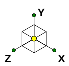
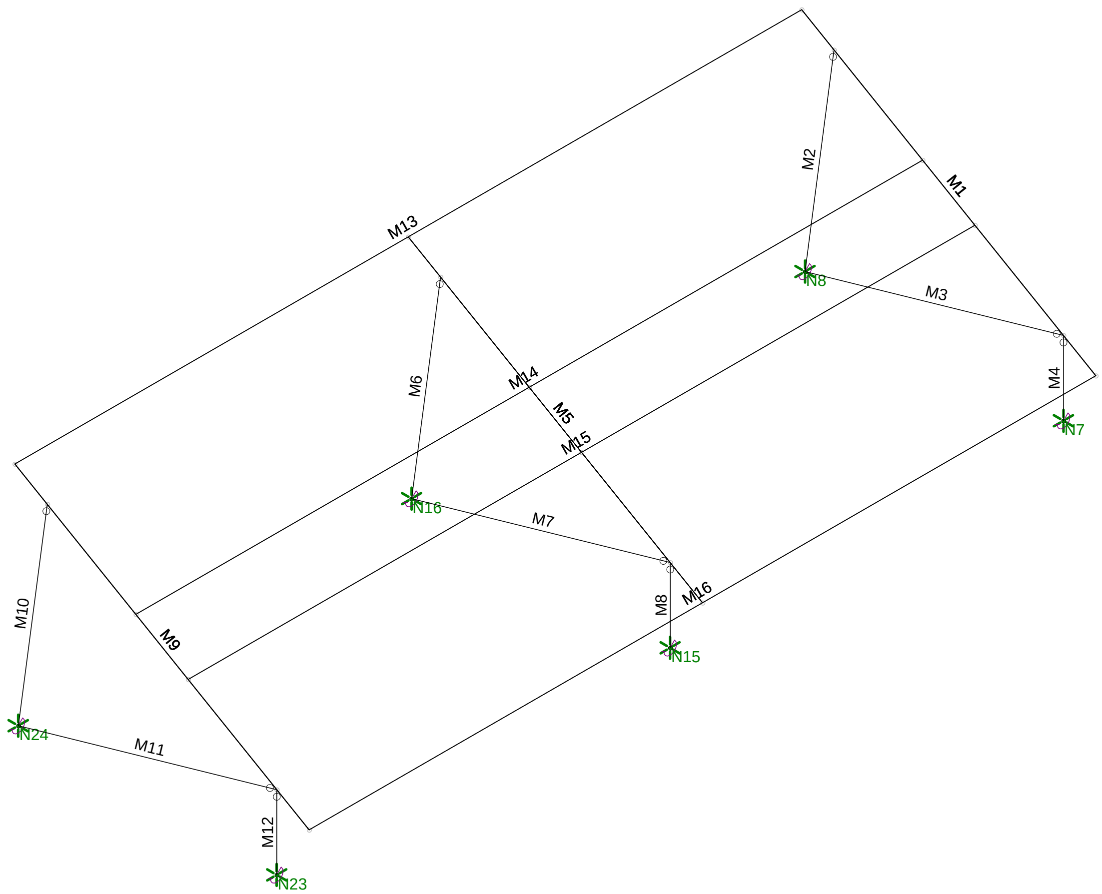




Schletter, Inc.		30ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

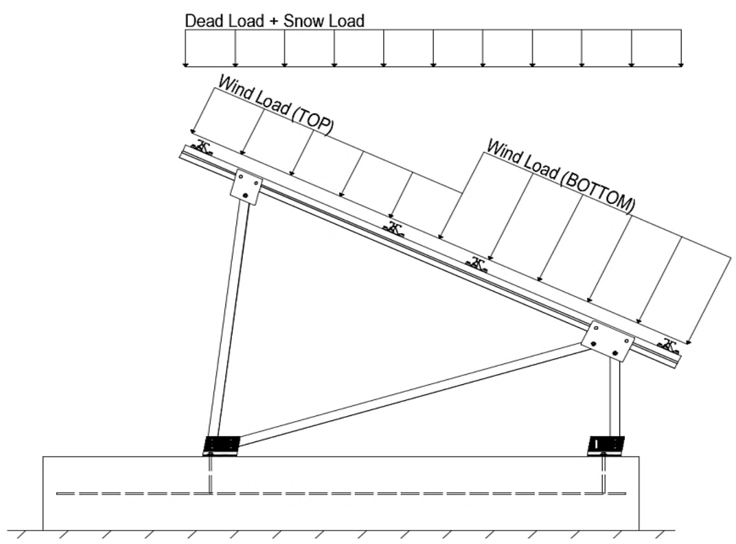
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 = 30°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 16.49 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 150 mph — Exposure Category = C
Height < 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 35.33 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{M}
1.54D + 1.3E + 0.2S ^{R}
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

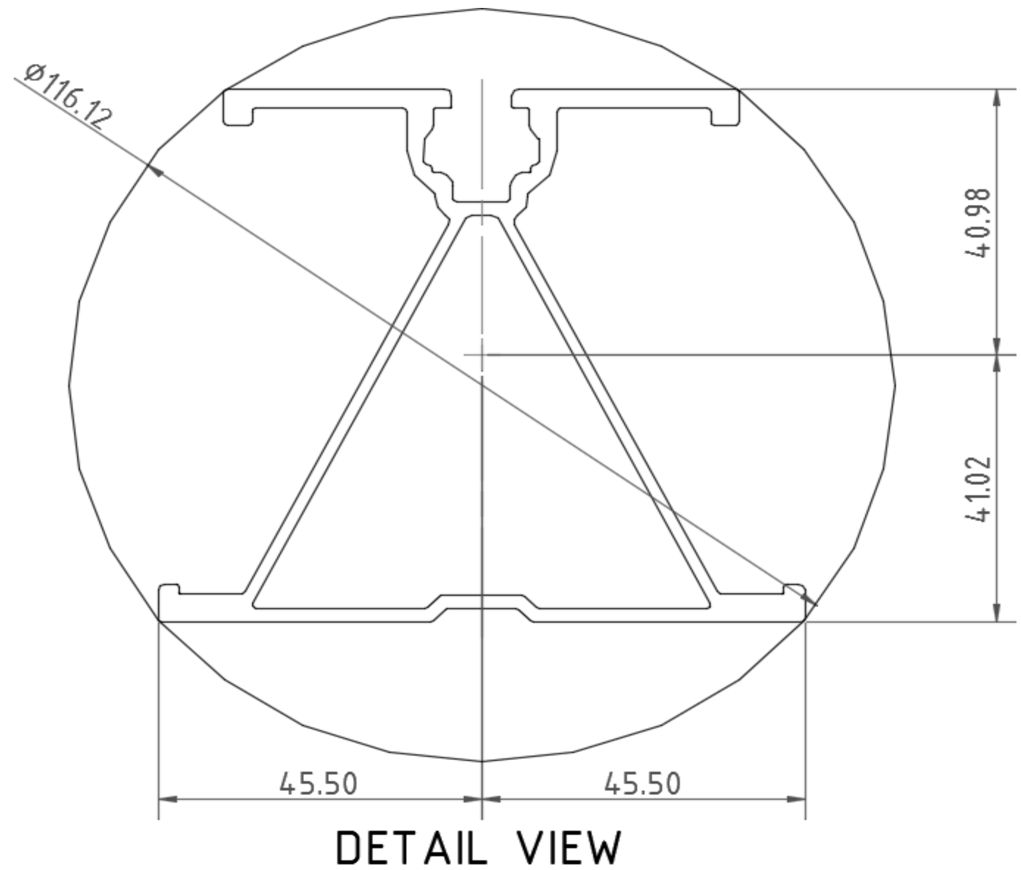
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

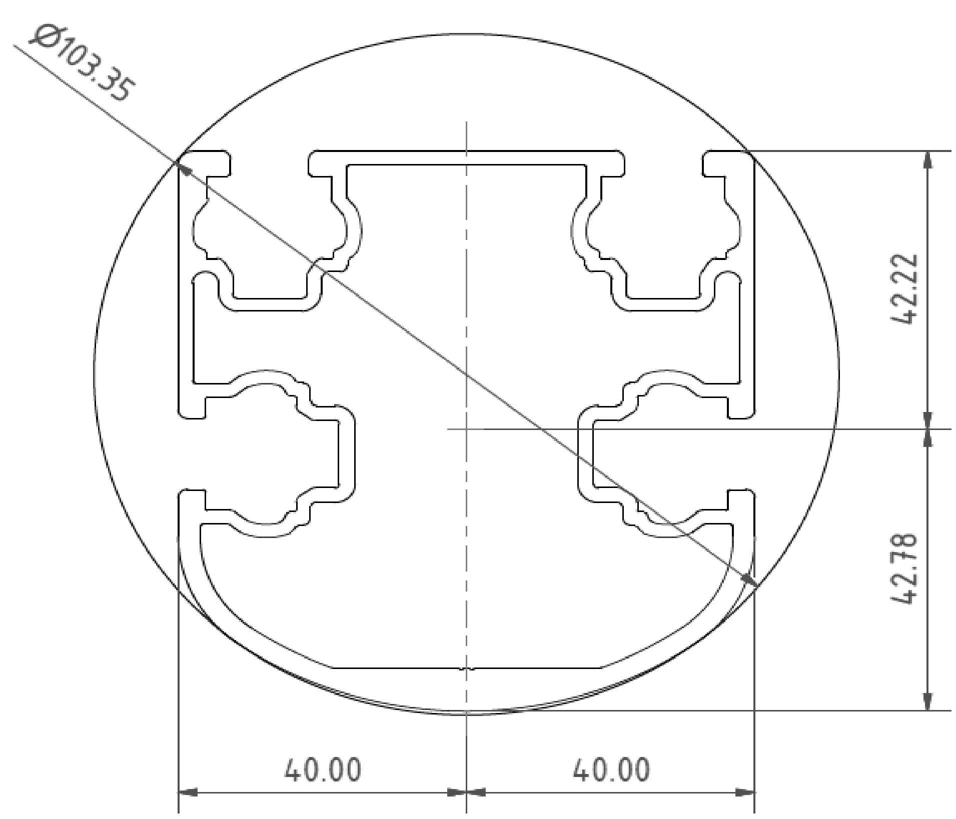
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.999	k-ft
M_z =	0.005	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	72%	



4.2 Girder Design

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

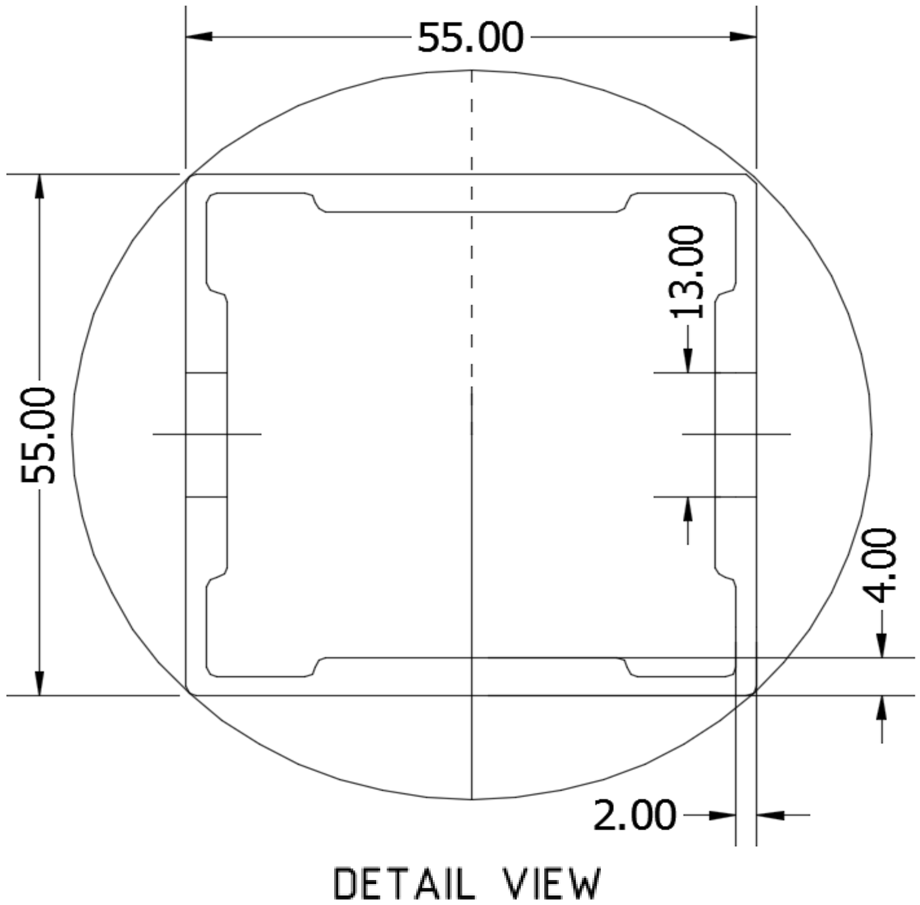
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.933	k-ft
M_z =	0.000	k-ft
P_n =	-0.911	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	86%	



4.3 Front Strut Design

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

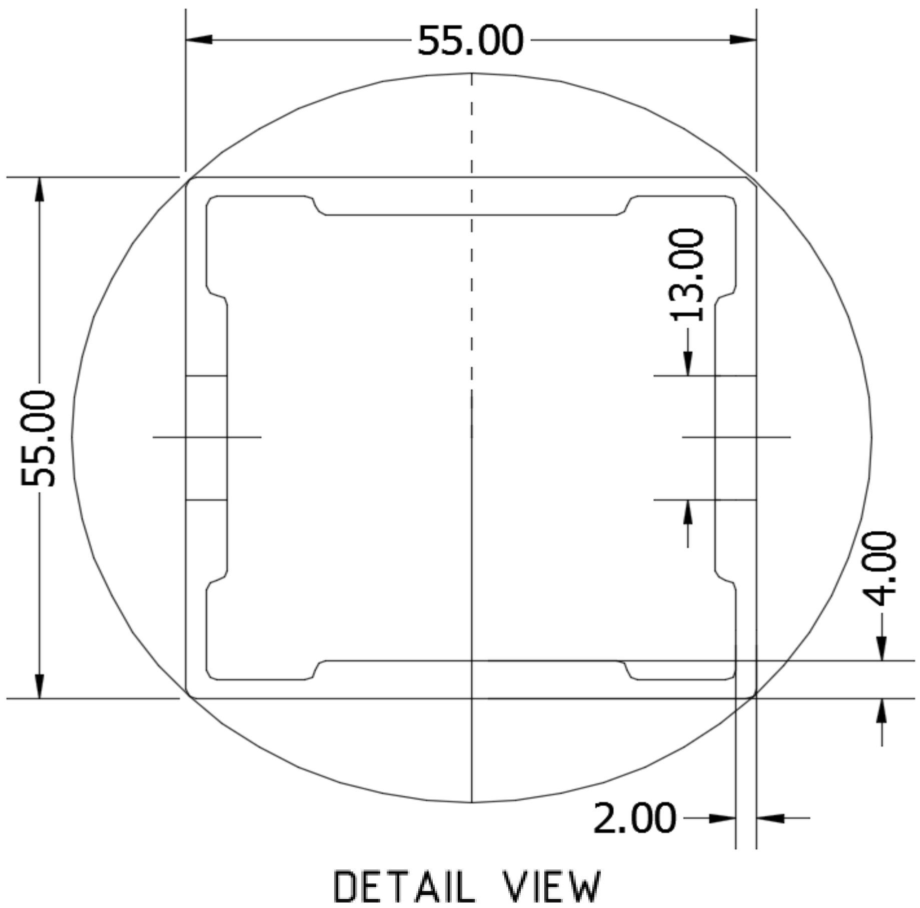
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.398	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	9%	



