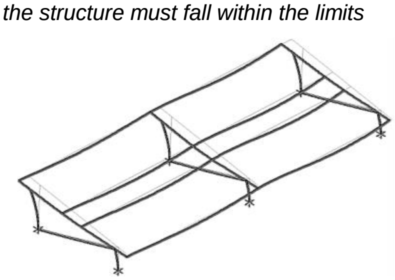
7. SEISMIC DESIGN

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} =	60.93	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.219	in
Max Drift, Δ_{MAX} =	0.066	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 = 120 in

J = 0.432

331.976

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

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= 27.4 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 120

J = 0.432

211.117

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 104.56 in
J = 1.08
179.85

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

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= 29.0 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 = 104.56
J = 1.08
190.335

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

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= 28.9

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

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

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.323 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

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

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7
λ = 0.57371
r = 0.81 in

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

$S1^*$ = 0.33515

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

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

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

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

3.4.10
Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:
3.4.14
L_b = 98.03 in
J = 0.942
152.985

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

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

Weak Axis:
3.4.14
L_b = 98.03
J = 0.942
152.985

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

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

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 = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 6.11 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 6.29 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 78.35 in

J = 0.942

122.273

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

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

$L_b =$ 78.35

J = 0.942

122.273

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

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 = 1.8125

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83375

φF_L= (φccFcy)/(λ²)

φF_L= 8.88278 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.88 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.14 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	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	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-46.866	-46.866	0	0
2	M14	Y	-46.866	-46.866	0	0
3	M15	Y	-46.866	-46.866	0	0
4	M16	Y	-46.866	-46.866	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	-78.344	-78.344	0	0
2	M14	y	-78.344	-78.344	0	0
3	M15	y	-126.031	-126.031	0	0
4	M16	y	-126.031	-126.031	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	177.125	177.125	0	0
2	M14	y	136.25	136.25	0	0
3	M15	y	74.938	74.938	0	0
4	M16	y	74.938	74.938	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	723.523	2	1162.435	2	.907	1	.004	1	0	1	0	1
2		min	-904.921	3	-1398.546	3	.05	15	0	15	0	1	0	1
3	N7	max	.046	9	1128.189	1	-.898	15	-.002	15	0	1	0	1
4		min	-.205	2	4.738	3	-18.723	1	-.036	1	0	1	0	1
5	N15	max	.01	9	2883.445	1	0	3	0	4	0	1	0	1
6		min	-2.219	2	-89.419	3	0	1	0	1	0	1	0	1
7	N16	max	2643.083	2	3729.925	2	0	3	0	12	0	1	0	1
8		min	-2822.578	3	-4520.76	3	0	14	0	14	0	1	0	1
9	N23	max	.046	9	1128.189	1	18.723	1	.036	1	0	1	0	1
10		min	-.205	2	4.738	3	.898	15	.002	15	0	1	0	1
11	N24	max	723.523	2	1162.435	2	-.05	15	0	15	0	1	0	1
12		min	-904.921	3	-1398.546	3	-.907	1	-.004	1	0	1	0	1
13	Totals:	max	4087.5	2	10794.667	1	0	2						
14		min	-4632.51	3	-7397.795	3	0	9						

