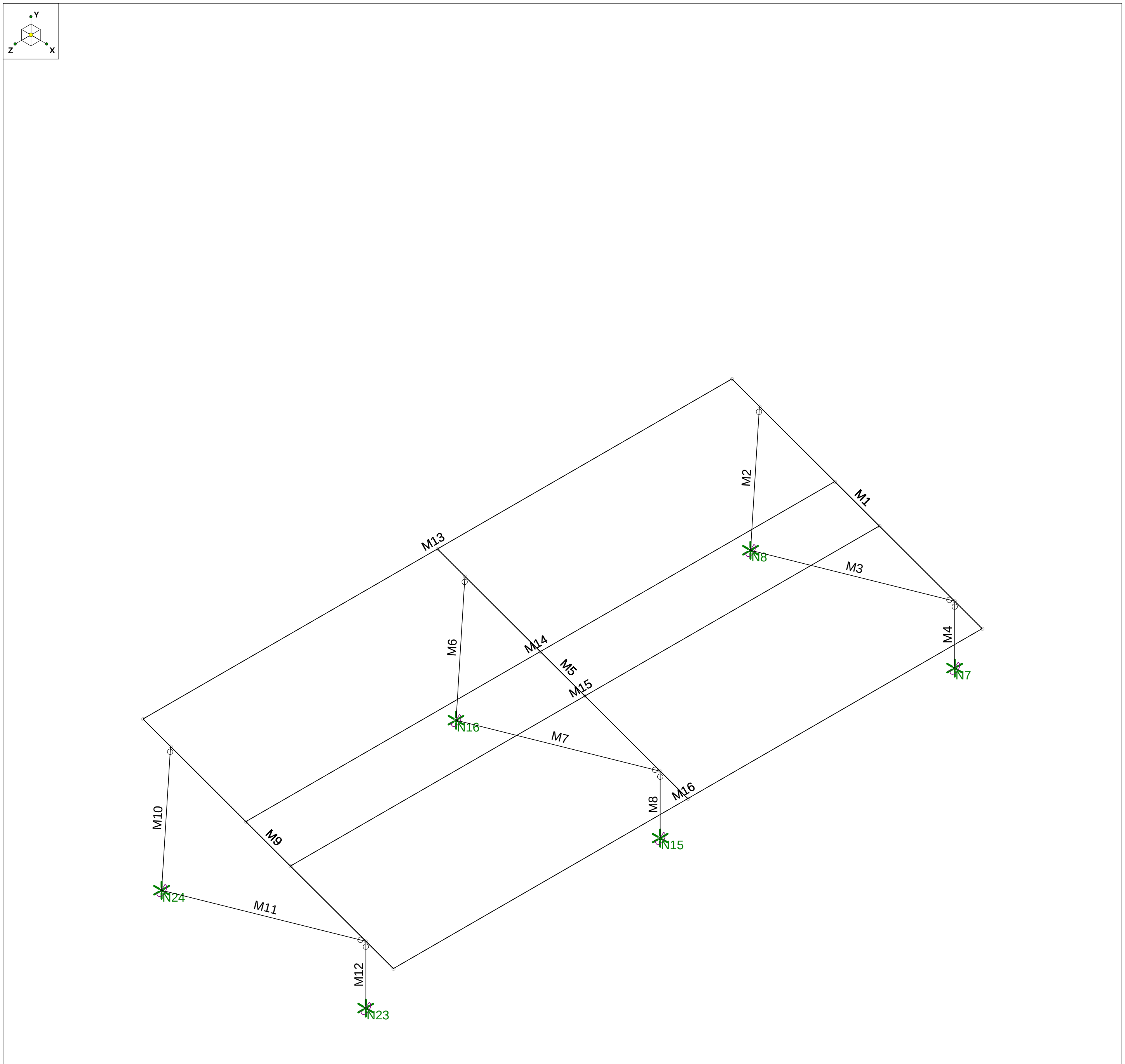


Schletter, Inc.		20ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

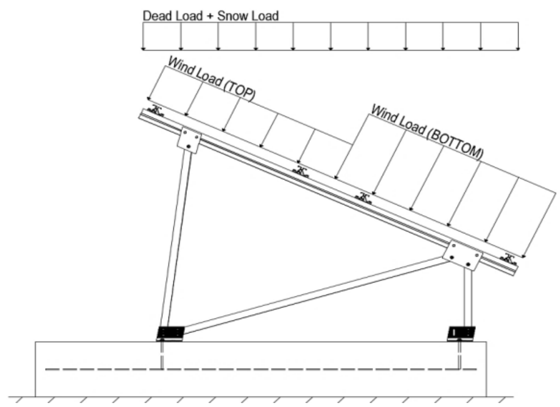
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 2
Module Tilt = 20°
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 = 20.62 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.91
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 160 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 40.19 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.050	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.650	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.400	*(Suction)*
$Cf-_{TOP, INNER PURLIN}$	=	-1.840	
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads - N/A

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

ASCE 7, Section 12.8.1.3: A maximum S_s of 1.5 may be used to calculate the base shear, C_s, of structures under five stories and with a period, T, of 0.5 or less. Therefore, a S_{ds} of 1.0 was used to calculate C_s.

2.5 Combination of Loads

ASCE 7 requires that all structures be checked by specified combinations of loads. Applicable load combinations are provided below.

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)

Allowable Stress Design, ASD

Member deflection checks and foundation designs are done according to the following ASD load combinations:

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)

[M] *Uses the minimum allowable module dead load.*
[R] *Include redundancy factor of 1.3.*
[O] *Includes overstrength factor of 1.25. Used to check seismic drift.*

3. STRUCTURAL ANALYSIS

3.1 RISA Results

Appendix B.1 contains outputs from the structural analysis software package, RISA. These outputs are used to accurately determine resultant member and reaction forces from the loads seen throughout Section 2.

3.2 RISA Components

A member and node list has been provided below to correlate the RISA components with the design calculations in Section 4. Items of significance have been listed.

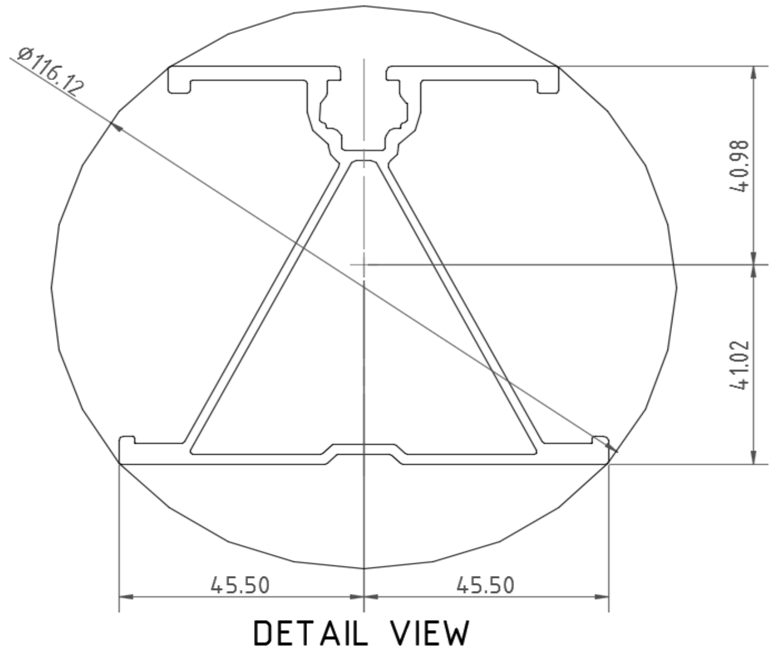
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer
Front Struts	Location				
M4	Outer				
M8	Inner				
M12	Outer				

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

Aluminum purlins are used to transfer loads to the support structure. Purlins are designed as continous beams with cantilevers. These are considered beams with internal hinges that can be joined with splices at 25% of the support respective span. See Appendix A.1 for detailed member calculations. Section units are in (mm).

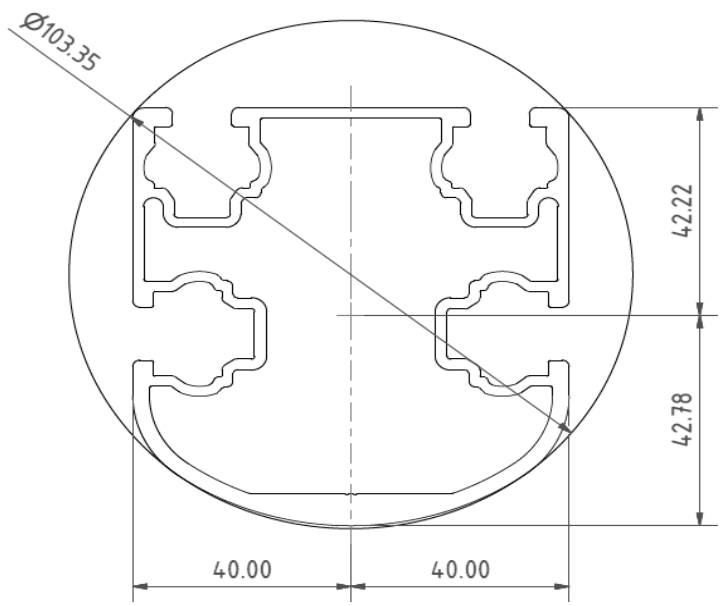
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-2.379	k-ft
M_z =	0.004	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	86%	



4.2 Girder Design

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

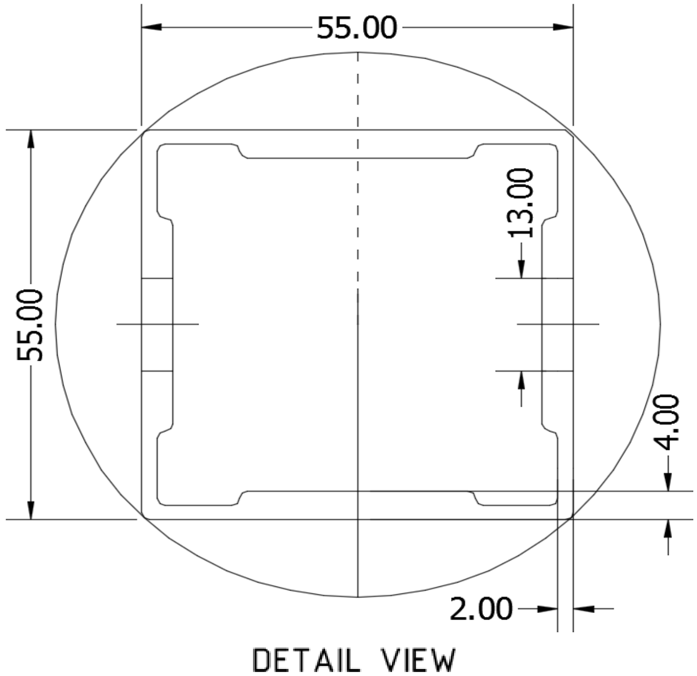
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.380	k-ft
M_z =	0.000	k-ft
P_n =	-0.739	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



4.3 Front Strut Design

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

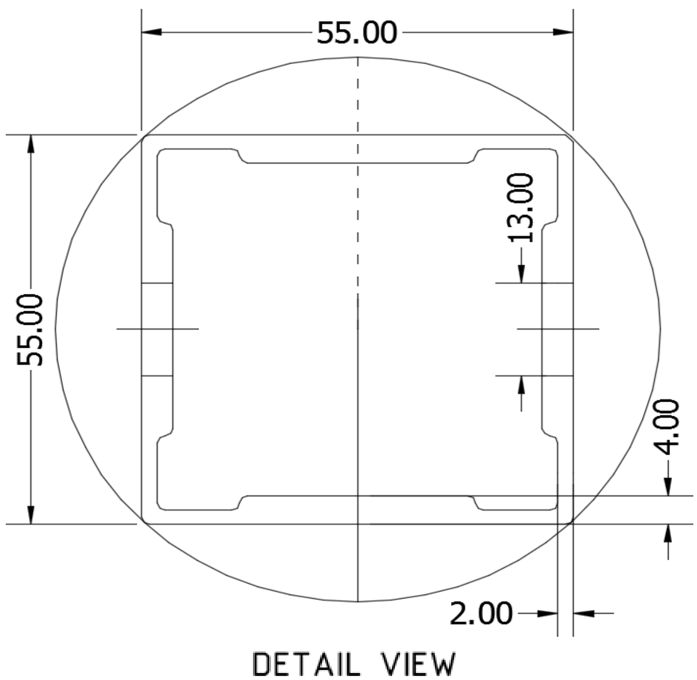
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.473	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	13%	



4.4 Diagonal Strut Design

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

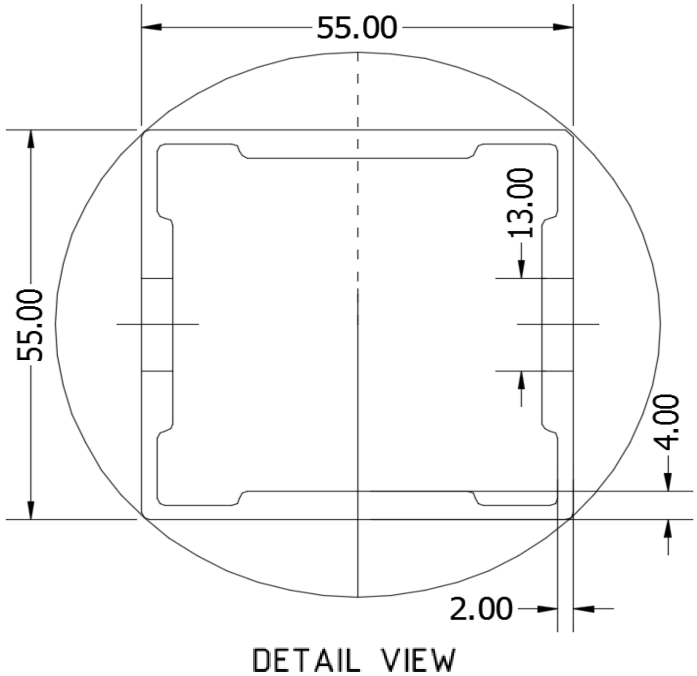
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.083	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	29%	



4.5 Rear Strut Design

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

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	55.91	in
$\Phi F_{ty\ AXIAL}$ =	15.92	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 =	3.553	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	23%	



5. FOUNDATION DESIGN CALCULATIONS

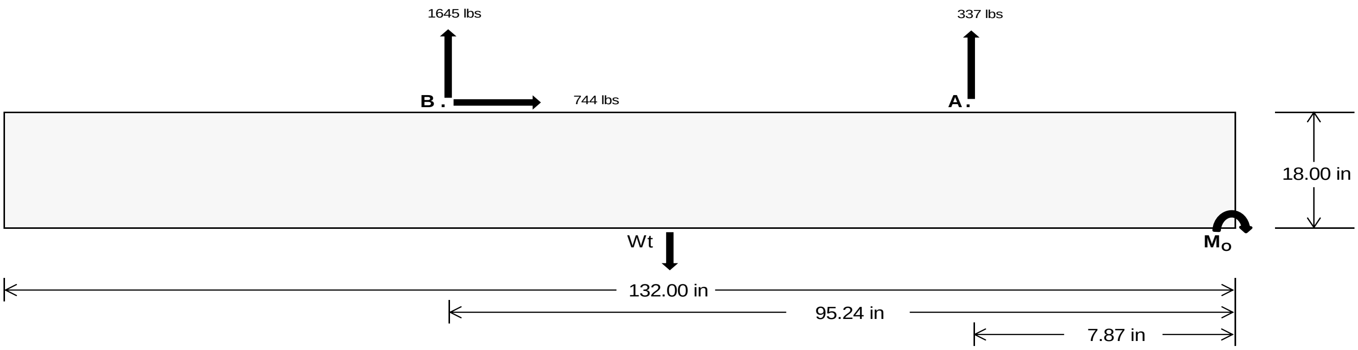
5.1 Helical Pile Foundations

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 =	1478.66	7144.22	k
Compressive Load =	4515.45	5355.74	k
Lateral Load =	8.68	3224.97	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>
Weight of Concrete = 145 pcf
Compressive Strength = 2500 psi
Yield Strength = 60000 psi

<u>Footing Reinforcement</u>
Use fiber reinforcing with (3) #5 rebar.