4.4 Diagonal Strut Design

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

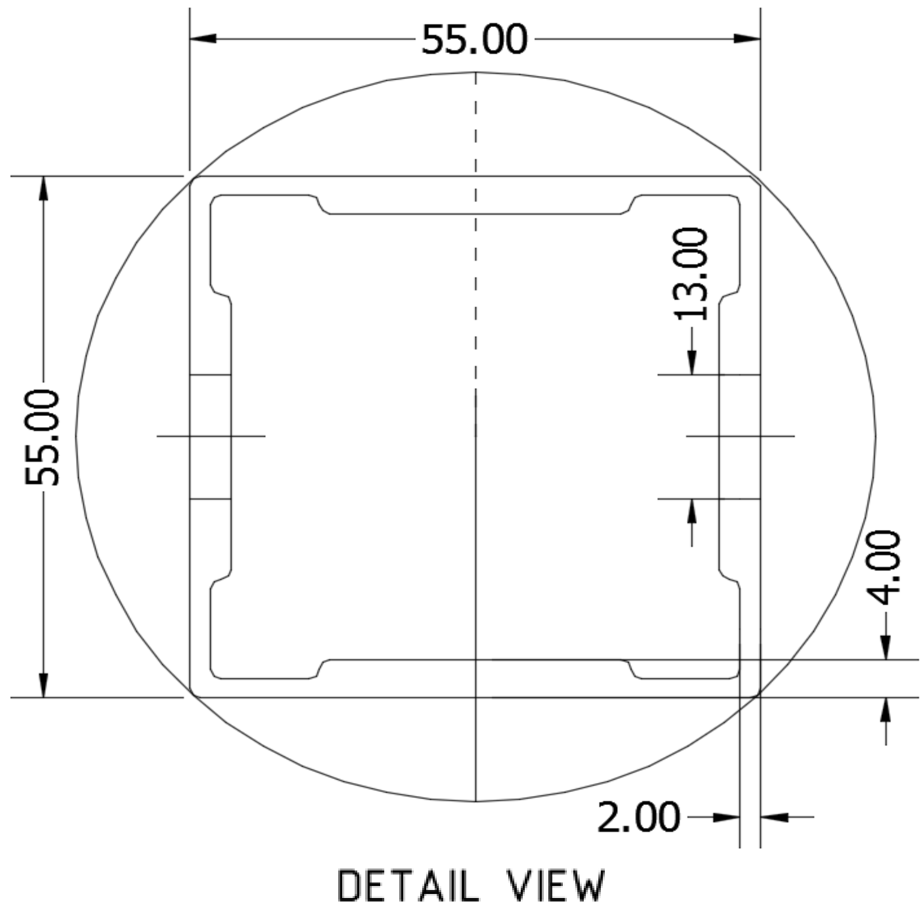
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	2.641	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	37%	



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 =	70.83	in
$\Phi F_{ty\ AXIAL}$ =	10.55	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.176	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.365	k
Utilization =	31%	



5. FOUNDATION DESIGN CALCULATIONS

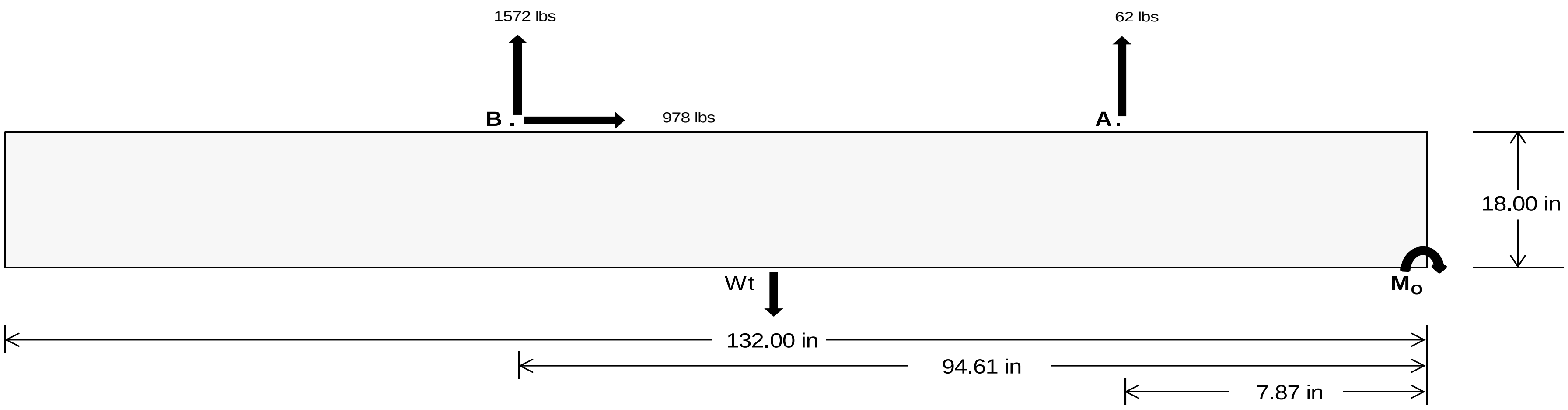
5.1 Helical Pile Foundations

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 =	284.73	6827.72	k
Compressive Load =	3117.11	5041.12	k
Lateral Load =	9.38	4238.36	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).



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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check	
M_O =	166831.2 in-lbs
Resisting Force Required =	2527.75 lbs
S.F. =	1.67
Weight Required =	4212.91 lbs
Minimum Width =	34 in in
Weight Provided =	6778.75 lbs

A minimum 132in long x 34in wide x 18in tall ballast foundation is required to resist overturning.

Sliding	
Force =	977.85 lbs
Friction =	0.4
Weight Required =	2444.61 lbs
Resisting Weight =	6778.75 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 34in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion	
Sliding Force =	977.85 lbs
Cohesion =	130 psf
Area =	31.17 ft^2
Resisting =	3389.38 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 34in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key	
Additional Force =	0 lbs
Lateral Bearing Pressure =	200 psf/ft
Required Depth =	0.00 ft
f'_c =	2500 psi
Length =	8 in

Shear key is not required.

Bearing Pressure

	Ballast Width			
	34 in	35 in	36 in	37 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.83 ft) =	6779 lbs	6978 lbs	7178 lbs	7377 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	34 in	35 in	36 in	37 in	34 in	35 in	36 in	37 in	34 in	35 in	36 in	37 in	34 in	35 in	36 in	37 in
F_A	985 lbs	985 lbs	985 lbs	985 lbs	1267 lbs	1267 lbs	1267 lbs	1267 lbs	1582 lbs	1582 lbs	1582 lbs	1582 lbs	-123 lbs	-123 lbs	-123 lbs	-123 lbs
F_B	927 lbs	927 lbs	927 lbs	927 lbs	2164 lbs	2164 lbs	2164 lbs	2164 lbs	2218 lbs	2218 lbs	2218 lbs	2218 lbs	-3145 lbs	-3145 lbs	-3145 lbs	-3145 lbs
F_V	138 lbs	138 lbs	138 lbs	138 lbs	1760 lbs	1760 lbs	1760 lbs	1760 lbs	1410 lbs	1410 lbs	1410 lbs	1410 lbs	-1956 lbs	-1956 lbs	-1956 lbs	-1956 lbs
P_{total}	8691 lbs	8890 lbs	9090 lbs	9289 lbs	10209 lbs	10408 lbs	10608 lbs	10807 lbs	10579 lbs	10779 lbs	10978 lbs	11177 lbs	800 lbs	919 lbs	1039 lbs	1159 lbs
M	2768 lbs-ft	2768 lbs-ft	2768 lbs-ft	2768 lbs-ft	3619 lbs-ft	3619 lbs-ft	3619 lbs-ft	3619 lbs-ft	4493 lbs-ft	4493 lbs-ft	4493 lbs-ft	4493 lbs-ft	3966 lbs-ft	3966 lbs-ft	3966 lbs-ft	3966 lbs-ft
e	0.32 ft	0.31 ft	0.30 ft	0.30 ft	0.35 ft	0.35 ft	0.34 ft	0.33 ft	0.42 ft	0.42 ft	0.41 ft	0.40 ft	4.96 ft	4.31 ft	3.82 ft	3.42 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}	230.4 psf	230.0 psf	229.7 psf	229.4 psf	264.2 psf	262.9 psf	261.6 psf	260.4 psf	260.8 psf	259.6 psf	258.4 psf	257.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	327.3 psf	324.2 psf	321.2 psf	318.4 psf	390.9 psf	385.9 psf	381.3 psf	376.8 psf	418.1 psf	412.3 psf	406.9 psf	401.8 psf	348.5 psf	177.3 psf	137.2 psf	120.6 psf

Maximum Bearing Pressure = 418 psf
Allowable Bearing Pressure = 1500 psf

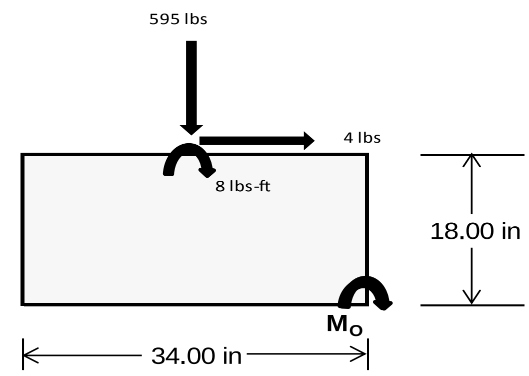
Use a 132in long x 34in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 828.7 ft-lbs
Resisting Force Required = 584.98 lbs
S.F. = 1.67
Weight Required = 974.96 lbs
Minimum Width = 34 in in
Weight Provided = 6778.75 lbs

A minimum 132in long x 34in 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	34 in			34 in			34 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	211 lbs	510 lbs	211 lbs	595 lbs	1611 lbs	595 lbs	62 lbs	149 lbs	62 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	8603 lbs	6779 lbs	8603 lbs	8583 lbs	6779 lbs	8583 lbs	2516 lbs	6779 lbs	2516 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	14 lbs-ft	0 lbs-ft	14 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	0.47 ft	0.47 ft	0.47 ft	0.47 ft	0.47 ft	0.47 ft	0.47 ft	0.47 ft	0.47 ft
f_{min}	275.8 psf	217.5 psf	275.8 psf	274.5 psf	217.5 psf	274.5 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.3 psf	217.5 psf	276.3 psf	276.3 psf	217.5 psf	276.3 psf	80.7 psf	217.5 psf	80.7 psf

Maximum Bearing Pressure = 276 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 34in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 34in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

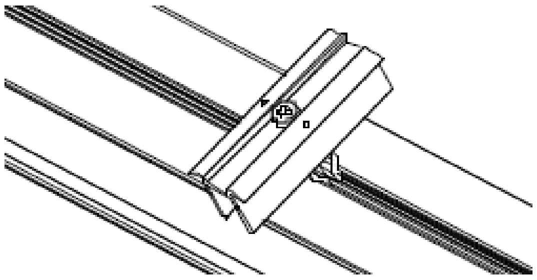
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

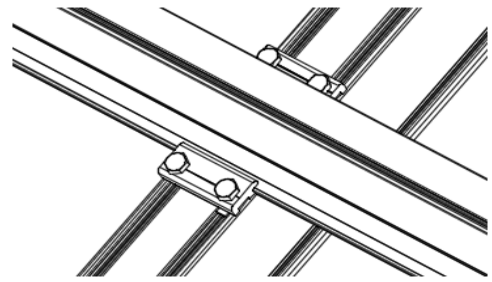
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins	
Maximum Uplifting Force =	0.867 k
Allowable Uplift =	1.214 k
Utilization =	71%



Fastening of Purlins to Girders	
Maximum Uplifting Force =	2.485 k
Allowable Uplift =	4.357 k
Utilization =	57%



6.2 Strut Connections

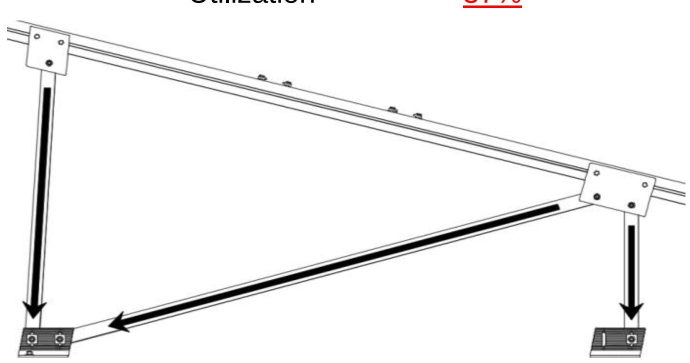
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut	
Maximum Axial Load =	2.398 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	32%

Rear Strut	
Maximum Axial Load =	4.557 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	61%

Diagonal Strut	
Maximum Axial Load =	2.731 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	37%

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.

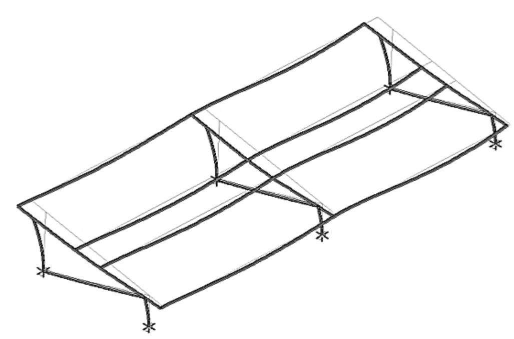
7. SEISMIC DESIGN

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} =		48.27 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.965 in
Max Drift, Δ_{MAX} =		0.024 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 = 96 in

J = 0.432

265.581

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.0 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

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 = 96

J = 0.432

168.894

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

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= 29.1

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)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:
3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:
3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L St$ = 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

φF_L = 1.3φyFcy

φF_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)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

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

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 70.83 in
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.0 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 70.83
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.0

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.63853

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80939

φF_L= (φccFcy)/(λ²)