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	108.07	1	427.854	1	-9.83	15	0	3	.304	1	0	1
2			min	5.05	15	-644.122	3	-211.501	1	-.015	2	.014	15	0	3
3		2	max	108.07	1	299.072	1	-7.547	15	0	3	.096	1	.61	3
4			min	5.05	15	-453.342	3	-162.278	1	-.015	2	.005	15	-.404	1
5		3	max	108.07	1	170.29	1	-5.265	15	0	3	0	3	1.007	3
6			min	5.05	15	-262.562	3	-113.054	1	-.015	2	-.057	1	-.665	1
7		4	max	108.07	1	41.508	1	-2.983	15	0	3	-.006	12	1.193	3
8			min	5.05	15	-71.783	3	-63.831	1	-.015	2	-.155	1	-.782	1
9		5	max	108.07	1	118.997	3	-.701	15	0	3	-.009	12	1.167	3
10			min	5.05	15	-87.274	1	-14.607	1	-.015	2	-.199	1	-.757	1
11		6	max	108.07	1	309.777	3	34.616	1	0	3	-.009	15	.929	3
12			min	5.05	15	-216.056	1	.788	12	-.015	2	-.188	1	-.588	1
13		7	max	108.07	1	500.556	3	83.839	1	0	3	-.006	15	.479	3
14			min	5.05	15	-344.838	1	3.107	12	-.015	2	-.122	1	-.277	1
15		8	max	108.07	1	691.336	3	133.063	1	0	3	.002	2	.178	1
16			min	5.05	15	-473.62	1	5.427	12	-.015	2	-.004	3	-.184	3
17		9	max	108.07	1	882.115	3	182.286	1	0	3	.174	1	.776	1
18			min	5.05	15	-602.402	1	7.746	12	-.015	2	.005	12	-1.058	3
19		10	max	108.07	1	731.183	1	-10.065	12	0	12	.404	1	1.517	1
20			min	5.05	15	-1072.895	3	-231.51	1	-.015	2	.015	12	-2.144	3
21		11	max	108.07	1	602.402	1	-7.746	12	.015	2	.174	1	.776	1
22			min	5.05	15	-882.115	3	-182.286	1	0	3	.005	12	-1.058	3
23		12	max	108.07	1	473.62	1	-5.427	12	.015	2	.002	2	.178	1
24			min	5.05	15	-691.336	3	-133.063	1	0	3	-.004	3	-.184	3
25		13	max	108.07	1	344.838	1	-3.107	12	.015	2	-.006	15	.479	3
26			min	5.05	15	-500.556	3	-83.839	1	0	3	-.122	1	-.277	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	108.07	1	216.056	1	-.788	12	.015	2	-.009	15	.929	3
28			min	5.05	15	-309.777	3	-34.616	1	0	3	-.188	1	-.588	1
29		15	max	108.07	1	87.274	1	14.607	1	.015	2	-.009	12	1.167	3
30			min	5.05	15	-118.997	3	.701	15	0	3	-.199	1	-.757	1
31		16	max	108.07	1	71.783	3	63.831	1	.015	2	-.006	12	1.193	3
32			min	5.05	15	-41.508	1	2.983	15	0	3	-.155	1	-.782	1
33		17	max	108.07	1	262.562	3	113.054	1	.015	2	0	3	1.007	3
34			min	5.05	15	-170.29	1	5.265	15	0	3	-.057	1	-.665	1
35		18	max	108.07	1	453.342	3	162.278	1	.015	2	.096	1	.61	3
36			min	5.05	15	-299.072	1	7.547	15	0	3	.005	15	-.404	1
37		19	max	108.07	1	644.122	3	211.501	1	.015	2	.304	1	0	1
38			min	5.05	15	-427.854	1	9.83	15	0	3	.014	15	0	3
39	M14	1	max	58.59	1	465.758	1	-10.181	15	.011	3	.354	1	0	1
40			min	2.746	15	-513.31	3	-219.068	1	-.013	2	.017	15	0	3
41		2	max	58.59	1	336.976	1	-7.899	15	.011	3	.138	1	.49	3
42			min	2.746	15	-367.947	3	-169.844	1	-.013	2	.006	15	-.446	1
43		3	max	58.59	1	208.194	1	-5.616	15	.011	3	.002	3	.818	3
44			min	2.746	15	-222.584	3	-120.621	1	-.013	2	-.024	1	-.749	1
45		4	max	58.59	1	79.412	1	-3.334	15	.011	3	-.005	12	.984	3
46			min	2.746	15	-77.221	3	-71.397	1	-.013	2	-.13	1	-.909	1
47		5	max	58.59	1	68.142	3	-1.052	15	.011	3	-.008	12	.989	3
48			min	2.746	15	-49.37	1	-22.174	1	-.013	2	-.182	1	-.925	1
49		6	max	58.59	1	213.505	3	27.05	1	.011	3	-.008	15	.833	3
50			min	2.746	15	-178.152	1	.436	12	-.013	2	-.179	1	-.799	1
51		7	max	58.59	1	358.868	3	76.273	1	.011	3	-.006	15	.515	3
52			min	2.746	15	-306.934	1	2.756	12	-.013	2	-.122	1	-.529	1
53		8	max	58.59	1	504.231	3	125.496	1	.011	3	0	10	.035	3
54			min	2.746	15	-435.715	1	5.075	12	-.013	2	-.01	1	-.13	2
55		9	max	58.59	1	649.594	3	174.72	1	.011	3	.157	1	.439	1
56			min	2.746	15	-564.497	1	7.395	12	-.013	2	.004	12	-.606	3
57		10	max	58.59	1	693.279	1	-9.714	12	.011	3	.378	1	1.138	1
58			min	2.746	15	-794.957	3	-223.943	1	-.013	2	.014	12	-1.408	3
59		11	max	58.59	1	564.497	1	-7.395	12	.013	2	.157	1	.439	1
60			min	2.746	15	-649.594	3	-174.72	1	-.011	3	.004	12	-.606	3
61		12	max	58.59	1	435.715	1	-5.075	12	.013	2	0	10	.035	3
62			min	2.746	15	-504.231	3	-125.496	1	-.011	3	-.01	1	-.13	2
63		13	max	58.59	1	306.934	1	-2.756	12	.013	2	-.006	15	.515	3
64			min	2.746	15	-358.868	3	-76.273	1	-.011	3	-.122	1	-.529	1
65		14	max	58.59	1	178.152	1	-.436	12	.013	2	-.008	15	.833	3
66			min	2.746	15	-213.505	3	-27.05	1	-.011	3	-.179	1	-.799	1
67		15	max	58.59	1	49.37	1	22.174	1	.013	2	-.008	12	.989	3
68			min	2.746	15	-68.142	3	1.052	15	-.011	3	-.182	1	-.925	1
69		16	max	58.59	1	77.221	3	71.397	1	.013	2	-.005	12	.984	3
70			min	2.746	15	-79.412	1	3.334	15	-.011	3	-.13	1	-.909	1
71		17	max	58.59	1	222.584	3	120.621	1	.013	2	.002	3	.818	3
72			min	2.746	15	-208.194	1	5.616	15	-.011	3	-.024	1	-.749	1
73		18	max	58.59	1	367.947	3	169.844	1	.013	2	.138	1	.49	3
74			min	2.746	15	-336.976	1	7.899	15	-.011	3	.006	15	-.446	1
75		19	max	58.59	1	513.31	3	219.068	1	.013	2	.354	1	0	1
76			min	2.746	15	-465.758	1	10.181	15	-.011	3	.017	15	0	3
77	M15	1	max	-2.947	15	625.02	2	-10.176	15	.014	2	.353	1	0	2
78			min	-62.846	1	-283.776	3	-218.993	1	-.009	3	.016	15	0	3
79		2	max	-2.947	15	449.335	2	-7.894	15	.014	2	.137	1	.272	3
80			min	-62.846	1	-206.538	3	-169.77	1	-.009	3	.006	15	-.597	2
81		3	max	-2.947	15	273.649	2	-5.611	15	.014	2	.002	3	.459	3
82			min	-62.846	1	-129.299	3	-120.547	1	-.009	3	-.024	1	-.999	2
83		4	max	-2.947	15	97.964	2	-3.329	15	.014	2	-.005	12	.56	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	-62.846	1	-52.061	3	-71.323	1	-.009	3	-.131	1	-1.205	2
85		5	max	-2.947	15	25.178	3	-1.047	15	.014	2	-.008	12	.575	3
86			min	-62.846	1	-77.721	2	-22.1	1	-.009	3	-.182	1	-1.216	2
87		6	max	-2.947	15	102.416	3	27.124	1	.014	2	-.008	15	.504	3
88			min	-62.846	1	-253.407	2	.511	12	-.009	3	-.18	1	-1.032	2
89		7	max	-2.947	15	179.655	3	76.347	1	.014	2	-.006	15	.347	3
90			min	-62.846	1	-429.092	2	2.83	12	-.009	3	-.122	1	-.653	2
91		8	max	-2.947	15	256.893	3	125.571	1	.014	2	0	10	.105	3
92			min	-62.846	1	-604.778	2	5.149	12	-.009	3	-.01	1	-.091	1
93		9	max	-2.947	15	334.132	3	174.794	1	.014	2	.157	1	.691	2
94			min	-62.846	1	-780.463	2	7.469	12	-.009	3	.004	12	-.224	3
95		10	max	-2.947	15	956.148	2	-9.788	12	.014	2	.378	1	1.656	2
96			min	-62.846	1	-411.37	3	-224.017	1	-.009	3	.014	12	-.638	3
97		11	max	-2.947	15	780.463	2	-7.469	12	.009	3	.157	1	.691	2
98			min	-62.846	1	-334.132	3	-174.794	1	-.014	2	.004	12	-.224	3
99		12	max	-2.947	15	604.778	2	-5.149	12	.009	3	0	10	.105	3
100			min	-62.846	1	-256.893	3	-125.571	1	-.014	2	-.01	1	-.091	1
101		13	max	-2.947	15	429.092	2	-2.83	12	.009	3	-.006	15	.347	3
102			min	-62.846	1	-179.655	3	-76.347	1	-.014	2	-.122	1	-.653	2
103		14	max	-2.947	15	253.407	2	-.511	12	.009	3	-.008	15	.504	3
104			min	-62.846	1	-102.416	3	-27.124	1	-.014	2	-.18	1	-1.032	2
105		15	max	-2.947	15	77.721	2	22.1	1	.009	3	-.008	12	.575	3
106			min	-62.846	1	-25.178	3	1.047	15	-.014	2	-.182	1	-1.216	2
107		16	max	-2.947	15	52.061	3	71.323	1	.009	3	-.005	12	.56	3
108			min	-62.846	1	-97.964	2	3.329	15	-.014	2	-.131	1	-1.205	2
109		17	max	-2.947	15	129.299	3	120.547	1	.009	3	.002	3	.459	3
110			min	-62.846	1	-273.649	2	5.611	15	-.014	2	-.024	1	-.999	2
111		18	max	-2.947	15	206.538	3	169.77	1	.009	3	.137	1	.272	3
112			min	-62.846	1	-449.335	2	7.894	15	-.014	2	.006	15	-.597	2
113		19	max	-2.947	15	283.776	3	218.993	1	.009	3	.353	1	0	2
114			min	-62.846	1	-625.02	2	10.176	15	-.014	2	.016	15	0	3
115	M16	1	max	-5.698	15	587.27	2	-9.847	15	.012	1	.307	1	0	2
116			min	-121.63	1	-254.408	3	-211.992	1	-.012	3	.014	15	0	3
117		2	max	-5.698	15	411.584	2	-7.565	15	.012	1	.098	1	.24	3
118			min	-121.63	1	-177.17	3	-162.769	1	-.012	3	.005	15	-.555	2
119		3	max	-5.698	15	235.899	2	-5.283	15	.012	1	-.001	12	.394	3
120			min	-121.63	1	-99.931	3	-113.545	1	-.012	3	-.055	1	-.915	2
121		4	max	-5.698	15	60.213	2	-3.001	15	.012	1	-.006	12	.462	3
122			min	-121.63	1	-22.693	3	-64.322	1	-.012	3	-.154	1	-1.079	2
123		5	max	-5.698	15	54.546	3	-.719	15	.012	1	-.009	12	.444	3
124			min	-121.63	1	-115.472	2	-15.099	1	-.012	3	-.198	1	-1.048	2
125		6	max	-5.698	15	131.784	3	34.125	1	.012	1	-.009	15	.341	3
126			min	-121.63	1	-291.157	2	1.009	12	-.012	3	-.188	1	-.823	2
127		7	max	-5.698	15	209.023	3	83.348	1	.012	1	-.006	15	.151	3
128			min	-121.63	1	-466.843	2	3.328	12	-.012	3	-.122	1	-.401	2
129		8	max	-5.698	15	286.261	3	132.572	1	.012	1	.001	10	.215	2
130			min	-121.63	1	-642.528	2	5.647	12	-.012	3	-.003	3	-.124	3
131		9	max	-5.698	15	363.5	3	181.795	1	.012	1	.172	1	1.026	2
132			min	-121.63	1	-818.214	2	7.967	12	-.012	3	.006	12	-.485	3
133		10	max	-5.698	15	993.899	2	-10.286	12	.012	1	.402	1	2.033	2
134			min	-121.63	1	-440.738	3	-231.019	1	-.012	3	.016	12	-.932	3
135		11	max	-5.698	15	818.214	2	-7.967	12	.012	3	.172	1	1.026	2
136			min	-121.63	1	-363.5	3	-181.795	1	-.012	1	.006	12	-.485	3
137		12	max	-5.698	15	642.528	2	-5.647	12	.012	3	.001	10	.215	2
138			min	-121.63	1	-286.261	3	-132.572	1	-.012	1	-.003	3	-.124	3
139		13	max	-5.698	15	466.843	2	-3.328	12	.012	3	-.006	15	.151	3
140			min	-121.63	1	-209.023	3	-83.348	1	-.012	1	-.122	1	-.401	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-5.698	15	291.157	2	-1.009	12	.012	3	-.009	15	.341	3
142			min	-121.63	1	-131.784	3	-34.125	1	-.012	1	-.188	1	-.823	2
143		15	max	-5.698	15	115.472	2	15.099	1	.012	3	-.009	12	.444	3
144			min	-121.63	1	-54.546	3	.719	15	-.012	1	-.198	1	-1.048	2
145		16	max	-5.698	15	22.693	3	64.322	1	.012	3	-.006	12	.462	3
146			min	-121.63	1	-60.213	2	3.001	15	-.012	1	-.154	1	-1.079	2
147		17	max	-5.698	15	99.931	3	113.545	1	.012	3	-.001	12	.394	3
148			min	-121.63	1	-235.899	2	5.283	15	-.012	1	-.055	1	-.915	2
149		18	max	-5.698	15	177.17	3	162.769	1	.012	3	.098	1	.24	3
150			min	-121.63	1	-411.584	2	7.565	15	-.012	1	.005	15	-.555	2
151		19	max	-5.698	15	254.408	3	211.992	1	.012	3	.307	1	0	2
152			min	-121.63	1	-587.27	2	9.847	15	-.012	1	.014	15	0	3
153	M2	1	max	1017.512	1	2.022	4	.605	1	0	5	0	3	0	1
154			min	-1221.565	3	.476	15	.028	15	0	1	0	1	0	1
155		2	max	1018.042	1	1.951	4	.605	1	0	5	0	1	0	15
156			min	-1221.168	3	.459	15	.028	15	0	1	0	15	0	4
157		3	max	1018.571	1	1.88	4	.605	1	0	5	0	1	0	15
158			min	-1220.771	3	.442	15	.028	15	0	1	0	15	-.001	4
159		4	max	1019.1	1	1.809	4	.605	1	0	5	0	1	0	15
160			min	-1220.374	3	.426	15	.028	15	0	1	0	15	-.002	4
161		5	max	1019.63	1	1.738	4	.605	1	0	5	0	1	0	15
162			min	-1219.977	3	.409	15	.028	15	0	1	0	15	-.003	4
163		6	max	1020.159	1	1.667	4	.605	1	0	5	.001	1	0	15
164			min	-1219.581	3	.392	15	.028	15	0	1	0	15	-.003	4
165		7	max	1020.688	1	1.596	4	.605	1	0	5	.001	1	0	15
166			min	-1219.184	3	.375	15	.028	15	0	1	0	15	-.004	4
167		8	max	1021.217	1	1.525	4	.605	1	0	5	.002	1	-.001	15
168			min	-1218.787	3	.359	15	.028	15	0	1	0	15	-.004	4
169		9	max	1021.747	1	1.454	4	.605	1	0	5	.002	1	-.001	15
170			min	-1218.39	3	.342	15	.028	15	0	1	0	15	-.005	4
171		10	max	1022.276	1	1.383	4	.605	1	0	5	.002	1	-.001	15
172			min	-1217.993	3	.325	15	.028	15	0	1	0	15	-.005	4
173		11	max	1022.805	1	1.312	4	.605	1	0	5	.002	1	-.001	15
174			min	-1217.596	3	.309	15	.028	15	0	1	0	15	-.006	4
175		12	max	1023.335	1	1.241	4	.605	1	0	5	.002	1	-.002	15
176			min	-1217.199	3	.292	15	.028	15	0	1	0	15	-.006	4
177		13	max	1023.864	1	1.17	4	.605	1	0	5	.003	1	-.002	15
178			min	-1216.802	3	.275	15	.028	15	0	1	0	15	-.007	4
179		14	max	1024.393	1	1.099	4	.605	1	0	5	.003	1	-.002	15
180			min	-1216.405	3	.259	15	.028	15	0	1	0	15	-.007	4
181		15	max	1024.922	1	1.028	4	.605	1	0	5	.003	1	-.002	15
182			min	-1216.008	3	.242	15	.028	15	0	1	0	15	-.008	4
183		16	max	1025.452	1	.957	4	.605	1	0	5	.003	1	-.002	15
184			min	-1215.611	3	.222	12	.028	15	0	1	0	15	-.008	4
185		17	max	1025.981	1	.886	4	.605	1	0	5	.003	1	-.002	15
186			min	-1215.214	3	.194	12	.028	15	0	1	0	15	-.008	4
187		18	max	1026.51	1	.817	2	.605	1	0	5	.004	1	-.002	15
188			min	-1214.817	3	.166	12	.028	15	0	1	0	15	-.009	4
189		19	max	1027.04	1	.762	2	.605	1	0	5	.004	1	-.002	15
190			min	-1214.42	3	.139	12	.028	15	0	1	0	15	-.009	4
191	M3	1	max	639.39	2	8.874	4	.472	1	0	15	0	1	.009	4
192			min	-801.565	3	2.086	15	.022	15	0	1	0	15	.002	15
193		2	max	639.219	2	8.005	4	.472	1	0	15	0	1	.005	2
194			min	-801.693	3	1.882	15	.022	15	0	1	0	15	.001	12
195		3	max	639.049	2	7.136	4	.472	1	0	15	0	1	.002	2
196			min	-801.821	3	1.678	15	.022	15	0	1	0	15	0	3
197		4	max	638.878	2	6.267	4	.472	1	0	15	.001	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-801.948	3	1.473	15	.022	15	0	1	0	15	-.002	3
199		5	max	638.708	2	5.398	4	.472	1	0	15	.001	1	-.001	15
200			min	-802.076	3	1.269	15	.022	15	0	1	0	15	-.005	4
201		6	max	638.538	2	4.53	4	.472	1	0	15	.002	1	-.002	15
202			min	-802.204	3	1.065	15	.022	15	0	1	0	15	-.007	4
203		7	max	638.367	2	3.661	4	.472	1	0	15	.002	1	-.002	15
204			min	-802.332	3	.861	15	.022	15	0	1	0	15	-.009	4
205		8	max	638.197	2	2.792	4	.472	1	0	15	.002	1	-.002	15
206			min	-802.459	3	.656	15	.022	15	0	1	0	15	-.01	4
207		9	max	638.027	2	1.923	4	.472	1	0	15	.002	1	-.003	15
208			min	-802.587	3	.452	15	.022	15	0	1	0	15	-.011	4
209		10	max	637.856	2	1.054	4	.472	1	0	15	.002	1	-.003	15
210			min	-802.715	3	.248	15	.022	15	0	1	0	15	-.012	4
211		11	max	637.686	2	.283	2	.472	1	0	15	.003	1	-.003	15
212			min	-802.843	3	-.084	3	.022	15	0	1	0	15	-.012	4
213		12	max	637.516	2	-.16	15	.472	1	0	15	.003	1	-.003	15
214			min	-802.97	3	-.684	4	.022	15	0	1	0	15	-.012	4
215		13	max	637.345	2	-.365	15	.472	1	0	15	.003	1	-.003	15
216			min	-803.098	3	-1.553	4	.022	15	0	1	0	15	-.012	4
217		14	max	637.175	2	-.569	15	.472	1	0	15	.003	1	-.003	15
218			min	-803.226	3	-2.422	4	.022	15	0	1	0	15	-.011	4
219		15	max	637.005	2	-.773	15	.472	1	0	15	.004	1	-.002	15
220			min	-803.354	3	-3.29	4	.022	15	0	1	0	15	-.009	4
221		16	max	636.834	2	-.977	15	.472	1	0	15	.004	1	-.002	15