<u>Overturning Check</u>
M_O = 172687.8 in-lbs
Resisting Force Required = 2616.48 lbs
S.F. = 1.67
Weight Required = 4360.80 lbs
Minimum Width = <u>38 in</u> in
Weight Provided = 7576.25 lbs

A minimum 132in long x 38in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>
Force = 744.05 lbs
Friction = 0.4
Weight Required = 1860.13 lbs
Resisting Weight = 7576.25 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 38in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>
Sliding Force = 744.05 lbs
Cohesion = 130 psf
Area = 34.83 ft^2
Resisting = 3788.13 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 38in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>
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.

<u>Bearing Pressure</u>

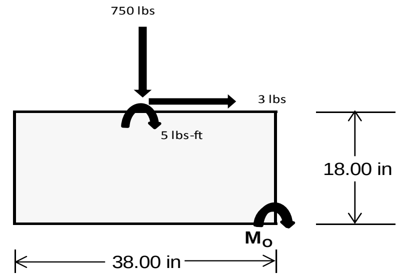
	Ballast Width			
	<u>38 in</u>	<u>39 in</u>	<u>40 in</u>	<u>41 in</u>
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3.17 ft) =	<u>7576 lbs</u>	<u>7776 lbs</u>	<u>7975 lbs</u>	<u>8174 lbs</u>

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in
F_A	1320 lbs	1320 lbs	1320 lbs	1320 lbs	1816 lbs	1816 lbs	1816 lbs	1816 lbs	2242 lbs	2242 lbs	2242 lbs	2242 lbs	-674 lbs	-674 lbs	-674 lbs	-674 lbs
F_B	1340 lbs	1340 lbs	1340 lbs	1340 lbs	2199 lbs	2199 lbs	2199 lbs	2199 lbs	2543 lbs	2543 lbs	2543 lbs	2543 lbs	-3290 lbs	-3290 lbs	-3290 lbs	-3290 lbs
F_V	143 lbs	143 lbs	143 lbs	143 lbs	1316 lbs	1316 lbs	1316 lbs	1316 lbs	1084 lbs	1084 lbs	1084 lbs	1084 lbs	-1488 lbs	-1488 lbs	-1488 lbs	-1488 lbs
P_{total}	10236 lbs	10436 lbs	10635 lbs	10834 lbs	11591 lbs	11790 lbs	11990 lbs	12189 lbs	12361 lbs	12560 lbs	12759 lbs	12959 lbs	582 lbs	702 lbs	822 lbs	941 lbs
M	3342 lbs-ft	3342 lbs-ft	3342 lbs-ft	3342 lbs-ft	5416 lbs-ft	5416 lbs-ft	5416 lbs-ft	5416 lbs-ft	6289 lbs-ft	6289 lbs-ft	6289 lbs-ft	6289 lbs-ft	2518 lbs-ft	2518 lbs-ft	2518 lbs-ft	2518 lbs-ft
e	0.33 ft	0.32 ft	0.31 ft	0.31 ft	0.47 ft	0.46 ft	0.45 ft	0.44 ft	0.51 ft	0.50 ft	0.49 ft	0.49 ft	4.32 ft	3.59 ft	3.06 ft	2.68 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	241.5 psf	240.9 psf	240.3 psf	239.8 psf	247.9 psf	247.2 psf	246.4 psf	245.7 psf	256.4 psf	255.4 psf	254.4 psf	253.5 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	346.2 psf	342.9 psf	339.8 psf	336.8 psf	417.6 psf	412.4 psf	407.6 psf	402.9 psf	453.3 psf	447.3 psf	441.5 psf	436.1 psf	104.3 psf	75.3 psf	67.5 psf	65.0 psf

Maximum Bearing Pressure = 453 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 38in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design



Overturning Check

M_O = 1177.3 ft-lbs
Resisting Force Required = 743.56 lbs
S.F. = 1.67
Weight Required = 1239.27 lbs
Minimum Width = 38 in in
Weight Provided = 7576.25 lbs

A minimum 132in long x 38in 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	38 in			38 in			38 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	213 lbs	550 lbs	213 lbs	750 lbs	2185 lbs	750 lbs	62 lbs	161 lbs	62 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9593 lbs	7576 lbs	9593 lbs	9678 lbs	7576 lbs	9678 lbs	2805 lbs	7576 lbs	2805 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	10 lbs-ft	0 lbs-ft	10 lbs-ft	0 lbs-ft	0 lbs-ft	0 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	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft
f_{min}	275.2 psf	217.5 psf	275.2 psf	277.3 psf	217.5 psf	277.3 psf	80.5 psf	217.5 psf	80.5 psf
f_{max}	275.6 psf	217.5 psf	275.6 psf	278.4 psf	217.5 psf	278.4 psf	80.5 psf	217.5 psf	80.5 psf

Maximum Bearing Pressure = 278 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 38in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 38in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

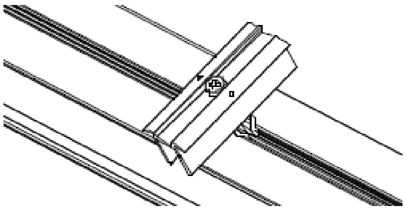
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

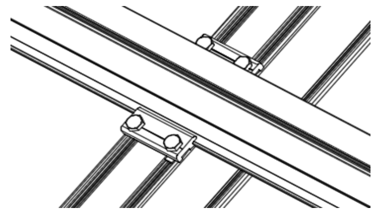
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.912	k
Allowable Uplift =	1.214	k
Utilization =	75%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.771	k
Allowable Uplift =	4.357	k
Utilization =	64%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	3.473	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	47%	

Rear Strut		
Maximum Axial Load =	4.908	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	66%	

Diagonal Strut		
Maximum Axial Load =	2.228	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	30%	

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.

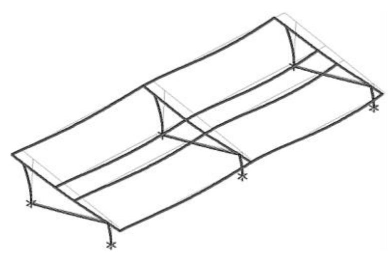
7. SEISMIC DESIGN

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} =	40.12	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.802	in
Max Drift, Δ_{MAX} =	0.023	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 = 102 in

J = 0.432

282.18

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

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= 27.9 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 in³

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 102

J = 0.432

179.449

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

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

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 in³

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)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
$\varphi F_L = (\varphi ck2*\sqrt{(BpE)})/(1.6b/t)$
$\varphi F_L =$ 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
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
$P_{max} =$ 41.32 kips

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

Girder = **BF0**

Strong Axis:

3.4.14

$L_b =$ 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.4 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 31.6 ksi

Weak Axis:

3.4.14

$L_b =$ 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.2

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

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

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

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

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

$C_0 =$ 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

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

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

$C_0 =$ 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

φcc = 0.86047

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

$\varphi F_L =$ 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 55.91 in
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.4 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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:

3.4.14

$L_b =$ 55.91
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.4

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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 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 = 1.29339

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76107

φF_L = (φccFcy)/(λ²)