φF_L= 10.5516 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

$\varphi F_L =$ 10.55 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 10.86 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	-39.836	-39.836	0	0
2	M14	Y	-39.836	-39.836	0	0
3	M15	Y	-39.836	-39.836	0	0
4	M16	Y	-39.836	-39.836	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	-113.295	-113.295	0	0
2	M14	y	-113.295	-113.295	0	0
3	M15	y	-182.257	-182.257	0	0
4	M16	y	-182.257	-182.257	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	256.145	256.145	0	0
2	M14	y	197.035	197.035	0	0
3	M15	y	108.369	108.369	0	0
4	M16	y	108.369	108.369	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	876.629	2	1226.199	2	.432	1	.002	1	0	1	0	1
2		min	-1049.412	3	-1642.313	3	.023	15	0	15	0	1	0	1
3	N7	max	.022	9	903.477	1	-.355	15	0	15	0	1	0	1
4		min	-.209	2	-37.249	3	-7.219	1	-.014	1	0	1	0	1
5	N15	max	.023	9	2397.779	2	0	3	0	3	0	1	0	1
6		min	-2.144	2	-219.022	3	0	1	0	1	0	1	0	1
7	N16	max	2978.138	2	3877.782	2	0	3	0	3	0	1	0	1
8		min	-3260.279	3	-5252.09	3	0	11	0	2	0	1	0	1
9	N23	max	.022	9	903.477	1	7.219	1	.014	1	0	1	0	1
10		min	-.209	2	-37.249	3	.355	15	0	15	0	1	0	1
11	N24	max	876.629	2	1226.199	2	-.023	15	0	15	0	1	0	1
12		min	-1049.412	3	-1642.313	3	-.432	1	-.002	1	0	1	0	1
13	Totals:	max	4728.832	2	10369.288	2	0	3						
14		min	-5359.344	3	-8830.237	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	68.053	1	414.092	2	-6.827	15	0	15	.162	1	0	2
2			min	3.287	15	-756.086	3	-143.476	1	-.014	2	.008	15	0	3
3		2	max	68.053	1	288.935	2	-5.239	15	0	15	.049	1	.573	3
4			min	3.287	15	-532.527	3	-109.885	1	-.014	2	.002	15	-.312	2
5		3	max	68.053	1	163.778	2	-3.651	15	0	15	.003	3	.947	3
6			min	3.287	15	-308.967	3	-76.293	1	-.014	2	-.033	1	-.514	2
7		4	max	68.053	1	38.621	2	-2.063	15	0	15	-.002	12	1.122	3
8			min	3.287	15	-85.408	3	-42.702	1	-.014	2	-.086	1	-.604	2
9		5	max	68.053	1	138.151	3	-.183	10	0	15	-.005	12	1.099	3
10			min	3.287	15	-86.536	2	-9.11	1	-.014	2	-.109	1	-.582	2
11		6	max	68.053	1	361.71	3	24.481	1	0	15	-.005	15	.876	3
12			min	3.287	15	-211.693	2	-.813	3	-.014	2	-.102	1	-.45	2
13		7	max	68.053	1	585.27	3	58.073	1	0	15	-.003	15	.455	3
14			min	3.287	15	-336.85	2	1.209	12	-.014	2	-.066	1	-.206	2
15		8	max	68.053	1	808.829	3	91.664	1	0	15	.004	2	.149	2
16			min	3.287	15	-462.007	2	2.797	12	-.014	2	-.006	3	-.164	3
17		9	max	68.053	1	1032.388	3	125.256	1	0	15	.097	1	.615	2
18			min	3.287	15	-587.164	2	4.385	12	-.014	2	-.002	3	-.982	3
19		10	max	68.053	1	712.321	2	-5.973	12	0	12	.223	1	1.193	2
20			min	3.287	15	-1255.948	3	-158.848	1	-.014	2	.004	12	-1.999	3
21		11	max	68.053	1	587.164	2	-4.385	12	.014	2	.097	1	.615	2
22			min	3.287	15	-1032.388	3	-125.256	1	0	15	-.002	3	-.982	3
23		12	max	68.053	1	462.007	2	-2.797	12	.014	2	.004	2	.149	2
24			min	3.287	15	-808.829	3	-91.664	1	0	15	-.006	3	-.164	3
25		13	max	68.053	1	336.85	2	-1.209	12	.014	2	-.003	15	.455	3
26			min	3.287	15	-585.27	3	-58.073	1	0	15	-.066	1	-.206	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	68.053	1	211.693	2	.813	3	.014	2	-.005	15	.876	3
28			min	3.287	15	-361.71	3	-24.481	1	0	15	-.102	1	-.45	2
29		15	max	68.053	1	86.536	2	9.11	1	.014	2	-.005	12	1.099	3
30			min	3.287	15	-138.151	3	.183	10	0	15	-.109	1	-.582	2
31		16	max	68.053	1	85.408	3	42.702	1	.014	2	-.002	12	1.122	3
32			min	3.287	15	-38.621	2	2.063	15	0	15	-.086	1	-.604	2
33		17	max	68.053	1	308.967	3	76.293	1	.014	2	.003	3	.947	3
34			min	3.287	15	-163.778	2	3.651	15	0	15	-.033	1	-.514	2
35		18	max	68.053	1	532.527	3	109.885	1	.014	2	.049	1	.573	3
36			min	3.287	15	-288.935	2	5.239	15	0	15	.002	15	-.312	2
37		19	max	68.053	1	756.086	3	143.476	1	.014	2	.162	1	0	2
38			min	3.287	15	-414.092	2	6.827	15	0	15	.008	15	0	3
39	M14	1	max	36.33	1	462.304	2	-7.08	15	.011	3	.19	1	0	1
40			min	1.75	15	-608.604	3	-148.798	1	-.012	2	.009	15	0	3
41		2	max	36.33	1	337.147	2	-5.492	15	.011	3	.073	1	.465	3
42			min	1.75	15	-437.587	3	-115.207	1	-.012	2	.004	15	-.355	2
43		3	max	36.33	1	211.99	2	-3.905	15	.011	3	.005	3	.778	3
44			min	1.75	15	-266.57	3	-81.615	1	-.012	2	-.015	1	-.599	2
45		4	max	36.33	1	86.833	2	-2.317	15	.011	3	-.001	12	.939	3
46			min	1.75	15	-95.553	3	-48.023	1	-.012	2	-.072	1	-.732	2
47		5	max	36.33	1	75.464	3	-.729	15	.011	3	-.004	12	.948	3
48			min	1.75	15	-38.324	2	-14.432	1	-.012	2	-.1	1	-.754	2
49		6	max	36.33	1	246.481	3	19.16	1	.011	3	-.005	15	.805	3
50			min	1.75	15	-163.481	2	-1.207	3	-.012	2	-.098	1	-.664	2
51		7	max	36.33	1	417.498	3	52.751	1	.011	3	-.003	15	.51	3
52			min	1.75	15	-288.638	2	.948	12	-.012	2	-.066	1	-.463	2
53		8	max	36.33	1	588.515	3	86.343	1	.011	3	.002	10	.062	3
54			min	1.75	15	-413.795	2	2.536	12	-.012	2	-.006	3	-.151	2
55		9	max	36.33	1	759.533	3	119.934	1	.011	3	.088	1	.273	2
56			min	1.75	15	-538.952	2	4.123	12	-.012	2	-.002	3	-.537	3
57		10	max	36.33	1	664.109	2	-5.711	12	.011	3	.209	1	.807	2
58			min	1.75	15	-930.55	3	-153.526	1	-.012	2	.004	12	-1.288	3
59		11	max	36.33	1	538.952	2	-4.123	12	.012	2	.088	1	.273	2
60			min	1.75	15	-759.533	3	-119.934	1	-.011	3	-.002	3	-.537	3
61		12	max	36.33	1	413.795	2	-2.536	12	.012	2	.002	10	.062	3
62			min	1.75	15	-588.515	3	-86.343	1	-.011	3	-.006	3	-.151	2
63		13	max	36.33	1	288.638	2	-.948	12	.012	2	-.003	15	.51	3
64			min	1.75	15	-417.498	3	-52.751	1	-.011	3	-.066	1	-.463	2
65		14	max	36.33	1	163.481	2	1.207	3	.012	2	-.005	15	.805	3
66			min	1.75	15	-246.481	3	-19.16	1	-.011	3	-.098	1	-.664	2
67		15	max	36.33	1	38.324	2	14.432	1	.012	2	-.004	12	.948	3
68			min	1.75	15	-75.464	3	.729	15	-.011	3	-.1	1	-.754	2
69		16	max	36.33	1	95.553	3	48.023	1	.012	2	-.001	12	.939	3
70			min	1.75	15	-86.833	2	2.317	15	-.011	3	-.072	1	-.732	2
71		17	max	36.33	1	266.57	3	81.615	1	.012	2	.005	3	.778	3
72			min	1.75	15	-211.99	2	3.905	15	-.011	3	-.015	1	-.599	2
73		18	max	36.33	1	437.587	3	115.207	1	.012	2	.073	1	.465	3
74			min	1.75	15	-337.147	2	5.492	15	-.011	3	.004	15	-.355	2
75		19	max	36.33	1	608.604	3	148.798	1	.012	2	.19	1	0	1
76			min	1.75	15	-462.304	2	7.08	15	-.011	3	.009	15	0	3
77	M15	1	max	-1.826	15	669.241	2	-7.078	15	.013	2	.19	1	0	2
78			min	-37.694	1	-342.968	3	-148.808	1	-.01	3	.009	15	0	3
79		2	max	-1.826	15	482.785	2	-5.49	15	.013	2	.073	1	.264	3
80			min	-37.694	1	-250.765	3	-115.216	1	-.01	3	.004	15	-.512	2
81		3	max	-1.826	15	296.328	2	-3.902	15	.013	2	.004	3	.446	3
82			min	-37.694	1	-158.562	3	-81.625	1	-.01	3	-.015	1	-.858	2
83		4	max	-1.826	15	109.872	2	-2.314	15	.013	2	-.002	12	.546	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	-37.694	1	-66.359	3	-48.033	1	-.01	3	-.072	1	-1.039	2
85		5	max	-1.826	15	25.843	3	-.726	15	.013	2	-.004	12	.564	3
86			min	-37.694	1	-76.585	2	-14.442	1	-.01	3	-.1	1	-1.054	2
87		6	max	-1.826	15	118.046	3	19.15	1	.013	2	-.005	15	.5	3
88			min	-37.694	1	-263.041	2	-1.007	3	-.01	3	-.098	1	-.903	2
89		7	max	-1.826	15	210.249	3	52.741	1	.013	2	-.003	15	.354	3
90			min	-37.694	1	-449.498	2	1.068	12	-.01	3	-.066	1	-.586	2
91		8	max	-1.826	15	302.452	3	86.333	1	.013	2	.002	10	.126	3
92			min	-37.694	1	-635.954	2	2.656	12	-.01	3	-.006	3	-.104	2
93		9	max	-1.826	15	394.655	3	119.924	1	.013	2	.088	1	.545	2
94			min	-37.694	1	-822.411	2	4.244	12	-.01	3	-.001	3	-.184	3
95		10	max	-1.826	15	1008.868	2	-5.832	12	.013	2	.209	1	1.359	2
96			min	-37.694	1	-486.858	3	-153.516	1	-.01	3	.004	12	-.576	3
97		11	max	-1.826	15	822.411	2	-4.244	12	.01	3	.088	1	.545	2
98			min	-37.694	1	-394.655	3	-119.924	1	-.013	2	-.001	3	-.184	3
99		12	max	-1.826	15	635.954	2	-2.656	12	.01	3	.002	10	.126	3
100			min	-37.694	1	-302.452	3	-86.333	1	-.013	2	-.006	3	-.104	2
101		13	max	-1.826	15	449.498	2	-1.068	12	.01	3	-.003	15	.354	3
102			min	-37.694	1	-210.249	3	-52.741	1	-.013	2	-.066	1	-.586	2
103		14	max	-1.826	15	263.041	2	1.007	3	.01	3	-.005	15	.5	3
104			min	-37.694	1	-118.046	3	-19.15	1	-.013	2	-.098	1	-.903	2
105		15	max	-1.826	15	76.585	2	14.442	1	.01	3	-.004	12	.564	3
106			min	-37.694	1	-25.843	3	.726	15	-.013	2	-.1	1	-1.054	2
107		16	max	-1.826	15	66.359	3	48.033	1	.01	3	-.002	12	.546	3
108			min	-37.694	1	-109.872	2	2.314	15	-.013	2	-.072	1	-1.039	2
109		17	max	-1.826	15	158.562	3	81.625	1	.01	3	.004	3	.446	3
110			min	-37.694	1	-296.328	2	3.902	15	-.013	2	-.015	1	-.858	2
111		18	max	-1.826	15	250.765	3	115.216	1	.01	3	.073	1	.264	3
112			min	-37.694	1	-482.785	2	5.49	15	-.013	2	.004	15	-.512	2
113		19	max	-1.826	15	342.968	3	148.808	1	.01	3	.19	1	0	2
114			min	-37.694	1	-669.241	2	7.078	15	-.013	2	.009	15	0	3
115	M16	1	max	-3.543	15	623.071	2	-6.835	15	.009	2	.164	1	0	2
116			min	-73.475	1	-303.202	3	-143.825	1	-.012	3	.008	15	0	3
117		2	max	-3.543	15	436.615	2	-5.247	15	.009	2	.051	1	.229	3
118			min	-73.475	1	-210.999	3	-110.233	1	-.012	3	.002	15	-.471	2
119		3	max	-3.543	15	250.158	2	-3.659	15	.009	2	.001	3	.375	3
120			min	-73.475	1	-118.796	3	-76.641	1	-.012	3	-.032	1	-.776	2
121		4	max	-3.543	15	63.701	2	-2.071	15	.009	2	-.003	12	.44	3
122			min	-73.475	1	-26.593	3	-43.05	1	-.012	3	-.086	1	-.916	2
123		5	max	-3.543	15	65.609	3	-.427	10	.009	2	-.005	12	.422	3
124			min	-73.475	1	-122.755	2	-9.458	1	-.012	3	-.109	1	-.889	2
125		6	max	-3.543	15	157.812	3	24.133	1	.009	2	-.005	15	.323	3
126			min	-73.475	1	-309.212	2	-.144	3	-.012	3	-.102	1	-.697	2
127		7	max	-3.543	15	250.015	3	57.725	1	.009	2	-.003	15	.142	3
128			min	-73.475	1	-495.668	2	1.611	12	-.012	3	-.066	1	-.34	2
129		8	max	-3.543	15	342.218	3	91.316	1	.009	2	.003	2	.184	2
130			min	-73.475	1	-682.125	2	3.198	12	-.012	3	-.004	3	-.121	3
131		9	max	-3.543	15	434.421	3	124.908	1	.009	2	.096	1	.873	2
132			min	-73.475	1	-868.581	2	4.786	12	-.012	3	0	3	-.467	3
133		10	max	-3.543	15	1055.038	2	-6.374	12	.009	2	.222	1	1.728	2
134			min	-73.475	1	-526.624	3	-158.499	1	-.012	3	.006	12	-.894	3
135		11	max	-3.543	15	868.581	2	-4.786	12	.012	3	.096	1	.873	2
136			min	-73.475	1	-434.421	3	-124.908	1	-.009	2	0	3	-.467	3
137		12	max	-3.543	15	682.125	2	-3.198	12	.012	3	.003	2	.184	2
138			min	-73.475	1	-342.218	3	-91.316	1	-.009	2	-.004	3	-.121	3
139		13	max	-3.543	15	495.668	2	-1.611	12	.012	3	-.003	15	.142	3
140			min	-73.475	1	-250.015	3	-57.725	1	-.009	2	-.066	1	-.34	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	-3.543	15	309.212	2	.144	3	.012	3	-.005	15	.323	3
142			min	-73.475	1	-157.812	3	-24.133	1	-.009	2	-.102	1	-.697	2
143		15	max	-3.543	15	122.755	2	9.458	1	.012	3	-.005	12	.422	3
144			min	-73.475	1	-65.609	3	.427	10	-.009	2	-.109	1	-.889	2
145		16	max	-3.543	15	26.593	3	43.05	1	.012	3	-.003	12	.44	3
146			min	-73.475	1	-63.701	2	2.071	15	-.009	2	-.086	1	-.916	2
147		17	max	-3.543	15	118.796	3	76.641	1	.012	3	.001	3	.375	3
148			min	-73.475	1	-250.158	2	3.659	15	-.009	2	-.032	1	-.776	2
149		18	max	-3.543	15	210.999	3	110.233	1	.012	3	.051	1	.229	3
150			min	-73.475	1	-436.615	2	5.247	15	-.009	2	.002	15	-.471	2
151		19	max	-3.543	15	303.202	3	143.825	1	.012	3	.164	1	0	2
152			min	-73.475	1	-623.071	2	6.835	15	-.009	2	.008	15	0	3
153	M2	1	max	1010.969	2	1.931	4	.314	1	0	3	0	3	0	1
154			min	-1423.251	3	.454	15	.015	15	0	1	0	2	0	1
155		2	max	1011.444	2	1.845	4	.314	1	0	3	0	1	0	15
156			min	-1422.894	3	.434	15	.015	15	0	1	0	15	0	4
157		3	max	1011.92	2	1.76	4	.314	1	0	3	0	1	0	15
158			min	-1422.537	3	.414	15	.015	15	0	1	0	15	-.001	4
159		4	max	1012.396	2	1.674	4	.314	1	0	3	0	1	0	15
160			min	-1422.18	3	.394	15	.015	15	0	1	0	15	-.002	4
161		5	max	1012.872	2	1.588	4	.314	1	0	3	0	1	0	15
162			min	-1421.823	3	.374	15	.015	15	0	1	0	15	-.002	4
163		6	max	1013.347	2	1.503	4	.314	1	0	3	0	1	0	15
164			min	-1421.466	3	.354	15	.015	15	0	1	0	15	-.003	4
165		7	max	1013.823	2	1.417	4	.314	1	0	3	0	1	0	15
166			min	-1421.11	3	.334	15	.015	15	0	1	0	15	-.003	4
167		8	max	1014.299	2	1.332	4	.314	1	0	3	0	1	0	15
168			min	-1420.753	3	.313	15	.015	15	0	1	0	15	-.004	4
169		9	max	1014.775	2	1.246	4	.314	1	0	3	0	1	0	15
170			min	-1420.396	3	.293	15	.015	15	0	1	0	15	-.004	4
171		10	max	1015.25	2	1.161	4	.314	1	0	3	0	1	-.001	15
172			min	-1420.039	3	.26	12	.015	15	0	1	0	15	-.005	4
173		11	max	1015.726	2	1.075	4	.314	1	0	3	.001	1	-.001	15
174			min	-1419.682	3	.227	12	.015	15	0	1	0	15	-.005	4
175		12	max	1016.202	2	1.008	2	.314	1	0	3	.001	1	-.001	15
176			min	-1419.326	3	.193	12	.015	15	0	1	0	15	-.005	4
177		13	max	1016.678	2	.941	2	.314	1	0	3	.001	1	-.001	15
178			min	-1418.969	3	.16	12	.015	15	0	1	0	15	-.006	4
179		14	max	1017.153	2	.874	2	.314	1	0	3	.001	1	-.001	15
180			min	-1418.612	3	.127	12	.015	15	0	1	0	15	-.006	4
181		15	max	1017.629	2	.807	2	.314	1	0	3	.001	1	-.001	15
182			min	-1418.255	3	.093	12	.015	15	0	1	0	15	-.006	4
183		16	max	1018.105	2	.741	2	.314	1	0	3	.002	1	-.001	15
184			min	-1417.898	3	.058	3	.015	15	0	1	0	15	-.006	4
185		17	max	1018.581	2	.674	2	.314	1	0	3	.002	1	-.002	15
186			min	-1417.542	3	.008	3	.015	15	0	1	0	15	-.006	4
187		18	max	1019.056	2	.607	2	.314	1	0	3	.002	1	-.002	12
188			min	-1417.185	3	-.042	3	.015	15	0	1	0	15	-.007	4
189		19	max	1019.532	2	.541	2	.314	1	0	3	.002	1	-.002	12
190			min	-1416.828	3	-.092	3	.015	15	0	1	0	15	-.007	4
191	M3	1	max	765.923	2	7.78	4	.169	1	0	3	0	1	.007	4
192			min	-885.28	3	1.829	15	.008	15	0	1	0	15	.002	12
193		2	max	765.753	2	7.015	4	.169	1	0	3	0	1	.004	2
194			min	-885.408	3	1.649	15	.008	15	0	1	0	15	0	12
195		3	max	765.582	2	6.251	4	.169	1	0	3	0	1	.002	2
196			min	-885.535	3	1.47	15	.008	15	0	1	0	15	-.001	3
197		4	max	765.412	2	5.487	4	.169	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	-885.663	3	1.29	15	.008	15	0	1	0	15	-.002	3
199		5	max	765.242	2	4.722	4	.169	1	0	3	0	1	0	15
200			min	-885.791	3	1.11	15	.008	15	0	1	0	15	-.004	4
201		6	max	765.071	2	3.958	4	.169	1	0	3	0	1	-.001	15
202			min	-885.919	3	.931	15	.008	15	0	1	0	15	-.005	4
203		7	max	764.901	2	3.193	4	.169	1	0	3	0	1	-.002	15
204			min	-886.046	3	.751	15	.008	15	0	1	0	15	-.007	4
205		8	max	764.73	2	2.429	4	.169	1	0	3	0	1	-.002	15
206			min	-886.174	3	.571	15	.008	15	0	1	0	15	-.008	4
207		9	max	764.56	2	1.664	4	.169	1	0	3	0	1	-.002	15
208			min	-886.302	3	.392	15	.008	15	0	1	0	15	-.009	4
209		10	max	764.39	2	.9	4	.169	1	0	3	0	1	-.002	15
210			min	-886.43	3	.202	12	.008	15	0	1	0	15	-.01	4
211		11	max	764.219	2	.289	2	.169	1	0	3	0	1	-.002	15
212			min	-886.557	3	-.169	3	.008	15	0	1	0	15	-.01	4
213		12	max	764.049	2	-.148	15	.169	1	0	3	.001	1	-.002	15
214			min	-886.685	3	-.629	4	.008	15	0	1	0	15	-.01	4
215		13	max	763.879	2	-.327	15	.169	1	0	3	.001	1	-.002	15
216			min	-886.813	3	-1.393	4	.008	15	0	1	0	15	-.009	4
217		14	max	763.708	2	-.507	15	.169	1	0	3	.001	1	-.002	15
218			min	-886.941	3	-2.158	4	.008	15	0	1	0	15	-.008	4
219		15	max	763.538	2	-.687	15	.169	1	0	3	.001	1	-.002	15
220			min	-887.068	3	-2.922	4	.008	15	0	1	0	15	-.007	4
221		16	max	763.368	2	-.866	15	.169	1	0	3	.001	1	-.001	15
222			min	-887.196	3	-3.687	4	.008	15	0	1	0	15	-.006	4
223		17	max	763.197	2	-1.046	15	.169	1	0	3	.001	1	-.001	15
224			min	-887.324	3	-4.451	4	.008	15	0	1	0	15	-.004	4
225		18	max	763.027	2	-1.226	15	.169	1	0	3	.001	1	0	15
226			min	-887.452	3	-5.216	4	.008	15	0	1	0	15	-.002	4
227		19	max	762.857	2	-1.405	15	.169	1	0	3	.002	1	0	1
228			min	-887.58	3	-5.98	4	.008	15	0	1	0	15	0	1
229	M4	1	max	900.411	1	0	1	-.356	15	0	1	.001	1	0	1
230			min	-39.549	3	0	1	-7.404	1	0	1	0	15	0	1
231		2	max	900.581	1	0	1	-.356	15	0	1	0	1	0	1
232			min	-39.421	3	0	1	-7.404	1	0	1	0	15	0	1
233		3	max	900.751	1	0	1	-.356	15	0	1	0	15	0	1
234			min	-39.293	3	0	1	-7.404	1	0	1	0	1	0	1
235		4	max	900.922	1	0	1	-.356	15	0	1	0	15	0	1
236			min	-39.166	3	0	1	-7.404	1	0	1	-.001	1	0	1
237		5	max	901.092	1	0	1	-.356	15	0	1	0	15	0	1
238			min	-39.038	3	0	1	-7.404	1	0	1	-.002	1	0	1
239		6	max	901.263	1	0	1	-.356	15	0	1	0	15	0	1
240			min	-38.91	3	0	1	-7.404	1	0	1	-.003	1	0	1
241		7	max	901.433	1	0	1	-.356	15	0	1	0	15	0	1
242			min	-38.782	3	0	1	-7.404	1	0	1	-.004	1	0	1
243		8	max	901.603	1	0	1	-.356	15	0	1	0	15	0	1
244			min	-38.655	3	0	1	-7.404	1	0	1	-.005	1	0	1
245		9	max	901.774	1	0	1	-.356	15	0	1	0	15	0	1
246			min	-38.527	3	0	1	-7.404	1	0	1	-.006	1	0	1
247		10	max	901.944	1	0	1	-.356	15	0	1	0	15	0	1
248			min	-38.399	3	0	1	-7.404	1	0	1	-.006	1	0	1
249		11	max	902.114	1	0	1	-.356	15	0	1	0	15	0	1
250			min	-38.271	3	0	1	-7.404	1	0	1	-.007	1	0	1
251		12	max	902.285	1	0	1	-.356	15	0	1	0	15	0	1
252			min	-38.143	3	0	1	-7.404	1	0	1	-.008	1	0	1
253		13	max	902.455	1	0	1	-.356	15	0	1	0	15	0	1
254			min	-38.016	3	0	1	-7.404	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	902.625	1	0	1	-.356	15	0	1	0	15	0	1
256			min	-37.888	3	0	1	-7.404	1	0	1	-.01	1	0	1
257		15	max	902.796	1	0	1	-.356	15	0	1	0	15	0	1
258			min	-37.76	3	0	1	-7.404	1	0	1	-.011	1	0	1
259		16	max	902.966	1	0	1	-.356	15	0	1	0	15	0	1
260			min	-37.632	3	0	1	-7.404	1	0	1	-.011	1	0	1
261		17	max	903.136	1	0	1	-.356	15	0	1	0	15	0	1
262			min	-37.505	3	0	1	-7.404	1	0	1	-.012	1	0	1
263		18	max	903.307	1	0	1	-.356	15	0	1	0	15	0	1
264			min	-37.377	3	0	1	-7.404	1	0	1	-.013	1	0	1
265		19	max	903.477	1	0	1	-.356	15	0	1	0	15	0	1