222			min	-803.482	3	-4.159	4	.022	15	0	1	0	15	-.008	4
223		17	max	636.664	2	-1.182	15	.472	1	0	15	.004	1	-.001	15
224			min	-803.609	3	-5.028	4	.022	15	0	1	0	15	-.006	4
225		18	max	636.494	2	-1.386	15	.472	1	0	15	.004	1	0	15
226			min	-803.737	3	-5.897	4	.022	15	0	1	0	15	-.003	4
227		19	max	636.323	2	-1.59	15	.472	1	0	15	.004	1	0	1
228			min	-803.865	3	-6.766	4	.022	15	0	1	0	15	0	1
229	M4	1	max	1125.123	1	0	1	-.899	15	0	1	.004	1	0	1
230			min	2.438	3	0	1	-19.319	1	0	1	0	15	0	1
231		2	max	1125.293	1	0	1	-.899	15	0	1	.001	1	0	1
232			min	2.566	3	0	1	-19.319	1	0	1	0	15	0	1
233		3	max	1125.464	1	0	1	-.899	15	0	1	0	15	0	1
234			min	2.694	3	0	1	-19.319	1	0	1	0	1	0	1
235		4	max	1125.634	1	0	1	-.899	15	0	1	0	15	0	1
236			min	2.822	3	0	1	-19.319	1	0	1	-.003	1	0	1
237		5	max	1125.804	1	0	1	-.899	15	0	1	0	15	0	1
238			min	2.949	3	0	1	-19.319	1	0	1	-.005	1	0	1
239		6	max	1125.975	1	0	1	-.899	15	0	1	0	15	0	1
240			min	3.077	3	0	1	-19.319	1	0	1	-.008	1	0	1
241		7	max	1126.145	1	0	1	-.899	15	0	1	0	15	0	1
242			min	3.205	3	0	1	-19.319	1	0	1	-.01	1	0	1
243		8	max	1126.315	1	0	1	-.899	15	0	1	0	15	0	1
244			min	3.333	3	0	1	-19.319	1	0	1	-.012	1	0	1
245		9	max	1126.486	1	0	1	-.899	15	0	1	0	15	0	1
246			min	3.46	3	0	1	-19.319	1	0	1	-.014	1	0	1
247		10	max	1126.656	1	0	1	-.899	15	0	1	0	15	0	1
248			min	3.588	3	0	1	-19.319	1	0	1	-.016	1	0	1
249		11	max	1126.826	1	0	1	-.899	15	0	1	0	15	0	1
250			min	3.716	3	0	1	-19.319	1	0	1	-.019	1	0	1
251		12	max	1126.997	1	0	1	-.899	15	0	1	0	15	0	1
252			min	3.844	3	0	1	-19.319	1	0	1	-.021	1	0	1
253		13	max	1127.167	1	0	1	-.899	15	0	1	-.001	15	0	1
254			min	3.971	3	0	1	-19.319	1	0	1	-.023	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	1127.337	1	0	1	-.899	15	0	1	-.001	15	0	1
256			min	4.099	3	0	1	-19.319	1	0	1	-.025	1	0	1
257		15	max	1127.508	1	0	1	-.899	15	0	1	-.001	15	0	1
258			min	4.227	3	0	1	-19.319	1	0	1	-.028	1	0	1
259		16	max	1127.678	1	0	1	-.899	15	0	1	-.001	15	0	1
260			min	4.355	3	0	1	-19.319	1	0	1	-.03	1	0	1
261		17	max	1127.848	1	0	1	-.899	15	0	1	-.001	15	0	1
262			min	4.482	3	0	1	-19.319	1	0	1	-.032	1	0	1
263		18	max	1128.019	1	0	1	-.899	15	0	1	-.002	15	0	1
264			min	4.61	3	0	1	-19.319	1	0	1	-.034	1	0	1
265		19	max	1128.189	1	0	1	-.899	15	0	1	-.002	15	0	1
266			min	4.738	3	0	1	-19.319	1	0	1	-.036	1	0	1
267	M6	1	max	3222.393	1	2.223	2	0	1	0	1	0	1	0	1
268			min	-3948.092	3	.311	12	0	1	0	1	0	1	0	1
269		2	max	3222.922	1	2.168	2	0	1	0	1	0	1	0	12
270			min	-3947.696	3	.283	12	0	1	0	1	0	1	0	2
271		3	max	3223.452	1	2.112	2	0	1	0	1	0	1	0	12
272			min	-3947.299	3	.256	12	0	1	0	1	0	1	-.002	2
273		4	max	3223.981	1	2.057	2	0	1	0	1	0	1	0	12
274			min	-3946.902	3	.228	12	0	1	0	1	0	1	-.002	2
275		5	max	3224.51	1	2.001	2	0	1	0	1	0	1	0	12
276			min	-3946.505	3	.2	12	0	1	0	1	0	1	-.003	2
277		6	max	3225.039	1	1.946	2	0	1	0	1	0	1	0	12
278			min	-3946.108	3	.173	12	0	1	0	1	0	1	-.004	2
279		7	max	3225.569	1	1.891	2	0	1	0	1	0	1	0	12
280			min	-3945.711	3	.137	3	0	1	0	1	0	1	-.004	2
281		8	max	3226.098	1	1.835	2	0	1	0	1	0	1	0	12
282			min	-3945.314	3	.096	3	0	1	0	1	0	1	-.005	2
283		9	max	3226.627	1	1.78	2	0	1	0	1	0	1	0	12
284			min	-3944.917	3	.054	3	0	1	0	1	0	1	-.006	2
285		10	max	3227.157	1	1.725	2	0	1	0	1	0	1	0	12
286			min	-3944.52	3	.013	3	0	1	0	1	0	1	-.006	2
287		11	max	3227.686	1	1.669	2	0	1	0	1	0	1	0	12
288			min	-3944.123	3	-.029	3	0	1	0	1	0	1	-.007	2
289		12	max	3228.215	1	1.614	2	0	1	0	1	0	1	0	3
290			min	-3943.726	3	-.07	3	0	1	0	1	0	1	-.008	2
291		13	max	3228.745	1	1.559	2	0	1	0	1	0	1	0	3
292			min	-3943.329	3	-.112	3	0	1	0	1	0	1	-.008	2
293		14	max	3229.274	1	1.503	2	0	1	0	1	0	1	0	3
294			min	-3942.932	3	-.153	3	0	1	0	1	0	1	-.009	2
295		15	max	3229.803	1	1.448	2	0	1	0	1	0	1	0	3
296			min	-3942.535	3	-.195	3	0	1	0	1	0	1	-.009	2
297		16	max	3230.332	1	1.393	2	0	1	0	1	0	1	0	3
298			min	-3942.138	3	-.236	3	0	1	0	1	0	1	-.01	2
299		17	max	3230.862	1	1.337	2	0	1	0	1	0	1	0	3
300			min	-3941.741	3	-.278	3	0	1	0	1	0	1	-.01	2
301		18	max	3231.391	1	1.282	2	0	1	0	1	0	1	0	3
302			min	-3941.344	3	-.319	3	0	1	0	1	0	1	-.011	2
303		19	max	3231.92	1	1.227	2	0	1	0	1	0	1	0	3
304			min	-3940.947	3	-.361	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2388.904	2	8.909	4	0	1	0	1	0	1	.011	2
306			min	-2483.887	3	2.091	15	0	1	0	1	0	1	0	3
307		2	max	2388.734	2	8.04	4	0	1	0	1	0	1	.008	2
308			min	-2484.015	3	1.887	15	0	1	0	1	0	1	-.002	3
309		3	max	2388.564	2	7.171	4	0	1	0	1	0	1	.005	2
310			min	-2484.142	3	1.683	15	0	1	0	1	0	1	-.004	3
311		4	max	2388.393	2	6.302	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	-2484.27	3	1.479	15	0	1	0	1	0	1	-.005	3
313		5	max	2388.223	2	5.433	4	0	1	0	1	0	1	0	2
314			min	-2484.398	3	1.274	15	0	1	0	1	0	1	-.007	3
315		6	max	2388.053	2	4.564	4	0	1	0	1	0	1	-.002	15
316			min	-2484.526	3	1.07	15	0	1	0	1	0	1	-.008	3
317		7	max	2387.882	2	3.695	4	0	1	0	1	0	1	-.002	15
318			min	-2484.653	3	.866	15	0	1	0	1	0	1	-.009	4
319		8	max	2387.712	2	2.826	4	0	1	0	1	0	1	-.002	15
320			min	-2484.781	3	.662	15	0	1	0	1	0	1	-.01	4
321		9	max	2387.542	2	1.992	2	0	1	0	1	0	1	-.003	15
322			min	-2484.909	3	.386	12	0	1	0	1	0	1	-.011	4
323		10	max	2387.371	2	1.315	2	0	1	0	1	0	1	-.003	15
324			min	-2485.037	3	.01	3	0	1	0	1	0	1	-.012	4
325		11	max	2387.201	2	.638	2	0	1	0	1	0	1	-.003	15
326			min	-2485.164	3	-.498	3	0	1	0	1	0	1	-.012	4
327		12	max	2387.031	2	-.039	2	0	1	0	1	0	1	-.003	15
328			min	-2485.292	3	-1.006	3	0	1	0	1	0	1	-.012	4
329		13	max	2386.86	2	-.359	15	0	1	0	1	0	1	-.003	15
330			min	-2485.42	3	-1.518	4	0	1	0	1	0	1	-.012	4
331		14	max	2386.69	2	-.564	15	0	1	0	1	0	1	-.003	15
332			min	-2485.548	3	-2.387	4	0	1	0	1	0	1	-.011	4
333		15	max	2386.52	2	-.768	15	0	1	0	1	0	1	-.002	15
334			min	-2485.675	3	-3.256	4	0	1	0	1	0	1	-.009	4
335		16	max	2386.349	2	-.972	15	0	1	0	1	0	1	-.002	15
336			min	-2485.803	3	-4.125	4	0	1	0	1	0	1	-.008	4
337		17	max	2386.179	2	-1.176	15	0	1	0	1	0	1	-.001	15
338			min	-2485.931	3	-4.994	4	0	1	0	1	0	1	-.006	4
339		18	max	2386.009	2	-1.381	15	0	1	0	1	0	1	0	15
340			min	-2486.059	3	-5.863	4	0	1	0	1	0	1	-.003	4
341		19	max	2385.838	2	-1.585	15	0	1	0	1	0	1	0	1
342			min	-2486.186	3	-6.732	4	0	1	0	1	0	1	0	1
343	M8	1	max	2880.379	1	0	1	0	1	0	1	0	1	0	1
344			min	-91.719	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2880.549	1	0	1	0	1	0	1	0	1	0	1
346			min	-91.591	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2880.72	1	0	1	0	1	0	1	0	1	0	1
348			min	-91.463	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2880.89	1	0	1	0	1	0	1	0	1	0	1
350			min	-91.335	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2881.06	1	0	1	0	1	0	1	0	1	0	1
352			min	-91.207	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2881.231	1	0	1	0	1	0	1	0	1	0	1
354			min	-91.08	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2881.401	1	0	1	0	1	0	1	0	1	0	1
356			min	-90.952	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2881.571	1	0	1	0	1	0	1	0	1	0	1
358			min	-90.824	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2881.742	1	0	1	0	1	0	1	0	1	0	1
360			min	-90.696	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2881.912	1	0	1	0	1	0	1	0	1	0	1
362			min	-90.569	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2882.082	1	0	1	0	1	0	1	0	1	0	1
364			min	-90.441	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2882.253	1	0	1	0	1	0	1	0	1	0	1
366			min	-90.313	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2882.423	1	0	1	0	1	0	1	0	1	0	1
368			min	-90.185	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	2882.593	1	0	1	0	1	0	1	0	1	0	1
370			min	-90.058	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2882.764	1	0	1	0	1	0	1	0	1	0	1
372			min	-89.93	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2882.934	1	0	1	0	1	0	1	0	1	0	1
374			min	-89.802	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2883.104	1	0	1	0	1	0	1	0	1	0	1
376			min	-89.674	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2883.275	1	0	1	0	1	0	1	0	1	0	1
378			min	-89.547	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2883.445	1	0	1	0	1	0	1	0	1	0	1
380			min	-89.419	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1017.512	1	2.022	4	-.028	15	0	1	0	1	0	1
382			min	-1221.565	3	.476	15	-.605	1	0	5	0	3	0	1
383		2	max	1018.042	1	1.951	4	-.028	15	0	1	0	15	0	15
384			min	-1221.168	3	.459	15	-.605	1	0	5	0	1	0	4
385		3	max	1018.571	1	1.88	4	-.028	15	0	1	0	15	0	15
386			min	-1220.771	3	.442	15	-.605	1	0	5	0	1	-.001	4
387		4	max	1019.1	1	1.809	4	-.028	15	0	1	0	15	0	15
388			min	-1220.374	3	.426	15	-.605	1	0	5	0	1	-.002	4
389		5	max	1019.63	1	1.738	4	-.028	15	0	1	0	15	0	15
390			min	-1219.977	3	.409	15	-.605	1	0	5	0	1	-.003	4
391		6	max	1020.159	1	1.667	4	-.028	15	0	1	0	15	0	15
392			min	-1219.581	3	.392	15	-.605	1	0	5	-.001	1	-.003	4
393		7	max	1020.688	1	1.596	4	-.028	15	0	1	0	15	0	15
394			min	-1219.184	3	.375	15	-.605	1	0	5	-.001	1	-.004	4
395		8	max	1021.217	1	1.525	4	-.028	15	0	1	0	15	-.001	15
396			min	-1218.787	3	.359	15	-.605	1	0	5	-.002	1	-.004	4
397		9	max	1021.747	1	1.454	4	-.028	15	0	1	0	15	-.001	15
398			min	-1218.39	3	.342	15	-.605	1	0	5	-.002	1	-.005	4
399		10	max	1022.276	1	1.383	4	-.028	15	0	1	0	15	-.001	15
400			min	-1217.993	3	.325	15	-.605	1	0	5	-.002	1	-.005	4
401		11	max	1022.805	1	1.312	4	-.028	15	0	1	0	15	-.001	15
402			min	-1217.596	3	.309	15	-.605	1	0	5	-.002	1	-.006	4
403		12	max	1023.335	1	1.241	4	-.028	15	0	1	0	15	-.002	15
404			min	-1217.199	3	.292	15	-.605	1	0	5	-.002	1	-.006	4
405		13	max	1023.864	1	1.17	4	-.028	15	0	1	0	15	-.002	15
406			min	-1216.802	3	.275	15	-.605	1	0	5	-.003	1	-.007	4
407		14	max	1024.393	1	1.099	4	-.028	15	0	1	0	15	-.002	15
408			min	-1216.405	3	.259	15	-.605	1	0	5	-.003	1	-.007	4
409		15	max	1024.922	1	1.028	4	-.028	15	0	1	0	15	-.002	15
410			min	-1216.008	3	.242	15	-.605	1	0	5	-.003	1	-.008	4
411		16	max	1025.452	1	.957	4	-.028	15	0	1	0	15	-.002	15
412			min	-1215.611	3	.222	12	-.605	1	0	5	-.003	1	-.008	4
413		17	max	1025.981	1	.886	4	-.028	15	0	1	0	15	-.002	15
414			min	-1215.214	3	.194	12	-.605	1	0	5	-.003	1	-.008	4
415		18	max	1026.51	1	.817	2	-.028	15	0	1	0	15	-.002	15
416			min	-1214.817	3	.166	12	-.605	1	0	5	-.004	1	-.009	4
417		19	max	1027.04	1	.762	2	-.028	15	0	1	0	15	-.002	15
418			min	-1214.42	3	.139	12	-.605	1	0	5	-.004	1	-.009	4
419	M11	1	max	639.39	2	8.874	4	-.022	15	0	1	0	15	.009	4
420			min	-801.565	3	2.086	15	-.472	1	0	15	0	1	.002	15
421		2	max	639.219	2	8.005	4	-.022	15	0	1	0	15	.005	2
422			min	-801.693	3	1.882	15	-.472	1	0	15	0	1	.001	12
423		3	max	639.049	2	7.136	4	-.022	15	0	1	0	15	.002	2
424			min	-801.821	3	1.678	15	-.472	1	0	15	0	1	0	3
425		4	max	638.878	2	6.267	4	-.022	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-801.948	3	1.473	15	-.472	1	0	15	-.001	1	-.002	3
427		5	max	638.708	2	5.398	4	-.022	15	0	1	0	15	-.001	15
428			min	-802.076	3	1.269	15	-.472	1	0	15	-.001	1	-.005	4
429		6	max	638.538	2	4.53	4	-.022	15	0	1	0	15	-.002	15
430			min	-802.204	3	1.065	15	-.472	1	0	15	-.002	1	-.007	4
431		7	max	638.367	2	3.661	4	-.022	15	0	1	0	15	-.002	15
432			min	-802.332	3	.861	15	-.472	1	0	15	-.002	1	-.009	4
433		8	max	638.197	2	2.792	4	-.022	15	0	1	0	15	-.002	15
434			min	-802.459	3	.656	15	-.472	1	0	15	-.002	1	-.01	4
435		9	max	638.027	2	1.923	4	-.022	15	0	1	0	15	-.003	15
436			min	-802.587	3	.452	15	-.472	1	0	15	-.002	1	-.011	4
437		10	max	637.856	2	1.054	4	-.022	15	0	1	0	15	-.003	15
438			min	-802.715	3	.248	15	-.472	1	0	15	-.002	1	-.012	4
439		11	max	637.686	2	.283	2	-.022	15	0	1	0	15	-.003	15
440			min	-802.843	3	-.084	3	-.472	1	0	15	-.003	1	-.012	4
441		12	max	637.516	2	-.16	15	-.022	15	0	1	0	15	-.003	15
442			min	-802.97	3	-.684	4	-.472	1	0	15	-.003	1	-.012	4
443		13	max	637.345	2	-.365	15	-.022	15	0	1	0	15	-.003	15
444			min	-803.098	3	-1.553	4	-.472	1	0	15	-.003	1	-.012	4
445		14	max	637.175	2	-.569	15	-.022	15	0	1	0	15	-.003	15
446			min	-803.226	3	-2.422	4	-.472	1	0	15	-.003	1	-.011	4
447		15	max	637.005	2	-.773	15	-.022	15	0	1	0	15	-.002	15
448			min	-803.354	3	-3.29	4	-.472	1	0	15	-.004	1	-.009	4
449		16	max	636.834	2	-.977	15	-.022	15	0	1	0	15	-.002	15
450			min	-803.482	3	-4.159	4	-.472	1	0	15	-.004	1	-.008	4
451		17	max	636.664	2	-1.182	15	-.022	15	0	1	0	15	-.001	15
452			min	-803.609	3	-5.028	4	-.472	1	0	15	-.004	1	-.006	4
453		18	max	636.494	2	-1.386	15	-.022	15	0	1	0	15	0	15
454			min	-803.737	3	-5.897	4	-.472	1	0	15	-.004	1	-.003	4
455		19	max	636.323	2	-1.59	15	-.022	15	0	1	0	15	0	1
456			min	-803.865	3	-6.766	4	-.472	1	0	15	-.004	1	0	1
457	M12	1	max	1125.123	1	0	1	19.319	1	0	1	0	15	0	1
458			min	2.438	3	0	1	.899	15	0	1	-.004	1	0	1
459		2	max	1125.293	1	0	1	19.319	1	0	1	0	15	0	1
460			min	2.566	3	0	1	.899	15	0	1	-.001	1	0	1
461		3	max	1125.464	1	0	1	19.319	1	0	1	0	1	0	1
462			min	2.694	3	0	1	.899	15	0	1	0	15	0	1
463		4	max	1125.634	1	0	1	19.319	1	0	1	.003	1	0	1
464			min	2.822	3	0	1	.899	15	0	1	0	15	0	1
465		5	max	1125.804	1	0	1	19.319	1	0	1	.005	1	0	1
466			min	2.949	3	0	1	.899	15	0	1	0	15	0	1
467		6	max	1125.975	1	0	1	19.319	1	0	1	.008	1	0	1
468			min	3.077	3	0	1	.899	15	0	1	0	15	0	1
469		7	max	1126.145	1	0	1	19.319	1	0	1	.01	1	0	1
470			min	3.205	3	0	1	.899	15	0	1	0	15	0	1
471		8	max	1126.315	1	0	1	19.319	1	0	1	.012	1	0	1
472			min	3.333	3	0	1	.899	15	0	1	0	15	0	1
473		9	max	1126.486	1	0	1	19.319	1	0	1	.014	1	0	1
474			min	3.46	3	0	1	.899	15	0	1	0	15	0	1
475		10	max	1126.656	1	0	1	19.319	1	0	1	.016	1	0	1
476			min	3.588	3	0	1	.899	15	0	1	0	15	0	1
477		11	max	1126.826	1	0	1	19.319	1	0	1	.019	1	0	1
478			min	3.716	3	0	1	.899	15	0	1	0	15	0	1