φF_L = 15.9235 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

$\varphi F_L =$ 15.92 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 16.39 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-54.031	-54.031	0	0
2	M14	Y	-54.031	-54.031	0	0
3	M15	Y	-54.031	-54.031	0	0
4	M16	Y	-54.031	-54.031	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	-117.695	-117.695	0	0
2	M14	y	-117.695	-117.695	0	0
3	M15	y	-184.95	-184.95	0	0
4	M16	y	-184.95	-184.95	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	269.018	269.018	0	0
2	M14	y	206.247	206.247	0	0
3	M15	y	112.091	112.091	0	0
4	M16	y	112.091	112.091	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	638.246	2	1290.407	2	.622	1	.003	1	0	1	0	1
2		min	-792.507	3	-1702.993	3	.026	15	0	15	0	1	0	1
3	N7	max	.026	9	1175.424	1	-.254	15	0	15	0	1	0	1
4		min	-.207	2	-332.29	3	-6.675	1	-.014	1	0	1	0	1
5	N15	max	.022	9	3473.421	2	0	2	0	2	0	1	0	1
6		min	-2.317	2	-1137.428	3	0	1	0	1	0	1	0	1
7	N16	max	2245.602	2	4119.8	2	0	11	0	11	0	1	0	1
8		min	-2480.748	3	-5495.551	3	0	12	0	1	0	1	0	1
9	N23	max	.026	9	1175.424	1	6.675	1	.014	1	0	1	0	1
10		min	-.207	2	-332.29	3	.254	15	0	15	0	1	0	1
11	N24	max	638.246	2	1290.407	2	-.026	15	0	15	0	1	0	1
12		min	-792.507	3	-1702.993	3	-.622	1	-.003	1	0	1	0	1
13	Totals:	max	3519.363	2	12452.587	2	0	2						
14		min	-4066.824	3	-10703.546	3	0	1						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	69.537	1	482.587	2	-4.971	15	0	15	.165	1	0	1
2			min	2.567	15	-842.088	3	-136.133	1	-.016	2	.006	15	0	3
3		2	max	69.537	1	336.943	2	-3.817	15	0	15	.052	1	.678	3
4			min	2.567	15	-592.772	3	-104.382	1	-.016	2	.002	15	-.387	2
5		3	max	69.537	1	191.299	2	-2.663	15	0	15	.002	3	1.12	3
6			min	2.567	15	-343.455	3	-72.632	1	-.016	2	-.032	1	-.636	2
7		4	max	69.537	1	45.842	1	-1.509	15	0	15	-.002	12	1.326	3
8			min	2.567	15	-94.138	3	-40.881	1	-.016	2	-.086	1	-.748	2
9		5	max	69.537	1	155.179	3	-.234	10	0	15	-.004	12	1.297	3
10			min	2.567	15	-99.989	2	-9.13	1	-.016	2	-.109	1	-.723	2
11		6	max	69.537	1	404.495	3	22.621	1	0	15	-.004	15	1.033	3
12			min	2.567	15	-245.633	2	-.519	3	-.016	2	-.103	1	-.559	2
13		7	max	69.537	1	653.812	3	54.371	1	0	15	-.002	15	.533	3
14			min	2.567	15	-391.276	2	.921	12	-.016	2	-.066	1	-.26	1
15		8	max	69.537	1	903.129	3	86.122	1	0	15	.003	2	.18	2
16			min	2.567	15	-536.92	2	2.075	12	-.016	2	-.005	3	-.202	3
17		9	max	69.537	1	1152.446	3	117.873	1	0	15	.096	1	.755	2
18			min	2.567	15	-682.564	2	3.229	12	-.016	2	0	3	-1.172	3
19		10	max	69.537	1	1401.762	3	149.624	1	.016	2	.223	1	1.469	2
20			min	2.567	15	-828.208	2	4.383	12	0	12	.003	12	-2.379	3
21		11	max	69.537	1	682.564	2	-3.229	12	.016	2	.096	1	.755	2
22			min	2.567	15	-1152.446	3	-117.873	1	0	15	0	3	-1.172	3
23		12	max	69.537	1	536.92	2	-2.075	12	.016	2	.003	2	.18	2
24			min	2.567	15	-903.129	3	-86.122	1	0	15	-.005	3	-.202	3
25		13	max	69.537	1	391.276	2	-.921	12	.016	2	-.002	15	.533	3
26			min	2.567	15	-653.812	3	-54.371	1	0	15	-.066	1	-.26	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	69.537	1	245.633	2	.519	3	.016	2	-.004	15	1.033	3
28			min	2.567	15	-404.495	3	-22.621	1	0	15	-.103	1	-.559	2
29		15	max	69.537	1	99.989	2	9.13	1	.016	2	-.004	12	1.297	3
30			min	2.567	15	-155.179	3	.234	10	0	15	-.109	1	-.723	2
31		16	max	69.537	1	94.138	3	40.881	1	.016	2	-.002	12	1.326	3
32			min	2.567	15	-45.842	1	1.509	15	0	15	-.086	1	-.748	2
33		17	max	69.537	1	343.455	3	72.632	1	.016	2	.002	3	1.12	3
34			min	2.567	15	-191.299	2	2.663	15	0	15	-.032	1	-.636	2
35		18	max	69.537	1	592.772	3	104.382	1	.016	2	.052	1	.678	3
36			min	2.567	15	-336.943	2	3.817	15	0	15	.002	15	-.387	2
37		19	max	69.537	1	842.088	3	136.133	1	.016	2	.165	1	0	1
38			min	2.567	15	-482.587	2	4.971	15	0	15	.006	15	0	3
39	M14	1	max	35.785	1	530.587	2	-5.147	15	.012	3	.192	1	0	1
40			min	1.32	15	-670.426	3	-140.945	1	-.014	2	.007	15	0	3
41		2	max	35.785	1	384.943	2	-3.993	15	.012	3	.074	1	.543	3
42			min	1.32	15	-480.393	3	-109.194	1	-.014	2	.003	15	-.432	2
43		3	max	35.785	1	239.299	2	-2.838	15	.012	3	.003	3	.907	3
44			min	1.32	15	-290.36	3	-77.444	1	-.014	2	-.014	1	-.727	2
45		4	max	35.785	1	93.656	2	-1.684	15	.012	3	-.001	12	1.092	3
46			min	1.32	15	-100.327	3	-45.693	1	-.014	2	-.072	1	-.884	2
47		5	max	35.785	1	89.706	3	-.53	15	.012	3	-.003	12	1.097	3
48			min	1.32	15	-53.91	1	-13.942	1	-.014	2	-.1	1	-.904	2
49		6	max	35.785	1	279.739	3	17.809	1	.012	3	-.004	15	.922	3
50			min	1.32	15	-197.632	2	-.787	3	-.014	2	-.098	1	-.786	2
51		7	max	35.785	1	469.772	3	49.56	1	.012	3	-.002	15	.569	3
52			min	1.32	15	-343.276	2	.743	12	-.014	2	-.067	1	-.531	2
53		8	max	35.785	1	659.805	3	81.31	1	.012	3	.001	10	.035	3
54			min	1.32	15	-488.92	2	1.897	12	-.014	2	-.005	1	-.138	2
55		9	max	35.785	1	849.838	3	113.061	1	.012	3	.087	1	.407	1
56			min	1.32	15	-634.564	2	3.051	12	-.014	2	-.001	3	-.678	3
57		10	max	35.785	1	1039.871	3	144.812	1	.014	2	.209	1	1.065	1
58			min	1.32	15	-780.208	2	4.205	12	-.012	3	.003	12	-1.57	3
59		11	max	35.785	1	634.564	2	-3.051	12	.014	2	.087	1	.407	1
60			min	1.32	15	-849.838	3	-113.061	1	-.012	3	-.001	3	-.678	3
61		12	max	35.785	1	488.92	2	-1.897	12	.014	2	.001	10	.035	3
62			min	1.32	15	-659.805	3	-81.31	1	-.012	3	-.005	1	-.138	2
63		13	max	35.785	1	343.276	2	-.743	12	.014	2	-.002	15	.569	3
64			min	1.32	15	-469.772	3	-49.56	1	-.012	3	-.067	1	-.531	2
65		14	max	35.785	1	197.632	2	.787	3	.014	2	-.004	15	.922	3
66			min	1.32	15	-279.739	3	-17.809	1	-.012	3	-.098	1	-.786	2
67		15	max	35.785	1	53.91	1	13.942	1	.014	2	-.003	12	1.097	3
68			min	1.32	15	-89.706	3	.53	15	-.012	3	-.1	1	-.904	2
69		16	max	35.785	1	100.327	3	45.693	1	.014	2	-.001	12	1.092	3
70			min	1.32	15	-93.656	2	1.684	15	-.012	3	-.072	1	-.884	2
71		17	max	35.785	1	290.36	3	77.444	1	.014	2	.003	3	.907	3
72			min	1.32	15	-239.299	2	2.838	15	-.012	3	-.014	1	-.727	2
73		18	max	35.785	1	480.393	3	109.194	1	.014	2	.074	1	.543	3
74			min	1.32	15	-384.943	2	3.993	15	-.012	3	.003	15	-.432	2
75		19	max	35.785	1	670.426	3	140.945	1	.014	2	.192	1	0	1
76			min	1.32	15	-530.587	2	5.147	15	-.012	3	.007	15	0	3
77	M15	1	max	-1.38	15	745.057	2	-5.145	15	.014	2	.192	1	0	2
78			min	-37.27	1	-370.763	3	-140.947	1	-.01	3	.007	15	0	3
79		2	max	-1.38	15	535.895	2	-3.991	15	.014	2	.074	1	.302	3
80			min	-37.27	1	-269.656	3	-109.196	1	-.01	3	.003	15	-.605	2
81		3	max	-1.38	15	326.732	2	-2.837	15	.014	2	.003	3	.509	3
82			min	-37.27	1	-168.548	3	-77.445	1	-.01	3	-.014	1	-1.012	2
83		4	max	-1.38	15	117.57	2	-1.683	15	.014	2	-.001	12	.621	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	-37.27	1	-67.44	3	-45.694	1	-.01	3	-.072	1	-1.222	2
85		5	max	-1.38	15	33.668	3	-.529	15	.014	2	-.003	12	.637	3
86			min	-37.27	1	-91.593	2	-13.944	1	-.01	3	-.1	1	-1.234	2
87		6	max	-1.38	15	134.776	3	17.807	1	.014	2	-.004	15	.557	3
88			min	-37.27	1	-300.755	2	-.654	3	-.01	3	-.098	1	-1.049	2
89		7	max	-1.38	15	235.884	3	49.558	1	.014	2	-.002	15	.382	3
90			min	-37.27	1	-509.918	2	.823	12	-.01	3	-.067	1	-.666	2
91		8	max	-1.38	15	336.992	3	81.309	1	.014	2	.001	10	.112	3
92			min	-37.27	1	-719.08	2	1.977	12	-.01	3	-.005	1	-.089	1
93		9	max	-1.38	15	438.1	3	113.059	1	.014	2	.087	1	.692	2
94			min	-37.27	1	-928.243	2	3.131	12	-.01	3	0	3	-.254	3
95		10	max	-1.38	15	539.208	3	144.81	1	.01	3	.209	1	1.667	2
96			min	-37.27	1	-1137.405	2	4.285	12	-.014	2	.003	12	-.716	3
97		11	max	-1.38	15	928.243	2	-3.131	12	.01	3	.087	1	.692	2
98			min	-37.27	1	-438.1	3	-113.059	1	-.014	2	0	3	-.254	3
99		12	max	-1.38	15	719.08	2	-1.977	12	.01	3	.001	10	.112	3
100			min	-37.27	1	-336.992	3	-81.309	1	-.014	2	-.005	1	-.089	1
101		13	max	-1.38	15	509.918	2	-.823	12	.01	3	-.002	15	.382	3
102			min	-37.27	1	-235.884	3	-49.558	1	-.014	2	-.067	1	-.666	2
103		14	max	-1.38	15	300.755	2	.654	3	.01	3	-.004	15	.557	3
104			min	-37.27	1	-134.776	3	-17.807	1	-.014	2	-.098	1	-1.049	2
105		15	max	-1.38	15	91.593	2	13.944	1	.01	3	-.003	12	.637	3
106			min	-37.27	1	-33.668	3	.529	15	-.014	2	-.1	1	-1.234	2
107		16	max	-1.38	15	67.44	3	45.694	1	.01	3	-.001	12	.621	3
108			min	-37.27	1	-117.57	2	1.683	15	-.014	2	-.072	1	-1.222	2
109		17	max	-1.38	15	168.548	3	77.445	1	.01	3	.003	3	.509	3
110			min	-37.27	1	-326.732	2	2.837	15	-.014	2	-.014	1	-1.012	2
111		18	max	-1.38	15	269.656	3	109.196	1	.01	3	.074	1	.302	3
112			min	-37.27	1	-535.895	2	3.991	15	-.014	2	.003	15	-.605	2
113		19	max	-1.38	15	370.763	3	140.947	1	.01	3	.192	1	0	2
114			min	-37.27	1	-745.057	2	5.145	15	-.014	2	.007	15	0	3
115	M16	1	max	-2.734	15	699.049	2	-4.977	15	.011	1	.167	1	0	2
116			min	-74.105	1	-333.417	3	-136.416	1	-.013	3	.006	15	0	3
117		2	max	-2.734	15	489.886	2	-3.823	15	.011	1	.053	1	.267	3
118			min	-74.105	1	-232.309	3	-104.666	1	-.013	3	.002	15	-.561	2
119		3	max	-2.734	15	280.724	2	-2.669	15	.011	1	.001	3	.439	3
120			min	-74.105	1	-131.201	3	-72.915	1	-.013	3	-.031	1	-.925	2
121		4	max	-2.734	15	71.562	2	-1.515	15	.011	1	-.002	12	.515	3
122			min	-74.105	1	-30.094	3	-41.164	1	-.013	3	-.085	1	-1.092	2
123		5	max	-2.734	15	71.014	3	-.36	15	.011	1	-.004	12	.496	3
124			min	-74.105	1	-137.601	2	-9.413	1	-.013	3	-.109	1	-1.061	2
125		6	max	-2.734	15	172.122	3	22.337	1	.011	1	-.004	15	.381	3
126			min	-74.105	1	-346.763	2	-.07	3	-.013	3	-.103	1	-.832	2
127		7	max	-2.734	15	273.23	3	54.088	1	.011	1	-.002	15	.171	3
128			min	-74.105	1	-555.926	2	1.191	12	-.013	3	-.067	1	-.406	2
129		8	max	-2.734	15	374.338	3	85.839	1	.011	1	.002	2	.218	2
130			min	-74.105	1	-765.088	2	2.345	12	-.013	3	-.003	3	-.135	3
131		9	max	-2.734	15	475.446	3	117.59	1	.011	1	.095	1	1.04	2
132			min	-74.105	1	-974.251	2	3.499	12	-.013	3	0	3	-.537	3
133		10	max	-2.734	15	576.554	3	149.34	1	.013	3	.222	1	2.059	2
134			min	-74.105	1	-1183.413	2	4.652	12	-.011	1	.005	12	-1.033	3
135		11	max	-2.734	15	974.251	2	-3.499	12	.013	3	.095	1	1.04	2
136			min	-74.105	1	-475.446	3	-117.59	1	-.011	1	0	3	-.537	3
137		12	max	-2.734	15	765.088	2	-2.345	12	.013	3	.002	2	.218	2
138			min	-74.105	1	-374.338	3	-85.839	1	-.011	1	-.003	3	-.135	3
139		13	max	-2.734	15	555.926	2	-1.191	12	.013	3	-.002	15	.171	3
140			min	-74.105	1	-273.23	3	-54.088	1	-.011	1	-.067	1	-.406	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	-2.734	15	346.763	2	.07	3	.013	3	-.004	15	.381	3
142			min	-74.105	1	-172.122	3	-22.337	1	-.011	1	-.103	1	-.832	2
143		15	max	-2.734	15	137.601	2	9.413	1	.013	3	-.004	12	.496	3
144			min	-74.105	1	-71.014	3	.36	15	-.011	1	-.109	1	-1.061	2
145		16	max	-2.734	15	30.094	3	41.164	1	.013	3	-.002	12	.515	3
146			min	-74.105	1	-71.562	2	1.515	15	-.011	1	-.085	1	-1.092	2
147		17	max	-2.734	15	131.201	3	72.915	1	.013	3	.001	3	.439	3
148			min	-74.105	1	-280.724	2	2.669	15	-.011	1	-.031	1	-.925	2
149		18	max	-2.734	15	232.309	3	104.666	1	.013	3	.053	1	.267	3
150			min	-74.105	1	-489.886	2	3.823	15	-.011	1	.002	15	-.561	2
151		19	max	-2.734	15	333.417	3	136.416	1	.013	3	.167	1	0	2
152			min	-74.105	1	-699.049	2	4.977	15	-.011	1	.006	15	0	3
153	M2	1	max	1120.731	2	2.029	4	.651	1	0	3	0	3	0	1
154			min	-1520.659	3	.478	15	.024	15	0	1	0	2	0	1
155		2	max	1121.111	2	1.995	4	.651	1	0	3	0	1	0	15
156			min	-1520.375	3	.47	15	.024	15	0	1	0	15	0	4
157		3	max	1121.49	2	1.962	4	.651	1	0	3	0	1	0	15
158			min	-1520.09	3	.462	15	.024	15	0	1	0	15	-.001	4
159		4	max	1121.869	2	1.928	4	.651	1	0	3	0	1	0	15
160			min	-1519.806	3	.454	15	.024	15	0	1	0	15	-.002	4
161		5	max	1122.248	2	1.895	4	.651	1	0	3	0	1	0	15
162			min	-1519.521	3	.446	15	.024	15	0	1	0	15	-.002	4
163		6	max	1122.628	2	1.862	4	.651	1	0	3	0	1	0	15
164			min	-1519.237	3	.438	15	.024	15	0	1	0	15	-.002	4
165		7	max	1123.007	2	1.828	4	.651	1	0	3	0	1	0	15
166			min	-1518.952	3	.431	15	.024	15	0	1	0	15	-.003	4
167		8	max	1123.386	2	1.795	4	.651	1	0	3	.001	1	0	15
168			min	-1518.668	3	.423	15	.024	15	0	1	0	15	-.003	4
169		9	max	1123.765	2	1.761	4	.651	1	0	3	.001	1	0	15
170			min	-1518.384	3	.415	15	.024	15	0	1	0	15	-.004	4
171		10	max	1124.145	2	1.728	4	.651	1	0	3	.001	1	-.001	15
172			min	-1518.099	3	.407	15	.024	15	0	1	0	15	-.004	4
173		11	max	1124.524	2	1.695	4	.651	1	0	3	.002	1	-.001	15
174			min	-1517.815	3	.398	12	.024	15	0	1	0	15	-.005	4
175		12	max	1124.903	2	1.661	4	.651	1	0	3	.002	1	-.001	15
176			min	-1517.53	3	.385	12	.024	15	0	1	0	15	-.005	4
177		13	max	1125.282	2	1.628	4	.651	1	0	3	.002	1	-.001	15
178			min	-1517.246	3	.372	12	.024	15	0	1	0	15	-.006	4
179		14	max	1125.662	2	1.594	4	.651	1	0	3	.002	1	-.001	15
180			min	-1516.961	3	.359	12	.024	15	0	1	0	15	-.006	4
181		15	max	1126.041	2	1.561	4	.651	1	0	3	.002	1	-.002	15
182			min	-1516.677	3	.346	12	.024	15	0	1	0	15	-.006	4
183		16	max	1126.42	2	1.528	4	.651	1	0	3	.002	1	-.002	15
184			min	-1516.392	3	.333	12	.024	15	0	1	0	15	-.007	4
185		17	max	1126.799	2	1.494	4	.651	1	0	3	.003	1	-.002	15
186			min	-1516.108	3	.32	12	.024	15	0	1	0	15	-.007	4
187		18	max	1127.179	2	1.461	2	.651	1	0	3	.003	1	-.002	15
188			min	-1515.824	3	.307	12	.024	15	0	1	0	15	-.008	4
189		19	max	1127.558	2	1.435	2	.651	1	0	3	.003	1	-.002	15
190			min	-1515.539	3	.294	12	.024	15	0	1	0	15	-.008	4
191	M3	1	max	583.7	2	7.983	4	.066	1	0	3	0	1	.008	4
192			min	-714.858	3	1.877	15	.002	15	0	1	0	15	.002	15
193		2	max	583.53	2	7.213	4	.066	1	0	3	0	1	.005	2
194			min	-714.985	3	1.696	15	.002	15	0	1	0	15	0	12
195		3	max	583.36	2	6.443	4	.066	1	0	3	0	1	.003	2
196			min	-715.113	3	1.515	15	.002	15	0	1	0	15	0	3
197		4	max	583.189	2	5.673	4	.066	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-715.241	3	1.334	15	.002	15	0	1	0	15	-.002	3
199		5	max	583.019	2	4.903	4	.066	1	0	3	0	1	0	15
200			min	-715.369	3	1.153	15	.002	15	0	1	0	15	-.003	3
201		6	max	582.849	2	4.133	4	.066	1	0	3	0	1	-.001	15
202			min	-715.497	3	.972	15	.002	15	0	1	0	15	-.005	4
203		7	max	582.678	2	3.363	4	.066	1	0	3	0	1	-.001	15
204			min	-715.624	3	.791	15	.002	15	0	1	0	15	-.006	4
205		8	max	582.508	2	2.593	4	.066	1	0	3	0	1	-.002	15
206			min	-715.752	3	.61	15	.002	15	0	1	0	15	-.008	4
207		9	max	582.338	2	1.823	4	.066	1	0	3	0	1	-.002	15
208			min	-715.88	3	.429	15	.002	15	0	1	0	15	-.009	4
209		10	max	582.167	2	1.053	4	.066	1	0	3	0	1	-.002	15
210			min	-716.008	3	.248	15	.002	15	0	1	0	15	-.009	4
211		11	max	581.997	2	.417	2	.066	1	0	3	0	1	-.002	15
212			min	-716.135	3	-.101	3	.002	15	0	1	0	15	-.009	4
213		12	max	581.827	2	-.114	15	.066	1	0	3	0	1	-.002	15
214			min	-716.263	3	-.551	3	.002	15	0	1	0	15	-.009	4
215		13	max	581.656	2	-.295	15	.066	1	0	3	0	1	-.002	15
216			min	-716.391	3	-1.257	4	.002	15	0	1	0	15	-.009	4
217		14	max	581.486	2	-.476	15	.066	1	0	3	0	1	-.002	15
218			min	-716.519	3	-2.027	4	.002	15	0	1	0	15	-.008	4
219		15	max	581.316	2	-.657	15	.066	1	0	3	0	1	-.002	15
220			min	-716.646	3	-2.797	4	.002	15	0	1	0	15	-.007	4
221		16	max	581.145	2	-.838	15	.066	1	0	3	0	1	-.001	15
222			min	-716.774	3	-3.567	4	.002	15	0	1	0	15	-.006	4
223		17	max	580.975	2	-1.019	15	.066	1	0	3	0	1	-.001	15
224			min	-716.902	3	-4.337	4	.002	15	0	1	0	15	-.004	4
225		18	max	580.805	2	-1.2	15	.066	1	0	3	0	1	0	15
226			min	-717.03	3	-5.107	4	.002	15	0	1	0	15	-.002	4
227		19	max	580.634	2	-1.381	15	.066	1	0	3	0	1	0	1
228			min	-717.157	3	-5.877	4	.002	15	0	1	0	15	0	1
229	M4	1	max	1172.358	1	0	1	-.254	15	0	1	0	1	0	1
230			min	-334.59	3	0	1	-6.92	1	0	1	0	15	0	1
231		2	max	1172.528	1	0	1	-.254	15	0	1	0	12	0	1
232			min	-334.462	3	0	1	-6.92	1	0	1	0	1	0	1
233		3	max	1172.699	1	0	1	-.254	15	0	1	0	15	0	1
234			min	-334.334	3	0	1	-6.92	1	0	1	-.001	1	0	1
235		4	max	1172.869	1	0	1	-.254	15	0	1	0	15	0	1
236			min	-334.206	3	0	1	-6.92	1	0	1	-.002	1	0	1
237		5	max	1173.039	1	0	1	-.254	15	0	1	0	15	0	1
238			min	-334.079	3	0	1	-6.92	1	0	1	-.003	1	0	1
239		6	max	1173.21	1	0	1	-.254	15	0	1	0	15	0	1
240			min	-333.951	3	0	1	-6.92	1	0	1	-.004	1	0	1
241		7	max	1173.38	1	0	1	-.254	15	0	1	0	15	0	1
242			min	-333.823	3	0	1	-6.92	1	0	1	-.004	1	0	1
243		8	max	1173.55	1	0	1	-.254	15	0	1	0	15	0	1
244			min	-333.695	3	0	1	-6.92	1	0	1	-.005	1	0	1
245		9	max	1173.721	1	0	1	-.254	15	0	1	0	15	0	1
246			min	-333.568	3	0	1	-6.92	1	0	1	-.006	1	0	1
247		10	max	1173.891	1	0	1	-.254	15	0	1	0	15	0	1
248			min	-333.44	3	0	1	-6.92	1	0	1	-.007	1	0	1
249		11	max	1174.061	1	0	1	-.254	15	0	1	0	15	0	1
250			min	-333.312	3	0	1	-6.92	1	0	1	-.008	1	0	1
251		12	max	1174.232	1	0	1	-.254	15	0	1	0	15	0	1
252			min	-333.184	3	0	1	-6.92	1	0	1	-.008	1	0	1
253		13	max	1174.402	1	0	1	-.254	15	0	1	0	15	0	1
254			min	-333.057	3	0	1	-6.92	1	0	1	-.009	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	1174.573	1	0	1	-.254	15	0	1	0	15	0	1
256			min	-332.929	3	0	1	-6.92	1	0	1	-.01	1	0	1
257		15	max	1174.743	1	0	1	-.254	15	0	1	0	15	0	1
258			min	-332.801	3	0	1	-6.92	1	0	1	-.011	1	0	1
259		16	max	1174.913	1	0	1	-.254	15	0	1	0	15	0	1
260			min	-332.673	3	0	1	-6.92	1	0	1	-.011	1	0	1
261		17	max	1175.084	1	0	1	-.254	15	0	1	0	15	0	1
262			min	-332.546	3	0	1	-6.92	1	0	1	-.012	1	0	1
263		18	max	1175.254	1	0	1	-.254	15	0	1	0	15	0	1
264			min	-332.418	3	0	1	-6.92	1	0	1	-.013	1	0	1
265		19	max	1175.424	1	0	1	-.254	15	0	1	0	15	0	1
266			min	-332.29	3	0	1	-6.92	1	0	1	-.014	1	0	1
267	M6	1	max	3545.989	2	2.692	2	0	1	0	1	0	1	0	1
268			min	-4908.388	3	-.199	3	0	1	0	1	0	1	0	1