266			min	-37.249	3	0	1	-7.404	1	0	1	-.014	1	0	1
267	M6	1	max	3167.292	2	2.295	2	0	1	0	1	0	1	0	1
268			min	-4556.5	3	.122	3	0	1	0	1	0	1	0	1
269		2	max	3167.768	2	2.229	2	0	1	0	1	0	1	0	3
270			min	-4556.143	3	.072	3	0	1	0	1	0	1	0	2
271		3	max	3168.244	2	2.162	2	0	1	0	1	0	1	0	3
272			min	-4555.786	3	.022	3	0	1	0	1	0	1	-.001	2
273		4	max	3168.72	2	2.095	2	0	1	0	1	0	1	0	3
274			min	-4555.429	3	-.028	3	0	1	0	1	0	1	-.002	2
275		5	max	3169.195	2	2.029	2	0	1	0	1	0	1	0	3
276			min	-4555.073	3	-.078	3	0	1	0	1	0	1	-.003	2
277		6	max	3169.671	2	1.962	2	0	1	0	1	0	1	0	3
278			min	-4554.716	3	-.128	3	0	1	0	1	0	1	-.003	2
279		7	max	3170.147	2	1.895	2	0	1	0	1	0	1	0	3
280			min	-4554.359	3	-.178	3	0	1	0	1	0	1	-.004	2
281		8	max	3170.623	2	1.828	2	0	1	0	1	0	1	0	3
282			min	-4554.002	3	-.228	3	0	1	0	1	0	1	-.005	2
283		9	max	3171.098	2	1.762	2	0	1	0	1	0	1	0	3
284			min	-4553.645	3	-.278	3	0	1	0	1	0	1	-.005	2
285		10	max	3171.574	2	1.695	2	0	1	0	1	0	1	0	3
286			min	-4553.288	3	-.328	3	0	1	0	1	0	1	-.006	2
287		11	max	3172.05	2	1.628	2	0	1	0	1	0	1	0	3
288			min	-4552.932	3	-.378	3	0	1	0	1	0	1	-.006	2
289		12	max	3172.526	2	1.562	2	0	1	0	1	0	1	0	3
290			min	-4552.575	3	-.428	3	0	1	0	1	0	1	-.007	2
291		13	max	3173.001	2	1.495	2	0	1	0	1	0	1	0	3
292			min	-4552.218	3	-.478	3	0	1	0	1	0	1	-.007	2
293		14	max	3173.477	2	1.428	2	0	1	0	1	0	1	0	3
294			min	-4551.861	3	-.528	3	0	1	0	1	0	1	-.008	2
295		15	max	3173.953	2	1.362	2	0	1	0	1	0	1	.001	3
296			min	-4551.504	3	-.578	3	0	1	0	1	0	1	-.008	2
297		16	max	3174.429	2	1.295	2	0	1	0	1	0	1	.001	3
298			min	-4551.148	3	-.628	3	0	1	0	1	0	1	-.009	2
299		17	max	3174.904	2	1.228	2	0	1	0	1	0	1	.001	3
300			min	-4550.791	3	-.678	3	0	1	0	1	0	1	-.009	2
301		18	max	3175.38	2	1.162	2	0	1	0	1	0	1	.002	3
302			min	-4550.434	3	-.728	3	0	1	0	1	0	1	-.01	2
303		19	max	3175.856	2	1.095	2	0	1	0	1	0	1	.002	3
304			min	-4550.077	3	-.778	3	0	1	0	1	0	1	-.01	2
305	M7	1	max	2641.193	2	7.804	4	0	1	0	1	0	1	.01	2
306			min	-2729.125	3	1.833	15	0	1	0	1	0	1	-.002	3
307		2	max	2641.023	2	7.04	4	0	1	0	1	0	1	.007	2
308			min	-2729.252	3	1.653	15	0	1	0	1	0	1	-.003	3
309		3	max	2640.853	2	6.275	4	0	1	0	1	0	1	.005	2
310			min	-2729.38	3	1.473	15	0	1	0	1	0	1	-.005	3
311		4	max	2640.682	2	5.511	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2729.508	3	1.294	15	0	1	0	1	0	1	-.006	3
313		5	max	2640.512	2	4.746	4	0	1	0	1	0	1	0	2
314			min	-2729.636	3	1.114	15	0	1	0	1	0	1	-.007	3
315		6	max	2640.342	2	3.982	4	0	1	0	1	0	1	0	2
316			min	-2729.763	3	.934	15	0	1	0	1	0	1	-.007	3
317		7	max	2640.171	2	3.218	4	0	1	0	1	0	1	-.002	15
318			min	-2729.891	3	.755	15	0	1	0	1	0	1	-.008	3
319		8	max	2640.001	2	2.506	2	0	1	0	1	0	1	-.002	15
320			min	-2730.019	3	.478	12	0	1	0	1	0	1	-.008	3
321		9	max	2639.831	2	1.91	2	0	1	0	1	0	1	-.002	15
322			min	-2730.147	3	.181	12	0	1	0	1	0	1	-.009	4
323		10	max	2639.66	2	1.314	2	0	1	0	1	0	1	-.002	15
324			min	-2730.274	3	-.254	3	0	1	0	1	0	1	-.009	4
325		11	max	2639.49	2	.719	2	0	1	0	1	0	1	-.002	15
326			min	-2730.402	3	-.701	3	0	1	0	1	0	1	-.01	4
327		12	max	2639.32	2	.123	2	0	1	0	1	0	1	-.002	15
328			min	-2730.53	3	-1.148	3	0	1	0	1	0	1	-.01	4
329		13	max	2639.149	2	-.323	15	0	1	0	1	0	1	-.002	15
330			min	-2730.658	3	-1.594	3	0	1	0	1	0	1	-.009	4
331		14	max	2638.979	2	-.503	15	0	1	0	1	0	1	-.002	15
332			min	-2730.785	3	-2.134	4	0	1	0	1	0	1	-.008	4
333		15	max	2638.809	2	-.683	15	0	1	0	1	0	1	-.002	15
334			min	-2730.913	3	-2.898	4	0	1	0	1	0	1	-.007	4
335		16	max	2638.638	2	-.863	15	0	1	0	1	0	1	-.001	15
336			min	-2731.041	3	-3.662	4	0	1	0	1	0	1	-.006	4
337		17	max	2638.468	2	-1.042	15	0	1	0	1	0	1	-.001	15
338			min	-2731.169	3	-4.427	4	0	1	0	1	0	1	-.004	4
339		18	max	2638.298	2	-1.222	15	0	1	0	1	0	1	0	15
340			min	-2731.296	3	-5.191	4	0	1	0	1	0	1	-.002	4
341		19	max	2638.127	2	-1.402	15	0	1	0	1	0	1	0	1
342			min	-2731.424	3	-5.956	4	0	1	0	1	0	1	0	1
343	M8	1	max	2394.713	2	0	1	0	1	0	1	0	1	0	1
344			min	-221.322	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2394.884	2	0	1	0	1	0	1	0	1	0	1
346			min	-221.194	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2395.054	2	0	1	0	1	0	1	0	1	0	1
348			min	-221.066	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2395.224	2	0	1	0	1	0	1	0	1	0	1
350			min	-220.939	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2395.395	2	0	1	0	1	0	1	0	1	0	1
352			min	-220.811	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2395.565	2	0	1	0	1	0	1	0	1	0	1
354			min	-220.683	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2395.735	2	0	1	0	1	0	1	0	1	0	1
356			min	-220.555	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2395.906	2	0	1	0	1	0	1	0	1	0	1
358			min	-220.428	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2396.076	2	0	1	0	1	0	1	0	1	0	1
360			min	-220.3	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2396.246	2	0	1	0	1	0	1	0	1	0	1
362			min	-220.172	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2396.417	2	0	1	0	1	0	1	0	1	0	1
364			min	-220.044	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2396.587	2	0	1	0	1	0	1	0	1	0	1
366			min	-219.917	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2396.757	2	0	1	0	1	0	1	0	1	0	1
368			min	-219.789	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	2396.928	2	0	1	0	1	0	1	0	1	0	1
370			min	-219.661	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2397.098	2	0	1	0	1	0	1	0	1	0	1
372			min	-219.533	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2397.268	2	0	1	0	1	0	1	0	1	0	1
374			min	-219.406	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2397.439	2	0	1	0	1	0	1	0	1	0	1
376			min	-219.278	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2397.609	2	0	1	0	1	0	1	0	1	0	1
378			min	-219.15	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2397.779	2	0	1	0	1	0	1	0	1	0	1
380			min	-219.022	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1010.969	2	1.931	4	-.015	15	0	1	0	2	0	1
382			min	-1423.251	3	.454	15	-.314	1	0	3	0	3	0	1
383		2	max	1011.444	2	1.845	4	-.015	15	0	1	0	15	0	15
384			min	-1422.894	3	.434	15	-.314	1	0	3	0	1	0	4
385		3	max	1011.92	2	1.76	4	-.015	15	0	1	0	15	0	15
386			min	-1422.537	3	.414	15	-.314	1	0	3	0	1	-.001	4
387		4	max	1012.396	2	1.674	4	-.015	15	0	1	0	15	0	15
388			min	-1422.18	3	.394	15	-.314	1	0	3	0	1	-.002	4
389		5	max	1012.872	2	1.588	4	-.015	15	0	1	0	15	0	15
390			min	-1421.823	3	.374	15	-.314	1	0	3	0	1	-.002	4
391		6	max	1013.347	2	1.503	4	-.015	15	0	1	0	15	0	15
392			min	-1421.466	3	.354	15	-.314	1	0	3	0	1	-.003	4
393		7	max	1013.823	2	1.417	4	-.015	15	0	1	0	15	0	15
394			min	-1421.11	3	.334	15	-.314	1	0	3	0	1	-.003	4
395		8	max	1014.299	2	1.332	4	-.015	15	0	1	0	15	0	15
396			min	-1420.753	3	.313	15	-.314	1	0	3	0	1	-.004	4
397		9	max	1014.775	2	1.246	4	-.015	15	0	1	0	15	0	15
398			min	-1420.396	3	.293	15	-.314	1	0	3	0	1	-.004	4
399		10	max	1015.25	2	1.161	4	-.015	15	0	1	0	15	-.001	15
400			min	-1420.039	3	.26	12	-.314	1	0	3	0	1	-.005	4
401		11	max	1015.726	2	1.075	4	-.015	15	0	1	0	15	-.001	15
402			min	-1419.682	3	.227	12	-.314	1	0	3	-.001	1	-.005	4
403		12	max	1016.202	2	1.008	2	-.015	15	0	1	0	15	-.001	15
404			min	-1419.326	3	.193	12	-.314	1	0	3	-.001	1	-.005	4
405		13	max	1016.678	2	.941	2	-.015	15	0	1	0	15	-.001	15
406			min	-1418.969	3	.16	12	-.314	1	0	3	-.001	1	-.006	4
407		14	max	1017.153	2	.874	2	-.015	15	0	1	0	15	-.001	15
408			min	-1418.612	3	.127	12	-.314	1	0	3	-.001	1	-.006	4
409		15	max	1017.629	2	.807	2	-.015	15	0	1	0	15	-.001	15
410			min	-1418.255	3	.093	12	-.314	1	0	3	-.001	1	-.006	4
411		16	max	1018.105	2	.741	2	-.015	15	0	1	0	15	-.001	15
412			min	-1417.898	3	.058	3	-.314	1	0	3	-.002	1	-.006	4
413		17	max	1018.581	2	.674	2	-.015	15	0	1	0	15	-.002	15
414			min	-1417.542	3	.008	3	-.314	1	0	3	-.002	1	-.006	4
415		18	max	1019.056	2	.607	2	-.015	15	0	1	0	15	-.002	12
416			min	-1417.185	3	-.042	3	-.314	1	0	3	-.002	1	-.007	4
417		19	max	1019.532	2	.541	2	-.015	15	0	1	0	15	-.002	12
418			min	-1416.828	3	-.092	3	-.314	1	0	3	-.002	1	-.007	4
419	M11	1	max	765.923	2	7.78	4	-.008	15	0	1	0	15	.007	4
420			min	-885.28	3	1.829	15	-.169	1	0	3	0	1	.002	12
421		2	max	765.753	2	7.015	4	-.008	15	0	1	0	15	.004	2
422			min	-885.408	3	1.649	15	-.169	1	0	3	0	1	0	12
423		3	max	765.582	2	6.251	4	-.008	15	0	1	0	15	.002	2
424			min	-885.535	3	1.47	15	-.169	1	0	3	0	1	-.001	3
425		4	max	765.412	2	5.487	4	-.008	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	-885.663	3	1.29	15	-.169	1	0	3	0	1	-.002	3
427		5	max	765.242	2	4.722	4	-.008	15	0	1	0	15	0	15
428			min	-885.791	3	1.11	15	-.169	1	0	3	0	1	-.004	4
429		6	max	765.071	2	3.958	4	-.008	15	0	1	0	15	-.001	15
430			min	-885.919	3	.931	15	-.169	1	0	3	0	1	-.005	4
431		7	max	764.901	2	3.193	4	-.008	15	0	1	0	15	-.002	15
432			min	-886.046	3	.751	15	-.169	1	0	3	0	1	-.007	4
433		8	max	764.73	2	2.429	4	-.008	15	0	1	0	15	-.002	15
434			min	-886.174	3	.571	15	-.169	1	0	3	0	1	-.008	4
435		9	max	764.56	2	1.664	4	-.008	15	0	1	0	15	-.002	15
436			min	-886.302	3	.392	15	-.169	1	0	3	0	1	-.009	4
437		10	max	764.39	2	.9	4	-.008	15	0	1	0	15	-.002	15
438			min	-886.43	3	.202	12	-.169	1	0	3	0	1	-.01	4
439		11	max	764.219	2	.289	2	-.008	15	0	1	0	15	-.002	15
440			min	-886.557	3	-.169	3	-.169	1	0	3	0	1	-.01	4
441		12	max	764.049	2	-.148	15	-.008	15	0	1	0	15	-.002	15
442			min	-886.685	3	-.629	4	-.169	1	0	3	-.001	1	-.01	4
443		13	max	763.879	2	-.327	15	-.008	15	0	1	0	15	-.002	15
444			min	-886.813	3	-1.393	4	-.169	1	0	3	-.001	1	-.009	4
445		14	max	763.708	2	-.507	15	-.008	15	0	1	0	15	-.002	15
446			min	-886.941	3	-2.158	4	-.169	1	0	3	-.001	1	-.008	4
447		15	max	763.538	2	-.687	15	-.008	15	0	1	0	15	-.002	15
448			min	-887.068	3	-2.922	4	-.169	1	0	3	-.001	1	-.007	4
449		16	max	763.368	2	-.866	15	-.008	15	0	1	0	15	-.001	15
450			min	-887.196	3	-3.687	4	-.169	1	0	3	-.001	1	-.006	4
451		17	max	763.197	2	-1.046	15	-.008	15	0	1	0	15	-.001	15
452			min	-887.324	3	-4.451	4	-.169	1	0	3	-.001	1	-.004	4
453		18	max	763.027	2	-1.226	15	-.008	15	0	1	0	15	0	15
454			min	-887.452	3	-5.216	4	-.169	1	0	3	-.001	1	-.002	4
455		19	max	762.857	2	-1.405	15	-.008	15	0	1	0	15	0	1
456			min	-887.58	3	-5.98	4	-.169	1	0	3	-.002	1	0	1
457	M12	1	max	900.411	1	0	1	7.404	1	0	1	0	15	0	1
458			min	-39.549	3	0	1	.356	15	0	1	-.001	1	0	1
459		2	max	900.581	1	0	1	7.404	1	0	1	0	15	0	1
460			min	-39.421	3	0	1	.356	15	0	1	0	1	0	1
461		3	max	900.751	1	0	1	7.404	1	0	1	0	1	0	1
462			min	-39.293	3	0	1	.356	15	0	1	0	15	0	1
463		4	max	900.922	1	0	1	7.404	1	0	1	.001	1	0	1
464			min	-39.166	3	0	1	.356	15	0	1	0	15	0	1
465		5	max	901.092	1	0	1	7.404	1	0	1	.002	1	0	1
466			min	-39.038	3	0	1	.356	15	0	1	0	15	0	1
467		6	max	901.263	1	0	1	7.404	1	0	1	.003	1	0	1
468			min	-38.91	3	0	1	.356	15	0	1	0	15	0	1
469		7	max	901.433	1	0	1	7.404	1	0	1	.004	1	0	1
470			min	-38.782	3	0	1	.356	15	0	1	0	15	0	1
471		8	max	901.603	1	0	1	7.404	1	0	1	.005	1	0	1
472			min	-38.655	3	0	1	.356	15	0	1	0	15	0	1
473		9	max	901.774	1	0	1	7.404	1	0	1	.006	1	0	1
474			min	-38.527	3	0	1	.356	15	0	1	0	15	0	1
475		10	max	901.944	1	0	1	7.404	1	0	1	.006	1	0	1
476			min	-38.399	3	0	1	.356	15	0	1	0	15	0	1
477		11	max	902.114	1	0	1	7.404	1	0	1	.007	1	0	1
478			min	-38.271	3	0	1	.356	15	0	1	0	15	0	1
479		12	max	902.285	1	0	1	7.404	1	0	1	.008	1	0	1
480			min	-38.143	3	0	1	.356	15	0	1	0	15	0	1
481		13	max	902.455	1	0	1	7.404	1	0	1	.009	1	0	1
482			min	-38.016	3	0	1	.356	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	902.625	1	0	1	7.404	1	0	1	.01	1	0	1
484			min	-37.888	3	0	1	.356	15	0	1	0	15	0	1
485		15	max	902.796	1	0	1	7.404	1	0	1	.011	1	0	1
486			min	-37.76	3	0	1	.356	15	0	1	0	15	0	1
487		16	max	902.966	1	0	1	7.404	1	0	1	.011	1	0	1
488			min	-37.632	3	0	1	.356	15	0	1	0	15	0	1
489		17	max	903.136	1	0	1	7.404	1	0	1	.012	1	0	1
490			min	-37.505	3	0	1	.356	15	0	1	0	15	0	1
491		18	max	903.307	1	0	1	7.404	1	0	1	.013	1	0	1
492			min	-37.377	3	0	1	.356	15	0	1	0	15	0	1
493		19	max	903.477	1	0	1	7.404	1	0	1	.014	1	0	1
494			min	-37.249	3	0	1	.356	15	0	1	0	15	0	1
495	M1	1	max	143.482	1	756.042	3	-3.287	15	0	2	.162	1	0	15
496			min	6.827	15	-413.527	2	-67.986	1	0	3	.008	15	-.014	2
497		2	max	144.198	1	755.112	3	-3.287	15	0	2	.126	1	.204	2
498			min	7.043	15	-414.768	2	-67.986	1	0	3	.006	15	-.399	3
499		3	max	547.902	3	517.95	2	-3.272	15	0	3	.09	1	.412	2
500			min	-317.311	2	-568.91	3	-67.776	1	0	2	.004	15	-.782	3
501		4	max	548.439	3	516.709	2	-3.272	15	0	3	.054	1	.139	2
502			min	-316.595	2	-569.841	3	-67.776	1	0	2	.003	15	-.481	3
503		5	max	548.976	3	515.469	2	-3.272	15	0	3	.019	1	-.003	15
504			min	-315.878	2	-570.771	3	-67.776	1	0	2	0	15	-.18	3
505		6	max	549.513	3	514.228	2	-3.272	15	0	3	0	15	.121	3
506			min	-315.162	2	-571.701	3	-67.776	1	0	2	-.017	1	-.405	2
507		7	max	550.051	3	512.988	2	-3.272	15	0	3	-.003	15	.423	3
508			min	-314.446	2	-572.632	3	-67.776	1	0	2	-.053	1	-.676	2
509		8	max	550.588	3	511.747	2	-3.272	15	0	3	-.004	15	.725	3
510			min	-313.73	2	-573.562	3	-67.776	1	0	2	-.089	1	-.946	2
511		9	max	564.239	3	51.566	2	-5.022	15	0	9	.054	1	.845	3
512			min	-252.028	2	.378	15	-104.134	1	0	3	.003	15	-1.082	2
513		10	max	564.776	3	50.325	2	-5.022	15	0	9	0	10	.825	3
514			min	-251.312	2	.004	15	-104.134	1	0	3	0	1	-1.109	2
515		11	max	565.313	3	49.085	2	-5.022	15	0	9	-.003	15	.806	3
516			min	-250.596	2	-1.529	4	-104.134	1	0	3	-.056	1	-1.135	2
517		12	max	578.766	3	382.566	3	-3.196	15	0	2	.088	1	.705	3
518			min	-188.808	2	-619.529	2	-66.46	1	0	3	.004	15	-1.008	2
519		13	max	579.304	3	381.636	3	-3.196	15	0	2	.053	1	.503	3
520			min	-188.091	2	-620.769	2	-66.46	1	0	3	.003	15	-.68	2
521		14	max	579.841	3	380.706	3	-3.196	15	0	2	.018	1	.302	3
522			min	-187.375	2	-622.01	2	-66.46	1	0	3	0	15	-.352	2
523		15	max	580.378	3	379.775	3	-3.196	15	0	2	0	15	.101	3
524			min	-186.659	2	-623.25	2	-66.46	1	0	3	-.018	1	-.039	1
525		16	max	580.915	3	378.845	3	-3.196	15	0	2	-.003	15	.305	2
526			min	-185.943	2	-624.491	2	-66.46	1	0	3	-.053	1	-.099	3
527		17	max	581.452	3	377.914	3	-3.196	15	0	2	-.004	15	.635	2
528			min	-185.227	2	-625.731	2	-66.46	1	0	3	-.088	1	-.299	3
529		18	max	-7.051	15	624.799	2	-3.543	15	0	3	-.006	15	.32	2
530			min	-144.536	1	-302.354	3	-73.54	1	0	2	-.125	1	-.147	3
531		19	max	-6.835	15	623.558	2	-3.543	15	0	3	-.008	15	.012	3
532			min	-143.82	1	-303.284	3	-73.54	1	0	2	-.164	1	-.009	2
533	M5	1	max	317.685	1	2511.82	3	0	1	0	1	0	1	.028	2
534			min	11.947	12	-1421.703	2	0	1	0	1	0	1	0	15
535		2	max	318.401	1	2510.89	3	0	1	0	1	0	1	.779	2
536			min	12.305	12	-1422.943	2	0	1	0	1	0	1	-1.324	3
537		3	max	1724.36	3	1482.921	2	0	1	0	1	0	1	1.495	2
538			min	-1048.784	2	-1747.04	3	0	1	0	1	0	1	-2.597	3
539		4	max	1724.898	3	1481.68	2	0	1	0	1	0	1	.713	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
540			min	-1048.068	2	-1747.97	3	0	1	0	1	0	1	-1.675	3
541		5	max	1725.435	3	1480.439	2	0	1	0	1	0	1	.015	9
542			min	-1047.351	2	-1748.901	3	0	1	0	1	0	1	-.753	3
543		6	max	1725.972	3	1479.199	2	0	1	0	1	0	1	.171	3
544			min	-1046.635	2	-1749.831	3	0	1	0	1	0	1	-.85	2
545		7	max	1726.509	3	1477.958	2	0	1	0	1	0	1	1.094	3
546			min	-1045.919	2	-1750.761	3	0	1	0	1	0	1	-1.63	2
547		8	max	1727.046	3	1476.718	2	0	1	0	1	0	1	2.018	3
548			min	-1045.203	2	-1751.692	3	0	1	0	1	0	1	-2.409	2
549		9	max	1744.225	3	173.772	2	0	1	0	1	0	1	2.321	3
550			min	-912.362	2	.372	15	0	1	0	1	0	1	-2.751	2
551		10	max	1744.762	3	172.531	2	0	1	0	1	0	1	2.248	3
552			min	-911.646	2	-.002	15	0	1	0	1	0	1	-2.843	2
553		11	max	1745.299	3	171.291	2	0	1	0	1	0	1	2.175	3
554			min	-910.93	2	-1.472	4	0	1	0	1	0	1	-2.933	2
555		12	max	1762.874	3	1146.224	3	0	1	0	1	0	1	1.909	3
556			min	-778.262	2	-1827.559	2	0	1	0	1	0	1	-2.628	2
557		13	max	1763.411	3	1145.294	3	0	1	0	1	0	1	1.304	3
558			min	-777.546	2	-1828.8	2	0	1	0	1	0	1	-1.664	2
559		14	max	1763.949	3	1144.364	3	0	1	0	1	0	1	.7	3
560			min	-776.829	2	-1830.04	2	0	1	0	1	0	1	-.698	2
561		15	max	1764.486	3	1143.433	3	0	1	0	1	0	1	.268	2
562			min	-776.113	2	-1831.281	2	0	1	0	1	0	1	-.002	13
563		16	max	1765.023	3	1142.503	3	0	1	0	1	0	1	1.234	2
564			min	-775.397	2	-1832.521	2	0	1	0	1	0	1	-.507	3
565		17	max	1765.56	3	1141.572	3	0	1	0	1	0	1	2.201	2
566			min	-774.681	2	-1833.762	2	0	1	0	1	0	1	-1.109	3
567		18	max	-13.105	12	2113.623	2	0	1	0	1	0	1	1.133	2
568			min	-317.724	1	-1052.661	3	0	1	0	1	0	1	-.58	3
569		19	max	-12.747	12	2112.383	2	0	1	0	1	0	1	.018	2
570			min	-317.007	1	-1053.591	3	0	1	0	1	0	1	-.025	3
571	M9	1	max	143.482	1	756.042	3	67.986	1	0	3	-.008	15	0	15
572			min	6.827	15	-413.527	2	3.287	15	0	2	-.162	1	-.014	2
573		2	max	144.198	1	755.112	3	67.986	1	0	3	-.006	15	.204	2
574			min	7.043	15	-414.768	2	3.287	15	0	2	-.126	1	-.399	3
575		3	max	547.902	3	517.95	2	67.776	1	0	2	-.004	15	.412	2
576			min	-317.311	2	-568.91	3	3.272	15	0	3	-.09	1	-.782	3
577		4	max	548.439	3	516.709	2	67.776	1	0	2	-.003	15	.139	2
578			min	-316.595	2	-569.841	3	3.272	15	0	3	-.054	1	-.481	3
579		5	max	548.976	3	515.469	2	67.776	1	0	2	0	15	-.003	15
580			min	-315.878	2	-570.771	3	3.272	15	0	3	-.019	1	-.18	3