479		12	max	1126.997	1	0	1	19.319	1	0	1	.021	1	0	1
480			min	3.844	3	0	1	.899	15	0	1	0	15	0	1
481		13	max	1127.167	1	0	1	19.319	1	0	1	.023	1	0	1
482			min	3.971	3	0	1	.899	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	1127.337	1	0	1	19.319	1	0	1	.025	1	0	1
484			min	4.099	3	0	1	.899	15	0	1	.001	15	0	1
485		15	max	1127.508	1	0	1	19.319	1	0	1	.028	1	0	1
486			min	4.227	3	0	1	.899	15	0	1	.001	15	0	1
487		16	max	1127.678	1	0	1	19.319	1	0	1	.03	1	0	1
488			min	4.355	3	0	1	.899	15	0	1	.001	15	0	1
489		17	max	1127.848	1	0	1	19.319	1	0	1	.032	1	0	1
490			min	4.482	3	0	1	.899	15	0	1	.001	15	0	1
491		18	max	1128.019	1	0	1	19.319	1	0	1	.034	1	0	1
492			min	4.61	3	0	1	.899	15	0	1	.002	15	0	1
493		19	max	1128.189	1	0	1	19.319	1	0	1	.036	1	0	1
494			min	4.738	3	0	1	.899	15	0	1	.002	15	0	1
495	M1	1	max	211.509	1	644.063	3	-5.05	15	0	1	.304	1	0	3
496			min	9.83	15	-425.462	1	-107.852	1	0	3	.014	15	-.015	2
497		2	max	212.352	1	642.969	3	-5.05	15	0	1	.237	1	.25	1
498			min	10.084	15	-426.921	1	-107.852	1	0	3	.011	15	-.399	3
499		3	max	515.686	3	496.491	1	-5.022	15	0	3	.17	1	.506	1
500			min	-314.597	2	-477.659	3	-107.58	1	0	1	.008	15	-.786	3
501		4	max	516.318	3	495.032	1	-5.022	15	0	3	.103	1	.198	1
502			min	-313.755	2	-478.753	3	-107.58	1	0	1	.005	15	-.489	3
503		5	max	516.95	3	493.573	1	-5.022	15	0	3	.036	1	-.005	15
504			min	-312.913	2	-479.848	3	-107.58	1	0	1	.002	15	-.192	3
505		6	max	517.582	3	492.114	1	-5.022	15	0	3	-.001	15	.107	3
506			min	-312.07	2	-480.942	3	-107.58	1	0	1	-.031	1	-.439	2
507		7	max	518.213	3	490.655	1	-5.022	15	0	3	-.005	15	.405	3
508			min	-311.228	2	-482.036	3	-107.58	1	0	1	-.097	1	-.744	2
509		8	max	518.845	3	489.196	1	-5.022	15	0	3	-.008	15	.705	3
510			min	-310.385	2	-483.13	3	-107.58	1	0	1	-.164	1	-1.047	2
511		9	max	536.351	3	45.382	2	-7.768	15	0	9	.101	1	.823	3
512			min	-218.769	2	.446	15	-166.241	1	0	3	.005	15	-1.199	2
513		10	max	536.983	3	43.923	2	-7.768	15	0	9	0	15	.803	3
514			min	-217.927	2	.006	15	-166.241	1	0	3	-.002	1	-1.227	2
515		11	max	537.614	3	42.464	2	-7.768	15	0	9	-.005	15	.784	3
516			min	-217.084	2	-1.733	4	-166.241	1	0	3	-.105	1	-1.253	2
517		12	max	554.999	3	318.507	3	-4.822	15	0	2	.161	1	.684	3
518			min	-125.454	2	-582.534	2	-103.48	1	0	3	.007	15	-1.111	2
519		13	max	555.631	3	317.413	3	-4.822	15	0	2	.096	1	.487	3
520			min	-124.612	2	-583.993	2	-103.48	1	0	3	.004	15	-.749	2
521		14	max	556.263	3	316.318	3	-4.822	15	0	2	.032	1	.29	3
522			min	-123.769	2	-585.452	2	-103.48	1	0	3	.002	15	-.388	1
523		15	max	556.894	3	315.224	3	-4.822	15	0	2	-.001	15	.094	3
524			min	-122.927	2	-586.911	2	-103.48	1	0	3	-.032	1	-.051	1
525		16	max	557.526	3	314.13	3	-4.822	15	0	2	-.004	15	.343	2
526			min	-122.084	2	-588.37	2	-103.48	1	0	3	-.096	1	-.101	3
527		17	max	558.158	3	313.035	3	-4.822	15	0	2	-.007	15	.708	2
528			min	-121.242	2	-589.829	2	-103.48	1	0	3	-.16	1	-.296	3
529		18	max	-10.101	15	589.648	2	-5.698	15	0	3	-.011	15	.355	2
530			min	-212.828	1	-253.436	3	-121.836	1	0	2	-.231	1	-.145	3
531		19	max	-9.847	15	588.189	2	-5.698	15	0	3	-.014	15	.012	3
532			min	-211.985	1	-254.531	3	-121.836	1	0	2	-.307	1	-.012	1
533	M5	1	max	463.003	1	2145.622	3	0	1	0	1	0	1	.031	2
534			min	20.132	12	-1449.995	1	0	1	0	1	0	1	0	3
535		2	max	463.846	1	2144.528	3	0	1	0	1	0	1	.928	1
536			min	20.553	12	-1451.455	1	0	1	0	1	0	1	-1.331	3
537		3	max	1637.099	3	1450.993	1	0	1	0	1	0	1	1.798	1
538			min	-1084.019	2	-1499.333	3	0	1	0	1	0	1	-2.622	3
539		4	max	1637.731	3	1449.534	1	0	1	0	1	0	1	.898	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	-1083.177	2	-1500.427	3	0	1	0	1	0	1	-1.691	3
541		5	max	1638.363	3	1448.075	1	0	1	0	1	0	1	.024	9
542			min	-1082.334	2	-1501.521	3	0	1	0	1	0	1	-.76	3
543		6	max	1638.994	3	1446.616	1	0	1	0	1	0	1	.173	3
544			min	-1081.492	2	-1502.616	3	0	1	0	1	0	1	-.953	2
545		7	max	1639.626	3	1445.157	1	0	1	0	1	0	1	1.105	3
546			min	-1080.65	2	-1503.71	3	0	1	0	1	0	1	-1.844	2
547		8	max	1640.258	3	1443.698	1	0	1	0	1	0	1	2.039	3
548			min	-1079.807	2	-1504.804	3	0	1	0	1	0	1	-2.734	2
549		9	max	1669.765	3	152.057	2	0	1	0	1	0	1	2.348	3
550			min	-890.017	2	.445	15	0	1	0	1	0	1	-3.121	2
551		10	max	1670.397	3	150.597	2	0	1	0	1	0	1	2.274	3
552			min	-889.175	2	.005	15	0	1	0	1	0	1	-3.215	2
553		11	max	1671.029	3	149.138	2	0	1	0	1	0	1	2.202	3
554			min	-888.333	2	-1.459	4	0	1	0	1	0	1	-3.308	2
555		12	max	1700.778	3	979.504	3	0	1	0	1	0	1	1.933	3
556			min	-698.57	2	-1740.553	2	0	1	0	1	0	1	-2.958	2
557		13	max	1701.41	3	978.41	3	0	1	0	1	0	1	1.325	3
558			min	-697.728	2	-1742.012	2	0	1	0	1	0	1	-1.877	2
559		14	max	1702.042	3	977.316	3	0	1	0	1	0	1	.718	3
560			min	-696.886	2	-1743.471	2	0	1	0	1	0	1	-.817	1
561		15	max	1702.674	3	976.221	3	0	1	0	1	0	1	.287	2
562			min	-696.043	2	-1744.93	2	0	1	0	1	0	1	0	13
563		16	max	1703.305	3	975.127	3	0	1	0	1	0	1	1.371	2
564			min	-695.201	2	-1746.389	2	0	1	0	1	0	1	-.493	3
565		17	max	1703.937	3	974.033	3	0	1	0	1	0	1	2.455	2
566			min	-694.358	2	-1747.848	2	0	1	0	1	0	1	-1.098	3
567		18	max	-20.993	12	1993.746	2	0	1	0	1	0	1	1.258	2
568			min	-462.893	1	-881.045	3	0	1	0	1	0	1	-.572	3
569		19	max	-20.571	12	1992.287	2	0	1	0	1	0	1	.023	1
570			min	-462.051	1	-882.14	3	0	1	0	1	0	1	-.025	3
571	M9	1	max	211.509	1	644.063	3	107.852	1	0	3	-.014	15	0	3
572			min	9.83	15	-425.462	1	5.05	15	0	1	-.304	1	-.015	2
573		2	max	212.352	1	642.969	3	107.852	1	0	3	-.011	15	.25	1
574			min	10.084	15	-426.921	1	5.05	15	0	1	-.237	1	-.399	3
575		3	max	515.686	3	496.491	1	107.58	1	0	1	-.008	15	.506	1
576			min	-314.597	2	-477.659	3	5.022	15	0	3	-.17	1	-.786	3
577		4	max	516.318	3	495.032	1	107.58	1	0	1	-.005	15	.198	1
578			min	-313.755	2	-478.753	3	5.022	15	0	3	-.103	1	-.489	3
579		5	max	516.95	3	493.573	1	107.58	1	0	1	-.002	15	-.005	15
580			min	-312.913	2	-479.848	3	5.022	15	0	3	-.036	1	-.192	3
581		6	max	517.582	3	492.114	1	107.58	1	0	1	.031	1	.107	3
582			min	-312.07	2	-480.942	3	5.022	15	0	3	.001	15	-.439	2
583		7	max	518.213	3	490.655	1	107.58	1	0	1	.097	1	.405	3
584			min	-311.228	2	-482.036	3	5.022	15	0	3	.005	15	-.744	2
585		8	max	518.845	3	489.196	1	107.58	1	0	1	.164	1	.705	3
586			min	-310.385	2	-483.13	3	5.022	15	0	3	.008	15	-1.047	2
587		9	max	536.351	3	45.382	2	166.241	1	0	3	-.005	15	.823	3
588			min	-218.769	2	.446	15	7.768	15	0	9	-.101	1	-1.199	2
589		10	max	536.983	3	43.923	2	166.241	1	0	3	.002	1	.803	3
590			min	-217.927	2	.006	15	7.768	15	0	9	0	15	-1.227	2
591		11	max	537.614	3	42.464	2	166.241	1	0	3	.105	1	.784	3
592			min	-217.084	2	-1.733	4	7.768	15	0	9	.005	15	-1.253	2
593		12	max	554.999	3	318.507	3	103.48	1	0	3	-.007	15	.684	3
594			min	-125.454	2	-582.534	2	4.822	15	0	2	-.161	1	-1.111	2
595		13	max	555.631	3	317.413	3	103.48	1	0	3	-.004	15	.487	3
596			min	-124.612	2	-583.993	2	4.822	15	0	2	-.096	1	-.749	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	556.263	3	316.318	3	103.48	1	0	3	-.002	15	.29	3
598			min	-123.769	2	-585.452	2	4.822	15	0	2	-.032	1	-.388	1
599		15	max	556.894	3	315.224	3	103.48	1	0	3	.032	1	.094	3
600			min	-122.927	2	-586.911	2	4.822	15	0	2	.001	15	-.051	1
601		16	max	557.526	3	314.13	3	103.48	1	0	3	.096	1	.343	2
602			min	-122.084	2	-588.37	2	4.822	15	0	2	.004	15	-.101	3
603		17	max	558.158	3	313.035	3	103.48	1	0	3	.16	1	.708	2
604			min	-121.242	2	-589.829	2	4.822	15	0	2	.007	15	-.296	3
605		18	max	-10.101	15	589.648	2	121.836	1	0	2	.231	1	.355	2
606			min	-212.828	1	-253.436	3	5.698	15	0	3	.011	15	-.145	3
607		19	max	-9.847	15	588.189	2	121.836	1	0	2	.307	1	.012	3
608			min	-211.985	1	-254.531	3	5.698	15	0	3	.014	15	-.012	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.179	2	.01	3	1.231e-2	2	NC	1	NC	1
2			min	0	15	-.036	3	-.005	2	-2.55e-3	3	NC	1	NC	1
3		2	max	0	1	.269	3	.051	1	1.381e-2	2	NC	5	NC	2
4			min	0	15	-.01	9	.002	10	-2.552e-3	3	786.813	3	4783.007	1
5		3	max	0	1	.516	3	.121	1	1.53e-2	2	NC	5	NC	3
6			min	0	15	-.143	1	.006	15	-2.554e-3	3	434.739	3	1997.736	1
7		4	max	0	1	.666	3	.181	1	1.679e-2	2	NC	5	NC	3
8			min	0	15	-.216	1	.009	15	-2.557e-3	3	341.823	3	1335.082	1
9		5	max	0	1	.701	3	.211	1	1.829e-2	2	NC	5	NC	5
10			min	0	15	-.213	1	.01	15	-2.559e-3	3	325.636	3	1144.394	1
11		6	max	0	1	.623	3	.202	1	1.978e-2	2	NC	5	NC	5
12			min	0	15	-.138	1	.01	15	-2.561e-3	3	364.007	3	1191.545	1
13		7	max	0	1	.456	3	.158	1	2.127e-2	2	NC	5	NC	5
14			min	0	15	-.016	9	.008	15	-2.563e-3	3	487.428	3	1528.119	1
15		8	max	0	1	.244	3	.091	1	2.276e-2	2	NC	1	NC	5
16			min	0	15	.005	15	0	10	-2.566e-3	3	856.281	3	2679.09	1
17		9	max	0	1	.315	2	.032	3	2.426e-2	2	NC	4	NC	1
18			min	0	15	.009	15	-.009	10	-2.568e-3	3	1759.262	2	NC	1
19		10	max	0	1	.375	2	.031	3	2.575e-2	2	NC	3	NC	1
20			min	0	1	-.035	3	-.021	2	-2.57e-3	3	1225.058	2	NC	1
21		11	max	0	15	.315	2	.032	3	2.426e-2	2	NC	4	NC	1
22			min	0	1	.009	15	-.009	10	-2.568e-3	3	1759.262	2	NC	1
23		12	max	0	15	.244	3	.091	1	2.276e-2	2	NC	1	NC	5
24			min	0	1	.005	15	0	10	-2.566e-3	3	856.281	3	2679.09	1
25		13	max	0	15	.456	3	.158	1	2.127e-2	2	NC	5	NC	5
26			min	0	1	-.016	9	.008	15	-2.563e-3	3	487.428	3	1528.119	1
27		14	max	0	15	.623	3	.202	1	1.978e-2	2	NC	5	NC	5
28			min	0	1	-.138	1	.01	15	-2.561e-3	3	364.007	3	1191.545	1
29		15	max	0	15	.701	3	.211	1	1.829e-2	2	NC	5	NC	5
30			min	0	1	-.213	1	.01	15	-2.559e-3	3	325.636	3	1144.394	1
31		16	max	0	15	.666	3	.181	1	1.679e-2	2	NC	5	NC	3
32			min	0	1	-.216	1	.009	15	-2.557e-3	3	341.823	3	1335.082	1
33		17	max	0	15	.516	3	.121	1	1.53e-2	2	NC	5	NC	3
34			min	0	1	-.143	1	.006	15	-2.554e-3	3	434.739	3	1997.736	1
35		18	max	0	15	.269	3	.051	1	1.381e-2	2	NC	5	NC	2
36			min	0	1	-.01	9	.002	10	-2.552e-3	3	786.813	3	4783.007	1
37		19	max	0	15	.179	2	.01	3	1.231e-2	2	NC	1	NC	1
38			min	-.001	1	-.036	3	-.005	2	-2.55e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.34	3	.009	3	7.131e-3	2	NC	1	NC	1
40			min	0	15	-.552	2	-.005	2	-5.151e-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	.672	3	.034	1	8.413e-3	2	NC	5	NC	2
42			min	0	15	-.889	2	0	10	-6.197e-3	3	701.943	1	7327.627	1
43		3	max	0	1	.957	3	.095	1	9.694e-3	2	NC	15	NC	3
44			min	0	15	-1.184	2	.005	15	-7.244e-3	3	374.243	1	2565.837	1
45		4	max	0	1	1.163	3	.152	1	1.098e-2	2	9324.703	15	NC	3
46			min	0	15	-1.411	2	.007	15	-8.291e-3	3	276.343	1	1593.772	1
47		5	max	0	1	1.273	3	.184	1	1.226e-2	2	8068.431	15	NC	3
48			min	0	15	-1.552	2	.009	15	-9.337e-3	3	238.135	1	1312.18	1
49		6	max	0	1	1.289	3	.182	1	1.354e-2	2	7732.466	15	NC	3
50			min	0	15	-1.608	2	.009	15	-1.038e-2	3	226.909	1	1331.482	1
51		7	max	0	1	1.224	3	.144	1	1.482e-2	2	7999.146	15	NC	5
52			min	0	15	-1.589	2	.007	15	-1.143e-2	3	231.625	2	1676.388	1
53		8	max	0	1	1.109	3	.084	1	1.61e-2	2	8740.161	15	NC	3
54			min	0	15	-1.519	2	0	10	-1.248e-2	3	248.194	2	2893.471	1
55		9	max	0	1	.993	3	.029	3	1.738e-2	2	9734.283	15	NC	1
56			min	0	15	-1.439	2	-.008	10	-1.352e-2	3	270.824	2	NC	1
57		10	max	0	1	.938	3	.027	3	1.866e-2	2	NC	15	NC	1
58			min	0	1	-1.398	2	-.019	2	-1.457e-2	3	283.904	2	NC	1
59		11	max	0	15	.993	3	.029	3	1.738e-2	2	9734.283	15	NC	1
60			min	0	1	-1.439	2	-.008	10	-1.352e-2	3	270.824	2	NC	1
61		12	max	0	15	1.109	3	.084	1	1.61e-2	2	8740.161	15	NC	3
62			min	0	1	-1.519	2	0	10	-1.248e-2	3	248.194	2	2893.471	1
63		13	max	0	15	1.224	3	.144	1	1.482e-2	2	7999.146	15	NC	5
64			min	0	1	-1.589	2	.007	15	-1.143e-2	3	231.625	2	1676.388	1
65		14	max	0	15	1.289	3	.182	1	1.354e-2	2	7732.466	15	NC	3
66			min	0	1	-1.608	2	.009	15	-1.038e-2	3	226.909	1	1331.482	1
67		15	max	0	15	1.273	3	.184	1	1.226e-2	2	8068.431	15	NC	3
68			min	0	1	-1.552	2	.009	15	-9.337e-3	3	238.135	1	1312.18	1
69		16	max	0	15	1.163	3	.152	1	1.098e-2	2	9324.703	15	NC	3
70			min	0	1	-1.411	2	.007	15	-8.291e-3	3	276.343	1	1593.772	1
71		17	max	0	15	.957	3	.095	1	9.694e-3	2	NC	15	NC	3
72			min	0	1	-1.184	2	.005	15	-7.244e-3	3	374.243	1	2565.837	1
73		18	max	0	15	.672	3	.034	1	8.413e-3	2	NC	5	NC	2
74			min	0	1	-.889	2	0	10	-6.197e-3	3	701.943	1	7327.627	1
75		19	max	0	15	.34	3	.009	3	7.131e-3	2	NC	1	NC	1
76			min	0	1	-.552	2	-.005	2	-5.151e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.348	3	.008	3	4.384e-3	3	NC	1	NC	1
78			min	0	1	-.551	2	-.004	2	-7.419e-3	2	NC	1	NC	1
79		2	max	0	15	.573	3	.034	1	5.277e-3	3	NC	5	NC	2
80			min	0	1	-.972	2	0	10	-8.759e-3	2	570.247	2	7264.843	1
81		3	max	0	15	.771	3	.095	1	6.17e-3	3	NC	15	NC	3
82			min	0	1	-1.336	2	.005	15	-1.01e-2	2	305.787	2	2552.953	1
83		4	max	0	15	.925	3	.152	1	7.062e-3	3	9340.497	15	NC	3
84			min	0	1	-1.604	2	.007	15	-1.144e-2	2	228.002	2	1587.623	1
85		5	max	0	15	1.026	3	.185	1	7.955e-3	3	8083.729	15	NC	3
86			min	0	1	-1.755	2	.009	15	-1.278e-2	2	199.348	2	1307.657	1
87		6	max	0	15	1.07	3	.182	1	8.848e-3	3	7749.339	15	NC	3
88			min	0	1	-1.789	2	.009	15	-1.412e-2	2	193.912	2	1326.795	1
89		7	max	0	15	1.066	3	.145	1	9.741e-3	3	8019.73	15	NC	3
90			min	0	1	-1.723	2	.007	15	-1.546e-2	2	204.798	2	1669.256	1
91		8	max	0	15	1.029	3	.085	1	1.063e-2	3	8767.045	15	NC	3
92			min	0	1	-1.595	2	.001	10	-1.68e-2	2	229.949	2	2873.598	1
93		9	max	0	15	.982	3	.027	3	1.153e-2	3	9769.47	15	NC	1
94			min	0	1	-1.461	2	-.007	10	-1.814e-2	2	263.905	2	NC	1
95		10	max	0	1	.957	3	.025	3	1.242e-2	3	NC	15	NC	1
96			min	0	1	-1.396	2	-.018	2	-1.948e-2	2	284.225	2	NC	1
97		11	max	0	1	.982	3	.027	3	1.153e-2	3	9769.47	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.461	2	-.007	10	-1.814e-2	2	263.905	2	NC	1
99		12	max	0	1	1.029	3	.085	1	1.063e-2	3	8767.045	15	NC	3
100			min	0	15	-1.595	2	.001	10	-1.68e-2	2	229.949	2	2873.598	1
101		13	max	0	1	1.066	3	.145	1	9.741e-3	3	8019.73	15	NC	3