269		2	max	3546.368	2	2.666	2	0	1	0	1	0	1	0	3
270			min	-4908.104	3	-.218	3	0	1	0	1	0	1	0	2
271		3	max	3546.747	2	2.64	2	0	1	0	1	0	1	0	3
272			min	-4907.819	3	-.238	3	0	1	0	1	0	1	-.001	2
273		4	max	3547.127	2	2.614	2	0	1	0	1	0	1	0	3
274			min	-4907.535	3	-.257	3	0	1	0	1	0	1	-.002	2
275		5	max	3547.506	2	2.588	2	0	1	0	1	0	1	0	3
276			min	-4907.251	3	-.277	3	0	1	0	1	0	1	-.003	2
277		6	max	3547.885	2	2.562	2	0	1	0	1	0	1	0	3
278			min	-4906.966	3	-.296	3	0	1	0	1	0	1	-.003	2
279		7	max	3548.264	2	2.536	2	0	1	0	1	0	1	0	3
280			min	-4906.682	3	-.316	3	0	1	0	1	0	1	-.004	2
281		8	max	3548.644	2	2.51	2	0	1	0	1	0	1	0	3
282			min	-4906.397	3	-.335	3	0	1	0	1	0	1	-.005	2
283		9	max	3549.023	2	2.484	2	0	1	0	1	0	1	0	3
284			min	-4906.113	3	-.355	3	0	1	0	1	0	1	-.005	2
285		10	max	3549.402	2	2.458	2	0	1	0	1	0	1	0	3
286			min	-4905.828	3	-.374	3	0	1	0	1	0	1	-.006	2
287		11	max	3549.781	2	2.432	2	0	1	0	1	0	1	0	3
288			min	-4905.544	3	-.394	3	0	1	0	1	0	1	-.007	2
289		12	max	3550.161	2	2.406	2	0	1	0	1	0	1	0	3
290			min	-4905.259	3	-.413	3	0	1	0	1	0	1	-.007	2
291		13	max	3550.54	2	2.38	2	0	1	0	1	0	1	0	3
292			min	-4904.975	3	-.433	3	0	1	0	1	0	1	-.008	2
293		14	max	3550.919	2	2.354	2	0	1	0	1	0	1	.001	3
294			min	-4904.691	3	-.452	3	0	1	0	1	0	1	-.008	2
295		15	max	3551.299	2	2.328	2	0	1	0	1	0	1	.001	3
296			min	-4904.406	3	-.472	3	0	1	0	1	0	1	-.009	2
297		16	max	3551.678	2	2.302	2	0	1	0	1	0	1	.001	3
298			min	-4904.122	3	-.491	3	0	1	0	1	0	1	-.01	2
299		17	max	3552.057	2	2.276	2	0	1	0	1	0	1	.001	3
300			min	-4903.837	3	-.511	3	0	1	0	1	0	1	-.01	2
301		18	max	3552.436	2	2.25	2	0	1	0	1	0	1	.002	3
302			min	-4903.553	3	-.53	3	0	1	0	1	0	1	-.011	2
303		19	max	3552.816	2	2.224	2	0	1	0	1	0	1	.002	3
304			min	-4903.268	3	-.55	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2082.665	2	8.014	4	0	1	0	1	0	1	.011	2
306			min	-2225.257	3	1.881	15	0	1	0	1	0	1	-.002	3
307		2	max	2082.495	2	7.244	4	0	1	0	1	0	1	.009	2
308			min	-2225.385	3	1.7	15	0	1	0	1	0	1	-.003	3
309		3	max	2082.325	2	6.474	4	0	1	0	1	0	1	.006	2
310			min	-2225.512	3	1.519	15	0	1	0	1	0	1	-.005	3
311		4	max	2082.154	2	5.704	4	0	1	0	1	0	1	.004	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	-2225.64	3	1.338	15	0	1	0	1	0	1	-.006	3
313		5	max	2081.984	2	4.934	4	0	1	0	1	0	1	.002	2
314			min	-2225.768	3	1.157	15	0	1	0	1	0	1	-.007	3
315		6	max	2081.814	2	4.164	4	0	1	0	1	0	1	0	2
316			min	-2225.896	3	.976	15	0	1	0	1	0	1	-.007	3
317		7	max	2081.643	2	3.394	4	0	1	0	1	0	1	-.001	15
318			min	-2226.023	3	.795	15	0	1	0	1	0	1	-.008	3
319		8	max	2081.473	2	2.698	2	0	1	0	1	0	1	-.002	15
320			min	-2226.151	3	.504	12	0	1	0	1	0	1	-.008	3
321		9	max	2081.303	2	2.098	2	0	1	0	1	0	1	-.002	15
322			min	-2226.279	3	.204	12	0	1	0	1	0	1	-.009	3
323		10	max	2081.132	2	1.498	2	0	1	0	1	0	1	-.002	15
324			min	-2226.407	3	-.228	3	0	1	0	1	0	1	-.009	4
325		11	max	2080.962	2	.898	2	0	1	0	1	0	1	-.002	15
326			min	-2226.534	3	-.678	3	0	1	0	1	0	1	-.009	4
327		12	max	2080.791	2	.298	2	0	1	0	1	0	1	-.002	15
328			min	-2226.662	3	-1.128	3	0	1	0	1	0	1	-.009	4
329		13	max	2080.621	2	-.291	15	0	1	0	1	0	1	-.002	15
330			min	-2226.79	3	-1.578	3	0	1	0	1	0	1	-.009	4
331		14	max	2080.451	2	-.472	15	0	1	0	1	0	1	-.002	15
332			min	-2226.918	3	-2.028	3	0	1	0	1	0	1	-.008	4
333		15	max	2080.28	2	-.653	15	0	1	0	1	0	1	-.002	15
334			min	-2227.045	3	-2.765	4	0	1	0	1	0	1	-.007	4
335		16	max	2080.11	2	-.834	15	0	1	0	1	0	1	-.001	15
336			min	-2227.173	3	-3.535	4	0	1	0	1	0	1	-.006	4
337		17	max	2079.94	2	-1.015	15	0	1	0	1	0	1	-.001	15
338			min	-2227.301	3	-4.305	4	0	1	0	1	0	1	-.004	4
339		18	max	2079.769	2	-1.196	15	0	1	0	1	0	1	0	15
340			min	-2227.429	3	-5.075	4	0	1	0	1	0	1	-.002	4
341		19	max	2079.599	2	-1.377	15	0	1	0	1	0	1	0	1
342			min	-2227.556	3	-5.845	4	0	1	0	1	0	1	0	1
343	M8	1	max	3470.355	2	0	1	0	1	0	1	0	1	0	1
344			min	-1139.728	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3470.525	2	0	1	0	1	0	1	0	1	0	1
346			min	-1139.6	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3470.696	2	0	1	0	1	0	1	0	1	0	1
348			min	-1139.472	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3470.866	2	0	1	0	1	0	1	0	1	0	1
350			min	-1139.344	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3471.036	2	0	1	0	1	0	1	0	1	0	1
352			min	-1139.217	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3471.207	2	0	1	0	1	0	1	0	1	0	1
354			min	-1139.089	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3471.377	2	0	1	0	1	0	1	0	1	0	1
356			min	-1138.961	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3471.547	2	0	1	0	1	0	1	0	1	0	1
358			min	-1138.833	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3471.718	2	0	1	0	1	0	1	0	1	0	1
360			min	-1138.706	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3471.888	2	0	1	0	1	0	1	0	1	0	1
362			min	-1138.578	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3472.058	2	0	1	0	1	0	1	0	1	0	1
364			min	-1138.45	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3472.229	2	0	1	0	1	0	1	0	1	0	1
366			min	-1138.322	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3472.399	2	0	1	0	1	0	1	0	1	0	1
368			min	-1138.195	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	3472.569	2	0	1	0	1	0	1	0	1	0	1
370			min	-1138.067	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3472.74	2	0	1	0	1	0	1	0	1	0	1
372			min	-1137.939	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3472.91	2	0	1	0	1	0	1	0	1	0	1
374			min	-1137.811	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3473.08	2	0	1	0	1	0	1	0	1	0	1
376			min	-1137.683	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3473.251	2	0	1	0	1	0	1	0	1	0	1
378			min	-1137.556	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3473.421	2	0	1	0	1	0	1	0	1	0	1
380			min	-1137.428	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1120.731	2	2.029	4	-.024	15	0	1	0	2	0	1
382			min	-1520.659	3	.478	15	-.651	1	0	3	0	3	0	1
383		2	max	1121.111	2	1.995	4	-.024	15	0	1	0	15	0	15
384			min	-1520.375	3	.47	15	-.651	1	0	3	0	1	0	4
385		3	max	1121.49	2	1.962	4	-.024	15	0	1	0	15	0	15
386			min	-1520.09	3	.462	15	-.651	1	0	3	0	1	-.001	4
387		4	max	1121.869	2	1.928	4	-.024	15	0	1	0	15	0	15
388			min	-1519.806	3	.454	15	-.651	1	0	3	0	1	-.002	4
389		5	max	1122.248	2	1.895	4	-.024	15	0	1	0	15	0	15
390			min	-1519.521	3	.446	15	-.651	1	0	3	0	1	-.002	4
391		6	max	1122.628	2	1.862	4	-.024	15	0	1	0	15	0	15
392			min	-1519.237	3	.438	15	-.651	1	0	3	0	1	-.002	4
393		7	max	1123.007	2	1.828	4	-.024	15	0	1	0	15	0	15
394			min	-1518.952	3	.431	15	-.651	1	0	3	0	1	-.003	4
395		8	max	1123.386	2	1.795	4	-.024	15	0	1	0	15	0	15
396			min	-1518.668	3	.423	15	-.651	1	0	3	-.001	1	-.003	4
397		9	max	1123.765	2	1.761	4	-.024	15	0	1	0	15	0	15
398			min	-1518.384	3	.415	15	-.651	1	0	3	-.001	1	-.004	4
399		10	max	1124.145	2	1.728	4	-.024	15	0	1	0	15	-.001	15
400			min	-1518.099	3	.407	15	-.651	1	0	3	-.001	1	-.004	4
401		11	max	1124.524	2	1.695	4	-.024	15	0	1	0	15	-.001	15
402			min	-1517.815	3	.398	12	-.651	1	0	3	-.002	1	-.005	4
403		12	max	1124.903	2	1.661	4	-.024	15	0	1	0	15	-.001	15
404			min	-1517.53	3	.385	12	-.651	1	0	3	-.002	1	-.005	4
405		13	max	1125.282	2	1.628	4	-.024	15	0	1	0	15	-.001	15
406			min	-1517.246	3	.372	12	-.651	1	0	3	-.002	1	-.006	4
407		14	max	1125.662	2	1.594	4	-.024	15	0	1	0	15	-.001	15
408			min	-1516.961	3	.359	12	-.651	1	0	3	-.002	1	-.006	4
409		15	max	1126.041	2	1.561	4	-.024	15	0	1	0	15	-.002	15
410			min	-1516.677	3	.346	12	-.651	1	0	3	-.002	1	-.006	4
411		16	max	1126.42	2	1.528	4	-.024	15	0	1	0	15	-.002	15
412			min	-1516.392	3	.333	12	-.651	1	0	3	-.002	1	-.007	4
413		17	max	1126.799	2	1.494	4	-.024	15	0	1	0	15	-.002	15
414			min	-1516.108	3	.32	12	-.651	1	0	3	-.003	1	-.007	4
415		18	max	1127.179	2	1.461	2	-.024	15	0	1	0	15	-.002	15
416			min	-1515.824	3	.307	12	-.651	1	0	3	-.003	1	-.008	4
417		19	max	1127.558	2	1.435	2	-.024	15	0	1	0	15	-.002	15
418			min	-1515.539	3	.294	12	-.651	1	0	3	-.003	1	-.008	4
419	M11	1	max	583.7	2	7.983	4	-.002	15	0	1	0	15	.008	4
420			min	-714.858	3	1.877	15	-.066	1	0	3	0	1	.002	15
421		2	max	583.53	2	7.213	4	-.002	15	0	1	0	15	.005	2
422			min	-714.985	3	1.696	15	-.066	1	0	3	0	1	0	12
423		3	max	583.36	2	6.443	4	-.002	15	0	1	0	15	.003	2
424			min	-715.113	3	1.515	15	-.066	1	0	3	0	1	0	3
425		4	max	583.189	2	5.673	4	-.002	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	-715.241	3	1.334	15	-.066	1	0	3	0	1	-.002	3
427		5	max	583.019	2	4.903	4	-.002	15	0	1	0	15	0	15
428			min	-715.369	3	1.153	15	-.066	1	0	3	0	1	-.003	3
429		6	max	582.849	2	4.133	4	-.002	15	0	1	0	15	-.001	15
430			min	-715.497	3	.972	15	-.066	1	0	3	0	1	-.005	4
431		7	max	582.678	2	3.363	4	-.002	15	0	1	0	15	-.001	15
432			min	-715.624	3	.791	15	-.066	1	0	3	0	1	-.006	4
433		8	max	582.508	2	2.593	4	-.002	15	0	1	0	15	-.002	15
434			min	-715.752	3	.61	15	-.066	1	0	3	0	1	-.008	4
435		9	max	582.338	2	1.823	4	-.002	15	0	1	0	15	-.002	15
436			min	-715.88	3	.429	15	-.066	1	0	3	0	1	-.009	4
437		10	max	582.167	2	1.053	4	-.002	15	0	1	0	15	-.002	15
438			min	-716.008	3	.248	15	-.066	1	0	3	0	1	-.009	4
439		11	max	581.997	2	.417	2	-.002	15	0	1	0	15	-.002	15
440			min	-716.135	3	-.101	3	-.066	1	0	3	0	1	-.009	4
441		12	max	581.827	2	-.114	15	-.002	15	0	1	0	15	-.002	15
442			min	-716.263	3	-.551	3	-.066	1	0	3	0	1	-.009	4
443		13	max	581.656	2	-.295	15	-.002	15	0	1	0	15	-.002	15
444			min	-716.391	3	-1.257	4	-.066	1	0	3	0	1	-.009	4
445		14	max	581.486	2	-.476	15	-.002	15	0	1	0	15	-.002	15
446			min	-716.519	3	-2.027	4	-.066	1	0	3	0	1	-.008	4
447		15	max	581.316	2	-.657	15	-.002	15	0	1	0	15	-.002	15
448			min	-716.646	3	-2.797	4	-.066	1	0	3	0	1	-.007	4
449		16	max	581.145	2	-.838	15	-.002	15	0	1	0	15	-.001	15
450			min	-716.774	3	-3.567	4	-.066	1	0	3	0	1	-.006	4
451		17	max	580.975	2	-1.019	15	-.002	15	0	1	0	15	-.001	15
452			min	-716.902	3	-4.337	4	-.066	1	0	3	0	1	-.004	4
453		18	max	580.805	2	-1.2	15	-.002	15	0	1	0	15	0	15
454			min	-717.03	3	-5.107	4	-.066	1	0	3	0	1	-.002	4
455		19	max	580.634	2	-1.381	15	-.002	15	0	1	0	15	0	1
456			min	-717.157	3	-5.877	4	-.066	1	0	3	0	1	0	1
457	M12	1	max	1172.358	1	0	1	6.92	1	0	1	0	15	0	1
458			min	-334.59	3	0	1	.254	15	0	1	0	1	0	1
459		2	max	1172.528	1	0	1	6.92	1	0	1	0	1	0	1
460			min	-334.462	3	0	1	.254	15	0	1	0	12	0	1
461		3	max	1172.699	1	0	1	6.92	1	0	1	.001	1	0	1
462			min	-334.334	3	0	1	.254	15	0	1	0	15	0	1
463		4	max	1172.869	1	0	1	6.92	1	0	1	.002	1	0	1
464			min	-334.206	3	0	1	.254	15	0	1	0	15	0	1
465		5	max	1173.039	1	0	1	6.92	1	0	1	.003	1	0	1
466			min	-334.079	3	0	1	.254	15	0	1	0	15	0	1
467		6	max	1173.21	1	0	1	6.92	1	0	1	.004	1	0	1
468			min	-333.951	3	0	1	.254	15	0	1	0	15	0	1
469		7	max	1173.38	1	0	1	6.92	1	0	1	.004	1	0	1
470			min	-333.823	3	0	1	.254	15	0	1	0	15	0	1
471		8	max	1173.55	1	0	1	6.92	1	0	1	.005	1	0	1
472			min	-333.695	3	0	1	.254	15	0	1	0	15	0	1
473		9	max	1173.721	1	0	1	6.92	1	0	1	.006	1	0	1
474			min	-333.568	3	0	1	.254	15	0	1	0	15	0	1
475		10	max	1173.891	1	0	1	6.92	1	0	1	.007	1	0	1
476			min	-333.44	3	0	1	.254	15	0	1	0	15	0	1
477		11	max	1174.061	1	0	1	6.92	1	0	1	.008	1	0	1
478			min	-333.312	3	0	1	.254	15	0	1	0	15	0	1
479		12	max	1174.232	1	0	1	6.92	1	0	1	.008	1	0	1
480			min	-333.184	3	0	1	.254	15	0	1	0	15	0	1
481		13	max	1174.402	1	0	1	6.92	1	0	1	.009	1	0	1
482			min	-333.057	3	0	1	.254	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1174.573	1	0	1	6.92	1	0	1	.01	1	0	1
484			min	-332.929	3	0	1	.254	15	0	1	0	15	0	1
485		15	max	1174.743	1	0	1	6.92	1	0	1	.011	1	0	1
486			min	-332.801	3	0	1	.254	15	0	1	0	15	0	1
487		16	max	1174.913	1	0	1	6.92	1	0	1	.011	1	0	1
488			min	-332.673	3	0	1	.254	15	0	1	0	15	0	1
489		17	max	1175.084	1	0	1	6.92	1	0	1	.012	1	0	1
490			min	-332.546	3	0	1	.254	15	0	1	0	15	0	1
491		18	max	1175.254	1	0	1	6.92	1	0	1	.013	1	0	1
492			min	-332.418	3	0	1	.254	15	0	1	0	15	0	1
493		19	max	1175.424	1	0	1	6.92	1	0	1	.014	1	0	1
494			min	-332.29	3	0	1	.254	15	0	1	0	15	0	1
495	M1	1	max	136.138	1	842.057	3	-2.567	15	0	1	.165	1	0	15
496			min	4.971	15	-482.032	2	-69.472	1	0	3	.006	15	-.016	2
497		2	max	136.628	1	841.048	3	-2.567	15	0	1	.129	1	.239	2
498			min	5.119	15	-483.378	2	-69.472	1	0	3	.005	15	-.445	3
499		3	max	431.42	3	589.134	2	-2.543	15	0	3	.092	1	.481	2
500			min	-254.814	2	-624.315	3	-68.965	1	0	2	.003	15	-.87	3
501		4	max	431.787	3	587.788	2	-2.543	15	0	3	.056	1	.184	1
502			min	-254.324	2	-625.325	3	-68.965	1	0	2	.002	15	-.541	3
503		5	max	432.154	3	586.442	2	-2.543	15	0	3	.019	1	-.004	15
504			min	-253.834	2	-626.334	3	-68.965	1	0	2	0	15	-.21	3
505		6	max	432.522	3	585.096	2	-2.543	15	0	3	0	15	.12	3
506			min	-253.344	2	-627.344	3	-68.965	1	0	2	-.017	1	-.448	2
507		7	max	432.889	3	583.75	2	-2.543	15	0	3	-.002	15	.452	3
508			min	-252.854	2	-628.354	3	-68.965	1	0	2	-.054	1	-.757	2
509		8	max	433.257	3	582.404	2	-2.543	15	0	3	-.003	15	.783	3
510			min	-252.364	2	-629.363	3	-68.965	1	0	2	-.09	1	-1.064	2
511		9	max	443.066	3	53.513	2	-3.862	15	0	9	.055	1	.914	3
512			min	-197.182	2	.409	15	-104.775	1	0	3	.002	15	-1.217	2
513		10	max	443.433	3	52.167	2	-3.862	15	0	9	0	10	.891	3
514			min	-196.692	2	.003	15	-104.775	1	0	3	0	1	-1.245	2
515		11	max	443.801	3	50.821	2	-3.862	15	0	9	-.002	15	.869	3
516			min	-196.202	2	-1.668	4	-104.775	1	0	3	-.056	1	-1.273	2
517		12	max	453.478	3	414.767	3	-2.483	15	0	2	.089	1	.759	3
518			min	-140.964	2	-694.034	2	-67.525	1	0	3	.003	15	-1.128	2
519		13	max	453.845	3	413.757	3	-2.483	15	0	2	.053	1	.54	3
520			min	-140.474	2	-695.38	2	-67.525	1	0	3	.002	15	-.762	2
521		14	max	454.213	3	412.748	3	-2.483	15	0	2	.018	1	.322	3
522			min	-139.984	2	-696.727	2	-67.525	1	0	3	0	15	-.395	2
523		15	max	454.58	3	411.738	3	-2.483	15	0	2	0	15	.105	3
524			min	-139.494	2	-698.073	2	-67.525	1	0	3	-.018	1	-.049	1
525		16	max	454.947	3	410.729	3	-2.483	15	0	2	-.002	15	.342	2
526			min	-139.004	2	-699.419	2	-67.525	1	0	3	-.054	1	-.112	3
527		17	max	455.315	3	409.719	3	-2.483	15	0	2	-.003	15	.712	2
528			min	-138.514	2	-700.765	2	-67.525	1	0	3	-.089	1	-.329	3
529		18	max	-5.125	15	700.877	2	-2.734	15	0	3	-.005	15	.358	2
530			min	-136.903	1	-332.47	3	-74.168	1	0	2	-.127	1	-.162	3
531		19	max	-4.977	15	699.531	2	-2.734	15	0	3	-.006	15	.013	3
532			min	-136.413	1	-333.48	3	-74.168	1	0	2	-.167	1	-.011	1
533	M5	1	max	299.238	1	2803.463	3	0	1	0	1	0	1	.032	2
534			min	8.767	12	-1653.396	2	0	1	0	1	0	1	0	15
535		2	max	299.728	1	2802.453	3	0	1	0	1	0	1	.905	2
536			min	9.012	12	-1654.742	2	0	1	0	1	0	1	-1.478	3
537		3	max	1369.719	3	1723.31	2	0	1	0	1	0	1	1.738	2
538			min	-859.383	2	-1944.066	3	0	1	0	1	0	1	-2.9	3
539		4	max	1370.087	3	1721.964	2	0	1	0	1	0	1	.84	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	-858.893	2	-1945.076	3	0	1	0	1	0	1	-1.873	3
541		5	max	1370.454	3	1720.618	2	0	1	0	1	0	1	.02	9
542			min	-858.403	2	-1946.085	3	0	1	0	1	0	1	-.847	3
543		6	max	1370.822	3	1719.272	2	0	1	0	1	0	1	.18	3
544			min	-857.913	2	-1947.095	3	0	1	0	1	0	1	-.987	2
545		7	max	1371.189	3	1717.926	2	0	1	0	1	0	1	1.208	3
546			min	-857.423	2	-1948.104	3	0	1	0	1	0	1	-1.894	2
547		8	max	1371.557	3	1716.58	2	0	1	0	1	0	1	2.236	3
548			min	-856.933	2	-1949.114	3	0	1	0	1	0	1	-2.8	2
549		9	max	1384.198	3	180.022	2	0	1	0	1	0	1	2.573	3
550			min	-739.885	2	.405	15	0	1	0	1	0	1	-3.192	2
551		10	max	1384.566	3	178.676	2	0	1	0	1	0	1	2.491	3
552			min	-739.395	2	0	15	0	1	0	1	0	1	-3.286	2
553		11	max	1384.933	3	177.33	2	0	1	0	1	0	1	2.409	3
554			min	-738.905	2	-1.59	4	0	1	0	1	0	1	-3.38	2
555		12	max	1397.839	3	1263.736	3	0	1	0	1	0	1	2.114	3
556			min	-621.968	2	-2080.155	2	0	1	0	1	0	1	-3.026	2
557		13	max	1398.206	3	1262.726	3	0	1	0	1	0	1	1.447	3
558			min	-621.478	2	-2081.501	2	0	1	0	1	0	1	-1.928	2
559		14	max	1398.574	3	1261.717	3	0	1	0	1	0	1	.781	3
560			min	-620.988	2	-2082.847	2	0	1	0	1	0	1	-.83	2
561		15	max	1398.941	3	1260.707	3	0	1	0	1	0	1	.27	2
562			min	-620.498	2	-2084.193	2	0	1	0	1	0	1	-.002	13
563		16	max	1399.309	3	1259.698	3	0	1	0	1	0	1	1.37	2
564			min	-620.008	2	-2085.539	2	0	1	0	1	0	1	-.549	3
565		17	max	1399.676	3	1258.688	3	0	1	0	1	0	1	2.471	2
566			min	-619.518	2	-2086.885	2	0	1	0	1	0	1	-1.214	3
567		18	max	-9.549	12	2370.599	2	0	1	0	1	0	1	1.273	2
568			min	-299.178	1	-1152.377	3	0	1	0	1	0	1	-.635	3
569		19	max	-9.304	12	2369.253	2	0	1	0	1	0	1	.023	1
570			min	-298.688	1	-1153.387	3	0	1	0	1	0	1	-.027	3
571	M9	1	max	136.138	1	842.057	3	69.472	1	0	3	-.006	15	0	15
572			min	4.971	15	-482.032	2	2.567	15	0	1	-.165	1	-.016	2
573		2	max	136.628	1	841.048	3	69.472	1	0	3	-.005	15	.239	2
574			min	5.119	15	-483.378	2	2.567	15	0	1	-.129	1	-.445	3
575		3	max	431.42	3	589.134	2	68.965	1	0	2	-.003	15	.481	2
576			min	-254.814	2	-624.315	3	2.543	15	0	3	-.092	1	-.87	3
577		4	max	431.787	3	587.788	2	68.965	1	0	2	-.002	15	.184	1
578			min	-254.324	2	-625.325	3	2.543	15	0	3	-.056	1	-.541	3
579		5	max	432.154	3	586.442	2	68.965	1	0	2	0	15	-.004	15
580			min	-253.834	2	-626.334	3	2.543	15	0	3	-.019	1	-.21	3
581		6	max	432.522	3	585.096	2	68.965	1	0	2	.017	1	.12	3
582			min	-253.344	2	-627.344	3	2.543	15	0	3	0	15	-.448	2
583		7	max	432.889	3	583.75	2	68.965	1	0	2	.054	1	.452	3
584			min	-252.854	2	-628.354	3	2.543	15	0	3	.002	15	-.757	2