581		6	max	549.513	3	514.228	2	67.776	1	0	2	.017	1	.121	3
582			min	-315.162	2	-571.701	3	3.272	15	0	3	0	15	-.405	2
583		7	max	550.051	3	512.988	2	67.776	1	0	2	.053	1	.423	3
584			min	-314.446	2	-572.632	3	3.272	15	0	3	.003	15	-.676	2
585		8	max	550.588	3	511.747	2	67.776	1	0	2	.089	1	.725	3
586			min	-313.73	2	-573.562	3	3.272	15	0	3	.004	15	-.946	2
587		9	max	564.239	3	51.566	2	104.134	1	0	3	-.003	15	.845	3
588			min	-252.028	2	.378	15	5.022	15	0	9	-.054	1	-1.082	2
589		10	max	564.776	3	50.325	2	104.134	1	0	3	0	1	.825	3
590			min	-251.312	2	.004	15	5.022	15	0	9	0	10	-1.109	2
591		11	max	565.313	3	49.085	2	104.134	1	0	3	.056	1	.806	3
592			min	-250.596	2	-1.529	4	5.022	15	0	9	.003	15	-1.135	2
593		12	max	578.766	3	382.566	3	66.46	1	0	3	-.004	15	.705	3
594			min	-188.808	2	-619.529	2	3.196	15	0	2	-.088	1	-1.008	2
595		13	max	579.304	3	381.636	3	66.46	1	0	3	-.003	15	.503	3
596			min	-188.091	2	-620.769	2	3.196	15	0	2	-.053	1	-.68	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	579.841	3	380.706	3	66.46	1	0	3	0	15	.302	3
598			min	-187.375	2	-622.01	2	3.196	15	0	2	-.018	1	-.352	2
599		15	max	580.378	3	379.775	3	66.46	1	0	3	.018	1	.101	3
600			min	-186.659	2	-623.25	2	3.196	15	0	2	0	15	-.039	1
601		16	max	580.915	3	378.845	3	66.46	1	0	3	.053	1	.305	2
602			min	-185.943	2	-624.491	2	3.196	15	0	2	.003	15	-.099	3
603		17	max	581.452	3	377.914	3	66.46	1	0	3	.088	1	.635	2
604			min	-185.227	2	-625.731	2	3.196	15	0	2	.004	15	-.299	3
605		18	max	-7.051	15	624.799	2	73.54	1	0	2	.125	1	.32	2
606			min	-144.536	1	-302.354	3	3.543	15	0	3	.006	15	-.147	3
607		19	max	-6.835	15	623.558	2	73.54	1	0	2	.164	1	.012	3
608			min	-143.82	1	-303.284	3	3.543	15	0	3	.008	15	-.009	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.116	2	.01	3	9.669e-3	2	NC	1	NC	1
2			min	0	15	-.026	3	-.006	2	-2.469e-3	3	NC	1	NC	1
3		2	max	0	1	.16	3	.017	1	1.077e-2	2	NC	4	NC	1
4			min	0	15	0	15	-.002	10	-2.414e-3	3	1033.86	3	NC	1
5		3	max	0	1	.311	3	.042	1	1.187e-2	2	NC	5	NC	2
6			min	0	15	-.039	1	0	10	-2.358e-3	3	570.49	3	4585.156	1
7		4	max	0	1	.403	3	.062	1	1.296e-2	2	NC	5	NC	3
8			min	0	15	-.069	1	.002	10	-2.303e-3	3	447.475	3	3087.399	1
9		5	max	0	1	.427	3	.072	1	1.406e-2	2	NC	5	NC	3
10			min	0	15	-.066	1	.002	10	-2.248e-3	3	424.511	3	2668.555	1
11		6	max	0	1	.382	3	.068	1	1.516e-2	2	NC	5	NC	3
12			min	0	15	-.032	1	0	10	-2.193e-3	3	470.985	3	2812.959	1
13		7	max	0	1	.283	3	.052	1	1.626e-2	2	NC	4	NC	2
14			min	0	15	0	15	-.003	10	-2.138e-3	3	621.126	3	3694.557	1
15		8	max	0	1	.157	3	.029	3	1.736e-2	2	NC	1	NC	2
16			min	0	15	.002	15	-.007	10	-2.082e-3	3	1048.869	3	6928.901	1
17		9	max	0	1	.2	2	.029	3	1.846e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.015	2	-2.027e-3	3	2279.981	2	9707.017	3
19		10	max	0	1	.231	2	.029	3	1.955e-2	2	NC	3	NC	1
20			min	0	1	-.009	3	-.021	2	-1.972e-3	3	1660.629	2	9789.099	3
21		11	max	0	15	.2	2	.029	3	1.846e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.015	2	-2.027e-3	3	2279.981	2	9707.017	3
23		12	max	0	15	.157	3	.029	3	1.736e-2	2	NC	1	NC	2
24			min	0	1	.002	15	-.007	10	-2.082e-3	3	1048.869	3	6928.901	1
25		13	max	0	15	.283	3	.052	1	1.626e-2	2	NC	4	NC	2
26			min	0	1	0	15	-.003	10	-2.138e-3	3	621.126	3	3694.557	1
27		14	max	0	15	.382	3	.068	1	1.516e-2	2	NC	5	NC	3
28			min	0	1	-.032	1	0	10	-2.193e-3	3	470.985	3	2812.959	1
29		15	max	0	15	.427	3	.072	1	1.406e-2	2	NC	5	NC	3
30			min	0	1	-.066	1	.002	10	-2.248e-3	3	424.511	3	2668.555	1
31		16	max	0	15	.403	3	.062	1	1.296e-2	2	NC	5	NC	3
32			min	0	1	-.069	1	.002	10	-2.303e-3	3	447.475	3	3087.399	1
33		17	max	0	15	.311	3	.042	1	1.187e-2	2	NC	5	NC	2
34			min	0	1	-.039	1	0	10	-2.358e-3	3	570.49	3	4585.156	1
35		18	max	0	15	.16	3	.017	1	1.077e-2	2	NC	4	NC	1
36			min	0	1	0	15	-.002	10	-2.414e-3	3	1033.86	3	NC	1
37		19	max	0	15	.116	2	.01	3	9.669e-3	2	NC	1	NC	1
38			min	0	1	-.026	3	-.006	2	-2.469e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.258	3	.009	3	5.473e-3	2	NC	1	NC	1
40			min	0	15	-.366	2	-.005	2	-4.458e-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	.468	3	.011	1	6.42e-3	2	NC	5	NC	1
42			min	0	15	-.557	2	-.002	10	-5.311e-3	3	914.022	3	NC	1
43		3	max	0	1	.65	3	.032	1	7.368e-3	2	NC	5	NC	2
44			min	0	15	-.728	2	0	10	-6.163e-3	3	490.094	3	5918.431	1
45		4	max	0	1	.784	3	.052	1	8.316e-3	2	NC	5	NC	2
46			min	0	15	-.861	2	.001	10	-7.016e-3	3	365.379	3	3700.402	1
47		5	max	0	1	.859	3	.062	1	9.264e-3	2	NC	5	NC	3
48			min	0	15	-.948	2	.002	10	-7.868e-3	3	319.399	3	3069.599	1
49		6	max	0	1	.876	3	.061	1	1.021e-2	2	NC	5	NC	3
50			min	0	15	-.989	2	0	10	-8.721e-3	3	307.83	2	3151.064	1
51		7	max	0	1	.844	3	.047	1	1.116e-2	2	NC	5	NC	2
52			min	0	15	-.989	2	-.003	10	-9.573e-3	3	307.824	2	4059.219	1
53		8	max	0	1	.78	3	.026	3	1.211e-2	2	NC	5	NC	2
54			min	0	15	-.961	2	-.006	10	-1.043e-2	3	322.532	2	7476.864	1
55		9	max	0	1	.713	3	.026	3	1.305e-2	2	NC	5	NC	1
56			min	0	15	-.924	2	-.014	2	-1.128e-2	3	344.108	2	NC	1
57		10	max	0	1	.68	3	.026	3	1.4e-2	2	NC	5	NC	1
58			min	0	1	-.904	2	-.019	2	-1.213e-2	3	356.672	2	NC	1
59		11	max	0	15	.713	3	.026	3	1.305e-2	2	NC	5	NC	1
60			min	0	1	-.924	2	-.014	2	-1.128e-2	3	344.108	2	NC	1
61		12	max	0	15	.78	3	.026	3	1.211e-2	2	NC	5	NC	2
62			min	0	1	-.961	2	-.006	10	-1.043e-2	3	322.532	2	7476.864	1
63		13	max	0	15	.844	3	.047	1	1.116e-2	2	NC	5	NC	2
64			min	0	1	-.989	2	-.003	10	-9.573e-3	3	307.824	2	4059.219	1
65		14	max	0	15	.876	3	.061	1	1.021e-2	2	NC	5	NC	3
66			min	0	1	-.989	2	0	10	-8.721e-3	3	307.83	2	3151.064	1
67		15	max	0	15	.859	3	.062	1	9.264e-3	2	NC	5	NC	3
68			min	0	1	-.948	2	.002	10	-7.868e-3	3	319.399	3	3069.599	1
69		16	max	0	15	.784	3	.052	1	8.316e-3	2	NC	5	NC	2
70			min	0	1	-.861	2	.001	10	-7.016e-3	3	365.379	3	3700.402	1
71		17	max	0	15	.65	3	.032	1	7.368e-3	2	NC	5	NC	2
72			min	0	1	-.728	2	0	10	-6.163e-3	3	490.094	3	5918.431	1
73		18	max	0	15	.468	3	.011	1	6.42e-3	2	NC	5	NC	1
74			min	0	1	-.557	2	-.002	10	-5.311e-3	3	914.022	3	NC	1
75		19	max	0	15	.258	3	.009	3	5.473e-3	2	NC	1	NC	1
76			min	0	1	-.366	2	-.005	2	-4.458e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.263	3	.008	3	3.88e-3	3	NC	1	NC	1
78			min	0	1	-.365	2	-.005	2	-5.726e-3	2	NC	1	NC	1
79		2	max	0	15	.409	3	.011	1	4.623e-3	3	NC	5	NC	1
80			min	0	1	-.607	2	-.002	10	-6.724e-3	2	793.933	2	NC	1
81		3	max	0	15	.54	3	.033	1	5.367e-3	3	NC	5	NC	2
82			min	0	1	-.817	2	0	10	-7.722e-3	2	424.374	2	5894.677	1
83		4	max	0	15	.643	3	.052	1	6.111e-3	3	NC	5	NC	2
84			min	0	1	-.975	2	.002	10	-8.72e-3	2	314.713	2	3686.947	1
85		5	max	0	15	.712	3	.063	1	6.854e-3	3	NC	5	NC	3
86			min	0	1	-1.068	2	.002	10	-9.718e-3	2	272.936	2	3057.769	1
87		6	max	0	15	.746	3	.061	1	7.598e-3	3	NC	5	NC	3
88			min	0	1	-1.096	2	0	10	-1.072e-2	2	262.421	2	3136.263	1
89		7	max	0	15	.75	3	.048	1	8.342e-3	3	NC	5	NC	2
90			min	0	1	-1.069	2	-.002	10	-1.171e-2	2	272.687	2	4031.525	1
91		8	max	0	15	.731	3	.026	1	9.085e-3	3	NC	5	NC	2
92			min	0	1	-1.005	2	-.006	10	-1.271e-2	2	299.68	2	7375.481	1
93		9	max	0	15	.706	3	.024	3	9.829e-3	3	NC	5	NC	1
94			min	0	1	-.936	2	-.013	2	-1.371e-2	2	335.877	2	NC	1
95		10	max	0	1	.692	3	.024	3	1.057e-2	3	NC	5	NC	1
96			min	0	1	-.902	2	-.018	2	-1.471e-2	2	357.14	2	NC	1
97		11	max	0	1	.706	3	.024	3	9.829e-3	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	-.936	2	-.013	2	-1.371e-2	2	335.877	2	NC	1
99		12	max	0	1	.731	3	.026	1	9.085e-3	3	NC	5	NC	2
100			min	0	15	-1.005	2	-.006	10	-1.271e-2	2	299.68	2	7375.481	1
101		13	max	0	1	.75	3	.048	1	8.342e-3	3	NC	5	NC	2
102			min	0	15	-1.069	2	-.002	10	-1.171e-2	2	272.687	2	4031.525	1
103		14	max	0	1	.746	3	.061	1	7.598e-3	3	NC	5	NC	3
104			min	0	15	-1.096	2	0	10	-1.072e-2	2	262.421	2	3136.263	1
105		15	max	0	1	.712	3	.063	1	6.854e-3	3	NC	5	NC	3
106			min	0	15	-1.068	2	.002	10	-9.718e-3	2	272.936	2	3057.769	1
107		16	max	0	1	.643	3	.052	1	6.111e-3	3	NC	5	NC	2
108			min	0	15	-.975	2	.002	10	-8.72e-3	2	314.713	2	3686.947	1
109		17	max	0	1	.54	3	.033	1	5.367e-3	3	NC	5	NC	2
110			min	0	15	-.817	2	0	10	-7.722e-3	2	424.374	2	5894.677	1
111		18	max	0	1	.409	3	.011	1	4.623e-3	3	NC	5	NC	1
112			min	0	15	-.607	2	-.002	10	-6.724e-3	2	793.933	2	NC	1
113		19	max	0	1	.263	3	.008	3	3.88e-3	3	NC	1	NC	1
114			min	0	15	-.365	2	-.005	2	-5.726e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.103	2	.007	3	7.074e-3	3	NC	1	NC	1
116			min	0	1	-.088	3	-.004	2	-8.016e-3	2	NC	1	NC	1
117		2	max	0	15	.004	14	.017	1	8.038e-3	3	NC	4	NC	1
118			min	0	1	-.035	2	-.001	10	-8.736e-3	2	1391.886	2	NC	1
119		3	max	0	15	.013	3	.042	1	9.003e-3	3	NC	5	NC	2
120			min	0	1	-.145	2	.001	10	-9.456e-3	2	776.633	2	4583.572	1
121		4	max	0	15	.033	3	.062	1	9.968e-3	3	NC	5	NC	3
122			min	0	1	-.206	2	.003	15	-1.018e-2	2	621.966	2	3076.798	1
123		5	max	0	15	.026	3	.072	1	1.093e-2	3	NC	5	NC	3
124			min	0	1	-.211	2	.004	10	-1.09e-2	2	612.191	2	2650.487	1
125		6	max	0	15	0	15	.069	1	1.19e-2	3	NC	5	NC	3
126			min	0	1	-.161	2	.002	10	-1.162e-2	2	728.224	2	2780.209	1
127		7	max	0	15	.005	9	.053	1	1.286e-2	3	NC	4	NC	2
128			min	0	1	-.068	2	0	10	-1.234e-2	2	1124.006	2	3616.886	1
129		8	max	0	15	.058	1	.029	1	1.383e-2	3	NC	4	NC	2
130			min	0	1	-.121	3	-.005	10	-1.306e-2	2	3336.522	2	6598.541	1
131		9	max	0	15	.146	2	.021	3	1.479e-2	3	NC	4	NC	1
132			min	0	1	-.174	3	-.011	2	-1.378e-2	2	2212.255	3	NC	1
133		10	max	0	1	.191	2	.021	3	1.576e-2	3	NC	4	NC	1
134			min	0	1	-.198	3	-.016	2	-1.45e-2	2	1739.443	3	NC	1
135		11	max	0	1	.146	2	.021	3	1.479e-2	3	NC	4	NC	1
136			min	0	15	-.174	3	-.011	2	-1.378e-2	2	2212.255	3	NC	1
137		12	max	0	1	.058	1	.029	1	1.383e-2	3	NC	4	NC	2
138			min	0	15	-.121	3	-.005	10	-1.306e-2	2	3336.522	2	6598.541	1
139		13	max	0	1	.005	9	.053	1	1.286e-2	3	NC	4	NC	2
140			min	0	15	-.068	2	0	10	-1.234e-2	2	1124.006	2	3616.886	1
141		14	max	0	1	0	15	.069	1	1.19e-2	3	NC	5	NC	3
142			min	0	15	-.161	2	.002	10	-1.162e-2	2	728.224	2	2780.209	1
143		15	max	0	1	.026	3	.072	1	1.093e-2	3	NC	5	NC	3
144			min	0	15	-.211	2	.004	10	-1.09e-2	2	612.191	2	2650.487	1
145		16	max	0	1	.033	3	.062	1	9.968e-3	3	NC	5	NC	3
146			min	0	15	-.206	2	.003	15	-1.018e-2	2	621.966	2	3076.798	1
147		17	max	0	1	.013	3	.042	1	9.003e-3	3	NC	5	NC	2
148			min	0	15	-.145	2	.001	10	-9.456e-3	2	776.633	2	4583.572	1
149		18	max	0	1	.004	14	.017	1	8.038e-3	3	NC	4	NC	1
150			min	0	15	-.035	2	-.001	10	-8.736e-3	2	1391.886	2	NC	1
151		19	max	0	1	.103	2	.007	3	7.074e-3	3	NC	1	NC	1
152			min	0	15	-.088	3	-.004	2	-8.016e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.009	2	.005	1	-6.899e-6	15	NC	1	NC	1
154			min	-.01	3	-.014	3	0	15	-1.426e-4	1	7858.549	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	.008	2	.005	1	-6.512e-6	15	NC	1	NC	1
156			min	-.009	3	-.014	3	0	15	-1.346e-4	1	9044.171	2	NC	1
157		3	max	.006	2	.007	2	.004	1	-6.125e-6	15	NC	1	NC	1
158			min	-.008	3	-.013	3	0	15	-1.266e-4	1	NC	1	NC	1
159		4	max	.006	2	.005	2	.004	1	-5.737e-6	15	NC	1	NC	1
160			min	-.008	3	-.013	3	0	15	-1.186e-4	1	NC	1	NC	1
161		5	max	.005	2	.004	2	.004	1	-5.35e-6	15	NC	1	NC	1
162			min	-.007	3	-.012	3	0	15	-1.105e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.003	1	-4.963e-6	15	NC	1	NC	1
164			min	-.007	3	-.011	3	0	15	-1.025e-4	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.003	1	-4.575e-6	15	NC	1	NC	1
166			min	-.006	3	-.011	3	0	15	-9.451e-5	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.002	1	-4.188e-6	15	NC	1	NC	1
168			min	-.006	3	-.01	3	0	15	-8.649e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.002	1	-3.8e-6	15	NC	1	NC	1
170			min	-.005	3	-.01	3	0	15	-7.847e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.002	1	-3.413e-6	15	NC	1	NC	1
172			min	-.005	3	-.009	3	0	15	-7.046e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.001	1	-3.026e-6	15	NC	1	NC	1
174			min	-.004	3	-.008	3	0	15	-6.244e-5	1	NC	1	NC	1
175		12	max	.003	2	0	2	.001	1	-2.638e-6	15	NC	1	NC	1
176			min	-.004	3	-.007	3	0	15	-5.442e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-2.251e-6	15	NC	1	NC	1
178			min	-.003	3	-.006	3	0	15	-4.64e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-1.864e-6	15	NC	1	NC	1
180			min	-.003	3	-.005	3	0	15	-3.838e-5	1	NC	1	NC	1
181		15	max	.002	2	0	15	0	1	-1.476e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-3.036e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-1.089e-6	15	NC	1	NC	1
184			min	-.002	3	-.003	3	0	15	-2.234e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-7.016e-7	15	NC	1	NC	1
186			min	-.001	3	-.002	3	0	15	-1.433e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-3.142e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-6.308e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.71e-6	1	NC	1	NC	1
190			min	0	1	0	1	0	1	-3.461e-7	3	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	0	3	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.191e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.316e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	3	6.336e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.752e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	3	1.322e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	4.187e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	12	2.011e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	5.623e-5	1	NC	1	NC	1
200			min	-.001	2	-.008	4	0	12	2.699e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	7.058e-5	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	12	3.388e-6	15	9638.578	4	NC	1
203		7	max	.003	3	-.003	15	0	1	8.494e-5	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	4.076e-6	15	8301.533	4	NC	1
205		8	max	.003	3	-.003	15	0	1	9.929e-5	1	NC	1	NC	1
206			min	-.003	2	-.012	4	0	15	4.765e-6	15	7477.48	4	NC	1
207		9	max	.003	3	-.003	15	0	1	1.136e-4	1	NC	2	NC	1
208			min	-.003	2	-.013	4	0	15	5.453e-6	15	6993.215	4	NC	1
209		10	max	.004	3	-.003	15	0	1	1.28e-4	1	NC	5	NC	1
210			min	-.003	2	-.014	4	0	15	6.142e-6	15	6764.974	4	NC	1
211		11	max	.004	3	-.003	15	.001	1	1.424e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.004	2	-.014	4	0	15	6.83e-6	15	6759.314	4	NC	1
213		12	max	.005	3	-.003	15	.001	1	1.567e-4	1	NC	2	NC	1
214			min	-.004	2	-.013	4	0	15	7.519e-6	15	6980.301	4	NC	1
215		13	max	.005	3	-.003	15	.002	1	1.711e-4	1	NC	1	NC	1
216			min	-.004	2	-.013	4	0	15	8.207e-6	15	7472.726	4	NC	1
217		14	max	.006	3	-.003	15	.002	1	1.854e-4	1	NC	1	NC	1
218			min	-.005	2	-.011	4	0	15	8.896e-6	15	8345.045	4	NC	1
219		15	max	.006	3	-.002	15	.003	1	1.998e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	9.584e-6	15	9836.591	4	NC	1
221		16	max	.006	3	-.002	15	.003	1	2.141e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	1.027e-5	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.004	1	2.285e-4	1	NC	1	NC	1
224			min	-.006	2	-.006	4	0	15	1.096e-5	15	NC	1	NC	1
225		18	max	.007	3	0	15	.004	1	2.428e-4	1	NC	1	NC	1
226			min	-.006	2	-.004	3	0	15	1.165e-5	15	NC	1	NC	1
227		19	max	.008	3	0	10	.005	1	2.572e-4	1	NC	1	NC	1
228			min	-.007	2	-.002	3	0	15	1.234e-5	15	NC	1	NC	1
229	M4	1	max	.002	1	.006	2	0	15	6.897e-5	1	NC	1	NC	2
230			min	0	3	-.008	3	-.005	1	3.326e-6	15	NC	1	4883.933	1
231		2	max	.002	1	.006	2	0	15	6.897e-5	1	NC	1	NC	2
232			min	0	3	-.008	3	-.005	1	3.326e-6	15	NC	1	5301.569	1
233		3	max	.002	1	.006	2	0	15	6.897e-5	1	NC	1	NC	2
234			min	0	3	-.007	3	-.004	1	3.326e-6	15	NC	1	5799.198	1
235		4	max	.002	1	.005	2	0	15	6.897e-5	1	NC	1	NC	2
236			min	0	3	-.007	3	-.004	1	3.326e-6	15	NC	1	6397.501	1
237		5	max	.002	1	.005	2	0	15	6.897e-5	1	NC	1	NC	2
238			min	0	3	-.006	3	-.003	1	3.326e-6	15	NC	1	7124.584	1
239		6	max	.002	1	.005	2	0	15	6.897e-5	1	NC	1	NC	2
240			min	0	3	-.006	3	-.003	1	3.326e-6	15	NC	1	8019.43	1
241		7	max	.001	1	.004	2	0	15	6.897e-5	1	NC	1	NC	2
242			min	0	3	-.005	3	-.003	1	3.326e-6	15	NC	1	9137.372	1
243		8	max	.001	1	.004	2	0	15	6.897e-5	1	NC	1	NC	1
244			min	0	3	-.005	3	-.002	1	3.326e-6	15	NC	1	NC	1
245		9	max	.001	1	.004	2	0	15	6.897e-5	1	NC	1	NC	1
246			min	0	3	-.004	3	-.002	1	3.326e-6	15	NC	1	NC	1
247		10	max	.001	1	.003	2	0	15	6.897e-5	1	NC	1	NC	1
248			min	0	3	-.004	3	-.002	1	3.326e-6	15	NC	1	NC	1
249		11	max	0	1	.003	2	0	15	6.897e-5	1	NC	1	NC	1
250			min	0	3	-.004	3	-.001	1	3.326e-6	15	NC	1	NC	1
251		12	max	0	1	.002	2	0	15	6.897e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	3.326e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	6.897e-5	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	3.326e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	6.897e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	3.326e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	6.897e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	3.326e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	6.897e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	3.326e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	6.897e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	3.326e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	6.897e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	3.326e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.897e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	3.326e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.031	2	0	1	0	1	NC	4	NC	1