102			min	0	15	-1.723	2	.007	15	-1.546e-2	2	204.798	2	1669.256	1
103		14	max	0	1	1.07	3	.182	1	8.848e-3	3	7749.339	15	NC	3
104			min	0	15	-1.789	2	.009	15	-1.412e-2	2	193.912	2	1326.795	1
105		15	max	0	1	1.026	3	.185	1	7.955e-3	3	8083.729	15	NC	3
106			min	0	15	-1.755	2	.009	15	-1.278e-2	2	199.348	2	1307.657	1
107		16	max	0	1	.925	3	.152	1	7.062e-3	3	9340.497	15	NC	3
108			min	0	15	-1.604	2	.007	15	-1.144e-2	2	228.002	2	1587.623	1
109		17	max	0	1	.771	3	.095	1	6.17e-3	3	NC	15	NC	3
110			min	0	15	-1.336	2	.005	15	-1.01e-2	2	305.787	2	2552.953	1
111		18	max	0	1	.573	3	.034	1	5.277e-3	3	NC	5	NC	2
112			min	0	15	-.972	2	0	10	-8.759e-3	2	570.247	2	7264.843	1
113		19	max	0	1	.348	3	.008	3	4.384e-3	3	NC	1	NC	1
114			min	0	15	-.551	2	-.004	2	-7.419e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.163	1	.007	3	7.957e-3	3	NC	1	NC	1
116			min	-.001	1	-.118	3	-.004	2	-1.052e-2	1	NC	1	NC	1
117		2	max	0	15	.003	13	.05	1	9.178e-3	3	NC	5	NC	2
118			min	-.001	1	-.096	2	.003	15	-1.166e-2	1	941.106	2	4847.295	1
119		3	max	0	15	.05	3	.12	1	1.04e-2	3	NC	5	NC	3
120			min	0	1	-.298	2	.006	15	-1.28e-2	1	524.856	2	2011.974	1
121		4	max	0	15	.085	3	.18	1	1.162e-2	3	NC	5	NC	3
122			min	0	1	-.413	2	.009	15	-1.393e-2	1	419.943	2	1340.012	1
123		5	max	0	15	.076	3	.21	1	1.284e-2	3	NC	5	NC	3
124			min	0	1	-.423	2	.01	15	-1.507e-2	1	412.643	2	1145.523	1
125		6	max	0	15	.023	3	.203	1	1.406e-2	3	NC	5	NC	3
126			min	0	1	-.332	2	.01	15	-1.621e-2	1	489.189	2	1189.145	1
127		7	max	0	15	.002	13	.159	1	1.528e-2	3	NC	5	NC	3
128			min	0	1	-.162	2	.008	15	-1.734e-2	1	748.571	2	1517.771	1
129		8	max	0	15	.093	1	.092	1	1.65e-2	3	NC	4	NC	3
130			min	0	1	-.161	3	.003	10	-1.848e-2	1	2126.129	2	2629.811	1
131		9	max	0	15	.258	1	.026	1	1.772e-2	3	NC	4	NC	2
132			min	0	1	-.248	3	-.006	10	-1.962e-2	1	1845.921	3	9660.661	1
133		10	max	0	1	.332	1	.022	3	1.894e-2	3	NC	5	NC	1
134			min	0	1	-.286	3	-.017	2	-2.076e-2	1	1416.902	1	NC	1
135		11	max	0	1	.258	1	.026	1	1.772e-2	3	NC	4	NC	2
136			min	0	15	-.248	3	-.006	10	-1.962e-2	1	1845.921	3	9660.661	1
137		12	max	0	1	.093	1	.092	1	1.65e-2	3	NC	4	NC	3
138			min	0	15	-.161	3	.003	10	-1.848e-2	1	2126.129	2	2629.811	1
139		13	max	0	1	.002	13	.159	1	1.528e-2	3	NC	5	NC	3
140			min	0	15	-.162	2	.008	15	-1.734e-2	1	748.571	2	1517.771	1
141		14	max	0	1	.023	3	.203	1	1.406e-2	3	NC	5	NC	3
142			min	0	15	-.332	2	.01	15	-1.621e-2	1	489.189	2	1189.145	1
143		15	max	0	1	.076	3	.21	1	1.284e-2	3	NC	5	NC	3
144			min	0	15	-.423	2	.01	15	-1.507e-2	1	412.643	2	1145.523	1
145		16	max	0	1	.085	3	.18	1	1.162e-2	3	NC	5	NC	3
146			min	0	15	-.413	2	.009	15	-1.393e-2	1	419.943	2	1340.012	1
147		17	max	0	1	.05	3	.12	1	1.04e-2	3	NC	5	NC	3
148			min	0	15	-.298	2	.006	15	-1.28e-2	1	524.856	2	2011.974	1
149		18	max	.001	1	.003	13	.05	1	9.178e-3	3	NC	5	NC	2
150			min	0	15	-.096	2	.003	15	-1.166e-2	1	941.106	2	4847.295	1
151		19	max	.001	1	.163	1	.007	3	7.957e-3	3	NC	1	NC	1
152			min	0	15	-.118	3	-.004	2	-1.052e-2	1	NC	1	NC	1
153	M2	1	max	.008	1	.009	2	.014	1	-1.553e-5	15	NC	1	NC	2
154			min	-.009	3	-.015	3	0	15	-3.329e-4	1	8490.823	2	5470.865	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	.007	1	.008	2	.013	1	-1.474e-5	15	NC	1	NC	2
156			min	-.009	3	-.015	3	0	15	-3.16e-4	1	NC	1	5962.079	1
157		3	max	.007	1	.006	2	.012	1	-1.395e-5	15	NC	1	NC	2
158			min	-.008	3	-.014	3	0	15	-2.991e-4	1	NC	1	6546.502	1
159		4	max	.006	1	.005	2	.011	1	-1.317e-5	15	NC	1	NC	2
160			min	-.008	3	-.014	3	0	15	-2.822e-4	1	NC	1	7248.569	1
161		5	max	.006	1	.003	2	.01	1	-1.238e-5	15	NC	1	NC	2
162			min	-.007	3	-.013	3	0	15	-2.653e-4	1	NC	1	8101.524	1
163		6	max	.006	1	.002	2	.008	1	-1.159e-5	15	NC	1	NC	2
164			min	-.007	3	-.013	3	0	15	-2.484e-4	1	NC	1	9151.542	1
165		7	max	.005	1	.001	2	.007	1	-1.08e-5	15	NC	1	NC	1
166			min	-.006	3	-.012	3	0	15	-2.315e-4	1	NC	1	NC	1
167		8	max	.005	1	0	2	.006	1	-1.001e-5	15	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-2.146e-4	1	NC	1	NC	1
169		9	max	.004	1	0	2	.005	1	-9.226e-6	15	NC	1	NC	1
170			min	-.005	3	-.011	3	0	15	-1.977e-4	1	NC	1	NC	1
171		10	max	.004	1	-.002	15	.005	1	-8.438e-6	15	NC	1	NC	1
172			min	-.005	3	-.011	3	0	15	-1.807e-4	1	NC	1	NC	1
173		11	max	.003	1	-.002	15	.004	1	-7.65e-6	15	NC	1	NC	1
174			min	-.004	3	-.01	3	0	15	-1.638e-4	1	NC	1	NC	1
175		12	max	.003	1	-.002	15	.003	1	-6.863e-6	15	NC	1	NC	1
176			min	-.004	3	-.009	3	0	15	-1.469e-4	1	NC	1	NC	1
177		13	max	.003	1	-.002	15	.002	1	-6.075e-6	15	NC	1	NC	1
178			min	-.003	3	-.008	3	0	15	-1.3e-4	1	NC	1	NC	1
179		14	max	.002	1	-.002	15	.002	1	-5.287e-6	15	NC	1	NC	1
180			min	-.003	3	-.007	3	0	15	-1.131e-4	1	NC	1	NC	1
181		15	max	.002	1	-.001	15	.001	1	-4.499e-6	15	NC	1	NC	1
182			min	-.002	3	-.006	4	0	15	-9.62e-5	1	NC	1	NC	1
183		16	max	.001	1	-.001	15	0	1	-3.711e-6	15	NC	1	NC	1
184			min	-.002	3	-.005	4	0	15	-7.929e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-2.923e-6	15	NC	1	NC	1
186			min	-.001	3	-.003	4	0	15	-6.238e-5	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	-2.135e-6	15	NC	1	NC	1
188			min	0	3	-.002	4	0	15	-4.547e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-1.347e-6	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-2.856e-5	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	5.412e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	2.561e-7	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	4.177e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	1	1.947e-6	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	15	7.813e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	1	3.637e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	15	1.145e-4	1	NC	1	NC	1
198			min	-.001	2	-.009	4	0	1	5.328e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	15	1.508e-4	1	NC	1	NC	1
200			min	-.001	2	-.012	4	0	1	7.018e-6	15	8382.304	4	NC	1
201		6	max	.002	3	-.004	15	0	15	1.872e-4	1	NC	5	NC	1
202			min	-.002	2	-.015	4	0	1	8.709e-6	15	6802.371	4	NC	1
203		7	max	.003	3	-.004	15	0	15	2.236e-4	1	NC	5	NC	1
204			min	-.002	2	-.018	4	0	1	1.04e-5	15	5850.387	4	NC	1
205		8	max	.003	3	-.005	15	0	1	2.599e-4	1	NC	5	NC	1
206			min	-.002	2	-.02	4	0	12	1.209e-5	15	5263.42	4	NC	1
207		9	max	.003	3	-.005	15	0	1	2.963e-4	1	NC	5	NC	1
208			min	-.003	2	-.021	4	0	12	1.378e-5	15	4917.683	4	NC	1
209		10	max	.004	3	-.005	15	.001	1	3.326e-4	1	NC	5	NC	1
210			min	-.003	2	-.022	4	0	15	1.547e-5	15	4753.226	4	NC	1
211		11	max	.004	3	-.005	15	.002	1	3.69e-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	-.022	4	0	15	1.716e-5	15	4745.913	4	NC	1
213		12	max	.005	3	-.005	15	.002	1	4.053e-4	1	NC	5	NC	1
214			min	-.004	2	-.021	4	0	15	1.885e-5	15	4898.163	4	NC	1
215		13	max	.005	3	-.005	15	.003	1	4.417e-4	1	NC	5	NC	1
216			min	-.004	2	-.02	4	0	15	2.054e-5	15	5241.08	4	NC	1
217		14	max	.006	3	-.004	15	.004	1	4.78e-4	1	NC	5	NC	1
218			min	-.005	2	-.018	4	0	15	2.223e-5	15	5850.451	4	NC	1
219		15	max	.006	3	-.004	15	.006	1	5.144e-4	1	NC	3	NC	1
220			min	-.005	2	-.015	4	0	15	2.392e-5	15	6893.779	4	NC	1
221		16	max	.007	3	-.003	15	.007	1	5.508e-4	1	NC	1	NC	1
222			min	-.005	2	-.012	4	0	15	2.562e-5	15	8776.38	4	NC	1
223		17	max	.007	3	-.002	15	.009	1	5.871e-4	1	NC	1	NC	1
224			min	-.006	2	-.009	4	0	15	2.731e-5	15	NC	1	NC	1
225		18	max	.007	3	-.001	15	.011	1	6.235e-4	1	NC	1	NC	2
226			min	-.006	2	-.005	1	0	15	2.9e-5	15	NC	1	9285.541	1
227		19	max	.008	3	0	10	.013	1	6.598e-4	1	NC	1	NC	2
228			min	-.006	2	-.002	1	0	15	3.069e-5	15	NC	1	7746.938	1
229	M4	1	max	.003	1	.006	2	0	15	2.336e-4	1	NC	1	NC	3
230			min	0	3	-.008	3	-.013	1	1.09e-5	15	NC	1	1890.202	1
231		2	max	.003	1	.006	2	0	15	2.336e-4	1	NC	1	NC	3
232			min	0	3	-.008	3	-.012	1	1.09e-5	15	NC	1	2051.219	1
233		3	max	.002	1	.005	2	0	15	2.336e-4	1	NC	1	NC	3
234			min	0	3	-.007	3	-.011	1	1.09e-5	15	NC	1	2243.12	1
235		4	max	.002	1	.005	2	0	15	2.336e-4	1	NC	1	NC	3
236			min	0	3	-.007	3	-.01	1	1.09e-5	15	NC	1	2473.88	1
237		5	max	.002	1	.005	2	0	15	2.336e-4	1	NC	1	NC	3
238			min	0	3	-.006	3	-.009	1	1.09e-5	15	NC	1	2754.341	1
239		6	max	.002	1	.004	2	0	15	2.336e-4	1	NC	1	NC	3
240			min	0	3	-.006	3	-.008	1	1.09e-5	15	NC	1	3099.541	1
241		7	max	.002	1	.004	2	0	15	2.336e-4	1	NC	1	NC	3
242			min	0	3	-.005	3	-.007	1	1.09e-5	15	NC	1	3530.824	1
243		8	max	.002	1	.004	2	0	15	2.336e-4	1	NC	1	NC	3
244			min	0	3	-.005	3	-.006	1	1.09e-5	15	NC	1	4079.315	1
245		9	max	.001	1	.003	2	0	15	2.336e-4	1	NC	1	NC	2
246			min	0	3	-.004	3	-.005	1	1.09e-5	15	NC	1	4791.862	1
247		10	max	.001	1	.003	2	0	15	2.336e-4	1	NC	1	NC	2
248			min	0	3	-.004	3	-.004	1	1.09e-5	15	NC	1	5741.682	1
249		11	max	.001	1	.003	2	0	15	2.336e-4	1	NC	1	NC	2
250			min	0	3	-.004	3	-.004	1	1.09e-5	15	NC	1	7048.515	1
251		12	max	.001	1	.002	2	0	15	2.336e-4	1	NC	1	NC	2
252			min	0	3	-.003	3	-.003	1	1.09e-5	15	NC	1	8919.42	1
253		13	max	0	1	.002	2	0	15	2.336e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	-.002	1	1.09e-5	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	2.336e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	-.002	1	1.09e-5	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	2.336e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	-.001	1	1.09e-5	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	2.336e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	1.09e-5	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	2.336e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	1.09e-5	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	2.336e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	1.09e-5	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.336e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	1.09e-5	15	NC	1	NC	1
267	M6	1	max	.024	1	.034	2	0	1	0	1	NC	3	NC	1
268			min	-.029	3	-.047	3	0	1	0	1	2272.567	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	.023	1	.031	2	0	1	0	1	NC	3	NC	1
270			min	-.028	3	-.044	3	0	1	0	1	2503.6	2	NC	1
271		3	max	.021	1	.028	2	0	1	0	1	NC	3	NC	1
272			min	-.026	3	-.042	3	0	1	0	1	2784.337	2	NC	1
273		4	max	.02	1	.025	2	0	1	0	1	NC	3	NC	1
274			min	-.025	3	-.039	3	0	1	0	1	3129.521	2	NC	1
275		5	max	.019	1	.022	2	0	1	0	1	NC	3	NC	1
276			min	-.023	3	-.037	3	0	1	0	1	3559.991	2	NC	1
277		6	max	.017	1	.019	2	0	1	0	1	NC	3	NC	1
278			min	-.021	3	-.034	3	0	1	0	1	4105.998	2	NC	1
279		7	max	.016	1	.016	2	0	1	0	1	NC	1	NC	1
280			min	-.02	3	-.032	3	0	1	0	1	4812.837	2	NC	1
281		8	max	.015	1	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.018	3	-.029	3	0	1	0	1	5750.891	2	NC	1
283		9	max	.013	1	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.016	3	-.027	3	0	1	0	1	7034.583	2	NC	1
285		10	max	.012	1	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.024	3	0	1	0	1	8860.617	2	NC	1
287		11	max	.011	1	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.013	3	-.021	3	0	1	0	1	NC	1	NC	1
289		12	max	.009	1	.005	2	0	1	0	1	NC	1	NC	1
290			min	-.011	3	-.019	3	0	1	0	1	NC	1	NC	1
291		13	max	.008	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.016	3	0	1	0	1	NC	1	NC	1
293		14	max	.007	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.014	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.011	3	0	1	0	1	NC	1	NC	1
297		16	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
299		17	max	.003	1	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	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	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	-.004	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.01	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.013	3	0	1	0	1	8537.256	3	NC	1
315		6	max	.007	3	-.004	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.016	3	0	1	0	1	6945.511	4	NC	1
317		7	max	.008	3	-.004	15	0	1	0	1	NC	2	NC	1
318			min	-.008	2	-.018	3	0	1	0	1	5963.699	4	NC	1
319		8	max	.009	3	-.005	15	0	1	0	1	NC	2	NC	1
320			min	-.009	2	-.02	3	0	1	0	1	5358.107	4	NC	1
321		9	max	.011	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.01	2	-.021	4	0	1	0	1	5000.504	4	NC	1
323		10	max	.012	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.012	2	-.022	4	0	1	0	1	4828.698	4	NC	1
325		11	max	.014	3	-.005	15	0	1	0	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
326			min	-.013	2	-.022	4	0	1	0	1	4817.415	4	NC	1
327		12	max	.015	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.014	2	-.021	4	0	1	0	1	4968.602	4	NC	1
329		13	max	.016	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.016	2	-.02	4	0	1	0	1	5313.433	4	NC	1
331		14	max	.018	3	-.004	15	0	1	0	1	NC	5	NC	1
332			min	-.017	2	-.018	3	0	1	0	1	5928.415	4	NC	1
333		15	max	.019	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.018	2	-.017	3	0	1	0	1	6982.951	4	NC	1
335		16	max	.02	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.019	2	-.014	3	0	1	0	1	8887.204	4	NC	1
337		17	max	.022	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.021	2	-.012	3	0	1	0	1	NC	1	NC	1
339		18	max	.023	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.022	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.024	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.023	2	-.006	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.023	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.025	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	1	.021	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.024	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	1	.02	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.022	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.019	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.021	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.018	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.016	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.01	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	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	3	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	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	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.008	1	.009	2	0	15	3.329e-4	1	NC	1	NC	2