585		8	max	433.257	3	582.404	2	68.965	1	0	2	.09	1	.783	3
586			min	-252.364	2	-629.363	3	2.543	15	0	3	.003	15	-1.064	2
587		9	max	443.066	3	53.513	2	104.775	1	0	3	-.002	15	.914	3
588			min	-197.182	2	.409	15	3.862	15	0	9	-.055	1	-1.217	2
589		10	max	443.433	3	52.167	2	104.775	1	0	3	0	1	.891	3
590			min	-196.692	2	.003	15	3.862	15	0	9	0	10	-1.245	2
591		11	max	443.801	3	50.821	2	104.775	1	0	3	.056	1	.869	3
592			min	-196.202	2	-1.668	4	3.862	15	0	9	.002	15	-1.273	2
593		12	max	453.478	3	414.767	3	67.525	1	0	3	-.003	15	.759	3
594			min	-140.964	2	-694.034	2	2.483	15	0	2	-.089	1	-1.128	2
595		13	max	453.845	3	413.757	3	67.525	1	0	3	-.002	15	.54	3
596			min	-140.474	2	-695.38	2	2.483	15	0	2	-.053	1	-.762	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	454.213	3	412.748	3	67.525	1	0	3	0	15	.322	3
598			min	-139.984	2	-696.727	2	2.483	15	0	2	-.018	1	-.395	2
599		15	max	454.58	3	411.738	3	67.525	1	0	3	.018	1	.105	3
600			min	-139.494	2	-698.073	2	2.483	15	0	2	0	15	-.049	1
601		16	max	454.947	3	410.729	3	67.525	1	0	3	.054	1	.342	2
602			min	-139.004	2	-699.419	2	2.483	15	0	2	.002	15	-.112	3
603		17	max	455.315	3	409.719	3	67.525	1	0	3	.089	1	.712	2
604			min	-138.514	2	-700.765	2	2.483	15	0	2	.003	15	-.329	3
605		18	max	-5.125	15	700.877	2	74.168	1	0	2	.127	1	.358	2
606			min	-136.903	1	-332.47	3	2.734	15	0	3	.005	15	-.162	3
607		19	max	-4.977	15	699.531	2	74.168	1	0	2	.167	1	.013	3
608			min	-136.413	1	-333.48	3	2.734	15	0	3	.006	15	-.011	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.132	2	.008	3	1.071e-2	2	NC	1	NC	1
2			min	0	15	-.03	3	-.004	2	-2.427e-3	3	NC	1	NC	1
3		2	max	0	1	.216	3	.02	1	1.204e-2	2	NC	4	NC	1
4			min	0	15	-.007	9	-.001	10	-2.391e-3	3	830.929	3	NC	1
5		3	max	0	1	.415	3	.047	1	1.338e-2	2	NC	5	NC	2
6			min	0	15	-.095	1	0	10	-2.354e-3	3	458.998	3	4327.056	1
7		4	max	0	1	.536	3	.071	1	1.471e-2	2	NC	5	NC	3
8			min	0	15	-.144	1	.002	10	-2.317e-3	3	360.73	3	2898.16	1
9		5	max	0	1	.564	3	.082	1	1.605e-2	2	NC	5	NC	3
10			min	0	15	-.142	1	.002	10	-2.281e-3	3	343.375	3	2493.026	1
11		6	max	0	1	.503	3	.078	1	1.739e-2	2	NC	5	NC	3
12			min	0	15	-.09	1	.001	10	-2.244e-3	3	383.289	3	2611.944	1
13		7	max	0	1	.369	3	.06	1	1.872e-2	2	NC	5	NC	2
14			min	0	15	-.011	9	-.002	10	-2.208e-3	3	511.759	3	3393.274	1
15		8	max	0	1	.199	3	.033	1	2.006e-2	2	NC	1	NC	2
16			min	0	15	.002	15	-.005	10	-2.171e-3	3	892.209	3	6172.888	1
17		9	max	0	1	.237	2	.024	3	2.139e-2	2	NC	4	NC	1
18			min	0	15	.005	15	-.011	2	-2.134e-3	3	1929.409	2	NC	1
19		10	max	0	1	.281	2	.024	3	2.273e-2	2	NC	3	NC	1
20			min	0	1	-.025	3	-.016	2	-2.098e-3	3	1366.293	2	NC	1
21		11	max	0	15	.237	2	.024	3	2.139e-2	2	NC	4	NC	1
22			min	0	1	.005	15	-.011	2	-2.134e-3	3	1929.409	2	NC	1
23		12	max	0	15	.199	3	.033	1	2.006e-2	2	NC	1	NC	2
24			min	0	1	.002	15	-.005	10	-2.171e-3	3	892.209	3	6172.888	1
25		13	max	0	15	.369	3	.06	1	1.872e-2	2	NC	5	NC	2
26			min	0	1	-.011	9	-.002	10	-2.208e-3	3	511.759	3	3393.274	1
27		14	max	0	15	.503	3	.078	1	1.739e-2	2	NC	5	NC	3
28			min	0	1	-.09	1	.001	10	-2.244e-3	3	383.289	3	2611.944	1
29		15	max	0	15	.564	3	.082	1	1.605e-2	2	NC	5	NC	3
30			min	0	1	-.142	1	.002	10	-2.281e-3	3	343.375	3	2493.026	1
31		16	max	0	15	.536	3	.071	1	1.471e-2	2	NC	5	NC	3
32			min	0	1	-.144	1	.002	10	-2.317e-3	3	360.73	3	2898.16	1
33		17	max	0	15	.415	3	.047	1	1.338e-2	2	NC	5	NC	2
34			min	0	1	-.095	1	0	10	-2.354e-3	3	458.998	3	4327.056	1
35		18	max	0	15	.216	3	.02	1	1.204e-2	2	NC	4	NC	1
36			min	0	1	-.007	9	-.001	10	-2.391e-3	3	830.929	3	NC	1
37		19	max	0	15	.132	2	.008	3	1.071e-2	2	NC	1	NC	1
38			min	0	1	-.03	3	-.004	2	-2.427e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.274	3	.007	3	6.175e-3	2	NC	1	NC	1
40			min	0	15	-.407	2	-.004	2	-4.865e-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	.538	3	.014	1	7.299e-3	2	NC	5	NC	1
42			min	0	15	-.655	2	-.002	10	-5.835e-3	3	772.021	3	NC	1
43		3	max	0	1	.765	3	.037	1	8.422e-3	2	NC	5	NC	2
44			min	0	15	-.873	2	0	10	-6.805e-3	3	415.414	3	5532.861	1
45		4	max	0	1	.928	3	.06	1	9.545e-3	2	NC	5	NC	3
46			min	0	15	-1.04	2	.002	10	-7.775e-3	3	311.574	3	3448.599	1
47		5	max	0	1	1.016	3	.072	1	1.067e-2	2	NC	15	NC	3
48			min	0	15	-1.146	2	.002	10	-8.745e-3	3	274.867	3	2850.929	1
49		6	max	0	1	1.027	3	.071	1	1.179e-2	2	NC	15	NC	3
50			min	0	15	-1.188	2	0	10	-9.716e-3	3	261.228	2	2911.418	1
51		7	max	0	1	.973	3	.055	1	1.291e-2	2	NC	15	NC	2
52			min	0	15	-1.176	2	-.002	10	-1.069e-2	3	265.47	2	3712.188	1
53		8	max	0	1	.881	3	.031	1	1.404e-2	2	NC	15	NC	2
54			min	0	15	-1.127	2	-.005	10	-1.166e-2	3	283.644	2	6637.229	1
55		9	max	0	1	.787	3	.021	3	1.516e-2	2	NC	5	NC	1
56			min	0	15	-1.068	2	-.01	2	-1.263e-2	3	308.604	2	NC	1
57		10	max	0	1	.742	3	.021	3	1.628e-2	2	NC	5	NC	1
58			min	0	1	-1.039	2	-.015	2	-1.36e-2	3	323.049	2	NC	1
59		11	max	0	15	.787	3	.021	3	1.516e-2	2	NC	5	NC	1
60			min	0	1	-1.068	2	-.01	2	-1.263e-2	3	308.604	2	NC	1
61		12	max	0	15	.881	3	.031	1	1.404e-2	2	NC	15	NC	2
62			min	0	1	-1.127	2	-.005	10	-1.166e-2	3	283.644	2	6637.229	1
63		13	max	0	15	.973	3	.055	1	1.291e-2	2	NC	15	NC	2
64			min	0	1	-1.176	2	-.002	10	-1.069e-2	3	265.47	2	3712.188	1
65		14	max	0	15	1.027	3	.071	1	1.179e-2	2	NC	15	NC	3
66			min	0	1	-1.188	2	0	10	-9.716e-3	3	261.228	2	2911.418	1
67		15	max	0	15	1.016	3	.072	1	1.067e-2	2	NC	15	NC	3
68			min	0	1	-1.146	2	.002	10	-8.745e-3	3	274.867	3	2850.929	1
69		16	max	0	15	.928	3	.06	1	9.545e-3	2	NC	5	NC	3
70			min	0	1	-1.04	2	.002	10	-7.775e-3	3	311.574	3	3448.599	1
71		17	max	0	15	.765	3	.037	1	8.422e-3	2	NC	5	NC	2
72			min	0	1	-.873	2	0	10	-6.805e-3	3	415.414	3	5532.861	1
73		18	max	0	15	.538	3	.014	1	7.299e-3	2	NC	5	NC	1
74			min	0	1	-.655	2	-.002	10	-5.835e-3	3	772.021	3	NC	1
75		19	max	0	15	.274	3	.007	3	6.175e-3	2	NC	1	NC	1
76			min	0	1	-.407	2	-.004	2	-4.865e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.28	3	.006	3	4.14e-3	3	NC	1	NC	1
78			min	0	1	-.407	2	-.004	2	-6.4e-3	2	NC	1	NC	1
79		2	max	0	15	.458	3	.014	1	4.965e-3	3	NC	5	NC	1
80			min	0	1	-.717	2	-.001	10	-7.568e-3	2	657.811	2	NC	1
81		3	max	0	15	.616	3	.038	1	5.79e-3	3	NC	5	NC	2
82			min	0	1	-.985	2	0	10	-8.735e-3	2	352.582	2	5512.484	1
83		4	max	0	15	.738	3	.06	1	6.615e-3	3	NC	5	NC	3
84			min	0	1	-1.183	2	.002	10	-9.902e-3	2	262.692	2	3437.402	1
85		5	max	0	15	.817	3	.072	1	7.44e-3	3	NC	15	NC	3
86			min	0	1	-1.296	2	.002	10	-1.107e-2	2	229.413	2	2841.361	1
87		6	max	0	15	.851	3	.071	1	8.265e-3	3	NC	15	NC	3
88			min	0	1	-1.322	2	.001	10	-1.224e-2	2	222.786	2	2899.792	1
89		7	max	0	15	.847	3	.056	1	9.09e-3	3	NC	15	NC	2
90			min	0	1	-1.276	2	-.001	10	-1.34e-2	2	234.743	2	3691.205	1
91		8	max	0	15	.816	3	.032	1	9.915e-3	3	NC	15	NC	2
92			min	0	1	-1.183	2	-.004	10	-1.457e-2	2	262.749	2	6565.646	1
93		9	max	0	15	.777	3	.02	3	1.074e-2	3	NC	5	NC	1
94			min	0	1	-1.086	2	-.009	2	-1.574e-2	2	300.503	2	NC	1
95		10	max	0	1	.757	3	.02	3	1.157e-2	3	NC	5	NC	1
96			min	0	1	-1.038	2	-.014	2	-1.691e-2	2	323.057	2	NC	1
97		11	max	0	1	.777	3	.02	3	1.074e-2	3	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
98			min	0	15	-1.086	2	-.009	2	-1.574e-2	2	300.503	2	NC	1
99		12	max	0	1	.816	3	.032	1	9.915e-3	3	NC	15	NC	2
100			min	0	15	-1.183	2	-.004	10	-1.457e-2	2	262.749	2	6565.646	1
101		13	max	0	1	.847	3	.056	1	9.09e-3	3	NC	15	NC	2
102			min	0	15	-1.276	2	-.001	10	-1.34e-2	2	234.743	2	3691.205	1
103		14	max	0	1	.851	3	.071	1	8.265e-3	3	NC	15	NC	3
104			min	0	15	-1.322	2	.001	10	-1.224e-2	2	222.786	2	2899.792	1
105		15	max	0	1	.817	3	.072	1	7.44e-3	3	NC	15	NC	3
106			min	0	15	-1.296	2	.002	10	-1.107e-2	2	229.413	2	2841.361	1
107		16	max	0	1	.738	3	.06	1	6.615e-3	3	NC	5	NC	3
108			min	0	15	-1.183	2	.002	10	-9.902e-3	2	262.692	2	3437.402	1
109		17	max	0	1	.616	3	.038	1	5.79e-3	3	NC	5	NC	2
110			min	0	15	-.985	2	0	10	-8.735e-3	2	352.582	2	5512.484	1
111		18	max	0	1	.458	3	.014	1	4.965e-3	3	NC	5	NC	1
112			min	0	15	-.717	2	-.001	10	-7.568e-3	2	657.811	2	NC	1
113		19	max	0	1	.28	3	.006	3	4.14e-3	3	NC	1	NC	1
114			min	0	15	-.407	2	-.004	2	-6.4e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.116	2	.006	3	7.503e-3	3	NC	1	NC	1
116			min	0	1	-.094	3	-.003	2	-8.963e-3	2	NC	1	NC	1
117		2	max	0	15	.002	13	.02	1	8.61e-3	3	NC	4	NC	1
118			min	0	1	-.07	2	0	10	-9.897e-3	2	1097.027	2	NC	1
119		3	max	0	15	.043	3	.048	1	9.717e-3	3	NC	5	NC	2
120			min	0	1	-.217	2	.002	10	-1.083e-2	2	611.988	2	4327.942	1
121		4	max	0	15	.072	3	.071	1	1.082e-2	3	NC	5	NC	3
122			min	0	1	-.3	2	.003	15	-1.176e-2	2	489.924	2	2890.954	1
123		5	max	0	15	.065	3	.083	1	1.193e-2	3	NC	5	NC	3
124			min	0	1	-.307	2	.003	15	-1.27e-2	2	481.889	2	2479.797	1
125		6	max	0	15	.023	3	.079	1	1.304e-2	3	NC	5	NC	3
126			min	0	1	-.24	2	.003	10	-1.363e-2	2	572.426	2	2587.577	1
127		7	max	0	15	.001	13	.062	1	1.415e-2	3	NC	4	NC	2
128			min	0	1	-.116	2	0	10	-1.457e-2	2	880.405	2	3335.878	1
129		8	max	0	15	.061	1	.035	1	1.525e-2	3	NC	4	NC	2
130			min	0	1	-.124	3	-.003	10	-1.55e-2	2	2565.796	2	5940.096	1
131		9	max	0	15	.176	1	.018	3	1.636e-2	3	NC	4	NC	1
132			min	0	1	-.193	3	-.007	2	-1.643e-2	2	2061.174	3	NC	1
133		10	max	0	1	.233	2	.017	3	1.747e-2	3	NC	4	NC	1
134			min	0	1	-.224	3	-.013	2	-1.737e-2	2	1572.955	3	NC	1
135		11	max	0	1	.176	1	.018	3	1.636e-2	3	NC	4	NC	1
136			min	0	15	-.193	3	-.007	2	-1.643e-2	2	2061.174	3	NC	1
137		12	max	0	1	.061	1	.035	1	1.525e-2	3	NC	4	NC	2
138			min	0	15	-.124	3	-.003	10	-1.55e-2	2	2565.796	2	5940.096	1
139		13	max	0	1	.001	13	.062	1	1.415e-2	3	NC	4	NC	2
140			min	0	15	-.116	2	0	10	-1.457e-2	2	880.405	2	3335.878	1
141		14	max	0	1	.023	3	.079	1	1.304e-2	3	NC	5	NC	3
142			min	0	15	-.24	2	.003	10	-1.363e-2	2	572.426	2	2587.577	1
143		15	max	0	1	.065	3	.083	1	1.193e-2	3	NC	5	NC	3
144			min	0	15	-.307	2	.003	15	-1.27e-2	2	481.889	2	2479.797	1
145		16	max	0	1	.072	3	.071	1	1.082e-2	3	NC	5	NC	3
146			min	0	15	-.3	2	.003	15	-1.176e-2	2	489.924	2	2890.954	1
147		17	max	0	1	.043	3	.048	1	9.717e-3	3	NC	5	NC	2
148			min	0	15	-.217	2	.002	10	-1.083e-2	2	611.988	2	4327.942	1
149		18	max	0	1	.002	13	.02	1	8.61e-3	3	NC	4	NC	1
150			min	0	15	-.07	2	0	10	-9.897e-3	2	1097.027	2	NC	1
151		19	max	0	1	.116	2	.006	3	7.503e-3	3	NC	1	NC	1
152			min	0	15	-.094	3	-.003	2	-8.963e-3	2	NC	1	NC	1
153	M2	1	max	.006	2	.006	2	.005	1	-5.108e-6	15	NC	1	NC	1
154			min	-.008	3	-.01	3	0	15	-1.384e-4	1	9024.487	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
155		2	max	.006	2	.005	2	.005	1	-4.768e-6	15	NC	1	NC	1
156			min	-.008	3	-.01	3	0	15	-1.292e-4	1	NC	1	NC	1
157		3	max	.005	2	.005	2	.004	1	-4.428e-6	15	NC	1	NC	1
158			min	-.007	3	-.009	3	0	15	-1.2e-4	1	NC	1	NC	1
159		4	max	.005	2	.004	2	.004	1	-4.088e-6	15	NC	1	NC	1
160			min	-.007	3	-.009	3	0	15	-1.108e-4	1	NC	1	NC	1
161		5	max	.005	2	.003	2	.004	1	-3.748e-6	15	NC	1	NC	1
162			min	-.006	3	-.009	3	0	15	-1.015e-4	1	NC	1	NC	1
163		6	max	.004	2	.003	2	.003	1	-3.408e-6	15	NC	1	NC	1
164			min	-.006	3	-.008	3	0	15	-9.229e-5	1	NC	1	NC	1
165		7	max	.004	2	.002	2	.003	1	-3.068e-6	15	NC	1	NC	1
166			min	-.005	3	-.008	3	0	15	-8.306e-5	1	NC	1	NC	1
167		8	max	.004	2	.001	2	.002	1	-2.728e-6	15	NC	1	NC	1
168			min	-.005	3	-.007	3	0	15	-7.383e-5	1	NC	1	NC	1
169		9	max	.003	2	0	2	.002	1	-2.388e-6	15	NC	1	NC	1
170			min	-.004	3	-.007	3	0	15	-6.46e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.002	1	-2.048e-6	15	NC	1	NC	1
172			min	-.004	3	-.006	3	0	15	-5.536e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.001	1	-1.708e-6	15	NC	1	NC	1
174			min	-.004	3	-.006	3	0	15	-4.613e-5	1	NC	1	NC	1
175		12	max	.002	2	0	2	.001	1	-1.368e-6	15	NC	1	NC	1
176			min	-.003	3	-.005	3	0	15	-3.69e-5	1	NC	1	NC	1
177		13	max	.002	2	0	2	0	1	-1.028e-6	15	NC	1	NC	1
178			min	-.003	3	-.004	3	0	15	-2.767e-5	1	NC	1	NC	1
179		14	max	.002	2	0	15	0	1	-6.884e-7	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-1.844e-5	1	NC	1	NC	1
181		15	max	.001	2	0	15	0	1	-3.484e-7	15	NC	1	NC	1
182			min	-.002	3	-.003	3	0	15	-9.208e-6	1	NC	1	NC	1
183		16	max	0	2	0	15	0	1	3.362e-7	2	NC	1	NC	1
184			min	-.001	3	-.002	3	0	15	-7.796e-7	3	NC	1	NC	1
185		17	max	0	2	0	15	0	1	9.255e-6	1	NC	1	NC	1
186			min	0	3	-.002	3	0	15	1.141e-7	12	NC	1	NC	1
187		18	max	0	2	0	15	0	1	1.849e-5	1	NC	1	NC	1
188			min	0	3	0	3	0	15	6.715e-7	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.772e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.012e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.225e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.824e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	7.504e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	2.764e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.383e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	8.753e-7	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	4.016e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.474e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	5.649e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	2.073e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	7.282e-5	1	NC	1	NC	1
202			min	-.001	2	-.009	4	0	15	2.672e-6	15	NC	1	NC	1
203		7	max	.002	3	-.002	15	.001	1	8.914e-5	1	NC	1	NC	1
204			min	-.002	2	-.01	4	0	15	3.271e-6	15	8934.464	4	NC	1
205		8	max	.002	3	-.003	15	.001	1	1.055e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	3.87e-6	15	7993.303	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	1.218e-4	1	NC	1	NC	1
208			min	-.002	2	-.013	4	0	15	4.469e-6	15	7433.686	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	1.381e-4	1	NC	2	NC	1
210			min	-.003	2	-.013	4	0	15	5.068e-6	15	7157.235	4	NC	1
211		11	max	.003	3	-.003	15	.002	1	1.545e-4	1	NC	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
212			min	-.003	2	-.013	4	0	15	5.667e-6	15	7122.904	4	NC	1
213		12	max	.004	3	-.003	15	.002	1	1.708e-4	1	NC	2	NC	1
214			min	-.003	2	-.013	4	0	15	6.265e-6	15	7331.199	4	NC	1
215		13	max	.004	3	-.003	15	.003	1	1.871e-4	1	NC	1	NC	1
216			min	-.003	2	-.012	4	0	15	6.864e-6	15	7826.347	4	NC	1
217		14	max	.005	3	-.003	15	.003	1	2.034e-4	1	NC	1	NC	1
218			min	-.004	2	-.011	4	0	15	7.463e-6	15	8719.541	4	NC	1
219		15	max	.005	3	-.002	15	.003	1	2.198e-4	1	NC	1	NC	1
220			min	-.004	2	-.009	4	0	15	8.062e-6	15	NC	1	NC	1
221		16	max	.005	3	-.002	15	.004	1	2.361e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	8.661e-6	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.004	1	2.524e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	1	0	15	9.26e-6	15	NC	1	NC	1
225		18	max	.006	3	0	15	.005	1	2.688e-4	1	NC	1	NC	1
226			min	-.005	2	-.004	1	0	15	9.859e-6	15	NC	1	NC	1
227		19	max	.006	3	0	15	.005	1	2.851e-4	1	NC	1	NC	1
228			min	-.005	2	-.003	1	0	15	1.046e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.005	2	0	15	1.924e-5	1	NC	1	NC	2
230			min	0	3	-.006	3	-.005	1	7.17e-7	15	NC	1	4802.781	1
231		2	max	.003	1	.004	2	0	15	1.924e-5	1	NC	1	NC	2
232			min	0	3	-.006	3	-.005	1	7.17e-7	15	NC	1	5226.424	1
233		3	max	.002	1	.004	2	0	15	1.924e-5	1	NC	1	NC	2
234			min	0	3	-.006	3	-.004	1	7.17e-7	15	NC	1	5730.413	1
235		4	max	.002	1	.004	2	0	15	1.924e-5	1	NC	1	NC	2
236			min	0	3	-.005	3	-.004	1	7.17e-7	15	NC	1	6335.655	1
237		5	max	.002	1	.004	2	0	15	1.924e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.004	1	7.17e-7	15	NC	1	7070.567	1
239		6	max	.002	1	.003	2	0	15	1.924e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.003	1	7.17e-7	15	NC	1	7974.553	1
241		7	max	.002	1	.003	2	0	15	1.924e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.003	1	7.17e-7	15	NC	1	9103.551	1
243		8	max	.002	1	.003	2	0	15	1.924e-5	1	NC	1	NC	1
244			min	0	3	-.004	3	-.002	1	7.17e-7	15	NC	1	NC	1
245		9	max	.002	1	.003	2	0	15	1.924e-5	1	NC	1	NC	1
246			min	0	3	-.003	3	-.002	1	7.17e-7	15	NC	1	NC	1
247		10	max	.001	1	.002	2	0	15	1.924e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.002	1	7.17e-7	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	1.924e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.001	1	7.17e-7	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	1.924e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.001	1	7.17e-7	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.924e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	7.17e-7	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.924e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	7.17e-7	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	1.924e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	7.17e-7	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.924e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	7.17e-7	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.924e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	7.17e-7	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.924e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	7.17e-7	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.924e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	7.17e-7	15	NC	1	NC	1
267	M6	1	max	.019	2	.022	2	0	1	0	1	NC	4	NC	1
268			min	-.026	3	-.032	3	0	1	0	1	1712.415	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.018	2	.02	2	0	1	0	1	NC	4	NC	1
270			min	-.025	3	-.03	3	0	1	0	1	1817.093	3	NC	1