268			min	-.031	3	-.044	3	0	1	0	1	1597.068	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	.02	2	.028	2	0	1	0	1	NC	4	NC	1
270			min	-.029	3	-.041	3	0	1	0	1	1692.989	3	NC	1
271		3	max	.019	2	.026	2	0	1	0	1	NC	4	NC	1
272			min	-.027	3	-.039	3	0	1	0	1	1801.205	3	NC	1
273		4	max	.018	2	.023	2	0	1	0	1	NC	4	NC	1
274			min	-.026	3	-.036	3	0	1	0	1	1924.264	3	NC	1
275		5	max	.017	2	.02	2	0	1	0	1	NC	4	NC	1
276			min	-.024	3	-.034	3	0	1	0	1	2065.445	3	NC	1
277		6	max	.015	2	.018	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.031	3	0	1	0	1	2229.035	3	NC	1
279		7	max	.014	2	.016	2	0	1	0	1	NC	1	NC	1
280			min	-.02	3	-.029	3	0	1	0	1	2420.755	3	NC	1
281		8	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.019	3	-.026	3	0	1	0	1	2648.41	3	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.024	3	0	1	0	1	2922.934	3	NC	1
285		10	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.021	3	0	1	0	1	3260.126	3	NC	1
287		11	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.019	3	0	1	0	1	3683.698	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.017	3	0	1	0	1	4230.925	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.014	3	0	1	0	1	4963.953	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.012	3	0	1	0	1	5994.674	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.009	3	0	1	0	1	7546.919	3	NC	1
297		16	max	.004	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.007	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	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	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	8721.926	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.014	3	0	1	0	1	7793.839	3	NC	1
319		8	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7245.233	3	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.01	2	-.016	3	0	1	0	1	6962.739	3	NC	1
323		10	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6849.844	4	NC	1
325		11	max	.013	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	-.013	2	-.016	3	0	1	0	1	6839.847	4	NC	1
327		12	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.014	2	-.016	3	0	1	0	1	7059.745	4	NC	1
329		13	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.015	2	-.015	3	0	1	0	1	7554.419	4	NC	1
331		14	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.017	2	-.014	3	0	1	0	1	8433.155	4	NC	1
333		15	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.018	2	-.013	3	0	1	0	1	9937.445	4	NC	1
335		16	max	.02	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.019	2	-.012	3	0	1	0	1	NC	1	NC	1
337		17	max	.021	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.02	2	-.01	3	0	1	0	1	NC	1	NC	1
339		18	max	.022	3	0	10	0	1	0	1	NC	1	NC	1
340			min	-.022	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.024	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.023	2	-.006	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	2	.022	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.024	3	0	1	0	1	NC	1	NC	1
345		2	max	.005	2	.021	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.023	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	2	.02	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.022	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	2	.018	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	2	.017	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	2	.016	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	2	.015	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	2	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	2	.012	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	2	.011	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	2	.01	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	2	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	0	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.009	2	0	15	1.426e-4	1	NC	1	NC	1
382			min	-.01	3	-.014	3	-.005	1	6.899e-6	15	7858.549	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	.008	2	0	15	1.346e-4	1	NC	1	NC	1
384			min	-.009	3	-.014	3	-.005	1	6.512e-6	15	9044.171	2	NC	1
385		3	max	.006	2	.007	2	0	15	1.266e-4	1	NC	1	NC	1
386			min	-.008	3	-.013	3	-.004	1	6.125e-6	15	NC	1	NC	1
387		4	max	.006	2	.005	2	0	15	1.186e-4	1	NC	1	NC	1
388			min	-.008	3	-.013	3	-.004	1	5.737e-6	15	NC	1	NC	1
389		5	max	.005	2	.004	2	0	15	1.105e-4	1	NC	1	NC	1
390			min	-.007	3	-.012	3	-.004	1	5.35e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.025e-4	1	NC	1	NC	1
392			min	-.007	3	-.011	3	-.003	1	4.963e-6	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	9.451e-5	1	NC	1	NC	1
394			min	-.006	3	-.011	3	-.003	1	4.575e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	8.649e-5	1	NC	1	NC	1
396			min	-.006	3	-.01	3	-.002	1	4.188e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	7.847e-5	1	NC	1	NC	1
398			min	-.005	3	-.01	3	-.002	1	3.8e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	7.046e-5	1	NC	1	NC	1
400			min	-.005	3	-.009	3	-.002	1	3.413e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	6.244e-5	1	NC	1	NC	1
402			min	-.004	3	-.008	3	-.001	1	3.026e-6	15	NC	1	NC	1
403		12	max	.003	2	0	2	0	15	5.442e-5	1	NC	1	NC	1
404			min	-.004	3	-.007	3	-.001	1	2.638e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	4.64e-5	1	NC	1	NC	1
406			min	-.003	3	-.006	3	0	1	2.251e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	3.838e-5	1	NC	1	NC	1
408			min	-.003	3	-.005	3	0	1	1.864e-6	15	NC	1	NC	1
409		15	max	.002	2	0	15	0	15	3.036e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	1.476e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	2.234e-5	1	NC	1	NC	1
412			min	-.002	3	-.003	3	0	1	1.089e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.433e-5	1	NC	1	NC	1
414			min	-.001	3	-.002	3	0	1	7.016e-7	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	6.308e-6	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	3.142e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.461e-7	3	NC	1	NC	1
418			min	0	1	0	1	0	1	-1.71e-6	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.191e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	0	3	NC	1	NC	1
421		2	max	0	3	0	15	0	3	-6.336e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.316e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	3	-1.322e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-2.752e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	12	-2.011e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	1	-4.187e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	12	-2.699e-6	15	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-5.623e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	12	-3.388e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-7.058e-5	1	9638.578	4	NC	1
431		7	max	.003	3	-.003	15	0	15	-4.076e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-8.494e-5	1	8301.533	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-4.765e-6	15	NC	1	NC	1
434			min	-.003	2	-.012	4	0	1	-9.929e-5	1	7477.48	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-5.453e-6	15	NC	2	NC	1
436			min	-.003	2	-.013	4	0	1	-1.136e-4	1	6993.215	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-6.142e-6	15	NC	5	NC	1
438			min	-.003	2	-.014	4	0	1	-1.28e-4	1	6764.974	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-6.83e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.004	2	-.014	4	-.001	1	-1.424e-4	1	6759.314	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-7.519e-6	15	NC	2	NC	1
442			min	-.004	2	-.013	4	-.001	1	-1.567e-4	1	6980.301	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-8.207e-6	15	NC	1	NC	1
444			min	-.004	2	-.013	4	-.002	1	-1.711e-4	1	7472.726	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-8.896e-6	15	NC	1	NC	1
446			min	-.005	2	-.011	4	-.002	1	-1.854e-4	1	8345.045	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-9.584e-6	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.003	1	-1.998e-4	1	9836.591	4	NC	1
449		16	max	.006	3	-.002	15	0	15	-1.027e-5	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.003	1	-2.141e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-1.096e-5	15	NC	1	NC	1
452			min	-.006	2	-.006	4	-.004	1	-2.285e-4	1	NC	1	NC	1
453		18	max	.007	3	0	15	0	15	-1.165e-5	15	NC	1	NC	1
454			min	-.006	2	-.004	3	-.004	1	-2.428e-4	1	NC	1	NC	1
455		19	max	.008	3	0	10	0	15	-1.234e-5	15	NC	1	NC	1
456			min	-.007	2	-.002	3	-.005	1	-2.572e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.006	2	.005	1	-3.326e-6	15	NC	1	NC	2
458			min	0	3	-.008	3	0	15	-6.897e-5	1	NC	1	4883.933	1
459		2	max	.002	1	.006	2	.005	1	-3.326e-6	15	NC	1	NC	2
460			min	0	3	-.008	3	0	15	-6.897e-5	1	NC	1	5301.569	1
461		3	max	.002	1	.006	2	.004	1	-3.326e-6	15	NC	1	NC	2
462			min	0	3	-.007	3	0	15	-6.897e-5	1	NC	1	5799.198	1
463		4	max	.002	1	.005	2	.004	1	-3.326e-6	15	NC	1	NC	2
464			min	0	3	-.007	3	0	15	-6.897e-5	1	NC	1	6397.501	1
465		5	max	.002	1	.005	2	.003	1	-3.326e-6	15	NC	1	NC	2
466			min	0	3	-.006	3	0	15	-6.897e-5	1	NC	1	7124.584	1
467		6	max	.002	1	.005	2	.003	1	-3.326e-6	15	NC	1	NC	2
468			min	0	3	-.006	3	0	15	-6.897e-5	1	NC	1	8019.43	1
469		7	max	.001	1	.004	2	.003	1	-3.326e-6	15	NC	1	NC	2
470			min	0	3	-.005	3	0	15	-6.897e-5	1	NC	1	9137.372	1
471		8	max	.001	1	.004	2	.002	1	-3.326e-6	15	NC	1	NC	1
472			min	0	3	-.005	3	0	15	-6.897e-5	1	NC	1	NC	1
473		9	max	.001	1	.004	2	.002	1	-3.326e-6	15	NC	1	NC	1
474			min	0	3	-.004	3	0	15	-6.897e-5	1	NC	1	NC	1
475		10	max	.001	1	.003	2	.002	1	-3.326e-6	15	NC	1	NC	1
476			min	0	3	-.004	3	0	15	-6.897e-5	1	NC	1	NC	1
477		11	max	0	1	.003	2	.001	1	-3.326e-6	15	NC	1	NC	1
478			min	0	3	-.004	3	0	15	-6.897e-5	1	NC	1	NC	1
479		12	max	0	1	.002	2	.001	1	-3.326e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-6.897e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-3.326e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-6.897e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-3.326e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-6.897e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-3.326e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-6.897e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-3.326e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-6.897e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-3.326e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-6.897e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-3.326e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-6.897e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.326e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-6.897e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.116	2	0	1	8.172e-3	2	NC	1	NC	1
496			min	-.006	2	-.026	3	0	15	-1.807e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.01	3	.054	2	0	15	4.009e-3	2	NC	4	NC	1
498			min	-.006	2	-.009	3	-.004	1	-8.943e-3	3	1877.471	2	NC	1
499		3	max	.009	3	.015	3	0	15	2.614e-5	10	NC	5	NC	1
500			min	-.006	2	-.011	2	-.005	1	-1.07e-4	3	908.018	2	NC	1
501		4	max	.009	3	.054	3	0	15	3.417e-3	2	NC	5	NC	1
502			min	-.006	2	-.084	2	-.005	1	-3.832e-3	3	576.09	2	NC	1
503		5	max	.009	3	.102	3	0	15	6.818e-3	2	NC	5	NC	1
504			min	-.005	2	-.16	2	-.003	1	-7.558e-3	3	417.563	2	NC	1
505		6	max	.009	3	.154	3	0	15	1.022e-2	2	NC	15	NC	1
506			min	-.005	2	-.233	2	-.001	1	-1.128e-2	3	329.969	2	NC	1
507		7	max	.009	3	.204	3	0	1	1.362e-2	2	NC	15	NC	1
508			min	-.005	2	-.298	2	0	3	-1.501e-2	3	278.13	2	NC	1
509		8	max	.009	3	.245	3	0	1	1.702e-2	2	NC	15	NC	1
510			min	-.005	2	-.35	2	0	15	-1.873e-2	3	247.409	2	NC	1
511		9	max	.008	3	.272	3	0	15	1.929e-2	2	NC	15	NC	1
512			min	-.005	2	-.383	2	0	1	-1.906e-2	3	231.392	2	NC	1
513		10	max	.008	3	.282	3	0	1	2.081e-2	2	9952.129	15	NC	1
514			min	-.005	2	-.394	2	0	15	-1.713e-2	3	226.709	2	NC	1
515		11	max	.008	3	.275	3	0	1	2.233e-2	2	NC	15	NC	1
516			min	-.005	2	-.382	2	0	15	-1.52e-2	3	232.242	2	NC	1
517		12	max	.008	3	.252	3	0	15	2.155e-2	2	NC	15	NC	1
518			min	-.005	2	-.348	2	0	1	-1.301e-2	3	249.968	2	NC	1
519		13	max	.008	3	.214	3	0	15	1.728e-2	2	NC	15	NC	1
520			min	-.005	2	-.294	2	0	1	-1.041e-2	3	284.303	2	NC	1
521		14	max	.007	3	.167	3	.001	1	1.301e-2	2	NC	15	NC	1
522			min	-.005	2	-.226	2	0	15	-7.815e-3	3	343.052	2	NC	1
523		15	max	.007	3	.114	3	.003	1	8.744e-3	2	NC	5	NC	1
524			min	-.005	2	-.151	2	0	15	-5.219e-3	3	444.271	2	NC	1
525		16	max	.007	3	.059	3	.005	1	4.477e-3	2	NC	5	NC	1
526			min	-.005	2	-.076	2	0	15	-2.623e-3	3	631.891	2	NC	1
527		17	max	.007	3	.005	3	.005	1	3.571e-4	1	NC	5	NC	1
528			min	-.005	2	-.006	2	0	15	-2.757e-5	3	1033.304	2	NC	1
529		18	max	.007	3	.051	2	.004	1	6.718e-3	2	NC	4	NC	1
530			min	-.004	2	-.043	3	0	15	-2.765e-3	3	2194.442	2	NC	1
531		19	max	.007	3	.103	2	0	15	1.348e-2	2	NC	1	NC	1
532			min	-.004	2	-.088	3	0	1	-5.627e-3	3	NC	1	NC	1
533	M5	1	max	.029	3	.231	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	-.009	3	0	1	0	1	NC	1	NC	1
535		2	max	.029	3	.106	2	0	1	0	1	NC	5	NC	1
536			min	-.021	2	.002	15	0	1	0	1	925.926	2	NC	1
537		3	max	.029	3	.046	3	0	1	0	1	NC	5	NC	1
538			min	-.021	2	-.035	2	0	1	0	1	435.339	2	NC	1
539		4	max	.029	3	.136	3	0	1	0	1	NC	15	NC	1
540			min	-.02	2	-.203	2	0	1	0	1	266.229	2	NC	1
541		5	max	.028	3	.259	3	0	1	0	1	9395.853	15	NC	1
542			min	-.02	2	-.386	2	0	1	0	1	187.257	2	NC	1
543		6	max	.027	3	.398	3	0	1	0	1	7220.621	15	NC	1
544			min	-.02	2	-.568	2	0	1	0	1	144.671	2	NC	1
545		7	max	.027	3	.532	3	0	1	0	1	5967.094	15	NC	1
546			min	-.019	2	-.732	2	0	1	0	1	119.971	2	NC	1
547		8	max	.026	3	.645	3	0	1	0	1	5239.394	15	NC	1
548			min	-.019	2	-.864	2	0	1	0	1	105.566	2	NC	1
549		9	max	.026	3	.718	3	0	1	0	1	4866.661	15	NC	1
550			min	-.019	2	-.948	2	0	1	0	1	98.162	2	NC	1
551		10	max	.025	3	.744	3	0	1	0	1	4754.46	15	NC	1
552			min	-.018	2	-.976	2	0	1	0	1	96.004	2	NC	1
553		11	max	.024	3	.724	3	0	1	0	1	4866.949	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.018	2	-.948	2	0	1	0	1	98.551	2	NC	1
555		12	max	.024	3	.661	3	0	1	0	1	5240.057	15	NC	1
556			min	-.018	2	-.86	2	0	1	0	1	106.848	2	NC	1
557		13	max	.023	3	.56	3	0	1	0	1	5968.399	15	NC	1
558			min	-.017	2	-.72	2	0	1	0	1	123.321	2	NC	1
559		14	max	.023	3	.433	3	0	1	0	1	7223.099	15	NC	1
560			min	-.017	2	-.546	2	0	1	0	1	152.273	2	NC	1
561		15	max	.022	3	.292	3	0	1	0	1	9400.653	15	NC	1
562			min	-.017	2	-.359	2	0	1	0	1	203.957	2	NC	1
563		16	max	.022	3	.149	3	0	1	0	1	NC	15	NC	1
564			min	-.017	2	-.177	2	0	1	0	1	304.352	2	NC	1
565		17	max	.021	3	.016	3	0	1	0	1	NC	5	NC	1
566			min	-.016	2	-.019	2	0	1	0	1	530.559	2	NC	1
567		18	max	.021	3	.097	2	0	1	0	1	NC	5	NC	1
568			min	-.016	2	-.097	3	0	1	0	1	1186.704	2	NC	1
569		19	max	.021	3	.191	2	0	1	0	1	NC	1	NC	1
570			min	-.016	2	-.198	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.116	2	0	15	1.807e-2	3	NC	1	NC	1
572			min	-.006	2	-.026	3	0	1	-8.172e-3	2	NC	1	NC	1
573		2	max	.01	3	.054	2	.004	1	8.943e-3	3	NC	4	NC	1
574			min	-.006	2	-.009	3	0	15	-4.009e-3	2	1877.471	2	NC	1
575		3	max	.009	3	.015	3	.005	1	1.07e-4	3	NC	5	NC	1
576			min	-.006	2	-.011	2	0	15	-2.614e-5	10	908.018	2	NC	1
577		4	max	.009	3	.054	3	.005	1	3.832e-3	3	NC	5	NC	1
578			min	-.006	2	-.084	2	0	15	-3.417e-3	2	576.09	2	NC	1
579		5	max	.009	3	.102	3	.003	1	7.558e-3	3	NC	5	NC	1
580			min	-.005	2	-.16	2	0	15	-6.818e-3	2	417.563	2	NC	1
581		6	max	.009	3	.154	3	.001	1	1.128e-2	3	NC	15	NC	1
582			min	-.005	2	-.233	2	0	15	-1.022e-2	2	329.969	2	NC	1
583		7	max	.009	3	.204	3	0	3	1.501e-2	3	NC	15	NC	1
584			min	-.005	2	-.298	2	0	1	-1.362e-2	2	278.13	2	NC	1
585		8	max	.009	3	.245	3	0	15	1.873e-2	3	NC	15	NC	1
586			min	-.005	2	-.35	2	0	1	-1.702e-2	2	247.409	2	NC	1
587		9	max	.008	3	.272	3	0	1	1.906e-2	3	NC	15	NC	1
588			min	-.005	2	-.383	2	0	15	-1.929e-2	2	231.392	2	NC	1
589		10	max	.008	3	.282	3	0	15	1.713e-2	3	9952.129	15	NC	1
590			min	-.005	2	-.394	2	0	1	-2.081e-2	2	226.709	2	NC	1
591		11	max	.008	3	.275	3	0	15	1.52e-2	3	NC	15	NC	1
592			min	-.005	2	-.382	2	0	1	-2.233e-2	2	232.242	2	NC	1
593		12	max	.008	3	.252	3	0	1	1.301e-2	3	NC	15	NC	1
594			min	-.005	2	-.348	2	0	15	-2.155e-2	2	249.968	2	NC	1
595		13	max	.008	3	.214	3	0	1	1.041e-2	3	NC	15	NC	1
596			min	-.005	2	-.294	2	0	15	-1.728e-2	2	284.303	2	NC	1
597		14	max	.007	3	.167	3	0	15	7.815e-3	3	NC	15	NC	1
598			min	-.005	2	-.226	2	-.001	1	-1.301e-2	2	343.052	2	NC	1
599		15	max	.007	3	.114	3	0	15	5.219e-3	3	NC	5	NC	1
600			min	-.005	2	-.151	2	-.003	1	-8.744e-3	2	444.271	2	NC	1
601		16	max	.007	3	.059	3	0	15	2.623e-3	3	NC	5	NC	1
602			min	-.005	2	-.076	2	-.005	1	-4.477e-3	2	631.891	2	NC	1
603		17	max	.007	3	.005	3	0	15	2.757e-5	3	NC	5	NC	1
604			min	-.005	2	-.006	2	-.005	1	-3.571e-4	1	1033.304	2	NC	1
605		18	max	.007	3	.051	2	0	15	2.765e-3	3	NC	4	NC	1
606			min	-.004	2	-.043	3	-.004	1	-6.718e-3	2	2194.442	2	NC	1
607		19	max	.007	3	.103	2	0	1	5.627e-3	3	NC	1	NC	1
608			min	-.004	2	-.088	3	0	15	-1.348e-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