382			min	-.009	3	-.015	3	-.014	1	1.553e-5	15	8490.823	2	5470.865	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	.007	1	.008	2	0	15	3.16e-4	1	NC	1	NC	2
384			min	-.009	3	-.015	3	-.013	1	1.474e-5	15	NC	1	5962.079	1
385		3	max	.007	1	.006	2	0	15	2.991e-4	1	NC	1	NC	2
386			min	-.008	3	-.014	3	-.012	1	1.395e-5	15	NC	1	6546.502	1
387		4	max	.006	1	.005	2	0	15	2.822e-4	1	NC	1	NC	2
388			min	-.008	3	-.014	3	-.011	1	1.317e-5	15	NC	1	7248.569	1
389		5	max	.006	1	.003	2	0	15	2.653e-4	1	NC	1	NC	2
390			min	-.007	3	-.013	3	-.01	1	1.238e-5	15	NC	1	8101.524	1
391		6	max	.006	1	.002	2	0	15	2.484e-4	1	NC	1	NC	2
392			min	-.007	3	-.013	3	-.008	1	1.159e-5	15	NC	1	9151.542	1
393		7	max	.005	1	.001	2	0	15	2.315e-4	1	NC	1	NC	1
394			min	-.006	3	-.012	3	-.007	1	1.08e-5	15	NC	1	NC	1
395		8	max	.005	1	0	2	0	15	2.146e-4	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.006	1	1.001e-5	15	NC	1	NC	1
397		9	max	.004	1	0	2	0	15	1.977e-4	1	NC	1	NC	1
398			min	-.005	3	-.011	3	-.005	1	9.226e-6	15	NC	1	NC	1
399		10	max	.004	1	-.002	15	0	15	1.807e-4	1	NC	1	NC	1
400			min	-.005	3	-.011	3	-.005	1	8.438e-6	15	NC	1	NC	1
401		11	max	.003	1	-.002	15	0	15	1.638e-4	1	NC	1	NC	1
402			min	-.004	3	-.01	3	-.004	1	7.65e-6	15	NC	1	NC	1
403		12	max	.003	1	-.002	15	0	15	1.469e-4	1	NC	1	NC	1
404			min	-.004	3	-.009	3	-.003	1	6.863e-6	15	NC	1	NC	1
405		13	max	.003	1	-.002	15	0	15	1.3e-4	1	NC	1	NC	1
406			min	-.003	3	-.008	3	-.002	1	6.075e-6	15	NC	1	NC	1
407		14	max	.002	1	-.002	15	0	15	1.131e-4	1	NC	1	NC	1
408			min	-.003	3	-.007	3	-.002	1	5.287e-6	15	NC	1	NC	1
409		15	max	.002	1	-.001	15	0	15	9.62e-5	1	NC	1	NC	1
410			min	-.002	3	-.006	4	-.001	1	4.499e-6	15	NC	1	NC	1
411		16	max	.001	1	-.001	15	0	15	7.929e-5	1	NC	1	NC	1
412			min	-.002	3	-.005	4	0	1	3.711e-6	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	6.238e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	4	0	1	2.923e-6	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	4.547e-5	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	2.135e-6	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	2.856e-5	1	NC	1	NC	1
418			min	0	1	0	1	0	1	1.347e-6	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-2.561e-7	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-5.412e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-1.947e-6	15	NC	1	NC	1
422			min	0	2	-.003	4	0	15	-4.177e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	1	-3.637e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	15	-7.813e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	1	-5.328e-6	15	NC	1	NC	1
426			min	-.001	2	-.009	4	0	15	-1.145e-4	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	1	-7.018e-6	15	NC	1	NC	1
428			min	-.001	2	-.012	4	0	15	-1.508e-4	1	8382.304	4	NC	1
429		6	max	.002	3	-.004	15	0	1	-8.709e-6	15	NC	5	NC	1
430			min	-.002	2	-.015	4	0	15	-1.872e-4	1	6802.371	4	NC	1
431		7	max	.003	3	-.004	15	0	1	-1.04e-5	15	NC	5	NC	1
432			min	-.002	2	-.018	4	0	15	-2.236e-4	1	5850.387	4	NC	1
433		8	max	.003	3	-.005	15	0	12	-1.209e-5	15	NC	5	NC	1
434			min	-.002	2	-.02	4	0	1	-2.599e-4	1	5263.42	4	NC	1
435		9	max	.003	3	-.005	15	0	12	-1.378e-5	15	NC	5	NC	1
436			min	-.003	2	-.021	4	0	1	-2.963e-4	1	4917.683	4	NC	1
437		10	max	.004	3	-.005	15	0	15	-1.547e-5	15	NC	5	NC	1
438			min	-.003	2	-.022	4	-.001	1	-3.326e-4	1	4753.226	4	NC	1
439		11	max	.004	3	-.005	15	0	15	-1.716e-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	-.022	4	-.002	1	-3.69e-4	1	4745.913	4	NC	1
441		12	max	.005	3	-.005	15	0	15	-1.885e-5	15	NC	5	NC	1
442			min	-.004	2	-.021	4	-.002	1	-4.053e-4	1	4898.163	4	NC	1
443		13	max	.005	3	-.005	15	0	15	-2.054e-5	15	NC	5	NC	1
444			min	-.004	2	-.02	4	-.003	1	-4.417e-4	1	5241.08	4	NC	1
445		14	max	.006	3	-.004	15	0	15	-2.223e-5	15	NC	5	NC	1
446			min	-.005	2	-.018	4	-.004	1	-4.78e-4	1	5850.451	4	NC	1
447		15	max	.006	3	-.004	15	0	15	-2.392e-5	15	NC	3	NC	1
448			min	-.005	2	-.015	4	-.006	1	-5.144e-4	1	6893.779	4	NC	1
449		16	max	.007	3	-.003	15	0	15	-2.562e-5	15	NC	1	NC	1
450			min	-.005	2	-.012	4	-.007	1	-5.508e-4	1	8776.38	4	NC	1
451		17	max	.007	3	-.002	15	0	15	-2.731e-5	15	NC	1	NC	1
452			min	-.006	2	-.009	4	-.009	1	-5.871e-4	1	NC	1	NC	1
453		18	max	.007	3	-.001	15	0	15	-2.9e-5	15	NC	1	NC	2
454			min	-.006	2	-.005	1	-.011	1	-6.235e-4	1	NC	1	9285.541	1
455		19	max	.008	3	0	10	0	15	-3.069e-5	15	NC	1	NC	2
456			min	-.006	2	-.002	1	-.013	1	-6.598e-4	1	NC	1	7746.938	1
457	M12	1	max	.003	1	.006	2	.013	1	-1.09e-5	15	NC	1	NC	3
458			min	0	3	-.008	3	0	15	-2.336e-4	1	NC	1	1890.202	1
459		2	max	.003	1	.006	2	.012	1	-1.09e-5	15	NC	1	NC	3
460			min	0	3	-.008	3	0	15	-2.336e-4	1	NC	1	2051.219	1
461		3	max	.002	1	.005	2	.011	1	-1.09e-5	15	NC	1	NC	3
462			min	0	3	-.007	3	0	15	-2.336e-4	1	NC	1	2243.12	1
463		4	max	.002	1	.005	2	.01	1	-1.09e-5	15	NC	1	NC	3
464			min	0	3	-.007	3	0	15	-2.336e-4	1	NC	1	2473.88	1
465		5	max	.002	1	.005	2	.009	1	-1.09e-5	15	NC	1	NC	3
466			min	0	3	-.006	3	0	15	-2.336e-4	1	NC	1	2754.341	1
467		6	max	.002	1	.004	2	.008	1	-1.09e-5	15	NC	1	NC	3
468			min	0	3	-.006	3	0	15	-2.336e-4	1	NC	1	3099.541	1
469		7	max	.002	1	.004	2	.007	1	-1.09e-5	15	NC	1	NC	3
470			min	0	3	-.005	3	0	15	-2.336e-4	1	NC	1	3530.824	1
471		8	max	.002	1	.004	2	.006	1	-1.09e-5	15	NC	1	NC	3
472			min	0	3	-.005	3	0	15	-2.336e-4	1	NC	1	4079.315	1
473		9	max	.001	1	.003	2	.005	1	-1.09e-5	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-2.336e-4	1	NC	1	4791.862	1
475		10	max	.001	1	.003	2	.004	1	-1.09e-5	15	NC	1	NC	2
476			min	0	3	-.004	3	0	15	-2.336e-4	1	NC	1	5741.682	1
477		11	max	.001	1	.003	2	.004	1	-1.09e-5	15	NC	1	NC	2
478			min	0	3	-.004	3	0	15	-2.336e-4	1	NC	1	7048.515	1
479		12	max	.001	1	.002	2	.003	1	-1.09e-5	15	NC	1	NC	2
480			min	0	3	-.003	3	0	15	-2.336e-4	1	NC	1	8919.42	1
481		13	max	0	1	.002	2	.002	1	-1.09e-5	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-2.336e-4	1	NC	1	NC	1
483		14	max	0	1	.002	2	.002	1	-1.09e-5	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-2.336e-4	1	NC	1	NC	1
485		15	max	0	1	.001	2	.001	1	-1.09e-5	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-2.336e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-1.09e-5	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-2.336e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-1.09e-5	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-2.336e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-1.09e-5	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-2.336e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-1.09e-5	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.336e-4	1	NC	1	NC	1
495	M1	1	max	.01	3	.179	2	.001	1	1.372e-2	1	NC	1	NC	1
496			min	-.005	2	-.036	3	0	15	-2.373e-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	.01	3	.086	2	0	15	6.608e-3	1	NC	5	NC	1
498			min	-.005	2	-.016	3	-.01	1	-1.178e-2	3	1471.082	2	NC	1
499		3	max	.01	3	.015	3	0	15	-1.134e-6	10	NC	5	NC	2
500			min	-.005	2	-.012	2	-.014	1	-2.966e-4	1	709.941	2	8956.275	1
501		4	max	.01	3	.066	3	0	15	4.722e-3	2	NC	15	NC	2
502			min	-.005	2	-.123	2	-.013	1	-4.825e-3	3	449.456	2	9644.664	1
503		5	max	.01	3	.131	3	0	15	9.536e-3	1	9864.306	15	NC	1
504			min	-.005	2	-.238	2	-.009	1	-9.53e-3	3	324.998	2	NC	1
505		6	max	.009	3	.201	3	0	15	1.445e-2	1	7783.457	15	NC	1
506			min	-.005	2	-.35	2	-.004	1	-1.424e-2	3	256.312	2	NC	1
507		7	max	.009	3	.267	3	0	1	1.937e-2	1	6556.288	15	NC	1
508			min	-.005	2	-.449	2	0	3	-1.894e-2	3	215.724	2	NC	1
509		8	max	.009	3	.323	3	.001	1	2.429e-2	1	5830.806	15	NC	1
510			min	-.005	2	-.528	2	0	15	-2.365e-2	3	191.704	2	NC	1
511		9	max	.009	3	.359	3	0	15	2.705e-2	2	5451.695	15	NC	1
512			min	-.005	2	-.578	2	0	1	-2.397e-2	3	179.183	2	NC	1
513		10	max	.009	3	.373	3	0	1	2.91e-2	2	5335.936	15	NC	1
514			min	-.004	2	-.595	2	0	15	-2.137e-2	3	175.51	2	NC	1
515		11	max	.008	3	.364	3	0	1	3.116e-2	2	5451.455	15	NC	1
516			min	-.004	2	-.578	2	0	15	-1.877e-2	3	179.804	2	NC	1
517		12	max	.008	3	.333	3	0	15	3.002e-2	2	5830.307	15	NC	1
518			min	-.004	2	-.526	2	-.001	1	-1.594e-2	3	193.563	2	NC	1
519		13	max	.008	3	.284	3	0	15	2.41e-2	2	6555.428	15	NC	1
520			min	-.004	2	-.443	2	0	1	-1.275e-2	3	220.188	2	NC	1
521		14	max	.008	3	.221	3	.003	1	1.818e-2	2	7782.018	15	NC	1
522			min	-.004	2	-.34	2	0	15	-9.558e-3	3	265.774	2	NC	1
523		15	max	.007	3	.15	3	.008	1	1.226e-2	2	9861.841	15	NC	1
524			min	-.004	2	-.226	2	0	15	-6.369e-3	3	344.336	2	NC	1
525		16	max	.007	3	.076	3	.012	1	6.334e-3	2	NC	15	NC	1
526			min	-.004	2	-.112	2	0	15	-3.181e-3	3	489.912	2	NC	1
527		17	max	.007	3	.005	3	.013	1	8.505e-4	1	NC	5	NC	2
528			min	-.004	2	-.006	2	0	15	8.211e-6	3	799.172	1	9540.251	1
529		18	max	.007	3	.083	1	.009	1	1.002e-2	2	NC	5	NC	1
530			min	-.004	2	-.058	3	0	15	-3.686e-3	3	1685.099	1	NC	1
531		19	max	.007	3	.163	1	0	15	1.991e-2	2	NC	1	NC	1
532			min	-.004	2	-.118	3	-.001	1	-7.503e-3	3	NC	1	NC	1
533	M5	1	max	.031	3	.375	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	-.035	3	0	1	0	1	NC	1	NC	1
535		2	max	.031	3	.18	2	0	1	0	1	NC	5	NC	1
536			min	-.021	2	-.012	3	0	1	0	1	700.569	2	NC	1
537		3	max	.031	3	.048	3	0	1	0	1	NC	15	NC	1
538			min	-.022	2	-.04	2	0	1	0	1	329.007	2	NC	1
539		4	max	.03	3	.174	3	0	1	0	1	6861.773	15	NC	1
540			min	-.021	2	-.302	2	0	1	0	1	201.152	2	NC	1
541		5	max	.029	3	.347	3	0	1	0	1	4786.935	15	NC	1
542			min	-.021	2	-.587	2	0	1	0	1	141.345	2	NC	1
543		6	max	.029	3	.541	3	0	1	0	1	3676.468	15	NC	1
544			min	-.02	2	-.871	2	0	1	0	1	109.1	2	NC	1
545		7	max	.028	3	.73	3	0	1	0	1	3036.617	15	NC	1
546			min	-.02	2	-1.128	2	0	1	0	1	90.412	2	NC	1
547		8	max	.028	3	.888	3	0	1	0	1	2665.339	15	NC	1
548			min	-.019	2	-1.335	2	0	1	0	1	79.522	2	NC	1
549		9	max	.027	3	.991	3	0	1	0	1	2474.999	15	NC	1
550			min	-.019	2	-1.466	2	0	1	0	1	73.925	2	NC	1
551		10	max	.026	3	1.028	3	0	1	0	1	2417.612	15	NC	1
552			min	-.019	2	-1.51	2	0	1	0	1	72.289	2	NC	1
553		11	max	.026	3	1.002	3	0	1	0	1	2475.1	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	-.018	2	-1.466	2	0	1	0	1	74.201	2	NC	1
555		12	max	.025	3	.915	3	0	1	0	1	2665.584	15	NC	1
556			min	-.018	2	-1.329	2	0	1	0	1	80.421	2	NC	1
557		13	max	.024	3	.775	3	0	1	0	1	3037.129	15	NC	1
558			min	-.018	2	-1.112	2	0	1	0	1	92.732	2	NC	1
559		14	max	.024	3	.598	3	0	1	0	1	3677.486	15	NC	1
560			min	-.018	2	-.842	2	0	1	0	1	114.336	2	NC	1
561		15	max	.023	3	.402	3	0	1	0	1	4788.972	15	NC	1
562			min	-.017	2	-.55	2	0	1	0	1	152.798	2	NC	1
563		16	max	.022	3	.202	3	0	1	0	1	6866.079	15	NC	1
564			min	-.017	2	-.266	2	0	1	0	1	225.41	1	NC	1
565		17	max	.022	3	.016	3	0	1	0	1	NC	15	NC	1
566			min	-.017	2	-.02	2	0	1	0	1	383.36	1	NC	1
567		18	max	.022	3	.174	1	0	1	0	1	NC	5	NC	1
568			min	-.017	2	-.143	3	0	1	0	1	841.56	1	NC	1
569		19	max	.022	3	.332	1	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.286	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.179	2	0	15	2.373e-2	3	NC	1	NC	1
572			min	-.005	2	-.036	3	-.001	1	-1.372e-2	1	NC	1	NC	1
573		2	max	.01	3	.086	2	.01	1	1.178e-2	3	NC	5	NC	1
574			min	-.005	2	-.016	3	0	15	-6.608e-3	1	1471.082	2	NC	1
575		3	max	.01	3	.015	3	.014	1	2.966e-4	1	NC	5	NC	2
576			min	-.005	2	-.012	2	0	15	1.134e-6	10	709.941	2	8956.275	1
577		4	max	.01	3	.066	3	.013	1	4.825e-3	3	NC	15	NC	2
578			min	-.005	2	-.123	2	0	15	-4.722e-3	2	449.456	2	9644.664	1
579		5	max	.01	3	.131	3	.009	1	9.53e-3	3	9864.306	15	NC	1
580			min	-.005	2	-.238	2	0	15	-9.536e-3	1	324.998	2	NC	1
581		6	max	.009	3	.201	3	.004	1	1.424e-2	3	7783.457	15	NC	1
582			min	-.005	2	-.35	2	0	15	-1.445e-2	1	256.312	2	NC	1
583		7	max	.009	3	.267	3	0	3	1.894e-2	3	6556.288	15	NC	1
584			min	-.005	2	-.449	2	0	1	-1.937e-2	1	215.724	2	NC	1
585		8	max	.009	3	.323	3	0	15	2.365e-2	3	5830.806	15	NC	1
586			min	-.005	2	-.528	2	-.001	1	-2.429e-2	1	191.704	2	NC	1
587		9	max	.009	3	.359	3	0	1	2.397e-2	3	5451.695	15	NC	1
588			min	-.005	2	-.578	2	0	15	-2.705e-2	2	179.183	2	NC	1
589		10	max	.009	3	.373	3	0	15	2.137e-2	3	5335.936	15	NC	1
590			min	-.004	2	-.595	2	0	1	-2.91e-2	2	175.51	2	NC	1
591		11	max	.008	3	.364	3	0	15	1.877e-2	3	5451.455	15	NC	1
592			min	-.004	2	-.578	2	0	1	-3.116e-2	2	179.804	2	NC	1
593		12	max	.008	3	.333	3	.001	1	1.594e-2	3	5830.307	15	NC	1
594			min	-.004	2	-.526	2	0	15	-3.002e-2	2	193.563	2	NC	1
595		13	max	.008	3	.284	3	0	1	1.275e-2	3	6555.428	15	NC	1
596			min	-.004	2	-.443	2	0	15	-2.41e-2	2	220.188	2	NC	1
597		14	max	.008	3	.221	3	0	15	9.558e-3	3	7782.018	15	NC	1
598			min	-.004	2	-.34	2	-.003	1	-1.818e-2	2	265.774	2	NC	1
599		15	max	.007	3	.15	3	0	15	6.369e-3	3	9861.841	15	NC	1
600			min	-.004	2	-.226	2	-.008	1	-1.226e-2	2	344.336	2	NC	1
601		16	max	.007	3	.076	3	0	15	3.181e-3	3	NC	15	NC	1
602			min	-.004	2	-.112	2	-.012	1	-6.334e-3	2	489.912	2	NC	1
603		17	max	.007	3	.005	3	0	15	-8.211e-6	3	NC	5	NC	2
604			min	-.004	2	-.006	2	-.013	1	-8.505e-4	1	799.172	1	9540.251	1
605		18	max	.007	3	.083	1	0	15	3.686e-3	3	NC	5	NC	1
606			min	-.004	2	-.058	3	-.009	1	-1.002e-2	2	1685.099	1	NC	1
607		19	max	.007	3	.163	1	.001	1	7.503e-3	3	NC	1	NC	1
608			min	-.004	2	-.118	3	0	15	-1.991e-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