271		3	max	.017	2	.019	2	0	1	0	1	NC	4	NC	1
272			min	-.023	3	-.029	3	0	1	0	1	1935.341	3	NC	1
273		4	max	.016	2	.017	2	0	1	0	1	NC	4	NC	1
274			min	-.022	3	-.027	3	0	1	0	1	2069.904	3	NC	1
275		5	max	.015	2	.015	2	0	1	0	1	NC	4	NC	1
276			min	-.02	3	-.025	3	0	1	0	1	2224.314	3	NC	1
277		6	max	.014	2	.013	2	0	1	0	1	NC	4	NC	1
278			min	-.019	3	-.023	3	0	1	0	1	2403.191	3	NC	1
279		7	max	.013	2	.012	2	0	1	0	1	NC	1	NC	1
280			min	-.017	3	-.021	3	0	1	0	1	2612.699	3	NC	1
281		8	max	.012	2	.01	2	0	1	0	1	NC	1	NC	1
282			min	-.016	3	-.019	3	0	1	0	1	2861.242	3	NC	1
283		9	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.015	3	-.018	3	0	1	0	1	3160.594	3	NC	1
285		10	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.013	3	-.016	3	0	1	0	1	3527.761	3	NC	1
287		11	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.012	3	-.014	3	0	1	0	1	3988.26	3	NC	1
289		12	max	.007	2	.005	2	0	1	0	1	NC	1	NC	1
290			min	-.01	3	-.012	3	0	1	0	1	4582.198	3	NC	1
291		13	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.009	3	-.01	3	0	1	0	1	5376.423	3	NC	1
293		14	max	.005	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.009	3	0	1	0	1	6491.277	3	NC	1
295		15	max	.004	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.007	3	0	1	0	1	8167.458	3	NC	1
297		16	max	.003	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.003	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	8689.371	3	NC	1
317		7	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.013	3	0	1	0	1	7759.186	3	NC	1
319		8	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.014	3	0	1	0	1	7208.44	3	NC	1
321		9	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	6923.482	3	NC	1
323		10	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.015	3	0	1	0	1	6853.291	3	NC	1
325		11	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.01	2	-.015	3	0	1	0	1	6984.956	3	NC	1
327		12	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7337.874	3	NC	1
329		13	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.013	3	0	1	0	1	7943.312	4	NC	1
331		14	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.013	2	-.012	3	0	1	0	1	8845.083	4	NC	1
333		15	max	.015	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.011	3	0	1	0	1	NC	1	NC	1
335		16	max	.016	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.009	3	0	1	0	1	NC	1	NC	1
337		17	max	.017	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.016	2	-.008	1	0	1	0	1	NC	1	NC	1
339		18	max	.018	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.017	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.019	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.018	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	2	.017	2	0	1	0	1	NC	1	NC	1
344			min	-.003	3	-.019	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	2	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.003	3	-.018	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	2	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.017	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	2	.014	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.016	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	2	.013	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	2	.012	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.014	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	2	.011	2	0	1	0	1	NC	1	NC	1
356			min	-.002	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	2	.01	2	0	1	0	1	NC	1	NC	1
358			min	-.002	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	2	.009	2	0	1	0	1	NC	1	NC	1
360			min	-.002	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	2	.008	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	2	.007	2	0	1	0	1	NC	1	NC	1
364			min	-.001	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	2	.006	2	0	1	0	1	NC	1	NC	1
366			min	-.001	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	2	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	2	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	2	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	2	.006	2	0	15	1.384e-4	1	NC	1	NC	1
382			min	-.008	3	-.01	3	-.005	1	5.108e-6	15	9024.487	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
383		2	max	.006	2	.005	2	0	15	1.292e-4	1	NC	1	NC	1
384			min	-.008	3	-.01	3	-.005	1	4.768e-6	15	NC	1	NC	1
385		3	max	.005	2	.005	2	0	15	1.2e-4	1	NC	1	NC	1
386			min	-.007	3	-.009	3	-.004	1	4.428e-6	15	NC	1	NC	1
387		4	max	.005	2	.004	2	0	15	1.108e-4	1	NC	1	NC	1
388			min	-.007	3	-.009	3	-.004	1	4.088e-6	15	NC	1	NC	1
389		5	max	.005	2	.003	2	0	15	1.015e-4	1	NC	1	NC	1
390			min	-.006	3	-.009	3	-.004	1	3.748e-6	15	NC	1	NC	1
391		6	max	.004	2	.003	2	0	15	9.229e-5	1	NC	1	NC	1
392			min	-.006	3	-.008	3	-.003	1	3.408e-6	15	NC	1	NC	1
393		7	max	.004	2	.002	2	0	15	8.306e-5	1	NC	1	NC	1
394			min	-.005	3	-.008	3	-.003	1	3.068e-6	15	NC	1	NC	1
395		8	max	.004	2	.001	2	0	15	7.383e-5	1	NC	1	NC	1
396			min	-.005	3	-.007	3	-.002	1	2.728e-6	15	NC	1	NC	1
397		9	max	.003	2	0	2	0	15	6.46e-5	1	NC	1	NC	1
398			min	-.004	3	-.007	3	-.002	1	2.388e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	5.536e-5	1	NC	1	NC	1
400			min	-.004	3	-.006	3	-.002	1	2.048e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	4.613e-5	1	NC	1	NC	1
402			min	-.004	3	-.006	3	-.001	1	1.708e-6	15	NC	1	NC	1
403		12	max	.002	2	0	2	0	15	3.69e-5	1	NC	1	NC	1
404			min	-.003	3	-.005	3	-.001	1	1.368e-6	15	NC	1	NC	1
405		13	max	.002	2	0	2	0	15	2.767e-5	1	NC	1	NC	1
406			min	-.003	3	-.004	3	0	1	1.028e-6	15	NC	1	NC	1
407		14	max	.002	2	0	15	0	15	1.844e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	0	1	6.884e-7	15	NC	1	NC	1
409		15	max	.001	2	0	15	0	15	9.208e-6	1	NC	1	NC	1
410			min	-.002	3	-.003	3	0	1	3.484e-7	15	NC	1	NC	1
411		16	max	0	2	0	15	0	15	7.796e-7	3	NC	1	NC	1
412			min	-.001	3	-.002	3	0	1	-3.362e-7	2	NC	1	NC	1
413		17	max	0	2	0	15	0	15	-1.141e-7	12	NC	1	NC	1
414			min	0	3	-.002	3	0	1	-9.255e-6	1	NC	1	NC	1
415		18	max	0	2	0	15	0	15	-6.715e-7	15	NC	1	NC	1
416			min	0	3	0	3	0	1	-1.849e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.012e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.772e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	8.824e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	3.225e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-2.764e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-7.504e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-8.753e-7	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-2.383e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-1.474e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-4.016e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-2.073e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-5.649e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-2.672e-6	15	NC	1	NC	1
430			min	-.001	2	-.009	4	0	1	-7.282e-5	1	NC	1	NC	1
431		7	max	.002	3	-.002	15	0	15	-3.271e-6	15	NC	1	NC	1
432			min	-.002	2	-.01	4	-.001	1	-8.914e-5	1	8934.464	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-3.87e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.055e-4	1	7993.303	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-4.469e-6	15	NC	1	NC	1
436			min	-.002	2	-.013	4	-.001	1	-1.218e-4	1	7433.686	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-5.068e-6	15	NC	2	NC	1
438			min	-.003	2	-.013	4	-.002	1	-1.381e-4	1	7157.235	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-5.667e-6	15	NC	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
440			min	-.003	2	-.013	4	-.002	1	-1.545e-4	1	7122.904	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-6.265e-6	15	NC	2	NC	1
442			min	-.003	2	-.013	4	-.002	1	-1.708e-4	1	7331.199	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-6.864e-6	15	NC	1	NC	1
444			min	-.003	2	-.012	4	-.003	1	-1.871e-4	1	7826.347	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-7.463e-6	15	NC	1	NC	1
446			min	-.004	2	-.011	4	-.003	1	-2.034e-4	1	8719.541	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-8.062e-6	15	NC	1	NC	1
448			min	-.004	2	-.009	4	-.003	1	-2.198e-4	1	NC	1	NC	1
449		16	max	.005	3	-.002	15	0	15	-8.661e-6	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.004	1	-2.361e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-9.26e-6	15	NC	1	NC	1
452			min	-.005	2	-.006	1	-.004	1	-2.524e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-9.859e-6	15	NC	1	NC	1
454			min	-.005	2	-.004	1	-.005	1	-2.688e-4	1	NC	1	NC	1
455		19	max	.006	3	0	15	0	15	-1.046e-5	15	NC	1	NC	1
456			min	-.005	2	-.003	1	-.005	1	-2.851e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.005	2	.005	1	-7.17e-7	15	NC	1	NC	2
458			min	0	3	-.006	3	0	15	-1.924e-5	1	NC	1	4802.781	1
459		2	max	.003	1	.004	2	.005	1	-7.17e-7	15	NC	1	NC	2
460			min	0	3	-.006	3	0	15	-1.924e-5	1	NC	1	5226.424	1
461		3	max	.002	1	.004	2	.004	1	-7.17e-7	15	NC	1	NC	2
462			min	0	3	-.006	3	0	15	-1.924e-5	1	NC	1	5730.413	1
463		4	max	.002	1	.004	2	.004	1	-7.17e-7	15	NC	1	NC	2
464			min	0	3	-.005	3	0	15	-1.924e-5	1	NC	1	6335.655	1
465		5	max	.002	1	.004	2	.004	1	-7.17e-7	15	NC	1	NC	2
466			min	0	3	-.005	3	0	15	-1.924e-5	1	NC	1	7070.567	1
467		6	max	.002	1	.003	2	.003	1	-7.17e-7	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-1.924e-5	1	NC	1	7974.553	1
469		7	max	.002	1	.003	2	.003	1	-7.17e-7	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-1.924e-5	1	NC	1	9103.551	1
471		8	max	.002	1	.003	2	.002	1	-7.17e-7	15	NC	1	NC	1
472			min	0	3	-.004	3	0	15	-1.924e-5	1	NC	1	NC	1
473		9	max	.002	1	.003	2	.002	1	-7.17e-7	15	NC	1	NC	1
474			min	0	3	-.003	3	0	15	-1.924e-5	1	NC	1	NC	1
475		10	max	.001	1	.002	2	.002	1	-7.17e-7	15	NC	1	NC	1
476			min	0	3	-.003	3	0	15	-1.924e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.001	1	-7.17e-7	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-1.924e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.001	1	-7.17e-7	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-1.924e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-7.17e-7	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-1.924e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-7.17e-7	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.924e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-7.17e-7	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-1.924e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-7.17e-7	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-1.924e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-7.17e-7	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.924e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-7.17e-7	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.924e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.17e-7	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.924e-5	1	NC	1	NC	1
495	M1	1	max	.008	3	.132	2	0	1	1.095e-2	1	NC	1	NC	1
496			min	-.004	2	-.03	3	0	15	-2.249e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.008	3	.064	2	0	15	5.357e-3	2	NC	4	NC	1
498			min	-.004	2	-.014	3	-.004	1	-1.112e-2	3	1696.353	2	NC	1
499		3	max	.008	3	.011	3	0	15	3.496e-5	10	NC	5	NC	1
500			min	-.004	2	-.009	2	-.005	1	-1.191e-4	3	818.966	2	NC	1
501		4	max	.008	3	.053	3	0	15	4.167e-3	2	NC	5	NC	1
502			min	-.004	2	-.091	2	-.005	1	-4.536e-3	3	518.254	2	NC	1
503		5	max	.007	3	.105	3	0	15	8.306e-3	2	NC	5	NC	1
504			min	-.004	2	-.176	2	-.003	1	-8.953e-3	3	374.814	2	NC	1
505		6	max	.007	3	.161	3	0	15	1.244e-2	2	NC	15	NC	1
506			min	-.004	2	-.258	2	-.001	1	-1.337e-2	3	295.678	2	NC	1
507		7	max	.007	3	.215	3	0	1	1.658e-2	2	NC	15	NC	1
508			min	-.004	2	-.331	2	0	3	-1.779e-2	3	248.907	2	NC	1
509		8	max	.007	3	.26	3	0	1	2.072e-2	2	9703.718	15	NC	1
510			min	-.004	2	-.39	2	0	15	-2.22e-2	3	221.216	2	NC	1
511		9	max	.007	3	.289	3	0	15	2.345e-2	2	9077.337	15	NC	1
512			min	-.004	2	-.426	2	0	1	-2.249e-2	3	206.791	2	NC	1
513		10	max	.007	3	.299	3	0	1	2.523e-2	2	8886.238	15	NC	1
514			min	-.004	2	-.439	2	0	15	-2.004e-2	3	202.56	2	NC	1
515		11	max	.007	3	.292	3	0	1	2.701e-2	2	9077.01	15	NC	1
516			min	-.004	2	-.426	2	0	15	-1.759e-2	3	207.489	2	NC	1
517		12	max	.006	3	.268	3	0	15	2.603e-2	2	9703.016	15	NC	1
518			min	-.004	2	-.388	2	0	1	-1.492e-2	3	223.323	2	NC	1
519		13	max	.006	3	.228	3	0	15	2.087e-2	2	NC	15	NC	1
520			min	-.004	2	-.328	2	0	1	-1.195e-2	3	253.999	2	NC	1
521		14	max	.006	3	.177	3	.001	1	1.571e-2	2	NC	15	NC	1
522			min	-.003	2	-.252	2	0	15	-8.971e-3	3	306.495	2	NC	1
523		15	max	.006	3	.12	3	.003	1	1.055e-2	2	NC	5	NC	1
524			min	-.003	2	-.168	2	0	15	-5.996e-3	3	396.946	2	NC	1
525		16	max	.006	3	.061	3	.005	1	5.387e-3	2	NC	5	NC	1
526			min	-.003	2	-.083	2	0	15	-3.02e-3	3	564.618	2	NC	1
527		17	max	.006	3	.004	3	.005	1	3.902e-4	1	NC	5	NC	1
528			min	-.003	2	-.006	2	0	15	-4.359e-5	3	923.363	2	NC	1
529		18	max	.006	3	.059	2	.004	1	8.504e-3	2	NC	4	NC	1
530			min	-.003	2	-.047	3	0	15	-3.541e-3	3	1960.948	2	NC	1
531		19	max	.006	3	.116	2	0	15	1.709e-2	2	NC	1	NC	1
532			min	-.003	2	-.094	3	0	1	-7.189e-3	3	NC	1	NC	1
533	M5	1	max	.024	3	.281	2	0	1	0	1	NC	1	NC	1
534			min	-.016	2	-.025	3	0	1	0	1	NC	1	NC	1
535		2	max	.024	3	.135	2	0	1	0	1	NC	5	NC	1
536			min	-.016	2	-.01	3	0	1	0	1	797.105	2	NC	1
537		3	max	.024	3	.036	3	0	1	0	1	NC	5	NC	1
538			min	-.016	2	-.028	2	0	1	0	1	374.759	2	NC	1
539		4	max	.023	3	.135	3	0	1	0	1	NC	15	NC	1
540			min	-.016	2	-.224	2	0	1	0	1	229.168	2	NC	1
541		5	max	.023	3	.272	3	0	1	0	1	8075.215	15	NC	1
542			min	-.016	2	-.437	2	0	1	0	1	161.181	2	NC	1
543		6	max	.022	3	.426	3	0	1	0	1	6209.25	15	NC	1
544			min	-.015	2	-.648	2	0	1	0	1	124.52	2	NC	1
545		7	max	.022	3	.577	3	0	1	0	1	5133.237	15	NC	1
546			min	-.015	2	-.839	2	0	1	0	1	103.257	2	NC	1
547		8	max	.022	3	.703	3	0	1	0	1	4508.277	15	NC	1
548			min	-.015	2	-.992	2	0	1	0	1	90.857	2	NC	1
549		9	max	.021	3	.784	3	0	1	0	1	4188.044	15	NC	1
550			min	-.014	2	-1.089	2	0	1	0	1	84.485	2	NC	1
551		10	max	.021	3	.813	3	0	1	0	1	4091.601	15	NC	1
552			min	-.014	2	-1.123	2	0	1	0	1	82.621	2	NC	1
553		11	max	.02	3	.793	3	0	1	0	1	4188.184	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.014	2	-1.09	2	0	1	0	1	84.785	2	NC	1
555		12	max	.02	3	.724	3	0	1	0	1	4508.601	15	NC	1
556			min	-.014	2	-.989	2	0	1	0	1	91.844	2	NC	1
557		13	max	.019	3	.613	3	0	1	0	1	5133.881	15	NC	1
558			min	-.014	2	-.828	2	0	1	0	1	105.829	2	NC	1
559		14	max	.019	3	.473	3	0	1	0	1	6210.484	15	NC	1
560			min	-.013	2	-.628	2	0	1	0	1	130.336	2	NC	1
561		15	max	.018	3	.317	3	0	1	0	1	8077.62	15	NC	1
562			min	-.013	2	-.412	2	0	1	0	1	173.904	2	NC	1
563		16	max	.018	3	.159	3	0	1	0	1	NC	15	NC	1
564			min	-.013	2	-.201	2	0	1	0	1	258.042	2	NC	1
565		17	max	.017	3	.012	3	0	1	0	1	NC	5	NC	1
566			min	-.013	2	-.017	2	0	1	0	1	446.307	2	NC	1
567		18	max	.017	3	.121	2	0	1	0	1	NC	5	NC	1
568			min	-.013	2	-.112	3	0	1	0	1	991.783	2	NC	1
569		19	max	.017	3	.233	2	0	1	0	1	NC	1	NC	1
570			min	-.013	2	-.224	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.132	2	0	15	2.249e-2	3	NC	1	NC	1
572			min	-.004	2	-.03	3	0	1	-1.095e-2	1	NC	1	NC	1
573		2	max	.008	3	.064	2	.004	1	1.112e-2	3	NC	4	NC	1
574			min	-.004	2	-.014	3	0	15	-5.357e-3	2	1696.353	2	NC	1
575		3	max	.008	3	.011	3	.005	1	1.191e-4	3	NC	5	NC	1
576			min	-.004	2	-.009	2	0	15	-3.496e-5	10	818.966	2	NC	1
577		4	max	.008	3	.053	3	.005	1	4.536e-3	3	NC	5	NC	1
578			min	-.004	2	-.091	2	0	15	-4.167e-3	2	518.254	2	NC	1
579		5	max	.007	3	.105	3	.003	1	8.953e-3	3	NC	5	NC	1
580			min	-.004	2	-.176	2	0	15	-8.306e-3	2	374.814	2	NC	1
581		6	max	.007	3	.161	3	.001	1	1.337e-2	3	NC	15	NC	1
582			min	-.004	2	-.258	2	0	15	-1.244e-2	2	295.678	2	NC	1
583		7	max	.007	3	.215	3	0	3	1.779e-2	3	NC	15	NC	1
584			min	-.004	2	-.331	2	0	1	-1.658e-2	2	248.907	2	NC	1
585		8	max	.007	3	.26	3	0	15	2.22e-2	3	9703.718	15	NC	1
586			min	-.004	2	-.39	2	0	1	-2.072e-2	2	221.216	2	NC	1
587		9	max	.007	3	.289	3	0	1	2.249e-2	3	9077.337	15	NC	1
588			min	-.004	2	-.426	2	0	15	-2.345e-2	2	206.791	2	NC	1
589		10	max	.007	3	.299	3	0	15	2.004e-2	3	8886.238	15	NC	1
590			min	-.004	2	-.439	2	0	1	-2.523e-2	2	202.56	2	NC	1
591		11	max	.007	3	.292	3	0	15	1.759e-2	3	9077.01	15	NC	1
592			min	-.004	2	-.426	2	0	1	-2.701e-2	2	207.489	2	NC	1
593		12	max	.006	3	.268	3	0	1	1.492e-2	3	9703.016	15	NC	1
594			min	-.004	2	-.388	2	0	15	-2.603e-2	2	223.323	2	NC	1
595		13	max	.006	3	.228	3	0	1	1.195e-2	3	NC	15	NC	1
596			min	-.004	2	-.328	2	0	15	-2.087e-2	2	253.999	2	NC	1
597		14	max	.006	3	.177	3	0	15	8.971e-3	3	NC	15	NC	1
598			min	-.003	2	-.252	2	-.001	1	-1.571e-2	2	306.495	2	NC	1
599		15	max	.006	3	.12	3	0	15	5.996e-3	3	NC	5	NC	1
600			min	-.003	2	-.168	2	-.003	1	-1.055e-2	2	396.946	2	NC	1
601		16	max	.006	3	.061	3	0	15	3.02e-3	3	NC	5	NC	1
602			min	-.003	2	-.083	2	-.005	1	-5.387e-3	2	564.618	2	NC	1
603		17	max	.006	3	.004	3	0	15	4.359e-5	3	NC	5	NC	1
604			min	-.003	2	-.006	2	-.005	1	-3.902e-4	1	923.363	2	NC	1
605		18	max	.006	3	.059	2	0	15	3.541e-3	3	NC	4	NC	1
606			min	-.003	2	-.047	3	-.004	1	-8.504e-3	2	1960.948	2	NC	1
607		19	max	.006	3	.116	2	0	1	7.189e-3	3	NC	1	NC	1
608			min	-.003	2	-.094	3	0	15	-1.709e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