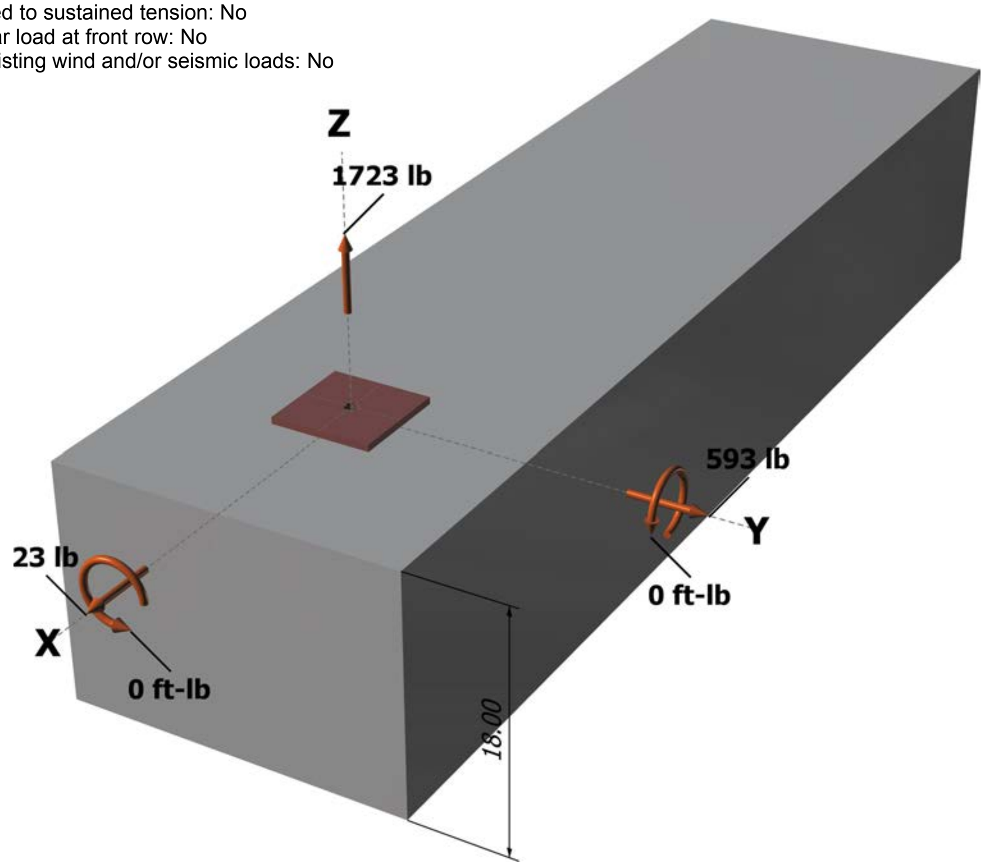
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