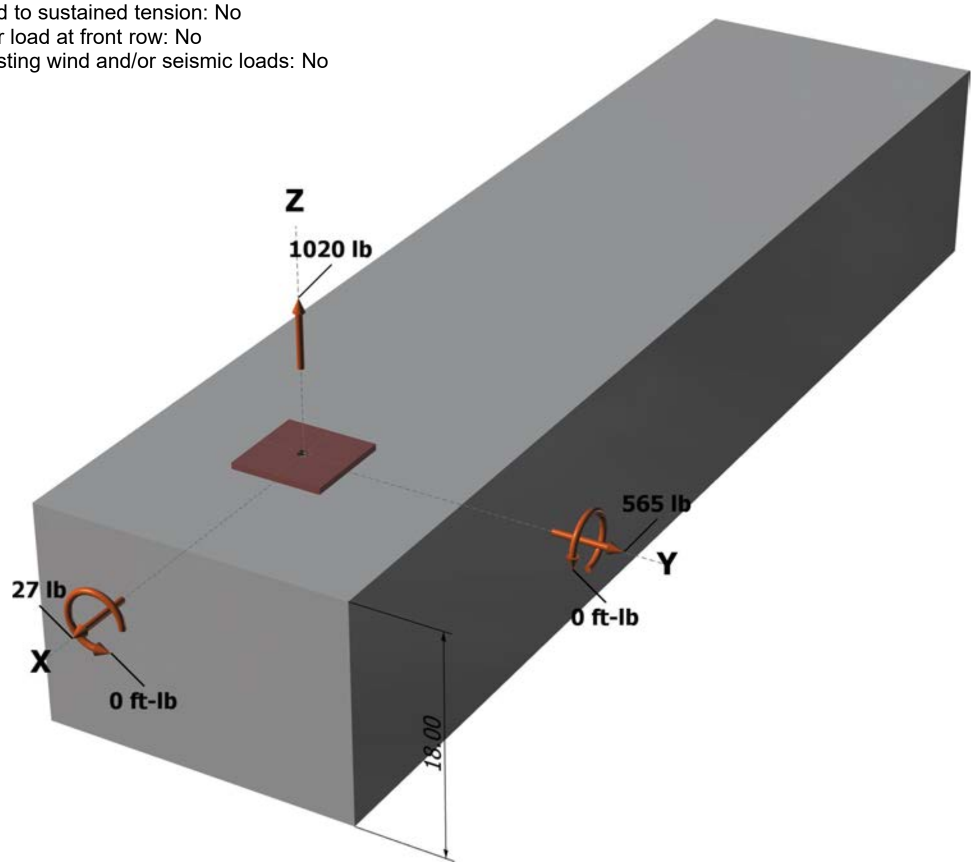
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