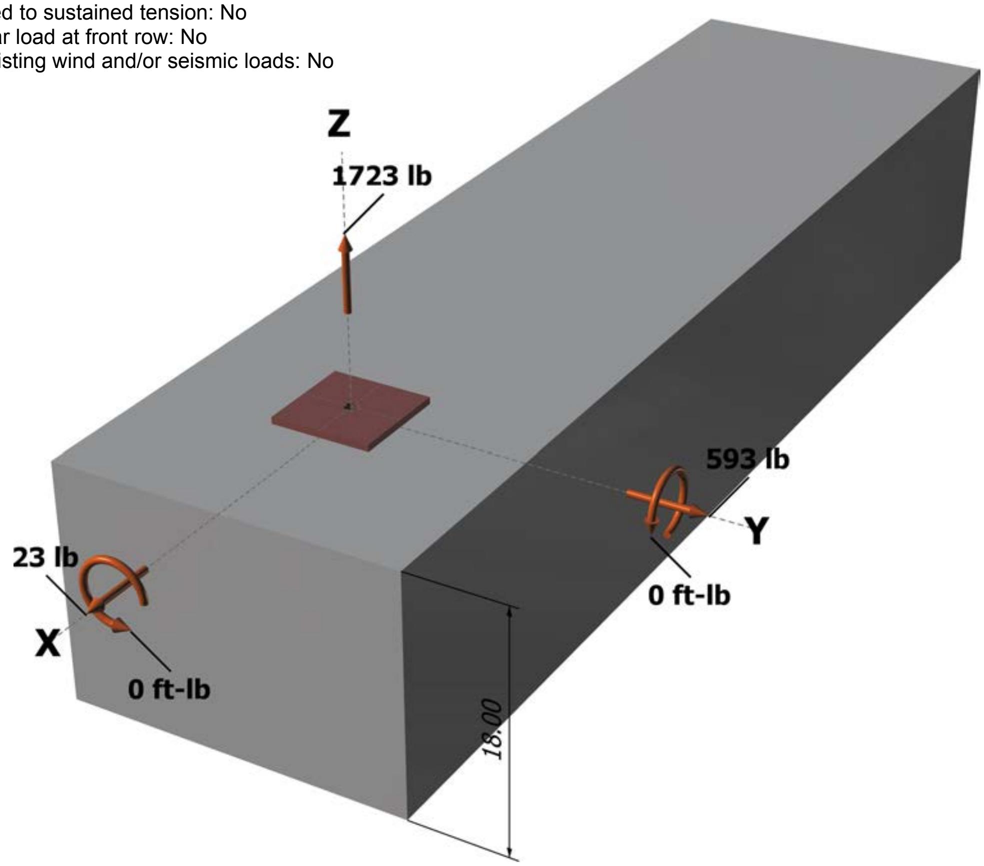
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