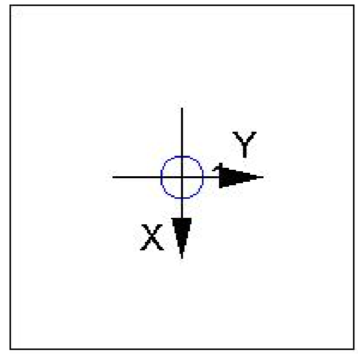
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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)

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

$\tau_{k,cr}$ (psi)	$f_{short-term}$	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.

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 34-35 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

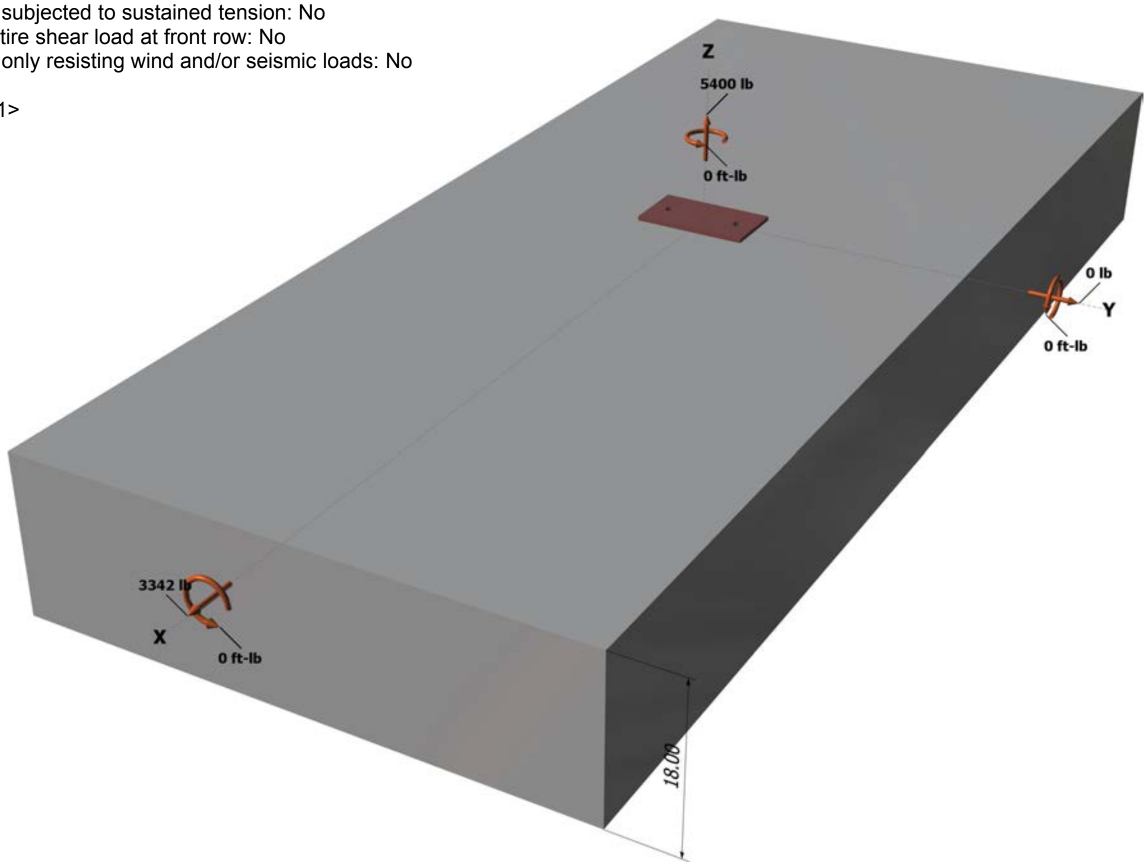
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

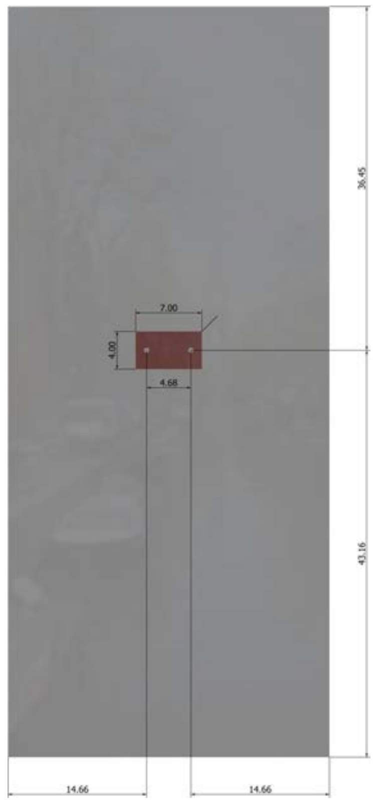
<Figure 1>



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, 34-35 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>



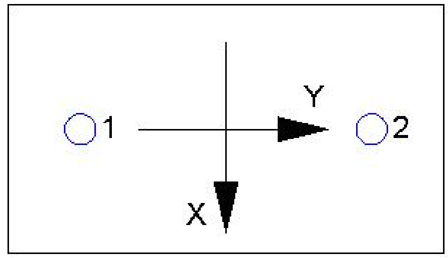
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2700.0	1671.0	0.0	1671.0
2	2700.0	1671.0	0.0	1671.0
Sum	5400.0	3342.0	0.0	3342.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5400
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
612.00	648.00	1.000	0.944	1.000	1.000	15593	0.70	9735

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	14.66	21056

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
791.64	967.12	1.000	1.000	1.000	21056	0.70	24129

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2700	6071	0.44	Pass
Concrete breakout	5400	10231	0.53	Pass
Adhesive	**5400**	**8093**	**0.67**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1671**	**3156**	**0.53**	**Pass (Governs)**
T Concrete breakout x+	3342	9735	0.34	Pass
|| Concrete breakout y-	1671	24129	0.07	Pass
Pryout	3342	20601	0.16	Pass

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

Sec. D.7.3	0.67	0.53	119.7 %	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.