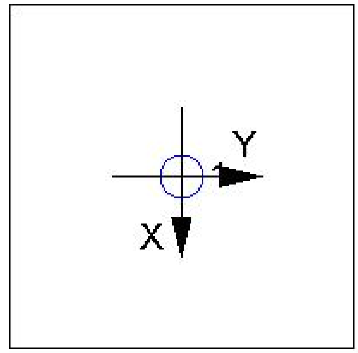
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
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	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**566**	**3156**	**0.18**	**Pass (Governs)**
T Concrete breakout y+	565	3934	0.14	Pass
T Concrete breakout x+	27	3018	0.01	Pass
|| Concrete breakout y+	27	8508	0.00	Pass
|| Concrete breakout x+	565	6875	0.08	Pass
Concrete breakout, combined	-	-	0.14	Pass
Pryout	566	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	1.0	Pass

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

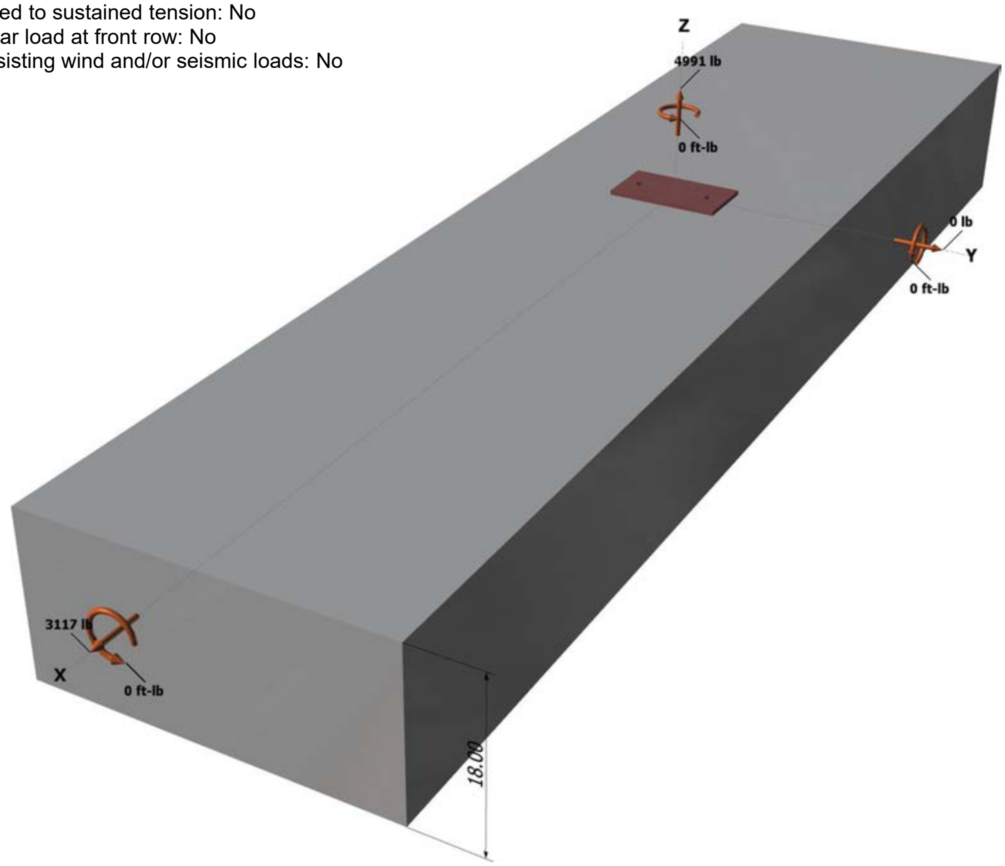
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

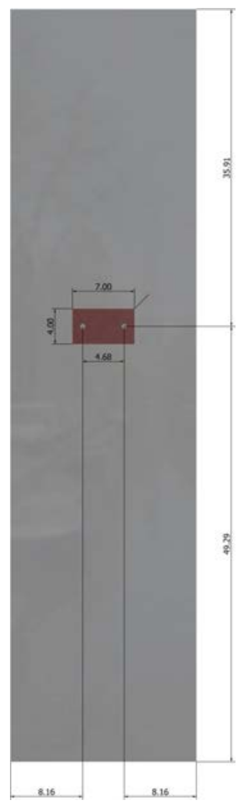
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



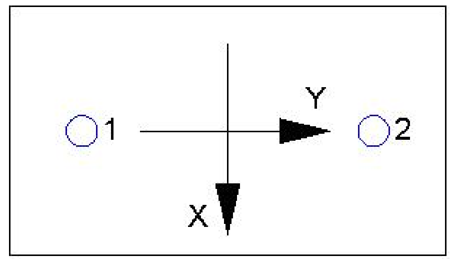
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2495.5	1558.5	0.0	1558.5
2	2495.5	1558.5	0.0	1558.5
Sum	4991.0	3117.0	0.0	3117.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4991
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	2496	6071	0.41	Pass
Concrete breakout	4991	9208	0.54	Pass
Adhesive	**4991**	**8093**	**0.62**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	1559	3156	0.49	Pass
T Concrete breakout x+	**3117**	**5323**	**0.59**	**Pass (Governs)**

|| Concrete breakout y-	**1559**	**12241**	**0.13**	**Pass (Governs)**
Pryout	3117	19833	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.62	0.59	120.2 %	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.