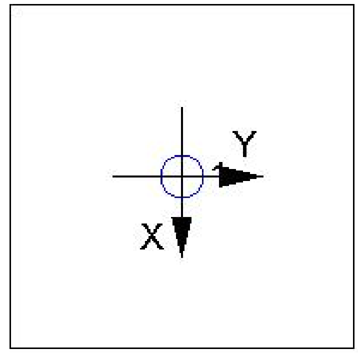
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

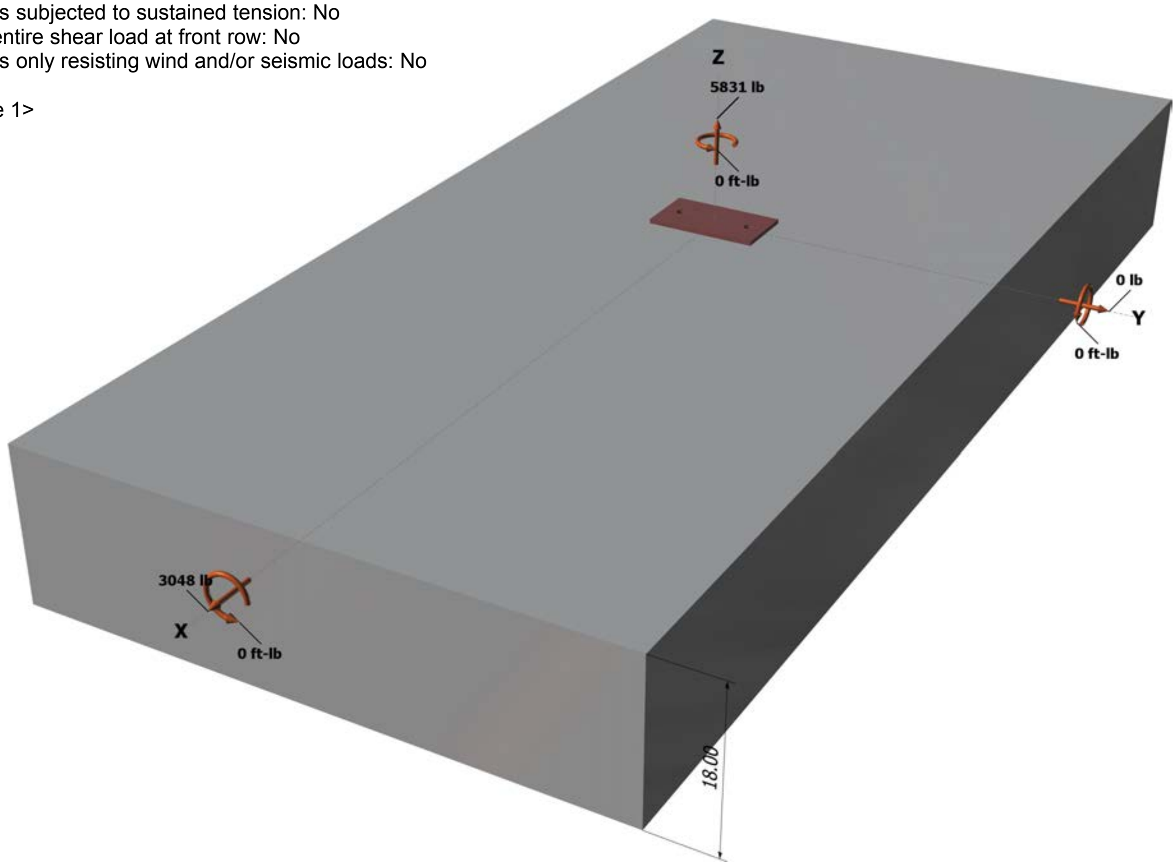
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

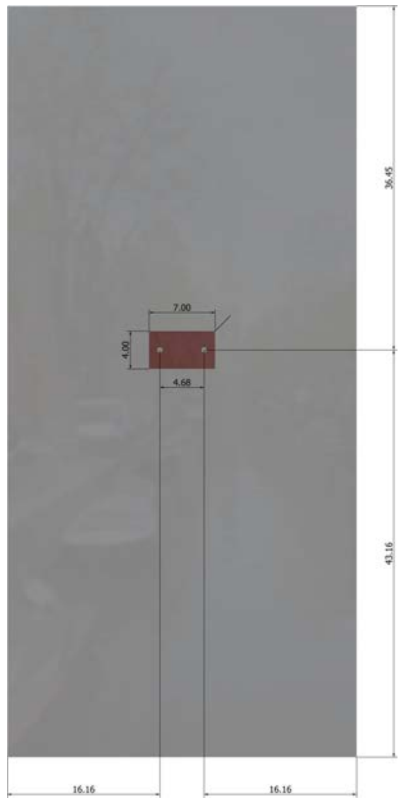
<Figure 1>



SIMPSON Strong-Tie® Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 37-42 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>



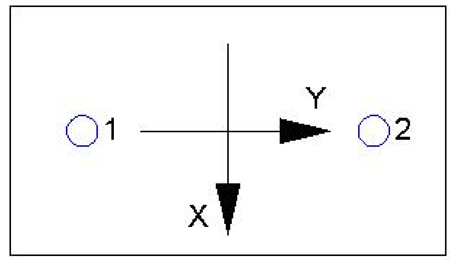
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2915.5	1524.0	0.0	1524.0
2	2915.5	1524.0	0.0	1524.0
Sum	5831.0	3048.0	0.0	3048.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5831
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} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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

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

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

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

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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	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)
666.00	648.00	1.000	0.969	1.000	1.000	15593	0.70	10875

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	16.16	24369

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
872.64	1175.16	1.000	1.000	1.000	24369	0.70	25334

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2916	6071	0.48	Pass
Concrete breakout	5831	10231	0.57	Pass
Adhesive	**5831**	**8093**	**0.72**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1524**	**3156**	**0.48**	**Pass (Governs)**
T Concrete breakout x+	3048	10875	0.28	Pass
|| Concrete breakout y-	1524	25334	0.06	Pass
Pryout	3048	20601	0.15	Pass

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

Sec. D.7.3	0.72	0.48	120.3 %	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.